R&S®VTE
Video Tester
User Manual

2116126302

User Manual

Version 14

ROHDE&SCHWARZ

This manual describes the R&S®VTE (2115.7300.02) with firmware version FW 02.20 and later.
In addition to the base unit, all available options are described. For details on options, see the data sheet.

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2116.1263.02 | Version 14 | R&S®VTE

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®VTE is indicated as R&S VTE.

Contents

1 Preface

Provides an overview of the user documentation and the conventions used in the documentation.

1.1 Documentation Overview

This chapter provides an overview of the R&S VTE user documentation. Unless specified otherwise, you find the documents on the R&S VTE product page at:

www.rohde-schwarz.com/manual/vte

1.1.1 Getting Started Manual

Introduces the R&S VTE and describes how to set up and start working with the product. Includes a sample application and general information, e.g. safety instructions, etc. A printed version is delivered with the instrument.

1.1.2 User Manuals and Help

Contains the description of all instrument modes and functions. Also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.

The contents of the user manual is available as help on the R&S VTE. The help offers quick, context-sensitive access to the complete information for the base unit and the software options.

For detailed information on how to use the help, refer to the Chapter 3.7, "Getting Help", on page 34.

1.1.3 Tutorials

Tutorials offer guided examples and demonstrations on operating the R&S VTE. They are provided on the product page of the internet.

1.1.4 Printed Safety Instructions

Provides safety information in many languages. The printed document is delivered with the product.

1.1.5 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S VTE. It also lists the options and their order numbers, and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

See www.rohde-schwarz.com/brochure-datasheet/vte

1.1.6 Release Notes and Open Source Acknowledgment (OSA)

The release notes list new features, improvements and known issues of the current firmware version, and describe the firmware installation.

The open source acknowledgment document provides verbatim license texts of the used open source software. On the R&S VTE, the open source acknowledgment document is provided as PDF file in `C:/Program%20Files/Rohde-Schwarz/VTS/2.11.0/Tools/`.

See www.rohde-schwarz.com/firmware/vte

1.1.7 Application Notes, Application Cards, White Papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/application/vte

1.2 Conventions Used in the Documentation

The following conventions are used throughout this documentation.

Typographical conventions

Convention	Description
"Graphical user interface elements"	All names of graphical user interface elements on the screen, such as dialogs, menus, options, buttons, and softkeys are enclosed by parentheses.
[keys]	Key names are written in capital letters.
`File names, commands, program code`	File names, commands, coding samples and screen output are distinguished by their font.
Input	Input to be entered by the user is displayed in italics.
Links	Links are displayed in blue font.
"References"	References to other parts of the documentation are enclosed by parentheses.

Conventions for procedure descriptions

When describing how to operate the R&S VTE, several alternative methods may be available to perform the same task. If possible, the procedure using the touchscreen is described.

The following table gives an overview how the terms for different operating methods are related.

For more information on operation refer to the Chapter 3, "Operating Concepts", on page 20.

Table 1-1: Terms used in the documentation

Term used in documentation	Control in focus	Used method and its common term		
		Finger on the touchscreen	**Mouse pointer in the display**	**Hardkey or keyboard**
To tap	Icon, button	To tap	To click	To press
To double-tap	Directory, file	To double-tap To touch & hold	To double-click	To focus and press <Enter> key
To select	Menu, command, tab, list entry, parameter value	To tap	To click	To focus and press <Enter> key
To activate/deactivate	Option	To tap	To click	To focus and press <Enter> key
To scroll	Scroll bar (vertical or horizontal)	To flick	To scroll	To press [PAGE DOWN] or [PAGE UP] key
To drag & drop	Graphical elements, files	To touch & hold, slide and release	To drag & drop	-

1.3 Key Features

The R&S VTE video test center is a universal platform for testing video and audio interfaces on consumer electronics equipment in R&D where a wide variety of applications need to be addressed and involve different AV interface technologies. The modular platform accommodates up to eight test modules and can be equipped with additional software to optimally suit the requirements of specific applications.

See the Rohde & Schwarz Home Page at http://www.rohde-schwarz.com for information on available hardware and software options, data sheet and product brochure, application notes.

2 Safety and Regulatory Information

The product documentation helps you use the product safely and efficiently. Follow the instructions provided here and in the Chapter 2.1, "Safety Instructions", on page 16.

Intended use

The product is intended for the development, production and verification of electronic components and devices in industrial, administrative, and laboratory environments. Use the product only for its designated purpose. Observe the operating conditions and performance limits stated in the data sheet.

Where do I find safety information?

Safety information is part of the product documentation. It warns you of potential dangers and gives instructions on how to prevent personal injury or damage caused by dangerous situations. Safety information is provided as follows:

- In Chapter 2.1, "Safety Instructions", on page 16. The same information is provided in many languages as printed "Safety Instructions". The printed "Safety Instructions" are delivered with the product.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

2.1 Safety Instructions

Products from the Rohde & Schwarz group of companies are manufactured according to the highest technical standards. To use the products safely, follow the instructions provided here and in the product documentation. Keep the product documentation nearby and offer it to other users.

Use the product only for its intended use and within its performance limits. Intended use and limits are described in the product documentation such as the data sheet, manuals and the printed safety instructions. If you are unsure about the appropriate use, contact Rohde & Schwarz customer service.

Using the product requires specialists or specially trained personnel. These users also need sound knowledge of at least one of the languages in which the user interfaces and the product documentation are available.

If any part of the product is damaged or broken, stop using the product. Never open the casing of the product. Only service personnel authorized by Rohde & Schwarz are allowed to repair the product. Contact Rohde & Schwarz customer service at http://www.customersupport.rohde-schwarz.com.

Lifting and carrying the product

The maximum weight of the product is provided in the data sheet. To move the product safely, you can use lifting or transporting equipment such as lift trucks and forklifts. Follow the instructions provided by the equipment manufacturer.

Choosing the operating site

Only use the product indoors. The product casing is not waterproof. Water that enters can electrically connect the casing with live parts, which can lead to electric shock, serious personal injury or death if you touch the casing. If Rohde & Schwarz provides a carrying bag designed for your product, you can use the product outdoors.

Unless otherwise specified, you can operate the product up to an altitude of 2000 m above sea level. The product is suitable for pollution degree 2 environments where nonconductive contamination can occur. For more information on environmental conditions such as ambient temperature and humidity, see the data sheet.

Setting up the product

Always place the product on a stable, flat and level surface with the bottom of the product facing down. If the product is designed for different positions, secure the product so that it cannot fall over.

If the product has foldable feet, always fold the feet completely in or out to ensure stability. The feet can collapse if they are not folded out completely or if the product is moved without lifting it. The foldable feet are designed to carry the weight of the product, but not an extra load.

If stacking is possible, keep in mind that a stack of products can fall over and cause injury.

If you mount products in a rack, ensure that the rack has sufficient load capacity and stability. Observe the specifications of the rack manufacturer. Always install the products from the bottom shelf to the top shelf so that the rack stands securely. Secure the product so that it cannot fall off the rack.

Connecting to power

The product is an overvoltage category II product and has to be connected to a fixed installation used to supply energy-consuming equipment such as household appliances and similar loads. Be aware that electrically powered products have risks, such as electric shock, fire, personal injury or even death.

Take the following measures for your safety:

- Before switching on the product, ensure that the voltage and frequency indicated on the product match the available power source. If the power adapter does not adjust automatically, set the correct value and check the rating of the fuse.
- If a product has an exchangeable fuse, its type and characteristics are indicated next to the fuse holder. Before changing the fuse, switch off the instrument and disconnect it from the power source. How to change the fuse is described in the product documentation.
- Only use the power cable delivered with the product. It complies with country-specific safety requirements. Only insert the plug into an outlet with protective conductor terminal.
- Only use intact cables and route them carefully so that they cannot be damaged. Check the power cables regularly to ensure that they are undamaged. Also ensure that nobody can trip over loose cables.

- If the product needs an external power supply, use the power supply that is delivered with the product or that is recommended in the product documentation or a power supply that conforms to the country-specific regulations.
- Only connect the product to a power source with a fuse protection of maximum 20 A.
- Ensure that you can disconnect the product from the power source at any time. Pull the power plug to disconnect the product. The power plug must be easily accessible. If the product is integrated into a system that does not meet these requirements, provide an easily accessible circuit breaker at the system level.

Cleaning the product

Use a dry, lint-free cloth to clean the product. When cleaning, keep in mind that the casing is not waterproof. Do not use liquid cleaning agents.

Meaning of safety labels

Safety labels on the product warn against potential hazards.

	Potential hazard Read the product documentation to avoid personal injury or product damage.
	Electrical hazard Indicates live parts. Risk of electric shock, fire, personal injury or even death.
	Hot surface Do not touch. Risk of skin burns. Risk of fire.
	Protective conductor terminal Connect this terminal to a grounded external conductor or to protective ground. This protects you against electric shock should an electric problem occur.

Connecting headphones

Take the following measures to prevent hearing damage. Before using headphones, check the volume and reduce it if necessary. If you monitor varying signal levels, take off the headphones and wait until the signal has settled. Then adjust the volume.

2.2 Labels on the Product

Labels on the casing inform about:

- Personal safety, see "Meaning of safety labels" on page 18.
- Product and environment safety, see Table 2-1.
- Identification of the product on the type plate.

Table 2-1: Labels regarding product and environment safety

	Labeling in line with EN 50419 for disposal of electrical and electronic equipment after the product has come to the end of its service life. For more information, see "Electrical and electronic equipment" on page 1020.
	Read the manual for information.
	Headphone. Take care with the volume setting, see "Connecting headphones" on page 18.

2.3 Warning Messages in the Documentation

A warning message points out a risk or danger that you need to be aware of. The signal word indicates the severity of the safety hazard and how likely it will occur if you do not follow the safety precautions.

WARNING

Potentially hazardous situation

Could result in death or serious injury if not avoided.

CAUTION

Potentially hazardous situation

Could result in minor or moderate injury if not avoided.

NOTICE

Potential risks of damage

Could result in damage to the supported product or to other property.

2.4 Korea Certification Class A

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

3 Operating Concepts

There are three ways to operate the R&S VTE.

Manual operation

You can manually operate the R&S VTE as follows:

- Using the touchscreen and the controls on the front panel.
- Using an external keyboard and mouse.

The access rights are the same, regardless of whether you operate the R&S VTE using the touchscreen and controls on the front panel or the keyboard and mouse.

Manual operation is also called local operation. The principles of manual operation are explained in the following sections.

Further information:

- Names used in the documentation for the cursor keys
  See Chapter 4.2.1.2, "Cursor Keys", on page 62
- Which key on the front panel corresponds to which key on the external keyboard
  See Table 4-1.
- How to connect keyboard and mouse
  See Chapter 4.1.6, "Connecting External USB Devices", on page 58.
- What to do if you want to operate an R&S VTE that is used by another user in a remote operation/control session?
  Depends on the session type, see "To end the connection at the R&S VTE" on page 43, "To end the connection at the R&S VTE" on page 44 or "To switch to manual operation" on page 47.

Remote operation

The R&S VTE can be remote-operated from an external computer. After the connection is set up, the screen content of the R&S VTE is displayed on the monitor of the external computer. You can operate the R&S VTE using the computer keyboard and mouse.

This allows convenient operation of the R&S VTE from the desktop even when the R&S VTE is integrated in a rack in the next room. Remote operation (in contrast to remote control) does not use remote control commands but a separate Windows software which is installed on the computer.

Further information:

- Chapter 3.10, "Setting Up Remote Operation", on page 41

Remote control

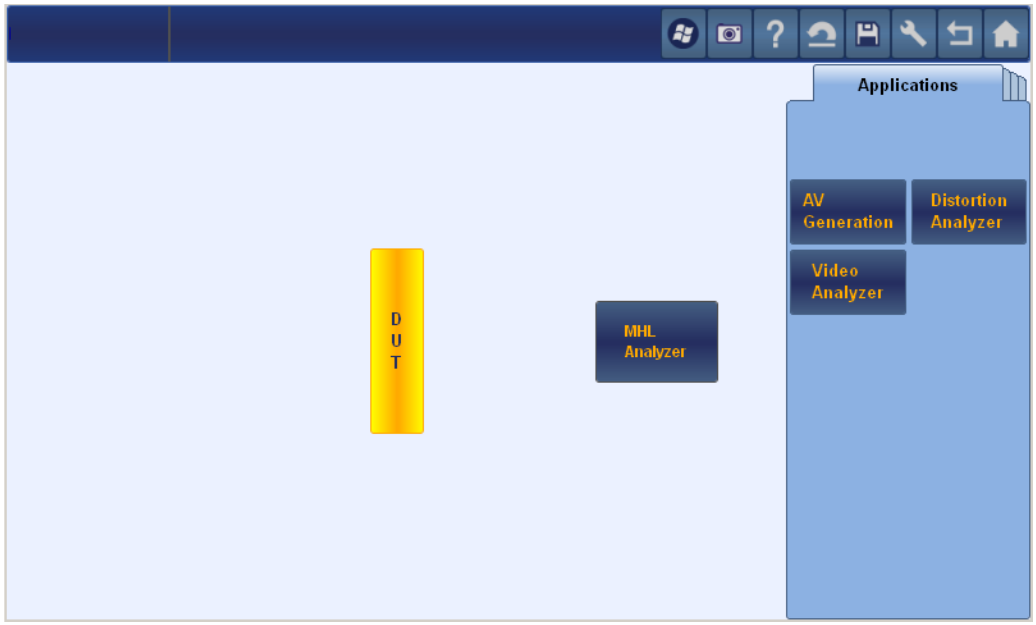
Create programs to automatize repeating settings, tests and measurements. The R&S VTE is connected to a computer running the program.

Further information:

- Chapter 3.11, "Setting Up Remote Control", on page 44

3.1 Home Screen

After starting the firmware for the first time, the home screen is displayed.



In the left pane, all open applications are displayed. These applications are presented as a tab in the application screen, see Chapter 3.2, "Basic Layout of the Application Screen", on page 22.

In the right pane on the "Applications" tab, all available but closed applications are displayed.

In the home screen, you can do the following.

- Opening applications.
  See "To open an application" on page 21.
- Closing applications.
  See "To close an application" on page 22.
- Changing to the application screen.
  See "To change to the application screen" on page 22.
- Using the toolbar to change to important settings and information.
  See "Toolbar" on page 23.

To open an application

1. In the right pane on the "Applications" tab, touch and hold the icon of an application until the color of the icon changes.

2. Slide it into the left pane of the home screen and release it.

   Remote command: `INSTrument:ACTivate` on page 497

To close an application

1. In the left pane, touch and hold the icon of an application until the color of the icon changes.
2. Slide it into the right pane of the home screen and release it.

   Remote command: `INSTrument:DEACtivate` on page 497

You can only open and close measurement applications. Signal generating applications are running all the time. Therefore, they are always open and displayed in the left pane.

To change to the application screen

► In the left pane, tap the icon of an application.

Note: You can only display information on applications that are open (displayed in the left pane).

To display the home screen

You can go back to the home screen at all times.

► In the toolbar, tap  .

3.2 Basic Layout of the Application Screen

The title bar with the integrated toolbar is part of the application screen. If an application is open, it is presented as a tab, see Chapter 3.1, "Home Screen", on page 21. The parameters of each application are grouped by topic on subtabs, a secondary set of tabs, at the bottom.

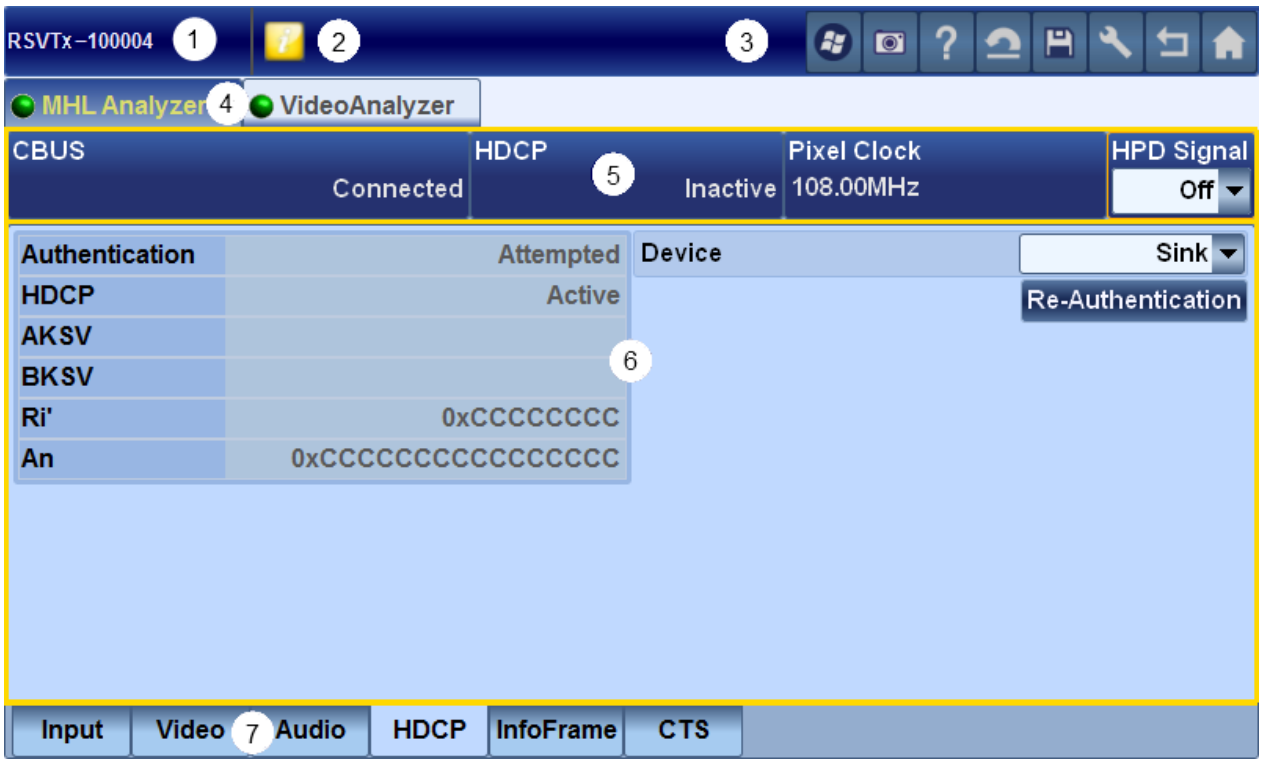


Figure 3-1: Application screen (example)

1 = Title bar
2 = Messages
3 = Toolbar
4 = Tab title
5 = Favorites
6 = Parameter values
7 = Subtabs

Title bar

See (1) in Figure 3-1.

Displays, if available, the host name and the firmware version.

Messages

See (2) in Figure 3-1.

Displays error messages, if an error has occurred. For a detailed description of the messages, tap . Further information, see Chapter 16.2, "Device-Specific Errors Messages", on page 1011.

Toolbar

See (3) in Figure 3-1.

Provides quick access to important settings and information.

Icon	Name	Description
	Windows	Opens the Windows "Start" menu. For information, refer to the Windows 7 documentation.
	Hardcopy	Creates a screenshot of the current screen content, and opens the "File" dialog. Enter a filename and select the file format: PNG, JPG or BMP. The default directory is `D:\VTE\UserData\Hardcopy`
	Help	Displays the help topic that corresponds to the selected parameter set. See Chapter 3.7, "Getting Help", on page 34.
	Preset	Opens and closes the "Reset" dialog. See Chapter 3.5, "Presetting the R&S VTE", on page 32.
	File	Opens and closes the "File" dialog. See Chapter 5, "File and Data Management", on page 86.
	Setup	Opens and closes the "Setup" dialog. See Chapter 6, "Basic Instrument Configurations", on page 94.
	Up	Goes to the next higher level.
	Home screen	Displays the home screen. See Chapter 3.1, "Home Screen", on page 21.

Tab title

See (4) in Figure 3-1.

Displays the name and status of the application. The status of the application is displayed by an LED symbol.

LED color	Application status	Description
Gray	Inactive	Applies only if applications use the same resources.
Green	OK	No messages present, signals are OK.
Yellow	A warning is active.	Input signal is missing, wrong symbol rate, etc. See Chapter 16.2, "Device-Specific Errors Messages", on page 1011.
Red	A fatal error has occurred.	Supply voltage missing, fan defect, etc. Contact the service.

Information and favorites

See (5) in Figure 3-1.

Displays the important parameters for the selected application all the time. If a parameter is editable, you can also change its value here.

You can change the favorites, see Chapter 3.6, "Managing Your Favorites", on page 33.

Parameter values

See (6) in Figure 3-1.

To view and set the parameter values. The status of a parameter is conveyed by its font and color.

Status	Color	Font
Active	Black	Regular
Not active	Black	Italic
Not conforming to standard	Red	Regular
Not available*	Gray	Regular
* Only used for parameter values		

Further information:

- Chapter 3.3.3, "Setting Parameters", on page 26

Subtabs

See (7) in Figure 3-1.

Groups the parameters of the selected application by topic.

3.3 On-Screen Actions

Using the touchscreen is the most direct interaction way. Use your fingers to set parameters in dialog boxes, enter data, scale diagrams and much more. Most of the control elements and actions on the screen are based on the Windows concept, and you easily become familiar with the user interface.

Tapping the screen works like clicking mouse buttons. For information on the terms used in the documentation, see Table 1-1.

3.3.1 Using the Toolbar

For details on the toolbar functions, see "Toolbar" on page 23.

To use toolbar functions

► Tap an icon to activate the corresponding function.

3.3.2 Hiding or Displaying a Parameter Pane

If a dialog is divided into a graph pane and a parameter pane, you can enlarge the graph pane by hiding the parameter pane.

1. Tap to hide the parameter pane.

   The graph is displayed as large as possible.

2. If you want to display the parameter pane again, tap .

3.3.3 Setting Parameters

The parameters of each application are grouped by topic on subtabs at the bottom.

To change to another parameter set

► At the bottom of the dialog, select another subtab of the application.

To select a parameter value from a list

The list can consist of alphanumeric parameters, for example "On" and "Off" or "1", "2", "3".

1. Tap to open the list.

   A list with all available values is displayed.

2. Tap a list item to select it.

   The change takes effect immediately.

3. If you want to exit the list without changing the values, tap again.

To select parameter settings in a dialog

Parameters that require more than one value are configured using a dialog.

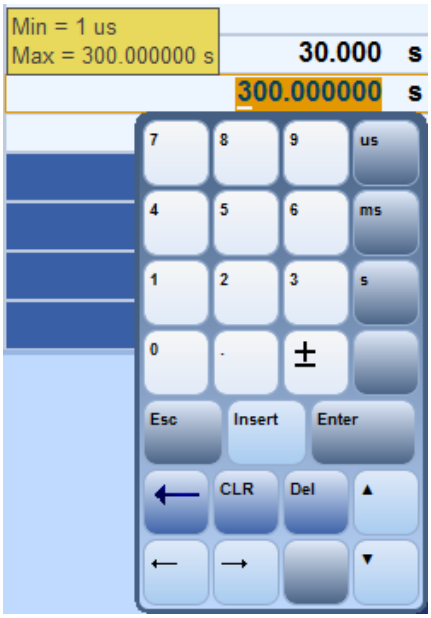
1. Tap to open the dialog.
2. In the dialog, change the settings as required.
3. Tap "OK".

   The dialog is closed and the changes are applied.

4. If you want to exit the dialog without making changes, tap "Cancel".

To enter a numeric parameter

1. Tap the field content to open the on-screen keypad.



The selected field content is highlighted. The minimum and maximum value is displayed.

Note: For details on the on-screen keypad, see Chapter 3.3.3.1, "On-Screen Keypad", on page 28.

2. If you want to enter a new numeric value, use the digit keys. Separate decimal places by using the decimal point key.
3. If you want to modify a certain digit, select this digit instead of the whole number.
   a) Use the arrow keys to move the cursor to this digit.
   b) Tap a digit key, or tap the up/down key.
4. If you want to change the sign of the value, tap "±".
5. If you want to change the unit, tap a unit key.
6. If you want to save the changes and close the on-screen keypad, tap "Enter".

   If the entered value exceeds the maximum, the maximum value is set instead. The change takes effect immediately, and, if the parameter is displayed in the information and favorites pane, it is the parameter is updated.
7. If you want to exit without changes, tap "Esc".

To enter an alphanumeric parameter

1. Tap the field content you want to change.

   The on-screen keyboard is opened.
2. Enter the text as you would on a normal keyboard.

   Note: For details on the on-screen keyboard, see Chapter 3.3.3.2, "On-Screen Keyboard", on page 29.

Table 3-1: Cursor behavior

Cursor look	Function
Horizontal underline	Underlined numbers or characters are selected.
Colored rectangle	Marked numbers or characters are overwritten.
Vertical line	New entries are inserted at the cursor position.

3.3.3.1 On-Screen Keypad

For data input in dialog boxes, the touchscreen provides an on-screen keypad to enter numeric values and units.

Key	Description
0 ... 9	Enters digits.
.	Separates the decimal places.
±	Changes the sign.
us, ms, s	Enters the dimension. The available keys depend on the parameter.
Esc	Exits the on-screen keypad without changes.
Insert	Switches the cursor into insert mode. You can insert digits until the maximum number of allowed digits has been reached. If you want to switch off the insert mode, tap this key again.
Enter	Saves the changes and closes the on-screen keypad.
←	Backspace key; deletes the last digit before the cursor.
CLR	Deletes the field content.
Del	Deletes the highlighted digits.
▲	Up key; increases the value of the digit on which the cursor is placed. If you want to increase the step width, place the cursor on a digit to the left. If you want to decrease the step width, place the cursor on a digit to the right.

Key	Description
←	Left arrow key; moves the cursor to the left.
→	Right arrow key; moves the cursor to the right.
▼	Down key; decreases the value of the digit on which the cursor is placed. If you want to increase the step width, place the cursor on a digit to the left. If you want to decrease the step width, place the cursor on a digit to the right.

3.3.3.2 On-Screen Keyboard

For text input, the touchscreen provides an on-screen keyboard with English layout.

Key	Description
Last	Returns to the currently defined value, i.e. the value that was used before the keyboard was displayed.
Esc	Exits the on-screen keyboard without changes.
Shift	Switches the keyboard to capital letters and the special characters. If you want to return to small letters, tap this key again.
CLR	Deletes the field content.
Insert	Switches the cursor into insert mode. If you want to switch off the insert mode, tap this key again.
Space	Enters or inserts a space, depending on the setting of the "Insert" key.
←	Left arrow key; moves the cursor to the left.
→	Right arrow key; moves the cursor to the right.
▲	Up key; increases the value of the character or digit on which the cursor is placed.
▼	Down key; decreases the value of the character or digit on which the cursor is placed.
Enter	Saves the changes and closes the on-screen keypad.
←	Backspace key; deletes the last character before the cursor.

3.3.4 Scaling and Evaluating Diagrams

Also to the scaling offered by the controls of the graphical user interface, you can also scale diagrams using the touchscreen.

To shift a diagram in negative or positive x/y-direction

1. Touch and hold the diagram in the middle until a cross is displayed (see Figure 3-2).
2. Slide your finger to the left, right, up, or down.
3. Release when you have reached the desired position.

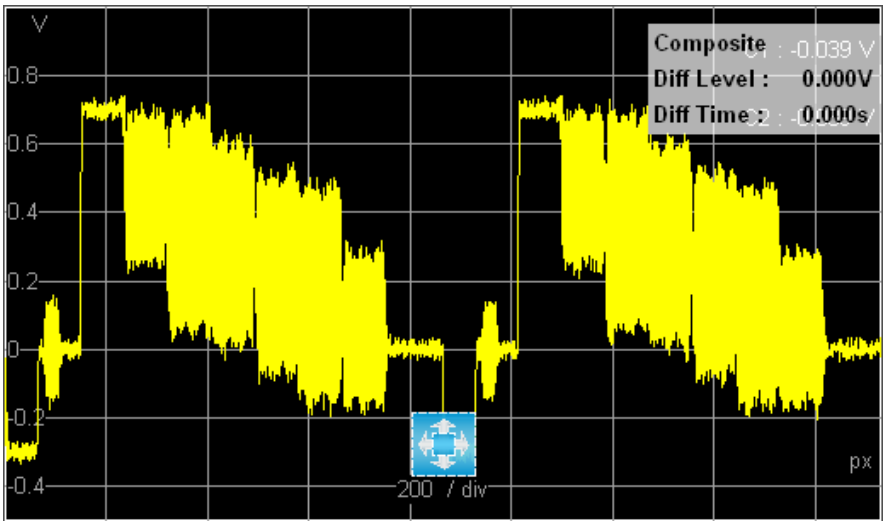


Figure 3-2: Shifting a diagram

To compress or stretch the x-axis

1. Touch and hold the diagram in one of the bottom corners until the right or left arrow is displayed (see Figure 3-3).
2. Slide your finger to the left or right.
3. Release when you have reached the desired scaling.

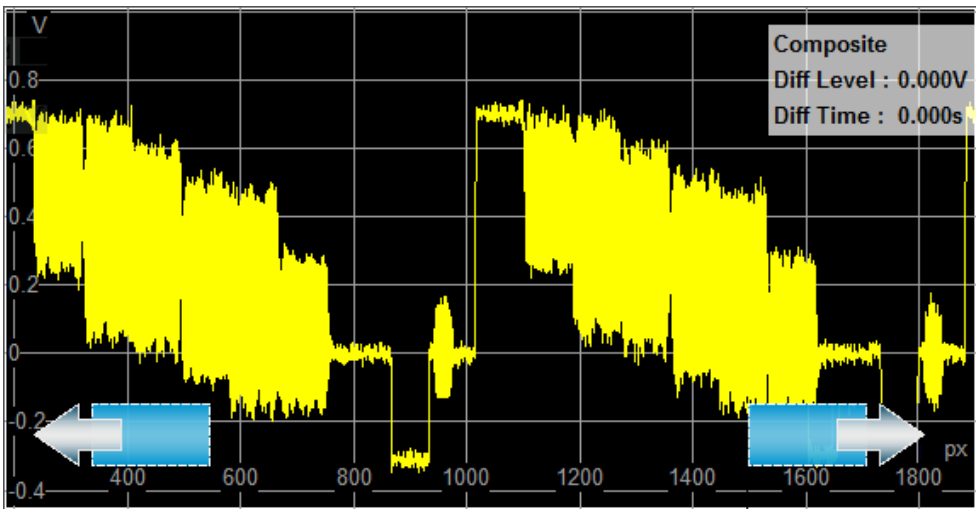


Figure 3-3: Scaling the x-axis

To compress or stretch the y-axis

1. Touch and hold the diagram in one of the left corners until the up or down arrow is displayed (see Figure 3-4).
2. Slide your finger up or down.
3. Release when you have reached the desired scaling.

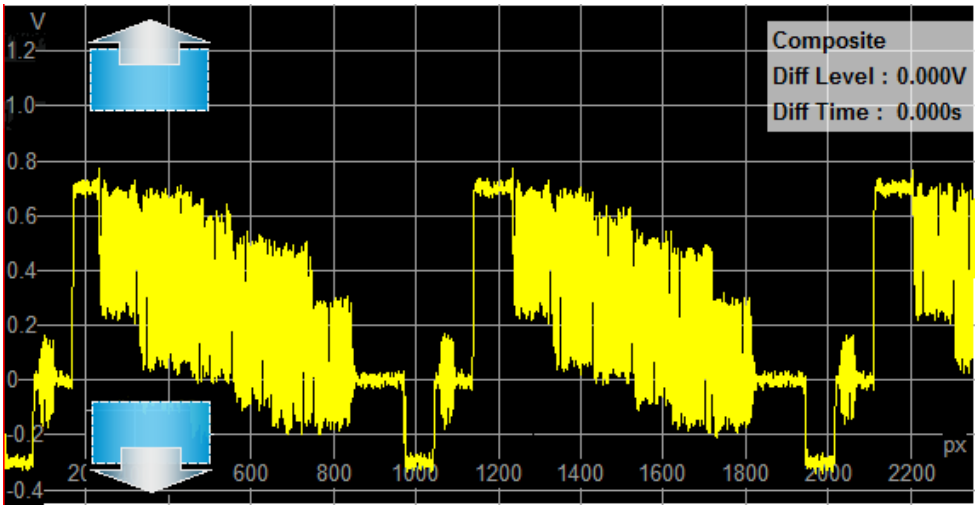


Figure 3-4: Scaling the y-axis

The left bottom corner is used for x- and y-scaling. If the wrong arrow is displayed, move your finger closer to the axis you want to scale.

To move a cursor

1. Touch the label of the cursor.

2. Slide your finger to the left or right.
3. Release when you have reached the desired position.

If the cursor is outside of displayed area, its label is always visible at the left or right display edge.

3.4 Changing between Open Applications

Every application is a separate unit and is operated independently of the other applications, more or less like two separate instruments.

To select an application

All open applications are displayed as tabs.

► Select the tab of the application you want to display.

The behavior of the application that you are leaving depends on its purpose:
- Measurement applications: All running measurements are stopped.
- Signal generating applications keep running.

Remote command: `INSTrument:ACTivate` on page 497

Further information:
- "To open an application" on page 21.
- "To close an application" on page 22.

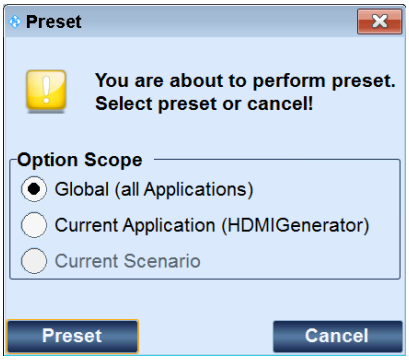
3.5 Presetting the R&S VTE

Use the preset functionality to set the R&S VTE to a well-defined state. This allows you to change parameter values from well defined starting point.

To preset the R&S VTE

1. In the toolbar, tap .

   The "Preset" dialog is displayed.



2. Tap "Preset".
   The R&S VTE is set to the preset values.

3.6 Managing Your Favorites

Favorites allow fast access to often or commonly used parameters. They are displayed below the tab title of an application and consist of two different sets:

- Default favorites
  Application-specific favorites that are displayed in the upper row. You cannot change them.
- Your favorites
  Application-independent favorites that are displayed in the lower row. You can add and remove favorites from any application of the R&S VTE. This allows fast operation that goes beyond individual applications.
  If your favorite is from another application, it only displays a value if the corresponding application is running.

While the default favorites are only labeled with the parameter name, the name of your own favorites includes the application name, for example AudioAnalyzer:Filter.

To create a favorite

1. Touch and hold the element you want to add until the name changes color.

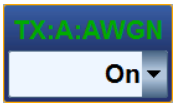
   

   If an element is not suitable as favorite, it does not change color.

2. Slide the element into the favorites pane and release it.
   If an element is already available as favorite, a prohibition sign ⃠ is displayed next to the element when you slide it into the favorites pane. You cannot add an element to the favorites pane twice.

To delete a favorite

1. Touch and hold the favorite you want to remove until the name changes color.



2. Slide the element from the favorites pane and release it.

3.7 Getting Help

If you need information, you can display the help. If you prefer reading in a PDF, you can look up information in the user manual that is delivered with the R&S VTE on disk.

3.7.1 Displaying Help

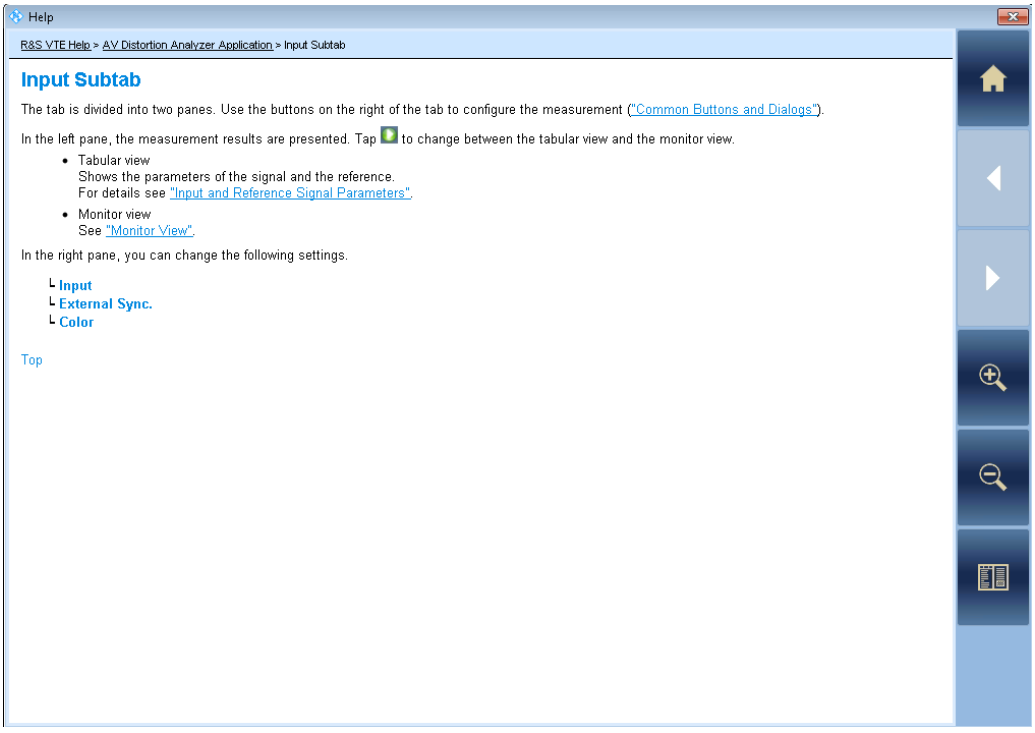
You can display the help at any time while operating the R&S VTE.

The R&S VTE provides context-sensitive help to the currently selected tab or dialog. You can directly display the corresponding help topic without searching for it.

To display help

1. Set the focus on the tab or dialog you want to display help for.
2. In the toolbar, tap .

   The "Help" dialog opens with the corresponding help topic.



To close the help dialog

► In the toolbar, tap ? again.

► In the upper right corner of the dialog, tap the close button.

3.7.2 Navigating in the Help

To provide you with as much information as possible at a glance, the "Help" dialog opens with the table of contents hidden.

To display the navigation pane

► Tap to show the navigation pane.

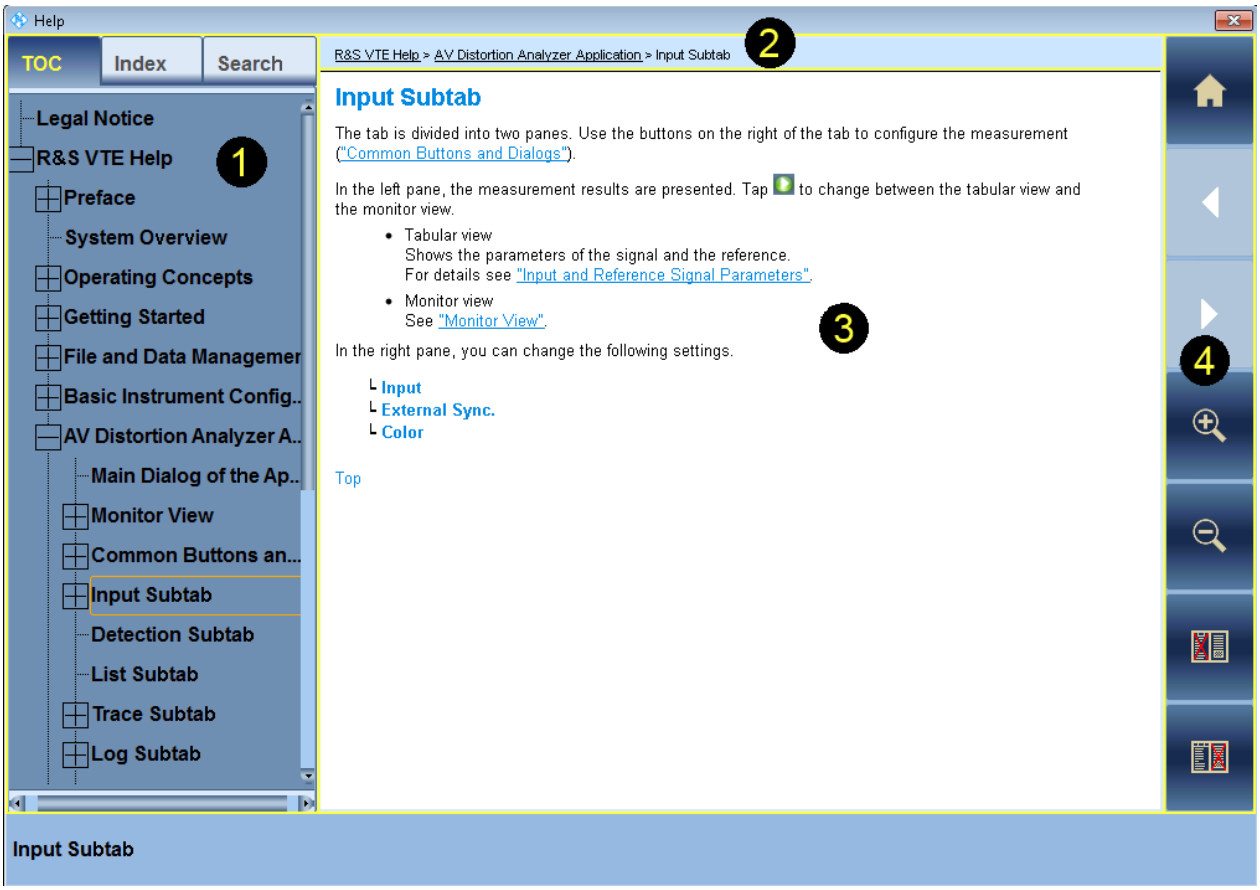


Figure 3-5: Help dialog with navigation pane

1 = Navigation pane
2 = Breadcrumbs
3 = Content pane
4 = Toolbar

The "Help" dialog is divided in two panes: Navigation pane on the left and content pane on the right.

Navigation pane

See (1) in Figure 3-5.

Contains the following tabs:

- "TOC"
  Table of contents
- "Index"
  Topic catalog
- "Search"
  Full-text search

Breadcrumbs

See (2) in Figure 3-5.

Displays the navigation to the displayed topic if you use the table of contents. You can display any topic of this path by tapping the underlined text. Tapping the icon leads you back to the originally displayed topic.

Toolbar

See (4) in Figure 3-5.

Supports quick navigation between topics and different views.

Table 3-2: Toolbar of the Help dialog

Icon	Name	Description
	Home screen	Displays the start topic with the address data of Rohde & Schwarz.
	Previous	Goes to the previously displayed topic. Useful to go back to the original topic after using a link. If disabled, the background color is a pale blue.
	Next	Goes to the next topic again. Only available if you have used before. If disabled, the background color is a pale blue.
	Zoom in	Enlarges the font size.
	Zoom out	Reduces the font size.
	Split view	Displays both the navigation pane and the content pane.
	Content view	Hides the navigation pane and shows only the content pane.
	Navigation view	Hides the content pane and shows only the navigation pane.

To search for a topic in the index

1. In the navigation pane, tap "Index".
2. Tap the empty field.

   The on-screen keyboard is displayed.
3. Enter the first characters of the keyword you are interested in.

The entries containing these characters are displayed.

4. Tap the suitable index entry.

   The corresponding topic is displayed in the content pane.

To search topics for a text string

1. In the navigation pane, tap "Search".
2. Tap the empty field.

   The on-screen keyboard is displayed.
3. Enter the string you want to find in the full-text search.
4. Tap the suitable entry.

   The corresponding topic is displayed in the content pane.

3.8 Using the Controls

Alternatively or additionally to the touchscreen, you can use the rotary knob and the hardkeys provided on the front panel.

Further information:

- Chapter 4.2.1.2, "Cursor Keys", on page 62.
- Chapter 4.2.1.4, "Rotary Knob", on page 63

3.9 Operating the R&S VTE in a LAN

The R&S VTE is equipped with a network interface and can be connected to an Ethernet LAN (local area network). The network card operates with 1000 Mbit Ethernet IEEE 802.3ab. The TCP/IP network protocol and the associated network services are preconfigured.

To be able to exchange data within a local area network (LAN), every computer or R&S VTE that is connected must have a unique IP address or a unique computer name. Access between different users is managed with access authorizations.

Provided the appropriate rights have been assigned and the Window 7 firewall configuration is adapted accordingly, the interface can be used e.g. for transferring data, printing on network printers, operating/controlling the R&S VTE from a remote computer.

To use network resources, access must be granted. To share files on the R&S VTE with other network users, access to R&S VTE resources, e.g. the hard drives, must also be granted. All these administration tasks are normally performed by a network administrator using the Windows 7 Start menu (for details refer to the Windows 7 documentation). Contact your network administrator for access authorizations.

User name and password of the R&S VTE are factory-set. The user name is used for auto login, access authorization and remote operation.

For further information:

- Chapter 15.1.1, "Login", on page 1005
- Chapter 4.2.2.8, "LAN", on page 68
- Chapter 3.10, "Setting Up Remote Operation", on page 41 for details on remote operation.
- Chapter 3.11, "Setting Up Remote Control", on page 44 for details on remote control.

3.9.1 Connecting the R&S VTE to a Network

Before connecting the R&S VTE to a network or configuring a network, do the following:

- Consult your network administrator.
- If your network does not support DHCP or if you choose to disable dynamic TCP/IP configuration, you must assign valid address information before connecting the R&S VTE to the LAN.

Errors may affect the entire network.

Efficient virus protection is a prerequisite for secure operation in the network. Never connect the R&S VTE to a network without proper protection against a virus infection, as doing so may cause damage to the R&S VTE firmware.

To connect the R&S VTE to a network

1. Fulfill all prerequisites mentioned above.
2. Make sure that the R&S VTE is switched off. This is the only way to ensure that the network connection is reliably detected and any disruptions during the operation of the R&S VTE are avoided.
3. Connect the R&S VTE to the network using a CAT-5e cable or better.
4. Switch on the R&S VTE.

To disconnect the R&S VTE from a network

1. Make sure that the R&S VTE is switched off.
2. Disconnect the R&S VTE from the network.

3.9.2 Connecting the R&S VTE to a Computer

How to set up a LAN connection between an R&S VTE and a single computer without integration into a larger network depends on the operating system installed on the computer.

3.9.2.1 Windows 7 Operating System

If Windows 7 is installed on the computer, you can set up a LAN connection really fast.

1. Activate DHCP on both the computer and the R&S VTE.
2. Connect the computer and the R&S VTE with a standard RJ.45 cross-over cable (LAN cable).

   After approx. 16 seconds, the connection is established.
3. To address the R&S VTE, use the computer name.

Further information:

- " Querying the computer name using the firmware" on page 40

3.9.2.2 Other Operating Systems

If Windows 7 is not installed on the computer, you need to assign IP addresses.

1. Assign an IP address to the R&S VTE and the computer.
   The IP addresses *192.168.xxx.yyy* are available for use here. xxx and yyy can assume values of *1* to *255*. The value for the subnet mask is *255.255.255.0*.
2. Connect the R&S VTE and the computer with a standard RJ.45 cross-over cable (LAN cable).
3. To address the R&S VTE, use the assigned IP address.

3.9.3 Zero Configuration Networking

The R&S mDNS service is installed with the firmware. Using this service, you can connect to a network automatically. You do not need to set up services, such as dynamic host configuration protocol (DHCP) and domain name system (DNS), or configure the network settings manually as described in Chapter 3.9.4, "Configuring the Network Card", on page 39.

3.9.4 Configuring the Network Card

Under Windows 7, network card drivers do not need to be installed separately. If the R&S VTE is connected to the LAN, Windows 7 automatically detects the network connection and activates the required drivers.

The configuration tasks depend on whether your network has a DHCP server or not. They are performed in the "Setup" dialog.

For details see also Chapter 6.1, "System Tab", on page 94.

If you are not familiar with LAN configurations, ask your network administrator.

If you use the R&S mDNS Service, you do not need to configure at all. For details, see Chapter 3.9.3, "Zero Configuration Networking", on page 39.

Networks with DHCP Server

The R&S VTE is preconfigured for networks using the dynamic host configuration protocol (DHCP). In such networks, the R&S VTE is automatically assigned a free IP address. Identification in the network is based on the use of a unique computer name.

Every R&S VTE is assigned an individual computer name at the factory. It is displayed as part of the window title of the application.

If necessary, you can change the computer name using the firmware or the Windows 7 Start menu (for details refer to the Windows 7 documentation).

Querying the computer name using the firmware

In the firmware, "host name" is used as synonym for "computer name".

1. If the R&S VTE has a default computer name, the computer name is displayed in the title bar of the application.
   See Figure 3-1
2. If no default computer name is displayed, do the following.
   a) In the toolbar, tap .
   b) On the "System" tab, under "LAN Services", select the "Host Name" field.
3. Read out the name.

Naming rule for the default computer name

The default computer name is composed as follows:

<instrument short name>-<serial number>

Example: VTE-100104

The serial number consists of 6 digits and is printed on the cabinet of the R&S VTE.

Networks without DHCP Server

In networks that assign fixed IP addresses, the network administrator usually configures the network card. Contact your network administrator. The IP address is set using the firmware or the Windows 7 Start menu (for details refer to the Windows 7 documentation).

Entering the IP address using the firmware

1. In the toolbar, tap .
2. On the "System" tab, under "LAN Services", select the "IP Addresses" field.
3. Enter the IP address.

3.9.5 Firewall Settings

By default, the Windows Firewall is activated to protect the R&S VTE from an attack of hostile users and programs. The Windows Firewall suppresses all network communication which is not initialized by the R&S VTE itself or which is not defined as an exception.

To enable data transfer or to allow access to the R&S VTE, define exceptions using the Windows 7 Start menu. For details refer to the Windows 7 documentation or contact your network administrator for support.

3.10 Setting Up Remote Operation

You can remotely operate the R&S VTE as follows:

- Chapter 3.10.1, "Using the Remote Desktop", on page 41
- Chapter 3.10.2, "Using a VNC Client", on page 43

For details on remote control, see Chapter 3.11, "Setting Up Remote Control", on page 44.

3.10.1 Using the Remote Desktop

The Windows remote desktop connection software simulates the user interface of the R&S VTE. Thus, you can operate the R&S VTE manually from an external computer in the same way as operating the R&S VTE itself. During the Remote Desktop session, operation at the R&S VTE itself is not possible. Access by an external computer and the identity of the remote user is indicated on the login display of Windows 7.

Prerequisites

- The external computer must meet the following conditions:
  - Remote desktop connection program is installed.
  - LAN interface is configured for the network.
  - Remote desktop connection program is configured (see "To configure the external computer" on page 42).
- R&S VTE and the computer are connected using a LAN network.

NOTICE

Risk of unauthorized access

If the Remote Desktop is activated, any user in the network can access this R&S VTE if they know the host name and user data of the R&S VTE.

To configure the external computer

With the Windows 7 operating system, the remote desktop connection program is already installed. For all other Windows operating systems starting with Windows 95™, the program is available as a free download at (http://www.microsoft.com).

1. If necessary, install the remote desktop connection program.
2. In the "Start" menu, select "All Programs", "Accessories" and then "Remote Desktop Connection".
3. In the "Remote Desktop Connection" dialog, click "Show Options".
4. On the "General" tab in the "Computer" field, enter the host name of the R&S VTE. Every R&S VTE is delivered with a host name that is suitable for use with manual remote desktop, see also " Querying the computer name using the firmware" on page 40.
5. In the "User name" field, enter the user name. The factory-set data is described in Chapter 15.1.1, "Login", on page 1005).
6. Click "Save As" to save the user data.
   - If you save the data in the `Default.rdp` file, the connection you have configured will be the default when the remote desktop connection program is started.
   - If you save the data under another name, the settings for the configured connection will be shown in the "Computer" list.
7. On the "Display" tab, set the resolution for display of the R&S VTE screen to 1024 x 768 pixels or a higher value of your choice.

If you want to manually operate several R&S VTEs from an external computer, you have to open a separate Remote Desktop Control window for each R&S VTE. Start the remote desktop connection program as many times as necessary.

To set up a connection using a LAN network

1. In the "Start" menu of the external computer, select "All Programs", "Accessories" and then "Remote Desktop Connection".
2. In the "Computer" list, select the host name of the R&S VTE you want to operate (see " Querying the computer name using the firmware" on page 40).
3. Click "Connect".
4. Enter the password. It is necessary in order to obtain access authorization for the R&S VTE. The factory-set data is described in Chapter 15.1.1, "Login", on page 1005).

   After login is completed, the R&S VTE screen is displayed and the R&S VTE is ready for remote operation. The settings that were active before the connection was established are used. You can operate the R&S VTE user interface with the mouse and/or keyboard.

To end the connection at the external computer

► In the "Start" menu, select "Disconnect".

To end the connection at the R&S VTE

1. Make sure that the R&S VTE is free for you to use.
2. Enter the password (see also Chapter 15.1.1, "Login", on page 1005).

   The connection to the external computer is ended.

3.10.2 Using a VNC Client

VNC simulates the user interface of the R&S VTE. Thus, you can manually operate the R&S VTE from an external computer in the same way as operating the R&S VTE itself. During VNC operation, local operation (manual operation, see Chapter 3.1, "Home Screen", on page 21) and remote operation have equal access rights. Both users see the same screen contents of the R&S VTE and can operate the R&S VTE simultaneously.

Prerequisites

- The external computer must meet the following conditions:
  - TightVNC software is installed.
  - LAN interface is configured for the network.
- R&S VTE and the computer are connected using a LAN network.

On the R&S VTE, the VNC server program is already installed and configured.

NOTICE

Risk of unauthorized access

If the VNC connection is activated, any user in the network who knows the password and IP address of the R&S VTE can access it. To prevent this, disable the VNC server service or uninstall the VNC program on the R&S VTE.

To enhance security, also disable communications on the network via the Ultr@VNC program in the firewall.

To set up a connection at the external computer

1. In the "Start" menu, select "Programs" > "TightVNC" > "TightVNC Viewer".

   The "New TightVNC Connection" dialog is displayed.
2. Enter the host name or the IP address of the R&S VTE (see " Querying the computer name using the firmware" on page 40).
3. Click "Connect".

   The "Authentication" dialog is displayed.

4. Enter the password. For information on the factory-set password, see Chapter 15.1.1, "Login", on page 1005.
5. Click "OK".
   The R&S VTE screen is displayed on the computer.

To end the connection at the external computer

► End the remote operation by closing the VNC application.

To end the connection at the R&S VTE

1. Make sure that the R&S VTE is free for you to use.
2. Log in as local user.

   Note: The external user does not need to log off before.

3.11 Setting Up Remote Control

On power-on, the R&S VTE is always in the manual operating state (see Chapter 3.1, "Home Screen", on page 21). Switching from manual operation to remote control and vice versa does not affect the instrument settings.

Manual operation is designed for maximum operating convenience. In contrast, the priority of remote control is the "predictability" of the instrument status. Therefore, control programs should always define an initial instrument status (e.g. with the command *RST) and then implement the required settings.

For remote control, communication between the R&S VTE and the controlling computer is established based on the VISA (virtual instrument software architecture) standard. Depending on the interface used for the connection between R&S VTE and computer, different protocols are used. To perform actions, SCPI (standard commands for programmable instruments) commands are used. The supported SCPI commands are described in Chapter 14, "Remote Command Reference", on page 488. For more information on SCPI, see also Chapter 13, "Remote Control Basics", on page 469.

Prerequisites

- The computer and the R&S VTE are connected by an interface suitable for remote control.
  See Chapter 3.11.2, "Remote Control Interfaces and Protocols", on page 45.
- The interface you want to use is configured for the network.
  See Chapter 6.2, "Remote Tab", on page 96.
- The software for instrument control and the VISA program library must be installed on the controller.
  See Chapter 3.11.1, "VISA Libraries", on page 45

- The host name or the IP address of the R&S VTE is known (see Chapter 3.9.4, "Configuring the Network Card", on page 39).

3.11.1 VISA Libraries

A VISA installation is a prerequisite for remote control. On the R&S VTE, VISA is already installed.

VISA (virtual instrument software architecture) is a standardized software interface library providing input and output functions to communicate with instruments. The used interface is selected at initialization time by the channel-specific address string ("VISA resource") indicated in Chapter 3.11.2, "Remote Control Interfaces and Protocols", on page 45, or by an appropriately defined VISA alias (short name).

For more information about VISA, refer to the specification of this standard maintained by the IVI Foundation (http://www.ivifoundation.org/).

3.11.2 Remote Control Interfaces and Protocols

The instrument supports different interfaces for remote control.

A VISA installation on the controller is a prerequisite for remote control using these interfaces.

3.11.2.1 LAN Interface

The LAN (local area network) interface of the R&S VTE is based on TCP/IP and consists of a connector, a network interface card and protocols. Connect the computer and the R&S VTE to a common network with TCP/IP network protocol.

If several instruments are connected to the network, each instrument has its own IP address and associated "VISA resource". The controller identifies these instruments by the "VISA resource".

The R&S VTE is preconfigured for networks using DHCP (dynamic host configuration protocol). If using this configuration, enter the host name instead of the IP address. You can also assign a fixed IP address to the R&S VTE.

Further information:

- Chapter 3.9, "Operating the R&S VTE in a LAN", on page 37
- Interface description, see Chapter 4.2.2.8, "LAN", on page 68

VXI-11 protocol

The VXI-11 standard is based on the ONC RPC (open network computing remote procedure call) protocol which in turn relies on TCP/IP as the network/transport layer. The TCP/IP network protocol and the associated network services are preconfigured. TCP/IP ensures connection-oriented communication, where the order of the

exchanged messages is adhered to and interrupted links are identified. With this protocol, messages cannot be lost.

For configuration, see "VXI-11" on page 100.

HiSLIP protocol

The HiSLIP (high-speed LAN instrument protocol) is the successor protocol for VXI-11 for TCP-based instruments specified by the IVI foundation. The protocol uses two TCP sockets for a single connection: one for fast data transfer, the other for non-sequential control commands for example `Device Clear` or `SRQ`).

HiSLIP data is sent to the device using the "fire and forget" method with immediate return. Thus, a successful return of a VISA operation such as `viWrite()` does not guarantee that the R&S VTE has finished or started the requested command, but is delivered to the TCP/IP buffers.

HiSLIP has the following characteristics:

- High performance as with raw socket network connections
- Compatible IEEE 488.2 support for message exchange protocol, device clear, serial poll, remote/local, trigger, and service request
- Single IANA registered port (4880), which simplifies the configuration of firewalls
- Supports simultaneous access of multiple users by providing versatile locking mechanisms
- Usable for IPv6 or IPv4 networks

For configuration, see "HiSLIP" on page 98.

Socket communication

The socket communication, also referred as "raw Ethernet communication", does not necessarily require a VISA installation on the remote controller side. The simplest way to establish socket communication is to use the built-in telnet program. The telnet program is part of every operating system and supports a communication with the software on a command-by-command basis. Socket connections are established on a specially defined port. For better utilization and to enable automation by programs, you can program user-defined.

Further information:

- Configuration, see "TCPIP" on page 98
- Chapter 3.11.4, "Using Raw TCPIP/Sockets", on page 47

3.11.2.2 USB Interface

The USB type B interface is used to establish the connection. VISA detects and configures the R&S VTE automatically. You do not have to enter an address string or install a separate driver.

Further information:

- Configuration, see "USB2" on page 99

- Interface description, see Chapter 4.2.2.10, "USB DEVICE Port", on page 70

3.11.3 Basic Procedures

To switch to remote control

1. Make sure that you meet the prerequisites ("Prerequisites" on page 44).
2. Send the `&GTR` interface command (go to remote).
   The R&S VTE is set to the remote state.

   Note: During remote control, manual operation is disabled. To indicate this state, "Controlled by Remote" is displayed.

To disable manual operation during remote control completely

► Send the `:SYST:KLOC ON` command.

Inadvertent switchover with the [LOCAL] key is not possible. Switching to manual operation is only possible by a remote control command.
To indicate this state, "REM LLO" is displayed in the special fields area.

To disable or enable the LOCAL key during remote control

► Send the `&LLO` interface command.

► Send the `&NREN` interface command.

To switch to manual operation

1. Wait until command processing is completed. Otherwise the R&S VTE returns to remote control immediately.
2. The R&S VTE remains in the remote state until you perform one of the following actions.
   - Send the `&GTL` interface command (go to local).
   - Send the `CALL IBLOC(generator%)` command.

3.11.4 Using Raw TCPIP/Sockets

The R&S VTE can be remote controlled via features known as "sockets" or "raw TCPIP". The following program represents a terminal application.

The source code is held in ANSI-C and must be linked to "Ws2_32.lib" in Microsoft Visual Studio. Note that you do not need a VISA driver to operate the program.

Start the program as follows: `SocketsRawTcpIpExample IP-address port timeout`

For R&S instruments, use the following values:

"port" = 5025

"timeout" is expressed in seconds.

Example: `SocketsRawTcpIpExample 172.29.48.10 5025 0.5`

```
//Example terminal program to remote control an R&S VTE.
It establishes a connection via raw TCPIP / Sockets.
// Written in ANSI-C

#include <tchar.h>

#include <winsock2.h>  //include Windows Sockets 2
#include <ws2tcpip.h>  //include Windows Sockets 2 Extension for
TCP/IP protocols


//contains configuration data
struct SocketsRawTcpIpConfig_struct
{
  SOCKET            CurrentSocketDescr;
  struct addrinfo   AddressInfo;
  bool              ClientIsConnected;
  double            Timeout;
} SocketsRawTcpIpConfig;

/* METHOD ************************************************************************/
// Function name   : ConnectToServer
// Description     : Connects to the server
// Return type     : void
// Argument        : char *pHostName: e. g. "172.29.48.10",
// the Windows host name is not supported!
// Argument        : int port:        e. g. "5025"
// Argument        : char *pTimeout:  e. g. "0.5" for 500 ms
void ConnectToServer(char *pHostName, char *pPort, char *pTimeout)
{
  struct addrinfo   *pRes;
  int               retVal;


  //convert timeout
  SocketsRawTcpIpConfig.Timeout = atof(pTimeout);


  // Setup the hints address info structure
  // which is passed to the getaddrinfo() function
  memset(&SocketsRawTcpIpConfig.AddressInfo, 0,
  sizeof(SocketsRawTcpIpConfig.AddressInfo));
  SocketsRawTcpIpConfig.AddressInfo.ai_family = AF_INET;
  SocketsRawTcpIpConfig.AddressInfo.ai_socktype = SOCK_STREAM;
```

```
  SocketsRawTcpIpConfig.AddressInfo.ai_protocol = IPPROTO_TCP;
  if((retVal = getaddrinfo(pHostName, pPort,
  &SocketsRawTcpIpConfig.AddressInfo, &pRes)) != 0)
  {
    printf("getaddrinfo() failed!\n");
    WSACleanup();
    exit(1);
  }


  //create socket
  SocketsRawTcpIpConfig.CurrentSocketDescr =
  socket(SocketsRawTcpIpConfig.AddressInfo.ai_family,
  SocketsRawTcpIpConfig.AddressInfo.ai_socktype,
  SocketsRawTcpIpConfig.AddressInfo.ai_protocol);
  if(SocketsRawTcpIpConfig.CurrentSocketDescr == INVALID_SOCKET)
  {
    printf("Can't create socket!\n" );
    WSACleanup();
    exit(2);
  }


  //connect to socket
  // The sockaddr_in structure specifies the address family,
  // IP address, and port of the server to be connected to.
  struct sockaddr_in ClientService;
  ClientService.sin_family = AF_INET;
  ClientService.sin_addr.s_addr = inet_addr(pHostName);
  ClientService.sin_port = htons((u_short)atol(pPort));

  if(connect(SocketsRawTcpIpConfig.CurrentSocketDescr, (SOCKADDR*)
  &ClientService, sizeof(ClientService) ) == SOCKET_ERROR)
  {
    printf( "Failed to connect!\n" );
    WSACleanup();
    exit(3);
  }


  SocketsRawTcpIpConfig.ClientIsConnected = true;
}



/* METHOD *************************************************************/
// Function name    : Transmit
// Description      : Transmits characters to the server.
// Return type      : int: returns the total number of bytes sent
// Argument         : char *pCommand: e. g. "*IDN?"
```

```
int Transmit(char *pCommand)
{
  char  *pBuffer;
  int   SentBytes = 0;


  if(SocketsRawTcpIpConfig.ClientIsConnected)
  {
    //newline is needed for EOF detection so the passed command has to be
    //extended!
    pBuffer = (char *)calloc(1, strlen(pCommand) + 2);
    //one more bytes for EOF and string end (\0);
    //buffer is initialized with zeroes
    strncpy(pBuffer, pCommand, strlen(pCommand));
    if(pBuffer[strlen(pBuffer) - 1] != '\n')
      strcat(pBuffer, "\n");

    if((SentBytes = send(SocketsRawTcpIpConfig.CurrentSocketDescr, pBuffer,
    (int)strlen(pBuffer), 0 )) < 0 )
    {
      printf( "Could not send data!\n" );
      WSACleanup();
      exit(3);
    }

    free(pBuffer);
  }

  return SentBytes;
}



/* METHOD ********************************************************************/
// Function name   : Receive
// Description     : Receives characters from the server
// Return type     : int: returns the total number of bytes received
// Argument        : char *pReceiveBuffer
// Argument        : unsigned int BufferSize: size of pReceiveBuffer
int Receive(char *pReceiveBuffer, unsigned int BufferSize)
{
  int ReceivedBytes = 0;
  int ReturnFromSelect;
  fd_set SelectReadFds;
  struct timeval SelectTimeout;


  if(SocketsRawTcpIpConfig.ClientIsConnected)
  {
    //clearing passed buffer
```

```
    memset(pReceiveBuffer, 0, BufferSize);


    //setting parameters for select(...)
    //which socket to address...
    SelectReadFds.fd_count = 1;
    SelectReadFds.fd_array[0] = SocketsRawTcpIpConfig.CurrentSocketDescr;
    //timeout
    SelectTimeout.tv_sec = (long)SocketsRawTcpIpConfig.Timeout;
    //based on seconds
    SelectTimeout.tv_usec = (long)((SocketsRawTcpIpConfig.Timeout -
    (double)SelectTimeout.tv_sec) / 1.0E-6);   //based on micro seconds

    //check if socket can be read
    ReturnFromSelect = select(0, &SelectReadFds, 0, 0, &SelectTimeout);
    switch(ReturnFromSelect)
    {
      case 0:  //timeout...no more data
        break;
      case 1:  //only one socket was checked
        //This is the answer we were waiting for... proceed with reading
        //read data and store in buffer
        //read one byte less than size of buffer otherwise string end will
        //be lost!
        ReceivedBytes = recv(SocketsRawTcpIpConfig.CurrentSocketDescr,
        pReceiveBuffer, BufferSize - 1, 0);

        if(ReceivedBytes <= 0)
        {
          printf( "Could not receive data!\n" );
          WSACleanup();
          exit(4);
        }
        break;
      default:
        break;
    }
  }

  return ReceivedBytes;
}



/* METHOD ********************************************************************/
// Function name   : _tmain
// Description     : main entry; simple terminal program
// Return type     : int
// Argument        : int argc
// Argument        : _TCHAR* argv[]
```

```
int _tmain(int argc, _TCHAR* argv[])
{
  char Command[1000];
  char Answer[10000];
  WORD wVersionRequested;
  WSADATA wsaData;
  int ReceivedBytes;


  //check program arguments
  if(argc != 4)
  {
    printf("Start this program with\n\
%s IP-address port timeout\n\
For R&S instruments \"port\" is preconfigured to 5025! Timeout is in
seconds.\n\n", argv[0]);

    printf("Example:\n\
%s 172.29.48.10 5025 0.5\n", argv[0]);

    exit(99);
  }


  //Initialize configuration
  memset(&SocketsRawTcpIpConfig, 0, sizeof(SocketsRawTcpIpConfig));
  SocketsRawTcpIpConfig.CurrentSocketDescr = INVALID_SOCKET;
  SocketsRawTcpIpConfig.ClientIsConnected = false;


  //Initialize WS2_32.dll
  wVersionRequested = MAKEWORD(2, 2);
  WSAStartup(wVersionRequested, &wsaData);


  //connect to desired server
  ConnectToServer(argv[1], argv[2], argv[3]);

  //main task:
  //  - wait for command to be sent to the unit
  //  - when the command contains a "?" wait for the answer sent by the unit
  //  - repeat as long as "quit" is entered
  printf("End program with \"quit\"!\n\n");
  printf("Command: ");
  while(strcmp(gets(Command), "quit"))  //quit program?
  {
    //Send command
    Transmit(Command);
```

```
    //was it a query command?
    if(strchr(Command, '?'))
    {
      printf("Answer: ");
      //because the answer could be longer than our buffer repeat reading
      //from socket
      do
      {
        ReceivedBytes = Receive(Answer, sizeof(Answer));
        printf("%s", Answer);
      }
      while(ReceivedBytes);

      printf("\n");
    }

    printf("Command: ");
  }


  //Terminate using WS2_32.dll
  WSACleanup();


          return 0;
}
```

4 Getting Started

This chapter provides the information needed to set up and start working with the instrument.

4.1 Preparing for Use

This chapter describes the basic steps to be taken when setting up the product for the first time.

4.1.1 Lifting and Carrying

See "Lifting and carrying the product" on page 16.

Use the handles to carry the R&S VTE.

4.1.2 Unpacking and Checking

The R&S VTE is shipped together with its mandatory accessories in a cardboard box.

1. Check the shipping container and cushioning material for damage.
2. Unpack the product carefully.
   a) Open the cardboard box.
   b) Remove the accessories packed into the box.
   c) Take the R&S VTE out of the packaging.
   d) Remove the shock protectors attached to the R&S VTE.
3. Retain the original packing material. Use it when transporting or shipping the product later.
4. Using the delivery documents, check the equipment for completeness.
5. Check the equipment for damage.

   If the delivery is incomplete or equipment is damaged, contact Rohde & Schwarz.

For information on warranty conditions for the R&S VTE, refer to the terms of the delivery documents.

4.1.3 Choosing the Operating Site

Specific operating conditions ensure accurate measurements and avoid damage to the product and connected devices. For information on environmental conditions such as ambient temperature and humidity, see the data sheet.

See also "Choosing the operating site" on page 17.

Electromagnetic compatibility classes

The electromagnetic compatibility (EMC) class indicates where you can operate the product. The EMC class of the product is given in the data sheet under "General data".

- Class B equipment is suitable for use in:
  - Residential environments
  - Environments that are directly connected to a low-voltage supply network that supplies residential buildings
- Class A equipment is intended for use in industrial environments. It can cause radio disturbances in residential environments due to possible conducted and radiated disturbances. It is therefore not suitable for class B environments.
  If class A equipment causes radio disturbances, take appropriate measures to eliminate them.

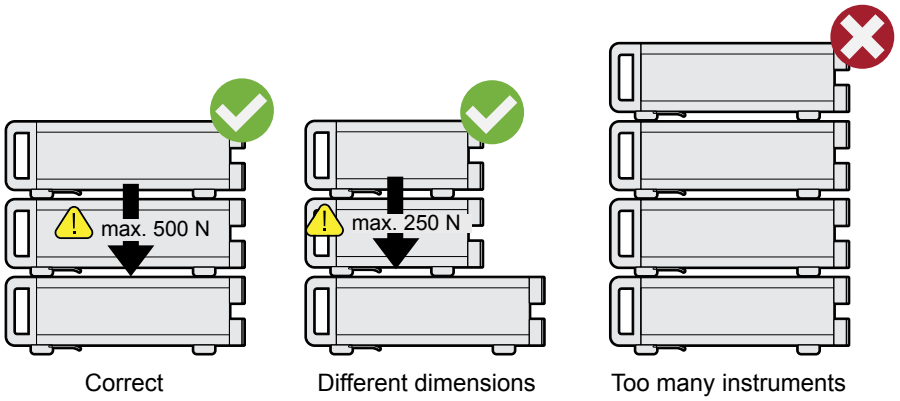
4.1.3.1 Setting Up the Product

See also:

- "Setting up the product" on page 17
- "Intended use" on page 16

To place the product on a bench top

1. Place the product on a stable, flat and level surface. Ensure that the surface can support the weight of the product. For information on the weight, see the data sheet.
2. **CAUTION!** Foldable feet can collapse. See "Setting up the product" on page 17.
   Always fold the feet completely in or out. With folded-out feet, do not place anything on top or underneath the product.
3. **WARNING!** A stack of products can fall over and cause injury. Never stack more than three products on top of each other. Instead, mount them in a rack.
   Stack as follows:
   - It is best if all products have the same dimensions (width and length).
   - The overall load on the lowest product must not exceed 500 N.
   - With smaller products on top of the lowest product, the overall load on the lowest product must not exceed 250 N.



4. **NOTICE!** Overheating can damage the product.
   Prevent overheating as follows:
   - Keep a minimum distance of 10 cm between the fan openings of the product and any object in the vicinity.
   - Do not place the product next to heat-generating equipment such as radiators or other products.

You can mount the product in a 19" rack.

To prepare the rack

1. Observe the requirements and instructions in "Setting up the product" on page 17.
2. **NOTICE!** Insufficient airflow can cause overheating and damage the product.
   Design and implement an efficient ventilation concept for the rack.

To mount the product in a rack

1. Use an adapter kit to prepare the product for rack mounting.
   a) Order the rack adapter kit designed for the product. For the order number, see data sheet.
   b) Mount the adapter kit. Follow the assembly instructions provided with the adapter kit.
2. Lift the product to shelf height.
3. Grab the handles and push the product onto the shelf until the rack brackets fit closely to the rack.
4. Tighten all screws at the rack brackets to secure the product at the rack.

To unmount the product from a rack

1. Loosen the screws at the rack brackets.
2. Remove the product from the rack.

3. If placing the product on a bench top again, unmount the adapter kit from the product. Follow the instructions provided with the adapter kit.

4.1.4 Considerations for Test Setup

Cable selection and electromagnetic interference (EMI)

Electromagnetic interference (EMI) can affect the measurement results.

To suppress electromagnetic radiation during operation:

- Use high-quality shielded cables, especially for connecting the following:
  - RF/marker/trigger/reference inputs and outputs: Use cables with at least 80 dB to 1 GHz shielding, usually achieved by double-shielded cables.
  - USB interfaces: Use double-shielded cables no longer than 1 m. Use only USB devices that remain within the permissible EMI limits.
  - USB device port: Use double-shielded cables no longer than 5 m.
  - Display port interface: Only use peripheral equipment that does not cause limit violations.
  - DVI interface: Use a cable shielded with ferrite cores.
  - LAN interface: Use category 7 cables.
- Always terminate open cable ends.
- Ensure that connected external devices comply with EMC regulations.

Signal input and output levels

Information on signal levels is provided in the data sheet. Keep the signal levels within the specified ranges to avoid damage to the product and connected devices.

4.1.5 Connecting to Power

For safety information, see "Connecting to power" on page 17.

The R&S VTE is powered by alternating current.

1. Plug the AC power cable into the AC power connector on the rear panel of the product. Only use the AC power cable delivered with the product.
2. Plug the AC power cable into a power outlet with ground contact.

   The required ratings are listed next to the AC power connector and in the data sheet.

Further information:

- Chapter 4.2.2.1, "AC Power Supply Connector and Switch", on page 65

4.1.6 Connecting External USB Devices

Using the USB interfaces, you can directly connect USB devices to the R&S VTE. This number can be increased as necessary by using USB hubs.

Due to the large number of available USB devices, there is almost no limit to the possible expansions. In the following, USB devices that can be useful are listed.

- Keyboard for entering comments, file names, etc. or for easy access to Windows 7 settings. See Chapter 4.1.6.1, "External Keyboard", on page 58.
- Mouse if you prefer this way of operation over a touchscreen. See Chapter 4.1.6.2, "Mouse", on page 59.
- Memory stick for easy transfer of data to/from a computer (e.g. firmware updates). See Chapter 4.1.6.3, "Memory Stick", on page 59.
- External drives for easy installation of firmware applications. See Chapter 4.1.6.4, "External Drive", on page 59.
- Printer for printing measurement results.

To install a USB device

1. Connect the USB device to the R&S VTE. You can connect a USB device during operation because all USB devices are Plug and Play.

   Windows 7 automatically searches for a suitable device driver.

2. If Windows 7 does not find a suitable driver, it prompts you to specify a directory that contains the driver software. If the driver software is on a CD-ROM, connect a USB CD–ROM drive to the R&S VTE before proceeding.

To uninstall a USB device

► Disconnect the USB device from the R&S VTE at any time convenient.

Windows 7 immediately detects the change in the hardware configuration and deactivates the corresponding driver.

4.1.6.1 External Keyboard

Connect the keyboard to one of the USB interfaces (type A). The default language setting is for a UK keyboard. You can change the language and modify other settings such as the repetition rate in Windows 7. For information on how to change these settings refer to the Windows 7 documentation.

Table 4-1: Corresponding keys: front panel - external keyboard

Key on front panel	Corresponding key on keyboard	Function description
Rotary knob: left turn	<Shift>+<Tab>	Chapter 4.2.1.4, "Rotary Knob", on page 63
Rotary knob: right turn	<Tab>	"
Rotary knob: press	<Shift>+<Enter>	"
Cursor keys	<Left Arrow>, <Right Arrow>, <Up Arrow>, <Down Arrow>	Chapter 4.2.1.2, "Cursor Keys", on page 62

Key on front panel	Corresponding key on keyboard	Function description
[ENTER]	<Enter>	"
[ESC]	ESC	"

4.1.6.2 Mouse

You can change settings such as the speed of the mouse cursor in Windows 7. For information, see the Windows 7 documentation.

4.1.6.3 Memory Stick

The R&S VTE has a disk drive. You can exchange data by using a memory stick which you plug into one of the USB interfaces. The memory stick is automatically assigned a free drive letter and you can use Windows Explorer to transfer data.

4.1.6.4 External Drive

You can use the USB interface to supply the power for an external hard disk drive (HDD). Make sure that the maximum current suffices the power requirement of the HDD. For USB 2.0, the maximum current is limited to 500 mA. With a Y cable, you can use a second USB port as additional power supply.

4.1.7 Switching On or Off

Table 4-2: Overview of power states

Status	LEDs at standby key	Position of power switch
Off	Not illuminated	[0]
Standby	yellow LED (right) illuminated.	[I]
Ready	green LED (left) illuminated.	[I]

The standby key is at the front panel of the R&S VTE, see Chapter 4.2.1.1, "Standby Key", on page 62.

The power switch is at the rear panel of the R&S VTE, see Chapter 4.2.2.1, "AC Power Supply Connector and Switch", on page 65.

To switch on the product

The product is off but connected to power.

1. Set the switch on the power supply to position [I].

   The yellow LED at the standby key is illuminated.

2. Press the standby key.

The green LED at the standby key is illuminated.

The R&S VTE starts booting:

- The installed BIOS version and some of the computer features are displayed on the screen for a few seconds.
- The Windows 7 operating system is booted, followed by the R&S VTE firmware.
- A self-test is performed.

After booting is completed, the main screen of the R&S VTE is displayed, and the R&S VTE is ready for operation.
The configuration settings that were active before the R&S VTE was last shutdown are automatically restored.

Use the "File" dialog to load another instrument setting, see Chapter 5, "File and Data Management", on page 86.

Activating the power save mode

Power save mode is not set by default for the R&S VTE.

If you do not need the display, you can switch off the monitor in Windows 7. For details, refer to the Windows 7 documentation.

To shut down the product

The product is in the ready state.

► Press the standby key.

The operating system shuts down. The yellow LED at the standby key is illuminated.

To disconnect from power

The product is in the standby state.

1. **NOTICE!** Risk of data loss. If you disconnect the product from power when it is in the ready state, you can lose settings and data. Shut it down first.

   Set the switch on the power supply to position [0].

   The LEDs at the standby key are switched off.

2. Disconnect the product from the power source.

4.1.8 Checking the Provided Options

The R&S VTE can be equipped with options. To check whether the installed options correspond to the options indicated on the delivery note, proceed as follows.

1. In the toolbar, tap .
2. Select the "SW/HW Equipment" tab.

3. Under "Hardware Configuration", check the availability of the hardware options as indicated in the delivery note.
4. Under "Installed Software", check the availability of the software options as indicated in the delivery note.

Further information:

- Chapter 6.4, "SW/HW-Equipment Tab", on page 105.

For an overview of the all options available for the R&S VTE, refer to the Rohde & Schwarz Homepage.

4.1.9 Turn-On Tests

During power-on and on an ongoing basis during operation, the R&S VTE automatically monitors the main instrument functions. If an error is detected, a message is displayed. Read the description of the error or warning carefully.

Besides automatic monitoring of instrument functions, the R&S VTE also offers the following way of ensuring proper operation.

4.2 Instrument Tour

This chapter describes the front panel and the rear panel of the R&S VTE, including all status LEDs, connectors and modules.

For information on permissible input and output levels, see the data sheet.

Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, follow the instructions in "Cable selection and electromagnetic interference (EMI)" on page 57.

The meanings of the labels on the product are described in Chapter 2.2, "Labels on the Product", on page 18.

4.2.1 Front Panel

This chapter provides an overview of the controls and connectors on the front panel. Each control or connector is briefly described along with a reference to the chapters containing detailed information about its usage.

Figure 4-1: Front panel view

1 = Standby key
2 = USB interfaces
3 = Headphones
4 = Rotary knob
5 = Cursor/ENTER/ESC keys
6 = Display

4.2.1.1 Standby Key

See (1) in Figure 4-1.

For safety information, see "Connecting to power" on page 17.

The standby key works only if the AC power switch on the back of the R&S VTE is switched on. The standby key switches the R&S VTE from standby to on and back.

Further information:

- Chapter 4.1.5, "Connecting to Power", on page 57
- Chapter 4.1.7, "Switching On or Off", on page 59

4.2.1.2 Cursor Keys

See (5) in Figure 4-1.

Cursor keys

<Up Arrow>/<Down Arrow> keys:

- Moves the focus vertically in windows, dialogs, tables and lists.
- If a numeric parameter value is in editing mode, increases or decreases the digit value at the cursor position.

<Left Arrow>/<Right Arrow> keys:

- Moves the focus horizontally in windows, dialogs, tables and lists.
- If a numeric parameter value is in editing mode, moves the cursor from digit to digit.

4.2.1.3 ENTER/ESC Keys

See (5) in Figure 4-1.

ENTER key

Pressing the [ENTER] key performs one of the following actions:

- If the focused parameter has numeric values, activates the editing mode.
- If the focused parameter has alphanumeric values other than "ON"/"OFF", opens the parameter value list.
- If the focused parameter has the values "ON"/"OFF", changes from one to the other.
- Completes the data entry and accepts the new value. For numeric parameter values, the unit is displayed in the menu next to the value.
- Confirms and closes message windows (as tapping "OK").

ESC key

- Exits the selected parameter value without making changes.
- Exits the dialog without making changes.

4.2.1.4 Rotary Knob

See (4) in Figure 4-1.

Turning the rotary knob performs one of the following actions:

- Moves the focus in windows, dialogs, tables and lists.
- If a numeric parameter value is in editing mode, increases or decreases the digit value at the cursor position.

Pressing the rotary knob performs the same actions as the [ENTER] key.

Further information:

- "ENTER key" on page 63.
- Chapter 3.3.3, "Setting Parameters", on page 26).

4.2.1.5 Display

See (6) in Figure 4-1.

For information on the touch screen operation, see Chapter 3, "Operating Concepts", on page 20.

4.2.1.6 USB Interfaces

See (2) in Figure 4-1.

See Chapter 4.2.2.9, "USB Interfaces", on page 69.

4.2.1.7 Headphones

See (3) in Figure 4-1.

For safety information, see "Connecting headphones" on page 18.

The jack socket for the L/R analog audio output provides the Windows system sound. The socket is intended for connecting headphones or an active loudspeaker.

The R&S VTE has an internal active loudspeaker. If the jack socket for the L/R analog audio output is connected, the internal loudspeaker is disabled.

4.2.2 Rear Panel

This chapter provides an overview of the controls and connectors on the rear panel. Each control or connector is briefly described along with a reference to the chapters containing detailed information about its usage.

Figure 4-2: Rear panel view

1 = Trigger input
2 = Marker output
3 = AC power supply connector and switch
4 = External reference input
5 = Reference output
6/7 = DVI and display port
8 = LAN interface
9 = USB interfaces type A
10 = USB interface type B
11 = eSATA interface
12 = Module (example); maximal number of modules: 3

4.2.2.1 AC Power Supply Connector and Switch

See (3) in Figure 4-2.

Observe the safety instructions in "Connecting to power" on page 17.

The IEC 320/EN 60320 AC power supply connector and the AC power switch are combined (type C14). For the ratings of the power supply, refer to the data sheet.

A fuse holder is integrated.

The AC power switch is located above the AC power supply connector.

Switch positions:

- [I]: Depending on the setting of the standby key on the front panel, the R&S VTE is either in standby mode or in operation.

- [O]: The entire instrument is disconnected from the AC power supply.

Further information:

- Chapter 4.1.5, "Connecting to Power", on page 57
- Chapter 4.1.7, "Switching On or Off", on page 59
- Chapter 18.2, "Changing Fuses", on page 1019

4.2.2.2 TRIGGER Input

See (1) in Figure 4-2.

BNC connector. Input for external triggering.

4.2.2.3 MARKER Output

See (2) in Figure 4-2.

BNC connector. Output of the internal marker signal.

See "Source" on page 110.

4.2.2.4 EXT REF IN

See (4) in Figure 4-2.

BNC connector. Input for the external reference frequency.

See "Source" on page 107.

4.2.2.5 REF OUT

See (5) in Figure 4-2.

BNC connector. Output of the internal reference signal. If activated, a signal is always present at this output.

When using an internal reference, the frequency generated by the internal reference oscillator of the R&S VTE is made available. If an external reference is activated, the signal applied to the reference frequency input is also available here. It is buffered and filtered.

See "Reference Out" on page 108.

4.2.2.6 DISPLAY PORT

See (6) in Figure 4-2.

The display port connector provides the monitor output signal of the built-in computer. The connected computer monitor needs to provide a resolution of 1024x768 pixels or higher.

You can use either the DISPLAY PORT or the DVI-D port. Using both connectors at the same time is not supported.

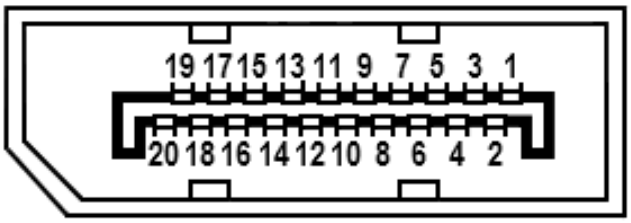


Table 4-3: Pin assignment

Pin	Name	Description
1	ML_Lane 0 (p)	Lane 0 (positive)
2	GND	Ground
3	ML_Lane 0 (n)	Lane 0 (negative)
4	ML_Lane 1 (p)	Lane 1 (positive)
5	GND	Ground
6	ML_Lane 1 (n)	Lane 1 (negative)
7	ML_Lane 2 (p)	Lane 2 (positive)
8	GND	Ground
9	ML_Lane 2 (n)	Lane 2 (negative)
10	ML_Lane 3 (p)	Lane 3 (positive)
11	GND	Ground
12	ML_Lane 3 (n)	Lane 3 (negative)
13	GND	Connected to ground
14	GND	Connected to ground
15	AUX_CH (p)	Auxiliary channel (positive)
16	GND	Ground
17	AUX_CH (n)	Auxiliary channel (negative)
18	Hot plug	Hot plug detect
19	Return	Return for power
20	DP_PWR	Power for connector (3.3 V, 500 mA)

4.2.2.7 DVI Port

See (7) in Figure 4-2.

DVI-D socket. Output for the monitor signal of the built-in computer. The connected computer monitor needs to provide a resolution of 1024x768 pixels or higher.

You can use either the DISPLAY PORT or the DVI-D port. Using both connectors at the same time is not supported.

You can use a DVI-I cable for connecting R&S VTE and display, but the analog video interface (pins C1 to C4) is not provided by the R&S VTE.

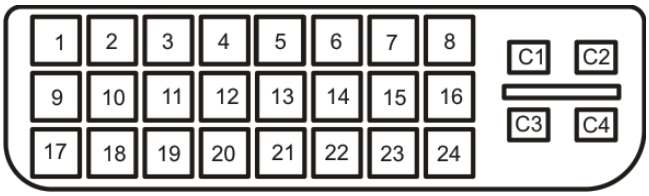


Table 4-4: Pin assignment

Pin	Signal	Pin	Signal
1	TMDS data 2-	15	Ground (for +5V)
2	TMDS data 2+	16	Hot plug detect (HPD)
3	TMDS data 2 shield	17	TMDS data 0-
4	Not used	18	TMDS data 0+
5	Not used	19	TMDS data 0 shield
6	DDC clock	20	Not used
7	DDC data	21	Not used
8	Analog vertical sync	22	TMDS clock shield
9	TMDS data 1-	23	TMDS clock+
10	TMDS data 1+	24	TMDS Clock-
11	TMDS data 1 shield	C1	Not used
12	Not used	C2	Not used
13	Not used	C3	Not used
14	+5V power	C4	Not used

4.2.2.8 LAN

See (8) in Figure 4-2.

1 gigabit LAN interface (1000 Base-T). Used to connect the R&S VTE to a local network for remote control, remote operation, printouts and data transfer. The assignment of the RJ.45 CAT5 connector supports twisted-pair category 7 UTP/STP cables in a star configuration (UTP stands for "unshielded twisted pair", and STP for "shielded twisted pair").

Do not connect or disconnect the network cable until the instrument is switched off. Otherwise, the network connection cannot be reliably detected.

Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, follow the instructions in "Cable selection and electromagnetic interference (EMI)" on page 57.

Further information:

- Chapter 3.9, "Operating the R&S VTE in a LAN", on page 37
- Chapter 3.11.2.1, "LAN Interface", on page 45.

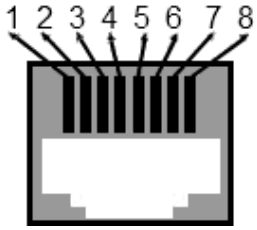


Table 4-5: Pin assignment

Pin	Name	Description
1	TX+_D1	Transmit data, positive
2	TX-_D1	Transmit data, negative
3	RX+_D2	Receive data, positive
4	BI+_D3	Bi-directional, positive
5	BI-_D3	Bi-directional, negative
6	RX-_D2	Receive data
7	BI+_D4	Bi-directional, positive
8	BI-_D4	Bi-directional, negative
Case	GND	Ground

4.2.2.9 USB Interfaces

See (9) in Figure 4-2.

USB 2.0 (universal serial bus) interfaces of the type A (host USB). Used to connect external devices like a keyboard, mouse, printer, memory stick, or to perform a firmware update.

Further information:

- Chapter 4.1.6, "Connecting External USB Devices", on page 58

Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, follow the instructions in "Cable selection and electromagnetic interference (EMI)" on page 57.

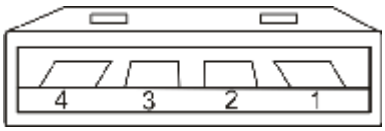


Table 4-6: Pin assignment

Pin	Signal name	Description
1	VBUS	Power + 5 V / + 0.5 A max.
2	D-	USB 2.0 differential pair
3	D+	
4	GND	Ground

4.2.2.10 USB DEVICE Port

See (10) in Figure 4-2.

USB 2.0 (universal serial bus) interface of the type B (receptacle). Used to connect the R&S VTE to a computer.

Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, follow the instructions in "Cable selection and electromagnetic interference (EMI)" on page 57.

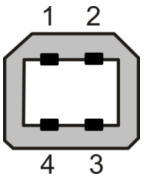


Table 4-7: Pin assignment

Pin	Abbreviation	Signal
1	VBUS	+5 V input
2	D-	Data -
3	D+	Data +
4	GND	Ground

4.2.2.11 eSATA Interface

See (11) in Figure 4-2.

External serial ATA (eSATA) interface. Used to connect external eSATA devices, e.g. hard disk drives.

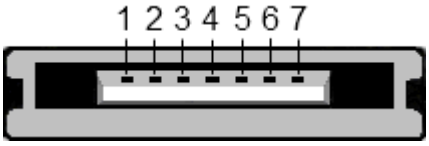


Table 4-8: Pin assignment

Pin	Name
1	GND
2	A +
3	A -
4	GND
5	B +
6	B -
7	GND

4.2.2.12 HDMI Connector

The HDMI type A socket is used in several optional modules. The pin assignment and pin assignment are as follows.

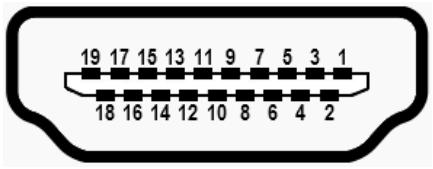


Figure 4-3: HDMI type A socket

Table 4-9: Pin assignment

Pin	Description
1	TMDS data2+
2	TMDS data2 shield
3	TMDS data2–
4	TMDS data1+
5	TMDS data1 shield
6	TMDS data1–
7	TMDS data0+
8	TMDS data0 shield
9	TMDS data0–
10	TMDS clock+
11	TMDS clock shield

Pin	Description
12	TMDS clock–
13	CEC
14	Reserved (not connected)
15	SCL
16	SDA
17	DDC/CEC ground
18	+5 V power (+5 V / 500 mA)
19	Hot plug detect

4.2.2.13 MHL RX/TX Module (R&S VT-B2350)

The MHL RX/TX module (R&S VT-B2350) is optional.

MHL is the abbreviation for mobile high-definition link.

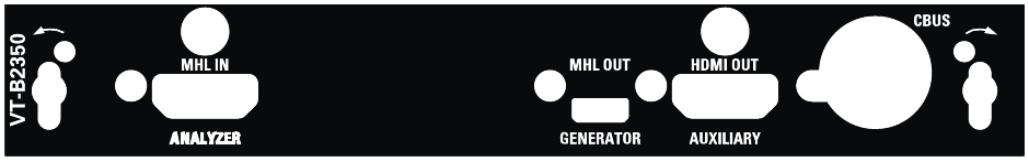


Figure 4-4: MHL RX/TX module

MHL IN ANALYZER

HDMI type A socket. Used to feed in an MHL signal conforming to the MHL specification version 1.1.

To help locating a connector socket, you can let its status LED flash. This LED is controlled under "Input" on page 448.

An LED indicates the status:

- LED off: Currently not used.
- LED green: Used by an application. Connected state is valid for the MHL signal.
- LED yellow: Used by an application but connection cannot be achieved.

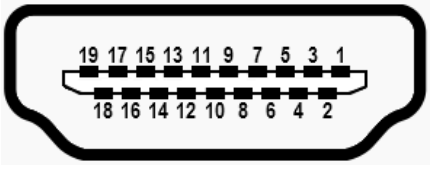


Figure 4-5: HDMI type A socket

Table 4-10: Pin assignment

Pin	Description
1	Not connected
2	CD_SENSE
3	Not connected
4	Not connected
5	TMDS GND
6	Not connected
7	MHL data+ (TMDS)
8	MHL data shield
9	MHL data– (TMDS)
10	Not connected
11	TMDS GND
12	Not connected
13	Not connected
14	Not connected
15	CD_PULLUP
16	Not connected
17	VBUS_CBUS_GND
18	VBUS (+5 V / 500 mA)
19	CBUS

MHL OUT GENERATOR

µUSB socket. Used to output an MHL signal conforming to the MHL specification version 1.1.

An LED indicates the status:

- LED off: Currently not used.
- LED blue: Used by an application.

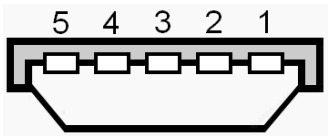


Figure 4-6: µUSB socket

Table 4-11: Pin assignment

Pin	Description
1	VBUS (+5 V / 200 mA)
2	MHL data– (TMDS)
3	MHL data+ (TMDS)
4	CBUS
5	Ground
Shield	Shield

HDMI OUT AUXILIARY

HDMI type A socket. Used to output an HDMI signal conforming to the HDMI specification version 1.4b.

An LED indicates the status:

- LED off: Currently not used.
- LED blue: Used by an application.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

CBUS

Currently not in use.

4.2.2.14 MHL RX PackedPixel Module (R&S VT-B2351)

The MHL RX PackedPixel module (R&S VT-B2351) is optional.

MHL is the abbreviation for mobile high-definition link.

Figure 4-7: MHL RX PackedPixel module

MHL IN ANALYZER

HDMI type A socket. Used to feed in an MHL signal conforming to the MHL specification version 2.0.

To help locating a connector socket, you can let its status LED flash. This LED is controlled under "Input" on page 448.

An LED indicates the status:

- LED off: Currently not used.
- LED green: Used by an application. Connected state is valid for the MHL signal.
- LED yellow: Used by an application but connection cannot be achieved.

The pin labeling is shown in Figure 4-5.

The pin assignment is shown in Table 4-10.

HDMI OUT AUXILIARY

HDMI type A socket. Used to output an HDMI signal conforming to the HDMI specification version 1.4b.

An LED indicates the status:

- LED off: Currently not used.
- LED blue: Used by an application.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

4.2.2.15 HDMI RX Module (R&S VT-B2360/2361)

The HDMI RX module is optional. It is available in two designs:

- HDMI RX 225 MHz (R&S VT-B2360)
- HDMI RX 300 MHz (R&S VT-B2361)

For details see also the data sheet.

Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, use the recommended cables. If no cable is noted, you can use a single shielded cable.

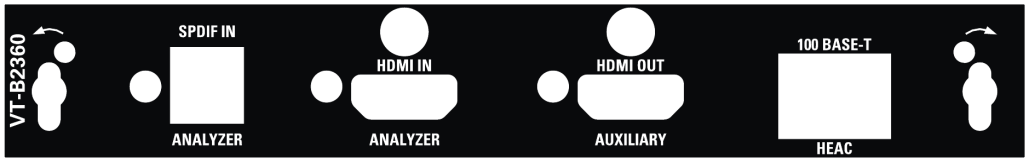


Figure 4-8: HDMI RX module

SPDIF IN ANALYZER

Toslink connector (female). Used as optical digital audio input.

The input is configured in the audio analyzer application under "Input" on page 168.

An LED indicates the status:

- LED off: Currently not used.
- LED green: Used by an application. Connected state is valid for the MHL signal.

- LED yellow: Used by an application but connection cannot be achieved.

HDMI IN ANALYZER

HDMI type A socket. Used to feed in an HDMI signal conforming to the HDMI specification version 1.4b. To connect to this input, use a HDMI 1.4 cable.

The input is configured in the HDMI analyzer, AV distortion analyzer, video analyzer, audio analyzer applications, "Input" tab, "Input" parameter.

An LED indicates the status:

- LED off: Currently not used.
- LED blue: Used by an application.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

HDMI OUT AUXILIARY

HDMI type A socket. Used to output an HDMI signal conforming to the HDMI specification version 1.4b. To connect to this output, use a HDMI 1.4 cable.

An LED indicates the status:

- LED off: Currently not used.
- LED blue: Used by an application.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

100 BASE-T HEAC

HEAC is the abbreviation for HDMI Ethernet and audio return channel

100 Mbit/s LAN interface (100 Base-T). Used to connect the HDMI Ethernet and audio return channel (HEAC). The assignment of the RJ.45 CAT5 connector supports twisted pair category 7 UTP/STP cables in a star configuration (UTP stands for "unshielded twisted pair", and STP for "shielded twisted pair").

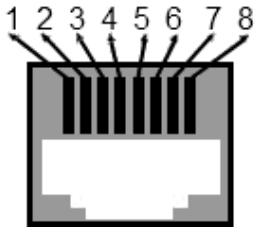


Table 4-12: Pin assignment

Pin	Name	Description
1	TX+_D1	Transmit data, positive
2	TX-_D1	Transmit data, negative
3	RX+_D2	Receive data, positive
4	BI+_D3	Bi-directional, positive

Pin	Name	Description
5	BI-_D3	Bi-directional, negative
6	RX-_D2	Receive data
7	BI+_D4	Bi-directional, positive
8	BI-_D4	Bi-directional, negative
Case	GND	Ground

4.2.2.16 HDMI TX Module (R&S VT-B360)

The HDMI TX module (R&S VT-B360) is optional.

Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, use the recommended cables. If no cable is noted, you can use a single shielded cable.

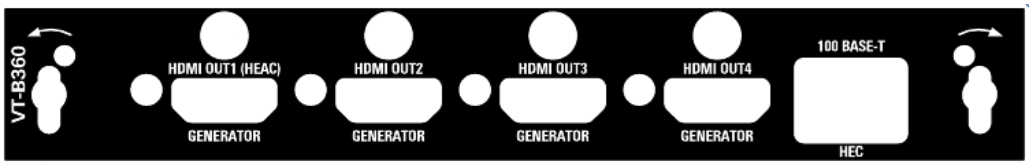


Figure 4-9: HDMI TX module

HDMI OUT1 (HEAC) GENERATOR, HDMI OUT2 GENERATOR, HDMI OUT3 GENERATOR, HDMI OUT4 GENERATOR

HDMI type A sockets. Used to output an HDMI signal conforming to the HDMI specification version 1.4b. To connect to this output, use a HDMI 1.4 cable category 2 conforming to the HDMI specification version 1.4b.

An LED indicates the status:

- LED off: Currently not used.
- LED blue: Used by an application.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

100 BASE-T HEC

HEC is the abbreviation for HDMI Ethernet channel.

100 Mbit/s LAN interface (100 Base-T). Used to connect the HDMI Ethernet and audio return channel (HEAC). The assignment of the RJ.45 CAT5 connector supports twisted pair category 7 UTP/STP cables in a star configuration (UTP stands for "unshielded twisted pair", and STP for "shielded twisted pair").

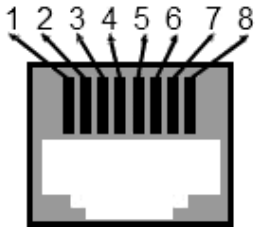


Table 4-13: Pin assignment

Pin	Name	Description
1	TX+_D1	Transmit data, positive
2	TX-_D1	Transmit data, negative
3	RX+_D2	Receive data, positive
4	BI+_D3	Bi-directional, positive
5	BI-_D3	Bi-directional, negative
6	RX-_D2	Receive data
7	BI+_D4	Bi-directional, positive
8	BI-_D4	Bi-directional, negative
Case	GND	Ground

4.2.2.17 HDMI CTS RX/TX 600 MHz Module (R&S VT-B2362)

The HDMI CTS RX/TX 600 MHz module (R&S VT-B2362) is optional.

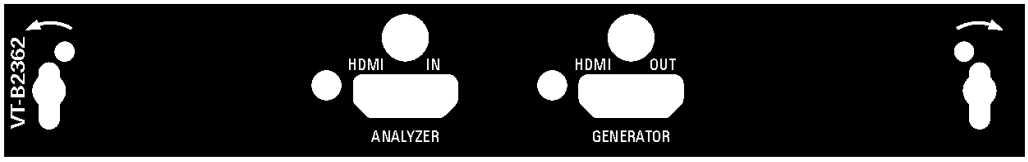


Figure 4-10: HDMI CTS RX/TX 600 MHz module

The module supports HDMI 2.0 and provides 2 interfaces. For details see also the data sheet.

HDMI IN ANALYZER

HDMI type A socket. Used to input an HDMI signal conforming to the HDMI specification version 2.0. To connect to this input, use a high-speed HDMI cable.

The input is configured in the HDMI analyzer application under "Input" on page 287.

An LED indicates the status:

- LED off: Currently not used.
- LED green: Used by an application. Connected state is valid for the HDMI signal.
- LED yellow: Used by an application but connection cannot be achieved.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

HDMI OUT GENERATOR

HDMI type A socket. Used to output an HDMI signal conforming to the HDMI specification version 2.0. To connect to this output, use a high-speed HDMI cable.

The output is configured in the HDMI generator application, "Output" tab, "HDMI Out" parameter.

An LED indicates the status:

- LED off: Currently not used.
- LED blue: Used by an application.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

4.2.2.18 HDMI RX/TX 600 MHz Module (R&S VT-B2363)

The HDMI RX/TX 600 MHz module (R&S VT-B2363) is optional.

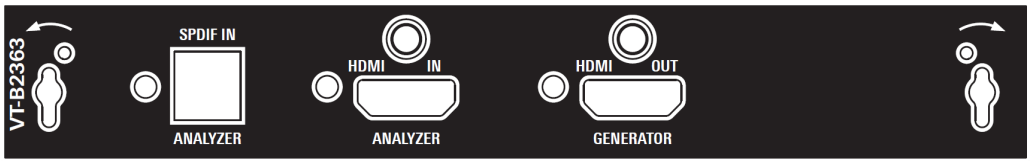


Figure 4-11: HDMI RX/TX 600 MHz module

The module supports HDMI 2.0. For details see also the data sheet.

SPDIF IN ANALYZER

Toslink connector (female). Used as optical digital audio input.

The input is configured in the audio analyzer application under "Input" on page 168.

An LED indicates the status:

- LED off: Currently not used.
- LED green: Used by an application.

HDMI IN ANALYZER

HDMI type A socket. Used to input an HDMI signal conforming to the HDMI specification version 2.0. To connect to this input, use a high-speed HDMI cable.

The input is configured in the HDMI analyzer application, "Input" tab, "Input" parameter.

An LED indicates the status:

- LED off: Currently not used.
- LED green: Used by an application. Connected state is valid for the HDMI signal.
- LED yellow: Used by an application but connection cannot be achieved.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

HDMI OUT GENERATOR

HDMI type A socket. Used to output an HDMI signal conforming to the HDMI specification version 2.0. To connect to this output, use a high-speed HDMI cable.

The output is configured in the HDMI generator application, "Output" tab, "HDMI Out" parameter.

An LED indicates the status:

- LED off: Currently not used.
- LED blue: Used by an application.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

4.2.2.19 Analog A/V RX Module (R&S VT-B2370)

The analog A/V RX module (R&S VT-B2370) is optional.

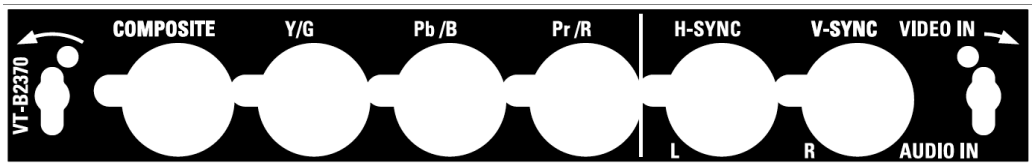


Figure 4-12: Analog A/V RX module

COMPOSITE

BNC connector. Used to feed in a composite video signal (700 mV, 75 Ω, DC coupled).

An LED indicates the status:

- LED off: Currently not used.
- LED green: Used by an application. Synchronization state is valid for the composite video.
- LED yellow: Used but synchronization cannot be achieved.

Y/G, Pb/B, Pr/R

BNC connectors. Used to feed in the three component video signals (700 mV, 75 Ω, DC coupled).

LEDs indicate the status:

- LED off: Currently not used.
- LED green: Used by an application. Synchronization state is valid for the component video.*
- LED yellow: Used but synchronization cannot be achieved.*

* Synchronization can be achieved by evaluating the Y/G signal or the external video synchronization signals fed in by the [H-SYNC] and [V-SYNC] connectors (see below).

H-SYNC and V-SYNC (VIDEO IN), L and R (AUDIO IN)

BNC connectors.

- L, R (AUDIO IN)
  Used to feed in audio signals L and R (unbalanced).
  L corresponds to "CH1", and R corresponds to "CH2".
- H-SYNC, V-SYNC (VIDEO IN)
  Used to feed in external video synchronization signals (high resistance).

LEDs indicate the status:

- LED off: Currently not used.
- LED green:
  – Used as audio input(s).
  – Used for external video synchronization. Synchronization state is valid.
- LED yellow: Used for external video synchronization. Synchronization cannot be achieved.

4.2.2.20 TMDS Time Domain Analyzer Module (R&S VT-B2380)

The TMDS time domain analyzer module (R&S VT-B2380) is optional.

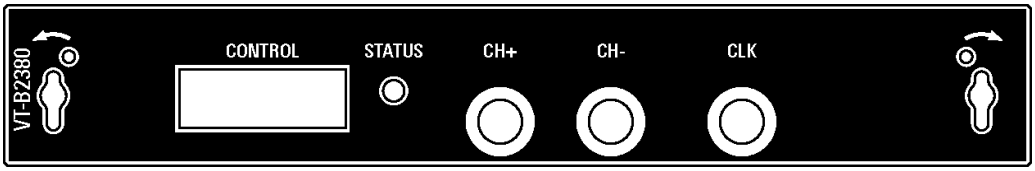


Figure 4-13: TMDS time domain analyzer module

The module provides 4 interfaces. For details see also the data sheet.

The module is delivered with a cable (2115.9719.00) to connect the HDMI type A TPA (plug) (R&S VT-Z2385). For instructions on the setup see Chapter 4.2.3.1, "HDMI Type A TPA (Plug) (R&S VT-Z2385)", on page 82.

CONTROL

This connector contains lines for driving the probe and control lines of the HDMI or MHL connection.

STATUS

LEDs indicate the status:

- Off: Currently not used.
- Green: Used by an application. Connected state is valid for the time domain measurement.
- Yellow: Used by an application but connection cannot be achieved.

CH+

SMA connector. This line carries the single ended positive TMDS signal without DC offset terminated with 50 Ω to ground.

CH-

SMA connector. This line carries the single ended negative TMDS signal without DC offset terminated with 50 Ω to ground.

CLK

SMA connector. This line carries the single ended clock signal without DC offset terminated with 50 Ω to ground.

4.2.3 Accessories

Rohde & Schwarz provides accessories for special measurement applications.

4.2.3.1 HDMI Type A TPA (Plug) (R&S VT-Z2385)

The HDMI type A TPA (plug) (R&S VT-Z2385), shortly referred to as probe, is optional. It is required for the time domain analyzer application (TDA), see Chapter 11, "Time Domain Analyzer Application", on page 368.

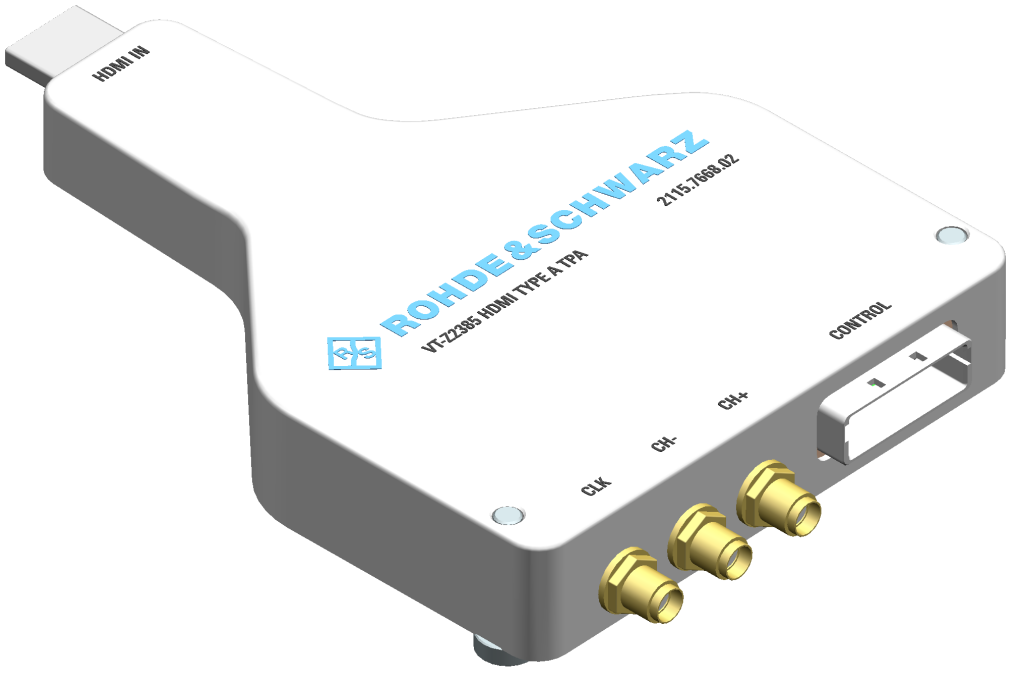


Figure 4-14: HDMI type A TPA (plug)

HDMI IN

HDMI type A connector. Used to connect the probe to the source. Suitable for sockets up to HDMI 2.0, HDMI 1.4b included.

CLK, CH-, CH+, CONTROL

These connectors are used to connect the probe to the TMDS time domain analyzer module (R&S VT-B2380).

Corresponding interfaces on the probe and on the TMDS time domain analyzer module carry the same name. They are described in Chapter 4.2.2.20, "TMDS Time Domain Analyzer Module (R&S VT-B2380)", on page 81.

The connected probe is signaled in the top left corner of the time domain analyzer application, see "Probe (default favorite)" on page 369. The connection of the RF cables cannot be checked.

Ensuring a proper connection

To connect the HDMI type A TPA (plug) (R&S VT-Z2385), only use the cable supplied with the TMDS time domain analyzer module (R&S VT-B2380), see Chapter 4.2.2.20, "TMDS Time Domain Analyzer Module (R&S VT-B2380)", on page 81.

Otherwise, your measurement results are not reliable.

To connect the probe

The R&S cable consists of 4 individual wires. To help you connect the correct ends, the wires are labeled. Matching ends carry the same name.

1. Connect the CONTROL connectors of the R&S cable:
   a) One end goes into the CONTROL socket of the TMDS time domain analyzer module (R&S VT-B2380).
   b) The other end goes into the CONTROL socket of the probe.

   The CONTROL connectors are unique and cannot be confused.
2. Connect the CH+, CH- and CLK connectors of the R&S cable:
   a) Take care to connect only connectors and sockets carrying the same name.
   b) Use the torque wrench provided with the cable to ensure optimal connection. It is a torque wrench with 8·lbf-in (0.9 Nm).

4.2.3.2 HDMI Pass-Through Adapter (R&S VT-Z2390)

The HDMI pass-through adapter (R&S VT-Z2390) is optional.

Use the adapter to trace the communication between 2 devices in the CEC/DDC analyzer application.

Further information:

- Chapter 10.3, "CEC/DDC Analyzer Application", on page 333
- Chapter 10.3.4, "Tracer Subtab", on page 343

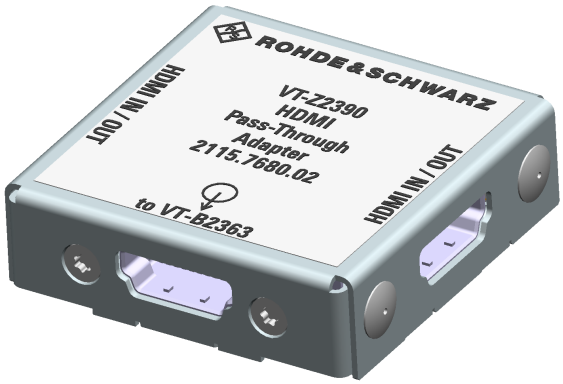


Figure 4-15: HDMI pass-through adapter

to R&S VT-B2363

HDMI type A socket. Connect it to either socket of the HDMI RX/TX 600 MHz module (R&S VT-B2363):

- HDMI IN ANALYZER
- HDMI OUT GENERATOR

Use a high-speed HDMI cable.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

See also Chapter 4.2.2.18, "HDMI RX/TX 600 MHz Module (R&S VT-B2363)", on page 79.

HDMI IN/OUT

HDMI type A socket. Used to input/output an HDMI signal conforming to the HDMI specification version 2.0. To connect to this input/output, use a high-speed HDMI cable.

The pin labeling and pin assignment are shown in Chapter 4.2.2.12, "HDMI Connector", on page 71.

5 File and Data Management

The R&S VTE uses files to save all instrument and user data. Managing files is a central application. When you open the "File" dialog, the current application is still running, but it is covered by the "File" dialog. For general information on the graphical user interface, see Chapter 3.3, "On-Screen Actions", on page 25.

The tabs available in the "File" dialog depend on the method you apply to open it.

To open the general File dialog

► In the toolbar, tap .

To open the application-specific File dialog

► On the application tab, tap or "Save".

The application-specific "File" dialog is displayed, see "Application-specific File dialog" on page 90.

File types

The file type depends on the file content.

Table 5-1: Available file types

File extension	Content	Application if not generally used
AVR	Reference sequences	AV distortion analyzer
BIN	Extended display identification data (EDID)	
BMP	Captured screenshots	
CSV	Logs Analog video measurement results	AV distortion analyzer Video analyzer
HDMI	Captured data	HDMI analyzer
JPG	Captured screenshots	
MHL	Data captured in normal mode	MHL analyzer
MHLP	Data captured in PackedPixel mode	MHL analyzer
PNG	Captured screenshots	
SAVRCL	Saved instrument settings	
VMVTX	Auto and measurement settings	Video analyzer

Further information:

- Instrument drives see "<Drive>" on page 90

5.1 Saving and Recalling Instrument Settings

You can save instrument settings and recall them later for the following purposes:

- To repeat a measurement under specific conditions on the R&S VTE.
- To transfer the settings used in a test setup with more than one R&S VTE.

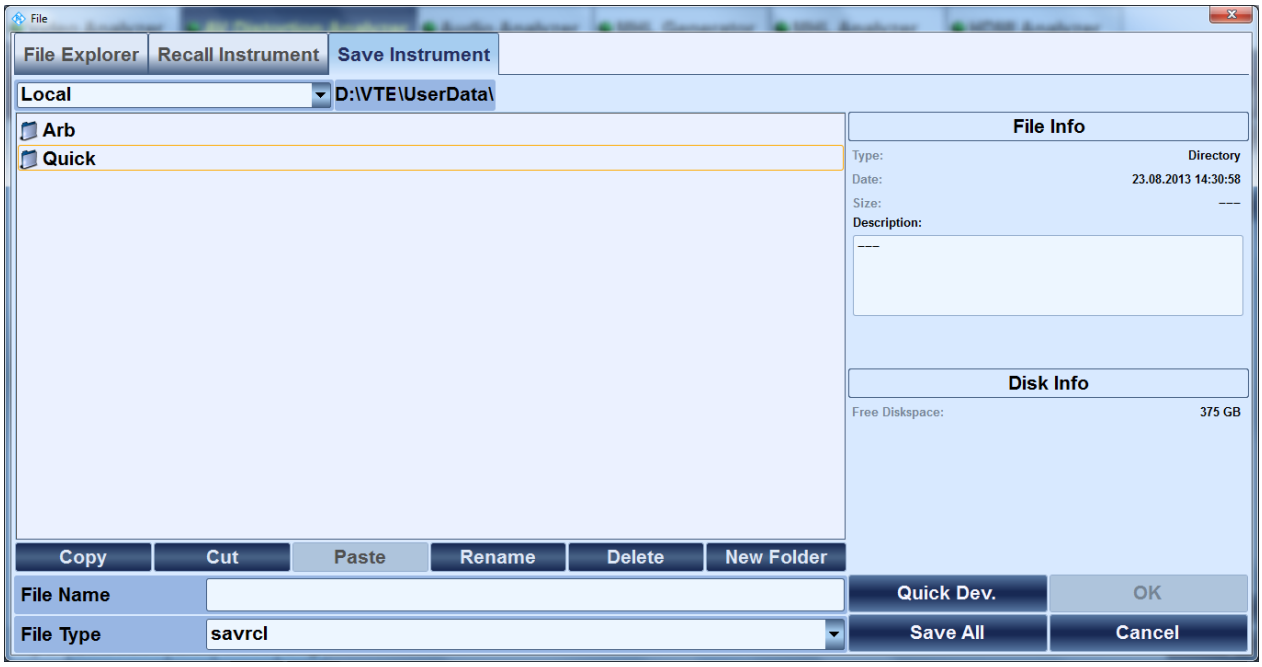
To save instrument settings, you can:

- Use the intermediate memories, see "Quick Device dialog" on page 93
- Create, save and recall files, as described in the following step-by-step instructions.

Both ways are provided in general "File" dialog.

To save the instrument settings

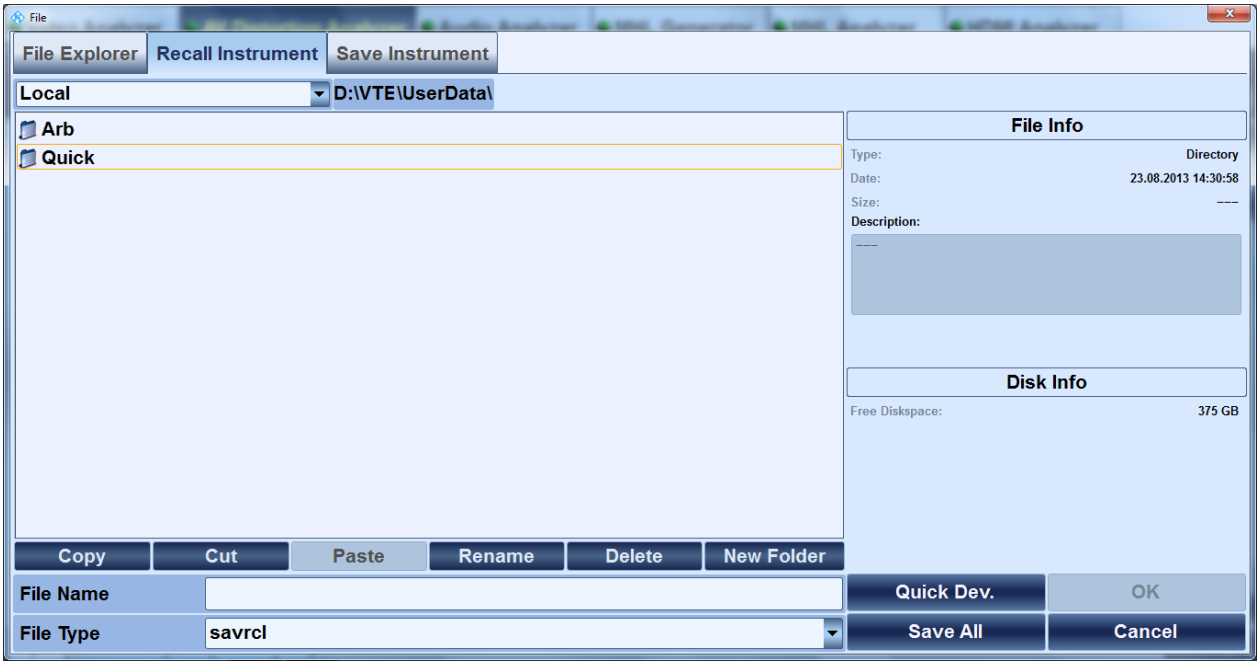
1. Open the general "File" dialog, see "To open the general File dialog" on page 86.
2. Select the "Save Instrument" tab.



3. Select the drive where you want to save the instrument settings.
4. Select an existing folder or create a new one.
5. Enter a file name or select a file to overwrite it.
6. Tap "OK" to save the instrument settings.

To recall the instrument settings

1. Open the general "File" dialog, see "To open the general File dialog" on page 86.
2. Select the "Recall Instrument" tab.



3. Select the drive from which you want to recall the instrument settings.
4. Select a folder.
5. Select a file.

   Note: Only files that match the selected extension are displayed.
6. Tap "OK" to recall the instrument settings.

5.2 Saving and Loading Files

If you need to save or load application-specific files, the application provides access to the application-specific "File" dialog. For these files, a preconfigured default folder already exists and is displayed on opening the dialog.

To save a file

1. Open the application-specific "File" dialog, see "To open the application-specific File dialog" on page 86.

   The "Save <file>" tab is displayed.
   The suitable file type is already selected under "File Type" on page 92.
2. Select the drive where you want to save the file.
3. Select an existing folder or create a new one.
4. Enter a file name.
5. Tap "OK" to save the file.

To load a file

1. Open the application-specific "File" dialog, see "To open the application-specific File dialog" on page 86.
2. Select the "Load <file>" or "Recall <file>" tab.
3. Select the drive from which you want to load the file.
4. Select a folder.
5. Select a file.

   Note: Only files that match the selected extension are displayed.
6. Tap "OK" to load the file.

Remote commands

- `MMEMory:ATTRibute` on page 499
- `MMEMory:LOAD:STATe` on page 503
- `MMEMory:STORe:STATe` on page 505

5.3 File Dialog

The "File" dialog always contains a tab like the "File Explorer" tab. It offers access to the available drives to manage your data. You can use the preconfigured default folders, but you can also create your own folders.

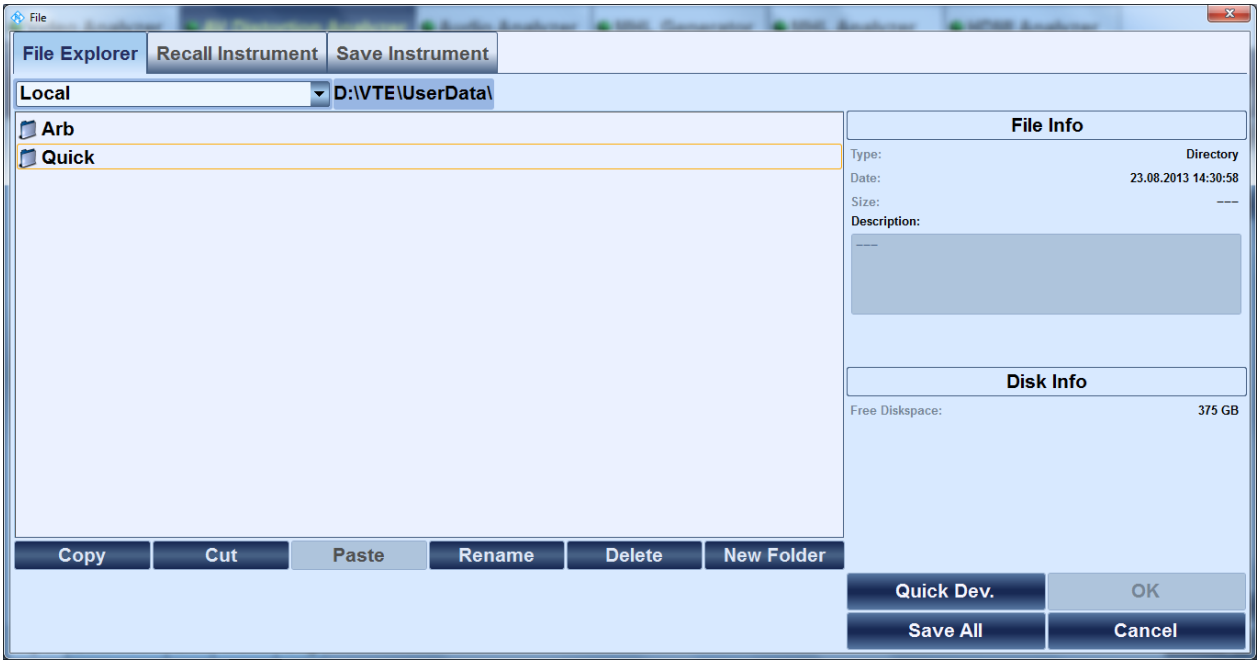


Figure 5-1: File Explorer tab

The tabs available in the "File" dialog depend on the method you apply to open it:

- "To open the general File dialog" on page 86
- "To open the application-specific File dialog" on page 86

General File dialog

Use this dialog for the following tasks:

- Managing your data on the "File Explorer" tab.
- Chapter 5.1, "Saving and Recalling Instrument Settings", on page 87.

Application-specific File dialog

Use this dialog for the following task:

- Chapter 5.2, "Saving and Loading Files", on page 88

Tabs in the File dialog

All tabs are similarly structured. If not restricted, the description of the controls applies to all tabs.

<Drive>
Selects the drive. The path is displayed next to the selected drive.

- "Local"
  `D:` drive for storing user-defined data. The `D:` drive can have any number of folder structures. Various default folders are preconfigured to facilitate file sorting.
- "<Memory stick>"
  If a memory stick is connected, the name of the memory stick is displayed in the list. It is assigned the `E:` drive.
- <Network drive>
  If the R&S VTE is connected to a network, all network drives for which you have access rights are displayed.

Note: C: drive. The `C:` drive is a protected system drive. To prevent system files from being deleted or overwritten inadvertently, the `C:` drive is not displayed. It can be accessed only by the service.

Remote command:
`MMEMory:CDIRectory` on page 501
`MMEMory:MSIS` on page 505
`MMEMory:DRIVes?` on page 503

<Folders>
Displays all folders, subfolders and files available in the selected directory.

You can open and close folders and select files. Use the buttons below the folders to perform further actions.

Remote command:
`MMEMory:CATalog?` on page 500
`MMEMory:CATalog:LENGth?` on page 500
`MMEMory:DCATalog?` on page 502
`MMEMory:DCATalog:LENGth?` on page 502

Copy button
Copies the selected file or folder to the clipboard. Used in combination with "Paste button" on page 91.

Remote command:
`MMEMory:COPY` on page 501

Cut button
Copies the selected file or folder to the clipboard and deletes it from the folder. Used to move a file in combination with "Paste button" on page 91.

Remote command:
`MMEMory:MOVE` on page 504

Paste button
Only available, if a file or folder has been copied to the clipboard ("Copy button" on page 91, "Cut button" on page 91).

Inserts the selected file or folder at the selected position.

Remote command:
`MMEMory:MOVE` on page 504

Rename button
Opens the "Rename" dialog ("Rename dialog" on page 91).

Rename dialog ← Rename button
Displays the current folder or file name. To change the name, use the on-screen keyboard (Chapter 3.3.3.2, "On-Screen Keyboard", on page 29).

Delete button
Deletes the selected file or folder after confirmation.

Remote command:
MMEMory:DELete on page 503
MMEMory:RDIRectory on page 505

New Folder button
Opens the "New Folder" dialog ("New Folder dialog" on page 92).

New Folder dialog ← New Folder button
Enter a name for the new folder using the on-screen keyboard (Chapter 3.3.3.2, "On-Screen Keyboard", on page 29).

Remote command:
MMEMory:MDIRectory on page 504

File Name
Not available on the "File Explorer" tab.

File name for loading or saving a file. If you want to enter or change a name, use the on-screen keyboard (Chapter 3.3.3.2, "On-Screen Keyboard", on page 29).

Remote command:
MMEMory:DATA on page 501
HCOPy:FILE on page 496

File Type
Not available on the "File Explorer" tab.

The suitable extension is already selected. In the list, only extensions suitable for this application are displayed. For information on all file types, see Table 5-1.

Note: The selected file type works as a filter. In the folders, you can only see files that match the selected extension.

Remote command:
MMEMory:DATA on page 501
HCOPy:DEVice:FORMat on page 496

File Info
Displays the file type and size, the date when the file was saved and, if available, a description.

If you save a file, you can enter a description.

Remote command:
HCOPy:DEVice:METadata on page 496

Disk Info
Displays the free disk space available to save data.

Quick Dev. button
Only available on the "Save Instrument" and "Recall Instrument" tabs.

Opens the "Quick Device" dialog ("Quick Device dialog" on page 93).

Quick Device dialog ← Quick Dev. button
Provides 5 intermediate memories for saving and recalling instrument data quickly without bothering with file names. You just have to keep the characteristics of these settings in mind for reusing (recalling) them.

In the "Save" column, tap one of the buttons. For example, if you tap "Save Quick 1", the file is saved as `Quick1.savrcl` in the `Quick` folder. If a file with this name already exists, you can overwrite it.

In the "Load" column, tap one of the buttons. For example, if you tap "Load Quick 1", the `Quick1.savrcl` file is loaded from the `Quick` folder.

Further information, see also Chapter 5.1, "Saving and Recalling Instrument Settings", on page 87.

Remote command:
`*SAV` on page 494
`*RCL` on page 493

Save All
Only available on the "Save Instrument" and "Recall Instrument" tabs.

Saves all current settings immediately. If the settings are not changed afterwards, these settings are provided when the R&S VTE is switched off and on again.

6 Basic Instrument Configurations

The setup is a central application. When you open the "Setup" dialog, the current application is still running, but it is covered by the "Setup" dialog. For general information on the graphical user interface, see Chapter 3.3, "On-Screen Actions", on page 25.

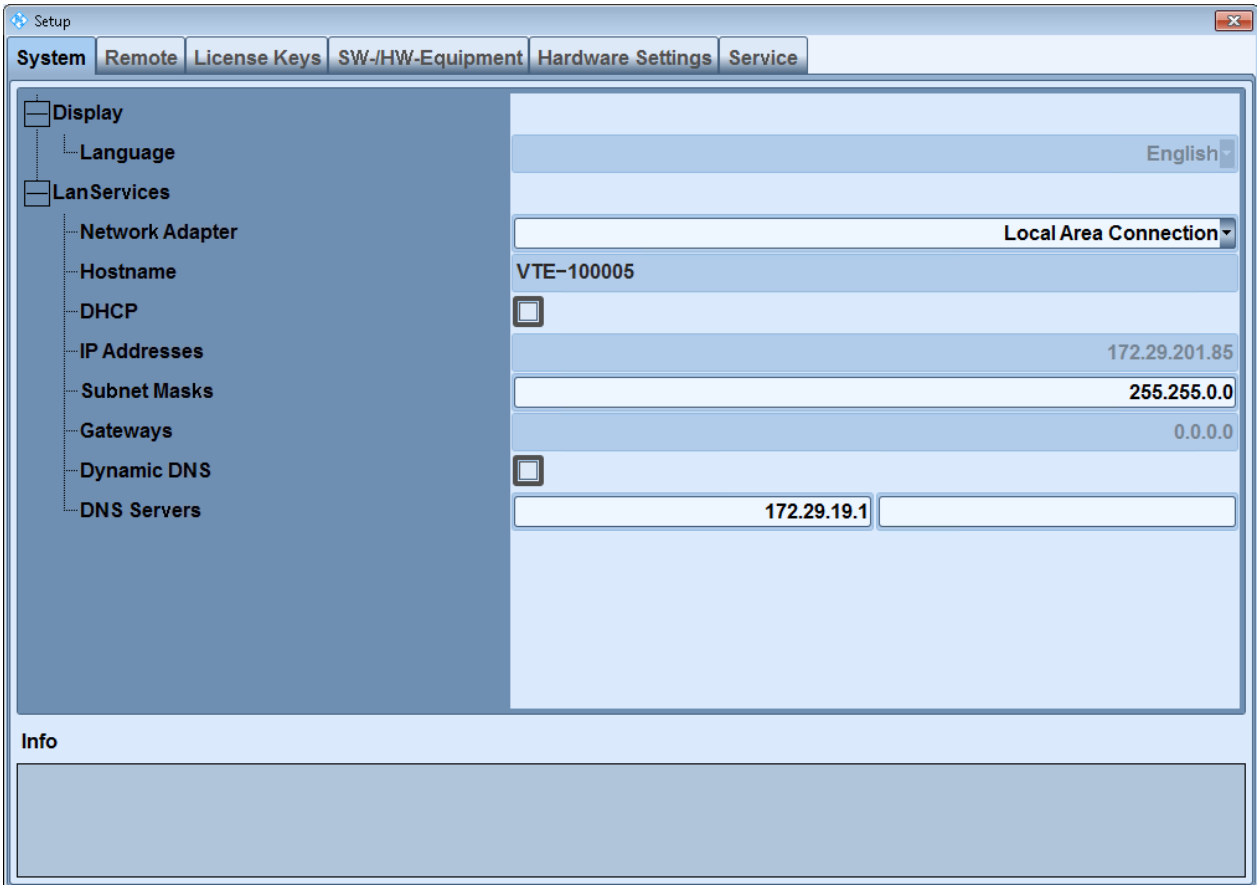
To display the Setup dialog

► In the toolbar, tap .

The "Setup" dialog is displayed.

6.1 System Tab

The tab is divided into two panes. In the lower "Info" pane, additional information is displayed.



Display
Groups the parameters for configuring the display.

Language ← Display
Sets the language of the graphical user interface. Fixed setting.

Remote command:
`SYSTem:DISPlay:LANGuage` on page 517

LAN Services
Groups the parameters for configuring the LAN. Some of these settings, you can also configure in Windows, but they are accessible here for your convenience.

If you are not familiar with LAN configurations, ask your network administrator.

Network Adapter ← LAN Services
Displays the available LAN networks. If there is more than one, you can select one from the list. See also Chapter 3.9.1, "Connecting the R&S VTE to a Network", on page 38.

Remote command:
`SYSTem:COMMunicate:NET:ADAPter` on page 513

Host Name ← LAN Services
Displays the computer name. Each instrument is delivered with a default computer name, but you can change it. The naming conventions of Windows apply.

See also "Naming rule for the default computer name" on page 40.

Remote command:
`SYSTem:COMMunicate:NET:HOSTname?` on page 514

DHCP ← LAN Services
If your network has a DHCP server and you want to use it, enable this option. See also Chapter 3.9.4, "Configuring the Network Card", on page 39.

DHCP = dynamic host configuration protocol

Remote command:
`SYSTem:COMMunicate:NET:DHCP?` on page 513

IP Addresses ← LAN Services
Defines the IP address. The TCP/IP protocol is pre-installed with the IP address *10.0.0.10*. If the DHCP server is available, the parameter is read-only (see "DHCP" on page 95).

The IP address consists of 4 number blocks separated by dots. In maximum, each block contains 3 digits, for example *100.100.100.100*. Less digits in a block are also allowed, as an example see the pre-installed address.

See also Chapter 3.9.1, "Connecting the R&S VTE to a Network", on page 38.

Remote command:
`SYSTem:COMMunicate:NET:IPADdress?` on page 514

Subnet Masks ← LAN Services
Sets the subnet mask. The TCP/IP protocol is pre-installed with the subnet mask *255.255.255.0*. If the DHCP server is available, the parameter is read-only (see "DHCP" on page 95).

The subnet mask consists of 4 number blocks separated by dots. In maximum, each block contains 3 digits, for example *100.100.100.100*. Less digits in a block are also allowed, as an example see the pre-installed address.

Remote command:
`SYSTem:COMMunicate:NET:SUBNet:MASK?` on page 514

Gateways ← LAN Services
Defines the gateway address. If the DHCP server is available, the parameter is read-only (see "DHCP" on page 95).

The gateway address consists of 4 number blocks separated by dots. In maximum, each block contains 3 digits, for example *100.100.100.100*. Less digits in a block are also allowed, for example *12.345.67.8*.

Remote command:
`SYSTem:COMMunicate:NET:GATeway?` on page 513

Dynamic DNS ← LAN Services
If you want to obtain the DNS server address automatically, enable this option.

If you want to define a DNS server address, disable this option and enter the DNS server address under "DNS Servers" on page 96.

DNS = domain name system

Remote command:
`SYSTem:COMMunicate:NET:DNS:ENABle?` on page 513

DNS Servers ← LAN Services
Sets the IP addresses of the primary and secondary DNS servers. Only used if dynamic DNS is disabled ("Dynamic DNS" on page 96).

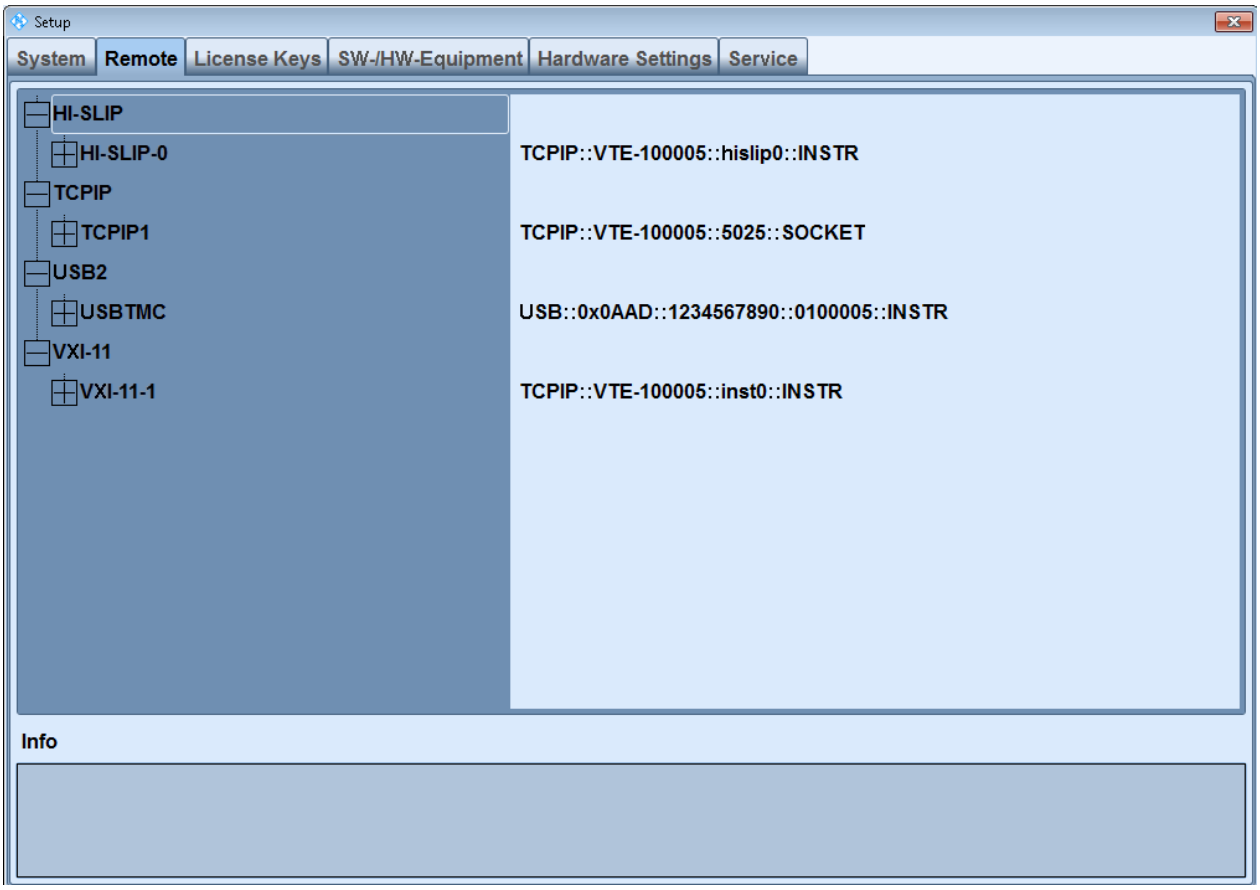
If the DHCP server is available, the parameter is read-only (see "DHCP" on page 95).

6.2 Remote Tab

For remote control, communication between the R&S VTE and the controlling computer is established based on the VISA (virtual instrument software architecture) standard. Depending on the interface used for the connection between R&S VTE and com-

puter, different protocols are used. The remote control information is sorted according to the used protocol. See also Chapter 3.11, "Setting Up Remote Control", on page 44.

The tab is divided into two panes. In the lower "Info" pane, additional information is displayed.



HiSLIP
Lists the connections using the high-speed LAN instrument protocol (HiSLIP), see "HiSLIP protocol" on page 46.

HiSLIP-n ← HiSLIP
The connections are numbered consecutively, starting at 0. For each connection, detailed information is listed.

Visa Resource ← HiSLIP-n ← HiSLIP
Displays the resource name used by the programs for identification and control of the R&S VTE. Has the form *TCPIP::host name::HiSLIPn::INSTR*, where:

TCPIP	Used network protocol
host name	Computer name of the R&S VTE
HiSLIPn	Numbered connection, for example hislip0

Example: TCPIP::VTE-100005::hislip0::INSTR

Assigned Instrument ← HiSLIP-n ← HiSLIP
Displays the number of assigned instruments.

HiSLIP Port ← HiSLIP-n ← HiSLIP
Displays the port number.

TCPIP
Lists the connections using the transmission control protocol/internet protocol (TCP/IP), see "Socket communication" on page 46.

TCPIPn ← TCPIP
The connections are numbered consecutively, starting at 1. For each connection, detailed information is listed.

Visa Resource ← TCPIPn ← TCPIP
Displays the resource name used by the programs for identification and control of the R&S VTE. Has the form *TCPIP::host name::data port::SOCKET*, where:

TCPIP	Used network protocol
host name	Computer name of the R&S VTE
data port	See "Data Port" on page 99

Example: TCPIP::VTE-100005::5025::SOCKET

Remote command:
`SYSTem:COMMunicate:SOCKet<inst>:VRESource?` on page 515

Assigned Instrument ← TCPIPn ← TCPIP
Displays the number of assigned instruments.

Data Port ← TCPIPn ← TCPIP
Sets the data port number for task-specific data exchange.

Remote command:
`SYSTem:COMMunicate:SOCKet<inst>:PORT` on page 515

Control Port ← TCPIPn ← TCPIP
Displays the control port number.

Protocol Mode ← TCPIPn ← TCPIP
Sets the protocol operation mode for direct socket communication.

- "Raw"
  No support of control messages, for example polling or service request.
- "Agilent"
  Emulation codes using control connection (control port).
- "IEEE1174"
  Emulation codes using data connection (data port).
  IEEE standard (institute of electrical and electronics engineers)

Remote command:
`SYSTem:COMMunicate:SOCKet<inst>:MODE` on page 514

USB2
Lists the connections using the USB type B interface, see Chapter 3.11.2.2, "USB Interface", on page 46.

USBTMC ← USB2
Uses the USB test and measurement class (USBTMC) protocol.

Visa Resource ← USBTMC ← USB2
Displays the resource name used by the programs for identification and control of the R&S VTE. Has the form *USB::vendor ID::device ID::serial number::INSTR*, where:

vendor ID	Vendor ID for Rohde & Schwarz: 0xaad
device ID	See "DeviceID" on page 100
serial number	Serial number of the R&S VTE, see "Serial Number" on page 102

Example: USB::0x0AAD::241::0100005::INSTR

Remote command:
`SYSTem:COMMunicate:USB:VRESource?` on page 515

Assigned Instrument ← USBTMC ← USB2
Displays the number of assigned instruments.

Vendor ← USBTMC ← USB2
Displays the name of the vendor: Rohde & Schwarz GmbH & Co. KG

DeviceID ← USBTMC ← USB2
Displays the ID number of the R&S VTE, see "Device Identification" on page 101.

VXI-11
Lists the connections using the LAN interface and the VXI-11 protocol, see Chapter 3.11.2.1, "LAN Interface", on page 45.

VXI-11-n ← VXI-11
The connections are numbered consecutively, starting at 1. For each connection, detailed information is listed.

Remote command:
`SYSTem:COMMunicate:VXI<inst>:GTR` on page 516

Visa Resource ← VXI-11-n ← VXI-11
Displays the resource name used by the programs for identification and control of the R&S VTE. Has the form *TCPIP::host name::inst0::INSTR*, where:

TCPIP	Used network protocol
host name	Computer name of the R&S VTE
inst0	Resource
INSTR	VXI-11 protocol is used

Example: TCPIP::VTE-100005::inst0::INSTR

Remote command:
`SYSTem:COMMunicate:VXI<inst>:VRESource?` on page 516

Assigned Instrument ← VXI-11-n ← VXI-11
Displays the number of assigned instruments.

6.3 License Keys Tab

The R&S VTE includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). The OpenSSL Toolkit is used unchanged in the license key procedure.

Further information:

- Release notes

Common remote commands

`*OPT?` on page 492

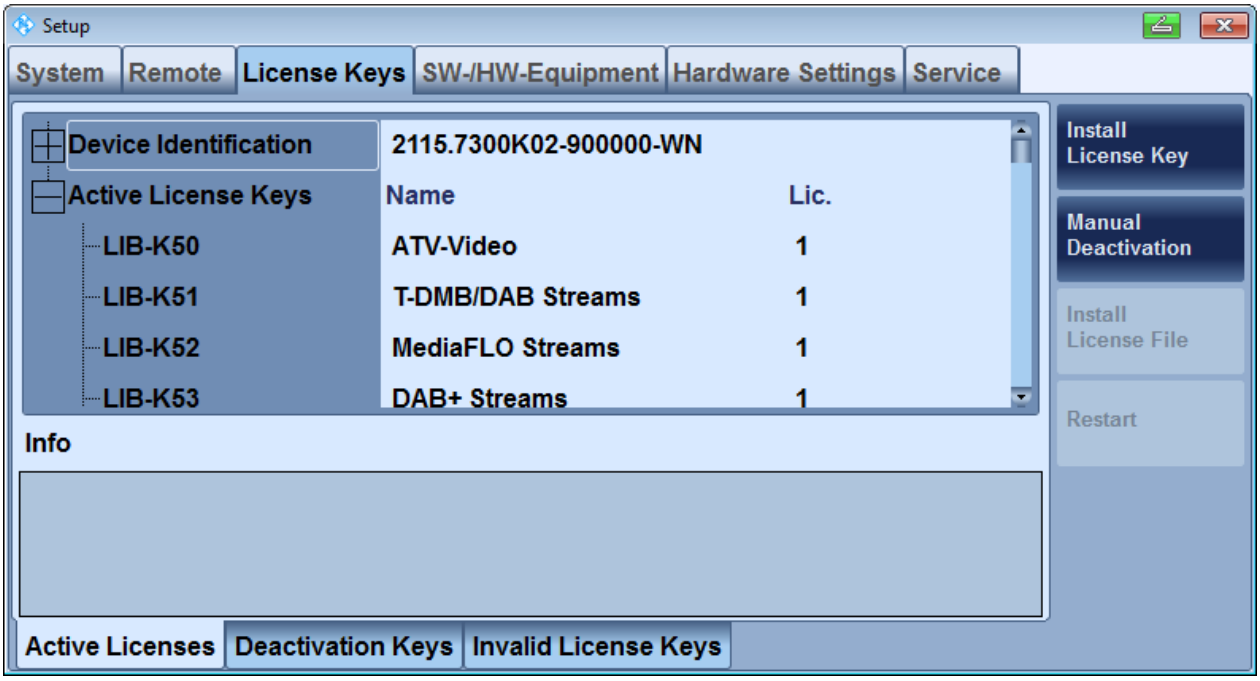
`SYSTem:OPTion:LIST?` on page 520

6.3.1 Displayed Information and Common Buttons

All tabs are similarly structured. Each tab is divided into two panes.

- In the upper pane, the "Device Identification" is displayed on all tabs. The further content is subtab-specific.
- In the lower "Info" pane, additional information to the selected option is displayed.

The buttons are available on all subtabs.



Device Identification
Displays the identification number that is unique for each R&S VTE. The string has the following structure:

<part number>-<serial number>-<checksum>

Part No. ← Device Identification
Displays the part number of the R&S VTE, for example 2115.7300K02.

Remote command:
`*IDN?` on page 491

Serial Number ← Device Identification
Displays the serial number of the R&S VTE, for example 010101.

Remote command:
`*IDN?` on page 491

Active License Keys
Only available on the "Active Licenses" subtab.

Lists all software options that are enabled on the R&S VTE. If a license is temporary, the expiration date is also displayed.

Deactivation Keys
Only available on the "Deactivation Keys" subtab.

Lists all deactivation keys that you have used in the past.

Inactive License Keys
Only available on the "Invalid License Keys" subtab.

Lists all license keys that are invalid for some reason: date expired, wrong license key.

Install License Key button
Opens the "Install License Key" dialog. Further information, see "To install a license key manually" on page 102.

Manual Deactivation button
For Rohde & Schwarz representatives only.

Install License File button
Opens the file manager to select a license file.

Further information:
- "To install a license file" on page 103
- Chapter 5.3, "File Dialog", on page 89

Restart button
Only available if a correct activation key has been entered.

Reboots the R&S VTE to complete the installation.

6.3.2 Installing License Keys

You can enter the license key manually or use an RSI file.

To install a license key manually

1. Open the "Setup" dialog, see "To display the Setup dialog" on page 94.
2. Select the "License Keys" tab.
3. Tap "Install License Key".

4. In the "Install License Key" dialog, enter the license key from the software option list supplied with the option.

   If the key is accepted, a corresponding message is displayed.
   If the key is not accepted, an error message is displayed. Reenter the license key or use the license file, see "To install a license file" on page 103.

5. Tap "Restart" to reboot the R&S VTE.

6. Check whether the option is active: The option is displayed under "Active License Keys" on page 102.

To install a license file

1. On the `D:\` drive, create a folder and copy the RSI file delivered with the option into the folder.

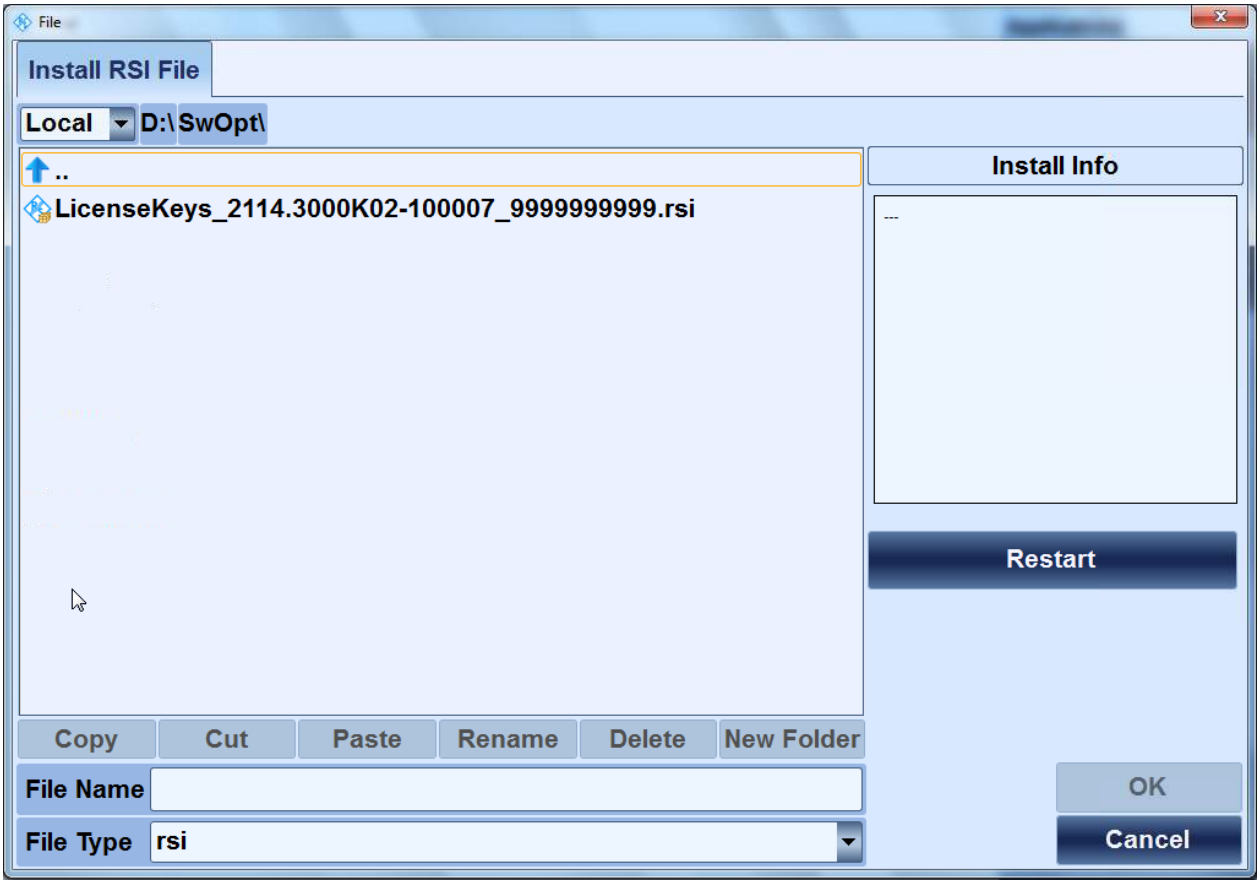
2. Open the "Setup" dialog, see "To display the Setup dialog" on page 94.

3. Select the "License Keys" tab.

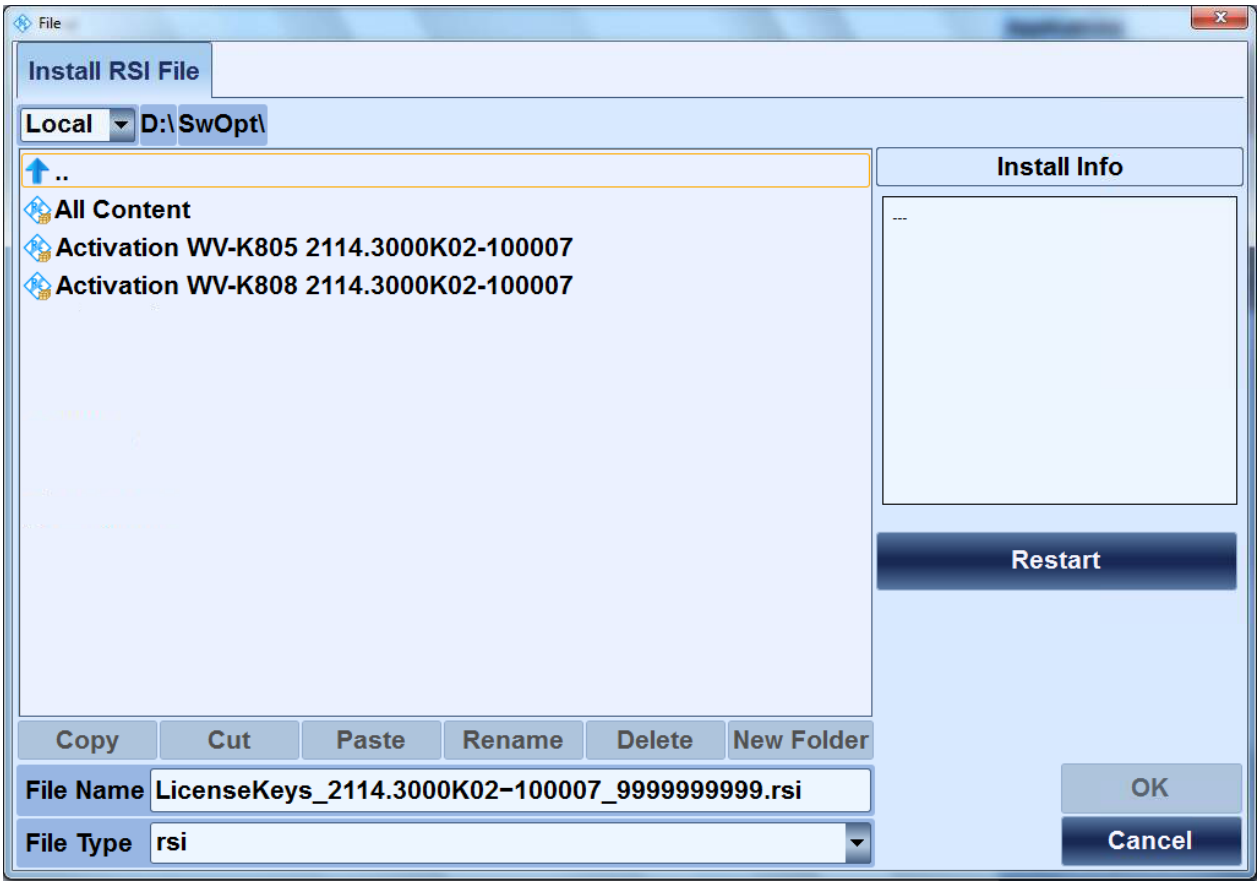
4. Tap "Install License File".

5. Select the folder with the license file.

   In the example screenshots, the folder is called `SwOpt`.



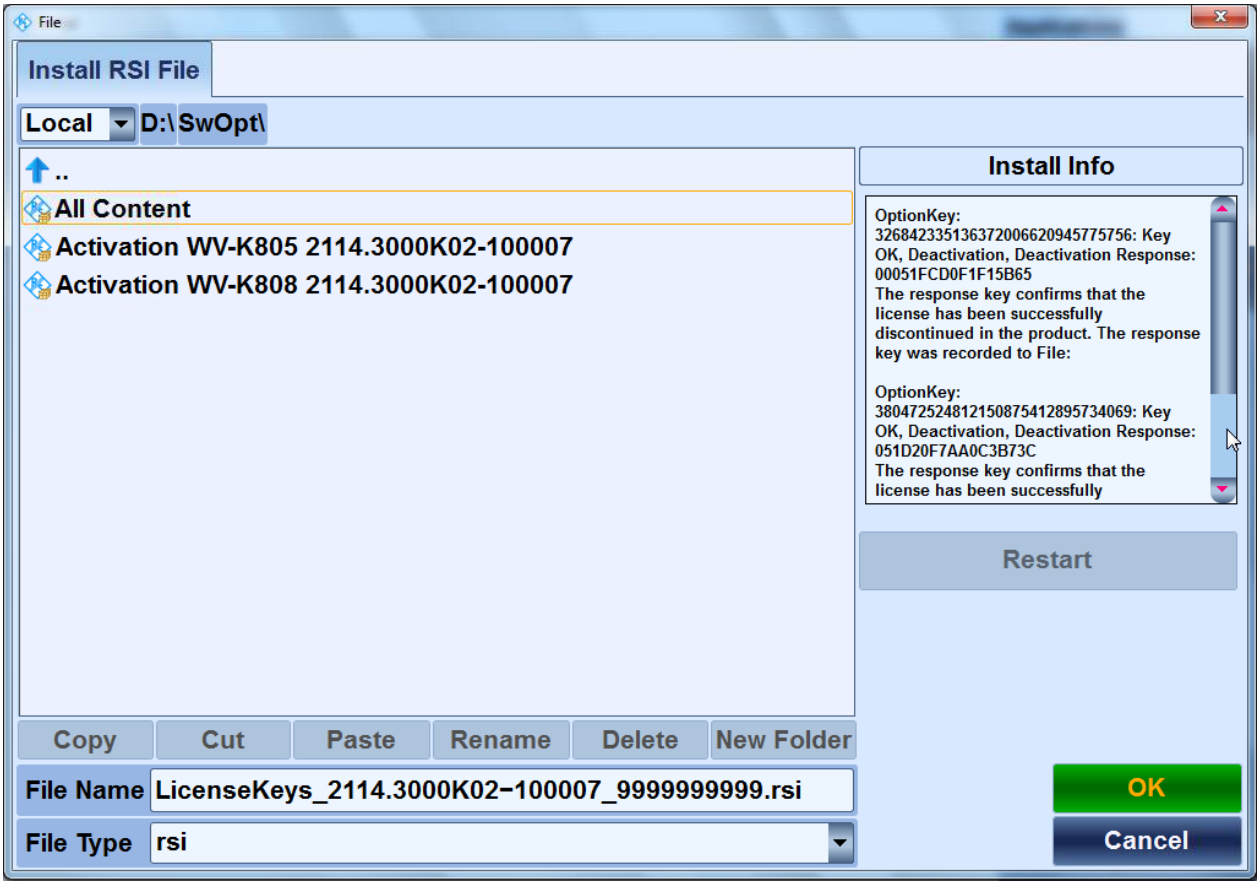
6. Tap the RSI file.



`All Content` and all single keys contained in the RSI file are displayed.
`All Content` contains all license keys. The name of a single key starts with `Activation`.

7. Select `All Content` or a single activation key.

   Under "Install Info", information about the selected license key(s) is displayed.



8. Tap "OK" to install the selected license key(s).
9. Tap "Restart" to complete the installation.

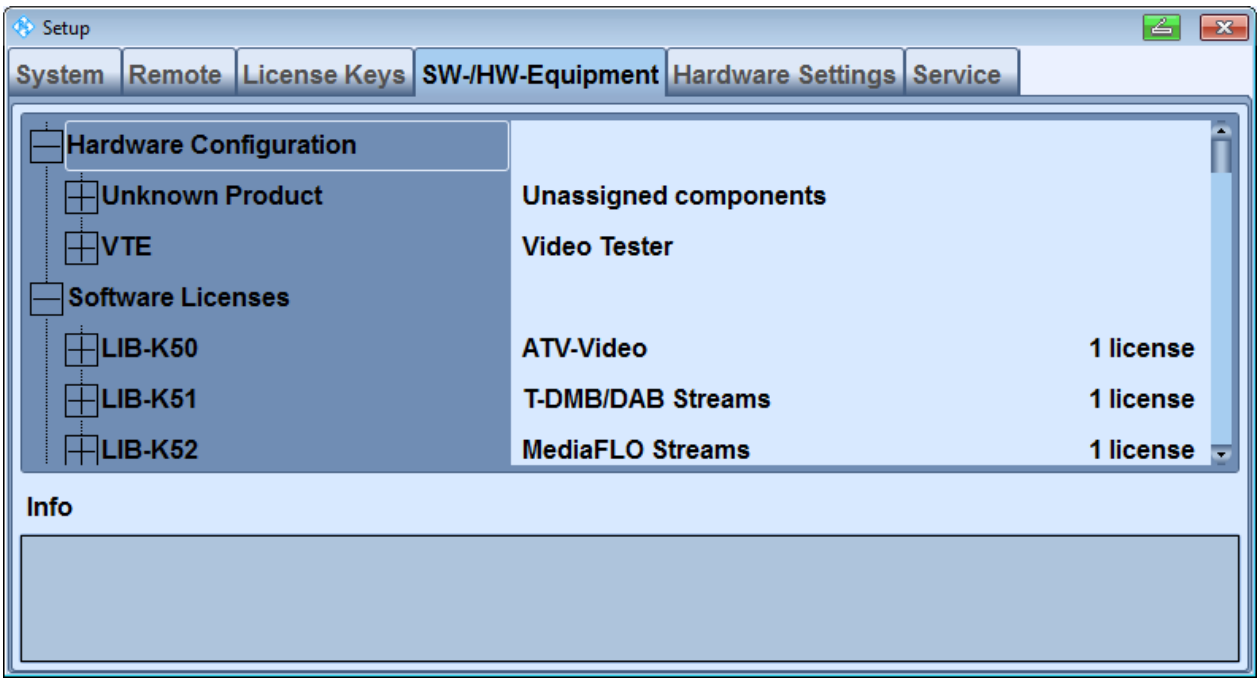
6.4 SW/HW-Equipment Tab

The tab is divided into two panes. In the lower "Info" pane, additional information to the selected option is displayed.

Common remote commands

`SYSTem:OPTion:LIST?` on page 520

`*OPT?` on page 492



Hardware Configuration
Lists the currently installed hardware. For each installed hardware option, the status and the part number are displayed. If you select an option, additional information is displayed in the "Info" pane.

Software Licenses
Lists the currently installed hardware and software options. If a hardware option requires a software option, the corresponding license key and its status is listed with the hardware option.

Installed Software
Displays information about the installed firmware. You can check whether the installed firmware is up-to-date.

If an installation package is not working, an error message is displayed.

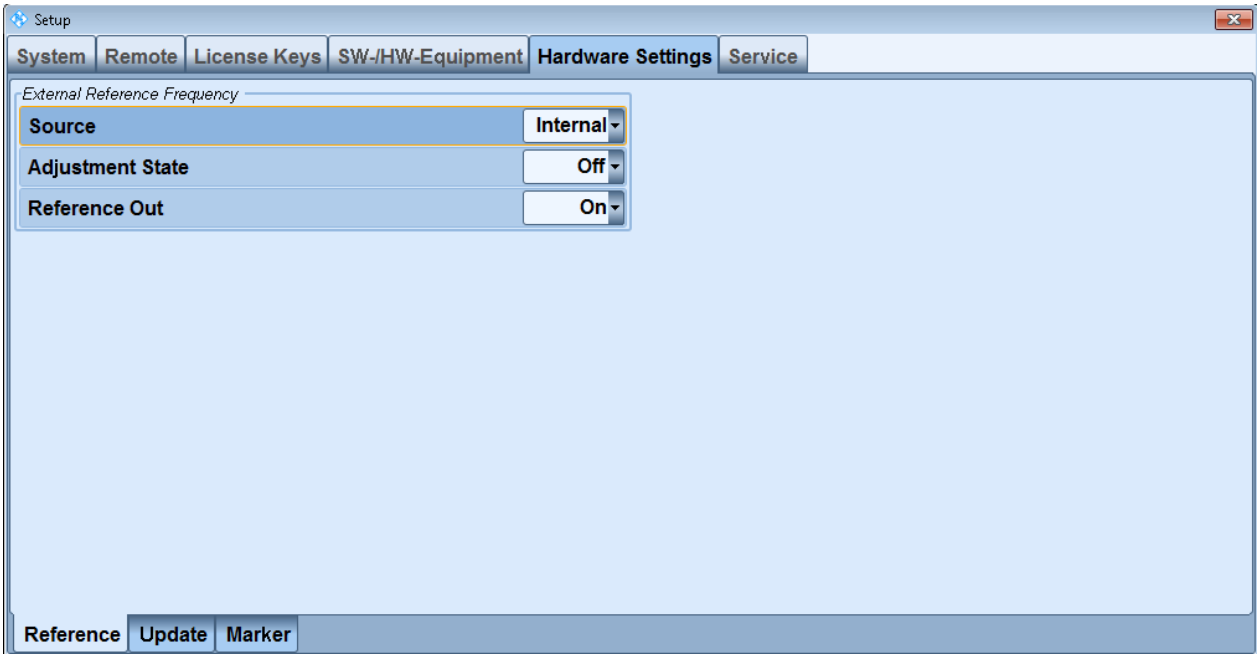
Operating System
Displays information regarding the operating system: version, service pack, status.

6.5 Hardware Settings Tab

The content depends on the installed (hardware) options.

6.5.1 Reference Subtab

Groups the reference oscillator parameters.



External Reference Frequency
The R&S VTE is equipped with an internal reference oscillator that provides the internal reference frequency of 10 MHz. It is used as internal reference source for the synthesizer and the local oscillator.

Source ← External Reference Frequency
Sets the reference frequency source.

The signal is output at Chapter 4.2.2.5, "REF OUT", on page 66.

- "Internal"
  Uses the internal reference signal of 10 MHz according to the adjustment state selected under "Adjustment State" on page 108.

- "External"
  Uses an external reference signal supplied at Chapter 4.2.2.4, "EXT REF IN", on page 66.

Remote command:
`[SOURce<hw>:]ROSCillator` on page 507

Adjustment State ← External Reference Frequency
Only available if "Internal" is set under "Source" on page 107.

Sets adjustment method for the internal reference frequency.

- "Off"
  Uses the calibrated adjustment value of the internal reference frequency. This value is determined at a R&S service centers during calibration.
- "On"
  Uses the adjustment value set under "Adjustment DAC Value" on page 108. Thus the frequency can be impaired freely, for example to simulate a frequency error.

Note: If enabled, the R&S VTE is no longer in a calibrated state. However, the calibration value is not changed. The R&S VTE resumes the calibrated state after disabling this mode.

Remote command:
`[SOURce<hw>:]ROSCillator[:INTernal]:ADJust[:STATe]` on page 508

Adjustment DAC Value ← External Reference Frequency
Only available if:

- "Internal" is set under "Source" on page 107.
- "On" is set under "Adjustment State" on page 108.

Sets a user-defined adjustment value for the internal reference frequency.

- "0" to "65535"

Remote command:
`[SOURce<hw>:]ROSCillator[:INTernal]:ADJust:VALue` on page 507

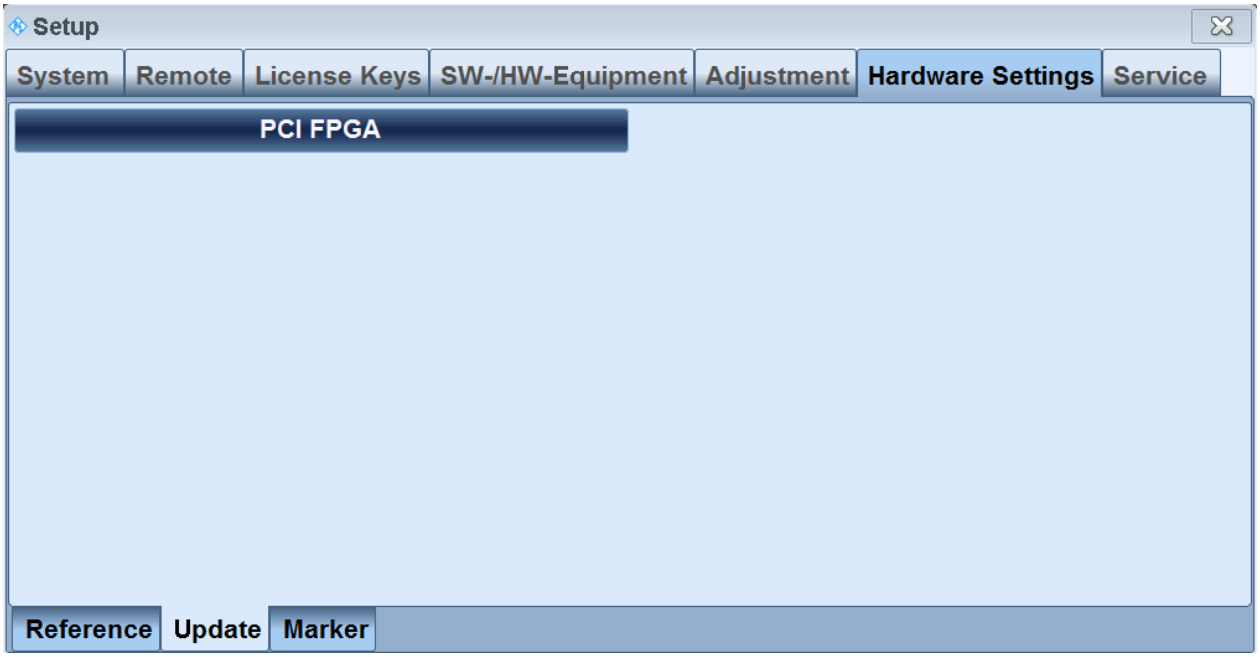
Reference Out ← External Reference Frequency
Enables or disables the RF output (Chapter 4.2.2.5, "REF OUT", on page 66).

- "On"
- "Off"

Remote command:
`OUTPut:ROSCillator[:STATe]` on page 506

6.5.2 Update Subtab

Groups update functions.

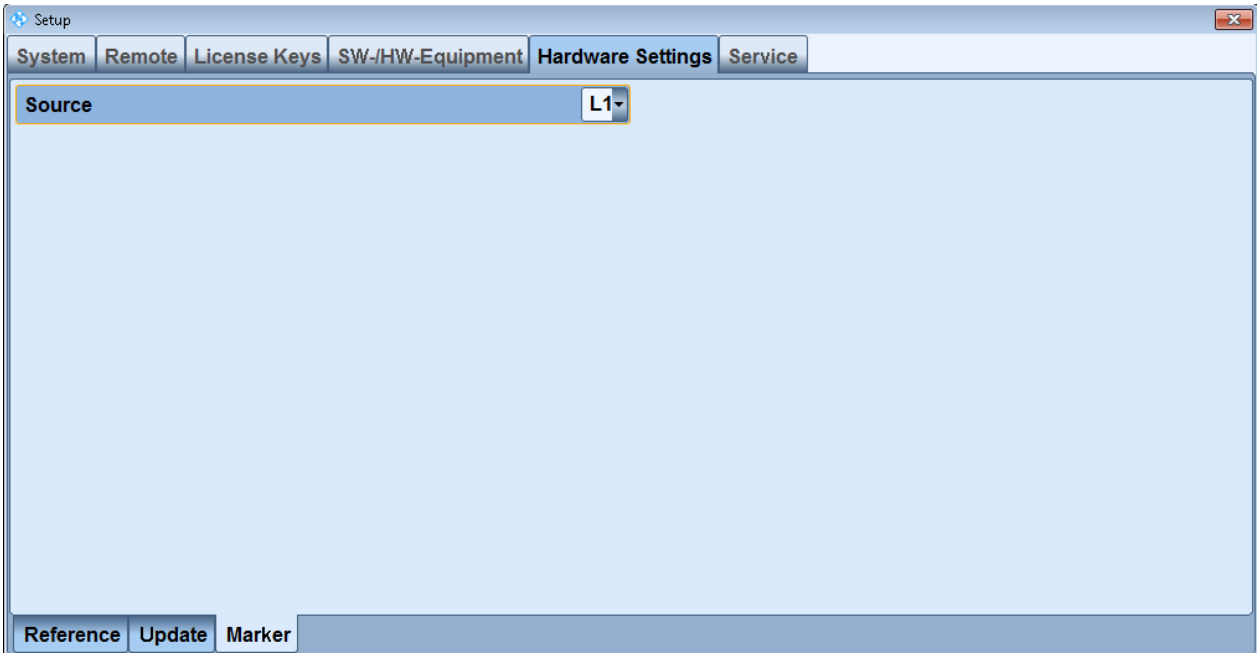


PCI FPGA button
Performs an update of boot devices. Tap this button only if you are prompted to do so. For step-by-step instructions, see the release notes.

NOTICE! Risk of instrument failure. The installation takes some minutes. Please be patient and do not switch off the R&S VTE during the installation.
During the installation, a boot device(s) update (PCI update) is performed. If you switch off the R&S VTE during this boot device(s) update, the R&S VTE will fail and has to be returned to the R&S service center in Munich. Be aware that only the R&S service center in Munich is able to fix this failure.

6.5.3 Marker Subtab

Configures the marker output.



Source
Sets the slot of the MARKER output (Chapter 4.2.2.3, "MARKER Output", on page 66).

- "L1" to "L3"
  L = left

Remote command:
`[SOURce<hw>:]MARKer:SOURce` on page 507

6.6 Service Tab

For service purposes only.

7 AV Distortion Analyzer Application

Requires the following options:

- AV inspection option (R&S VT-K2110)
- For extended functionality: AV distortion analysis option (R&S VT-K2111)
- Suitable module as described in the data sheet, see also "Input" on page 129

The AV inspection application performs still pictures and moving pictures match detection by comparing the incoming signal with a reference signal.

For more information about this application, see also the application note at:

http://www.rohde-schwarz.com/appnote/7BM87

7.1 Main Dialog of the Application

The parameters are grouped on subtabs. If a measured value is displayed in red, it is faulty.

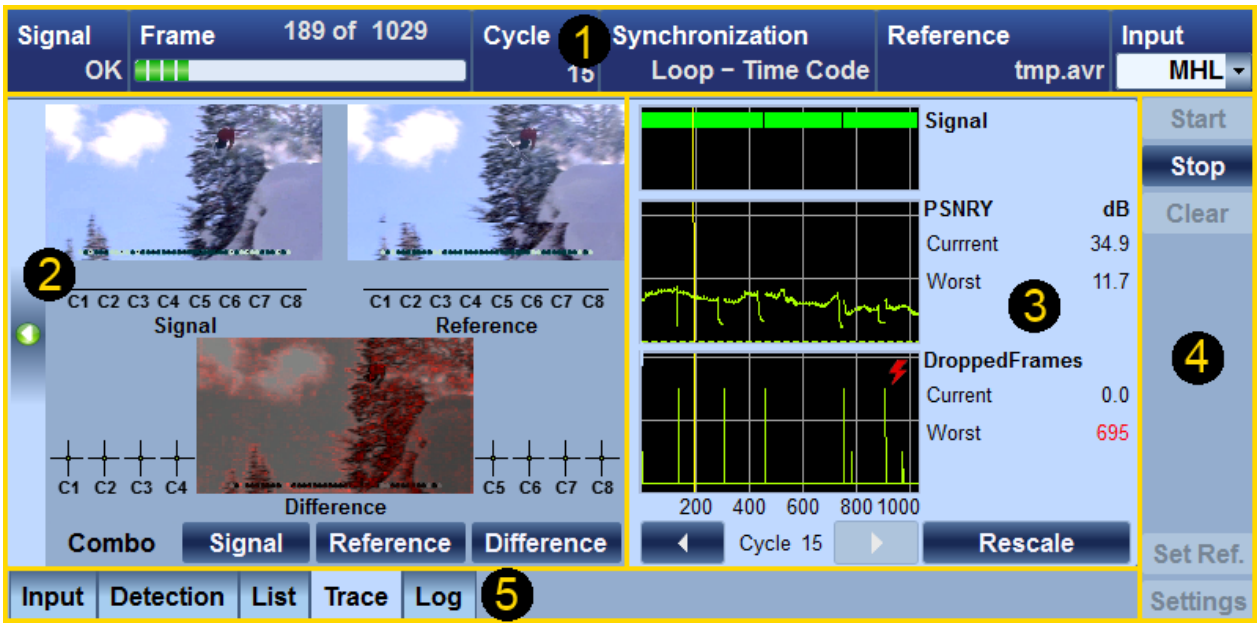


Figure 7-1: Main dialog (example)

1 = favorites
2 = monitor view
3 = subtab-specific pane
4 = common buttons
5 = subtabs titles

Default favorites

See (1) in Figure 7-1.

Parameters that are often needed are provided as default favorites below the tab title. Some of the default favorites of the application itself are also available on one of the subtabs.

- "Signal"
  Displays the signal status: "OK", "Fail"
- "Frame"
  xxx of yyy, e.g. 234 of 1380
  xxx = number of the frame currently under evaluation.
  yyy = number of frames in the reference video.
- "Cycle"
  xxx of yyy, e.g. 34 of 80
  xxx = number of already passed cycles.
  yyy = optional number of target cycles, set in Chapter 7.3.3, "Edit Settings Dialog", on page 121.
- "Synchronization" on page 117
- "Reference"
  Name of the reference set in Chapter 7.3.2, "Set Reference Dialog", on page 116.
- "Input" on page 129

Monitor view

See (2) in Figure 7-1.

See Chapter 7.2, "Monitor View", on page 112.

Subtab-specific pane

See (3) in Figure 7-1.

Displays the subtab-specific content. See the chapters on the subtabs.

Common buttons pane

See (4) in Figure 7-1.

Contains the common buttons that are available throughout the application. These buttons also give access to dialogs.

See Chapter 7.3, "Common Buttons and Dialogs", on page 115.

Common remote command

`DISPlay<hw>:AVDA:SELect:TAB` on page 559

7.2 Monitor View

You can display the monitor view on all subtabs of the AV distortion analyzer application. The monitor view is always displayed in the left pane (see Figure 7-1).

To show and hide the monitor view

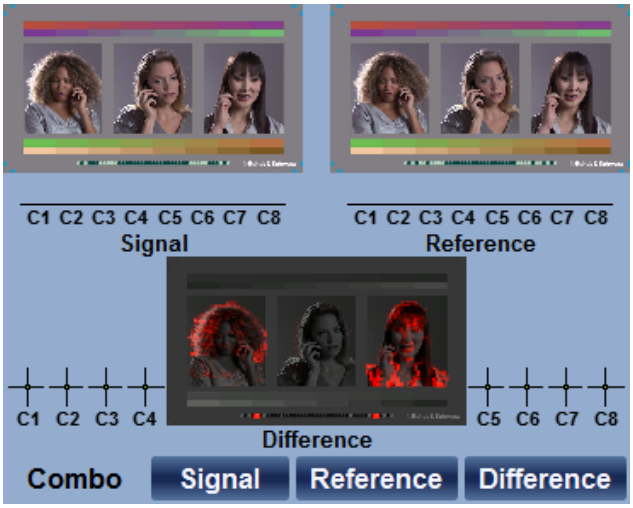
► On the left border of the main dialog, tap .

The monitor view offers 4 different views. To select a view, tap the corresponding tab.

Combo subtab

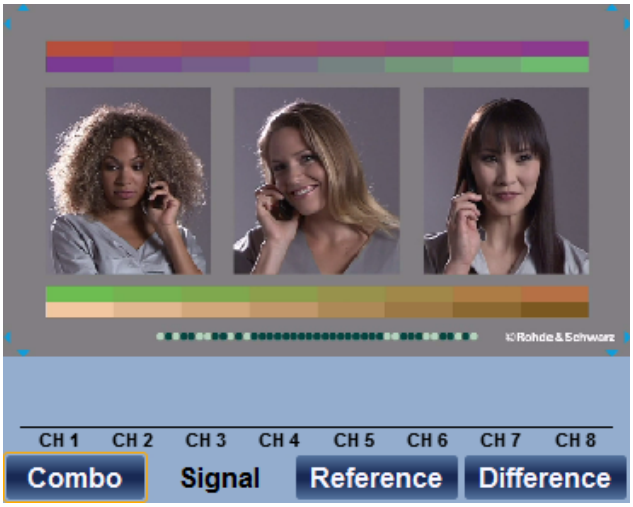
Shows the combination of the other 3 views.

- "Signal subtab" on page 113
- "Reference subtab" on page 114
- "Difference subtab" on page 114



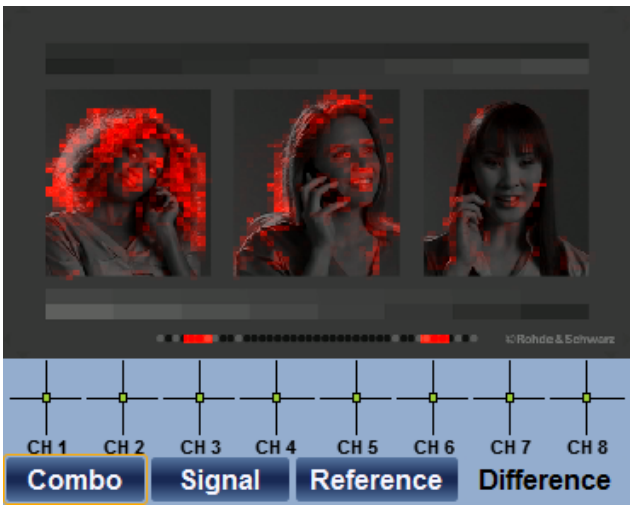
Signal subtab

Shows the picture and the audio levels of the selected input signal. Even if the measurement is not running, the live picture of the connected signal is displayed. If no device is connected, a black rectangle is displayed instead.



Reference subtab
Shows the picture and the audio levels of the selected reference signal.

Difference subtab
Shows the difference picture and the difference audio level and audio delay.



7.3 Common Buttons and Dialogs

The following buttons and dialogs are available throughout the application.

7.3.1 Buttons Pane

Groups all common buttons (see Figure 7-1).

Start button
Starts the measurement. Only available if the measurement has been stopped, and a reference signal is loaded.

Remote command:
`INITiate<hw>:AVDA` on page 559

Stop button
Stops the measurement. Only available if the measurement has been started.

Remote command:
`ABORt<hw>:AVDA` on page 522

Clear button
Clears all measurement results.

Remote command:
`CLEar<hw>:AVDA` on page 522

Set Ref. button
Opens the "Set Reference" dialog to record the reference sequence. Only available if the measurement has been stopped. See Chapter 7.3.2, "Set Reference Dialog", on page 116.

Settings button
Opens the "Edit Settings" dialog to configure the measurement. Only available if the measurement has been stopped. See Chapter 7.3.3, "Edit Settings Dialog", on page 121.

7.3.2 Set Reference Dialog

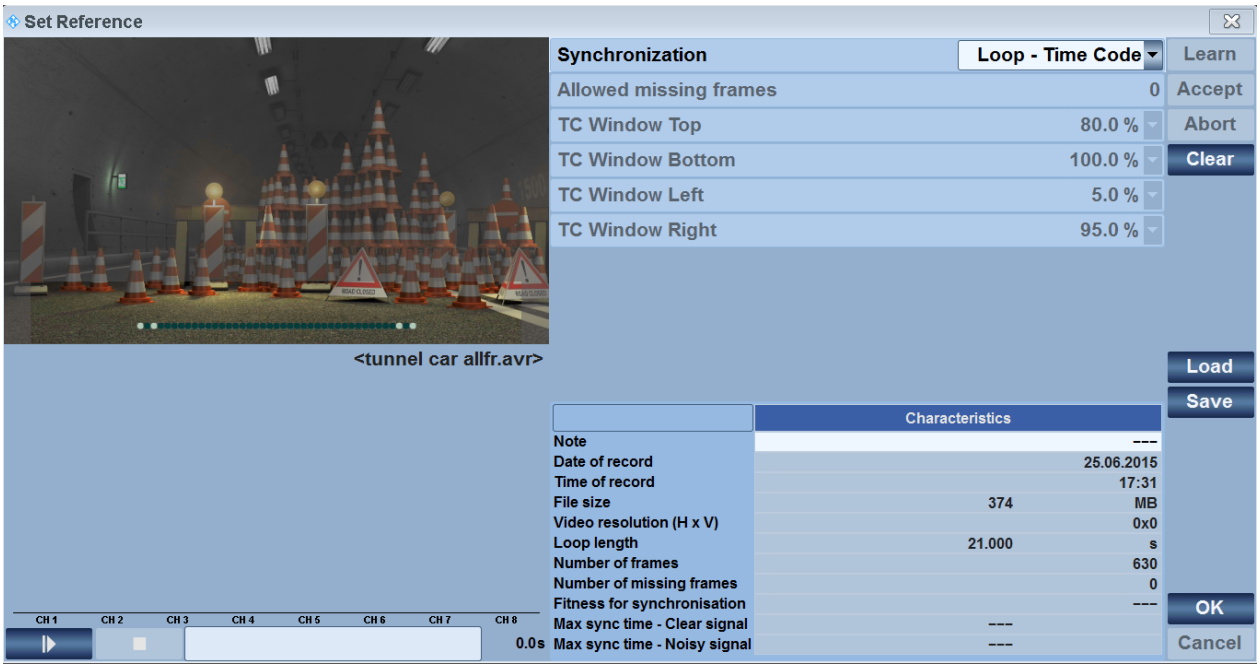
In this dialog, perform the following tasks:

- Selecting the synchronization mode.
  "Synchronization" on page 117.
- Recording the reference sequence.
  "Learn button" on page 119
  "Accept button" on page 119.
- Saving the recorded reference sequence.
  "Save button" on page 120.
- Loading a recorded reference sequence.
  "Load button" on page 120.

To open the "Set Reference" dialog

► Tap "Set Ref." in the common buttons pane (see Figure 7-1).

The "Set Reference" dialog is displayed.



The title bar varies depending on the status.

- "<>"
  No reference sequence has been recorded or loaded.
- <temp.avr>
  A reference sequence has been recorded but not saved.
- <name.avr>
  The name.avr reference sequence has been loaded or saved.

Remote command to query the status

READ<hw>[:SCALar]:AVDA:REFerence:COMMand:STATe? on page 579

Settings

Synchronization
Sets the synchronization mode. Depending on the selected synchronization mode, a set of further parameters is displayed.

APL = average picture level

- "Loop - APL"
  Synchronization based on the image content.
  Use this method if the following applies:
  – There are adequate differences between the images in the sequence.
  – The number of images in the signal and reference is always the same. Normally the case for DUTs with hardware decoder.
    DUTs using software for decoding occasionally do not output individual images, for example mobile phones. Here, you must follow the procedure described under "Loop - Time Code".

  Use: Measurement at the digital output of a set-top box, camera or disk player.
- "Loop - APL Section"
  Same as "Loop - APL" except here it is possible to define an image section which is used for synchronization. The section is defined under "Section Top, Section Bottom, Section Left, Section Right" on page 118.
- "Loop - Time Code"

Synchronization based on a time code in the images of the sequence. The time code is set under "TC Window Top, TC Window Bottom, TC Window Left, TC Window Right" on page 119.
Use this method if the video sequence is output via a software decoder (example: mobile) or if the signal contains a high level of noise (example: analog output). With this procedure, each individual image of the sequence is identified by a time code. Thus, the synchronization can also take place even if individual images are suppressed during playback or are not clearly discernible owing to superimposed interference.
Use: Measurement at the digital output of mobile phones or at analog outputs.

- "Still Picture"
  Synchronization to an individual video image.
  Use this method if you want to synchronize to an individual still image.
  Use: Measurement at signal outputs of all types.
- "Self Referenced"
  Free-running measurement.
  Use this method if you only want to determine whether the applied signal is changing. Here, the previous image of the applied signal serves as the reference. You do not need to record a reference.
  Use: Measurement at signal outputs of all types.

Remote command:
`CONFigure<hw>:AVDA:REFerence:SYNC` on page 556

Loop Detection Time
Only available if "Loop - APL" or "Loop - APL Section" is set under "Synchronization" on page 117.

Sets the time interval for monitoring a signal to detect a loop.

If no loop is detected during this interval, the recording is ended and a message is displayed.

If a loop is detected during this interval, the loop length is listed in the "Characteristics" table, and the "Accept" button becomes available to stop recording. If you do not stop recording and a longer loop is detected, the loop length is set to this value (loop in loop problem).

- "0.0 s" to "300.0 s"

Remote command:
`CONFigure<hw>:AVDA:REFerence:DETection:TIME` on page 555

Section Top, Section Bottom, Section Left, Section Right
Only available if "Loop - APL Section" is set under "Synchronization" on page 117.

Reduces the window size used for loop detection.

- "0%" to "100%" of the full frame.
  The minimum window is 5% of the horizontal x vertical resolution.

Remote command:
`CONFigure<hw>:AVDA:REFerence:DETection:WINDow:SIZE` on page 556

Allowed Missing Frames
Only available if "Loop - Time Code" is set under "Synchronization" on page 117.

Sets the allowed number of missing frames during recording.

- "0" to "9999"

Use this function if the DUT skips frames during playback, which can happen if the CPU of the DUT cannot keep up with the decoding. This behavior can significantly extend the recording (learning) time, especially for long sequences. When the number of missing frames is equal to or less than the number of allowed missing frames, the "Accept" button is enabled, and you can stop the recording. During the measurement, the missing frames are skipped.

Remote command:
`CONFigure<hw>:AVDA:REFerence:TIMecode:MFRames` on page 556

TC Window Top, TC Window Bottom, TC Window Left, TC Window Right
Only available if "Loop - Time Code" is set under "Synchronization" on page 117. TC is the abbreviation for time code.

Reduces the window size used for loop detection.

- "0%" to "100%" of the full frame.
  The minimum window is 5% of the horizontal x vertical resolution.

Remote command:
`CONFigure<hw>:AVDA:REFerence:TIMecode:WINDow:SIZE` on page 557

Characteristics list
Displays the reference characteristics.

Remote command:
`READ<hw>[:SCALar]:AVDA:REFerence:INFO:NOTE?` on page 581
`READ<hw>[:SCALar]:AVDA:REFerence:INFO:DATE?` on page 580
`READ<hw>[:SCALar]:AVDA:REFerence:INFO:TIME?` on page 582
`READ<hw>[:SCALar]:AVDA:REFerence:INFO:FSIZe?` on page 580
`READ<hw>[:SCALar]:AVDA:REFerence:INFO:RESolution?` on page 582
`READ<hw>[:SCALar]:AVDA:REFerence:INFO:LLENgth?` on page 580
`READ<hw>[:SCALar]:AVDA:REFerence:INFO:NFRames?` on page 581

Learn button
Starts recording (learning) a new reference sequence. During learning, the video input signal is shown.

If recording is stopped successfully (loop detected), and you want to save the reference sequence, proceed with "Accept button" on page 119.

To stop recording, proceed with "Abort button" on page 120.

Remote command:
`CONFigure<hw>:AVDA:REFerence:COMMand` on page 555

Accept button
Only available if recording has been started ("Learn" button), and a loop has been detected.

Stops recording (learning). See also "Loop Detection Time" on page 118.

To save the reference sequence, proceed with "Save button" on page 120.

To continue without saving, proceed with "Clear button" on page 120.

Remote command:
CONFigure<hw>:AVDA:REFerence:COMMand on page 555

Abort button
Only available if recording has been started ("Learn" button).

Stops recording (learning) without discarding of the results.

To continue recording, proceed with "Learn button" on page 119.

Remote command:
CONFigure<hw>:AVDA:REFerence:COMMand on page 555

Clear button
Only available if recording has been stopped using the "Accept" button.

Clears all recorded results. A message is displayed if the recorded results are not saved.

To continue recording, proceed with "Learn button" on page 119.

Remote command:
CONFigure<hw>:AVDA:REFerence:COMMand on page 555

Load button
Opens a file dialog to load a previously saved sequence.

Remote command:
MMEMory<hw>:AVDA:REFerence:DATA:LOAD on page 560
MMEMory<hw>:AVDA:REFerence:DATA:LOAD:STATe? on page 560

Save button
Opens a file dialog to save the recorded results.

Remote command:
MMEMory<hw>:AVDA:REFerence:DATA:SAVE on page 561
MMEMory<hw>:AVDA:REFerence:DATA:SAVE:STATe? on page 561

Play button
Starts playing the reference sequence. Only available if a reference sequence has been loaded or recorded.

Pause button
Pauses playing the reference sequence.

<Progress>
Displays the playback position.

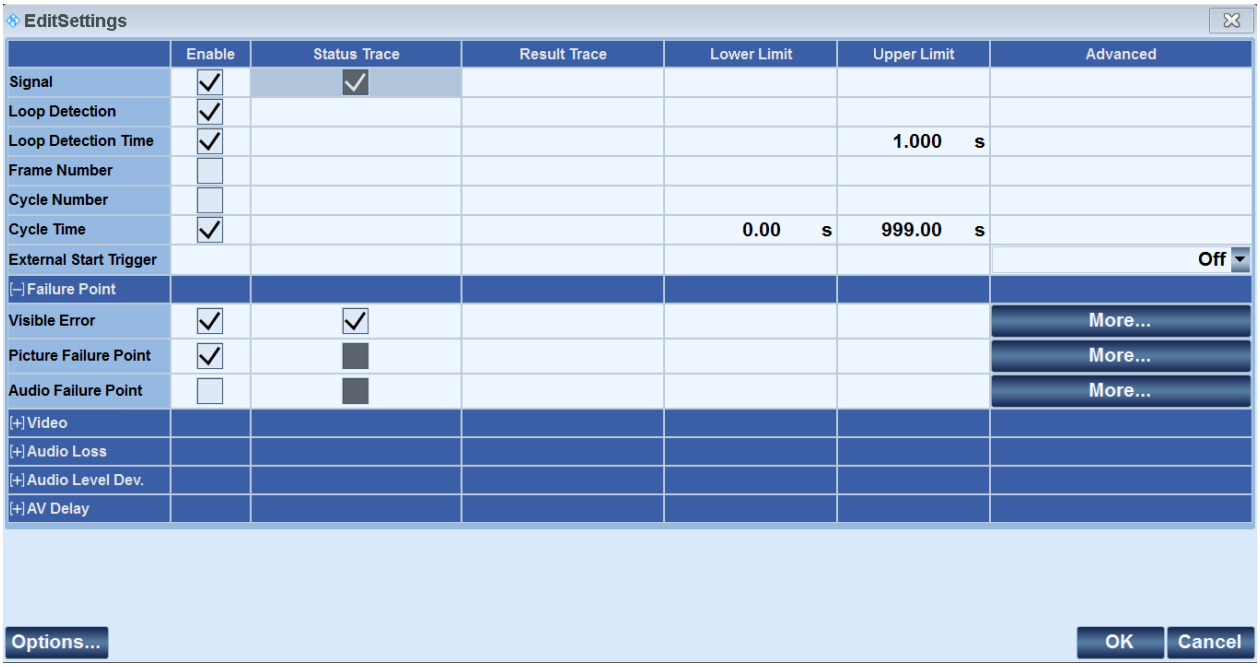
Remote command:
READ<hw>[:SCALar]:AVDA:REFerence:COMMand:PROGress? on page 579

7.3.3 Edit Settings Dialog

To open the "Edit Settings" dialog

► Tap "Settings" in the common buttons pane (see Figure 7-1).

The "Edit Settings" dialog is displayed.



Restricted number of displayed status/result traces

Up to 4 status traces can be displayed simultaneously.

Up to 3 result traces can be displayed simultaneously.

If the maximum number is reached, the other checkboxes of the column are disabled (grayed). To enable a grayed checkbox, you need to disable another one first.

Settings

<Measurement parameters table>
To configure the measurements according to the following criteria, the table consists of the following columns:

- "Enable"
  Enables or disables the parameter display on the "List" tab.
  Chapter 7.6, "List Subtab", on page 132
- "Status Trace"
  Enables or disables the parameter display in the status trace. The total number is restricted, see "Restricted number of displayed status/result traces" on page 121.
  "<Status trace>" on page 136
- "Result Trace"
  Enables or disables the parameter display in the result trace. The total number is restricted, see "Restricted number of displayed status/result traces" on page 121.
  "<Result trace>" on page 136
- "Lower Limit"
  Defines the lower limit of the parameter displayed on the "List" tab.
  Chapter 7.6, "List Subtab", on page 132
- "Upper Limit"
  Defines the upper limit of the parameter displayed on the "List" tab.
  Chapter 7.6, "List Subtab", on page 132
- "Advanced"
  Extended settings for each measurement.

<General parameters> ← <Measurement parameters table>
Groups the configuration parameters that are not related to a special measurement.

Remote command:
"Signal" parameter (general measurement)
`CONFigure<hw>:AVDA:LIST:SIGNal[:STATe]` on page 552
"Loop Detection" parameter (general measurement)
`CONFigure<hw>:AVDA:LIST:LDETection[:STATe]` on page 541
"Detection Time" parameter (general measurement)
`CONFigure<hw>:AVDA:LIST:LDETection:TIME[:STATe]` on page 540
`CONFigure<hw>:AVDA:LIST:LDETection:TIME:LIMit` on page 540
"Frame Number" parameter (general measurement)
`CONFigure<hw>:AVDA:LIST:FNUMber[:STATe]` on page 534
"Cycle Number" parameter (general measurement)
`CONFigure<hw>:AVDA:LIST:CNUMber[:STATe]` on page 532
"Cycle Time" parameter (general measurement)
`CONFigure<hw>:AVDA:LIST:CTIMe[:STATe]` on page 533
`CONFigure<hw>:AVDA:LIST:CTIMe:LIMit` on page 532
"External Start Trigger" parameter (general measurement)
`CONFigure<hw>:AVDA:LIST:TRIGger` on page 554

<Failure point parameters> ← <Measurement parameters table>
Configures the failure point measurement.

To configure the advanced settings, use the additional dialogs:

- Chapter 7.3.4, "Visible Error Definition Dialog", on page 125.
- Chapter 7.3.5, "Picture Failure Point Dialog", on page 125.
- Chapter 7.3.6, "Audio Failure Point Definition Dialog", on page 126.

Remote command:
"Visible Error" parameter (failure point measurement)
CONFigure<hw>:AVDA:LIST:FPOint:VERRor[:STATe] on page 539
"Picture Failure Point" parameter (failure point measurement)
CONFigure<hw>:AVDA:LIST:FPOint:PICTure[:STATe] on page 537
"Audio Failure Point" parameter (failure point measurement)
CONFigure<hw>:AVDA:LIST:FPOint:AUDio[:STATe] on page 534

<Video parameters> ← <Measurement parameters table>
Configures the video measurement.

To configure the advanced settings, use the additional dialogs:
- Chapter 7.3.7, "Freeze Settings Dialog", on page 126
- Chapter 7.3.8, "Rendering Rate Settings Dialog", on page 126
- Chapter 7.3.9, "Latency Settings Dialog", on page 127

Remote command:
"Freeze" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:VFReeze[:STATe] on page 554
"Relative Picture Freeze" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:RFReeze[:STATe] on page 547
CONFigure<hw>:AVDA:LIST:RFReeze:LIMit on page 547
"Dropped Frames" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:FDRopped[:STATe] on page 533
CONFigure<hw>:AVDA:LIST:FDRopped:LIMit on page 533
"Black Frame" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:BFRame[:STATe] on page 532
CONFigure<hw>:AVDA:LIST:BFRame:APL on page 531
"Avg. Picture Level" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:AVPL[:STATe] on page 530
"Pixel Error Y" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:PXERror:Y[:STATe] on page 547
CONFigure<hw>:AVDA:LIST:PXERror:Y:LIMit on page 546
"Pixel Error Cb" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:PXERror:CB[:STATe] on page 545
CONFigure<hw>:AVDA:LIST:PXERror:CB:LIMit on page 545
"Pixel Error Cr" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:PXERror:CR[:STATe] on page 546
CONFigure<hw>:AVDA:LIST:PXERror:CR:LIMit on page 546
"PSNR Y" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:PSNR:Y[:STATe] on page 544
CONFigure<hw>:AVDA:LIST:PSNR:Y:LIMit on page 544
CONFigure<hw>:AVDA:LIST:PSNR:Y:AVERage on page 544
"PSNR Cb" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:PSNR:CB[:STATe] on page 542
CONFigure<hw>:AVDA:LIST:PSNR:CB:LIMit on page 542
CONFigure<hw>:AVDA:LIST:PSNR:CB:AVERage on page 542
"PSNR Cr" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:PSNR:CR[:STATe] on page 543
CONFigure<hw>:AVDA:LIST:PSNR:CR:LIMit on page 543

CONFigure<hw>:AVDA:LIST:PSNR:CR:AVERage on page 543
"SSIM" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:SSIM[:STATe] on page 552
CONFigure<hw>:AVDA:LIST:SSIM:LIMit on page 552
CONFigure<hw>:AVDA:LIST:SSIM:AVERage on page 552
"Mos-V" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:MOSV[:STATe] on page 541
CONFigure<hw>:AVDA:LIST:MOSV:LIMit on page 541
"Rendering Rate" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:RRATe[:STATe] on page 551
CONFigure<hw>:AVDA:LIST:RRATe:LIMit on page 549
"AVG Rend Rate" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:RRATe:AVERage[:STATe] on page 549
CONFigure<hw>:AVDA:LIST:RRATe:AVERage:LIMit on page 548
"STD Rend Rate" parameter (video measurement)
CONFigure<hw>:AVDA:LIST:RRATe:STDeviation[:STATe] on page 550
CONFigure<hw>:AVDA:LIST:RRATe:STDeviation:LIMit on page 549
"Latency" parameter (video measurement)
CONFigure<hw>:AVDA:TTVideo on page 557

<Audio loss parameters> ← <Measurement parameters table>
Configures the audio loss measurement.

Remote command:
CONFigure<hw>:AVDA:LIST:AUDio:LOSS[:STATe] on page 528
CONFigure<hw>:AVDA:LIST:AUDio:LOSS:LIMit on page 528
CONFigure<hw>:AVDA:LIST:AUDio:LOSS:ADVanced on page 527

<Audio level deviation parameters> ← <Measurement parameters table>
Configures the audio level deviation measurement.

Remote command:
CONFigure<hw>:AVDA:LIST:AUDio:LEVel[:STATe] on page 527
CONFigure<hw>:AVDA:LIST:AUDio:LEVel:LIMit on page 526

<AV delay parameters> ← <Measurement parameters table>
Configures the AV delay measurement.

To configure the advanced settings, use the additional dialog:
- Chapter 7.3.10, "Setting Options Dialog", on page 128

Remote command:
CONFigure<hw>:AVDA:LIST:AVDelay[:STATe] on page 529
CONFigure<hw>:AVDA:LIST:AVDelay:LIMit on page 529

Options button
Opens the "Setting Options" dialog, see Chapter 7.3.10, "Setting Options Dialog", on page 128.

7.3.4 Visible Error Definition Dialog

To open the "Visible Error Definition" dialog

1. Tap "Settings" in the common buttons pane (see Figure 7-1).
   The "Edit Settings" dialog is displayed.
2. Open the "Failure Point" parameter list.
3. In the "Visible Error" row, tap "More".

<Visible error definition parameters>
Advanced settings for the "Visible Error" parameter (failure point measurement).

If you want to preset the settings for analog video, enable "Default Analog Video".

If you want to preset the settings for digital video, enable "Default Digital Video".

Remote command:
`CONFigure<hw>:AVDA:LIST:FPOint:VERRor:SSIM` on page 538
`CONFigure<hw>:AVDA:LIST:FPOint:VERRor:PSNR` on page 538
`CONFigure<hw>:AVDA:LIST:FPOint:VERRor:DURation` on page 538
`CONFigure<hw>:AVDA:LIST:FPOint:VERRor:DEFault` on page 537

7.3.5 Picture Failure Point Dialog

To open the "Picture Failure Point" dialog

1. Tap "Settings" in the common buttons pane (see Figure 7-1).
   The "Edit Settings" dialog is displayed.
2. Open the "Failure Point" parameter list.
3. In the "Picture Failure Point" row, tap "More".

<Picture failure point parameters>
Advanced settings for the "Picture Failure Point" parameter (failure point measurement).

If you want to preset the settings for NorDig QMP1, enable "Default NorDig QMP1". The same goes for the other default options.

Remote command:
`CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod` on page 536
`CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:TOTal` on page 537
`CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:GAP` on page 536
`CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:ALLowed` on page 536
`CONFigure<hw>:AVDA:LIST:FPOint:PICTure:DEFault` on page 535

7.3.6 Audio Failure Point Definition Dialog

To open the "Audio Failure Point Definition" dialog

1. Tap "Settings" in the common buttons pane (see Figure 7-1).
   The "Edit Settings" dialog is displayed.
2. Open the "Failure Point" parameter list.
3. In the "Audio Failure Point" row, tap "More".

Length of Test Period
Advanced setting for the "Audio Failure Point" parameter (failure point measurement).

Remote command:
`CONFigure<hw>:AVDA:LIST:FPOint:AUDio:DURation` on page 534

7.3.7 Freeze Settings Dialog

To open the "Freeze Settings" dialog

1. Tap "Settings" in the common buttons pane (see Figure 7-1).
   The "Edit Settings" dialog is displayed.
2. Open the "Video" parameter list.
3. In the "Freeze" row, tap "More".

Freeze Time Threshold
Defines the time threshold above which a still picture is assessed as frozen.

Remote command:
`CONFigure<hw>:AVDA:LIST:FREeze:DETecttime` on page 540

Freeze APL Threshold
Defines the APL threshold beneath which a change of luminance is not assessed as movement.

Remote command:
`CONFigure<hw>:AVDA:LIST:FREeze:APLThreshold` on page 539

7.3.8 Rendering Rate Settings Dialog

To open the "Rendering Rate Settings" dialog

1. Tap "Settings" in the common buttons pane (see Figure 7-1).
   The "Edit Settings" dialog is displayed.
2. Open the "Video" parameter list.

3. In the "Rendering Rate"/"AVG Rend Rate"/"STD Rend Rate" row, tap "More".

<Rendering rate parameters>
Advanced settings for the video measurement.

Remote command:
`CONFigure<hw>:AVDA:LIST:RRATe:WINDow` on page 551
`CONFigure<hw>:AVDA:LIST:RRATe:AVERage:SDWindow` on page 548
`CONFigure<hw>:AVDA:LIST:RRATe:STDeviation:RSELector` on page 550
`CONFigure<hw>:AVDA:LIST:RRATe:STDeviation:RNOMinal` on page 550

7.3.9 Latency Settings Dialog

Latency measures the time between:

- Dark to bright or bright to dark transition of the average picture level (APL) of the incoming HDMI video signal
- Slope of a trigger signal that is connected to the trigger input of the R&S VTE

The following settings define the trigger conditions.

To open the "Latency Settings" dialog

1. Tap "Settings" in the common buttons pane (see Figure 7-1).

   The "Edit Settings" dialog is displayed.

2. Open the "Video" parameter list.

3. In the "Latency" row, tap "More".

APL Threshold
Sets the threshold for detecting an APL transition as a triggering event.

Remote command:
`CONFigure<hw>:AVDA:TTVideo:APL:THReshold` on page 558

APL Hysteresis
Sets the switching hysteresis for detecting an APL transition as a triggering event.

Remote command:
`CONFigure<hw>:AVDA:TTVideo:APL:HYSTerese` on page 558

APL Trigger Slope
Sets whether the APL signal triggers with the rising or falling slope.

Remote command:
`CONFigure<hw>:AVDA:TTVideo:APL:SLOPe` on page 558

External Trigger Slope
Sets whether the external trigger signal triggers with the rising or falling slope.

Remote command:
`CONFigure<hw>:AVDA:TTVideo:TRIGger:SLOPe` on page 559

7.3.10 Setting Options Dialog

To open the "Setting Options" dialog

1. Tap "Settings" in the common buttons pane (see Figure 7-1).

   The "Edit Settings" dialog is displayed.

2. Tap "Options".

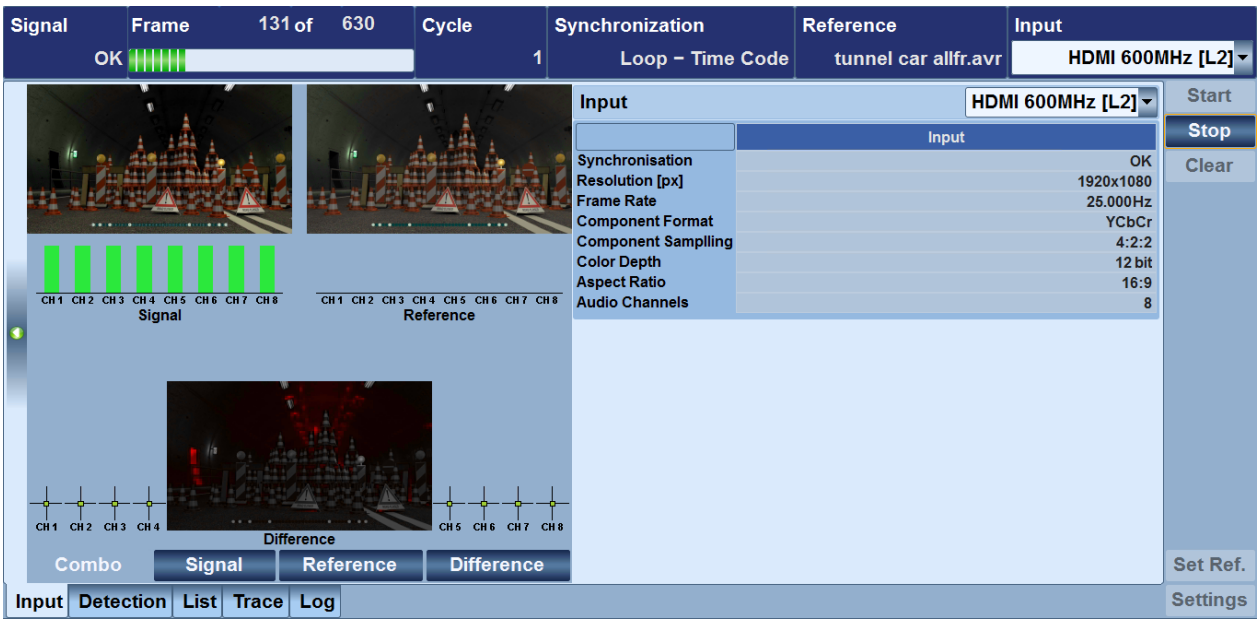
Optional measurement parameters
Optional settings to configure the measurement results.

Remote command:
`CONFigure<hw>:AVDA:LIST:STILlimage:SYNC` on page 553
`CONFigure<hw>:AVDA:LIST:STILlimage:RESYnc` on page 553
`CONFigure<hw>:AVDA:LIST:APL:SYNC` on page 526
`CONFigure<hw>:AVDA:LIST:APL:RESYnc` on page 525
`CONFigure<hw>:AVDA:LIST:AVTest:TCTone` on page 531
`CONFigure<hw>:AVDA:LIST:AVTest:TTPeriode` on page 531
`CONFigure<hw>:AVDA:LIST:AVTest:DEFault` on page 530

7.4 Input Subtab

Used to configure the input and view the input and reference signal parameters. If visible, the monitor view is displayed in the left pane, see Chapter 7.2, "Monitor View", on page 112.

► Use the buttons on the right of the tab to configure the measurement. Chapter 7.3, "Common Buttons and Dialogs", on page 115.



Input

Sets the input signal for the measurement.

The available input list is hardware-dependent. It depends on the type and number of installed modules.

- "Composite" [<module slot>]
  Composite signal input
  Required hardware option: analog A/V RX module (R&S VT-B2370)
- "Component" [<module slot>]
  Component signal input
  Required hardware option: analog A/V RX module (R&S VT-B2370)
- "HDMI" [<module slot>]
  HDMI signal input
  Required hardware option, one of the following:
  – HDMI RX 225 MHz module (R&S VT-B2360)
  – HDMI RX 300 MHz module (R&S VT-B2361)
- "HDMI 600MHz"
  HDMI input signal
  Required hardware option: HDMI RX/TX 600 MHz module (R&S VT-B2363)
- "MHL" [<module slot>]
  Mobile high definition link audio signals up to v1.2
  Required hardware option: MHL RX/TX module (R&S VT-B2350)
- "MHL PkdPx" [<module slot>]

Mobile high definition link audio signals up to v2.0
Required hardware option: MHL RX PackedPixel module (R&S VT-B2351)

Remote command:
ROUTe<hw>:AVDA:MODule:CATalog? on page 589
ROUTe<hw>:AVDA:MODule:SELect on page 589

External Sync.
Only available if "Component" is set under "Input" on page 129.

Determines whether an internal or external synchronization signal is used.

- "On"
  Uses the external synchronization input of the analog A/V RX module (R&S VT-B2370).
- "Off"
  Uses the synchronization information of the component Y/G input signal.

Remote command:
ROUTe<hw>:AVDA on page 589

Color
Only available if "Component" is set under "Input" on page 129.

Sets the color model for the input signal.

- "RGB"
- "YPbPr"

Remote command:
CONFigure<hw>:AVDA:COLor:ANALog on page 523

Picture Aspect Ratio
Only required for analog video signals: "Composite" or "Component" is set under "Input" on page 129.

Sets the aspect ratio of the video picture.

- "4:3"
- "16:9"

Remote command:
CONFigure<hw>:AVDA:ASPRatio:ANALog on page 523

<Input and reference signal parameters>
The parameters are displayed in table format.

Input column ← <Input and reference signal parameters>
Displays the input signal parameters.

Remote command:
READ<hw>[:SCALar]:AVDA:INPut:SYNC[:STATe]? on page 565
READ<hw>[:SCALar]:AVDA:INPut:RESolution? on page 565
READ<hw>[:SCALar]:AVDA:INPut:FRAMe:RATE? on page 565
READ<hw>[:SCALar]:AVDA:INPut:COMPonent:FORMat? on page 564
READ<hw>[:SCALar]:AVDA:INPut:COMPonent:SAMPling? on page 564
READ<hw>[:SCALar]:AVDA:INPut:COLor:DEPTh? on page 563

READ<hw>[:SCALar]:AVDA:INPut:ARATio? on page 563
READ<hw>[:SCALar]:AVDA:INPut:AUDio:CH:COUNt? on page 563

Reference column ← <Input and reference signal parameters>
Displays the reference signal parameters. Only visible if the monitor view is hidden, see "To show and hide the monitor view" on page 113.

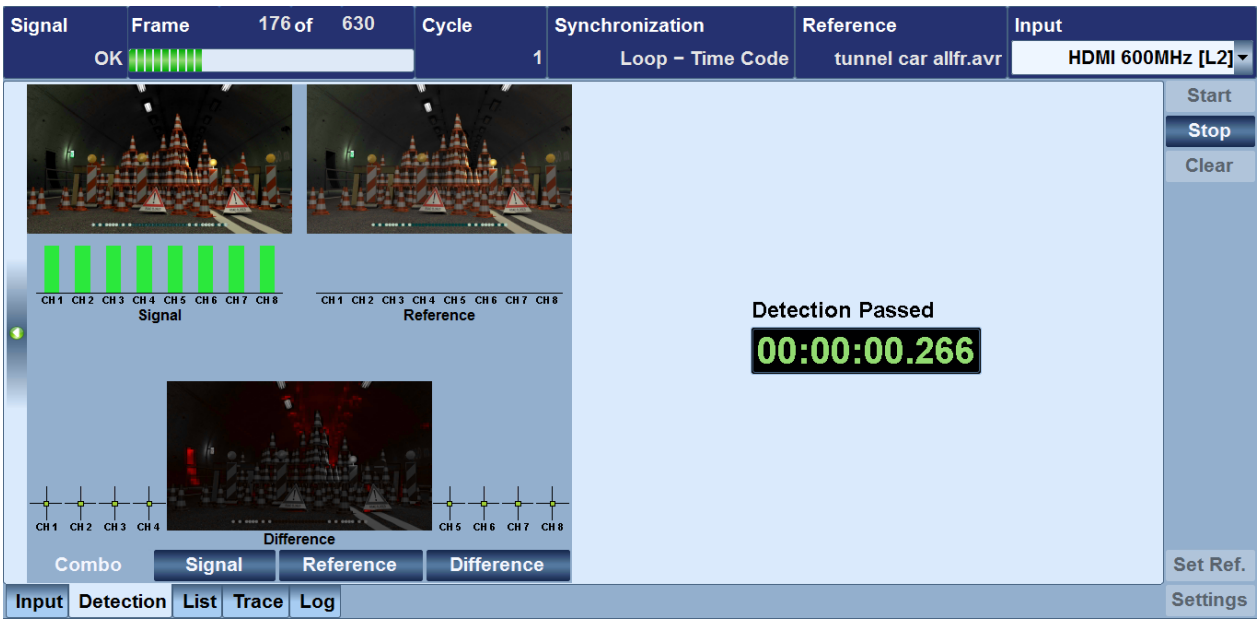
To configure the reference signal, tap the "Set Ref. button" on page 116. See Chapter 7.3.2, "Set Reference Dialog", on page 116.

Remote command:
READ<hw>[:SCALar]:AVDA:RINPut:SYNC[:STATe]? on page 586
READ<hw>[:SCALar]:AVDA:RINPut:RESolution? on page 586
READ<hw>[:SCALar]:AVDA:RINPut:FRAMe:RATE? on page 586
READ<hw>[:SCALar]:AVDA:RINPut:COMPonent:FORMat? on page 584
READ<hw>[:SCALar]:AVDA:RINPut:COMPonent:SAMPling? on page 584
READ<hw>[:SCALar]:AVDA:RINPut:COLor:DEPTh? on page 583
READ<hw>[:SCALar]:AVDA:RINPut:ARATio? on page 583
READ<hw>[:SCALar]:AVDA:RINPut:AUDio:CH:COUNt? on page 583
READ<hw>[:SCALar]:AVDA:RINPut:FILE? on page 584
READ<hw>[:SCALar]:AVDA:RINPut:FILE:TIME? on page 584
READ<hw>[:SCALar]:AVDA:RINPut:COMMent? on page 583
READ<hw>[:SCALar]:AVDA:RINPut:LOOP:COUNt? on page 586
READ<hw>[:SCALar]:AVDA:RINPut:FRAMe:COUNt? on page 585
READ<hw>[:SCALar]:AVDA:RINPut:FITNess:VSYNc? on page 585
READ<hw>[:SCALar]:AVDA:RINPut:FITNess:AVDelay? on page 585

7.5 Detection Subtab

Shows whether the input signal could be synchronized to the selected reference signal at least once and how long the synchronization took after the measurement started. If visible, the monitor view is displayed in the left pane, see Chapter 7.2, "Monitor View", on page 112.

► Use the buttons on the right of the tab to configure the measurement. Chapter 7.3, "Common Buttons and Dialogs", on page 115.



<Status>
Displays the status of the measurement.

- "Detection Running"
  The measurement has been started but synchronization to the reference has not yet taken place.
- "Detection Passed"
  The measurement has been started, and the reference was recognized. This information is preserved, even if the signal cannot be synchronized to the reference later on.
- "Stop"
  The measurement has been stopped.

Remote command:
`READ<hw>[:SCALar]:AVDA:DETection[:STATe]?` on page 562

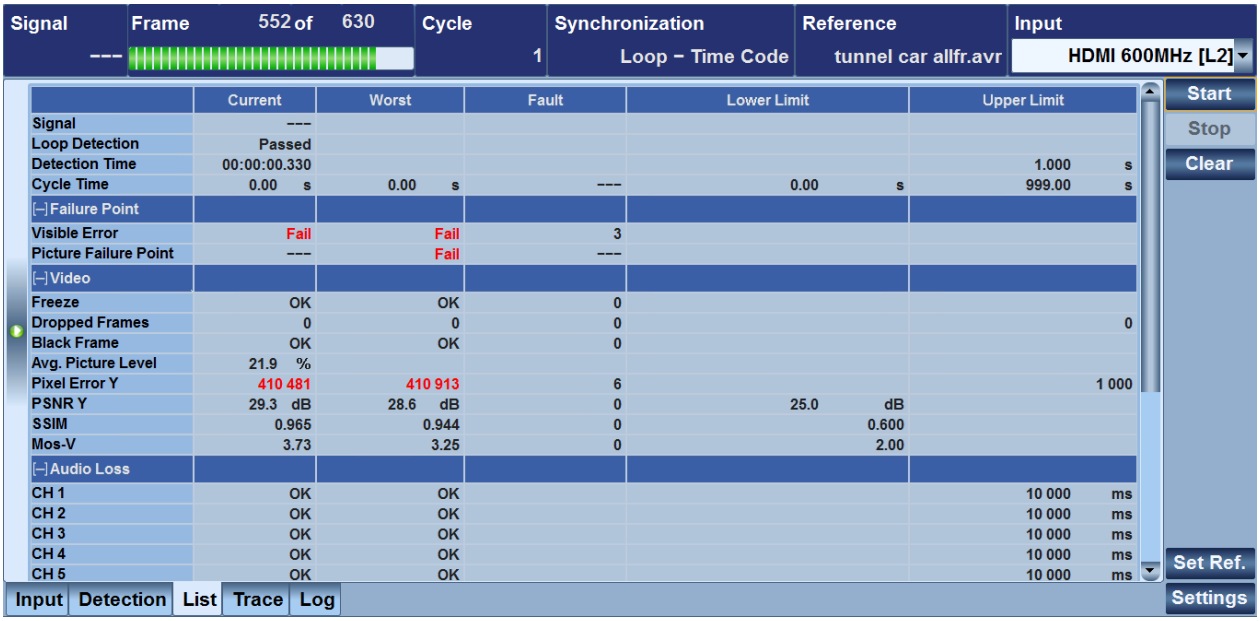
<Counter>
Displays the time that was needed to synchronize the input signal to the reference.
Format: hh:mm:ss.sss

Remote command:
`READ<hw>[:SCALar]:AVDA:DETection:TIME?` on page 562

7.6 List Subtab

Displays the measurement results in a tabular view. If visible, the monitor view is displayed in the left pane, see Chapter 7.2, "Monitor View", on page 112.

► Use the buttons on the right of the tab to configure the measurement.
Chapter 7.3, "Common Buttons and Dialogs", on page 115.



<Measurement results table>
The table consists of the following columns:

- "Current"
  Current test result.
- "Worst"
  Worst test result within the running test period.
- "Fault"
  Number of detected faults.
- "Lower Limit", "Upper Limit"
  Limits for the fault detection.

Note: To configure the measurement results and the limits, tap the "Settings button" on page 116. See Chapter 7.3.3, "Edit Settings Dialog", on page 121.

<General results> ← <Measurement results table>
Groups the results that are not related to a special measurement.

Remote command:
`READ<hw>[:SCALar]:AVDA:LIST:SIGNal?` on page 577
`READ<hw>[:SCALar]:AVDA:LIST:LDETection?` on page 572
`READ<hw>[:SCALar]:AVDA:LIST:FNUMber?` on page 570

READ<hw>[:SCALar]:AVDA:LIST:CNUMber? on page 569
READ<hw>[:SCALar]:AVDA:LIST:CTIMe? on page 569

<Failure point results> ← <Measurement results table>
Groups the results of the failure point measurement.

Remote command:
READ<hw>[:SCALar]:AVDA:LIST:FPOint:VERRor? on page 572
READ<hw>[:SCALar]:AVDA:LIST:FPOint:PICTure? on page 571
READ<hw>[:SCALar]:AVDA:LIST:FPOint:AUDio? on page 571

<Video results> ← <Measurement results table>
Groups the results of the video measurement.

Remote command:
READ<hw>[:SCALar]:AVDA:LIST:VFReeze? on page 578
READ<hw>[:SCALar]:AVDA:LIST:RFReeze? on page 575
READ<hw>[:SCALar]:AVDA:LIST:FDRopped? on page 570
READ<hw>[:SCALar]:AVDA:LIST:BFRame? on page 569
READ<hw>[:SCALar]:AVDA:LIST:AVPL? on page 568
READ<hw>[:SCALar]:AVDA:LIST:PXERror:Y? on page 575
READ<hw>[:SCALar]:AVDA:LIST:PXERror:CB? on page 574
READ<hw>[:SCALar]:AVDA:LIST:PXERror:CR? on page 575
READ<hw>[:SCALar]:AVDA:LIST:PSNR:Y? on page 574
READ<hw>[:SCALar]:AVDA:LIST:PSNR:CB? on page 573
READ<hw>[:SCALar]:AVDA:LIST:PSNR:CR? on page 573
READ<hw>[:SCALar]:AVDA:LIST:SSIM? on page 578
READ<hw>[:SCALar]:AVDA:LIST:MOSV? on page 572
READ<hw>[:SCALar]:AVDA:LIST:RRATe? on page 576
READ<hw>[:SCALar]:AVDA:LIST:RRATe:AVERage? on page 576
READ<hw>[:SCALar]:AVDA:LIST:RRATe:STDeviation? on page 577
READ<hw>[:SCALar]:AVDA:TTVideo:COUNter? on page 587
READ<hw>[:SCALar]:AVDA:TTVideo:STATe? on page 587
READ<hw>[:SCALar]:AVDA:TTVideo:VALue? on page 588

<Audio loss results> ← <Measurement results table>
Groups the results of the audio loss measurement.

Remote command:
READ<hw>[:SCALar]:AVDA:LIST:AUDio:LOSS? on page 567

<Audio level deviation results> ← <Measurement results table>
Groups the results of the audio level deviation measurement.

Remote command:
READ<hw>[:SCALar]:AVDA:LIST:AUDio:LEVel? on page 566

<AV delay results> ← <Measurement results table>
Groups the results of the AV delay measurement.

Remote command:
READ<hw>[:SCALar]:AVDA:LIST:AVDelay? on page 568

7.7 Trace Subtab

Shows the progress of the measurement results over time. If visible, the monitor view is displayed in the left pane, see Chapter 7.2, "Monitor View", on page 112.

The total number of simultaneously displayed status/result traces is restricted, see "Restricted number of displayed status/result traces" on page 121.

You can enlarge and move the result traces to optimize the progress presentation.

1. Tap the section and move horizontal or vertical.

   Figure 7-2 shows the second result trace as an example.

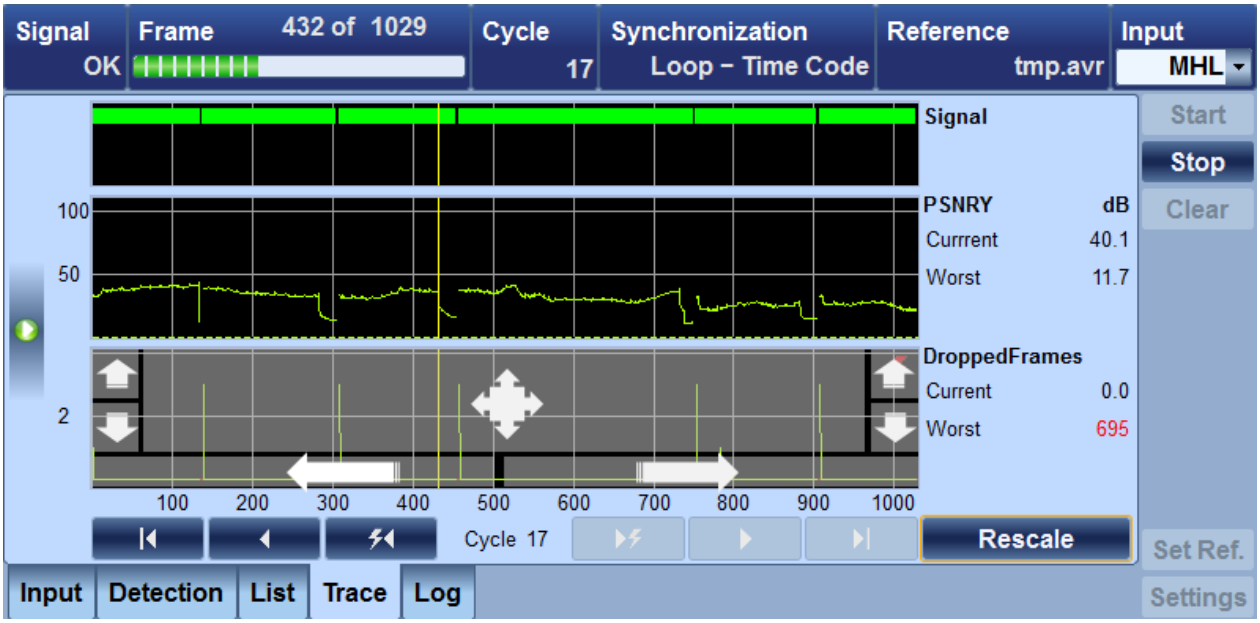
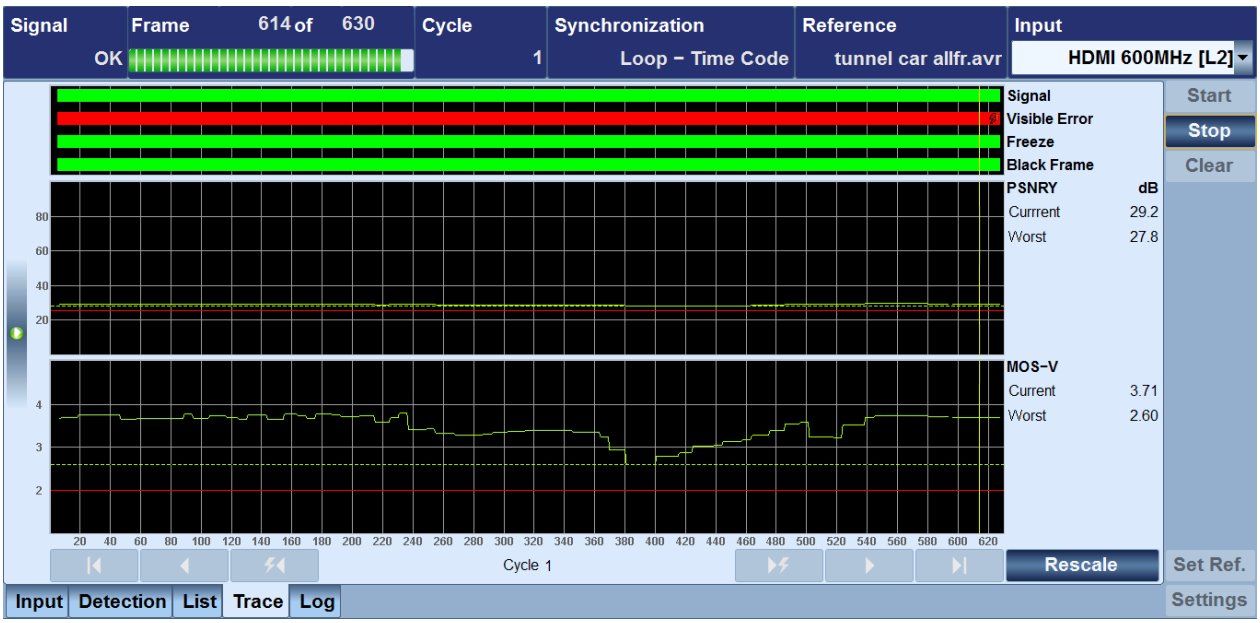


Figure 7-2: Enlarging or moving a result trace

2. To undo all changes, tap "Rescale".

► Use the buttons on the right of the tab to configure the measurement. Chapter 7.3, "Common Buttons and Dialogs", on page 115.



<Status trace>
Shows the measurement result status over time as a colored bar. In the Chapter 7.3.3, "Edit Settings Dialog", on page 121, select the measurement results of which you want to display the status.

The status trace is displayed in the upper pane (see Figure 7-2).

The colored bars convey the following information.

- Green bar: OK
- Red bar: error
- No bar: no measurement results available

<Result trace>
Shows the measurement result trace over time. In the Chapter 7.3.3, "Edit Settings Dialog", on page 121, select the measurement results of which you want to display the trace.

The result traces are displayed in the lower panes (see Figure 7-2).

The displayed time period is identical to the length of the loop detected for the reference signal. I.e. if the loop is 10 seconds long, then a 10 second interval is displayed. All preceding cycles are stored and can be displayed at any time.

To navigate, use the buttons below the traces. If the monitor view is also displayed, not all buttons are available due to limited space.

Icon	Go to
	First cycle of the measurement
	Cycle preceding the currently displayed cycle

Icon	Go to
	Next preceding cycle with limit violation
	Next succeeding cycle with limit violation
	Cycle succeeding the currently displayed cycle
	Cycle that is measured

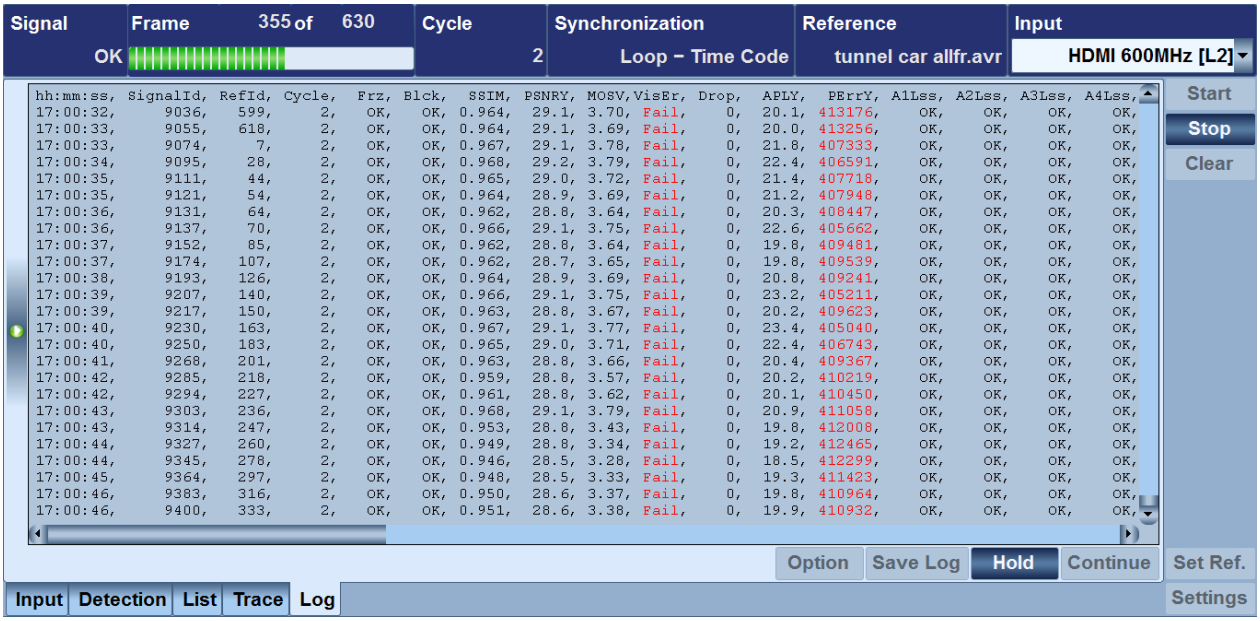
The storage depth is limited to approximately an hour measuring, then the older results are overwritten.

Note: For "Still Picture" and "Self Referenced" synchronization, no loop length is set. The displayed time range is fixed to 30 s.

7.8 Log Subtab

Shows a list of the measured data. If visible, the monitor view is displayed in the left pane, see Chapter 7.2, "Monitor View", on page 112.

► Use the buttons on the right of the tab to configure the measurement. Chapter 7.3, "Common Buttons and Dialogs", on page 115.



<Measured data list>
Each row represents a frame. 3 parameters are always displayed to define the frame exactly.

- "hh:mm:ss"
  Time when the frame was measured.
- "SignalId"
  Number of the frame. All frames measured since the start of the measurement are numbered consecutively.
- "RefId"
  Reference sequence used for analysis

The parameters also displayed depend on your selection. The log shows only the measured data that are enabled in the Chapter 7.3.3, "Edit Settings Dialog", on page 121.

Use the buttons below the list to configure the log data.

Option button
Opens the "Log Options" dialog to configure the log data. See "Log Options dialog" on page 138.

Log Options dialog ← Option button
Configures the log list and the log file.

Log Data ← Log Options dialog ← Option button
Selects the data that is displayed in the log list and output in the log file.

- "On all Frames"
  Measured data for all frames.
- "On Limit Violation only"
  Only if a limit was violated.

Remote command:
`CONFigure<hw>:AVDA:LOG:OPTions` on page 554

Decimal Point in csv File ← Log Options dialog ← Option button
Sets the column delimiter and decimal separator used in the log file.

- "Comma"
  Separates the decimal places by commas and the columns by semicolons.
- "Dot"
  Separates the decimal places by dots and the columns by commas.

Remote command:
`CONFigure<hw>:AVDA:LOG:OPTions` on page 554

Save Log button
Opens a file dialog to specify the directory where the CSV files are saved. You can use the CSV files for further analysis with data processing programs.

Depending on the measurement duration, the log files can be large. To prevent the log files from growing too large, new files are regularly created during the measurement.

The file name is composed as follows:

`distortion_analyzer_log_jjjj-mm-dd_hh-mm-ss.csv`

Example: `distortion_analyzer_log_2013-09-05_09-07-15.csv`

Note: In the list, only the data of the last 1000 frames are displayed. But in the CSV files, all measured data is saved.

Remote command:

`MMEMory<hw>:AVDA:LOG:DATA:SAVE` on page 560

Hold button
Stops the update of the log list. Allows you to analyze the measured data without stopping the measurement.

Continue button
Continues the update of the log list. All data measured during the hold time are added. Ensures that no data is lost.

8 Video Analyzer Application

Requires the following options:

- Video analyzer option (R&S VT-K2100)
- Suitable module as described in the data sheet, see also "Input" on page 143

8.1 Main Dialog of the Application

The parameters are grouped on tabs. If a measured parameter is displayed in red color, the value does not meet the requirements of the specification.

Default favorites

Parameters that are often needed are provided as default favorites below the tab title. The default favorites of the application itself are also available on one of the subtabs.

- "Signal" on page 141
- "Average" on page 142
- "Input" on page 143
- "Resolution" on page 141
- "Freeze" on page 142

Common remote commands

`READ<hw>[:SCALar]:VIDeo:COMMand[:STATe]?` on page 661

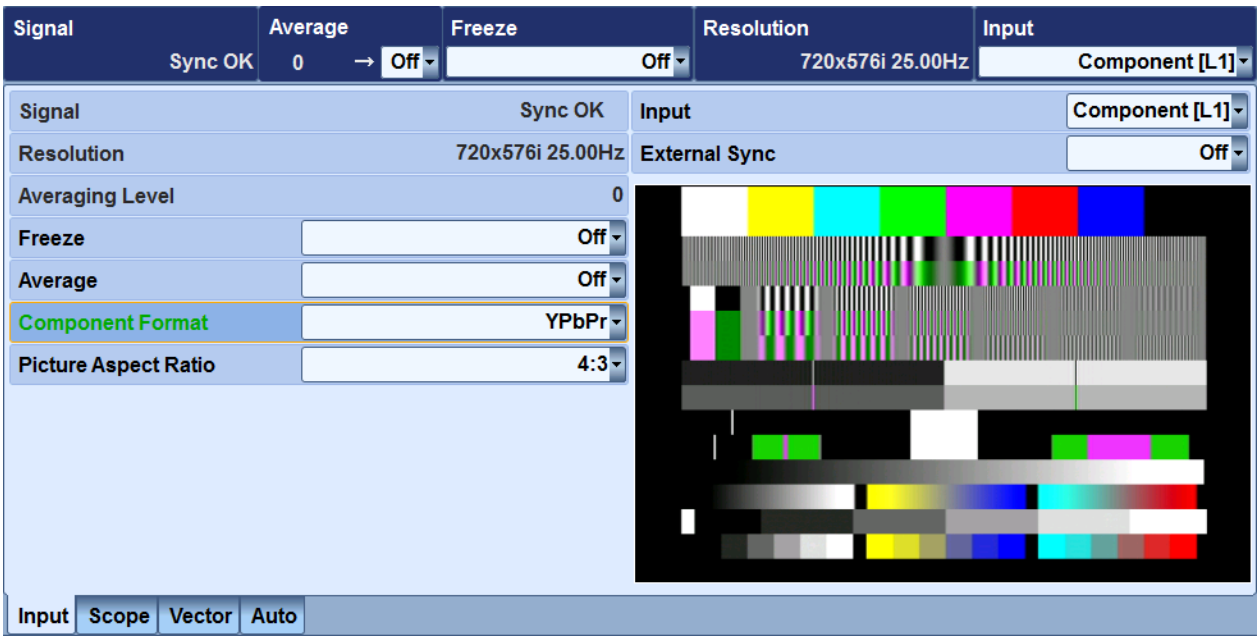
`DISPlay<hw>:VIDeo:SELect:TAB` on page 652

`INITiate<hw>:VIDeo` on page 654

`READ<hw>[:SCALar]:VIDeo:FORMat?` on page 662

8.2 Input Subtab

Displays the input parameters and the present video signal.



Signal
Displays the status of selected video analyzer input.

- "Sync OK"
  A valid video signal is present at the selected video analyzer input.
- "Sync?"
  No valid video signal is present at the selected video analyzer input.

Remote command:
`READ<hw>[:SCALar]:VIDeo:SIGNal?` on page 663

Resolution
Displays the current video resolution (horizontal/vertical) of the measured input signal.

Remote command:
`READ<hw>[:SCALar]:VIDeo:RESolution?` on page 663

Video Standard
Only available if "Composite" is set under "Input" on page 143.

Displays the video standard (BG Pal, M/NTSC, ...) of the measured input signal.

Remote command:
`READ<hw>[:SCALar]:VIDeo:STANdard?` on page 663

Averaging Level
If averaging is enabled under "Average" on page 142, displays the current averaging level.

Remote command:
`READ<hw>[:SCALar]:VIDeo:AVERage:COUNt?` on page 661

Freeze
If enabled, retains measurement results for documentation or keeps them in the display for an extended period of time.

- "Off"
  Measurement is running. Measurement results are changing continuously.
- "On"
  Measurement is frozen.

Remote command:
`SENSe<hw>:MEASure:VIDeo:FREeze` on page 679

Average
Sets the averaging of the video input signal. A noisy video signal can be "smoothed" by averaging to an appropriate degree.

- "Off"
- "2^n" with n = 1, 2, ..., 8

Remote command:
`CALCulate<hw>:VIDeo:AVERage:COUNt` on page 607

Quantization
Only available for digital video signals.

- "8 bit"
- "10 bit"
- "12 bit"
- "16 bit"

Remote command:
`READ<hw>[:SCALar]:VIDeo:QUANtization?` on page 662

Quantization Range
Only available for digital video signals.

- "Full Range"
- "Limited Range"

Table 8-1: Signal range according to quantization parameters

Quantization	Signal	Full range	Limited range
8 bit	R,G,B,Y	0 to 255	16 to 235
	Cb,Cr	1 to 255	16 to 240
10 bit	R,G,B,Y	0 to 1023	64 to 960

Quantization	Signal	Full range	Limited range
	Cb,Cr	0 to 1023	64 to 960
12 bit	R,G,B,Y	0 to 4095	256 to 3760
	Cb,Cr	0 to 4095	256 to 3840
16 bit	R,G,B,Y	0 to 65535	4096 to 60160
	Cb,Cr	0 to 65535	256 to 61440

Remote command:
`READ<hw>[:SCALar]:VIDeo:QUANtization?` on page 662

Component Format
Sets the color model of the measured analog or digital component video input signals.

- "RGB"
  The video input signal is interpreted as an RGB signal.
- "YCbCr"
  The digital video input signal is interpreted as a YCbCr signal.
  Only available if "MHL", "MHL PkdPx" or "HDMI" (digital input) is set under "Input" on page 143.
- "YPbPr"
  The analog video input signal is interpreted as a YPbPr signal.
  Only available if "Component" (analog input) is set under "Input" on page 143.

Remote command:
`CONFigure<hw>:VIDeo:COMPonent:FORMat:ANALog` on page 609
`READ<hw>[:SCALar]:VIDeo:COMPonent:FORMat:DIGital?` on page 661

Picture Aspect Ratio
Only required for analog video signals: "Composite" or "Component" is set under "Input" on page 143. Digital video signals contain the aspect ratio information.

Sets the aspect ratio of the video picture.

- "4:3"
  Shows the video picture with aspect ratio 4:3, independent from the aspect ratio of the video source.
- "16:9"
  Shows the video picture with aspect ratio 16:9, independent from the aspect ratio of the video source.

Remote command:
`CONFigure<hw>:VIDeo:SIGNal:ASPRatio:ANALog` on page 610

Input
Sets the input signal. This selection determines which measurement view and measurement analysis is active.

The available input list is hardware-dependent. It depends on the type and number of installed modules.

- "Composite" [<module slot>]
  Composite input signal
  Required hardware option: analog A/V RX module (R&S VT-B2370).

- "Component" [<module slot>]
  Component input signal
  Required hardware option: analog A/V RX module (R&S VT-B2370).
- "HDMI" [<module slot>]
  HDMI input signal
  Required hardware option, one of the following:
  – HDMI RX 225 MHz module (R&S VT-B2360)
  – HDMI RX 300 MHz module (R&S VT-B2361)
- "HDMI 600MHz" [<module slot>]
  HDMI input signal
  Required hardware option: HDMI RX/TX 600 MHz module (R&S VT-B2363)
- "MHL" [<module slot>]
  Mobile high definition link audio signals up to v1.2
  Required hardware option: MHL RX/TX module (R&S VT-B2350)
- "MHL PkdPx" [<module slot>]
  Mobile high definition link audio signals up to v2.0
  Required hardware option: MHL RX PackedPixel module (R&S VT-B2351)

Remote command:
`ROUTe<hw>:VIDeo:MODule:CATalog?` on page 678
`ROUTe<hw>:VIDeo:MODule:SELect` on page 678

External Sync
Only available if "Component" is set under "Input" on page 143.

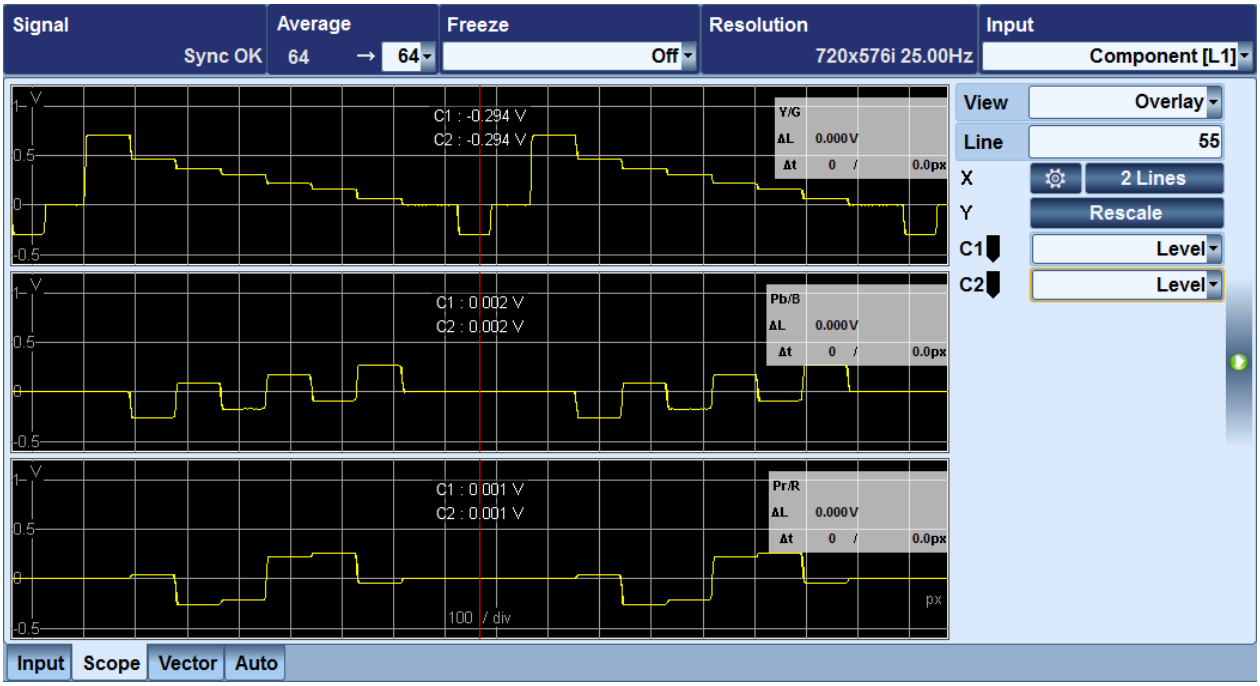
Enables or disables the external synchronization.

- "Off"
  Synchronizes to Y/G.
- "On"
  Synchronizes to the external synchronization input of the analog A/V RX module (R&S VT-B2370), see "H-SYNC and V-SYNC (VIDEO IN), L and R (AUDIO IN)" on page 81.

Remote command:
`ROUTe<hw>:VIDeo:SSELect` on page 678

8.3 Scope Subtab

Divided into the graph pane and parameter pane. The graph pane displays TV scope chart, see "<Chart display>" on page 145. To exclusively display the graph, tap .



<Chart display>

The unit of vertical scale (y-scale) is in volts. The unit of horizontal scale (x-scale) is in pixel or microseconds. To change it, use the "Settings Trace dialog" on page 148.

The label of cursor C1/C2 shows the signal level in volts of current cursor position. If two cursors are enabled, the legend in the right upper corner shows the time and level difference values of the both cursors.

Further information:

- Chapter 3.3.4, "Scaling and Evaluating Diagrams", on page 30

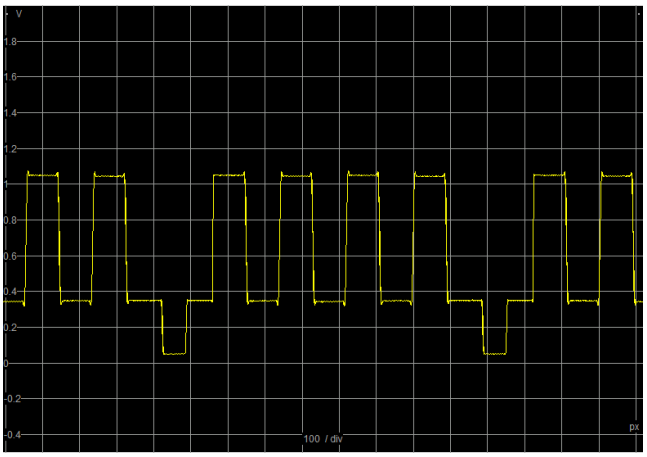
Remote command:

`DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:PIXel` on page 652

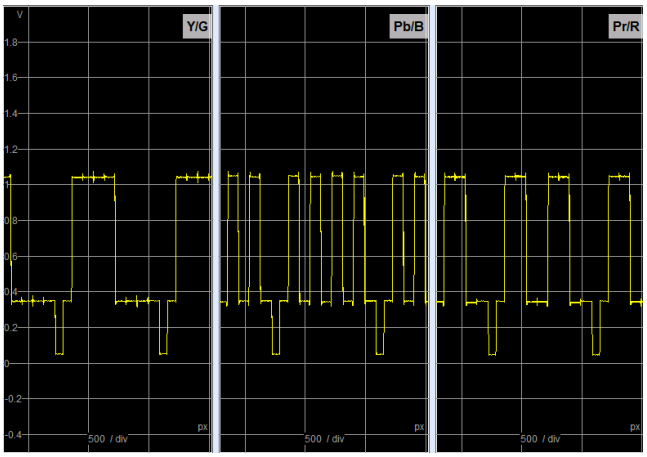
`DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:TIME` on page 653

CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:PIXel
on page 608
CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:TIME
on page 609

Single waveform chart ← <Chart display>

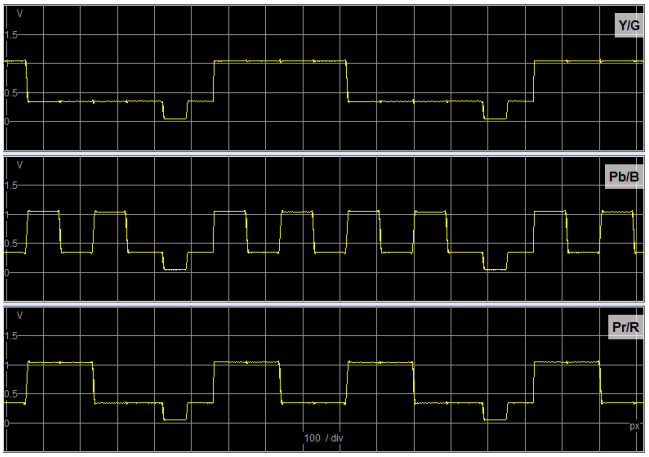


Parade waveform chart ← <Chart display>



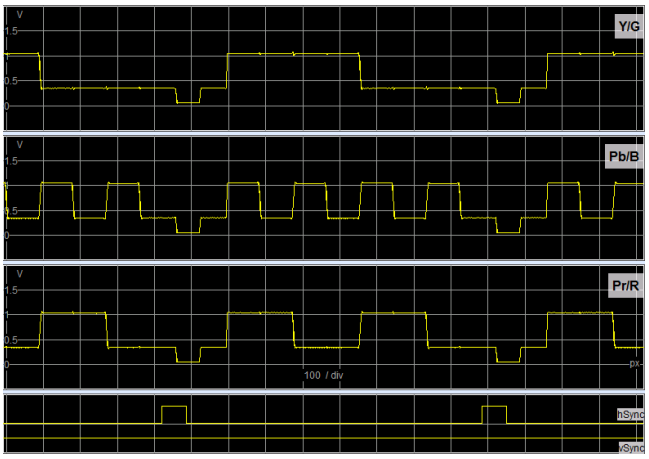
Shows all three component signals (YCbCr or RGB) side by side simultaneously. Diagram interactions such as scaling or moving the cursors affect all three displays similarly.

Overlay waveform chart ← <Chart display>



Shows all 3 component signals (YCbCr or RGB) top down simultaneously. Diagram interactions such as scaling or moving the cursors affect all three displays similarly.

Overlay sync waveform chart ← <Chart display>



Shows all 3 component signals (YCbCr or RGB) top down simultaneously, and a binary display of the external sync signals, H-SYNC and V-SYNC. For "Component" input signals, this chart is only available if "On" is set under "External Sync" on page 144.

View
Only available if a component input signal is set under "Input" on page 143.

Sets the content of the chart display.

- "Y/G Trace"
  Shows the luminance or green component signal of video input.
- "Pb/Blue Trace"
  Shows the blue color differential or blue component signal of video input.
- "Pr/Red Trace"
  Shows the red color differential or red component signal of video input.
- "Parade"
  See "Parade waveform chart" on page 146.
- "Overlay"

See "Overlay waveform chart" on page 147.

- "Overlay Sync"
  Only available if "On" is set under "External Sync" on page 144.
  See "Overlay sync waveform chart" on page 147.

Remote command:
DISPlay<hw>[:WINDow]:SCOPe:TRACe:SELect on page 652
READ<hw>:ARRay:SCOPe:TRACe? on page 658

Line
Sets the center of the chart display to the selected video line of displayed video signal.

Remote command:
DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:PIXel on page 652
DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:TIME on page 653
CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:PIXel on page 608
CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:TIME on page 609

Field
Only available if:

- "Composite" is set under "Input" on page 143.
- The input signal complies with the NTSC standard that defines the vertical position by field and line. The standard is displayed under "Video Standard" on page 141.

Selects the video field 1 or 2 of the displayed video signal to define the video line, see "Line" on page 148.

Remote command:
DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:PIXel on page 652
DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:TIME on page 653
CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:PIXel on page 608
CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:TIME on page 609

X
To select the settings for the x-scale, tap . The "Settings Trace" dialog is displayed, see "Settings Trace dialog" on page 148.

To assign the selected x-rescale value to the chart display, tap the button for x-rescaling next to the icon. The button is labeled with the currently selected value.

Settings Trace dialog
The appearance of the dialog depends on the video input signal (interlaced or progressive).

You can change the following settings.

Rescale ← Settings Trace dialog
Sets the x-rescale value.

- "1 Line"

Displays one video line.
- "2 Lines"
  Displays two video lines.
- "1st Field"
  Displays the complete 1st video field. Only available for interlaced video input signals.
- "2nd Field"
  Displays the complete 2nd video field. Only available for interlaced video input signals.
- "Field"
  Displays the complete video field. Only available for progressive video input signals.
- "VBlank 1"
  Displays the field blanking interval and start of the 1st field. Only available for interlaced video input signals.
- "VBlank 2"
  Displays the field blanking interval and start of the 2nd field. Only available for interlaced video input signals.
- "VBlank"
  Displays the field blanking interval and start of the field. Only available for progressive video input signals.
- "Vector Line"
  Displays one video line of the line selected on the "Vector" tab.

Unit ← Settings Trace dialog
Sets the unit of the x-span/position of the chart display and cursors ("C1, C2" on page 149, "Span" on page 150).
- "px"
  Pixel
- "µs"
  Micro seconds

Y
To rescale the chart display in y-direction, tap the "Rescale" button.

Remote command:
`DISPlay<hw>[:WINDow]:SCOPe:TRACe:Y:POSition` on page 653

C1, C2
Sets the cursor function.
- "Off"
  Switches off cursor 1.
- "Level"
  Measures the average level at the cursor position.
- "Slope"
  Evaluates a slope in the cursor window.

Remote command:
`CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:TYPE` on page 607
`READ<hw>[:SCALar]:SCOPe:TRACe:CURSor<cursor>?` on page 660

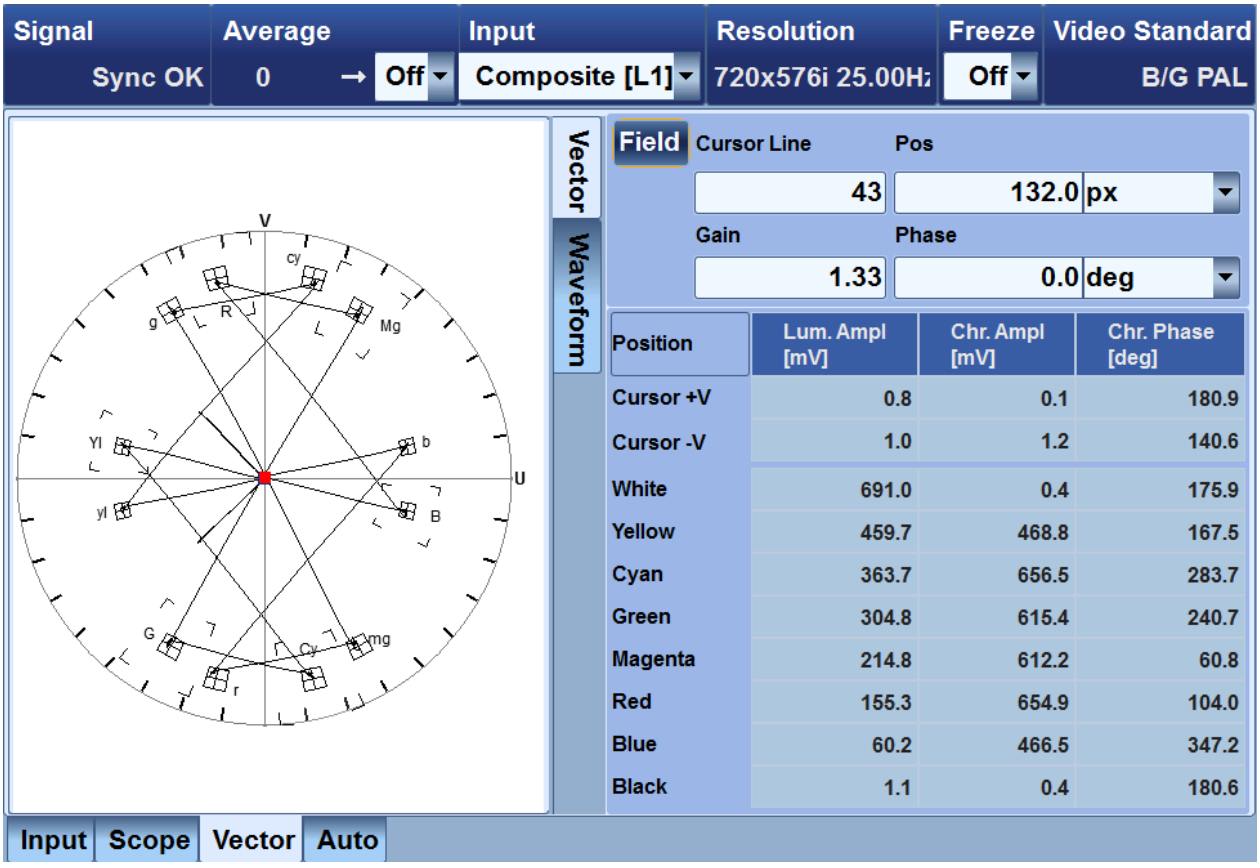
Span
Only available if "Slope" is set under "C1, C2" on page 149.

Sets the span.

Remote command:
`DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:PIXel` on page 652
`DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:TIME` on page 653
`CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:PIXel` on page 608
`CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:TIME` on page 609

8.4 Vector Subtab

Divided into the graph pane and parameter pane. The graph pane displays the vector scope (table and graph), see "<Measurement results table>" on page 151 and "<Chart display>" on page 151.



<Measurement results table>
The cursor measured results are the chrominance amplitude, the chrominance phase and the associated luminance level. Only if the Component/PAL standard is selected, there are pairs of measurement values (V+ and V-) for the chrominance amplitude, the chrominance phase and the associated luminance level.

If the selected video line is a standard color bar, the measurement results are automatically calculated and displayed for white, yellow, cyan, green, magenta, red, blue, and black.

Remote command:
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR?` on page 674
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:BLACk?` on page 674
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:BLUE?` on page 674
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:CYAN?` on page 674
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:GREen?` on page 675
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:MAGenta?` on page 675
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:RED?` on page 675
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:WHITe?` on page 675
`READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:YELLow?` on page 675
Cursor measurement values for all standards except PAL:
`READ<hw>[:SCALar]:VIDeo:VECTor:CURSor?` on page 675
Cursor measurement values for the PAL standard only:
`READ<hw>[:SCALar]:VIDeo:VECTor:CURSor:VPHase?` on page 676

<Chart display>
Displays the vector diagram, waveform and picture of video input signal.

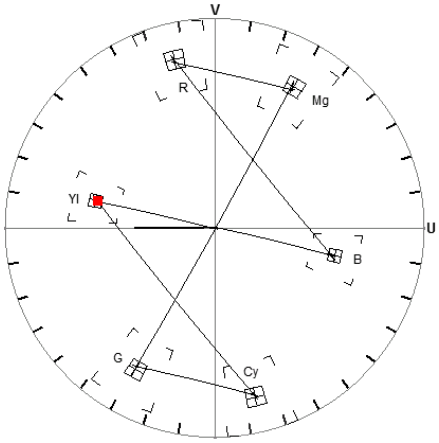


Figure 8-1: Vector diagram, NTSC standard

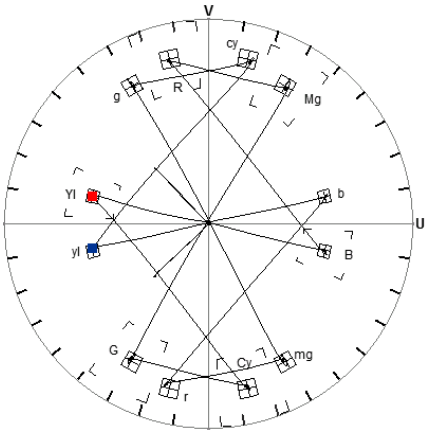


Figure 8-2: Vector diagram, PAL standard

The vector diagram graphically displays the color information, magnitude and phase of one measured video line. The endpoints of all color vectors in the diagram are joined by line. Tolerance markers show the positions of a standard color bar signal.

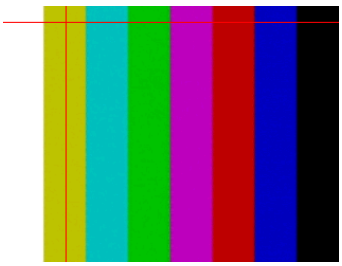


Figure 8-3: Picture of video input signal

Figure 8-4: Line trace of video input signal

In the upper pane, the picture of the measured video signal is displayed. The selected cursor line is displayed as a horizontal line.

In the lower pane, the waveform of the measured video line is displayed. The displayed signal section is permanently set and cannot be varied. The cursor position in the line is displayed as a vertical line.

Remote command:
Vector diagram:
`READ<hw>:ARRay:VIDeo:VECTor?` on page 659
Line trace:
`READ<hw>:ARRay:VIDeo:VECTor:TRACe:XTRace?` on page 676
`READ<hw>:ARRay:VIDeo:VECTor:TRACe:YTRace?` on page 677

Field
Only available if an interlaced video standard is recognized.

Toggles between the fields. The values of the other parameters are adapted accordingly.

Remote command:
CONFigure<hw>:VIDeo:VECTor:TRACe:CURSor:LPOSition:PIXel on page 610
CONFigure<hw>:VIDeo:VECTor:TRACe:CURSor:LPOSition:TIME on page 611

Cursor Line / Pos.
Sets the cursor position by defining the number of the TV line and the position in the line trace.

Remote command:
CONFigure<hw>:VIDeo:VECTor:TRACe:CURSor:LPOSition:PIXel on page 610
CONFigure<hw>:VIDeo:VECTor:TRACe:CURSor:LPOSition:TIME on page 611

Gain
Sets the phase to rotate the vector trace in the diagram.

Remote command:
SENSe<hw>:VIDeo:VECTor:CORRection:GAIN[:INPut][:MAGNitude] on page 679

Phase
Sets the gain to expand the vector trace in the diagram.

Remote command:
SENSe<hw>:VIDeo:VECTor:CORRection:GAIN[:INPut]:PHASe on page 679

8.5 Auto Subtab

Measures all selected parameters continuously and displays the results in a table, see "<Measurement results table>" on page 155.

For a detailed description of the parameters refer to the following application notes:

- "7MH108 Analog Composite Video Analysis"
- "7MH107 Analog Component Video Analysis"

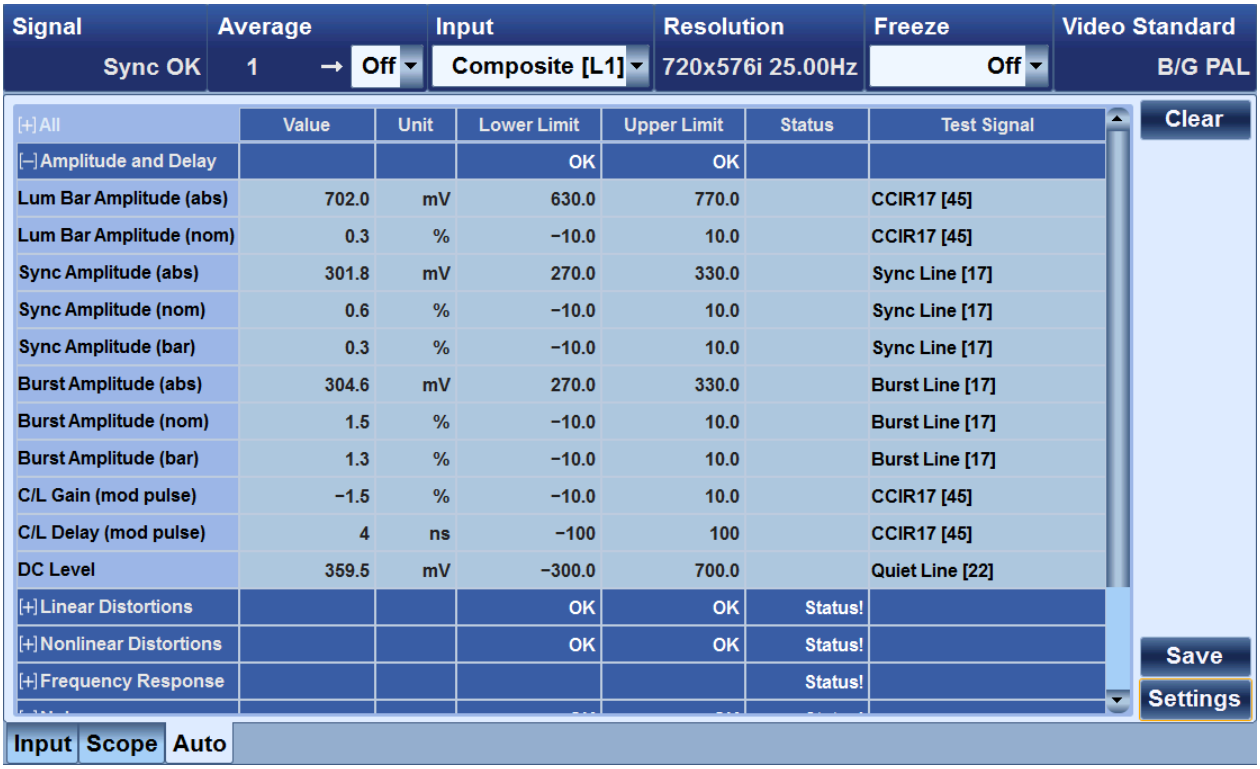
Application notes for the R&S VTE are provided on the Rohde & Schwarz Home Page under http://www.rohde-schwarz.com/applications/vtc_vte_vts.

To configure the displayed measurement results

1. Tap "Settings".

   The "Auto and Measurement Settings" dialog is displayed.

2. Configure the individual parameters as described in "Auto and Measurement Settings dialog" on page 157.



<Measurement results table>
Groups the available video parameters by the key issues. The following parameter groups are available, depending on the input set under "Input" on page 143:

Composite input
- "Amplitude and Delay"
  See Chapter 14.4.1.1, "Amplitude and Delay (Composite Input Signal)", on page 591
- "Linear Distortions"
  See Chapter 14.4.1.2, "Linear Distortions (Composite Input Signal)", on page 591
- "Nonlinear Distortions"
  See Chapter 14.4.1.3, "Nonlinear Distortions (Composite Input Signal)", on page 592
- "Frequency Response"
  See Chapter 14.4.1.4, "Frequency Response (Composite Input Signal)", on page 593
- "Noise"
  See Chapter 14.4.1.5, "Noise (Composite Input Signal)", on page 595
- "Timing"
  See Chapter 14.4.1.6, "Timing (Composite Input Signal)", on page 596
- "Jitter"
  See Chapter 14.4.1.7, "Jitter (Composite Input Signal)", on page 597
- "Video Data"
  See Chapter 14.4.1.8, "Video Data (Composite Input Signal)", on page 597

Component, HDMI, MHL input
- "Amplitude and Delay"
  See Chapter 14.4.2.1, "Amplitude and Delay (Component, HDMI, MHL Input Signal)", on page 598
- "Linear Distortions"
  See Chapter 14.4.2.2, "Linear Distortions (Component, HDMI, MHL Input Signal)", on page 600
- "Nonlinear Distortions"
  See Chapter 14.4.2.3, "Nonlinear Distortions (Component, HDMI, MHL Input Signal)", on page 601
- "Frequency Response"
  See Chapter 14.4.2.4, "Frequency Response (Component, HDMI, MHL Input Signal)", on page 601
- "Noise"
  See Chapter 14.4.2.5, "Noise (Component, HDMI, MHL Input Signal)", on page 604

- "Timing"
  See Chapter 14.4.2.6, "Timing (Component, HDMI, MHL Input Signal)", on page 604
- "Jitter"
  See Chapter 14.4.2.7, "Jitter (Component, HDMI, MHL Input Signal)", on page 605

Remote command:
See Chapter 14.4.10.3, "READ<hw>[:SCALar]:VIDeo:MEASure Subsystem", on page 664

[+] All button ← <Measurement results table>
Opens all parameter groups and lists each individual parameter. Located in the upper left corner of the table.

[-] All button ← <Measurement results table>
Closes all parameter groups and overviews the measurement status. Located in the upper left corner of the table.

Value column ← <Measurement results table>
Displays the measured value of the parameter. If the current measured value violates any set limit, the value is displayed in red color.

Unit column ← <Measurement results table>
Displays the unit of the measured value.

Lower Limit column ← <Measurement results table>
Displays the lower limit for the monitoring of the measured value set under "Lower Limit column" on page 159.

Upper Limit column ← <Measurement results table>
Displays the lower limit for the monitoring of the measured value set under "Upper Limit column" on page 159.

Status column ← <Measurement results table>
Displays the overall measurement status of the parameter group.

- "OK"
  All result values are within the set limits.
- "Fail" (in red color)
  At least one measured parameter is not valid (e.g. no applicable test signal) or a result value is not within set limits.

If you open the list of the parameter group, the status for each individual measured parameter is also displayed. For a description of possible status, see Table 14-18.

Test Signal column ← <Measurement results table>
Displays the used test signal and test line for the video parameter set in the "<Parameter configuration dialog>" on page 161.

Clear button
Resets all measurement results.

Save button
Opens a dialog box to save the current measurement results in a CSV file.

You can define a separator on the "Extras tab" on page 160.

Remote command:
`MMEMory<hw>:VIDeo:MEASure:RESult:NTSC:STORe` on page 656
`MMEMory<hw>:VIDeo:MEASure:RESult:PAL:STORe` on page 656
`MMEMory<hw>:VIDeo:MEASure:RESult:RGB:STORe` on page 656
`MMEMory<hw>:VIDeo:MEASure:RESult:Y:STORe` on page 656

Settings button
Opens the "Auto and Measurement Settings" dialog, see "Auto and Measurement Settings dialog" on page 157.

Auto and Measurement Settings dialog
Used to configure the parameters of the "<Measurement results table>" on page 155:
- Enabling or disabling individual parameters for measurement.
  See "Enable column" on page 158.
- Configuring the lower and upper limits of a parameter.
  See "Lower Limit column" on page 159 and "Upper Limit column" on page 159.
- Defining the test signal.
  See "Test Signal column" on page 159.

Depending on the input set under "Input" on page 143, several tabs for parameter sets are available:
- "NTSC", "PAL"
  For composite input.
- "RGB", "YPbPr"
  For component input. The separation in 2 tabs enables you to configure RGB and YPbPr parameters independently from each other.
- "RGB", "YCbCr"
  For HDMI, MHL input. The separation in 2 tabs enables you to configure RGB and YCbCr parameters independently from each other.

Additionally, the "Extras" tab is provided, see "Extras tab" on page 160.

To open the dialog, see "Settings button" on page 157.

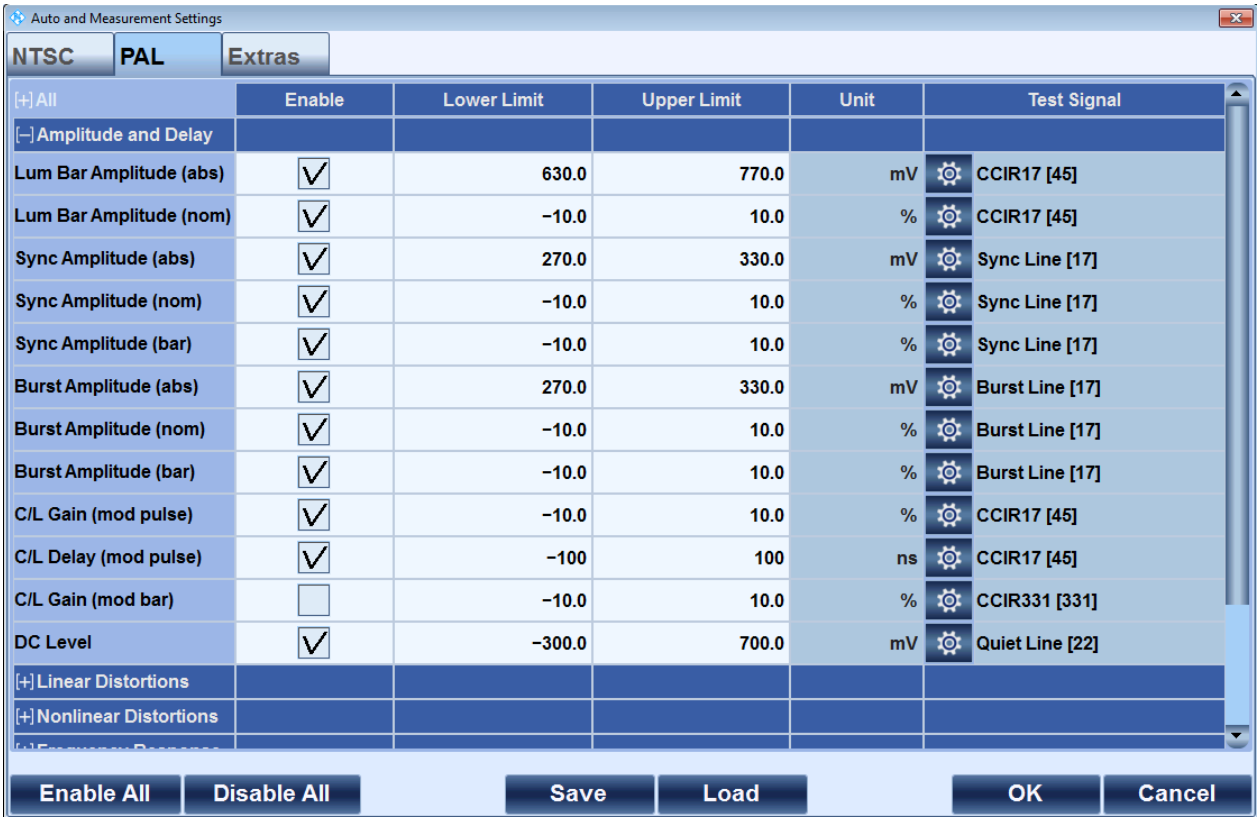


Figure 8-5: Example for composite input

Remote command:
See Chapter 14.4.6.3, "CONFigure<hw>:VIDeo:MEASure Subsystem", on page 611

<Settings table> ← Auto and Measurement Settings dialog
Contains all available parameters grouped by key issues, as in the "<Measurement results table>" on page 155.

Configure each parameter for the auto measurement function. For information on the parameters, see for

- Composite input: Chapter 14.4.1, "Parameters for Composite Input Signals", on page 590
- Component, HDMI, MHL input: Chapter 14.4.2, "Parameters for Component, HDMI, MHL Input Signal", on page 598

Enable column ← <Settings table> ← Auto and Measurement Settings dialog
Enables or disables the individual parameter for measurement.

Remote command:
Depends on the parameter group and the video standard:
`CONFigure<hw>:VIDeo:MEASure:<parameter group>:<video standard>:SELect`
See Chapter 14.4.6.3, "CONFigure<hw>:VIDeo:MEASure Subsystem", on page 611

Lower Limit column ← <Settings table> ← Auto and Measurement Settings dialog
Sets the lower limit for monitoring the individual parameter.

Remote command:
Depends on the parameter group and the video standard:
`CONFigure<hw>:VIDeo:MEASure:<parameter group>:<video standard>:LIMit:LOWer`
See Chapter 14.4.6.3, "CONFigure<hw>:VIDeo:MEASure Subsystem", on page 611

Upper Limit column ← <Settings table> ← Auto and Measurement Settings dialog
Sets the upper limit for monitoring the individual parameter.

Remote command:
Depends on the parameter group and the video standard:
`CONFigure<hw>:VIDeo:MEASure:<parameter group>:<video standard>:LIMit:UPPer`
See Chapter 14.4.6.3, "CONFigure<hw>:VIDeo:MEASure Subsystem", on page 611

Unit column ← <Settings table> ← Auto and Measurement Settings dialog
Displays the unit of the parameter.

Test Signal column ← <Settings table> ← Auto and Measurement Settings dialog
Displays the currently selected test signal.

To define another test signal, tap . See "<Parameter configuration dialog>" on page 161.

Absolute Amplitude Unit ← Auto and Measurement Settings dialog
Only available if "Component", "HDMI", "MHL" or "MHL PkdPx" is set under "Input" on page 143.

Sets the unit for the "Lower Limit", "Upper Limit" columns for the "Lum Bar Amplitude (abs)", "Sync Amplitude (abs)", "Color Bar Amplitude", "Multiburst Flag Amplitude (abs)" parameters.

Note: For composite input, mV is always used as unit.

The data basis for the limit values works with the "%RNG" unit. Except for composite input, the limit values are used for all input signals and video standards. Therefore only one set limit values has to be hold available. If absolute amplitude limit values higher than 100 % are set (useful for analog input signals), this value is out of the range for all "FRange<num>" units and could be out of the range for the "LRange<num>" units. Then the actual overranged value is shown in the limit column, which will be never exceeded.

- "%RNG"
  Absolute amplitude value in percentage of the range in digits (digital signal) or 700 mV (analog signal). The advantage of this unit is the common validity of the value independent of the defined range of the input signal.
  Example: A value of 100 % corresponds to 255 for a full range 8 bit digital signal or 700 mV for an analog Y signal or +350 mV for an analog Pb/Pr signal.
- "mV"
  Only used for component input (analog signal).

- "FRange8", "FRange10", "FRange12", "FRange16"
  Digits of a full range digital signal with the corresponding number of bits.
  Only used for HDMI, MHL input (digital signal).
- "LRange8", "LRange10", "LRange12", "LRange16"
  Digits of a limited range digital signal with the corresponding number of bits.
  Only used for HDMI, MHL input (digital signal).

Remote command:
`UNIT<hw>:VIDeo:MEASure:COMPonent:ANALog` on page 680
`UNIT<hw>:VIDeo:MEASure:COMPonent:DIGital` on page 680

Line Counter ← Auto and Measurement Settings dialog
See "Line Counter" on page 162.

Enable All, Disable All button ← Auto and Measurement Settings dialog
Enables/disables the measurement of all parameter at once.

Remote command:
`CONFigure<hw>:VIDeo:MEASure:NTSC:SELect:ALL` on page 643
`CONFigure<hw>:VIDeo:MEASure:PAL:SELect:ALL` on page 643
`CONFigure<hw>:VIDeo:MEASure:RGB:SELect:ALL` on page 643
`CONFigure<hw>:VIDeo:MEASure:Y:SELect:ALL` on page 643

Save button ← Auto and Measurement Settings dialog
Opens a file dialog to save the current auto and measurement settings in a binary file. These settings include the definition of the test signals, see "<Parameter configuration dialog>" on page 161.

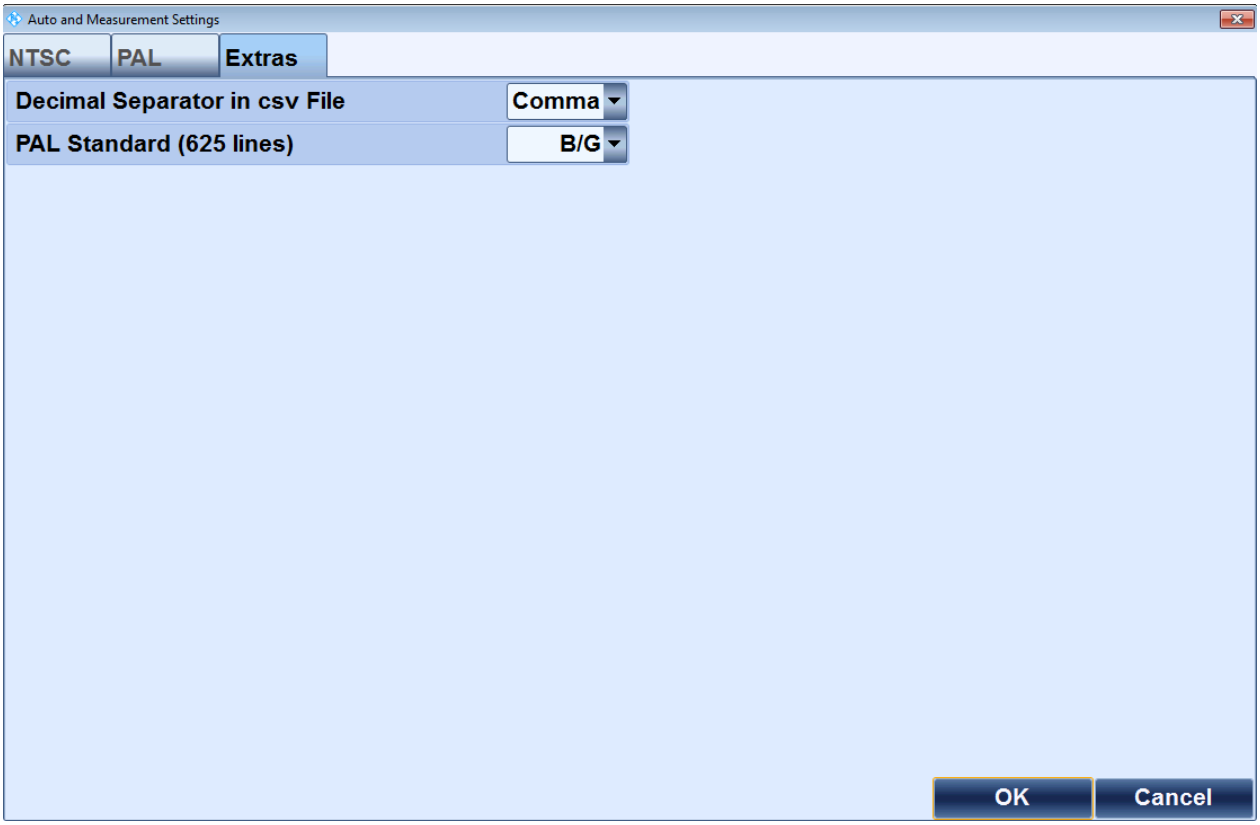
The file extension is VMVTX.

Remote command:
`MMEMory<hw>:VIDeo:MEASure:SETTings:NTSC:LOAD` on page 657
`MMEMory<hw>:VIDeo:MEASure:SETTings:PAL:LOAD` on page 657
`MMEMory<hw>:VIDeo:MEASure:SETTings:RGB:LOAD` on page 657
`MMEMory<hw>:VIDeo:MEASure:SETTings:Y:LOAD` on page 657

Load button ← Auto and Measurement Settings dialog
Opens a file dialog to load any stored auto and measurement settings.

Remote command:
`MMEMory<hw>:VIDeo:MEASure:RESult:NTSC:STORe` on page 656
`MMEMory<hw>:VIDeo:MEASure:RESult:PAL:STORe` on page 656
`MMEMory<hw>:VIDeo:MEASure:RESult:RGB:STORe` on page 656
`MMEMory<hw>:VIDeo:MEASure:RESult:Y:STORe` on page 656

Extras tab ← Auto and Measurement Settings dialog
Independent from the selected input, this tab is provided in the "Auto and Measurement Settings dialog" on page 157.



Decimal Separator in csv File ← Extras tab ← Auto and Measurement Settings dialog
Defines the separator used in the CSV file. Select the column delimiter and decimal separator.

- "Comma"
  Separates the decimal places by commas and the columns by semicolons.
- "Dot"

Separates the decimal places by dots and the columns by commas.

Remote command:
`MMEMory<hw>:VIDeo:MEASure:STORe:SEParator` on page 658

PAL Standard (625) ← Extras tab ← Auto and Measurement Settings dialog
Only available if "Composite" is set under "Input" on page 143.

Sets the B/G, D/K or I substandards. The video bandwidth depends on the substandard. The video bandwidth influences the measurement of the "2T Pulse k-Factor", "Short Time Distortion" and "C/SND Intermodulation" parameters.

Remote command:
`CONFigure<hw>:VIDeo:MEASure:PAL:STANdard` on page 643

<Parameter configuration dialog>
Defines the test signal and the measurement locations for the parameter displayed in the title bar.

To open the dialog, see "Test Signal column" on page 159.

Test Signal ← <Parameter configuration dialog>
Each parameter needs a defined test signal. See Chapter 14.4.3, "Test Signals", on page 605.

Remote command:
Depends on the parameter group and the video standard. See Chapter 14.4.3, "Test Signals", on page 605.

Test Line ← <Parameter configuration dialog>
Most test signals cover one video line. Assign the individual video line that includes this test signal. The range depends on the video standard and the input signal set under "Input" on page 143.

Composite input
- BG/PAL
  First field: "6" to "309"
  Second field: "318" to "622"
- M/NTSC
  First and second field: "10" to "262"

Exceptions:
- "Field Line" test signal for measuring the sync amplitude in the line-sync area. This measurement is always carried out in line 3 (PB/PAL) and line 6 (M/NTSC) respectively.
- "Field Blanc", "50 Hz Pulse", "Full Field", and "Active Video" test signals include more then one video line. The definition is invariant.

Component, HDMI, MHL input: Depending of the video standard, the video line ranges from "1" to "1250". The video line depends on counting mode set under "Line Counter" on page 162.

For an overview on available test signals, see Chapter 14.4.3, "Test Signals", on page 605.

Remote command:
For the test signals, the video line is configured video standard-specific:
`CONFigure<hw>:VIDeo:MEASure:TSIGnal:PAL:LINE` on page 648
`CONFigure<hw>:VIDeo:MEASure:TSIGnal:NTSC:LINE` on page 648
`CONFigure<hw>:VIDeo:MEASure:TSIGnal:RGB:LINE` on page 649
`CONFigure<hw>:VIDeo:MEASure:TSIGnal:Y:LINE` on page 649
Test signal names see Chapter 14.4.3, "Test Signals", on page 605.

Line Counter ← <Parameter configuration dialog>
Only available if "Component", "HDMI", "MHL" or "MHL PkdPx" is set under "Input" on page 143.

Sets the counting mode for the assigned test line under "Test Line" on page 162.

- "%VAct"
  Percent value of the visible picture from top of the screen, e. g. 50 corresponds to the vertical center of the picture. The advantage of this mode is the common validity of the value, independent of the vertical resolution of the video standard.
- "Active Field"
  Line number referred to the active area of the frame.
- "Full Field"

Only available for the component input (analog signal).
Line number referred to the frame including the V-blanking area.

Note: For composite input (NTSC and PAL standards), only the "Full Field" line counting mode is used (see above).

Remote command:
`CONFigure<hw>:VIDeo:MEASure:COMPonent:ANALog:CLINe` on page 619
`CONFigure<hw>:VIDeo:MEASure:COMPonent:DIGital:CLINe` on page 619

Location Unit ← <Parameter configuration dialog>
Sets the unit for the measurement locations.

- "px"
  Pixel number from the start of the video line.
- "us"
  Horizontal location in µs from the start of the video line.

Note: For HDMI, MHL input signals, with exception of the "Sync Amplitude" parameter group, the %HActive unit is used. %HActive corresponds to the left edge of the screen, for example 50 corresponds to the horizontal center of the picture.
For the "Sync Amplitude" parameter group, which is only available for the component input (analog signal), the %HTotel unit is used. 0%HTotal corresponds to the start of the line. The benefit of this unit is the common validity of the value, independent of the horizontal resolution of the video standard.

Remote command:
`UNIT<hw>:VIDeo:MEASure:TSIGnal:LOCation` on page 681

Location table ← <Parameter configuration dialog>

- "Location" column
  Displays the number and the name of the location windows needed for the present parameter configuration.
- "Center" column
  Sets the center of the corresponding location window. The unit of this value is set under "Location Unit" on page 163.
- "Width" column
  Sets the width of the corresponding location window. The unit of this value is set under "Location Unit" on page 163.

Note: For component input signals. The rising edge location of the luminance bar is used as timing reference for all defined location windows. If the measured time for the rising edge deviates from the center value of location 1 ("Lum Bar Duration" parameter), the deviation is added to the center values of all location windows. In this way, any shift between sync and video content is adjusted. If the measurement of the rising edge of the luminance bar is not valid, no adjustment is performed.

Remote command:
Starting the location editor:
`INITiate<hw>:VIDeo:MEASure:LOCation:NTSC:UP` on page 655
`INITiate<hw>:VIDeo:MEASure:LOCation:PAL:UP` on page 655
`INITiate<hw>:VIDeo:MEASure:LOCation:RGB:UP` on page 655
`INITiate<hw>:VIDeo:MEASure:LOCation:Y:UP` on page 655
Closing the location editor:
`INITiate<hw>:VIDeo:MEASure:LOCation:DOWN` on page 655

Querying the location editor status:
INITiate<hw>:VIDeo:MEASure:LOCation? on page 654
Querying the number of valid locations:
READ<hw>[:SCALar]:VIDeo:MEASure:TSIGnal:LOCation:COUNt?
on page 672
Positioning the location cursor:
CONFigure<hw>:VIDeo:MEASure:TSIGnal:LOCation:CURSor<line>:CENTer
on page 647
CONFigure<hw>:VIDeo:MEASure:TSIGnal:LOCation:CURSor<line>:SPAN
on page 647
Querying the name of the location where the cursor is positioned:
READ<hw>[:SCALar]:VIDeo:MEASure:TSIGnal:LOCation:CURSor<line>:
NAME? on page 673
Querying the trace data:
READ<hw>:ARRay:VIDeo:MEASure:TSIGnal:LOCation:TRACe? on page 659

Bandwidth (composite inputs) ← <Parameter configuration dialog>
Only available for the "Lum Noise" parameter group. The available settings depend on the video standard.

NTSC standard:
- "Default (4.2 MHz)"
- "5.0 MHz"
- "Full BW"

PAL standard:
- "Default (5.0 MHz)"
- "Full BW"

Remote command:
CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:BANDwidth on page 637
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:BANDwidth on page 637

Bandwidth (component and digital inputs) ← <Parameter configuration dialog>
Only for the "Signal to Noise" parameter.
- "Default"
  Uses the measurement bandwidth fitted to signal bandwidth of the input signal, for example 10 MHz for SD, 30 MHz for HD, 720p for RGB and Y.
- "4.2 MHz (NTC7 weight.)"
- "5.0 MHz (NTC7 weight.)"
- "20 MHz"

For PbPr (analog input) and CbCr (digital input), the halfed measurement bandwidth is applied.

Remote command:
CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:BANDwidth on page 640
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:BANDwidth on page 640

Weighting ← <Parameter configuration dialog>
Only available if:
- "Composite" is set under "Input" on page 143.
- Input signal is NTSC standard.

- "Lum Noise" parameter group is set.

Applies a weighting curve.

- "Default (NTC7)"
- "Unified (CCIR)"

Remote command:
`CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:WEIGhting` on page 640

9 Audio Analyzer Application

Requires the following options:

- Audio analyzer option (R&S VT-K2150)
- Suitable hardware option as described in the data sheet, see also "Input" on page 168

The audio analyzer application provides a suite of tools for measuring audio performance and quality.

9.1 Main Dialog of the Application

The parameters are grouped on tabs.

Information and default favorites

Parameters that are often needed are provided as default favorites below the tab title. Some of the default favorites of the application itself are also available on one of the subtabs.

- "Signal"
  Displays the signal status.
  Remote command: `READ<hw>[:SCALar]:AUDio:SIGNal?` on page 714
- "Running"
  Displays the sample status and which measurement is running.
  Remote command: `READ<hw>[:SCALar]:AUDio:COMMand:STATe?` on page 703
- "Sample Rate" on page 169
- "Input" on page 168

Common remote commands

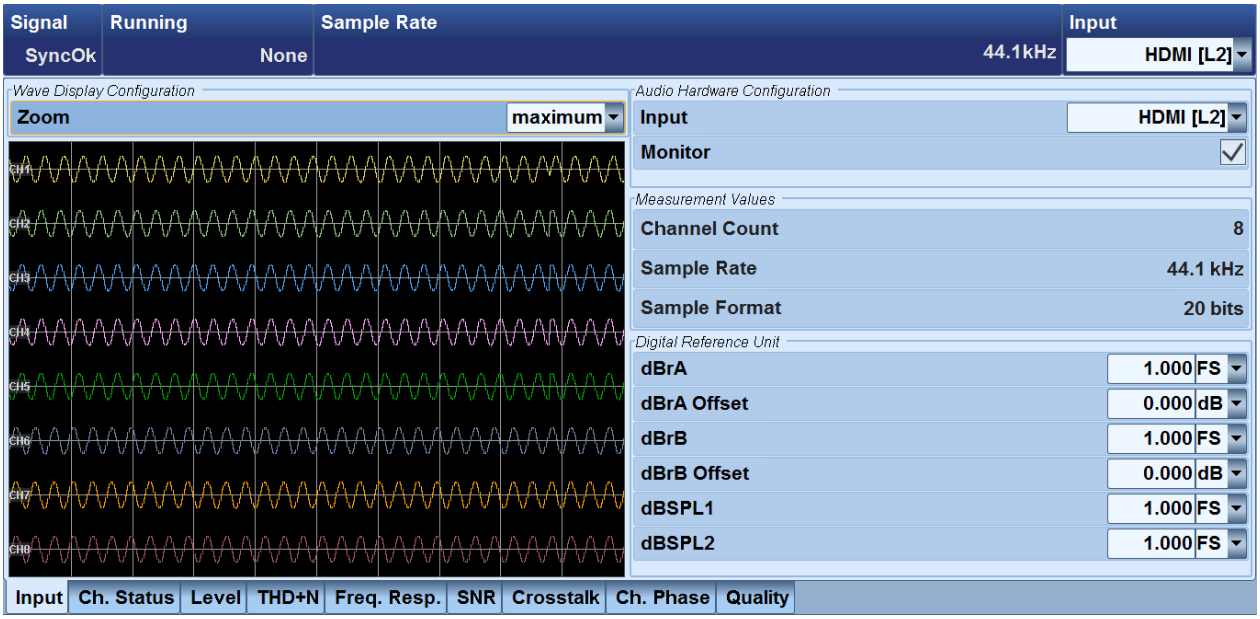
`DISPlay<hw>:AUDio:SELect:TAB` on page 695

`INITiate<hw>:AUDio` on page 696

`ABORt<hw>:AUDio` on page 681

9.2 Input Subtab

Configures the input source.



Wave Display Configuration
Shows a realtime waveform display of the audio signal from the input device. Each input channel has a separate waveform display. With no signal connected, the wave display shows a straight line.

Zoom ← Wave Display Configuration
Sets the zoom of the wave chart time window.

- "Maximum"
  Allows for viewing fast transients.
- "Minimum"
  Gives an overview of the signal behavior for a longer period of time.

Remote command:
DISPlay<hw>:AUDio:WAVeform:ZOOM on page 696

Audio Hardware Configuration
Provides details of the audio input devices available.

Input ← Audio Hardware Configuration
Sets the input signal.

The available input list is hardware-dependent. It depends on the type and number of installed modules.

- "Analog L/R" [<module slot>]
  Analog audio inputs up to 80 kHz
  Required hardware option: analog AV RX module (R&S VT-B2370)
  If active, the results for channel 1 ("CH1") and channel 2 ("CH2") are displayed. Channel 1 is the left channel. Channel 2 is the right channel.
- "HDMI" [<module slot>]
  Digital audio from SD and HD video signals
  Required hardware option, one of the following:
  – HDMI RX 225 MHz module (R&S VT-B2360)
  – HDMI RX 300 MHz module (R&S VT-B2361)
- "HDMI 600MHz" [<module slot>]
  Digital audio from SD and HD video signals
  Required hardware option: HDMI RX/TX 600 MHz module (R&S VT-B2363)
- "HDMI 600MHz Arc" [<module slot>]
  Audio return channel (ARC) from HDMI generator output
  Required hardware option: HDMI RX/TX 600 MHz module (R&S VT-B2363)
- "HDMI 600MHz S/PDIF" [<module slot>]
  Digital audio interface via TOSLINK
  Required hardware option: HDMI RX/TX 600 MHz module (R&S VT-B2363)
- "HDMI Tx Arc" [<module slot>]
  Audio return channel (ARC) from HDMI generator output
  Required hardware option: HDMI TX module (R&S VT-B360)
- "MHL" [<module slot>]
  Mobile high definition link audio signals up to v1.2
  Required hardware option: MHL RX/TX module (R&S VT-B2350)
- "MHL PkdPx" [<module slot>]
  Mobile high definition link audio signals up to v2.0
  Required hardware option: MHL RX PackedPixel module (R&S VT-B2351)
- "S/PDIF" [<module slot>]
  Digital audio interface via TOSLINK
  Required hardware option, one of the following:
  – HDMI RX 225 MHz module (R&S VT-B2360)
  – HDMI RX 300 MHz module (R&S VT-B2361)

Remote command:
ROUTe<hw>:AUDio:MODule:CATalog? on page 758
ROUTe<hw>:AUDio:MODule:SELect on page 759

Monitor ← Audio Hardware Configuration
If enabled, the current audio signal is played via loudspeaker and headphone output.

Impedance ← Audio Hardware Configuration
Only available if "Analog L/R" is set under "Input" on page 168.

Sets the impedance of both analog audio inputs.

- 100 kΩ
- 600 Ω

Remote command:
`CONFigure<hw>:AUDio:INPut:IMPedance` on page 691

Coupling ← Audio Hardware Configuration
Only available if "Analog L/R" is set under "Input" on page 168.

Sets the coupling of both analog audio inputs.

- AC
- DC

Remote command:
`CONFigure<hw>:AUDio:INPut:COUPling` on page 690

Measurements Values
Provides the format of the currently selected input device.

Channel Count ← Measurements Values
Displays the count of audio input channels available from the current selected audio source. The channel count is determined by the interface type and the external device connected.

- "1" to "8"

Remote command:
`READ<hw>[:SCALar]:AUDio:CHANnel:COUNt?` on page 702

Sample Rate ← Measurements Values
Displays the current sample rate from the selected audio source. The sample rate is determined by the interface type and the external device connected.

- "22 kHz"
- "32 kHz"
- "44.1 kHz"
- "48 kHz"
- "88.2 kHz"
- "96 kHz"
- "174 kHz"
- "192 kHz"
  For analog sources, the default sample rate is 192 kHz.

Remote command:
`READ<hw>[:SCALar]:AUDio:SAMPle:RATE?` on page 713

Sample Format ← Measurements Values
Displays the current sample bit size. The sample format is determined by the interface type and the external device connected.

- "16"
- "20"
- "24"

- "32"

Remote command:
READ<hw>[:SCALar]:AUDio:SAMPle:FORMat? on page 713

Analog/Digital Reference Unit
Sets the reference units that allow to display the measurement results in units relative to a user-defined set of reference values.

Table 9-1: Explanation of reference units available

Unit	Analog input	Digital input
dBrA dBrB	Decibels relative to the defined input reference level with dB offset. Two configurations sets are provided (dBrA and dBrB) for convenience when comparing different devices.	Decibels relative to the defined full scale level and offset Two configurations sets are provided (dBrA and dBrB) for convenience when comparing different devices.
dBSPL1 dBSPL2	Acoustic measure of sound pressure level, relative to a reference value. These references are determined by measuring the acoustic output from a loudspeaker when fed with a known electrical input signal. Two configurations sets are provided (dBSPL1 and dBSPL2) for convenience when comparing different devices.	Separate references settings are provided for digital sources since the acoustic measurements require a known electrical input signal which has different characteristics for digital devices. Two configurations sets are provided (dBSPL1 and dBSPL2) for convenience when comparing different devices.

dBrA Reference ← Analog/Digital Reference Unit
Sets the reference level V(rms) for input using dBrA.

Remote command:
Analog input devices: SENSe<hw>:AUDio:REFerence:ANALog:DBRA on page 762
Digital input devices: SENSe<hw>:AUDio:REFerence:DIGital:DBRA on page 764

dBrA Offset ← Analog/Digital Reference Unit
Sets the reference offset level for input using dBrA.

Remote command:
Analog input devices: SENSe<hw>:AUDio:REFerence:ANALog:OFFSet:DBRA on page 763
Digital input devices: SENSe<hw>:AUDio:REFerence:DIGital:OFFSet:DBRA on page 765

dBrB Reference ← Analog/Digital Reference Unit
Sets the reference level V(rms) for input using dBrB.

Remote command:
Analog input devices: SENSe<hw>:AUDio:REFerence:ANALog:DBRB on page 762
Digital input devices: SENSe<hw>:AUDio:REFerence:DIGital:DBRB on page 764

dBrB Offset ← Analog/Digital Reference Unit
Sets the reference offset level for input using dBrB.

Remote command:
Analog input devices: SENSe<hw>:AUDio:REFerence:ANALog:OFFSet:DBRB
on page 763
Digital input devices: SENSe<hw>:AUDio:REFerence:DIGital:OFFSet:DBRB
on page 765

dBSPL1 Reference ← Analog/Digital Reference Unit
Sets the reference level for measuring the sound pressure level.

Remote command:
Analog input devices: SENSe<hw>:AUDio:REFerence:ANALog:DBSPl<source>
on page 763
Digital input devices: SENSe<hw>:AUDio:REFerence:DIGital:DBSPl<source>
on page 764

dBSPL2 Reference ← Analog/Digital Reference Unit
Sets the reference level for measuring the sound pressure level.

Remote command:
Analog input devices: SENSe<hw>:AUDio:REFerence:ANALog:DBSPl<source>
on page 763
Digital input devices: SENSe<hw>:AUDio:REFerence:DIGital:DBSPl<source>
on page 764

9.3 Ch. Status Subtab

Requires the compressed audio support option (R&S VT-K2151).

Provides a protocol analysis of the IEC 60958 channel status information. The protocol analyzer runs continuously on the currently selected audio source. If a parameter is invalid, it is displayed in red.

Supported input sources

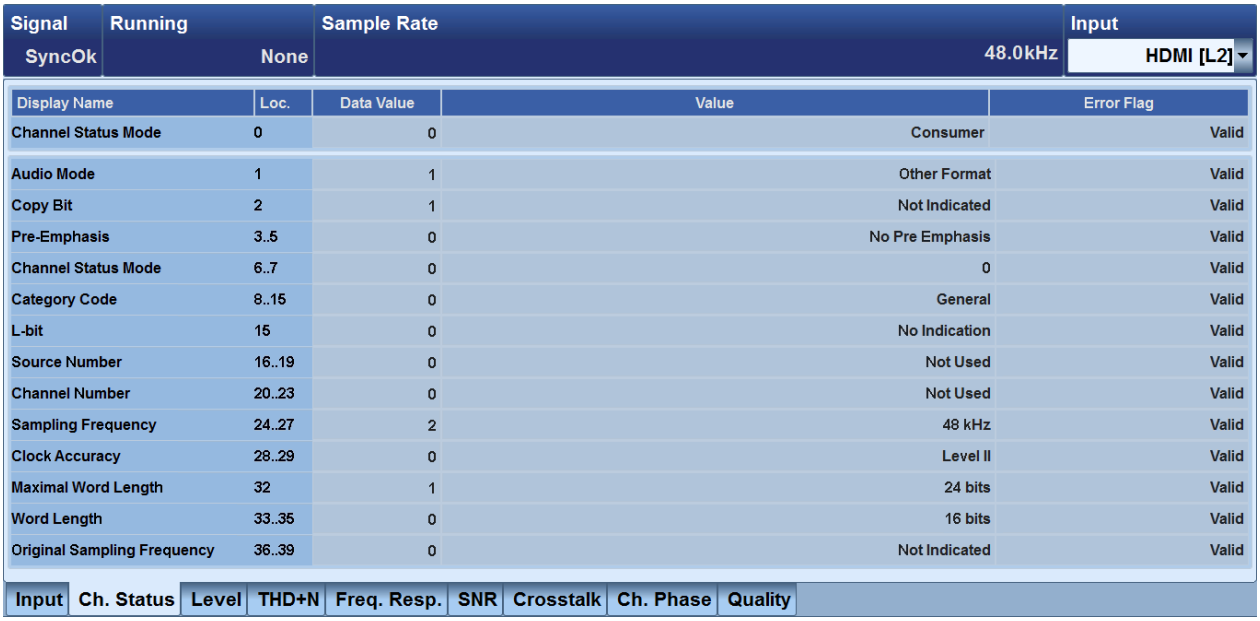
You can analyze the channel status information for the following audio sources:

- S/PDIF
- HDMI
- MHL

If you select an input source that is not supported, the "Channel Status Mode" is grayed out and no results are displayed.

Remote command:

READ<hw>[:SCALar]:AUDio:SPDif:SOURce:SUPPorted? on page 756



Channel Status Mode
The mode is selected automatically.
- "Consumer"
- "Professional"
  Only available for S/PDIF sources

Depending on the mode, the available analyzer results change in the "<Results table>" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:MODE?` on page 730
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:DATA:MODE?` on page 730
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:VALidity:MODE?` on page 756

<Results table>
The table consists of the following columns:
- 1st column: "Display Name"
  Parameter name
- 2nd column: "Loc."
  Numbers of the channel status bits
- 3rd column: "Data Value"
  Raw data for the parameter
- 4th column: "Value"
  Parameter setting
- 5th column: "Error Flag"
  Validity of setting

For each parameter, you can query the results separately. In the following, the parameters are sorted alphabetically.

Alignment Level ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:ALIGnment?` on page 730
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:ALIGnment?` on page 732
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:ALIGnment?` on page 747

Audio Mode ← <Results table>
Available for both channel status modes.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:AUDiomode? on page 715
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:AUDiomode? on page 717
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:AUDiomode? on page 724
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:AUDiomode? on page 731
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:AUDiomode? on page 733
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:AUDiomode? on page 747

Category Code ← <Results table>
Only available if "Consumer" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:CATegorycode? on page 715
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:CATegorycode? on page 717
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:CATegorycode? on page 725

Channel Destination ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DEData? on page 741
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:DEData? on page 734
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:DEData? on page 749

Channel Mode ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:CHANmode? on page 731
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:CHANmode? on page 733
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:CHANmode? on page 748

Channel Number ← <Results table>
Available for both channel status modes.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:CHANnel?` on page 716
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:CHANnel?` on page 718
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:CHANnel?` on page 725
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:CHNumber?` on page 732
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:CHNumber?` on page 734
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:CHNumber?` on page 748

Channel Status Mode ← <Results table>
Only available if "Consumer" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:CSMode?` on page 717
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:CSMode?` on page 719
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:CSMode?` on page 726

Clock Accuracy ← <Results table>
Only available if "Consumer" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:CLKacc?` on page 716
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:CLKacc?` on page 718
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:CLKacc?` on page 725

Copy Bit ← <Results table>
Only available if "Consumer" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:COPYbit?` on page 716
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:COPYbit?` on page 719
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:COPYbit?` on page 726

Cyclic Redundancy Check Character ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:CRCFlag?` on page 732
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:CRCFlag?` on page 734
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:CRCFlag?` on page 749

Encoded Sampling Frequency ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:ESRate?` on page 741
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:ESRate?` on page 735
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:ESRate?` on page 749

L-Bit ← <Results table>
Only available if "Consumer" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:LBIT?` on page 722
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:LBIT?` on page 719
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:LBIT?` on page 727

Local Address ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:SADDress?` on page 745
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:SADDress?` on page 738
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:SADDress?` on page 753

Lock Indication ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:LOCK? on page 742
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:LOCK? on page 735
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:LOCK? on page 750

Maximum Word Length ← <Results table>
Only available if "Consumer" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:MWLength? on page 722
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:MWLength? on page 720
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:MWLength? on page 727

Multichannel Mode ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:MCMNumber? on page 743
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:MCMNumber? on page 736
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:MCMNumber? on page 751

Multichannel Mode Control Bit ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:MCMControl? on page 743
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:MCMControl? on page 736
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:MCMControl? on page 750

Multichannel Number ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:MCNumber? on page 743
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:MCNumber? on page 736
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:MCNumber? on page 751

Origin Data ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:ORData? on page 744
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:ORData? on page 737
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:ORData? on page 751

Original Sampling Frequency ← <Results table>
Only available if "Consumer" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:OSRate? on page 723
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:OSRate? on page 720
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:OSRate? on page 727

Pre-Emphasis ← <Results table>
Available for both channel status modes.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:PREemphasis? on page 723
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:PREemphasis? on page 720
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:PREemphasis? on page 728
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:PREemphasis? on page 744
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:PREemphasis? on page 737
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:PREemphasis? on page 752

Reference Signal ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:REFSignal? on page 744
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:REFSignal? on page 738
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:REFSignal? on page 752

Sampling Frequency ← <Results table>
Available for both channel status modes.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:SRATe? on page 724
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:SRATe? on page 721
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:SRATe? on page 729
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:SRATe? on page 745
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:SRATe? on page 738
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:SRATe? on page 753

Sampling Frequency Scaling ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:SRSCale? on page 746
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:SRSCale? on page 739
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:SRSCale? on page 753

Source Number ← <Results table>
Only available if "Consumer" is displayed under "Channel Status Mode" on page 173.

Remote command:
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:SOURce? on page 723
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:SOURce? on page 721
READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:SOURce? on page 728

Time of Day ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:TODaddress?` on page 746
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:TODaddress?` on page 739
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:TODaddress?` on page 754

Use of Auxiliary Bits ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:UBLength?` on page 746
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:UBLength?` on page 740
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:UBLength?` on page 754

User Bits Management ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:UBManage?` on page 747
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:UBManage?` on page 740
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:UBManage?` on page 755

Valid Flag ← <Results table>
Only available if "Professional" is displayed under "Channel Status Mode" on page 173.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:FLAG?` on page 742
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:VALidflag?` on page 740

Word Length ← <Results table>
Available for both channel status modes.

Remote command:
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:WLENgth?` on page 729
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:WLENgth?` on page 722
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:WLENgth?` on page 729
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:WLENgth?` on page 755
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:WLENgth?` on page 741
`READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:WLENgth?` on page 755

9.4 Level Subtab

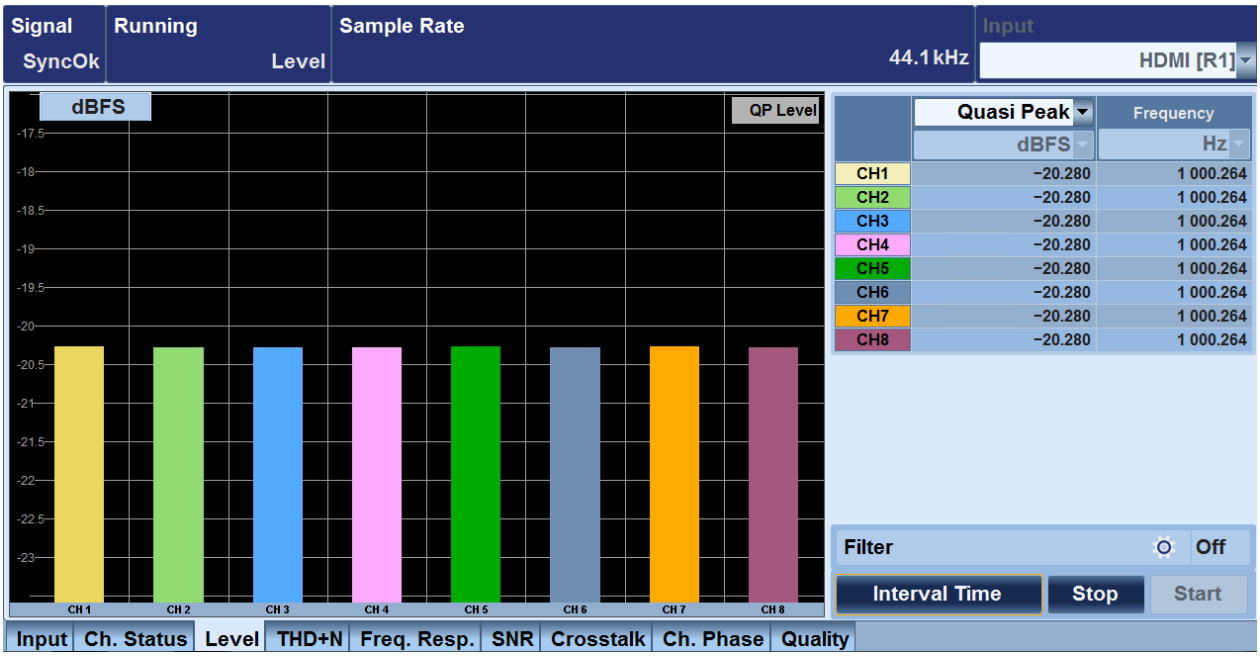
This measurement provides a continuous real-time measurement of the RMS, quasi-peak and peak level of the incoming audio data. The measurement results are displayed in graphical and numerical form. In addition to the level measurement, a measurement of the fundamental frequency of the input audio is provided.

Further information:

- Chapter 9.12.1, "Level Measurement", on page 212

Remote command to query measurement progress

`READ<hw>[:SCALar]:AUDio:LEVel:COMMand:PROGress?` on page 707



<Channel table>
For each channel, the parameters are displayed. The background color of the channel cell matches the color of the corresponding bar in the bar chart.

Remote command:
`READ<hw>[:SCALar]:AUDio:LEVel:MEASure:VALue?` on page 708

<Measurement selector> ← <Channel table>
Selects the type of level measurement.

- "RMS"
  RMS level measurement
- "Peak"
  Peak level measurement
- "Quasi-Peak"
  Quasi-peak measurement according to ITU-R 468

Remote command:
`CALCulate<hw>:AUDio:LEVel:FUNCtion` on page 686

<Unit selector> ← <Channel table>
Sets the unit for the level measurement.

Table 9-2: Available units for analog input devices

Unit	Description
"V"	Volts RMS
"dBV"	Decibels relative to 1 V(rms)
"dBu"	Decibels relative to 0.7745967 V(rms)
"dBrA"	Decibels relative to first set of analog user-defined levels and offset
"dBrB"	Decibels relative to second set of analog user-defined levels and offset
"dBSPL1"	Decibels relative to first analog sound pressure reference level

Unit	Description
"dBSPL2"	Decibels relative to second analog sound pressure reference level
"Vpp"	Volts pp referenced to Volts RMS The Vpp value is calculated from the RMS voltage level and is valid for sine wave signals only. For peak measurements of other signals, switch to peak measurements and use the "V" unit.

Table 9-3: Available units for digital input devices

Unit	Description
"FS"	Full-scale (0 to 1)
"% FS"	Percentage of full-scale (0 % to 100 %)
"dBFS"	Decibels relative to full-scale
"dBrA"	Decibels relative to first set of digital user-defined levels and offset
"dBrB"	Decibels relative to second set of digital user-defined levels and offset
"dBSPL1"	Decibels relative to first digital sound pressure reference level
"dBSPL2"	Decibels relative to second digital sound pressure reference level

Remote command:
`SENSe<hw>:AUDio:UNIT:LEVel:ANALog` on page 766
`SENSe<hw>:AUDio:UNIT:LEVel:DIGitial` on page 767

Frequency ← <Channel table>
Displays the measured fundamental frequency for each channel. This display is continuously updated while the measurement is running.

You can set the unit for the displayed frequency: Hz, kHz.

Remote command:
`SENSe<hw>:AUDio:UNIT:FREQuency` on page 766

Filter
Displays the filter status.

- "Off"
  All 3 filters are disabled.
- "On"
  At least one of the filters is enabled.

Tap to open the dialog to configure the filter. See "Filter Configuration dialog" on page 183.

Filter Configuration dialog ← Filter
Sets each filter individually.

The provided filters condition the signal before measuring. They are inserted in series, before the measurement. You can individually configure or disable the filters and tailor the frequency response of the measurement. A common usage can be to limit the measurement to only frequencies below 22 kHz, in which case you would select a 22 kHz low pass filter.

The available filters are described in Chapter 9.11, "Weighting Filters", on page 204.

Remote command:
SENSe<hw>:AUDio:LEVel:FILTer<Index> on page 761

Averaging button
Only available if measurement is stopped and "RMS" is selected under "<Measurement selector>" on page 182.

Opens the dialog to configure the averaging functions. See "Level Averaging Config dialog" on page 184.

Level Averaging Config dialog ← Averaging button
Only available if "RMS" is selected under "<Measurement selector>" on page 182.

Configures the averaging functions for the measurement type.

Average ← Level Averaging Config dialog ← Averaging button
Enables or disables the averaging algorithm.

- "On"
- "Off"

Remote command:
CALCulate<hw>:AUDio:LEVel:AVERage:STATe on page 685

Algorithm ← Level Averaging Config dialog ← Averaging button
Sets the algorithms for smoothing the measurement results.

- "Average"
  Reduces the effect of rapid changes in the measurement results.
  Uses a moving average algorithm to smooth the results. The moving average period is configurable ("Average Time" on page 184).
- "Flat"
  Reduces the effect of outlying measurements.
  Uses an algorithm that compares all the measurement results for a time period, ignores values outside the tolerance range and returns a median value. Configure the following parameters:
  – "Settling Time" on page 184
  – "Tolerance" on page 185

Remote command:
CALCulate<hw>:AUDio:LEVel:AVERage:ALGorithm on page 685

Average Time ← Level Averaging Config dialog ← Averaging button
Only available if "Average" is set under "Algorithm" on page 184.

Sets the period used for the moving average.

- "0.000 s" to "10.000 s"

Remote command:
CALCulate<hw>:AUDio:LEVel:AVERage:TIME on page 686

Settling Time ← Level Averaging Config dialog ← Averaging button
Only available if "Flat" is set under "Algorithm" on page 184.

Sets the period used to calculate the median.

- "0 s" to "10 s"
  Default value: 0.01 s.

Remote command:
CALCulate<hw>:AUDio:LEVel:AVERage:SETTling:TIME on page 685

Tolerance ← Level Averaging Config dialog ← Averaging button
Only available if "Flat" is set under "Algorithm" on page 184.

Sets the tolerance range in %. If a settling period contains measurement results that are out of the tolerance range from the median value, the result is considered invalid.

- "1.000 %" to "100.000 %"
  Default value: 20 %.

Remote command:
CALCulate<hw>:AUDio:LEVel:AVERage:TOLerance on page 686

Interval Time button
Opens the dialog box to configure the interval time. See "Interval Time Config dialog" on page 185.

Interval Time Config dialog ← Interval Time button
Only available if "Peak" or "Quasi-Peak" is selected under "<Measurement selector>" on page 182.

Sets the interval time for the peak and quasi-peak measurement. The result represents the highest value within this time interval. After the start of the measurement, the first value is displayed after the defined time interval. When the next time interval is elapsed, the result is updated, and so on.

Remote command:
CALCulate<hw>:AUDio:LEVel:INTerval:TIME on page 687

Stop button
Only available if this measurement is running.

Stops the running measurement.

Remote command:
ABORt<hw>:AUDio on page 681

Start button
Starts the currently selected measurement. A progress bar indicates the status of the currently running measurement if appropriate. During a measurement, the settings are disabled.

Note: If you start a measurement, the currently running measurement is automatically stopped.

Remote command:
INITiate<hw>:AUDio on page 696

9.5 THD+N Subtab

This measurement provides a continuous realtime measurement of the total harmonic distortion plus noise for each of the channels of incoming audio. In addition to the THD +N results, the RMS level and the detected fundamental frequency of each channel are also displayed.

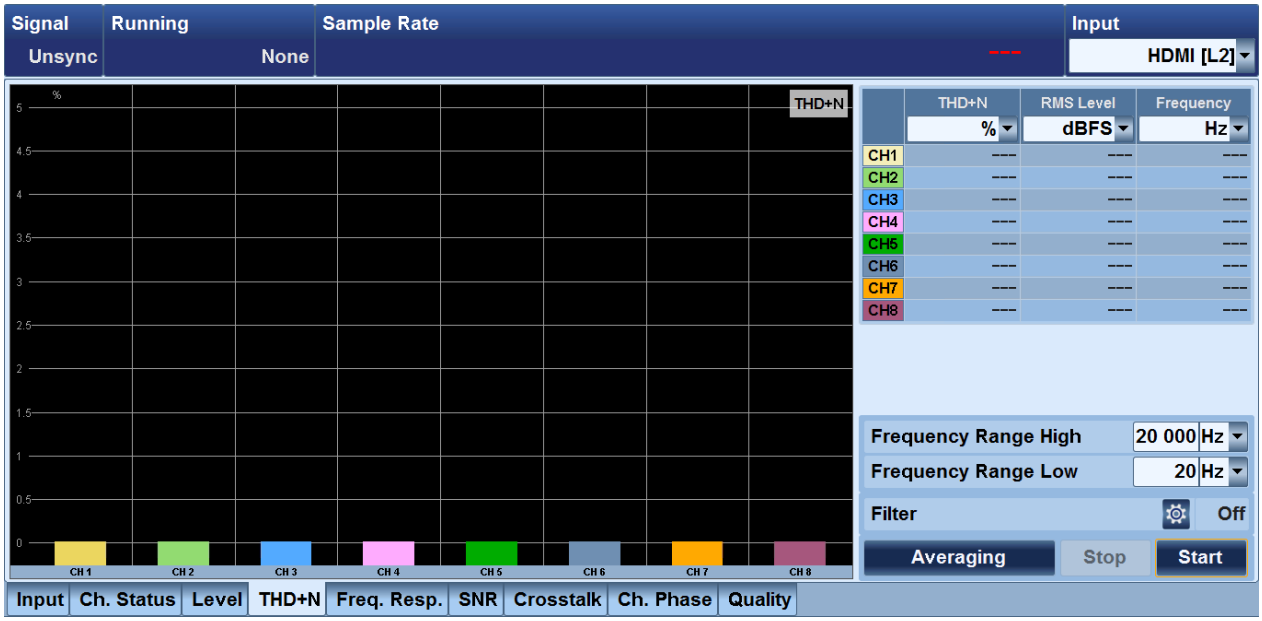
THD+N measurements are used to measure harmonic distortion and noise at the same time. The DUT is set to output a fixed frequency sinusoidal signal. The measurement is a ratio of the harmonics and noise to the fundamental waveform appearing in the DUT output. A lower THD+N measurement is a desirable since it indicates that the DUT has a less distorted output and/or a lower noise.

Further information:

- Chapter 9.12.2, "THD+N Measurement", on page 213

Remote command to query measurement progress

`READ<hw>[:SCALar]:AUDio:THDN:COMMand:PROGress?` on page 756



<Channel table>
For each channel, the parameters are displayed. The background color of the channel cell matches the color of the corresponding bar in the bar chart.

Remote command:
`READ<hw>[:SCALar]:AUDio:THDN:MEASure:VALue?` on page 757

THD+N ← <Channel table>
Displays the THD+N measurement for each channel. This display is continuously updated while the measurement is running. The display shows averaged measured values if averaging is enabled.

You can set the unit used for the THD+N display.

Table 9-4: Available units

Unit	Description
"x/y"	Ratio of the THD+N level to the input signal level
"%"	THD+N relative to the input signal expressed as a percentage
"ppm"	THD+N relative to the input signal, expressed as parts per million
"dB"	THD+N in decibels relative to the input signal

Remote command:
`SENSe<hw>:AUDio:UNIT:THDN` on page 767

RMS Level ← <Channel table>
See "<Unit selector>" on page 182.

Frequency ← <Channel table>
See "Frequency " on page 183.

Frequency Range High
Sets the upper limit of the frequency range in which the measurement is performed.

- "0 Hz" to "80 000 Hz"
  Must be larger than "Frequency Range Low" on page 187.

Remote command:
`CONFigure<hw>:AUDio:THDN:FREQuency:HIGH` on page 694

Frequency Range Low
Sets the lower limit of the frequency range in which the measurement is performed.

- "0 Hz" to "80 000 Hz"
  Must be smaller than "Frequency Range High" on page 187.

Remote command:
`CONFigure<hw>:AUDio:THDN:FREQuency:LOW` on page 694

Filter
See "Filter" on page 183.

Remote command:
`SENSe<hw>:AUDio:THDN:FILTer<index>` on page 766

Averaging button
Opens the dialog to configure the averaging functions. See "Level Averaging Config dialog" on page 184.

Remote command:
CALCulate<hw>:AUDio:THDN:AVERage:STATe on page 687
CALCulate<hw>:AUDio:THDN:AVERage:ALGorithm on page 687
CALCulate<hw>:AUDio:THDN:AVERage:TIME on page 687
CALCulate<hw>:AUDio:THDN:AVERage:SETTling:TIME on page 687
CALCulate<hw>:AUDio:THDN:AVERage:TOLerance on page 687

Stop button
See "Stop button" on page 185.

Start button
See "Start button" on page 185.

9.6 Freq. Resp. Subtab

The frequency response measurement provides two measurement modes. The measurement result display and the parameters to configure the measurement are mode-specific.

- Chapter 9.6.2, "FFT Spectrum Measurement Mode", on page 189
- Chapter 9.6.3, "Frequency Sweep Measurement Mode", on page 191

Features shared by both modes are described in Chapter 9.6.1, "Common Settings and Commands", on page 188.

Further information:

- Chapter 9.12.3, "Frequency Response Measurement", on page 214

9.6.1 Common Settings and Commands

The following features are available in both measurement modes.

Remote command to query measurement progress

READ<hw>[:SCALar]:AUDio:FRESponse:COMMand:PROGress? on page 705

Settings

Mode
Sets the measurement mode.
- "FFT Spectrum"
  See Chapter 9.6.2, "FFT Spectrum Measurement Mode", on page 189.
- "Frequency Sweep"
  See Chapter 9.6.3, "Frequency Sweep Measurement Mode", on page 191.

Remote command:
`CALCulate<hw>:AUDio:FRESponse:MODE` on page 683

Filter
See "Filter" on page 183.

Tap ⚙ to open the "Settings" dialog. See "Filter Configuration dialog" on page 183.

Settings dialog ← Filter
- "Filter 1", "Filter 2", "Filter 3"
  See "Filter Configuration dialog" on page 183.
- "Decimal Separator in csv File"
  Applies only in the "Frequency Sweep" mode. Configures the CSV files that are saved when you tap the "Save button" on page 193.
  – "Comma"
    Separates the decimal places by commas and the columns by semicolons.
  – "Dot"
    Separates the decimal places by dots and the columns by commas.

Remote command:
`SENSe<hw>:AUDio:FRESponse:FILTer<index>` on page 760
`MMEMory<hw>:AUDio:FRESponse:RESult:STORe:SEParator` on page 697

Peak Hold
If enabled only the peak values are displayed. All other values are omitted.

Remote command:
`CALCulate<hw>:AUDio:FRESponse:PKHold` on page 684

Stop button
See "Stop button" on page 185.

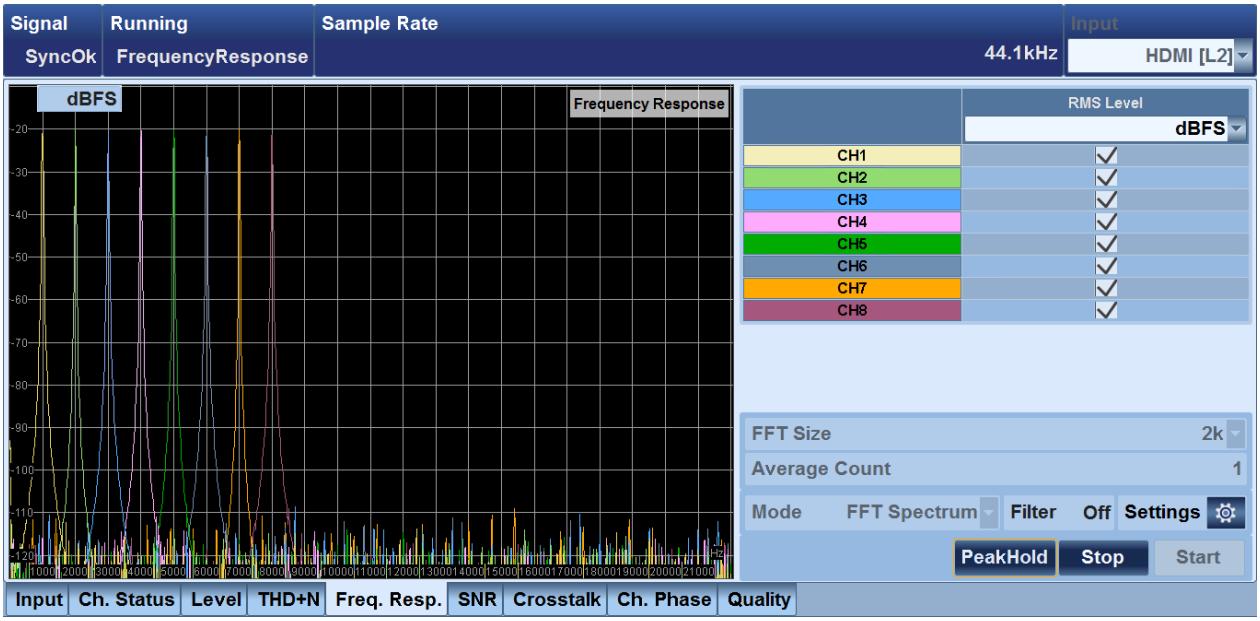
Start button
See "Start button" on page 185.

9.6.2 FFT Spectrum Measurement Mode

Used to perform repeatedly an FFT measurement of each of the incoming audio data channels.

In the left pane, the chart is displayed. In the right pane, the channel table and settings are available.

For settings available in both measurement modes, see Chapter 9.6.1, "Common Settings and Commands", on page 188.



<Chart display>
Displays the results of the FFT. Each enabled input channel is plotted separately.

Remote command:
`READ<hw>:ARRay:AUDio:FRESponse:TRACe?` on page 701

<Channel table>
The background color of the channel cell matches the color of the corresponding trace. You can enable or disable the display of each input channel trace in the chart.

You can set the unit used for the y-axis of the frequency response chart. The available units depend on the selected device, analog or digital (see Table 9-2, Table 9-3).

Remote command:
`CONFigure<hw>:AUDio:FRESponse:SELect` on page 690
`DISPlay<hw>:AUDio:FRESponse:UNIT` on page 695

FFT Size
Sets the length of the FFT and thus changes the number of points plotted on the x-axis of the chart display. Increasing the FFT length increases the measurement time and the frequency selectivity, and decreases the temporal accuracy. Conversely, decreasing the FFT size gives faster measurements, less frequency selectivity and more temporal accuracy.

Remote command:
`CONFigure<hw>:AUDio:FRESponse:FFTSize` on page 689

Average Count
Sets the number of FFT measurements to be averaged for the chart display. A high average count setting, especially when combined with large FFT sizes, can result in long delays before the chart display updates.

- "1" to "20"
  Default value: 1

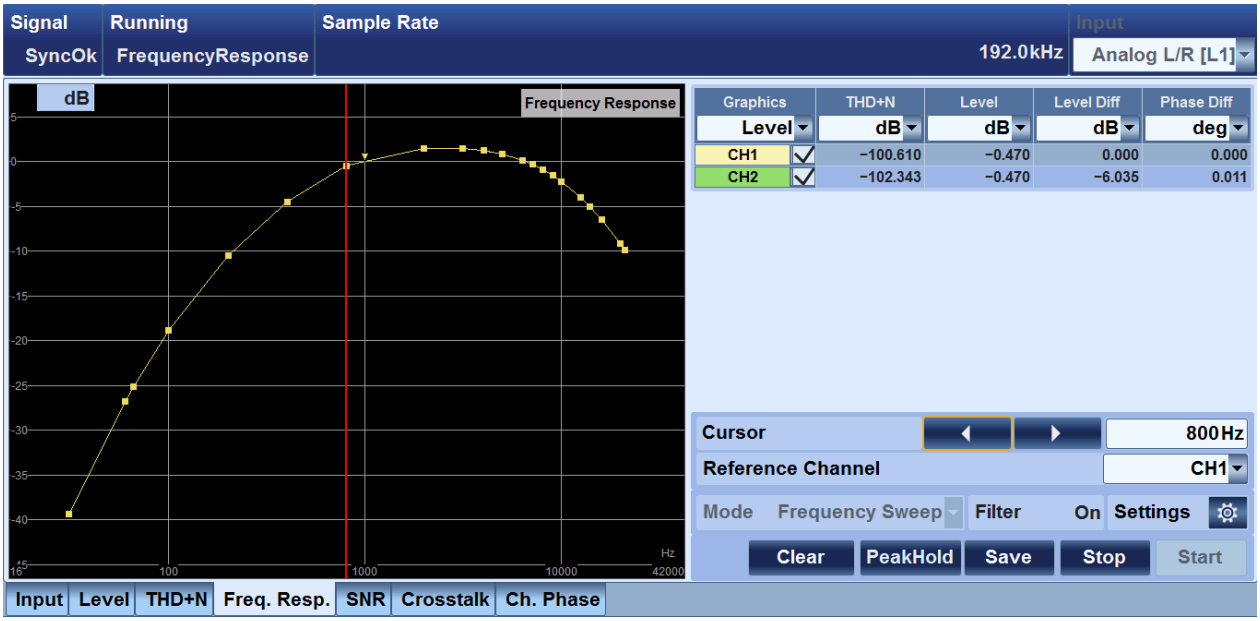
Remote command:
`CALCulate<hw>:AUDio:FRESponse:AVERage:COUNt` on page 683

9.6.3 Frequency Sweep Measurement Mode

Used to measure simultaneously THD+N, level, level difference, or phase difference accumulated over time.

In the left pane, the chart is displayed. In the right pane, the channel table and settings are available.

For settings available in both measurement modes, see Chapter 9.6.1, "Common Settings and Commands", on page 188.



<Chart display>
Displays the chart for the selected measurement. Select the measurement and the displayed channel traces under "Graphics column" on page 192.

The measured values are displayed over the detected frequencies of each incoming audio data channel.

Remote command:
`READ<hw>:ARRay:AUDio:FRESponse:TRACe?` on page 701

<Channel table>
For each input channel, the values measured at the cursor frequency are displayed.

Graphics column ← <Channel table>
Select the measurement you want to display as a chart.

You can disable or enable the display of each input channel trace in the chart. The background color of the channel cell matches the color of the corresponding trace.

Remote command:
`CALCulate<hw>:AUDio:FRESponse:GRAPhics` on page 683
`CONFigure<hw>:AUDio:FRESponse:SELect` on page 690

THD+N column ← <Channel table>
See "THD+N" on page 187.

Remote command:
`READ<hw>[:SCALar]:AUDio:THDN:MEASure:VALue?` on page 757
`SENSe<hw>:AUDio:UNIT:THDN` on page 767

Level column ← <Channel table>
Shows the frequency response of each channel referenced to its level at 1 kHz. If no burst with the frequency 1 kHz is included into the measurement sequence, the reference level is determined by interpolation of the levels next to the frequency of 1 kHz. If there are only burst with frequency below or above 1 kHz, the reference frequency is set to the available frequency next to 1 kHz. There is a marker that is set to the current reference frequency.

The unit is fixed to "dB".

Remote command:
`READ<hw>[:SCALar]:AUDio:THDN:MEASure:VALue?` on page 757

Level Diff column ← <Channel table>
Shows the frequency response of each channel referenced to the "Reference Channel". The values are only displayed if a suitable reference signal is present.

The unit is fixed to "dB".

Remote command:
`READ<hw>[:SCALar]:AUDio:DLEVel:MEASure:VALue?` on page 705

Phase Diff column ← <Channel table>
See "Phase" on page 198.

The values are only displayed if a suitable reference signal is present.

Remote command:
READ<hw>[:SCALar]:AUDio:DIPHase:MEASure:VALue? on page 704
SENSe<hw>:AUDio:IPHase:UNIT on page 760

Cursor
Defines the position on the x-axis of the displayed measurement values. The exact cursor position is displayed in the field.

Use the arrow keys to shift the position of the cursor or enter a value. If you enter a new frequency value that does not match a valid frequency of the current measurement, the value is adjusted accordingly.

In the chart, the cursor is represented as a vertical line.

Remote command:
CONFigure<hw>:AUDio:FRESponse:CURSor:FREQuency on page 688
CONFigure<hw>:AUDio:FRESponse:CURSor:STEP on page 689

Reference Channel
Sets the channel that is used as reference signal to calculate the level difference and phase difference.

Remote command:
CONFigure<hw>:AUDio:FRESponse:REFerence on page 689

Clear button
Resets the measurement.

Remote command:
CONFigure<hw>:AUDio:FRESponse:RESult:CLEar on page 690

Save button
Opens the "File" dialog to save the measurement results in a CSV file. See Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:AUDio:FRESponse:RESult:STORe on page 696

9.7 SNR Subtab

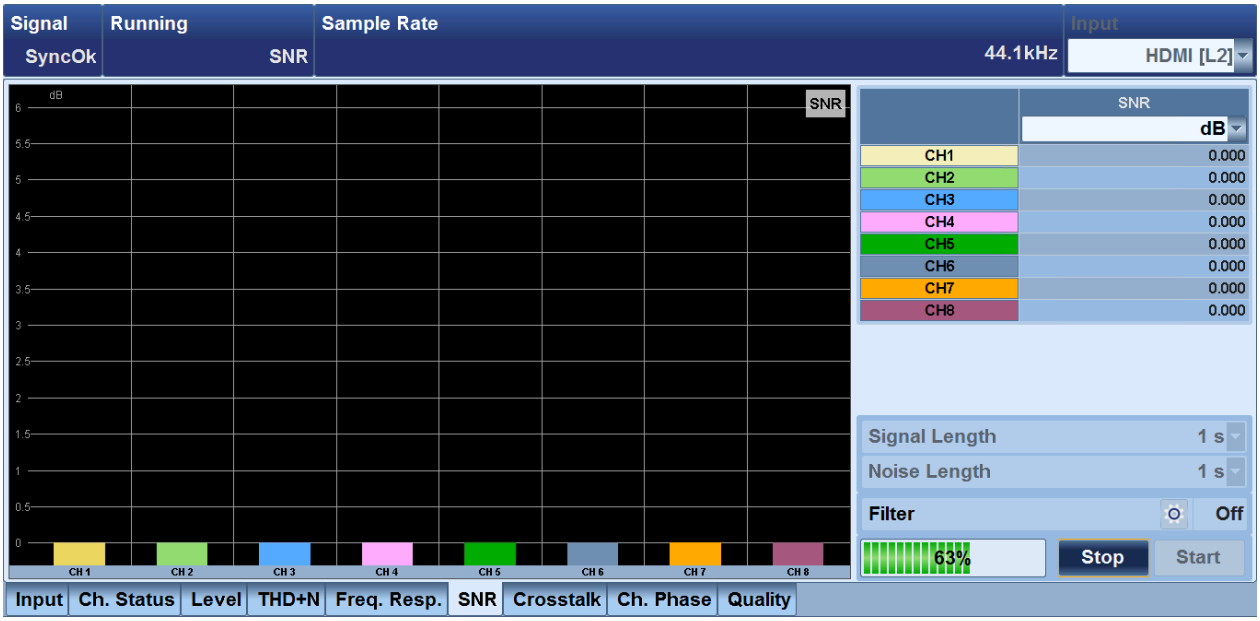
The signal to noise ratio (SNR) measurement involves measuring the level of a period of signal and measuring the level of a period of background noise. The SNR is a ratio of these two measurements and is an indicator of audio quality. The results are provided as a bar chart and a numeric display with several different units. Configuration is available for three separate pre-measurement filters and the test signal parameters.

Further information:

- Chapter 9.12.4, "Signal to Noise Ratio Measurement", on page 214

Remote command to query measurement progress

READ<hw>[:SCALar]:AUDio:SNR:COMMand:PROGress? on page 714



<Channel table>
For each channel, the parameters are displayed. The background color of the channel cell matches the color of the corresponding bar in the bar chart.

SNR ← <Channel table>
Displays the signal to noise ratio (SNR) measurement result for each individual input channel. This display is continuously updated while the measurement is running.

You can set the unit used for the SNR display.

Table 9-5: Available units

Unit	Description
"x/y"	Ratio of the noise level to the signal level
"dB"	Noise in decibels relative to the signal

Remote command:
`READ<hw>[:SCALar]:AUDio:SNR:MEASure:VALue?` on page 714
`SENSe<hw>:AUDio:SNR:UNIT` on page 766

Signal Length
Sets the signal length that is analyzed for each cycle. If this setting does not match the test signal of the DUT, the result is inaccurate.

- "1 s", "2 s", "3 s", "4 s", "5 s"

Remote command:
CONFigure<hw>:AUDio:SNR:SLENgth on page 694

Noise Length
Sets the noise length that is analyzed for each cycle. If this setting does not match the test signal of the DUT, the results are inaccurate.

- "1 s", "2 s", "3 s", "4 s", "5 s"

Remote command:
CONFigure<hw>:AUDio:SNR:NLENgth on page 693

Filter
See "Filter" on page 183.

Remote command:
SENSe<hw>:AUDio:SNR:FILTer<index> on page 765

Stop button
See "Stop button" on page 185.

Start button
See "Start button" on page 185.

9.8 Crosstalk Subtab

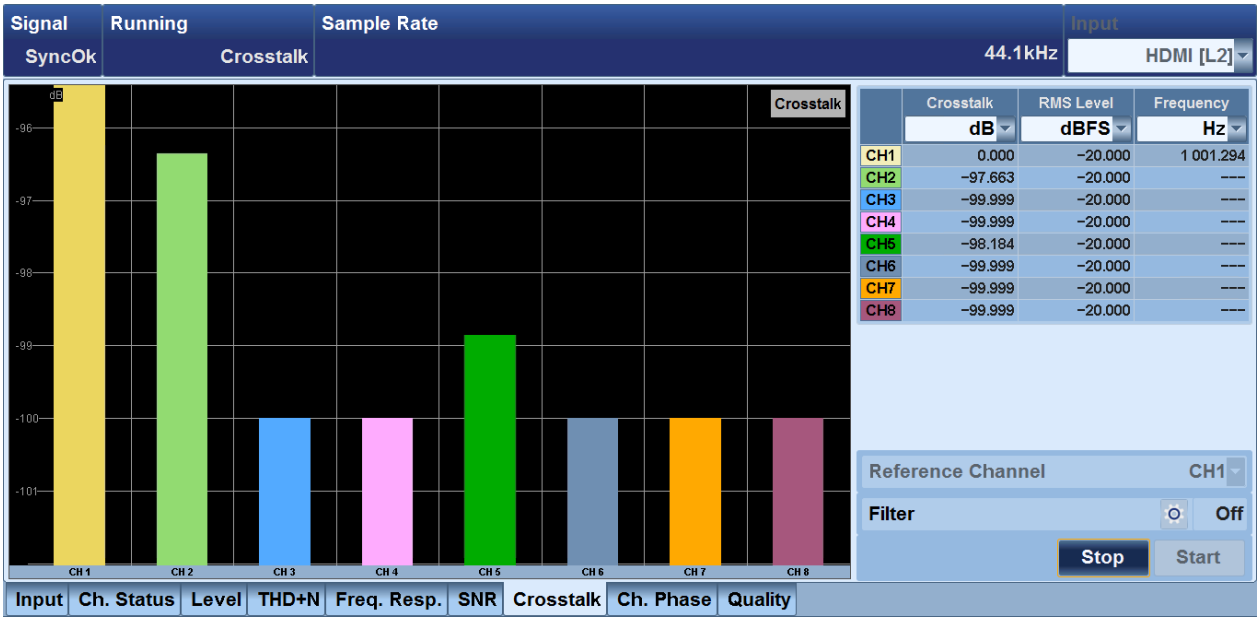
The crosstalk measurement provides an indication of the amount of signal "leaking" from a reference channel into the other channels. The results are provided as a bar chart and a numeric display with several different units. Configuration is available for three separate pre-measurement filters, the reference channel and an averaging algorithm.

Further information:

- Chapter 9.12.5, "Crosstalk Measurement", on page 215

Remote command to query measurement progress

READ<hw>[:SCALar]:AUDio:CROSstalk:COMMand:PROGress? on page 703



<Channel table>
For each channel, the parameters are displayed. The background color of the channel cell matches the color of the corresponding bar in the bar chart.

Remote command:
`READ<hw>[:SCALar]:AUDio:CROSstalk:MEASure:VALue?` on page 704

Crosstalk ← <Channel table>
Displays the crosstalk measurement for each channel. This display is continuously updated while the measurement is running. The display shows averaged measured values if averaging is enabled.

You can set the unit used for the crosstalk display.

Table 9-6: Available units

Unit	Description
"x/y"	Ratio of the crosstalk level to the reference signal level
"%"	Crosstalk relative to the reference signal expressed as a percentage
"ppm"	Crosstalk relative to the reference signal, expressed as parts per million
"dB"	Crosstalk in decibels relative to the reference signal

Remote command:
SENSe<hw>:AUDio:CROSstalk:UNIT on page 760

RMS Level ← <Channel table>
See "<Unit selector>" on page 182.

Frequency ← <Channel table>
See "Frequency " on page 183.

Reference Channel
Sets the signal source channel.

Remote command:
CONFigure<hw>:AUDio:CROSstalk:REFerence on page 688

Filter
See "Filter" on page 183.

Remote command:
SENSe<hw>:AUDio:CROSstalk:FILTer<index> on page 760

Averaging button
Opens the dialog to configure the averaging functions. See "Level Averaging Config dialog" on page 184.

Remote command:
CALCulate<hw>:AUDio:CROSstalk:AVERage:STATe on page 682
CALCulate<hw>:AUDio:CROSstalk:AVERage:ALGorithm on page 682
CALCulate<hw>:AUDio:CROSstalk:AVERage:TIME on page 683
CALCulate<hw>:AUDio:CROSstalk:AVERage:SETTling:TIME on page 682
CALCulate<hw>:AUDio:CROSstalk:AVERage:TOLerance on page 683

Stop button
See "Stop button" on page 185.

Start button
See "Start button" on page 185.

9.9 Ch. Phase Subtab

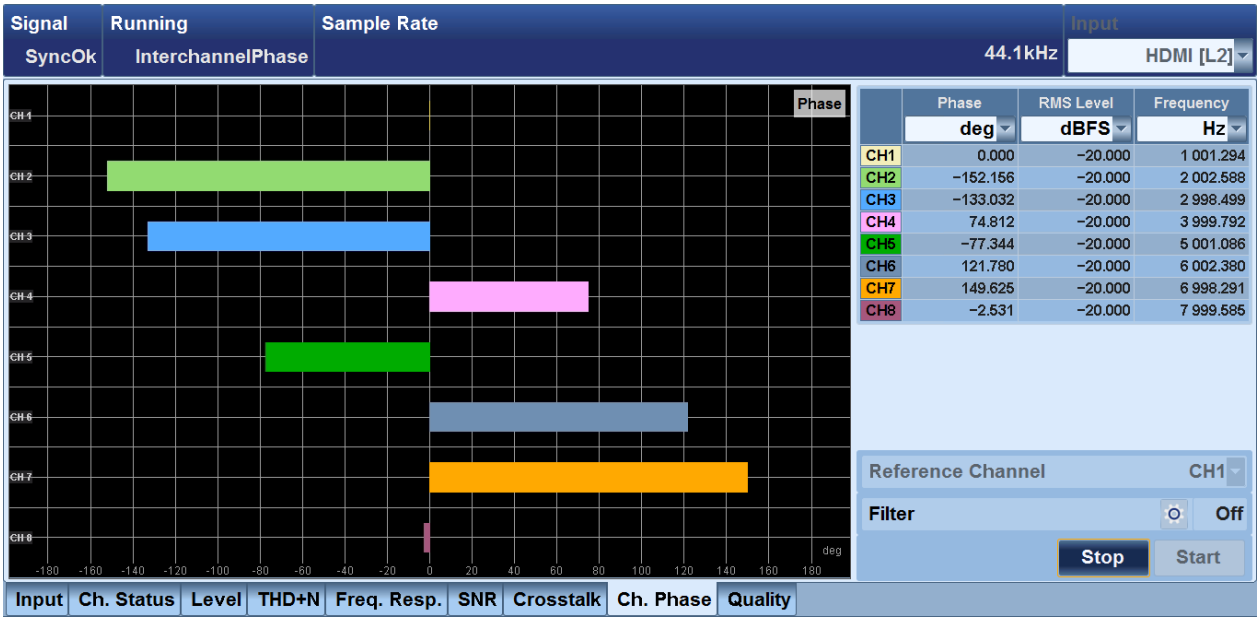
This measurement provides a means of measuring the phase of each audio input channel in relation to a reference channels measured phase. The results are provided as a bar chart and a numeric display with several different units. Configuration is available for three separate pre-measurement filters, the reference channel and an averaging algorithm.

Further information:

- Chapter 9.12.6, "Channel Phase Measurement", on page 215

Remote command to query measurement progress

READ<hw>[:SCALar]:AUDio:IPHase:COMMand:PROGress? on page 706



<Channel table>
For each channel, the parameters are displayed. The background color of the channel cell matches the color of the corresponding bar in the bar chart.

Remote command:
READ<hw>[:SCALar]:AUDio:IPHase:MEASure:VALue? on page 707

Phase ← <Channel table>
Displays the measured phase for each channel. The reference channel phase is always zero.

You can set the phase unit.

Table 9-7: Available units

Unit	Description
"deg"	Degrees: -180 to 180
"rad"	Radians

Remote command:
SENSe<hw>:AUDio:IPHase:UNIT on page 760

RMS Level ← <Channel table>
See "<Unit selector>" on page 182.

Frequency ← <Channel table>
See "Frequency " on page 183.

Reference Channel
Sets the channel whose phase is used as the reference phase.

Remote command:
CONFigure<hw>:AUDio:IPHase:REFerence on page 691

Filter
See "Filter" on page 183.

Remote command:
SENSe<hw>:AUDio:IPHase:FILTer<index> on page 760

Averaging button
Opens the dialog to configure the averaging functions. See "Level Averaging Config dialog" on page 184.

Remote command:
CALCulate<hw>:AUDio:IPHase:AVERage:STATe on page 684
CALCulate<hw>:AUDio:IPHase:AVERage:ALGorithm on page 684
CALCulate<hw>:AUDio:IPHase:AVERage:TIME on page 684
CALCulate<hw>:AUDio:IPHase:AVERage:SETTling:TIME on page 684
CALCulate<hw>:AUDio:IPHase:AVERage:TOLerance on page 685

Stop button
See "Stop button" on page 185.

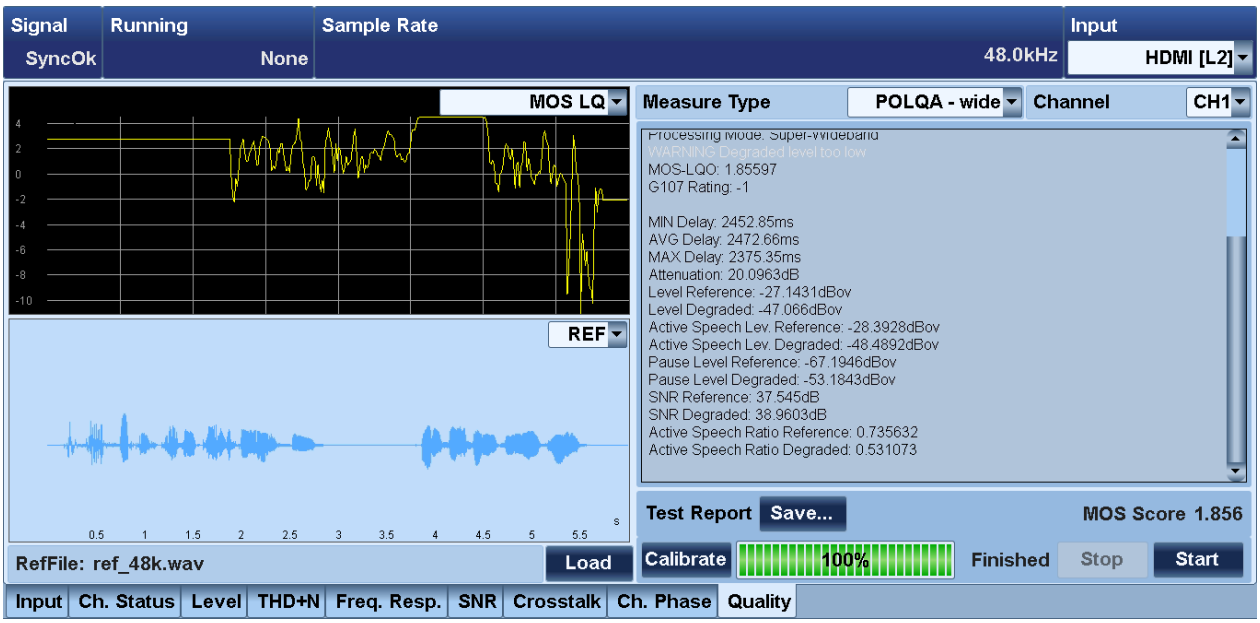
Start button
See "Start button" on page 185.

9.10 Quality Subtab

Provides a measurement of speech quality. The measurements return a result that is as close as possible to the result of subjective quality scores obtained by subjective listening tests. The measurement uses real speech as a test signal. The tests evaluate the kinds of distortions and anomalies that occur in telephony networks which impinge on speech intelligibility and listening experience.

Divided into the graph pane and parameter pane. The graph pane is described in "<Graph pane>" on page 203.

The parameter pane displays a detailed report of the measurement results. This report is available after a complete measurement.



Measure Type

All available tests return a mean opinion score (MOS) that covers a scale for 1 (bad) to 5 (excellent).

- "PESQ"
  Requires the speech quality measurement PESQ option (R&S VT-K2158)
  Perceptual evaluation of speech quality (PESQ) is a test for the speech quality as perceived by a listener. It uses a model of subjective tests. The measurement compares a reference recording and a captured recording from the DUT of the same content.

- "POLQA - Narrow"
  Requires the listening quality analysis POLQA option (R&S VT-K2159)
  Perceptual objective listening quality assessment (POLQA) is a test for the speech quality as perceived by a listener. POLQA has additional handling for variable delays. "POLQA - Narrow" is for common telephony bandwidth: 300 Hz to 3400 Hz.
- "POLQA - Wide"
  Requires the listening quality analysis POLQA option (R&S VT-K2159)
  Perceptual objective listening quality assessment (POLQA) is a test for the speech quality as perceived by a listener. POLQA has additional handling for variable delays. "POLQA - Wide" is for common super wide band speech signals: 50 Hz to 14000 Hz.

Remote command:
`SENSe<hw>:AUDio:QC:MEASure:TYPE` on page 761

Channel
Sets the channel used for audio capture.
- "CH1" to <highest channel for selected input source>

Remote command:
`CONFigure<hw>:AUDio:QC:REFerence` on page 693

<Test report>
Displays a report of the test results, including details of the measurement results and information about the captured audio. Also, any errors or configuration problems are displayed.

Remote command:
`READ<hw>[:SCALar]:AUDio:QC:REPort:COUNt?` on page 711
`READ<hw>[:SCALar]:AUDio:QC:REPort?` on page 710

Save button
Opens a file dialog to save the test report. See Chapter 5, "File and Data Management", on page 86.

Remote command:
`MMEMory<hw>:AUDio:QC:REPort:STORe` on page 698

MOS Score
Displays the final mean opinion score (MOS) after a successful measurement has been completed.

Remote command:
`READ<hw>[:SCALar]:AUDio:QC:MEASure:MOS?` on page 709

Calibrate button
Tap the button to calibrate the audio capture and reference, see "Calibration dialog" on page 201.

Calibration dialog ← Calibrate button
Groups the calibration parameters.

Capture ← Calibration dialog ← Calibrate button
Groups the calibration parameters of the captured audio.

Gain ← Capture ← Calibration dialog ← Calibrate button
Only available if the auto gain is disabled, see "Auto Gain" on page 202.

Sets the gain applied to the captured audio before the measurement.
- "-24.00 dB" to "24.00 dB"

Remote command:
CONFigure<hw>:AUDio:QC:CALibrate:GAIN on page 692

Delay ← Capture ← Calibration dialog ← Calibrate button
Only available if the auto delay is disabled, see "Auto Delay" on page 202.

Sets the delay between measurement starting and capture starting.
- "0.000 s" to "5.000 s"

Remote command:
CONFigure<hw>:AUDio:QC:CALibrate:DELay on page 692

Auto Gain ← Capture ← Calibration dialog ← Calibrate button
Enables or disables the automatic gain function.
- "On"
  Scales the captured audio levels to match the reference file.
- "Off"

Remote command:
CONFigure<hw>:AUDio:QC:CALibrate:AUTO:GAIN on page 691

Auto Delay ← Capture ← Calibration dialog ← Calibrate button
Enables or disables the auto delay function.
- "On"
  Delays the capture until activity is detected in the incoming stream.
- "Off"

Remote command:
CONFigure<hw>:AUDio:QC:CALibrate:AUTO:DELay on page 691

Reference ← Calibration dialog ← Calibrate button
Groups the calibration reference parameters.

Gain ← Reference ← Calibration dialog ← Calibrate button
Sets the gain applied to the reference before the measurement.
- "-36.00 dB" to "12.00 dB"

Remote command:
CONFigure<hw>:AUDio:QC:CALibrate:REFerence:GAIN on page 692

<Status display>
Displays the status and the progress of the measurement.
- "Idle"
- "Capture"
- "Finished"

Remote command:
READ<hw>[:SCALar]:AUDio:QC:COMMand:STATe? on page 709
READ<hw>[:SCALar]:AUDio:QC:COMMand:PROGress? on page 708

Stop button
See "Stop button" on page 185.

Start button
See "Start button" on page 185.

<Graph pane>
The graph pane on the left provides two displays.

<Results graphs> ← <Graph pane>
The upper display shows the graph of the selected measurement results regarding time. Select the measurement results you want to display. The results are available if:
- They are part of the measurement set under "Measure Type" on page 200.
- The measurement is completed.

PESQ measurements:
- "MOS"
  MOS result over time
- "MOS LQ"
  MOS LQ result over time
- "REF VAD"
  Reference file voice activity detected over time
- "CAP VAD"
  Captured audio voice activity detected over time
- "Drop Outs"
  Drop outs in the captured audio over time
- "REF Clip"
  Occurrences of clipping in the reference file over time
- "CAP Clip"
  Occurrences of clipping in the captured audio over time

POLQA measurements:
- "MOS LQ"
  MOS LQ result over time
- "Delay per Sample"
  Measured delay time in ms for each sample
- "REF VAD"
  Reference file voice activity detected over time
- "DEG VAD"
  Degraded audio voice activity detected over time

Remote command:
CONFigure<hw>:AUDio:QC:RESult:SELect on page 693
SENSe<hw>:AUDio:QC:RESult:CATalog? on page 761
READ<hw>:ARRay:AUDio:QC:RESult:TRACe? on page 702
READ<hw>[:SCALar]:AUDio:QC:RESult:XSCale? on page 711
READ<hw>[:SCALar]:AUDio:QC:RESult:YSCale? on page 712

<Waveform display> ← <Graph pane>
The lower display shows the selected waveform. Select the waveform you want to display.

- "REF"
  Reference speech file waveform
- "CAPT"
  Captured audio waveform; only available after a completed measurement.

Remote command:
`SENSe<hw>:AUDio:QC:WAVeform:CATalog` on page 762
`READ<hw>:ARRay:AUDio:QC:WAVeform:TRACe?` on page 702
`READ<hw>[:SCALar]:AUDio:QC:WAVeform:XSCale?` on page 712
`READ<hw>[:SCALar]:AUDio:QC:WAVeform:YSCale?` on page 713

Load button ← <Graph pane>
Opens a file dialog to load the reference file. See Chapter 5, "File and Data Management", on page 86.

Remote command:
`MMEMory<hw>:AUDio:QC:REFerence:DATA:LOAD` on page 697
`READ<hw>[:SCALar]:AUDio:QC:REFerence:DISFilename?` on page 709
`READ<hw>[:SCALar]:AUDio:QC:REFerence:LENGth?` on page 710
`READ<hw>[:SCALar]:AUDio:QC:REFerence:VALFile?` on page 710

9.11 Weighting Filters

In addition to the user-definable filters, the R&S VTE also offers many weighting filters which conform to the relevant standards.

A Weighting
Standards: DIN 45412, DIN 45633, IEC 179, IEC 651, ANSI S1.4

Application: weighted noise measurement

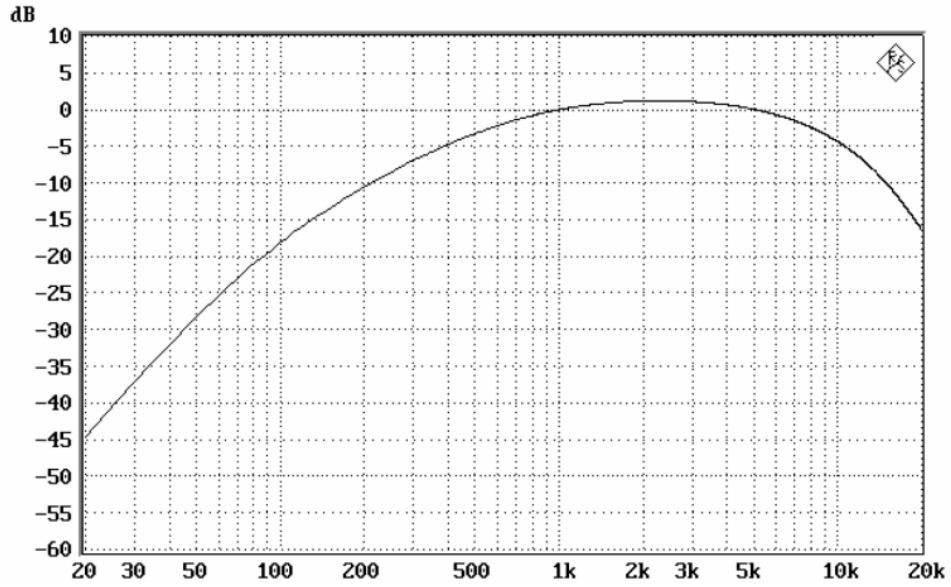


Figure 9-1: A weighting filter

C Message

Standard: IEEE 743-1995

Application: weighted noise measurement

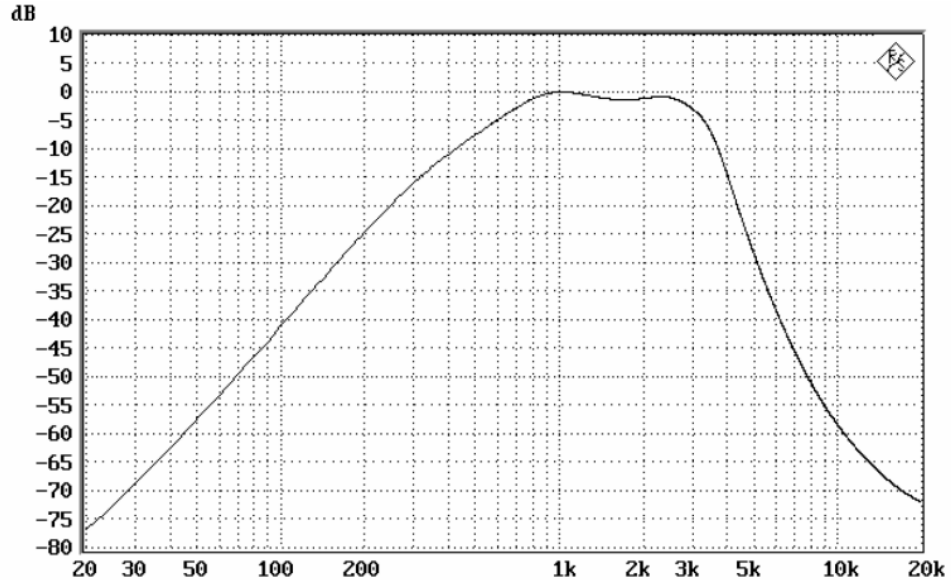


Figure 9-2: C message filter

CCITT

Standards: ITU-T Rec. O.41, CISPR 6-76, ITU-T Rec. P.53

Application: psophometrical weighting

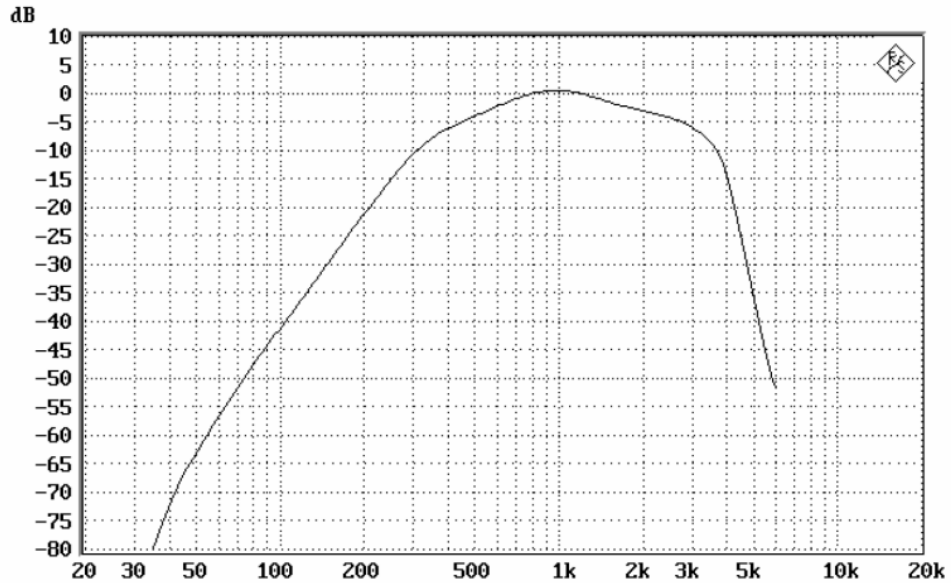
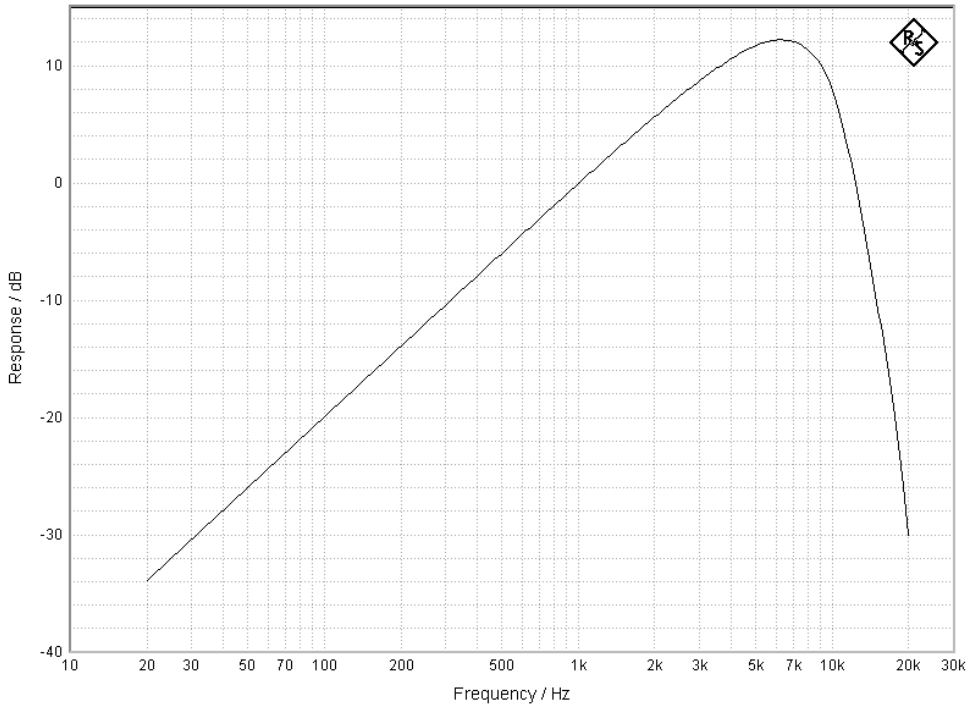


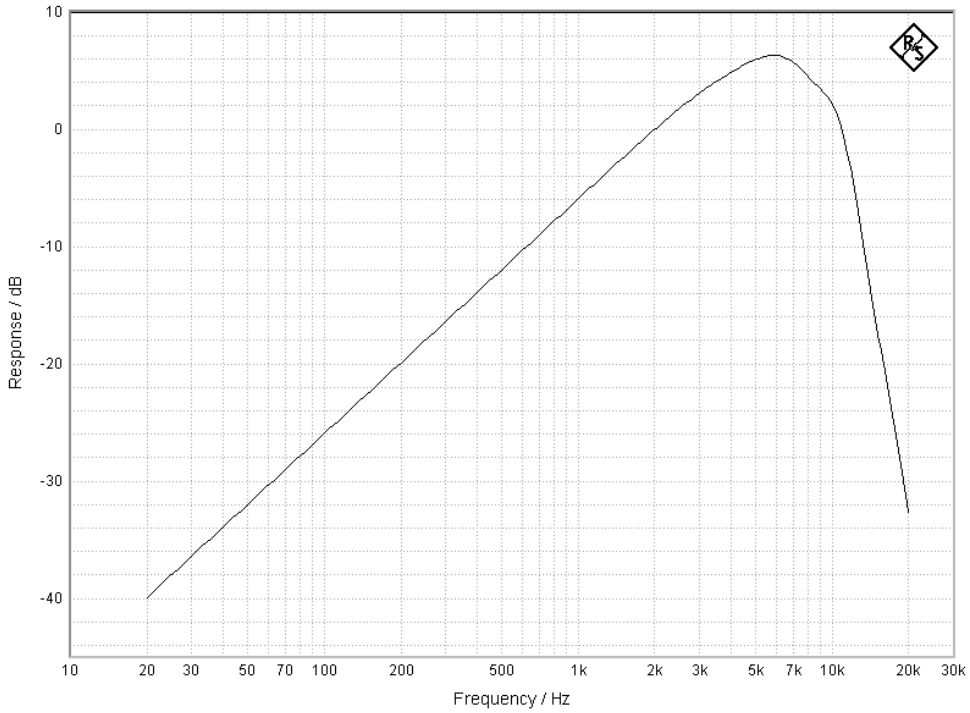
Figure 9-3: CCITT filter

CCIR 1k /ITU468
Standard: ITU-R BS.468-4

Application: quasi-peak measurement



CCIR 2k
Standard: ITU-R BS.468-4, but with 0 dB gain point at 2 kHz



De-Emphasis 50 15
Standard: CCIR Rec. 651

Application: compact disc

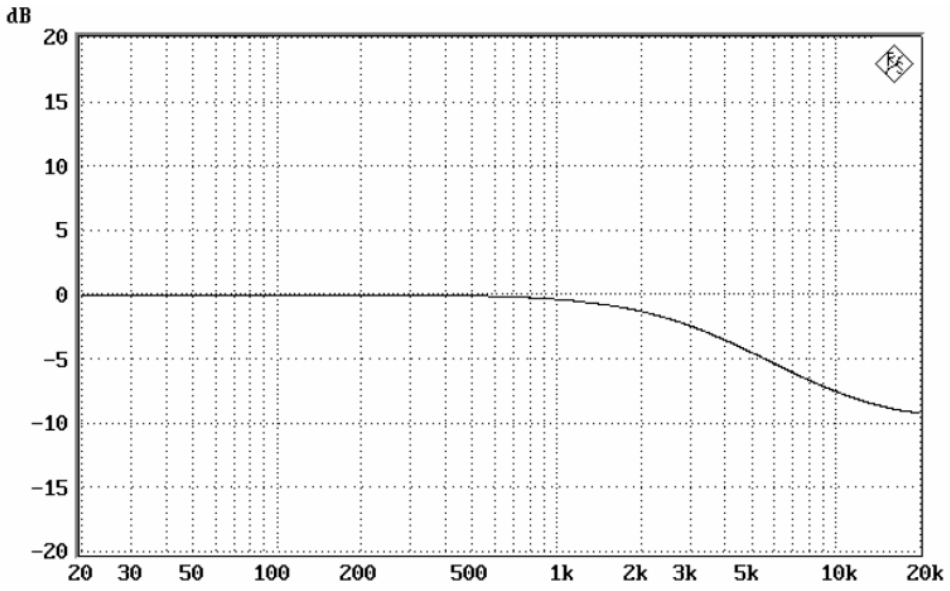


Figure 9-4: De-emphasis 50 15 filter

De-Emphasis 50
Standard: ARD Spec. 5/3.1

Application: weighted noise measurement

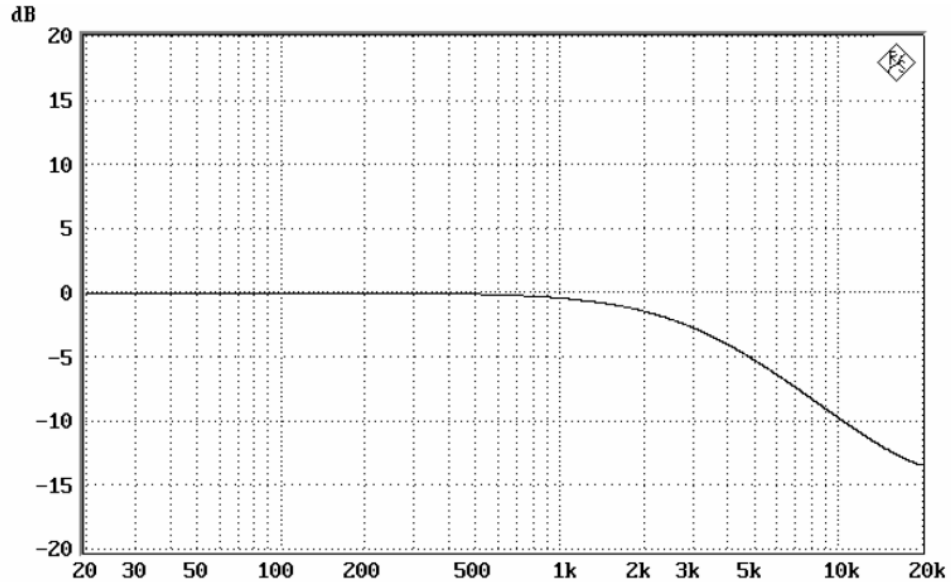


Figure 9-5: De-emphasis 50 filter

De-Emphasis 75

Standard: ARD Spec. 5/3.1

Application: weighted noise measurement

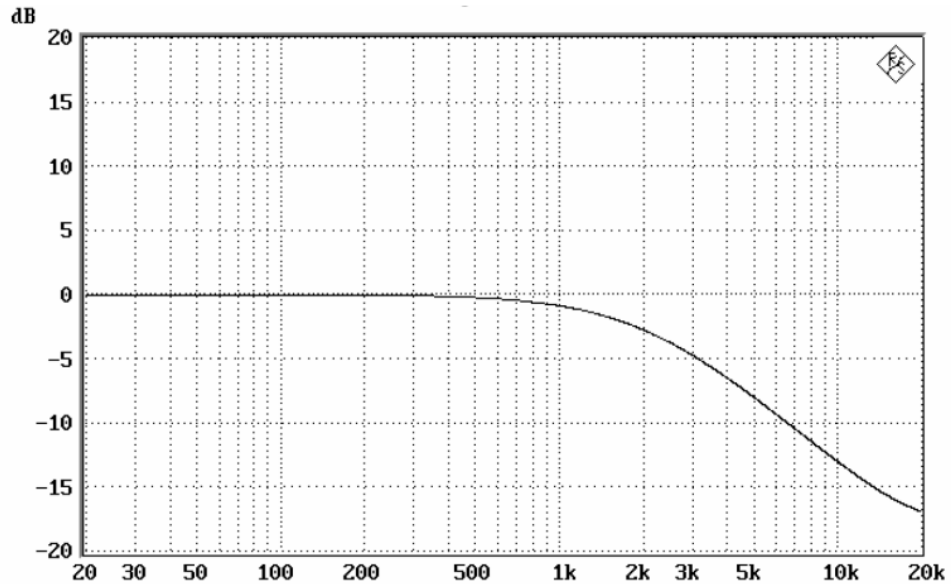


Figure 9-6: De-emphasis 75 filter

IEC Tuner

Standard: DIN/IEC 60315-4

Application: measurements on FM tuners

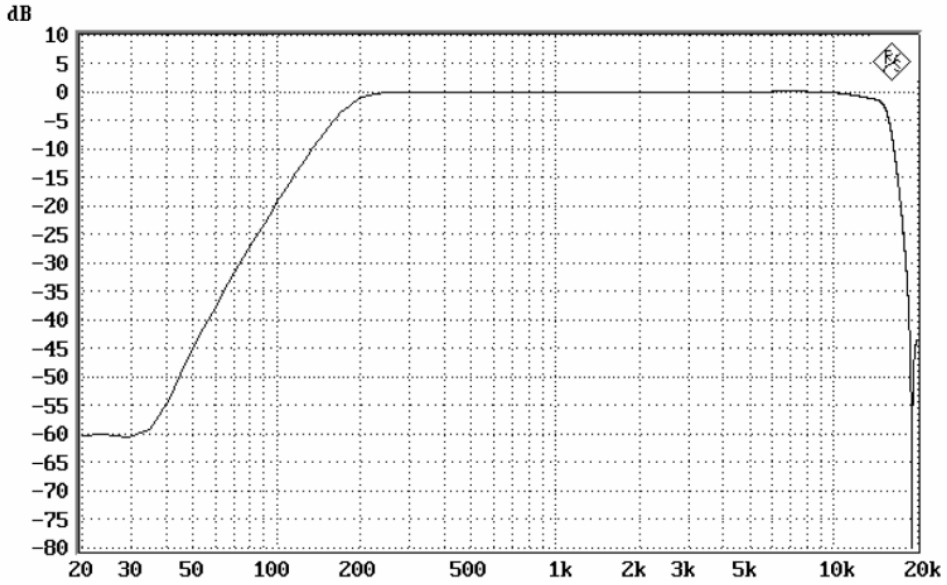


Figure 9-7: IEC tuner filter

JITTW
Standard: AES 3

Application: weighting of jitter transmission function 1st order HP -3 dB at 700 Hz -20 dB at 70 Hz

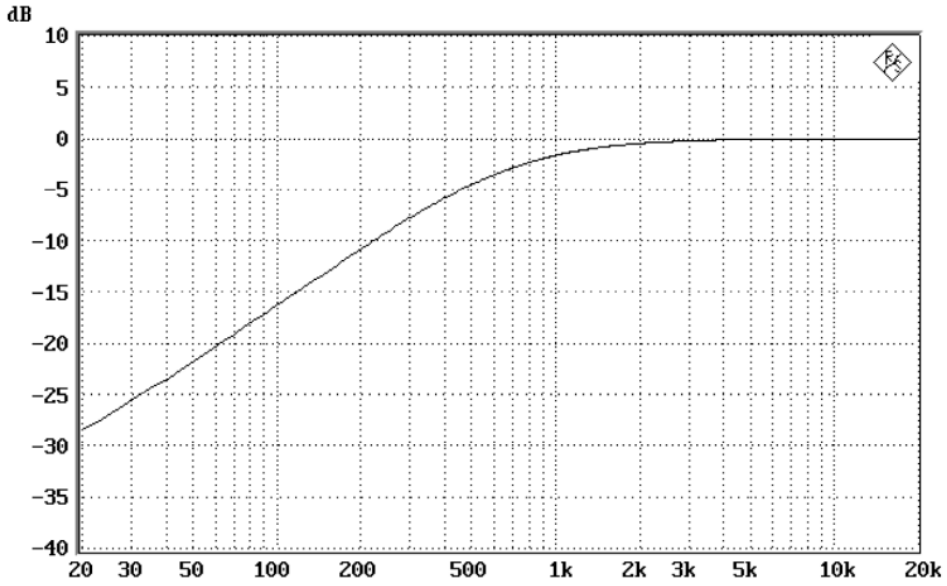


Figure 9-8: JITTW filter

Pre-Emphasis 50 15
Standard: CCIR Rec. 651

Application: compact disc

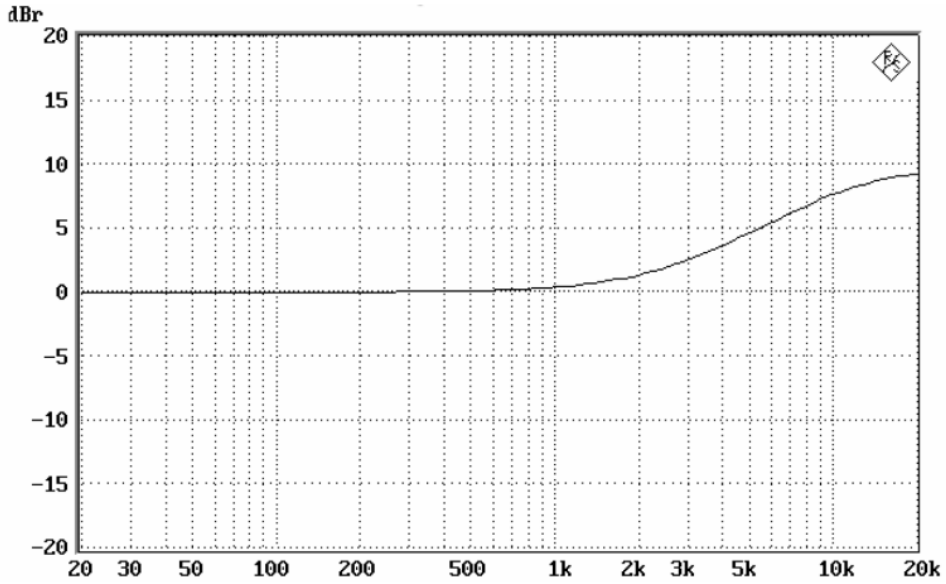


Figure 9-9: Pre-emphasis 50 15 filter

Pre-Emphasis 50
Standard: ARD Spec. 5/3.1

Application: weighted noise measurement

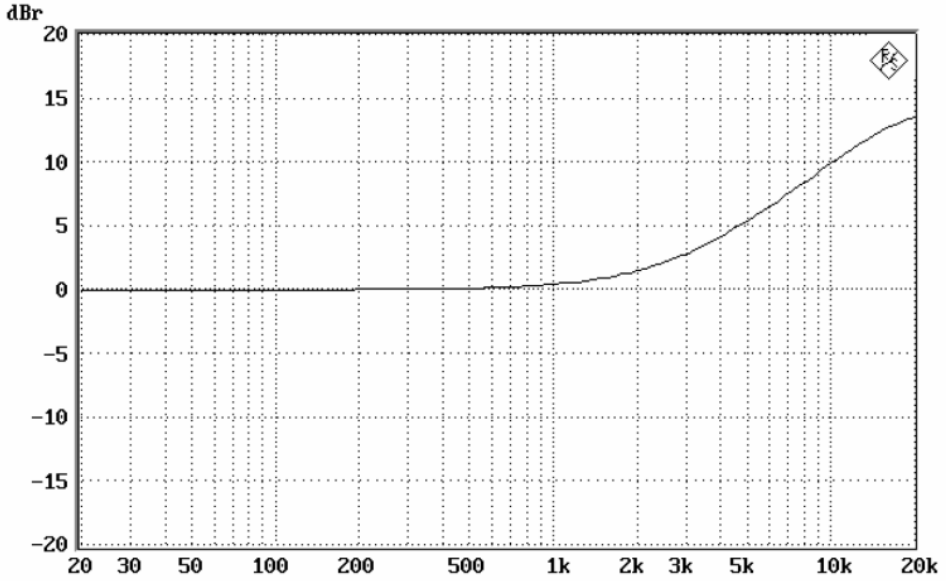


Figure 9-10: Pre-emphasis 50 filter

Pre-Emphasis 75
Standard: ARD Spec. 5/3.1

Application: weighted noise measurement

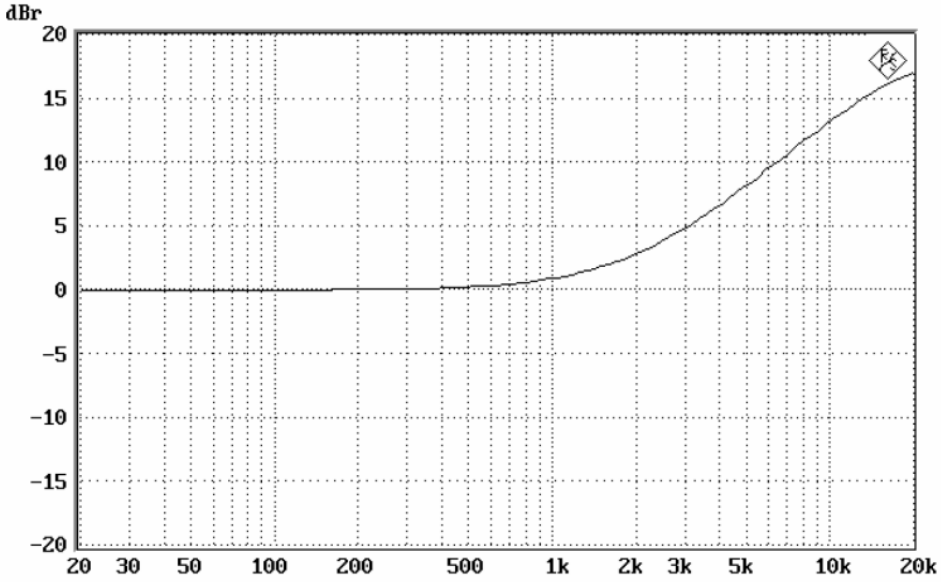


Figure 9-11: Pre-emphasis 75 filter

HPF 22 Hz
High-pass with 3 dB cutoff frequency at 22 Hz

HPF 400 Hz
High-pass with 3 dB cutoff frequency at 400 Hz

LPF 22 kHz
Lowpass with 3 dB cutoff frequency at 22 kHz

LPF 30 kHz
Lowpass with 3 dB cutoff frequency at 30 kHz

9.12 Suitable Test Signals and Procedures

Test signal levels

The amplitude of the required test signals depends on the DUT. Generally there are two commonly used signal levels definitions.

- Maximum operating level (MOL)
  - DUT maximum input signal level before distortion occurs
  - Usually 0 dB for digital signals
- Nominal operating level (NOL)
  - DUT recommended input signal level
  - Often -20 dB for digital signals

For other levels, you can either use a signal generator with volume control or create additional test files.

NOTICE

Analog input DUT

Excessive signal levels can damage the equipment. Refer to the DUT specifications for information on MOL and NOL.

Test signal content

The test signals generally contain a single sinusoidal component. The sinus needs to be as "pure" as possible, especially if testing for distortion, since any additional harmonics or noise in the test signal appears in the measurement results.

Sometimes, you can use a white noise signal for testing. A white noise signal contains equal amounts of all frequencies.

The human ear can hear frequencies within the range 20 Hz to 20 kHz. Usually, audio analysis is limited to this range.

If the DUT needs to be tested over a range of frequencies, use stepped or swept signals. Generally the frequency sweeps logarithmically from the minimum to the maximum over a predefined period.

9.12.1 Level Measurement

The parameters are described in Chapter 9.4, "Level Subtab", on page 181.

Measuring the DUT gain

Feed a sine wave at 1 kHz at NOL to the DUT and measure the output. The gain in dB is calculated by subtracting the output level (in dBFS) from the input level (in dBFS).

Specifying the DUT frequency response

To specify the frequency response of a DUT, you can use level measurements. A frequency response specification contains a minimum and maximum frequency as well as a positive and negative amplitude error range.

Example of a complete frequency response specification:

- 22 Hz to 22 kHz
- +0/-0.01 dB

To measure the frequency response

1. Set filters 1 and 2 to limit the frequency range from 22 Hz to 22 kHz.
2. Initially measures using a 1 kHz sine test signal at NOL to determine the 0 dB point.
3. Test a swept sine test signal at NOL.

The maximum and minimum levels are recorded and compared to the 1 kHz level to give the ±dB levels quoted.

Tip: A longer sweep time yields more accurate the results.

9.12.2 THD+N Measurement

The parameters are described in Chapter 9.5, "THD+N Subtab", on page 186.

Specifying the total harmonic distortion plus noise (THD+N) of a DUT

A complete THD+N specification includes the test signal level, test signal frequency range, DUT gain (if applicable) and measurement bandwidth.

Example of a well specified THD+N:

- THD+N less than 0.01 %
- 0 dBFS
- 20 Hz to 20 kHz
- Unity gain
- 20 kHz bandwidth

In general, THD+N is tested with a bandwidth limited to 20 kHz or 22 kHz. Do not use any noise weighting filtering.

Use a test signal with a level at the MOL of the DUT.

A single THD+N measurement requires a single frequency sinusoidal signal. For the most accurate results, test the THD+N at a constant frequency rather than using a sweep. Use a set of sinusoidal signals to cover the frequency range of interest.

Perform the test at a frequency range from 20 Hz to 20 kHz. Since the bandwidth of the measurement extends to 20 kHz, harmonic distortion in a test signal above 10 kHz is not measured. For this reason, the IEC recommends testing THD+N only up to 6 kHz.

Depending on the desired thoroughness, use a 1 octave, 1/3 octave or 1/6 octave step.

Once you have performed a set of THD+N measurements across the frequency range of interest, you can quote the THD+N specification based on the highest THD+N value measured.

Measuring the input level at onset of distortion

You can use a THD+N measurement to find the maximum input signal before the DUT starts distorting unacceptably.

For this kind of testing, either use a test signal with stepped amplitudes or a signal generator with variable amplitude. Increase the test signal amplitude until the measured THD+N exceeds an acceptable amount.

9.12.3 Frequency Response Measurement

The parameters are described in Chapter 9.6, "Freq. Resp. Subtab", on page 188.

Perform this test with a swept tone. The start and stop frequencies depend on the DUT specifications. For example if a DUT uses a 22 kHz sampling rate internally, there is not point sweeping the test signal past 22 kHz. Conventionally, the frequency range from 20 Hz to 20 kHz is used since it covers the full range of frequencies audible to the human ear.

Use a test signal with a level at the NOL of the DUT.

Alternatively, you can measure the frequency response with a white noise signal.

9.12.4 Signal to Noise Ratio Measurement

The parameters are described in Chapter 9.7, "SNR Subtab", on page 193.

Specifying the signal to noise ratio (SNR) of a DUT

In addition to the actual SNR value, a properly specified SNR includes the following:

- Amplitude of reference signal
- Bandwidth
- Weighting of the test, if any
- DUT gain, if applicable

Example specification:

- 111 dB @ 0 dBFS
- 22 kHz bandwidth
- Unity gain

More often than not, the SNR is quoted as one of the following:

- SNR A-weighting = 111 dB
- SNR = 90 dB

Unless otherwise stated, you can assume the following:

- SNR is measured without weighting.
- Reference signal is at MOL.
- Bandwidth is limited to 20 kHz.
- DUT is at unity gain.

The A-weighting filter is undefined above 20 kHz. Therefore use a 20 kHz LPF in addition to the A-weighting filter.

Use a test signal that alternates between a sine wave and silence. Generally the SNR is independent of the test signal frequency; you can use a 1 kHz sine wave as is customary.

The SNR result varies with the test signal amplitude. The best figures are obtained with a MOL signal.

The period of sine component can be 1 s, 2 s, 3 s, 4 s, or 5 s long. Likewise, the silence section can be 1 s, 2 s, 3 s, 4 s, or 5 s long. Longer periods give more accurate results.

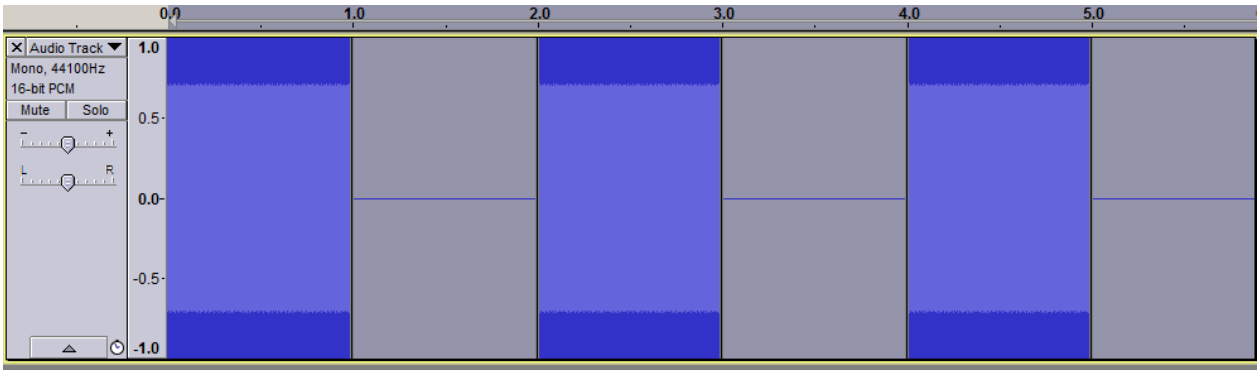


Figure 9-12: SNR test signal with 1 s of 1 kHz sine followed by 1 s of silence

9.12.5 Crosstalk Measurement

The parameters are described in Chapter 9.8, "Crosstalk Subtab", on page 195.

Use a multichannel test signal with silence in all but one channel, referred to as the reference channel. The reference channels contain a sine wave at the MOL. Since crosstalk is frequency-dependent, perform the tests over a range of frequencies (1/3 octave steps between 20 Hz to 20 kHz). Depending on the DUT, provide test signals for every possible reference channel.

9.12.6 Channel Phase Measurement

The parameters are described in Chapter 9.9, "Ch. Phase Subtab", on page 197.

Use sine waves at the MOL or NOL. These waves have to be multichannel with identical audio on each channel, i.e. perfectly phase aligned.

The channel phase delays vary with frequency, therefore it can be useful to test at a range of frequencies (1/3 octave steps between 20 Hz to 20 kHz).

10 HDMI Applications

10.1 HDMI Generator Application

Requires the following options:

- Suitable module as described in the data sheet
  See also "Module (default favorite)" on page 217
- Additional options for CTS tests
  See Chapter 10.1.8, "CTS Subtab", on page 265
- Additional options for CEC tracer test
  See Chapter 10.1.9, "CEC Subtab", on page 280

Further options that are required for special features are described in the context.

The HDMI TX generator application generates HDMI test signals to test HDMI-capable sink devices such as TV sets or dongles. In addition, the HDMI generator application provides HDMI sink and dongle system tests in line with the HDMI compliance test specification.

10.1.1 Main Dialog of the Application

The parameters are grouped on tabs.

Default favorites

Parameters that are often needed are provided as default favorites below the tab title.

- "Signal"
  Currently selected content, see "Content Selection" on page 223.
- "Status"
  - "Running", "Stopped", "Paused", and "CTS Test Running"
  - Replay time in the play file
  - Progress bar; shows the current play position in the play file and the play window.
- "Module (default favorite)" on page 217
- "Standard (default favorite)" on page 217

Common remote command

`DISPlay<hw>:HDGenerator:SELect:TAB` on page 851

Module (default favorite)

Selects the module that is used for HDMI analysis.

The available input list is hardware-dependent. It depends on the type and number of installed modules.

- "Tx 300MHz"
  HDMI TX 300 MHz module (R&S VT-B360)
- "CTS Rx/Tx 600MHz"
  HDMI CTS RX/TX 600 MHz module (R&S VT-B2362)
- "Rx/Tx 600MHz"
  HDMI RX/TX 600 MHz module (R&S VT-B2363)
  This module also requires the HDMI TX option (R&S VT-K364).

Remote command:

`ROUTe<hw>:HDGenerator:MODule:SELect` on page 872

Standard (default favorite)

Sets the HDMI standard.

- "HDMI 1.4"
- "HDMI 2.0"

Remote command:

`ROUTe<hw>:HDGenerator:OSELect:VERSion` on page 873

10.1.2 Output Subtab

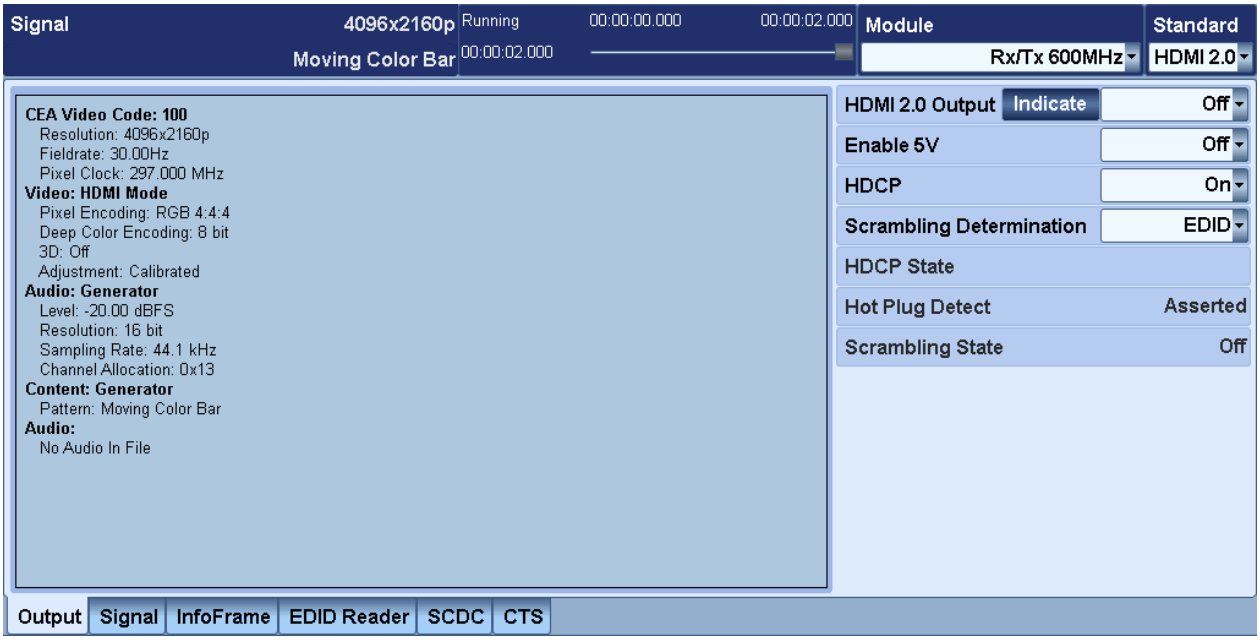
Defines the output interfaces.

In the left pane, the details of the signal are displayed. The signal is supplied at all available outputs.

Remote command to query the content of the output pane

`READ<hw>:HDGenerator:OUTPut:CONTent?` on page 860

Only available if "Tx 300MHz" or "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.



HDMI Out 1 to 4 (HDMI TX 300 MHz module)
Only available if "Tx 300MHz" is set under "Module (default favorite)" on page 217.

Enables or disables each output separately. The HDMI TX 300 MHz module (R&S VT-B360) provides 4 outputs.

- "On"
- "Off"

Note: To indicate the output at your R&S VTE, tap "Indicate".
A flashing LED indicates the output until you tap "OK".

Remote command:
`CONFigure<hw>:HDGenerator:OUTPut:HDMiout<port>` on page 831

HDMI Out (HDMI CTS RX/TX 600 MHz module)
Only available if "CTS Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

The HDMI CTS RX/TX 600 MHz module (R&S VT-B2362) provides one output.

Note: To indicate the output at your R&S VTE, tap "Indicate".
A flashing LED indicates the output until you tap "OK".

Remote command:
CONFigure<hw>:HDGenerator:OUTPut:HDMiout<port> on page 831

HDMI 2.0 Output (HDMI RX/TX 600 MHz module)
Only available if "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

Enables or disables the HDMI output. The HDMI RX/TX 600 MHz module (R&S VT-B2363) provides one output.

- "On"
- "Off"

Note: To indicate the output at your R&S VTE, tap "Indicate".
A flashing LED indicates the output until you tap "OK".

Remote command:
CONFigure<hw>:HDGenerator:OUTPut:HDMiout<port> on page 831

Enable 5V (HDMI RX/TX 600 MHz module)
Only available if "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

Enables or disables 5 V for the HDMI output.

- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:OUTPut:ENVoltage on page 830

HDCP (HDMI TX 300 MHz module)
Only available if "Tx 300MHz" is set under "Module (default favorite)" on page 217.

Enables or disables the HDCP encryption.

If "Off" is set under "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218, you cannot change the setting.

- "On"
- "Off"
  Fixed setting if:
  – "VESA Code" is set under "Video Code" on page 224
  – "DVI" is set under "Signaling Mode" on page 225

Remote command:
CONFigure<hw>:HDGenerator:OUTPut:HDCPout<port> on page 831

HDCP (HDMI RX/TX 600 MHz module)
Only available if "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

Enables or disables the HDCP encryption, and sets the HDCP version.

If "Off" is set under "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218, you cannot change the setting.

- "On"
  Automatic mode, the HDCP encryption version depends on selected "Video Code" on page 224.
- "HDCP 1.4"
- "HDCP 2.2"
- "Off"
  Fixed setting if:

– "VESA Code" is set under "Video Code" on page 224
– "DVI" is set under "Signaling Mode" on page 225

Remote command:
`CONFigure<hw>:HDGenerator:OUTPut:HDCPout<port>` on page 831

Scrambling Determination (HDMI RX/TX 600 MHz module)
Only available if "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

Sets the source of the scrambling determination.

If "Off" is set under "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218, you cannot change the setting.

- "EDID"
- "Always On"
- "600MHz Only"
- "Always Off"

Remote command:
`CONFigure<hw>:HDGenerator:OUTPut:SCRDet` on page 832

Scrambling State (HDMI RX/TX 600 MHz module)
Only available if "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

Displays the scrambling status.

Remote command:
`READ<hw>:HDGenerator:OUTPut:SCRState?` on page 861

HDCP State (HDMI TX module and HDMI RX/TX 600 MHz module)
Only available if "Tx 300MHz" or "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

Displays the status of the HDCP encryption.

- "Unknown"
- "Deactivated"
- "Offline"
- "DDC Error"
- "Unavailable"
- "Bad Key"
- "Init"
- "Sync"
- "Init Keys"
- "Active"

Remote command:
`READ<hw>:HDGenerator:OUTPut:HDCPstate<port>?` on page 860

Hot Plug Detect
Displays the status of the hot plug detect connection.

- "Asserted"
- "Not Asserted"

Remote command:
`READ<hw>:HDGenerator:OUTPut:HPDout<port>[:STATe]?` on page 861

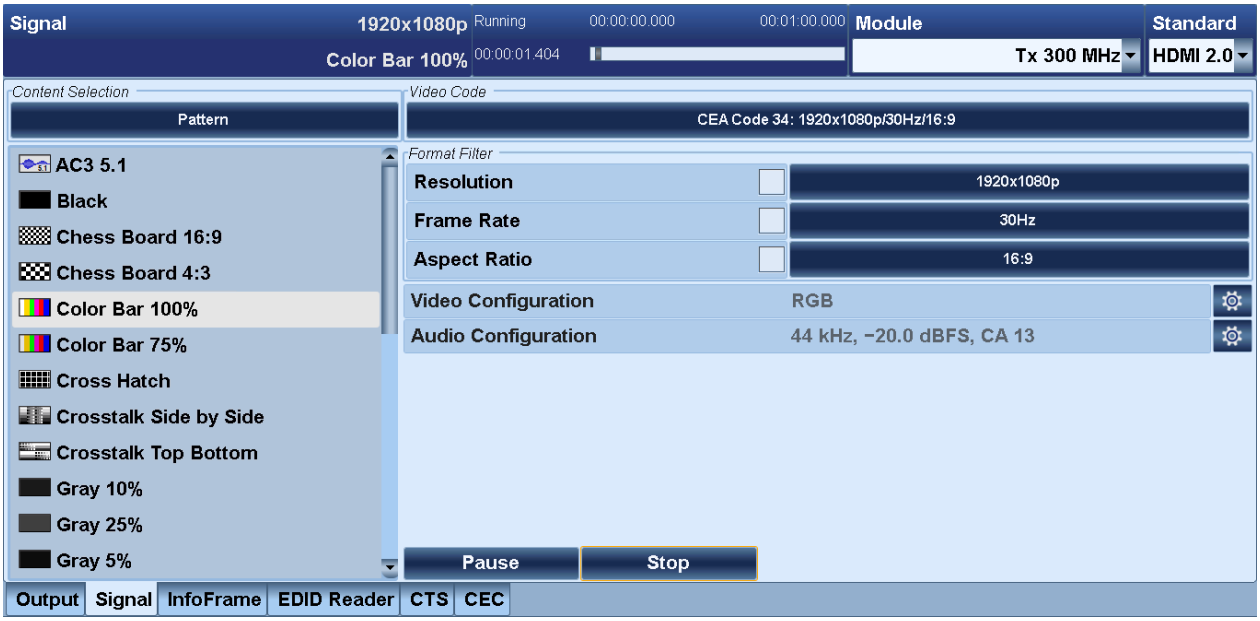
10.1.3 Signal Subtab

Only available if "Tx 300MHz" or "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

Defines the video/audio signal and the signal properties.

Additional options required

Using files that contain more than 1 frame requires the HDMI moving pictures option (R&S VT-K361).



Content Selection
Select a predefined signal from the content list. If you want to change the content that is displayed in the list, tap the button above the list. The "Content Selection" dialog is displayed, see "Content Selection dialog" on page 223.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:PLAY:PATT` on page 851

Content Selection dialog ← Content Selection
Filters the signals that are displayed in the content list under "Content Selection" on page 223.

The content depends on the installed options, see also "Additional options required" on page 221.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:PLAY:FILE` on page 850
`CONFigure<hw>:HDGenerator:SIGNal:PLAY:PATT` on page 851
`CONFigure<hw>:HDGenerator:SIGNal:NOBLack` on page 850

General ← Content Selection dialog ← Content Selection
Selects either content from the designated R&S VTE directory or another location.

All Signals ← General ← Content Selection dialog ← Content Selection
Displays all available signals.

File ← General ← Content Selection dialog ← Content Selection
Opens the "File" dialog to load a file. See Chapter 5.3, "File Dialog", on page 89.

Content ← Content Selection dialog ← Content Selection
Groups the content according to the following criteria.

Pattern ← Content ← Content Selection dialog ← Content Selection
Displays all available patterns, see Chapter 10.4.1, "Patterns", on page 348.

Natural ← Content ← Content Selection dialog ← Content Selection
Displays still pictures with natural content, for example campfire or colored pencils.

Motion ← Content ← Content Selection dialog ← Content Selection
Displays motion pictures.

Libraries ← Content Selection dialog ← Content Selection
Groups the signals that are available in the following libraries.

EBU Signals ← Libraries ← Content Selection dialog ← Content Selection
For future use only.

HDR Signals ← Libraries ← Content Selection dialog ← Content Selection
Displays all available high dynamic range (HDR) signals, see Chapter 10.4.2, "HDR Signals", on page 350.

User Signals ← Libraries ← Content Selection dialog ← Content Selection
Displays all signals that are stored in the `D:\VideoLib\User` directory.

Prerequisite: Under `D:\VideoLib`, create the `User` folder and store the files you want to use there. See also Chapter 5.3, "File Dialog", on page 89.

If you update the `User` folder, for example by adding new files, you need to delete the `avgdb` file in the `D:\VideoLib\User` directory.

Application ← Content Selection dialog ← Content Selection
Filters according to the application.

Lip Sync Test ← Application ← Content Selection dialog ← Content Selection
Contains streams that are used to synchronize audio and video.

Video Code
Tap the button to select the video code. In the "Video Code" dialog, all available video codes are sorted on several tabs. See Chapter 10.4.3, "Video Codes", on page 353.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD` on page 836
`CONFigure<hw>:HDGenerator:SIGNal:VICD:HCODe` on page 841
`CONFigure<hw>:HDGenerator:SIGNal:VICD:VCODe` on page 841

Format Filter
Select the resolution, frame rate or aspect ratio. The video code and content selection is filtered accordingly.

Resolution ← Format Filter
Tap the button to open the "Resolution" dialog, see "Resolution dialog" on page 231.

Frame Rate ← Format Filter
Tap the button to select the frame rate in the format filter.

In the "Frame Rate" dialog, tap the parameter to enable the filter function for the "Video Code" on page 224.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:FRAM` on page 850

Aspect Ratio ← Format Filter
Tap the button to select the aspect ratio in the format filter.

In the "Aspect Ratio" dialog, tap the parameter to enable the filter function for the "Video Code" on page 224.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:ASPRatio on page 849

Video Configuration
Tap to open the "Video Configuration" dialog, see "Video Configuration dialog" on page 225.

In gray color, the most important settings of the video configuration are displayed.

Video Configuration dialog ← Video Configuration
Groups the parameters to configure the video signal.

Component Format ← Video Configuration dialog ← Video Configuration
Sets the pixel encoding.
- "RGB"
- "YCbCr 4:4:4"
- "YCbCr 4:2:2"
- "YCbCr 4:2:0"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:COMPonent:FORMat on page 845

Signaling Mode ← Video Configuration dialog ← Video Configuration
Enables or disables the HDMI data channel.
- "HDMI"
- "DVI"
  Disables the audio channel of the HDMI signal. No additional data, switch to RGB color signals.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:SIGNal on page 848

Quantization Range ← Video Configuration dialog ← Video Configuration
Enables or disables the full color range.
- "Limited Range"
- "Full Range"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:QUANtization on page 848

Deep Color ← Video Configuration dialog ← Video Configuration
Sets the color resolution of the pixel.
- "Off"
- "10 bit"
- "12 bit"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:DEPColor on page 845

Pixelshift Vertical ← Video Configuration dialog ← Video Configuration
Scrolls the screen contents in the selected velocity and direction.
- "On"

- "Off"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:PIXVertical on page 848

Vertical ← Video Configuration dialog ← Video Configuration
Sets the scroll velocity and direction.
- "-63 Lines/Frame" to "63 Lines/Frame"
  The sign defines the scroll direction: Positive values move the image upwards, negative values move the image downwards.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:PIXelshift:VERTical on page 847

Pixelshift Horizontal ← Video Configuration dialog ← Video Configuration
Scrolls the screen contents in the selected velocity and direction.
- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:PIXHorizontal on page 847

Horizontal ← Video Configuration dialog ← Video Configuration
Sets the scroll velocity and direction.
- "-63 Lines/Frame" to "63 Lines/Frame"
  The sign defines the scroll direction: Positive values move the image to the left, negative values move the image to the right.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:PIXelshift:HORizontal on page 847

Adjustment ← Video Configuration dialog ← Video Configuration
Sets the calibrated values or the variable values of the signal amplitude.
- "Calibrated"
  Disables variation. All levels are in according to their default levels.
- "Variable"
  Enables variation.

Note: The maximum amplitude is limited by the signal amplitude range of the individual signal outputs. This value is given in the data sheet.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:ADJustment on page 842

Resolution Clipping ← Video Configuration dialog ← Video Configuration
Allows clipping the resolution of the video signal. This feature is particularly useful in conjunction with 12-bit video signals. It easily allows verifying in an optical way how many bits a TV monitor is processing.
- "Off"
- "1 bit" to "11 bit"

Note: This setting only affects the video signal. It has no impact on the setting of the HDMI interface.
Example: If a 12-bit signal is selected and the resolution clipping is set to 8 bit, the signal is transmitted as a 12-bit signal, but the lower 4 bits of the signal are set to 0.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:CLIPping` on page 844

Overall Amplification ← Video Configuration dialog ← Video Configuration
Sets the variation of the overall signal level. It includes all component amplitudes but not the synchronization level.

- "0.000" to "2.000"
  Multiplier that is applied to the original level.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:AMPL:RGB` on page 843
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:AMPL:YCBCr` on page 843

Overall Offset ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 225.

Adds a DC offset to the R, G, B signal at the same time.

- "0.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:OFFSet` on page 846

Chroma Amplification ← Video Configuration dialog ← Video Configuration
Only available:

- If "YCbCr 4:4:4", "YCbCr 4:2:2" or "YCbCr 4:2:0" is set under "Component Format" on page 225.
- For Y, Cb/Pb, Cr/Pr signals.

Sets the common variation of the all chroma signal level.

- "0.000" to "2.000"
  Multiplier that is applied to the original level.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:AMPL:CHRoma` on page 843

R Level, G Level, B Level ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 225.

Sets the individual variation of the signal components amplitude.

- "0.0" to "200.0"
  Percentage of the calibrated signal level that is used.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:R` on page 846
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:G` on page 846
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:B` on page 846

Y Level, C_b/P_b Level, C_r/P_r Level ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr 4:4:4", "YCbCr 4:2:2" or "YCbCr 4:2:0" is set under "Component Format" on page 225.

Sets the individual variation of the signal components amplitude.

- "0.0" to "200.0"
  Percentage of the calibrated signal level that is used.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:Y` on page 846
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:CB` on page 846
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:CR` on page 846

R Offset, G Offset, B Offset ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 225.

Adds a DC offset to the red, green or blue signal only.

- "0.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:ROFFset` on page 844
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:GOFFset` on page 844
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:BOFFset` on page 844

Y Offset ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr 4:4:4", "YCbCr 4:2:2" or "YCbCr 4:2:0" is set under "Component Format" on page 225.

Adds a DC offset to the luminance signal.

- "0.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:YOFFset` on page 848

C_b Offset, C_r Offset ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr 4:4:4", "YCbCr 4:2:2" or "YCbCr 4:2:0" is set under "Component Format" on page 225.

Adds a DC offset to the luminance signal.

- "-100.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:CBOFfset` on page 844
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:CROFfset` on page 844

Default button ← Video Configuration dialog ← Video Configuration
Sets each value in the "Video Configuration" dialog to its default value.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VIDConf:DEFault` on page 845

Audio Configuration
Tap to open the "Audio Configuration" dialog, see "Audio Configuration dialog" on page 229.

In gray color, the most important settings of the audio configuration are displayed.

Audio Configuration dialog ← Audio Configuration
Groups the parameters to configure the audio signal.

Audio ← Audio Configuration dialog ← Audio Configuration
Sets the audio source.

- "Mute"
- "Generator"
  Enables the internal sine wave generator.
- "Source Video File"
  Audio signal as embedded in the video signal file. This setting is mandatory for Lip-Sync signals.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:AUDConf:SELect` on page 836

Sampling Rate ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 229.

Sets the sample rate of the contained audio signal, the audio sampling rate.

- "32 kHz"
- "44.1 kHz"
- "48 kHz"
- "88.2 kHz"
- "96 kHz"
- "176.4 kHz"
- "192 kHz"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:AUDConf:SAMPling:RATE` on page 835

Audio Level ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 229.

Sets the audio level of all channels together. The digital audio level is adjusted in dBFS (decibel relative to full scale).

- "-99.0 dBFS" to "0 dBFS" (full scale)

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:AUDConf:LEVel` on page 834

Resolution ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 229.

Sets the audio resolution of all channels. The resolution of the audio signal is adjusted in the following steps for internal sine wave generation.

- "16 bit"
- "20 bit"
- "24 bit"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:AUDConf:RESolution on page 835

Channel Allocation (hex) ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 229.

Specifies the speaker allocation.

- "00" to "31"
  Successive abbreviations (see Table 10-7).
  The list is in accordance with the CEA-861-E specification. The value specifies the channel allocation index.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:AUDConf:CHALlocation on page 833

<Audio channels> ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 229.

Enables or disables the channel, sets its frequency and sets the audio level of each channel. The digital audio level is adjusted in dBFS (decibel relative to full scale).

In sum, 8 channels are available.

- "100 Hz" to "20000 Hz"
- "-99.0 dBFS" to "0 dBFS" (full scale)

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:AUDConf:CH<port> on page 833
CONFigure<hw>:HDGenerator:SIGNal:AUDConf:FREQ:CH<port> on page 834
CONFigure<hw>:HDGenerator:SIGNal:AUDConf:LEVel:CH<port>
on page 835

Default button ← Audio Configuration dialog ← Audio Configuration
Sets each value in the "Audio Configuration" dialog to its default value.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:AUDConf:DEFault on page 834

Start button
Only available if the play was stopped or paused.

Starts playing the signal selected under "Content Selection" on page 223.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:COMMand on page 849
READ<hw>:HDGenerator:SIGNal:STATus? on page 870

Stop button
Only available if a signal is being played or the play was paused.

Stops playing the signal selected under "Content Selection" on page 223.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:COMMand on page 849
READ<hw>:HDGenerator:SIGNal:STATus? on page 870

Pause button
Only available if a signal is being played or the play was stopped.

Pauses playing the signal selected under "Content Selection" on page 223.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:COMMand` on page 849
`READ<hw>:HDGenerator:SIGNal:STATus?` on page 870

Resolution dialog
Sets the resolution in the format filter.

HDMI, VESA tabs ← Resolution dialog
Used to choose a predefined parameter. Tap the corresponding parameter button to enable the filter function for the "Video Code" on page 224.

User Defined tab ← Resolution dialog
Requires the HDMI TX user-defined option (R&S VT-K362).

Used to define your own video timing configuration.

H. Active Pixels ← User Defined tab ← Resolution dialog
Sets the number of horizontal active pixels.
- "512" to "4096"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HACTive` on page 837

H. Front Porch Pixels ← User Defined tab ← Resolution dialog
Sets the number of horizontal front porch pixels.
- "5" to "4096"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HFPorch` on page 838

H. Sync. Pixels ← User Defined tab ← Resolution dialog
Sets the number of horizontal synchronization pixels.
- "5" to "1024"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HSYNc` on page 838

H. Back Porch Pixels ← User Defined tab ← Resolution dialog
Sets the number of horizontal back porch pixels, calculated as follows:

"H. Blanking Pixels" - "H. Front Porch Pixels" - "H. Sync Pixels"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HBPorch` on page 837

H. Blanking Pixels ← User Defined tab ← Resolution dialog
Displays the number of horizontal blanking pixels.

Remote command:
`READ<hw>:HDGenerator:SIGNal:VICD:CUSTom:HBLank?` on page 871

H. Total Pixels ← User Defined tab ← Resolution dialog
Displays the number of horizontal total pixels, calculated as follows:

"H. Active Pixels" + "H. Blanking Pixels"

Remote command:
`READ<hw>:HDGenerator:SIGNal:VICD:CUSTom:HTOPixel?` on page 871

H. Sync. Polarity ← User Defined tab ← Resolution dialog
Sets the horizontal synchronization polarity.
- "Positive"
- "Negative"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HPOLarity` on page 838

Pixel Repetition ← User Defined tab ← Resolution dialog
Sets the number of repeated pixels.
- "None" to "10"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:PXRepetition` on page 839

Pixel Frequency ← User Defined tab ← Resolution dialog
Sets the actual pixel frequency.

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:PXFRequency` on page 839

V. Active Lines ← User Defined tab ← Resolution dialog
Sets the number of vertical active lines.
- "200" to "2160"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VACTive` on page 839

V. Front Porch Lines ← User Defined tab ← Resolution dialog
Sets the number of vertical front porch lines.
- "1" to "512"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VFPorch` on page 840

V. Sync. Lines ← User Defined tab ← Resolution dialog
Sets the number of vertical sync lines.
- "2" to "512"

Remote command:
`CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VSYNc` on page 841

V. Back Porch Lines ← User Defined tab ← Resolution dialog
Sets the number of vertical back porch lines.
- "1" to "512"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VBPorch on page 840

V. Blanking Lines ← User Defined tab ← Resolution dialog
Displays the number of vertical blanking lines.

Remote command:
READ<hw>:HDGenerator:SIGNal:VICD:CUSTom:VBLank? on page 872

V. Total Lines ← User Defined tab ← Resolution dialog
Displays the number of vertical total lines.

Remote command:
READ<hw>:HDGenerator:SIGNal:VICD:CUSTom:VTOLines? on page 872

V. Sync. Polarity ← User Defined tab ← Resolution dialog
Sets the vertical synchronization polarity.
- "Positive"
- "Negative"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VPOLarity on page 841

Video Format ← User Defined tab ← Resolution dialog
Sets the video format.
- "Progressive"
- "Interlaced"
- "Equal Sync. Interlaced"

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:PROGressive on page 838

Vertical Frequency ← User Defined tab ← Resolution dialog
Sets the actual vertical frequency.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VFRequency on page 840

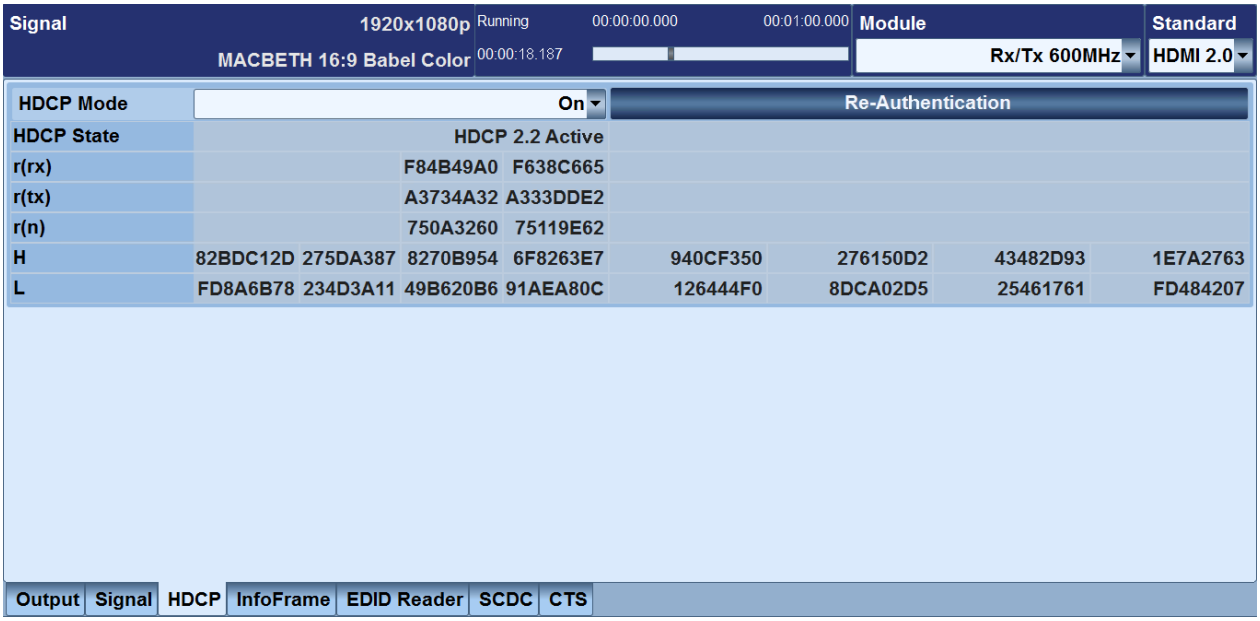
Default button ← User Defined tab ← Resolution dialog
Sets each value to its default value.

Remote command:
CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:DEFault on page 837

10.1.4 HDCP Subtab

Only available if "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

Displays all measurement values related to high-bandwidth digital content protection (HDCP).



HDCP Mode
See "HDCP (HDMI RX/TX 600 MHz module)" on page 219.

HDCP State
Displays if an HDCP content protection is active.

Remote command:
`READ<hw>:HDGenerator:OUTPut:HDCPstate<port>?` on page 860

Re-Authentication button
Clears the current R_i' value to reauthenticate the source.

Remote command:
`CONFigure<hw>:HDGenerator:HDCP:REAuth` on page 781

<HDCP version 1.4 parameters>
Only available if:
- Output signal complies with HDCP version 1.4.
- "On" is set under "HDCP (HDMI RX/TX 600 MHz module)" on page 219

AKSV ← <HDCP version 1.4 parameters>
Displays the key selection vector of the transmitter.

Remote command:
`READ<hw>:HDGenerator:HDCP:AKSV?` on page 857

BKSV ← <HDCP version 1.4 parameters>
Displays the key selection vector of the receiver.

Remote command:
`READ<hw>:HDGenerator:HDCP:BKSV?` on page 857

Ri' ← <HDCP version 1.4 parameters>
Displays the current link synchronization verification values.

Remote command:
`READ<hw>:HDGenerator:HDCP:RI?` on page 859

An ← <HDCP version 1.4 parameters>
Displays the session random number.

Remote command:
`READ<hw>:HDGenerator:HDCP:AN?` on page 857

<HDCP version 2.2 parameters>
Only available if:
- Output signal complies with HDCP version 2.2.
- "On" is set under "HDCP (HDMI RX/TX 600 MHz module)" on page 219

r(rx) ← <HDCP version 2.2 parameters>
Displays the pseudo-random value of the authentication protocol.

Remote command:
`READ<hw>:HDGenerator:HDCP:RRX?` on page 859

r(tx) ← <HDCP version 2.2 parameters>
Displays the pseudo-random value of the authentication protocol.

Remote command:
`READ<hw>:HDGenerator:HDCP:RTX?` on page 860

r(n) ← <HDCP version 2.2 parameters>
Displays the pseudo-random value of the locality check.

Remote command:
`READ<hw>:HDGenerator:HDCP:RN?` on page 859

H ← <HDCP version 2.2 parameters>
Displays the hash value calculated by the receiver of the authentication protocol.

Remote command:
READ<hw>:HDGenerator:HDCP:H? on page 858

L ← <HDCP version 2.2 parameters>
Displays the locality check hash value calculated by the receiver of the locality check.

Remote command:
READ<hw>:HDGenerator:HDCP:L? on page 858

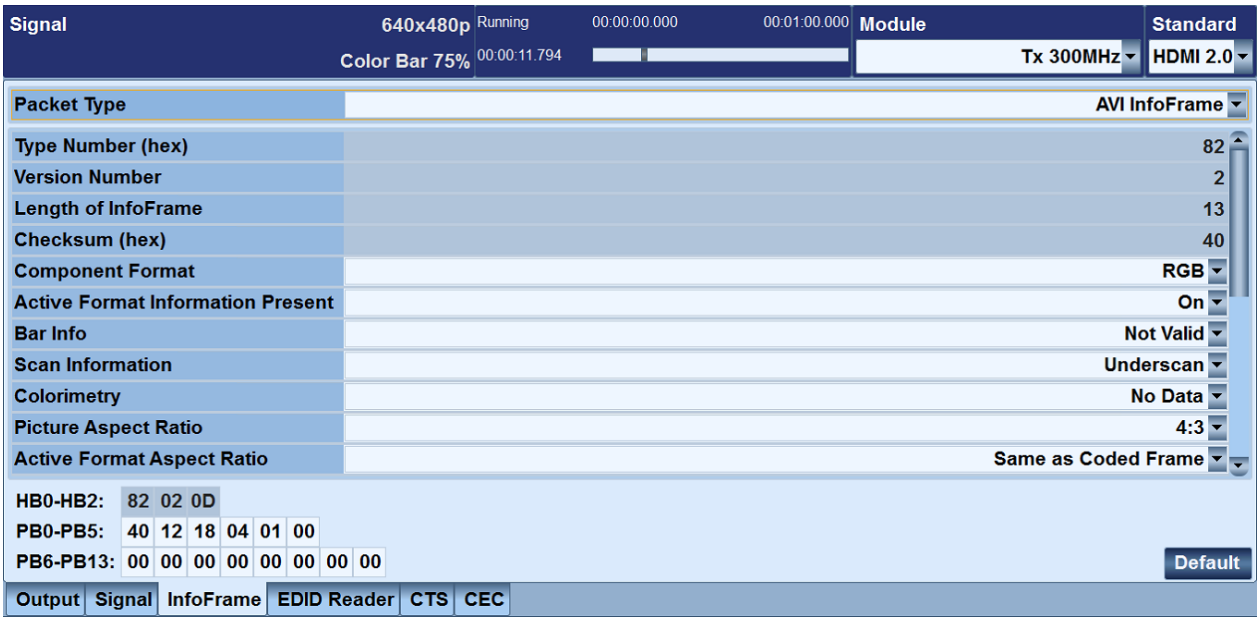
10.1.5 InfoFrame Subtab

Only available if "Tx 300 MHz" or "Rx/Tx 600 MHz" is set under "Module (default favorite)" on page 217.

Requires the HDMI TX user-defined option (R&S VT-K362).

Displays all InfoFrame related information.

Max. number of active InfoFrames
The AVI InfoFrame and the audio InfoFrame are always active. The other InfoFrames can be enabled and disabled, but in sum no more than 8 InfoFrames can be active simultaneously. If already 8 InfoFrames are active, you have to disable one of the InfoFrames first before enabling a new one.



Packet Type
Sets the InfoFrame packet filter to one of the following InfoFrames.

- "AVI InfoFrame"
  Auxiliary video information (AVI) InfoFrame
- "Audio InfoFrame"
- "SPD InfoFrame"
  Source product description (SPD) InfoFrame
- "MPEG InfoFrame"
  MPEG source InfoFrame
- "Vendor Specific InfoFrame"
  Vendor-specific InfoFrame (main)
- "Vendor Specific InfoFrame 2"

- "Vendor Specific InfoFrame 3"
- "Vendor Specific InfoFrame 4"
- "Dynamic Range and Mastering InfoFrame"
  Only available if "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.
- "Gamut Boundary Data"
- "ISRC1"
  International standard recording code 1
- "ISRC2"
  International standard recording code 2

<AVI InfoFrame parameters>
Auxiliary video information (AVI) InfoFrame

Only available if "AVI InfoFrame" is set under "Packet Type" on page 239.

Type Number (hex) ← <AVI InfoFrame parameters>
Displays the type number hexadecimal.

Version Number ← <AVI InfoFrame parameters>
Displays the version.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:AUX:VERSion?` on page 797

Length of InfoFrame ← <AVI InfoFrame parameters>
Displays the length of the InfoFrame.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:AUX:LENGth?` on page 794

Checksum (hex) ← <AVI InfoFrame parameters>
Displays the checksum hexadecimal.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:AUX:CSUM?` on page 791

Component Format ← <AVI InfoFrame parameters>
Sets the pixel encoding.

- "RGB"
- "YCbCr 4:4:4"
- "YCbCr 4:2:2"
- "YCbCr 4:2:0"
- "IDO-Defined"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:AUX:COMPonent:FORMat` on page 790

Active Format Information Present ← <AVI InfoFrame parameters>

- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:AFPResent on page 789

Bar Info ← <AVI InfoFrame parameters>
- "Not Valid"
- "Vertical Bar"
- "Horizontal Bar"
- "Both Bars"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:BARinfo on page 789

Scan Information ← <AVI InfoFrame parameters>
- "No Data"
- "Overscan"
- "Underscan"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:SCANinfo on page 796

Colorimetry ← <AVI InfoFrame parameters>
- "No Data"
- "SMPTE 170M/ITU601 "
- "ITU709"
- "Extended Colorm. Valid"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:COLorimetry on page 790

Picture Aspect Ratio ← <AVI InfoFrame parameters>
- "No Data"
- "4:3"
- "16:9"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:PICTurear on page 795

Active Format Aspect Ratio ← <AVI InfoFrame parameters>
- "AFD Unknown"
- "Box 16:9 (Top)"
- "Box 14:9 (Top)"
- "Box > 16:9 (Center)"
- "Same as Coded Frame"
- "4:3 (Center)"
- "16:9 (Center)"
- "14:9 (Center)"
- "4:3 (Protect 14:9 Center)"
- "16:9 (Protect 14:9 Center)"
- "16:9 (Protect 4:3 Center)"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:FORMatar on page 792

IT Content ← <AVI InfoFrame parameters>
- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:ITContent on page 793

Extended Colorimetry ← <AVI InfoFrame parameters>
- "xvYCC 601"
- "xvYCC 709"
- "sYCC 601"
- "Adobe YCC 601"
- "Adobe RGB"
- "ITU-R BT.2020 $Y'_CC'_{BC}C'_{RC}$"
- "TR-R BT.2020 $Y'_CC'_BC'_R$"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:EXTColorim on page 791

RGB Quantization Range ← <AVI InfoFrame parameters>
- "Default"
- "Limited Range"
- "Full Range"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:RGBQrange on page 796

Non-Uniform Picture Scaling ← <AVI InfoFrame parameters>
- "Unknown"
- "H. Scaled"
- "V. Scaled "
- "H. & V. Scaled "

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:NUSCaling on page 794

Pixel Repetition ← <AVI InfoFrame parameters>
- "No Repetition"
- "Pixel Sent n Times" with n = 2 to 10

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:PXRepetition on page 795

Video Identification Code ← <AVI InfoFrame parameters>
- "0" to "255"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:VIC on page 797

YCC Quantization Range ← <AVI InfoFrame parameters>
- "Limited Range"
- "Full Range"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:YCCQuant on page 797

Content Type ← <AVI InfoFrame parameters>
- "Graphics"
- "Photo"
- "Cinema"
- "Game"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:CONTenttype on page 791

Line Number of Top Bar End ← <AVI InfoFrame parameters>
- "0" to "9999"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:TBAR on page 796

Line Number of Bottom Bar Start ← <AVI InfoFrame parameters>
- "0" to "9999"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:BBAR on page 790

Pixel Number of Left Bar End ← <AVI InfoFrame parameters>
- "0" to "9999"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:LBAR on page 793

Pixel Number of Right Bar Start ← <AVI InfoFrame parameters>
- "0" to "9999"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:RBAR on page 795

<Audio InfoFrame parameters>
Only available if "Audio InfoFrame" is set under "Packet Type" on page 239.

Type Number (hex) ← <Audio InfoFrame parameters>
Displays the type number hexadecimal.

Version Number ← <Audio InfoFrame parameters>
Displays the version.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:VERSion? on page 788

Length of InfoFrame ← <Audio InfoFrame parameters>
Displays the length of the InfoFrame.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:LENGth? on page 786

Checksum (hex) ← <Audio InfoFrame parameters>
Displays the checksum hexadecimal.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:AUDio:CSUM?` on page 785

Coding Type ← <Audio InfoFrame parameters>
- "Stream Header"
- "PCM"
- "AC-3"
- "MPEG-1"
- "MP3"
- "MPEG-2"
- "AAC LC"
- "DTS"
- "ATRAC"
- "One Bit Audio"
- "Enhanced AC-3"
- "DTS-HD"
- "MAT" (MLP)
- "DST"
- "WMA Pro"
- "Extended"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:AUDio:CODE:TYPE` on page 784

Channel Count ← <Audio InfoFrame parameters>
- "Stream Header"
- "2 Channels"
- "3 Channels"
- "4 Channels"
- "5 Channels"
- "6 Channels"
- "7 Channels"
- "8 Channels"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:AUDio:CHANnel:COUNt`
on page 782

Sampling Frequency ← <Audio InfoFrame parameters>
- "Stream Header"
- "32 kHz"
- "44.1 kHz"
- "48 kHz"
- "88.2 kHz"
- "96 kHz"
- "176.4 kHz"
- "192 kHz"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:SAMPling:FREQuency
on page 787

Sampling Size ← <Audio InfoFrame parameters>
- "Stream Header"
- "16 bit"
- "20 bit"
- "24 bit"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:SAMPling:SIZE
on page 788

Code Extension ← <Audio InfoFrame parameters>
- "Coding Type"
- "MPEG-4 HE ACC"
- "MPEG-4 HE ACC v2"
- "MPEG-4 ACC LC"
- "DRA"
- "MPEG-4 HE ACC + MPEG Surround"
- "MPEG-4 AAC LC + MPEG Surround" = 10

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:CODE:EXTension
on page 783

Channel Allocation (hex) ← <Audio InfoFrame parameters>
- "00" to "31"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:CHANnel:ALLocation
on page 782

Downmix Inhibit ← <Audio InfoFrame parameters>
- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:DMI on page 785

Level Shift Value ← <Audio InfoFrame parameters>
- "0 dB" to "15 dB"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:LSValue on page 787

LFE Playback Level ← <Audio InfoFrame parameters>
- "Unknown"
- "0 dB Playback"
- "+10 dB Playback"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUDio:LFEPlayback on page 786

<SPD InfoFrame parameters>
Source product description (SPD) InfoFrame

Only available if "SPD InfoFrame" is set under "Packet Type" on page 239.

Active ← <SPD InfoFrame parameters>
Enables or disables the SPD InfoFrame. See also "Max. number of active InfoFrames" on page 236.
- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:SPD:ACTive on page 816

Type Number (hex) ← <SPD InfoFrame parameters>
Displays the type number hexadecimal.

Version Number ← <SPD InfoFrame parameters>
Displays the version.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:SPD:VERSion? on page 819

Length of InfoFrame ← <SPD InfoFrame parameters>
Displays the length of the InfoFrame.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:SPD:LENGth? on page 817

Checksum (hex) ← <SPD InfoFrame parameters>
Displays the checksum hexadecimal.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:SPD:CSUM? on page 816

Vendor Name ← <SPD InfoFrame parameters>
- 8 characters

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:SPD:VENDor on page 818

Product Description ← <SPD InfoFrame parameters>
- 16 characters

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:SPD:PRODuct on page 817

Source Information ← <SPD InfoFrame parameters>
- "Unknown"
- "Digital STB"
- "DVD Player"

- "D-VHS"
- "HDD Recorder"
- "DVC"
- "DSC"
- "Video CD"
- "Game"
- "PC General"
- "Blu-Ray Disc"
- "Super Audio CD"
- "HD DVC"
- "PMP"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:SPD:SOURceinfo` on page 817

<MPEG InfoFrame parameters>
Only available if "MPEG InfoFrame" is set under "Packet Type" on page 239.

Active ← <MPEG InfoFrame parameters>
Enables or disables the MPEG InfoFrame. See also "Max. number of active InfoFrames" on page 236.
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:MPEG:ACTive` on page 813

Type Number (hex) ← <MPEG InfoFrame parameters>
Displays the type number hexadecimal.

Version Number ← <MPEG InfoFrame parameters>
Displays the version.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:MPEG:VERSion?` on page 815

Length of InfoFrame ← <MPEG InfoFrame parameters>
Displays the length of the InfoFrame.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:MPEG:LENGth?` on page 815

Checksum (hex) ← <MPEG InfoFrame parameters>
Displays the checksum hexadecimal.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:MPEG:CSUM?` on page 814

MPEG Bit Rate ← <MPEG InfoFrame parameters>
Sets the MPEG bit rate in bit/s.
- "0" to "2147483648" (2^{31})

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:MPEG:BITRate` on page 813

Field Repeat (for 3:2 Pull-Down) ← <MPEG InfoFrame parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:MPEG:FREPeat` on page 814

MPEG Frame ← <MPEG InfoFrame parameters>
Enables or disables the MPEG InfoFrame.

- "Unknown"
- "I Picture"
- "B Picture"
- "P Picture"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:MPEG:MPEGframe` on page 815

<Vendor-specific InfoFrame 1 to 4 parameters>
Only available if "Vendor Specific InfoFrame","Vendor Specific InfoFrame 2","Vendor Specific InfoFrame 3" or "Vendor Specific InfoFrame 4" is set under "Packet Type" on page 239.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:IDX` on page 825

Active ← <Vendor-specific InfoFrame 1 to 4 parameters>
Enables and selects the vendor-specific InfoFrame. See also "Max. number of active InfoFrames" on page 236.
- "Off"
- "HDMI 1.4 3D"
- "HDMI 1.4 VIC"
- "HDMI 2.0"
- "Vendor Specific"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:ACTive` on page 820

Type Number (hex) ← <Vendor-specific InfoFrame 1 to 4 parameters>
Displays the type number hexadecimal.

Version Number ← <Vendor-specific InfoFrame 1 to 4 parameters>
Sets the version.
- "0" to "255"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:VERSion` on page 828

Length of InfoFrame ← <Vendor-specific InfoFrame 1 to 4 parameters>
Sets the length of the InfoFrame.
- "0" to "27"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:LENGth` on page 825

Checksum (hex) ← <Vendor-specific InfoFrame 1 to 4 parameters>
Displays the checksum hexadecimal.

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:CSUM?` on page 820

IEEE OUI (hex) ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "00" "00" "00" to "FF" "FF" "FF"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:OUI` on page 826

Video Format ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "None"
- "Extended Resolution"
- "3D Format"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:VIDeoformat` on page 829

VSIF Version ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "0 to 255"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:VSVersion` on page 829

3D Valid ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:VALid` on page 828

3D Additional Info Present ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:ADDinfo` on page 820

3D Disparity Present ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:DISParity` on page 822

3D Meta Present ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:META` on page 825

Extended HDMI VIC ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "1" to "255"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:HVIC` on page 824

3D Structure ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "Frame Packing"
- "Field Alternative"
- "Line Alternative"
- "Side by Side (Full)"
- "L + Depth"
- "L + Depth + Graphics + Graphics-Depth"
- "Top and Bottom"
- "Side by Side (Half)"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:STRucture` on page 827

3D Ext Data ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "Horizontal Odd/Left, Odd Right"
- "Horizontal Odd/Left, Even Right "
- "Horizontal Even/Left, Odd Right"
- "Horizontal Even/Left, Even Right"
- "Quincunx Odd/Left, Odd Right"
- "Quincunx Odd/Left, Even Right"
- "Quincunx Even/Left, Odd Right"
- "Quincunx Even/Left, Even Right"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:EXTData` on page 823

3D Dual View ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:DUALview` on page 823

3D View Dependency ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "None"
- "Right View"
- "Left View"
- "Both Views"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:VWDependency` on page 829

3D Preferred 2D View ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "None"
- "Right View"
- "Left View"
- "Do Not Care"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:VWPReferred on page 829

Metadata Type ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "Parallax"
- "Reserved"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:METatype on page 825

Parallax Zero ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "0" to "65535"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:PARZero on page 827

Parallax Scale ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "0" to "65535"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:PARScale on page 826

Dref ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "0" to "65535"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:DREF on page 823

Wref ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "0" to "65535"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:WREF on page 830

Disparity Version ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "None"
- "Range Hint"
- "Multi Region"
- "Multi Region + Range Hint"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:DIVersion on page 822

Video Max Disparity Hint ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "-2048" to "2047"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:DMAX on page 822

Video Min Disparity Hint ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "-2048" to "2047"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:VSIF:DMIN on page 823

Number of Regions ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "0" to "4", "9", "16"
- "Reserved"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:NREGions` on page 826

Max Picture Disparity ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "-128" to "127"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:DIPMax` on page 821

Min Disparity Region 0 ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "-128" to "127"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:DIRNull` on page 821

Min Disparity Region 1 to Min Disparity Region 15 ← <Vendor-specific InfoFrame 1 to 4 parameters>
- "-128" to "127"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:VSIF:DIRegion<region>`
on page 821

<Dynamic range and mastering InfoFrame parameters>
Only available if "Dynamic Range and Mastering InfoFrame" is set under "Packet Type" on page 239.

The HDR and colorimetry InfoFrame carries data identifying the characteristics of HDR stream, the EOTF and the static metadata associated with the HDR stream.

Further information is provided in the following references:
- CEA-861.3 HDR Static Metadata Extensions
- CEA-861-F, A DTV Profile for Uncompressed High Speed Digital Interfaces, May 2014
- SMPTE ST 2084:2014, High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays
- SMPTE ST 2086:2014, Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut Images

Active ← <Dynamic range and mastering InfoFrame parameters>
Enables or disables the HDR and colorimetry data. See also "Max. number of active InfoFrames" on page 236.
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:ACTive` on page 798

Type Number (hex) ← <Dynamic range and mastering InfoFrame parameters>
Displays the type number hexadecimal.

Electro-Optical Transfer Function ← <Dynamic range and mastering InfoFrame parameters>
Sets the electro-optical transfer function.
- "HDR Luminance Processing"
- "SDR Luminance Processing"
- "SMPTE ST 2084"
- "Future EOTF"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:EOTF` on page 800

Static Metadata Descriptor ← <Dynamic range and mastering InfoFrame parameters>
- "Static Metadata Descriptor 1"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:SMD` on page 802

Display Primaries X[0] ← <Dynamic range and mastering InfoFrame parameters>
- "0.00000" to "1.00000"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPXNull` on page 799

Display Primaries Y[0] ← <Dynamic range and mastering InfoFrame parameters>
- "0.00000" to "1.00000"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPYNull` on page 800

Display Primaries X[1] ← <Dynamic range and mastering InfoFrame parameters>
- "0.00000" to "1.00000"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPX<idx>` on page 799

Display Primaries Y[1] ← <Dynamic range and mastering InfoFrame parameters>
- "0.00000" to "1.00000"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPY<idx>` on page 799

Display Primaries X[2] ← <Dynamic range and mastering InfoFrame parameters>
- "0.00000" to "1.00000"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPX<idx>` on page 799

Display Primaries Y[2] ← <Dynamic range and mastering InfoFrame parameters>
- "0.00000" to "1.00000"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPY<idx>` on page 799

White Point X ← <Dynamic range and mastering InfoFrame parameters>
- "0.00000" to "1.00000"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:WPX` on page 802

White Point Y ← <Dynamic range and mastering InfoFrame parameters>
- "0.00000" to "1.00000"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:WPY` on page 802

Max Display Mastering Luminance ← <Dynamic range and mastering InfoFrame parameters>
- "0" to "65535"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:LMAX` on page 801

Min Display Mastering Luminance ← <Dynamic range and mastering InfoFrame parameters>
- "0.0000" to "6.5535"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:LMIN` on page 801

Max Content Light Level ← <Dynamic range and mastering InfoFrame parameters>
- "0" to "65535"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:CLL` on page 798

Max Frame Average Light Level ← <Dynamic range and mastering InfoFrame parameters>
- "0" to "65535"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:DRMI:FALL` on page 800

<Gamut boundary data parameters>
Only available if "Gamut Boundary Data" is set under "Packet Type" on page 239.

Active ← <Gamut boundary data parameters>
Enables or disables the gamut boundary data. See also "Max. number of active InfoFrames" on page 236.
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:GBD:ACTive` on page 803

Type Number (hex) ← <Gamut boundary data parameters>
Displays the type number hexadecimal.

Next Field ← <Gamut boundary data parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:GBD:NEXT` on page 806

GBD Profile ← <Gamut boundary data parameters>
- "P0"
- "P1"
- "P2"
- "P3"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:GBD:PROFile` on page 808

Affected Sequence Num ← <Gamut boundary data parameters>
- "0" to "15"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:GBD:SEQaffected` on page 809

Current Sequence Num ← <Gamut boundary data parameters>
- "0" to "15"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:GBD:SEQCurrent` on page 809

No Current GBD ← <Gamut boundary data parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:GBD:NOGBd` on page 807

Format Flag ← <Gamut boundary data parameters>
- "Vertices + Facets"
- "Range Description"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:GBD:FORMat` on page 805

Facet Mode ← <Gamut boundary data parameters>
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:INFoframe:GBD:FACetmode` on page 805

Color Precision ← <Gamut boundary data parameters>
- "8 bit"
- "10 bit"
- "12 bit"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:COLPrecision on page 804

Color Space ← <Gamut boundary data parameters>
- "RGB"
- "YCC 601"
- "YCC 709"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:COLSpace on page 804

Number of Vertices ← <Gamut boundary data parameters>
- "4" to "65535"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:NUMVertices on page 807

Number of Facets ← <Gamut boundary data parameters>
- "0" to "65535"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:NUMFacets on page 807

Minimum Red ← <Gamut boundary data parameters>
- "-4.0000" to "4.0000"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:MINRed on page 806

Maximum Red ← <Gamut boundary data parameters>
- "-4.0000" to "4.0000"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:MAXRed on page 806

Minimum Green ← <Gamut boundary data parameters>
- "-4.0000" to "4.0000"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:MINGreen on page 806

Maximum Green ← <Gamut boundary data parameters>
- "-4.0000" to "4.0000"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:MAXGreen on page 806

Minimum Blue ← <Gamut boundary data parameters>
- "-4.0000" to "4.0000"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:MINBlue on page 806

Maximum Blue ← <Gamut boundary data parameters>
- "-4.0000" to "4.0000"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:MAXBlue on page 806

Black Point ← <Gamut boundary data parameters>
- "0" to "4095"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:BLACk<port> on page 804

Red Primary ← <Gamut boundary data parameters>
- "0" to "4095"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:PRED<port> on page 808

Green Primary ← <Gamut boundary data parameters>
- "0" to "4095"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:PGReen<port> on page 808

Blue Primary ← <Gamut boundary data parameters>
- "0" to "4095"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:GBD:PBLue<port> on page 808

ISRC1
Only available if "ISRC1" is set under "Packet Type" on page 239.

International standard recording code (ISRC)

A source can handle an international standard recording code (ISRC) and/or UPC/EAN by describing the origin or owner details for each track of content on the medium. These values can be transmitted using the ISRC1 and ISRC2 packets.

Active ← ISRC1
Enables or disables the international standard recording code 1. See also "Max. number of active InfoFrames" on page 236.
- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:ISRC:ACTive on page 809

Type Number (hex) ← ISRC1
Displays the type number hexadecimal.

ISRC Continued ← ISRC1
- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:ISRC:CONTinue on page 810

ISRC Valid ← ISRC1
- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:ISRC:VALid on page 811

ISRC Status ← ISRC1
- "Unknown"
- "Track Start"
- "Track Intermediate"
- "Track End"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:ISRC:STATus on page 811

UPC EAN ISRC ← ISRC1
Universal product code (UPC), European article number (EAN)
- String of max. 16 characters. Alphanumeric and special characters are allowed.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:ISRC:ISRC on page 810

ISRC2
International standard recording code 2

Only available if "ISRC2" is set under "Packet Type" on page 239.

Active ← ISRC2
Enables or disables the international standard recording code 2. See also "Max. number of active InfoFrames" on page 236.
- "On"
- "Off"

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:ACTive on page 812

Type Number (hex) ← ISRC2
Displays the type number hexadecimal.

UPC EAN ISRC 16 ← ISRC2
See "UPC EAN ISRC" on page 258.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:ISRC on page 812

HB0 to HB2
Header bytes 0 to 2; "HB0" is read-only.

If "AVI InfoFrame" is set under "Packet Type" on page 239, "HB1" and "HB2" are also read-only.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:HBYTe<port>? on page 793
CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port> on page 785

CONFigure<hw>:HDGenerator:INFoframe:SPD:HBYTe<port> on page 816
CONFigure<hw>:HDGenerator:INFoframe:MPEG:HBYTe<port> on page 815
CONFigure<hw>:HDGenerator:INFoframe:VSIF:HBYTe<port> on page 824
CONFigure<hw>:HDGenerator:INFoframe:DRMI:HBYTe<port> on page 801
CONFigure<hw>:HDGenerator:INFoframe:GBD:HBYTe<port> on page 806
CONFigure<hw>:HDGenerator:INFoframe:ISRC:HBYTe<port> on page 810
CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:HBYTe<port> on page 812

PB0 to PB27
Packet bytes 0 to 27

For the SPD InfoFrame, use 25 packet bytes as defined in the standard.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:PBYTe<port> on page 794
CONFigure<hw>:HDGenerator:INFoframe:AUDio:PBYTe<port> on page 787
CONFigure<hw>:HDGenerator:INFoframe:SPD:PBYTe<port> on page 817
CONFigure<hw>:HDGenerator:INFoframe:MPEG:PBYTe<port> on page 815
CONFigure<hw>:HDGenerator:INFoframe:VSIF:PBYTe<port> on page 827
CONFigure<hw>:HDGenerator:INFoframe:DRMI:PBNull on page 801
CONFigure<hw>:HDGenerator:INFoframe:DRMI:PBYTe<byte> on page 802
CONFigure<hw>:HDGenerator:INFoframe:GBD:PBNull on page 808
CONFigure<hw>:HDGenerator:INFoframe:GBD:PBYTe<port> on page 808
CONFigure<hw>:HDGenerator:INFoframe:ISRC:PBNull on page 811
CONFigure<hw>:HDGenerator:INFoframe:ISRC:PBYTe<port> on page 811
CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:PBNull on page 813
CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:PBYTe<port> on page 813

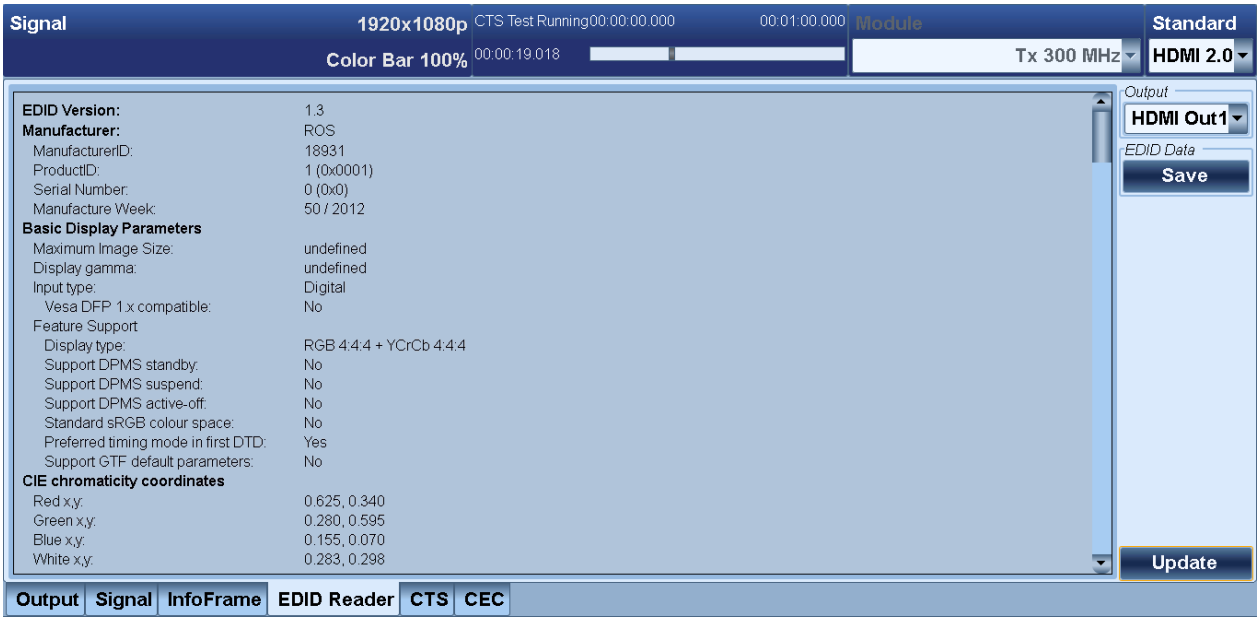
Default button
Sets each value to its default value.

Remote command:
CONFigure<hw>:HDGenerator:INFoframe:AUX:DEFault on page 791
CONFigure<hw>:HDGenerator:INFoframe:AUDio:DEFault on page 785
CONFigure<hw>:HDGenerator:INFoframe:SPD:DEFault on page 816
CONFigure<hw>:HDGenerator:INFoframe:MPEG:DEFault on page 814
CONFigure<hw>:HDGenerator:INFoframe:VSIF:DEFault on page 820
CONFigure<hw>:HDGenerator:INFoframe:DRMI:DEFault on page 799
CONFigure<hw>:HDGenerator:INFoframe:GBD:DEFault on page 805
CONFigure<hw>:HDGenerator:INFoframe:ISRC:DEFault on page 810
CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:DEFault on page 812

10.1.6 EDID Reader Subtab

Only available if "Tx 300 MHz" or "Rx/Tx 600 MHz" is set under "Module (default favorite)" on page 217.

Displays the extended display identification data (EDID) of the monitor that is connected using the HDMI interface.



Output(HDMI TX 300 MHz module)
Sets the output for the EDID reading. The HDMI TX 300 MHz module (R&S VT-B360) provides 4 outputs.

- "HDMI Out 1"
- "HDMI Out 2"
- "HDMI Out 3"
- "HDMI Out 4"

Remote command:
`CONFigure<hw>:HDGenerator:EDID:SOUT` on page 781

Output(HDMI RX/TX 600 MHz module)
Displays the output for the EDID reading. The HDMI RX/TX 600 MHz module (R&S VT-B2363) provides one output.

- "HDMI Out 600MHz"

Remote command:
`CONFigure<hw>:HDGenerator:EDID:SOUT` on page 781

Save EDID Data
Saves the read EDID data in a chosen folder.

Remote command:
`CONFigure<hw>:HDGenerator:EDID:SAVE` on page 780
`READ<hw>:HDGenerator:EDID:DUMP?` on page 856

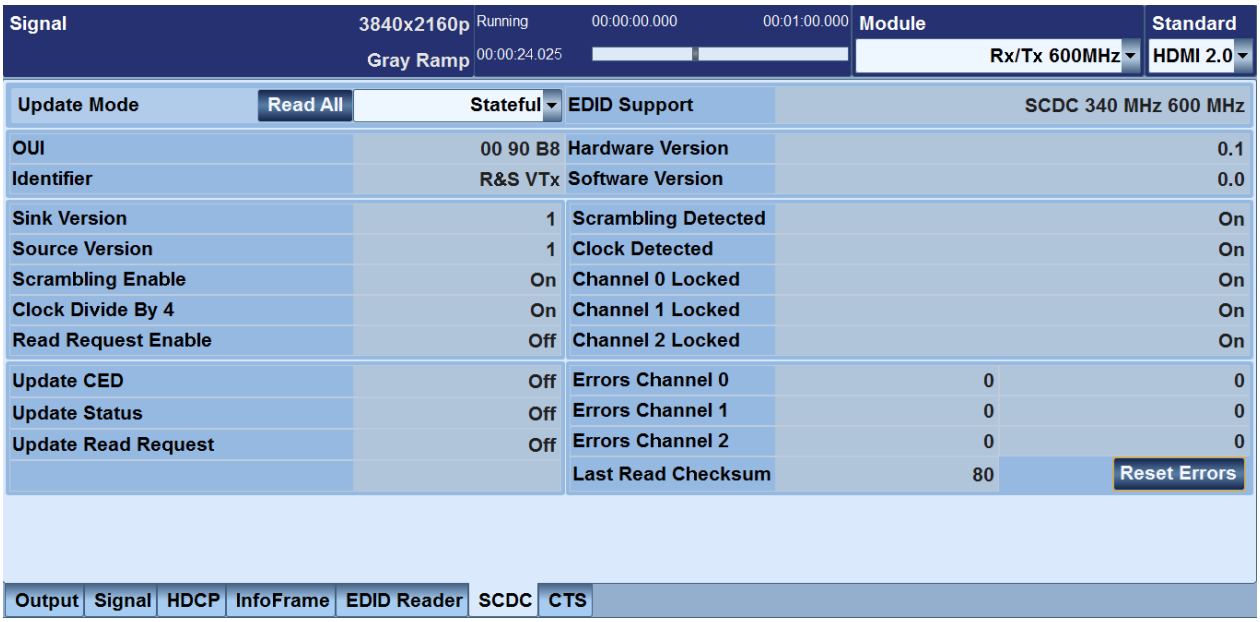
Update
Updates the left panel with the EDID reading on the chosen output.

Remote command:
`CONFigure<hw>:HDGenerator:EDID:UPDate` on page 781

10.1.7 SCDC Subtab

Only available if "Rx/Tx 600MHz" is set under "Module (default favorite)" on page 217.

The status and control data channel (SCDC) is a point-to-point communication protocol enabling data exchange between an HDMI source and an attached HDMI sink. It is required for the setup of the scrambling mode that is necessary for data rates above 3.4 Gbps per lane. See the high-definition multimedia interface specification, version 2.0.



Update Mode
Defines how the update is performed.

- "Stateful"
  Uses a state machine conforming to the HDMI 2.0 standard.
- "Poll"
  Performs an automatic update every 250 ms.
- "Manual"
  Updates only if you tap the "Read All button" on page 262.

Remote command:
`CONFigure<hw>:HDGenerator:SCDC:MODE` on page 832

Read All button ← Update Mode
Only applies if "Manual" is set under "Update Mode" on page 262.

Updates the SCDC reading.

Remote command:
`CONFigure<hw>:HDGenerator:SCDC:UPDate` on page 832

EDID Support
SCDC capability of the connected sink as described in the EDID.

- "No SCDC"
  Sink does not support SCDC.
- "SCDC 600 MHz"
  Sink supports SCDC, but no scrambling for TMDS below 340 MHz.
- "SCDC 340 MHZ 600 MHz"
  Sink supports SCDC and also scrambling for TMDS below 340 MHz.

<Manufacturer-specific registers set by the sink>
Displays the following information.

OUI ← <Manufacturer-specific registers set by the sink>
Organizationally unique identifier manufacturer

Remote command:
`READ<hw>:HDGenerator:SCDC:OUI?` on page 863

Identifier ← <Manufacturer-specific registers set by the sink>
Identifier of the R&S VTE

Remote command:
`READ<hw>:HDGenerator:SCDC:IDENtifier?` on page 863

Hardware Version ← <Manufacturer-specific registers set by the sink>
Hardware version of the connected sink

Remote command:
`READ<hw>:HDGenerator:SCDC:HWVersion?` on page 863

Software Version ← <Manufacturer-specific registers set by the sink>
Software version of the connected sink

Remote command:
`READ<hw>:HDGenerator:SCDC:SWVersion?` on page 869

<Versions>
Displays version information.

Sink Version ← <Versions>
Sink software version; always set to "1" for R&S VTE.

Remote command:
`READ<hw>:HDGenerator:SCDC:SINKversion?` on page 868

Source Version ← <Versions>
Source software version; always set to "1" for R&S VTE.

Remote command:
`READ<hw>:HDGenerator:SCDC:SRCVersion?` on page 868

<TMDS configuration>
Displays configuration information.

Scrambling Enable ← <TMDS configuration>
Set by the source. "On" enables scrambling in the sink.

Remote command:
`READ<hw>:HDGenerator:SCDC:SCRambling:ENABle?` on page 866

Clock Divide By 4 ← <TMDS configuration>
Set by the source. Enabled if *TMDS bit period* to *TMDS clock period* ratio is 1/40.

Remote command:
`READ<hw>:HDGenerator:SCDC:CDIVide?` on page 862

Read Request Enable ← <TMDS configuration>
Enabled if the connected sink supports the SCDC read request feature.

Remote command:
`READ<hw>:HDGenerator:SCDC:RRENable?` on page 864

<Update flags>
Not supported by the HDMI generator application. Only relevant if source and sink support these update flags.

Update CED ← <Update flags>
Enabled by the sink if any error counter value:
- Increments by more than 4 in 1 second.
- Reaches its maximum value.

Remote command:
`READ<hw>:HDGenerator:SCDC:UPDate:CED?` on page 869

Update Status ← <Update flags>
Enabled by the sink if any clock status is changed.

Remote command:
`READ<hw>:HDGenerator:SCDC:UPDate:STATus?` on page 870

Update Read Request ← <Update flags>
Enabled by the sink if a test read request is generated.

Remote command:
`READ<hw>:HDGenerator:SCDC:UPDate:READrequest?` on page 870

<Scrambler status>
Displays status information.

Scrambling Detected ← <Scrambler status>
Enabled if the sink detects scrambled control.

Remote command:
`READ<hw>:HDGenerator:SCDC:SCRambling:DETect?` on page 865

Clock Detected ← <Scrambler status>
Status flag. Enabled if the sink detects a valid clock signal.

Remote command:
`READ<hw>:HDGenerator:SCDC:SCRambling:CLOCk?` on page 865

Channel 0 Locked, Channel 1 Locked, Channel 2 Locked ← <Scrambler status>
Status flags. Enabled if the sink is successfully decoding data.

Remote command:
`READ<hw>:HDGenerator:SCDC:SCRambling:CHNull?` on page 865
`READ<hw>:HDGenerator:SCDC:SCRambling:CH<channel>?` on page 864

<Character error detection>
Optional setting, but supported by the HDMI generator application.

Provides a mechanism for the sink to report detected character errors. Allows checking the link quality.

Errors Channel 0, Errors Channel 1, Errors Channel 2 ← <Character error detection>
- <Value in left column>
  Number of character errors detected by the sink since the last readout.
- <Value in right column>

Number of all read character errors since:
– HDMI connection was made.
– Last manual reset of the character error counters using "Reset Errors button" on page 265.

Remote command:
`READ<hw>:HDGenerator:SCDC:SCRambling:ERRNull?` on page 867
`READ<hw>:HDGenerator:SCDC:SCRambling:ERR<channel>?` on page 866
`READ<hw>:HDGenerator:SCDC:SCRambling:SUMNull?` on page 868
`READ<hw>:HDGenerator:SCDC:SCRambling:SUM<channel>?` on page 867

Last Read Checksum ← <Character error detection>
To check the correct transmission of the values of the character error counters, the sink calculates and provides a checksum when the source reads the counter values. If the specified checksum is displayed in red, it does not match the checksum of the received number of character errors.

Remote command:
`READ<hw>:HDGenerator:SCDC:SCRambling:ERRChecksum?` on page 867

Reset Errors button ← <Character error detection>
Resets the number of all read character errors.

Remote command:
`CONFigure<hw>:HDGenerator:SCDC:SCRambling:RESet` on page 832

10.1.8 CTS Subtab

Requires additional, module-dependant options, see also the data sheet:
- HDMI CTS sink test option (R&S VT-K365) for the R&S VT-B360/2362 modules
- HDMI 1.4 CTS sink test (R&S VT-K367) for the R&S VT-B2363 module
- HDMI 2.0 CTS sink test (R&S VT-K368) for the R&S VT-B2363 module

Executes sink tests according to the compliance test specifications (CTS).

Divided into two panes. The left pane displays the compliance test results.

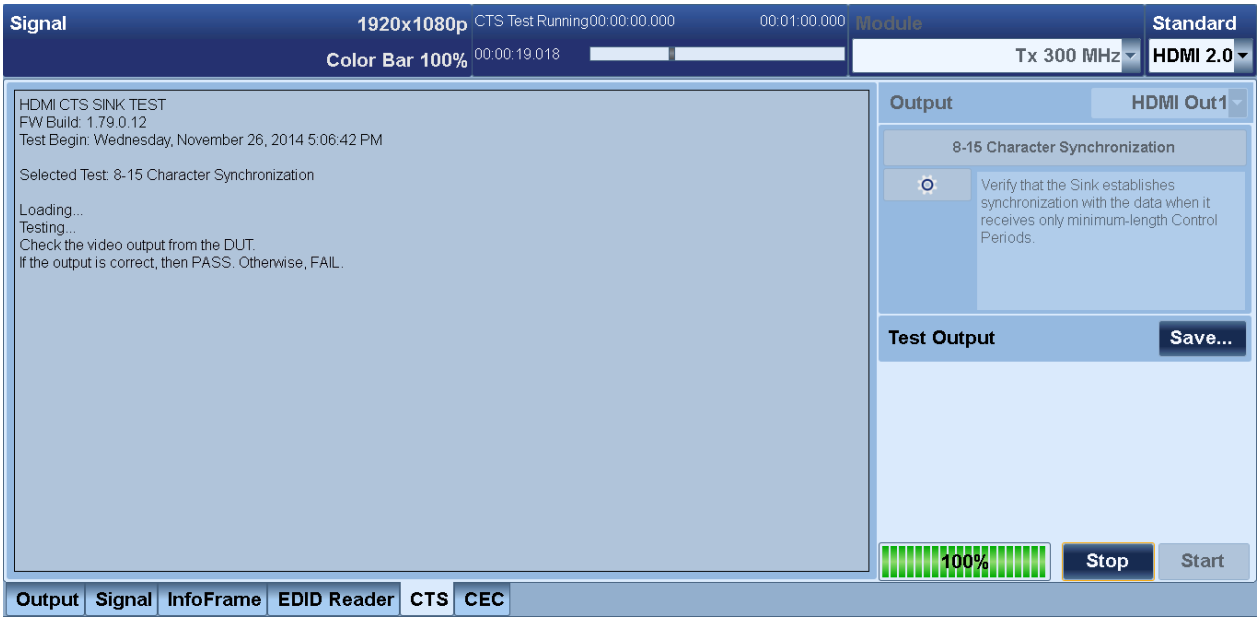
Suitable output modules

Depending on the TMDS character clock that a CTS source test ID requires, select the "Module (default favorite)" on page 217:
- < 340 MHz
  Select "Tx 300MHz".
- > 340 MHz
  Select "CTS Rx/Tx 600MHz" or "Rx/Tx 600MHz".

Remote commands to query measurement results

`READ<hw>:HDGenerator:CTS:REPort:COUNt?` on page 856

`READ<hw>:HDGenerator:CTS:REPort?` on page 855



Output
Selects the HDMI output.

Remote command:
`CONFigure<hw>:HDGenerator:CTS:OUTPut` on page 776

<Test case> button
Displays the selected test case.

Tap this button to select another test case, see "CTS Sink Tests dialog" on page 268.

Tap ⚙ to configure the selected test, see "CTS Configuration dialog" on page 269.

CTS Sink Tests dialog ← <Test case> button
Displays all available test cases (see Table 14-21).

Select the desired test case. If you select a new test case, the old test results are deleted.

Note: If HDMI CTS RX/TX 600 MHz module (R&S VT-B2362) was refitted and starting a test case causes an error message, see "Start button" on page 280.

Remote command:
CONFigure<hw>:HDGenerator:CTS:SELect on page 778

CTS Configuration dialog
In a tree view, displays all available test cases. Each test case has its own set of parameters. The parameters are subentries of the corresponding test case node. Open a test case to display and edit the parameters of this test case.

8-15 Character Synchronization ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Contains no parameters to configure.

8-16 Acceptance of All Valid Packet Types ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-16 Acceptance of All Valid Packet Types ← CTS Configuration dialog
Presets the video format. If this setting does not match the actual video format of the input signal, the test result is "Failed".

- <Video format>
  See also Chapter 10.4.3, "Video Codes", on page 353.

Remote command:
CONFigure<hw>:HDGenerator:CTS:VFORmat on page 779

<CDF sink parameters> ← 8-16 Acceptance of All Valid Packet Types ← CTS Configuration dialog
Set the following CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT:

- "CDF Sink Supports AI"
- "CDF Sink xvYCC"

Remote command:
CONFigure<hw>:HDGenerator:CTS:CDFSink on page 774

8-17 Basic Format Support Requirements ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Contains no parameters to configure.

8-18 HDMI Format Support Requirements ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

<CDF sink parameters> ← 8-18 HDMI Format Support Requirements ← CTS Configuration dialog
Set the following CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT:

- "CDF Sink 60 Hz"
- "CDF Sink 50 Hz"
- "CDF Sink HDTV"
- "CDF Sink 720p60 Other"
- "CDF Sink 1080i60 Other"
- "CDF Sink 720p50 Other"
- "CDF Sink 1080i50 Other"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CDFSink` on page 774

8-19 Pixel Encoding Requirements ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-19 Pixel Encoding Requirements ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Encoding ← 8-19 Pixel Encoding Requirements ← CTS Configuration dialog
Sets the color format and the chroma sampling that is used for the selected test.

- "RGB"
- "YCbCr 4:2:2"
- "YCbCr 4:4:4"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:PIXelencode` on page 777

8-20 Video Format Timing ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-20 Video Format Timing ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Clock Frequency ← 8-20 Video Format Timing ← CTS Configuration dialog
Sets the pixel clock frequency that is used for the selected test in accordance with the tolerances defined in the CEA-861-D specification.

- "Standard"
- "Minimum"
- "Maximum"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:PCLock:FREQuency` on page 776

8-21 Audio Clock Regeneration ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-21 Audio Clock Regeneration ← CTS Configuration dialog
See "Video Format" on page 269.

N Value ← 8-21 Audio Clock Regeneration ← CTS Configuration dialog
Sets the value of numerator N.
- "Minimum"
- "Maximum"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:NVALue` on page 776

8-22 Audio Sample Packet Jitter ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-22 Audio Sample Packet Jitter ← CTS Configuration dialog
See "Video Format" on page 269.

8-23 Audio Formats ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-23 Audio Formats ← CTS Configuration dialog
See "Video Format" on page 269.

Audio Format ← 8-23 Audio Formats ← CTS Configuration dialog
Sets the PCM sampling frequency that is used for the selected test.
- "PCM 2 Channels 32 kHz"
- "PCM 2 Channels 44.1 kHz"
- "PCM 2 Channels 48 kHz"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:AFORmat` on page 773

8-24 Interoperability with DVI ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-24 Interoperability with DVI ← CTS Configuration dialog
See "Video Format" on page 269.

8-25 Deep Color ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-25 Deep Color ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Encoding ← 8-25 Deep Color ← CTS Configuration dialog
See "Pixel Encoding" on page 270.

Color Depth ← 8-25 Deep Color ← CTS Configuration dialog
Sets the color depth that is used for the selected test.
- "10 bit"
- "12 bit"
- "16 bit"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CDEPth` on page 774

8-27 High Bitrate Audio ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-27 High Bitrate Audio ← CTS Configuration dialog
See "Video Format" on page 269.

Audio Format ← 8-27 High Bitrate Audio ← CTS Configuration dialog
Sets the audio format that is applied to the test.
- "Dolby TrueHD"
- "DTS-HD Master Audio"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:AFORmat` on page 773

8-28 One Bit Audio ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-28 One Bit Audio ← CTS Configuration dialog
See "Video Format" on page 269.

8-29 3D: Video Format Timing ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-29 3D: Video Format Timing ← CTS Configuration dialog
See "Video Format" on page 269.

3D Format ← 8-29 3D: Video Format Timing ← CTS Configuration dialog
Sets the 3D format that is used for the selected test.
- "Frame Packing"
- "Top-and-Bottom"
- "Side-by-Side (Half)"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:VFORmat:HDEXtension` on page 779

Pixel Clock Frequency ← 8-29 3D: Video Format Timing ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

8-30 4K x 2K Video Format Timing ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-30 4K x 2K Video Format Timing ← CTS Configuration dialog
Presets the video format. If this setting does not match the actual video format of the input signal, the test result is "Failed".

- "4Kx2Kp @ 30Hz"
- "4Kx2Kp @ 25Hz"
- "4Kx2Kp @ 24Hz"
- "4Kx2Kp @ 24Hz (SMPTE)"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:VFORmat:UHD` on page 780

Pixel Clock Frequency ← 8-30 4K x 2K Video Format Timing ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

8-31 AVI InfoFrame ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← 8-31 AVI InfoFrame ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Encoding ← 8-31 AVI InfoFrame ← CTS Configuration dialog
See "Pixel Encoding" on page 270.

ITC ← 8-31 AVI InfoFrame ← CTS Configuration dialog
Sets the value of the IT content field of the AVI InfoFrame.

- "Graphics"
- "Photo"
- "Cinema"
- "Game"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:ITC` on page 775

Extended Colorimetry ← 8-31 AVI InfoFrame ← CTS Configuration dialog
Sets the extended colorimetry field of the AVI InfoFrame.

- "Adobe RGB"
- "sYCC601"
- "Adobe YCC601"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CEXTended` on page 775

HF2-5 6G - Scrambling ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Video Format ← HF2-5 6G - Scrambling ← CTS Configuration dialog
See "Video Format" on page 269.

HF2-6 6G - 2160p 24-bit Color Depth ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Test Configuration ← HF2-6 6G - 2160p 24-bit Color Depth ← CTS Configuration dialog
Configures a test in accordance with the CTS. Follow the CTS and the R&S MOI (method of implementation) of this test for detailed information.

- "Read EDID"
- "Video Transmission"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:TCONfig` on page 778

Video Format ← HF2-6 6G - 2160p 24-bit Color Depth ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Clock Frequency ← HF2-6 6G - 2160p 24-bit Color Depth ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

HF2-7 6G - 2160p Deep Color ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Test Configuration ← HF2-7 6G - 2160p Deep Color ← CTS Configuration dialog
See "Test Configuration" on page 274.

Video Format ← HF2-7 6G - 2160p Deep Color ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Clock Frequency ← HF2-7 6G - 2160p Deep Color ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

Pixel Encoding ← HF2-7 6G - 2160p Deep Color ← CTS Configuration dialog
See "Pixel Encoding" on page 270.

Color Depth ← HF2-7 6G - 2160p Deep Color ← CTS Configuration dialog
See "Color Depth" on page 272.

HF2-8 6G - 2160p 3D ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Test Configuration ← HF2-8 6G - 2160p 3D ← CTS Configuration dialog
See "Test Configuration" on page 274.

Video Format ← HF2-8 6G - 2160p 3D ← CTS Configuration dialog
See "Video Format" on page 269.

3D Format ← HF2-8 6G - 2160p 3D ← CTS Configuration dialog
See "3D Format" on page 272.

Pixel Clock Frequency ← HF2-8 6G - 2160p 3D ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

HF2-9 Sink TMDS Prot. - Scrambling ≤ 340 Mcsc ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Video Format ← HF2-9 Sink TMDS Prot. - Scrambling ≤ 340 Mcsc ← CTS Configuration dialog
See "Video Format" on page 269.

Scrambling ← HF2-9 Sink TMDS Prot. - Scrambling ≤ 340 Mcsc ← CTS Configuration dialog
Sets the Scrambling_Enable bit in the SCDC configuration of the attached sink DUT.
- "On"
- "Off"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:SCRambling` on page 777

HF2-10 6G - HF-VSDB ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Contains no parameters to configure.

HF2-23 Sink Pixel Decoding - YCbCr 4:2:0 ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Test Configuration ← HF2-23 Sink Pixel Decoding - YCbCr 4:2:0 ← CTS Configuration dialog
See "Test Configuration" on page 274.

Video Format ← HF2-23 Sink Pixel Decoding - YCbCr 4:2:0 ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Clock Frequency ← HF2-23 Sink Pixel Decoding - YCbCr 4:2:0 ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

HF2-24 YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Test Configuration ← HF2-24 YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
See "Test Configuration" on page 274.

Video Format ← HF2-24 YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
See "Video Format" on page 269.

Color Depth ← HF2-24 YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
See "Color Depth" on page 272.

HF2-25 Sink Video Timing - 21:9 (64:27) ← CTS Configuration dialog
Available for all "Suitable output modules" on page 265.

Test Configuration ← HF2-25 Sink Video Timing - 21:9 (64:27) ← CTS Configuration dialog
See "Test Configuration" on page 274.

Video Format ← HF2-25 Sink Video Timing - 21:9 (64:27) ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Clock Frequency ← HF2-25 Sink Video Timing - 21:9 (64:27) ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

HF2-26 Video Format Declaration ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

<CDF sink parameters> ← HF2-26 Video Format Declaration ← CTS Configuration dialog
Set the following CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT:
- "CDF Sink_Video_Formats_21by9"
- "CDF Sink_Above_340"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CDFSink` on page 774

HF2-31 Sink EDID - YCbCr 4:2:0 - Data Blocks ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Contains no parameters to configure.

HF2-32 YCbCr 4:2:0 BT.2020 - Data Block ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

<CDF sink parameters> ← HF2-32 YCbCr 4:2:0 BT.2020 - Data Block ← CTS Configuration dialog
Set the following CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT:
- "CDF Sink_HDMI_YCBCR_420_BT2020_YCC"
- "CDF Sink_HDMI_YCBCR_420_BT2020_cYCC"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CDFSink` on page 774

HF2-35 YCbCr 4:2:0 Deep Color HF-VSDB ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

<CDF sink parameters> ← HF2-35 YCbCr 4:2:0 Deep Color HF-VSDB ← CTS Configuration dialog
Set the following CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT:
- "CDF Sink_HDMI_YCBCR_420_DC10"
- "CDF Sink_HDMI_YCBCR_420_DC12"
- "CDF Sink_HDMI_YCBCR_420_DC16"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CDFSink` on page 774

HF2-36 6G - Non-2160p 24-bit Color Depth ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Video Format ← HF2-36 6G - Non-2160p 24-bit Color Depth ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Clock Frequency ← HF2-36 6G - Non-2160p 24-bit Color Depth ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

HF2-37 6G - Non-2160p Deep Color ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Test Configuration ← HF2-37 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Test Configuration" on page 274.

Video Format ← HF2-37 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Video Format" on page 269.

Pixel Clock Frequency ← HF2-37 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

Pixel Encoding ← HF2-37 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Pixel Encoding" on page 270.

Color Depth ← HF2-37 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Color Depth" on page 272.

HF2-38 6G - Non-2160p 3D ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Video Format ← HF2-38 6G - Non-2160p 3D ← CTS Configuration dialog
See "Video Format" on page 269.

3D Format ← HF2-38 6G - Non-2160p 3D ← CTS Configuration dialog
See "3D Format" on page 272.

Pixel Clock Frequency ← HF2-38 6G - Non-2160p 3D ← CTS Configuration dialog
See "Pixel Clock Frequency" on page 270.

HF2-39 3D and Multistream Audio Data Blocks ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

<CDF sink parameters> ← HF2-39 3D and Multistream Audio Data Blocks ← CTS Configuration dialog
Set the following CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT:
- "CDF Sink_MS_Audio"
- "CDF Sink_One_Bit_MS_Audio"
- "CDF Sink_MS_Audio_Mixed"
- "CDF Sink_3D_Audio"
- "CDF Sink_One_Bit_3D_Audio"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CDFSink` on page 774

HF2-41 HDMI-VSDBs Independent View ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

Contains no parameters to configure.

HF2-53 HF-VSDB ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218 is as output.

<CDF sink parameters> ← HF2-53 HF-VSDB ← CTS Configuration dialog
Set the following CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT:
- "CDF Sink_HDMI_YCBCR_420_DC10"

- "CDF Sink_HDMI_YCBCR_420_DC12"
- "CDF Sink_HDMI_YCBCR_420_DC16"
- "CDF Sink_OSD_Disparity"
- "CDF Sink_DualView"
- "CDF Sink_IndepView"
- "CDF Sink_SCDC"
- "CDF Sink_SCDC_Read_Request"
- "CDF Sink_Above_340"
- "CDF Sink_LTE_340Mcsc_Scrambling"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CDFSink` on page 774

HF2-54 HDR Static Metadata Data Block ← CTS Configuration dialog
Only available if "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219 or "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218 is as output.

Video Format ← HF2-54 HDR Static Metadata Data Block ← CTS Configuration dialog
See "Video Format" on page 269.

Test Configuration ← HF2-54 HDR Static Metadata Data Block ← CTS Configuration dialog
See "Test Configuration" on page 274.

<CDF sink parameters> ← HF2-54 HDR Static Metadata Data Block ← CTS Configuration dialog
Set the following CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT:

- "CDF Sink HDR Traditional SDR"
- "CDF Sink HDR Traditional HDR"
- "CDF Sink HDR SMPTE ST 2084"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:CDFSink` on page 774

Signal ← HF2-54 HDR Static Metadata Data Block ← CTS Configuration dialog
Only available if "Video Transmission" is set under "Test Configuration" on page 274.

Sets the electro-optical transfer function.

- "Traditional SDR"
- "Traditional HDR"
- "SMPTE ST 2084"

Remote command:
`CONFigure<hw>:HDGenerator:CTS:SIGNal` on page 778

Save button
Opens the "File" dialog to save the test output. See Chapter 5.3, "File Dialog", on page 89.

Remote command:
`MMEMory<hw>:HDGenerator:CTS:REPort:STORe` on page 853

<Status display>
Displays the current status, e.g. "Loading", "Ready".

Remote command:
`READ<hw>:HDGenerator:CTS:CONTrol:STATe?` on page 855
`READ<hw>:HDGenerator:CTS:CONTrol:PROGress?` on page 854

Stop button
Stops a running test. Only available if a test is running.

Remote command:
`ABORt<hw>:HDGenerator:CTS` on page 768

Start button
Starts a test. Only available if no test is running.

If an HDMI signal file is not available, an error message is displayed. If you use the HDMI CTS RX/TX 600 MHz module (R&S VT-B2362), make sure that the library delivered with this option is installed. Several test cases are provided by this library.

Remote command:
`INITiate<hw>:HDGenerator:CTS` on page 852

10.1.9 CEC Subtab

Only available if "Tx 300 MHz" is set under "Module (default favorite)" on page 217.

Requires additional, module-dependant options, see also the data sheet:

- CEC tracer option (R&S VT-K2366) for the R&S VT-B360/2362 modules
- CEC CTS test (R&S VT-K2392) for the R&S VT-B2363 module

Used to send commands to an HDMI sink device or to receive such commands from an HDMI sink device.

The R&S VTE itself participates in the CEC communication. Depending on the mode, the R&S VTE listens to all CEC traffic or only to the CEC traffic dedicated to its logical address. Each received command or reply from the DUT is listed in the left pane, the output pane. You can also configure and send commands from the R&S VTE to the DUT. These outgoing commands are also listed in the output pane.

Remote commands to query results

`READ<hw>:HDGenerator:CEC:REPort:COUNt?` on page 854

`READ<hw>:HDGenerator:CEC:REPort?` on page 853

Output
Sets one of the 4 HDMI outputs of the HDMI TX 300 MHz module (R&S VT-B360). Select the output port that is connected to the DUT.

Remote command:
`CONFigure<hw>:HDGenerator:CEC:OUTPut` on page 771

Logical Address
Sets the logical address of the R&S VTE.

Remote command:
`CONFigure<hw>:HDGenerator:CEC:LADDress` on page 770

Destination
Sets the logical address of the DUT that receives the CEC messages sent by the R&S VTE.

Remote command:
`CONFigure<hw>:HDGenerator:CEC:DESTination` on page 769

Opcode and Parameters
Displays the selected operation code (opcode) of the CEC command that is sent by the R&S VTE. Depending on the selected opcode, the input of additional parameters in hexadecimal format is required.

Tap this button to select another opcode in the "CEC Opcodes" dialog. The available opcodes are listed in Chapter 10.4.4, "CEC Communication", on page 364.

Remote command:
`CONFigure<hw>:HDGenerator:CEC:OPCode` on page 770
`CONFigure<hw>:HDGenerator:CEC:OPCode:PARam:LENGth` on page 771
`CONFigure<hw>:HDGenerator:CEC:OPCode:PARam` on page 770

Save button
Saves the protocol trace in a file.

Remote command:
`MMEMory<hw>:HDGenerator:CEC:DATA:STORe` on page 852

Send button
Sends a command with the selected opcode and parameters. Only available if the protocol trace has been started ("Start button" on page 282).

Remote command:
`CONFigure<hw>:HDGenerator:CEC:COMMand:SEND` on page 769

Stop button
Stops the protocol trace. Use the scroll bar to navigate in the recorded trace.

Remote command:
`ABORt<hw>:HDGenerator:CEC` on page 768

Start button
Starts the protocol trace and performs a device discovery. All content in the output pane is cleared, and the incoming commands from the DUT are listed in the output pane.

Remote command:
`INITiate<hw>:HDGenerator:CEC` on page 851

10.2 HDMI Analyzer Application

Requires the following options:

- Suitable module as described in the data sheet, see also "Input" on page 287
- Additional options for CTS tests, see Chapter 10.2.8, "CTS Subtab", on page 301
- Additional options for CEC tracer test, see Chapter 10.2.9, "CEC Subtab", on page 331

The HDMI analyzer application displays the relevant protocol parameters.

- Pixel clock and video timing parameters in line with CEA-861E
- Audio data
- High-bandwidth digital content protection (HDCP) status
- Auxiliary video information InfoFrame (AVI InfoFrame), audio InfoFrame, source product description (SPD) InfoFrame, and MPEG InfoFrame

The HDMI analyzer application measures in real-time.

10.2.1 Main Dialog of the Application

The parameters are grouped on tabs. If a measured parameter is displayed in red color, the value does not meet the requirements of the HDMI specification.

Default favorites

Parameters that are often needed are provided as default favorites below the tab title. The default favorites of the application itself are also available on one of the subtabs.

- "Video Code" on page 286
- "Pixel Clock" on page 286
- "TMDS Char. Clk." on page 286
- "Input" on page 287
- "Standard (default favorite)" on page 283

Common remote command

`DISPlay<hw>:HDMI:SELect:TAB` on page 893

Standard (default favorite)

Sets the HDMI standard.

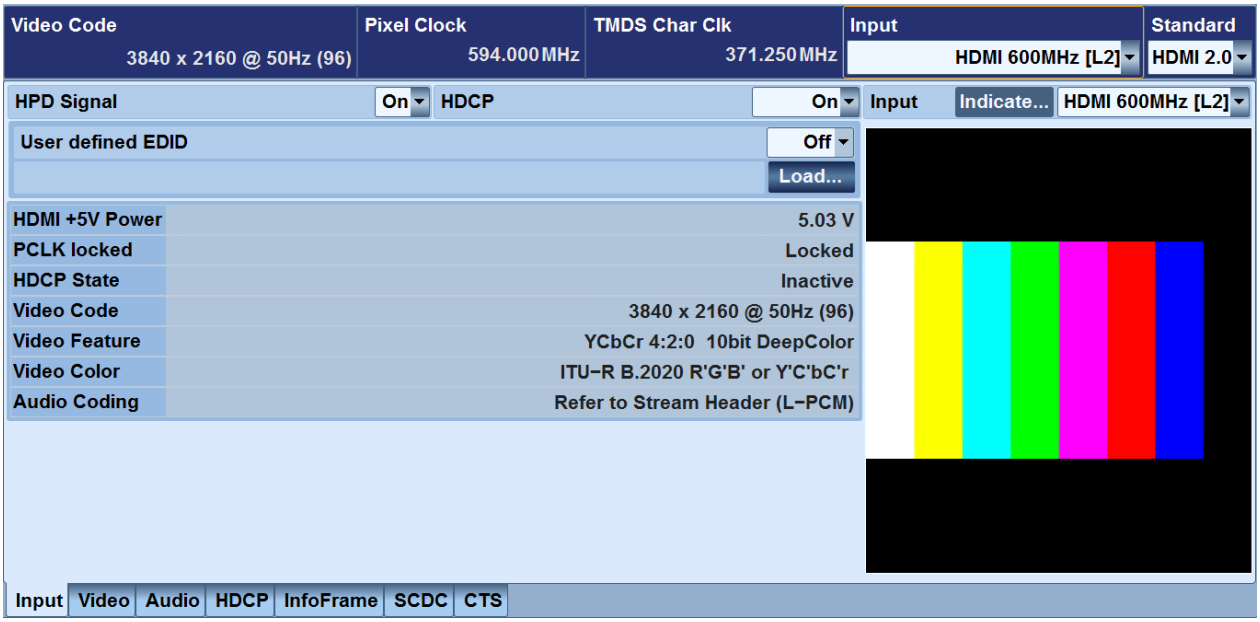
- "HDMI 1.4"
- "HDMI 2.0"

Remote command:

`ROUTe<hw>:HDMI:ISELect:VERSion` on page 960

10.2.2 Input Subtab

Displays the input parameters and the present video signal. To enlarge the thumbnail picture to full-screen size, tap the picture.



HPD Signal

Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Sets the hotplug detect (HPD) signal.

- "On"
  Enables "Hotplug Detect".
- "Off"
  Disables "Hotplug Detect".

Remote command:
`CONFigure<hw>:HDMI:INPut:HPDSignal` on page 893

HDCP (HDMI TX 300 MHz module)

Only available if "HDMI [<module slot>]" is set under "Input" on page 287.

Enables or disables the HDCP encryption.

- "On"

If the source sends a signal with HDCP, the R&S VTE uses HDCP.
- "Off"
  R&S VTE does not use HDCP.

Remote command:
CONFigure<hw>:HDMI:INPut:HDCP on page 892

HDCP (HDMI RX/TX 600 MHz module)
Only available if "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Enables or disables the HDCP encryption, and sets the HDCP version.
- "On"
  Automatic mode, the HDCP encryption version depends on the input signal.
- "HDCP 1.4"
- "HDCP 2.2"
- "Off"

Remote command:
CONFigure<hw>:HDMI:INPut:HDCP on page 892

User Defined EDID
Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Changes the EDID settings.
- "Off"
  The R&S HDMI default EDID is active.
- "File"
  Uses a user-defined EDID. Opens the "File" dialog to load the binary file.
  If you want to load another file later, tap "Load".
- "Aux"
  Uses the EDID that is read at the AUX output. Imports the EDID capabilities of the device connected at the AUX output to the analyzer input.
  If you want to save this EDID as a binary file for later use, tap "Save".

Remote command:
CONFigure<hw>:HDMI:INPut:EDID:USER on page 892
MMEMory<hw>:HDMI:INPut:EDID:DATA:LOAD on page 896
MMEMory<hw>:HDMI:INPut:EDID:DATA:STORe on page 896

HDMI +5V Power
Displays the voltage detected at the HDMI input.

Remote command:
READ<hw>[:SCALar]:HDMI:INPut:VOLTage? on page 946
READ<hw>[:SCALar]:HDMI:INPut:HPOWer? on page 943

PCLK Locked
Displays if the R&S VTE has detected a valid HDMI input clock.

Remote command:
READ<hw>[:SCALar]:HDMI:INPut:PCLock:STATe? on page 944

HDCP State
Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays the HDCP status.

Remote command:
`READ<hw>[:SCALar]:HDMI:INPut:HDCP?` on page 942

TMDS Char. Clk.
Displays the TMDS character clock rate in MHz.

Remote command:
`READ<hw>[:SCALar]:HDMI:INPut:TMDSclock?` on page 944

Pixel Clock
Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays the pixel clock rate in MHz.

Remote command:
`READ<hw>[:SCALar]:HDMI:INPut:PCLock?` on page 943

Video Code
Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays the following information:
- "HDR"
  Transmission of dynamic range and mastering InfoFrame
- Video code derived from the AVI (auxiliary video information) InfoFrame

Remote command:
`READ<hw>[:SCALar]:HDMI:INPut:VCODe?` on page 944

Video Feature
Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays the following information:
- "RGB", "YCbCr 4:4:4", "YCbCr4:2:2" or "YCbCr 4:2:0"
  Video color coding
- "8bit", "10bit", "12bit" or "16bit"
  Number of bits per pixel
- "FullRange", "LimRange"
  Level range
- "Deep Color"
  HDMI deep color enabled

Remote command:
`READ<hw>[:SCALar]:HDMI:INPut:VFEature?` on page 945

Video Color
Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays the following information:
- "No Data", "SMPTE 170M/ITU601", "ITU709", "xvYCC 601", "xvYCC 709", "sYCC 601", "Adobe RGB", "ITU-R BT.2020 (5)", "ITU-R BT.2020 (6)"
  Colorimetry
- "SDR Luminance Processing", "HDR Luminance Processing", "SMPTE ST 2084" or "Future EOTF (HLG)"
  Electro optical transfer function for HDR transmission

Remote command:
`READ<hw>[:SCALar]:HDMI:INPut:VCOLor?` on page 945

Audio Coding
Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays the audio coding type derived from audio InfoFrame.

Remote command:
`READ<hw>[:SCALar]:HDMI:INPut:ACODe?` on page 942

Input
Sets the input that is used for HDMI analysis.

The available input list is hardware-dependent. It depends on the type and number of installed modules.
- "HDMI [<module slot>]"
  HDMI RX 225 MHz module (R&S VT-B2360) or HDMI RX 300 MHz module (R&S VT-B2361)
- "HDMI CTS [<module slot>]"
  HDMI CTS RX/TX 600 MHz module (R&S VT-B2362)
- "HDMI 600 MHz [<module slot>]"
  HDMI RX/TX 600 MHz module (R&S VT-B2363)
  This module also requires the HDMI RX option (R&S VT-K2364).

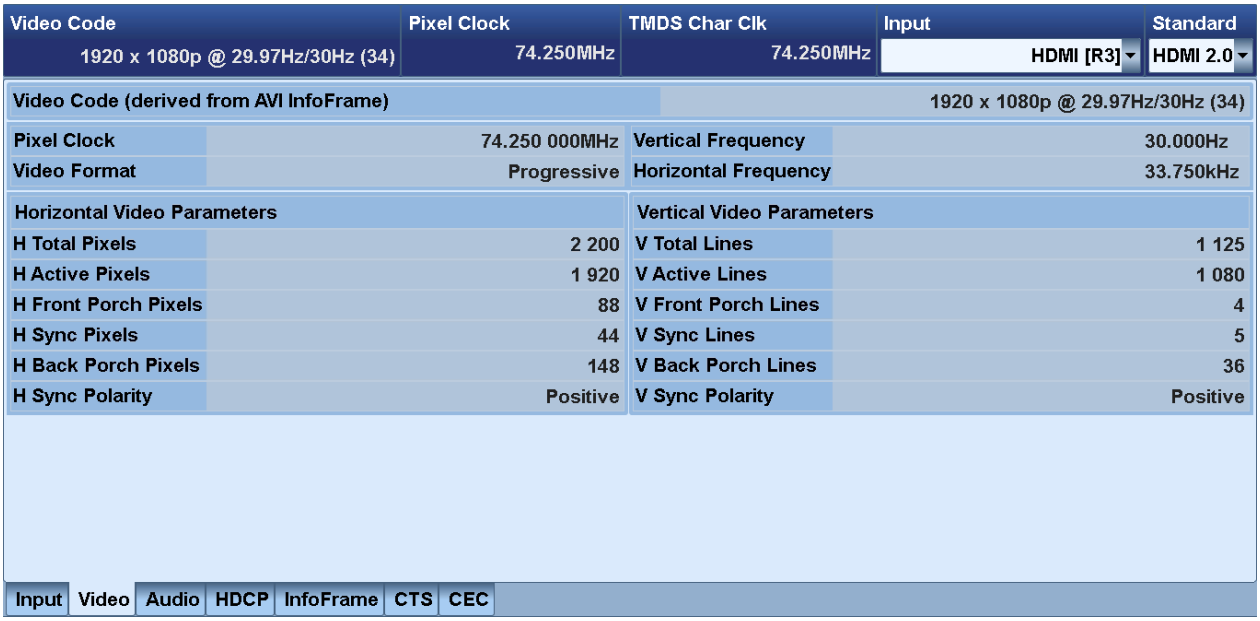
Note: To indicate the input at your R&S VTE, tap "Indicate".
A flashing LED indicates the input until you tap "OK".

Remote command:
`ROUTe<hw>:HDMI:MODule:CATalog?` on page 960
`ROUTe<hw>:HDMI:MODule:SELect` on page 961

10.2.3 Video Subtab

Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays all video related measurement values.



Video Code
Displays the video code derived from the AVI InfoFrame.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VCODe?` on page 956

Pixel Clock
Displays the measured pixel clock of the HDMI input signal.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:PCLock?` on page 956

Video Format
Displays the video format of the HDMI video content.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VFORmat?` on page 956

Vertical Frequency
Displays the measured vertical frequency of the HDMI video content.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VFRequency?` on page 957

Horizontal Frequency
Displays the measured horizontal frequency of the HDMI video content.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:HFRequency?` on page 953

Horizontal Video Parameters
Groups the measured horizontal video parameters of the HDMI video content.

H Total Pixels ← Horizontal Video Parameters
Displays the number of horizontal total pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:TOTal?` on page 955

H Active Pixels ← Horizontal Video Parameters
Displays the number of horizontal active pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:ACTive?` on page 954

H Front Porch Pixels ← Horizontal Video Parameters
Displays the number of horizontal front porch pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:FPORch?` on page 954

H Sync Pixels ← Horizontal Video Parameters
Displays the number of horizontal synchronization pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:SYNC?` on page 955

H Back Porch Pixels ← Horizontal Video Parameters
Displays the number of horizontal back porch pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:BPORch?` on page 954

H Sync Polarity ← Horizontal Video Parameters
Displays horizontal synchronization polarity.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:SYNC:POLarity?` on page 955

Vertical Video Parameters
Groups the measured vertical video parameters of the HDMI video content.

V Total Lines ← Vertical Video Parameters
Displays the number of vertical total pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:TOTal?` on page 959

V Active Lines ← Vertical Video Parameters
Displays the number of vertical active pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:ACTive?` on page 957

V Front Porch Lines ← Vertical Video Parameters
Displays the number of vertical front porch pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:FPORch?` on page 958

V Sync Lines ← Vertical Video Parameters
Displays the number of vertical synchronization pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:SYNC?` on page 958

V Back Porch Lines ← Vertical Video Parameters
Displays the number of vertical back porch pixels.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:BPORch?` on page 958

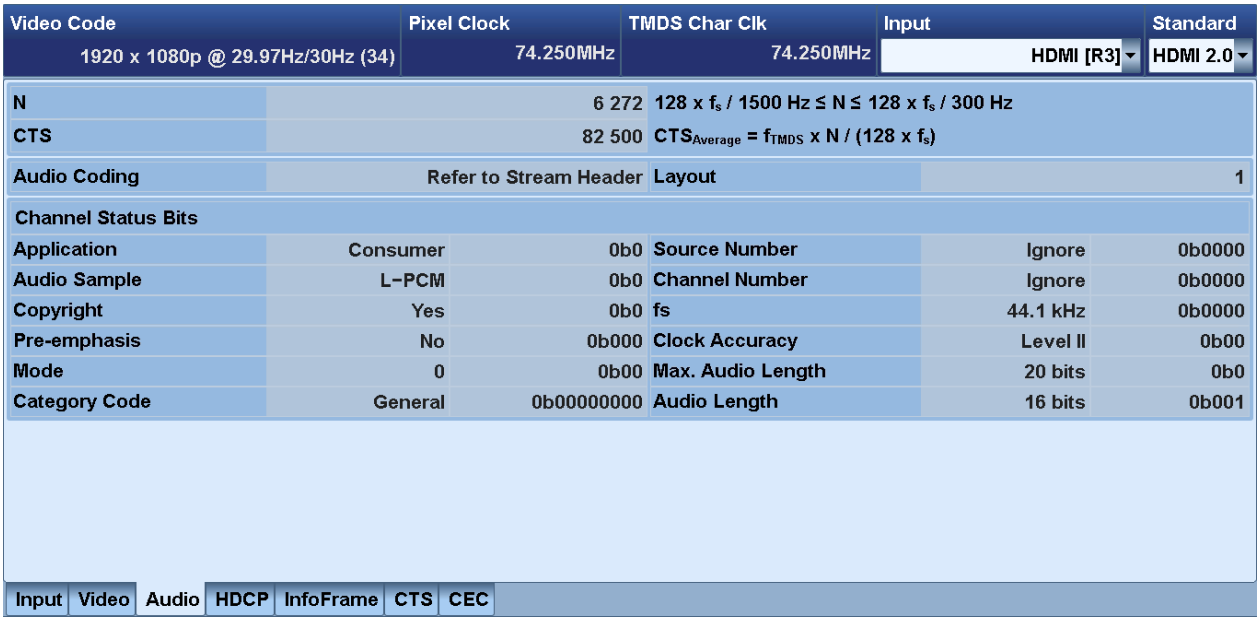
V Sync Polarity ← Vertical Video Parameters
Displays the vertical synchronization polarity.

Remote command:
`READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:SYNC:POLarity?` on page 959

10.2.4 Audio Subtab

Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays all audio related measurement values.



N

Displays the N value derived from the audio clock regeneration packet.

Next to it on the right, the formula for calculation is displayed.

Remote command:

`READ<hw>[:SCALar]:HDMI:AUDio:N?` on page 902

CTS

Displays the cycle timestamp value derived from the audio clock regeneration packet.

Next to it on the right, the formula for calculation is displayed.

Remote command:

`READ<hw>[:SCALar]:HDMI:AUDio:CTS?` on page 900

Audio Coding
Displays the audio coding type derived from the audio InfoFrame.

Remote command:
`READ<hw>[:SCALar]:HDMI:AUDio:ACODe?` on page 898

Layout
Displays the layout value derived from the audio sample packet.

Remote command:
`READ<hw>[:SCALar]:HDMI:AUDio:LAYout?` on page 900

Channel Status Bits
Groups the content of the channel status bits derived from the audio sample packets. The left column displays the binary value as present in the signal, the right column displays an interpretation.

Application ← Channel Status Bits
Displays the application.

Remote command:
`READ<hw>[:SCALar]:HDMI:AUDio:APPLication?` on page 898

Audio Sample ← Channel Status Bits
Displays the audio samples.

Remote command:
`READ<hw>[:SCALar]:HDMI:AUDio:SAMPles?` on page 904

Copyright ← Channel Status Bits
Displays the copyright.

Remote command:
`READ<hw>[:SCALar]:HDMI:AUDio:COPYright?` on page 899

Pre-emphasis ← Channel Status Bits
Displays the pre-emphasis.

Remote command:
`READ<hw>[:SCALar]:HDMI:AUDio:PREemphasis?` on page 903

Mode ← Channel Status Bits
Displays the mode.

Remote command:
`READ<hw>[:SCALar]:HDMI:AUDio:MODE?` on page 902

Category Code ← Channel Status Bits
Displays category code.

Remote command:
`READ<hw>[:SCALar]:HDMI:AUDio:CATegory?` on page 899

Source Number ← Channel Status Bits
Displays the source number.

Remote command:
READ<hw>[:SCALar]:HDMI:AUDio:NSOurce? on page 903

Channel Number ← Channel Status Bits
Displays the channel number.

Remote command:
READ<hw>[:SCALar]:HDMI:AUDio:NCHannel? on page 902

fs ← Channel Status Bits
Displays the f_s value.

Remote command:
READ<hw>[:SCALar]:HDMI:AUDio:FS? on page 900

Clock Accuracy ← Channel Status Bits
Displays the clock accuracy.

Remote command:
READ<hw>[:SCALar]:HDMI:AUDio:CACCuracy? on page 898

Max. Audio Length ← Channel Status Bits
Displays the maximum audio length.

Remote command:
READ<hw>[:SCALar]:HDMI:AUDio:LENGth:MAX? on page 901

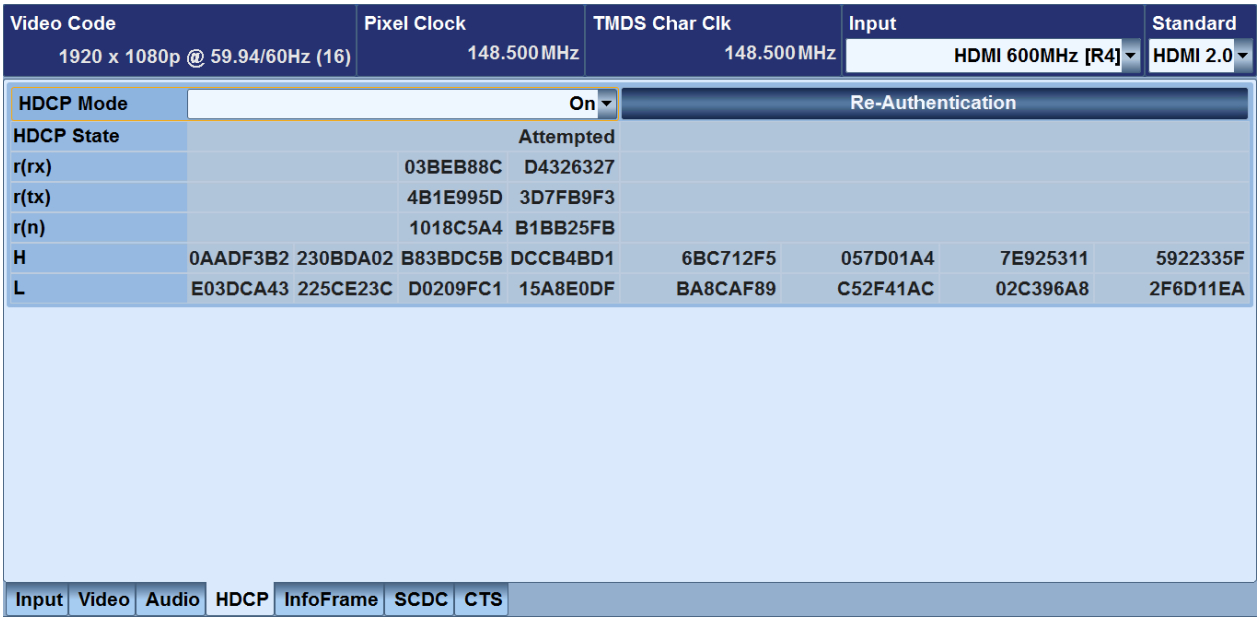
Audio Length ← Channel Status Bits
Displays the audio length.

Remote command:
READ<hw>[:SCALar]:HDMI:AUDio:LENGth? on page 901

10.2.5 HDCP Subtab

Only available if "HDMI [<module slot>]" (HDCP 1.4 only) or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays all measurement values related to high-bandwidth digital content protection (HDCP).



HDCP Mode
See "HDCP (HDMI RX/TX 600 MHz module)" on page 285 and "HDCP (HDMI RX/TX 600 MHz module)" on page 285.

HDCP State
Displays if an HDCP content protection is active.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:AUTHentic?` on page 908

Re-Authentication button
Clears the current R_i' value to reauthenticate the source.

<HDCP version 1.4 parameters>
Only available if:
- Input signal complies with HDCP version 1.4, see "HDCP Mode" on page 294.

- "On" is set under "HDCP (HDMI TX 300 MHz module)" on page 284

AKSV ← <HDCP version 1.4 parameters>
Displays the key selection vector of the transmitter.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:AKSV?` on page 907

BKSV ← <HDCP version 1.4 parameters>
Displays the key selection vector of the receiver.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:BKSV?` on page 908

Ri' ← <HDCP version 1.4 parameters>
Displays the current link synchronization verification values.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:RI?` on page 909

An ← <HDCP version 1.4 parameters>
Displays the session random number.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:AN?` on page 907

<HDCP version 2.2 parameters>
Only available if:
- "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287
- Input signal complies with HDCP version 2.2, see "HDCP Mode" on page 294.
- "On" is set under "HDCP (HDMI TX 300 MHz module)" on page 284

r(rx) ← <HDCP version 2.2 parameters>
Displays the pseudo-random value of the authentication protocol.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:RRX?` on page 910

r(tx) ← <HDCP version 2.2 parameters>
Displays the pseudo-random value of the authentication protocol.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:RTX?` on page 910

r(n) ← <HDCP version 2.2 parameters>
Displays the pseudo-random value of the locality check.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:RN?` on page 910

H ← <HDCP version 2.2 parameters>
Displays the hash value calculated by the receiver of the authentication protocol.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:H?` on page 908

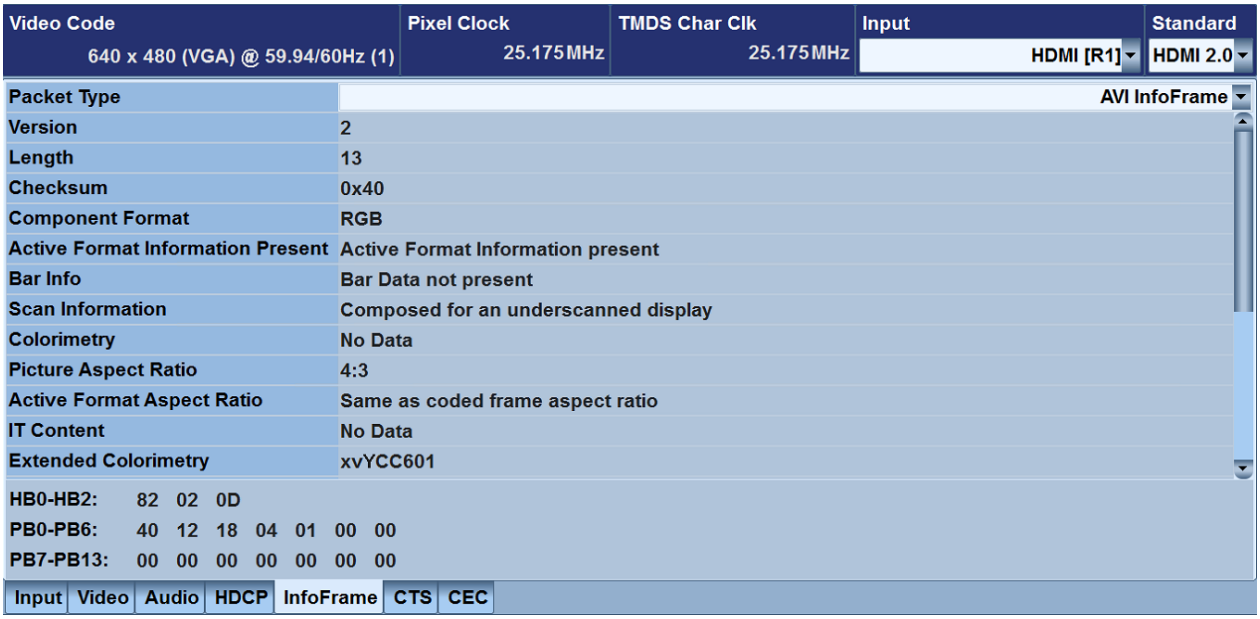
L ← <HDCP version 2.2 parameters>
Displays the locality check hash value calculated by the receiver of the locality check.

Remote command:
`READ<hw>[:SCALar]:HDMI:HDCP:L?` on page 909

10.2.6 InfoFrame Subtab

Only available if "HDMI [<module slot>]" or "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

Displays all InfoFrame-related information. The content depends on the selection under "Packet Type" on page 296.



Packet Type
Sets the InfoFrame packet filter to one of the following InfoFrames. All other parameters that are displayed relate information about this InfoFrame.

- "AVI InfoFrame"
- "Audio InfoFrame"
- "SPD InfoFrame"
- "MPEG InfoFrame"
- "HDMI Vendor Specific InfoFrame"
- "HDMI Forum Vendor Specific InfoFrame"

- "Dynamic Range and Mastering InfoFrame"
  Only available if "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

<AVI InfoFrame parameters>
Only available if "AVI InfoFrame" is set under "Packet Type" on page 296.

Remote command:
See Chapter 14.7.6.6, "READ<hw>[:SCALar]:HDMI:INFO:AVI Subsystem", on page 915.

<Audio InfoFrame parameters>
Only available if "Audio InfoFrame" is set under "Packet Type" on page 296.

Remote command:
See Chapter 14.7.6.5, "READ<hw>[:SCALar]:HDMI:INFO:AUDio Subsystem", on page 911.

<SPD InfoFrame parameters>
Only available if "SPD InfoFrame" is set under "Packet Type" on page 296.

Remote command:
See Chapter 14.7.6.10, "READ<hw>[:SCALar]:HDMI:INFO:SPD Subsystem", on page 937.

<MPEG InfoFrame parameters>
Only available if "MPEG InfoFrame" is set under "Packet Type" on page 296.

Remote command:
See Chapter 14.7.6.9, "READ<hw>[:SCALar]:HDMI:INFO:MPEG Subsystem", on page 934.

<HDMI vendor-specific InfoFrame parameters>
Only available if "HDMI Vendor Specific InfoFrame" is set under "Packet Type" on page 296.

Remote command:
See Chapter 14.7.6.11, "READ<hw>[:SCALar]:HDMI:INFO:VENDor Subsystem", on page 939.

<HDMI forum vendor-specific InfoFrame parameters>
Only available if "HDMI Forum Vendor Specific InfoFrame" is set under "Packet Type" on page 296.

Remote command:
See Chapter 14.7.6.8, "READ<hw>[:SCALar]:HDMI:INFO:HFVendor Subsystem", on page 928.

<Dynamic range and mastering InfoFrame parameters>
Only available if:
- "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.
- "Dynamic Range and Mastering InfoFrame" is set under "Packet Type" on page 296.

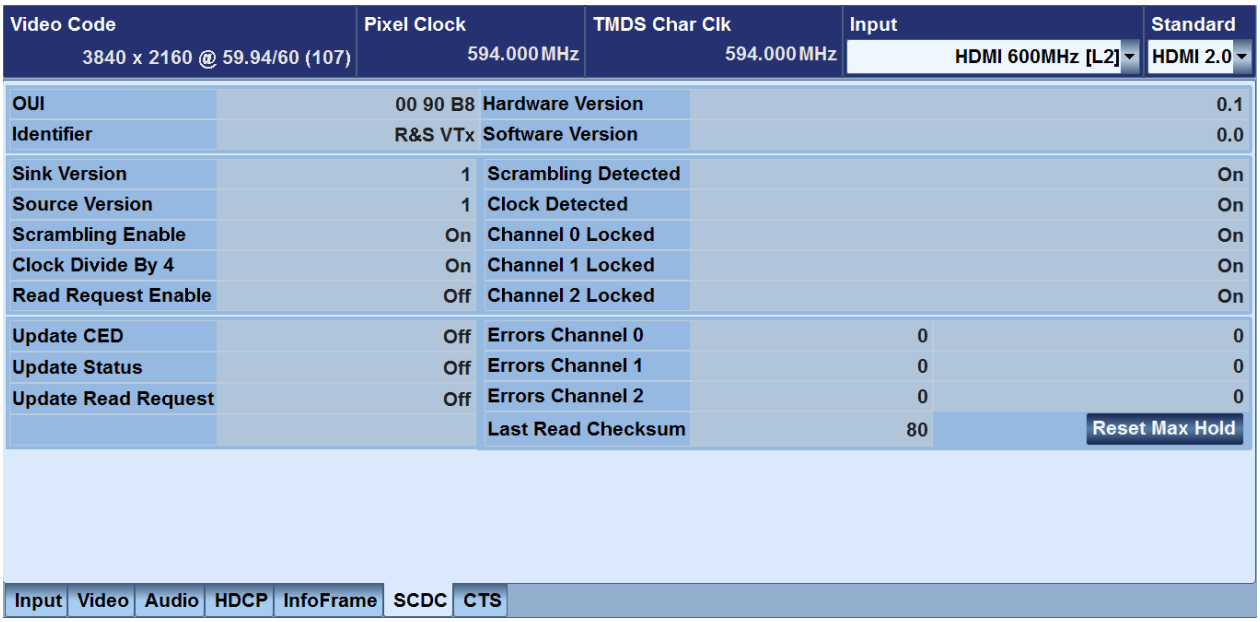
The HDR and colorimetry InfoFrame carries data identifying the characteristics of HDR stream, the EOTF and the static metadata associated with the HDR stream.

Remote command:
See Chapter 14.7.6.7, "READ<hw>[:SCALar]:HDMI:INFO:DRMI Subsystem", on page 922.

10.2.7 SCDC Subtab

Only available if "HDMI 600 MHz [<module slot>]" is set under "Input" on page 287.

The status and control data channel (SCDC) is a point-to-point communication protocol enabling data exchange between an HDMI source and an attached HDMI sink. It is required for the setup of the scrambling mode that is necessary for data rates above 3.4 Gbps per lane. See the high-definition multimedia interface specification, version 2.0.



Displays the SCDC reading on the chosen port. The content is updated every second.

<Manufacturer-specific registers set by the sink>
Displays the following information.

OUI ← <Manufacturer-specific registers set by the sink>
Organizationally unique identifier manufacturer

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:OUI?` on page 948

Identifier ← <Manufacturer-specific registers set by the sink>
Identifier of the R&S VTE

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:IDENtifier?` on page 947

Hardware Version ← <Manufacturer-specific registers set by the sink>
Hardware version of the connected sink

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:HWVersion?` on page 947

Software Version ← <Manufacturer-specific registers set by the sink>
Software version of the connected sink

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SWVersion?` on page 952

<Versions>
Displays version information.

Sink Version ← <Versions>
Sink software version; always set to "1" for R&S VTE.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SINKversion?` on page 951

Source Version ← <Versions>
Source software version; always set to "1" for R&S VTE.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SRCVersion?` on page 951

<TMDS configuration>
Displays configuration information.

Scrambling Enable ← <TMDS configuration>
Set by the source. "On" enables scrambling in the sink.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:ENABle?` on page 950

Clock Divide By 4 ← <TMDS configuration>
Set by the source. Enabled if *TMDS bit period* to *TMDS clock period* ratio is 1/40.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:CDIVide?` on page 947

Read Request Enable ← <TMDS configuration>
Enabled if the connected sink supports the SCDC read request feature.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:RRENable?` on page 948

<Update flags>
Not supported by the HDMI analyzer application. Only relevant if source and sink support these update flags.

Update CED ← <Update flags>
Enabled by the sink if any error counter value:
- Increments by more than 4 in 1 second.
- Reaches its maximum value.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:UPDate:CED?` on page 952

Update Status ← <Update flags>
Enabled by the sink if any clock status is changed.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:UPDate:STATe?` on page 952

Update Read Request ← <Update flags>
Enabled by the sink if a test read request is generated.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:UPDate:READreqest?` on page 952

<Scrambler status>
Displays status information.

Scrambling Detected ← <Scrambler status>
Enabled if the sink detects scrambled control.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:DETect?` on page 949

Clock Detected ← <Scrambler status>
Status flag. Enabled if the sink detects a valid clock signal.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:CLOCk?` on page 949

Channel 0 Locked, Channel 1 Locked, Channel 2 Locked ← <Scrambler status>
Status flags. Enabled if the sink is successfully decoding data.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:CHNull?` on page 949
`READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:CH<channel>?` on page 948

<Character error detection>
Optional setting, but supported by the HDMI analyzer application.

Provides a mechanism for the sink to report detected character errors. Allows checking the link quality.

Errors Channel 0, Errors Channel 1, Errors Channel 2 ← <Character error detection>
- <Value in left column>
  Number of character errors detected by the sink within the last second. The HDMI analyzer application accumulates all detected errors in the SCDC register. When

the source reads these values, the registers are reset. The register values of the accumulated character errors are not shown on the "SCDC" tab.

- <Value in right column>
  Highest value of detected character errors since:
  – HDMI connection was made.
  – Last manual reset of the character error counters using "Reset Max Hold button" on page 301.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:ERRNull?` on page 951
`READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:ERR<channel>?` on page 950

Last Read Checksum ← <Character error detection>
To check the correct transmission of the values of the character error counters, the sink calculates and provides a checksum when the source reads the counter values. If the specified checksum value is not updated while character errors are detected, it means that the source is not reading the error channel register.

Remote command:
`READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:ERRChecksum?` on page 950

Reset Max Hold button ← <Character error detection>
Resets the peak value of the detected character errors.

Remote command:
`CONFigure<hw>:HDMI:SCDC:SCRambling:RESet` on page 893

10.2.8 CTS Subtab

Requires additional, module-dependant options, see also the data sheet:

- HDMI CTS source test (R&S VT-K2365) for the R&S VT-B2360/2361/2362 modules
- HDMI 1.4 CTS source test (R&S VT-K2367) for the R&S VT-B2363 module
- HDMI 2.0 CTS source test (R&S VT-K2368) for the R&S VT-B2363 module

Executes source tests according to the compliance test specifications (CTS).

Divided into two panes. The left pane displays the compliance test results.

Suitable input modules

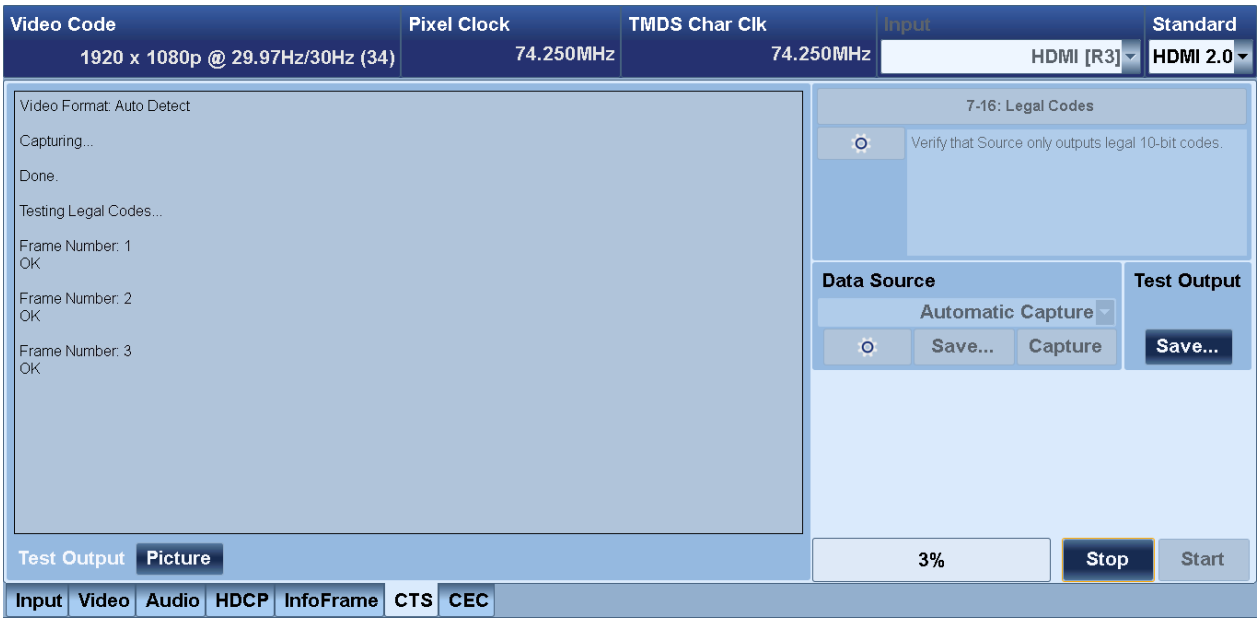
Depending on the TMDS character clock that a CTS source test ID requires, select the "Input" on page 287:

- < 340 MHz
  Select "HDMI [<module slot>]".
- > 340 MHz
  Select "HDMI CTS [<module slot>]" or "HDMI 600 MHz [<module slot>]".

Remote commands to query measurement results

`READ<hw>[:SCALar]:HDMI:CTS:REPort?` on page 906

READ<hw>[:SCALar]:HDMI:CTS:REPort:COUNt? on page 906



<Test case> button
Displays the selected test case.

Tap this button to select another test case, see "Test Case dialog" on page 307.

Tap ⚙ to configure the selected test, see "CTS Configuration dialog" on page 308.

Test Case dialog ← <Test case> button
Displays all test cases available for the selected input module (see Table 14-22).

Select the desired test case. If you select a new test case, the old test results are deleted.

Remote command:
CONFigure<hw>:HDMI:CTS:SELect on page 889

CTS Configuration dialog
In a tree view, displays all available test cases. Each test case has its own set of parameters. The parameters are subentries of the corresponding test case node. Open a test case to display and edit the parameters of this test case.

7-16: Legal Codes ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-16: Legal Codes ← CTS Configuration dialog
Sets the video format that is applied to the selected test.

- "Auto Detect"
  Automatic video format detection.
- <Video format>
  Presets the video format. The R&S VTE signals this video format as exclusively supported video format to the DUT.
  See also Chapter 10.4.3, "Video Codes", on page 353.

Remote command:
CONFigure<hw>:HDMI:CTS:VFORmat on page 890

Test Length ← 7-16: Legal Codes ← CTS Configuration dialog
Sets the length of the HDMI sequence for analysis.

- "Frames"
  Not available for all tests. Number of video frames that are analyzed, set under "Number of Frames" on page 308.
- "2 seconds"
  Two seconds of HDMI data are analyzed.

Remote command:
CONFigure<hw>:HDMI:CTS:TESTlength:MODE on page 889

Number of Frames ← 7-16: Legal Codes ← CTS Configuration dialog
Sets the number of video frames that are analyzed.

- "1" to "120"

Remote command:
CONFigure<hw>:HDMI:CTS:TESTlength:FRAMes on page 889

7-17: Basic Protocol ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-17: Basic Protocol ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← 7-17: Basic Protocol ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-17: Basic Protocol ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-18: Extended Control Period ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-18: Extended Control Period ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← 7-18: Extended Control Period ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-18: Extended Control Period ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-19: Packet Types ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-19: Packet Types ← CTS Configuration dialog
See "Video Format" on page 308.

Test Setup ← 7-19: Packet Types ← CTS Configuration dialog
Enables or disables the indication of ACP, ISRC1 and ISRC2 packets support in the EDID.
- "Supports AI = 0"
- "Supports AI = 1"

Remote command:
`CONFigure<hw>:HDMI:CTS:PTYPe:SETup` on page 888

Test Length ← 7-19: Packet Types ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-19: Packet Types ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-23: Pixel Encoding - RGB to RGB-only Sink ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-23: Pixel Encoding - RGB to RGB-only Sink ← CTS Configuration dialog
See "Video Format" on page 308.

Test Setup ← 7-23: Pixel Encoding - RGB to RGB-only Sink ← CTS Configuration dialog
Selects the CTS subtest.
- "Verify Pixel Encoding"
- "Verify Q and YQ in AVI IF"

Remote command:
`CONFigure<hw>:HDMI:CTS:PENCode:RGB:SETup` on page 887

CDF Setup ← 7-23: Pixel Encoding - RGB to RGB-only Sink ← CTS Configuration dialog
Sets whether the source supports the transmission of "AVI InfoFrames". Configure the test according to the DUT capabilities declared in the CDF form.
- "Source_AVI_Supported = Y"
- "Source_AVI_Supported = N"

Remote command:
`CONFigure<hw>:HDMI:CTS:PENCode:RGB:CDF` on page 887

Test Length ← 7-23: Pixel Encoding - RGB to RGB-only Sink ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-23: Pixel Encoding - RGB to RGB-only Sink ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-24: Pixel Encoding - YCbCr to YCbCr Sink ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-24: Pixel Encoding - YCbCr to YCbCr Sink ← CTS Configuration dialog
See "Video Format" on page 308.

Test Setup ← 7-24: Pixel Encoding - YCbCr to YCbCr Sink ← CTS Configuration dialog
Selects the CTS subtest.
- "Verify Pixel Encoding"
- "Verify Q and YQ in AVI IF"

Remote command:
`CONFigure<hw>:HDMI:CTS:PENCode:YCBCr:SETup` on page 888

CDF Setup ← 7-24: Pixel Encoding - YCbCr to YCbCr Sink ← CTS Configuration dialog
Sets whether the source supports the transmission of "AVI InfoFrames". Configure the test according to the DUT capabilities declared in the CDF form.
- "Source_AVI_Supported = Y"
- "Source_AVI_Supported = N"

Remote command:
`CONFigure<hw>:HDMI:CTS:PENCode:YCBCr:CDF` on page 887

Pixel Encoding ← 7-24: Pixel Encoding - YCbCr to YCbCr Sink ← CTS Configuration dialog
Sets the pixel encoding that is applied to this test.
- "YCbCr 4:2:2"
- "YCbCr 4:4:4"

Remote command:
`CONFigure<hw>:HDMI:CTS:PENCode:YCBCr:PENCode` on page 888

Test Length ← 7-24: Pixel Encoding - YCbCr to YCbCr Sink ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-24: Pixel Encoding - YCbCr to YCbCr Sink ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-25: Video Format Timing ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-25: Video Format Timing ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← 7-25: Video Format Timing ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-25: Video Format Timing ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-26: Pixel Repetition ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-26: Pixel Repetition ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← 7-26: Pixel Repetition ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-26: Pixel Repetition ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-27: AVI InfoFrame ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-27: AVI InfoFrame ← CTS Configuration dialog
See "Video Format" on page 308.

Content Type ← 7-27: AVI InfoFrame ← CTS Configuration dialog
- "Undefined"
- "Photo"
- "Cinema"
- "Game"

Remote command:
`CONFigure<hw>:HDMI:CTS:AVI:CTYPe` on page 881

Test Length ← 7-27: AVI InfoFrame ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-27: AVI InfoFrame ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-28: IEC 60958 / IEC 61937 ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Test Length ← 7-28: IEC 60958 / IEC 61937 ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-28: IEC 60958 / IEC 61937 ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-29: Audio Clock Regeneration ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Test Length ← 7-29: Audio Clock Regeneration ← CTS Configuration dialog
See "Test Length" on page 308.

7-30: Audio Sample Packet Jitter ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-30: Audio Sample Packet Jitter ← CTS Configuration dialog
See "Video Format" on page 308.

Sampling Frequency ← 7-30: Audio Sample Packet Jitter ← CTS Configuration dialog
Sets the audio sampling frequency that is applied to the test.

Remote command:
`CONFigure<hw>:HDMI:CTS:AUD:SAMPling:FREQuency` on page 880

Test Length ← 7-30: Audio Sample Packet Jitter ← CTS Configuration dialog
See "Test Length" on page 308.

7-31: Audio InfoFrame ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Test Length ← 7-31: Audio InfoFrame ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-31: Audio InfoFrame ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-32: Audio Sample Packet Layout ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Test Length ← 7-32: Audio Sample Packet Layout ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-32: Audio Sample Packet Layout ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-33: Interoperability with DVI ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

HDMI VSDB ← 7-33: Interoperability with DVI ← CTS Configuration dialog
Sets the length of the HDMI vendor-specific data block.

- "DVI"
  0
- "HDMI_VSDB_eq_5"
  5
- "HDMI_VSDB_gt_5"
  > 5

Remote command:
`CONFigure<hw>:HDMI:CTS:DVI:VSDB` on page 883

Test Length ← 7-33: Interoperability with DVI ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-33: Interoperability with DVI ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-33a: Interoperability with multiple VSDB ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-33a: Interoperability with multiple VSDB ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← 7-33a: Interoperability with multiple VSDB ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-33a: Interoperability with multiple VSDB ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-34: Deep Color ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-34: Deep Color ← CTS Configuration dialog
See "Video Format" on page 308.

Color Depth ← 7-34: Deep Color ← CTS Configuration dialog
Sets the color depth in bit.

Remote command:
`CONFigure<hw>:HDMI:CTS:CDEPth` on page 881

Test Length ← 7-34: Deep Color ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-34: Deep Color ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-35: Gamut Metadata Transmission ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-35: Gamut Metadata Transmission ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← 7-35: Gamut Metadata Transmission ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-35: Gamut Metadata Transmission ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-36: High-Bitrate Audio ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Test Length ← 7-36: High-Bitrate Audio ← CTS Configuration dialog
See "Test Length" on page 308.

7-37: One Bit Audio ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Test Length ← 7-37: One Bit Audio ← CTS Configuration dialog
See "Test Length" on page 308.

7-38: 3D Video Format Timing ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-38: 3D Video Format Timing ← CTS Configuration dialog
See "Video Format" on page 308.

3D Format ← 7-38: 3D Video Format Timing ← CTS Configuration dialog
Sets the 3D format that is used for the selected test.

- "Auto Detect"
- "Frame Packing"
- "Top-and-Bottom"
- "Side-by-Side"

Remote command:
`CONFigure<hw>:HDMI:CTS:VFORmat:HDEXtension` on page 891

HDMI VSDB ← 7-38: 3D Video Format Timing ← CTS Configuration dialog
Sets the length of the HDMI vendor-specific data block.

- "HDMI_VSDB_eq_5"

5
- "HDMI_VSDB_gt_5"
  > 5

Remote command:
`CONFigure<hw>:HDMI:CTS:DVI:VSDB` on page 883

Test Length ← 7-38: 3D Video Format Timing ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-38: 3D Video Format Timing ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-39: 4K x 2K Video Format Timing ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-39: 4K x 2K Video Format Timing ← CTS Configuration dialog
Sets the video format that is applied.
- "Auto Detect"
  Automatic video format detection.
- <4K video format>
  Presets the video format. The R&S VTE signals this video format as exclusively supported video format to the DUT.

Remote command:
`CONFigure<hw>:HDMI:CTS:VFORmat:FK` on page 890

Test Length ← 7-39: 4K x 2K Video Format Timing ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-39: 4K x 2K Video Format Timing ← CTS Configuration dialog
See "Number of Frames" on page 308.

7-40: Extended Colorimetry Transmission ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← 7-40: Extended Colorimetry Transmission ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← 7-40: Extended Colorimetry Transmission ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← 7-40: Extended Colorimetry Transmission ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-10: TMDS Prot 6G - TMDS Bit Clock Ratio ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-10: TMDS Prot 6G - TMDS Bit Clock Ratio ← CTS Configuration dialog
See "Video Format" on page 308.

HF1-11: TMDS Prot 6G - 2160p Legal Codes ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-11: TMDS Prot 6G - 2160p Legal Codes ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-11: TMDS Prot 6G - 2160p Legal Codes ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-11: TMDS Prot 6G - 2160p Legal Codes ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-12: TMDS Prot 6G - Basic Prot and Scrambling ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-12: TMDS Prot 6G - Basic Prot and Scrambling ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-12: TMDS Prot 6G - Basic Prot and Scrambling ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-12: TMDS Prot 6G - Basic Prot and Scrambling ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-13: TMDS Prot - Scrambling <= 3.4Gbps ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-13: TMDS Prot - Scrambling <= 3.4Gbps ← CTS Configuration dialog
See "Video Format" on page 308.

CDF Source LTE 340Mcsc Scrambling ← HF1-13: TMDS Prot - Scrambling <= 3.4Gbps ← CTS Configuration dialog
Sets whether the DUT supports scrambling for TMDS character rates at or below 340 Mcsc. Check the compliance declaration form (CDF) of the DUT for this information.

- "Yes"
- "No"

Remote command:
`CONFigure<hw>:HDMI:CTS:TMDS:SCRambling:CDF` on page 890

EDID Setup ← HF1-13: TMDS Prot - Scrambling <= 3.4Gbps ← CTS Configuration dialog
Enables or disables scrambling for TMDS character rates at or below 340 Mcsc.

- "LTE 340 Mcsc Scrambling No"
  Only available if "Yes" is set under "CDF Source LTE 340Mcsc Scrambling" on page 316.
- "LTE 340 Mcsc Scrambling Yes"

Remote command:
`CONFigure<hw>:HDMI:CTS:EDID:SCRambling` on page 885

Test Length ← HF1-13: TMDS Prot - Scrambling <= 3.4Gbps ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-13: TMDS Prot - Scrambling <= 3.4Gbps ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-14: Video Timing 6G - 2160p 24-bit Color Depth ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-14: Video Timing 6G - 2160p 24-bit Color Depth ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-14: Video Timing 6G - 2160p 24-bit Color Depth ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-14: Video Timing 6G - 2160p 24-bit Color Depth ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-15: Video Timing 6G - 2160p Deep Color ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-15: Video Timing 6G - 2160p Deep Color ← CTS Configuration dialog
See "Video Format" on page 308.

Color Depth ← HF1-15: Video Timing 6G - 2160p Deep Color ← CTS Configuration dialog
See "Color Depth" on page 313.

EDID Setup ← HF1-15: Video Timing 6G - 2160p Deep Color ← CTS Configuration dialog
Sets the maximum supported TMDS character rate in the EDID.

- "MAX TMDS Character Rate = 595Mcsc"
- "MAX TMDS Character Rate = 425Mcsc"

Remote command:
CONFigure<hw>:HDMI:CTS:EDID:TMDS on page 886

Test Length ← HF1-15: Video Timing 6G - 2160p Deep Color ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-15: Video Timing 6G - 2160p Deep Color ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-16: Video Timing 6G - 2160p 3D ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-16: Video Timing 6G - 2160p 3D ← CTS Configuration dialog
See "Video Format" on page 308.

3D Format ← HF1-16: Video Timing 6G - 2160p 3D ← CTS Configuration dialog
See "3D Format" on page 314.

Test Length ← HF1-16: Video Timing 6G - 2160p 3D ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-16: Video Timing 6G - 2160p 3D ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-18: AVI InfoFrame 6G - 2160p ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-18: AVI InfoFrame 6G - 2160p ← CTS Configuration dialog
See "Video Format" on page 308.

EDID Setup ← HF1-18: AVI InfoFrame 6G - 2160p ← CTS Configuration dialog
Sets the colorimetry support that the EDID of the test equipment indicates to the DUT.

- "No Colorimetry Support"
- "Colorimetry ITU R BT2020 101"
- "Colorimetry ITU R BT2020 110"

Remote command:
CONFigure<hw>:HDMI:CTS:EDID:COLorimetry on page 884

Test Length ← HF1-18: AVI InfoFrame 6G - 2160p ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-18: AVI InfoFrame 6G - 2160p ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-21: TMDS Prot 6G - Non-2160p Legal Codes ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-21: TMDS Prot 6G - Non-2160p Legal Codes ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-21: TMDS Prot 6G - Non-2160p Legal Codes ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-21: TMDS Prot 6G - Non-2160p Legal Codes ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-22: TMDS Protocol 6G - Non-2160p Basic Prot and Scrambling ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-22: TMDS Protocol 6G - Non-2160p Basic Prot and Scrambling ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-22: TMDS Protocol 6G - Non-2160p Basic Prot and Scrambling ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-22: TMDS Protocol 6G - Non-2160p Basic Prot and Scrambling ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-24: Video Timing 6G - Non-2160p 24-bit Color Depth ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-24: Video Timing 6G - Non-2160p 24-bit Color Depth ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-24: Video Timing 6G - Non-2160p 24-bit Color Depth ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-24: Video Timing 6G - Non-2160p 24-bit Color Depth ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-25: Video Timing 6G - Non-2160p Deep Color ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-25: Video Timing 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Video Format" on page 308.

Color Depth ← HF1-25: Video Timing 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Color Depth" on page 313.

EDID Setup ← HF1-25: Video Timing 6G - Non-2160p Deep Color ← CTS Configuration dialog
Sets the maximum supported TMDS character rate in the EDID.
- "MAX TMDS Character Rate = 595Mcsc "
- "MAX TMDS Character Rate < 340Mcsc"

Remote command:
`CONFigure<hw>:HDMI:CTS:EDID:TMDS` on page 886

Test Length ← HF1-25: Video Timing 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-25: Video Timing 6G - Non-2160p Deep Color ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-26: Video Timing 6G - Non-2160p 3D ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-26: Video Timing 6G - Non-2160p 3D ← CTS Configuration dialog
See "Video Format" on page 308.

3D Format ← HF1-26: Video Timing 6G - Non-2160p 3D ← CTS Configuration dialog
See "3D Format" on page 314.

Test Length ← HF1-26: Video Timing 6G - Non-2160p 3D ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-26: Video Timing 6G - Non-2160p 3D ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-28: AVI InfoFrame 6G - Non-2160p ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-28: AVI InfoFrame 6G - Non-2160p ← CTS Configuration dialog
See "Video Format" on page 308.

EDID Setup ← HF1-28: AVI InfoFrame 6G - Non-2160p ← CTS Configuration dialog
See "EDID Setup" on page 318.

Test Length ← HF1-28: AVI InfoFrame 6G - Non-2160p ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-28: AVI InfoFrame 6G - Non-2160p ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-31: Pix Enc - YCbCr 4:2:0 - TMDS Pix Enc ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← HF1-31: Pix Enc - YCbCr 4:2:0 - TMDS Pix Enc ← CTS Configuration dialog
See "Video Format" on page 308.

EDID Setup ← HF1-31: Pix Enc - YCbCr 4:2:0 - TMDS Pix Enc ← CTS Configuration dialog
Configures the test.
- "YCbCr 4:2:0 Video Data Block"
- "No YCbCr 4:2:0 Support"

Remote command:
`CONFigure<hw>:HDMI:CTS:EDID` on page 883

DUT Test Image Support ← HF1-31: Pix Enc - YCbCr 4:2:0 - TMDS Pix Enc ← CTS Configuration dialog
Enables or disables the test image output.

Remote command:
`CONFigure<hw>:HDMI:CTS:DUT` on page 882

Test Length ← HF1-31: Pix Enc - YCbCr 4:2:0 - TMDS Pix Enc ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-31: Pix Enc - YCbCr 4:2:0 - TMDS Pix Enc ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS ← CTS Configuration dialog
See "Video Format" on page 308.

Color Depth ← HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS ← CTS Configuration dialog
See "Color Depth" on page 313.

EDID Setup ← HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS ← CTS Configuration dialog
Enables or disables the support of 4:2:0 deep color with 30 bit, 36 bit and 48 bit in the HF-VSDB.

- "HF-VSDB DC 30/36/48bit 420 Yes"
- "HF-VSDB DC 30/36/48bit 420 No"

Remote command:
`CONFigure<hw>:HDMI:CTS:EDID:VSDB` on page 886

DUT Test Image Support ← HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS ← CTS Configuration dialog
See "DUT Test Image Support" on page 321.

Test Length ← HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-33: Video Timing - YCbCr 4:2:0 ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI" is set under "Input" on page 287.

Video Format ← HF1-33: Video Timing - YCbCr 4:2:0 ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-33: Video Timing - YCbCr 4:2:0 ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-33: Video Timing - YCbCr 4:2:0 ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-34: Video Timing - YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-34: Video Timing - YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
See "Video Format" on page 308.

Color Depth ← HF1-34: Video Timing - YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
See "Color Depth" on page 313.

Test Length ← HF1-34: Video Timing - YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-34: Video Timing - YCbCr 4:2:0 Deep Color ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-35: Video Timing - 21:9 (64:27) ← CTS Configuration dialog
Available for all "Suitable input modules" on page 301.

Video Format ← HF1-35: Video Timing - 21:9 (64:27) ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-35: Video Timing - 21:9 (64:27) ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-35: Video Timing - 21:9 (64:27) ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-36: 3D Audio (L-PCM) - Packet Format ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Sampling Frequency ← HF1-36: 3D Audio (L-PCM) - Packet Format ← CTS Configuration dialog
See "Sampling Frequency" on page 312.

Channel Type ← HF1-36: 3D Audio (L-PCM) - Packet Format ← CTS Configuration dialog
Sets the number of audio channels.
- "10_2"
- "22_2"
- "30_2"

Remote command:
`CONFigure<hw>:HDMI:CTS:AUD:CHANnel:TYPE` on page 880

EDID Setup ← HF1-36: 3D Audio (L-PCM) - Packet Format ← CTS Configuration dialog
Enables or disables the 3D audio support.
- "3D_Audio_Support_No"
- "3D_Audio_Support_Yes"

Remote command:
`CONFigure<hw>:HDMI:CTS:EDID:LPCM` on page 885

Test Length ← HF1-36: 3D Audio (L-PCM) - Packet Format ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-36: 3D Audio (L-PCM) - Packet Format ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-37: 3D Audio (One Bit) - Packet Format ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Sampling Frequency ← HF1-37: 3D Audio (One Bit) - Packet Format ← CTS Configuration dialog
See "Sampling Frequency" on page 312.

Channel Type ← HF1-37: 3D Audio (One Bit) - Packet Format ← CTS Configuration dialog
See "Channel Type" on page 323.

Test Length ← HF1-37: 3D Audio (One Bit) - Packet Format ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-37: 3D Audio (One Bit) - Packet Format ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-38: MS Source Audio Encoding (L-PCM and 61937) Packet Format ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Sampling Frequency ← HF1-38: MS Source Audio Encoding (L-PCM and 61937) Packet Format ← CTS Configuration dialog
See "Sampling Frequency" on page 312.

Audio Streams ← HF1-38: MS Source Audio Encoding (L-PCM and 61937) Packet Format ← CTS Configuration dialog
Sets the number of audio streams.

Remote command:
`CONFigure<hw>:HDMI:CTS:AUD:STReams` on page 880

Test Length ← HF1-38: MS Source Audio Encoding (L-PCM and 61937) Packet Format ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-38: MS Source Audio Encoding (L-PCM and 61937) Packet Format ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-39: MS Audio (One Bit) - Packet Format ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Sampling Frequency ← HF1-39: MS Audio (One Bit) - Packet Format ← CTS Configuration dialog
See "Sampling Frequency" on page 312.

Audio Streams ← HF1-39: MS Audio (One Bit) - Packet Format ← CTS Configuration dialog
See "Audio Streams" on page 324.

Test Length ← HF1-39: MS Audio (One Bit) - Packet Format ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-39: MS Audio (One Bit) - Packet Format ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-40: CEA-861-F Audio ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Audio Format ← HF1-40: CEA-861-F Audio ← CTS Configuration dialog
Sets the audio format that is applied to the test.
- "MPEG-4 HE AAC"
- "MPEG-4 HE AAC v2"
- "MPEG-4 AAC LC"
- "DRA"
- "MPEG-4 HE AAC + MPEG Surround"
- "MPEG-4 AAC LC + MPEG Surround"

Remote command:
`CONFigure<hw>:HDMI:CTS:AFORmat` on page 879

Test Length ← HF1-40: CEA-861-F Audio ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-40: CEA-861-F Audio ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-41: 3D Audio - IEC Sample Packet ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Sampling Frequency ← HF1-41: 3D Audio - IEC Sample Packet ← CTS Configuration dialog
See "Sampling Frequency" on page 312.

Channel Type ← HF1-41: 3D Audio - IEC Sample Packet ← CTS Configuration dialog
See "Channel Type" on page 323.

Test Length ← HF1-41: 3D Audio - IEC Sample Packet ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-41: 3D Audio - IEC Sample Packet ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-42: MS Audio - IEC Sample Packet ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Sampling Frequency ← HF1-42: MS Audio - IEC Sample Packet ← CTS Configuration dialog
See "Sampling Frequency" on page 312.

Audio Streams ← HF1-42: MS Audio - IEC Sample Packet ← CTS Configuration dialog
See "Audio Streams" on page 324.

Test Length ← HF1-42: MS Audio - IEC Sample Packet ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-42: MS Audio - IEC Sample Packet ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-43: HBR Audio - IEC Audio Stream Packet ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Test Length ← HF1-43: HBR Audio - IEC Audio Stream Packet ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-43: HBR Audio - IEC Audio Stream Packet ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-44: 3D and MS Audio - Supported Frequency ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Test Length ← HF1-44: 3D and MS Audio - Supported Frequency ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-44: 3D and MS Audio - Supported Frequency ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-45: Basic Audio - Allowed Rate ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Test Length ← HF1-45: Basic Audio - Allowed Rate ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-45: Basic Audio - Allowed Rate ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-47: HDMI-VSIF - 3D OSD Disparity ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-47: HDMI-VSIF - 3D OSD Disparity ← CTS Configuration dialog
See "Video Format" on page 308.

EDID Setup ← HF1-47: HDMI-VSIF - 3D OSD Disparity ← CTS Configuration dialog
Sets the 3D mode indication in the EDID.
- "2D Mode"
- "3D Mode No Signaling"
- "3D Mode With Signaling"

Remote command:
`CONFigure<hw>:HDMI:CTS:EDID:ODISparity` on page 885

Test Length ← HF1-47: HDMI-VSIF - 3D OSD Disparity ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-47: HDMI-VSIF - 3D OSD Disparity ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-48: HDMI-VSIF - Dual-View ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-48: HDMI-VSIF - Dual-View ← CTS Configuration dialog
See "Video Format" on page 308.

CDF Setup ← HF1-48: HDMI-VSIF - Dual-View ← CTS Configuration dialog
Sets whether the source supports the generation of test images for dual view transmission. Configure the test according to the DUT capabilities declared in the CDF form.
- "SRC DualView Test Image No"
- "SRC DualView Test Image Yes"

Remote command:
`CONFigure<hw>:HDMI:CTS:VSIFs:DUALview:CDF` on page 891

Test Length ← HF1-48: HDMI-VSIF - Dual-View ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-48: HDMI-VSIF - Dual-View ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-49: HDMI-VSIF - Independent-View ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-49: HDMI-VSIF - Independent-View ← CTS Configuration dialog
See "Video Format" on page 308.

Test Length ← HF1-49: HDMI-VSIF - Independent-View ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-49: HDMI-VSIF - Independent-View ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-51: AVI InfoFrame - YCbCr 4:2:0 ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-51: AVI InfoFrame - YCbCr 4:2:0 ← CTS Configuration dialog
See "Video Format" on page 308.

EDID Setup ← HF1-51: AVI InfoFrame - YCbCr 4:2:0 ← CTS Configuration dialog
Configures the test.
- "YCbCr 4:2:0 Video Data Block"
- "YCbCr 4:2:0 Capability Map Data Block"
- "YCbCr 4:2:0 CMDB Data Block Size = 1"
- "No YCbCr 4:2:0 Support"

Remote command:
`CONFigure<hw>:HDMI:CTS:EDID` on page 883

Test Length ← HF1-51: AVI InfoFrame - YCbCr 4:2:0 ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-51: AVI InfoFrame - YCbCr 4:2:0 ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-52: AVI InfoFrame - YCbCr 4:2:0 BT.2020 ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

Video Format ← HF1-52: AVI InfoFrame - YCbCr 4:2:0 BT.2020 ← CTS Configuration dialog
See "Video Format" on page 308.

EDID Setup ← HF1-52: AVI InfoFrame - YCbCr 4:2:0 BT.2020 ← CTS Configuration dialog
Configures the test.
- "YCbCr 4:2:0 Video Data Block"
- "YCbCr 4:2:0 Capability Map Data Block"

Remote command:
CONFigure<hw>:HDMI:CTS:EDID on page 883

EDID Colorimetry Setup ← HF1-52: AVI InfoFrame - YCbCr 4:2:0 BT.2020 ← CTS Configuration dialog
Sets the colorimetry support that the EDID of the test equipment indicates to the DUT.
- "No Colorimetry Support"
- "Colorimetry ITU R BT2020 101"
- "Colorimetry ITU R BT2020 110"

Remote command:
CONFigure<hw>:HDMI:CTS:EDID:COLorimetry on page 884

Test Length ← HF1-52: AVI InfoFrame - YCbCr 4:2:0 BT.2020 ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-52: AVI InfoFrame - YCbCr 4:2:0 BT.2020 ← CTS Configuration dialog
See "Number of Frames" on page 308.

HF1-53: High Dynamic Range ← CTS Configuration dialog
Only available if "HDMI 600 MHz" or "HDMI CTS" is set under "Input" on page 287.

EDID Setup ← HF1-53: High Dynamic Range ← CTS Configuration dialog
Configures the test.
- "HDR Traditional SDR"
- "HDR Traditional HDR"
- "HDR Traditional HDR EOTF"
- "HDR SMPTE ST 2084"
- "HDR SMPTE ST 2084 EOTF"

Remote command:
CONFigure<hw>:HDMI:CTS:EDID:HDR on page 884

Test Length ← HF1-53: High Dynamic Range ← CTS Configuration dialog
See "Test Length" on page 308.

Number of Frames ← HF1-53: High Dynamic Range ← CTS Configuration dialog
See "Number of Frames" on page 308.

Data Source
Sets the source of the data to be analyzed.
- "Automatic Capture"
  The HDMI data is automatically captured and tested. After the test has been finished, you can save the data in a file, see "Save button" on page 330.
- "Manual Capture"
  The HDMI data is captured without automatic testing, see "Capture button" on page 330. You can save the data to file, see "Save button" on page 330. Or you can apply a test to the captured data.
- "File"

To use a previously saved file. Tap "Load" to select the file for analysis, see "Load button" on page 330.

To configure the data source, tap .

Remote command:
CONFigure<hw>:HDMI:CTS:DATA on page 881

Data Source Config dialog ← Data Source
Sets the amount of data that are saved in a file.

Save Capture Size ← Data Source Config dialog ← Data Source
- "Frames"
  With the number of video frames set under "Number of Frames" on page 330.
- "2 seconds"
  2 seconds of HDMI data are saved in a file.

Remote command:
CONFigure<hw>:HDMI:CTS:DATA:STORe:SIZE:MODE on page 882

Number of Frames ← Data Source Config dialog ← Data Source
Sets the number of video frames that are saved in a file. The number of frames cannot exceed the length of 2 seconds.

Remote command:
CONFigure<hw>:HDMI:CTS:DATA:STORe:SIZE:FRAMes on page 882

Save button ← Data Source
Opens the "File" dialog to save the captured data. See also Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:HDMI:CTS:DATA:STORe on page 895

Load button ← Data Source
Only available if "File" is set under "Data Source" on page 329.

Opens the "File" dialog to select file. See also Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:HDMI:CTS:DATA:LOAD on page 895

Capture button ← Data Source
Only available if "Manual Capture" is set under "Data Source" on page 329.

Triggers manual capturing.

Remote command:
INITiate<hw>:HDMI:CTS on page 894

Save button (Test Output)
Opens the "File" dialog to save the test output. See also Chapter 5.3, "File Dialog", on page 89.

The 3 TMDS characters for channel 0, channel 1 and channel 2 are stored in a 4 byte word as shown in Figure 10-1. The figure also shows how the character data are extracted for the 3 TMDS channels.

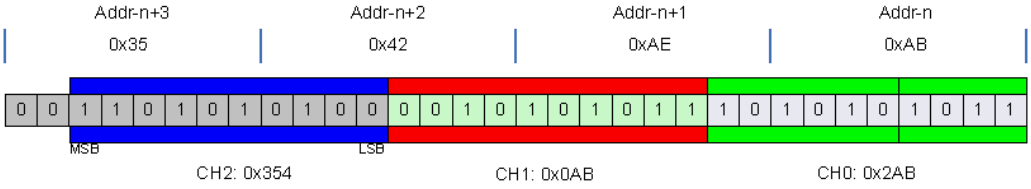


Figure 10-1: TMDS channels

Remote command:
`MMEMory<hw>:HDMI:CTS:REPort:STORe` on page 896

<Status display>
Displays the current status.

Remote command:
`READ<hw>[:SCALar]:HDMI:CTS:CONTrol:STATe?` on page 905
`READ<hw>[:SCALar]:HDMI:CTS:CONTrol:PROGress?` on page 905

Stop button
Stops a running test. Only available if a test is running.

Remote command:
`ABORt<hw>:HDMI:CTS` on page 874

Start button
Starts a test. Only available if no test is running.

Remote command:
`INITiate<hw>:HDMI:CTS` on page 894

10.2.9 CEC Subtab

Only available if "HDMI [<module slot>]" is set under "Input" on page 287.

Requires additional, module-dependant options, see also the data sheet:

- CEC tracer test (R&S VT-K2366) for the R&S VT-B2360/2361 modules

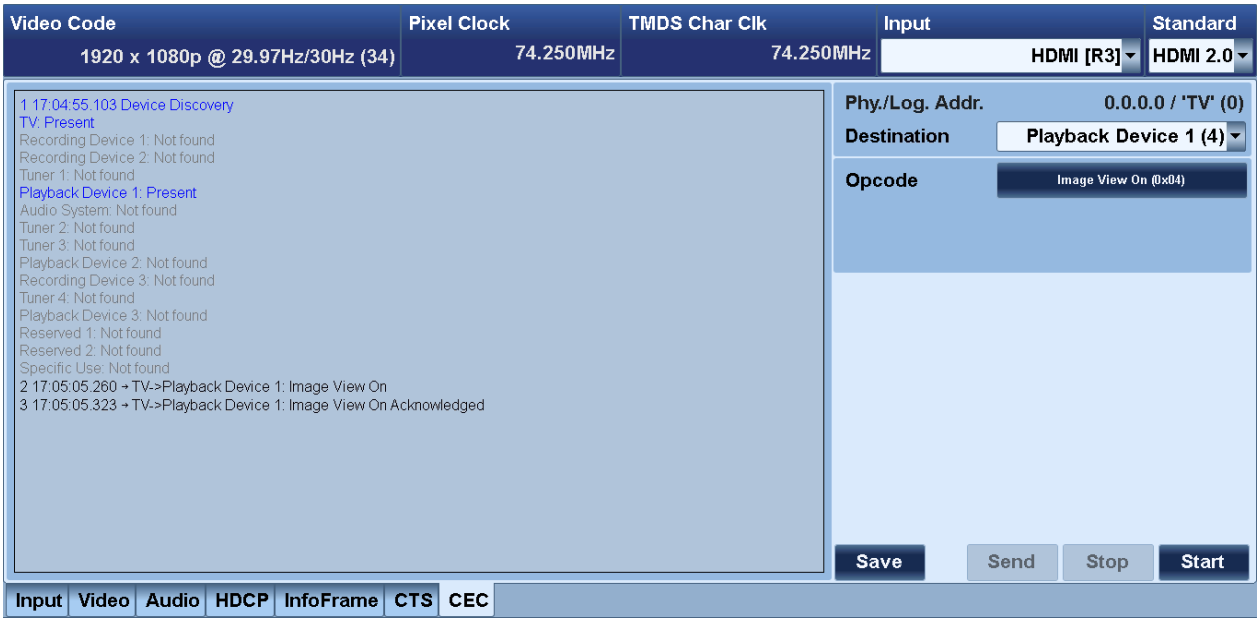
Used to send commands to an HDMI source device or to receive such commands from an HDMI source device.

The R&S VTE itself participates in the CEC communication and acts as a 'TV' set. Depending on the mode, the R&S VTE listens to all CEC traffic or only to the CEC traffic dedicated to the 'TV' set. Each received command or reply from the DUT is listed in the left pane, the output pane. You can also configure and send commands from the R&S VTE to the DUT. These outgoing commands are also listed in the output pane.

Remote commands to query results

READ<hw>[:SCALar]:HDMI:CEC:REPort? on page 904

READ<hw>[:SCALar]:HDMI:CEC:REPort:COUNt? on page 905



Phy./Log. Addr.
The logical device address is 0.

Destination
Sets the logical address of the DUT that receives the CEC messages sent by the R&S VTE.

Remote command:
CONFigure<hw>:HDMI:CEC:DESTination on page 875

Opcode and Parameters
Displays the selected operation code (opcode) of the CEC command that is sent by the R&S VTE. Depending on the selected opcode, the input of additional parameters in hexadecimal format is required.

Tap this button to select another opcode in the "CEC Opcodes" dialog. The available opcodes are listed in Chapter 10.4.4, "CEC Communication", on page 364.

Remote command:
CONFigure<hw>:HDMI:CEC:OPCode on page 875
CONFigure<hw>:HDMI:CEC:OPCode:PARam on page 876
CONFigure<hw>:HDMI:CEC:OPCode:PARam:LENGth on page 876

Save button
Saves the protocol trace in a file.

Remote command:
MMEMory<hw>:HDMI:CEC:DATA:STORe on page 894

Send button
Only available if the protocol trace has been started ("Start button" on page 333).

Sends a command with the selected opcode and parameters.

Remote command:
CONFigure<hw>:HDMI:CEC:COMMand:SEND on page 875

Stop button
Stops the protocol trace. Use the scroll bar to navigate in the recorded trace.

Remote command:
ABORt<hw>:HDMI:CEC on page 874

Start button
Starts the protocol trace and performs a device discovery. All content in the output pane is cleared, and the incoming commands from the DUT are listed in the output pane.

Remote command:
INITiate<hw>:HDMI:CEC on page 894

10.3 CEC/DDC Analyzer Application

Requires the following options:

- CEC/DDC analysis (R&S VT-K2391)
- HDMI RX/TX 600 MHz module (R&S VT-B2363)
  See Chapter 4.2.2.18, "HDMI RX/TX 600 MHz Module (R&S VT-B2363)", on page 79
- HDMI pass-through adapter (R&S VT-Z2390)
  See Chapter 4.2.3.2, "HDMI Pass-Through Adapter (R&S VT-Z2390)", on page 84

The CEC/DDC analyzer application traces and displays details of data packets along with waveforms captured on DDC and CEC buses of both HDMI input and output ports. In addition, the application works as a tracer when both HDMI source and sink devices are connected to the tester through the HDMI pass-through adapter (R&S VT-Z2390). Data packets over CEC and DDC buses between HDMI source device and sink device are displayed and analyzed.

10.3.1 Main Dialog of the Application

The parameters are grouped on tabs.

Displayed information

"HDMI IN" displays information on the HDMI IN port.

- Status information:
  - "DDC Tracer Passive", "CEC Tracer Passive"
    Displayed if the HDMI pass-through adapter (R&S VT-Z2390) is connected to the port.
  - "DDC Tracer Active", "CEC Tracer Active"
    Displayed if the DUT (Rx or Tx) is directly connected to the port.
  - "DUT Connected"
  - "No DUT Connected" (in orange color)

  Remote command: `READ<hw>:CECDdc:STATus:IN?` on page 978
- For the port that is used to send commands ("Port" on page 340), a short version of the logical address is displayed. This enables you to quickly check which port is active.
  Example: (0) for "TV (0)"
  The numbers assigned to device types are listed in Table 10-1.

"HDMI OUT" displays information on the HDMI OUT port as described for "HDMI IN".

Remote command: `READ<hw>:CECDdc:STATus:OUT?` on page 978

Default favorites

Parameters that are often needed are provided as default favorites below the tab title. The default favorites of the application itself are also available on one of the subtabs.

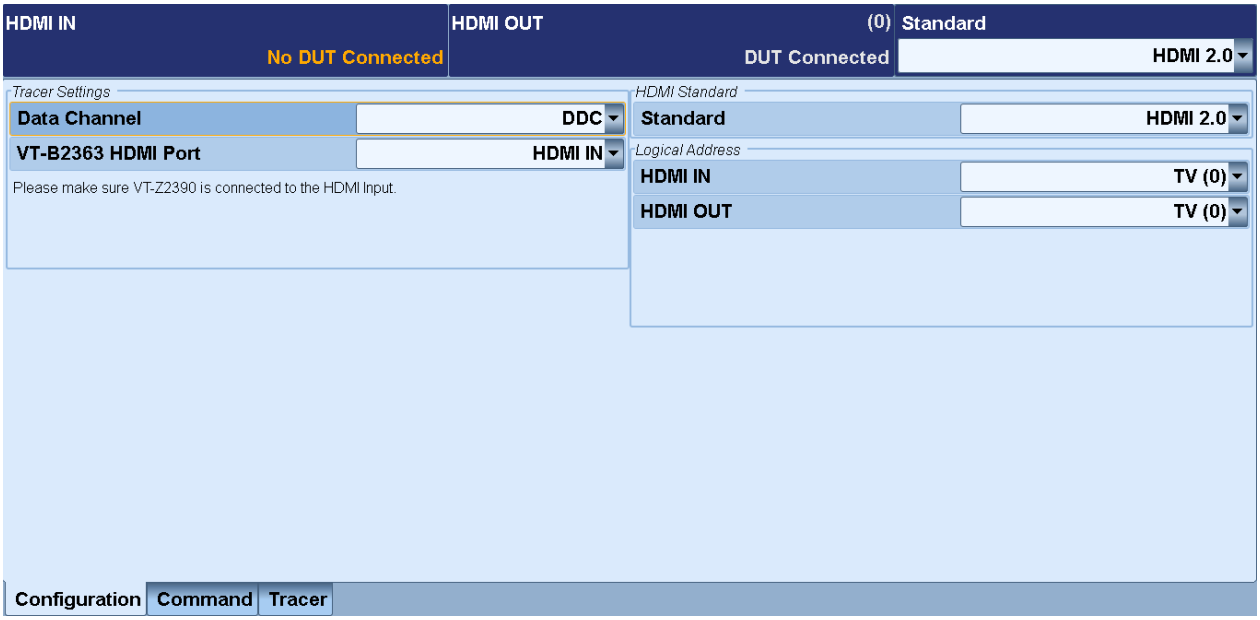
- "Standard" on page 335

Common remote command

`DISPlay<hw>:CECDdc:SELect:TAB` on page 975

10.3.2 Configuration Subtab

Used to configure the HDMI IN and HDMI OUT ports independently from each other to emulate different device types.



Tracer Settings
Groups the setup parameters.

Data Channel ← Tracer Settings
Sets the CEC/DDC channel for the sniffing and tracing function. Only one channel can be sampled at any time.

Remote command:
`CONFigure<hw>:CECDdc:CONFigure:CHANnel` on page 972

VT-B2363 HDMI Port ← Tracer Settings
Sets the port of the HDMI RX/TX 600 MHz module (R&S VT-B2363) for the tracer.
- "HDMI IN"
- "HDMI OUT"

Remote command:
`CONFigure<hw>:CECDdc:CONFigure:PORT` on page 973

Standard
Sets the HDMI standard.
- "HDMI 1.4"
- "HDMI 2.0"

Remote command:
ROUTe<hw>:CECDdc:SELect:VERSion on page 980

Logical Address
Groups the parameters to configure the logical addresses.

Note: Make sure to assign only free addresses in order to avoid address conflicts.

HDMI IN ← Logical Address
Sets the DUT type addressed at the HDMI IN port of the HDMI RX/TX 600 MHz module (R&S VT-B2363).
- "Unassigned"
- Further parameter values, see Table 10-1

Remote command:
CONFigure<hw>:CECDdc:CONFigure:INITiator:HIN on page 973

HDMI OUT ← Logical Address
Sets the DUT type addressed at the HDMI OUT port of the HDMI RX/TX 600 MHz module (R&S VT-B2363).
- "Unassigned"
- Further parameter values, see Table 10-1

Remote command:
CONFigure<hw>:CECDdc:CONFigure:INITiator:HOUT on page 973

<Status message> ← Logical Address
Displays information about the status of the logical address configuration. Updated when you set a different logical address.

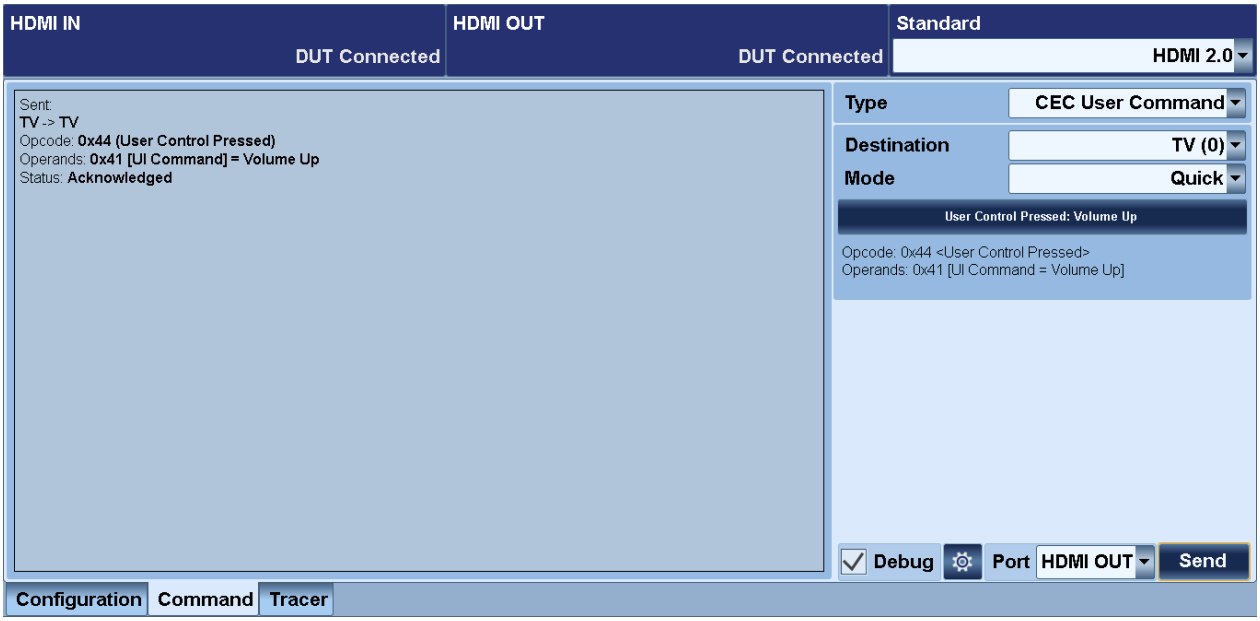
10.3.3 Command Subtab

Shows the transferred protocol data packets by sending commands to the different device types. This allows you to troubleshoot communication issues between two devices.

The left pane displays the test reports that are generated according to the command type.

Remote command to query the test reports

READ<hw>:CECDdc:COMMand:OUTPut? on page 977



Type
Sets the command type.

- "CEC User Command"
  To send customized CEC commands.
  See "<CEC user command parameters>" on page 338.
- "CEC Device Discovery"
  To discover devices connected in the CEC network.
  See "<CEC device discovery parameters>" on page 341.
- "Read EDID"
  To read EDID data of sink devices connected to HDMI OUT port.
  See "<Read EDID parameters>" on page 341.
- "SCDC Read"
  To read the SCDC registers.
  See "<SCDC read parameters>" on page 342.
- "SCDC Write"
  To write the SCDC registers using the DDC channel.
  See "<SCDC write parameters>" on page 342.

Remote command:
`CONFigure<hw>:CECDdc:COMMand:TYPE` on page 972

<CEC user command parameters>
Only available if "CEC User Command" is set under "Type" on page 338.

Destination ← <CEC user command parameters>
Sets the logical address of the DUT that should receive the CEC messages sent by the R&S VTE.

- Parameter values see Table 10-1

Remote command:
`CONFigure<hw>:CECDdc:COMMand:CEC:DESTination` on page 966

Mode ← <CEC user command parameters>
Sets the way how to select a command:

- "Quick"
  Provides a simple way to select a command without having to key in any parameters.
- "Advanced"
  Allows to enter hexadecimal values for opcodes or parameters.

Remote command:
`CONFigure<hw>:CECDdc:COMMand:CEC:MODE` on page 967

<CEC command> button ← <CEC user command parameters>
Only available if "Quick" is set under "Mode" on page 338.

Displays the selected CEC command.

Tap this button to select another CEC command, see "CEC Opcodes dialog" on page 339.

Below this button, information on the opcode and the operands of the CEC command are displayed.

Remote command:
`CONFigure<hw>:CECDdc:COMMand:CEC:OPCode` on page 967
`READ<hw>:CECDdc:COMMand:CEC:QMODe:DESCription?` on page 977

Opcode button ← <CEC user command parameters>
Only available if "Advanced" is set under "Mode" on page 338.

Displays the selected opcode.

Tap this button to select another opcode, see "CEC Opcodes dialog" on page 339.

Remote command:
`CONFigure<hw>:CECDdc:COMMand:CEC:OPCode` on page 967

CEC Opcodes dialog ← <CEC user command parameters>
The available tabs depend on the mode set under "Mode" on page 338.

Remote command:
`CONFigure<hw>:CECDdc:COMMand:CEC:OPCode` on page 967

Preset tab (Quick mode) ← CEC Opcodes dialog ← <CEC user command parameters>
Groups all commands defined by the firmware. Tap a command to select it (see Table 10-9).

User Defined tab (Quick mode) ← CEC Opcodes dialog ← <CEC user command parameters>
Groups all customized hotkeys, see Chapter 10.3.6, "Customizing CEC Command Hotkeys", on page 347.

Opcodes 1|2|3|4|5 tabs (Advanced mode) ← CEC Opcodes dialog ← <CEC user command parameters>
Groups the standard opcodes as defined by the HDMI specifications, see Chapter 10.4.4, "CEC Communication", on page 364.

Custom tab (Advanced mode) ← CEC Opcodes dialog ← <CEC user command parameters>
Select an opcode by its hexadecimal value. Enter the opcode and tap "Select".

Used to create user-defined hotkeys, see Chapter 10.3.6, "Customizing CEC Command Hotkeys", on page 347.

No. of Param. ← <CEC user command parameters>
Only available if "Advanced" is set under "Mode" on page 338.

Sets the number of additional parameters that are required, see "Parameter 1 to 14" on page 340.
- "0" to "14"

Remote command:
CONFigure<hw>:CECDdc:COMMand:CEC:OPERands on page 968

Parameter 1 to 14 ← <CEC user command parameters>
Only available if "Advanced" is set under "Mode" on page 338.

Depending on the selected opcode, the input of additional parameters in hexadecimal format is required.

- Standard opcode, selected on the "Opcodes 1|2|3|4|5 tabs (Advanced mode)" on page 339
  The number of parameters is automatically displayed as required.
- Custom opcode, selected on the "Custom tab (Advanced mode)" on page 339
  Set the number of parameters under "No. of Param." on page 339.

Remote command:
CONFigure<hw>:CECDdc:COMMand:CEC:OPERands on page 968

Assign Hotkey button ← <CEC user command parameters>
Only available if "Advanced" is set under "Mode" on page 338.

Opens the "Assign Hotkey" dialog. There, you define your own hotkeys used in the quick mode, see Chapter 10.3.6, "Customizing CEC Command Hotkeys", on page 347.

Remote command:
CONFigure<hw>:CECDdc:COMMand:CEC:HOTKey on page 966

Load Preset button ← <CEC user command parameters>
Only available if "Advanced" is set under "Mode" on page 338.

Opens the "CEC Opcodes" dialog as available in quick mode. Select a CEC command. All related information is displayed: opcode, number of parameters, parameter values.

Debug ← <CEC user command parameters>
Enables or disables debugging. Tap ⚙ to configure the CEC debugger, see "CEC Debugger Settings dialog" on page 341.

Remote command:
CONFigure<hw>:CECDdc:COMMand:DEBug on page 969

Default button ← Debug ← <CEC user command parameters>
Sets each value in the "CEC Debugger Settings" dialog to its default value.

Remote command:
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:DEFault on page 963

Port ← <CEC user command parameters>
Sets the port of the HDMI RX/TX 600 MHz module (R&S VT-B2363) at which the commands are send.

- "HDMI IN"
- "HDMI OUT"

Remote command:
CONFigure<hw>:CECDdc:COMMand:PORT on page 969

Send button ← <CEC user command parameters>
Sends a command:
- According to the type set under "Type" on page 338
- At the port set under "Port" on page 340

Remote command:
CONFigure<hw>:CECDdc:COMMand:SEND on page 972

CEC Debugger Settings dialog ← <CEC user command parameters>
Configures the CEC debugger.

Enable Acks ← CEC Debugger Settings dialog ← <CEC user command parameters>
Groups the parameters to enable or disable acknowledgments from the DUT.

Remote command:
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:DIRected:HEADer on page 964
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:DIRected:DATA on page 963
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:BROadcast:HEADer
on page 963
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:BROadcast:DATA on page 963

Control Timing ← CEC Debugger Settings dialog ← <CEC user command parameters>
Groups the parameters to set periods.

Remote command:
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:STARtbit:LOW on page 965
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:STARtbit:TOTal on page 965
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:ONEBit:LOW on page 964
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:ONEBit:TOTal on page 964
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:ZERobit:LOW on page 965
CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:ZERobit:TOTal on page 966

<CEC device discovery parameters>
Only available if "CEC Device Discovery" is set under "Type" on page 338.

Discover Devices button ← <CEC device discovery parameters>
Starts the device discovery process.

Remote command:
CONFigure<hw>:CECDdc:COMMand:DISCover on page 969

Port ← <CEC device discovery parameters>
See "Port" on page 340.

<Read EDID parameters>
Only available if "Read EDID" is set under "Type" on page 338.

Read EDID Data button ← <Read EDID parameters>
Starts reading the EDID data from the sink DUT.

Remote command:
CONFigure<hw>:CECDdc:COMMand:EDID:READ on page 969

Save button ← <Read EDID parameters>
Opens the "File" dialog to save the read EDID data in binary format. See also Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:CECDdc:COMMand:EDID:DATA:STORe on page 976

<SCDC read parameters>
Only available if "SCDC Read" is set under "Type" on page 338.

The status and control data channel (SCDC) is a point-to-point communication protocol enabling data exchange between an HDMI source and an attached HDMI sink.

Offset ← <SCDC read parameters>
- "0" to "FF"

Remote command:
CONFigure<hw>:CECDdc:COMMand:SCDC:READ:OFFSet on page 970

Number of Bytes ← <SCDC read parameters>
- "1" to "16"

Remote command:
CONFigure<hw>:CECDdc:COMMand:SCDC:READ:BYTes on page 970

Read SCDC button ← <SCDC read parameters>
Starts reading the SCDC registers using the HDMI OUT port.

Remote command:
CONFigure<hw>:CECDdc:COMMand:SCDC:READ on page 970

<SCDC write parameters>
Only available if "SCDC Write" is set under "Type" on page 338.

Offset ← <SCDC write parameters>
- "0" to "FF"

Remote command:
CONFigure<hw>:CECDdc:COMMand:SCDC:WRITe:OFFSet on page 971

Number of Bytes ← <SCDC write parameters>
- "1" to "16"

Remote command:
CONFigure<hw>:CECDdc:COMMand:SCDC:WRITe:BYTes on page 971

Value [Offset], Value [Offset+1], ..., Value [Offset+15] ← <SCDC write parameters>
Sets the bytes.

How many parameters of this type are displayed depends on the setting under "Number of Bytes" on page 342.
- "0" to "FF"

Remote command:
CONFigure<hw>:CECDdc:COMMand:SCDC:WRITe:BYTes on page 971

Write SCDC button ← <SCDC write parameters>
Starts writing the SCDC registers using the HDMI OUT port.

Remote command:
CONFigure<hw>:CECDdc:COMMand:SCDC:WRITe on page 971

10.3.4 Tracer Subtab

Displays the details of data packets along with the waveforms captured on the CEC and DDC buses of the HDMI IN/OUT ports of the bus tester.

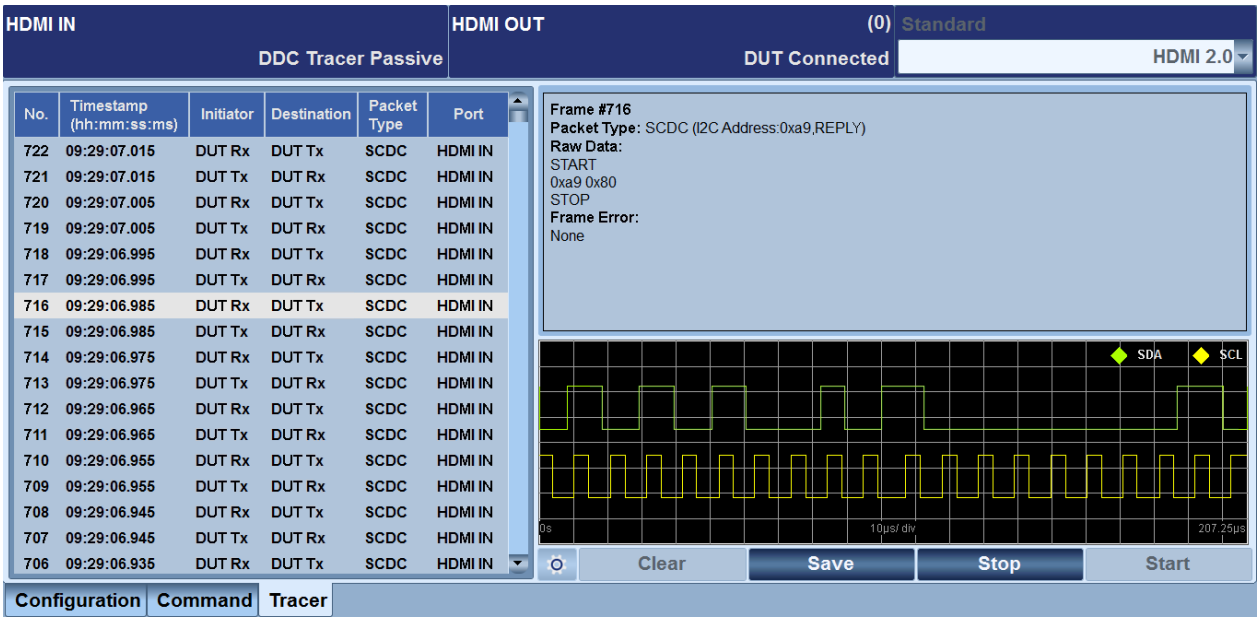
Divided into 3 panes:

- "<Packet data table>" on page 344
- "<Description>" on page 344
- "<Waveform scope>" on page 345

When starting the measurement, only the packet data table in the left pane fills up. The panes on the right stay empty.

► If you want to display a description and a waveform scope, select a row in the packet data table.

The selected row is highlighted in white.



<Packet data table>
In the table, you can select or deselect an entry to display details. To use filters, tap ⚙.
The "Tracer Settings" dialog is displayed, see "Tracer Settings dialog" on page 345.

Remote command:
`READ<hw>:CECDdc:TRACer:TABLe:COUNt?` on page 979
`CONFigure<hw>:CECDdc:TRACer:TABLe:SELect` on page 975
`READ<hw>:CECDdc:TRACer:TABLe:ITEM?` on page 979

No. column ← <Packet data table>
Displays the number of the row.

Timestamp column ← <Packet data table>
Displays the time stamp when the messages are communicated.

Initiator column ← <Packet data table>
Displays the device that initiates the command.
- "DUT Tx"
- "DUT Rx"

Destination column ← <Packet data table>
Displays the device that receives the command.
- "DUT Tx"
- "DUT Rx"

Packet Type column ← <Packet data table>
Displays the packet type during the communication.

Port column ← <Packet data table>
Displays which port is used during the communication.

<Description>
Displays the description of the row selected in the "<Packet data table>" on page 344.

Remote command:
`READ<hw>:CECDdc:TRACer:DESCription?` on page 978

<Waveform scope>
Displays the waveform scope of the row selected in the "<Packet data table>" on page 344. Depending on the packet type, displays 1 waveform (CEC packets) or 2 waveforms (EDID or SCDC packets). You can use zooming.

Remote command:
`READ<hw>:CECDdc:TRACer:TRACe?` on page 980

<Tracer settings> button
Tap ⚙ to configure the tracer, see "Tracer Settings dialog" on page 345.

Clear button
Clears the content in all panes.

Remote command:
`CLEar<hw>:CECDdc:TRACer` on page 962

Save button
Saves the packet data in a TXT file.

Remote command:
`MMEMory<hw>:CECDdc:TRACer:DATA:STORe` on page 976

Stop button
Stops the tracer function.

Remote command:
`ABORt<hw>:CECDdc:TRACer` on page 961

Start button
Starts the tracer function.

Remote command:
`INITiate<hw>:CECDdc:TRACer` on page 975

Tracer Settings dialog
Used to specify filter options that reduce the amount of data displayed in the "<Packet data table>" on page 344.

Device 1, Device 2 ← Tracer Settings dialog
Used to monitor communications between 2 device types. For example, if "Device 1" is set to "TV" and "Device 2" is set to "Playback Device 1", only the packets involving these device types as initiator or destination are displayed in the "<Packet data table>" on page 344.

- "All"
- "Bus Tester"
- "DUT"
- Further parameter values see Table 10-1

Remote command:
`CONFigure<hw>:CECDdc:TRACer:DEVice:ONE` on page 973
`CONFigure<hw>:CECDdc:TRACer:DEVice:TWO` on page 973

Packet ← Tracer Settings dialog
Used to monitor only specific packet types.

- "All"
- "CEC"
- "EDID"
- "SCDC"
- "HDCP"
- "DDC"

Remote command:
`CONFigure<hw>:CECDdc:TRACer:PACKet` on page 974

Status ← Tracer Settings dialog
Used to check for errors.

- "All"
- "No Error"
- "Error"

Remote command:
`CONFigure<hw>:CECDdc:TRACer:STATus` on page 974

10.3.5 Addressing the DUT

The DUT is connected to the HDMI IN/OUT of the HDMI RX/TX 600 MHz module (R&S VT-B2363). You address it in various parameters by its device type.

Table 10-1: Device types

Parameter value	Remote command parameter
"TV (0)"	TV
"Recording Device 1 (1)"	RD1
"Recording Device 2 (2)"	RD2
"Tuner 1 (3)"	TUN1
"Playback Device 1 (4)"	PD1
"Audio System (5)"	AUDio
"Tuner 2 (6)"	TUN2
"Tuner 3 (7)"	TUN3
"Playback Device 2 (8)"	PD2
"Recording Device 3 (9)"	PD3
"Tuner 4 (10)"	TUN4
"Playback Device 3 (11)"	PD3
HDMI 1.4: "Reserved (12)" HDMI 2.0: "Backup 1 (12)"	R12
HDMI 1.4: "Reserved (13)" HDMI 2.0: "Backup 2 (13)"	R13

Parameter value	Remote command parameter
"Specific Use (14)"	SPECific
"Unregistered (15)" or "Broadcast (15)"	UORBroadcast

10.3.6 Customizing CEC Command Hotkeys

For commands that you need often but that are not available as ready-made hotkeys in the quick mode, you can define your own set of hotkeys.

To define a hotkey used in the quick mode

1. Under "Mode", select "Advanced".
2. Tap "Opcode".

   The "CEC Opcodes" dialog is displayed.
3. Select the "Custom" tab.
4. Enter an opcode.
5. Tap "Select".

   The main dialog is displayed again.
6. Under "No. of Param.", enter a value to define how many additional parameters in hexadecimal format are required.
7. Enter the additional parameters.
8. Tap "Assign Hotkey".

   The "Assign Hotkey" dialog is displayed.
9. Under "Select Hotkey", select the hotkey you want to customize. The list contains all hotkeys currently available on the "User Defined" tab in the "CEC Opcodes" dialog of the quick mode.
10. Under "Hotkey Name", enter a name for the hotkey.

10.4 Content and Codes

Provides detailed information on content and codes are available in the HDMI applications.

10.4.1 Patterns

The HDMI generator application provides the patterns described in Table 10-2.

To select a pattern

1. On the "Signal" subtab, tap the content selection button, see "Content Selection" on page 223.

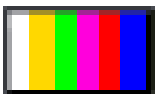
   The "Content Selection" dialog is displayed.

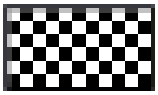
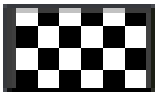
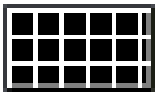
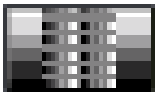
2. Under "Content", tap "Pattern".

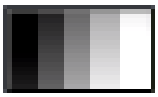
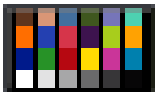
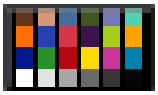
   In the content list, all available patterns are displayed.

3. Select a pattern.
   Remote command:
   `CONFigure<hw>:HDGenerator:SIGNal:PLAY:PATT` on page 851

Table 10-2: Pattern content

Content	Name Used as string in remote command
	"Color Bar 75%"
	"Color Bar 100%"
	"Plain Red"
	"Plain Green"
	"Plain Blue"
	"Plain Magenta"
	"Plain Yellow"
	"Plain Cyan"

Content	Name Used as string in remote command
	"White"
	"Black"
	"Gray 75%"
	"Gray 50%"
	"Gray 25%"
	"Gray 10%"
	"Gray 5%"
	"Gray Ramp"
	"Chess Board 16:9"
	"Chess Board 4:3"
	"Cross Hatch"
	"Crosstalk Side by Side"
	"Crosstalk Top Bottom"

Content	Name Used as string in remote command
	"V Ramp RGB444"
	"H Ramp"
	"MACBETH 16:9 Babel Color"
	"MACBETH 16:9 Color Checker"
	"SMPTE Colorbar 16:9"
	"YCbCr 4:2:0 Test Image"

10.4.2 HDR Signals

The HDMI generator application provides the high dynamic range (HDR) signals described in Table 10-3.

To select a HDR signal

1. On the "Signal" subtab, tap the content selection button, see "Content Selection" on page 223.

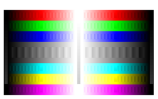
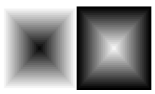
   The "Content Selection" dialog is displayed.

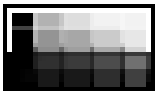
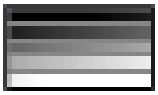
2. Under "Library", tap "HDR Signals".

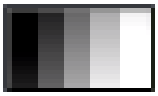
   In the content list, all available HDR signals are displayed.

3. Select a signal.

Table 10-3: HDR signals library

Content	Name	Description
	"HDR Ramp"	Quantization intervals, color gamut, maximum luminance
	"HDR Step 1" to "HDR Step 6"	6 test patterns of 20 steps of white and black

Content	Name	Description
	"HDR 0to01_1_10_100_1k_2k_3k cd"	Luminance steps based on the optical output level (cd/m^2), coded with SMPTE ST 2084 1st row (bottom): 0 cd/m^2 (left) to 0.1 cd/m^2 (right) 2nd row: 0 cd/m^2 (left) to 1 cd/m^2 (right) 3rd row: 0 cd/m^2 (left) to 10 cd/m^2 (right) 4th row: 0 cd/m^2 (left) to 100 cd/m^2 (right) 5th row: 0 cd/m^2 (left) to 1000 cd/m^2 (right) 6th row: 0 cd/m^2 (left) to 2000 cd/m^2 (right) 7th row (top): 0 cd/m^2 (left) to 3000 cd/m^2 (right)
	"Horizontal Line 100%"	Contrast, maximum luminance
	"H Ramp"	Horizontal ramp
	"L20 C100 100 %"	Contrast, maximum luminance For different luminance levels, vary the "Y Level, C_b/P_b Level, C_r/P_r Level" on page 228.
	"L20 C20 100%"	
	"L20 C40 100%"	
	"L20 C60 100%"	
	"L20 C80 100%"	
	"Plain Black"	Plain color signals
	"Plain Blue"	
	"Plain Cyan"	
	"Plain Green"	

Content	Name	Description
	"Plain Magenta"	
	"Plain Red"	
	"Plain White"	
	"Plain Yellow"	
	"Vertical Line 100%"	Contrast, maximum luminance
	"V Ramp"	Vertical ramp

10.4.2.1 Application Examples for HDR Source Testing

Does the video source interpret the HDR meta data block of the EDID correctly?

1. Feed HDR video content.

   If the HDMI analyzer provides an EDID without HDR meta data block, the source must not send HDR.
   If the HDMI analyzer provides an EDID with HDR meta data block, the source has to send HDR.

2. Feed non-HDR video content.

   If the HDMI analyzer provides an EDID with HDR meta data block, the source must not send HDR.

Is the dynamic and mastering range InfoFrame compliant and consistent?

1. Perform the HF1-53 test case according to the compliance test specifications (CTS).
2. Check the consistency.

10.4.2.2 Application Examples for HDR Sink Testing

Does the sink DUT provide the HDR static meta data block in the EDID correctly?

1. Use the EDID interpreter.
2. Perform the HF1-54 test case according to the compliance test specifications (CTS).

Is the dynamic range and master InfoFrame interpreted correctly?

1. Modify the InfoFrame of the HDMI generator.
2. Check the reaction on the TV display.

Is the panel performance suitable?

1. Send a pre-equalized HDR test pattern.
2. Check the brightness gradient visually.
3. Send an Lx Cx pattern, for example "L20 C60".
4. Check the display brightness with a spectrometer.

10.4.3 Video Codes

The following video codes are available in the "Video Code" dialog, see "Video Code" on page 224.

Remote commands:

`CONFigure<hw>:HDGenerator:SIGNal:VICD` on page 836

`CONFigure<hw>:HDGenerator:SIGNal:VICD:HCODe` on page 841

`CONFigure<hw>:HDGenerator:SIGNal:VICD:VCODe` on page 841

Apart from Table 10-6, the information given in this section is conforming to the CEA-861-E specification. The content of Table 10-6 is conforming to the CEA-861-F specification.

Table 10-4: Video codecs: HDMI_VIC for HDMI 1.4b, HDMI 2.0

HDMI_VIC	Pixel frequency	H_{active}	V_{freq}	V_{active}	Remote command parameter (<video format>)
0x01	297.000 MHz/296.703 MHz	3840	30.000 Hz/29.970 Hz	2160	VIC1
0x02	297.000 MHz	3840	25.000 Hz	2160	VIC2
0x03	297.000 MHz/296.703 MHz	3840	24.000 Hz/23.976 Hz	2160	VIC3
0x04	297.000 MHz	4096	24.000 Hz	2160	VIC4

Table 10-5: Video codecs: VIC for HDMI 1.4b

VIC	Format	Field rate	Picture aspect ratio (H:V)	Pixel aspect ratio (H:V)	Remote command parameter (<video format>)
1	640x480p	59.94 Hz/60 Hz	4:3	1:1	C1
2	720x480p	59.94 Hz/60 Hz	4:3	8:9	C2
3	720x480p	59.94 Hz/60 Hz	16:9	32:27	C3
4	1280x720p	59.94 Hz/60 Hz	16:9	1:1	C4
5	1920x1080i	59.94 Hz/60 Hz	16:9	1:1	C5
6	720(1440)x480i	59.94 Hz/60 Hz	4:3	8:9	C6
7	720(1440)x480i	59.94 Hz/60 Hz	16:9	32:27	C7
8	720(1440)x240p	59.94 Hz/60 Hz	4:3	4:9	C8A|C8B
9	720(1440)x240p	59.94 Hz/60 Hz	16:9	16:27	C9A|C9B
10	2880x480i	59.94 Hz/60 Hz	4:3	2:9 to 20:9 1)	C10
11	2880x480i	59.94 Hz/60 Hz	16:9	8:27 to 80:27 1)	C11
12	2880x240p	59.94 Hz/60 Hz	4:3	1:9 to 10:9 1)	C12A|C12B
13	2880x240p	59.94 Hz/60 Hz	16:9	4:27 to 40:27 1)	C13A|C13B
14	1440x480p	59.94 Hz/60 Hz	4:3	4:9 or 8:9 2)	C14
15	1440x480p	59.94 Hz/60 Hz	16:9	16:27 or 32:27 2)	C15
16	1920x1080p	59.94 Hz/60 Hz	16:9	1:1	C16
17	720x576p	50 Hz	4:3	16:15	C17
18	720x576p	50 Hz	16:9	64:45	C18
19	1280x720p	50 Hz	16:9	1:1	C19
20	1920x1080i	50 Hz	16:9	1:1	C20
21	720(1440)x576i	50 Hz	4:3	16:15	C21
22	720(1440)x576i	50 Hz	16:9	64:45	C22
23	720(1440)x288p	50 Hz	4:3	8:15	C23A|C23B|C23C
24	720(1440)x288p	50 Hz	16:9	32:45	C24A|C24B|C24C
25	2880x576i	50 Hz	4:3	2:15 to 20:15 1)	C25
26	2880x576i	50 Hz	16:9	16:45 to 160:45 1)	C26
27	2880x288p	50 Hz	4:3	1:15 to 10:15 1)	C27A|C27B|C27C
28	2880x288p	50 Hz	16:9	8:45 to 80:45 1)	C28A|C28B|C28C
1) The pixel repeat value can vary from 1 to 10 resulting in 10 variations of pixel aspect ratio. 2) The pixel repeat value can vary from 1 to 2 resulting in 2 variations of pixel aspect ratio. 3) The pixel repeat value can be 1, 2 to 4 resulting in 3 variations of pixel aspect ratio.					

VIC	Format	Field rate	Picture aspect ratio (H:V)	Pixel aspect ratio (H:V)	Remote command parameter (<video format>)
29	1440x576p	50 Hz	4:3	8:15 or 16:15 [2)]	C29
30	1440x576p	50 Hz	16:9	32:45 or 64:45 [2)]	C30
31	1920x1080p	50 Hz	16:9	1:1	C31
32	1920x1080p	23.97 Hz/24 Hz	16:9	1:1	C32
33	1920x1080p	25 Hz	16:9	1:1	C33
34	1920x1080p	29.97 Hz/30 Hz	16:9	1:1	C34
35	2880x480p	59.94 Hz/60 Hz	4:3	2:9, 4:9, or 8:9 [3)]	C35
36	2880x480p	59.94 Hz/60 Hz	16:9	8:27, 16:27, or 32:27 [3)]	C36
37	2880x576p	50 Hz	4:3	4:15, 8:15, or 16:15 [3)]	C37
38	2880x576p	50 Hz	16:9	16:45, 32:45, or 64:45 [3)]	C38
39	1920x1080i (1250 total)	50 Hz	16:9	1:1	C39
40	1920x1080i	100 Hz	16:9	1:1	C40
41	1280x720p	100 Hz	16:9	1:1	C41
42	720x576p	100 Hz	4:3	16:15	C42
43	720x576p	100 Hz	16:9	64:45	C43
44	720(1440)x576i	100 Hz	4:3	16:15	C44
45	720(1440)x576i	100 Hz	16:9	64:45	C45
46	1920x1080i	119.88 Hz/120 Hz	16:9	1:1	C46
47	1280x720p	119.88 Hz/120 Hz	16:9	1:1	C47
48	720x480p	119.88 Hz/120 Hz	4:3	8:9	C48
49	720x480p	119.88 Hz/120 Hz	16:9	32:27	C49
50	720(1440)x480i	119.88 Hz/120 Hz	4:3	8:9	C50
51	720(1440)x480i	119.88 Hz/120 Hz	16:9	32:27	C51
52	720x576p	200 Hz	4:3	16:15	C52
53	720x576p	200 Hz	16:9	64:45	C53
54	720(1440)x576i	200 Hz	4:3	16:15	C54
55	720(1440)x576i	200 Hz	16:9	64:45	C55
56	720x480p	239.76 Hz/240 Hz	4:3	8:9	C56

1) The pixel repeat value can vary from 1 to 10 resulting in 10 variations of pixel aspect ratio.
2) The pixel repeat value can vary from 1 to 2 resulting in 2 variations of pixel aspect ratio.
3) The pixel repeat value can be 1, 2 to 4 resulting in 3 variations of pixel aspect ratio.

VIC	Format	Field rate	Picture aspect ratio (H:V)	Pixel aspect ratio (H:V)	Remote command parameter (<video format>)
57	720x480p	239.76 Hz/240 Hz	16:9	32:27	C57
58	720(1440)x480i	239.76 Hz/240 Hz	4:3	8:9	C58
59	720(1440)x480i	239.76 Hz/240 Hz	16:9	32:27	C59
60	1280x720p	23.97 Hz/24 Hz	16:9	1:1	C60
61	1280x720p	25 Hz	16:9	1:1	C61
62	1280x720p	29.97 Hz/30 Hz	16:9	1:1	C62
63	1920x1080p	119.88 Hz/120 Hz	16:9	1:1	C63
64	1920x1080p	100 Hz	16:9	1:1	C64
65 to 127	Reserved for the future				
0	No video identification code available (used with AVI InfoFrame only)				
1) The pixel repeat value can vary from 1 to 10 resulting in 10 variations of pixel aspect ratio. 2) The pixel repeat value can vary from 1 to 2 resulting in 2 variations of pixel aspect ratio. 3) The pixel repeat value can be 1, 2 to 4 resulting in 3 variations of pixel aspect ratio.					

Table 10-6: Video codecs: VIC for HDMI 2.0

VIC	Format	Field rate	Picture aspect ratio (H:V)	Pixel aspect ratio (H:V)	Remote command parameter (<video format>)
1	640x480p	59.94 Hz/60 Hz	4:3	1:1	C1
2	720x480p	59.94 Hz/60 Hz	4:3	8:9	C2
3	720x480p	59.94 Hz/60 Hz	16:9	32:27	C3
4	1280x720p	59.94 Hz/60 Hz	16:9	1:1	C4
5	1920x1080i	59.94 Hz/60 Hz	16:9	1:1	C5
6	720(1440)x480i	59.94 Hz/60 Hz	4:3	8:9	C6
7	720(1440)x480i	59.94 Hz/60 Hz	16:9	32:27	C7
8	720(1440)x240p	59.94 Hz/60 Hz	4:3	4:9	C8A|C8B
9	720(1440)x240p	59.94 Hz/60 Hz	16:9	16:27	C9A|C9B
10	2880x480i	59.94 Hz/60 Hz	4:3	2:9 to 20:9 1)	C10
1) The pixel repeat value can vary from 9 to 0 resulting in 10 variations of pixel aspect ratio. 2) The pixel repeat value can be 0 or 1 resulting in 2 variations of pixel aspect ratio. 3) The pixel repeat value can be 0, 1 or 3 resulting in 3 variations of pixel aspect ratio. 4) This picture aspect ratio continues the progression $(4:3)^N$, where N=1, 2, 3, and is near other wide cinematic values in use such as 2.2:1 (SMPTE RP 91), 21:9, and 2.39:1 (SMPTE RP 40).					

VIC	Format	Field rate	Picture aspect ratio (H:V)	Pixel aspect ratio (H:V)	Remote command parameter (<video format>)
11	2880x480i	59.94 Hz/60 Hz	16:9	8:27 to 80:27 1)	C11
12	2880x240p	59.94 Hz/60 Hz	4:3	1:9 to 10:9 1)	C12A|C12B
13	2880x240p	59.94 Hz/60 Hz	16:9	4:27 to 40:27 1)	C13A|C13B
14	1440x480p	59.94 Hz/60 Hz	4:3	4:9 or 8:9 2)	C14
15	1440x480p	59.94 Hz/60 Hz	16:9	16:27 or 32:27 2)	C15
16	1920x1080p	59.94 Hz/60 Hz	16:9	1:1	C16
17	720x576p	50 Hz	4:3	16:15	C17
18	720x576p	50 Hz	16:9	64:45	C18
19	1280x720p	50 Hz	16:9	1:1	C19
20	1920x1080i	50 Hz	16:9	1:1	C20
21	720(1440)x576i	50 Hz	4:3	16:15	C21
22	720(1440)x576i	50 Hz	16:9	64:45	C22
23	720(1440)x288p	50 Hz	4:3	8:15	C23A|C23B|C23C
24	720(1440)x288p	50 Hz	16:9	32:45	C24A|C24B|C24C
25	2880x576i	50 Hz	4:3	2:15 to 20:15 1)	C25
26	2880x576i	50 Hz	16:9	16:45 to 160:45 1)	C26
27	2880x288p	50 Hz	4:3	1:15 to 10:15 1)	C27A|C27B|C27C
28	2880x288p	50 Hz	16:9	8:45 to 80:45 1)	C28A|C28B|C28C
29	1440x576p	50 Hz	4:3	8:15 or 16:15 2)	C29
30	1440x576p	50 Hz	16:9	32:45 or 64:45 2)	C30
31	1920x1080p	50 Hz	16:9	1:1	C31
32	1920x1080p	23.98 Hz/24 Hz	16:9	1:1	C32
33	1920x1080p	25 Hz	16:9	1:1	C33
34	1920x1080p	29.97 Hz/30 Hz	16:9	1:1	C34
35	2880x480p	59.94 Hz/60 Hz	4:3	2:9, 4:9, or 8:9 3)	C35
36	2880x480p	59.94 Hz/60 Hz	16:9	8:27, 16:27, or 32:27 3)	C36
37	2880x576p	50 Hz	4:3	4:15, 8:15, or 16:15 3)	C37

1) The pixel repeat value can vary from 9 to 0 resulting in 10 variations of pixel aspect ratio.

2) The pixel repeat value can be 0 or 1 resulting in 2 variations of pixel aspect ratio.

3) The pixel repeat value can be 0, 1 or 3 resulting in 3 variations of pixel aspect ratio.

4) This picture aspect ratio continues the progression $(4:3)^N$, where N=1, 2, 3, and is near other wide cinematic values in use such as 2.2:1 (SMPTE RP 91), 21:9, and 2.39:1 (SMPTE RP 40).

VIC	Format	Field rate	Picture aspect ratio (H:V)	Pixel aspect ratio (H:V)	Remote command parameter (<video format>)
38	2880x576p	50 Hz	16:9	16:45, 32:45, or 64:45 3)	C38
39	1920x1080i (1250 total)	50 Hz	16:9	1:1	C39
40	1920x1080i	100 Hz	16:9	1:1	C40
41	1280x720p	100 Hz	16:9	1:1	C41
42	720x576p	100 Hz	4:3	16:15	C42
43	720x576p	100 Hz	16:9	64:45	C43
44	720(1440)x576i	100 Hz	4:3	16:15	C44
45	720(1440)x576i	100 Hz	16:9	64:45	C45
46	1920x1080i	119.88 Hz/120 Hz	16:9	1:1	C46
47	1280x720p	119.88 Hz/120 Hz	16:9	1:1	C47
48	720x480p	119.88 Hz/120 Hz	4:3	8:9	C48
49	720x480p	119.88 Hz/120 Hz	16:9	32:27	C49
50	720(1440)x480i	119.88 Hz/120 Hz	4:3	8:9	C50
51	720(1440)x480i	119.88 Hz/120 Hz	16:9	32:27	C51
52	720x576p	200 Hz	4:3	16:15	C52
53	720x576p	200 Hz	16:9	64:45	C53
54	720(1440)x576i	200 Hz	4:3	16:15	C54
55	720(1440)x576i	200 Hz	16:9	64:45	C55
56	720x480p	239.76 Hz/240 Hz	4:3	8:9	C56
57	720x480p	239.76 Hz/240 Hz	16:9	32:27	C57
58	720(1440)x480i	239.76 Hz/240 Hz	4:3	8:9	C58
59	720(1440)x480i	239.76 Hz/240 Hz	16:9	32:27	C59
60	1280x720p	23.98 Hz/24 Hz	16:9	1:1	C60
61	1280x720p	25 Hz	16:9	1:1	C61
62	1280x720p	29.97 Hz/30 Hz	16:9	1:1	C62
63	1920x1080p	119.88 Hz/120 Hz	16:9	1:1	C63
64	1920x1080p	100 Hz	16:9	1:1	C64

1) The pixel repeat value can vary from 9 to 0 resulting in 10 variations of pixel aspect ratio.

2) The pixel repeat value can be 0 or 1 resulting in 2 variations of pixel aspect ratio.

3) The pixel repeat value can be 0, 1 or 3 resulting in 3 variations of pixel aspect ratio.

4) This picture aspect ratio continues the progression $(4:3)^N$, where N=1, 2, 3, and is near other wide cinematic values in use such as 2.2:1 (SMPTE RP 91), 21:9, and 2.39:1 (SMPTE RP 40).

VIC	Format	Field rate	Picture aspect ratio (H:V)	Pixel aspect ratio (H:V)	Remote command parameter (<video format>)
65	1280x720p	23.98 Hz/24 Hz	64:27 4)	4:3	C65
66	1280x720p	25 Hz	64:27 4)	4:3	C66
67	1280x720p	29.97 Hz/30 Hz	64:27 4)	4:3	C67
68	1280x720p	50 Hz	64:27 4)	4:3	C68
69	1280x720p	59.94 Hz/60 Hz	64:27 4)	4:3	C69
70	1280x720p	100 Hz	64:27 4)	4:3	C70
71	1280x720p	119.88 Hz/120 Hz	64:27 4)	4:3	C71
72	1920x1080p	23.98 Hz/24 Hz	64:27 4)	4:3	C72
73	1920x1080p	25 Hz	64:27 4)	4:3	C73
74	1920x1080p	29.97 Hz/30 Hz	64:27 4)	4:3	C74
75	1920x1080p	50 Hz	64:27 4)	4:3	C75
76	1920x1080p	59.94 Hz/60 Hz	64:27 4)	4:3	C76
77	1920x1080p	100 Hz	64:27 4)	4:3	C77
78	1920x1080p	119.88 Hz/120 Hz	64:27 4)	4:3	C78
79	1680x720p	23.98 Hz/24 Hz	64:27 4)	64:63	C79
80	1680x720p	25 Hz	64:27 4)	64:63	C80
81	1680x720p	29.97 Hz/30 Hz	64:27 4)	64:63	C81
82	1680x720p	50 Hz	64:27 4)	64:63	C82
83	1680x720p	59.94 Hz/60 Hz	64:27 4)	64:63	C83
84	1680x720p	100 Hz	64:27 4)	64:63	C84
85	1680x720p	119.88 Hz/120 Hz	64:27 4)	64:63	C85
86	2560x1080p	23.98 Hz/24 Hz	64:27 4)	1:1	C86
87	2560x1080p	25 Hz	64:27 4)	1:1	C87
88	2560x1080p	29.97 Hz/30 Hz	64:27 4)	1:1	C88
89	2560x1080p	50 Hz	64:27 4)	1:1	C89
90	2560x1080p	59.94 Hz/60 Hz	64:27 4)	1:1	C90
91	2560x1080p	100 Hz	64:27 4)	1:1	C91

1) The pixel repeat value can vary from 9 to 0 resulting in 10 variations of pixel aspect ratio.

2) The pixel repeat value can be 0 or 1 resulting in 2 variations of pixel aspect ratio.

3) The pixel repeat value can be 0, 1 or 3 resulting in 3 variations of pixel aspect ratio.

4) This picture aspect ratio continues the progression $(4:3)^N$, where N=1, 2, 3, and is near other wide cinematic values in use such as 2.2:1 (SMPTE RP 91), 21:9, and 2.39:1 (SMPTE RP 40).

VIC	Format	Field rate	Picture aspect ratio (H:V)	Pixel aspect ratio (H:V)	Remote command parameter (<video format>)
92	2560x1080p	119.88 Hz/120 Hz	64:27 4)	1:1	C92
93	3840x2160p	23.98 Hz/24 Hz	16:9	1:1	C93
94	3840x2160p	25 Hz	16:9	1:1	C94
95	3840x2160p	29.97 Hz/30 Hz	16:9	1:1	C95
96	3840x2160p	50 Hz	16:9	1:1	C96
97	3840x2160p	59.94 Hz/60 Hz	16:9	1:1	C97
98	4096x2160p	23.98 Hz/24 Hz	256:135	1:1	C98
99	4096x2160p	25 Hz	256:135	1:1	C99
100	4096x2160p	29.97 Hz/30 Hz	256:135	1:1	C100
101	4096x2160p	50 Hz	256:135	1:1	C101
102	4096x2160p	59.94 Hz/60 Hz	256:135	1:1	C102
103	3840x2160p	23.98 Hz/24 Hz	64:27 4)	4:3	C103
104	3840x2160p	25 Hz	64:27 4)	4:3	C104
105	3840x2160p	29.97 Hz/30 Hz	64:27 4)	4:3	C105
106	3840x2160p	50 Hz	64:27 4)	4:3	C106
107	3840x2160p	59.94 Hz/60 Hz	64:27 4)	4:3	C107
108 to 255	Reserved for the future				
0	No video identification code available (used with AVI InfoFrame only)				

1) The pixel repeat value can vary from 9 to 0 resulting in 10 variations of pixel aspect ratio.

2) The pixel repeat value can be 0 or 1 resulting in 2 variations of pixel aspect ratio.

3) The pixel repeat value can be 0, 1 or 3 resulting in 3 variations of pixel aspect ratio.

4) This picture aspect ratio continues the progression $(4:3)^N$, where N=1, 2, 3, and is near other wide cinematic values in use such as 2.2:1 (SMPTE RP 91), 21:9, and 2.39:1 (SMPTE RP 40).

Picture aspect ratio

For example, with the 720x480 (16:9) data format and a 4:3 display, the source could:

- Use pan and scan information to crop the data to 540 horizontal pixels and then resample up to the required 720 pixels for output to the display
- Vertically resample to 360 lines and create bars of 60 lines above and below it to send this "letterbox" with the required 480 lines for output.

Other picture scaling methods are possible in either source or sink. For example, picture aspect ratio scaling (picture expand, shrink, etc.) can be accomplished in the source, including, possibly, added black/gray lines in the pixel portion of the video. The

exception to this is the 640x480 format, which is always sent as 4x3 data, and is rendered according to the characteristics of the sink.

Channel allocation

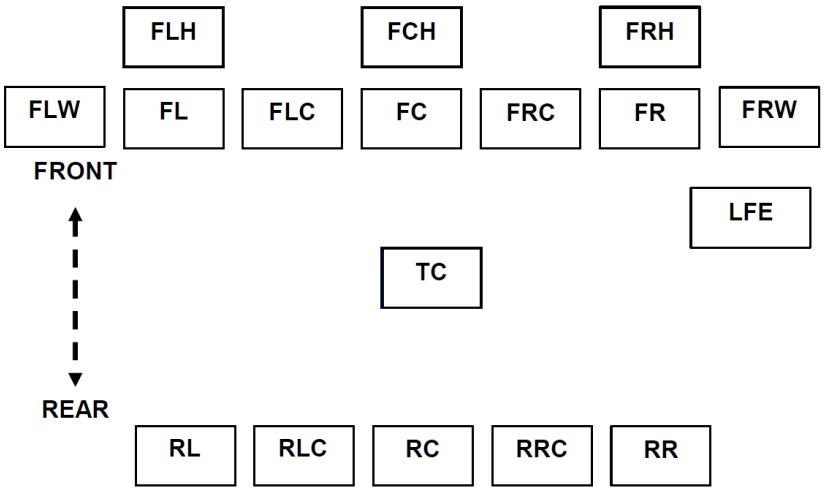


Figure 10-2: Speaker placement

Label	Location
FL	Front left
FC	Front center
FR	Front right
FLC	Front left center
FRC	Front right center
RL	Rear left
RC	Rear center
RR	Rear right
RLC	Rear left center
RRC	Rear right center
LFE	Low frequency effect
FLW	Front left wide
FRW	Front right wide
FLH	Front left high
FCH	Front center high
FRH	Front right high
TC	Top center

FLW/FRW are front perimeter speakers, outside of the front main speakers.
FLH/FCH/FRH are front elevated speakers, generally above the front main speakers.
TC is an upper surround or overhead speaker, directly above overhead.

Data byte 4 contains information that describes how various speaker locations are allocated to transmission channels. Channel allocation is shown in Table 10-7. See annex K of the CEA-861-E specification for additional information concerning audio channel allocation relationships between CEA-861-E and other standards.

Table 10-7: Audio InfoFrame data byte 4

CA (binary)								**CA (hex)**	**Channel number**							
7	6	5	4	3	2	1	0		8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	0	0x00	-	-	-	-	-	-	FR	FL
0	0	0	0	0	0	0	1	0x01	-	-	-	-	-	LFE	FR	FL
0	0	0	0	0	0	1	0	0x02	-	-	-	-	FC	-	FR	FL
0	0	0	0	0	0	1	1	0x03	-	-	-	-	FC	LFE	FR	FL
0	0	0	0	0	1	0	0	0x04	-	-	-	RC	-	-	FR	FL
0	0	0	0	0	1	0	1	0x05	-	-	-	RC	-	LFE	FR	FL
0	0	0	0	0	1	1	0	0x06	-	-	-	RC	FC	-	FR	FL
0	0	0	0	0	1	1	1	0x07	-	-	-	RC	FC	LFE	FR	FL
0	0	0	0	1	0	0	0	0x08	-	-	RR	RL	-	-	FR	FL
0	0	0	0	1	0	0	1	0x09	-	-	RR	RL	-	LFE	FR	FL
0	0	0	0	1	0	1	0	0x0A	-	-	RR	RL	FC	-	FR	FL
0	0	0	0	1	0	1	1	0x0B	-	-	RR	RL	FC	LFE	FR	FL
0	0	0	0	1	1	0	0	0x0C	-	RC	RR	RL	-	-	FR	FL
0	0	0	0	1	1	0	1	0x0D	-	RC	RR	RL	-	LFE	FR	FL
0	0	0	0	1	1	1	0	0x0E	-	RC	RR	RL	FC	-	FR	FL
0	0	0	0	1	1	1	1	0x0F	-	RC	RR	RL	FC	LFE	FR	FL
0	0	0	1	0	0	0	0	0x10	RRC	RLC	RR	RL	-	-	FR	FL
0	0	0	1	0	0	0	1	0x11	RRC	RLC	RR	RL	-	LFE	FR	FL
0	0	0	1	0	0	1	0	0x12	RRC	RLC	RR	RL	FC	-	FR	FL
0	0	0	1	0	0	1	1	0x13	RRC	RLC	RR	RL	FC	LFE	FR	FL
0	0	0	1	0	1	0	0	0x14	FRC	FLC	-	-	-	-	FR	FL
0	0	0	1	0	1	0	1	0x15	FRC	FLC	-	-	-	LFE	FR	FL
0	0	0	1	0	1	1	0	0x16	FRC	FLC	-	-	FC	-	FR	FL
0	0	0	1	0	1	1	1	0x17	FRC	FLC	-	-	FC	LFE	FR	FL

CA (binary)								CA (hex)	Channel number							
0	0	0	1	1	0	0	0	0x18	FRC	FLC	-	RC	-	-	FR	FL
0	0	0	1	1	0	0	1	0x19	FRC	FLC	-	RC	-	LFE	FR	FL
0	0	0	1	1	0	1	0	0x1A	FRC	FLC	-	RC	FC	-	FR	FL
0	0	0	1	1	0	1	1	0x1B	FRC	FLC	-	RC	FC	LFE	FR	FL
0	0	0	1	1	1	0	0	0x1C	FRC	FLC	RR	RL	-	-	FR	FL
0	0	0	1	1	1	0	1	0x1D	FRC	FLC	RR	RL	-	LFE	FR	FL
0	0	0	1	1	1	1	0	0x1E	FRC	FLC	RR	RL	FC	-	FR	FL
0	0	0	1	1	1	1	1	0x1F	FRC	FLC	RR	RL	FC	LFE	FR	FL
0	0	1	0	0	0	0	0	0x20	-	FCH	RR	RL	FC	-	FR	FL
0	0	1	0	0	0	0	1	0x21	-	FCH	RR	RL	FC	LFE	FR	FL
0	0	1	0	0	0	1	0	0x22	TC	-	RR	RL	FC	-	FR	FL
0	0	1	0	0	0	1	1	0x23	TC	-	RR	RL	FC	LFE	FR	FL
0	0	1	0	0	1	0	0	0x24	FRH	FLH	RR	RL	-	-	FR	FL
0	0	1	0	0	1	0	1	0x25	FRH	FLH	RR	RL	-	LFE	FR	FL
0	0	1	0	0	1	1	0	0x26	FRW	FLW	RR	RL	-	-	FR	FL
0	0	1	0	0	1	1	1	0x27	FRW	FLW	RR	RL	-	LFE	FR	FL
0	0	1	0	1	0	0	0	0x28	TC	RC	RR	RL	FC	-	FR	FL
0	0	1	0	1	0	0	1	0x29	TC	RC	RR	RL	FC	LFE	FR	FL
0	0	1	0	1	0	1	0	0x2A	FCH	RC	RR	RL	FC	-	FR	FL
0	0	1	0	1	0	1	1	0x2B	FCH	RC	RR	RL	FC	LFE	FR	FL
0	0	1	0	1	1	0	0	0x2C	TC	FCH	RR	RL	FC	-	FR	FL
0	0	1	0	1	1	0	1	0x2D	TC	FCH	RR	RL	FC	LFE	FR	FL
0	0	1	0	1	1	1	0	0x2E	FRH	FLH	RR	RL	FC	-	FR	FL
0	0	1	0	1	1	1	1	0x2F	FRH	FLH	RR	RL	FC	LFE	FR	FL
0	0	1	1	0	0	0	0	0x30	FRW	FLW	RR	RL	FC	-	FR	FL
0	0	1	1	0	0	0	1	0x31	FRW	FLW	RR	RL	FC	LFE	FR	FL
0	0	1	1	0	0	1	0	0x32	Reserved							
...																
1	1	1	1	1	1	1	1	0xFF								

10.4.4 CEC Communication

CEC operation codes used in the CEC communication. Shortened, they are called opcodes.

The remote command parameter in the following table only applies to the HDMI analyzer and HDMI generator applications.

In the CEC/DDC analyzer application, the opcode is addressed by 2 parameters as described in `CONFigure<hw>:CECDdc:COMMand:CEC:OPCode` on page 967.

Table 10-8: CEC operation codes

CEC feature	Operation code	Remote command parameter (<opcode>)
One touch play	Image View On (0x04)	OP04
	Text View On (0x0D)	OP0D
	Active Source (0x82)	OP82
Routing control	Standby (0x36)	RC36
	Routing Change (0x80)	RC80
	Routing Information (0x81)	RC81
	Active Source (0x82)	RC82
	Request Active Source (0x85)	RC85
	Set Stream Path (0x86)	RC86
	Inactive Source (0x9D)	RC9D
One touch record	Record On (0x09)	OR09
	Record Status (0x0A)	OR0A
	Record Off (0x0B)	OR0B
	Record TV Screen (0x0F)	OR0F
Deck control	Give Deck Status (0x1A)	DC1A
	Deck Status (0x1B)	DC1B
	Play (0x41)	DC41
	Deck Control (0x42)	DC42
Timer programming	Clear Analog Timer (0x33)	TP33
	Set Analog Timer (0x34)	TP34
	Timer Status (0x35)	TP35
	Timer Cleared Status (0x43)	TP43
	Set Timer Program Title (0x67)	TP67
	Set Digital Timer (0x97)	TP97

CEC feature	Operation code	Remote command parameter (<opcode>)
	Clear Digital Timer (0x99)	TP99
	Clear External Timer (0xA1)	TPA1
	Set External Timer (0xA2)	TPA2
System information	Polling Message	SIPM
	Set Menu Language (0x32)	SI32
	Give Physical Address (0x83)	SI83
	Report Physical Address (0x84)	SI84
	Get Menu Language (0x91)	SI91
	CEC Version (0x9E)	SI9E
	Get CEC Version (0x9F)	SI9F
Capability discovery & control	CDC Message (0xF8)	CDF8
Tuner control	Tuner Step Increment (0x05)	TC05
	Tuner Step Decrement (0x06)	TC06
	Tuner Device Status (0x07)	TC07
	Give Tuner Device Status (0x08)	TC08
	Select Analog Service (0x92)	TC92
	Select Digital Service (0x93)	TC93
Vendor specific commands	Device Vendor ID (0x87)	VC87
	Vendor Command (0x89)	VC89
	Vendor Remote Button Down (0x8A)	VC8A
	Vendor Remote Button Up (0x8B)	VC8B
	Get Device Vendor ID (0x8C)	VC8C
	CEC Version (0x9E)	VC9E
	Get CEC Version (0x9F)	VC9F
	Vendor Command With ID (0xA0)	VCA0
OSD display	Set OSD String (0x64)	OD64
Device OSD transfer	Give OSD Name (0x46)	DT46
	Set OSD Name (0x47)	DT47
Device menu control	User Control Pressed (0x44)	DM44
	User Control Released (0x45)	DM45
	Menu Request (0x8D)	DM8D
	Menu Status (0x8E)	DM8E
Remote control passthrough	User Control Pressed (0x44)	RC44

CEC feature	Operation code	Remote command parameter (<opcode>)
	User Control Released (0x45)	RC45
Power status	Give Device Power Status (0x8F)	PS8F
	Report Power Status (0x90)	PS90
General protocol messages	Feature Abort (0x00)	GP00
	Abort (Reserved for Testing) (0xFF)	GPFF
System audio control	User Control Pressed (0x44)	SA44
	User Control Released (0x45)	SA45
	System Audio Mode Request (0x70)	SA70
	Give Audio Status (0x71)	SA71
	Set System Audio Mode (0x72)	SA72
	Report Audio Status (0x7A)	SA7A
	Give System Audio Mode Status (0x7D)	SA7D
	System Audio Mode Status (0x7E)	SA7E
	Report Short Audio Descriptor (0xA3)	SAA3
	Request Short Audio Descriptor (0xA4)	SAA4
Audio rate control	Set Audio Rate (0x9A)	AR9A
Audio return channel control	Initiate ARC (0xC0)	ARC0
	Report ARC Initiated (0xC1)	ARC1
	Report ARC Terminated (0xC2)	ARC2
	Request ARC Initiation (0xC3)	ARC3
	Request ARC Termination (0xC4)	ARC4
	Terminate ARC (0xC5)	ARC5

Table 10-9: CEC commands (CEC/DDC analyzer application, quick mode)

Type	Remote command parameters	
	<Group>	"<String>"
Preset	PRES	User Control Pressed: Volume Up
		User Control Pressed: Volume Down
		User Control Pressed: Mute
		User Control Pressed: Power Toggle Function
		Give Device Power Status
		User Control Pressed: Play
		User Control Pressed: Stop

Type	Remote command parameters	
	<Group>	"<String>"
		User Control Pressed: Pause
		User Control Pressed: Power On Function
		User Control Pressed: Power Off Function
		Active Source
		Image View On
		Standby
		Record On
		Record Off
		Give Physical Address
		Get CEC Version
		Set Menu Language: [ENG]
		Menu Request: Activate
		Deck Control: Eject
User-defined	UDEF	1. Undefined ... 20. Undefined Or the name you have assigned to the hotkey

11 Time Domain Analyzer Application

Requires the following options:

- TMDS time domain analyzer module (R&S VT-B2380)
  See Chapter 4.2.2.20, "TMDS Time Domain Analyzer Module (R&S VT-B2380)", on page 81
- HDMI type A TPA (plug) (R&S VT-Z2385)
  See Chapter 4.2.3.1, "HDMI Type A TPA (Plug) (R&S VT-Z2385)", on page 82

The time domain analyzer application (TDA) performs the electrical measurement on HDMI or MHL source devices. Depending on the type of test probe adapter (TPA), it allows to check the quality of TMDS (transition-minimized differential signaling) outputs and other lines of an HDMI or MHL output connector. The quality grade of each source device type is enforced by the HDMI or MHL licensing LLC by defining a compliance test specification (CTS).

Precompliance

Although the time domain analyzer application performs the measurement in a different way than described in the CTS, it gives a good indication of whether the device under test (DUT) would pass the HDMI/MHL compliance tests. If the DUT marginally fails a test performed by the time domain analyzer application, it still has a chance to pass the test with the prescribed test equipment.

HDCP

To perform the measurement, a continuous signal is required. Because the time domain analyzer application is not able to perform the handshake for a HDCP transmission, there may be no measurement with sources that interrupt the TMDS clock if a HDCP connection cannot be established.

The time domain analyzer application performs:

- Scope measurements on TMDS lines
- CTS measurements on TMDS lines
- CTS measurements on other signal lines

The main function of the time domain analyzer application is the eye diagram measurement of the TMDS data lines. These lines are grouped in pairs and contain data bits in the range between 250 Mbit/s and 6 Gbit/s in differential mode. To sample those high data rates, usually a high-speed oscilloscope with sampling rates above 40 GSample/s and a bandwidth of 16 GHz is required. The time domain analyzer application uses a sub sampling method instead. Due to a synchronous clock signal, sampling at different phases of the data signal is possible to get a complete eye diagram. Further measurements are performed on the results of this eye diagram measurement on the different TMDS data lines.

11.1 Main Dialog of the Application

The parameters are grouped on tabs.

Default favorites

Parameters that are often needed are provided as default favorites below the tab title.

- "Probe (default favorite)" on page 369
- "DDC EDID" on page 371
- "Signal (default favorite)" on page 369
- "TMDS Char Clk (default favorite)" on page 370
- Channel

  Not available on the "Input" subtab. Differs depending on the selected measurement:
  - "Scope" subtab: "Channel (default favorite)" on page 373
  - "CTS" subtab: "Channel (default favorite)" on page 382

Common remote commands

`DISPlay<hw>:TDA:SELect:TAB` on page 989

`READ<hw>[:SCALar]:TDA:COMMand:STATe?` on page 992

Probe (default favorite)

Displays the probe type connected to the TMDS time domain analyzer module (R&S VT-B2380).

- "VT-Z2385"
  HDMI type A TPA (plug) (R&S VT-Z2385)
  For information on the setup see Chapter 4.2.3.1, "HDMI Type A TPA (Plug) (R&S VT-Z2385)", on page 82.

Remote command:

`SENSe<hw>[:SCALar]:TDA:INPut:PROBe?` on page 1003

`ROUTe<hw>:TDA:MODule:CATalog?` on page 1002

Signal (default favorite)

Displays if the TMDS time domain analyzer module (R&S VT-B2380) was able to synchronize to the detected HDMI or MHL input clock.

- "Locked"
- "Unlocked"

Remote command:

`READ<hw>[:SCALar]:TDA:SIGNal:STATe?` on page 1002

TMDS Char Clk (default favorite)

Displays the measured value of the TMDS character clock in MHz. The TMDS character clock is always 1/10th of the TMDS bit rate. TMDS character clock is equal to the TMDS clock rate for all HDMI 1.4 modes, but in 6G mode (HDMI 2.0) or with MHL, it is 4 times the TMDS clock rate.

Remote command:

`READ<hw>[:SCALar]:TDA:CLOCk:CHARacter?` on page 992

`READ<hw>[:SCALar]:TDA:BTOLink?` on page 992

11.2 Input Subtab

Configures the EDID to control the DUT.

By selecting a frequency, you want to force the DUT to produce a specific TMDS bit rate: an EDID is presented that allows only this TMDS character rate (frequency). Because not all source devices support all video standards and given the range of video descriptors, it is possible to generate another character rate than required. In these cases, load a user-defined EDID from a file. Subsequently, a reconnect of the device by opening and closing the hot plug detect line is performed. You can also trigger a reconnect separately ("Reconnect button" on page 371).

EDID
Groups the extended display identification data (EDID).

TMDS Character Clock ← EDID
Sets an EDID to force the DUT to produce the test frequencies. The range depends on the standard.

- HDMI 1.4b: "25.175000 MHz" to "297.000000 MHz"
- HDMI 2.0: "356.043600 MHz", "593.406000 MHz", "594.000000 MHz"

Remote command:
`CONFigure<hw>:TDA:FREQuency` on page 985

User-Defined EDID ← EDID
Allows the usage of a user-defined EDID file.

- "File"
  Opens the "File" dialog to select an EDID file. See Chapter 5.3, "File Dialog", on page 89.
  If the EDID file is valid, it is immediately loaded for readout, the user-defined EDID button is set to "File", and the "Reconnect" button is enabled.
- "Off"
  Uses a default EDID depending on the setting under "TMDS Character Clock" on page 371.

Remote command:
`CONFigure<hw>:TDA:INPut:EDID:USER` on page 986

Load ← EDID
Opens the "File" dialog to select an EDID file. See Chapter 5.3, "File Dialog", on page 89.

Remote command:
`MMEMory<hw>:TDA:INPut:EDID:DATA:LOAD` on page 991

DDC EDID ← EDID
Displays the status of reading the extended display identification data (EDID) from the DUT.

Remote command:
`READ<hw>[:SCALar]:TDA:INPut:EDID?` on page 995

Reconnect button ← EDID
Opens the hot plug detect line and reconnects the line afterwards to force the DUT to reread the EDID.

Remote command:
`ROUTe<hw>:TDA:REConnect` on page 1002

11.3 Scope Subtab

Displays the measurement results depending on the selected view. The scope measurement display depends on the setting of the channels to be measured. As described under "Channel (default favorite)" on page 373, the voltage scaling depends on the measurement type: single ended or differential.

The measurement results are presented in a graphical and tabular view. The scale of the graphical view and the content of the tabular depend on the selection under "View" on page 374.

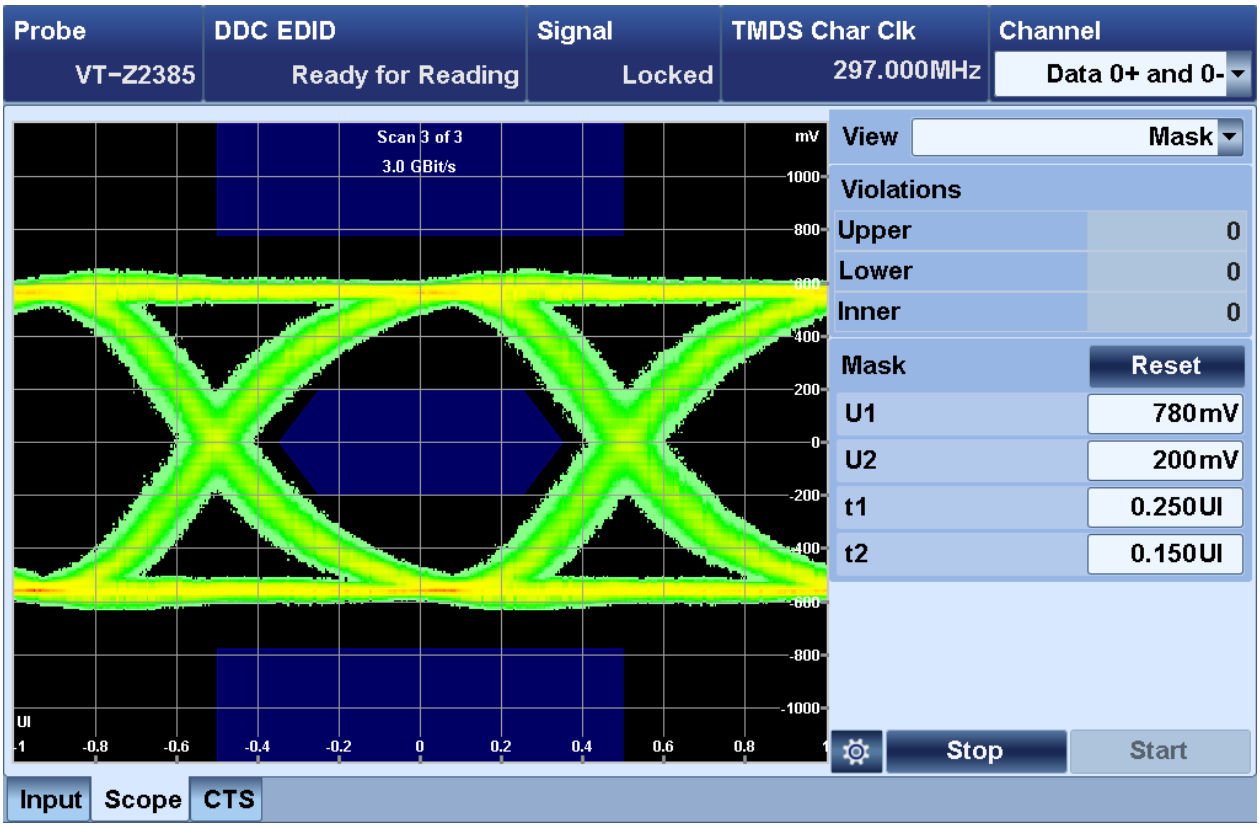
Remote commands to query measurement results and status

Measured values of the eye diagram:

`READ<hw>:ARRay:TDA:SCOPe:EYE?` on page 991

Current scan number:

`READ<hw>[:SCALar]:TDA:SCOPe:PERSistence:COUNt?` on page 1000



Channel (default favorite)
The available parameters depend on the probe and the measurement. For an HDMI probe in the scope measurement it is:

- "Data 0+ and 0-"
  Differential measurement
- "Data 0+ and GND"
  Single ended measurement
- "Data 0- and GND"
  Single ended measurement
- "Data 1+ and 1-"
  Differential measurement
- "Data 1+ and GND"
  Single ended measurement
- "Data 1- and GND"
  Single ended measurement
- "Data 2+ and 2-"
  Differential measurement
- "Data 2+ and GND"
  Single ended measurement
- "Data 2- and GND"
  Single ended measurement

Differential measurements show the voltage difference between 2 lines. There is no DC offset (0 V). The amplitude of the signal is the sum of the amplitudes of the 2 single lines measured to ground (single ended measurement).

For TMDS signals, the positive and the negative lines have a DC offset of about 2.9 V and a peak-to-peak voltage of 400 mV (+/- 200 mV). Because the negative line shows the inverted signal of the positive line, there is a differential peak-to-peak voltage of 800 mV (+/- 400 mV), with the DC offset eliminated. The scales of the scope display and the values of cursor, mask, and vertical histogram take this into account.

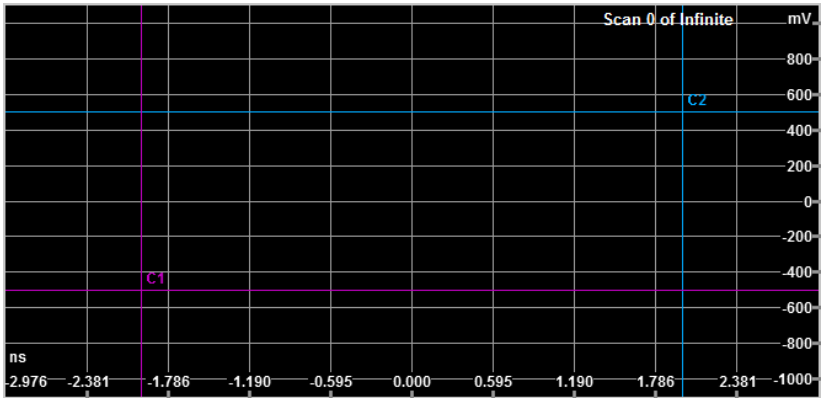
Remote command:
`READ<hw>[:SCALar]:TDA:LIST:INPut?` on page 996
`ROUTe<hw>:TDA:SCOPe:HDMI:CHANnel:SELect` on page 1003

View
Sets the measurement function of the scope.

- "Cursor"
  See "Cursor View" on page 374.
- "Mask"
  See "Mask View" on page 375.
- "Horizontal Histogram"
  See "Horizontal Histogram View" on page 376.
- "Vertical Histogram"
  See "Vertical Histogram View" on page 377.

Remote command:
`CONFigure<hw>:TDA:SCOPe` on page 986

Cursor View



You can move the cursor by sliding your finger on the touch screen, or selecting the "C1"/"C2" parameter and changing its value.

Remote command:
`CONFigure<hw>:TDA:SCOPe` on page 986

C1, C2 ← Cursor View
Sets the x and y value. To change the units of the axes, tap ⚙, see "Unit Settings" on page 379.

Remote command:
`CONFigure<hw>:TDA:SCOPe:CURSor<cursor>` on page 987

U_{C2-C1} ← Cursor View
Displays the voltage difference between the cursors.

Remote command:
READ<hw>[:SCALar]:TDA:SCOPe:CURSor:DIFFerence? on page 996

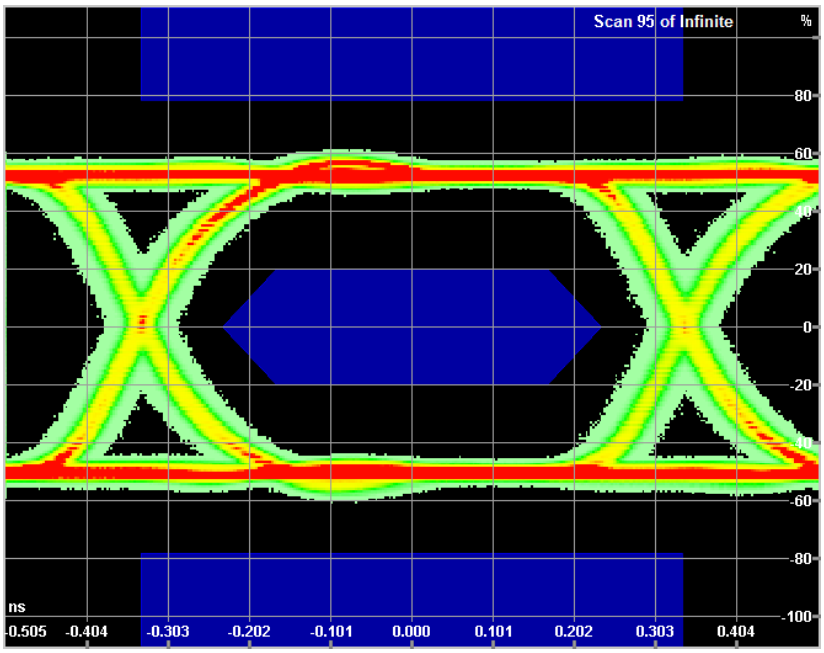
t_{C2-C1} ← Cursor View
Displays the time difference between the cursors.

Remote command:
READ<hw>[:SCALar]:TDA:SCOPe:CURSor:DIFFerence? on page 996

f_{C2-C1} ← Cursor View
Displays the frequency difference between the cursors.

Remote command:
READ<hw>[:SCALar]:TDA:SCOPe:CURSor:DIFFerence? on page 996

Mask View



Violations of the mask are indicated by coloring the samples to violet and counting the violations in the measurement display.

Remote command:
CONFigure<hw>:TDA:SCOPe on page 986

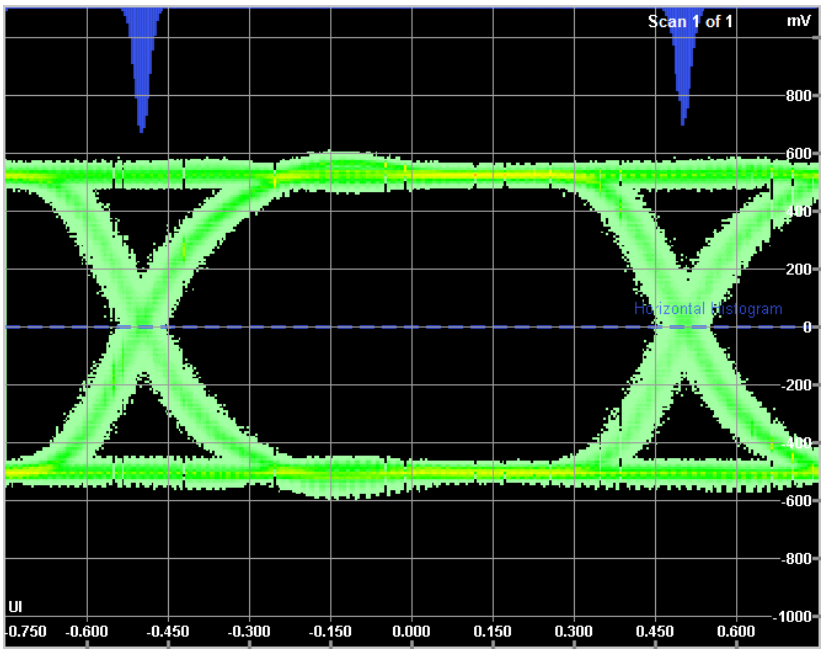
Violations ← Mask View
Displays the counts of mask violations. To change the mask, tap , see "Mask" on page 375.

Remote command:
READ<hw>[:SCALar]:TDA:SCOPe:MASK:VIOLation? on page 999

Mask ← Mask View
Configures the mask. Tap "Reset" to set the default values.

Remote command:
CONFigure<hw>:TDA:SCOPe:MASK on page 987
CONFigure<hw>:TDA:SCOPe:MASK:RESet on page 988

Horizontal Histogram View



The horizontal histogram shows the appearances of samples on the 0 volt line at the 2 crossing points of the signal (edges). The occurrence at these points ideally shows hills with a Gaussian distribution.

Remote command:
CONFigure<hw>:TDA:SCOPe on page 986
READ<hw>[:SCALar]:TDA:SCOPe:HHIStogram:VALues? on page 998

Right - Left (H2 - H1) ← Horizontal Histogram View
Difference between the right histogram calculation and the left histogram calculation. See "Left Histogram (H1), Right Histogram (H2)" on page 376.

- The difference of the "Mean" values nominally gives the bit time.
- "Min" is the difference between the leftmost point of the right histogram minus the rightmost point of the left histogram.
- "Max" is the difference between the rightmost point of the right histogram minus the leftmost point of the left histogram.
- A difference of "Standard Deviation" is not defined.

Remote command:
READ<hw>[:SCALar]:TDA:SCOPe:HHIStogram? on page 997

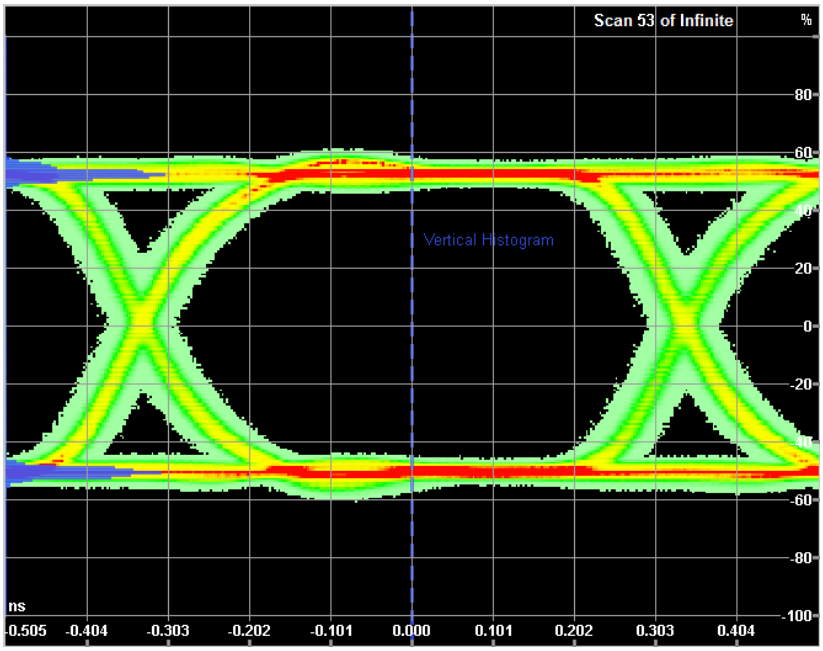
Left Histogram (H1), Right Histogram (H2) ← Horizontal Histogram View
The left histogram is a statistical calculation of the sampling distribution left of the eye mid point. The right histogram is a statistical calculation of the sampling distribution right of the eye mid point.

A description of the distribution is defined by the following parameters:

- "Mean"
  Middle of all occurrences
- "Max"
- "Min"
- "Standard Deviation"
  Square root of all squares of the distance to the mean value times number of occurrence divided by the total number of occurrences

Remote command:
`READ<hw>[:SCALar]:TDA:SCOPe:HHIStogram?` on page 997

Vertical Histogram View



The vertical horizontal histogram shows the appearances of samples in the center time between the 2 crossing points of the signal (edges). The occurrence at these points ideally shows hills with a Gaussian distribution.

Remote command:
`CONFigure<hw>:TDA:SCOPe` on page 986
`READ<hw>[:SCALar]:TDA:SCOPe:VHIStogram:VALues?` on page 1001

Upper - Lower ← Vertical Histogram View
Difference between upper histogram calculation and lower histogram calculation. See "Upper Histogram, Lower Histogram" on page 378.

- The difference of the "Mean" values gives nominal peak to peak amplitude.
- "Min" is the difference between the lowermost point of the upper histogram minus the uppermost point of the lower histogram.
- "Max" is the difference between the uppermost point of the upper histogram minus the lowermost point of the lower histogram.
- A difference of "Standard Deviation" is not defined.

Remote command:
READ<hw>[:SCALar]:TDA:SCOPe:VHIStogram? on page 1000

Upper Histogram, Lower Histogram ← Vertical Histogram View
The upper histogram is a statistical calculation of the sampling distribution in the upper part of the eye mid point. The lower histogram is a statistical calculation of the sampling distribution in the lower part of the eye mid point.

A description of the distribution is defined by the following parameters:

- "Mean"
  Middle of all occurrences
- "Max"
- "Min"
- "Standard Deviation"
  Square root of all squares of the distance to the mean value times number of occurrence divided by the total number of occurrences

Remote command:
READ<hw>[:SCALar]:TDA:SCOPe:VHIStogram? on page 1000

Scope Settings dialog
Tap to configure the scope measurement.

Common ← Scope Settings dialog
Groups the common parameters for all views.

Persistence ← Common ← Scope Settings dialog
Defines the processing and display of the sampling data over time.

- "Infinite"
  Collects all data over all scans.
- "Limited"
  Filters over time. When the number of scans is reached, the older limitation data are replaced by new data.

Remote command:
CONFigure<hw>:TDA:SCOPe:PERSistence on page 988

Number of Scans ← Common ← Scope Settings dialog
Only available if "Limited" is set under "Persistence" on page 378.

Sets the memory time of samples.

Remote command:
CONFigure<hw>:TDA:SCOPe:PERSistence:COUNt on page 988

Resolution ← Common ← Scope Settings dialog
Sets the quality of the scope measurement.

- "Low"
  Less measurements per scan but with high speed
- "High"
  Maximum measurements per scan but with lower speed

Remote command:
CONFigure<hw>:TDA:SCOPe:RESolution on page 989

Span ← Common ← Scope Settings dialog
Sets the range of the scan over the TMDS data bit. Unit interval (UI) is the time for 1 bit transmitted.

- "1.2 UI"
  1 TMDS data bit +/-10 %
- "1.5 UI"
  1 TMDS data bit +/-25 %
- "2 UI"
  1 TMDS data bit +/-50 %
- "3 UI"
  3 TMDS data bits

Remote command:
`CONFigure<hw>:TDA:SCOPe:SPAN` on page 989

Unit Settings ← Scope Settings dialog
Changes the units in groups. If you change the unit of a voltage from V to mV, then all other voltages are changed to mV, too.

Voltage ← Unit Settings ← Scope Settings dialog

- "V"
  Volts
- "mV"
  Milli volts
- %
  Percent of a predefined value. The following rules apply:
  – Levels are relative to 500 mV in differential measurements, and relative to 250 mV in single ended measurements. Levels are single cursor or single vertical histogram values.
  – Peak-to-peak amplitudes are relative to 1000 mV in differential measurements, and relative to 500 mV in single ended measurements. Peak-to-peak amplitudes are cursor differences or values of "Upper - Lower" Histogram.

Remote command:
`UNIT<hw>:TDA:SCOPe:VOLTage` on page 1004

Time ← Unit Settings ← Scope Settings dialog

- "UI"
  Unit intervals: 1/(10 * Tchar)
- "ns"
  Nano seconds: 10^{-9} seconds
- ps
  Pico seconds: 10^{-12} seconds

Remote command:
`UNIT<hw>:TDA:SCOPe:TIME` on page 1004

Stop button
Stops the measurement.

Remote command:
`ABORt<hw>:TDA` on page 981

Start button
Starts the measurement.

Remote command:
`INITiate<hw>:TDA` on page 990

11.4 CTS Subtab

Requires the HDMI CTS source test (elec.) option (R&S VT-K2385).

Divided into two panes. The left pane displays the compliance test results. You can select between:

- "Test Report"
- "Waveform"
  If more than one graphical view is available, browse buttons are available and the number of the current view is displayed, for example "1/6" (1 of 6).

Remote commands to query measurement results

Number of report lines:

`READ<hw>[:SCALar]:TDA:CTS:REPort:COUNt?` on page 994

Text from the selected test report line:

`READ<hw>[:SCALar]:TDA:CTS:REPort?` on page 994

Final test result:

`READ<hw>[:SCALar]:TDA:CTS:RESult?` on page 994

Required user action:

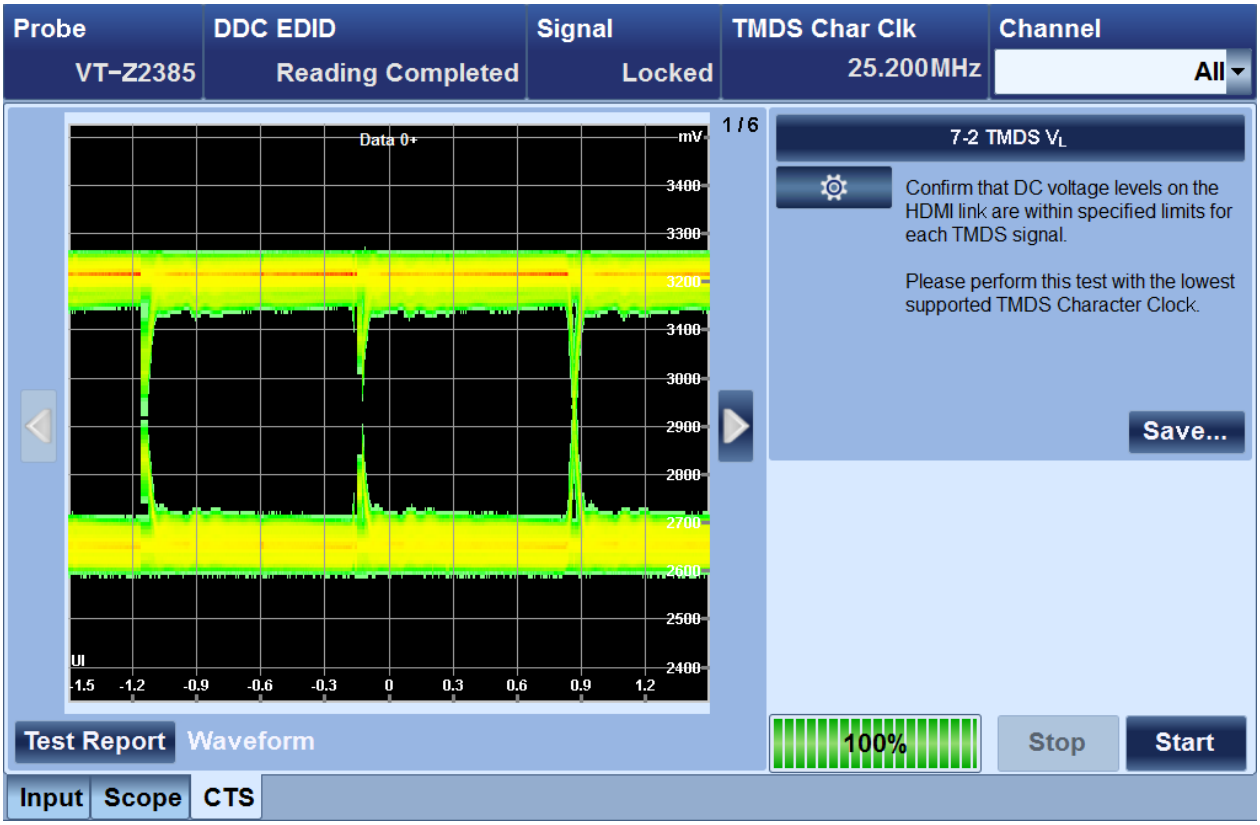
`READ<hw>[:SCALar]:TDA:CTS:UACTion?` on page 995

Measurement status:

`READ<hw>[:SCALar]:TDA:CTS:CONTrol:STATe?` on page 993

Measurement progress:

`READ<hw>[:SCALar]:TDA:CTS:CONTrol:PROGress?` on page 993



Channel (default favorite)
Sets the channel of the measurement.

- "All"
  All suitable lines or combinations of lines are measured in one scan.
- "Data 0+ and GND", "Data 0- and GND", "Data 1+ and GND", "Data 1- and GND", "Data 2+ and GND", "Data 2- and GND"
  Single ended measurement on a TMDS data line.
- "Data 0+ and 0-", "Data 1+ and 1-", "Data 2+ and 2-"
  Differential measurement of a TMDS data pair (+ and - lines).
- "Data 0 and 1", "Data 1 and 2", "Data 0 and 2"
  Differential measurement of one TMDS data pair in relation to another pair.
- "Clock+ and GND", "Clock- and GND"
  Single ended measurement of voltage on both lines.
- "Clock+ Clock-"
  Differential measurement of the clock+ and - lines.

Not every channel value is available for every test case, see Table 11-1 and Table 11-2.

Table 11-1: Available channel values for the HDMI 1.4 tests

Test case / Channel value	7-2	7-3	7-4	7-6	7-7	7-8	7-9
"All"	x	x	x	x	x		
"Data 0+ and GND"	x	x	x				
"Data 0- and GND"	x	x	x				
"Data 1+ and GND"	x	x	x				
"Data 1- and GND"	x	x	x				
"Data 2+ and GND"	x	x	x				

Test case / Channel value	7-2	7-3	7-4	7-6	7-7	7-8	7-9
"Data 2- and GND"	x	x	x				
"Data 0+ and 0-"			x		x		
"Data 1+ and 1-"			x		x		
"Data 2+ and 2-"			x		x		
"Data 0 and 1"				x			
"Data 1 and 2"				x			
"Data 0 and 2"				x			
"Clock+ and GND"		x					
"Clock- and GND"		x					
"Clock+ Clock-"						x	x

Table 11-2: Available channel values for the HDMI 2.0 tests

Test case / Channel value	HF1-1	HF1-2	HF1-3	HF1-4	HF1-5	HF1-6	HF1-7
"All"	x	x	x	x	x		
"Data 0+ and GND"	x	x					
"Data 0- and GND"	x	x					
"Data 1+ and GND"	x	x					
"Data 1- and GND"	x	x					
"Data 2+ and GND"	x	x					
"Data 2- and GND"	x	x					
"Data 0+ and 0-"		x		x	x		
"Data 1+ and 1-"		x		x	x		
"Data 2+ and 2-"		x		x	x		
"Data 0 and 1"			x				
"Data 1 and 2"			x				
"Data 0 and 2"			x				
"Clock+ and GND"							
"Clock- and GND"							
"Clock+ Clock-"						x	x

Remote command:
`CONFigure<hw>:TDA:CTS:HDMI:CHANnel:SELect` on page 982

<Test Case> button
Displays the selected test case.

Tap this button to select another test case, see "Test Case dialog" on page 384.

Tap ⚙ to configure the selected test, see "CTS Configuration dialog" on page 384.

Test Case dialog ← <Test Case> button
Displays all test cases that are available for the probe type.

Select the desired test case. If you select a new test case, the old test results are deleted.

Remote command:
`CONFigure<hw>:TDA:CTS:HDMI:SELect` on page 985
`READ<hw>[:SCALar]:TDA:CTS:HDMI:SELect:NAME?` on page 993

CTS Configuration dialog
In a tree view, displays all available test cases. Each test case has its own set of parameters. The parameters are subentries of the corresponding test case node. Open a test case to display and edit the parameters of this test case.

7-2: TMDS -V_L ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.2, "7-2: TMDS -V_L", on page 389.

Channel ← 7-2: TMDS -VL ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

Sink Supports Pixel Clock > 165 MHz ← 7-2: TMDS -VL ← CTS Configuration dialog
Sets the length of the test sequence corresponding to the CDF (capabilities declaration form) field for the DUT.

- "Yes"
  Runs the test in 2 loops. A second EDID with higher TMDS clock capabilities is presented to the DUT, and the measurement is repeated with the appropriate limits.
  The first loop with the upper limit of V_L:
  AV_{cc} - 400 mV = 2.9 V
  and the lower limit of V_L:
  AV_{cc} - 600 mV = 2.7 V
  and the second loop with the upper limit of V_L:
  AV_{cc} - 400 mV = 2.9 V
  and the lower limit of V_L:
  AV_{cc} - 700 mV = 2.6 V
- "No"
  Runs 1 loop only with the upper limit of V_L:
  AV_{cc} - 400 mV = 2.9 V
  and the lower limit of V_L:
  AV_{cc} - 600 mV = 2.7 V

Remote command:
`CONFigure<hw>:TDA:CTS:HDMI:HVL:HPCLck` on page 983

7-3: TMDS-V_{Off} ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.3, "7-3: TMDS-V_{Off}", on page 390.

Channel ← 7-3: TMDS-VOff ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

Standby Power Mode Exists ← 7-3: TMDS-VOff ← CTS Configuration dialog
Sets whether the DUT has a standby mode in addition to power-on and power-off mode.

- "Yes"
  The DUT has a standby mode where it might show a different behavior. Therefore, an additional test loop is performed.
- "No"
  The DUT has no standby mode.

Remote command:
`CONFigure<hw>:TDA:CTS:HDMI:LDEGradation:SPMexists` on page 984

7-4: TMDS-T_{Rise}/T_{Fall} ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.4, "7-4: TMDS-T_{Rise}/T_{Fall}", on page 391.

Channel ← 7-4: TMDS-TRise/TFall ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

7-6: TMDS Inter Pair Skew ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.5, "7-6: TMDS Inter Pair Skew", on page 392.

Channel ← 7-6: TMDS Inter Pair Skew ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

7-7: TMDS Intra Pair Skew ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.6, "7-7: TMDS Intra Pair Skew", on page 394.

Channel ← 7-7: TMDS Intra Pair Skew ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

7-8: Clock Duty Cycle ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.7, "7-8: Clock Duty Cycle", on page 395.

Channel ← 7-8: Clock Duty Cycle ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

7-9: TMDS Clock Jitter ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.8, "7-9: TMDS Clock Jitter", on page 396.

Channel ← 7-9: TMDS Clock Jitter ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

7-10: Data Eye Diagram ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.9, "7-10: Data Eye Diagram", on page 397.

Channel ← 7-10: Data Eye Diagram ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

7-13: DDC/CEC Capacitance ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.12, "7-13: DDC/CEC Capacitance", on page 401.

Channel ← 7-13: DDC/CEC Capacitance ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

Source DDC Cap Power On ← 7-13: DDC/CEC Capacitance ← CTS Configuration dialog
Determines the mode in which the capacitance of the SDA and SCL lines is measured. Set the value in accordance with the CDF (capabilities declaration form) field Source_DDC_cap_power-on.

- "Yes"
  Power-on mode
- "No"
  Power-off mode

Remote command:
`CONFigure<hw>:TDA:CTS:HDMI:SDCPower` on page 985

7-15: CEC Line Degradation ← CTS Configuration dialog
HDMI 1.4 test case, see also Chapter 11.5.1.13, "7-15: CEC Line Degradation", on page 401.

CDF CEC Protocol ← 7-15: CEC Line Degradation ← CTS Configuration dialog
Selects the measurements that are performed on the DUT. Set the value depending on the corresponding CDF (capabilities declaration form) field of the DUT.

- "Yes"
  Only the leakage current measurement is performed.
- "No"
  The impedance (CEC voltages) of the CEC line in power-on and power-off mode is measured in addition.

Remote command:
`CONFigure<hw>:TDA:CTS:HDMI:LDEGradation:CECProtocol` on page 984

Standby Power Mode Exists ← 7-15: CEC Line Degradation ← CTS Configuration dialog
See "Standby Power Mode Exists" on page 385.

HF 1-1: TMDS 6G V_L and V_{Swing} ← CTS Configuration dialog
HDMI 2.0 test case, see also Chapter 11.5.2.1, "HF 1-1: TMDS 6G V_L and V_{Swing}", on page 402.

Channel ← HF 1-1: TMDS 6G VL and VSwing ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

HF 1-2: TMDS 6G T_{Rise}/T_{Fall} ← CTS Configuration dialog
HDMI 2.0 test case, see also Chapter 11.5.2.2, "HF 1-2: TMDS 6G T_{Rise}/T_{Fall}", on page 403.

Channel ← HF 1-2: TMDS 6G TRise/TFall ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

HF 1-3: TMDS 6G Inter Pair Skew ← CTS Configuration dialog
HDMI 2.0 test case, see also Chapter 11.5.2.3, "HF 1-3: TMDS 6G Inter Pair Skew", on page 404.

Channel ← HF 1-3: TMDS 6G Inter Pair Skew ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

HF 1-4: TMDS 6G Intra Pair Skew ← CTS Configuration dialog
HDMI 2.0 test case, see also Chapter 11.5.2.4, "HF 1-4: TMDS 6G Intra Pair Skew", on page 406.

Channel ← HF 1-4: TMDS 6G Intra Pair Skew ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

HF 1-5: TMDS 6G Differential Voltage ← CTS Configuration dialog
HDMI 2.0 test case, see also Chapter 11.5.2.5, "HF 1-5: TMDS 6G Differential Voltage", on page 407.

Channel ← HF 1-5: TMDS 6G Differential Voltage ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

HF 1-6: TMDS 6G Clock Duty Cycle ← CTS Configuration dialog
HDMI 2.0 test case, see also Chapter 11.5.2.6, "HF 1-6: TMDS 6G Clock Duty Cycle", on page 408.

Channel ← HF 1-6: TMDS 6G Clock Duty Cycle ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

HF 1-7: TMDS 6G Clock Jitter ← CTS Configuration dialog
HDMI 2.0 test case, see also Chapter 11.5.2.7, "HF 1-7: TMDS 6G Clock Jitter", on page 409.

Channel ← HF 1-7: TMDS 6G Clock Jitter ← CTS Configuration dialog
See "Channel (default favorite)" on page 382.

Save button
Opens the "File" dialog to save the test report. See Chapter 5.3, "File Dialog", on page 89.

The file format is MHTML, short for MIME HTML. This is a web page archive format used to combine the HTML code and its companion resources in a single document. These report files include test report and the corresponding waveforms of the performed tests. MHTML files do have the extension `.mht` and are suitable for most internet browsers.

Remote command:
`MMEMory<hw>:TDA:CTS:DATA:STORe` on page 990

Stop button
Stops a running test. Only available if a test is running.

Remote command:
`ABORt<hw>:TDA` on page 981

Start button
Starts a test. Only available if no test is running.

Remote command:
`INITiate<hw>:TDA` on page 990

11.5 Compliance Tests

For each test, the purpose is described.

11.5.1 HDMI 1.4

Describes all compliance tests available for HDMI 1.4.

11.5.1.1 7-1: EDID Related Behavior

Source DUT supports the reading of the EDID 1.3 block and first CEA EDID timing extension from both 2-block and 4-block EDIDs.

This test connects additional capacitances to the SDA and SCL lines and provides 2 different EDIDs. The first part of the test works with the 2-block EDID. A hot plug connection is signaled, and the reading of the EDID monitored. The second part of the test works with the 4-block EDID in the same way.

Restriction
The time domain analyzer application does not check the timing of the SCL pulses.

After the test, the previous used EDID is restored and a reconnection is signaled.

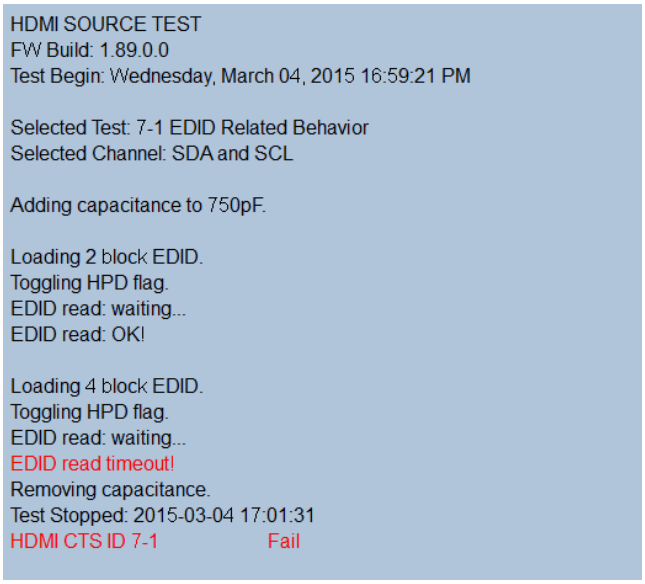


Figure 11-1: Test report

11.5.1.2 7-2: TMDS -V_L

The DC voltage levels on the HDMI link are within specified limits for each TMDS signal.

This measurement evaluates the most common low level voltage of each TMDS line. To reduce the influence of attenuation of higher frequencies on the lines, perform this test with the lowest supported TMDS character clock of the DUT: CEA 1 (640x480p/59.94Hz). The limits depend on the ability of the sink (TMDS time domain analyzer) to support higher TMDS character rates than 165 MHz. In this case, a second loop with a different EDID is performed.

HDMI SOURCE TEST
FW Build: 1.79.0.7
Test Begin: 2014-11-24 14:07:07

Selected Test: 7-2 TMDS V_L
TMDS Character Clock: 25.200 MHz
AV_{CC}: 3317 mV
Selected Channel: All
Sink supports > 165 MHz: Yes

Data 0+	V_L = 2653 mV (AV_{CC} - 664 mV)	Pass
Data 0-	V_L = 2628 mV (AV_{CC} - 689 mV)	Pass
Data 1+	V_L = 2640 mV (AV_{CC} - 676 mV)	Pass
Data 1-	V_L = 2622 mV (AV_{CC} - 694 mV)	Pass
Data 2+	V_L = 2645 mV (AV_{CC} - 672 mV)	Pass
Data 2-	V_L = 2618 mV (AV_{CC} - 699 mV)	Pass

Test Complete: 2014-11-24 14:08:55
HDMI CTS ID 7-2 Pass

Figure 11-2: Test report

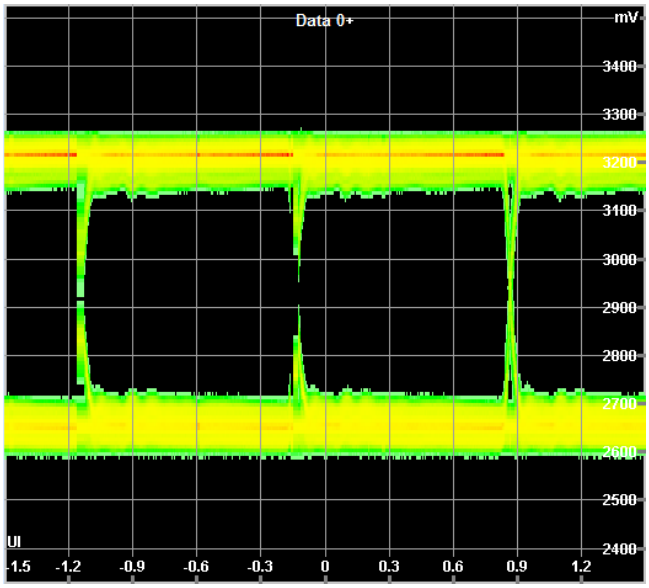


Figure 11-3: Waveform

11.5.1.3 7-3: TMDS-V_{Off}

A disabled TMDS link only allows leakage currents within the specified limits.

Requires different states for the DUT. During the test, you need to perform actions when prompted.

This test runs with 3 different DUT states.

- DUT disconnected from AC mains
- DUT in standby mode (If DUT supports such a mode)

- DUT in power-off mode

The remaining current must not exceed 0.2 mA, which causes a voltage of 10 mV at 50 Ω.

The compliance test results are displayed as test report only.

AV_{CC}: 3289 mV		
Data 0+	V_{OFF} = 3289 mV (AV_{CC} - 0 mV)	Pass
Data 0-	V_{OFF} = 3289 mV (AV_{CC} + 0 mV)	Pass
Data 1+	V_{OFF} = 3289 mV (AV_{CC} - 0 mV)	Pass
Data 1-	V_{OFF} = 3288 mV (AV_{CC} - 0 mV)	Pass
Data 2+	V_{OFF} = 3289 mV (AV_{CC} - 0 mV)	Pass
Data 2-	V_{OFF} = 3290 mV (AV_{CC} + 2 mV)	Pass
Clk+	V_{OFF} = 3290 mV (AV_{CC} + 1 mV)	Pass
Clk-	V_{OFF} = 3289 mV (AV_{CC} + 1 mV)	Pass
V_{OFF} in power off state		
AV_{CC}: 3289 mV		
Data 0+	V_{OFF} = 3289 mV (AV_{CC} - 0 mV)	Pass
Data 0-	V_{OFF} = 3289 mV (AV_{CC} + 0 mV)	Pass
Data 1+	V_{OFF} = 3289 mV (AV_{CC} - 0 mV)	Pass
Data 1-	V_{OFF} = 3288 mV (AV_{CC} - 0 mV)	Pass
Data 2+	V_{OFF} = 3289 mV (AV_{CC} - 0 mV)	Pass
Data 2-	V_{OFF} = 3290 mV (AV_{CC} + 2 mV)	Pass
Clk+	V_{OFF} = 3290 mV (AV_{CC} + 1 mV)	Pass
Clk-	V_{OFF} = 3290 mV (AV_{CC} + 1 mV)	Pass
Test Complete: 2014-11-26 15:39:34		
HDMI CTS ID 7-3		Pass

Figure 11-4: Test report

11.5.1.4 7-4: TMDS-T_{Rise}/T_{Fall}

The rise and fall times on the TMDS differential signals fall within the limits of the specification.

To get most accurate measurement values, perform this test with the highest supported TMDS character clock of the DUT: CEA code 63 (1920x1080p/120Hz).

The measurement calculates the rise and fall times of the signal edges from the eye diagram between 20 % and 80 % of the level. The test is performed on the differential data lines in general, but is also continuously available on single lines for problem evaluation.

The limits for rise and fall times are given by the CTS 1.4b specification. The times must be equal or longer than 75 ps.

HDMI SOURCE TEST
FW Build: 1.79.0.7
Test Begin: 2014-11-24 11:54:08

Selected Test: 7-4 TMDS T_{Rise}, T_{Fall}
TMDS Character Clock: 74.253 MHz
T_{Char}: 13467 ps
T_{Bit}: 1347 ps
AV_{CC}: 3283 mV
Selected Channel: All

Data 0+ to 0-	T_{Rise} = 199 ps (0.1474 T_{Bit})	Pass
	T_{Fall} = 166 ps (0.1235 T_{Bit})	Pass
Data 1+ to 1-	T_{Rise} = 304 ps (0.2261 T_{Bit})	Pass
	T_{Fall} = 309 ps (0.2293 T_{Bit})	Pass
Data 2+ to 2-	T_{Rise} = 284 ps (0.2111 T_{Bit})	Pass
	T_{Fall} = 355 ps (0.2639 T_{Bit})	Pass

Test Complete: 2014-11-24 11:54:58
HDMI CTS ID 7-4 Pass

Figure 11-5: Test report

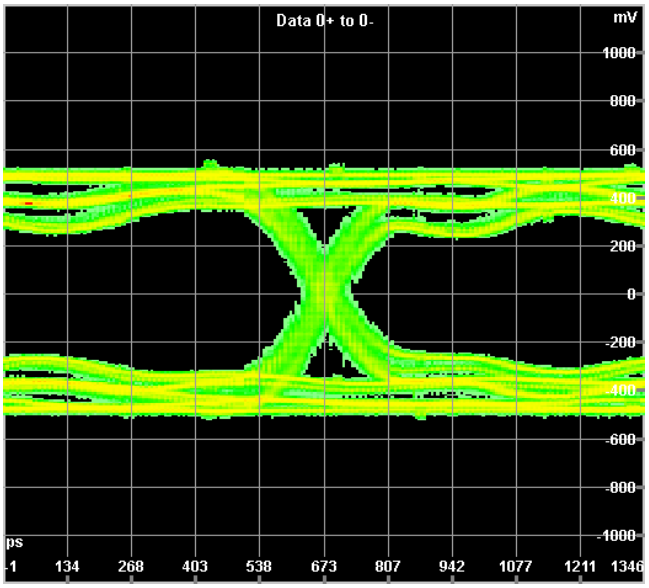


Figure 11-6: Waveform

11.5.1.5 7-6: TMDS Inter Pair Skew

The measurement calculates the delay (skew) between the differential TMDS data line pairs.

To get most accurate measurement values, perform this test with the highest supported TMDS character clock of the DUT: CEA code 63 (1920x1080p/120Hz).

Restriction

The time domain analyzer application performs the eye diagram measurement only. This means that the application is not able to trigger on sync words as it is required in the meaning of CTS. In fact, a delay between data lines of ±2 T_{Bit} is allowed. If a delay bigger than ±0.5 T_{Bit} is possible by DUT implementation, the results of the time domain analyzer application are not reliable.

HDMI SOURCE TEST
FW Build: 1.79.0.4
Test Begin: 2014-11-19 13:44:42

Selected Test: 7-6 TMDS Inter Pair Skew
T_{Char}: 13467.464 ps
Selected Channel: All

Data 0 to 1	T_{XPSKEW} = -0.0001 T_{Char}
Data 1 to 2	T_{XPSKEW} = 0.0009 T_{Char}
Data 0 to 2	T_{XPSKEW} = 0.0008 T_{Char}

Test Complete: 2014-11-19 13:45:05

Figure 11-7: Test report

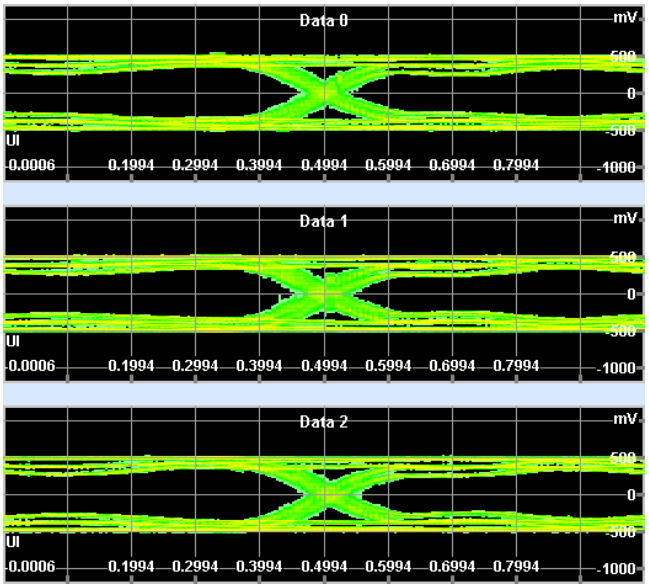


Figure 11-8: Waveform

11.5.1.6 7-7: TMDS Intra Pair Skew

Any skew within any one differential pair in the TMDS portion of the HDMI link does not exceed the limits in the specification.

To get most accurate measurement values, perform this test with the highest supported TMDS character clock of the DUT: CEA code 63 (1920x1080p/120Hz).

The measurement calculates the delay of each TMDS data line to its corresponding one, for example data 0+ to data 0-.

The limit of this these delays are 0.15 T_{Bit}.

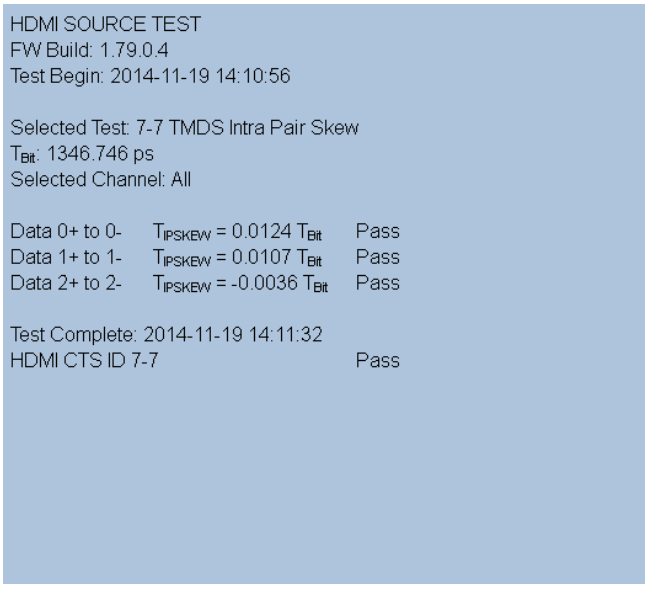


Figure 11-9: Test report

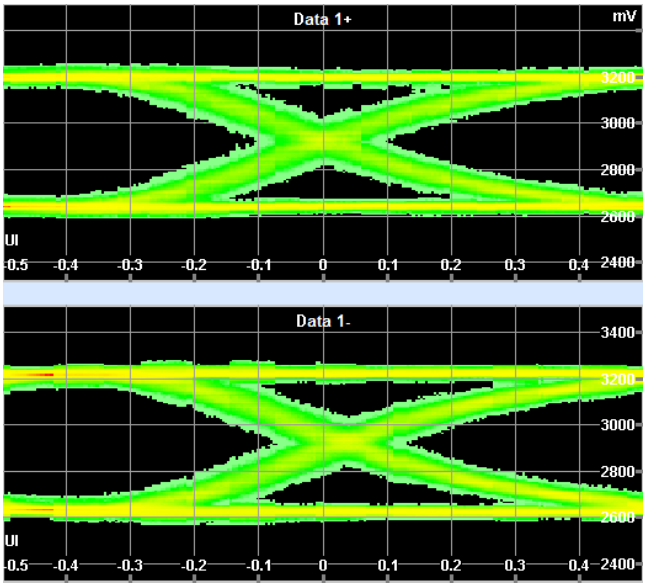


Figure 11-10: Waveform

11.5.1.7 7-8: Clock Duty Cycle

The duty cycle of the differential TMDS clock does not exceed the limits allowed by the specification.

The waveform of the differential clock lines is captured, and the duty cycle of the clock pulses calculated. The limits are between 40 % and 60 %.

HDMI SOURCE TEST
FW Build: 1.93.0.69
Test Begin: Thursday, May 21, 2015 18:29:10 PM

Selected Test: 7-8 TMDS Clock Duty Cycle
TMDS Character Clock: 148.503 MHz
AV_{CC}: 3286 mV
Selected Channel: All

T_{DUTY}(MIN) >= 40%
T_{DUTY}(MAX) <= 60%

Clk+ to Clk-	T_{DUTY}(AVG) = 50.1%	Pass
	T_{DUTY}(MIN) = 49.3%	Pass
	T_{DUTY}(MAX) = 50.7%	Pass

Test Complete: Thursday, May 21, 2015 18:29:16 PM
HDMI CTS ID 7-8 Pass

Figure 11-11: Test report

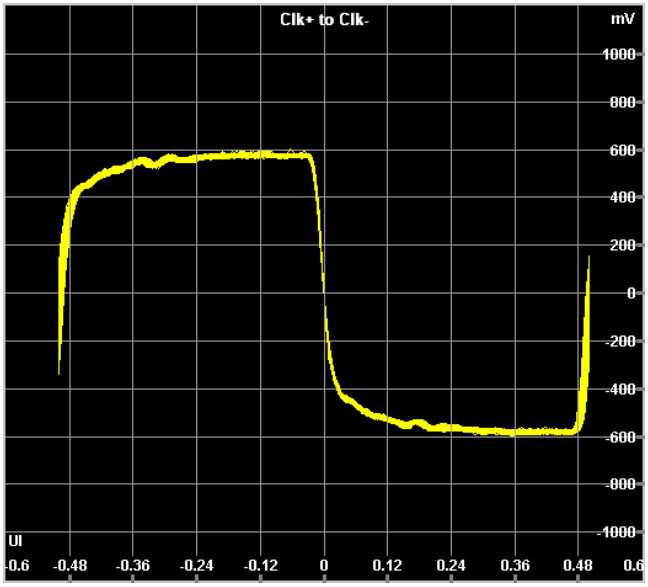


Figure 11-12: Waveform

11.5.1.8 7-9: TMDS Clock Jitter

The TMDS clock does not carry excessive jitter.

This measurement runs not with the original clock lines but with a recovered clock signal, because CTS requires a clock recovery unit (CRU). Thus, the recovered clock is sampled, measured and displayed. It does not show the amplitude or waveform of the TMDS clock lines (Clk+ and Clk-).

Restriction

Due to bandwidth limitations, the accuracy of this measurement is also limited, but a tendency of clock jitter is clearly visible. A failed test result does not mean that the DUT will fail in an accurate measurement, but a passed test shows that there is no relevant jitter on the TMDS clock.

HDMI SOURCE TEST
FW Build: 1.93.0.72
Test Begin: Tuesday, May 26, 2015 13:32:08 PM

Selected Test: 7-9 TMDS Clock Jitter
TMDS Character Clock: 25.175 MHz
T_{Bit}: 3972 ps
AV_{CC}: 3286 mV
Selected Channel: All

Clock $Jitter_{MAX}$ = 0.25 T_{Bit}

Clk+ to Clk- Jitter = 1374 ps
Jitter = 0.35 T_{Bit} Fail

Test Complete: Tuesday, May 26, 2015 13:32:16 PM
HDMI CTS ID 7-9 Fail

Figure 11-13: Test report

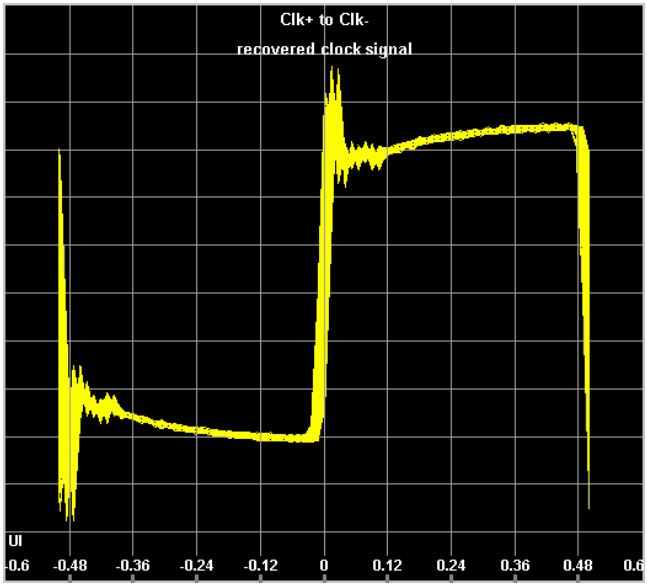


Figure 11-14: Waveform

11.5.1.9 7-10: Data Eye Diagram

The differential signal on each TMDS differential data pair has an "eye opening" that meets or exceeds the limits on eye opening in the specification.

For this measurement, an eye mask is defined in the CTS. The waveform is shifted in horizontal direction so that the number of violations are minimized. If there is no position with zero violations, the test fails. Perform the test with the following frequencies: 27 MHz, (or 25 MHz), 74.25 MHz, 148.5 MHz, 222.75 MHz, and the highest DUT sup-

ported frequency. You can control the DUT frequency using "TMDS Character Clock" on page 371.

HDMI SOURCE TEST
FW Build: 1.89.0.0
Test Begin: Wednesday, March 04, 2015 17:31:48 PM

Selected Test: 7-10 TMDS Data Eye Diagram
[Warning] TMDS Character Clock: 74.253 MHz. Please make sure it's 25MHz, 27MHz, 74.25MHz, 148.5MHz, 222.75MHz, or the highest frequency supported.
AV_{CC}: 3283 mV
Selected Channel: All

Data $Jitter_{MAX}$ = 0.30 T_{Bit}

Data 0+ to 0-	TP1	Mask Offset = 0.15 UI	
		Upper Violations = 0	Pass
		Lower Violations = 0	Pass
		Inner Violations = 0	Pass
		Data Jitter = 0.016 T_{Bit}	Pass
Data 1+ to 1-	TP1	Mask Offset = 0.15 UI	
		Upper Violations = 0	Pass
		Lower Violations = 0	Pass
		Inner Violations = 0	Pass
		Data Jitter = 0.016 T_{Bit}	Pass
Data 2+ to 2-	TP1	Mask Offset = 0.15 UI	
		Upper Violations = 0	Pass
		Lower Violations = 0	Pass
		Inner Violations = 0	Pass
		Data Jitter = 0.016 T_{Bit}	Pass

Test Complete: Wednesday, March 04, 2015 17:32:03 PM
HDMI CTS ID 7-10 Pass

Figure 11-15: Test report

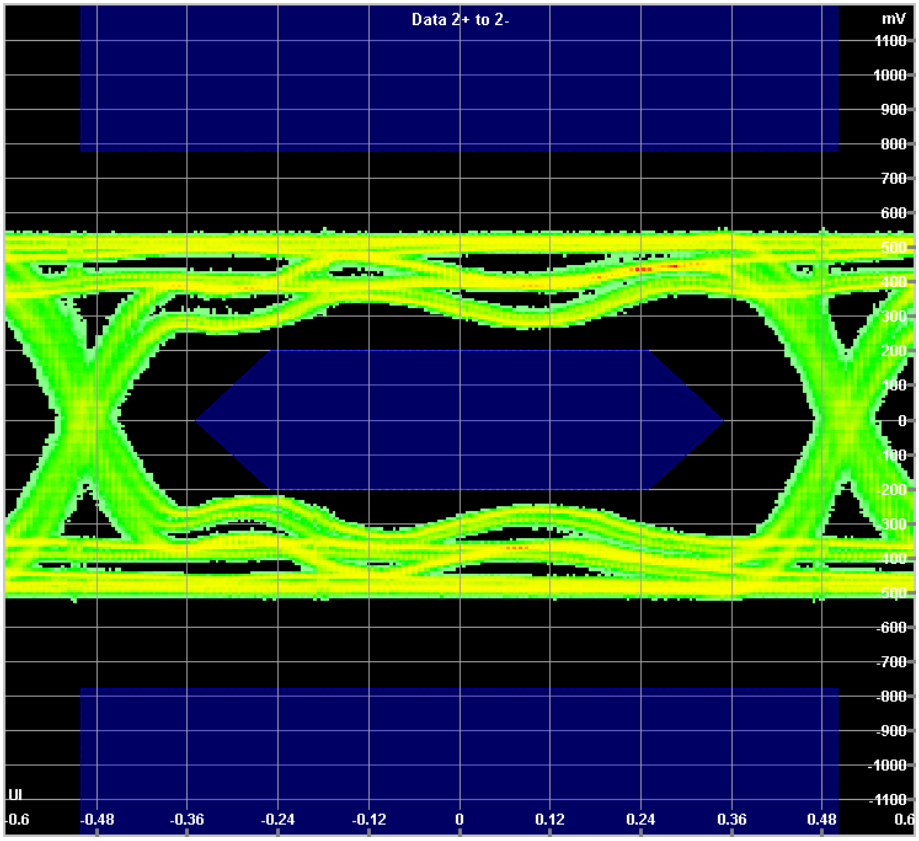


Figure 11-16: Waveform

11.5.1.10 7-11: +5 V Power

The +5V power signal meets voltage and current capacity requirements.

This test measures the +5 V power pin of the DUT. It should provide at least 4.8 V while 55 mA are drawn. The voltage is controlled also, when no current is drawn.

HDMI SOURCE TEST
FW Build: 1.89.0.0
Test Begin: Wednesday, March 04, 2015 17:07:16 PM

Selected Test: 7-11 +5V Power
Selected Channel: +5V

V_{5V_MIN} = 4.80 V
V_{5V_MAX} = 5.30 V

I = 55 mA
V_{5V} = 4.97 V Pass

I = 0 mA
V_{5V} = 5.16 V Pass

Test Complete: Wednesday, March 04, 2015 17:07:22 PM
HDMI CTS ID 7-11 Pass

Figure 11-17: Test report

11.5.1.11 7-12: Hotplug Detect

The source load on the hot plug pin allows the signal to meet the specified requirements.

This measurement determines that the hot plug pin is terminated according to the standard. DC voltages of 0.0 V, 0.4 V, 2.4 V and 5.3 V are connected via 1.2 kΩ resistor and the resulting HPD voltage is measured.

HDMI SOURCE TEST
FW Build: 1.89.0.0
Test Begin: Wednesday, March 04, 2015 17:08:08 PM

Selected Test: 7-12 Hot Plug Detect
Selected Channel: HPD

V_{HPD_MIN}(HIGH) = 2.0 V
V_{HPD_MAX}(HIGH) = 5.3 V
V_{HPD_MIN}(LOW) = 0.0 V
V_{HPD_MAX}(LOW) = 0.8 V

V_{HPD}(HIGH@2.4V) = 2.13 V Pass
V_{HPD}(HIGH@5.3V) = 4.41 V Pass
V_{HPD}(LOW@0.0V) = 0.18 V Pass
V_{HPD}(LOW@0.4V) = 0.51 V Pass

Test Complete: Wednesday, March 04, 2015 17:08:16 PM
HDMI CTS ID 7-12 Pass

Figure 11-18: Test report

11.5.1.12 7-13: DDC/CEC Capacitance

The capacitance load on the DDC and CEC lines does not exceed the limit in the specification and that DDC and CEC pull-ups are the correct voltage.

Depending on the setting under "Source DDC Cap Power On" on page 386, the measurement of the SDA and SCL line runs with a DUT in power-on or power-off mode. The measurement of the CEC line runs always in both modes. The limits are a capacitance of 50 pF and ±10 % voltage for the DDC lines and a capacitance of 150 pF for the CEC line. The voltage of the CEC line should be in a defined high or low state not in between.

HDMI SOURCE TEST
FW Build: 1.89.0.0
Test Begin: Wednesday, March 04, 2015 17:09:01 PM

Selected Test: 7-13 DDC/EEC Capacitance and Voltage
Selected Channel: All

SDA	C_{DUT_MAX} = 50 pF	
	V_{MIN} = 4.5 V	V_{MAX} = 5.5 V
SCL	C_{DUT_MAX} = 50 pF	
	V_{MIN} = 4.5 V	V_{MAX} = 5.5 V
CEC	$C_{DUT\_ON\_MAX}$ = 150 pF	$C_{DUT\_OFF\_MAX}$ = 150 pF
	V <= 0.6 V, or	
	2.5 V <= V <= 3.6 V	

DUT Power On

SDA	C_{DUT} = 51 pF	Fail
	V = 5.0 V	Pass
SCL	C_{DUT} = 0 pF	Pass
	V = 5.0 V	Pass
CEC	C_{DUT_ON} = 20 pF	Pass
	V = 3.3 V	Pass

DUT Power Off

CEC	C_{DUT_OFF} = 16 pF	Pass

Test Complete: Wednesday, March 04, 2015 17:09:56 PM
HDMI CTS ID 7-13 Fail

Figure 11-19: Test report

11.5.1.13 7-15: CEC Line Degradation

The DUT does not degrade communication between other CEC devices when power is applied, when power is removed and, if supported, in standby mode.

The voltages of different states (disconnected, pulled-up externally, pulled-down externally) of the CED line are measured.

HDMI SOURCE TEST
FW Build: 1.89.0.0
Test Begin: Wednesday, March 04, 2015 17:12:34 PM

Selected Test: 7-15 Line Degradation
Selected Channel: CEC

$I_{Leakage\_MAX}$ = 1.8 µA
0V <= V_{CEC1} <= 0.1V, or
2.88V <= V_{CEC1} <= 3.63V
2.97V <= V_{CEC} <= 3.63V
0.1056V <= V_{CEC2} <= 0.1344V, or
0.196V <= V_{CEC2} <= 0.274V

DUT Power Disconnected

$I_{Leakage}$ = -0.0 µA	Pass

DUT Power On

V_{CEC1} = 3.173 V	Pass
V_{CEC} = 3.310 V	Pass
V_{CEC2} = 0.245 V	Pass

DUT Power Off

V_{CEC1} = -0.000 V	Fail
V_{CEC} = 3.302 V	Pass
V_{CEC2} = 0.119 V	Fail

Test Complete: Wednesday, March 04, 2015 17:14:06 PM
HDMI CTS ID 7-15 Fail

Figure 11-20: Test report

11.5.2 HDMI 2.0

Describes all compliance tests available for HDMI 2.0.

11.5.2.1 HF 1-1: TMDS 6G V_L and V_{Swing}

The DC voltage levels on the HDMI link are within specified limits for each TMDS signal.

This measurement evaluates the most common low and high level voltage of each TMDS line. To reduce the influence of attenuation of higher frequencies on the lines, perform this test with the lowest supported TMDS character clock of the DUT above 340MHz: VIC91 (2560x1080p/100Hz).

Limits for the low level voltage (V_L):

(A_{Vcc} - 1000 mV) to (A_{Vcc} - 400 mV)

Limits for the amplitude (V_{Swing}):

400 mV to 600 mV

FW Build: 1.79.0.5
Test Begin: 2014-11-20 14:30:34

Selected Test: HF1-1 6G TMDS V_L and V_{Swing}
TMDS Character Clock: 594.000 MHz
AV_{CC}: 3309 mV
Selected Channel: All

Data 0+	V_L = 2767 mV (AV_{CC} - 542 mV)	Pass
	V_{Swing} = 452 mV	Pass
Data 0-	V_L = 2765 mV (AV_{CC} - 545 mV)	Pass
	V_{Swing} = 453 mV	Pass
Data 1+	V_L = 2737 mV (AV_{CC} - 572 mV)	Pass
	V_{Swing} = 489 mV	Pass
Data 1-	V_L = 2758 mV (AV_{CC} - 551 mV)	Pass
	V_{Swing} = 477 mV	Pass
Data 2+	V_L = 2776 mV (AV_{CC} - 534 mV)	Pass
	V_{Swing} = 457 mV	Pass
Data 2-	V_L = 2772 mV (AV_{CC} - 538 mV)	Pass
	V_{Swing} = 461 mV	Pass

Test Complete: 2014-11-20 14:32:30
HDMI HF 1-1 Pass

Figure 11-21: Test report

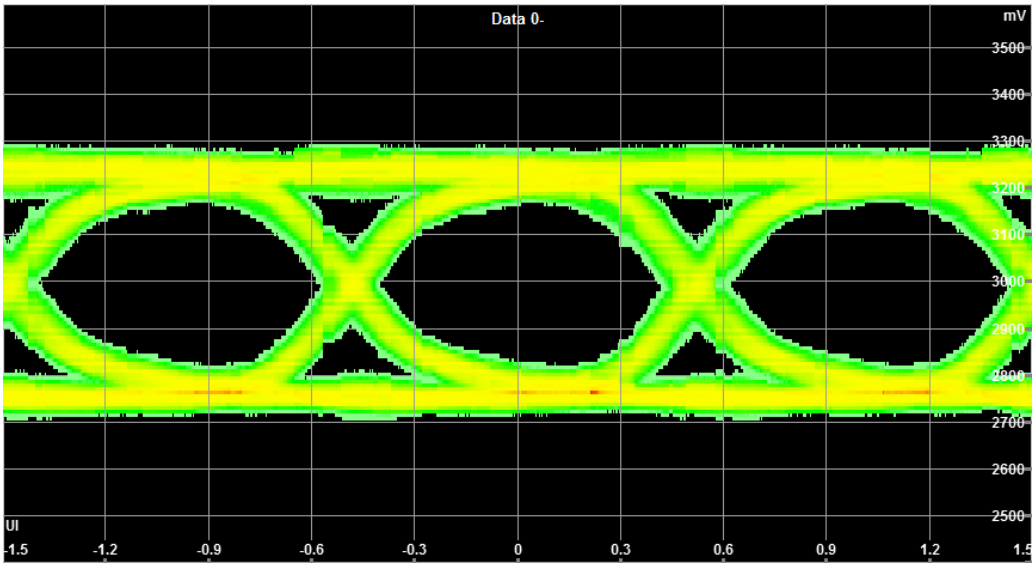


Figure 11-22: Waveform (2/6)

11.5.2.2 HF 1-2: TMDS 6G T_{Rise}/T_{Fall}

The rise times and fall times on the TMDS differential signals fall within the limits of the specification.

To get most accurate measurement values, perform this test with the highest supported TMDS character clock of the DUT: VIV96 (3840x2160p/50Hz).

The measurement calculates the rise and fall times of the signal edges from the eye diagram between 20 % and 80 % of the level. The test is performed on the differential

data lines in general, but is also continuously available on single lines for problem evaluation.

The limits for rise and fall times are given by the CTS 2.0 specification, the times must be equal or longer than 42.5 ps.

HDMI SOURCE TEST
FW Build: 1.79.0.5
Test Begin: 2014-11-20 14:36:10

Selected Test: HF1-2 6G TMDS T_{Rise}, T_{Fall}
TMDS Character Clock: 594.000 MHz
AV_{CC}: 3309 mV
Selected Channel: All

Data 0+ to 0-	T_{Rise} = 51.43 ps (0.3055 T_{Bit})	Pass
	T_{Fall} = 55.36 ps (0.3288 T_{Bit})	Pass
Data 1+ to 1-	T_{Rise} = 56.76 ps (0.3372 T_{Bit})	Pass
	T_{Fall} = 52.57 ps (0.3123 T_{Bit})	Pass
Data 2+ to 2-	T_{Rise} = 54.66 ps (0.3247 T_{Bit})	Pass
	T_{Fall} = 54.95 ps (0.3264 T_{Bit})	Pass

Test Complete: 2014-11-20 14:36:55
HDMI HF 1-2 Pass

Figure 11-23: Test report

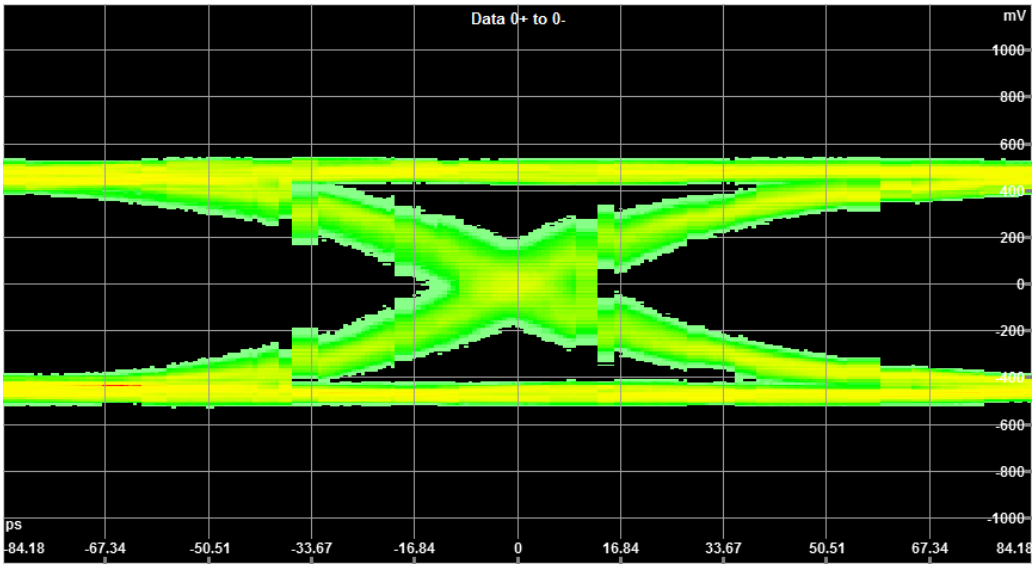


Figure 11-24: Waveform (1/3)

11.5.2.3 HF 1-3: TMDS 6G Inter Pair Skew

The measurement calculates the delay (skew) between the differential TMDS data line pairs.

To get most accurate measurement values, perform this test with the highest supported TMDS character clock of the DUT: VIV96 (3840x2160p/50Hz).

Restriction

The time domain analyzer application performs the eye diagram measurement only. This means that the application is not able to trigger on sync words as it is required in the meaning of CTS. In fact, a delay between data lines of ±2 T_{Bit} is allowed. If a delay bigger than ±0.5 T_{Bit} is possible by DUT implementation, the results of the time domain analyzer application are not reliable.

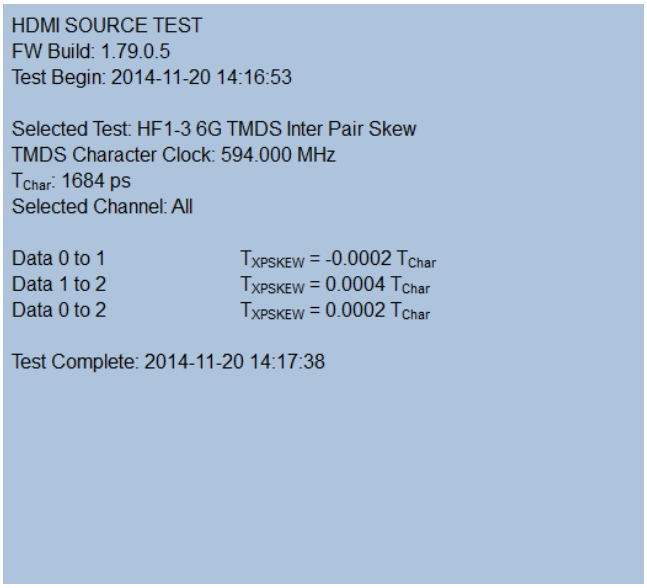


Figure 11-25: Test report

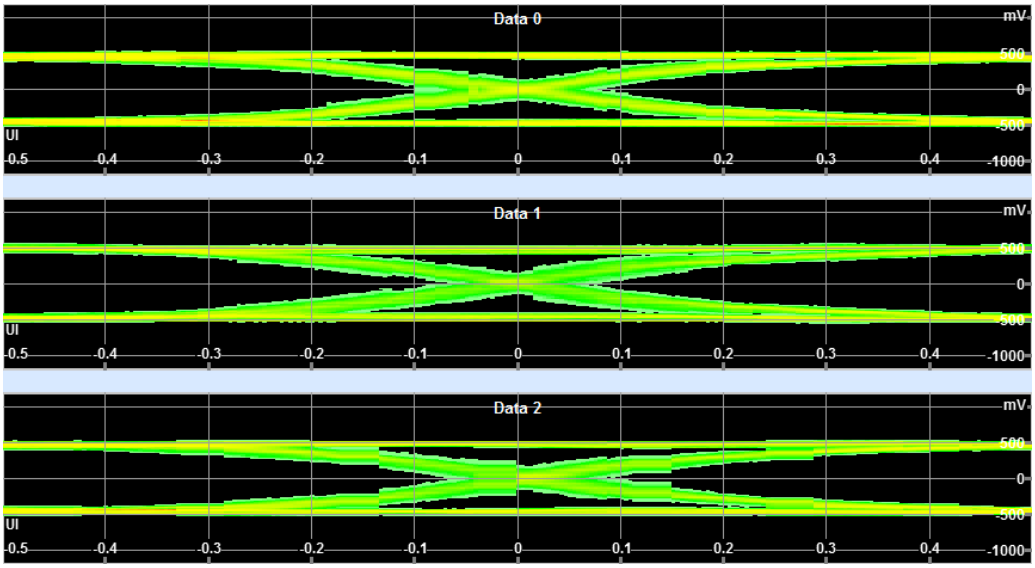


Figure 11-26: Waveform (1/1)

11.5.2.4 HF 1-4: TMDS 6G Intra Pair Skew

Any skew within any one differential pair in the TMDS portion of the HDMI link does not exceed the limits in the specification.

To get most accurate measurement values, perform this test with the highest supported TMDS character clock of the DUT: VIV96 (3840x2160p/50Hz).

The measurement calculates the delay of each TMDS data line to its corresponding one, for example data 0+ to data 0-.

The limit of this these delays are 0.15 T_{Bit}.

HDMI SOURCE TEST
FW Build: 1.79.0.5
Test Begin: 2014-11-20 14:21:25

Selected Test: HF1-4 6G TMDS Intra Pair Skew
TMDS Character Clock: 594.000 MHz
T_{Bit}: 168 ps
Selected Channel: All

Data 0+ to 0-	T_{IPSKEW} = 0.0205 T_{Bit}	Pass
Data 1+ to 1-	T_{IPSKEW} = 0.0176 T_{Bit}	Pass
Data 2+ to 2-	T_{IPSKEW} = -0.0188 T_{Bit}	Pass

Test Complete: 2014-11-20 14:22:37
HDMI HF 1-4 Pass

Figure 11-27: Test report

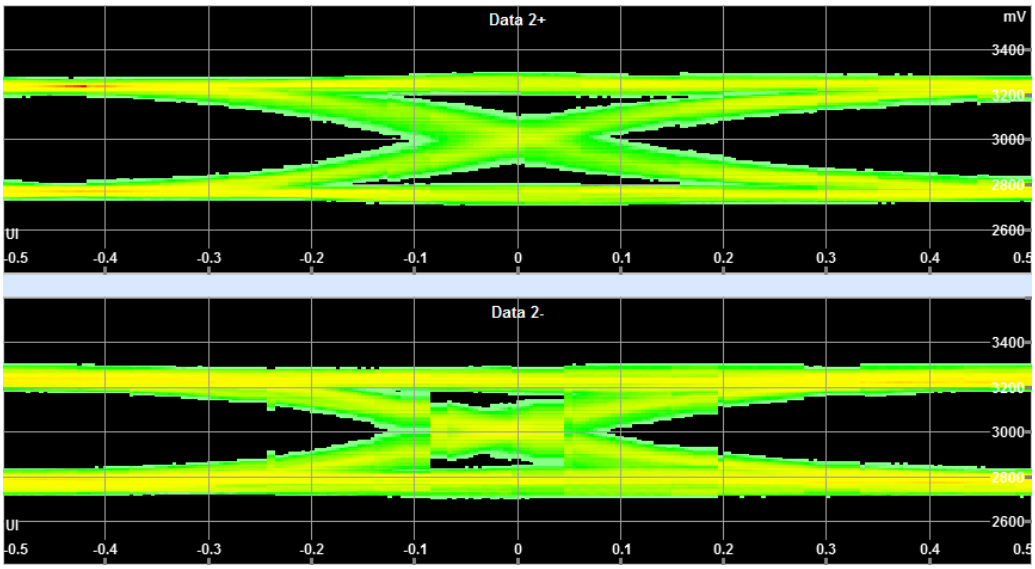


Figure 11-28: Waveform (3/3)

11.5.2.5 HF 1-5: TMDS 6G Differential Voltage

The differential signal on each TMDS differential pair does not exceed the maximum/ minimum differential voltage.

This measurement evaluates the minimum low and maximum high level voltages of each TMDS line pair.

To reduce the influence of attenuation of higher frequencies on the lines, perform this test with the lowest supported TMDS character clock of the DUT above 340 MHz: VIC91 (2560x1080p/100Hz).

Limits for the amplitude (differential voltage):

-780 mV to 780 mV

HDMI SOURCE TEST
FW Build: 1.79.0.5
Test Begin: 2014-11-20 14:24:25

Selected Test: HF1-5 6G TMDS Differential Voltage
TMDS Character Clock: 594.000 MHz
AV_{CC}: 3309 mV
Selected Channel: All

Data 0+ to 0-	V_{high} = 539 mV	Pass
	V_{low} = -523 mV	Pass
Data 1+ to 1-	V_{high} = 570 mV	Pass
	V_{low} = -563 mV	Pass
Data 2+ to 2-	V_{high} = 547 mV	Pass
	V_{low} = -531 mV	Pass

Test Complete: 2014-11-20 14:24:50
HDMI HF 1-5 Pass

Figure 11-29: Test report

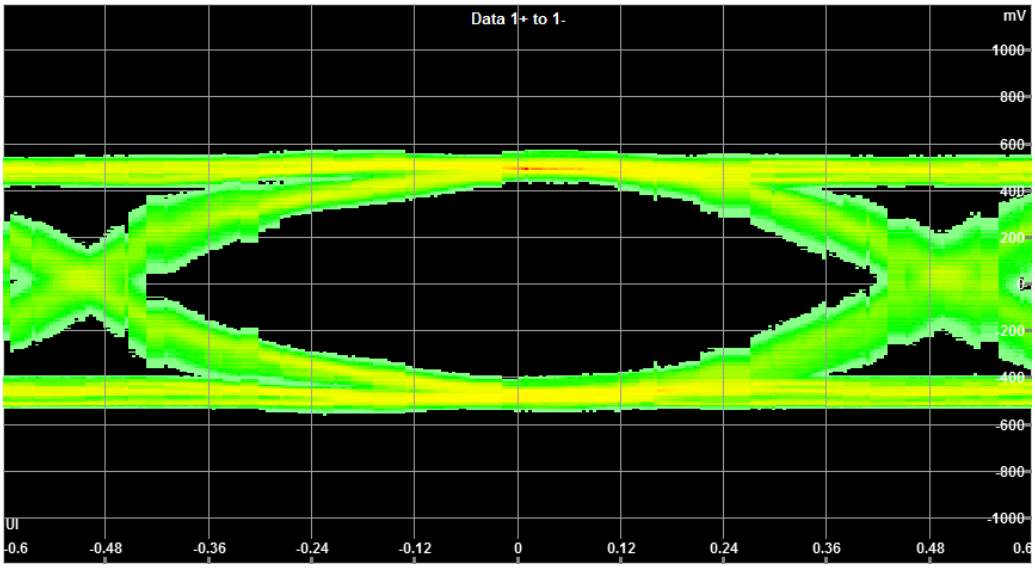


Figure 11-30: Waveform (2/3)

11.5.2.6 HF 1-6: TMDS 6G Clock Duty Cycle

The duty cycle of the differential TMDS clock does not exceed the limits allowed by the specification.

The waveform of the differential clock lines is captured, and the duty cycle of the clock pulses calculated. The limits are between 40 % and 60 %.

HDMI SOURCE TEST
FW Build: 1.93.0.72
Test Begin: Wednesday, May 27, 2015 09:53:04 AM

Selected Test: HF1-6 6G TMDS Clock Duty Cycle
TMDS Character Clock: 594.034 MHz
AV_{CC}: 3288 mV
Selected Channel: All

T_{DUTY}(MIN) >= 40%
T_{DUTY}(MAX) <= 60%
Clock Rate(MIN) >= 85 MHz
Clock Rate(MAX) <= 150 MHz

Clk+ to Clk-	T_{DUTY}(AVG) = 50.2%	Pass
	T_{DUTY}(MIN) = 49.3%	Pass
	T_{DUTY}(MAX) = 51.3%	Pass
	Clock Rate = 148.51 MHz	Pass

Test Complete: Wednesday, May 27, 2015 09:53:10 AM
HDMI HF 1-6 Pass

Figure 11-31: Test report

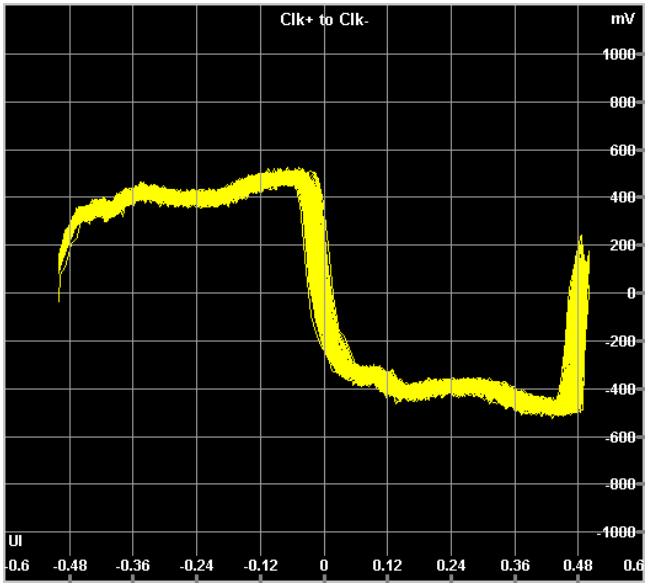


Figure 11-32: Waveform

11.5.2.7 HF 1-7: TMDS 6G Clock Jitter

The TMDS clock does not carry excessive jitter.

This measurement runs not with the original clock lines but with a recovered clock signal, because CTS requires a clock recovery unit (CRU). Thus, the recovered clock is sampled, measured and displayed. It does not show the amplitude or waveform of the TMDS clock lines (Clk+ and Clk-).

Restriction

Due to bandwidth limitations, the accuracy of this measurement is also limited, but a tendency of clock jitter is clearly visible. A failed test result does not mean that the DUT will fail in an accurate measurement, but a passed test shows that there is no relevant jitter on the TMDS clock.

HDMI SOURCE TEST
FW Build: 1.93.0.72
Test Begin: Wednesday, May 27, 2015 09:56:40 AM

Selected Test: HF1-7 6G TMDS Clock Jitter
TMDS Character Clock: 594.034 MHz
AV_{CC}: 3287 mV
Selected Channel: All

Clock $Jitter_{MAX}$ = 0.30 T_{Bit}
V_{Swing_MIN} = 400 mV
V_{Swing_MAX} = 1200 mV

Clk+ to Clk- Jitter = 73 ps
Jitter = 0.43 T_{Bit} Fail

Test Complete: Wednesday, May 27, 2015 09:56:48 AM
HDMI HF 1-7 Fail

Figure 11-33: Test report

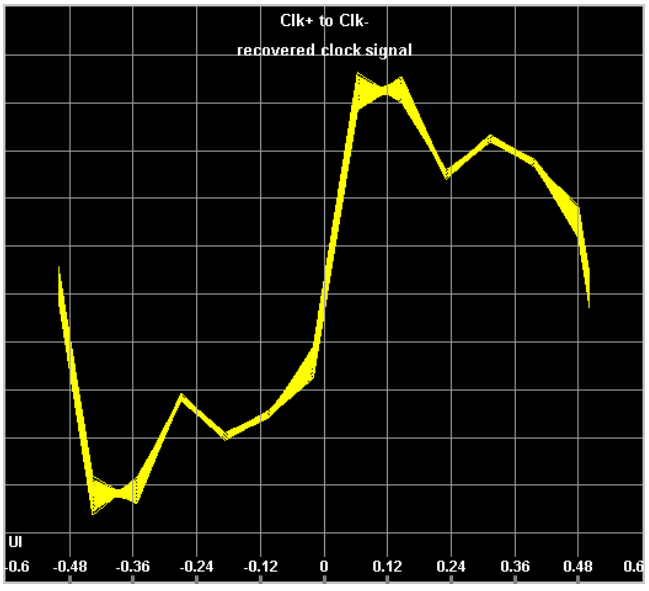


Figure 11-34: Waveform

12 MHL Applications

12.1 MHL Generator Application

Requires the following options:

- HDMI RX/TX 600 MHz module (R&S VT-B2363) or MHL RX/TX module (R&S VT-B2350)
- Additional option for CTS tests, see Chapter 12.1.6, "CTS Subtab", on page 438

The MHL generator application generates MHL test signals in order to test MHL-capable sink devices such as TV sets or dongles. In addition, the MHL generator application provides MHL sink and dongle system tests in line with the MHL compliance test specifications.

12.1.1 Main Dialog of the Application

The parameters are grouped on tabs.

Default favorites

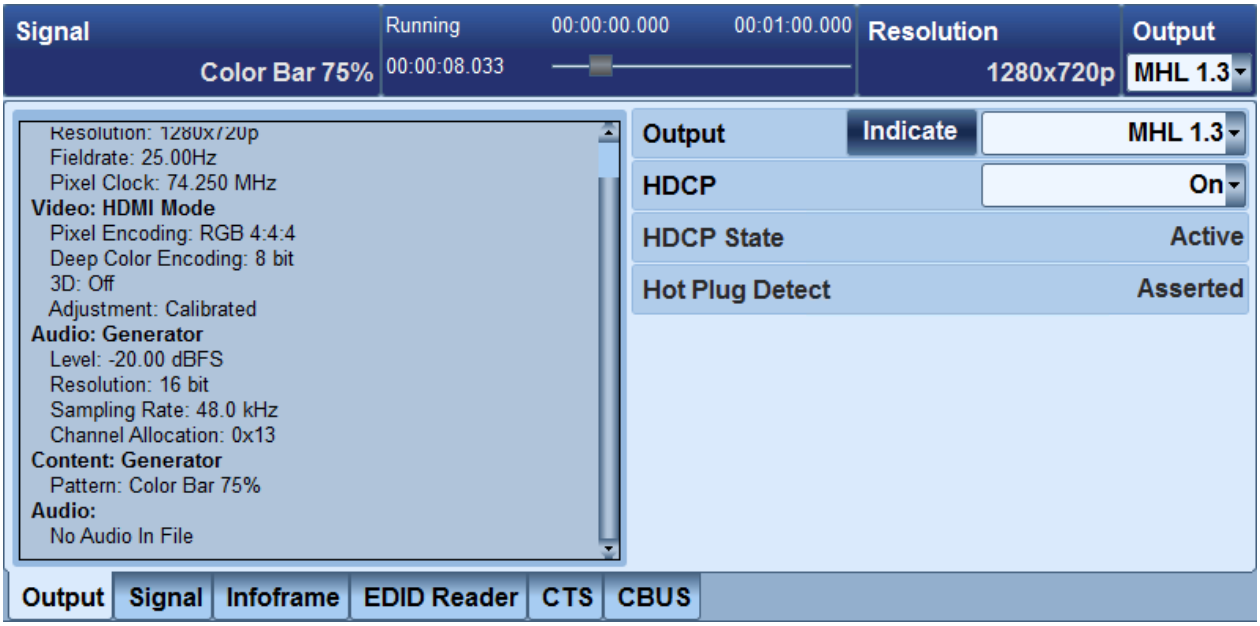
Parameters that are often needed are provided as default favorites below the tab title. The default favorites of the application itself are also available on one of the subtabs.

- "Output" on page 412

12.1.2 Output Subtab

Defines the output interfaces.

In the left pane, the details of the signal are displayed. The signal is supplied at all outputs.



Output
Enables or disables the output.

- "On"
- "Off"

Note: To indicate the output at your R&S VTE, tap "Indicate".
A flashing LED indicates the output until you tap "OK".

Remote command:
READ<hw>:AVGen:OUTPut:HPDout<1 to 4>[:STATe]?
CONFigure<hw>:AVGen:OUTPut:MHLout<1 to 4>[?] OFF|ON

HDCP
Enables or disables the HDCP encryption.

If "Off" is set under "Output" on page 412, you cannot change the setting.

- "On"
- "Off"
  Fixed setting if "VESA Code" is set under "Video Code" on page 415.

Remote command:
CONFigure<hw>:AVGen:OUTPut:HDCPout<1 to 4>[?] OFF|ON

HDCP State
Displays the status of the HDCP encryption.

- "Unknown"
- "Deactivated"
- "Offline"

- "DDC Error"
- "Unavailable"
- "Bad Key"
- "Init"
- "Sync"
- "Init Keys"
- "Active"

Remote command:
READ<hw>:AVGen:OUTPut:HDCPstate<1 to 4>?

Hot Plug Detect
Displays the status of the hot plug detect connection.

- "Asserted"
- "Not Asserted"

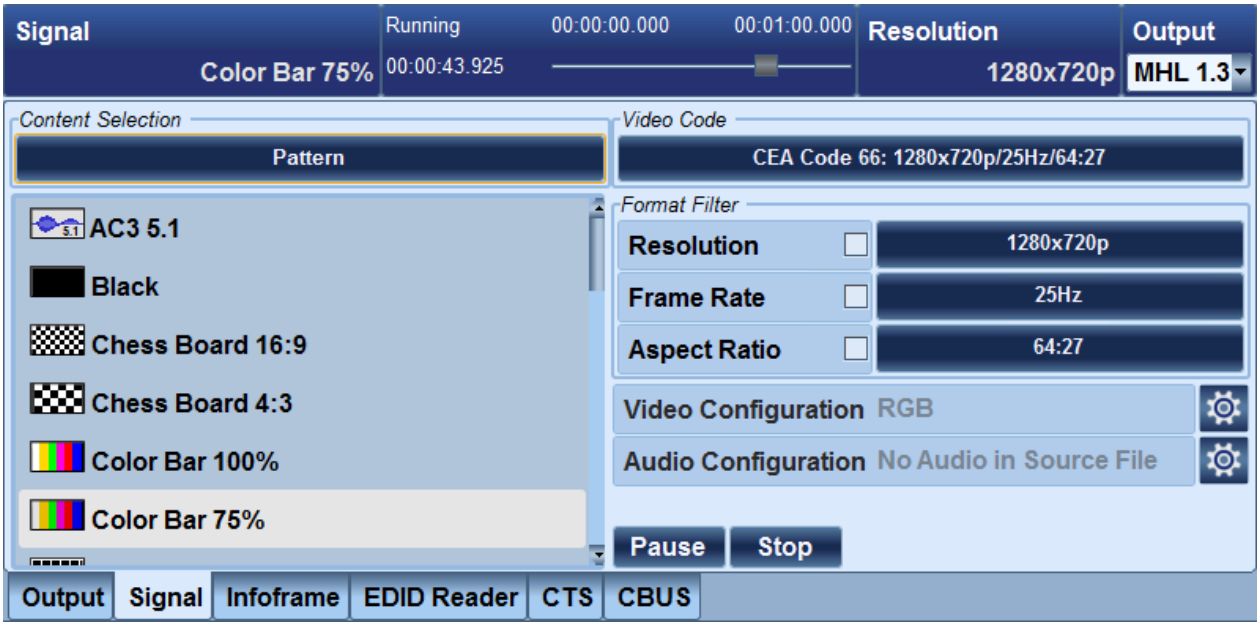
Remote command:
READ<hw>:AVGen:OUTPut:HPDout<1 to 4>[:STATe]?

<SCPI output description>
Only available with the SCPI command. Read out the string of the left side of the output pane.

Remote command:
READ<hw>:AVGen:OUTPut:CONTent?

12.1.3 Signal Subtab

Defines the video/audio signal and the signal properties.



Content Selection....415
└ Content Selection dialog....415

Content Selection
Select an item from the content list. If you want to change the content that is displayed in the list, tap the button above the list. The "Content Selection" dialog is displayed, see "Content Selection dialog" on page 415.

Remote command:
CONFigure<hw>:AVGen:SIGNal:PLAY:PATT[?] "<pattern>"
with "<pattern>" see Chapter 10.4.1, "Patterns", on page 348

Content Selection dialog ← Content Selection
All available signal types are displayed.

If you want to choose a predefined signal, tap the corresponding signal type button and close the dialog. In the left pane of the "Signal" subtab, all signals of the selected type are available in the content list. For information on pattern, see Chapter 10.4.1, "Patterns", on page 348.

If you want to select a file, tap "File" to display the "File" dialog. See Chapter 5.3, "File Dialog", on page 89.

Remote command:
CONFigure<hw>:AVGen:SIGNal:PLAY:FILE[?] "<filename>"
CONFigure<hw>:AVGen:SIGNal:PLAY:PATT[?] "<pattern>"
with "<pattern>" see Chapter 10.4.1, "Patterns", on page 348

Video Code
Tap the button to select the video code. In the "Video Code" dialog, all available video codes are sorted on several tabs. See Chapter 10.4.3, "Video Codes", on page 353.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD[?] 0 to 100
CONFigure<hw>:AVGen:SIGNal:VICD:HCODe[?] 0 to 100
CONFigure<hw>:AVGen:SIGNal:VICD:VCODe[?] 0 to 100

Format Filter
Select the wanted resolution, frame rate or aspect ratio, and the video code and content selection will be filtered accordingly.

Resolution ← Format Filter
Tap the button to open the "Resolution" dialog and select the resolution in the format filter.

If you want to choose a predefined parameter, tap the corresponding parameter button to enable the filter function for the "Video Code" on page 415.

If you want to define your own video timing configuration, tap "User Defined" to open the "User Defined Video Timing Configuration" dialog, see "User Defined Video Timing Configuration dialog" on page 423.

Frame Rate ← Format Filter
Tap the button to select the frame rate in the format filter.

In the "Frame Rate" dialog, tap the parameter to enable the filter function for the "Video Code" on page 415.

Remote command:
CONFigure<hw>:AVGen:SIGNal:FRAM[?] 23.97|24|25|29.97|30|43|50|56|59.94|60

Aspect Ratio ← Format Filter
Tap the button to select the aspect ratio in the format filter.

In the "Frame Rate" dialog, tap the parameter to enable the filter function for the "Video Code" on page 415.

Remote command:
CONFigure<hw>:AVGen:SIGNal:ASPRatio[?] F4_3|F16_9

Video Configuration
Tap to open the "Video Configuration" dialog, see "Video Configuration dialog" on page 416.

The gray label indicates the most important settings of the video configuration.

Video Configuration dialog ← Video Configuration
Groups the parameters to configure the video signal.

Component Format ← Video Configuration dialog ← Video Configuration
Selects the pixel encoding.
- "RGB"
- "YCbCr 4:4:4"
- "YCbCr 4:2:2"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:COMPonent:FORMat[?] RGB|Y444|Y422

Quantization Range ← Video Configuration dialog ← Video Configuration
Enables or disables the full color range.
- "Limited Range"
- "Full Range"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:QUANtization[?] LIMited|FULL

Pixelshift Vertical ← Video Configuration dialog ← Video Configuration
Scrolls the screen contents in the selected velocity and direction.
- "On"
- "Off"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:PIXVertical[?] OFF|ON

Vertical ← Video Configuration dialog ← Video Configuration
Selects the scroll velocity and direction.
- "-63 Lines/Frame" to "63 Lines/Frame".
  The sign defines the scroll direction: Positive values move the image upwards, negative values move the image downwards.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:PIXelshift:VERTical[?] -63 to 63

Pixelshift Horizontal ← Video Configuration dialog ← Video Configuration
Scrolls the screen contents in the selected velocity and direction.
- "On"
- "Off"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:PIXHorizonta[?] OFF|ON

Horizontal ← Video Configuration dialog ← Video Configuration
Selects the scroll velocity and direction.
- "-63 Pixel/Frame" to "63 Pixel/Frame".
  The sign defines the scroll direction: Positive values move the image to the left, negative values move the image to the right.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:PIXelshift:HORizontal[?] -63 to 63

Adjustment ← Video Configuration dialog ← Video Configuration
Sets the calibrated values or the variable values of the signal amplitude.
- "Calibrated"
  Disables variation. All levels are in according to their default levels.
- "Variable"
  Enables variation.

Note: The maximum amplitude is limited by the signal amplitude range of the individual signal outputs. This value is given in the data sheet.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:ADJustment[?] CALibrated|VARiable

Resolution Clipping ← Video Configuration dialog ← Video Configuration
Allows to clip the resolution of the video signal. This feature is particularly interesting in conjunction with 12 bit video signals. It easily allows to verify in an optical way how many bits a TV monitor is processing.
- "Off"
- "1 bit" to "7 bit"

Note: This setting only effects the video signal. It has no has no impact on the setting of the MHL interface.
Example: If a 12 bit signal is selected and the resolution clipping is set to 8 bit, the signal is transmitted as a 12 bit signal, but the lower four bits of the signal are set to zero.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:CLIPping[?] OFF|B7|B6|B5|B4|B3|B2|B1

Overall Amplification ← Video Configuration dialog ← Video Configuration
Sets the variation of the overall signal level. It includes all component amplitudes but not the synchronization level.

- "0.000" to "2.000"
  Multiplier that is applied to the original level.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:AMPL:RGB[?] 0.000 to 2.000
CONFigure<hw>:AVGen:SIGNal:VIDConf:AMPL:YCBCr[?] 0.000 to 2.000

Chroma Amplification ← Video Configuration dialog ← Video Configuration
Only available:

- If "YCbCr x:x:x" is set under "Component Format" on page 416.
- For Y, Cb/Pb, Cr/Pr signals.

Sets the common variation of the all chroma signal level.

- "0.000" to "2.000"
  Multiplier that is applied to the original level.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:AMPL:CHRoma[?] 0.000 to 2.000

R Level ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 416.

Sets the individual variation of the signal components amplitude.

- "0.0" to "200.0"
  Percentage of the calibrated signal level that is used.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:LEVel:R[?] 0.0 PCT to 200.0 PCT

G Level ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 416.

Sets the individual variation of the signal components amplitude.

- "0.0" to "200.0"
  Percentage of the calibrated signal level that is used.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:LEVel:G[?] 0.0 PCT to 200.0 PCT

B Level ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 416.

Sets the individual variation of the signal components amplitude.

- "0.0" to "200.0"
  Percentage of the calibrated signal level that is used.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:LEVel:B[?] 0.0 PCT to 200.0 PCT

Y Level ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr x:x:x" is set under "Component Format" on page 416.

Sets the individual variation of the signal components amplitude.
- "0.0" to "200.0"
  Percentage of the calibrated signal level that is used.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:LEVel:Y[?] 0.0 PCT to 200.0 PCT

C_b/P_b Level ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr x:x:x" is set under "Component Format" on page 416.

Sets the individual variation of the signal components amplitude.
- "0.0" to "200.0"
  Percentage of the calibrated signal level that is used.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:LEVel:CB[?] 0.0 PCT to 200.0 PCT

C_r/P_r Level ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr x:x:x" is set under "Component Format" on page 416.

Sets the individual variation of the signal components amplitude.
- "0.0" to "200.0"
  Percentage of the calibrated signal level that is used.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:LEVel:CR[?] 0.0 PCT to 200.0 PCT

Overall Offset ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 416.

Adds a DC offset to the R, G, B signal at the same time.
- "0.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:OFFset[?] 0.0 PCT to 100.0 PCT

R Offset ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 416.

Adds a DC offset to the red signal.
- "0.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:ROFFset[?] 0.0 PCT to 100.0 PCT

G Offset ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 416.

Adds a DC offset to the green signal.

- "0.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:GOFFset[?] 0.0 PCT to 100.0 PCT

B Offset ← Video Configuration dialog ← Video Configuration
Only available if "RGB" is set under "Component Format" on page 416.

Adds a DC offset to the blue signal.

- "0.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:BOFFset[?] 0.0 PCT to 100.0 PCT

Y Offset ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr x:x:x" is set under "Component Format" on page 416.

Adds a DC offset to the luminance signal.

- "0.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:YOFFset[?] 0.0 PCT to 100.0 PCT

C_b Offset ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr x:x:x" is set under "Component Format" on page 416.

Adds a DC offset to the luminance signal.

- "-100.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:CBOFfset[?] -100.0 PCT to 100.0 PCT

C_r Offset ← Video Configuration dialog ← Video Configuration
Only available if "YCbCr x:x:x" is set under "Component Format" on page 416.

Adds a DC offset to the luminance signal.

- "-100.0" to "100.0"
  Percentage of the nominal picture level that is used as offset.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:CROFfset[?] -100.0 PCT to 100.0 PCT

Default button ← Video Configuration dialog ← Video Configuration
Sets each value to its default value.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VIDConf:DEFault

Audio Configuration
Tap to open the "Audio Configuration" dialog, see "Audio Configuration dialog" on page 421.

The gray label indicates the most important settings of the audio configuration.

Audio Configuration dialog ← Audio Configuration
Groups the parameters to configure the audio signal.

Audio ← Audio Configuration dialog ← Audio Configuration
Sets the audio source.

- "Mute"
- "Generator"
  Enables the internal sine wave generator.
- "Source Video File"
  Audio signal as embedded in the video signal file. This setting is mandatory for Lip-Sync signals.

Remote command:
CONFigure<hw>:AVGen:SIGNal:AUDConf:SELect[?] MUTE|GENerator|VIDeofile

Sampling Rate ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 421.

Sets the sample rate of the contained audio signal, the audio sampling rate.

- "32 kHz"
- "44.1 kHz"
- "48 kHz"
- "88.2 kHz"
- "96 kHz"
- "176.4 kHz"
- "192 kHz"

Remote command:
CONFigure<hw>:AVGen:SIGNal:AUDConf:SAMPling:RATE[?] HZ32000|HZ44100|HZ48000|HZ88200|HZ96000|HZ176400|HZ192000

Audio Level ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 421.

Sets the audio level of all channels together. The digital audio level is adjusted in dBFS (decibel relative to full scale).

- "-99.0 dBFS" to "0 dBFS" (full scale)

Remote command:
CONFigure<hw>:AVGen:SIGNal:AUDConf:LEVel[?] -99.9 to 0.0

Resolution ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 421.

Sets the audio resolution of all channels. The resolution of the audio signal is adjusted in the following steps for internal sine wave generation.

- "16 bit"
- "20 bit"
- "24 bit"

Remote command:
CONFigure<hw>:AVGen:SIGNal:AUDConf:RESolution[?] B16|B20|B24

Channel Allocation ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 421.

Specifies the speaker allocation.

- "0" to "31"
  Successive abbreviations see Table 10-7.
  The list is in accordance with the CEA-861-E specification. The value specifies the channel allocation index.

Remote command:
CONFigure<hw>:AVGen:SIGNal:AUDConf:CHALlocation[?] 0 to 31

Channel 1 to 8 ← Audio Configuration dialog ← Audio Configuration
Only available if "Generator" is set under "Audio" on page 421.

Enables or disables the channel, sets its frequency and sets the audio level of each channel. The digital audio level is adjusted in dBFS (decibel relative to full scale).

- "100 Hz" to "20000 Hz"
- "-99.0 dBFS" to "0 dBFS" (full scale)

Remote command:
CONFigure<hw>:AVGen:SIGNal:AUDConf:CH<1 to 8>[?] OFF|ON
CONFigure<hw>:AVGen:SIGNal:AUDConf:FREQ:CH<1 to 8>[?] 100 to 20000
CONFigure<hw>:AVGen:SIGNal:AUDConf:LEVel:CH<1 to 8>[?] -99.9 to 0.0

Default button ← Audio Configuration dialog ← Audio Configuration
Sets each value to its default value.

Remote command:
CONFigure<hw>:AVGen:SIGNal:AUDConf:DEFault

Start button
Only available if the play was stopped or paused.

Starts playing the signal selected under "Content Selection" on page 415.

Remote command:
CONFigure<hw>:AVGen:SIGNal:COMMand[?] PLAY
READ<hw>:AVGen:SIGNal:STATus?

Stop button
Only available if a signal is being played or the play was paused.

Stops playing the signal selected under "Content Selection" on page 415.

Remote command:
CONFigure<hw>:AVGen:SIGNal:COMMand[?] STOP
READ<hw>:AVGen:SIGNal:STATus?

Pause button
Only available if a signal is being played or the play was stopped.

Pauses playing the signal selected under "Content Selection" on page 415.

Remote command:
CONFigure<hw>:AVGen:SIGNal:COMMand[?] PAUSe
READ<hw>:AVGen:SIGNal:STATus?

User Defined Video Timing Configuration dialog
Groups the parameters to define the video timing configuration.

To open the dialog, see "Resolution" on page 416.

H. Active Pixels ← User Defined Video Timing Configuration dialog
Sets the number of horizontal active pixels.
- "512" to "4096"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:HACTive[?] 512 to 4096

H. Front Porch Pixels ← User Defined Video Timing Configuration dialog
Sets the number of horizontal front porch pixels.
- "5" to "4096"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:HFPorch[?] 5 to 4096

H. Sync. Pixels ← User Defined Video Timing Configuration dialog
Sets the number of horizontal synchronization pixels.
- "5" to "1024"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:HSYNc[?] 5 to 1024

H. Back Porch Pixels ← User Defined Video Timing Configuration dialog
Sets the number of horizontal back porch pixels, calculated as follows:

"H. Blanking Pixels" - "H. Front Porch Pixels" - "H. Sync Pixels"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:HBPorch[?] 5 to 4096

H. Blanking Pixels ← User Defined Video Timing Configuration dialog
Displays the number of horizontal blanking pixels.

Remote command:
READ<hw>:AVGen:SIGNal:VICD:CUSTom:HBLank?

H. Total Pixels ← User Defined Video Timing Configuration dialog
Displays the number of horizontal total pixels, calculated as follows:

"H. Active Pixels" + "H. Blanking Pixels"

Remote command:
READ<hw>:AVGen:SIGNal:VICD:CUSTom:HTOPixel?

H. Sync. Polarity ← User Defined Video Timing Configuration dialog
Sets the horizontal synchronization polarity.
- "Positive"
- "Negative"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:HPOLarity[?] POSitive|NEGative

Pixel Repetition ← User Defined Video Timing Configuration dialog
Sets the number of repeated pixels.
- "None" to "10"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:PXRepetition[?] 1 to 10 (1 = "None")

Pixel Frequency ← User Defined Video Timing Configuration dialog
Sets the actual pixel frequency.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:PXFRequency[?] 25000000 to 320000000

V. Active Lines ← User Defined Video Timing Configuration dialog
Sets the number of vertical active lines.
- "200" to "2160"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:VACTive[?] 200 to 2160

V. Front Porch Lines ← User Defined Video Timing Configuration dialog
Sets the number of vertical front porch lines.
- "1" to "512"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:VFPorch[?] 1 to 512

V. Sync. Lines ← User Defined Video Timing Configuration dialog
Sets the number of vertical sync lines.
- "2" to "512"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:VSYNc[?] 2 to 512

V. Back Porch Lines ← User Defined Video Timing Configuration dialog
Sets the number of vertical back porch lines.
- "1" to "512"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:VBPorch[?] 1 to 512

V. Blanking Lines ← User Defined Video Timing Configuration dialog
Displays the number of vertical blanking lines.

Remote command:
READ<hw>:AVGen:SIGNal:VICD:CUSTom:VBLank?

V. Total Lines ← User Defined Video Timing Configuration dialog
Displays the number of vertical total lines.

Remote command:
READ<hw>:AVGen:SIGNal:VICD:CUSTom:VTOLines?

V. Sync. Polarity ← User Defined Video Timing Configuration dialog
Sets the vertical synchronization polarity.
- "Positive"
- "Negative"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:VPOLarity[?] POSitive|NEGative

Video Format ← User Defined Video Timing Configuration dialog
Sets the video format.
- "Progressive"
- "Interlaced"
- "Equal Sync. Interlaced"

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:PROGressive[?] PROGressive|INTerlaced|EVENsync

Vertical Frequency ← User Defined Video Timing Configuration dialog
Sets the actual vertical frequency.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:VFRequency[?] 20 to 300

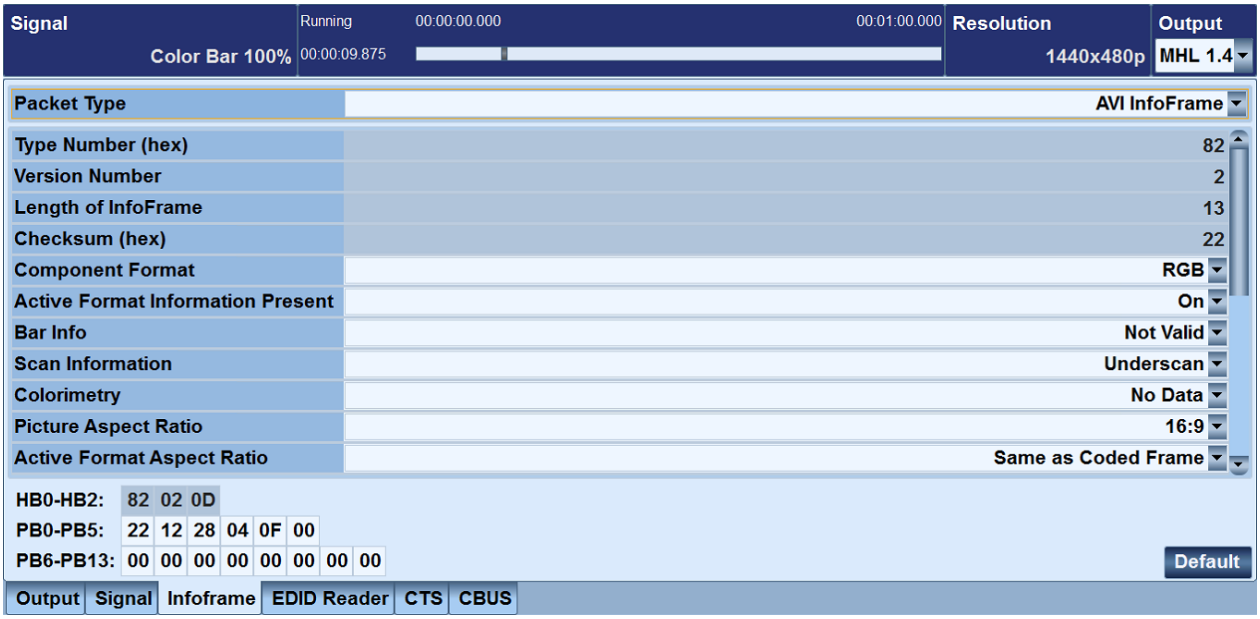
Default button ← User Defined Video Timing Configuration dialog
Sets each value to its default value.

Remote command:
CONFigure<hw>:AVGen:SIGNal:VICD:CUSTom:DEFault

12.1.4 InfoFrame Subtab

Displays all InfoFrame related information.

Max. number of active InfoFrames
The AVI InfoFrame and the Audio InfoFrame are always active. The other InfoFrames can be enabled and disabled, but in sum no more than 8 InfoFrames can be active simultaneously. If already 8 InfoFrames are active, you have to disable one of the InfoFrames first before enabling a new one.



Packet Type
Sets the InfoFrame packet filter to one of the following InfoFrames.

- "AVI InfoFrame"
  Auxiliary video information (AVI) InfoFrame
- "Audio InfoFrame"
- "SPD InfoFrame"
  Source product description (SPD) InfoFrame
- "MPEG InfoFrame"
  MPEG source InfoFrame
- "Vendor Specific InfoFrame"
  Vendor specific InfoFrame (main)
- "Vendor Specific InfoFrame 2"
- "Vendor Specific InfoFrame 3"
- "Vendor Specific InfoFrame 4"

<Common InfoFrame parameters>
This set of parameters is displayed for all InfoFrames.

Type Number (hex) ← <Common InfoFrame parameters>
Displays the type number hexadecimal.

Version ← <Common InfoFrame parameters>
Displays the version.

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:VERSion?
CONFigure<hw>:AVGen:INFoframe:AUDio:VERSion?
CONFigure<hw>:AVGen:INFoframe:SPD:VERSion?
CONFigure<hw>:AVGen:INFoframe:MPEG:VERSion?
CONFigure<hw>:AVGen:INFoframe:VSIF:VERSion?

Length of InfoFrame ← <Common InfoFrame parameters>
Displays the length of the Info Frame.

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:LENGth[?]
CONFigure<hw>:AVGen:INFoframe:AUDio:LENGth[?]
CONFigure<hw>:AVGen:INFoframe:SPD:LENGth[?]
CONFigure<hw>:AVGen:INFoframe:MPEG:LENGth[?]
CONFigure<hw>:AVGen:INFoframe:VSIF:LENGth[?]

Checksum (hex) ← <Common InfoFrame parameters>
Displays the checksum hexadecimal.

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:CSUM?
CONFigure<hw>:AVGen:INFoframe:AUDio:CSUM?
CONFigure<hw>:AVGen:INFoframe:SPD:CSUM?
CONFigure<hw>:AVGen:INFoframe:MPEG:CSUM?
CONFigure<hw>:AVGen:INFoframe:VSIF:CSUM?

<AVI InfoFrame parameters>
Auxiliary video information (AVI) InfoFrame

Only available if "AVI InfoFrame" is set under "Packet Type" on page 427.

Component Format ← <AVI InfoFrame parameters>
Sets the pixel encoding.
- "RGB"
- "YCC 4:4:4"
- "YCC 4:2:2"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:COMPonent:FORMat[?] 0 to 7
(0 = "RGB", 1 = "YCC 4:2:2", 2 = "YCC 4:4:4")

Active Format Information Present ← <AVI InfoFrame parameters>
- "On"
- "Off"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:AFPResent[?] OFF|ON

Bar Info ← <AVI InfoFrame parameters>
- "Not Valid"
- "Vertical Bar"
- "Horizontal Bar"

- "Both Bars"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:BARinfo[?] NONE|HORZ|VERT|BOTH

Scan Information ← <AVI InfoFrame parameters>
- "No Data"
- "Overscan"
- "Underscan"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:SCANinfo[?] 0 to 2
(0 = "No Data",1 = "Overscan", 2 = "Underscan")

Colorimetry ← <AVI InfoFrame parameters>
- "No Data"
- "SMPTE 170M/ITU601 "
- "ITU709"
- "Extended Colorm. Valid"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:COLorimetry[?] NONE|SMPTe170m|ITU709|EXTended

Picture Aspect Ratio ← <AVI InfoFrame parameters>
- "No Data"
- "4:4"
- "16:9"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:PICTurear[?] 0 to 2
(0 = "No Data", 1 = "4:4", 2 = "16:9")

Active Format Aspect Ratio ← <AVI InfoFrame parameters>
- "AFD Unknown"
- "Box 16:9 (Top)"
- "Box 14:9 (Top)"
- "Box > 16:9 (Center)"
- "Same as Coded Frame"
- "4:3 (Center)"
- "16:9 (Center)"
- "14:9 (Center)"
- "4:3 (Protect 14:9 Center)"
- "16:9 (Protect 14:9 Center)"
- "16:9 (Protect 4:3 Center)"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:FORMatar[?] 0 to 15
(0 = "AFD Unknown", 2 = "Box 16:9 (Top)", 3 = "Box 14:9 (Top)", 4 = "Box > 16:9 (Center)", 8 = "Same as Coded Frame", 9 = "4:3 (Center)", 10 = "16:9 (Center)", 11 = "14:9 (Center)", 13 = "4:3 (Protect 14:9 Center)", 14 = "16:9 (Protect 14:9 Center)", 15 = "16:9 (Protect 4:3 Center)")

IT Content ← <AVI InfoFrame parameters>
- "On"
- "Off"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:ITContent[?] OFF|ON

Extended Colorimetry ← <AVI InfoFrame parameters>
- "xvYCC 601"
- "xvYCC 709"
- "sYCC 601"
- "Adobe YCC 601"
- "Adobe RGB"
- "ITU-R BT.2020 $Y'_CC'_{BC}C'_{RC}$"
- "TR-R BT.2020 $Y'_CC'_BC'_R$"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:EXTColorim[?] 0 to 6
(0 = "xvYCC 601", 1 = "xvYCC 709", 2 = "sYCC 601", 3 = "Adobe YCC 601", 4 = "Adobe RGB", 5 = "ITU-R BT.2020 $Y'_CC'_{BC}C'_{RC}$", 6 = "TR-R BT.2020 $Y'_CC'_BC'_R$")

RGB Quantization Range ← <AVI InfoFrame parameters>
- "Default"
- "Limited Range"
- "Full Range"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:RGBQrange[?] 0 to 2
(0 = "Default", 1 = "Limited Range", 2 = "Full Range")

Nonuniform Picture Scaling ← <AVI InfoFrame parameters>
- "Unknown"
- "H. Scaled"
- "V. Scaled "
- "H. & V. Scaled "

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:NUSCaling[?] NONE|HORZ|VERT|BOTH

Pixel Repetition ← <AVI InfoFrame parameters>
- "No Repetition"
- "1" to "10"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:PXRepetition[?] 0 to 9

Video Identification Code ← <AVI InfoFrame parameters>
- "0" to "127"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:VIC[?] 0 to 127

YCC Quantization ← <AVI InfoFrame parameters>
- "Limited Range"

- "Full Range"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:YCCQuant[?] 0 to 1
(0 = "Limited Range", 1 = "Full Range")

Content Type ← <AVI InfoFrame parameters>
- "Graphics"
- "Photo"
- "Cinema"
- "Game"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:CONTenttype[?] GRAPhics|PHOTo|CINema|GAME

Line Number of Top Bar End ← <AVI InfoFrame parameters>
- "0" to "9999"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:TBAR[?] 0 to 9999

Line Number of Bottom Bar Start ← <AVI InfoFrame parameters>
- "0" to "9999"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:BBAR[?] 0 to 9999

Pixel Number of Left Bar End ← <AVI InfoFrame parameters>
- "0" to "9999"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:LBAR[?] 0 to 9999

Pixel Number of Right Bar Start ← <AVI InfoFrame parameters>
- "0" to "9999"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:RBAR[?] 0 to 9999

<Audio InfoFrame parameters>
Only available if "Audio InfoFrame" is set under "Packet Type" on page 427.

Coding Type ← <Audio InfoFrame parameters>
- "Stream Header"
- "PCM"
- "AC-3"
- "MPEG-1"
- "MP3"
- "MPEG-2"
- "AAC LC"
- "DTS"
- "ATRAC"
- "One Bit Audio"

- "Enhanced AC-3"
- "DTS-HD"
- "MAT" (MLP)
- "DST"
- "WMA Pro"
- "Extended"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:CODE:TYPE[?] 0 to 15
(0 = "Stream Header", 1 = "PCM", 2 = "AC-3", 3 = "MPEG-1", 4 = "MP3", 5 = "MPEG-2", 6 = "AAC LC", 7 = "DTS", 8 = "ATRAC", 9 = "One bit Audio", 10 = "Enhanced AC-3", 11 = "DTS-HD", 12 = "MAT", 13 = "DST", 14 = "WMA Pro", 15 = "Extended")

Channel Count ← <Audio InfoFrame parameters>

- "Stream Header"
- "2 Channels"
- "3 Channels"
- "4 Channels"
- "5 Channels"
- "6 Channels"
- "7 Channels"
- "8 Channels"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:CHANnel:COUNt[?] 0 to 7
(0 = "Stream Header", 1 = "2 Channels", 2 = "3 Channels", 3 = "4 Channels", 4 = "5 Channels", 5 = "6 Channels", 6 = "7 Channels", 7 = "8 Channels")

Sampling Frequency ← <Audio InfoFrame parameters>

- "Stream Header"
- "32 kHz"
- "44.1 kHz"
- "48 kHz"
- "88.2 kHz"
- "96 kHz"
- "176.4 kHz"
- "192 kHz"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:SAMPling:FREQuency[?] STReamheader|HZ32000|HZ44100|HZ48000|HZ88200|HZ96000|HZ176400|HZ192000

Sampling Size ← <Audio InfoFrame parameters>

- "Stream Header"
- "16 bit"
- "20 bit"
- "24 bit"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:SAMPling:SIZE[?] STReamheader|B16|B20|B24

Code Extension ← <Audio InfoFrame parameters>
- "Coding Type"
- "MPEG-4 HE ACC"
- "MPEG-4 HE ACC v2"
- "MPEG-4 ACC LC"
- "DRA"
- "MPEG-4 HE ACC + MPEG Surround"
- "MPEG-4 AAC LC + MPEG Surround" = 10

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:CODE:EXTension[?] 0 to 10
(0 = "Coding Type", 4 = "MPEG-4 HE ACC", 5 = "MPEG-4 HE ACC v2", 6 = "MPEG-4 ACC LC", 7 = "DRA", 8 = "MPEG-4 HE ACC + MPEG Surround", 10 = "MPEG-4 AAC LC + MPEG Surround")

Channel Allocation ← <Audio InfoFrame parameters>
- "0x00" to "0x31"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:CHANnel:ALLocation[?] 0x00 to 0x31

Downmix Inhibit ← <Audio InfoFrame parameters>
- "On"
- "Off"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:DMI[?] OFF|ON

Level Shift Value ← <Audio InfoFrame parameters>
- "0 dB" to "15 dB"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:LSValue[?] 0 to 15

LFE Playback Level ← <Audio InfoFrame parameters>
- "Unknown"
- "0 dB Playback"
- "+10 dB Playback"

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUDio:LFEPlayback[?] 0 to 2
(0 = "Unknown", 1 = "0 dB Playback", 2 = "+10 dB Playback")

<SPD InfoFrame parameters>
Source product description (SPD) InfoFrame

Only available if "SPD InfoFrame" is set under "Packet Type" on page 427.

Active ← <SPD InfoFrame parameters>
Enables or disables the SPD InfoFrame. See also "Max. number of active InfoFrames" on page 425.
- "On"
- "Off"

Remote command:
CONFigure<hw>:AVGen:INFoframe:SPD:ACTive[?] OFF|ON

Vendor Name ← <SPD InfoFrame parameters>
- "Read only"

Remote command:
CONFigure<hw>:AVGen:INFoframe:SPD:VENDor[?] "<string>"

Product Description ← <SPD InfoFrame parameters>
- "Read only"

Remote command:
CONFigure<hw>:AVGen:INFoframe:SPD:PRODuct[?] "<string>"

Source Information ← <SPD InfoFrame parameters>
- "Unknown"
- "Digital STB"
- "DVD Player"
- "D-VHS"
- "HDD Recorder"
- "DVC"
- "DSC"
- "Video CD"
- "Game"
- "PC General"
- "Blu-Ray Disc"
- "Super Audio CD"
- "HD DVC"
- "PMP"

Remote command:
CONFigure<hw>:AVGen:INFoframe:SPD:SOURceinfo[?] 0 to 13
(0 = "Unknown", 1 = "Digital STB", 2 = "DVD Player", 3 = "D-VHS", 4 = "HDD Recorder", 5 = "DVC", 6 = "DSC", 7 = "Video CD", 8 = "Game", 9 = "PC General", 10 = "Blu-Ray Disc", 11 = "Super Audio CD", 12 = "HD DVC" ,13 = "PMP")

<MPEG InfoFrame parameters>
Only available if "MPEG InfoFrame" is set under "Packet Type" on page 427.

Active ← <MPEG InfoFrame parameters>
Enables or disables the MPEG InfoFrame. See also "Max. number of active InfoFrames" on page 425.
- "On"
- "Off"

Remote command:
CONFigure<hw>:AVGen:INFoframe:MPEG:ACTive[?] OFF|ON

MPEG Bit Rate ← <MPEG InfoFrame parameters>
Sets the MPEG bit rate in bit/s.
- "0" to "2^31"

Remote command:
CONFigure<hw>:AVGen:INFoframe:MPEG:BITRate[?] 0 to 2^31

Field Repeat (for 3:2 Pull-Down) ← <MPEG InfoFrame parameters>
- "On"
- "Off"

Remote command:
CONFigure<hw>:AVGen:INFoframe:MPEG:FREPeat[?] OFF|ON

MPEG Frame ← <MPEG InfoFrame parameters>
Enables or disables the MPEG InfoFrame.

- "Unknown"
- "I Picture"
- "B Picture"
- "P Picture"

Remote command:
CONFigure<hw>:AVGen:INFoframe:MPEG:MPEGframe[?] UNKNown|I_Picture|B_Picture|P_Picture

<Vendor specific InfoFrame parameters>
Only available if "Vendor Specific InfoFrame","Vendor Specific InfoFrame 2","Vendor Specific InfoFrame 3" or "Vendor Specific InfoFrame 4" is set under "Packet Type" on page 427.

The SCPI commands of all vendor specific InfoFrames are the same. For the individual selection of a vendor specific InfoFrame, use the following SCPI command.

Remote command:
CONFigure<hw>:AVGen:INFoframe:VSIF:IDX[?] VSIF2|VSIF3|VSIF4

Active ← <Vendor specific InfoFrame parameters>
Enables and selects the vendor specific InfoFrame. See also "Max. number of active InfoFrames" on page 425.
- "Off"
- "MHL"
- "Vendor Specific"

Remote command:
CONFigure<hw>:AVGen:INFoframe:VSIF:ACTive[?] OFF|V_3D|VS

IEEE OUI ← <Vendor specific InfoFrame parameters>
- "0x00000000 to 0x00FFFFFF"

Remote command:
CONFigure<hw>:AVGen:INFoframe:VSIF:OUI[?] 0x00000000 to 0x00FFFFFF

MHL Video Format ← <Vendor specific InfoFrame parameters>
- "No MHL Video Format"
- "3D Format"

VSIF Version ← <Vendor specific InfoFrame parameters>
- "0 to 255"

Remote command:
CONFigure<hw>:AVGen:INFoframe:VSIF:VSVersion[?] 0 to 255

3D Format Type ← <Vendor specific InfoFrame parameters>
- "Frame Sequential"
- "Top Bottom"
- "Left Right"

HB0 to HB2
Header bytes 0 to 2; "HB0" is read-only, except if "Gamut Boundary Data", "ISRC1" or "ISCR2" is set under "Packet Type" on page 427.

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:HBYTe<1 to 2>[?] 0 to 255
CONFigure<hw>:AVGen:INFoframe:AUDio:HBYTe<1 to 2>[?] 0 to 255
CONFigure<hw>:AVGen:INFoframe:SPD:HBYTe<1 to 2>[?] 0 to 255
CONFigure<hw>:AVGen:INFoframe:MPEG:HBYTe<1 to 2>[?] 0 to 255
CONFigure<hw>:AVGen:INFoframe:VSIF:HBYTe<1 to 2>[?] 0 to 255

PB0 to PB27
Packet bytes 0 to 27

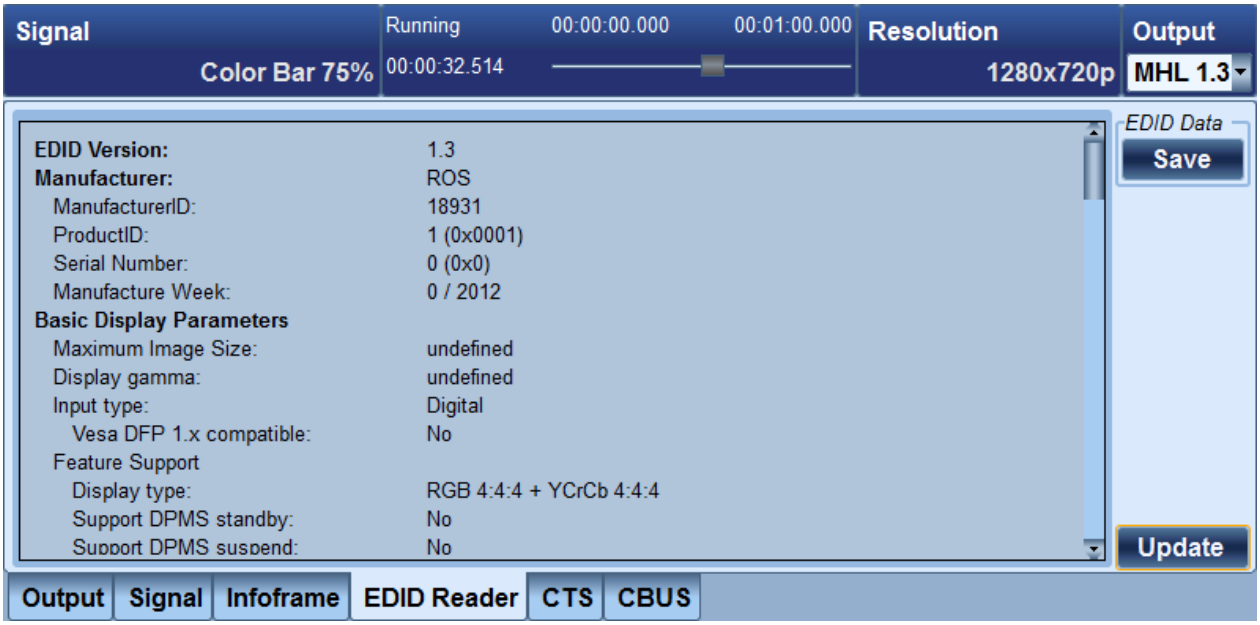
Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:PBYTe<1 to 13>[?] 0 to 255
CONFigure<hw>:AVGen:INFoframe:AUDio:PBYTe<1 to 10>[?] 0 to 255
CONFigure<hw>:AVGen:INFoframe:SPD:PBYTe<1 to 25>[?] 0 to 255
CONFigure<hw>:AVGen:INFoframe:MPEG:PBYTe<1 to 10>[?] 0 to 255
CONFigure<hw>:AVGen:INFoframe:VSIF:PBYTe<1 to 27>[?] 0 to 255

Default button
Sets each value to its default value.

Remote command:
CONFigure<hw>:AVGen:INFoframe:AUX:DEFault
CONFigure<hw>:AVGen:INFoframe:AUDio:DEFault
CONFigure<hw>:AVGen:INFoframe:SPD:DEFault
CONFigure<hw>:AVGen:INFoframe:MPEG:DEFault
CONFigure<hw>:AVGen:INFoframe:VSIF:DEFault

12.1.5 EDID Reader Subtab

Displays the extended display identification data (EDID) of the monitor that is connected using the MHL interface.



Select Output
Sets the output for the EDID reading.

- "MHL Out 1"
- "MHL Out 2"
- "MHL Out 3"
- "MHL Out 4"

Remote command:
CONFigure<hw>:AVGen:EDID:SOUT[?] 1 to 4

Save EDID Data
Saves the read EDID data in a chosen folder.

Remote command:
CONFigure<hw>:AVGen:EDID:SAVE

Update
Updates the left panel with the EDID reading on the chosen port.

Remote command:
CONFigure<hw>:AVGen:EDID:UPDate

<SCPI EDID binary read out>
Only available with SCPI command. Read out the binary data of the EDID on the chosen output.

Remote command:
READ<hw>:AVGen:EDID:DUMP?

12.1.6 CTS Subtab

Requires an additional option for the MHL CTS sink test: R&S VT-K355. See also the data sheet.

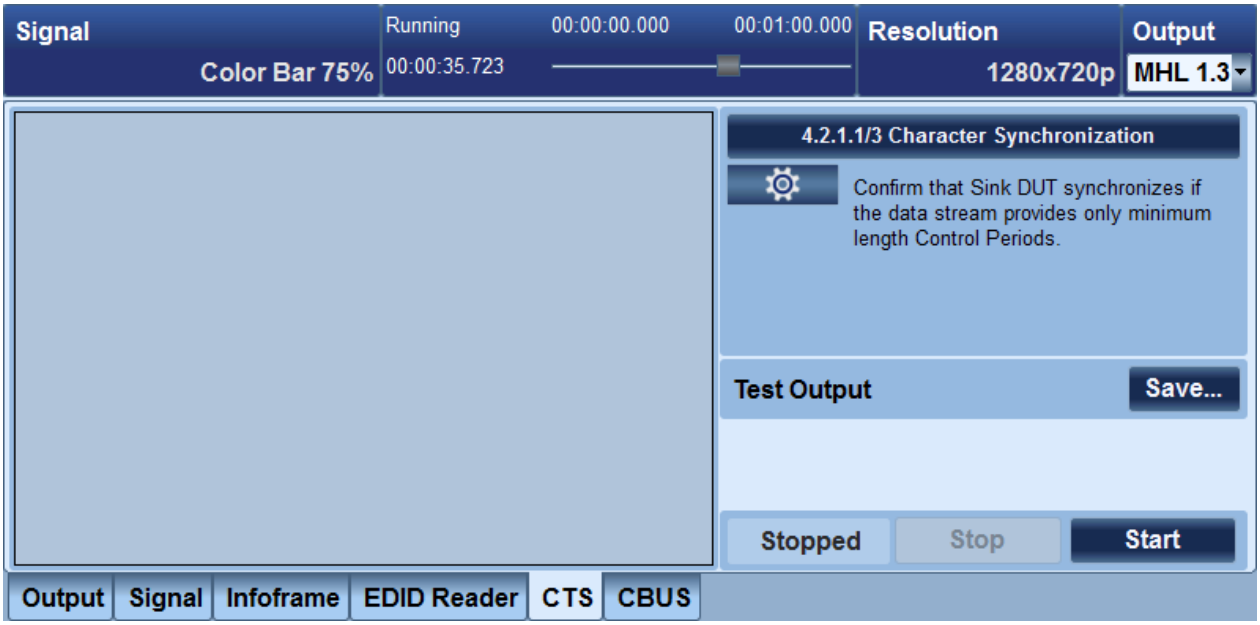
Executes sink and dongle tests according to the compliance test specifications (CTS).

Divided into two panes. The left pane displays the compliance test results.

Remote commands to query measurement results

READ<hw>[:SCALar]:AVGen:CTS:REPort:COUNt?

READ<hw>[:SCALar]:AVGen:CTS:REPort? <integer>|MINimum|MAXimum|UP|DOWN



<Test case> button
Displays the selected test case. The test case name consists of:

- Chapter number of the MHL compliance test specifications where the test case is described.
- Test case identifier

Tap this button to select another test case, see "Test Case dialog" on page 439.

Tap ⚙ to configure the selected test, see "CTS Configuration dialog" on page 440.

Test Case dialog ← <Test case> button
Displays all available test cases, see "<Test cases>" on page 439.

Select the desired test case. If you select a new test case, the old test results are deleted.

Remote command:
CONFigure<hw>:AVGen:CTS:SELect[?] <test case>
with <test case> see "<Test cases>" on page 439

<Test cases> ← <Test case> button
Table 12-1: Sink tests

Test case name	Remote command parameter (<test case>)
4.2.1.1/3 Character Synchronization	M000_csync
4.2.1.2/4 Packet Types	M001_ptype
4.2.2.1/4 Video Formats	M002_vformat
4.2.2.2/5 Pixel Encoding	M003_pixel
4.2.2.3 Video Quantization Range	M004_vqrange
4.2.3.1 IEC60958 / IEC61937	M005_iec6
4.2.3.2 Audio Clock Regeneration	M006_aclock
4.2.5.1 EDID Test	M007_edit
4.2.5.2 Device Capability Registers Test	M008_dcrt
4.2.5.3 Device Status Registers Test	M022_dsrt
4.2.6.1 RCP Sub-Commands Receiving Test	M009_rcprx
4.2.6.2 RCP Sub-Commands Transmitting Test	M010_rcptx
4.2.7.1 RAP and RAPK Sub-Commands Test	M023_rapsc
4.2.8.1 3D Video Mode Support Data	M024_3dvms
4.2.8.2/3 3D Video Format	M025_3dvft
4.2.9.1 UCP Sub-Commands Receiving Test	M026_ucprx
4.2.9.2 UCP Sub-Commands Transmitting Test	M027_ucptx

Table 12-2: Dongle tests

Test case name	Remote command parameter (<test case>)
5.2.1.1/3 Character Synchronization	M011_csync
5.2.1.1/3 Packet Types	M012_ptype
5.2.2.1/4 Video Formats	M013_vformat
5.2.2.2/5 Pixel Encoding	M014_pixel
5.2.2.3 Video Quantization Range	M015_vqrange
5.2.3.1 IEC60958 / IEC61937	M016_iec6
5.2.3.2 Audio Clock Regeneration	M017_aclock
5.2.5.1 EDID Test	M018_edit
5.2.5.2 Device Capability Registers Test	M019_dcrt
5.2.5.3 Device Status Registers Test	M030_dsrt
5.2.6.1 RCP Sub-Commands Receiving Test	M020_rcprx
5.2.6.2 RCP Sub-Commands Transmitting Test	M021_rcptx
5.2.7.1 RAP and RAPK Sub-Commands Test	M031_rapsc
5.2.8.1 3D Video Mode Support Data	M032_3dvms
5.2.8.2/3 3D Video Format	M033_3dvft
5.2.9.1 UCP Sub-Commands Receiving Test	M035_ucprx
5.2.9.2 UCP Sub-Commands Transmitting Test	M036_ucptx

CTS Configuration dialog
In a tree view, displays all available test cases. Each test case has its own set of parameters. The parameters are subentries of the corresponding test case node. Open a test case to display and edit the parameters of this test case.

Depending on the selected test case, you can change the following settings.

Video Format ← CTS Configuration dialog
Relevant for the following tests:
- "4/5.2.1.1/3 Character Synchronization"
- "4/5.2.1.2/4 Packet Types"
- "4/5.2.2.1/4 Video Formats"
- "4/5.2.2.2/5 Pixel Encoding"
- "4/5.2.2.3 Video Quantization Range"
- "4/5.2.3.1 IEC60958 / IEC61937"
- "4/5.2.3.2 Audio Clock Regeneration"

Sets the video format that is used for the selected test.
- "Auto Detect"
  Automatic video format detection.
- <Video format>

Presets the video format. If this setting does not match the actual video format of the input signal, the test result will be "Failed".

Remote command:
CONFigure<hw>:AVGen:CTS:VFORmat[?] <test case>,C2|C3|C4|C5|C6|C7|C17|C18|C19|C20|C21|C22|C34|C1|C32|C31|C16
with <test case> see "<Test cases>" on page 439

Pattern ← CTS Configuration dialog
Relevant for the following tests: "4/5.2.2.1/4 Video Formats"

Sets the video pattern that is used for the test.
- "Test Pattern"
- "Black Raster", "White Raster", "Red Raster", "Blue Raster", "Green Raster"
- "Ramp"

Remote command:
CONFigure<hw>:AVGen:CTS:VFORmat:PATTern[?] <test case>,PATTern|RAMP
with <test case> see "<Test cases>" on page 439

Pixel Encoding ← CTS Configuration dialog
Relevant for the following tests:
- "4/5.2.2.2/5 Pixel Encoding"
- "4/5.2.2.3 Video Quantization Range"

Sets the color format and the chroma sampling that is used for the selected test.
- "RGB"
- "YCbCr 4:2:2"
- "YCbCr 4:4:4"

Remote command:
CONFigure<hw>:AVGen:CTS:PIXelencoding[?] <test case>,RGB|Y444|Y422
with <test case> see "<Test cases>" on page 439

Audio Format ← CTS Configuration dialog
Relevant for the following tests:
- "4/5.2.3.1 IEC60958 / IEC61937"
- "4/5.2.3.2 Audio Clock Regeneration"

Sets the PCM sampling frequency that is used for the selected test.
- "PCM, 2 Channels, 32 kHz"
- "PCM, 2 Channels, 44.1 kHz"
- "PCM, 2 Channels, 48 kHz"

Remote command:
CONFigure<hw>:AVGen:CTS:AFORmat[?] <test case>,P32|P441|P48
with <test case> see "<Test cases>" on page 439

N Value ← CTS Configuration dialog
Relevant for the following test: "4/5.2.3.2 Audio Clock Regeneration"
- "Minimum N"
  Sets the N value to the minimum.
- "Maximum N"
  Sets the N value to the maximum.

Remote command:
CONFigure<hw>:AVGen:CTS:NVALue[?] <test case>,NMIN|NMAX
with <test case> see "<Test cases>" on page 439

Key ID ← CTS Configuration dialog
Relevant for the following tests:
- "4/5.2.6.1 RCP Sub-Commands Receiving Test"
- "4/5.2.6.2 RCP Sub-Commands Transmitting Test"

Sets the RCP key ID that is used for the selected test.
- "0x00" to "0x7F"

Remote command:
CONFigure<hw>:AVGen:CTS:KEYid[?] <test case>,<integer>
with <test case> see "<Test cases>" on page 439

Save button
Opens the "File" dialog to save the test output. See also Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:AVGen:CTS:REPort:STORe[?] "<filename>"

<Status display>
Displays the current status, e.g. "Loading", "Ready".

Remote command:
READ<hw>[:SCALar]:AVGen:CTS:CONTrol:STATe?
READ<hw>[:SCALar]:AVGen:CTS:CONTrol:PROGress?

Stop button
Stops a running test. Only available if a test is running.

Remote command:
ABORt<hw>:AVGen CTS

Start button
Starts a test. Only available if no test is running.

Remote command:
INITiate<hw>:AVGen CTS

12.1.7 CBUS Subtab

The CBUS tracer is used to send MSC, RCP, RAP and UCP commands to an MHL sink device (DUT) or to receive such commands from an MHL sink device (DUT).

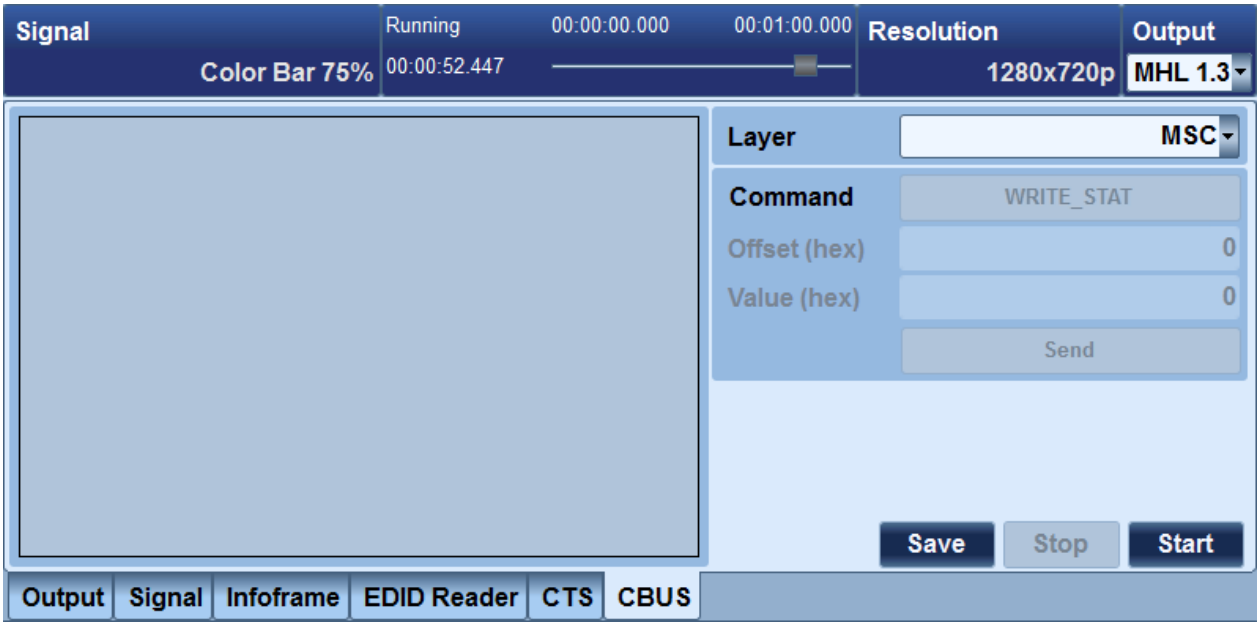
The test equipment itself participates in the CBUS communication. The application listens to all CBUS traffic belonging to the selected layer and lists each received command or reply from the DUT in the left pane, the output pane. You can configure and send commands from the test equipment to the DUT, too. These outgoing commands are also listed in the output pane.

Remote commands to query results

READ<hw>[:SCALar]:AVGen:CBUS:REPort:COUNt?

READ<hw>[:SCALar]:AVGen:CBUS:REPort? <integer>|MINimum|MAXimum|UP|DOWN

READ<hw>[:SCALar]:AVGen:OUTPut:CBUS?



Layer
Depending on the selected protocol layer, various commands and command parameters are supported. See the MHL specification for information on the purpose and the syntax of each command.

- "MSC"
  Used to send or receive commands based on the MSC (MHL sideband channel) protocol layer.
- "RCP"
  Used to send or receive commands based on the RCP (remote control protocol) protocol layer.
  The "Start Press and Hold" button is available for all commands that support the "press and hold" feature: The selected command is sent repeatedly until you tap the "Stop Press and Hold" button.
- "RAP"
  Used to send or receive commands based on the RAP (request action protocol) protocol layer.
- "UCP"

Used to send or receive commands based on the UCP (UTF-8 character protocol) protocol layer.

See also "Command and Parameters" on page 444.

Remote command:
CONFigure<hw>:AVGen:CBUS:LAYer[?] MSC|RAP|RCP|UCP

Command and Parameters
For the MSC, RCP and RAP protocol layers, a button with the selected command is displayed. Tap this button to select another command.

For UCP protocol layers, enter the UCP command as text string.

For the MSC protocol layers, depending on the selected command, additional configuration parameters may be required to complete the command.

Remote command:
Selecting or entering a command:
CONFigure<hw>:AVGen:CBUS:MSC:COMMand[?] WSTat|SETint|RDEVcap|GSTate|GVENdor|SHPD|CHPD|MSCMsg|GDDCerror|GMSCerror|WBURst
CONFigure<hw>:AVGen:CBUS:RAP:COMMand[?] <numeric>
CONFigure<hw>:AVGen:CBUS:RCP:COMMand[?] <numeric>
CONFigure<hw>:AVGen:CBUS:UCP:COMMand[?] "<string>"
Additional configuration parameters for MSC protocol layers:
CONFigure<hw>:AVGen:CBUS:MSC:MSCMsg:OPCode[?] MSGE|RCP|RCPK|RCPE|RAP|RAPK|UCP|UCPK|UCPE,<numeric>
CONFigure<hw>:AVGen:CBUS:MSC:RDEVcap:OFFSet[?] <numeric>
CONFigure<hw>:AVGen:CBUS:MSC:SETint:OFFSet[?] <numeric>
CONFigure<hw>:AVGen:CBUS:MSC:SETint:VALue[?] <numeric>
CONFigure<hw>:AVGen:CBUS:MSC:WBURst:OFFSet[?] <numeric>,<numeric>[,<numeric>]
CONFigure<hw>:AVGen:CBUS:MSC:WSTat:OFFSet[?] <numeric>
CONFigure<hw>:AVGen:CBUS:MSC:WSTat:VALue[?] <numeric>

Send button
Sends the selected/entered command.

Remote command:
CONFigure<hw>:AVGen:CBUS:COMMand:SEND

Start button
Starts the protocol trace for the selected layer. All content in the output pane is cleared, and the incoming commands from the DUT are listed in the output pane.

You can also select commands and sent them to the DUT.

Remote command:
CONFigure<hw>:AVGen:CBUS:COMMand[?] STARt|STOP

Stop button
Stops the protocol trace. Use the scroll bar to navigate in the recorded trace.

Remote command:
CONFigure<hw>:AVGen:CBUS:COMMand[?] STARt|STOP

Save button
Opens the "File" dialog to save the protocol trace in a file. See also Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:AVGen:CBUS:DATA:STORe[?] "<filename>"

12.2 MHL Analyzer Application

Requires the following options:

- Suitable module as described in the data sheet, see also "Input" on page 448
- Additional options for CTS tests, see Chapter 12.2.7, "CTS Subtab", on page 459

The MHL analyzer application displays the relevant protocol parameters.

- Pixel clock and video timing parameters in line with CEA-861E
- Audio data
- High-bandwidth digital content protection (HDCP) status
- Auxiliary video information InfoFrame (AVI InfoFrame), audio InfoFrame, source product description (SPD) InfoFrame, and MPEG InfoFrame

In addition to performing these realtime measurements, the MHL analyzer application provides test modes for MHL source system tests in line with the MHL compliance test specifications.

12.2.1 Main Dialog of the Application

The parameters are grouped on tabs. If a measured parameter is displayed in red color, the value does not meet the requirements of the MHL specification.

Default favorites

Parameters that are often needed are provided as default favorites below the tab title. Some of the default favorites of the application itself are also available on one of the subtabs.

- "CBUS" on page 447
- "Pixel Clock Locked" on page 447
- "Pixel Clock" on page 447
- "HDCP State" on page 447
- "Input" on page 448
- "Standard (default favorite)" on page 445

Standard (default favorite)

Sets the MHL standard.

Remote command:

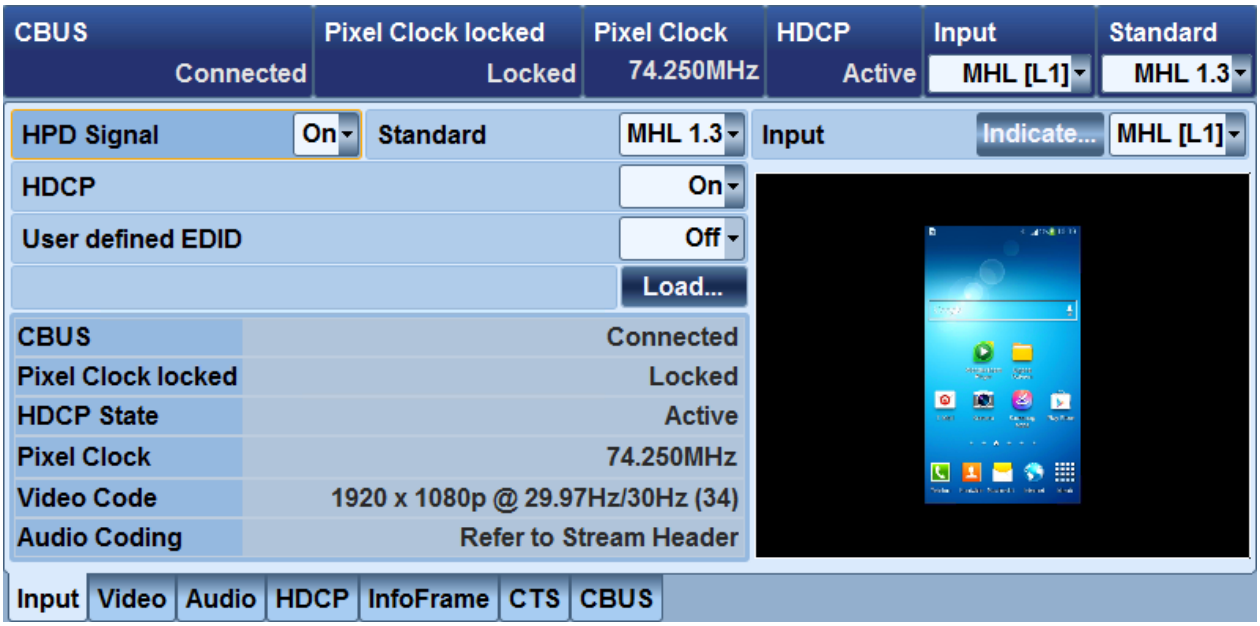
ROUTe<hw>:MHL:ISELect:VERSion[?] 12|21

ROUTe<hw>:MHL:ISELect[?] MHL13|MHL12|MHL|MHL21|MHL20

12.2.2 Input Subtab

Displays the input parameters and the present video signal.

► To enlarge the thumbnail picture to full-screen size, tap the picture. You can also add the thumbnail picture to your favorites.



HPD Signal
Sets the hotplug detect (HPD) signal.

- "On"
  Sends a `SET_HPD` command to the MHL source.
- "Off"
  Sends a `CLR_HPD` command to the MHL source.

Remote command:
CONFigure<hw>:MHL:INPut:HPDSignal[?] ON|OFF

HDCP
Enables or disables the HDCP encryption.
- "On"
  If the source sends a signal with HDCP, the R&S VTE uses HDCP.
- "Off"
  R&S VTE does not use HDCP.

Remote command:
CONFigure<hw>:MHL:INPut:HDCP[?] OFF|ON

User Defined EDID
Changes the EDID settings.
- "Off"
  The R&S HDMI default EDID is active.
- "File"
  Uses a user-defined EDID. Tap "File" to load the binary file.
- "Aux"
  Uses the EDID that is read at the AUX output. Imports the EDID capabilities of the device connected at the AUX output to the analyzer input.
  If you want to save this EDID as a binary file for later use, tap "Save".

Remote command:
CONFigure<hw>:MHL:INPut:EDID:USER[?] OFF|FILE|AUX|ON
MMEMory<hw>:MHL:INPut:EDID:DATA:LOAD[?] "<string>"
MMEMory<hw>:MHL:INPut:EDID:DATA:STORe[?] "<string>"

CBUS
Displays the status of the CBUS connection.
- "Connected"
- "WaitingForConnection"

Remote command:
READ<hw>[:SCALar]:MHL:INPut:CBUS?

Pixel Clock Locked
Displays if the R&S VTE has detected a valid MHL input clock.
- "Locked"
- "Unlocked"

Remote command:
READ<hw>[:SCALar]:MHL:INPut:PCLock:STATe?

HDCP State
Displays if an HDCP encryption is currently active.
- "Active"
- "Inactive"

Remote command:
READ<hw>[:SCALar]:MHL:INPut:HDCP?

Pixel Clock
Displays the value in MHz.

Remote command:
READ<hw>[:SCALar]:MHL:INPut:PCLock?

Video Code
Displays the video code derived from the AVI (auxiliary video information) InfoFrame.

Remote command:
READ<hw>[:SCALar]:MHL:INPut:VCODe?

Audio Coding
Displays the audio coding type derived from audio InfoFrame.

Remote command:
READ<hw>[:SCALar]:MHL:INPut:ACODe?

Input
Sets the input that is used for MHL analysis.

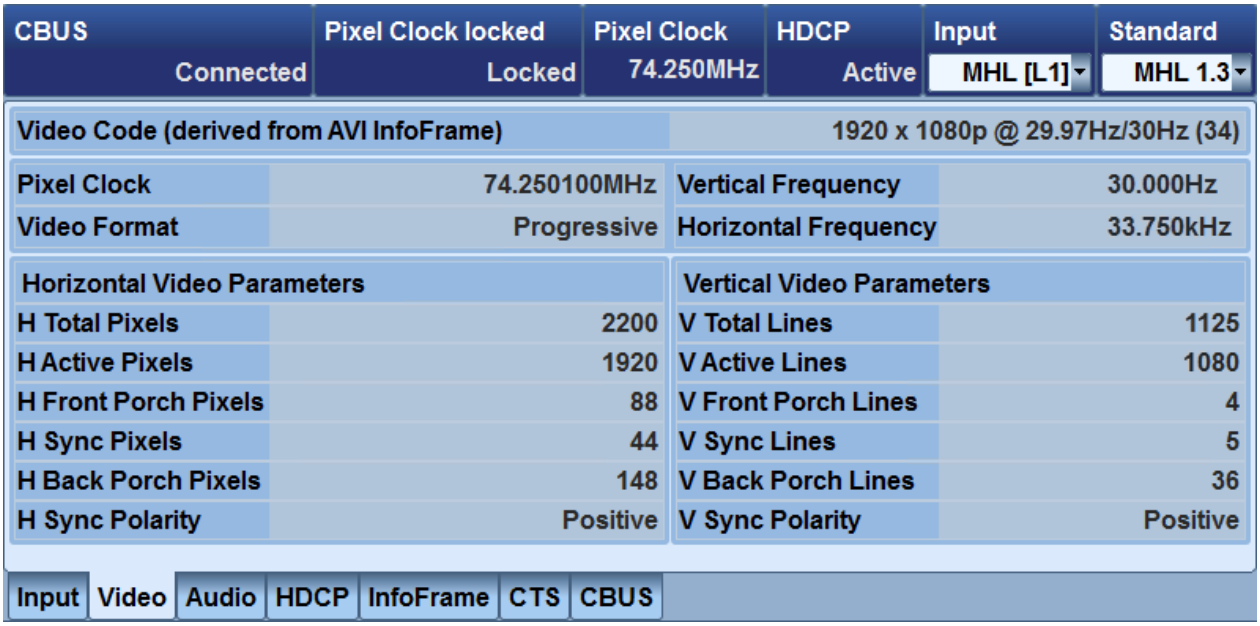
- "MHL" [<module slot>]
  HDMI RX/TX 600 MHz module (R&S VT-B2363) or MHL RX/TX module (R&S VT-B2350)
  Used for all MHL signals that are encoded in normal mode (24-bit per pixel mode).
- "MHL PkdPx" [<module slot>]
  Only for the PackedPixel mode: MHL RX PackedPixel module (R&S VT-B2351)
  Used for all MHL signals that are encoded in normal mode (24-bit per pixel mode) or in PackedPixel mode. All CTS tests that require the analysis of a PackedPixel encoded MHL signal can be performed using this input.

Note: To indicate the input at your R&S VTE, tap "Indicate".
A flashing LED indicates the input until you tap "OK".

Remote command:
ROUTe<hw>:MHL:MODule:SELect[?] "<module name>"
ROUTe<hw>:MHL:MODule:CATalog?

12.2.3 Video Subtab

Displays all video related measurement values.



Video Code
Displays the video code derived from the AVI InfoFrame.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:VCODe?

Pixel Clock
Displays the measured pixel clock of the MHL input signal.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:PCLock?

Vertical Frequency
Displays the measured vertical frequency of the MHL video content.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:VFRequency?

Horizontal Frequency
Displays the measured horizontal frequency of the MHL video content.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:HFRequency?

Horizontal Video Parameters
Groups the measured horizontal video parameters of the MHL video content.

H. Total Pixels ← Horizontal Video Parameters
Displays the number of horizontal total pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:HPIXel:TOTal?

H. Active Pixels ← Horizontal Video Parameters
Displays the number of horizontal active pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:HPIXel:ACTive?

H. Front Porch Pixels ← Horizontal Video Parameters
Displays the number of horizontal front porch pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:HPIXel:FPORch?

H. Sync. Pixels ← Horizontal Video Parameters
Displays the number of horizontal synchronization pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:HPIXel:SYNC?

H. Back Porch Pixels ← Horizontal Video Parameters
Displays the number of horizontal back porch pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:HPIXel:BPORch?

H. Sync. Polarity ← Horizontal Video Parameters
Displays the horizontal synchronization polarity.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:HPIXel:SYNC:POLarity?

Vertical Video Parameters
Groups the measured vertical video parameters of the MHL video content.

V. Total Lines ← Vertical Video Parameters
Displays the number of vertical total pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:VLINe:TOTal?

V. Active Lines ← Vertical Video Parameters
Displays the number of vertical active pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:VLINe:ACTive?

V. Front Porch Lines ← Vertical Video Parameters
Displays the number of vertical front porch pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:VLINe:FPORch?

V. Sync. Lines ← Vertical Video Parameters
Displays the number of vertical synchronization pixels.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:VLINe:SYNC?

V. Back Porch Lines ← Vertical Video Parameters
Displays the number of vertical back porch pixels.

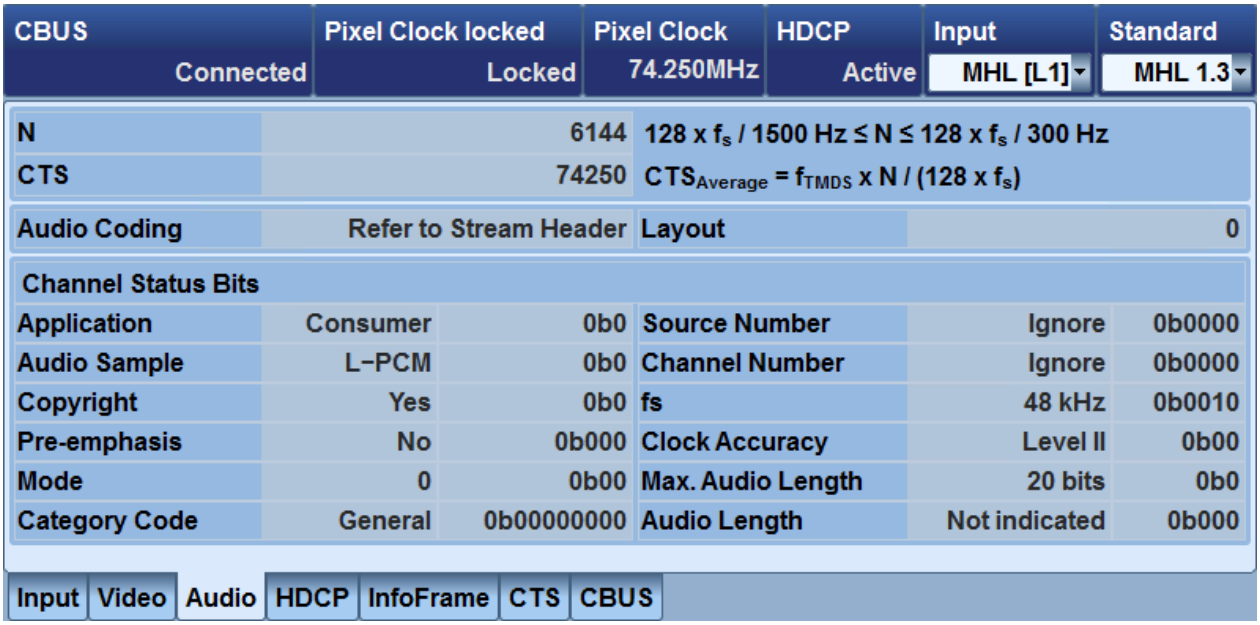
Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:VLINe:BPORch?

V. Sync. Polarity ← Vertical Video Parameters
Displays the vertical synchronization polarity.

Remote command:
READ<hw>[:SCALar]:MHL:VIDeo:VLINe:SYNC:POLarity?

12.2.4 Audio Subtab

Displays all audio related measurement values.



N
Displays the N value derived from the audio clock regeneration packet.

The formula for calculation is displayed at the right of the field.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:N?

CTS
Displays the CTS (cycle timestamp) value derived from the audio clock regeneration packet.

The formula for calculation is displayed at the right of the field.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:CTS?

Audio Coding
Displays the audio coding type derived from the audio InfoFrame. "Refer to Stream Header" means that the coding type is determined by the channel status bits.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:ACODe?

Layout
Displays the layout value derived from the audio sample packet.
- "0" indicates that 2 audio channels are encoded in the audio sample packets.
- "1" indicates that 3 to 8 audio channels are encoded in the audio sample packets.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:LAYout?

Channel Status Bits
Groups the content of the channel status bits derived from the audio sample packets. The left column displays the binary value as present in the signal, the right column displays an interpretation. See the IEC 60958-3 specification.

Application ← Channel Status Bits
Displays the application.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:APPLication?

Audio Sample ← Channel Status Bits
Displays the audio samples.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:SAMPles?

Copyright ← Channel Status Bits
Displays the copyright.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:COPYright?

Preemphasis ← Channel Status Bits
Displays the preemphasis.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:PREemphasis?

Mode ← Channel Status Bits
Displays the mode.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:MODE?

Category Code ← Channel Status Bits
Displays category code.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:CATegory?

Source Number ← Channel Status Bits
Displays the source number.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:NSOurce?

Channel Number ← Channel Status Bits
Displays the channel number.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:NCHannel?

f_s ← Channel Status Bits
Displays the f_s value.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:FS?

Clock Accuracy ← Channel Status Bits
Displays the clock accuracy.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:CACCuracy?

Max. Audio Length ← Channel Status Bits
Displays the maximum audio length.

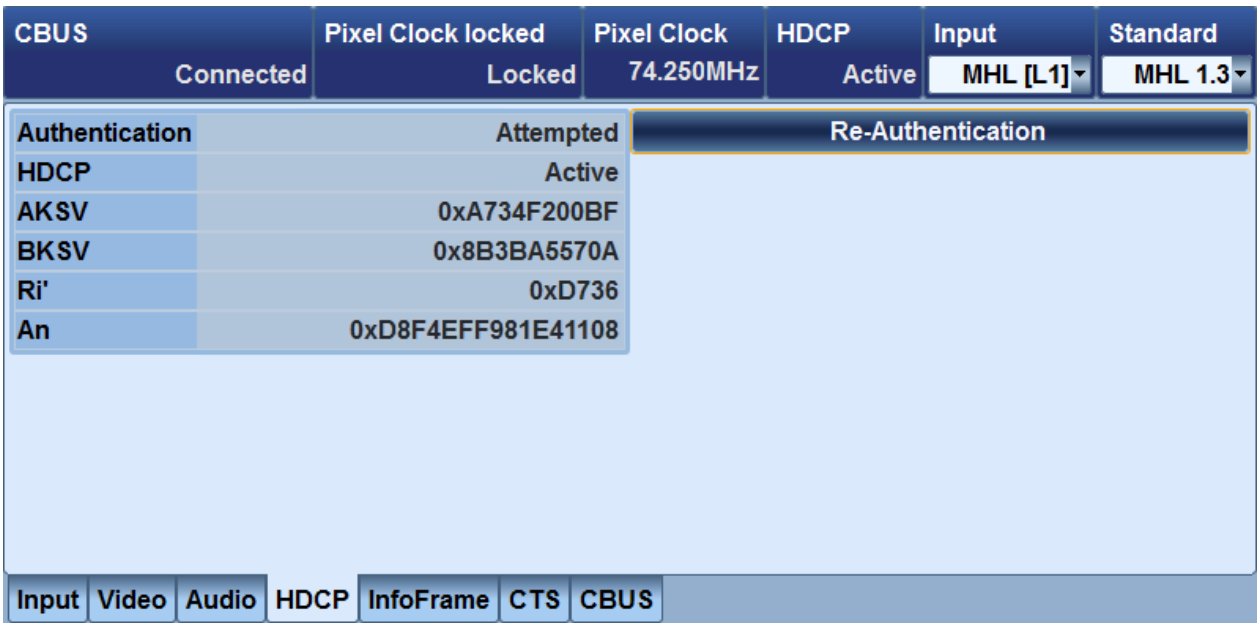
Remote command:
READ<hw>[:SCALar]:MHL:AUDio:LENGth:MAX?

Audio Length ← Channel Status Bits
Displays the audio length.

Remote command:
READ<hw>[:SCALar]:MHL:AUDio:LENGth?

12.2.5 HDCP Subtab

Displays all HDCP content protection related measurement values. See the HDCP specification.



Authentication
Displays if an HDCP authentication was attempted by the MHL source.

Remote command:
READ<hw>[:SCALar]:MHL:HDCP:AUTHentic?

HDCP
Displays if an HDCP content protection is currently active.

Remote command:
READ<hw>[:SCALar]:MHL:HDCP:HDCP?

AKSV
Displays the transmitter's key selection vector.

Remote command:
READ<hw>[:SCALar]:MHL:HDCP:AKSV?

BKSV
Displays the receiver's key selection vector.

Remote command:
READ<hw>[:SCALar]:MHL:HDCP:BKSV?

R_i'
Displays the current link synchronization verification values.

Remote command:
READ<hw>[:SCALar]:MHL:HDCP:RI?

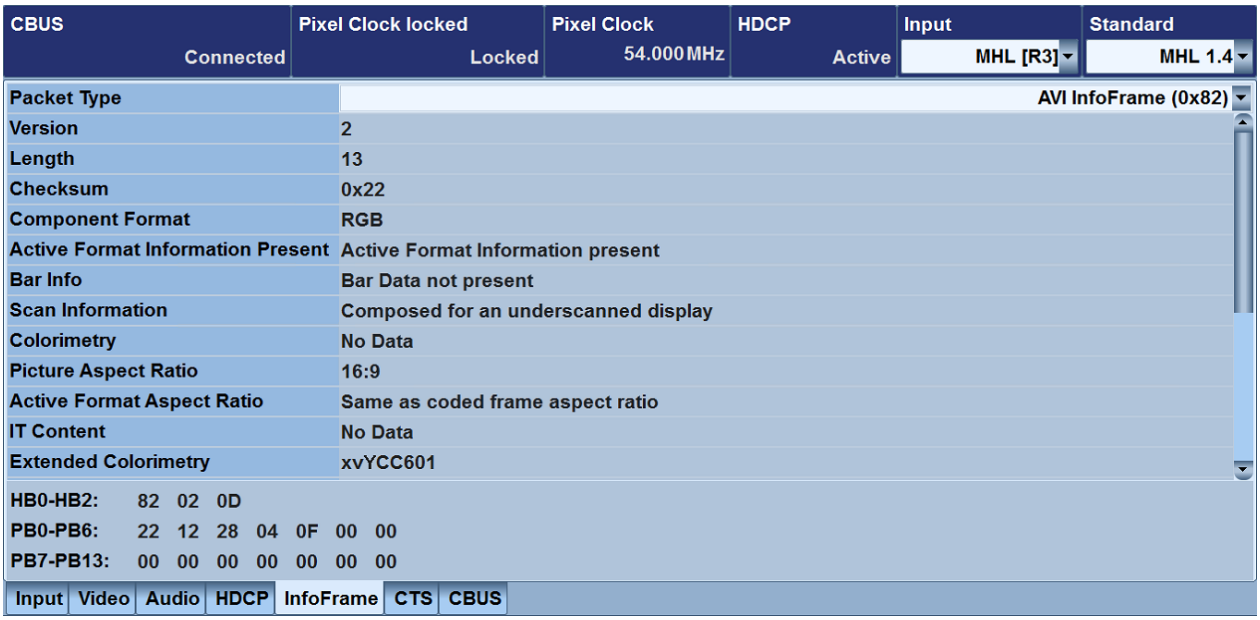
A_n
Displays the session random number.

Remote command:
READ<hw>[:SCALar]:MHL:HDCP:AN?

Re-Authentication button
Each time the button is pressed, triggers the source's re-authentication by clearing the current R_i' value.

12.2.6 InfoFrame Subtab

Displays all InfoFrame related information. The content depends on the selection under "Packet Type" on page 456.



Packet Type
Sets the InfoFrame packet filter for one of the following InfoFrames. All other parameters that are displayed relate information about this InfoFrame.

- "AVI InfoFrame (0x82)"

Contains all video related information, e.g. video code or pixel encoding. The usage of this InfoFrame is mandatory for MHL source devices.
AVI is the abbreviation for auxiliary video information.

- "Audio InfoFrame (0x84)"
  Used to indicate audio related information, e.g. channel count and channel allocation. This InfoFrame is mandatory for indicating the usage of audio content.
- "SPD InfoFrame (0x83)"
  Contains vendor and product specific information. The usage of this InfoFrame is optional.
  SPD is the abbreviation for source product description.
- "MPEG Source InfoFrame (0x85)"
  Contains MPEG encoding specific information. The usage of this InfoFrame is optional.
- "MHL Vendor Specific InfoFrame (0x81)"
  Indicates the usage of 3D video modes. This InfoFrame is defined in the MHL 2.x specification only.

<AVI InfoFrame parameters>

Parameter	Remote command
HB0 to HB3 (header bytes) PB0 to PB13 (packet bytes)	READ<hw>[:SCALar]:MHL:INFO:AVI:PDATa?
Version	READ<hw>[:SCALar]:MHL:INFO:AVI:VERSion?
Checksum	READ<hw>[:SCALar]:MHL:INFO:AVI:CSUM?
Length	READ<hw>[:SCALar]:MHL:INFO:AVI:LENGth?
Component Format	READ<hw>[:SCALar]:MHL:INFO:AVI:COMPonent:FORMat?
Active Format Information Present	READ<hw>[:SCALar]:MHL:INFO:AVI:AINFo?
Bar Info	READ<hw>[:SCALar]:MHL:INFO:AVI:BINFo?
Scan Information	READ<hw>[:SCALar]:MHL:INFO:AVI:SINFo?
Colorimetry	READ<hw>[:SCALar]:MHL:INFO:AVI:COLormetry?
Picture Aspect Ratio	READ<hw>[:SCALar]:MHL:INFO:AVI:ARATio?
Active Format Aspect Ratio	READ<hw>[:SCALar]:MHL:INFO:AVI:AFARatio?
IT Content	READ<hw>[:SCALar]:MHL:INFO:AVI:ITContent?
Extended Colorimetry	READ<hw>[:SCALar]:MHL:INFO:AVI:ECOLormetry?
RGB Quantization Range	READ<hw>[:SCALar]:MHL:INFO:AVI:RGBQrange?
Nonuniform Picture Scaling	READ<hw>[:SCALar]:MHL:INFO:AVI:NUPScaling?
Video Identification Code	READ<hw>[:SCALar]:MHL:INFO:AVI:VIDCode?
YCC Quantization	READ<hw>[:SCALar]:MHL:INFO:AVI:YCCQ?
Content Type	READ<hw>[:SCALar]:MHL:INFO:AVI:CTYPe?
Pixel Repetition	READ<hw>[:SCALar]:MHL:INFO:AVI:PREPetition?

Parameter	Remote command
Line Number of Top Bar End	READ<hw>[:SCALar]:MHL:INFO:AVI:LINE:END?
Line Number of Bottom Bar Start	READ<hw>[:SCALar]:MHL:INFO:AVI:LINE:STARt?
Pixel Number of Left Bar End	READ<hw>[:SCALar]:MHL:INFO:AVI:PIXel:LEFT?
Pixel Number of Right Bar Start	READ<hw>[:SCALar]:MHL:INFO:AVI:PIXel:RIGHt?

<Audio InfoFrame parameters>

Parameter	Remote command
HB0 to HB3 (header bytes) PB0 to PB10 (packet bytes)	READ<hw>[:SCALar]:MHL:INFO:AUDio:PDATa?
Version	READ<hw>[:SCALar]:MHL:INFO:AUDio:VERSion?
Checksum	READ<hw>[:SCALar]:MHL:INFO:AUDio:CSUM?
Length	READ<hw>[:SCALar]:MHL:INFO:AUDio:LENGth?
Coding Type	READ<hw>[:SCALar]:MHL:INFO:AUDio:CTYPe?
Channel Count	READ<hw>[:SCALar]:MHL:INFO:AUDio:CHANnel:COUNt?
Sampling Frequency	READ<hw>[:SCALar]:MHL:INFO:AUDio:SAMPling:FREQuency?
Sampling Size	READ<hw>[:SCALar]:MHL:INFO:AUDio:SAMPling:SIZE?
Code Extension	READ<hw>[:SCALar]:MHL:INFO:AUDio:CEXTension?
Channel Allocation	READ<hw>[:SCALar]:MHL:INFO:AUDio:CHANnel:ALLocation?
Downmix Inhibit	READ<hw>[:SCALar]:MHL:INFO:AUDio:DMIXinhibit?
Level Shift Value	READ<hw>[:SCALar]:MHL:INFO:AUDio:LSHift?
LFE Playback Level	READ<hw>[:SCALar]:MHL:INFO:AUDio:LFE?

<SPD InfoFrame parameters>

Parameter	Remote command
HB0 to HB3 (header bytes) PB0 to PB25 (packet bytes)	READ<hw>[:SCALar]:MHL:INFO:SPD:PDATa?
Version	READ<hw>[:SCALar]:MHL:INFO:SPD:VERSion?
Checksum	READ<hw>[:SCALar]:MHL:INFO:SPD:CSUM?
Length	READ<hw>[:SCALar]:MHL:INFO:SPD:LENGth?
Vendor Name	READ<hw>[:SCALar]:MHL:INFO:SPD:VENDor?
Product Description	READ<hw>[:SCALar]:MHL:INFO:SPD:PRODuct?

<MPEG InfoFrame parameters>

Parameter	Remote command
HB0 to HB3 (header bytes) PB0 to PB10 (packet bytes)	READ<hw>[:SCALar]:MHL:INFO:MPEG:PDATa?
Version	READ<hw>[:SCALar]:MHL:INFO:MPEG:VERSion?
Checksum	READ<hw>[:SCALar]:MHL:INFO:MPEG:CSUM?
Length	READ<hw>[:SCALar]:MHL:INFO:MPEG:LENGth?
MPEG Bit Rate	READ<hw>[:SCALar]:MHL:INFO:MPEG:MPEG:BRATe?
Field Repeat (for 3:2 Pull-Down)	READ<hw>[:SCALar]:MHL:INFO:MPEG:FREPeat?
MPEG Frame	READ<hw>[:SCALar]:MHL:INFO:MPEG:MPEG:FRAMe?

<MHL vendor specific InfoFrame parameters>

Parameter	Remote command
HB0 to HB3 (header bytes) PB0 to PB27 (packet bytes)	READ<hw>[:SCALar]:MHL:INFO:VENdor:PDATa?
Version	READ<hw>[:SCALar]:MHL:INFO:VENdor:VERSion?
Checksum	READ<hw>[:SCALar]:MHL:INFO:VENdor:CSUM?
Length	READ<hw>[:SCALar]:MHL:INFO:VENdor:LENGth?
IEEE Registration ID	READ<hw>[:SCALar]:MHL:INFO:VENdor:IEEE?
MHL Video Format	READ<hw>[:SCALar]:MHL:INFO:VENdor:VIDeoformat?
MHL 3D Format Type	READ<hw>[:SCALar]:MHL:INFO:VENdor:TDType?

12.2.7 CTS Subtab

Requires additional options, see also the data sheet:

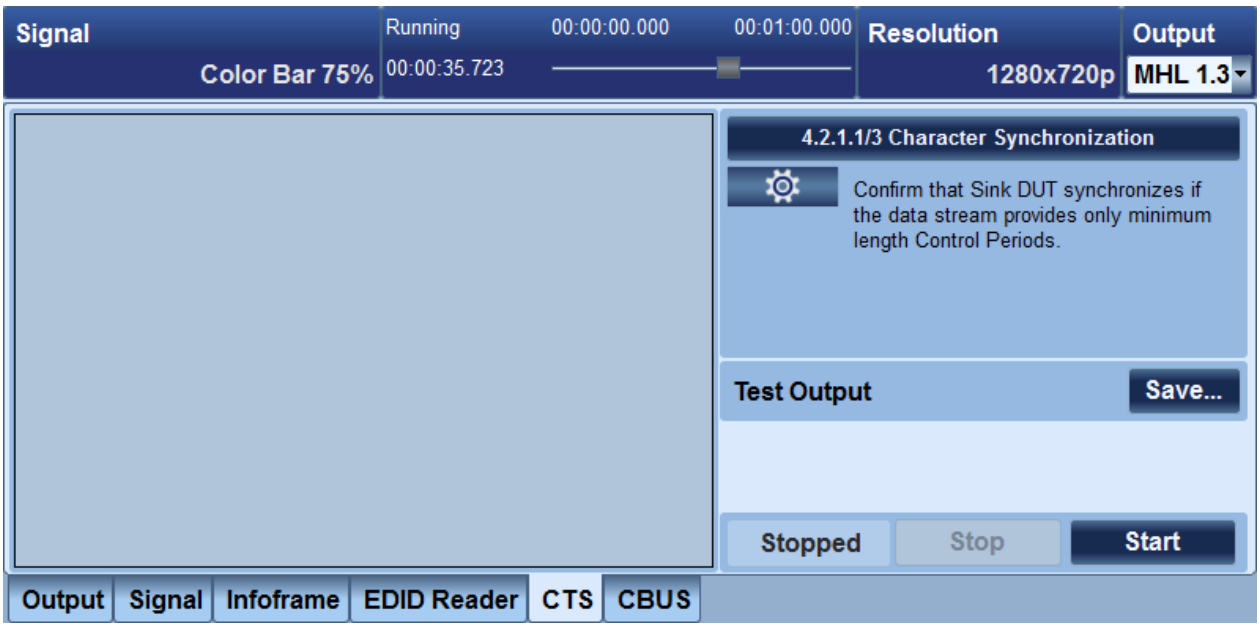
- For MHL CTS sink test: R&S VT-K355
- For MHL CTS source test: R&S VT-K2355

Divided into two panes. The left pane displays the compliance test results.

Remote commands to query measurement results

READ<hw>[:SCALar]:MHL:CTS:REPort:COUNt?

READ<hw>[:SCALar]:MHL:CTS:REPort? <integer>|MINimum|MAXimum|UP|DOWN



<Test case> button

Displays the selected test case. The test case name consists of:

- Chapter number of the MHL compliance test specifications where the test case is described.
- Test case identifier

Tap this button to select another test case, see "Test Case dialog" on page 461.

Tap ⚙ to configure the selected test, see "CTS Configuration dialog" on page 462.

Test Case dialog ← <Test case> button
Displays all available test cases, see "<Test cases>" on page 461.

The availability of some tests depends on the following settings:

- Selected MHL standard
- Selected input ("Input" on page 448)

Select the desired test case. If you select a new test case, the old test results are deleted.

Remote command:
CONFigure<hw>:MHL:CTS:SELect[?] <test case>,OFF|ON
with <test case> see "<Test cases>" on page 461

<Test cases> ← <Test case> button

Test case name	Remote command parameter (<test case>)
3.2.2.1/4 Legal Codes	M000_lcodes
3.2.2.2/5 Basic Protocol	M001_basprot
3.2.2.3/6 Packet Types	M002_packet
3.2.3.1/5 Video Formats	M003_vformat
3.2.3.2/6 Pixel Encoding	M004_pixel
3.2.3.3/6 AVI InfoFrame	M005_avi
3.2.3.4 Video Quantization Ranges	M006_vqrange
3.2.4.1 IEC60958 / IEC61937	M007_iec6
3.2.4.2 Audio Clock Regeneration	M008_aclock
3.2.4.3 Audio InfoFrame	M009_audioi
3.2.6.1 EDID Reading Test	M010_edit
3.2.6.2 Device Capability Registers Test	M011_dcrt
3.2.6.3/4 Device Status Registers Test	M014_dsrt
3.2.7.1 RCP Sub-Commands Receiving Test	M012_rcprx
3.2.7.2 RCP Sub-Commands Transmitting Test	M013_rcptx
3.2.8.1 RAP and RAPK Sub-Commands Test	M015_rapsc
3.2.9.1 3D Video Mode Support	M016_3dvms
3.2.9.2/4 3D Video Format Timings	M017_3dvft
3.2.9.3 3D Video Mode Indicator	M018_3dvmi
3.2.10.1 UCP Sub-Commands Receiving Test	M019_ucprx
3.2.10.2 UCP Sub-Commands Transmitting Test	M020_ucptx

CTS Configuration dialog
In a tree view, displays all available test cases. Each test case has its own set of parameters. The parameters are subentries of the corresponding test case node. Open a test case to display and edit the parameters of this test case.

Depending on the selected test case, you can change the following settings.

Video Format ← CTS Configuration dialog
Relevant for the following tests:
- "3.2.2.1/4 Legal Codes"
- "3.2.2.2/5 Basic Protocol"
- "3.2.2.3/6 Packet Types"
- "3.2.3.2/6 Pixel Encoding"
- "3.2.3.3/6 AVI InfoFrame"
- "3.2.3.4 Video Quantization Ranges"
- "3.2.9.2/4 3D Video Format Timings"
- "3.2.9.3 3D Video Mode Indicator"

Sets the video format that is applied to the selected test.
- "Auto Detect"
  Automatic video format detection.
- <Video format>
  Presets the video format. R&S VTE signals this video format as exclusively supported video format to the DUT.

Remote command:
CONFigure<hw>:MHL:CTS:VFORmat[?] <test case>,AUTO|C1|C2|C3|C4|C5|C6|C7|C17|C18|C19|C20|C21|C22|C32|C34|C31|C16
with <test case> see "<Test cases>" on page 461

Pixel Encoding ← CTS Configuration dialog
Relevant for the following test: "3.2.3.2/6 Pixel Encoding"

Sets the pixel encoding that is applied to this test.
- "RGB"
- "YCbCr 4:2:2"
- "YCbCr 4:4:4"

Remote command:
CONFigure<hw>:MHL:CTS:PIXelencoding[?] M004_pixel,RGB|Y422|Y444

Test Pattern ← CTS Configuration dialog
Relevant for the following test: "3.2.3.2/6 Pixel Encoding"

Sets the input test pattern that is applied to the selected test.
- "Fully Saturated B/W"
  The protocol analyzer automatically detects the actual pixel encoding. To use this setting, the input signal must contain a fully saturated B/W video signal.
- "Visual Analysis"
  Verify the correct pixel encoding by viewing the extracted picture. You can use any colored input signal with a known content.

Remote command:
CONFigure<hw>:MHL:CTS:TPATtern[?] M004_pixel,FULLysat|VANalysis

Video Quantization Ranges Test Setup ← CTS Configuration dialog
Relevant for the following test: "3.2.3.4 Video Quantization Ranges"

Sets the test setup that is applied to this test.

- "YCbCr QY = 0"
  QY bit is set to 0 in the R&S VTE's EDID. DUT output: YCbCr 4:2:2 or YCbCr 4:4:4 signal.
- "YCbCr QY = 1"
  QY bit is set to 1 in the R&S VTE's EDID. DUT output: YCbCr 4:2:2 or YCbCr 4:4:4 signal.
- "RGB"
  DUT output: RGB signal.

Remote command:
CONFigure<hw>:MHL:CTS:SETup[?] M006_vqrange,YQY0|YQY1|RGB

Audio Sampling Size ← CTS Configuration dialog
Relevant for the following test: "3.2.4.1 IEC60958 / IEC61937"

Sets the audio sampling size that is applied to this test.

- "16 Bit"
- "20 Bit"
- "24 Bit"

Remote command:
CONFigure<hw>:MHL:CTS:AUDio:SAMPle:SIZE[?] M007_iec6,B16|B20|B24

EDID Reading Test ← CTS Configuration dialog
Relevant for the following test: "3.2.6.1 EDID Reading Test"

Sets the EDID block number that is applied to this test.

- "2 Block EDID"
- "4 Block EDID"

Remote command:
CONFigure<hw>:MHL:CTS:EDID[?] M010_edit,BLK2|BLK4

Device Status Registers Test Mode ← CTS Configuration dialog
Relevant for the following test: "3.2.6.3/4 Device Status Registers Test"

Sets the test mode that is applied to this test.

- "Normal"
- "PackedPixel"

Remote command:
CONFigure<hw>:MHL:CTS:MODE[?] M014_dsrt,NORMal|PACKedpixel

Test Length ← CTS Configuration dialog
Relevant for the following tests:

- "3.2.2.1/4 Legal Codes"
- "3.2.2.2/5 Basic Protocol"
- "3.2.2.3/6 Packet Types"
- "3.2.3.1/5 Video Formats"
- "3.2.3.2/6 Pixel Encoding"
- "3.2.3.3/6 AVI InfoFrame"

- "3.2.3.4 Video Quantization Ranges"
- "3.2.4.1 IEC60958 / IEC61937"
- "3.2.4.2 Audio Clock Regeneration"
- "3.2.4.3 Audio InfoFrame"

Sets the length of the MHL sequence for analysis.

- "Frames"
  Number of video frames that are analyzed.
- 2 seconds
  Two seconds of MHL data are analyzed.

Remote command:
CONFigure<hw>:MHL:CTS:TESTlength:MODE[?] <test case>,SEC2|FRAMe
CONFigure<hw>:MHL:CTS:TESTlength:FRAMes[?] <test case>,<dec>
with <test case> see "<Test cases>" on page 461

Key ID ← CTS Configuration dialog
Relevant for the following tests:

- "3.2.7.1 RCP Sub-Commands Receiving Test"
- "3.2.7.2 RCP Sub-Commands Transmitting Test"

Sets the RCP key ID that is tested in the selected test.

- "0x00" to "0x7F"

Remote command:
CONFigure<hw>:MHL:CTS:KEYid[?] <test case>,<integer>
with <test case> see "<Test cases>" on page 461

3D Format ← CTS Configuration dialog
Relevant for the following tests:

- "3.2.9.2/4 3D Video Format Timings"
- "3.2.9.3 3D Video Mode Indicator"

Sets the 3D format that is applied to this test.

- "Left-Right"
- "Top-Bottom"
- "Frame Sequential"

Remote command:
CONFigure<hw>:MHL:CTS:VFORmat:HDEXtension[?] <test case>,AUTO|TBOTtom|LRIGht|FPACking
with <test case> see "<Test cases>" on page 461

Character Sequence ← CTS Configuration dialog
Relevant for the following tests:

- "3.2.10.1 UCP Sub-Commands Receiving Test"
- "3.2.10.2 UCP Sub-Commands Transmitting Test"

Sets the character sequence that is applied to this test.

Remote command:
CONFigure<hw>:MHL:CTS:UCP[?] <test case>, "<string>"
with <test case> see "<Test cases>" on page 461

Data Source
Sets the source of the data to be analyzed.

- "Automatic Capture"
  The MHL data is automatically captured and tested. After the test has been finished, you can save the data in a file, see "Save button" on page 465.
- "Manual Capture"
  The MHL data is captured without automatic testing, see "Capture button" on page 465. You can save the data to file, see "Save button" on page 465. Or you can apply a test to the captured data.
- "File"
  To use a previously saved file. Tap "Load" to select the file for analysis, see "Load button" on page 465.

To configure the data source, tap .

Remote command:
CONFigure<hw>:MHL:CTS:DATA[?] AUTO|MANual|FILE

Data Source Configuration dialog ← Data Source
Sets the amount of data that are saved in a file.

- "Frames"
  Number of video frames that are saved in a file. The number of frames cannot exceed the length of 2 seconds.
- "2 seconds"
  2 seconds of MHL data are saved in a file.

Remote command:
CONFigure<hw>:MHL:CTS:DATA:STORe:SIZE:MODE[?] SEC2|FRAMe
CONFigure<hw>:MHL:CTS:DATA:STORe:SIZE:FRAMes[?] <integer>

Capture button ← Data Source
Only available if "Manual Capture" is set under "Data Source" on page 465.

Triggers manual capturing.

Remote command:
INITiate<hw>:MHL:CTS

Save button ← Data Source
Opens the "File" dialog to save the captured data. See also Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:MHL:CTS:DATA:STORe[?] "<filename>"

Load button ← Data Source
Only available if "File" is set under "Data Source" on page 465.

Opens the "File" dialog to select file. See also Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:MHL:CTS:DATA:LOAD[?] "<filename>"

Save button (Test Output)
Opens the "File" dialog to save the test output. See also Chapter 5.3, "File Dialog", on page 89.

The 3 TMDS characters for channel 0, channel 1 and channel 2 are stored in a 4 byte word as shown in Figure 12-1. The figure also shows how the character data are extracted for the 3 TMDS channels.

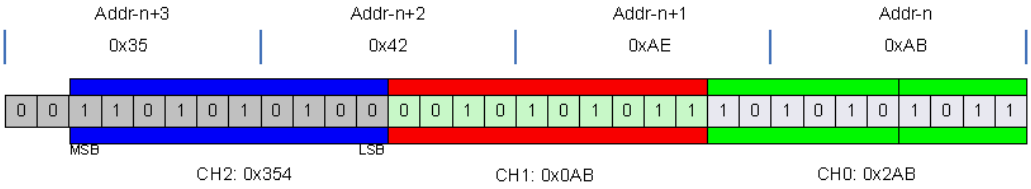


Figure 12-1: TMDS channels

Remote command:
MMEMory<hw>:MHL:CTS:REPort:STORe[?] "<filename>"

<Status display>
Displays the current status.

Remote command:
READ<hw>[:SCALar]:MHL:CTS:CONTrol:STATe?
READ<hw>[:SCALar]:MHL:CTS:CONTrol:PROGress?

Stop button
Stops a running test. Only available if a test is running.

Remote command:
ABORt<hw>:MHL:CTS

Start button
Starts a test. Only available if no test is running.

Remote command:
INITiate<hw>:MHL:CTS

12.2.8 CBUS Subtab

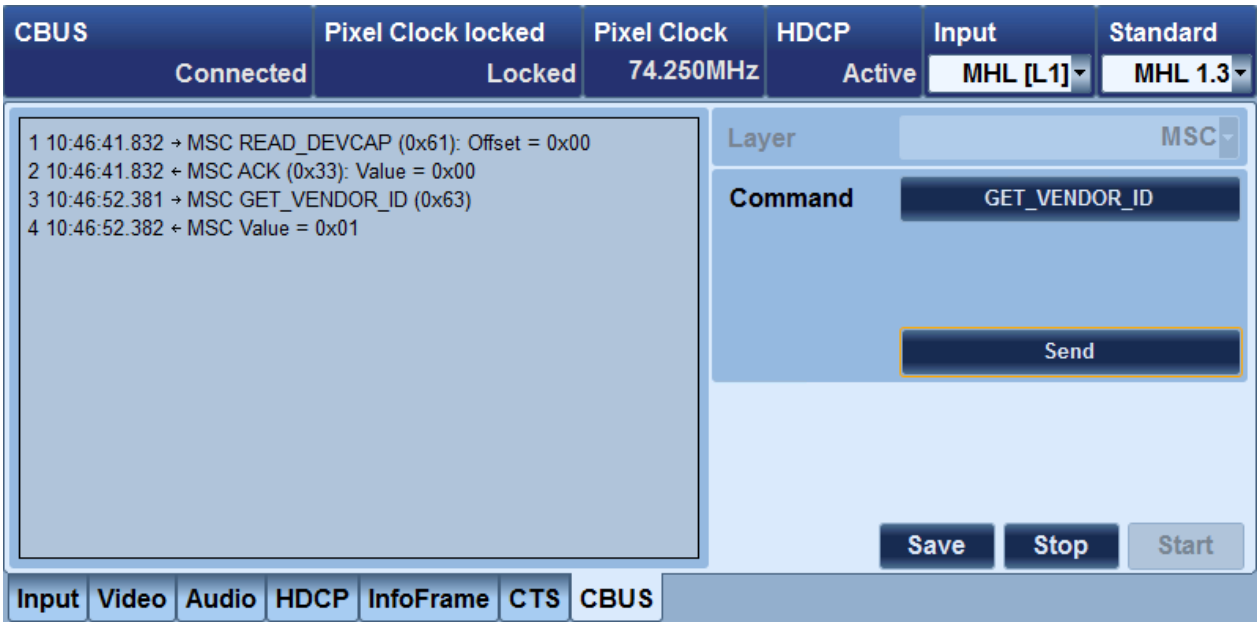
The CBUS tracer is used to send MSC, RCP, RAP and UCP commands to an MHL source device (DUT) or to receive such commands from an MHL source device (DUT).

The test equipment itself participates in the CBUS communication. The application listens to all CBUS traffic belonging to the selected layer and lists each received command or reply from the DUT in the left pane, the output pane. You can configure and send commands from the test equipment to the DUT, too. These outgoing commands are also listed in the output pane.

Remote commands to query results

READ<hw>[:SCALar]:MHL:CBUS:REPort:COUNt?

READ<hw>[:SCALar]:MHL:CBUS:REPort? <integer>|MINimum|MAXimum|UP|DOWN



Layer

Depending on the selected protocol layer, various commands and command parameters are supported. See the MHL specification for information on the purpose and the syntax of each command.

- "MSC"
  Used to send or receive commands based on the MSC (MHL sideband channel) protocol layer.
- "RCP"
  Used to send or receive commands based on the RCP (remote control protocol) protocol layer.
  The "Start Press and Hold" button is available for all commands that support the "press and hold" feature: The selected command is sent repeatedly until you tap the "Stop Press and Hold" button.
- "RAP"
  Used to send or receive commands based on the RAP (request action protocol) protocol layer.
- "UCP"
  Used to send or receive commands based on the UCP (UTF-8 character protocol) protocol layer.

See also "Command and Parameters" on page 468.

Remote command:
CONFigure<hw>:MHL:CBUS:LAYer[?] MSC|RCP|RAP|UCP

Command and Parameters
For the MSC, RCP and RAP protocol layers, a button with the selected command is displayed. Tap this button to select another command.

For UCP protocol layers, enter the UCP command as text string.

For the MSC protocol layers, depending on the selected command, additional configuration parameters may be required to complete the command.

Remote command:
Selecting or entering a command:
CONFigure<hw>:MHL:CBUS:MSC:COMMand[?] WSTat|SETint|RDEVcap|GSTate|GVENdor|SHPD|CHPD|MSCMsg|GDDCerror|GMSCerror|WBURst
CONFigure<hw>:MHL:CBUS:RAP:COMMand[?] <numeric>
CONFigure<hw>:MHL:CBUS:RCP:COMMand[?] <numeric>
CONFigure<hw>:MHL:CBUS:UCP:COMMand[?] "<string>"
Additional configuration parameters for MSC protocol layers:
CONFigure<hw>:MHL:CBUS:MSC:MSCMsg:OPCode[?] MSGE|RCP|RCPK|RCPE|RAP|RAPK|UCP|UCPK|UCPE,<numeric>
CONFigure<hw>:MHL:CBUS:MSC:RDEVcap:OFFSet[?] <numeric>
CONFigure<hw>:MHL:CBUS:MSC:SETint:OFFSet[?] <numeric>
CONFigure<hw>:MHL:CBUS:MSC:SETint:VALue[?] <numeric>
CONFigure<hw>:MHL:CBUS:MSC:WBURst:OFFSet[?] <numeric>,<numeric>[,<numeric>]
CONFigure<hw>:MHL:CBUS:MSC:WSTat:OFFSet[?] <numeric>
CONFigure<hw>:MHL:CBUS:MSC:WSTat:VALue[?] <numeric>

Send button
Sends the selected/entered command.

Remote command:
CONFigure<hw>:MHL:CBUS:COMMand:SEND

Start button
Starts the protocol trace for the selected layer. All content in the output pane is cleared, and the incoming commands from the DUT are listed in the output pane.

You can also select commands and sent them to the DUT.

Remote command:
CONFigure<hw>:MHL:CBUS:COMMand[?] STARt|STOP

Stop button
Stops the protocol trace. Use the scroll bar to navigate in the recorded trace.

Remote command:
CONFigure<hw>:MHL:CBUS:COMMand[?] STARt|STOP

Save button
Opens the "File" dialog to save the protocol trace in a file. See also Chapter 5.3, "File Dialog", on page 89.

Remote command:
MMEMory<hw>:MHL:CBUS:DATA:STORe[?] "<filename>"

13 Remote Control Basics

SCPI commands - messages - are used for remote control. Commands that are not taken from the SCPI standard follow the SCPI syntax rules. The instrument supports the SCPI version 1999. The SCPI standard is based on standard IEEE 488.2 and aims at the standardization of device-specific commands, error handling and the status registers. The tutorial "Automatic Measurement Control - A tutorial on SCPI and IEEE 488.2" from John M. Pieper (R&S order number 0002.3536.00) offers detailed information on concepts and definitions of SCPI.

Further information:

- Performing a remote control session: Chapter 3.11, "Setting Up Remote Control", on page 44
- Supported SCPI commands: Chapter 14, "Remote Command Reference", on page 488

13.1 SCPI Commands and Responses

Commands and responses are transmitted on the data lines, with the attention line being active (LOW). They are used to communicate between the controller and the R&S VTE and are distinguished by the direction they are sent. For information on the supported commands, see Chapter 14, "Remote Command Reference", on page 488.

Commands

Commands are sent from the controller to the R&S VTE. They operate the instrument functions and request information. The commands are subdivided according to two criteria:

- According to the effect they have on the R&S VTE:
  - **Setting commands** cause settings such as a reset of the R&S VTE or setting the frequency.
  - **Queries** cause data to be provided for remote control, e.g. for identification of the R&S VTE or polling a parameter value. Queries are formed by directly appending a question mark to the command header.
- According to their definition in standards:
  - **Common commands** are precisely defined in standard IEEE 488.2. They are employed identically on all instruments (if implemented). They refer to functions such as management of the standardized status registers, reset and self-test.
  - **Instrument control commands** refer to functions depending on the features of the instrument such as frequency settings. Many of these commands have also been standardized by the SCPI committee. These commands are marked as "SCPI compliant" in the command reference chapters. Commands without this SCPI label are device-specific, however, their syntax follows SCPI rules as permitted by the standard.

Instrument responses

Instrument responses (response messages and service requests) are sent from the R&S VTE to the controller after a query. They can contain measurement results, settings and information on the status.

13.2 SCPI Command Syntax

The commands consist of a so-called header and, in most cases, one or more parameters. The header and parameter are separated by a "white space" (ASCII code 0 to 9, 11 to 32 decimal, e.g. blank). The headers may consist of several keywords. Queries are formed by directly appending a question mark to the header.

The commands can be either device-specific or device-independent (common commands). Common and device-specific commands differ in their syntax.

13.2.1 Syntax for Common Commands

Common commands are device-independent. They consist of a header preceded by an asterisk (*) and one or more parameters, if any.

For an example, see `*RCL` on page 493.

13.2.2 Syntax for Device-Specific Commands

The commands used in the following examples are for demonstration purposes only. They are not necessarily implemented in the instrument.

Device-specific commands are of hierarchical structure. The different levels are represented by combined headers. Headers of the highest level (root level) have only one mnemonic. This mnemonic denotes a complete command system.

Example:

```
SOURce
```

This mnemonic denotes the `SOURce` command system.

For commands of lower levels, the complete path has to be specified, starting on the left with the highest level, the individual mnemonics being separated by a colon ":".

Example:

```
SOURce:DM:TRANsmission DVBC
```

Multiple use of mnemonics

Some mnemonics occur on several levels within one command system. Their effect depends on the structure of the command, i.e. on the position in the command header they are inserted in.

Example:

`SOURce:DM:SOURce INTern`

This command contains mnemonic `SOURce` in the third command level. It defines the source of the digital modulation.

`SOURce:IQCoder:DVBT:SOURce TSPlayer`

This command contains mnemonic `SOURce` in the fourth command level. It defines the source for the coder.

Optional mnemonics in square brackets

Some command systems permit certain mnemonics to be optionally inserted into the header or omitted. These mnemonics are marked by square brackets in this manual. The R&S VTE must recognize the long command to comply with the SCPI standard. Some commands are considerably shortened by omitting optional mnemonics.

Example:

`[SOURce]:POWer[:LEVel][:IMMediate][AMPLitude] 0DBM`

This command immediately sets the offset of the signal to 0 dB. The following command has the same effect.

`POWer 0DBM`

Do not omit an optional mnemonic if it includes a numeric suffix that is relevant for the effect of the command.

Long and short form

The mnemonics feature a long form and a short form. The short form is marked by upper case letters, the long form corresponds to the complete word. Either the short form or the long form can be entered; other abbreviations are not permitted.

Example:

`STATus:QUEStionable:ENABle 1` (long form)

`STAT:QUES:ENAB 1` (short form)

Uppercase and lowercase notation only serves to distinguish the two forms in the manual, the R&S VTE itself is case-insensitive.

Parameters

See Chapter 13.2.2.1, "Parameters", on page 472.

Numeric suffixes in angle brackets

If a command can be applied to multiple instances of an object, for example several inputs, the required instances is specified by a suffix added to the command. Numeric suffixes are indicated by angle brackets (<1...4>, <n>, <i>) and are replaced by a single value in the command. Entries without a suffix are interpreted as having the suffix 1.

For remote control, suffix counting may differ from the numbers of the corresponding selection used in manual operation. SCPI prescribes that suffix counting starts with 1. Suffix 1 is the default state.

13.2.2.1 Parameters

Many commands are supplemented by a parameter or a list of parameters.

The parameters must be separated from the header by a "white space" (ASCII code 0 to 9, 11 to 32 decimal, e.g. blank).

Example:

```
SOURce:POWer? MAXimum
```

If several parameters are specified in a command, they are separated by a comma (,).

Example:

```
SYSTem:TIME 1,5,46
```

A vertical dash in the parameter notation indicates alternatives and is read as an "or". The effect of the command differs, depending on which parameter is used.

Example:

```
SOURce:DM:POLarity NORMal|INVerted
```

If the `NORMal` parameter is selected, the spectrum appears normal, for `INVerted` it appears inverted.

Parameters in curly brackets are optional and can be inserted once or several times, or omitted.

Example:

```
SENSe:LIST:FREQuency <numeric_value>{,<numeric_value>}
```

The following are valid commands:

```
SENSe:LIST:FREQuency 10
SENSe:LIST:FREQuency 10,20
SENSe:LIST:FREQuency 10,20,30,40
```

Numeric values

Numerical values can contain a sign or decimal point. Values exceeding the resolution of the R&S VTE are rounded up or down. The mantissa may comprise up to 255 characters, the values must be in the value range -9.9 x 10^{37} to 9.9 x 10^{37}.

Exponential expressions are also allowed and are entered as follows: The base is 10 and is expressed by an "E" or "e", followed by the exponent. Entry of the exponent alone is not allowed.

Therefore the value range above is expressed as -9.9E37 to 9.9E37.

Example:

`SOURce:FREQuency 1.5E3` equals

`SOURce:FREQuency 1500`

Units

For physical quantities, the unit can be entered. Allowed unit prefixes are:

- G (giga)
- MA (mega), MOHM, MHZ
- K (kilo)
- M (milli)
- U (micro)
- N (nano)

If the unit is missing, the basic unit is used. In the following example, the basic unit is Hz.

Example:

`SOURce:FREQuency 1.5 kHz` equals

`SOURce:FREQuency 1.5E3`

Some settings allow relative values to be stated in percent. According to SCPI, this unit is represented by the `PCT` string.

Example:

`SOURce:SWEep:FREQuency:STEP:LOGarithmic 5PCT`

Special numeric values

The texts `MINimum`, `MAXimum`, `DEFault`, `UP` and `DOWN` are interpreted as special numerical values. See "Parameters" on page 488.

- `INFinity`/`NINF` (negative infinity)
  Represents the numerical values 9.9E37 or -9.9E37, respectively. Only sent as device responses.
- `NAN` (not a number)

Represents the value 9.91E37. Only sent as device response. This value is not defined. Possible causes are division by zero, subtraction or addition of infinite and the representation of missing values.

Boolean parameters

See "Parameters" on page 488.

Text parameters

Text parameters observe the syntax rules for mnemonics, i.e. they can be entered using a short or long form. Like any parameter, they have to be separated from the header by a white space. In the case of a query, the short form of the text is provided.

Example:

```
OUTPut:AMODe AUTO
```

Character strings

Strings must always be entered within quotation marks (' or ").

Example:

```
MMEMory:STORe:STATe 4,'D:\user\test4.savrcl'
```

Block data

Block data is a format which is suitable for the transmission of large amounts of data. A command using a block data parameter has the following structure.

Example:

```
MMEMory:DATA "test_file.wv",#45168xxxxxxxx
```

`Test_file.wv` denotes the name of the file to which the data are written. The comma is followed by the binary data block. The hash symbol # introduces the data block. The next number indicates how many of the following digits describe the length of the data block. In the example, the 4 following digits indicate the length to be 5168 bytes. The data bytes follow. During the transmission of these data bytes all end or other control signs are ignored until all bytes are transmitted.

`#0` specifies a data block of indefinite length. The use of the indefinite format requires a `NL^END` message to terminate the data block. This format is useful when the length of the transmission is not known or if speed or other considerations prevent segmentation of the data into blocks of definite length.

13.2.2.2 Overview of the Syntax Elements

Syntax element	Description
:	The colon separates the mnemonics of a command. In a command line, the separating semicolon marks the uppermost command level.
;	The semicolon separates two commands of a command line. It does not alter the path.
,	The comma separates several parameters of a command.
?	The question mark forms a query.
*	The asterisk marks a common command.
"	Quotation marks introduce a string and terminate it.
#	The hash symbol introduces binary, octal, hexadecimal and block data. Binary: #B10110 Octal: #O7612 Hexa: #HF3A7 Block: #21312
	A "white space" (ASCII code 0 to 9, 11 to 32 decimal, e.g. blank) separates header and parameter.

13.2.2.3 Syntax of a Command Line

A command line may consist of one or several commands. It is terminated by an EOI together with the last data byte.

Several commands in a command line must be separated by a semicolon ";". If the next command belongs to a different command system, the semicolon is followed by a colon.

Example:

```
SOURce:POWer MINimum;:OUTPut:STATe ON
```

This command line contains two commands. The first command is part of the `SOURce` system, the second command is part of the `OUTPut` system.

If the successive commands belong to the same system, having one or several levels in common, the command line can be abbreviated. To this end, the second command after the semicolon starts with the level that lies below the common levels. The colon following the semicolon must be omitted in this case.

Example:

```
SOURce:IQCoder:DVBT:DATA ON;:SOURce:IQCoder:DVBT:FFT:MODE M2K
```

This command line is represented in its full length and contains 2 commands separated from each other by the semicolon. Both commands are part of the `SOURce` command system, `IQCODER`, `DVBT` subsystem, that means they have 3 common levels.

When abbreviating the command line, the second command begins with the level below `SOURce:IQCODER:DVBT`. The colon after the semicolon is omitted.

The abbreviated form of the command line reads as follows:

```
:SOURce:IQCoder:DVBT:DATA ON;FFT:MODE M2K
```

However, a new command line always begins with the complete path.

Example:

```
SOURce:IQCoder:DVBT:DATA ON
SOURce:IQCoder:DVBT:FFT:MODE M2K
```

13.2.2.4 Responses to Queries

A query is defined for each setting command unless explicitly specified otherwise. It is formed by adding a question mark to the associated setting command. According to SCPI, the responses to queries are partly subject to stricter rules than in standard IEEE 488.2.

No header

The requested parameter is returned without header.

```
[SOURce:]IQCoder:DVBT:DATA:MOD?
```

Response: `ON`

Numerical values

Maximum values, minimum values and all further quantities, which are requested using a special text parameter, are returned as numerical values.

```
SOURce:FREQuency? MAX
```

Response: `1E3`

Boolean values

Boolean values are returned as:

- `0` for off
- `1` for on

```
OUTPut:STATe?
```

Response for on: `1`

Text parameters

Text parameters are returned in the short form.

`SOURce:DM:SOURce?`

Response for `INTernal`: `INT`

13.2.3 Command Sequence and Synchronization

Setting commands within one command line are not absolutely serviced in the order in which they have been received. In order to make sure that commands are actually carried out in a certain order, each command must be sent in a separate command line.

For overlapping commands, extra measures are necessary to prevent overlapping execution. Overlapping commands may not be executed completely before the next command starts executing. They usually take longer to process and allow the program to do other tasks while being executed. If overlapping commands do have to be executed in a defined order, for example to avoid wrong measurement results, controller and R&S VTE must be synchronized.

Use one of commands in Table 13-1 to synchronize controller and R&S VTE. All three commands cause a certain action only to be carried out after the hardware has been set and has settled. By suitable programming, the controller can be forced to wait for the respective action to occur.

Table 13-1: Synchronization using *OPC, *OPC? and *WAI

Command	Action	Programming the controller
`*OPC`	Sets the operation complete bit in the ESR after all previous commands have been executed.	Setting bit 0 in the ESE. Setting bit 5 in the SRE. Waiting for service request (SRQ).
`*OPC?`	Stops command processing until `1` is returned. This is only the case after the operation complete bit has been set in the ESR. This bit indicates that the previous setting has been completed.	Sending `*OPC?` directly after the command whose processing should be terminated before other commands can be executed.
`*WAI`	Stops further command processing until all commands sent before `*WAI` have been executed.	Sending `*WAI` directly after the command whose processing should be terminated before other commands are executed.

13.3 Status Reporting System

The status reporting system stores all information on the present operating state of the instrument, and on errors which have occurred. This information is stored in the status registers and in the error queue. The status registers and the error queue can be queried.

13.3.1 Hierarchy of Status Registers

The information is of a hierarchical structure.

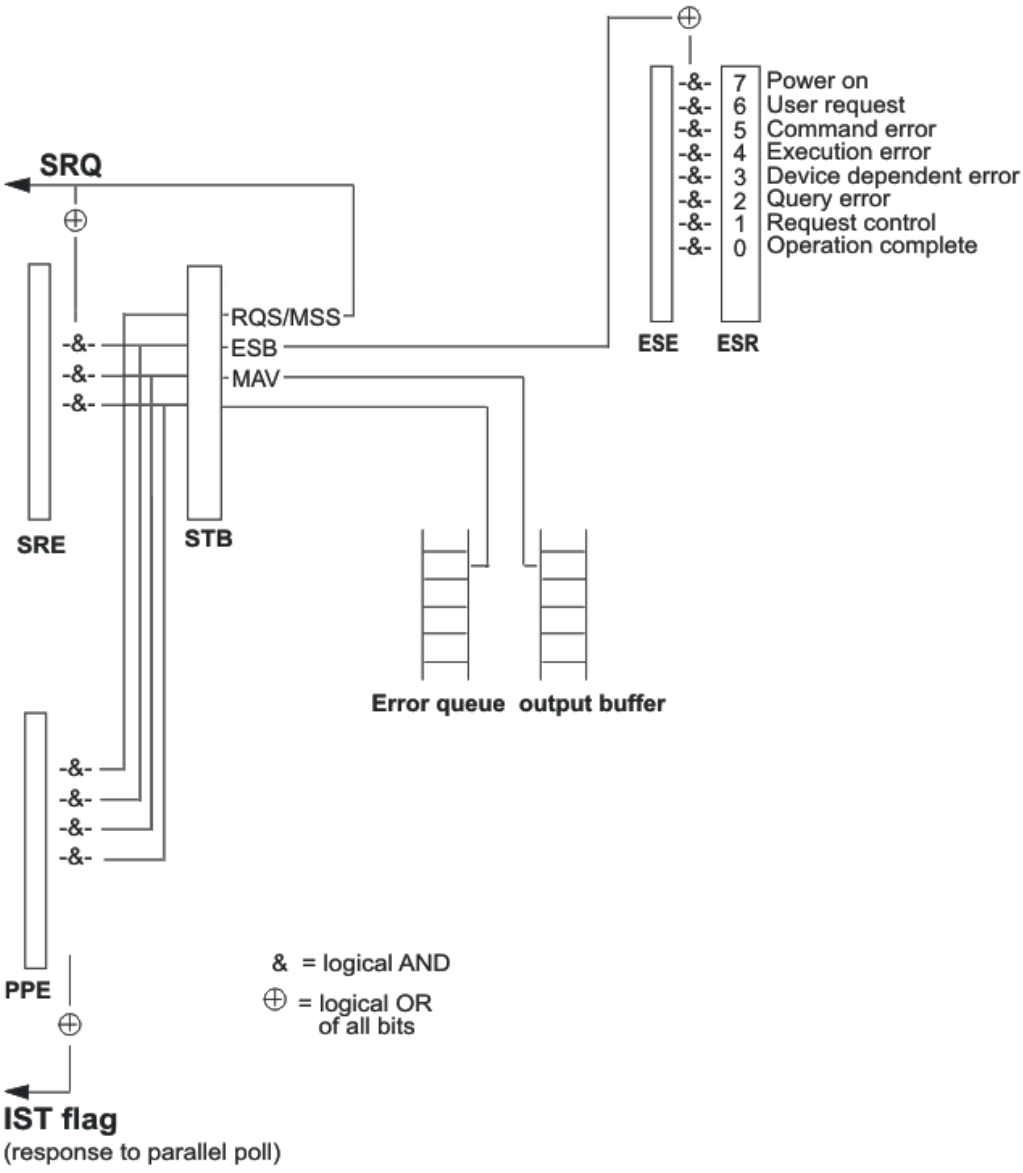


Figure 13-1: Status register hierarchy

The register status byte (STB) defined in IEEE 488.2 and its associated mask register service request enable (SRE) form the highest level.

The STB provides a rough overview of the instrument status, collecting the information of the lower-level registers. It receives information from:

- The event status register (ESR) which is also defined in IEEE 488.2 with the associated mask register standard event status enable (ESE).
- `STATus:OPERation` and `STATus:QUEStionable` which are defined by SCPI and contain detailed information on the R&S VTE.

The individual status flag (IST), like the SRQ, combines the entire instrument status in a single bit. The parallel poll enable register (PPE) fulfills the same function for the IST flag as the SRE for the service request.

The output buffer contains the messages the instrument returns to the controller. It is not part of the status reporting system but determines the value of the MAV bit in the STB.

The service request enable register SRE can be used as `ENABle` part of the STB if the STB is structured according to SCPI. By analogy, the ESE can be used as the `ENABle` part of the ESR.

Further information:

- Chapter 13.3.3.1, "Status Byte (STB) and Service Request Enable Register (SRE)", on page 481
- Chapter 13.3.3.2, "IST Flag and Parallel Poll Enable Register (PPE)", on page 482
- Chapter 13.3.3.3, "Event Status Register (ESR) and Event Status Enable Register (ESE)", on page 482

13.3.2 Structure of a SCPI Status Register

Each standard SCPI register consists of 5 parts which each have a width of 16 bits and have different functions (see Figure 13-2). The individual bits are independent of each other, that means each hardware status is assigned a bit number which is valid for all 5 parts. For example, bit 5 of the `STATus:OPERation` register is assigned to the hardware status "wait for trigger" in all 5 parts. Bit 15, the most significant bit, is set to zero for all parts. Thus the contents of the register parts can be processed by the controller as positive integer.

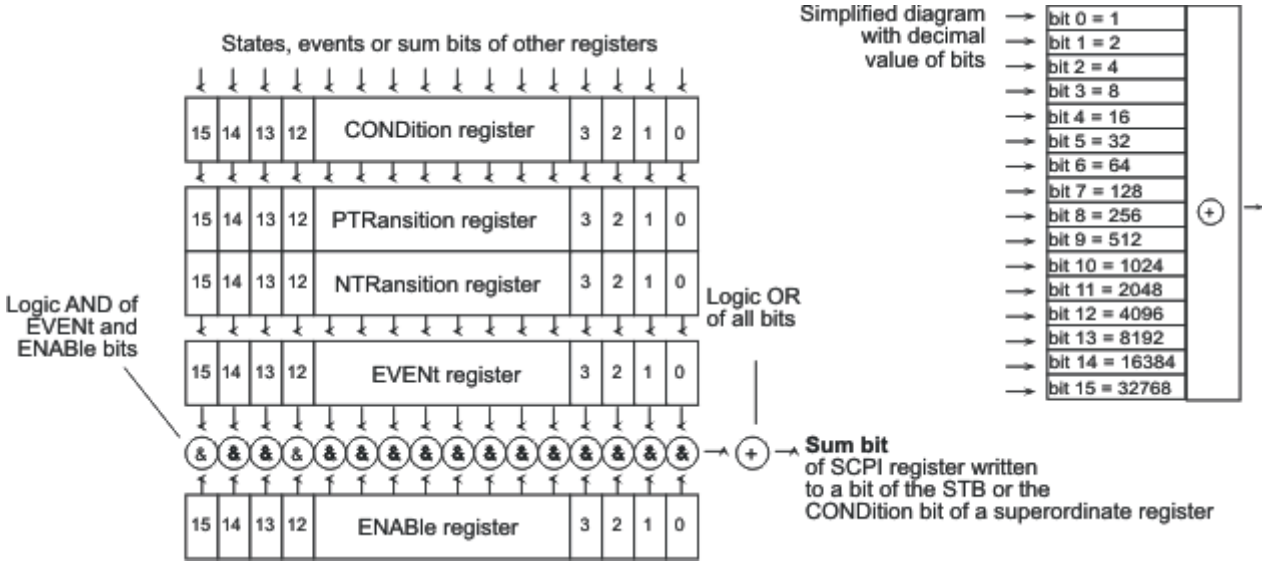


Figure 13-2: Status register model (example)

CONDition part

Is written into directly by the hardware or the sum bit of the next lower register. Its contents reflect the current instrument status. It can only be read, but not written into or cleared. Its contents are not affected by reading.

PTRansition part

Positive transition. Acts as a transition filter.

When a bit of the `CONDition` part is changed from 0 to 1, the associated PTR bit decides whether the EVENt bit is set to 1.

- PTR bit = 1: EVENt bit is set.
- PTR bit = 0: EVENt bit is not set.

This part can be written into and read as required. Its contents are not affected by reading.

NTRansition part

Negative transition. Acts as a transition filter.

When a bit of the `CONDition` part is changed from 1 to 0, the associated NTR bit decides whether the EVENt bit is set to 1.

- NTR bit = 1: EVENt bit is set.
- NTR bit = 0: EVENt bit is not set.

This part can be written into and read as required. Its contents are not affected by reading.

The two transition register parts define which state transition of the `CONDition` part (none, 0 to 1, 1 to 0 or both) is stored in the `EVENt` part.

EVENt part

Indicates whether an event has occurred since the last reading, it is the "memory" of the `CONDition` part. It only indicates events passed on by the transition filters. It is permanently updated by the R&S VTE.

This part is read-only. Reading the register clears it. This part is often equated with the entire register.

ENABle part

Determines whether the associated EVENt bit contributes to the sum bit. Each bit of the `EVENt` part is "ANDed" with the associated ENABle bit (symbol "&"). The results of all logical operations of this part are passed on to the sum bit using an "OR" function (symbol "+").

- ENABle bit = 0: Associated EVENt bit does not contribute to the sum bit.
- ENABle bit = 1: If the associated EVENT bit is "1", the sum bit is set to "1", too.

You can write into this part and read it. Its contents is not affected by reading.

Sum bit

Is obtained from the EVENt and ENABle part for each register. The result is entered into a bit of the CONDition part of the higher-order register.

The instrument automatically generates the sum bit for each register. Thus an event can lead to a service request throughout all levels of the hierarchy.

13.3.3 Contents of the Status Registers

In the following chapters, the contents of the status registers are described in more detail.

13.3.3.1 Status Byte (STB) and Service Request Enable Register (SRE)

The status byte (STB) is already defined in IEEE 488.2. It provides a rough overview of the instrument status by collecting the pieces of information of the lower registers. It can thus be compared with the CONDition part of an SCPI register and assumes the highest level within the SCPI hierarchy. A special feature is that bit 6 acts as the sum bit of the remaining bits of the status byte.

The STB is read out using the *STB? command or a serial poll.

The STB is linked to the service request enable register (SRE). Each bit of the STB is assigned a bit in the SRE. Bit 6 of the SRE is ignored. If a bit is set in the SRE and the associated bit in the STB changes from 0 to 1, a service request (SRQ) is generated, which triggers an interrupt in the controller if this is appropriately configured and can be further processed there.

The SRE is set using the *SRE command and read using the *SRE? command.

Table 13-2: Status byte bits

Bit no.	Meaning
0...1	Not used
2	**Error queue not empty** The bit is set when an entry is made in the error queue. If this bit is enabled by the SRE, each entry of the error queue generates a service request. Thus an error can be recognized and specified in greater detail by polling the error queue. The poll provides an informative error message. This procedure is to be recommended since it considerably reduces the problems involved with remote control.
3	**QUEStionable status sum bit** The bit is set if an EVENt bit is set in the QUEStionable status register and the associated ENABle bit is set to 1. A set bit indicates a questionable instrument status, which can be specified in greater detail by polling the QUEStionable status register.
4	**MAV bit** (Message available) The bit is set if a message is available in the output buffer which can be read. This bit can be used to enable data to be automatically read from the instrument to the controller.

Bit no.	Meaning
5	**ESB bit** Sum bit of the event status register. It is set if one of the bits in the event status register is set and enabled in the event status enable register. Setting of this bit indicates a serious error which can be specified in greater detail by polling the event status register.
6	**MSS bit** (master status summary bit) The bit is set if the instrument triggers a service request. This is the case if one of the other bits of this register is set together with its mask bit in the service request enable register SRE.
7	**OPERation status register sum bit** The bit is set if an EVENt bit is set in the `OPERation` status register and the associated ENABle bit is set to 1. A set bit indicates that the R&S VTE is just performing an action. The type of action can be queried by polling the `OPERation` status register.

13.3.3.2 IST Flag and Parallel Poll Enable Register (PPE)

As with the SRQ, the IST flag combines the entire status information in a single bit. You can read it by means of a parallel poll, see Chapter 13.3.3.2, "IST Flag and Parallel Poll Enable Register (PPE)", on page 482, or by using the `*IST?` command.

The parallel poll enable register (PPE) determines which bits of the STB contribute to the IST flag. The bits of the STB are "ANDed" with the corresponding bits of the PPE, with bit 6 being used as well in contrast to the SRE. The IST flag results from the "ORing" of all results. The PPE can be set using `*PRE` command and read using the `*PRE?` command.

13.3.3.3 Event Status Register (ESR) and Event Status Enable Register (ESE)

The ESR is defined in IEEE 488.2. It can be compared with the `EVENt` part of a SCPI register. The event status register can be read out using the `*ESR?` command.

The ESE corresponds to the `ENABle` part of a SCPI register. If a bit is set in the ESE and the associated bit in the ESR changes from 0 to 1, the ESB bit in the STB is set. The ESE register can be set using the `*ESE` command and read using the `*ESE?` command.

Table 13-3: Event status register bits

Bit no.	Meaning
0	**Operation complete** This bit is set on receipt of the `*OPC` command exactly when all previous commands have been executed.
1	Not used

Bit no.	Meaning
2	**Query error** This bit is set if either the controller wants to read data from the R&S VTE without having sent a query, or if it does not fetch requested data and sends new instructions to the R&S VTE instead. The cause is often a query which is faulty and hence cannot be executed.
3	**Device-dependent error** This bit is set if a device dependent error occurs. An error message with a number between -300 and -399 or a positive error number, which denotes the error in greater detail, is entered into the error queue.
4	**Execution error** This bit is set if a received command is syntactically correct but cannot be performed for other reasons. An error message with a number between -200 and -300, which denotes the error in greater detail, is entered into the error queue.
5	**Command error** This bit is set if a command which is undefined or syntactically incorrect is received. An error message with a number between -100 and -200, which denotes the error in greater detail, is entered into the error queue.
6	**User request** This bit is set when the R&S VTE is switched over to manual control.
7	**Power on** (supply voltage on) This bit is set on switching on the R&S VTE.

For information on error messages, see Chapter 16, "Troubleshooting", on page 1011.

13.3.3.4 STATus:OPERation Register

In the `CONDition` part, this register contains information on which actions the instrument is being executing or, in the `EVENt` part, information on which actions the instrument has executed since the last reading. It can be read using the `STATus:OPERation:CONDition?` or `STATus:OPERation[:EVENt]?` commands.

Table 13-4: STATus:OPERation register bits

Bit no.	Meaning
0-15	Not used

13.3.3.5 STATus:QUEStionable Register

This register contains information on questionable instrument states. They can occur, for example if the R&S VTE is operated out of its specifications. It can be queried using the `STATus:QUEStionable:CONDition?` or `STATus:QUEStionable[:EVENt]?` commands.

Table 13-5: STATus:QUEStionable register bits

Bit no.	Meaning
0-15	Not used

13.3.4 Application of the Status Reporting System

The purpose of the status reporting system is to monitor the status of one or several devices in a measuring system. To do this and react appropriately, the controller must receive and evaluate the information of all devices. The following standard methods are used.

Service request

Under certain circumstances, the R&S VTE can send a service request (SRQ) to the controller. Usually this service request initiates an interrupt at the controller, to which the control program can react appropriately. An SRQ is always initiated if one or several of bits 2, 3, 4, 5 or 7 of the status byte are set and enabled in the SRE. Each of these bits combines the information of a further register, the error queue or the output buffer. The `ENABle` parts of the status registers can be set so that arbitrary bits in an arbitrary status register initiate an SRQ. In order to use the possibilities of the service request effectively, all bits should be set to "1" in the enable registers SRE and ESE.

Example:

Use the `*OPC` command to generate an SRQ.

```
CALL IBWRT(generator%, "*ESE 1")
```

Sets bit 0 of ESE (operation complete).

```
CALL IBWRT(generator%, "*SRE 32")
```

Sets bit 5 of SRE (ESB).

After its settings have been completed, the instrument generates an SRQ.

The SRQ is the only possibility for the R&S VTE to become active on its own. Each controller program should set the R&S VTE such that a service request is initiated in the case of malfunction. The program should react appropriately to the service request.

Serial poll

Just as with the `*STB` command, the status byte of an instrument is queried. However, the query is made via interface messages and is thus clearly faster.

The serial poll method has already been defined in IEEE 488.1 and used to be the only standard possibility for different instruments to poll the status byte. The method also works for instruments which do not adhere to SCPI or IEEE 488.2.

The serial poll is mainly used to obtain a fast overview of the state of several instruments connected to the controller.

Parallel poll

Using a single command, the controller requests up to eight instruments to transmit one bit of information each on the data lines, that means to set the data line allocated to each instrument to a logical "0" or "1".

In addition to the SRE register, which determines the conditions under which an SRQ is generated, there is a parallel poll enable register (PPE). This register is "ANDed" with the STB bit by bit, considering also bit 6. The results are "ORed", the result is possibly inverted and then sent as a response to the parallel poll of the controller. The result can also be queried without parallel poll by means of the `*IST?` command.

The instrument first has to be set for the parallel poll using the `PPC` command. This command allocates a data line to the instrument and determines whether the response is to be inverted. The parallel poll itself is executed using `PPE`.

The parallel poll method is mainly used to find out quickly which instrument connected to the controller has sent a service request. To this effect, SRE and PPE must be set to the same value.

Query by means of commands

Each part of any status register can be read using of queries. There are two types of commands:

- The common commands `*ESR?`, `*IDN?`, `*IST?`, `*STB?` query the higher-level registers.
- The commands of the `STATus` system query the SCPI registers (`STATus:QUEStionable...`)

The returned value is always a decimal number that represents the bit pattern of the queried register. This number is evaluated by the controller program.

Queries are usually used after an SRQ in order to obtain more detailed information on the cause of the SRQ.

Error queue query

Each error state in the instrument leads to an entry in the error queue. The entries of the error queue are detailed plain text error messages that is displayed in the error line (manual control) or is queried using `SYSTem:ERRor?` command. Each call of `SYSTem:ERRor?` provides one entry from the error queue. If no error messages are stored there any more, the instrument responds with "0" (no error).

The error queue should be queried after every SRQ in the controller program as the entries describe the cause of an error more precisely than the status registers. Especially in the test phase of a controller program, the error queue should be queried regularly since faulty commands from the controller to the instrument are recorded there as well.

13.3.5 Reset Values of the Status Reporting Systems

The following table contains the different commands and events causing the status reporting system to be reset. With the exception of `*RST` and `SYSTem:PRESet`, no command influences the functional instrument settings.

DCL = device clear, SDC = selected device clear.

Result	Switching on supply voltage		DCL, SDC	*RST, SYSTem:PRESet	STATus:PRESet	*CLS
	Power on status clear 0	Power on status clear 1				
Clear STB, ESR	–	yes	–	–	–	yes
Clear SRE, ESE	–	yes	–	–	–	–
Clear PPE	–	yes	–	–	–	–
Clear EVENt parts of the registers	–	yes	–	–	–	yes
Clear `ENABle` parts of all `OPERation` and `QUESTionable` registers Fill `ENABle` parts of all other registers with *1*	–	yes	–	–	yes	–
Fill PTRansition parts with *1* Clear NTRansition parts	–	yes	–	–	yes	–
Clear error-queue	yes	yes	–	–	–	yes
Clear output buffer	yes	yes	yes	1)	1)	1)
Clear command processing and input buffer	yes	yes	yes	–	–	–
1) The first command in a command line that immediately follows a <program message terminator> clears the output buffer.						

13.4 General Programming Recommendations

Initial instrument status before changing settings

Manual operation is designed for maximum possible operating convenience. In contrast, the priority of remote control is the "predictability" of the instrument status. Thus, when a command attempts to define incompatible settings, the command is ignored and the instrument status remains unchanged, i.e. other settings are not automatically

adapted. Therefore, control programs should always define an initial instrument status (e.g. using the *RST command) and then implement the required settings.

Command sequence

As a general rule, send commands and queries in different program messages. Otherwise, the result of the query may vary depending on which operation is performed first (see also Preventing Overlapping Execution).

Reacting to malfunctions

The service request is the only possibility for the instrument to become active on its own. Each controller program should instruct the instrument to initiate a service request in case of malfunction. The program should react appropriately to the service request.

Error queues

The error queue should be queried after every service request in the controller program as the entries describe the cause of an error more precisely than the status registers. Especially in the test phase of a controller program the error queue should be queried regularly since faulty commands from the controller to the instrument are recorded there as well.

14 Remote Command Reference

This chapter describes all remote control commands of the R&S VTE. For each application, the commands are first listed for quick access, followed by a description of each command. An alphabetic list of all commands is given at the end of the manual.

The description of each command mainly contains the specifics for remote control. Follow the link under "Manual operation" for detailed information on the values and background information.

Further information:

- Starting/ending remote control
  See Chapter 3.11, "Setting Up Remote Control", on page 44
- Description of the SCPI command structure and syntax
  See Chapter 13, "Remote Control Basics", on page 469
- Description of the status registers
  See Chapter 13.3, "Status Reporting System", on page 477

14.1 Notation

All implemented commands are described with the associated parameters, ranges and reset values (*RST). Examples of the commands are included in the individual description.

Command forms

If no specific usage is given, a command can also be used as a query.

In the following cases, a usage is specified:

- "Query only"
  A query is characterized by ? at the end and has no *RST value.
- "Event"
  An event has no query form and no *RST value.

Upper case/lower case

Upper and lower case are used to identify the long form and short form of the mnemonics of a command in the description. The R&S VTE itself does not distinguish between upper and lower case letters, see "Long and short form" on page 471.

Parameters

In this chapter, short names are used for parameters in the remote command syntax. The most common short names are explained the following.

<boolean>: Parameter for the states "on" and "off". The "off" state can be stated either by the `OFF` mnemonic or the numeric value 0, the "on" state by `ON` or a numeric value

other than 0. If the parameter is queried, the numeric value 0 or 1 is always returned as a response.

<numeric_value>/ <num>: Parameters in which an entry as a numeric value or a setting by certain mnemonics (character data) is possible.

The following mnemonics are permissible:

- `MINimum`: Sets the parameter to the smallest value that is allowed.
- `MAXimum`: Sets the parameter to the largest value that is allowed.
- `DEFault`: Resets the parameter to its default.
- `UP`: Increases the value of the parameter by one increment.
- `DOWN`: Decreases the value of the parameter by one increment.

The numeric values of `MAXimum` and `MINimum` can be queried by stating the appropriate mnemonic after the question mark of the command.

Example:

```
SOURce:FREQuency? MAXimum
```

The returned result is the maximum settable numeric value for the RF frequency.

14.1.1 Addressing Module Slots

In analyzer applications, remote commands that select the input use string parameters composed of:

- Short term for module name
- [<module slot>]
  with <module slot> = L1, L2, or L3

Make sure that the string parameters match the installed options of the remote controlled R&S VTE.

If you are not sure which option is installed in which slot, query the installed options (`...:CATalog?`).

Example:

```
ROUTe<hw>:HDMI:MODule:SELect[?] "HDMI [L1]"
```

Selects the HDMI CTS RX/TX 600 MHz module (R&S VT-B2362) in slot L1 as input.

14.2 Common and General Commands

These commands provide general functions. Partly, they correlate to the functions provided in:

- "Setup" dialog, Chapter 6, "Basic Instrument Configurations", on page 94
- "File" dialog, Chapter 5, "File and Data Management", on page 86

- in toolbar, "Toolbar" on page 23

14.2.1 Common Commands

These commands are application-independent. Many of them are related to the status reporting system.

The common commands that are used most frequently are described in detail. Furthermore, the following common commands are supported. See also the IEEE 488.2 (IEC 625-2) standard.

- `*DEV[?] <numeric_value>`
- `*DMC[?] <string>,<block_data>|<string>`
- `*EMC[?] ON|OFF`
- `*GCLS`
- `*GMC? <string>`
- `*GOPC?`
- `*GWAI`
- `*LMC?`
- `*PMC`
- `*RMC <string>`
- `*SRQ? <integer>|DOWN|MAXimum|MINimum|UP`
- `*XESE[?] <expression>`
- `*XESR?`
- `*XPRE[?] <expression>`
- `*XSRE[?] <expression>`
- `*XSTB?`

***CLS**

Clear status

- Clears the output buffer.
- Sets the following to zero:
  - Status byte (STB)
  - Standard event register (ESR)
  - `EVENt` part of the `QUEStionable` register
  - `EVENt` part of the `OPERation` register

  The command does not change the mask and transition parts of the registers.

Usage: Event

***ESE** <Value>

Event status enable

Sets the event status enable register to the specified value. The query returns the content of the event status enable register in decimal form.

Parameters:
<Value> Range: 0 to 255

***ESR?**

Event status read

Returns the content of the event status register and sets the register to zero.

Return values:
<Content> Decimal form

Usage: Query only

***IDN?**

Identification query

Returns the identification of the R&S VTE:

<Manufacturer>,<ProductType>,<PartSerialNumber>,<FirmwareVersion>

Return values:

<Manufacturer> Manufacturer, for example Rohde & Schwarz

<ProductType> Product type, for example R&S VTE

<PartSerialNumber> <part number>/<serial number>
If this information is not available, 0 is returned.

<FirmwareVersion> Firmware version
If this information is not available, 0 is returned.

Example:
```
*IDN?
```
Query
```
Rohde&Schwarz,R&S VTE,
2115.7300k02/100006,1.90.0.0
```
Response

Usage: Query only

Manual operation: See "Part No." on page 101
See "Serial Number" on page 102

***IST?**

Individual status query

Returns the content of the IST flag. The IST flag is the status bit that is sent during a parallel poll.

Return values:

<ISTflag> 0 | 1

Usage: Query only

***OPC**

Operation complete

Used for command synchronization. Sets bit 0 in the event status register when all pending commands have been executed. This bit is used to initiate a service request.

Return values:

<Status> **1**
All pending commands have been executed.

0
There are commands pending.

***OPT?**

Option identification query

Returns all active hardware and software options. For a list of all available options, see the data sheet.

Return values:
<Options> List of the installed options separated by commas.

Usage: Query only

***PRE** <Value>

Parallel poll register enable

Sets the parallel poll enable register to the specified value. The query returns the content of the parallel poll enable register in decimal form.

Parameters:
<Value> Range: 0 to 255

***PSC** <Action>

Power on status clear

Determines whether the content of the `ENABle` registers is retained or reset on power on. If the ESE and SRE status registers are suitably configured, thus a service request can be triggered on power on.

The query returns the content of the power on status clear flag.

Parameters:
<Action> **0**
Retains the content.

1
Resets the content.

***RCL** <Memory>

Recall

Recalls the instrument data that was saved in an intermediate memory by the following commands:

- `*SAV` on page 494
- `MMEMory:STORe:STATe` on page 505

Setting parameters:
<Memory> Number that corresponds to the intermediate memory stored under:
`D:\VTE\UserData\Quick`

Range: 1 to 5

Example: `*RCL 2`
Loads the `Quick2.savrcl` file.

Usage: Setting only

Manual operation: See "Quick Device dialog" on page 93

***RST**

Reset

Resets the R&S VTE, that means sets it to a defined default status.

Usage: Setting only

***SAV** <Memory>

Save

Saves the current instrument data in an intermediate memory.

To load the saved data, use `*RCL` on page 493.

Setting parameters:

<Memory> Number that corresponds to the intermediate memory that is saved under:
`D:\VTE\UserData\Quick`
Range: 1 to 5

Example: `*SAV 2`
Saves the current instrument data in the `Quick2.savrcl` file.

Usage: Setting only

Manual operation: See "Quick Device dialog" on page 93

***SRE** <Content>

Service request enable

Determines the conditions under which a service request is triggered. Sets the service request enable register to the specified value. Bit 6 (MSS mask bit) remains 0.

The query returns the content of the service request enable register in decimal form.

Parameters:

<Content> Range: 0 to 255

***STB?**

Status byte query

Returns the content of the status byte.

Return values:

<Content> Decimal form

Usage: Query only

***TRG**

Trigger

Triggers all actions waiting for a trigger event.

Usage: Event

***TST?**

Self-test query

Triggers all self-tests of the instrument and outputs an error code in decimal form.

Return values:

<Result> **0**
Passed
1
Failed

Usage: Query only

***WAI**

Wait to continue

Waits until all pending commands have been executed, and all signals are stabilized. Only then subsequent commands are processed.

Usage: Event

14.2.2 CALibration Subsystem

For service purposes only.

14.2.3 DIAGnostic Subsystem

For service purposes only.

14.2.4 HCOPy Subsystem

Generates a hardcopy and configures the output.

HCOPy:DATA?

Generates a hardcopy of the current display. Transfers the hardcopy data directly as an NByte stream to the remote client.

Return values:

<Data> <dblock>
String

Usage: Query only

HCOPy:DEVice:FORMat <FileFormat>

Sets the graphic format of the hardcopy.

Parameters:

<FileFormat> BMP | JPG | PNG
*RST: BMP

Example: `HCOP:DEV:FORM PNG`
Adds the file extension PNG to the filename defined by `HCOPy:FILE` on page 496.

Manual operation: See "File Type" on page 92

HCOPy:DEVice:METadata <Enable>

If enabled, saves the following file information: type, date, size, and description, if available.

Parameters:

<Enable> ON | OFF
*RST: ON

Example: `HCOP:DEV:MET OFF`

Manual operation: See "File Info" on page 92

HCOPy:FILE <Path>

Generates a hardcopy of the current display and saves it in the specified file.

Setting parameters:

<Path> Path including the filename.
The file extension is specified by `HCOPy:DEVice:FORMat` on page 496.

Example:
```
HCOP:FILE "D:
\VTE\UserData\Hardcopy\measurement1"
```

Usage: Setting only

Manual operation: See "File Name" on page 92

14.2.5 INSTrument Subsystem

Managing applications.

Table 14-1: Application names

Application	Remote control string ("<Application>")
Audio analyzer	AUDIO
AV distortion analyzer	AVDA
CEC/DDC analyzer	BUS
HDMI analyzer	HDMIRX
HDMI generator	HDMITX
MHL analyzer	MHLRX
MHL generator	MHLTX
Time Domain Analyzer	TDA
Video analyzer	VIDEO

INSTrument:ACTivate <Application>

Selects the specified application. If the application is not open, it is also opened.

To determine the available applications use `INSTrument:CATalog?` on page 497.

Parameters:

<Application> Application name as a string, see Table 14-1.

Example: `INST:ACT "HDMIRX"`

INSTrument:CATalog?

Queries the available applications.

Parameters:

<Application> Application name as a string, see Table 14-1.

Example: `INST:CAT?`
Query
`"HDMIRX,AVDA,VIDEO,MHLRX,MHLTX,AUDIO,HDMITX, BUS"`
Response

INSTrument:DEACtivate <Application>

Closes the specified application.

Parameters:

<Application> Application name as a string, see Table 14-1.

Example: `INST:DEAC "HDMIRX"`

14.2.6 MMEMory Subsystem

Manages files and directories. Loads and saves instrument and user data.

To change and query the current directory, use `MMEMory:CDIRectory` on page 501.

Further information:

- Available file types see Table 5-1
- Instrument drives see "<Drive>" on page 90

Use of wildcards in filenames

`?` represents exactly one character.

`*` represents all characters up to the end of the file name.

Examples:

`*.log` includes all the files with the LOG extension in the directory.

`*.*` includes all the files in the directory.

MMEMory:ATTRibute <PathFile>, <FileAttributes>
MMEMory:ATTRibute? <PathFile>

Sets or deletes file attributes.

Setting parameters:

<FileAttributes> String containing the information whether a file attribute is to be set or deleted followed the attribute itself. Separated by a blank, more than one entry is possible.
Example: "-R +A"
Deletes the attribute for write protected file and adds the attribute for archiving file.

+
Sets the attribute that follows.

-
Deletes the attribute that follows.

R
Attribute for write protected file

A
Attribute for archiving file

S
Attribute for system file

H
Attribute for hidden file

*RST: -

Parameters for setting and query:

<PathFile> Path and filename including the extension:
"<Path>\<Filename>.<Extension>"
Example: `"D:\VTE\UserData\test.log"`
If the path is omitted, the current directory is used.

Return values:

<FileList> List containing strings of all files and their attributes in the specified path:
"<Filename1>,<FileAttribute1>","<Filename2>,<FileAttribute2>",...
The first 2 strings are related to the parent directory.

Example: `MMEM:ATTR "D:\VTE\UserData\*.log", "-R"`
Deletes the write protection for all `*.log` files in the `D:\VTE\UserData` directory.

Example: `MMEM:ATTR? "D:\VTE\UserData\Hardcopy\*.*"`
Query
`".,",".."," est389.bmp,A","test1.png,A", "test2.png,A"`
Response: Lists all files and their attributes in the `D:\VTE\UserData\Hardcopy` directory.

MMEMory:CATalog? <Path>[, <Format>]

Returns the content of a directory.

Query parameters:

<Path> Path of the directory; if omitted, the current directory is queried.

<Format> ALL | WTIMe

Return values:

<UsedDiskSpace> Byte size of all files in the directory

<FreeDiskSpace> Remaining disk space in bytes

<FileInfo> "<FileInfo1>", "<FileInfo2>", "<FileInfo3>", ...
Each <FileInfo> consists of: <filename>,<file type>,<file size in bytes>
Possible file types are ASCii, BINary, DIRectory

Example: `MMEM:CAT? "D:\VTE\UserData\Hardcopy"`
Query
`77615,261375090688,".,DIR,0","..,DIR,0",`
`"des.png,BIN,36460"`
Response: used disk space: 77.615 kbyte; remaining disk space: 261.375090688 Gbyte; no files in the `UserData` directory (".,DIR,0") and the `VTS` directory ("..,DIR,0"); `des.png` file, binary, 36.460 kbyte ("des.png,BIN,36460")

Usage: Query only

Manual operation: See "<Folders>" on page 91

MMEMory:CATalog:LENGth? [<Path>]

Returns the number of files in a directory.

Query parameters:

<Path> Path of the directory; if omitted, the current directory is queried.

Return values:

<FileCount> Number of files

Example: `MMEM:CAT:LENG? "D:\"`
Query
`19`
Response

Usage: Query only

Manual operation: See "<Folders>" on page 91

MMEMory:CDIRectory [<DirectoryName>]
MMEMory:CDIRectory? [<DirectoryName>]

Changes the current directory. If no path is specified in an `MMEM` command, this directory is used.

Parameters:

<DirectoryName> Absolute or relative path of the directory
To change to a higher directory, use 2 dots ".." .
*RST: D:\

Example: `MMEM:CDIR "D:\VTE\UserData"`
Changes from the current directory level to the `D:\VTE\UserData` subdirectory.

Manual operation: See "<Drive>" on page 90

MMEMory:COPY <Source>[, <Destination>]

Copies a file or complete directory to an existing directory.

Setting parameters:

<Source> Path and, for files, name of the file that is copied.

<Destination> Absolute or relative path and, for files, name of the target file.
If the destination not specified, <Source> is copied to the current directory.
If a file with the same name already exists in the destination directory, it is overwritten without an error message.

Example: `MMEM:COPY "D:\VTE\UserData\Hardcopy\des.png","E:"`
Copies the `des.png` file in the `D:\VTE\UserData\Hardcopy` directory to the memory stick without changing the filename.

Usage: Setting only

Manual operation: See "Copy button" on page 91

MMEMory:DATA <PathFile>, <BinaryBlock>[, <Append>]
MMEMory:DATA? <PathFile>

Writes the <BinaryBlock> data to a file specified by <PathFile>. Set the GPIB bus terminator to EOI in order to ensure correct data transfer.

The associated query transfers the specified file from the R&S VTE to the control computer. Make sure that the intermediate memory on the control computer is large enough to receive the file.

Use this command to read or transfer stored instrument settings or waveforms directly from/to the R&S VTE.

Parameters:

<BinaryBlock> <block>

The binary data block has the following structure: #<number><length entry><block data>

#
Comes always first in the binary block.

<number>
Indicates how many digits the subsequent length entry has.

<length entry>
Indicates the number of subsequent bytes.

<block data>
Block data for the specified length.

Setting parameters:

<Append> APPend

Parameters for setting and query:

<PathFile> Path and filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:DATA "D:\VTE\UserData\test1.txt",#15hallo`
Writes the binary block data to the `test1.txt` file.
<number> = 1, <length entry> = 5, <block data> = hallo

Manual operation: See "File Name" on page 92
See "File Type" on page 92

MMEMory:DCATalog? [<Path>]

Returns the subdirectories of a directory.

Query parameters:

<Path> Path of the directory; if omitted, the current directory is queried.

Return values:

<Catalog> Subdirectory name
The strings are separated by commas. The first 2 strings are related to the parent directory.

Example: `MMEM:DCAT?`
Query
`"Temp","Tools","VideoLib"`
Response

Usage: Query only

Manual operation: See "<Folders>" on page 91

MMEMory:DCATalog:LENGth? [<Path>]

Returns the number of subdirectories in a directory.

Query parameters:

<Path> Path of the directory; if omitted, the current directory is queried.

Return values:
<DirectoryCount> Number of subdirectories

Example: `MMEM:DCAT:LENG?`
Query
`10`
Response

Usage: Query only

Manual operation: See "<Folders>" on page 91

MMEMory:DELete <PathFile>

Deletes a file.

Parameters for setting and query:
<PathFile> Path and filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:DEL "D:\VTE\UserData\Hardcopy\test.png"`
Deletes the `test.png` file in the `D:\VTE\UserData\Hardcopy` directory.

Usage: Setting only

Manual operation: See "Delete button" on page 91

MMEMory:DRIVes?

Returns a list of the local and mapped network drives.

Return values:
<Drive> Drive name
The strings are separated by commas.

Example: `MMEM:DRIV?`
Query
`"C:\","D:\","E:\","Z:\"`
Response

Usage: Query only

Manual operation: See "<Drive>" on page 90

MMEMory:LOAD:STATe <MemoryNumber>, <PathFile>[, <Msus>]

Loads the instrument settings from a file into one of the intermediate memories, or recalls the instrument settings directly from a file.

Setting parameters:
<MemoryNumber> Number of the intermediate memory
0: Recalls the instrument settings directly from the file.

≠ 0: Loads the instrument settings into this intermediate memory.
To recall the instrument settings, use *RCL on page 493.

Range: 0 to 5

<Msus>

Parameters for setting and query:

<PathFile> Path and filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:LOAD:STAT 4,"D:\VTE\UserData\test4.savrcl"`
Loads the instrument settings from the `test4.savrcl` file into the intermediate memory 4.

Usage: Setting only

MMEMory:MDIRectory <PathDirectory>

Creates a new subdirectory or directory tree in a directory.

Setting parameters:

<PathDirectory> Directory name or directory tree; if the path is omitted, the current directory is used.

Example: `MMEM:MDIR "MyFiles\New"`
Creates the `MyFiles\New` directory tree in the current directory.

Usage: Setting only

Manual operation: See "New Folder dialog" on page 92

MMEMory:MOVE <Source>, <Destination>

Moves an existing file or directory, or renames the file or directory.

Setting parameters:

<Source> Path and, for files, name of the file that is moved or renamed. If the path is omitted, the current directory is used.

<Destination> Absolute or relative, existing path
To move and rename the file or directory, also enter a new name.
To rename the file or directory, omit the path.

Example: `MMEM:MOVE "test1.savrcl","\test\keep1.savrcl"`
Moves the `test1.savrcl` file from the current directory to the `test` subdirectory, and renames the file as `keep1.savrcl`.

Usage: Setting only

Manual operation: See "Cut button" on page 91
See "Paste button" on page 91

MMEMory:MSIS [<Msus>]

Sets the current drive. This setting is effective for all `MMEMory` commands where the drive is not explicitly specified.

MSIS = mass storage identification string

Parameters:
<Msus> *RST: D:\

Example: `MMEM:MSIS "C:"`
Sets the `C:` drive as current drive.

Manual operation: See "<Drive>" on page 90

MMEMory:RDIRectory <PathDirectory>

Deletes a directory.

Setting parameters:
<directory_name>

<PathDirectory> Directory name; if the path is omitted, the current directory is used.

Example: `MMEM:RDIR "MyFiles"`
Deletes the `"MyFiles` subdirectory in the current directory.

Usage: Setting only

Manual operation: See "Delete button" on page 91

MMEMory:STORe:STATe <MemoryNumber>, <PathFile>[, <Msus>]

Saves the instrument settings from one of the intermediate memories in a file, or saves the current instrument settings directly in a file.

Setting parameters:
<MemoryNumber> 0: Saves the current instrument settings directly in a file.
≠ 0: Saves the instrument settings from this intermediate memory.
To save the current instrument settings in one of the intermediate memories, use `*SAV` on page 494.

Range: 0 to 5

<PathFile> Path and filename including the extension. If the path is omitted, the current directory is used.

<Msus>

Example: `MMEM:STOR:STAT 4,"D:\VTE\UserData\test4.savrcl"`
Saves the instrument settings from intermediate memory 4 in the `test4.savrcl` file .

Usage: Setting only

14.2.7 OUTPut Subsystem

Configures the RF output.

OUTPut:ROSCillator[:STATe] <Enable>

Enables or disables the RF output.

Parameters:
<Enable> ON | OFF
*RST: ON

Example: `OUTP:ROSC OFF`

Manual operation: See "Reference Out" on page 108

14.2.8 SENSe Subsystem

Configures the reference frequency.

SENSe:ROSCillator:SOURce <ReferenceFreq>

See `[SOURce<hw>:]ROSCillator` on page 507

SENSe:ROSCillator[:INTernal]:ADJust:VALue <UserDefined>

See `[SOURce<hw>:]ROSCillator[:INTernal]:ADJust:VALue` on page 507

SENSe:ROSCillator[:INTernal]:ADJust[:STATe] <Enable>

See `[SOURce<hw>:]ROSCillator[:INTernal]:ADJust[:STATe]` on page 508

14.2.9 SOURce Subsystem

Configures the following:

- Marker output
- Reference frequency

[SOURce<hw>:]MARKer:SOURce <SlotName>

Sets the slot of the MARKER output.

Suffix:
<hw> 1,2
Selects the path.

Parameters:
<SlotName> | L1 | L2 | L3

Example: `MARK:SOUR L2`
Outputs the marker at slot 2.

Manual operation: See "Source" on page 110

[SOURce<hw>:]ROSCillator <ReferenceFreq>

Sets the reference frequency source.

Alias: `SENSe:ROSCillator:SOURce`

Suffix:
<hw> 1,2
Selects the path.

Parameters:
<ReferenceFreq> INTernal | EXTernal
*RST: INTernal

Example: `ROSC EXT`
Selects the external reference signal.

Manual operation: See "Source" on page 107

[SOURce<hw>:]ROSCillator[:INTernal]:ADJust:VALue <UserDefined>

Sets a user-defined adjustment value for the internal reference frequency.

Alias: `SENSe:ROSCillator[:INTernal]:ADJust:VALue`

Suffix:
<hw> 1,2
Selects the path.

Parameters:
<UserDefined> Range: 0 to 65535

Example: `ROSC:ADJ:VAL 1400`
Sets 1400.

Manual operation: See "Adjustment DAC Value" on page 108

[SOURce<hw>:]ROSCillator[:INTernal]:ADJust[:STATe] <Enable>

Sets adjustment method for the internal reference frequency.

Alias: `SENSe:ROSCillator[:INTernal]:ADJust[:STATe]`

Suffix:
<hw> 1,2
Selects the path.

Parameters:
<Enable> **ON | OFF**
*RST: ON

Example: `ROSC:ADJ OFF`

Manual operation: See "Adjustment State" on page 108

14.2.10 STATus Subsystem

This system contains the commands for the status reporting system, see also Chapter 13, "Remote Control Basics", on page 469.

`*RST` on page 494 has no effect on status registers.

Usage

Queries return the current value of the respective subregister. Thus you can check the status of the R&S VTE.

Setting commands configure the respective subregister. Thus you can determine which status changes of the R&S VTE cause a change in status registers.

Value range

Decimal value between 0 and 32767

(32767 = 2^{15}-1)

STATus:OPERation:CONDition?

Queries the content of the `CONDition` part of the `STATus:OPERation` register.

Provides information about the action currently executed by the R&S VTE. After the readout, the content is retained because it is the current hardware status.

Return values:
<RegisterValue> See "Value range" on page 508.

Example: `STAT:OPER:COND?`

Usage: Query only

STATus:OPERation:ENABle <RegisterValue>

Sets the bits of the `ENABle` part of the `STATus:OPERation` register.

Determines which events of the status event part are forwarded to the sum bit of the status byte. These events can be used for service request.

Parameters:
<RegisterValue> See "Value range" on page 508.

Example: `STAT:OPER:ENAB 32767`
All events are forwarded.

STATus:OPERation[:EVENt]?

Queries the content of the `EVENt` part of the `STATus:OPERation` register.

Provides information about the actions executed by the R&S VTE since the last readout. After the readout, the content is deleted.

Return values:
<RegisterValue> See "Value range" on page 508.

Example: `STAT:OPER?`

Usage: Query only

STATus:OPERation:NTRansition <RegisterValue>

Sets the bits of the `NTRansition` part of the `STATus:OPERation` register.

A set bit causes a bit transition from 1 to 0 in the `CONDition` part to produce an entry in the `EVENt` part of the register. Thus, the disappearance of an event in the hardware is detected, for example the end of a system error correction.

Parameters:
<RegisterValue> See "Value range" on page 508.

Example: STAT:OPER:NTR 0
No 1 to 0 transition in the CONDition part of the STATus:OPERation register produces an entry in the EVENt part.

STATus:OPERation:PTRansition <RegisterValue>

Sets the bits of the PTRansition part of the STATus:OPERation register.

A set bit causes a bit transition from 0 to 1 in the CONDition part to produce an entry in the EVENt part of the register. Thus, the appearance of an event in the hardware is detected, for example the start of a system error correction.

Parameters:
<RegisterValue> See "Value range" on page 508.

Example: STAT:OPER:PTR 32767
All transitions from 0 to 1 in the CONDition part of the STATus:OPERation register produce an entry in the EVENt part.

STATus:PRESet

Resets the status registers:

- All PTRansition parts are set to FFFFh (32767).
  All transitions from 0 to 1 are detected.
- All NTRansition parts are set to 0.
  A transition from 1 to 0 of a CONDition bit is not detected.
- The ENABle parts of STATus:OPERation and STATus:QUEStionable are set to 0.
  No event in these registers is forwarded.

Example: STAT:PRES

Usage: Event

STATus:QUEStionable:CONDition?

Queries the content of the CONDition part of the STATus:QUEStionable register.

Provides information about the action currently executed by the R&S VTE. After the readout, the content is retained because it is the current hardware status.

Return values:
<RegisterValue> See "Value range" on page 508.

Example: STAT:QUES:COND?

Usage: Query only

STATus:QUEStionable:ENABle <RegisterValue>

Sets the bits of the `ENABle` part of the `STATus:QUEStionable` register.

Determines which events of the `STATus:EVENt` part are enabled for the sum bit of the status byte. These events can be used for a service request.

Parameters:

<RegisterValue> See "Value range" on page 508.

Example: `STAT:QUES:ENAB 1`
Problems occurring in a system error correction produce an entry in the sum bit.

STATus:QUEStionable[:EVENt]?

Queries the content of the `EVENt` part of the `STATus:QUEStionable` register.

Provides information about the actions executed by the R&S VTE since the last read-out. After the readout, the content of the `EVENt` part is deleted.

Return values:

<RegisterValue> See "Value range" on page 508.

Example: `STAT:QUES?`

Usage: Query only

STATus:QUEStionable:NTRansition <RegisterValue>

Sets the bits of the `NTRansition` part of the `STATus:QUEStionable` register.

A set bit causes a bit transition from 1 to 0 in the `CONDition` part to produce an entry in the `EVENt` part of the register.

Parameters:

<RegisterValue> See "Value range" on page 508.

Example: `STAT:QUES:NTR 0`
A 1 to 0 transition in the `CONDition` part of the `STATus:QUEStionable` register does not produce an entry in the `EVENt` part.

STATus:QUEStionable:PTRansition <RegisterValue>

Sets the bits of the `PTRansition` part of the `STATus:QUEStionable` register.

A set bit causes a bit transition from 0 to 1 in the `CONDition` part to produce an entry in the `EVENt` part of the register.

Parameters:

<RegisterValue> See "Value range" on page 508.

Example: `STAT:QUES:PTR 32767`
All 0 to 1 transitions in the `CONDition` part of the `STATus:QUEStionable` register produce an entry in the `EVENt` part.

STATus:QUEue[:NEXT]?

Queries the oldest entry in the error queue and deletes this entry. For details on errors see Chapter 16, "Troubleshooting", on page 1011.

Alias: `SYSTem:ERRor[:NEXT]?` on page 518

Return values:

<ErrorCode> **1 to n**
Positive error number: device-specific error

0
No error, error queue is empty.

-n to -1
Negative error number: SCPI error message

<ErrorDescription> Text describing the error.

Example: `STATus:QUE?`
Queries the oldest entry of the error queue.
`0,"No error"`
Response: no error occurred since the error queue was last read out.

Usage: Query only

14.2.11 SYSTem Subsystem

Configures general functions that are not directly related to any application.

SYSTem:COMMunicate:NET:ADAPter <Network>

Selects one of the available LAN networks.

All `SYSTem:COMMunicate:NET:...` commands affect the selected network adapter.

Parameters:

<Network> Network name

Example: `SYST:COMM:NET:ADAP "Local Area Connection"`
Selects a local area (LAN) connection.

Manual operation: See "Network Adapter" on page 95

SYSTem:COMMunicate:NET:DHCP?

Queries whether your network uses a DHCP server.

Usage: Query only

Manual operation: See "DHCP" on page 95

SYSTem:COMMunicate:NET:DNS:ENABle?

If enabled, the DNS server address is obtained automatically.

Usage: Query only

Manual operation: See "Dynamic DNS" on page 96

SYSTem:COMMunicate:NET:GATeway?

Queries the default gateway.

Example: `SYST:COMM:NET:GAT?`
Query
`"12.345.67.8"`
Response

Usage: Query only

Manual operation: See "Gateways" on page 96

SYSTem:COMMunicate:NET:HOSTname?

Queries the hostname (computer name).

Return values:
<ComputerName>

Example:
```
SYST:COMM:NET:HOST?
```
Query
```
"VTE-100104"
```
Response

Usage: Query only

Manual operation: See "Host Name" on page 95

SYSTem:COMMunicate:NET:IPADdress?

Queries the IP address. The TCP/IP protocol is pre-installed with the IP address *10.0.0.10*.

Example:
```
SYST:COMM:NET:IPAD?
```
Query
```
"172.29.201.85"
```
Response

Usage: Query only

Manual operation: See "IP Addresses" on page 95

SYSTem:COMMunicate:NET:SUBNet:MASK?

Queries the subnet mask. The TCP/IP protocol is pre-installed with the subnet mask *255.255.255.0*.

Example:
```
SYST:COMM:NET:SUBN:MASK?
```
Query
```
"255.255.0.0"
```
Response

Usage: Query only

Manual operation: See "Subnet Masks" on page 96

SYSTem:COMMunicate:SOCKet<inst>:MODE <Protocol>

Sets the protocol operation mode for direct socket communication.

Suffix:
<inst> 1..*
Selects the connection.

Parameters:
<Protocol> RAW | AGILent | IEEE1174
*RST: AGIL

Example: `SYST:COMM:SOCK:MODE RAW`

Manual operation: See "Protocol Mode" on page 99

SYSTem:COMMunicate:SOCKet<inst>:PORT <Number>

Sets the data port number for task-specific data exchange.

Suffix:
<inst> 1..*
Selects the connection.

Parameters:
<Number> Range: 1 to 32767
*RST: 5025

Example: `SYST:COMM:SOCK:PORT 5025`

Manual operation: See "Data Port" on page 99

SYSTem:COMMunicate:SOCKet<inst>:VRESource?

Queries the resource name used by the programs for identification and control of the R&S VTE.

Suffix:
<inst> 1..*
Selects the connection.

Return values:
<Name> TCPIP::host name::data port::SOCKET

Example: `SYST:COMM:SOCK:VRES?`
Query
`"TCPIP::VTE-100005::5025::SOCKET"`
Response

Usage: Query only

Manual operation: See "Visa Resource" on page 98

SYSTem:COMMunicate:USB:VRESource?

Queries the resource name used by the programs for identification and control of the R&S VTE.

Return values:
<Name> USB::vendor ID::device ID::serial number::INSTR

Example: SYST:COMM:USB:VRES?
Query
"USB::0x0AAD::241::0100005::INSTR"
Response

Usage: Query only

Manual operation: See "Visa Resource" on page 99

SYSTem:COMMunicate:VXI<inst>:GTR <Enable>

Enables or disables the VXI-11 interface.

Suffix:
<inst> 1..*
Selects the connection.

Parameters:
<Enable> ON | OFF
*RST: ON

Example: SYST:COMM:VXI:GTR ON

Manual operation: See "VXI-11-n" on page 100

SYSTem:COMMunicate:VXI<inst>:VRESource?

Displays the resource name used by the programs for identification and control of the R&S VTE.

Suffix:
<inst> 1..*
Selects the connection.

Return values:
<Name> TCPIP::host name::INST0::INSTR

Example: SYST:COMM:VXI:VRES?
Query
"TCPIP::VTE-100005::inst0::INSTR"
Response

Usage: Query only

Manual operation: See "Visa Resource" on page 100

SYSTem:DFPRint [<Path>]

Generates an XML file and saves it in the specified folder. The name of the XML file starts with DeviceFootprint.

Information contained in the XML file:

- "DeviceData" for the basic unit
- "HardwareData" for the installed hardware modules

- "SoftwareData" for the installed firmware version
- "LicenseData" for the installed software options

Setting parameters:
<Path> Folder where the XML file is saved.

Return values:
<DeviceFootprint> Contents of the XML file as string.

Example: `SYST:DFPR "D:\VTE\UserData\Footprint"`

SYSTem:DISPlay:LANGuage <ShortName>

Fixed setting.

Parameters:
<ShortName> EN

Manual operation: See "Language" on page 95

SYSTem:DISPlay:UPDate <Enable>

Enables or disables updating the display. When changing to manual control, updating is automatically enabled.

Parameters:
<Enable> ON | OFF

Example: `SYST:DISP:UPD OFF`

SYSTem:ERRor:ALL?

Queries all entries in the error queue and deletes them. For details on errors see Chapter 16, "Troubleshooting", on page 1011.

Return values:
<ErrorCode> See `STATus:QUEue[:NEXT]?` on page 512.

<ErrorDescription> See `STATus:QUEue[:NEXT]?` on page 512.

Example:
```
SYST:ERR:ALL?
```
Query
```
0,"No error"
```
Response

Usage: Query only

Manual operation: See "[-350] Queue overflow" on page 1016

SYSTem:ERRor:CODE:ALL?

Queries all entries in the error queue and deletes them. Only the error code is returned. For details on errors see Chapter 16, "Troubleshooting", on page 1011.

Return values:
<ErrorCode> See STATus:QUEue[:NEXT]? on page 512.

Example: SYST:ERR:CODE:ALL?
Query
0
Response

Usage: Query only

SYSTem:ERRor:CODE[:NEXT]?

Queries the oldest entry in the error queue and deletes it. Only the error code is returned. For details on errors see Chapter 16, "Troubleshooting", on page 1011.

Return values:
<ErrorCode> See STATus:QUEue[:NEXT]? on page 512.

Example: SYST:ERR:CODE?
Query
0
Response

Usage: Query only

SYSTem:ERRor:COUNt?

Queries the number of entries in the error queue. For details on errors see Chapter 16, "Troubleshooting", on page 1011.

Return values:
<Number> Number of errors that occurred since the last readout.

Example: SYST:ERR:COUN?
Query
1
Response

Usage: Query only

SYSTem:ERRor[:NEXT]?

See alias: STATus:QUEue[:NEXT]? on page 512.

Return values:
<ErrorCode>

<ErrorDescription>

Usage: Query only

SYSTem:HELP:HEADers? [<Parser>]

Lists all possible remote commands of the R&S VTE together with their usage.

Query parameters:
<Parser>

Return values:
<SyntaxUsage> <dblock>

#<number><length entry> <command syntax>[/<usage>] <command syntax>[/<usage>], ...

#
Comes always first.

<number>
Indicates how many digits the subsequent length entry has.
(5 in the example)

<length entry>
Indicates the number of subsequent characters.
(69729 in the example)

<command syntax>
Syntax of the remote command without parameters

[/<usage>]
Optional information if the usage is restricted: `/qonly/` for queries, `/nquery/` for events.

Example: `SYST:HELP:HEAD?`
Query
`#569729 ... *SAV/nquery/ *SRE *STB?/qonly/ ...`
Response

Usage: Query only

SYSTem:HELP:SYNTax:ALL?

Lists all possible remote commands of the R&S VTE together with their parameters.

Return values:
<SyntaxParameter> <dblock>

#<number><length entry> <command syntax> <command syntax>, ...

#
Comes always first.

<number>
Indicates how many digits the subsequent length entry has.
(5 in the example)

<length entry>
Indicates the number of subsequent characters.
(91079 in the example)

<command syntax>
Syntax of the remote command with parameters

Example: `SYST:HELP:SYNT:ALL?`
Query
`#591079 ... :MMEMory:CATalog? <string>,ALL|WTIMe :MMEMory:CDIRectory[?] <string> ...`
Response

Usage: Query only

SYSTem:HELP:SYNTax? <Header>

Queries the possible parameters of a remote command.

Query parameters:

<Syntax> Syntax of the remote command.

Return values:

<Parameter> <dblock>
Possible parameters of the remote command.

Example: `SYST:HELP:SYNT? "SYSTem:COMMunicate:NET:DHCP"`
Query
`"SYSTem:COMMunicate:NET:DHCP[?] <boolean>"`
Response

Usage: Query only

SYSTem:OPTion:LIST? [<OptionType>[, <Validity>[, <Scope>[, <InstrumentNo.>]]]]

Returns a list of all options and packages available system-wide.

By using the parameters you can limit the result list. Not all parameter combinations are allowed. If a combination is not allowed, an error is returned.

Query parameters:

<OptionType> SWOPtion | HWOPtion | SWPackage | FWA | ALL
Characterizes the option type.
SWOPtion
Software option
HWOPtion
Hardware option
SWPackage
Software package
FWA
Firmware
ALL
All option types

<Validity> FUNCtional | VALid | ALL

FUNCtional
Ready to be used

VALid
Only allowed for software options

ALL
Both FUNCtional and VALid

Return values:

<OptionList> Response string; see example

Example: `SYST:OPT:LIST? FWA,FUNC`
Query
`"FWA AudioAnalyzer,FWA HDMIGenerator"`
Response

Usage: Query only

SYSTem:REBoot

Reboots the R&S VTE.

Example: `SYST:REB`

Usage: Event

SYSTem:RESTart

Restarts the firmware

Example: `SYST:REST`

Usage: Event

SYSTem:SERRor?

Returns a list of all errors that are currently present. This list corresponds to the errors displayed in the "Error Details" dialog, see Chapter 16.2, "Device-Specific Errors Messages", on page 1011.

Return values:

<ErrorList> <error number>,"<error description>", ...
Each error is listed with its number and a short description.

Example: `SYST:SERR?`
Query
`0,"No error"`
Response

Usage: Query only

SYSTem:SHUTdown

Shuts down the R&S VTE.

Example: `SYST:SHUT`

Usage: Event

14.2.12 TEST Subsystem

For service purposes only.

14.3 AV Distortion Analyzer Application

These commands correlate to the functions provided in Chapter 7, "AV Distortion Analyzer Application", on page 111.

14.3.1 ABORt Subsystem

ABORt<hw>:AVDA

Stops the measurement.

Suffix:

<hw> 1
Irrelevant

Example: `ABOR:AVDA`

Usage: Event

Manual operation: See "Stop button" on page 115

14.3.2 CLEar Subsystem

CLEar<hw>:AVDA

Clears all measurement results.

Suffix:
<hw> 1
Irrelevant

Usage: Event

Manual operation: See "Clear button" on page 115

14.3.3 CONFigure Subsystem

14.3.3.1 CONFigure<hw>:AVDA:ASPRatio Subsystem

CONFigure<hw>:AVDA:ASPRatio:ANALog <AspectRatio>

Sets the aspect ratio of the video picture.

Suffix:
<hw> 1
Irrelevant

Parameters:
<AspectRatio> F4_3 | F16_9
*RST: F4_3

Example:
```
CONF:AVDA:ASPR:ANAL F16_9
```

Manual operation: See "Picture Aspect Ratio" on page 130

14.3.3.2 CONFigure<hw>:AVDA:COLor Subsystem

CONFigure<hw>:AVDA:COLor:ANALog <ColorModel>

Sets the color model for the analog input signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<ColorModel> RGB | YPBPr
*RST: RGB

Example:
```
CONF:AVDA:COL:ANAL YPBP
```

Manual operation: See "Color" on page 130

14.3.3.3 CONFigure<hw>:AVDA:LIST Subsystem

Commands with 2 Boolean parameters

The first Boolean parameter enables or disables the parameter for the measurement.

The second Boolean parameter enables or disables the parameter display on the "Trace" tab, in the status trace or result trace.

The total number of simultaneously displayed status/result traces is restricted, see "Restricted number of displayed status/result traces" on page 121.

CONFigure<hw>:AVDA:LIST:APL:RESYnc <Value>

Sets the threshold for APL resynchronization (PSNR).

Suffix:

<hw> 1
Irrelevant

Parameters:

<Value> Range: 0.0 to 100.0
*RST: 15.0
Default unit: dB

Example: `CONF:AVDA:LIST:APL:RESY 50`
Sets 50.0 dB.

Manual operation: See "Optional measurement parameters" on page 128

CONFigure<hw>:AVDA:LIST:APL:SYNC <Value>

Sets the threshold for APL synchronization (PSNR).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 100.0
*RST: 38.0
Default unit: dB

Example: `CONF:AVDA:LIST:APL:SYNC 50`
Sets 50.0 dB.

Manual operation: See "Optional measurement parameters" on page 128

CONFigure<hw>:AVDA:LIST:AUDio:LEVel:LIMit <Lower (1 to 8)>, <Upper (1 to 8)>

Sets the lower and upper limits for the channel parameters (audio level dev. measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower (1 to 8)> Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Range: -99.9,-99.9,-99.9,-99.9,-99.9,-99.9,-99.9,-99.9 to 99.9,99.9,99.9,99.9,99.9,99.9,99.9,99.9
*RST: -99.9,-99.9,-99.9,-99.9,-99.9,-99.9,-99.9,-99.9
Default unit: dB

<Upper (1 to 8)> Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Range: -99.9,-99.9,-99.9,-99.9,-99.9,-99.9,-99.9,-99.9 to 99.9,99.9,99.9,99.9,99.9,99.9,99.9,99.9
*RST: 10.0,10.0,10.0,10.0,10.0,10.0,10.0,10.0
Default unit: dB

Example: `CONF:AVDA:LIST:AUD:LEV:LIM -10, -10, -10, 20, 20, 20, 20, 20, 80, 80, 80, 80, 80, 80, 80, 80`
Channel 1 to 3: sets -10.0 dB as lower limit.
Channel 4 to 8: sets 20.0 dB as lower limit.
Channel 1 to 8: sets 80.0 dB as upper limit.

Manual operation: See "<Audio level deviation parameters>" on page 124

CONFigure<hw>:AVDA:LIST:AUDio:LEVel[:STATe] <List (1 to 8)>, <Trace (1 to 8)>

Shows or hides the channel parameters (audio level dev. measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List (1 to 8)> OFF | ON

Enables or disables the display on the "List" tab.
Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>

*RST: ON,ON,ON,ON,ON,ON,ON,ON

<Trace (1 to 8)> OFF | ON

Enables or disables the display in the result trace.
Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>

*RST: OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF

Example:
```
CONF:AVDA:LIST:AUD:LEV ON, ON, ON, ON, ON, ON,
ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF
```
Shows channel 1 to 7 on the "List" tab.
Hides the display of all channels in the result trace.

Manual operation: See "<Audio level deviation parameters>" on page 124

CONFigure<hw>:AVDA:LIST:AUDio:LOSS:ADVanced <Threshold (1 to 8)>

Sets the audio loss threshold for the channel parameters (audio loss measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Threshold (1 to 8)> Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>

Range: -99.9,-99.9,-99.9,-99.9,-99.9,-99.9,-99.9,-99.9 to 0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0
*RST: -40.0,-40.0,-40.0,-40.0,-40.0,-40.0,-40.0,-40.0
Default unit: dBFS

Example:
```
CONF:AVDA:LIST:AUD:LOSS:ADV -10.0, -10.0,
-10.0, -10.0, -20.0, -20.0, -20.0, -20.0
```
Channel 1 to 4: sets -10.0 dBFS.
Channel 5 to 8: sets -20.0 dBFS.

Manual operation: See "<Audio loss parameters>" on page 124

CONFigure<hw>:AVDA:LIST:AUDio:LOSS:LIMit <Upper (1 to 8)>

Sets the upper limit for the channel parameters (audio loss measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Upper (1 to 8)> Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Range: 1,1,1,1,1,1,1,1 to 10000, 10000, 10000, 10000, 10000, 10000, 10000, 10000
*RST: 10000, 10000, 10000, 10000, 10000, 10000, 10000, 10000
Default unit: ms

Example: `CONF:AVDA:LIST:AUD:LOSS:LIM 10,10,10,10,1,1,1,1`
Channel 1 to 4: sets 10 ms.
Channel 5 to 8: sets 1 ms.

Manual operation: See "<Audio loss parameters>" on page 124

CONFigure<hw>:AVDA:LIST:AUDio:LOSS[:STATe] <List (1 to 8)>, <Trace (1 to 8)>

Shows or hides the channel parameters (audio loss measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List (1 to 8)> OFF | ON
Enables or disables the display on the "List" tab.
Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
*RST: ON,ON,ON,ON,ON,ON,ON,ON

<Trace (1 to 8)> OFF | ON
Enables or disables the display in the status trace.
Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
*RST: OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF

Example: `CONF:AVDA:LIST:AUD:LOSS ON, ON, ON, ON, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF`
Shows channel 1 to 7 on the "List" tab.
Hides the display of all channels in the result trace.

Manual operation: See "<Audio loss parameters>" on page 124

CONFigure<hw>:AVDA:LIST:AVDelay:LIMit <Lower (1 to 8)>, <Upper (1 to 8)>

Sets the upper and lower limits for the channel parameters (AV delay measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower (1 to 8)> Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Range: -1.000, -1.000, -1.000, -1.000, -1.000, -1.000, -1.000, -1.000 to 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000
*RST: -1.000, -1.000, -1.000, -1.000, -1.000, -1.000, -1.000, -1.000
Default unit: s

<Upper (1 to 8)> Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Range: -1.000, -1.000, -1.000, -1.000, -1.000, -1.000, -1.000, -1.000 to 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000
*RST: 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000
Default unit: s

Example: `CONF:AVDA:LIST:AVD:LIM 0, 0, 0, -0.5, -0.5, -0.5, -0.5, -0.5, -0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5`
Channel 1 to 3: sets 0.000 s as lower limit.
Channel 4 to 8: sets -0.500 s as lower limit.
Channel 1 to 8: sets 0.500 s as upper limit.

Manual operation: See "<AV delay parameters>" on page 124

CONFigure<hw>:AVDA:LIST:AVDelay[:STATe] <List (1 to 8)>, <Trace (1 to 8)>

Shows or hides the channel parameters (AV delay measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List (1 to 8)> OFF | ON
Enables or disables the display on the "List" tab.
Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
*RST: ON,ON,ON,ON,ON,ON,ON,ON

<Trace (1 to 8)> OFF | ON

Enables or disables the display in the result trace.
Enter a value for each channel:
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>

*RST: OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF

Example:
```
CONF:AVDA:LIST:AVD ON, ON, ON, ON, ON, ON, OFF,
OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF
```
Shows channel 1 to 6 on the "List" tab.
Hides the display of all channels in the result trace.

Manual operation: See "<AV delay parameters>" on page 124

CONFigure<hw>:AVDA:LIST:AVPL[:STATe] <List>, <Trace>

Shows or hides the "Avg. Picture Level" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON

Enables or disables the display on the "List" tab.

*RST: ON

<Trace> OFF | ON

Enables or disables the display in the result trace.

*RST: OFF

Example:
```
CONF:AVDA:LIST:AVPL ON,ON
```

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:AVTest:DEFault

Resets the following optional settings:

- CONFigure<hw>:AVDA:LIST:STILlimage:SYNC on page 553
- CONFigure<hw>:AVDA:LIST:STILlimage:RESYnc on page 553
- CONFigure<hw>:AVDA:LIST:APL:SYNC on page 526
- CONFigure<hw>:AVDA:LIST:APL:RESYnc on page 525
- CONFigure<hw>:AVDA:LIST:AVTest:TCTone on page 531
- CONFigure<hw>:AVDA:LIST:AVTest:TTPeriode on page 531

Suffix:
<hw> 1
Irrelevant

Example:
```
CONF:AVDA:LIST:AVT:DEF
```

Usage: Event

Manual operation: See "Optional measurement parameters" on page 128

CONFigure<hw>:AVDA:LIST:AVTest:TCTone <Test>

Sets the tone for AV testing with time code synchronization.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Test> NATural | TESTtone
For `TESTtone`, set the test tone period under `CONFigure<hw>:AVDA:LIST:AVTest:TTPeriode` on page 531.
*RST: NATural

Example: `CONF:AVDA:LIST:AVT:TCT TEST`

Manual operation: See "Optional measurement parameters" on page 128

CONFigure<hw>:AVDA:LIST:AVTest:TTPeriode <Value>

Sets the test tone period.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 2.000 to 10.000
*RST: 4.000
Default unit: s

Example: `CONF:AVDA:LIST:AVT:TTP 5.5`
Sets 5.500 s.

Manual operation: See "Optional measurement parameters" on page 128

CONFigure<hw>:AVDA:LIST:BFRame:APL <Value>

Sets the upper limit of the average picture level (APL) for the "Black Frame" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 100
*RST: 5
Default unit: PCT

Example: `CONF:AVDA:LIST:BFR:APL 10`
Sets 10 %.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:BFRame[:STATe] <List>, <Trace>

Shows or hides the "Black Frame" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the status trace.
*RST: ON

Example: `CONF:AVDA:LIST:BFR OFF,OFF`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:CNUMber[:STATe] <List>

Shows or hides the "Cycle Number" parameter (general measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

Example: `CONF:AVDA:LIST:CNUM ON`

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:CTIMe:LIMit <Lower>, <Upper>

Sets the upper and lower limits for the "Cycle Time" parameter (general measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:

<Lower> Range: 0.00 to 999.99
*RST: 0.00
Default unit: s

<Upper> Range: 0.00 to 999.99
*RST: 999.00
Default unit: s

Example: `CONF:AVDA:LIST:CTIM:LIM 3,100`
Sets the lower limit to 3.00 s, and the upper limit to 100.00 s.

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:CTIMe[:STATe] <List>

Shows or hides the "Cycle Time" parameter (general measurement).

Suffix:

<hw> 1
Irrelevant

Parameters:

<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

Example: `CONF:AVDA:LIST:CTIM OFF`

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:FDRopped:LIMit <Upper>

Sets the upper limit for the "Dropped Frames" parameter (video measurement).

Suffix:

<hw> 1
Irrelevant

Parameters:

<Upper> Range: 0 to 9999
*RST: 0

Example: `CONF:AVDA:LIST:FDR:LIM 2`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:FDRopped[:STATe] <List>, <Trace>

Shows or hides the "Dropped Frames" parameter (video measurement).

Suffix:

<hw> 1
Irrelevant

Parameters:

<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: OFF

Example: `CONF:AVDA:LIST:FDR ON,ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:FNUMber[:STATe] <List>

Shows or hides the "Frame Number" parameter (general measurement).

Suffix:

<hw> 1
Irrelevant

Parameters:

<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

Example: `CONF:AVDA:LIST:FNUM ON`

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:FPOint:AUDio:DURation <Value>

Sets the length of the test period for the "Audio Failure Point" parameter (failure point measurement).

Suffix:

<hw> 1
Irrelevant

Parameters:

<Value> Range: 1000 to 60000
*RST: 15000
Default unit: ms

Example: `CONF:AVDA:LIST:FPO:AUD:DUR 1000`
Sets 1000 ms.

Manual operation: See "Length of Test Period" on page 126

CONFigure<hw>:AVDA:LIST:FPOint:AUDio[:STATe] <List>, <Trace>

Shows or hides the "Audio Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

<Trace> OFF | ON
Enables or disables the display in the status trace.
*RST: OFF

Example: `CONF:AVDA:LIST:FPO:AUD ON,OFF`

Manual operation: See "<Failure point parameters>" on page 122

CONFigure<hw>:AVDA:LIST:FPOint:PICTure:DEFault <Settings>

Resets the following settings for the selected platform:

- `CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod` on page 536
- `CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:TOTal` on page 537
- `CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:GAP` on page 536
- `CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:ALLowed` on page 536

Applies to the "Picture Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<Settings> **QMP1 | 0**
QMP1

QMP2 | 1
QMP2

MBRai | 2
MBRAI

DBOok | 3
D-book

Example: `CONF:AVDA:LIST:FPO:PICT:DEF 2`
Sets MBRAI.

Usage: Setting only

Manual operation: See "<Picture failure point parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod <Value>

Sets the period length for the "Picture Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 60
*RST: 15 for NorDig QMP1; 60 for NorDig QMP2; 1 for MBRAI; 10 for D-Book
Default unit: s

Example: `CONF:AVDA:LIST:FPO:PICT:PER 20`
Sets 20 s.

Manual operation: See "<Picture failure point parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:ALLowed <Value>

Sets the number of periods that are allowed to have a visible error. Applies to the "Picture Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: Platform-specific
*RST: 0 for NorDig QMP1 and NorDig QMP2; 1 for MBRAI and D-Book

Example: `CONF:AVDA:LIST:FPO:PICT:PER:ALL 0`

Manual operation: See "<Picture failure point parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:GAP <Value>

Sets the gap between periods for the "Picture Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 60
*RST: 0 for NorDig QMP1, NorDig QMP2 and MBRAI; 5 for D-Book
Default unit: s

Example: `CONF:AVDA:LIST:FPO:PICT:PER:GAP 1`
Sets 1 s.

Manual operation: See "<Picture failure point parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:PICTure:PERiod:TOTal <Value>

Sets the total number of periods for the "Picture Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 99
*RST: 1 for NorDig QMP1 and NorDig QMP2; 20 for MBRAI; 3 for D-Book

Example: `CONF:AVDA:LIST:FPO:PICT:PER:TOT 20`

Manual operation: See "<Picture failure point parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:PICTure[:STATe] <List>, <Trace>

Shows or hides the "Picture Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the status trace.
*RST: OFF

Example: `CONF:AVDA:LIST:FPO:PICT OFF,ON`

Manual operation: See "<Failure point parameters>" on page 122

CONFigure<hw>:AVDA:LIST:FPOint:VERRor:DEFault <Settings>

Resets the following setting for analog or digital video:

- `CONFigure<hw>:AVDA:LIST:FPOint:VERRor:PSNR` on page 538

Applies to the "Visible Error" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<Settings> ANALog | DIGital

Example: `CONF:AVDA:LIST:FPO:VERR:DEF ANAL`

Usage: Setting only

Manual operation: See "<Visible error definition parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:VERRor:DURation <Value>

Sets the duration for the "Visible Error" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 20 to 999
*RST: 120
Default unit: ms

Example: `CONF:AVDA:LIST:FPO:VERR:DUR 100`
Sets 100 ms.

Manual operation: See "<Visible error definition parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:VERRor:PSNR <Value>

Sets the PSNR Y threshold for the "Visible Error" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 100.0
*RST: 35.0 for digital video; 25.0 for analog video
Default unit: dB

Example: `CONF:AVDA:LIST:FPO:VERR:PSNR 80`
Sets 80.0 dB.

Manual operation: See "<Visible error definition parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:VERRor:SSIM <Value>

Sets the SSIM threshold for the "Visible Error" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.000 to 1.000
*RST: 0.000

Example: `CONF:AVDA:LIST:FPO:VERR:SSIM 0.1`
Sets 0.100.

Manual operation: See "<Visible error definition parameters>" on page 125

CONFigure<hw>:AVDA:LIST:FPOint:VERRor[:STATe] <List>, <Trace>

Shows or hides the "Visible Error" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the status trace.
*RST: ON

Example: `CONF:AVDA:LIST:FPO:VERR ON,OFF`

Manual operation: See "<Failure point parameters>" on page 122

CONFigure<hw>:AVDA:LIST:FREeze:APLThreshold <Value>

Sets the APL threshold beneath which a change of luminance is not assessed as movement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.00 to 10.00
*RST: 0.03

Example: `CONF:AVDA:LIST:FRE:APLT 0.5`

Manual operation: See "Freeze APL Threshold" on page 126

CONFigure<hw>:AVDA:LIST:FREeze:DETecttime <Value>

Sets the time threshold above which a still picture is assessed as frozen.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 10000
*RST: 200
Default unit: ms

Example: `CONF:AVDA:LIST:FRE:DET 100`
Sets 100 ms.

Manual operation: See "Freeze Time Threshold" on page 126

CONFigure<hw>:AVDA:LIST:LDETection:TIME:LIMit <Upper>

Sets the upper limit for the "Detection Time" parameter (general measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Upper> Range: 0.000 to 60.000
*RST: 1.000
Default unit: s

Example: `CONF:AVDA:LIST:LDET:TIME:LIM 5`
Sets 5.000 s.

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:LDETection:TIME[:STATe] <List>

Shows or hides the "Detection Time" parameter (general measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

Example: `CONF:AVDA:LIST:LDET:TIME OFF`

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:LDETection[:STATe] <List>

Shows or hides the "Loop Detection" parameter (general measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

Example: `CONF:AVDA:LIST:LDET OFF`

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:MOSV:LIMit <Lower>

Sets the lower limit for the "Mos-V" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower> Range: 1.00 to 5.00
*RST: 2.00

Example: `CONF:AVDA:LIST:MOSV:LIM 3.5`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:MOSV[:STATe] <List>, <Trace>

Shows or hides the "Mos-V" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: ON

Example: `CONF:AVDA:LIST:MOSV OFF,OFF`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:CB:AVERage <Value>

Sets the average for the "PSNR Cb" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9999
*RST: 0
Default unit: ms

Example: `CONF:AVDA:LIST:PSNR:CB:AVER 100`
Sets 100 ms.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:CB:LIMit <Lower>

Sets the lower limit for the "PSNR Cb" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower> Range: 0.0 to 99.9
*RST: 25.0
Default unit: dB

Example: `CONF:AVDA:LIST:PSNR:CB:LIM 50`
Sets 50.0 dB.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:CB[:STATe] <List>, <Trace>

Shows or hides the "PSNR Cb" parameter (video measurement).

Peak signal-to-noise ratio (PSNR)

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: OFF

Example: `CONF:AVDA:LIST:PSNR:CB ON,ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:CR:AVERage <Value>

Sets the average for the "PSNR Cr" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9999
*RST: 0
Default unit: ms

Example: `CONF:AVDA:LIST:PSNR:CR:AVER 100`
Sets 100 ms.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:CR:LIMit <Lower>

Sets the lower limit for the "PSNR Cr" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower> Range: 0.0 to 99.9
*RST: 25.0
Default unit: dB

Example: `CONF:AVDA:LIST:PSNR:CR:LIM 50`
Sets 50.0 dB.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:CR[:STATe] <List>, <Trace>

Shows or hides the "PSNR Cr" parameter (video measurement).

Peak signal-to-noise ratio (PSNR)

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: OFF

Example: `CONF:AVDA:LIST:PSNR:CR ON,ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:Y:AVERage <Value>

Sets the average for the "PSNR Y" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9999
*RST: 0
Default unit: ms

Example: `CONF:AVDA:LIST:PSNR:Y:AVER 100`
Sets 100 ms.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:Y:LIMit <Lower>

Sets the lower limit for the "PSNR Y" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower> Range: 0.0 to 99.9
*RST: 25.0
Default unit: dB

Example: `CONF:AVDA:LIST:PSNR:Y:LIM 50`
Sets 50.0 dB.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PSNR:Y[:STATe] <List>, <Trace>

Shows or hides the "PSNR Y" parameter (video measurement).

Peak signal-to-noise ratio (PSNR)

Suffix:
<hw> 1
Irrelevant

Parameters:

<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: ON

Example: `CONF:AVDA:LIST:PSNR:Y OFF,OFF`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PXERror:CB:LIMit <Upper>

Sets the upper limit for the "Pixel Error Cb" parameter (video measurement).

Suffix:

<hw> 1
Irrelevant

Parameters:

<Upper> Range: 0 to 2073600
*RST: 1000

Example: `CONF:AVDA:LIST:PXER:CB:LIM 10000`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PXERror:CB[:STATe] <List>, <Trace>

Shows or hides the "Pixel Error Cb" parameter (video measurement).

Suffix:

<hw> 1
Irrelevant

Parameters:

<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: OFF

Example: `CONF:AVDA:LIST:PXER:CB ON,ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PXERror:CR:LIMit <Upper>

Sets the upper limit for the "Pixel Error Cr" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Upper> Range: 0 to 2073600
*RST: 1000

Example: `CONF:AVDA:LIST:PXER:CR:LIM 100`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PXERror:CR[:STATe] <List>, <Trace>

Shows or hides the "Pixel Error Cr" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: OFF

Example: `CONF:AVDA:LIST:PXER:CR ON,ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PXERror:Y:LIMit <Upper>

Sets the upper limit for the "Pixel Error Y" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Upper> Range: 0 to 2073600
*RST: 1000

Example: `CONF:AVDA:LIST:PXER:Y:LIM 2000`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:PXERror:Y[:STATe] <List>, <Trace>

Shows or hides the "Pixel Error Y" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: OFF

Example: `CONF:AVDA:LIST:PXER:Y ON,ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:RFReeze:LIMit <Lower>, <Upper>

Sets the upper and lower limits for the "Relative Picture Freeze" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower> Range: 0.00 to 99.00
*RST: 0.00
Default unit: PCT

<Upper> Range: 0.00 to 99.00
*RST: 99.00
Default unit: PCT

Example: `CONF:AVDA:LIST:RFR:LIM 10,80`
Sets the lower limit to 10.00 %, and the upper limit to 80.00 %.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:RFReeze[:STATe] <List>

Shows or hides the "Relative Picture Freeze" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:

<List> OFF | ON

Enables or disables the display on the "List" tab.

*RST: OFF

Example: `CONF:AVDA:LIST:RFR ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:RRATe:AVERage:LIMit <Lower>, <Upper>

Sets the upper and lower limits for the "AVG Rend Rate" parameter (video measurement).

Suffix:

<hw> 1
Irrelevant

Parameters:

<Lower> Range: 0.00 to 999.99
*RST: 15.00
Default unit: Hz

<Upper> Range: 0.00 to 999.99
*RST: 65.00
Default unit: Hz

Example: `CONF:AVDA:LIST:RRAT:AVER:LIM 30,100`
Sets the lower limit to 30.00 Hz, and the upper limit to 100.00 Hz.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:RRATe:AVERage:SDWindow <Value>

Sets the average and standard rendering rate measurement window.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Value> Range: 1 to 99
*RST: 20
Default unit: s

Example: `CONF:AVDA:LIST:RRAT:AVER:SDW 30`
Sets 30 s.

Manual operation: See "<Rendering rate parameters>" on page 127

CONFigure<hw>:AVDA:LIST:RRATe:AVERage[:STATe] <List>

Shows or hides the "AVG Rend Rate" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

Example: `CONF:AVDA:LIST:RRAT:AVER ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:RRATe:LIMit <Lower>, <Upper>

Sets the upper and lower limits for the "Rendering Rate" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower> Range: 0.00 to 999.99
*RST: 15.00
Default unit: Hz

<Upper> Range: 0.00 to 999.99
*RST: 65.00
Default unit: Hz

Example: `CONF:AVDA:LIST:RRAT:LIM 100,500`
Sets the lower limit to 100.00 Hz, and the upper limit to 500.00 Hz.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:RRATe:STDeviation:LIMit <Lower>, <Upper>

Sets the upper and lower limits for the "STD Rend Rate" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower> Range: 0.00 to 999.99
*RST: 0.00
Default unit: Hz

<Upper> Range: 0.00 to 999.99
*RST: 2.00
Default unit: Hz

Example: `CONF:AVDA:LIST:RRAT:STD:LIM 10,30`
Sets the lower limit to 10.00 Hz, and the upper limit to 30.00 Hz.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:RRATe:STDeviation:RNOMinal <Value>

Sets the nominal standard deviation value. Applies if the nominal value is enabled, see `CONFigure<hw>:AVDA:LIST:RRATe:STDeviation:RSELector` on page 550.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.00 to 999.99
*RST: 30.00
Default unit: Hz

Example: `CONF:AVDA:LIST:RRAT:STD:RNOM 100`
Sets 100 Hz.

Manual operation: See "<Rendering rate parameters>" on page 127

CONFigure<hw>:AVDA:LIST:RRATe:STDeviation:RSELector <Reference>

Sets the reference for the standard deviation.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Reference> RRATeavg | NOMinal

RRATeavg
Enables the AVG rendering rate.

NOMinal
Enables the nominal value. Set the value under `CONFigure<hw>:AVDA:LIST:RRATe:STDeviation:RNOMinal` on page 550.

*RST: RRATeavg

Example: `CONF:AVDA:LIST:RRAT:STD:RSEL NOM`

Manual operation: See "<Rendering rate parameters>" on page 127

CONFigure<hw>:AVDA:LIST:RRATe:STDeviation[:STATe] <List>

Shows or hides the "STD Rend Rate" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

Example: `CONF:AVDA:LIST:RRAT:STD ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:RRATe:WINDow <Value>

Sets the rendering rate measurement window.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 99
*RST: 2
Default unit: s

Example: `CONF:AVDA:LIST:RRAT:WIND 10`
Sets 10 s.

Manual operation: See "<Rendering rate parameters>" on page 127

CONFigure<hw>:AVDA:LIST:RRATe[:STATe] <List>, <Trace>

Shows or hides the "Rendering Rate" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: OFF

Example: `CONF:AVDA:LIST:RRAT ON,ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:SIGNal[:STATe] <List>

Shows or hides the "Signal" parameter (general measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

Example: `CONF:AVDA:LIST:SIGN OFF`

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:SSIM:AVERage <Value>

Sets the average for the "SSIM" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9999
*RST: 0
Default unit: ms

Example: `CONF:AVDA:LIST:SSIM:AVER 100`
Sets 100 ms.

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:SSIM:LIMit <Lower>

Sets the lower limit for the "SSIM" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Lower> Range: 0.000 to 1.000
*RST: 0.600

Example: `CONF:AVDA:LIST:SSIM:LIM 0.5`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:SSIM[:STATe] <List>, <Trace>

Shows or hides the "SSIM" parameter (video measurement).

Structural similarity (SSIM).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the result trace.
*RST: OFF

Example: `CONF:AVDA:LIST:SSIM ON,ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:LIST:STILlimage:RESYnc <Value>

Sets the threshold for still image resynchronization (PSNR).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 100.0
*RST: 15.0
Default unit: dB

Example: `CONF:AVDA:LIST:STIL:RESY 50`
Sets 50.0 dB.

Manual operation: See "Optional measurement parameters" on page 128

CONFigure<hw>:AVDA:LIST:STILlimage:SYNC <Value>

Sets the threshold for still image synchronization (PSNR).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 100.0
*RST: 38.0
Default unit: dB

Example: `CONF:AVDA:LIST:STIL:SYNC 50`
Sets 50.0 dB.

Manual operation: See "Optional measurement parameters" on page 128

CONFigure<hw>:AVDA:LIST:TRIGger <External>

Sets the external start trigger.

Suffix:
<hw> 1
Irrelevant

Parameters:
<External> OFF | POSSlope | NEGSlope
*RST: OFF

Example: `CONF:AVDA:LIST:TRIG POSS`

Manual operation: See "<General parameters>" on page 122

CONFigure<hw>:AVDA:LIST:VFReeze[:STATe] <List>, <Trace>

Shows or hides the "Freeze" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: ON

<Trace> OFF | ON
Enables or disables the display in the status trace.
*RST: ON

Example: `CONF:AVDA:LIST:VFR OFF,OFF`

Manual operation: See "<Video parameters>" on page 123

14.3.3.4 CONFigure<hw>:AVDA:LOG Subsystem

CONFigure<hw>:AVDA:LOG:OPTions <LogData>, <Separator>

Suffix:
<hw> 1
Irrelevant

Parameters:
<LogData> ALL | LVIolation
*RST: ALL

<Separator> COMMa | DOT
*RST: COMMa

Example: `CONF:AVDA:LOG:OPT LVI,DOT`

Manual operation: See "Log Data" on page 138
See "Decimal Point in csv File" on page 138

14.3.3.5 CONFigure<hw>:AVDA:REFerence Subsystem

CONFigure<hw>:AVDA:REFerence:COMMand <Recording>

Starts a new reference action.

To save the recorded results, use `MMEMory<hw>:AVDA:REFerence:DATA:SAVE` on page 561.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Recording> LEARn | ACCept | ABORt | CLEar
Only the following order is possible:
`LEARn` -> `ACCept` or `ABORt` -> `CLEar`

Example: `CONF:AVDA:REF:COMM LEAR`
Starts recording.

Manual operation: See "Learn button" on page 119
See "Accept button" on page 119
See "Abort button" on page 120
See "Clear button" on page 120

CONFigure<hw>:AVDA:REFerence:DETection:TIME <Interval>

Sets the time interval for monitoring a signal to detect a loop.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Interval> Range: 0.0 to 300.0
*RST: 60.0
Default unit: s

Example: `CONF:AVDA:REF:DET:TIME 10`
Sets 10.0 s.

Manual operation: See "Loop Detection Time" on page 118

CONFigure<hw>:AVDA:REFerence:DETection:WINDow:SIZE <Left>, <Right>, <Top>, <Bottom>

Reduces the window size used for loop detection (APL section).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Left> Range: 0.0 to 75.0
*RST: 20.0
Default unit: PCT

<Right> Range: 25.0 to 100.0
*RST: 80.0
Default unit: PCT

<Top> Range: 0.0 to 55.0
*RST: 40.0
Default unit: PCT

<Bottom> Range: 45.0 to 100.0
*RST: 60.0
Default unit: PCT

Example: `CONF:AVDA:REF:DET:WIND:SIZE 30,70,50,60`

Manual operation: See "Section Top, Section Bottom, Section Left, Section Right" on page 118

CONFigure<hw>:AVDA:REFerence:SYNC <Mode>

Sets the reference synchronization mode.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Mode> LAPL | SAPL | TCODe | SPICture | SREFerence
*RST: SREF

Example: `CONF:AVDA:REF:SYNC LAPL`
Sets loop average picture level (APL).

Manual operation: See "Synchronization" on page 117

CONFigure<hw>:AVDA:REFerence:TIMecode:MFRames <MissingFrames>

Sets the allowed number of missing frames during recording.

Suffix:
<hw> 1
Irrelevant

Parameters:

<MissingFrames> Range: 0 to 9999
*RST: 0

Example: `CONF:AVDA:REF:TIM:MFR 10`
Allows 10 frames.

Manual operation: See "Allowed Missing Frames" on page 118

CONFigure<hw>:AVDA:REFerence:TIMecode:WINDow:SIZE <Left>, <Right>, <Top>, <Bottom>

Reduces the window size used for loop detection (time code).

Suffix:

<hw> 1
Irrelevant

Parameters:

<Left> Range: 0.0 to 90.0
*RST: 5.0
Default unit: PCT

<Right> Range: 10.0 to 100.0
*RST: 95.0
Default unit: PCT

<Top> Range: 0.0 to 95.0
*RST: 80.0
Default unit: PCT

<Bottom> Range: 85.0 to 100.0
*RST: 100.0
Default unit: PCT

Example: `CONF:AVDA:REF:TIM:WIND:SIZE 30,70,50,60`

Manual operation: See "TC Window Top, TC Window Bottom, TC Window Left, TC Window Right" on page 119

14.3.3.6 CONFigure<hw>:AVDA:TTVideo Subsystem

CONFigure<hw>:AVDA:TTVideo <List>

Shows or hides the "Latency" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<List> OFF | ON
Enables or disables the display on the "List" tab.
*RST: OFF

Example: `CONF:AVDA:TTV ON`

Manual operation: See "<Video parameters>" on page 123

CONFigure<hw>:AVDA:TTVideo:APL:HYSTerese <Hysteresis>

Sets the switching hysteresis for detecting an APL transition as a triggering event.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Hysteresis> Percentage
Range: 0 to 100
*RST: 0

Example: `CONF:AVDA:TTV:APL:HYST 5`

Manual operation: See "APL Hysteresis" on page 127

CONFigure<hw>:AVDA:TTVideo:APL:SLOPe <Slope>

Sets whether the APL signal triggers with the rising or falling slope.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Slope> RISE | FALL
*RST: RISE

Example: `CONF:AVDA:TTV:APL:SLOP RISE`

Manual operation: See "APL Trigger Slope" on page 127

CONFigure<hw>:AVDA:TTVideo:APL:THReshold <Threshold>

Sets the threshold for detecting an APL transition as a triggering event.

Suffix:
<hw> 1
Irrelevant

Parameters:

<Threshold> Percentage

Range: 0 to 100
*RST: 50

Example: `CONF:AVDA:TTV:APL:THR 50`

Manual operation: See "APL Threshold" on page 127

CONFigure<hw>:AVDA:TTVideo:TRIGger:SLOPe <Slope>

Sets whether the external trigger signal triggers with the rising or falling slope.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Slope> RISE | FALL

*RST: RISE

Example: `CONF:AVDA:TTV:TRIG:SLOP RISE`

Manual operation: See "External Trigger Slope" on page 127

14.3.4 DISPlay Subsystem

DISPlay<hw>:AVDA:SELect:TAB <Tab>

Selects the measurement.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Tab> INPut | DETection | LIST | TRACe | LOG

Corresponds to the tabs in the manual control.

Example: `DISP:AVDA:SEL:TAB LIST`

14.3.5 INITiate Subsystem

INITiate<hw>:AVDA

Starts the measurement.

Suffix:

<hw> 1
Irrelevant

Example: `INIT:AVDA`

Usage: Event

Manual operation: See "Start button" on page 115

14.3.6 MMEMory Subsystem

MMEMory<hw>:AVDA:LOG:DATA:SAVE <PathFolder>

Creates a folder as specified where the log data is saved as CSV files.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFolder> Folder name. If the path is omitted, the current directory is used.

Example: `MMEM:AVDA:LOG:DATA:SAVE "D:\VTE\UserData\MyLog"`
Creates the `MyLog` folder in the `D:\VTE\UserData` directory.

Manual operation: See "Save Log button" on page 138

MMEMory<hw>:AVDA:REFerence:DATA:LOAD <PathFile>

Loads a previously saved sequence from the specified `*.avr` file.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:AVDA:REF:DATA:LOAD "D:\VTE\UserData\test1.avr"`
Loads `test1.avr` from the `D:\VTE\UserData` directory.

Manual operation: See "Load button" on page 120

MMEMory<hw>:AVDA:REFerence:DATA:LOAD:STATe?

Queries the loading status of the reference file.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> IDLE | RUNNing | READy | ERRor

Example: `MMEM:AVDA:REF:DATA:LOAD:STAT?`
Query
`READ`
Response

Usage: Query only

Manual operation: See "Load button" on page 120

MMEMory<hw>:AVDA:REFerence:DATA:SAVE <PathFile>

Saves the recorded results as a `*.avr` file in the specified directory.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:AVDA:REF:DATA:SAVE "D:\VTE\UserData\test1.avr"`
Saves `test1.avr` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 120

MMEMory<hw>:AVDA:REFerence:DATA:SAVE:STATe?

Queries the saving status of the reference file.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> IDLE | RUNNing | READy | ERRor

Example: `MMEM:AVDA:REF:DATA:SAVE:STAT?`
Query
`IDLE`
Response

Usage: Query only

Manual operation: See "Save button" on page 120

14.3.7 READ Subsystem

14.3.7.1 READ<hw>[:SCALar]:AVDA:DETection Subsystem

READ<hw>[:SCALar]:AVDA:DETection:TIME?

Queries the time that was needed to synchronize the input signal to the reference.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> Numeric value
Default unit: ms

Example: `READ:AVDA:DET:TIME?`
Query
`165`
Response

Usage: Query only

Manual operation: See "<Counter>" on page 132

READ<hw>[:SCALar]:AVDA:DETection[:STATe]?

Queries the status of the measurement.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> STOP | RUNNing | PASSed | ABORted

Example: `READ:AVDA:DET?`
Query
`PASS`
Response

Usage: Query only

Manual operation: See "<Status>" on page 132

14.3.7.2 READ<hw>[:SCALar]:AVDA:INPut Subsystems

READ<hw>[:SCALar]:AVDA:INPut:ARATio?

Queries the aspect ratio of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<MeasValue> F4_3 | F16_9

Example: `READ:AVDA:INP:ARAT?`
Query
`F16_9`
Response

Usage: Query only

Manual operation: See "Input column" on page 130

READ<hw>[:SCALar]:AVDA:INPut:AUDio:CH:COUNt?

Queries the number of audio channels of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<MeasValue> Numeric value

Example: `READ:AVDA:INP:AUD:CH:COUN?`
Query
`8`
Response

Usage: Query only

Manual operation: See "Input column" on page 130

READ<hw>[:SCALar]:AVDA:INPut:COLor:DEPTh?

Queries the color depth of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<MeasValue> Numeric value
Default unit: bit

Example: `READ:AVDA:INP:COL:DEPT?`
Query
`12`
Response

Usage: Query only

Manual operation: See "Input column" on page 130

READ<hw>[:SCALar]:AVDA:INPut:COMPonent:FORMat?

Queries the color model of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<ColorModel> RGB | YCBCr | YPBPr

RGB | YCBCr
Digital input signal

RGB | YPBPr
Analog input signal

Example: `READ:AVDA:INP:COMP:FORM?`
Query
`YCBC`
Response

Usage: Query only

Manual operation: See "Input column" on page 130

READ<hw>[:SCALar]:AVDA:INPut:COMPonent:SAMPling?

Queries the component sampling of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<MeasValue> 4_4_4 | 4_2_2 | 4_2_0

Example: `READ:AVDA:INP:COMP:SAMP?`
Query
`4_2_2`
Response

Usage: Query only

Manual operation: See "Input column" on page 130

READ<hw>[:SCALar]:AVDA:INPut:FRAMe:RATE?

Queries the frame rate of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<MeasValue> Numeric value
Default unit: Hz

Example: `READ:AVDA:INP:FRAM:RATE?`
Query
`2.500000E+001`
Response

Usage: Query only

Manual operation: See "Input column" on page 130

READ<hw>[:SCALar]:AVDA:INPut:RESolution?

Queries the resolution of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<MeasValue> String

Example: `READ:AVDA:INP:RES?`
Query
`"1920x1080"`
Response

Usage: Query only

Manual operation: See "Input column" on page 130

READ<hw>[:SCALar]:AVDA:INPut:SYNC[:STATe]?

Queries the synchronization state of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<MeasValue> OK | FAIL

Example: `READ:AVDA:INP:SYNC?`
Query
`OK`
Response

Usage: Query only

Manual operation: See "Input column" on page 130

14.3.7.3 READ<hw>[:SCALar]:AVDA:LIST Subsystem

READ<hw>[:SCALar]:AVDA:LIST:AUDio:LEVel?

Queries the results of the channel parameters (audio level dev. measurement).

Suffix:

<hw> 1
Irrelevant

Return values:

<Current (1 to 8)> Current test result.
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Default unit: dB

<Worst (1 to 8)> Worst test result within the running test period.
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Default unit: dB

Example:

```
READ:AVDA:LIST:AUD:LEV?
```

Query

```
-2.004823E+000, -2.004825E+000, -2.004825E+000,
-2.004822E+000, -2.004825E+000, -2.004825E+000,
-2.004822E+000, -2.004825E+000, -2.006055E+000,
-2.006056E+000, -2.006056E+000, -2.006055E+000,
-2.006057E+000, -2.006055E+000, -2.006055E+000,
-2.006057E+000
```

Response: <Current> of channel 1 to 8, followed by <Worst> of channel 1 to 8.

Usage: Query only

Manual operation: See "<Audio level deviation results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:AUDio:LOSS?

Queries the results of the channel parameters (audio loss measurement).

Suffix:

<hw> 1
Irrelevant

Return values:

<Current (1 to 8)> OK | FAIL
Current test result.
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>

<Worst (1 to 8)> OK | FAIL
Worst test result within the running test period.
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>

Example:

```
READ:AVDA:LIST:AUD:LOSS?
```

Query

```
OK, OK, OK, OK, OK, OK, OK, OK, OK, OK, OK, OK,
OK, OK, OK, OK
```

Response: <Current> of channel 1 to 8, followed by <Worst> of channel 1 to 8.

Usage: Query only

Manual operation: See "<Audio loss results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:AVDelay?

Queries the results of the channel parameters (AV delay measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current (1 to 8)> Current test result.
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Default unit: s

<Worst (1 to 8)> Worst test result within the running test period.
<CH1>,<CH2>,<CH3>,<CH4>,<CH5>,<CH6>,<CH7>,<CH8>
Default unit: s

Example: `READ:AVDA:LIST:AVD?`
Query
`0.000000E+000, 0.000000E+000, NAV, NAV, NAV, NAV, NAV, NAV, 0.000000E+000, 0.000000E+000, NAV, NAV, NAV, NAV, NAV, NAV`
Response for a signal with 2 audio channels, and current and worst audio to video delay of 0.000 s.

Usage: Query only

Manual operation: See "<AV delay results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:AVPL?

Queries the results of the "Avg. Picture Level" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.
Default unit: %

Example: `READ:AVDA:LIST:AVPL?`
Query
`1.973084E+001`
Response

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:BFRame?

Queries the results of the "Black Frame" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.

<Worst> Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:BFR?`
Query
`OK,OK,0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:CNUMber?

Queries the results of the "Cycle Number" parameter (general measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.

<Worst> Worst test result within the running test period.

Example: `READ:AVDA:LIST:CNUM?`
Query
`8,NAV`
Response: <Current>,<Worst>

Usage: Query only

Manual operation: See "<General results>" on page 133

READ<hw>[:SCALar]:AVDA:LIST:CTIMe?

Queries the results of the "Cycle Time" parameter (general measurement).

Suffix:
<hw> 1
Irrelevant

Return values:

<Current> Current test result.
Default unit: s

<Worst> Worst test result within the running test period.
Default unit: s

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:CTIM?`
Query
`2.520000E+001, 2.520000E+001, NAV`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<General results>" on page 133

READ<hw>[:SCALar]:AVDA:LIST:FDRopped?

Queries the results of the "Dropped Frames" parameter (video measurement).

Suffix:

<hw> 1
Irrelevant

Return values:

<Current> Current test result.

<Worst> Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:FDR?`
Query
`0,1,92`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:FNUMber?

Queries the results of the "Frame Number" parameter (general measurement).

Suffix:

<hw> 1
Irrelevant

Return values:

<Current> Current test result.

<Worst> Worst test result within the running test period.

Example: `READ:AVDA:LIST:FNUM?`
Query
`29,630`
Response: <Current>,<Worst>

Usage: Query only

Manual operation: See "<General results>" on page 133

READ<hw>[:SCALar]:AVDA:LIST:FPOint:AUDio?

Queries the results of the "Audio Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> OK | FAIL
Current test result.

<Worst> OK | FAIL
Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:FPO:AUD?`
Query
`NAV,NAV,NAV`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Failure point results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:FPOint:PICTure?

Queries the results of the "Picture Failure Point" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> OK | FAIL
Current test result.

<Worst> OK | FAIL
Worst test result within the running test period.

<Fault> Number of detected faults.

Example: READ:AVDA:LIST:FPO:PICT?
Query
FAIL,FAIL,NAV
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Failure point results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:FPOint:VERRor?

Queries the results of the "Visible Error" parameter (failure point measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> OK | FAIL
Current test result.

<Worst> OK | FAIL
Worst test result within the running test period.

<Fault> Number of detected faults.

Example: READ:AVDA:LIST:FPO:VERR?
Query
FAIL,FAIL,20311
Result: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Failure point results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:LDETection?

See READ<hw>[:SCALar]:AVDA:DETection[:STATe]? on page 562.

Usage: Query only

Manual operation: See "<General results>" on page 133

READ<hw>[:SCALar]:AVDA:LIST:MOSV?

Queries the results of the "Mos-V" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.

<Worst> Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:MOSV?`
Query
`2.906120E+000, 2.660050E+000, 0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:PSNR:CB?

Queries the results of the "PSNR Cb" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.
Default unit: dB

<Worst> Worst test result within the running test period.
Default unit: dB

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:PSNR:CB?`
Query
`4.273509E+001, 4.064017E+001, 0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:PSNR:CR?

Queries the results of the "PSNR Cr" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.
Default unit: dB

<Worst> Worst test result within the running test period.
Default unit: dB

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:PSNR:CR?`
Query
`4.573626E+001, 4.082593E+001, 0`
Response

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:PSNR:Y?

Queries the results of the "PSNR Y" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.
Default unit: dB

<Worst> Worst test result within the running test period.
Default unit: dB

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:PSNR:Y?`
Query
`2.951990E+001, 2.905932E+001, 0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:PXERror:CB?

Queries the results of the "Pixel Error Cb" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.

<Worst> Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:PXER:CB?`
Query
`82469,89223,68228`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:PXERror:CR?

Queries the results of the "Pixel Error Cr" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.

<Worst> Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:PXER:CR?`
Query
`59219,73471,70160`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:PXERror:Y?

Queries the results of the "Pixel Error Y" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.

<Worst> Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:PXER:Y?`
Query
`404021,407398,65946`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:RFReeze?

Queries the results of the "Relative Picture Freeze" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.
Default unit: %

<Worst> Worst test result within the running test period.
Default unit: %

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:RFR?`
Query
`0.000000E+000, 0.000000E+000, NAV`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:RRATe?

Queries the results of the "Rendering Rate" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.
Default unit: Hz

<Worst> Worst test result within the running test period.
Default unit: Hz

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:RRAT?`
Query
`2.500000E+001, 2.500000E+001, 0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:RRATe:AVERage?

Queries the results of the "AVG Rend Rate" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:

<Current> Current test result.
Default unit: Hz

<Worst> Worst test result within the running test period.
Default unit: Hz

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:RRAT:AVER?`
Query
`2.500000E+001, 2.500000E+001, 0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:RRATe:STDeviation?

Queries the results of the "STD Rend Rate" parameter (video measurement).

Suffix:

<hw> 1
Irrelevant

Return values:

<Current> Current test result.
Default unit: Hz

<Worst> Worst test result within the running test period.
Default unit: Hz

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:RRAT:STD?`
Query
`0.000000E+000, 0.000000E+000, 0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:SIGNal?

Queries the synchronization state of the input signal.

Suffix:

<hw> 1
Irrelevant

Return values:

<Sync> OK | FAIL

Example: `READ:AVDA:LIST:SIGN?`
Query
`OK`
Response

Usage: Query only

Manual operation: See "<General results>" on page 133

READ<hw>[:SCALar]:AVDA:LIST:SSIM?

Queries the results of the "SSIM" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result.

<Worst> Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:SSIM?`
Query
`9.276364E-001, 9.026720E-001, 0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:LIST:VFReeze?

Queries the results of the "Freeze" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> OK | FAIL
Current test result.

<Worst> OK | FAIL
Worst test result within the running test period.

<Fault> Number of detected faults.

Example: `READ:AVDA:LIST:VFR?`
Query
`OK,OK,0`
Response: <Current>,<Worst>,<Fault>

Usage: Query only

Manual operation: See "<Video results>" on page 134

14.3.7.4 READ<hw>[:SCALar]:AVDA:REFerence Subsystem

READ<hw>[:SCALar]:AVDA:REFerence:COMMand:PROGress?

Queries the reference recording progress.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Progress in %

Example: `READ:AVDA:REF:COMM:PROG?`
Query
`84`
Response

Usage: Query only

Manual operation: See "<Progress>" on page 120

READ<hw>[:SCALar]:AVDA:REFerence:COMMand:STATe?

Queries the state of the reference setting.

Suffix:
<hw> 1
Irrelevant

Return values:
<Learning> IDLE | LEARning | LOOPdetected | ACCepted

IDLE
No reference sequence is recorded or loaded.

LEARning
Recording a new reference sequence.

LOOPdetected
Recording is stopped successfully (loop detected).

ACCepted
Recorded reference sequence is accepted.

Example: `READ:AVDA:REF:COMM:STAT?`
Query
`LEAR`
Response

Usage: Query only

READ<hw>[:SCALar]:AVDA:REFerence:INFO:DATE?

Queries the reference record date.

Suffix:
<hw> 1
Irrelevant

Return values:
<RecordDate> String

Example: `READ:AVDA:REF:INFO:DATE?`
Query
`"25.06.2015"`
Response

Usage: Query only

Manual operation: See "Characteristics list" on page 119

READ<hw>[:SCALar]:AVDA:REFerence:INFO:FSIZe?

Queries the reference file size.

Suffix:
<hw> 1
Irrelevant

Return values:
<FileSize> Numeric value
Default unit: MB

Example: `READ:AVDA:REF:INFO:FSIZ?`
Query
`374`
Response

Usage: Query only

Manual operation: See "Characteristics list" on page 119

READ<hw>[:SCALar]:AVDA:REFerence:INFO:LLENgth?

Queries the reference loop length.

Suffix:
<hw> 1
Irrelevant

Return values:
<Loop> Numeric value
Default unit: s

Example: `READ:AVDA:REF:INFO:LLEN?`
Query
`2.100000E+001`
Response

Usage: Query only

Manual operation: See "Characteristics list" on page 119

READ<hw>[:SCALar]:AVDA:REFerence:INFO:NFRames?

Queries the number of frames in the reference.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AVDA:REF:INFO:NFR?`
Query
`630`
Response

Usage: Query only

Manual operation: See "Characteristics list" on page 119

READ<hw>[:SCALar]:AVDA:REFerence:INFO:NOTE?

Queries reference note.

Suffix:
<hw> 1
Irrelevant

Return values:
<Content> String

Example: `READ:AVDA:REF:INFO:NOTE?`
Query
`"---"`
Response

Usage: Query only

Manual operation: See "Characteristics list" on page 119

READ<hw>[:SCALar]:AVDA:REFerence:INFO:RESolution?

Queries the reference video resolution.

Suffix:
<hw> 1
Irrelevant

Return values:
<Video> String

Example: `READ:AVDA:REF:INFO:RES?`
Query
`"0x0"`
Response

Usage: Query only

Manual operation: See "Characteristics list" on page 119

READ<hw>[:SCALar]:AVDA:REFerence:INFO:TIME?

Queries the reference record time.

Suffix:
<hw> 1
Irrelevant

Return values:
<RecordTime> String

Example: `READ:AVDA:REF:INFO:TIME?`
Query
`"17:31"`
Response

Usage: Query only

Manual operation: See "Characteristics list" on page 119

14.3.7.5 READ<hw>[:SCALar]:AVDA:RINPut Subsystem

READ<hw>[:SCALar]:AVDA:RINPut:ARATio?

Queries the aspect ratio of the reference signal. See `READ<hw>[:SCALar]:AVDA:INPut:ARATio?` on page 563.

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:AUDio:CH:COUNt?

Queries the number of audio channels of the reference signal. See `READ<hw>[:SCALar]:AVDA:INPut:AUDio:CH:COUNt?` on page 563.

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:COLor:DEPTh?

Queries the color depth of the reference signal. See `READ<hw>[:SCALar]:AVDA:INPut:COLor:DEPTh?` on page 563.

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:COMMent?

Queries the comment of the reference.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Available if provided by the reference file.

Example: `READ:AVDA:RINP:COMM?`
Query
`"Sequence of car in a tunnel"`
Response

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:COMPonent:FORMat?

Queries the color model of the reference signal. See `READ<hw>[:SCALar]:AVDA:INPut:COMPonent:FORMat?` on page 564.

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:COMPonent:SAMPling?

Queries the component sampling of the reference signal. See `READ<hw>[:SCALar]:AVDA:INPut:COMPonent:SAMPling?` on page 564.

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:FILE?

Queries the name of the reference file.

Suffix:
<hw> 1
Irrelevant

Return values:
<Name> Filename including the extension.

Example:
```
READ:AVDA:RINP:FILE?
```
Query
```
"tunnel car allfr.avr"
```
Response

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:FILE:TIME?

Queries the date and time of the reference file.

Suffix:
<hw> 1
Irrelevant

Return values:
<Date> dd.mm.yyyy

<Time> hh:mm

Example:
```
READ:AVDA:RINP:FILE:TIME?
```
Query
```
"25.06.2015","17:31"
```
Response

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:FITNess:AVDelay?

Queries the AV delay fitness of the reference.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> ACCeptable | EXCellent

Example: `READ:AVDA:RINP:FITN?`
Query
`EXC`
Response

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:FITNess:VSYNc?

Queries the video synchronization fitness of the reference.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> ACCeptable | EXCellent

Example: `READ:AVDA:RINP:FITN:VSYN?`
Query
`ACC`
Response

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:FRAMe:COUNt?

Queries the number of frames in the reference signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AVDA:RINP:FRAM:COUN?`
Query
`630`
Response

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:FRAMe:RATE?

Queries frame rate of the reference signal. See `READ<hw>[:SCALar]:AVDA:INPut:FRAMe:RATE?` on page 565.

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:LOOP:COUNt?

Queries the loop length of the reference signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value
Default unit: s

Example: `READ:AVDA:RINP:LOOP:COUN?`
Query
`2.100000E+001`
Response

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:RESolution?

Queries the resolution of the reference signal. See `READ<hw>[:SCALar]:AVDA:INPut:RESolution?` on page 565.

Usage: Query only

Manual operation: See "Reference column" on page 131

READ<hw>[:SCALar]:AVDA:RINPut:SYNC[:STATe]?

Queries the synchronization state of the reference signal. See `READ<hw>[:SCALar]:AVDA:INPut:SYNC[:STATe]?` on page 565.

Usage: Query only

Manual operation: See "Reference column" on page 131

14.3.7.6 READ<hw>[:SCALar]:AVDA:TTVideo Subsystem

READ<hw>[:SCALar]:AVDA:TTVideo:COUNter?

Queries the counter that is incremented at each trigger event to indicate that the measured value was updated.

This result is for remote operation only and not available on the user interface.

Suffix:
<hw> 1
Irrelevant

Return values:
<Counter> Number of detected faults in the current counter loop. After reaching 127, the counter restarts at 0.
Range: 0 to 127

Example: `READ:AVDA:TTV:COUN?`
Query
`17`
Response

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:TTVideo:STATe?

Queries a flag indicating that at least one valid measurement has been detected after clearing the measurement results.

This result is for remote operation only and not available on the user interface.

Suffix:
<hw> 1
Irrelevant

Return values:
<State> **0**
No valid measurement
1
At least one valid measurement

Example: READ:AVDA:TTV:STAT?
Query
1
Response

Usage: Query only

Manual operation: See "<Video results>" on page 134

READ<hw>[:SCALar]:AVDA:TTVideo:VALue?

Queries the results of the "Latency" parameter (video measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> Current test result
Default unit: ms

Example: READ:AVDA:TTV:VAL?
Query
-225
Response

Usage: Query only

Manual operation: See "<Video results>" on page 134

14.3.8 ROUTe Subsystem

Table 14-2: Addressing input types

<Input type>	Description	Required option
Composite	Composite input signal	Analog A/V RX module (R&S VT-B2370)
Component	Component input signal	Analog A/V RX module (R&S VT-B2370)
HDMI	HDMI input signal	HDMI RX 225 MHz module (R&S VT-B2360) HDMI RX 300 MHz module (R&S VT-B2361)
HDMI 600MHz	HDMI input signal	HDMI RX/TX 600 MHz module (R&S VT-B2363)
MHL	Mobile high definition link audio signals up to v1.2	MHL RX/TX module (R&S VT-B2350)
MHL PkdPx	Mobile high definition link audio signals up to v2.0	MHL RX PackedPixel module (R&S VT-B2351)

ROUTe<hw>:AVDA <Enable>

Enables or disables the external synchronization for a component input signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `ROUT:AVDA ON`

Manual operation: See "External Sync." on page 130

ROUTe<hw>:AVDA:MODule:CATalog?

Queries the available input types and the slot position of the corresponding module.

Suffix:
<hw> 1
Irrelevant

Return values:
<Input> "<input type> [<module slot>], <input type> [<module slot>], ..."
with <input type> see Table 14-2
and [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:AVDA:MOD:CAT?`
Query
`"HDMI 600MHz [L1], Composite [L3], Component [L3], HDMI [R1], MHL [R3]"`
Response

Usage: Query only

Manual operation: See "Input" on page 129

ROUTe<hw>:AVDA:MODule:SELect <Input>

Sets the input signal.

To determine the available input types, use `ROUTe<hw>:AVDA:MODule:CATalog?` on page 589.

Suffix:
<hw> 1
Irrelevant

Parameters:

<Input> "<input type> [<module slot>]"
with <input type> see Table 14-2
and [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:AVDA:MOD:SEL "Component [L3]"`
Selects the composite input signal, slot 3.

Manual operation: See "Input" on page 129

14.4 Video Analyzer Application

These commands correlate to the functions provided in Chapter 8, "Video Analyzer Application", on page 140.

Many remote commands of the video analyzer application are addressed to a certain video parameter or test signal by using parameters.

Example:

```
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:TSIGnal[?]
<ParameterName>,<TestSignalName>
```

The parameters differ depending on the input signal, parameter group and video standard. For selecting the input signal use `ROUTe<hw>:VIDeo:MODule:SELect` on page 678.

14.4.1 Parameters for Composite Input Signals

The parameters are listed in the measurement results table, see "<Measurement results table>" on page 155.

The `<ParameterName>` depends on the parameter group and video standard. For each parameter group and video standard, an individual remote command is provided. The description of the remote commands is grouped by subsystems.

14.4.1.1 Amplitude and Delay (Composite Input Signal)

Table 14-3: BG/PAL and M/NTSC parameters

Parameter	<ParameterName> **BG/PAL | M/NTSC**	**Unit** **BG/PAL | M/NTSC**	**Limit range** **BG/PAL | M/NTSC**
Luminance Bar Amplitude (abs)	LBAA | LBAI	mV | IRE	0.0 to 1400.0 | 0.0 to 200.0
Luminance Bar Amplitude (nom)	LBAR	%	-100.0 to 100.0
Sync Amplitude (abs)	SAA | SAI	mV | IRE	60.0 to 600.0 | 10.0 to 80.0
Sync Amplitude (nom)	SARN	%	-80.0 to 100.0
Sync Amplitude (bar)	SARB	%	-50.0 to 50.0
Burst Amplitude (abs)	BAA | BAI	mV | IRE	60.0 to 600.0 | 10.0 to 80.0
Burst Amplitude (nom)	BARN	%	-80.0 to 100.0
Burst Amplitude (bar)	BARB	%	-50.0 to 50.0
C/L Gain (pulse)	CLGP	%	-50.0 to 50.0
C/L Gain 100 (pulse)	CLP1	%	50.0 to 150.0
C/L Delay (pulse)	CLDP	ns	-500.0 to 500.0
C/L Gain (bar)	CLGB	%	-50.0 to 50.0
C/L Gain 100 (bar)	CLB1	%	50.0 to 150.0
DC Level	DCL	mV	-2000.0 to 2000.0

14.4.1.2 Linear Distortions (Composite Input Signal)

Table 14-4: BG/PAL and M/NTSC parameters

Parameter	<ParameterName>	**Unit**	**Limit range** **BG/PAL | M/NTSC**
Baseline Distortion	BD	%	-40.0 to 40.0
2T Pulse Amplitude	TTPA	%	-50.0 to 50.0
2T Pulse k-Faktor	TTPK	%	-1.0 to 10.0
2T Pulse Half Ampl Dur	TTPHad	ns	100.0 to 400.0

Parameter	<ParameterName>	Unit	Limit range BG/PAL | M/NTSC
2T Pulse KPB	TTKPb	%	-1.0 to 10.0 | -50.0 to 50.0
Tilt	TILT	%	-40.0 to 40.0
ST Dist Rising Edge	STME	%	-40.0 to 40.0
ST Dist Falling Edge	STRE	%	-40.0 to 40.0
ST Dist Max Edge	STFE	%	-40.0 to 40.0
ST Dist Rise Time	STRT	ns	10.0 to 1000.0
ST Dist Fall Time	STFT	ns	10.0 to 1000.0
Line Time Dist	LTD	%	-40.0 to 40.0
Field Time Dist	FTD	%	-40.0 to 40.0

14.4.1.3 Nonlinear Distortions (Composite Input Signal)

Table 14-5: BG/PAL and M/NTSC parameters

Parameter	<ParameterName>	Unit	Limit range
C NL Gain pos	GPOScnl	%	-1.0 to 50.0
C NL Gain neg	GNEGcnl	%	-50.0 to 1.0
C NL Gain pp	GPPCnl	%	-1.0 to 100.0
C NL Gain S1	GS1Cnl	%	-50.0 to 50.0
C NL Gain S2	GS2Cnl	%	-50.0 to 50.0
C NL Gain S3	GS3Cnl	%	-50.0 to 50.0
C NL Phase pos	PPOScnl	deg	-1.0 to 50.0
C NL Phase neg	PNEGcnl	deg	-50.0 to 1.0
C NL Phase pp	PPPCnl	deg	-1.0 to 100.0
C NL Phase S1	PS1Cnl	deg	-50.0 to 50.0
C NL Phase S2	PS2Cnl	deg	-50.0 to 50.0
C NL Phase S3	PS3Cnl	deg	-50.0 to 50.0
C/L Intermod (pulse)	CLIP	%	-50.0 to 50.0
C/L Intermod Step1 (bar)	CLI1step	%	-50.0 to 50.0
C/L Intermod Step2 (bar)	CLI2step	%	-50.0 to 50.0
C/L Intermod Step3 (bar)	CLI3step	%	-50.0 to 50.0
Lum NL	LNL	%	-1.0 to 50.0
Lum NL Step1	LNL1step	%	50.0 to 100.0
Lum NL Step2	LNL2step	%	50.0 to 100.0

Parameter	<ParameterName>	Unit	Limit range
Lum NL Step3	LNL3step	%	50.0 to 100.0
Lum NL Step4	LNL4step	%	50.0 to 100.0
Lum NL Step5	LNL5step	%	50.0 to 100.0
Diff Gain ref	DGRef	%	-50.0 to 50.0
Diff Gain pos	DGPos	%	-1.0 to 50.0
Diff Gain neg	DGNeg	%	-50.0 to 1.0
Diff Gain pp	DGPP	%	-1.0 to 100.0
Diff Gain Step1	DG1Step	%	-50.0 to 50.0
Diff Gain Step2	DG2Step	%	-50.0 to 50.0
Diff Gain Step3	DG3Step	%	-50.0 to 50.0
Diff Gain Step4	DG4Step	%	-50.0 to 50.0
Diff Gain Step5	DG5Step	%	-50.0 to 50.0
Diff Phase pos	DPPos	deg	-1.0 to 50.0
Diff Phase neg	DPNeg	deg	-50.0 to 1.0
Diff Phase pp	DPPP	deg	-100.0 to 100.0
Diff Phase Step1	DP1Step	deg	-50.0 to 50.0
Diff Phase Step2	DP2Step	deg	-50.0 to 50.0
Diff Phase Step3	DP3Step	deg	-50.0 to 50.0
Diff Phase Step4	DP4Step	deg	-50.0 to 50.0
Diff Phase Step5	DP5Step	deg	-50.0 to 50.0

14.4.1.4 Frequency Response (Composite Input Signal)

Table 14-6: BG/PAL parameters

Parameter	<ParameterName>	Unit	Limit range
Multiburst Flag (abs)	MABS	mV	0.0 to 1000.0
Multiburst Flag (nom)	MRN	%	-100.0 to 50.0
Multiburst Flag (bar)	MRB	%	-100.0 to 50.0
Multiburst 0.5 (%)	M05Pct	%	-100.0 to 50.0
Multiburst 1.0 (%)	M10Pct	%	-100.0 to 50.0
Multiburst 2.0 (%)	M20Pct	%	-100.0 to 50.0
Multiburst 4.0 (%)	M40Pct	%	-100.0 to 50.0
Multiburst 4.8 (%)	M48Pct	%	-100.0 to 50.0
Multiburst 5.8 (%)	M58Pct	%	-100.0 to 50.0

Parameter	<ParameterName>	Unit	Limit range
Multiburst 0.5 (dB)	M05Db	dB	-40.0 to 6.0
Multiburst 1.0 (dB)	M10Db	dB	-40.0 to 6.0
Multiburst 2.0 (dB)	M20Db	dB	-40.0 to 6.0
Multiburst 4.0 (dB)	M40Db	dB	-40.0 to 6.0
Multiburst 4.8 (dB)	M48Db	dB	-40.0 to 6.0
Multiburst 5.8 (dB)	M58Db	dB	-40.0 to 6.0

Table 14-7: M/NTSC parameters

Parameter	<ParameterName>	Unit	Limit range
Multiburst NTC7 Flag (abs)	TIRE	IRE	0.0 to 140.0
Multiburst NTC7 Flag (nom)	TRN	%	-100.0 to 50.0
Multiburst NTC7 Flag (bar)	TRB	%	-100.0 to 50.0
Multiburst NTC7 0.5 (%)	T05Pct	%	-100.0 to 50.0
Multiburst NTC7 1.0 (%)	T10Pct	%	-100.0 to 50.0
Multiburst NTC7 2.0 (%)	T20Pct	%	-100.0 to 50.0
Multiburst NTC7 3.0 (%)	T30Pct	%	-100.0 to 50.0
Multiburst NTC7 3.58 (%)	T35Pct	%	-100.0 to 50.0
Multiburst NTC7 4.2 (%)	T42Pct	%	-100.0 to 50.0
Multiburst NTC7 0.5 (dB)	T05Db	dB	-40.0 to 6.0
Multiburst NTC7 1.0 (dB)	T10Db	dB	-40.0 to 6.0
Multiburst NTC7 2.0 (dB)	T20Db	dB	-40.0 to 6.0
Multiburst NTC7 3.0 (dB)	T30Db	dB	-40.0 to 6.0
Multiburst NTC7 3.58 (dB)	T35Db	dB	-40.0 to 6.0
Multiburst NTC7 4.2 (dB)	T42Db	dB	-40.0 to 6.0
Multiburst FCC Flag (abs)	FIRE	IRE	0.0 to 140.0
Multiburst FCC Flag (nom)	FRN	%	-100.0 to 50.0
Multiburst FCC Flag (bar)	FRB	%	-100.0 to 50.0
Multiburst FCC 0.5 (%)	F05Pct	%	-100.0 to 50.0
Multiburst FCC 1.25 (%)	F12Pct	%	-100.0 to 50.0
Multiburst FCC 2.0 (%)	F20Pct	%	-100.0 to 50.0
Multiburst FCC 3.0 (%)	F30Pct	%	-100.0 to 50.0
Multiburst FCC 3.58 (%)	F35Pct	%	-100.0 to 50.0
Multiburst FCC 4.1 (%)	F41Pct	%	-100.0 to 50.0
Multiburst FCC 0.5 (dB)	F05Db	dB	-40.0 to 6.0

Parameter	<ParameterName>	Unit	Limit range
Multiburst FCC 1.25 (dB)	F12Db	dB	-40.0 to 6.0
Multiburst FCC 2.0 (dB)	F20Db	dB	-40.0 to 6.0
Multiburst FCC 3.0 (dB)	F30Db	dB	-40.0 to 6.0
Multiburst FCC 3.58 (dB)	F35Db	dB	-40.0 to 6.0
Multiburst FCC 4.1 (dB)	F41Db	dB	-40.0 to 6.0

Table 14-8: BG/PAL and M/NTSC parameters

Parameter	<ParameterName>	Unit	Limit range
Sin x/x Amplitude pos	SXAPos	dB	-100.0 to 100.0
Sin x/x Amplitude neg	SXANeg	dB	-100.0 to 100.0
Sin x/x Group Delay pos	SXGPos	ns	-1000.0 to 1000.0
Sin x/x Group Delay neg	SXGNeg	ns	-1000.0 to 1000.0

14.4.1.5 Noise (Composite Input Signal)

Table 14-9: BG/PAL and M/NTSC parameters

Parameter	<ParameterName> BG/PAL | M/NTSC	Unit BG/PAL | M/NTSC	Limit range BG/PAL | M/NTSC
Lum Noise unw (abs)	LNUabs | LNUI	mV | IRE	-1.0 to 50.0 | -1.0 to 8.0
Lum Noise unw (nom)	LNUNom	dB	25.0 to 1000.0
Lum Noise unw (bar)	LNUBar	dB	25.0 to 1000.0
Lum Noise lumw (abs)	LNLabs | LNLI	mV | IRE	-1.0 to 50.0 | -1.0 to 8.0
Lum Noise lumw (nom)	LNLNom	dB	25.0 to 1000.0
Lum Noise lumw (bar)	LNLBar	dB	25.0 to 1000.0
C/SND Intermod (abs)	CSIabs | CSII	mV | IRE	-1.0 to 50.0 | -1.0 to 8.0
C/SND Intermod (nom)	CSINom	dB	30.0 to 1000.0
C/SND Intermod (bar)	CSIBar	dB	30.0 to 1000.0
Chroma Noise AM	AMNoise	dB	25.0 to 55.0
Chroma Noise PM	PMNoise	dB	25.0 to 55.0

Table 14-10: BG/PAL parameters

Parameter	<ParameterName>	Unit	Limit range
Lum Noise chrw (abs)	LNCabs	mV	-1.0 to 50.0
Lum Noise chrw (nom)	LNCNom	dB	25.0 to 1000.0
Lum Noise chrw (bar)	LNCBar	dB	25.0 to 1000.0

Parameter	<ParameterName>	Unit	Limit range
SND/SND Intermod (abs)	SSIabs	mV	-1.0 to 50.0
SND/SND Intermod (nom)	SSINom	dB	30.0 to 1000.0
SND/SND Intermod (bar)	SSIBar	dB	30.0 to 1000.0

14.4.1.6 Timing (Composite Input Signal)

Table 14-11: BG/PAL and M/NTSC parameters

Parameter	<ParameterName>	Unit	Limit range BG/PAL | M/NTSC
Field Period First Field	FPFirst	us	19970.0 to 20030.0 | 16653.0 to 16713.0
Field Period Second Field	FPSecond	us	19970.0 to 20030.0 | 16653.0 to 16713.0
Field Period Full Field	FPFField	us	39940.0 to 40060.0 | 33316.0 to 33416.0
Equalizing Pulse Duration	FPDE	us	1.35 to 3.35
Serration Pulse Duration	FPDS	us	2.7 to 6.7
Line Period us	LP	us	60.0 to 68.0
Line Blanking (nom)	LBNom	us	7.0 to 65.0
Line Blanking (bar)	LBBar	us	7.0 to 65.0
Sync Duration	LSD	us	2.7 to 6.7
Sync Slope neg	LSFT	ns	10.0 to 1000.0 | 70.0 to 1000.0
Sync Slope pos	LSRT	ns	10.0 to 1000.0 | 70.0 to 1000.0
Burst Position	BTP	us	4.7 to 6.0
Burst Duration	BTD	us	1.5 to 3.0
Lum Bar Duration	LBDuration	us	5.0 to 15.0 | 10.0 to 26.0
SC/H Phase Line	SHLine	deg	-90.0 to 90.0
SC/H Phase average	SHAVerage	deg	-90.0 to 90.0
SC/H Phase pos peak	SHPos	deg	-90.0 to 90.0
SC/H Phase neg peak	SHNeg	deg	-90.0 to 90.0
SC/H Phase pp	SHPP	deg	-90.0 to 90.0 | -1.0 to 180.0
SC Frequency	SCF	Hz	4433518.75 to 4433718.75 | 3579445.0 to 3579645.0

Table 14-12: BG/PAL parameters

Parameter	<ParameterName>	Unit	Limit range
PAL Phase Line	PPLine	deg	0.0 to 180.0
PAL Phase average	PPAVerage	deg	0.0 to 180.0
PAL Phase pos peak	PPPos	deg	0.0 to 180.0
PAL Phase neg peak	PPNeg	deg	0.0 to 180.0
PAL Phase pp	PPPP	deg	-1.0 to 180.0

14.4.1.7 Jitter (Composite Input Signal)

Table 14-13: BG/PAL and M/NTSC parameters

Parameter	<ParameterName>	Unit	Limit range
Field Jitter pos peak	FJPos	ns	-1000.0 to 30000.0
Field Jitter neg peak	FJNeg	ns	-30000.0 to 1000.0
Field Jitter pp	FJPP	ns	-1000.0 to 30000.0
Field Jitter Std. Deviation	FJSD	ns	-1000.0 to 30000.0
Line Jitter pos peak	LJPos	ns	-1.0 to 4000.0
Line Jitter neg peak	LJNeg	ns	-4000.0 to 0.0
Line Jitter pp	LJPP	ns	-1.0 to 4000.0
Line Jitter Std. Deviation	LJSD	ns	-1.0 to 4000.0

14.4.1.8 Video Data (Composite Input Signal)

Table 14-14: BG/PAL and M/NTSC parameters

Parameter	<ParameterName> BG/PAL | M/NTSC	Unit BG/PAL | M/NTSC	Limit range BG/PAL | M/NTSC
Vtxt Basic Amplitude (abs)	VBAA | VBAI	mV | IRE	0.0 to 1400.0 | 0.0 to 200.0
Vtxt Basic Amplitude (nom)	VBAN	%	-100.0 to 100.0
Vtxt Basic Amplitude (bar)	VBAB	%	-100.0 to 100.0
Vtxt Decoding Margin	VDM	%	0.0 to 100.0
Vtxt Timing Margin	VTM	%	0.0 to 100.0
Vtxt Data Timing	VDT	us	10.0 to 14.0 | 9.0 to 15.0
Vtxt Run-in bits	VRIBits	-	6.0 to 24.0
Vtxt Error Rate	VERR	dB	-1000.0 to +100.0

14.4.2 Parameters for Component, HDMI, MHL Input Signal

The parameters are listed in the measurement results table, see "<Measurement results table>" on page 155.

The <ParameterName> depends on the parameter group and video standard. For each parameter group and video standard, an individual remote command is provided. The description of the remote commands is grouped by subsystems.

Each parameter name contains a channel number that characterizes one of the 3 channels of an analog or digital component video signal. See Table 14-15.

Table 14-15: Available channel numbers (component, HDMI, MHL input signal)

Channel number	RGB Digital or analog video	YCbCr Digital video	YPbPr Analog video
C1	G green	Y luminance	Y luminance
C2	B blue	Cb color difference (Y-B)	Pb color difference (Y-B)
C3	R red	Cr color difference (Y-R)	Pr color difference (Y-R)

14.4.2.1 Amplitude and Delay (Component, HDMI, MHL Input Signal)

Parameter		<ParameterName>	Unit	Limit range RGB | YPbPr/YCbCr
Component RGB	Component YPbPr/YCbCr			
Lum Bar Amplitude G (abs)	Lum Bar Amplitude Y (abs)	LBAAC1	mV	0.0 to 1400.0
Lum Bar Amplitude B (abs)	Lum Bar Amplitude Cb/Pb (abs)	LBAAC2	mV	0.0 to 1400.0
Lum Bar Amplitude R (abs)	Lum Bar Amplitude Cr/Pr (abs)	LBAAC3	mV	0.0 to 1400.0
Lum Bar Amplitude G (nom)	Lum Bar Amplitude Y (nom)	LBANC1	%	-99.0 to 100.0
Lum Bar Amplitude B (nom)	Lum Bar Amplitude Cb/Pb (nom)	LBANC2	%	-99.0 to 100.0
Lum Bar Amplitude R (nom)	Lum Bar Amplitude Cr/Pr (nom)	LBANC3	%	-99.0 to 100.0
Sync Amplitude G (abs) Only available for "Component" input	Sync Amplitude Y (abs) Only available for "Component" input	SAAC1	mV	0.0 to 1400.0
Sync Amplitude G (nom) Only available for "Component" input	Sync Amplitude Y (nom) Only available for "Component" input	SANC1	%	-99.0 to 100.0
Color Bar Ampl. White G	Color Bar Ampl. White Y	CBAWC1	mV	-700.0 to 700.0 | -700.0 to 1400.0

Parameter		<Parameter Name>	Unit	Limit range RGB | YPbPr/YCbCr
Component RGB	**Component YPbPr/YCbCr**			
Color Bar Ampl. White B	Color Bar Ampl. White Cb/Pb	CBAWC2	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. White R	Color Bar Ampl. White Cr/Pr	CBAWC3	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Yellow G	Color Bar Ampl. Yellow Y	CBAYC1	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Yellow B	Color Bar Ampl. Yellow Cb/Pb	CBAYC2	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Yellow R	Color Bar Ampl. Yellow Cr/Pr	CBAYC3	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Cyan G	Color Bar Ampl. Cyan Y	CBACC1	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Cyan B	Color Bar Ampl. Cyan Cb/Pb	CBACC2	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Cyan R	Color Bar Ampl. Cyan Cr/Pr	CBACC3	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Green G	Color Bar Ampl. Green Y	CBAGC1	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Green B	Color Bar Ampl. Green Cb/Pb	CBAGC2	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Green R	Color Bar Ampl. Green Cr/Pr	CBAGC3	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Magenta G	Color Bar Ampl. Magenta Y	CBAMC1	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Magenta B	Color Bar Ampl. Magenta Cb/Pb	CBAMC2	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Magenta R	Color Bar Ampl. Magenta Cr/Pr	CBAMC3	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Red G	Color Bar Ampl. Red Y	CBARC1	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Red B	Color Bar Ampl. Red Cb/Pb	CBARC2	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Red R	Color Bar Ampl. Red Cr/Pr	CBARC3	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Blue G	Color Bar Ampl. Blue Y	CBABC1	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Blue B	Color Bar Ampl. Blue Cb/Pb	CBABC2	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Blue R	Color Bar Ampl. Blue Cr/Pr	CBABC3	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Black G	Color Bar Ampl. Black Y	CBAAC1	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Black B	Color Bar Ampl. Black Cb/Pb	CBAAC2	mV	-700.0 to 700.0 | -700.0 to 1400.0
Color Bar Ampl. Black R	Color Bar Ampl. Black Cr/Pr	CBAAC3	mV	-700.0 to 700.0 | -700.0 to 1400.0
Inter Channel Delay (G - B)	Inter Channel Delay (Y - Cb/Pb)	IDC1C2	ns	-1000.0 to 1000.0
Inter Channel Delay (G - R)	Inter Channel Delay (Y - Cr/Pr)	IDC1C3	ns	-1000.0 to 1000.0
Inter Channel Delay (B - R)	Inter Channel Delay (Cb/Pb - Cr/Pr)	IDC2C3	ns	-1000.0 to 1000.0
Inter Channel Ampl. (G - B)	Inter Channel Ampl. (Y - Cb/Pb)	IAC1C2	%	-100.0 to 100.0
Inter Channel Ampl. (G - R)	Inter Channel Ampl. (Y - Cr/Pr)	IAC1C3	%	-100.0 to 100.0
Inter Channel Ampl. (B - R)	Inter Channel Ampl. (Cb/Pb - Cr/Pr)	IAC2C3	%	-100.0 to 100.0

14.4.2.2 Linear Distortions (Component, HDMI, MHL Input Signal)

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
2T Pulse Amplitude G	2T Pulse Amplitude Y	TTPAC1	%	-100.0 to 100.0
2T Pulse Amplitude B	2T Pulse Amplitude Cb/Pb	TTPAC2	%	-100.0 to 100.0
2T Pulse Amplitude R	2T Pulse Amplitude Cr/Pr	TTPAC3	%	-100.0 to 100.0
2T Pulse k-Faktor G	2T Pulse k-Faktor Y	TTPKC1	%	-1.0 to 100.0
2T Pulse k-Faktor B	2T Pulse k-Faktor Cb/Pb	TTPKC2	%	-1.0 to 100.0
2T Pulse k-Faktor R	2T Pulse k-Faktor Cr/Pr	TTPKC3	%	-1.0 to 100.0
2T Pulse HAD G	2T Pulse HAD Y	TTPHadC1	ns	0.0 to 1000.0
2T Pulse HAD B	2T Pulse HAD Cb/Pb	TTPHadC2	ns	0.0 to 1000.0
2T Pulse HAD R	2T Pulse HAD Cr/Pr	TTPHadC3	ns	0.0 to 1000.0
ST Dist Rise Time G	ST Dist Rise Time Y	STRTC1	ns	0.0 to 1000.0
ST Dist Rise Time B	ST Dist Rise Time Cb/Pb	STRTC2	ns	0.0 to 1000.0
ST Dist Rise Time R	ST Dist Rise Time Cr/Pr	STRTC3	ns	0.0 to 1000.0
ST Dist Fall Time G	ST Dist Fall Time Y	STFTC1	ns	0.0 to 1000.0
ST Dist Fall Time B	ST Dist Fall Time Cb/Pb	STFTC2	ns	0.0 to 1000.0
ST Dist Fall Time R	ST Dist Fall Time Cr/Pr	STFTC3	ns	0.0 to 1000.0
ST Dist Rise Preshoot G	ST Dist Rise Preshoot Y	STRPC1	%	0.0 to 100.0
ST Dist Rise Preshoot B	ST Dist Rise Preshoot Cb/Pb	STRPC2	%	0.0 to 100.0
ST Dist Rise Preshoot R	ST Dist Rise Preshoot Cr/Pr	STRPC3	%	0.0 to 100.0
ST Dist Fall Preshoot G	ST Dist Fall Preshoot Y	STFPC1	%	0.0 to 100.0
ST Dist Fall Preshoot B	ST Dist Fall Preshoot Cb/Pb	STFPC2	%	0.0 to 100.0
ST Dist Fall Preshoot R	ST Dist Fall Preshoot Cr/Pr	STFPC3	%	0.0 to 100.0
ST Dist Rise Overshoot G	ST Dist Rise Overshoot Y	STROC1	%	0.0 to 100.0
ST Dist Rise Overshoot B	ST Dist Rise Overshoot Cb/Pb	STROC2	%	0.0 to 100.0
ST Dist Rise Overshoot R	ST Dist Rise Overshoot Cr/Pr	STROC3	%	0.0 to 100.0
ST Dist Fall Overshoot G	ST Dist Fall Overshoot Y	STFOC1	%	0.0 to 100.0
ST Dist Fall Overshoot B	ST Dist Fall Overshoot Cb/Pb	STFOC2	%	0.0 to 100.0
ST Dist Fall Overshoot R	ST Dist Fall Overshoot Cr/Pr	STFOC3	%	0.0 to 100.0

14.4.2.3 Nonlinear Distortions (Component, HDMI, MHL Input Signal)

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
Nonlinearity G	Nonlinearity Y	NLC1	%	-1.0 to 50.0
Nonlinearity B	Nonlinearity Cb/Pb	NLC2	%	-1.0 to 50.0
Nonlinearity R	Nonlinearity Cr/Pr	NLC3	%	-1.0 to 50.0
Nonlinearity Step1 G	Nonlinearity Step1 Y	NL1stepC1	%	50.0 to 100.0
Nonlinearity Step1 B	Nonlinearity Step1 Cb/Pb	NL1stepC2	%	50.0 to 100.0
Nonlinearity Step1 R	Nonlinearity Step1 Cr/Pr	NL1stepC3	%	50.0 to 100.0
Nonlinearity Step2 G	Nonlinearity Step2 Y	NL2stepC1	%	50.0 to 100.0
Nonlinearity Step2 B	Nonlinearity Step2 Cb/Pb	NL2stepC2	%	50.0 to 100.0
Nonlinearity Step2 R	Nonlinearity Step2 Cr/Pr	NL2stepC3	%	50.0 to 100.0
Nonlinearity Step3 G	Nonlinearity Step3 Y	NL3stepC1	%	50.0 to 100.0
Nonlinearity Step3 B	Nonlinearity Step3 Cb/Pb	NL3stepC2	%	50.0 to 100.0
Nonlinearity Step3 R	Nonlinearity Step3 Cr/Pr	NL3stepC3	%	50.0 to 100.0
Nonlinearity Step4 G	Nonlinearity Step4 Y	NL4stepC1	%	50.0 to 100.0
Nonlinearity Step4 B	Nonlinearity Step4 Cb/Pb	NL4stepC2	%	50.0 to 100.0
Nonlinearity Step4 R	Nonlinearity Step4 Cr/Pr	NL4stepC3	%	50.0 to 100.0
Nonlinearity Step5 G	Nonlinearity Step5 Y	NL5stepC1	%	50.0 to 100.0
Nonlinearity Step5 B	Nonlinearity Step5 Cb/Pb	NL5stepC2	%	50.0 to 100.0
Nonlinearity Step5 R	Nonlinearity Step5 Cr/Pr	NL5stepC3	%	50.0 to 100.0

14.4.2.4 Frequency Response (Component, HDMI, MHL Input Signal)

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
Sin x/x Amplitude pos G	Sin x/x Amplitude pos Y	SXAposC1	dB	-100.0 to 100.0
Sin x/x Amplitude pos B	Sin x/x Amplitude pos Cb/Pb	SXAposC2	dB	-100.0 to 100.0
Sin x/x Amplitude pos R	Sin x/x Amplitude pos Cr/Pr	SXAposC3	dB	-100.0 to 100.0
Sin x/x Amplitude neg G	Sin x/x Amplitude neg Y	SXAnegC1	dB	-100.0 to 100.0
Sin x/x Amplitude neg B	Sin x/x Amplitude neg Cb/Pb	SXAnegC2	dB	-100.0 to 100.0
Sin x/x Amplitude neg R	Sin x/x Amplitude neg Cr/Pr	SXAnegC3	dB	-100.0 to 100.0
Sin x/x Group Delay pos G	Sin x/x Group Delay pos Y	SXGposC1	ns	-1000.0 to 1000.0
Sin x/x Group Delay pos B	Sin x/x Group Delay pos Cb/Pb	SXGposC2	ns	-1000.0 to 1000.0

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
Sin x/x Group Delay pos R	Sin x/x Group Delay pos Cr/Pr	SXGposC3	ns	-1000.0 to 1000.0
Sin x/x Group Delay neg G	Sin x/x Group Delay neg Y	SXGnegC1	ns	-1000.0 to 1000.0
Sin x/x Group Delay neg B	Sin x/x Group Delay neg Cb/Pb	SXGnegC2	ns	-1000.0 to 1000.0
Sin x/x Group Delay neg R	Sin x/x Group Delay neg Cr/Pr	SXGnegC3	ns	-1000.0 to 1000.0
Sweep Amplitude pos G	Sweep Amplitude pos Y	SWEEPposC1	dB	-100.0 to 100.0
Sweep Amplitude pos B	Sweep Amplitude pos Cb/Pb	SWEEPposC2	dB	-100.0 to 100.0
Sweep Amplitude pos R	Sweep Amplitude pos Cr/Pr	SWEEPposC3	dB	-100.0 to 100.0
Sweep Amplitude neg G	Sweep Amplitude neg Y	SWEEPnegC1	dB	-100.0 to 100.0
Sweep Amplitude neg B	Sweep Amplitude neg Cb/Pb	SWEEPnegC2	dB	-100.0 to 100.0
Sweep Amplitude neg R	Sweep Amplitude neg Cr/Pr	SWEEPnegC3	dB	-100.0 to 100.0
Multiburst Flag G (abs)	Multiburst Flag Y (abs)	MABSC1	mV	0.0 to 1400.0
Multiburst Flag B (abs)	Multiburst Flag Cb/Pb (abs)	MABSC2	mV	0.0 to 1400.0
Multiburst Flag R (abs)	Multiburst Flag Cr/Pr (abs)	MABSC3	mV	0.0 to 1400.0
Multiburst Flag G (nom)	Multiburst Flag Y (nom)	MRNC1	%	-99.0 to 100.0
Multiburst Flag B (nom)	Multiburst Flag Cb/Pb (nom)	MRNC2	%	-99.0 to 100.0
Multiburst Flag R (nom)	Multiburst Flag Cr/Pr (nom)	MRNC3	%	-99.0 to 100.0
Multiburst 1 Ampl. G (%)	Multiburst 1 Ampl. Y (%)	M1PctC1	%	-100.0 to 50.0
Multiburst 1 Ampl. B (%)	Multiburst 1 Ampl. Cb/Pb (%)	M1PctC2	%	-100.0 to 50.0
Multiburst 1 Ampl. R (%)	Multiburst 1 Ampl. Cr/Pr (%)	M1PctC3	%	-100.0 to 50.0
Multiburst 2 Ampl. G (%)	Multiburst 2 Ampl. Y (%)	M2PctC1	%	-100.0 to 50.0
Multiburst 2 Ampl. B (%)	Multiburst 2 Ampl. Cb/Pb (%)	M2PctC2	%	-100.0 to 50.0
Multiburst 2 Ampl. R (%)	Multiburst 2 Ampl. Cr/Pr (%)	M2PctC3	%	-100.0 to 50.0
Multiburst 3 Ampl. G (%)	Multiburst 3 Ampl. Y (%)	M3PctC1	%	-100.0 to 50.0
Multiburst 3 Ampl. B (%)	Multiburst 3 Ampl. Cb/Pb (%)	M3PctC2	%	-100.0 to 50.0
Multiburst 3 Ampl. R (%)	Multiburst 3 Ampl. Cr/Pr (%)	M3PctC3	%	-100.0 to 50.0
Multiburst 4 Ampl. G (%)	Multiburst 4 Ampl. Y (%)	M4PctC1	%	-100.0 to 50.0
Multiburst 4 Ampl. B (%)	Multiburst 4 Ampl. Cb/Pb (%)	M4PctC2	%	-100.0 to 50.0
Multiburst 4 Ampl. R (%)	Multiburst 4 Ampl. Cr/Pr (%)	M4PctC3	%	-100.0 to 50.0
Multiburst 5 Ampl. G (%)	Multiburst 5 Ampl. Y (%)	M5PctC1	%	-100.0 to 50.0
Multiburst 5 Ampl. B (%)	Multiburst 5 Ampl. Cb/Pb (%)	M5PctC2	%	-100.0 to 50.0
Multiburst 5 Ampl. R (%)	Multiburst 5 Ampl. Cr/Pr (%)	M5PctC3	%	-100.0 to 50.0
Multiburst 6 Ampl. G (%)	Multiburst 6 Ampl. Y (%)	M6PctC1	%	-100.0 to 50.0

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
Multiburst 6 Ampl. B (%)	Multiburst 6 Ampl. Cb/Pb (%)	M6PctC2	%	-100.0 to 50.0
Multiburst 6 Ampl. R (%)	Multiburst 6 Ampl. Cr/Pr (%)	M6PctC3	%	-100.0 to 50.0
Multiburst 1 Ampl. G dB	Multiburst 1 Ampl. Y (dB)	M1DbC1	dB	-100.0 to 6.0
Multiburst 1 Ampl. B (dB)	Multiburst 1 Ampl. Cb/Pb (dB)	M1DbC2	dB	-100.0 to 6.0
Multiburst 1 Ampl. R (dB)	Multiburst 1 Ampl. Cr/Pr (dB)	M1DbC3	dB	-100.0 to 6.0
Multiburst 2 Ampl. G (dB)	Multiburst 2 Ampl. Y (dB)	M2DbC1	dB	-100.0 to 6.0
Multiburst 2 Ampl. B (dB)	Multiburst 2 Ampl. Cb/Pb (dB)	M2DbC2	dB	-100.0 to 6.0
Multiburst 2 Ampl. R (dB)	Multiburst 2 Ampl. Cr/Pr (dB)	M2DbC3	dB	-100.0 to 6.0
Multiburst 3 Ampl. G (dB)	Multiburst 3 Ampl. Y (dB)	M3DbC1	dB	-100.0 to 6.0
Multiburst 3 Ampl. B (dB)	Multiburst 3 Ampl. Cb/Pb (dB)	M3DbC2	dB	-100.0 to 6.0
Multiburst 3 Ampl. R (dB)	Multiburst 3 Ampl. Cr/Pr (dB)	M3DbC3	dB	-100.0 to 6.0
Multiburst 4 Ampl. G (dB)	Multiburst 4 Ampl. Y (dB)	M4DbC1	dB	-100.0 to 6.0
Multiburst 4 Ampl. B (dB)	Multiburst 4 Ampl. Cb/Pb (dB)	M4DbC2	dB	-100.0 to 6.0
Multiburst 4 Ampl. R (dB)	Multiburst 4 Ampl. Cr/Pr (dB)	M4DbC3	dB	-100.0 to 6.0
Multiburst 5 Ampl. G (dB)	Multiburst 5 Ampl. Y (dB)	M5DbC1	dB	-100.0 to 6.0
Multiburst 5 Ampl. B (dB)	Multiburst 5 Ampl. Cb/Pb (dB)	M5DbC2	dB	-100.0 to 6.0
Multiburst 5 Ampl. R (dB)	Multiburst 5 Ampl. Cr/Pr (dB)	M5DbC3	dB	-100.0 to 6.0
Multiburst 6 Ampl. G (dB)	Multiburst 6 Ampl. Y (dB)	M6DbC1	dB	-100.0 to 6.0
Multiburst 6 Ampl. B (dB)	Multiburst 6 Ampl. Cb/Pb (dB)	M6DbC2	dB	-100.0 to 6.0
Multiburst 6 Ampl. R (dB)	Multiburst 6 Ampl. Cr/Pr (dB)	M6DbC3	dB	-100.0 to 6.0
Multiburst 1 Freq. G	Multiburst 1 Freq. Y	M1FRC1	MHz	0.01 to 100.00
Multiburst 1 Freq. B	Multiburst 1 Freq. Cb/Pb	M1FRC2	MHz	0.01 to 100.00
Multiburst 1 Freq. R	Multiburst 1 Freq. Cr/Pr	M1FRC3	MHz	0.01 to 100.00
Multiburst 2 Freq. G	Multiburst 2 Freq. Y	M2FRC1	MHz	0.01 to 100.00
Multiburst 2 Freq. B	Multiburst 2 Freq. Cb/Pb	M2FRC2	MHz	0.01 to 100.00
Multiburst 2 Freq. R	Multiburst 2 Freq. Cr/Pr	M2FRC3	MHz	0.01 to 100.00
Multiburst 3 Freq. G	Multiburst 3 Freq. Y	M3FRC1	MHz	0.01 to 100.00
Multiburst 3 Freq. B	Multiburst 3 Freq. Cb/Pb	M3FRC2	MHz	0.01 to 100.00
Multiburst 3 Freq. R	Multiburst 3 Freq. Cr/Pr	M3FRC3	MHz	0.01 to 100.00
Multiburst 4 Freq. G	Multiburst 4 Freq. Y	M4FRC1	MHz	0.01 to 100.00
Multiburst 4 Freq. B	Multiburst 4 Freq. Cb/Pb	M4FRC2	MHz	0.01 to 100.00
Multiburst 4 Freq. R	Multiburst 4 Freq. Cr/Pr	M4FRC3	MHz	0.01 to 100.00

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
Multiburst 5 Freq. G	Multiburst 5 Freq. Y	M5FRC1	MHz	0.01 to 100.00
Multiburst 5 Freq. B	Multiburst 5 Freq. Cb/Pb	M5FRC2	MHz	0.01 to 100.00
Multiburst 5 Freq. R	Multiburst 5 Freq. Cr/Pr	M5FRC3	MHz	0.01 to 100.00
Multiburst 6 Freq. G	Multiburst 6 Freq. Y	M6FRC1	MHz	0.01 to 100.00
Multiburst 6 Freq. B	Multiburst 6 Freq. Cb/Pb	M6FRC2	MHz	0.01 to 100.00
Multiburst 6 Freq. R	Multiburst 6 Freq. Cr/Pr	M6FRC3	MHz	0.01 to 100.00

14.4.2.5 Noise (Component, HDMI, MHL Input Signal)

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
Signal to Noise unw G	Signal to Noise unw Y	S2NunwC1	dB	0.0 to 1000.0
Signal to Noise unw B	Signal to Noise unw Cb/Pb	S2NunwC2	dB	0.0 to 1000.0
Signal to Noise unw R	Signal to Noise unw Cr/Pr	S2NunwC3	dB	0.0 to 1000.0
Signal to Noise lumw G	Signal to Noise lumw Y	S2NLumwC1	dB	0.0 to 1000.0
Signal to Noise lumw B	Signal to Noise lumw Cb/Pb	S2NLumwC2	dB	0.0 to 1000.0
Signal to Noise lumw R	Signal to Noise lumw Cr/Pr	S2NLumwC3	dB	0.0 to 1000.0

14.4.2.6 Timing (Component, HDMI, MHL Input Signal)

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
Frame Period	Frame Period	FPERIOD	us	1.0 to 99 999.0
Frame Frequency	Frame Frequency	FFREQ	Hz	1.0 to 200.0
Line Period	Line Period	LPERIOD	us	1.0 to 1000.0
Line Frequency	Line Frequency	LFREQ	Hz	1.0 to 999 999.0
Bar Duration G	Bar Duration Y	BDURC1	us	1.0 to 100.0
Bar Duration B	Bar Duration Cb/Cr	BDURC2	us	1.0 to 100.0
Bar Duration R	Bar Duration Pb/Pr	BDURC3	us	1.0 to 100.0

14.4.2.7 Jitter (Component, HDMI, MHL Input Signal)

Parameter		<Parameter Name>	Unit	Limit range
Component RGB	**Component YPbPr/YCbCr**			
Line Jitter pos peak	Line Jitter pos peak	LJPOS	ns	0.0 to 1000.0
Line Jitter neg peak	Line Jitter neg peak	LJNEG	ns	-1000.0 to 0.0
Line Jitter pp	Line Jitter pp	LJPP	ns	-1000.0 to 1000.0
Line Jitter Std. Deviation	Line Jitter Std. Deviation	LJSD	ns	0.0 to 1000.0

14.4.3 Test Signals

The available test signals depend on the input signal. For selecting the input signal use `ROUTe<hw>:VIDeo:MODule:SELect` on page 678.

Table 14-16: Composite input signal

Test signal	<TestSignalName>	Available for video standard	
		BG/PAL	M/NTSC
CCIR17	T17Ccir	x	
CCIR18	T18ccir	x	
CCIR330	T330ccir	x	
CCIR331	T331ccir	x	
FCC Composite	TCPFcc		x
FCC Multiburst	TMULtfcc		x
NTC7 Composite	TCPNtc7		x
NTC7 Combination	TCBNtc7		x
Sync Line	TSYNcline		x
Burst Line	TBURstline	x	x
H Blank	THBLank	x	x
Field Line	TVLine	x	x
Field Blank	TVBLank	x	x
Full Field	TFField	x	x
Quiet Line	TQUietline	x	x
Sawtooth	TSAWtooth	x	x
Red Bar	TREDbar	x	x
Videotext UK	TVTXtuk	x	
Teletext	TTTXt		x

Test signal	<TestSignalName>	Available for video standard	
		BG/PAL	M/NTSC
15 kHz Pulse	T15Kpulse	x	x
50 Hz Pulse	T50Pulse	x	
60 Hz Pulse	T60Pulse		x
Sinx/x	TSINx_x	x	x
Mod Ramp	TMODramp	x	x
250 kHz Pulse	T250kpulse	x	x
2T Pulse	TTTPulse	x	x

Table 14-17: Component, HDMI, MHL input signal

Test signal	<TestSignalName>
Color Bars	TCBar
Multiburst	TMBurstline
Sinx/x	TSINx_x
Sweep	TSWeep
2T Pulse & Bar	TTPBar
Ramp	TRAMp
Staircase	TSTaircase
Sync Line	TSYNcline
Quiet Line	TQUietline

14.4.4 Status of Measured Parameters

The status of every measured parameter is indicated.

Table 14-18: Possible status of measured parameters

Status display	<Status>	Description
"Cnf Error"	CERR	Internal error
"Invalid"	INValid	Measured value is invalid.
"Bar <<"	LBAR	Luminance bar is too small.
"Loc Error"	LERR	Internal error
"Flag <<"	LFLag	Flag is too small.
"LL"	LL	Measured value undercuts the lower limit.
"TestSig <<"	LTSig	Test signal amplitude is too small.
"not avail"	NAV	Parameter is not enabled for measurement.

Status display	<Status>	Description
"Overflow"	OFLow	Measured value is too large.
"<Status field is empty>"	OK	Measured value is within the set limits.
"Testline?"	TLINe	One or more test signals are not assigned to a video line.
"TestSig?"	TSIG	Luminance bar is too small.
"Underflow"	UFLow	Measured value is too small.
"UL"	UL	Measured value exceeds the upper limit.
"?????????"	UNKNown	Unspecified error
"Wait..."	WAIT	Measured value is not yet settled.
"Wrong Rcv"	WRCV	Internal error

14.4.5 CALCulate Subsystem

CALCulate<hw>:VIDeo:AVERage:COUNt <Average>

Sets the averaging of the video input signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Average> 0 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256

Example: CALC:VID:AVER:COUN 8
Sets the averaging to 8.

Manual operation: See "Average" on page 142

14.4.6 CONFigure Subsystem

14.4.6.1 CONFigure<hw>:SCOPe Subsystem

CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:TYPE <CursorType>

Sets the cursor function.

Suffix:
<hw> 1
Irrelevant

<cursor> 1-2
Cursor number

Parameters:
<CursorType> OFF | LEVel | SLOPe

Example: `CONF:SCOP:TRAC:CURS2:TYPE LEV`
Measures the average level at the position of cursor 2.

Manual operation: See "C1, C2" on page 149

CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:PIXel
<CLineNumber>, <CPosition>[, <CXSpan>, <FieldNumber>]

Positions the cursor or cursor window.

Suffix:
<hw> 1
Irrelevant

<cursor> 1-2
Cursor number

Parameters:
<CLineNumber> Number of the line in which the cursor is positioned.
Range: Depends on the selected standard.

<CPosition> Cursor position within the line
Default unit: px

<CXSpan> Width of the cursor window. Applies only if `SLOPe` is set under `CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:TYPE` on page 607.
Corresponds to "Span" on page 150.
Default unit: px

<FieldNumber> Selects the field. Applies only for the NTSC standard.
Corresponds to "Field" on page 148.
Range: 1 to 2

Example: `CONF:SCOP:TRAC:CURS1:X:LPOS:PIX 2,100`
Sets line number = 2, cursor position = 100 px

Manual operation: See "<Chart display>" on page 145
See "Line" on page 148
See "Field" on page 148
See "Span" on page 150

CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:X:LPOSition:TIME <CLineNumber>, <CPosition>[, <CXSpan>, <FieldNumber>]

Positions the cursor or cursor window.

Suffix:

<hw> 1
Irrelevant

<cursor> 1-2
Cursor number

Parameters:

<CLineNumber> Number of the line in which the cursor is positioned.
Range: Depends on the selected standard.

<CPosition> Cursor position within the line
Default unit: us

<CXSpan> Width of the cursor window. Applies only if `SLOPe` is set under `CONFigure<hw>:SCOPe:TRACe:CURSor<cursor>:TYPE` on page 607.
Corresponds to "Span" on page 150.
Default unit: us

<FieldNumber> Selects the field. Applies only for the NTSC standard.
Corresponds to "Field" on page 148.
Range: 1 to 2

Example: `CONF:SCOP:TRAC:CURS1:X:LPOS:TIME 1,50`
Sets line number = 1, cursor position = 50 µs

Manual operation: See "<Chart display>" on page 145
See "Line" on page 148
See "Field" on page 148
See "Span" on page 150

14.4.6.2 CONFigure<hw>:VIDeo Subsystem

For configuring the measured parameters see Chapter 14.4.6.3, "CONFigure<hw>:VIDeo:MEASure Subsystem", on page 611.

CONFigure<hw>:VIDeo:COMPonent:FORMat:ANALog <ColorModel>

Sets the color model of the analog component video input signals.

Suffix:
<hw> 1
Irrelevant

Parameters:
<ColorModel> RGB | YPBPr

Example: `CONF:VID:COMP:FORM:ANAL RGB`
Interprets the video input signal as an RGB signal.

Manual operation: See "Component Format" on page 143

CONFigure<hw>:VIDeo:SIGNal:ASPRatio:ANALog <AspectRatio>

Sets the aspect ratio of the video picture.

Suffix:
<hw> 1
Irrelevant

Parameters:
<AspectRatio> F4_3 | F16_9

Example: `CONF:VID:SIGN:ASPR:ANAL F16_9`
Sets 16:9.

Manual operation: See "Picture Aspect Ratio" on page 143

CONFigure<hw>:VIDeo:VECTor:TRACe:CURSor:LPOSition:PIXel <LineNumber>, <CPosition>[, <FieldNumber>]

Sets the cursor position by defining the number of the TV line and the position in the line trace.

Suffix:
<hw> 1
Irrelevant

Parameters:
<LineNumber> Number of the line in which the cursor is positioned.
Range: Depends on the selected standard.

<CPosition> Cursor position within the line
Default unit: px

<FieldNumber> Selects the field.
Range: 1 to 2

Example: `CONF:VID:VECT:TRAC:CURS:LPOS:PIX 23,192`
Sets line number = 23, cursor position = 192 px

Manual operation: See "Field" on page 152
See "Cursor Line / Pos." on page 153

CONFigure<hw>:VIDeo:VECTor:TRACe:CURSor:LPOSition:TIME <LineNumber>, <CPosition>[, <FieldNumber>]

Sets the cursor position by defining the number of the TV line and the position in the line trace.

Suffix:
<hw> 1
Irrelevant

Parameters:
<LineNumber> Number of the line in which the cursor is positioned.
Range: Depends on the selected standard.

<CPosition> Cursor position within the line
Default unit: us

<FieldNumber> Selects the field.
Range: 1 to 2

Example: `CONF:VID:VECT:TRAC:CURS:LPOS:TIME 23,2.9`
Sets line number = 23, cursor position = 2.9 µs

Manual operation: See "Field" on page 152
See "Cursor Line / Pos." on page 153

14.4.6.3 CONFigure<hw>:VIDeo:MEASure Subsystem

Configures the measured parameters.

<LimitValue>
A `<LimitValue>` has to contain at least one decimal place. Values without a decimal place are not accepted.

<ParameterName>

For composite input signals, the `<ParameterName>` is defined as a text parameter.

For component, HDMI, MHL input signals, the `<ParameterName>` is defined as a character string.

Further information:

- See Chapter 14.4.1, "Parameters for Composite Input Signals", on page 590
- See Chapter 14.4.2, "Parameters for Component, HDMI, MHL Input Signal", on page 598
- See Chapter 13.2.2.1, "Parameters", on page 472.

<TestSignalName>

In setting commands, the test signal name is defined as a text parameter as listed in the `<TestSignalName>` column of the tables in Chapter 14.4.3, "Test Signals", on page 605.

In queries, the test signal name is returned as a string. For an example see `CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:TSIGnal` on page 616.

CONFigure<hw>:VIDeo:MEASure:AMPDelay:NTSC:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:NTSC:LIMit:LOWer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:LIMit:LOWer? [<ParameterName>]

Configures the lower limit of the specified parameter for:

- Input signal: composite
- Parameter group: amplitude and delay
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Parameters:

<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.1.1, "Amplitude and Delay (Composite Input Signal)", on page 591.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.1, "Amplitude and Delay (Composite Input Signal)", on page 591.

Example: `CONF:VID:MEAS:AMPD:PAL:LIM:LOW SAA,80.0`
Sets a lower limit of 80.0 mV for "Sync Amplitude (abs)".

CONFigure<hw>:VIDeo:MEASure:AMPDelay:NTSC:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:NTSC:LIMit:UPPer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:LIMit:UPPer? [<ParameterName>]

Configures the upper limit of the specified parameter for:

- Input signal: composite
- Parameter group: amplitude and delay
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Parameters:

<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.1.1, "Amplitude and Delay (Composite Input Signal)", on page 591.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.1, "Amplitude and Delay (Composite Input Signal)", on page 591.

Example: `CONF:VID:MEAS:AMPD:PAL:LIM:UPP BAA,310.0`
Sets an upper limit of 310.0 mV for "Burst Amplitude (abs)".

CONFigure<hw>:VIDeo:MEASure:AMPDelay:NTSC:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:NTSC:SELect? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:SELect? [<ParameterName>]

Enables or disables the measurement of the specified parameter for:

- Input signal: composite
- Parameter group: amplitude and delay
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Parameters:

<Enable> OFF | ON

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.1, "Amplitude and Delay (Composite Input Signal)", on page 591.

Example: `CONF:VID:MEAS:AMPD:PAL:SEL CLGP,OFF`

CONFigure<hw>:VIDeo:MEASure:AMPDelay:NTSC:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:NTSC:TSIGnal? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:PAL:TSIGnal? [<ParameterName>]

Sets the test signal for the specified parameter for:

- Input signal: composite
- Parameter group: amplitude and delay
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-16.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.1, "Amplitude and Delay (Composite Input Signal)", on page 591.

Example: `CONF:VID:MEAS:AMPD:PAL:TSIG DCL,TQU`
Sets the CCIR17 test signal for "DC Level".

Example: `CONF:VID:MEAS:AMPD:PAL:TSIG? DCL`
Query
`"Quiet Line"`
Response: String as return value for the `TQU` text parameter.

CONFigure<hw>:VIDeo:MEASure:AMPDelay:RGB:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:RGB:LIMit:LOWer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:Y:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:Y:LIMit:LOWer? <ParameterName>

Configures the lower limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: amplitude and delay
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.2.1, "Amplitude and Delay (Component, HDMI, MHL Input Signal)", on page 598.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.1, "Amplitude and Delay (Component, HDMI, MHL Input Signal)", on page 598.

Example: `CONF:VID:MEAS:AMPD:Y:LIM:LOW "LBAAC1",120.0`
Sets a lower limit of 120.0 mV for "Lum Bar Amplitude Y (abs)".

CONFigure<hw>:VIDeo:MEASure:AMPDelay:RGB:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:RGB:LIMit:UPPer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:Y:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:Y:LIMit:UPPer? <ParameterName>

Configures the upper limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: amplitude and delay
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.2.1, "Amplitude and Delay (Component, HDMI, MHL Input Signal)", on page 598.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.1, "Amplitude and Delay (Component, HDMI, MHL Input Signal)", on page 598.

Example: `CONF:VID:MEAS:AMPD:Y:LIM:UPP "SAAC1",1200.0`
Sets an upper limit of 1200.0 mV for "Sync Amplitude Y (abs)".

CONFigure<hw>:VIDeo:MEASure:AMPDelay:RGB:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:RGB:SELect? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:Y:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:Y:SELect? <ParameterName>

Enables or disables the measurement of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: amplitude and delay
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.1, "Amplitude and Delay (Component, HDMI, MHL Input Signal)", on page 598.

Example: `CONF:VID:MEAS:AMPD:Y:SEL "LBAAC3",OFF`

CONFigure<hw>:VIDeo:MEASure:AMPDelay:RGB:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:RGB:TSIGnal? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:Y:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:AMPDelay:Y:TSIGnal? <ParameterName>

Sets the test signal for the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: amplitude and delay
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-17.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.1, "Amplitude and Delay (Component, HDMI, MHL Input Signal)", on page 598.

Example: `CONF:VID:MEAS:AMPD:Y:TSIG "CBAWC1",TCB`
Sets the color bars test signal for "Color Bar Ampl. White Y".

CONFigure<hw>:VIDeo:MEASure:COMPonent:ANALog:CLINe <unit>

Sets the counting mode for the assigned test line of a component input signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<CountingMode> PCT | FFIeld | AFIeld
*RST: FFI

Example: `CONF:VID:MEAS:COMP:ANAL:CLIN FFI`
Sets full field.

Manual operation: See "Line Counter" on page 162

CONFigure<hw>:VIDeo:MEASure:COMPonent:DIGital:CLINe <CountingMode>

Sets the counting mode for the assigned test line of an HDMI or MHL input signal.

Suffix:
<hw> 1
Irrelevant

Parameters:

<CountingMode> AFIeld | PCT

*RST: AFI

Example: `CONF:VID:MEAS:COMP:DIG:CLIN AFI`
Sets active field.

Manual operation: See "Line Counter" on page 162

CONFigure<hw>:VIDeo:MEASure:FRESponse:NTSC:LIMit:LOWer
<ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:FRESponse:NTSC:LIMit:LOWer?
[<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:FRESponse:PAL:LIMit:LOWer
<ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:FRESponse:PAL:LIMit:LOWer?
[<ParameterName>]

Configures the lower limit of the specified parameter for:

- Input signal: composite
- Parameter group: frequency response
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Parameters:

<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.1.4, "Frequency Response (Composite Input Signal)", on page 593.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.4, "Frequency Response (Composite Input Signal)", on page 593.

Example: `CONF:VID:MEAS:FRES:PAL:LIM:LOW MABS,80.0`
Sets a lower limit of 80.0 mV for "Multiburst Flag (abs)".

CONFigure<hw>:VIDeo:MEASure:FRESponse:NTSC:LIMit:UPPer
<ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:FRESponse:NTSC:LIMit:UPPer?
[<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:FRESponse:PAL:LIMit:UPPer
<ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:FRESponse:PAL:LIMit:UPPer?
[<ParameterName>]

Configures the upper limit of the specified parameter for:

- Input signal: composite
- Parameter group: frequency response

- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.1.4, "Frequency Response (Composite Input Signal)", on page 593.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.4, "Frequency Response (Composite Input Signal)", on page 593.

Example: `CONF:VID:MEAS:FRES:PAL:LIM:UPP MRB,10.0`
Sets an upper limit of 10.0 % for "Multiburst Flag (bar)".

CONFigure<hw>:VIDeo:MEASure:FRESponse:NTSC:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:FRESponse:NTSC:SELect? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:FRESponse:PAL:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:FRESponse:PAL:SELect? [<ParameterName>]

Enables or disables the measurement of the specified parameter for:

- Input signal: composite
- Parameter group: frequency response
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.4, "Frequency Response (Composite Input Signal)", on page 593.

Example: `CONF:VID:MEAS:FRES:PAL:SEL MABS,OFF`

CONFigure<hw>:VIDeo:MEASure:FRESponse:NTSC:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:FRESponse:NTSC:TSIGnal? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:FRESponse:PAL:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:FRESponse:PAL:TSIGnal? [<ParameterName>]

Sets the test signal for the specified parameter for:

- Input signal: composite
- Parameter group: frequency response
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-16.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.4, "Frequency Response (Composite Input Signal)", on page 593.

Example: `CONF:VID:MEAS:FRES:PAL:TSIG M58P,T17C`
Sets the CCIR17 test signal for "Multiburst 5.8 (%)".

CONFigure<hw>:VIDeo:MEASure:FRESponse:RGB:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:FRESponse:RGB:LIMit:LOWer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:FRESponse:Y:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:FRESponse:Y:LIMit:LOWer? <ParameterName>

Configures the lower limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: frequency response
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.2.4, "Frequency Response (Component, HDMI, MHL Input Signal)", on page 601.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.2.4, "Frequency Response (Component, HDMI, MHL Input Signal)", on page 601.

Example: `CONF:VID:MEAS:FRES:Y:LIM:LOW "SXAposC1",-10.0`
Sets a lower limit of -10.0 dB for "Sin x/x Amplitude pos Y".

CONFigure<hw>:VIDeo:MEASure:FRESponse:RGB:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:FRESponse:RGB:LIMit:UPPer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:FRESponse:Y:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:FRESponse:Y:LIMit:UPPer? <ParameterName>

Configures the upper limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: frequency response
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Parameters:

<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.2.4, "Frequency Response (Component, HDMI, MHL Input Signal)", on page 601.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.2.4, "Frequency Response (Component, HDMI, MHL Input Signal)", on page 601.

Example: `CONF:VID:MEAS:FRES:Y:LIM:UPP "SXAposC3",80.0`
Sets an upper limit of 80.0 dB for "Sin x/x Amplitude pos Cr/Pr".

CONFigure<hw>:VIDeo:MEASure:FRESponse:RGB:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:FRESponse:RGB:SELect? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:FRESponse:Y:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:FRESponse:Y:SELect? <ParameterName>

Enables or disables the measurement of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: frequency response
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.4, "Frequency Response (Component, HDMI, MHL Input Signal)", on page 601.

Example: `CONF:VID:MEAS:FRES:Y:SEL "SXGposC3",OFF`

CONFigure<hw>:VIDeo:MEASure:FRESponse:RGB:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:FRESponse:RGB:TSIGnal? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:FRESponse:Y:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:FRESponse:Y:TSIGnal? <ParameterName>

Sets the test signal for the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: frequency response
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-17.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.4, "Frequency Response (Component, HDMI, MHL Input Signal)", on page 601.

Example: `CONF:VID:MEAS:FRES:Y:TSIG "SXAposC1",TSIN`
Sets the "Sinx/x" test signal for "Sin x/x Amplitude pos Y".

CONFigure<hw>:VIDeo:MEASure:JITTer:NTSC:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:JITTer:NTSC:LIMit:LOWer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:JITTer:PAL:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:JITTer:PAL:LIMit:LOWer? [<ParameterName>]

Configures the lower limit of the specified parameter for:

- Input signal: composite
- Parameter group: jitter

- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.1.7, "Jitter (Composite Input Signal)", on page 597.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.7, "Jitter (Composite Input Signal)", on page 597.

Example: `CONF:VID:MEAS:JITT:PAL:LIM:LOW FJP,50.0`
Sets a lower limit of 50.0 ns for "Field Jitter pos peak".

CONFigure<hw>:VIDeo:MEASure:JITTer:NTSC:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:JITTer:NTSC:LIMit:UPPer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:JITTer:PAL:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:JITTer:PAL:LIMit:UPPer? [<ParameterName>]

Configures the upper limit of the specified parameter for:

- Input signal: composite
- Parameter group: jitter
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.1.7, "Jitter (Composite Input Signal)", on page 597.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.7, "Jitter (Composite Input Signal)", on page 597.

Example: `CONF:VID:MEAS:JITT:PAL:LIM:UPP FJSD,2000.0`
Sets an upper limit of 2000.0 ns for " Field Jitter Std. Deviation".

CONFigure<hw>:VIDeo:MEASure:JITTer:NTSC:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:JITTer:NTSC:SELect? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:JITTer:PAL:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:JITTer:PAL:SELect? [<ParameterName>]

Enables or disables the measurement of the specified parameter for:

- Input signal: composite
- Parameter group: jitter
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.7, "Jitter (Composite Input Signal)", on page 597.

Example: `CONF:VID:MEAS:JITT:PAL:SEL LJPP,OFF`

CONFigure<hw>:VIDeo:MEASure:JITTer:NTSC:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:JITTer:NTSC:TSIGnal? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:JITTer:PAL:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:JITTer:PAL:TSIGnal? [<ParameterName>]

Sets the test signal for the specified parameter for:

- Input signal: composite
- Parameter group: jitter
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-16.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.7, "Jitter (Composite Input Signal)", on page 597.

Example: `CONF:VID:MEAS:AMPD:PAL:TSIG FJN,TFF`
Sets the "Full Field" test signal for "Field Jitter neg peak".

CONFigure<hw>:VIDeo:MEASure:JITTer:RGB:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:JITTer:RGB:LIMit:LOWer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:JITTer:Y:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:JITTer:Y:LIMit:LOWer? <ParameterName>

Configures the lower limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: jitter
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.2.7, "Jitter (Component, HDMI, MHL Input Signal)", on page 605.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.7, "Jitter (Component, HDMI, MHL Input Signal)", on page 605.

Example: `CONF:VID:MEAS:JITT:Y:LIM:LOW "LJPOS",10.0`
Sets a lower limit of 10.0 mV for "Line Jitter pos peak".

CONFigure<hw>:VIDeo:MEASure:JITTer:RGB:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:JITTer:RGB:LIMit:UPPer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:JITTer:Y:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:JITTer:Y:LIMit:UPPer? <ParameterName>

Configures the upper limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: jitter
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.2.7, "Jitter (Component, HDMI, MHL Input Signal)", on page 605.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.7, "Jitter (Component, HDMI, MHL Input Signal)", on page 605.

Example: `CONF:VID:MEAS:JITT:Y:LIM:UPP "LJPP",900.0`
Sets an upper limit of 900.0 mV for "Line Jitter pp".

CONFigure<hw>:VIDeo:MEASure:JITTer:RGB:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:JITTer:RGB:SELect? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:JITTer:Y:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:JITTer:Y:SELect? <ParameterName>

Enables or disables the measurement of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: jitter
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.7, "Jitter (Component, HDMI, MHL Input Signal)", on page 605.

Example: `CONF:VID:MEAS:JITT:Y:SEL "LJSD",OFF`

CONFigure<hw>:VIDeo:MEASure:JITTer:RGB:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:JITTer:RGB:TSIGnal? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:JITTer:Y:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:JITTer:Y:TSIGnal? <ParameterName>

Sets the test signal for the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: jitter
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-17.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.7, "Jitter (Component, HDMI, MHL Input Signal)", on page 605.

Example: `CONF:VID:MEAS:JITT:Y:TSIG "LJPOS",TFF`
Sets the "Full Field" test signal for "Line Jitter pos peak".

CONFigure<hw>:VIDeo:MEASure:LINDist:NTSC:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:LINDist:NTSC:LIMit:LOWer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:LINDist:PAL:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:LINDist:PAL:LIMit:LOWer? [<ParameterName>]

Configures the lower limit of the specified parameter for:

- Input signal: composite
- Parameter group: linear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.1.2, "Linear Distortions (Composite Input Signal)", on page 591.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.2, "Linear Distortions (Composite Input Signal)", on page 591.

Example: `CONF:VID:MEAS:LIND:PAL:LIM:LOW TTPA,1.0`
Sets a lower limit of 1.0 % for "2T Pulse Amplitude".

CONFigure<hw>:VIDeo:MEASure:LINDist:NTSC:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:LINDist:NTSC:LIMit:UPPer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:LINDist:PAL:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:LINDist:PAL:LIMit:UPPer? [<ParameterName>]

Configures the upper limit of the specified parameter for:

- Input signal: composite
- Parameter group: linear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.1.2, "Linear Distortions (Composite Input Signal)", on page 591.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.2, "Linear Distortions (Composite Input Signal)", on page 591.

Example: `CONF:VID:MEAS:LIND:PAL:LIM:UPP BD,-30.0`
Sets an upper limit of -30.0 % for "Baseline Distortion".

CONFigure<hw>:VIDeo:MEASure:LINDist:NTSC:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:LINDist:NTSC:SELect? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:LINDist:PAL:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:LINDist:PAL:SELect? [<ParameterName>]

Enables or disables the measurement of the specified parameter for:

- Input signal: composite
- Parameter group: linear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Parameters:

<Enable> OFF | ON

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.2, "Linear Distortions (Composite Input Signal)", on page 591.

Example: `CONF:VID:MEAS:LIND:PAL:SEL TILT,OFF`

CONFigure<hw>:VIDeo:MEASure:LINDist:NTSC:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:LINDist:NTSC:TSIGnal? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:LINDist:PAL:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:LINDist:PAL:TSIGnal? [<ParameterName>]

Sets the test signal for the specified parameter for:

- Input signal: composite
- Parameter group: linear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Parameters:

<TestSignalName> Specifies the test signal. See Table 14-16.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.2, "Linear Distortions (Composite Input Signal)", on page 591.

Example: `CONF:VID:MEAS:LIND:PAL:TSIG TILT,T17C`
Sets the CCIR17 test signal for "Tilt".

CONFigure<hw>:VIDeo:MEASure:LINDist:RGB:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:LINDist:RGB:LIMit:LOWer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:LINDist:Y:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:LINDist:Y:LIMit:LOWer? <ParameterName>

Configures the lower limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: linear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Parameters:

<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.2.2, "Linear Distortions (Component, HDMI, MHL Input Signal)", on page 600.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.2.2, "Linear Distortions (Component, HDMI, MHL Input Signal)", on page 600.

Example: `CONF:VID:MEAS:LIND:Y:LIM:LOW "TTPAC2",-50.0`
Sets a lower limit of -50.0 % for "2T Pulse Amplitude Cb/Pb".

CONFigure<hw>:VIDeo:MEASure:LINDist:RGB:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:LINDist:RGB:LIMit:UPPer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:LINDist:Y:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:LINDist:Y:LIMit:UPPer? <ParameterName>

Configures the upper limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: linear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Parameters:

<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.2.2, "Linear Distortions (Component, HDMI, MHL Input Signal)", on page 600.

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.2.2, "Linear Distortions (Component, HDMI, MHL Input Signal)", on page 600.

Example: `CONF:VID:MEAS:LIND:Y:LIM:UPP "TTPAC1",99.0`
Sets an upper limit of 99.0 % for "2T Pulse Amplitude Y".

CONFigure<hw>:VIDeo:MEASure:LINDist:RGB:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:LINDist:RGB:SELect? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:LINDist:Y:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:LINDist:Y:SELect? <ParameterName>

Enables or disables the measurement of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: linear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Parameters:

<Enable> OFF | ON

Parameters for setting and query:

<ParameterName> Specifies the parameter. See Chapter 14.4.2.2, "Linear Distortions (Component, HDMI, MHL Input Signal)", on page 600.

Example: `CONF:VID:MEAS:LIND:Y:SEL "STRTC1",OFF`

CONFigure<hw>:VIDeo:MEASure:LINDist:RGB:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:LINDist:RGB:TSIGnal? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:LINDist:Y:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:LINDist:Y:TSIGnal? <ParameterName>

Sets the test signal for the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: linear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-17.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.2, "Linear Distortions (Component, HDMI, MHL Input Signal)", on page 600.

Example: `CONF:VID:MEAS:LIND:Y:TSIG "STRTC1",TTPB`
Sets the "2T Pulse & Bar" test signal for "ST Dist Rise Time Y".

CONFigure<hw>:VIDeo:MEASure:NLINdist:NTSC:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NLINdist:NTSC:LIMit:LOWer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:NLINdist:PAL:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NLINdist:PAL:LIMit:LOWer? [<ParameterName>]

Configures the lower limit of the specified parameter for:

- Input signal: composite
- Parameter group: nonlinear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.1.3, "Nonlinear Distortions (Composite Input Signal)", on page 592.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.3, "Nonlinear Distortions (Composite Input Signal)", on page 592.

Example: `CONF:VID:MEAS:NLIN:PAL:LIM:LOW GPOS,2.0`
Sets a lower limit of 2.0 % for "C NL Gain pos".

CONFigure<hw>:VIDeo:MEASure:NLINdist:NTSC:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NLINdist:NTSC:LIMit:UPPer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:NLINdist:PAL:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NLINdist:PAL:LIMit:UPPer? [<ParameterName>]

Configures the upper limit of the specified parameter for:

- Input signal: composite
- Parameter group: nonlinear distortions

- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.1.3, "Nonlinear Distortions (Composite Input Signal)", on page 592.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.3, "Nonlinear Distortions (Composite Input Signal)", on page 592.

Example: `CONF:VID:MEAS:NLIN:PAL:LIM:UPP GNEG,-2.0`
Sets an upper limit of -2.0 % for "C NL Gain neg".

CONFigure<hw>:VIDeo:MEASure:NLINdist:NTSC:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:NLINdist:NTSC:SELect? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:NLINdist:PAL:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:NLINdist:PAL:SELect? [<ParameterName>]

Enables or disables the measurement of the specified parameter for:

- Input signal: composite
- Parameter group: nonlinear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.3, "Nonlinear Distortions (Composite Input Signal)", on page 592.

Example: `CONF:VID:MEAS:NLIN:PAL:SEL PPPC,OFF`

CONFigure<hw>:VIDeo:MEASure:NLINdist:NTSC:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:NLINdist:NTSC:TSIGnal? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:NLINdist:PAL:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:NLINdist:PAL:TSIGnal? [<ParameterName>]

Sets the test signal for the specified parameter for:

- Input signal: composite

- Parameter group: nonlinear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-16.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.3, "Nonlinear Distortions (Composite Input Signal)", on page 592.

Example: `CONF:VID:MEAS:NLIN:PAL:TSIG PPPC,T17C`
Sets the CCIR17 test signal for "C NL Phase pp".

CONFigure<hw>:VIDeo:MEASure:NLINdist:RGB:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NLINdist:RGB:LIMit:LOWer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:NLINdist:Y:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NLINdist:Y:LIMit:LOWer? <ParameterName>

Configures the lower limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: nonlinear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.2.3, "Nonlinear Distortions (Component, HDMI, MHL Input Signal)", on page 601.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.3, "Nonlinear Distortions (Component, HDMI, MHL Input Signal)", on page 601.

Example: `CONF:VID:MEAS:NLIN:Y:LIM:LOW "NLC1",1.0`
Sets a lower limit of 1.0 % for "Nonlinearity Y".

CONFigure<hw>:VIDeo:MEASure:NLINdist:RGB:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NLINdist:RGB:LIMit:UPPer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:NLINdist:Y:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NLINdist:Y:LIMit:UPPer? <ParameterName>

Configures the upper limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: nonlinear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.2.3, "Nonlinear Distortions (Component, HDMI, MHL Input Signal)", on page 601.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.3, "Nonlinear Distortions (Component, HDMI, MHL Input Signal)", on page 601.

Example: `CONF:VID:MEAS:NLIN:Y:LIM:UPP "NL2stepC1",100.0`
Sets an upper limit of 100.0 % for "Nonlinearity Step2 Y".

CONFigure<hw>:VIDeo:MEASure:NLINdist:RGB:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:NLINdist:RGB:SELect? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:NLINdist:Y:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:NLINdist:Y:SELect? <ParameterName>

Enables or disables the measurement of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: nonlinear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.3, "Nonlinear Distortions (Component, HDMI, MHL Input Signal)", on page 601.

Example: `CONF:VID:MEAS:NLIN:Y:SEL "NLC2",OFF`

CONFigure<hw>:VIDeo:MEASure:NLINdist:RGB:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:NLINdist:RGB:TSIGnal? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:NLINdist:Y:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:NLINdist:Y:TSIGnal? <ParameterName>

Sets the test signal for the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: nonlinear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-17.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.3, "Nonlinear Distortions (Component, HDMI, MHL Input Signal)", on page 601.

Example: `CONF:VID:MEAS:NLIN:Y:TSIG "NLC3",TRAM`
Sets the "Ramp" test signal for "Nonlinearity Cr/Pr".

CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:BANDwidth <Bandwidth>

Sets the bandwidth for:

- Input signal: composite
- Parameter group: noise, "Lum Noise" parameters
- Video standard: NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<Bandwidth> HZ42 | HZ50 | FULL
*RST: HZ42

Example: `CONF:VID:MEAS:NOIS:NTSC:BAND HZ50`
Sets 5.0 MHz.

Manual operation: See "Bandwidth (composite inputs)" on page 164

CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:BANDwidth <Bandwidth>

Sets the bandwidth for:

- Input signal: composite
- Parameter group: noise, "Lum Noise" parameters

- Video standard: PAL

Suffix:
<hw> 1
Irrelevant

Parameters:
<Bandwidth> HZ50 | FULL
*RST: HZ50

Example: `CONF:VID:MEAS:NOIS:PAL:BAND FULL`
Sets full bandwidth.

Manual operation: See "Bandwidth (composite inputs)" on page 164

CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:LIMit:LOWer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:LIMit:LOWer? [<ParameterName>]

Configures the lower limit of the specified parameter for:

- Input signal: composite
- Parameter group: noise
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.1.5, "Noise (Composite Input Signal)", on page 595.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.5, "Noise (Composite Input Signal)", on page 595.

Example: `CONF:VID:MEAS:NOIS:PAL:LIM:LOW LNLN,50.0`
Sets a lower limit of 50.0 dB for "Lum Noise lumw (nom)".

CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:LIMit:UPPer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:LIMit:UPPer? [<ParameterName>]

Configures the upper limit of the specified parameter for:

- Input signal: composite
- Parameter group: noise

- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.1.5, "Noise (Composite Input Signal)", on page 595.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.5, "Noise (Composite Input Signal)", on page 595.

Example: `CONF:VID:MEAS:NOIS:PAL:LIM:UPP LNLB,700.0`
Sets an upper limit of 700.0 dB for "Lum Noise lumw (bar)".

CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:SELect? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:SELect? [<ParameterName>]

Enables or disables the measurement of the specified parameter for:

- Input signal: composite
- Parameter group: noise
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.5, "Noise (Composite Input Signal)", on page 595.

Example: `CONF:VID:MEAS:NOIS:PAL:SEL CSIN,OFF`

CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:TSIGnal? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:NOISe:PAL:TSIGnal? [<ParameterName>]

Sets the test signal for the specified parameter for:

- Input signal: composite
- Parameter group: noise

- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-16.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.5, "Noise (Composite Input Signal)", on page 595.

Example: `CONF:VID:MEAS:NOIS:PAL:TSIG CSIB,T17C`
Sets the CCIR17 test signal for "C/SND Intermod (bar)".

CONFigure<hw>:VIDeo:MEASure:NOISe:NTSC:WEIGhting <Weighting>

Applies a weighting curve for:

- Input signal: composite
- Parameter group: noise, "Lum Noise" parameters
- Video standard: NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<Weighting> NTC7 | UNIFied
*RST: NTC7

Example: `CONF:VID:MEAS:NOIS:NTSC:WEIG UNIF`
Sets unified (CCIR).

Manual operation: See "Weighting" on page 164

CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:BANDwidth <Bandwidth>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:BANDwidth <Bandwidth>

Sets the bandwidth for:

- Input signal: component and digital
- Parameter group: noise, "Signal to Noise" parameters
- Video standard: component RGB or component YPbPr/YCbCr

Parameters:
<Bandwidth> DEFault | HZ42 | HZ50 | HZ200
*RST: DEF

Example: `CONF:VID:MEAS:NOIS:Y:BAND HZ42`
Sets 4.2 MHz.

Manual operation: See "Bandwidth (component and digital inputs)" on page 164

CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:LIMit:LOWer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:LIMit:LOWer? <ParameterName>

Configures the lower limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: noise
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.2.5, "Noise (Component, HDMI, MHL Input Signal)", on page 604.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.5, "Noise (Component, HDMI, MHL Input Signal)", on page 604.

Example: `CONF:VID:MEAS:NOIS:Y:LIM:LOW "S2NunwC1",150.0`
Sets a lower limit of 150.0 dB for "Signal to Noise unw Y".

CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:LIMit:UPPer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:LIMit:UPPer? <ParameterName>

Configures the upper limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: noise
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.2.5, "Noise (Component, HDMI, MHL Input Signal)", on page 604.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.5, "Noise (Component, HDMI, MHL Input Signal)", on page 604.

Example: `CONF:VID:MEAS:NOIS:Y:LIM:UPP "S2NunwC2",900.0`
Sets an upper limit of 900.0 dB for "Signal to Noise unw Cb/Pb".

CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:SELect? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:SELect? <ParameterName>

Enables or disables the measurement of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: noise
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.5, "Noise (Component, HDMI, MHL Input Signal)", on page 604.

Example: `CONF:VID:MEAS:NOIS:Y:SEL "S2NunwC3",OFF`

CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:NOISe:RGB:TSIGnal? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:NOISe:Y:TSIGnal? <ParameterName>

Sets the test signal for the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: noise
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-17.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.5, "Noise (Component, HDMI, MHL Input Signal)", on page 604.

Example: `CONF:VID:MEAS:NOIS:Y:TSIG "S2NLumwC1",TQU`
Sets the quiet line test signal for "Signal to Noise lumw Y".

CONFigure<hw>:VIDeo:MEASure:NTSC:SELect:ALL <Enable>
CONFigure<hw>:VIDeo:MEASure:PAL:SELect:ALL <Enable>
CONFigure<hw>:VIDeo:MEASure:RGB:SELect:ALL <Enable>
CONFigure<hw>:VIDeo:MEASure:Y:SELect:ALL <Enable>

Enables/disables the measurement of all parameter at once.

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<Enable> OFF | ON

Example: `CONF:VID:MEAS:Y:SEL:ALL OFF`

Usage: Setting only

Manual operation: See "Enable All, Disable All button" on page 160

CONFigure<hw>:VIDeo:MEASure:PAL:STANdard <Substandard>

Sets the B/G, D/K or I substandards.

- Input signal: composite
- Video standard: BG/PAL

Suffix:
<hw> 1
Irrelevant

Parameters:
<Substandard> BG | DK | I
*RST: BG

Example: `CONF:VID:MEAS:PAL:STAN DK`

Manual operation: See "PAL Standard (625)" on page 161

CONFigure<hw>:VIDeo:MEASure:TIMing:NTSC:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:TIMing:NTSC:LIMit:LOWer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:TIMing:PAL:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:TIMing:PAL:LIMit:LOWer? [<ParameterName>]

Configures the lower limit of the specified parameter for:

- Input signal: composite
- Parameter group: timing
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.1.6, "Timing (Composite Input Signal)", on page 596.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.6, "Timing (Composite Input Signal)", on page 596.

Example: `CONF:VID:MEAS:TIM:PAL:LIM:LOW FPF,19990.0`
Sets a lower limit of 19990.0 us for "Field Period First Field".

CONFigure<hw>:VIDeo:MEASure:TIMing:NTSC:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:TIMing:NTSC:LIMit:UPPer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:TIMing:PAL:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:TIMing:PAL:LIMit:UPPer? [<ParameterName>]

Configures the upper limit of the specified parameter for:

- Input signal: composite
- Parameter group: timing
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.1.6, "Timing (Composite Input Signal)", on page 596.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.6, "Timing (Composite Input Signal)", on page 596.

Example: `CONF:VID:MEAS:TIM:PAL:LIM:UPP FPFF,40020.0`
Sets an upper limit of 40020.0 us for "Field Period Full Field".

CONFigure<hw>:VIDeo:MEASure:TIMing:NTSC:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:TIMing:NTSC:SELect? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:TIMing:PAL:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:TIMing:PAL:SELect? [<ParameterName>]

Enables or disables the measurement of the specified parameter for:

- Input signal: composite
- Parameter group: timing

- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.6, "Timing (Composite Input Signal)", on page 596.

Example: `CONF:VID:MEAS:TIM:PAL:SEL LSRT,OFF`

CONFigure<hw>:VIDeo:MEASure:TIMing:NTSC:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:TIMing:NTSC:TSIGnal? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:TIMing:PAL:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:TIMing:PAL:TSIGnal? [<ParameterName>]

Sets the test signal for the specified parameter for:

- Input signal: composite
- Parameter group: timing
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-16.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.6, "Timing (Composite Input Signal)", on page 596.

Example: `CONF:VID:MEAS:TIM:PAL:TSIG LSD,T17C`
Sets the CCIR17 test signal for "Sync Duration".

CONFigure<hw>:VIDeo:MEASure:TIMing:RGB:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:TIMing:RGB:LIMit:LOWer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:TIMing:Y:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:TIMing:Y:LIMit:LOWer? <ParameterName>

Configures the lower limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: timing
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.2.6, "Timing (Component, HDMI, MHL Input Signal)", on page 604.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.6, "Timing (Component, HDMI, MHL Input Signal)", on page 604.

Example: `CONF:VID:MEAS:TIM:Y:LIM:LOW "FPERIOD",99.0`
Sets a lower limit of 99.0 us for "Frame Period".

CONFigure<hw>:VIDeo:MEASure:TIMing:RGB:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:TIMing:RGB:LIMit:UPPer? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:TIMing:Y:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:TIMing:Y:LIMit:UPPer? <ParameterName>

Configures the upper limit of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: timing
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.2.6, "Timing (Component, HDMI, MHL Input Signal)", on page 604.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.6, "Timing (Component, HDMI, MHL Input Signal)", on page 604.

Example: `CONF:VID:MEAS:TIM:Y:LIM:UPP "FFREQ",180.0`
Sets an upper limit of 180.0 Hz for "Frame Frequency".

CONFigure<hw>:VIDeo:MEASure:TIMing:RGB:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:TIMing:RGB:SELect? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:TIMing:Y:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:TIMing:Y:SELect? <ParameterName>

Enables or disables the measurement of the specified parameter for:

- Input signal: component, HDMI, MHL

- Parameter group: timing
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.6, "Timing (Component, HDMI, MHL Input Signal)", on page 604.

Example: `CONF:VID:MEAS:TIM:Y:SEL "BDURC1",OFF`

CONFigure<hw>:VIDeo:MEASure:TIMing:RGB:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:TIMing:RGB:TSIGnal? <ParameterName>
CONFigure<hw>:VIDeo:MEASure:TIMing:Y:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:TIMing:Y:TSIGnal? <ParameterName>

Sets the test signal for the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: timing
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-17.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.6, "Timing (Component, HDMI, MHL Input Signal)", on page 604.

Example: `CONF:VID:MEAS:TIM:Y:TSIG "BDURC1",TTPB`
Sets the "2T Pluse" test signal for "Bar Duration Y".

CONFigure<hw>:VIDeo:MEASure:TSIGnal:LOCation:CURSor<line>:CENTer <Value>
CONFigure<hw>:VIDeo:MEASure:TSIGnal:LOCation:CURSor<line>:SPAN <Value>

Positions the specified location cursor.

Suffix:
<hw> 1
Irrelevant

<line> 1 to 10
Location cursor number

Parameters:
<Value> The unit is set under `UNIT<hw>:VIDeo:MEASure:TSIGnal:LOCation` on page 681.

Example: `CONF:VID:MEAS:TSIG:LOC:CURS2:SPAN 675.0`
Location cursor 2: Sets 675.0.

Manual operation: See "Location table" on page 163

CONFigure<hw>:VIDeo:MEASure:TSIGnal:NTSC:LINE <TestSignalName>, <FieldNumber>, <LineNumber>
CONFigure<hw>:VIDeo:MEASure:TSIGnal:NTSC:LINE? [<TestSignalName>]

Assigns the individual video line that includes this test signal for:

- Input signal: composite
- Video standard: M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<FieldNumber> Specifies the field.
Range: 1 to 2

<LineNumber> Specifies the individual video line.
Range: 10 to 262

Parameters for setting and query:
<TestSignalName> Specifies the test signal. See Table 14-16.

Example: `CONF:VID:MEAS:TSIG:NTSC:LINE T17C,1,10`

Manual operation: See "Test Line" on page 162

CONFigure<hw>:VIDeo:MEASure:TSIGnal:PAL:LINE <TestSignalName>, <LineNumber>
CONFigure<hw>:VIDeo:MEASure:TSIGnal:PAL:LINE? <TestSignalName>

Assigns the individual video line that includes this test signal for:

- Input signal: composite
- Video standard: BG/PAL

Suffix:
<hw> 1
Irrelevant

Parameters:

<LineNumber> Specifies the individual video line.

Range: 6 (1st field) | 318 (2nd field) to 309 (1st field) | 622 (2nd field)

Parameters for setting and query:

<TestSignalName> Specifies the test signal. See Table 14-16.

Example: `CONF:VID:MEAS:TSIG:PAL:LINE T17C,10`

Manual operation: See "Test Line" on page 162

CONFigure<hw>:VIDeo:MEASure:TSIGnal:RGB:LINE <TestSignalName>, <LineNumber>
CONFigure<hw>:VIDeo:MEASure:TSIGnal:RGB:LINE? <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:TSIGnal:Y:LINE <TestSignalName>, <LineNumber>
CONFigure<hw>:VIDeo:MEASure:TSIGnal:Y:LINE? <TestSignalName>

Assigns the individual video line that includes this test signal for:

- Input signal: component, HDMI, MHL
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Parameters:

<LineNumber> Specifies the individual video line.

Range: 1 to 1250

Parameters for setting and query:

<TestSignalName> Specifies the test signal. See Table 14-17.

Example: `CONF:VID:MEAS:TSIG:Y:LINE TCB,100`

Manual operation: See "Test Line" on page 162

CONFigure<hw>:VIDeo:MEASure:VTXT:NTSC:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:VTXT:NTSC:LIMit:LOWer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:VTXT:PAL:LIMit:LOWer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:VTXT:PAL:LIMit:LOWer? [<ParameterName>]

Configures the lower limit of the specified parameter for:

- Input signal: composite
- Parameter group: video data
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the lower limit for the parameter. See Chapter 14.4.1.8, "Video Data (Composite Input Signal)", on page 597.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.8, "Video Data (Composite Input Signal)", on page 597.

Example: `CONF:VID:MEAS:VTXT:PAL:LIM:LOW VBAN,10.0`
Sets a lower limit of 10.0 % for "Vtxt Basic Amplitude (nom)".

CONFigure<hw>:VIDeo:MEASure:VTXT:NTSC:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:VTXT:NTSC:LIMit:UPPer? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:VTXT:PAL:LIMit:UPPer <ParameterName>, <LimitValue>
CONFigure<hw>:VIDeo:MEASure:VTXT:PAL:LIMit:UPPer? [<ParameterName>]

Configures the upper limit of the specified parameter for:

- Input signal: composite
- Parameter group: video data
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<LimitValue> Specifies the upper limit for the parameter. See Chapter 14.4.1.8, "Video Data (Composite Input Signal)", on page 597.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.8, "Video Data (Composite Input Signal)", on page 597.

Example: `CONF:VID:MEAS:VTXT:PAL:LIM:UPP VBAB,90.0`
Sets an upper limit of 90.0 % for "Vtxt Basic Amplitude (bar)".

CONFigure<hw>:VIDeo:MEASure:VTXT:NTSC:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:VTXT:NTSC:SELect? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:VTXT:PAL:SELect <ParameterName>, <Enable>
CONFigure<hw>:VIDeo:MEASure:VTXT:PAL:SELect? [<ParameterName>]

Enables or disables the measurement of the specified parameter for:

- Input signal: composite

- Parameter group: video data
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.8, "Video Data (Composite Input Signal)", on page 597.

Example: `CONF:VID:MEAS:VTXT:PAL:SEL VDM,OFF`

CONFigure<hw>:VIDeo:MEASure:VTXT:NTSC:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:VTXT:NTSC:TSIGnal? [<ParameterName>]
CONFigure<hw>:VIDeo:MEASure:VTXT:PAL:TSIGnal <ParameterName>, <TestSignalName>
CONFigure<hw>:VIDeo:MEASure:VTXT:PAL:TSIGnal? [<ParameterName>]

Sets the test signal for the specified parameter for:

- Input signal: composite
- Parameter group: video data
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestSignalName> Specifies the test signal. See Table 14-16.

Parameters for setting and query:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.8, "Video Data (Composite Input Signal)", on page 597.

Example: `CONF:VID:MEAS:VTXT:PAL:TSIG VDT,TVTX`
Sets the "Videotext UK" signal for "Vtxt Data Timing".

14.4.7 DISPlay Subsystem

DISPlay<hw>:VIDeo:SELect:TAB <Tab>

Selects the measurement. If the measurement is not already running, it is started.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Tab> INPut | AUTO | SCOPe | VECTor
Corresponds to the tabs in the manual operation.

Example: `DISP:VID:SEL:TAB SCOP`

DISPlay<hw>[:WINDow]:SCOPe:TRACe:SELect <View>

Sets the content of the chart display.

Suffix:
<hw> 1
Irrelevant

Parameters:
<View> YGReen | CBBLue | CRRed | PARade | OVERlay | OLSYnc
*RST: YGR

Example: `DISP:SCOP:TRAC:SEL OVER`
Shows the overlay waveform chart.

Manual operation: See "View" on page 147

DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:PIXel <LineNumber>, <XPosition>, <XSpan>[, <FieldNumber>]

Sets the position of the chart display.

Suffix:
<hw> 1
Irrelevant

Parameters:
<LineNumber> Sets the center of the chart display to the selected line number.
Corresponds to "Line" on page 148.

<XPosition> Position of the left display margin within the selected line.
Default unit: px

<XSpan> Chart display width
Corresponds to "Rescale" on page 148.
Default unit: px

<FieldNumber> Selects the field. Applies only for the NTSC standard.
Corresponds to "Field" on page 148.
Range: 1 to 2

Example: DISP:SCOP:TRAC:X:LPOS:PIX 56,100,500
Sets line number = 56, position = 100 px, display width = 500 px

Manual operation: See "<Chart display>" on page 145
See "Line" on page 148
See "Field" on page 148
See "Span" on page 150

DISPlay<hw>[:WINDow]:SCOPe:TRACe:X:LPOSition:TIME <LineNumber>, <XPosition>, <XSpan>[, <FieldNumber>]

Sets the position of the chart display.

Suffix:
<hw> 1
Irrelevant

Parameters:
<LineNumber> Sets the center of the chart display to the selected line number.
Corresponds to "Line" on page 148.

<XPosition> Position of the left display margin within the selected line.
Default unit: us

<XSpan> Display width
Corresponds to "Rescale" on page 148.
Default unit: us

<FieldNumber> Selects the field. Applies only for the NTSC standard.
Corresponds to "Field" on page 148.
Range: 1 to 2

Example: DISP:SCOP:TRAC:X:LPOS:TIME 4,50,100
Sets line number = 4, position = 50 µs, display width = 100 µs

Manual operation: See "<Chart display>" on page 145
See "Line" on page 148
See "Field" on page 148
See "Span" on page 150

DISPlay<hw>[:WINDow]:SCOPe:TRACe:Y:POSition <YPosition>, <YSpan>

Scales the chart display in y-direction.

Suffix:
<hw> 1
Irrelevant

Parameters:
<YPosition> Position of the bottom display margin.

<YSpan> Display height

Example: `DISP:SCOP:TRAC:Y:POS -0.7,2.8`
Shows -0.7 V to 2.1 V of the y-axis.

Manual operation: See "Y" on page 149

14.4.8 INITiate Subsystem

INITiate<hw>:VIDeo <Tab>

Selects the measurement. If the measurement is not already running, it is started.

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<Tab> INPut | AUTO | SCOPe | VECTor
Corresponds to the tabs in the manual operation.

Example: `INIT:VID VECT`

Usage: Setting only

INITiate<hw>:VIDeo:MEASure:LOCation?

Queries the location editor status.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> DOWN | UP
DOWN
Disabled
UP
Running

<ParameterName> See Chapter 14.4.1, "Parameters for Composite Input Signals", on page 590 and Chapter 14.4.2, "Parameters for Component, HDMI, MHL Input Signal", on page 598.

<Standard> NTSC | PAL | RGB | Y

Example: `INIT:VID:MEAS:LOC?`
Query
`UP,"LBAA",PAL`
Response: <Status>,<ParameterName>,<Standard>

Usage: Query only

Manual operation: See "Location table" on page 163

INITiate<hw>:VIDeo:MEASure:LOCation:DOWN

Closes the location editor.

Suffix:
<hw> 1
Irrelevant

Example: `INIT:VID:MEAS:LOC:DOWN`

Usage: Event

Manual operation: See "Location table" on page 163

INITiate<hw>:VIDeo:MEASure:LOCation:NTSC:UP <ParameterName>
INITiate<hw>:VIDeo:MEASure:LOCation:PAL:UP <ParameterName>

Starts the location editor for:

- Input signal: composite
- Video standard: BG/PAL or M/NTSC
- Parameter as specified in string

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<ParameterName> See Chapter 14.4.1, "Parameters for Composite Input Signals", on page 590.

Example: `INIT:VID:MEAS:LOC:PAL:UP "LBAA"`
Starts the editor for the "Luminance Bar Amplitude (abs)" parameter.

Usage: Setting only

Manual operation: See "Location table" on page 163

INITiate<hw>:VIDeo:MEASure:LOCation:RGB:UP <ParameterName>
INITiate<hw>:VIDeo:MEASure:LOCation:Y:UP <ParameterName>

Starts the location editor for:

- Input signal: composite
- Video standard: component RGB or component YPbPr/YCbCr

- Parameter as specified in string

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<ParameterName> See Chapter 14.4.2, "Parameters for Component, HDMI, MHL Input Signal", on page 598.

Example: `INIT:VID:MEAS:LOC:Y:UP "LBAAC1"`
Starts the editor for the "Lum Bar Amplitude Y (abs)" parameter.

Usage: Setting only

Manual operation: See "Location table" on page 163

14.4.9 MMEMory Subsystem

MMEMory<hw>:VIDeo:MEASure:RESult:NTSC:STORe <PathFile>
MMEMory<hw>:VIDeo:MEASure:RESult:PAL:STORe <PathFile>
MMEMory<hw>:VIDeo:MEASure:RESult:RGB:STORe <PathFile>
MMEMory<hw>:VIDeo:MEASure:RESult:Y:STORe <PathFile>

Saves the current measurement results as a CSV file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a new directory using `MMEMory:MDIRectory` on page 504.

Define the column delimiter and decimal separator in the CSV file by using `MMEMory<hw>:VIDeo:MEASure:STORe:SEParator` on page 658.

Suffix:
<hw> 1
Irrelevant

Parameters:

<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:VID:MEAS:RES:PAL:STOR "D:\VTE\UserData\MyTestFile.csv"`
Saves `MyTestFile.csv` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 157
See "Load button" on page 160

MMEMory<hw>:VIDeo:MEASure:SETTings:NTSC:LOAD <PathFile>
MMEMory<hw>:VIDeo:MEASure:SETTings:PAL:LOAD <PathFile>
MMEMory<hw>:VIDeo:MEASure:SETTings:RGB:LOAD <PathFile>
MMEMory<hw>:VIDeo:MEASure:SETTings:Y:LOAD <PathFile>

Loads the auto and measurement settings from the specified binary VMVTX file.

Suffix:

<hw> 1
Irrelevant

Parameters:

<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:VID:MEAS:SETT:PAL:LOAD "D:\VTE\UserData\MySettings.vmvtx"`
Loads `MySettings.vmvtx` from the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 160

MMEMory<hw>:VIDeo:MEASure:SETTings:NTSC:STORe <PathFile>
MMEMory<hw>:VIDeo:MEASure:SETTings:PAL:STORe <PathFile>
MMEMory<hw>:VIDeo:MEASure:SETTings:RGB:STORe <PathFile>
MMEMory<hw>:VIDeo:MEASure:SETTings:Y:STORe <PathFile>

Saves the current auto and measurement settings as a binary VMVTX file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a new directory using `MMEMory:MDIRectory` on page 504.

Suffix:

<hw> 1
Irrelevant

Parameters:

<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:VID:MEAS:SETT:PAL:STOR "D:\VTE\UserData\MySettings.vmvtx"`
Saves `MySettings.vmvtx` in the `D:\VTE\UserData` directory.

MMEMory<hw>:VIDeo:MEASure:STORe:SEParator <Type>

Defines the column delimiter and decimal separator used in the CSV file saved by:

- `MMEMory<hw>:VIDeo:MEASure:RESult:NTSC:STORe` on page 656
- `MMEMory<hw>:VIDeo:MEASure:RESult:PAL:STORe` on page 656
- `MMEMory<hw>:VIDeo:MEASure:RESult:RGB:STORe` on page 656
- `MMEMory<hw>:VIDeo:MEASure:RESult:Y:STORe` on page 656

Suffix:
<hw> 1
Irrelevant

Parameters:
<Type> COMMa | DOT

COMMa
Separates the decimal places by commas and the columns by semicolons.

DOT
Separates the decimal places by dots and the columns by commas.

*RST: COMMa

Example: `MMEM:VID:MEAS:STOR:SEP DOT`

Manual operation: See "Decimal Separator in csv File" on page 161

14.4.10 READ Subsystem

14.4.10.1 READ<hw>:ARRay Subsystem

READ<hw>:ARRay:SCOPe:TRACe? <View>

Queries the trace data for the specified view.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<View> YGReen | CBBLue | CRRed | CCVS | SYNC
CCVS
For composite input signals
YGReen | CBBLue | CRRed | SYNC
For component input signals

Return values:
<y-Values> <dblock>
Response consists of #518432 and a list of all y-values. Each y-value is a 8 byte floating point value.

Usage: Query only

Manual operation: See "View" on page 147

READ<hw>:ARRay:VIDeo:MEASure:TSIGnal:LOCation:TRACe?

Queries the trace data in the location window.

Suffix:
<hw> 1
Irrelevant

Return values:
<y-Values> <dblock>
The trace result data are supplied as block data. The raw data field consists of a header and any number of sample values. The header describes the structure of the field.

Example: `READ:ARR:VIDeo:MEAS:TSIG:LOC:TRAC?`
Query
`1,942,8,9,0,#522608`
Response

Usage: Query only

Manual operation: See "Location table" on page 163

READ<hw>:ARRay:VIDeo:VECTor?

Queries the x- and y-values of the vector diagram.

Suffix:
<hw> 1
Irrelevant

Return values:

<x- and y-Values> <dblock>

Response consists of #535200, list of all x-values and list of all y-values. Each x- and y-value is a 8 byte floating point value.

Usage: Query only

Manual operation: See "<Chart display>" on page 151

14.4.10.2 READ<hw>[:SCALar] Subsystem

READ<hw>[:SCALar]:SCOPe:TRACe:CURSor<cursor>? <View>

Queries the trace data at the specified cursor position.

Suffix:

<hw> 1
Irrelevant

<cursor> 1-2
Cursor number

Query parameters:

<View> YGReen | CBBLue | CRRed | CCVS | SYNC

CCVS
For composite input signals

YGReen | CBBLue | CRRed | SYNC
For component input signals

Return values:

<Level> Default unit: V

<Slope> Only available if a slope is evaluated in the cursor window.
Default unit: px

<Position> Only available if a slope is evaluated in the cursor window.
Default unit: px

Example: `READ:SCOP:TRAC:CURS2? YGR`
Query
`-1.445511E-001,-2.748654E+000,4.326204E+002`
Response: level = -0.145 V, slope = -2.748654 px, position = 432.6204 px

Usage: Query only

Manual operation: See "C1, C2" on page 149

READ<hw>[:SCALar]:VIDeo:AVERage:COUNt?

Queries the current averaging level.

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> The number changes until the set level is reached.

Example: `READ:VID:AVER:COUN?`
Query
`3.200000E+001`
Response

Usage: Query only

Manual operation: See "Averaging Level" on page 142

READ<hw>[:SCALar]:VIDeo:COMMand[:STATe]?

Queries which measurement is currently selected.

Suffix:
<hw> 1
Irrelevant

Return values:
<Tab> INPut | AUTO | SCOPe | VECTor
Corresponds to the tab selected in the manual operation.

Example: `READ:VID:COMM?`
Query
`VECT`
Response

Usage: Query only

READ<hw>[:SCALar]:VIDeo:COMPonent:FORMat:DIGital?

Queries the color model of digital component video input signals.

Suffix:
<hw> 1
Irrelevant

Return values:
<ColorModel> RGB | YCBCr

Example: `READ:VID:COMP:FORM:DIG?`
Query
`RGB`
Response

Usage: Query only

Manual operation: See "Component Format" on page 143

READ<hw>[:SCALar]:VIDeo:FORMat?

Queries the video resolution of the input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<Lines> Number of vertical total pixels

<Pixels> Number of horizontal total pixels
Default unit: px

<FrameRate> Frame rate of the input signal
Default unit: Hz

<PixelClock> Measured pixel clock of the input signal
Default unit: Hz

Example: `READ:VID:FORM?`
Query
`625, 8.640000E+002, 25, 1.350000E+007`
Response: lines = 625, pixels = 864 px, frame rate = 25 Hz, pixel clock = 13.50000 MHz

Usage: Query only

READ<hw>[:SCALar]:VIDeo:QUANtization?

Queries the quantization of the measured input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<Range> LRANge | FRANge

<Quantization> BIT8 | BIT10 | BIT12 | BIT16

Example: `READ:VID:QUAN?`
Query
`LRAN,BIT8`
Response: limited range, 8 bit

Usage: Query only

Manual operation: See "Quantization" on page 142
See "Quantization Range" on page 142

READ<hw>[:SCALar]:VIDeo:RESolution?

Queries the current video resolution of the measured input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<Current> "<horizontal resolution>x<vertical resolution> <frame rate>"

Example: `READ:VID:RES?`
Query
`"720x576i 25.00Hz"`
Response

Usage: Query only

Manual operation: See "Resolution" on page 141

READ<hw>[:SCALar]:VIDeo:SIGNal?

Queries the status of selected video analyzer input.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> UNSYnc | SYNCok

Example: `READ:VID:SIGN?`
Query
`SYNC`
Response

Usage: Query only

Manual operation: See "Signal" on page 141

READ<hw>[:SCALar]:VIDeo:STANdard?

Queries the video standard of the measured input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<Composite> NONE | BGPal | DKPal | IPAL | MNTSc

Example: READ:VID:STAN?
Query
BGP
Response

Usage: Query only

Manual operation: See "Video Standard" on page 141

14.4.10.3 READ<hw>[:SCALar]:VIDeo:MEASure Subsystem

Queries the results of the measured parameters.

READ<hw>[:SCALar]:VIDeo:MEASure:AMPDelay:NTSC? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:AMPDelay:PAL? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: composite

- Parameter group: amplitude and delay
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.1, "Amplitude and Delay (Composite Input Signal)", on page 591.

Return values:
<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:AMPD:PAL? SAA`
Query
`2.960250E+002,OK`
Response for "Sync Amplitude (abs)": MeasValue = 296.0250 mV, Status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:AMPDelay:RGB? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:AMPDelay:Y? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: amplitude and delay
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.1, "Amplitude and Delay (Component, HDMI, MHL Input Signal)", on page 598.

Return values:
<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:AMPD:Y? "SAAC1"`
Query
`2.982682E+002,OK`
Response for "Sync Amplitude Y (abs)": measured value = 298.2682 mV, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:FRESponse:NTSC? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:FRESponse:PAL? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: composite
- Parameter group: frequency response
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Query parameters:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.4, "Frequency Response (Composite Input Signal)", on page 593.

Return values:

<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:FRES:PAL? MABS`
Query
`INV,TSIG`
Response for "Multiburst Flag (abs)": measured value = invalid, status = TSIG

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:FRESponse:RGB? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:FRESponse:Y? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: frequency response
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Query parameters:

<ParameterName> Specifies the parameter. See Chapter 14.4.2.4, "Frequency Response (Component, HDMI, MHL Input Signal)", on page 601.

Return values:

<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:FRES:Y? "SXAposC1"`
Query
`1.812717E+000,OK`
Response for "SINx/x Amplitude pos Y": measured value = 1.812717 dB, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:JITTer:NTSC? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:JITTer:PAL? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: composite
- Parameter group: jitter
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.7, "Jitter (Composite Input Signal)", on page 597.

Return values:
<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:JITT:PAL? LJP`
Query
`4.194639E-001,OK`
Response for "Line Jitter pos peak": measured value = 0.4194639 ns, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:JITTer:RGB? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:JITTer:Y? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: jitter
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.7, "Jitter (Component, HDMI, MHL Input Signal)", on page 605.

Return values:

<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:JITT:Y? "LJPOS"`
Query
`9.907014E-002,OK`
Response for "Line Jitter pos peak": measured value = 0.09907014 ns, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:LINDist:NTSC? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:LINDist:PAL? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: composite
- Parameter group: linear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Query parameters:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.2, "Linear Distortions (Composite Input Signal)", on page 591.

Return values:

<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:LIND:PAL? FTD`
Query
`9.990000E+001,OFL`
Response for "Field Time Dist": measured value = 99.90000 %, status = OFL

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:LINDist:RGB? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:LINDist:Y? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: linear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Query parameters:

<ParameterName> Specifies the parameter. See Chapter 14.4.2.2, "Linear Distortions (Component, HDMI, MHL Input Signal)", on page 600.

Return values:

<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example:

```
READ:VID:MEAS:LIND:Y? "TTPAC1"
```

Query

```
INV,TSIG
```

Response for "2T Pulse Amplitude Y": measured value = invalid, status = TSIG

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:NLINdist:NTSC? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:NLINdist:PAL? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: composite
- Parameter group: nonlinear distortions
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Query parameters:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.3, "Nonlinear Distortions (Composite Input Signal)", on page 592.

Return values:

<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example:

```
READ:VID:MEAS:NLIN:PAL? GPOS
```

Query

```
1.570230E-002,OK
```

Response for "C NL Gain pos": measured value = 0.01570230 %, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:NLINdist:RGB? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:NLINdist:Y? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: nonlinear distortions
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.3, "Nonlinear Distortions (Component, HDMI, MHL Input Signal)", on page 601.

Return values:
<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example:
```
READ:VID:MEAS:NLIN:Y? "NLC1"
```
Query
```
INV,INV
```
Response for "Nonlinearity Y": measured value = invalid, status = INV

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:NOISe:NTSC? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:NOISe:PAL? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: composite
- Parameter group: noise
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.5, "Noise (Composite Input Signal)", on page 595.

Return values:
<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example:
```
READ:VID:MEAS:NOIS:PAL? LNU
```
Query
```
2.099193E-001,OK
```
Response for "Luminance Noise unw (abs)": measured value = 0.2099193 mV, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:NOISe:RGB? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:NOISe:Y? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: noise
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:

<hw> 1
Irrelevant

Query parameters:

<ParameterName> Specifies the parameter. See Chapter 14.4.2.5, "Noise (Component, HDMI, MHL Input Signal)", on page 604.

Return values:

<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:NOIS:Y? "S2NunwC2"`
Query
`9.990000E+001,OK`
Response for "Signal to Noise unw Cb/Pb": measured value = 99.90000 dB, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:TIMing:NTSC? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:TIMing:PAL? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: composite
- Parameter group: timing
- Video standard: BG/PAL or M/NTSC

Suffix:

<hw> 1
Irrelevant

Query parameters:

<ParameterName> Specifies the parameter. See Chapter 14.4.1.6, "Timing (Composite Input Signal)", on page 596.

Return values:

<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:TIM:PAL? FPDE`
Query
`2.35054678E+000,OK`
Response for "Equalizing Pulse Duration": measured value = 2.35054678 µs, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:TIMing:RGB? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:TIMing:Y? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: component, HDMI, MHL
- Parameter group: timing
- Video standard: component RGB or component YPbPr/YCbCr

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ParameterName> Specifies the parameter. See Chapter 14.4.2.6, "Timing (Component, HDMI, MHL Input Signal)", on page 604.

Return values:
<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:TIM:Y? "FFREQ"`
Query
`2.500050E+001,OK`
Response for "Frame Frequency": measured value = 25.00050 Hz, status = OK

Usage: Query only

READ<hw>[:SCALar]:VIDeo:MEASure:TSIGnal:LOCation:COUNt?

Queries the number of valid measurement locations.

Suffix:
<hw> 1
Irrelevant

Return values:
<Cursor> Number of measurement locations

Example: `READ:VID:MEAS:TSIG:LOC:COUN?`
Query
`5`
Response

Usage: Query only

Manual operation: See "Location table" on page 163

READ<hw>[:SCALar]:VIDeo:MEASure:TSIGnal:LOCation:CURSor<line>:NAME?

Queries the name of the location where the cursor is positioned.

Suffix:
<hw> 1
Irrelevant

<Cursor> 1 to 10
Number of the measurement location

Return values:
<LocationName> String containing the name of the location.

Example: `READ:VID:MEAS:TSIG:LOC:CURS2:NAME?`
Query
`"Bar White"`
Response

Usage: Query only

Manual operation: See "Location table" on page 163

READ<hw>[:SCALar]:VIDeo:MEASure:VTXT:NTSC? <ParameterName>
READ<hw>[:SCALar]:VIDeo:MEASure:VTXT:PAL? <ParameterName>

Queries the measured value of the specified parameter for:

- Input signal: composite
- Parameter group: video data
- Video standard: BG/PAL or M/NTSC

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ParameterName> Specifies the parameter. See Chapter 14.4.1.8, "Video Data (Composite Input Signal)", on page 597.

Return values:
<MeasValue> Measured value or `INV` if invalid.

<Status> Specifies the status. See Table 14-18.

Example: `READ:VID:MEAS:VTXT:PAL? VBAA`
Query
`INV,TSIG`
Response for "Vtxt Basic Amplitude (abs)": measured value = invalid, status = TSIG

Usage: Query only

14.4.10.4 READ<hw>[:SCALar]:VIDeo:VECTor Subsystem

Queries the results of the vector measurement.

READ<hw>[:SCALar]:VIDeo:VECTor:CBAR? <Color>

Queries the current measurement results for the specified color.

Suffix:

<hw> 1
Irrelevant

Query parameters:

<Color> WHITe | YELLow | CYAN | GREen | MAGenta | RED | BLUE | BLACk

Return values:

<LumAmpl> Measured value of the luminance amplitude
Default unit: mV

<ChrAmpl> Measured value of the chrominance amplitude
Default unit: mV

<ChrPhase> Measured value of the chrominance phase
Default unit: deg

Example:

```
READ:VID:VECT:CBAR? WHIT
```

Query

```
1.640000E+002,0.000000E+000,0.000000E+000
```

Response: luminance amplitude = 164 mV, chrominance amplitude = 0 mV, chrominance phase = 0 deg

Usage: Query only

Manual operation: See "<Measurement results table>" on page 151

READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:BLACk?
READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:BLUE?
READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:CYAN?

READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:GREen?
READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:MAGenta?
READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:RED?
READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:WHITe?
READ<hw>[:SCALar]:VIDeo:VECTor:CBAR:YELLow?

Queries the current measurement results for the given color.

Suffix:

<hw> 1
Irrelevant

Return values:

<LumAmpl> Measured value of the luminance amplitude
Default unit: mV

<ChrAmpl> Measured value of the chrominance amplitude
Default unit: mV

<ChrPhase> Measured value of the chrominance phase
Default unit: deg

Example: `READ:VID:VECT:CBAR:YELL?`
Query
`168,82,174`
Response: luminance amplitude = 168 mV, chrominance amplitude = 82 mV, chrominance phase = 174 deg

Usage: Query only

Manual operation: See "<Measurement results table>" on page 151

READ<hw>[:SCALar]:VIDeo:VECTor:CURSor?

Queries the current measurement results at the cursor position for all standards except PAL.

Suffix:

<hw> 1
Irrelevant

Return values:

<LumAmpl> Measured value of the luminance amplitude
Default unit: mV

<ChrAmpl> Measured value of the chrominance amplitude
Default unit: mV

<ChrPhase> Measured value of the chrominance phase
Default unit: deg

Example: READ:VID:VECT:CURS?
Query
168,82,174
Response: luminance amplitude = 168 mV, chrominance amplitude = 82 mV, chrominance phase = 174 deg

Usage: Query only

Manual operation: See "<Measurement results table>" on page 151

READ<hw>[:SCALar]:VIDeo:VECTor:CURSor:VPHase?

Queries the current measurement results at the cursor position for the PAL standard.

Suffix:
<hw> 1
Irrelevant

Return values:
<+VLumAmpl> Measured value of the luminance amplitude at cursor +V
Default unit: mV

<+VChrAmpl> Measured value of the chrominance amplitude at cursor +V
Default unit: mV

<+VChrPhase> Measured value of the chrominance phase at cursor +V
Default unit: deg

<-VLumAmpl> Measured value of the luminance amplitude at cursor -V
Default unit: mV

<-VChrAmpl> Measured value of the chrominance amplitude at cursor -V
Default unit: mV

<-VChrPhase> Measured value of the chrominance phase at cursor -V
Default unit: deg

Example: READ:VID:VECT:CURS:VPH?
Query
3.794469E-001,4.831664E-001,1.646417E+002,
3.351848E-001,3.631200E-001,2.015625E+002
Response: +VLumAmpl = 0.3794469 mV, +VChrAmpl = 0.4831664 mV, +VChrPhase = 164.6417 deg, -VLumAmpl = 0.3351848 mV, -VChrAmpl = 0.3631200 mV, -VChrPhase = 201.5625 deg

Usage: Query only

Manual operation: See "<Measurement results table>" on page 151

READ<hw>:ARRay:VIDeo:VECTor:TRACe:XTRace?

Queries the x-values of the line trace.

Suffix:
<hw> 1
Irrelevant

Return values:
<x-Values> <dblock>
Response consists of #515360 and a list of all x-values. Each x-value is a 8 byte floating point value.

Usage: Query only

Manual operation: See "<Chart display>" on page 151

READ<hw>:ARRay:VIDeo:VECTor:TRACe:YTRace?

Queries the y-values of the line trace.

Suffix:
<hw> 1
Irrelevant

Return values:
<y-Values> <dblock>
Response consists of #515360 and a list of all y-values. Each y-value is a 8 byte floating point value.

Usage: Query only

Manual operation: See "<Chart display>" on page 151

14.4.11 ROUTe Subsystem

Table 14-19: Addressing input types

<Input type>	Description	Required option
Composite	Composite input signal	Analog A/V RX module (R&S VT-B2370)
Component	Component input signal	Analog A/V RX module (R&S VT-B2370)
HDMI	HDMI input signal	HDMI RX 225 MHz module (R&S VT-B2360) HDMI RX 300 MHz module (R&S VT-B2361)
HDMI 600MHz	HDMI input signal	HDMI RX/TX 600 MHz module (R&S VT-B2363)
MHL	Mobile high definition link audio signals up to v1.2	MHL RX/TX module (R&S VT-B2350)
MHL PkdPx	Mobile high definition link audio signals up to v2.0	MHL RX PackedPixel module (R&S VT-B2351)

ROUTe<hw>:VIDeo:MODule:CATalog?

Queries the available input types and the slot position of the corresponding module.

Suffix:
<hw> 1
Irrelevant

Return values:
<Input> "<input type> [<module slot>], <input type> [<module slot>], ..."
with <input type> see Table 14-19
and [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:VID:MOD:CAT?`
Query
`"Composite [L1],Component [L1]"`
Response

Usage: Query only

Manual operation: See "Input" on page 143

ROUTe<hw>:VIDeo:MODule:SELect <Input>

Sets the input signal.

To determine the available input types use `ROUTe<hw>:VIDeo:MODule:CATalog?` on page 678.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Input> "<input type> [<module slot>]"
with <input type> see Table 14-19
and [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:VID:MOD:SEL "Component [L1]"`
Selects the composite input signal, slot 1.

Manual operation: See "Input" on page 143

ROUTe<hw>:VIDeo:SSELect <Enable>

Enables or disables the external synchronization for a component input signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Example: `ROUT:VID:SSEL ON`

Manual operation: See "External Sync" on page 144

14.4.12 SENSe Subsystem

SENSe<hw>:MEASure:VIDeo:FREeze <Enable>

If enabled, retains measurement results for documentation.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `SENS:MEAS:VID:FRE OFF`
Measurement results are changing continuously.

Manual operation: See "Freeze" on page 142

SENSe<hw>:VIDeo:VECTor:CORRection:GAIN[:INPut]:PHASe <Value>

Sets the phase to rotate the vector trace in the diagram.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -180 to 180
*RST: 0
Default unit: deg

Example: `SENS:VID:VECT:CORR:GAIN:PHAS 120`
Sets 120 deg.

Manual operation: See "Phase" on page 153

SENSe<hw>:VIDeo:VECTor:CORRection:GAIN[:INPut][:MAGNitude] <Value>

Sets the gain to expand the vector trace in the diagram.

Suffix:
<hw> 1
Irrelevant

Parameters:

<Value> Range: 0.01 to 10.00
*RST: 1.00

Example: `SENS:VID:VECT:CORR:GAIN 2`
Sets an expansion of factor 2.

Manual operation: See "Gain" on page 153

14.4.13 UNIT Subsystem

UNIT<hw>:VIDeo:MEASure:COMPonent:ANALog <Unit>

Sets the unit for the lower and upper limit for:

- Component input
- "Lum Bar Amplitude (abs)", "Sync Amplitude (abs)", "Color Bar Amplitude", "Multiburst Flag Amplitude (abs)" parameters

Suffix:

<hw> 1
Irrelevant

Parameters:

<Unit> PCT | MV
*RST: MV

Example: `UNIT:VID:MEAS:COMP:ANAL PCT`
Sets %.

Manual operation: See "Absolute Amplitude Unit" on page 159

UNIT<hw>:VIDeo:MEASure:COMPonent:DIGital <Unit>

Sets the unit for the lower and upper limit for:

- HDMI, MHL input
- "Lum Bar Amplitude (abs)", "Sync Amplitude (abs)", "Color Bar Amplitude", "Multiburst Flag Amplitude (abs)" parameters

Suffix:

<hw> 1
Irrelevant

Parameters:

<Unit> PCT | LR8 | LR10 | LR12 | LR16 | FR8 | FR10 | FR12 | FR16 | V
*RST: PCT

Example: `UNIT:VID:MEAS:COMP:DIG LR8`
Sets LRange8.

Manual operation: See "Absolute Amplitude Unit" on page 159

UNIT<hw>:VIDeo:MEASure:TSIGnal:LOCation <Unit>

Sets the unit for the measurement locations.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Unit> PIXel | US
*RST: PIXel

Example: `UNIT:VID:MEAS:TSIG:LOC US`
Sets µs.

Manual operation: See "Location Unit" on page 163

14.5 Audio Analyzer Application

These commands correlate to the functions provided in Chapter 9, "Audio Analyzer Application", on page 166.

14.5.1 ABORt Subsystem

ABORt<hw>:AUDio

Stops the running measurement.

Suffix:
<hw> 1
Irrelevant

Example: `ABOR:AUD`

Usage: Event

Manual operation: See "Stop button" on page 185

14.5.2 CALCulate Subsystem

CALCulate<hw>:AUDio:CROSstalk:AVERage:ALGorithm <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:ALGorithm` on page 685.

Manual operation: See "Averaging button" on page 197

CALCulate<hw>:AUDio:CROSstalk:AVERage:SETTling:TIME <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:SETTling:TIME` on page 685.

Manual operation: See "Averaging button" on page 197

CALCulate<hw>:AUDio:CROSstalk:AVERage:STATe <Enable>

See `CALCulate<hw>:AUDio:LEVel:AVERage:STATe` on page 685.

Manual operation: See "Averaging button" on page 197

CALCulate<hw>:AUDio:CROSstalk:AVERage:TIME <Setting>

See CALCulate<hw>:AUDio:LEVel:AVERage:TIME on page 686.

Manual operation: See "Averaging button" on page 197

CALCulate<hw>:AUDio:CROSstalk:AVERage:TOLerance <Setting>

See CALCulate<hw>:AUDio:LEVel:AVERage:TOLerance on page 686.

Manual operation: See "Averaging button" on page 197

CALCulate<hw>:AUDio:FRESponse:AVERage:COUNt <Value>

Sets the number of FFT measurements to be averaged for the chart display.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 20
*RST: 1

Example: CALC:AUD:FRES:AVER:COUN 2

Manual operation: See "Average Count" on page 191

CALCulate<hw>:AUDio:FRESponse:GRAPhics <Meas>

Selects the measurement you want to display as a chart.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Meas> LEVel | RMS | THDN | DLEVel | DRMS | DICPh
*RST: LEV

Example: CALC:AUD:FRES:GRAP THDN
Selects the THD+N measurement.

Manual operation: See "Graphics column" on page 192

CALCulate<hw>:AUDio:FRESponse:MODE <Meas>

Sets the measurement mode.

Suffix:
<hw> 1
Irrelevant

Parameters:

<Meas> FFT | FSWeep

*RST: FFT

Example: `CALC:AUD:FRES:MODE FSW`
Sets FFT spectrum.

Manual operation: See "Mode" on page 189

CALCulate<hw>:AUDio:FRESponse:PKHold <Enable>

Enables or disables the peak hold.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Enable> OFF | ON

*RST: OFF

Example: `CALC:AUD:FRES:PKH ON`

Manual operation: See "Peak Hold" on page 189

CALCulate<hw>:AUDio:IPHase:AVERage:ALGorithm <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:ALGorithm` on page 685.

Manual operation: See "Averaging button" on page 199

CALCulate<hw>:AUDio:IPHase:AVERage:SETTling:TIME <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:SETTling:TIME` on page 685.

Manual operation: See "Averaging button" on page 199

CALCulate<hw>:AUDio:IPHase:AVERage:STATe <Enable>

See `CALCulate<hw>:AUDio:LEVel:AVERage:STATe` on page 685.

Manual operation: See "Averaging button" on page 199

CALCulate<hw>:AUDio:IPHase:AVERage:TIME <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:TIME` on page 686.

Manual operation: See "Averaging button" on page 199

CALCulate<hw>:AUDio:IPHase:AVERage:TOLerance <Setting>

See CALCulate<hw>:AUDio:LEVel:AVERage:TOLerance on page 686.

Manual operation: See "Averaging button" on page 199

CALCulate<hw>:AUDio:LEVel:AVERage:ALGorithm <Setting>

Sets the algorithms for smoothing the measurement results.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> AVERage | FLAT
*RST: AVERage

Example: CALC:AUD:LEV:AVER:ALG FLAT
Reduces the effect of outlying measurements.

Manual operation: See "Algorithm" on page 184

CALCulate<hw>:AUDio:LEVel:AVERage:SETTling:TIME <Setting>

Sets the period used to calculate the median.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> Range: 0.000 to 10.000
*RST: 0.010
Default unit: s

Example: CALC:AUD:LEV:AVER:SETT:TIME 0.1
Sets 0.100 s.

Manual operation: See "Settling Time" on page 184

CALCulate<hw>:AUDio:LEVel:AVERage:STATe <Enable>

Enables or disables the averaging algorithm.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: CALC:AUD:LEV:AVER:STAT ON

Manual operation: See "Average" on page 184

CALCulate<hw>:AUDio:LEVel:AVERage:TIME <Setting>

Sets the period used for the moving average.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> Range: 0.000 to 10.000
*RST: 0.100
Default unit: s

Example: `CALC:AUD:LEV:AVER:TIME 0.01`
Sets 0.010 s.

Manual operation: See "Average Time" on page 184

CALCulate<hw>:AUDio:LEVel:AVERage:TOLerance <Setting>

Sets the tolerance range.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> Range: 1.000 to 100.000
*RST: 20.000
Default unit: %

Example: `CALC:AUD:LEV:AVER:TOL 10`
Sets 10.000 %.

Manual operation: See "Tolerance" on page 185

CALCulate<hw>:AUDio:LEVel:FUNCtion <Measurement>

Selects the type of level measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Measurement> RMS | PEAK | QPEA
*RST: RMS

Example: `CALC:AUD:LEV:FUNC QPEA`
Selects the quasi-peak measurement.

Manual operation: See "<Measurement selector>" on page 182

CALCulate<hw>:AUDio:LEVel:INTerval:TIME <Time>

Sets the interval time for the peak and quasi-peak measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Time> Range: 0.001 to 10.000
*RST: 0.001
Default unit: s

Example: `CALC:AUD:LEV:INT:TIME 3`

Manual operation: See "Interval Time Config dialog" on page 185

CALCulate<hw>:AUDio:THDN:AVERage:ALGorithm <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:ALGorithm` on page 685.

Manual operation: See "Averaging button" on page 188

CALCulate<hw>:AUDio:THDN:AVERage:SETTling:TIME <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:SETTling:TIME` on page 685.

Manual operation: See "Averaging button" on page 188

CALCulate<hw>:AUDio:THDN:AVERage:STATe <Enable>

See `CALCulate<hw>:AUDio:LEVel:AVERage:STATe` on page 685.

Manual operation: See "Averaging button" on page 188

CALCulate<hw>:AUDio:THDN:AVERage:TIME <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:TIME` on page 686.

Manual operation: See "Averaging button" on page 188

CALCulate<hw>:AUDio:THDN:AVERage:TOLerance <Setting>

See `CALCulate<hw>:AUDio:LEVel:AVERage:TOLerance` on page 686.

Manual operation: See "Averaging button" on page 188

14.5.3 CONFigure Subsystem

CONFigure<hw>:AUDio:CROSstalk:REFerence <Channel>

Sets the signal source channel.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Channel> "CH1" to "<highest channel for selected input source>"
*RST: "CH1"

Example: `CONF:AUD:CROS:REF "CH2"`
Sets channel 2.

Manual operation: See "Reference Channel" on page 197

CONFigure<hw>:AUDio:FRESponse:CURSor:FREQuency <Value>

Defines the position of the cursor on the x-axis. If you enter a new frequency value that does not match a valid frequency of the current measurement, the value is adjusted accordingly.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Default unit: Hz

Example: `CONF:AUD:FRES:CURS:FREQ 1000`
Sets 1 kHz.

Manual operation: See "Cursor" on page 193

CONFigure<hw>:AUDio:FRESponse:CURSor:STEP <Direction>

Moves the cursor one step in the defined direction.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Direction> PREViousfreq | NEXTfreq

Example: `CONF:AUD:FRES:CURS:STEP PREV`
Moves the cursor to the next lower frequency value.

Manual operation: See "Cursor" on page 193

CONFigure<hw>:AUDio:FRESponse:FFTSize <String>

Sets the length of the FFT.

Suffix:
<hw> 1
Irrelevant

Parameters:
<String> "256" | "512" | "1k" | "2k" | "4k" | "8k" | "16k" | "32k" | "64k" | "128k" | "256k" | "512k" | "1M"
*RST: "1k"

Example: `CONF:AUD:FRES:FFTS "256"`

Manual operation: See "FFT Size" on page 190

CONFigure<hw>:AUDio:FRESponse:REFerence <Channel>

Sets the channel that is used as reference signal to calculate the level difference and phase difference.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Channel> "CH1" | "CH2" | "CH3" | "CH4" | "CH5" | "CH6" | "CH7" | "CH8"
*RST: "CH1"

Example: `CONF:AUD:FRES:REF "CH2"`
Sets channel 2 as reference.

Manual operation: See "Reference Channel" on page 193

CONFigure<hw>:AUDio:FRESponse:RESult:CLEar

Resets the measurement.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:AUD:FRES:RES:CLE`

Usage: Event

Manual operation: See "Clear button" on page 193

CONFigure<hw>:AUDio:FRESponse:SELect <Enable>

Enables or disables the display of each input channel trace in the chart.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
Separate setting for each channel
*RST: ON,ON,ON,ON,ON,ON,ON,ON

Example: `CONF:AUD:FRES:SEL ON,ON,ON,ON,ON,ON,ON,ON`
Enables all channels.

Manual operation: See "<Channel table>" on page 190
See "Graphics column" on page 192

CONFigure<hw>:AUDio:INPut:COUPling <Type>

Sets the coupling of both analog audio inputs.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Type> AC | DC
*RST: AC

Example: `CONF:AUD:INP:COUP DC`

Manual operation: See "Coupling" on page 169

CONFigure<hw>:AUDio:INPut:IMPedance <Value>

Sets the impedance of both analog audio inputs.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> HIGH | R600
*RST: HIGH

Example: `CONF:AUD:INP:IMP R600`
Sets 600 Ω.

Manual operation: See "Impedance" on page 169

CONFigure<hw>:AUDio:IPHase:REFerence <Channel>

Sets the signal source channel.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Channel> "CH1" to "<highest channel for selected input source>"
*RST: "CH1"

Example: `CONF:AUD:IPH:REF "CH2"`
Sets channel 2.

Manual operation: See "Reference Channel" on page 199

CONFigure<hw>:AUDio:QC:CALibrate:AUTO:DELay <Enable>

Enables or disables the auto delay function.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:AUD:QC:CAL:AUTO:DEL ON`

Manual operation: See "Auto Delay" on page 202

CONFigure<hw>:AUDio:QC:CALibrate:AUTO:GAIN <Enable>

Enables or disables the automatic gain function.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:AUD:QC:CAL:AUTO:GAIN ON`

Manual operation: See "Auto Gain" on page 202

CONFigure<hw>:AUDio:QC:CALibrate:DELay <Setting>

Sets the delay between measurement starting and capture starting.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> Range: 0.000 to 5.000
*RST: 0.000
Default unit: s

Example: `CONF:AUD:QC:CAL:DEL 1`
Sets 1.000 s.

Manual operation: See "Delay" on page 202

CONFigure<hw>:AUDio:QC:CALibrate:GAIN <Setting>

Sets the gain applied to the captured audio before the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> Range: -24.00 to 24.00
*RST: 0.00
Default unit: dB

Example: `CONF:AUD:QC:CAL:GAIN 10`
Sets 10.00 dB.

Manual operation: See "Gain" on page 202

CONFigure<hw>:AUDio:QC:CALibrate:REFerence:GAIN <arg>

Sets the gain applied to the reference before the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<arg> Range: -36.00 to 12.00
*RST: 0.00
Default unit: dB

Example: `CONF:AUD:QC:CAL:REF:GAIN 3`
Sets 3.00 dB.

Manual operation: See "Gain" on page 202

CONFigure<hw>:AUDio:QC:REFerence <Channel>

Sets the channel used for audio capture.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Channel> "CH1" to "<highest channel for selected input source>"
*RST: "CH1"

Example: `CONF:AUD:QC:REF "CH2"`
Sets channel 2.

Manual operation: See "Channel" on page 201

CONFigure<hw>:AUDio:QC:RESult:SELect <MeasResults>

Sets the measurement results that are displayed in the result graph.

Suffix:
<hw> 1
Irrelevant

Parameters:
<MeasResults> The string is identical to the name used in the graphical user interface. To determine the available measurement results, use `SENSe<hw>:AUDio:QC:RESult:CATalog?` on page 761.

Example: `CONF:AUD:QC:RES:SEL "MOS"`
Displays the MOS result over time.

Manual operation: See "<Results graphs>" on page 203

CONFigure<hw>:AUDio:SNR:NLENgth <Noise>

Sets the noise length that is analyzed for each cycle.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Noise> S1 | S2 | S3 | S4 | S5
*RST: S1

Example: `CONF:AUD:SNR:NLEN S2`
Sets 2 s.

Manual operation: See "Noise Length" on page 195

CONFigure<hw>:AUDio:SNR:SLENgth <Signal>

Sets the signal length that is analyzed for each cycle.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Signal> S1 | S2 | S3 | S4 | S5
*RST: S1

Example: `CONF:AUD:SNR:SLEN S2`
Sets 2 s.

Manual operation: See "Signal Length" on page 194

CONFigure<hw>:AUDio:THDN:FREQuency:HIGH <Limit>

Sets the upper limit of the frequency range in which the measurement is performed.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Limit> Range: 0 to 80000
*RST: 20000
Default unit: Hz

Example: `CONF:AUD:THDN:FREQ:HIGH 30000`
Sets 30 kHz.

Manual operation: See "Frequency Range High" on page 187

CONFigure<hw>:AUDio:THDN:FREQuency:LOW <Limit>

Sets the lower limit of the frequency range in which the measurement is performed.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Limit> Range: 0 to 80000
*RST: 20
Default unit: Hz

Example: `CONF:AUD:THDN:FREQ:LOW 30`
Sets 30 Hz.

Manual operation: See "Frequency Range Low" on page 187

14.5.4 DISPlay Subsystem

DISPlay<hw>:AUDio:FRESponse:UNIT <Chart>

Sets the unit used for the y-axis of the frequency response chart.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Chart> VRMS | DBV | DBU | DBRA | DBRB | DB1Spl | DB2Spl | VPP
The available units depend on the selected device: analog or digital. For details, see Table 9-2 and Table 9-3.
*RST: DBV for analog devices; DBU for digital devices

Example: `DISP:AUD:FRES:UNIT DBRA`

Manual operation: See "<Channel table>" on page 190

DISPlay<hw>:AUDio:SELect:TAB <Tab>

Selects the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Tab> INPut | LEVel | THDN | FRESponse | SNR | CROSstalk | IPHase | QC | STATus
Corresponds to the tabs in the manual operation.

Example: `DISP:AUD:SEL:TAB LEV`

DISPlay<hw>:AUDio:WAVeform:ZOOM <Window>

Sets the zoom of the wave chart time window.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Window> MINimum | MEDium | MAXimum
*RST: MIN

Example: `DISP:AUD:WAV:ZOOM MAX`
Sets maximum zoom.

Manual operation: See "Zoom" on page 167

14.5.5 INITiate Subsystem

INITiate<hw>:AUDio <Measurement>

Starts the selected measurement. The currently running measurement is automatically stopped.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Measurement> NONE | LEVel | THDN | SNR | CROSstalk | IPHase | FRESponse | QC

Example: `INIT:AUD LEV`

Manual operation: See "Start button" on page 185

14.5.6 MMEMory Subsystem

MMEMory<hw>:AUDio:FRESponse:RESult:STORe <PathFile>

Saves the current measurement results as a CSV file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Define the column delimiter and decimal separator in the CSV file by using `MMEMory<hw>:AUDio:FRESponse:RESult:STORe:SEParator` on page 697.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:AUD:FRES:RES:STOR "D:\VTE\UserData\AUDIOANALYZER\MyTestFile.csv"`
Saves `MyTestFile.csv` in the `D:\VTE\UserData\AUDIOANALYZER` directory.

Manual operation: See "Save button" on page 193

MMEMory<hw>:AUDio:FRESponse:RESult:STORe:SEParator <Decimal>

Sets the decimal separator in the CSV file saved by `MMEMory<hw>:AUDio:FRESponse:RESult:STORe` on page 696.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Decimal> COMMa | DOT
*RST: COMM

Example: `MMEM:AUD:FRES:RES:STOR:SEP DOT`
Separates the decimal places by dots and the columns by commas.

Manual operation: See "Settings dialog" on page 189

MMEMory<hw>:AUDio:QC:REFerence:DATA:LOAD <PathFile>

Loads the reference file (*.wav).

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:AUD:QC:REF:DATA:LOAD "D:\VTE\UserData\AUDIOANALYZER\MyRefFile.wav"`
Loads `MyRefFile.wav` from the `D:\VTE\UserData\AUDIOANALYZER` directory.

Manual operation: See "Load button" on page 204

MMEMory<hw>:AUDio:QC:REPort:STORe <PathFile>

Saves the test report as a TXT file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:AUD:QC:REP:STOR "D:\VTE\UserData\AUDIOANALYZER\MyTestFile.txt"`
Saves `MyTestFile.txt` in the `D:\VTE\UserData\AUDIOANALYZER` directory.

Manual operation: See "Save button" on page 201

14.5.7 READ Subsystem

READ<hw>:ARRay:AUDio:FRESponse:TRACe? <ChannelNumber>

Queries the measurement results for the x- and y-trace.

Suffix:

<hw> 1
Irrelevant

Query parameters:

<ChannelNumber> Range depends on the input signal.

Return values:

<Trace> <dblock>

Example: `READ:ARR:AUD:FRES:TRAC? 2`
Query
`2,0,0,1,#10`
Response for channel 2.

Usage: Query only

Manual operation: See "<Chart display>" on page 190
See "<Chart display>" on page 192

READ<hw>:ARRay:AUDio:QC:RESult:TRACe?

Queries the x- and y-trace of the result graph.

Suffix:
<hw> 1
Irrelevant

Return values:
<x- and y-Values> <dblock>

Example: `READ:ARR:AUD:QC:RES:TRAC?`
Query
`#511200`
Response

Usage: Query only

Manual operation: See "<Results graphs>" on page 203

READ<hw>:ARRay:AUDio:QC:WAVeform:TRACe?

Queries the x- and y-trace of the waveform display.

Suffix:
<hw> 1
Irrelevant

Return values:
<x- and y-Values> <dblock>

Example: `READ:ARR:AUD:QC:WAV:TRAC?`
Query
`#516800`
Response

Usage: Query only

Manual operation: See "<Waveform display>" on page 204

READ<hw>[:SCALar]:AUDio:CHANnel:COUNt?

Queries the count of audio input channels available from the current selected audio source.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Number of audio input channels

Example: `READ:AUD:CHAN:COUN?`
Query
`2`
Response

Usage: Query only

Manual operation: See "Channel Count" on page 169

READ<hw>[:SCALar]:AUDio:COMMand:STATe?

Queries which measurement is running.

Suffix:
<hw> 1
Irrelevant

Return values:
<Measurement> NONE | LEVel | THDN | SNR | CROSstalk | IPHase | FRESponse | QC

Example: `READ:AUD:COMM:STAT?`
Query
`FRES`
Response: frequency response measurement

Usage: Query only

READ<hw>[:SCALar]:AUDio:CROSstalk:COMMand:PROGress?

Queries the progress of the crosstalk measurement. A detailed response is only available if:

- `ON` is set under `CALCulate<hw>:AUDio:CROSstalk:AVERage:STATe` on page 682
- > 6.5 s is set under `CALCulate<hw>:AUDio:CROSstalk:AVERage:TIME` on page 683

Suffix:
<hw> 1
Irrelevant

Return values:
<Indicator> **0 to 100**
Measurement progress in %

-1
Measurement is running or stopped but no detailed progress is available.

INV
Another measurement is running.

Example: READ:AUD:CROS:COMM:PROG?
Query
-1
Response

Usage: Query only

READ<hw>[:SCALar]:AUDio:CROSstalk:MEASure:VALue? <ChannelNumber>

Queries the measured crosstalk, RMS level and the corresponding frequency for each channel.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ChannelNumber>

Return values:
<Crosstalk> Unit is set by SENSe<hw>:AUDio:CROSstalk:UNIT on page 760.

<Level> Unit depends on the input device:
SENSe<hw>:AUDio:UNIT:LEVel:ANALog on page 766
SENSe<hw>:AUDio:UNIT:LEVel:DIGitial on page 767.

<Frequency> Unit is set by SENSe<hw>:AUDio:UNIT:FREQuency on page 766.

Example: READ:AUD:CROS:MEAS:VAL? 1
Query
0.000000E+000,-2.000993E+001,1.999966E+004
Response for channel 1: crosstalk = 0.000000 dB, level = -20.00993 dBV, frequency = 19 999.66 Hz

Usage: Query only

Manual operation: See "<Channel table>" on page 196

READ<hw>[:SCALar]:AUDio:DIPHase:MEASure:VALue? <ChannelNumber>

Queries the measured difference interchannel phase, level and the corresponding frequency for each channel.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ChannelNumber> Range depends on the input signal.

Return values:
<Phase> Unit is set by SENSe<hw>:AUDio:IPHase:UNIT on page 760.

<Level> Unit depends on the input device:
SENSe<hw>:AUDio:UNIT:LEVel:ANALog on page 766
SENSe<hw>:AUDio:UNIT:LEVel:DIGitial on page 767.

<Frequency> Unit is set by SENSe<hw>:AUDio:UNIT:FREQuency on page 766.

Example: READ:AUD:DIPH:MEAS:VAL? 1
Query
0.000000E+000,0.000000E+000,1.000000E+003
Response for channel 1: phase = 0.000000 deg, level = 0.000000 dBV, frequency = 1000.000 Hz

Usage: Query only

Manual operation: See "Phase Diff column" on page 192

READ<hw>[:SCALar]:AUDio:DLEVel:MEASure:VALue? <ChannelNumber>

Queries the measured RMS difference level and the corresponding frequency for each channel.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ChannelNumber> Range depends on the input signal.

Return values:
<Level> Unit depends on the input device:
SENSe<hw>:AUDio:UNIT:LEVel:ANALog on page 766
SENSe<hw>:AUDio:UNIT:LEVel:DIGitial on page 767.

<Frequency> Unit is set by SENSe<hw>:AUDio:UNIT:FREQuency on page 766.

Example: READ:AUD:DLEV:MEAS:VAL? 1
Query
0.000000E+000,1.000000E+003
Response for channel 1: level = 0.000000 dBV, frequency = 1000.000 Hz

Usage: Query only

Manual operation: See "Level Diff column" on page 192

READ<hw>[:SCALar]:AUDio:FRESponse:COMMand:PROGress?

Queries the progress of the frequency response measurement. A detailed response is only available if:

- FFT is set under CALCulate<hw>:AUDio:FRESponse:MODE on page 683

- ≥ "128k" is set under CONFigure<hw>:AUDio:FRESponse:FFTSize on page 689

Suffix:
<hw> 1
Irrelevant

Return values:
<Indicator> **0 to 100**
Measurement progress in %

-1
Measurement is running or stopped but no detailed progress is available.

INV
Another measurement is running.

Example: READ:AUD:FRES:COMM:PROG?
Query
100
Response

Usage: Query only

READ<hw>[:SCALar]:AUDio:IPHase:COMMand:PROGress?

Queries the progress of the interchannel phase measurement. A detailed response is only available if ON is set under CALCulate<hw>:AUDio:IPHase:AVERage:STATe on page 684.

Suffix:
<hw> 1
Irrelevant

Return values:
<Indicator> **0 to 100**
Measurement progress in %

-1
Measurement is running or stopped but no detailed progress is available.

INV
Another measurement is running.

Example: READ:AUD:IPH:COMM:PROG?
Query
-1
Response

Usage: Query only

READ<hw>[:SCALar]:AUDio:IPHase:MEASure:VALue? <ChannelNumber>

Queries the measured interchannel phase, RMS level and the corresponding frequency for each channel.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ChannelNumber> Range depends on the input signal.

Return values:
<Phase> Unit is set by `SENSe<hw>:AUDio:IPHase:UNIT` on page 760.

<Level> Unit depends on the input device:
`SENSe<hw>:AUDio:UNIT:LEVel:ANALog` on page 766
`SENSe<hw>:AUDio:UNIT:LEVel:DIGitial` on page 767.

<Frequency> Unit is set by `SENSe<hw>:AUDio:UNIT:FREQuency` on page 766.

Example: `READ:AUD:IPH:MEAS:VAL? 1`
Query
`0.000000E+000,-2.000972E+001,2.000017E+004`
Response for channel 1: phase = 0.000000 deg, level = -20.00972 dBV, frequency = 20 000.17 Hz

Usage: Query only

Manual operation: See "<Channel table>" on page 198

READ<hw>[:SCALar]:AUDio:LEVel:COMMand:PROGress?

Queries the progress of the level measurement. A detailed response is only available if `ON` is set under `CALCulate<hw>:AUDio:LEVel:AVERage:STATe` on page 685.

Suffix:
<hw> 1
Irrelevant

Return values:
<Indicator> **0 to 100**
Measurement progress in %

-1
Measurement is running or stopped but no detailed progress is available.

INV
Another measurement is running.

Example: `READ:AUD:LEV:COMM:PROG?`
Query
`-1`
Response

Usage: Query only

READ<hw>[:SCALar]:AUDio:LEVel:MEASure:VALue? <ChannelNumber>

Queries the measured RMS level and the corresponding frequency for each channel.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ChannelNumber> Range depends on the input signal.

Return values:
<Level> Unit depends on the input device:
`SENSe<hw>:AUDio:UNIT:LEVel:ANALog` on page 766
`SENSe<hw>:AUDio:UNIT:LEVel:DIGitial` on page 767.

<Frequency> Unit is set by `SENSe<hw>:AUDio:UNIT:FREQuency` on page 766.

Example: `READ:AUD:LEV:MEAS:VAL? 1`
Query
`-2.001000E+001,2.000017E+004`
Response for channel 1: level = -20.01000 dBV, frequency = 20 000.17 Hz

Usage: Query only

Manual operation: See "<Channel table>" on page 182

READ<hw>[:SCALar]:AUDio:QC:COMMand:PROGress?

Queries the progress of the quality measurement.

Suffix:
<hw> 1
Irrelevant

Return values:
<Indicator> Progress in %.

Example: `READ:AUD:QC:COMM:PROG?`
Query
`100`
Response

Usage: Query only

Manual operation: See "<Status display>" on page 202

READ<hw>[:SCALar]:AUDio:QC:COMMand:STATe?

Queries the status of the quality measurement.

Suffix:
<hw> 1
Irrelevant

Return values:
<QualityMeas> IDLE | CAPTure | ANALyze | FINished | CALibrate

Example: `READ:AUD:QC:COMM:STAT?`
Query
`FIN`
Response

Usage: Query only

Manual operation: See "<Status display>" on page 202

READ<hw>[:SCALar]:AUDio:QC:MEASure:MOS?

Queries the final mean opinion score (MOS) after a successful measurement has been completed.

Suffix:
<hw> 1
Irrelevant

Return values:
<MeasValue> MOS value

Example: `READ:AUD:QC:MEAS:MOS?`
Query
`2.105680E+000`
`Response`

Usage: Query only

Manual operation: See "MOS Score" on page 201

READ<hw>[:SCALar]:AUDio:QC:REFerence:DISFilename?

Queries the filename of the reference file that is loaded.

Suffix:
<hw> 1
Irrelevant

Return values:
<Filename> Reference filename

Example: `READ:AUD:QC:REF:DISF?`
Query
`"MyRefFile.wav"`
Response

Usage: Query only

Manual operation: See "Load button" on page 204

READ<hw>[:SCALar]:AUDio:QC:REFerence:LENGth?

Queries the reference signal length.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Default unit: s

Example: `READ:AUD:QC:REF:LENG?`
Query
`5.760000E+008`
Response

Usage: Query only

Manual operation: See "Load button" on page 204

READ<hw>[:SCALar]:AUDio:QC:REFerence:VALFile?

Queries the validity of the reference file.

Suffix:
<hw> 1
Irrelevant

Return values:
<Validity> OK | ERRor | UNSupported

Example: `READ:AUD:QC:REF:VALF?`
Query
`OK`
Response

Usage: Query only

Manual operation: See "Load button" on page 204

READ<hw>[:SCALar]:AUDio:QC:REPort? <Entry>

Queries the content of the specified entry line in the audio quality test report.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<Entry> Number of the entry line in the audio quality test report.
You can query the total number of entries using `READ<hw>[:SCALar]:AUDio:QC:REPort:COUNt?` on page 711.
Range: 0 (= first line) to total number

Return values:
<Result> Contents of the line

Example: `READ:AUD:QC:REP? 2`
Query
`1,0x0000,"PESQ Version: 1.13"`
Response: Contents of third line.

Usage: Query only

Manual operation: See "<Test report>" on page 201

READ<hw>[:SCALar]:AUDio:QC:REPort:COUNt?

Queries the number of entry lines in the audio quality test report.

Suffix:
<hw> 1
Irrelevant

Return values:
<Entries> Total number of lines

Example: `READ:AUD:QC:REP:COUN?`
Query
`60`
Response

Usage: Query only

Manual operation: See "<Test report>" on page 201

READ<hw>[:SCALar]:AUDio:QC:RESult:XSCale?

Queries the x-scale of the result graph.

Suffix:
<hw> 1
Irrelevant

Return values:
<Min> Minimum value of the x-scale.

<Max> Maximum value of the x-scale.

Example: READ:AUD:QC:RES:XSC?
Query
NAV,NAV
Response

Usage: Query only

Manual operation: See "<Results graphs>" on page 203

READ<hw>[:SCALar]:AUDio:QC:RESult:YSCale?

Queries the y-scale of the result graph.

Suffix:
<hw> 1
Irrelevant

Return values:
<Min> Minimum value of the y-scale.

<Max> Maximum value of the y-scale.

Example: READ:AUD:QC:RES:YSC?
Query
-1.390500E+000,5.000000E+000
Response

Usage: Query only

Manual operation: See "<Results graphs>" on page 203

READ<hw>[:SCALar]:AUDio:QC:WAVeform:XSCale?

Queries the x-scale of the waveform display.

Suffix:
<hw> 1
Irrelevant

Return values:
<Min> Minimum value of the x-scale.

<Max> Maximum value of the x-scale.

Example: READ:AUD:QC:WAV:XSC?
Query
NAV,NAV
Response

Usage: Query only

Manual operation: See "<Waveform display>" on page 204

READ<hw>[:SCALar]:AUDio:QC:WAVeform:YSCale?

Queries the y-scale of the waveform display.

Suffix:
<hw> 1
Irrelevant

Return values:
<Min> Minimum value of the y-scale.

<Max> Maximum value of the y-scale.

Example: `READ:AUD:QC:WAV:YSC?`
Query
`NAV,NAV`
Response

Usage: Query only

Manual operation: See "<Waveform display>" on page 204

READ<hw>[:SCALar]:AUDio:SAMPle:FORMat?

Queries the current sample bit size.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Bit size

Example: `READ:AUD:SAMP:FORM?`
Query
`24`
Response

Usage: Query only

Manual operation: See "Sample Format" on page 169

READ<hw>[:SCALar]:AUDio:SAMPle:RATE?

Queries the current sample rate from the selected audio source.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Default unit: Hz

Example: `READ:AUD:SAMP:RATE?`
Query
`1.920000E+005`
Response: 192 kHz

Usage: Query only

Manual operation: See "Sample Rate" on page 169

READ<hw>[:SCALar]:AUDio:SIGNal?

Queries the status of selected audio analyzer input.

Suffix:
<hw> 1
Irrelevant

Return values:
<Synchronization> UNSYnc | SYNCok

Example: `READ:AUD:SIGN?`
Query
`SYNC`
Response

Usage: Query only

READ<hw>[:SCALar]:AUDio:SNR:COMMand:PROGress?

Queries the progress of the signal to noise ratio (SNR) measurement.

Suffix:
<hw> 1
Irrelevant

Return values:
<Indicator> Measurement progress in %

Example: `READ:AUD:SNR:COMM:PROG?`
Query
`33`
Response: 33 %

Usage: Query only

READ<hw>[:SCALar]:AUDio:SNR:MEASure:VALue? <ChannelNumber>

Queries the measured signal to noise ratio (SNR) for each channel.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ChannelNumber> Range depends on the input signal.

Return values:
<SNR> Unit is set by `SENSe<hw>:AUDio:SNR:UNIT` on page 766.

Example: `READ:AUD:SNR:MEAS:VAL? 1`
Query
`1.010008E-004`
Response for channel 1: SNR = 0.0001010008 dB

Usage: Query only

Manual operation: See "SNR" on page 194

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:AUDiomode?

Queries the audio mode. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> PCM | OTHer

Example: `READ:AUD:SPD:CHAN:STAT:CONS:AUD?`
Query

Response: linear PCM

Usage: Query only

Manual operation: See "Audio Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:CATegorycode?

Queries the category code. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> GENeral | LASer | DCSP | MAGTape | BRDCst | MIC-w/o | MIC-w/ | ADC-w/o | ADC-w/ | SSMP | REServed

Example: `READ:AUD:SPD:CHAN:STAT:CONS:CAT?`
Query
`SSMP`
Response

Usage: Query only

Manual operation: See "Category Code" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:CHANnel?

Queries the channel number. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NONE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16

Example: `READ:AUD:SPD:CHAN:STAT:CONS:CHAN?`
Query
`1`
Response

Usage: Query only

Manual operation: See "Channel Number" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:CLKacc?

Queries the clock accuracy. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> LEV1 | LEV2 | LEV3 | NONE

Example: `READ:AUD:SPD:CHAN:STAT:CONS:CLK?`
Query
`LEV1`
Response

Usage: Query only

Manual operation: See "Clock Accuracy" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:COPYbit?

Queries the copy bit. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NOTindicated | COPYright

Example: READ:AUD:SPD:CHAN:STAT:CONS:COPY?
Query
NOT
Response

Usage: Query only

Manual operation: See "Copy Bit" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:CSMode?

Queries the channel status mode. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> 0 | REServed

Example: READ:AUD:SPD:CHAN:STAT:CONS:CSM?
Query
0
Response

Usage: Query only

Manual operation: See "Channel Status Mode" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:AUDiomode?

Queries the audio mode data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: READ:AUD:SPD:CHAN:STAT:CONS:DATA:AUD?
Query
0
Response

Usage: Query only

Manual operation: See "Audio Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:CATegorycode?

Queries the category code data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:CAT?`
Query
0
Response

Usage: Query only

Manual operation: See "Category Code" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:CHANnel?

Queries the channel number data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:CHAN?`
Query
0
Response

Usage: Query only

Manual operation: See "Channel Number" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:CLKacc?

Queries the clock accuracy data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:CLK?`
Query
0
Response

Usage: Query only

Manual operation: See "Clock Accuracy" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:COPYbit?

Queries the copy bit data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:COPY?`
Query
0
Response

Usage: Query only

Manual operation: See "Copy Bit" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:CSMode?

Queries the channel status mode data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:CSM?`
Query
0
Response

Usage: Query only

Manual operation: See "Channel Status Mode" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:LBIT?

Queries the L-bit data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:LBIT?`
Query
0
Response

Usage: Query only

Manual operation: See "L-Bit" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:MWLength?

Queries the maximal word length data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:MWL?`
Query
0
Response

Usage: Query only

Manual operation: See "Maximum Word Length" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:OSRate?

Queries the original sampling frequency data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:OSR?`
Query
0
Response

Usage: Query only

Manual operation: See "Original Sampling Frequency" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:PREEmphasis?

Queries the pre-emphasis data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:PRE?`
Query
0
Response

Usage: Query only

Manual operation: See "Pre-Emphasis" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:SOURce?

Queries the source number data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:SOUR?`
Query
0
Response

Usage: Query only

Manual operation: See "Source Number" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:SRATe?

Queries the sampling frequency data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:SRAT?`
Query
0
Response

Usage: Query only

Manual operation: See "Sampling Frequency" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:DATA:WLENgth?

Queries the word length data. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:CONS:DATA:WLEN?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Word Length" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:LBIT?

Queries the L-bit. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NONE | PRERec

Example: `READ:AUD:SPD:CHAN:STAT:CONS:LBIT?`
Query
`NONE`
Response

Usage: Query only

Manual operation: See "L-Bit" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:MWLength?

Queries the maximal word length. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> B20 | B24

Example: `READ:AUD:SPD:CHAN:STAT:CONS:MWL?`
Query
`B20`
Response

Usage: Query only

Manual operation: See "Maximum Word Length" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:OSRate?

Queries the original sampling frequency. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> HZ44100 | HZ88200 | HZ22050 | HZ176400 | HZ48000 | HZ96000 | HZ24000 | HZ192000 | HZ8000 | HZ11025 | HZ12000 | HZ32000 | HZ16000 | REServed | NIND

Example: `READ:AUD:SPD:CHAN:STAT:CONS:OSR?`
Query
`HZ88200`
Response

Usage: Query only

Manual operation: See "Original Sampling Frequency" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:PREemphasis?

Queries the pre-emphasis. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NONE | 50/15 | REServed

Example: `READ:AUD:SPD:CHAN:STAT:CONS:PRE?`
Query
`NONE`
Response

Usage: Query only

Manual operation: See "Pre-Emphasis" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:SOURce?

Queries the source number. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NONE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16

Example: `READ:AUD:SPD:CHAN:STAT:CONS:SOUR?`
Query
`12`
Response

Usage: Query only

Manual operation: See "Source Number" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:SRATe?

Queries the sampling frequency. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> HZ22050 | HZ44100 | HZ88200 | HZ176400 | HZ24000 | HZ48000 | HZ96000 | HZ192000 | HZ32000 | NOTindicated

Example: `READ:AUD:SPD:CHAN:STAT:CONS:SRAT?`
Query
`HZ44100`
Response

Usage: Query only

Manual operation: See "Sampling Frequency" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:AUDiomode?

Queries the audio mode validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:AUD?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Audio Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:CATegorycode?

Queries the category code validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:CAT?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Category Code" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:CHANnel?

Queries the channel number validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:CHAN?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Channel Number" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:CLKacc?

Queries the clock accuracy validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:CLK?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Clock Accuracy" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:COPYbit?

Queries the copy bit validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:COPY?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Copy Bit" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:CSMode?

Queries the channel status mode validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:CSM?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Channel Status Mode" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:LBIT?

Queries the L-bit validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VALidity:LBIT?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "L-Bit" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:MWLength?

Queries the maximal word length validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:MWL?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Maximum Word Length" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:OSRate?

Queries the original sampling frequency validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:OSR?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Original Sampling Frequency" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:PREEmphasis?

Queries the pre-emphasis validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:PRE?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Pre-Emphasis" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:SOURce?

Queries the source number validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:SOUR?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Source Number" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:SRATe?

Queries the sampling frequency validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:SRAT?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Sampling Frequency" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:VALidity:WLENgth?

Queries the word length validity. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:CONS:VAL:WLEN?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Word Length" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:CONSumer:WLENgth?

Queries the word length. For consumer mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 | B24

Example: `READ:AUD:SPD:CHAN:STAT:CONS:WLEN?`
Query
`B16`
Response

Usage: Query only

Manual operation: See "Word Length" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:DATA:MODE?

Queries the SPDIF channel status data mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enabled> 1 | 0

Example: `READ:AUD:SPD:CHAN:STAT:DATA:MODE?`
Query
`1`
Response: enabled

Usage: Query only

Manual operation: See "Channel Status Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:MODE?

Queries the mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> CONSumer | PROFessional

Example: `READ:AUD:SPD:CHAN:STAT:MODE?`
Query
`PROF`
Response

Usage: Query only

Manual operation: See "Channel Status Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:ALIGnment?

Queries the alignment level. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NIND | DB-20 | DB-18 | REServed

Example: `READ:AUD:SPD:CHAN:STAT:PROF:ALIG?`
Query
`NIND`
Response: not indicated

Usage: Query only

Manual operation: See "Alignment Level" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:AUDiomode?

Queries the audio mode. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> PCM | OTHer

Example: `READ:AUD:SPD:CHAN:STAT:PROF:AUD?`
Query
`PCM`
Response: linear PCM

Usage: Query only

Manual operation: See "Audio Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:CHANmode?

Queries the channel mode. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NIND | DCHannel | STEReo | MONO | P/S | MULTi | SCHannel | REServed

Example: `READ:AUD:SPD:CHAN:STAT:PROF:CHAN?`
Query
`NIND`
Response: not indicated

Usage: Query only

Manual operation: See "Channel Mode" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:CHNumber?

Queries the channel number. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NONE | 1

Example: `READ:AUD:SPD:CHAN:STAT:PROF:CHN?`
Query
`1`
Response

Usage: Query only

Manual operation: See "Channel Number" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:CRCFlag?

Queries the cyclic redundancy check (CRC) flag. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> OK | NOT

Example: `READ:AUD:SPD:CHAN:STAT:PROF:CRCF?`
Query
`OK`
Response

Usage: Query only

Manual operation: See "Cyclic Redundancy Check Character" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:ALIGnment?

Queries the alignment level data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:ALIG?`
Query
0
Response

Usage: Query only

Manual operation: See "Alignment Level" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:AUDiomode?

Queries the audio mode data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:AUD?`
Query
0
Response

Usage: Query only

Manual operation: See "Audio Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:CHANmode?

Queries the encoded channel mode data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:CHAN?`
Query
0
Response

Usage: Query only

Manual operation: See "Channel Mode" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:CHNumber?

Queries the channel number data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:CHN?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Channel Number" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:CRCFlag?

Queries the cyclic redundancy check (CRC) flag data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:CRCF?`
Query
`132`
Response

Usage: Query only

Manual operation: See "Cyclic Redundancy Check Character" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:DEData?

Queries the channel destination data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:DED?`
Query
`281474976710655`
Response

Usage: Query only

Manual operation: See "Channel Destination" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:ESRate?

Queries the encoded sampling frequency data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:ESR?`
Query
`1`
Response

Usage: Query only

Manual operation: See "Encoded Sampling Frequency" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:LOCK?

Queries the lock indication data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:LOCK?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Lock Indication" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:MCMControl?

Queries the multichannel mode control data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:MCMC?`
Query
0
Response

Usage: Query only

Manual operation: See "Multichannel Mode Control Bit" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:MCMNumber?

Queries the multichannel mode number data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:MCMN?`
Query
0
Response

Usage: Query only

Manual operation: See "Multichannel Mode" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:MCNumber?

Queries the multichannel number data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:MCN?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Multichannel Number" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:ORData?

Queries the origin data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:ORD?`
Query
`281474976710655`
Response

Usage: Query only

Manual operation: See "Origin Data" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:PREemphasis?

Queries the pre-emphasis data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:PRE?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Pre-Emphasis" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:REFSignal?

Queries the reference signal data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:REFS?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Reference Signal" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:SADDress?

Queries the local sample address code data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:SADD?`
Query
`2147483647`
Response

Usage: Query only

Manual operation: See "Local Address" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:SRATe?

Queries the sampling frequency data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:SRAT?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Sampling Frequency" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:SRSCale?

Queries the sampling frequency scaling flag data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:SRSC?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Sampling Frequency Scaling" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:TODaddress?

Queries the time-of-day sample address code data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:TOD?`
Query
`2147483647`
Response

Usage: Query only

Manual operation: See "Time of Day" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:UBLength?

Queries the encoded use of auxiliary sample bits data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:UBL?`
Query
`4`
Response

Usage: Query only

Manual operation: See "Use of Auxiliary Bits" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:UBManage?

Queries the encoded user bits management data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:UBM?`
Query
`0`
Response

Usage: Query only

Manual operation: See "User Bits Management" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:VALidflag?

Queries the validity flag data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:VAL?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Valid Flag" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DATA:WLENgth?

Queries the encoded audio sample word length data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DATA:WLEN?`
Query
`5`
Response

Usage: Query only

Manual operation: See "Word Length" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:DEData?

Queries the destination data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting>

Example: `READ:AUD:SPD:CHAN:STAT:PROF:DED?`
Query
`"Destination"`
Response

Usage: Query only

Manual operation: See "Channel Destination" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:ESRate?

Queries the encoded sampling frequency. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NOTindicated | HZ48000 | HZ44100 | HZ32000

Example: `READ:AUD:SPD:CHAN:STAT:PROF:ESR?`
Query
`HZ44100`
Response

Usage: Query only

Manual operation: See "Encoded Sampling Frequency" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:FLAG?

Queries the validity flag. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> OK | NOT

Example: `READ:AUD:SPD:CHAN:STAT:PROF:FLAG?`
Query
`OK`
Response

Usage: Query only

Manual operation: See "Valid Flag" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:LOCK?

Queries the lock indication. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NOTindicated | UNLocked

Example: `READ:AUD:SPD:CHAN:STAT:PROF:LOCK?`
Query
`NOT`
Response

Usage: Query only

Manual operation: See "Lock Indication" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:MCMControl?

Queries the multichannel mode control. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> UNDefined | MULTi

Example: `READ:AUD:SPD:CHAN:STAT:PROF:MCMC?`
Query
`UND`
Response

Usage: Query only

Manual operation: See "Multichannel Mode Control Bit" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:MCMNumber?

Queries the multichannel mode number. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> 0 | 1 | 2 | 3 | NONE

Example: `READ:AUD:SPD:CHAN:STAT:PROF:MCMN?`
Query
`1`
Response

Usage: Query only

Manual operation: See "Multichannel Mode" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:MCNumber?

Queries the multichannel number. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NONE | 1

Example: `READ:AUD:SPD:CHAN:STAT:PROF:MCN?`
Query
`1`
Response

Usage: Query only

Manual operation: See "Multichannel Number" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:ORData?

Queries the origin data. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> String

Example: `READ:AUD:SPD:CHAN:STAT:PROF:ORD?`
Query
`"Origin"`
Response

Usage: Query only

Manual operation: See "Origin Data" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:PREemphasis?

Queries the pre-emphasis. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NOTindicated | 50/15 | ITU-t | NONE

Example: `READ:AUD:SPD:CHAN:STAT:PROF:PRE?`
Query
`NOT`
Response

Usage: Query only

Manual operation: See "Pre-Emphasis" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:REFSignal?

Queries the reference signal. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NONE | 1GRade | 2GRade | REServed

Example: `READ:AUD:SPD:CHAN:STAT:PROF:REFS?`
Query
`NONE`
Response

Usage: Query only

Manual operation: See "Reference Signal" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:SADDress?

Queries the local sample address code. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> String

Example: `READ:AUD:SPD:CHAN:STAT:PROF:SADD?`
Query
`2147483647`
Response

Usage: Query only

Manual operation: See "Local Address" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:SRATe?

Queries the sampling frequency. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NIND | HZ24000 | HZ96000 | HZ192000 | HZ22050 | HZ88200 | HZ176400 | REServed | USER

Example: `READ:AUD:SPD:CHAN:STAT:PROF:SRAT?`
Query
`HZ192000`
Response

Usage: Query only

Manual operation: See "Sampling Frequency" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:SRSCale?

Queries the sampling frequency scaling flag. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> NONE | 1/1.001

Example: `READ:AUD:SPD:CHAN:STAT:PROF:SRSC?`
Query
`NONE`
Response

Usage: Query only

Manual operation: See "Sampling Frequency Scaling" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:TODaddress?

Queries the time-of-day sample address code. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> Numeric value

Example: `READ:AUD:SPD:CHAN:STAT:PROF:TOD?`
Query
`2147483647`
Response

Usage: Query only

Manual operation: See "Time of Day" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:UBLength?

Queries the encoded use of auxiliary sample bits. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> B20/und | B24 | B20/cs | USER

Example: `READ:AUD:SPD:CHAN:STAT:PROF:UBL?`
Query
`B24`
Response

Usage: Query only

Manual operation: See "Use of Auxiliary Bits" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:UBManage?

Queries the encoded user bits management. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> UNDefined | B192 | AES18 | USER | GENeral

Example: `READ:AUD:SPD:CHAN:STAT:PROF:UBM?`
Query
`B192`
Response

Usage: Query only

Manual operation: See "User Bits Management" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:ALIGnment?

Queries the alignment level validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:ALIG?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Alignment Level" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:AUDiomode?

Queries the audio mode validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: READ:AUD:SPD:CHAN:STAT:PROF:VAL:AUD?
Query
VAL
Response

Usage: Query only

Manual operation: See "Audio Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:CHANmode?

Queries the encoded channel mode validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: READ:AUD:SPD:CHAN:STAT:PROF:VAL:CHAN?
Query
VAL
Response

Usage: Query only

Manual operation: See "Channel Mode" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:CHNumber?

Queries the channel number validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: READ:AUD:SPD:CHAN:STAT:PROF:VAL:CHN?
Query
VAL
Response

Usage: Query only

Manual operation: See "Channel Number" on page 175

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:CRCFlag?

Queries the cyclic redundancy check (CRC) flag validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:CRCF?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Cyclic Redundancy Check Character" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:DEData?

Queries the channel destination data validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:DED?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Channel Destination" on page 174

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:ESRate?

Queries the encoded sampling frequency validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:ESR?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Encoded Sampling Frequency" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:LOCK?

Queries the lock indication validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:LOCK?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Lock Indication" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:MCMControl?

Queries the multichannel mode control validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:MCMC?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Multichannel Mode Control Bit" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:MCMNumber?

Queries the multichannel mode number validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:MCMN?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Multichannel Mode" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:MCNumber?

Queries the multichannel number validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:MCN?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Multichannel Number" on page 177

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:ORData?

Queries the origin data validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:ORD?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Origin Data" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:PREEmphasis?

Queries the pre-emphasis validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:PRE?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Pre-Emphasis" on page 178

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:REFSignal?

Queries the reference signal validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:REFS?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Reference Signal" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:SADDress?

Queries the local sample address code validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:SADD?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Local Address" on page 176

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:SRATe?

Queries the sampling frequency validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:SRAT?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Sampling Frequency" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:SRSCale?

Queries the sampling frequency scaling flag validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:SRSC?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Sampling Frequency Scaling" on page 179

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:TODaddress?

Queries the time-of-day sample address code validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:TOD?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Time of Day" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:UBLength?

Queries the encoded use of auxiliary sample bits validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:UBL?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Use of Auxiliary Bits" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:UBManage?

Queries the encoded user bits management validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:UBM?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "User Bits Management" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:VALidity:WLENgth?

Queries the encoded audio sample word length validity. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> VALid | ERRoneous

Example: `READ:AUD:SPD:CHAN:STAT:PROF:VAL:WLEN?`
Query
`VAL`
Response

Usage: Query only

Manual operation: See "Word Length" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:PROFessional:WLENgth?

Queries the encoded audio sample word length. For professional mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<Setting> B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 | B24

Example: READ:AUD:SPD:CHAN:STAT:PROF:WLEN?
Query
B24
Response

Usage: Query only

Manual operation: See "Word Length" on page 180

READ<hw>[:SCALar]:AUDio:SPDif:CHANnel:STATus:VALidity:MODE?

Queries the SPDIF channel status validity.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> VALid | ERRoneous

Example: READ:AUD:SPD:CHAN:STAT:VAL:MODE?
Query
VAL
Response

Usage: Query only

Manual operation: See "Channel Status Mode" on page 173

READ<hw>[:SCALar]:AUDio:SPDif:SOURce:SUPPorted?

Queries if the audio source supports the IEC 60958 protocol.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> SUPPorted | NOTSupported

Example: READ:AUD:SPD:SOUR:SUPP?
Query
SUPP
Response

Usage: Query only

READ<hw>[:SCALar]:AUDio:THDN:COMMand:PROGress?

Queries the progress for the THD+N measurement. A detailed response is only available if ON is set under CALCulate<hw>:AUDio:THDN:AVERage:STATe on page 687.

Suffix:
<hw> 1
Irrelevant

Return values:
<Indicator> **0 to 100**
Measurement progress in %

-1
Measurement is running or stopped but no detailed progress is available.

INV
Another measurement is running.

Example: `READ:AUD:THDN:COMM:PROG?`
Query
`-1`
Response

Usage: Query only

READ<hw>[:SCALar]:AUDio:THDN:MEASure:VALue? <ChannelNumber>

Queries the measured THD+N, the RMS level and the corresponding frequency for each channel.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<ChannelNumber> Range depends on the input signal.

Return values:
<THD+N> Unit is set by `SENSe<hw>:AUDio:UNIT:THDN` on page 767.

<Level> Unit depends on the input device:
`SENSe<hw>:AUDio:UNIT:LEVel:ANALog` on page 766
`SENSe<hw>:AUDio:UNIT:LEVel:DIGitial` on page 767.

<Frequency> Unit is set by `SENSe<hw>:AUDio:UNIT:FREQuency` on page 766.

Example: `READ:AUD:THDN:MEAS:VAL? 1`
Query
`4.058851E-003,-2.000989E+001,2.000009E+004`
Response for channel 1: THD+N = 0.004058851 %, level = -20.00989 dBV, frequency = 20 000.09 Hz

Usage: Query only

Manual operation: See "<Channel table>" on page 187
See "THD+N column" on page 192
See "Level column" on page 192

14.5.8 ROUTe Subsystem

Table 14-20: Addressing input types

<Input type>	Description	Required option
`Analog L/R`	Analog audio input signal	Analog A/V RX module (R&S VT-B2370)
`HDMI`	Digital audio from SD and HD video signals	HDMI RX 225 MHz module (R&S VT-B2360) HDMI RX 300 MHz module (R&S VT-B2361)
`HDMI 600MHz`	Digital audio from SD and HD video signals	HDMI RX/TX 600 MHz module (R&S VT-B2363)
`HDMI 600MHz Arc`	Audio return channel (ARC) from HDMI generator output	HDMI RX/TX 600 MHz module (R&S VT-B2363)
`HDMI 600MHz S/PDIF`	Digital audio interface via TOSLINK	HDMI RX/TX 600 MHz module (R&S VT-B2363)
`HDMI Tx Arc`	Audio return channel (ARC) from HDMI generator output	HDMI TX module (R&S VT-B360)
`MHL`	Mobile high definition link audio signals up to v1.2	MHL RX/TX module (R&S VT-B2350)
`MHL PkdPx`	Mobile high definition link audio signals up to v2.0	MHL RX PackedPixel module (R&S VT-B2351)
`S/PDIF`	Digital audio interface via TOSLINK	HDMI RX 225 MHz module (R&S VT-B2360) HDMI RX 300 MHz module (R&S VT-B2361)

ROUTe<hw>:AUDio:MODule:CATalog?

Queries the available input types and the slot position of the corresponding module.

Suffix:
<hw> 1
Irrelevant

Return values:
<Input> "<input type> [<module slot>], <input type> [<module slot>], ..."
with <input type> see Table 14-20
and [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:AUD:MOD:CAT?`
Query
`"Analog L/R [L1]"`
Response

Usage: Query only

Manual operation: See "Input" on page 168

ROUTe<hw>:AUDio:MODule:SELect <Input>

Sets the input signal.

To determine the available input types, use `ROUTe<hw>:AUDio:MODule:CATalog?` on page 758.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Input> "<input type> [<module slot>]"
with <input type> see Table 14-20
and [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:AUD:MOD:SEL "Analog L/R [L1]"`
Selects the analog audio input signal, slot 1.

Manual operation: See "Input" on page 168

14.5.9 SENSe Subsystem

SENSe<hw>:AUDio:CROSstalk:FILTer<index> <FilterName>

See SENSe<hw>:AUDio:LEVel:FILTer<Index> on page 761.

Manual operation: See "Filter" on page 197

SENSe<hw>:AUDio:CROSstalk:UNIT <Chart>

Sets the unit used for the crosstalk measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Chart> XY | PCT | PPM | DB
See Table 9-6.
*RST: DB

Example: SENS:AUD:CROS:UNIT PPM
Sets ppm.

Manual operation: See "Crosstalk" on page 196

SENSe<hw>:AUDio:FRESponse:FILTer<index> <FilterName>

See SENSe<hw>:AUDio:LEVel:FILTer<Index> on page 761.

Manual operation: See "Settings dialog" on page 189

SENSe<hw>:AUDio:IPHase:FILTer<index> <FilterName>

See SENSe<hw>:AUDio:LEVel:FILTer<Index> on page 761.

Manual operation: See "Filter" on page 199

SENSe<hw>:AUDio:IPHase:UNIT <Chart>

Sets the unit used for the interchannel phase measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Chart> DEG | RAD
See Table 9-7.
*RST: DEG

Example: SENS:AUD:IPH:UNIT RAD

Manual operation: See "Phase Diff column" on page 192
See "Phase" on page 198

SENSe<hw>:AUDio:LEVel:FILTer<Index> <FilterName>

Sets each filter individually.

Suffix:
<hw> 1
Irrelevant

<Index> 1-3
Sets the filter index.

Parameters:
<FilterName> "Disabled" | "A Weighting" | "C Message" | "CCITT" | "CCIR 1k/ ITU468" | "CCIR 2k" | "De-Emphasis 50 15" | "De-Emphasis 50" | "De-Emphasis 75" | "IEC Tuner" | "JITTW" | "Pre-Emphasis 50 15" | "Pre-Emphasis 50" | "Pre-Emphasis 75" | "HPF 22HZ" | "HPF 400HZ" | "LPF 22KHZ" | "LPF 30KHZ"

For available filters, see also Chapter 9.11, "Weighting Filters", on page 204.

Example: `SENS:AUD:LEV:FILT2 "CCITT"`
Filter 2: sets psophometrical weighting.

Manual operation: See "Filter Configuration dialog" on page 183

SENSe<hw>:AUDio:QC:MEASure:TYPE <Test>

Sets the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Test> PESQ | NARRow | WIDE

*RST: PESQ

Example: `SENS:AUD:QC:MEAS:TYPE NARR`
Sets POLQA - narrow.

Manual operation: See "Measure Type" on page 200

SENSe<hw>:AUDio:QC:RESult:CATalog?

Queries the list of available measurement results.

Suffix:
<hw> 1
Irrelevant

Return values:
<List> Result names

Example: `SENS:AUD:QC:RES:CAT?`
Query
`"MOS,MOS LQ,REF VAD,CAP VAD,Drop Outs,REF Clip,CAP Clip"`
Response

Usage: Query only

Manual operation: See "<Results graphs>" on page 203

SENSe<hw>:AUDio:QC:WAVeform:CATalog <Type>

Sets the waveform that is displayed.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Type> REFerence | CAPTured
*RST: REF

Example: `SENS:AUD:QC:WAV:CAT CAPT`
Displays the captured audio waveform.

Manual operation: See "<Waveform display>" on page 204

SENSe<hw>:AUDio:REFerence:ANALog:DBRA <RefLevel>

Sets the reference level for input using dBrA. For analog input devices.

Suffix:
<hw> 1
Irrelevant

Parameters:
<RefLevel> Range: 0.0000 to 10.0000
*RST: 1.0000
Default unit: V(rms)

Example: `SENS:AUD:REF:ANAL:DBRA 2`

Manual operation: See "dBrA Reference " on page 170

SENSe<hw>:AUDio:REFerence:ANALog:DBRB <RefLevel>

Sets the reference level for input using dBrB. For analog input devices.

Suffix:
<hw> 1
Irrelevant

Parameters:

<RefLevel> Range: 0.0000 to 10.0000
*RST: 1.0000
Default unit: V(rms)

Example: `SENS:AUD:REF:ANAL:DBRB 2`

Manual operation: See "dBrB Reference" on page 170

SENSe<hw>:AUDio:REFerence:ANALog:DBSPl<source> <Level>

Sets the reference level for measuring the sound pressure level. For analog input devices.

Suffix:

<hw> 1
Irrelevant

<source> 1-2
Sets the sound source.

Parameters:

<Level> Range: 0.0000 to 10.0000
*RST: 1.0000
Default unit: V(rms)

Example: `SENS:AUD:REF:ANAL:DBSP1 3`

Manual operation: See "dBSPL1 Reference" on page 171
See "dBSPL2 Reference" on page 171

SENSe<hw>:AUDio:REFerence:ANALog:OFFSet:DBRA <RefOffset>

Sets the reference offset level for input using dBrA. For analog input devices.

Suffix:

<hw> 1
Irrelevant

Parameters:

<RefOffset> Range: -180.000 to 180.000
*RST: 0.000
Default unit: dB

Example: `SENS:AUD:REF:ANAL:OFFS:DBRA 2`

Manual operation: See "dBrA Offset" on page 170

SENSe<hw>:AUDio:REFerence:ANALog:OFFSet:DBRB <RefOffset>

Sets the reference offset level for input using dBrB. For analog input devices.

Suffix:
<hw> 1
Irrelevant

Parameters:
<RefOffset> Range: -180.000 to 180.000
*RST: 0.000
Default unit: dB

Example: `SENS:AUD:REF:ANAL:OFFS:DBRB 2`

Manual operation: See "dBrB Offset" on page 170

SENSe<hw>:AUDio:REFerence:DIGital:DBRA <RefLevel>

Sets the reference level for input using dBrA. For digital input devices.

Suffix:
<hw> 1
Irrelevant

Parameters:
<RefLevel> Range: 0.000 to 1.000
*RST: 1.000
Default unit: FS

Example: `SENS:AUD:REF:DIG:DBRA 0.08`

Manual operation: See "dBrA Reference " on page 170

SENSe<hw>:AUDio:REFerence:DIGital:DBRB <RefLevel>

Sets the reference level for input using dBrB. For digital input devices.

Suffix:
<hw> 1
Irrelevant

Parameters:
<RefLevel> Range: 0.000 to 1.000
*RST: 1.000
Default unit: FS

Example: `SENS:AUD:REF:DIG:DBRB 0.08`

Manual operation: See "dBrB Reference" on page 170

SENSe<hw>:AUDio:REFerence:DIGital:DBSPl<source> <Level>

Sets the reference level for measuring the sound pressure level. For digital input devices.

Suffix:
<hw> 1
Irrelevant

<source> 1-2
Sets the sound source.

Parameters:
<Level> Range: 0.000 to 1.000
*RST: 1.000
Default unit: FS

Example: `SENS:AUD:REF:DIG:DBSP1 1`

Manual operation: See "dBSPL1 Reference" on page 171
See "dBSPL2 Reference" on page 171

SENSe<hw>:AUDio:REFerence:DIGital:OFFSet:DBRA <RefOffset>

Sets the reference offset level for input using dBrA. For digital input devices.

Suffix:
<hw> 1
Irrelevant

Parameters:
<RefOffset> Range: -180.000 to 180.000
*RST: 0.000
Default unit: dB

Example: `SENS:AUD:REF:DIG:OFFS:DBRA 2`

Manual operation: See "dBrA Offset" on page 170

SENSe<hw>:AUDio:REFerence:DIGital:OFFSet:DBRB <RefOffset>

Sets the reference offset level for input using dBrB. For digital input devices.

Suffix:
<hw> 1
Irrelevant

Parameters:
<RefOffset> Range: -180.000 to 180.000
*RST: 0.000
Default unit: dB

Example: `SENS:AUD:REF:DIG:OFFS:DBRB 2`

Manual operation: See "dBrB Offset" on page 170

SENSe<hw>:AUDio:SNR:FILTer<index> <FilterName>

See `SENSe<hw>:AUDio:LEVel:FILTer<Index>` on page 761.

Manual operation: See "Filter" on page 195

SENSe<hw>:AUDio:SNR:UNIT <Chart>

Sets the unit used for the SNR measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Chart> DB | XY
See Table 9-5.
*RST: DB

Example: `SENS:AUD:SNR:UNIT XY`
Sets x/y.

Manual operation: See "SNR" on page 194

SENSe<hw>:AUDio:THDN:FILTer<index> <FilterName>

See `SENSe<hw>:AUDio:LEVel:FILTer<Index>` on page 761.

Manual operation: See "Filter" on page 187

SENSe<hw>:AUDio:UNIT:FREQuency <Unit>

Sets the unit for the measured frequency.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Unit> HZ | KHZ
Default unit: HZ

Example: `SENS:AUD:UNIT:FREQ KHZ`
Sets kHz.

Manual operation: See "Frequency " on page 183

SENSe<hw>:AUDio:UNIT:LEVel:ANALog <Unit>

Sets the unit for the measured RMS level. For analog input devices.

Suffix:
<hw> 1
Irrelevant

Parameters:

<Unit> VRMS | DBV | DBU | DBRA | DBRB | DB1Spl | DB2Spl | VPP

See Table 9-2.

VRMS
Corresponds to the unit V in the graphical user interface.

Default unit: DBV

Example: `SENS:AUD:UNIT:LEV:ANAL VRMS`
Sets volts RMS.

Manual operation: See "<Unit selector>" on page 182

SENSe<hw>:AUDio:UNIT:LEVel:DIGitial <Unit>

Sets the unit for the measured RMS level. For digital input devices.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Unit> FS | PCTFs | DBFS | DBRA | DBRB | DB1Spl | DB2Spl

See Table 9-3.

Default unit: DBFS

Example: `SENS:AUD:UNIT:LEV:DIG FS`
Sets full-scale.

Manual operation: See "<Unit selector>" on page 182

SENSe<hw>:AUDio:UNIT:THDN <Chart>

Sets the unit used for the THD+N measurement.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Chart> XY | PCT | PPM | DB

See Table 9-4.

*RST: PCT

Example: `SENS:AUD:UNIT:THDN DB`
Sets dB.

Manual operation: See "THD+N" on page 187
See "THD+N column" on page 192

14.6 HDMI Generator Application

These commands correlate to the functions provided in Chapter 10.1, "HDMI Generator Application", on page 216.

14.6.1 ABORt Subsystem

ABORt<hw>:HDGenerator:CEC

Stops the running CEC measurement.

Suffix:
<hw> 1
Irrelevant

Example: `ABOR:HDG:CEC`

Usage: Event

Manual operation: See "Stop button" on page 282

ABORt<hw>:HDGenerator:CTS

Stops the running CTS measurement.

Suffix:
<hw> 1
Irrelevant

Example: `ABOR:HDG:CTS`

Usage: Event

Manual operation: See "Stop button" on page 280

14.6.2 CONFigure Subsystem

14.6.2.1 CONFigure<hw>:HDGenerator:CEC Subsystem

Configures the CEC communication.

See also Chapter 10.2.9, "CEC Subtab", on page 331.

Addressing opcodes

See Chapter 10.4.4, "CEC Communication", on page 364.

CONFigure<hw>:HDGenerator:CEC:COMMand:SEND

Sends a command with the selected opcode and parameters.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:CEC:COMM:SEND`

Usage: Event

Manual operation: See "Send button " on page 282

CONFigure<hw>:HDGenerator:CEC:DESTination <Address>

Sets the logical address of the DUT that receives the CEC messages sent by the R&S VTE.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Address> TV0 | RD1 | RD2 | TUN1 | PD1 | AUDiosystem | TUN2 | TUN3 | PD2 | RD3 | TUN4 | PD3 | R12 | R13 | SPECificuse | BROadcast

with RD = recording device, TUN = tuner, PD = playback device, R = reserved

*RST: TV0

Example: `CONF:HDG:CEC:DEST RD2`

Manual operation: See "Destination" on page 281

CONFigure<hw>:HDGenerator:CEC:LADDress <Address>

Sets the logical address of the R&S VTE.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Address> RD1 | RD2 | TUN1 | PD1 | AUDiosystem | TUN2 | TUN3 | PD2 | RD3 | TUN4 | PD3 | R12 | R13 | SPECificuse | BROadcast
with RD = recording device, TUN = tuner, PD = playback device, R = reserved
*RST: PD1

Example: `CONF:HDG:CEC:LADD RD2`

Manual operation: See "Logical Address" on page 281

CONFigure<hw>:HDGenerator:CEC:OPCode <OperationCode>

Sets the operation code (opcode) of the CEC command that is sent by the R&S VTE.

Suffix:
<hw> 1
Irrelevant

Parameters:
<OperationCode> Specifies the operation code. See Chapter 10.4.4, "CEC Communication", on page 364.
*RST: OP04

Example: `CONF:HDG:CEC:OPC OP0D`

Manual operation: See "Opcode and Parameters" on page 281

CONFigure<hw>:HDGenerator:CEC:OPCode:PARam <OperationCode>, <Number>, <Value>
CONFigure<hw>:HDGenerator:CEC:OPCode:PARam? <OperationCode>, <Number>

Sets the value of the selected parameter for the specified operation code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: #H00 to #HFF

Parameters for setting and query:

<OperationCode> Specifies the operation code. See Chapter 10.4.4, "CEC Communication", on page 364.

<Number> Parameter number

Example: `CONF:HDG:CEC:OPC:PAR OR09, 2, #HFF`
Sets FF for parameter 2 of "Record On (0x09)".

Manual operation: See "Opcode and Parameters" on page 281

CONFigure<hw>:HDGenerator:CEC:OPCode:PARam:LENGth <OperationCode>, <Number>
CONFigure<hw>:HDGenerator:CEC:OPCode:PARam:LENGth? <OperationCode>

Sets the number of parameters for the specified operation code.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Number>

Parameters for setting and query:

<OperationCode> Specifies the operation code. See Chapter 10.4.4, "CEC Communication", on page 364.

Example: `CONF:HDG:CEC:OPC:PAR:LENG OR09, 5`
Sets 5 parameters for "Record On (0x09)".

Manual operation: See "Opcode and Parameters" on page 281

CONFigure<hw>:HDGenerator:CEC:OUTPut <Port>

Sets one of the 4 HDMI outputs of the HDMI TX 300 MHz module (R&S VT-B360).

Suffix:

<hw> 1
Irrelevant

Parameters:

<Port> OUT1 | OUT2 | OUT3 | OUT4
*RST: OUT1

Example: `CONF:HDG:CEC:OUTP OUT2`

Manual operation: See "Output" on page 281

14.6.2.2 CONFigure<hw>:HDGenerator:CTS Subsystem

Configures the parameters of the test cases.

See also"CTS Configuration dialog" on page 269.

Table 14-21: Addressing test cases

Test case name	Remote command parameter (<test case>)	Available for following outputs		
		"Rx/Tx 600MHz"	"Tx 300MHz"	"CTS Rx/Tx 600MHz"
"8-15 Character Synchronization"	M000_csync	x	x	
"8-16 Acceptance of All Valid Packet Types"	M001_validpt	x	x	
"8-17 Basic Format Support Requirements"	M002_basicfm	x	x	
"8-18 HDMI Format Support Requirements"	M003_hdmifmt	x	x	
"8-19 Pixel Encoding Requirements"	M004_pixelen	x	x	
"8-20 Video Format Timing"	M005_vformat	x	x	
"8-21 Audio Clock Regeneration"	M006_audiocl	x	x	
"8-22 Audio Sample Packet Jitter"	M007_audiosa	x	x	
"8-23 Audio Formats"	M009_aformat	x	x	
"8-24 Interoperability with DVI"	M010_dvi	x	x	
"8-25 Deep Color"	M011_deepc	x	x	
"8-27 High Bitrate Audio"	M012_hbaudio	x	x	
"8-28 One Bit Audio"	M013_lbaudio	x	x	
"8-29 3D: Video Format Timing"	M014_3dvfmt	x	x	
"8-30 4K x 2K Video Format Timing"	M015_4k2kvft	x	x	
"8-31 AVI InfoFrame"	M016_aviinfo	x	x	
"HF2-5 6G - Scrambling"	H025_scrambl	x		x
"HF2-6 6G - 2160p 24-bit Color Depth"	H026_24bit	x		x
"HF2-7 6G - 2160p Deep Color"	H027_2160p	x		x
"HF2-8 6G - 2160p 3D"	H028_3d	x		x
"HF2-9 Sink TMDS Prot. - Scrambling ≤ 340 Mcsc"	H029_tmds	x	x	
"HF2-10 6G - HF-VSDB"	H210_hfvsdb	x		x
"HF2-23 Sink Pixel Decoding - YCbCr 4:2:0"	H223_sinkpix	x	x	
"HF2-24 YCbCr 4:2:0 Deep Color"	H224_ycbcr42	x		x
"HF2-25 Sink Video Timing - 21:9 (64:27)"	H225_sinkvid	x	x	x
"HF2-26 Video Format Declaration"	H226_videofm	x	x	
"HF2-31 Sink EDID - YCbCr 4:2:0 - Data Blocks"	H231_sinkedi	x	x	
"HF2-32 YCbCr 4:2:0 BT.2020 - Data Block"	H232_ycbcr42	x	x	
"HF2-35 YCbCr 4:2:0 Deep Color HF-VSDB"	H235_ycbcr42	x	x	
"HF2-36 6G - Non-2160p 24-bit Color Depth"	H236_n24bit	x		x
"HF2-37 6G - Non-2160p Deep Color"	H237_n2160p	x		x

Test case name	Remote command parameter (<test case>)	Available for following outputs		
		"Rx/Tx 600MHz"	"Tx 300MHz"	"CTS Rx/Tx 600MHz"
"HF2-38 6G - Non-2160p 3D"	H238_n3d	x		x
"HF2-39 3D and Multistream Audio Data Blocks"	H239_3dmulti	x	x	
"HF2-41 HDMI-VSDBs Independent View"	H241_hdmivsd	x	x	
"HF2-53 HF-VSDB"	H253_hfvsdb	x	x	
"HF2-54 HDR Static Metadata Data Block"	H254_smdb	x		x

CONFigure<hw>:HDGenerator:CTS:AFORmat <TestCase>, <AudioFormat>
CONFigure<hw>:HDGenerator:CTS:AFORmat? <TestCase>

Sets the audio format.

Parameters:

<AudioFormat> P32 | P441 | P48 | DTSHd | DOLBy

Each test case has its own set of parameters.

P32 | P441 | P48
"8-23 Audio Formats": PCM sampling frequency

DTSHd | DOLBy
"8-27 High Bitrate Audio"

Parameters for setting and query:

<TestCase> Specifies the test case. See Table 14-21.

Example: `CONF:HDG:CTS:AFOR M009, P441`

Manual operation: See "Audio Format" on page 271
See "Audio Format" on page 272

CONFigure<hw>:HDGenerator:CTS:CDEPth <TestCase>, <ColorDepth>
CONFigure<hw>:HDGenerator:CTS:CDEPth? <TestCase>

Sets the color depth.

Parameters:
<ColorDepth> B10 | B12 | B16
Value in bit

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-21.

Example: `CONF:HDG:CTS:CDEP M011, B12`

Manual operation: See "Color Depth" on page 272

CONFigure<hw>:HDGenerator:CTS:CDFSink <TestCase>, <CDF>, <Support>
CONFigure<hw>:HDGenerator:CTS:CDFSink? <TestCase>, <CDF>

Set the CDF parameters in accordance with the CDF (capabilities declaration form) of the DUT.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> NO | YES

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-21.

<CDF> String of alphanumeric characters. Each test case has its own set of CDF parameters.

"SupportsAI" | "xvYCC"
"8-16 Acceptance of All Valid Packet Types"

"60Hz" | "50Hz" | "HDTV" | "720p60_Other" | "1080i60_Other" | "720p50_Other" | "1080i50_Other"
"8-18 HDMI Format Support Requirements"

"Video_Formats_21by9" | "Above_340"
"HF2-26 Video Format Declaration"

"HDMI_YCBCR_420_BT2020_YCC" | "HDMI_YCBCR_420_BT2020_cYCC"
"HF2-32 YCbCr 4:2:0 BT.2020 - Data Block"

"HDMI_YCBCR_420_DC10" | "HDMI_YCBCR_420_DC12" | "HDMI_YCBCR_420_DC16"
"HF2-35 YCbCr 4:2:0 Deep Color HF-VSDB"

"MS_Audio" | "One_Bit_MS_Audio" | "MS_Audio_Mixed" | "3D_Audio" | "One_Bit_3D_Audio"
"HF2-39 3D and Multistream Audio Data Blocks"

"OSD_Disparity" | "DualView" | "IndepView" | "SCDC" | "SCDC_Read_Request" | "Above_340" | "LTE_340Mcsc_Scrambling"
"HF2-53 HF-VSDB"

"Traditional_SDR" | "Traditional_HDR" | "SMPTE_ST_2084"
"HF2-54 HDR Static Metadata Data Block"

Example: `CONF:HDG:CTS:CDFS M001, "SupportsAI", NO`

Manual operation: See "<CDF sink parameters>" on page 269
See "<CDF sink parameters>" on page 270
See "<CDF sink parameters>" on page 276
See "<CDF sink parameters>" on page 277
See "<CDF sink parameters>" on page 277
See "<CDF sink parameters>" on page 278
See "<CDF sink parameters>" on page 278
See "<CDF sink parameters>" on page 279

CONFigure<hw>:HDGenerator:CTS:CEXTended <TestCase>, <Colorimetry>
CONFigure<hw>:HDGenerator:CTS:CEXTended? <TestCase>

Sets the extended colorimetry field of the AVI InfoFrame.

Parameters:
<Colorimetry> ARGB | SYCC | AYCC
*RST: ARGB

Parameters for setting and query:
<TestCase> **M016**
Applies only to "8-31 AVI InfoFrame".

Example: `CONF:HDG:CTS:CEXT M016, AYCC`

Manual operation: See "Extended Colorimetry" on page 273

CONFigure<hw>:HDGenerator:CTS:ITC <TestCase>, <Content>
CONFigure<hw>:HDGenerator:CTS:ITC? <TestCase>

Sets the value of the IT content field of the AVI InfoFrame.

Parameters:
<Content> GRAPhics | PHOTo | CINema | GAME
*RST: GRAPhics

Parameters for setting and query:
<TestCase> **M016**
Applies only to "8-31 AVI InfoFrame".

Example: `CONF:HDG:CTS:ITC M016, PHOT`

Manual operation: See "ITC" on page 273

CONFigure<hw>:HDGenerator:CTS:NVALue <TestCase>, <Numerator>
CONFigure<hw>:HDGenerator:CTS:NVALue? <TestCase>

Sets the value of numerator N.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Numerator> MINimum | MAXimum
*RST: MINimum

Parameters for setting and query:
<TestCase> **M006**
Applies only to "8-21 Audio Clock Regeneration".

Example: `CONF:HDG:CTS:NVAL M006, MAX`

Manual operation: See "N Value" on page 271

CONFigure<hw>:HDGenerator:CTS:OUTPut <Port>

Sets the HDMI output of the module selected by `ROUTe<hw>:HDGenerator:MODule:SELect` on page 872.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Port> OUT1 | OUT2 | OUT3 | OUT4 | CTS | HDMI600

OUT1 | OUT2 | OUT3 | OUT4
Sets one of the 4 HDMI outputs of the HDMI TX 300 MHz module (R&S VT-B360).

CTS
Sets the HDMI output of the HDMI CTS RX/TX 600 MHz module (R&S VT-B2362).

HDMI600
Sets the HDMI output of the HDMI RX/TX 600 MHz module (R&S VT-B2363).

Example: `CONF:HDG:CTS:OUTP OUT1`

Manual operation: See "Output" on page 268

CONFigure<hw>:HDGenerator:CTS:PCLock:FREQuency <TestCase>, <PixelClock>
CONFigure<hw>:HDGenerator:CTS:PCLock:FREQuency? <TestCase>

Sets the pixel clock frequency.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PixelClock> STD | MIN | MAX

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-21.

Example: `CONF:HDG:CTS:PCL:FREQ M005, MIN`

Manual operation: See "Pixel Clock Frequency" on page 270

CONFigure<hw>:HDGenerator:CTS:PIXelencode <TestCase>, <PixelEncoding>
CONFigure<hw>:HDGenerator:CTS:PIXelencode? <TestCase>

Sets the color format and the chroma sampling that is used for the selected test.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PixelEncoding> RGB | Y444 | Y422

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-21.

Example: `CONF:HDG:CTS:PIX M004, Y444`

Manual operation: See "Pixel Encoding" on page 270

CONFigure<hw>:HDGenerator:CTS:SCRambling <TestCase>, <Enable>
CONFigure<hw>:HDGenerator:CTS:SCRambling? <TestCase>

Sets the Scrambling_Enable bit in the SCDC configuration of the attached sink DUT.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: ON

Parameters for setting and query:
<TestCase> **H029**
Applies only to "HF2-9 Sink TMDS Prot. - Scrambling ≤ 340 Mcsc".

Example: `CONF:HDG:CTS:SCR H029, OFF`

Manual operation: See "Scrambling" on page 275

CONFigure<hw>:HDGenerator:CTS:SELect <TestCase>

Selects the specified test case.

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestCase> Specifies the test case. See Table 14-21.

Example: `CONF:HDG:CTS:SEL M005`

Manual operation: See "CTS Sink Tests dialog" on page 268

CONFigure<hw>:HDGenerator:CTS:SIGNal <CDFSink>

Configures the signal.

Applies only to "HF2-54 HDR Static Metadata Data Block".

Suffix:
<hw> 1
Irrelevant

Parameters:
<CDFSink> SDR | HDR | SMPTe
*RST: SDR

Example: `CONF:HDG:CTS:SIGN HDR`

Manual operation: See "Signal" on page 279

CONFigure<hw>:HDGenerator:CTS:TCONfig <TestCase>, <Configuration>
CONFigure<hw>:HDGenerator:CTS:TCONfig? <TestCase>

Configures a test in accordance with the CTS.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Configuration> EDID | VIDeo

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-21.

Example: `CONF:HDG:CTS:TCON H026, VID`

Manual operation: See "Test Configuration" on page 274

CONFigure<hw>:HDGenerator:CTS:VFORmat <TestCase>, <VideoFormat>
CONFigure<hw>:HDGenerator:CTS:VFORmat? <TestCase>

Sets the video format that is applied to the specified test case.

Suffix:
<hw> 1
Irrelevant

Parameters:
<VideoFormat> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8A | C8B | C9A | C9B | C10 | C11 | C12A | C12B | C13A | C13B | C14 | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23A | C23B | C23C | C24A | C24B | C24C | C25 | C26 | C27A | C27B | C27C | C28A | C28B | C28C | C29 | C30 | C31 | C32 | C33 | C34 | C35 | C36 | C37 | C38 | C39 | C40 | C41 | C42 | C43 | C44 | C45 | C46 | C47 | C48 | C49 | C50 | C51 | C52 | C53 | C54 | C55 | C56 | C57 | C58 | C59 | C60 | C61 | C62 | C63 | C64 | C65 | C66 | C67 | C68 | C69 | C70 | C71 | C72 | C73 | C74 | C75 | C76 | C77 | C78 | C79 | C80 | C81 | C82 | C83 | C84 | C85 | C86 | C87 | C88 | C89 | C90 | C91 | C92 | C96 | C97 | C101 | C102 | C103 | C104 | C105 | C106 | C107 | C93 | C94 | C95 | C98 | C99 | C100 | VIC1 | VIC2 | VIC3 | VIC4
See also Chapter 10.4.3, "Video Codes", on page 353.

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-21.

Example: `CONF:HDG:CTS:VFOR M001, C3`

Manual operation: See "Video Format" on page 269

CONFigure<hw>:HDGenerator:CTS:VFORmat:HDEXtension <TestCase>, <3DFormat>
CONFigure<hw>:HDGenerator:CTS:VFORmat:HDEXtension? <TestCase>

Sets the 3D format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<3DFormat> FPACking | TBOTtom | SBSide

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-21.

Example: `CONF:HDG:CTS:VFOR:HDEX M014, TBOT`

Manual operation: See "3D Format" on page 272

CONFigure<hw>:HDGenerator:CTS:VFORmat:UHD <TestCase>, <Format>
CONFigure<hw>:HDGenerator:CTS:VFORmat:UHD? <TestCase>

Presets the video format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Format> UHD1 | UHD2 | UHD3 | UHD4

UHD1
4Kx2Kp @ 30 Hz

UHD2
4Kx2Kp @ 25 Hz

UHD3
4Kx2Kp @ 24 Hz

UHD4
4Kx2Kp @ 24 Hz (SMPTE)

*RST: UHD1

Parameters for setting and query:
<TestCase> **M015**
Applies only to "8-30 4K x 2K Video Format Timing".

Example: `CONF:HDG:CTS:VFOR:UHD M015, UHD2`

Manual operation: See "Video Format" on page 273

14.6.2.3 CONFigure<hw>:HDGenerator:EDID Subsystem

CONFigure<hw>:HDGenerator:EDID:SAVE <PathFile>

Saves the read EDID data as a BIN file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `CONF:HDG:EDID:SAVE "D:\VTE\UserData\MyEDIDdata.bin"`
Saves `MyEDIDdata.bin` in the `D:\VTE\UserData` directory.

Manual operation: See "Save EDID Data" on page 260

CONFigure<hw>:HDGenerator:EDID:SOUT <Port>

Sets the HDMI output of a certain module.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Port> **<numeric_value> | OUT1 | OUT2 | OUT3 | OUT4**
Sets one of the 4 HDMI outputs of the HDMI TX 300 MHz module (R&S VT-B360). Instead of the parameter, you can use the numeric value, for example 1 instead of OUT1.

HDMI600
Sets the HDMI output of the HDMI RX/TX 600 MHz module (R&S VT-B2363).

Example: `CONF:HDG:EDID:SOUT OUT1`

Manual operation: See "Output(HDMI TX 300 MHz module)" on page 260
See "Output(HDMI RX/TX 600 MHz module)" on page 260

CONFigure<hw>:HDGenerator:EDID:UPDate

Updates the left panel with the EDID reading on the chosen output.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:EDID:UPD`

Usage: Event

Manual operation: See "Update" on page 260

14.6.2.4 CONFigure<hw>:HDGenerator:HDCP Subsystem

CONFigure<hw>:HDGenerator:HDCP:REAuth

Clears the current R_i' value to reauthenticate the source.

Example: `CONF:HDG:HDCP:REA`

Usage: Event

Manual operation: See "Re-Authentication button" on page 234

14.6.2.5 CONFigure<hw>:HDGenerator:INFoframe Subsystem

CONFigure<hw>:HDGenerator:INFoframe:AUDio Subsystem

Configures the audio InfoFrame.

CONFigure<hw>:HDGenerator:INFoframe:AUDio:CHANnel:ALLocation <Value>

Sets the channel allocation.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Value> Hexadecimal value
Range: #H0 to #H31
*RST: #H13

Example: `CONF:HDG:INF:AUD:CHAN:ALL #H19`

Manual operation: See "Channel Allocation (hex)" on page 245

CONFigure<hw>:HDGenerator:INFoframe:AUDio:CHANnel:COUNt <Value>

Sets the channel count.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> **0**
Stream header
1
2 channels
...
...
7
8 channels
*RST: 7

Example: `CONF:HDG:INF:AUD:CHAN:COUN 6`

Manual operation: See "Channel Count" on page 244

CONFigure<hw>:HDGenerator:INFoframe:AUDio:CODE:EXTension <Value>

Sets the code extension.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> **0**
Coding type
4
MPEG-4 HE ACC
5
MPEG-4 HE ACC v2
6
MPEG-4 ACC LC
7
DRA
8
MPEG-4 HE ACC + MPEG surround
10
MPEG-4 AAC LC + MPEG surround
*RST: 0

Example: `CONF:HDG:INF:AUD:CODE:EXT 4`

Manual operation: See "Code Extension" on page 245

CONFigure<hw>:HDGenerator:INFoframe:AUDio:CODE:TYPE <Value>

Sets the coding type.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> **0**
Stream header

1
PCM

2
AC-3

3
MPEG-1

4
MP3

5
MPEG-2

6
AAC LC

7
DTS

8
ATRAC

9
1-bit audio

10
Enhanced AC-3

11
DTS-HD

12
MAT

13
DST

14
WMA pro

15
Extended

*RST: 0

Example: `CONF:HDG:INF:AUD:CODE:TYPE 11`

Manual operation: See "Coding Type" on page 244

CONFigure<hw>:HDGenerator:INFoframe:AUDio:CSUM?

Queries the checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Decimal value

Example: `CONF:HDG:INF:AUD:CSUM?`
Query
`87`
Response

Usage: Query only

Manual operation: See "Checksum (hex)" on page 244

CONFigure<hw>:HDGenerator:INFoframe:AUDio:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:AUDio` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:AUD:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:AUDio:DMI <Enable>

Enables or disables the downmix inhibit.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:AUD:DMI ON`

Manual operation: See "Downmix Inhibit" on page 245

CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port> <Byte>

Sets the header bytes.

Suffix:
<hw> 1
Irrelevant

<port> Number of the header byte

Parameters:
<Byte> Decimal value
Range: 0 to 255

Example: `CONF:HDG:INF:AUD:HBYT2 10`
Header byte 2: Sets 10.

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:AUDio:LENGth?

Queries the length of the InfoFrame.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value>

Example: `CONF:HDG:INF:AUD:LENG?`
Query
`10`
Response

Usage: Query only

Manual operation: See "Length of InfoFrame" on page 243

CONFigure<hw>:HDGenerator:INFoframe:AUDio:LFEPlayback <Value>

Sets the LFE playback level.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> **0**
Unknown

1
0 dB playback

2
+10 dB playback

*RST: 0

Example: `CONF:HDG:INF:AUD:LFEP 1`

Manual operation: See "LFE Playback Level" on page 245

CONFigure<hw>:HDGenerator:INFoframe:AUDio:LSValue <Value>

Sets the level shift value

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 15
*RST: 0
Default unit: dB

Example: `CONF:HDG:INF:AUD:LSV 2`
Sets 2 dB.

Manual operation: See "Level Shift Value" on page 245

CONFigure<hw>:HDGenerator:INFoframe:AUDio:PBYTe<port> <Byte>

Sets the packet bytes.

Suffix:
<hw> 1
Irrelevant

<port> Number of the packet byte

Parameters:
<Byte> Decimal value
Range: 0 to 255

Example: `CONF:HDG:INF:AUD:PBYT4 19`
Packet byte 4: Sets 19.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:AUDio:SAMPling:FREQuency <SamplingFreq>

Sets the sampling frequency.

Suffix:
<hw> 1
Irrelevant

Parameters:
<SamplingFreq> STReamheader | HZ32000 | HZ44100 | HZ48000 | HZ88200 | HZ96000 | HZ176400 | HZ192000
*RST: STReamheader

Example: `CONF:HDG:INF:AUD:SAMP:FREQ HZ32000`
Sets 32 kHz.

Manual operation: See "Sampling Frequency" on page 244

CONFigure<hw>:HDGenerator:INFoframe:AUDio:SAMPling:SIZE <SamplingSize>

Sets the sampling size.

Suffix:
<hw> 1
Irrelevant

Parameters:
<SamplingSize> STReamheader | B16 | B20 | B24
*RST: STReamheader

Example: `CONF:HDG:INF:AUD:SAMP:SIZE B16`
Sets 16 bit.

Manual operation: See "Sampling Size" on page 245

CONFigure<hw>:HDGenerator:INFoframe:AUDio:VERSion?

Queries the version.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value>

Example: `CONF:HDG:INF:AUD:VERS?`
Query
`2`
Response

Usage: Query only

Manual operation: See "Version Number" on page 243

CONFigure<hw>:HDGenerator:INFoframe:AUX Subsystem

Configures the AVI InfoFrame.

CONFigure<hw>:HDGenerator:INFoframe:AUX:AFPResent <Enable>

Enables or disables active format information present.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: ON

Example: `CONF:HDG:INF:AUX:AFPR OFF`

Manual operation: See "Active Format Information Present" on page 240

CONFigure<hw>:HDGenerator:INFoframe:AUX:BARinfo <Type>

Sets the bar information.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Type> NONE | HORZ | VERT | BOTH
*RST: NONE

Example: `CONF:HDG:INF:AUX:BAR HORZ`

Manual operation: See "Bar Info" on page 241

CONFigure<hw>:HDGenerator:INFoframe:AUX:BBAR <Value>

Sets the line number of bottom bar start.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9999
*RST: 0

Example: `CONF:HDG:INF:AUX:BBAR 20`

Manual operation: See "Line Number of Bottom Bar Start" on page 243

CONFigure<hw>:HDGenerator:INFoframe:AUX:COLorimetry <Type>

Sets the colorimetry.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Type> NONE | SMPTe170m | ITU709 | EXTended
*RST: NONE

Example: `CONF:HDG:INF:AUX:COL EXT`

Manual operation: See "Colorimetry" on page 241

CONFigure<hw>:HDGenerator:INFoframe:AUX:COMPonent:FORMat <PixelEncoding>

Sets the pixel encoding.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PixelEncoding> **0**
RGB
1
YCbCr 4:2:2
2
YCbCr 4:4:4
3
YCbCr 4:2:0
7
IDO-defined

*RST: 0

Example: `CONF:HDG:INF:AUX:COMP:FORM 2`

Manual operation: See "Component Format" on page 240

CONFigure<hw>:HDGenerator:INFoframe:AUX:CONTenttype <Content>

Sets the content type.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Content> GRAPhics | PHOTo | CINema | GAME
*RST: GRAPhics

Example: `CONF:HDG:INF:AUX:CONT PHOT`

Manual operation: See "Content Type" on page 243

CONFigure<hw>:HDGenerator:INFoframe:AUX:CSUM?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:LENGth?` on page 786.

Usage: Query only

Manual operation: See "Checksum (hex)" on page 240

CONFigure<hw>:HDGenerator:INFoframe:AUX:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:AUX` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:AUX:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:AUX:EXTColorim <Type>

Sets the extended colorimetry.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Type>

0
xvYCC 601

1
xvYCC 709

2
sYCC 601

3
Adobe YCC 601

4
Adobe RGB

5
ITU-R BT.2020 $Y'_CC'_{BC}C'_{RC}$

6
TR-R BT.2020 $Y'_CC'_BC'_R$

*RST: 0

Example: `CONF:HDG:INF:AUX:EXTC 1`

Manual operation: See "Extended Colorimetry" on page 242

CONFigure<hw>:HDGenerator:INFoframe:AUX:FORMatar <AspectRatio>

Sets the active format aspect ratio

Suffix:
<hw> 1
Irrelevant

Parameters:
<AspectRatio> **0**
AFD unknown

2
Box 16:9 (top)

3
Box 14:9 (top)

4
Box > 16:9 (center)

8
Same as coded frame

9
4:3 (center)

10
16:9 (center)

11
14:9 (center)

13
4:3 (protect 14:9 center)

14
16:9 (protect 14:9 center)
15
16:9 (protect 4:3 center)
*RST: 8

Example: `CONF:HDG:INF:AUX:FORM 2`

Manual operation: See "Active Format Aspect Ratio" on page 241

CONFigure<hw>:HDGenerator:INFoframe:AUX:HBYTe<port>?

Queries the header bytes.

Suffix:
<hw> 1
Irrelevant

<port> Number of the header byte

Return values:
<Byte> Decimal value

Example: `CONF:HDG:INF:AUX:HBYT2?`
Query
`13`
Header byte 2: Response

Usage: Query only

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:AUX:ITContent <Enable>

Enables or disables the IT content.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:AUX:ITC ON`

Manual operation: See "IT Content" on page 242

CONFigure<hw>:HDGenerator:INFoframe:AUX:LBAR <Value>

Sets the pixel number of left bar end.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9999
*RST: 0

Example: `CONF:HDG:INF:AUX:LBAR 40`

Manual operation: See "Pixel Number of Left Bar End" on page 243

CONFigure<hw>:HDGenerator:INFoframe:AUX:LENGth?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:LENGth?` on page 786.

Usage: Query only

Manual operation: See "Length of InfoFrame" on page 240

CONFigure<hw>:HDGenerator:INFoframe:AUX:NUSCaling <Scaling>

Sets the nonuniform picture scaling.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Scaling> NONE | HORZ | VERT | BOTH
*RST: NONE

Example: `CONF:HDG:INF:AUX:NUSC HORZ`
Sets horizontally scaled.

Manual operation: See "Non-Uniform Picture Scaling" on page 242

CONFigure<hw>:HDGenerator:INFoframe:AUX:PBYTe<port> <Byte>

Sets the packet bytes.

Suffix:
<hw> 1
Irrelevant

<port> Number of the packet byte

Parameters:
<Byte> Decimal value
Range: 0 to 255

Example: `CONF:HDG:INF:AUX:PBYT5 35`
Packet byte 5: Sets 35.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:AUX:PICTurear <AspectRatio>

Sets the picture aspect ratio.

Suffix:
<hw> 1
Irrelevant

Parameters:
<AspectRatio> **0**
No data
1
4:3
2
16:9
*RST: 1

Example: `CONF:HDG:INF:AUX:PICT 2`

Manual operation: See "Picture Aspect Ratio" on page 241

CONFigure<hw>:HDGenerator:INFoframe:AUX:PXRepetition <Value>

Sets the pixel repetition.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9
*RST: 0

Example: `CONF:HDG:INF:AUX:PXR 1`
Sends pixel 2 times.

Manual operation: See "Pixel Repetition" on page 242

CONFigure<hw>:HDGenerator:INFoframe:AUX:RBAR <Value>

Sets the pixel number of right bar start.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9999
*RST: 0

Example: `CONF:HDG:INF:AUX:RBAR 50`

Manual operation: See "Pixel Number of Right Bar Start" on page 243

CONFigure<hw>:HDGenerator:INFoframe:AUX:RGBQrange <Quantization>

Sets the RGB quantization range.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Quantization> **0**
Default
1
Limited range
2
Full range
*RST: 1

Example: `CONF:HDG:INF:AUX:RGBQ 2`

Manual operation: See "RGB Quantization Range" on page 242

CONFigure<hw>:HDGenerator:INFoframe:AUX:SCANinfo <Type>

Sets the scan information.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Type> **0**
No data
1
Overscan
2
Underscan
*RST: 2

Example: `CONF:HDG:INF:AUX:SCAN 0`

Manual operation: See "Scan Information" on page 241

CONFigure<hw>:HDGenerator:INFoframe:AUX:TBAR <Value>

Sets the line number of top bar end.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 9999
*RST: 0

Example: `CONF:HDG:INF:AUX:TBAR 10`

Manual operation: See "Line Number of Top Bar End" on page 243

CONFigure<hw>:HDGenerator:INFoframe:AUX:VERSion?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:VERSion?` on page 788.

Usage: Query only

Manual operation: See "Version Number" on page 240

CONFigure<hw>:HDGenerator:INFoframe:AUX:VIC <Value>

Sets the video identification code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 255
*RST: 1

Example: `CONF:HDG:INF:AUX:VIC 127`

Manual operation: See "Video Identification Code" on page 242

CONFigure<hw>:HDGenerator:INFoframe:AUX:YCCQuant <Range>

Sets the YCC quantization.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Range> **0**
Limited range
1
Full range
*RST: 0

Example: `CONF:HDG:INF:AUX:YCCQ 1`

Manual operation: See "YCC Quantization Range" on page 242

CONFigure<hw>:HDGenerator:INFoframe:DRMI Subsystem

Configures the dynamic range and mastering InfoFrame.

CONFigure<hw>:HDGenerator:INFoframe:DRMI:ACTive <Enable>

Enables or disables the HDR and colorimetry data.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:DRMI:ACT ON`

Manual operation: See "Active" on page 252

CONFigure<hw>:HDGenerator:INFoframe:DRMI:CLL <Value>

Sets the maximum content light level.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 65535
*RST: 0

Example: `CONF:HDG:INF:DRMI:CLL 55`

Manual operation: See "Max Content Light Level" on page 254

CONFigure<hw>:HDGenerator:INFoframe:DRMI:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:DRMI` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:DRMI:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPX<idx> <Value>

Sets the x-coordinate of display primary 1 and 2.

Suffix:
<hw> 1
Irrelevant

<idx> 1-2
Number of the display primary

Parameters:
<Value> Range: 0.00000 to 1.00000
*RST: 0.60000 (X[1]) | 0.90000 (X[2])

Example: `CONF:HDG:INF:DRMI:DPX2 0.70000`
Display primary 2: Sets 0.70000.

Manual operation: See "Display Primaries X[1]" on page 253
See "Display Primaries X[2]" on page 253

CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPXNull <Value>

Sets the x-coordinate of display primary 0.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.00000 to 1.00000
*RST: 0.10000

Example: `CONF:HDG:INF:DRMI:DPXN 0.20000`

Manual operation: See "Display Primaries X[0]" on page 253

CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPY<idx> <Value>

Sets the y-coordinate of display primary 1 and 2.

Suffix:
<hw> 1
Irrelevant

<idx> 1-2
Number of the display primary

Parameters:
<Value> Range: 0.00000 to 1.00000
*RST: 0.90000 (Y[1]) | 0.12000 (Y[2])

Example: `CONF:HDG:INF:DRMI:DPY2 0.70000`
Display primary 2: Sets 0.70000.

Manual operation: See "Display Primaries Y[1]" on page 253
See "Display Primaries Y[2]" on page 253

CONFigure<hw>:HDGenerator:INFoframe:DRMI:DPYNull <Value>

Sets the y-coordinate of display primary 0.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.00000 to 1.00000
*RST: 0.10000

Example: `CONF:HDG:INF:DRMI:DPYN 0.20000`

Manual operation: See "Display Primaries Y[0]" on page 253

CONFigure<hw>:HDGenerator:INFoframe:DRMI:EOTF <Transfer>

Sets the electro-optical transfer function.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Transfer> SLP | HLP | ST2084 | FUTE
*RST: HLP

Example: `CONF:HDG:INF:DRMI:EOTF SLP`
Sets SDR luminance processing.

Manual operation: See "Electro-Optical Transfer Function" on page 253

CONFigure<hw>:HDGenerator:INFoframe:DRMI:FALL <Value>

Sets the maximum frame average light level.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 65535
*RST: 0

Example: `CONF:HDG:INF:DRMI:FALL 150`

Manual operation: See "Max Frame Average Light Level" on page 254

CONFigure<hw>:HDGenerator:INFoframe:DRMI:HBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port>` on page 785.

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:DRMI:LMAX <Value>

Sets the maximum display mastering luminance.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 65535
*RST: 0

Example: `CONF:HDG:INF:DRMI:LMAX 500`

Manual operation: See "Max Display Mastering Luminance" on page 254

CONFigure<hw>:HDGenerator:INFoframe:DRMI:LMIN <Value>

Sets the minimum display mastering luminance.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0000 to 6.5535
*RST: 0.0000

Example: `CONF:HDG:INF:DRMI:LMIN 1.0000`

Manual operation: See "Min Display Mastering Luminance" on page 254

CONFigure<hw>:HDGenerator:INFoframe:DRMI:PBNull <Byte>

Sets the packet byte 0.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Byte> Decimal value
Range: 0 to 255

Example: `CONF:HDG:INF:DRMI:PBN 251`

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:DRMI:PBYTe<byte> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:VSIF:PBYTe<port>` on page 827.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:DRMI:SMD <Descriptor>

Sets the static metadata descriptor.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Descriptor> SMD1

Example: `CONF:HDG:INF:DRMI:SMD SMD1`

Manual operation: See "Static Metadata Descriptor" on page 253

CONFigure<hw>:HDGenerator:INFoframe:DRMI:WPX <Value>

Sets the x-coordinate of the white point.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.00000 to 1.00000
*RST: 0.50000

Example: `CONF:HDG:INF:DRMI:WPX 0.60000`

Manual operation: See "White Point X" on page 254

CONFigure<hw>:HDGenerator:INFoframe:DRMI:WPY <Value>

Sets the y-coordinate of the white point.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.00000 to 1.00000
*RST: 0.50000

Example: `CONF:HDG:INF:DRMI:WPY 0.60000`

Manual operation: See "White Point Y" on page 254

CONFigure<hw>:HDGenerator:INFoframe:GBD Subsystem

Configures the Gamut boundary data InfoFrame.

CONFigure<hw>:HDGenerator:INFoframe:GBD:ACTive <Enable>

Enables or disables the gamut boundary data.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:GBD:ACT ON`

Manual operation: See "Active" on page 254

CONFigure<hw>:HDGenerator:INFoframe:GBD:BLACk<port> <Value>

Sets the black point.

Suffix:
<hw> 1
Irrelevant

<port> 1-3
x/y/z-coordinate

Parameters:
<Value> Range: 0 to 4095
*RST: 0

Example: `CONF:HDG:INF:GBD:BLAC2 100`
y-coordinate: Sets 100.

Manual operation: See "Black Point" on page 257

CONFigure<hw>:HDGenerator:INFoframe:GBD:COLPrecision <ColorDepth>

Sets the color precision.

Suffix:
<hw> 1
Irrelevant

Parameters:
<ColorDepth> CD8 | CD10 | CD12
*RST: CD8

Example: `CONF:HDG:INF:GBD:COLP CD10`
Sets 10 bit.

Manual operation: See "Color Precision" on page 255

CONFigure<hw>:HDGenerator:INFoframe:GBD:COLSpace <ColorSpace>

Sets the color space.

Suffix:
<hw> 1
Irrelevant

Parameters:
<ColorSpace> RGB | YCC601 | YCC709
*RST: RGB

Example: `CONF:HDG:INF:GBD:COLS YCC601`

Manual operation: See "Color Space" on page 256

CONFigure<hw>:HDGenerator:INFoframe:GBD:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:GBD` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:GBD:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:GBD:FACetmode <Enable>

Enables or disables the facet mode.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:GBD:FAC ON`

Manual operation: See "Facet Mode" on page 255

CONFigure<hw>:HDGenerator:INFoframe:GBD:FORMat <Flag>

Sets the format flag.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Flag> VERTices | RANGe
*RST: VERTices

Example: `CONF:HDG:INF:GBD:FORM RANG`

Manual operation: See "Format Flag" on page 255

CONFigure<hw>:HDGenerator:INFoframe:GBD:HBYTe<port> <Byte>

See CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port> on page 785.

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:GBD:MAXBlue
CONFigure<hw>:HDGenerator:INFoframe:GBD:MAXGreen
CONFigure<hw>:HDGenerator:INFoframe:GBD:MAXRed <Value>

Sets the maximum for blue/green/red.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -4.0000 to 4.0000
*RST: OFF

Example: CONF:HDG:INF:GBD:MAXR 0.1000

Manual operation: See "Maximum Red" on page 256

CONFigure<hw>:HDGenerator:INFoframe:GBD:MINBlue
CONFigure<hw>:HDGenerator:INFoframe:GBD:MINGreen
CONFigure<hw>:HDGenerator:INFoframe:GBD:MINRed <Value>

Sets the minimum for blue/green/red.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -4.0000 to 4.0000
*RST: OFF

Example: CONF:HDG:INF:GBD:MINR 0.1000

Manual operation: See "Minimum Red" on page 256

CONFigure<hw>:HDGenerator:INFoframe:GBD:NEXT <Enable>

Enables or disables the next field information.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:GBD:NEXT ON`

Manual operation: See "Next Field" on page 255

CONFigure<hw>:HDGenerator:INFoframe:GBD:NOGBd <Enable>

Sets whether no current gamut boundary data are present.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:GBD:NOGB ON`

Manual operation: See "No Current GBD" on page 255

CONFigure<hw>:HDGenerator:INFoframe:GBD:NUMFacets <Value>

Sets the number of facets.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 65535
*RST: OFF

Example: `CONF:HDG:INF:GBD:NUMF 300`

Manual operation: See "Number of Facets" on page 256

CONFigure<hw>:HDGenerator:INFoframe:GBD:NUMVertices <Value>

Sets the number of vertices.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 4 to 65535
*RST: 4

Example: `CONF:HDG:INF:GBD:NUMV 100`

Manual operation: See "Number of Vertices" on page 256

CONFigure<hw>:HDGenerator:INFoframe:GBD:PBLue<port>
CONFigure<hw>:HDGenerator:INFoframe:GBD:PGReen<port>
CONFigure<hw>:HDGenerator:INFoframe:GBD:PRED<port> <Value>

Sets the blue/green/red primary.

Suffix:
<hw> 1
Irrelevant

<port> 1-3
x/y/z-coordinate

Parameters:
<Value> Range: 0 to 4095
*RST: 0

Example: `CONF:HDG:INF:GBD:PRED3 200`
z-coordinate: Sets 200.

Manual operation: See "Red Primary" on page 257

CONFigure<hw>:HDGenerator:INFoframe:GBD:PBNull <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:DRMI:PBNull` on page 801.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:GBD:PBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:VSIF:PBYTe<port>` on page 827.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:GBD:PROFile <Number>

Sets the gamut boundary data InfoFrame profile.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Number> P0 | P1 | P2 | P3
*RST: P0

Example: `CONF:HDG:INF:GBD:PROF P1`

Manual operation: See "GBD Profile" on page 255

CONFigure<hw>:HDGenerator:INFoframe:GBD:SEQaffected <Value>

Sets the affected sequence number.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 15
*RST: 0

Example: `CONF:HDG:INF:GBD:SEQ 3`

Manual operation: See "Affected Sequence Num" on page 255

CONFigure<hw>:HDGenerator:INFoframe:GBD:SEQCurrent <Value>

Sets the current sequence number.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 15
*RST: 0

Example: `CONF:HDG:INF:GBD:SEQC 5`

Manual operation: See "Current Sequence Num" on page 255

CONFigure<hw>:HDGenerator:INFoframe:ISRC Subsystem

Configures the international standard recording code 1 InfoFrame.

CONFigure<hw>:HDGenerator:INFoframe:ISRC:ACTive <Enable>

Enables or disables the international standard recording code 1.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:ISRC:ACT ON`

Manual operation: See "Active" on page 257

CONFigure<hw>:HDGenerator:INFoframe:ISRC:CONTinue <Enable>

Enables or disables the ISRC continued information.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:ISRC:CONT ON`

Manual operation: See "ISRC Continued" on page 257

CONFigure<hw>:HDGenerator:INFoframe:ISRC:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:ISRC` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:ISRC:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:ISRC:HBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port>` on page 785.

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:ISRC:ISRC <Name>

Sets the ISRC 1 code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Name> String of max. 16 characters. Alphanumeric and special characters are allowed.

Example: `CONF:HDG:INF:ISRC:ISRC "12345"`

Manual operation: See "UPC EAN ISRC" on page 258

CONFigure<hw>:HDGenerator:INFoframe:ISRC:PBNull <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:DRMI:PBNull` on page 801.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:ISRC:PBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:VSIF:PBYTe<port>` on page 827.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:ISRC:STATus <Info>

Sets the ISRC status.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Info> UNKNown | STARt | INTermediate | END
*RST: INTermediate

Example: `CONF:HDG:INF:ISRC:STAT END`
Sets the status to track end.

Manual operation: See "ISRC Status" on page 258

CONFigure<hw>:HDGenerator:INFoframe:ISRC:VALid <Enable>

Enables or disables the ISRC validity check.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:ISRC:VAL ON`

Manual operation: See "ISRC Valid" on page 258

CONFigure<hw>:HDGenerator:INFoframe:ISRTwo Subsystem

Configures the international standard recording code 2 InfoFrame.

CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:ACTive <Enable>

Enables or disables the international standard recording code 2.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:ISRT:ACT ON`

Manual operation: See "Active" on page 258

CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:ISRT` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:ISRT:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:HBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port>` on page 785.

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:ISRC <Name>

Sets the ISRC 2 code. See `CONFigure<hw>:HDGenerator:INFoframe:ISRC:ISRC` on page 810.

Manual operation: See "UPC EAN ISRC 16" on page 258

CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:PBNull <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:DRMI:PBNull` on page 801.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:ISRTwo:PBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:VSIF:PBYTe<port>` on page 827.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:MPEG Subsystem

Configures the MPEG InfoFrame.

CONFigure<hw>:HDGenerator:INFoframe:MPEG:ACTive <Enable>

Enables or disables the MPEG InfoFrame.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:MPEG:ACT ON`

Manual operation: See "Active" on page 247

CONFigure<hw>:HDGenerator:INFoframe:MPEG:BITRate <Value>

Sets the MPEG bit rate.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 2147483648
*RST: 2000000
Default unit: bit/s

Example: `CONF:HDG:INF:MPEG:BITR 4000000`
Sets 4000000 bit/s.

Manual operation: See "MPEG Bit Rate" on page 247

CONFigure<hw>:HDGenerator:INFoframe:MPEG:CSUM?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:CSUM?` on page 785.

Usage: Query only

Manual operation: See "Checksum (hex)" on page 247

CONFigure<hw>:HDGenerator:INFoframe:MPEG:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:MPEG` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:MPEG:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:MPEG:FREPeat <Enable>

Enables or disables the field repeat.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:MPEG:FREP ON`

Manual operation: See "Field Repeat (for 3:2 Pull-Down)" on page 248

CONFigure<hw>:HDGenerator:INFoframe:MPEG:HBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port>` on page 785.

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:MPEG:LENGth?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:LENGth?` on page 786.

Usage: Query only

Manual operation: See "Length of InfoFrame" on page 247

CONFigure<hw>:HDGenerator:INFoframe:MPEG:MPEGframe <arg>

Enables or disables the MPEG InfoFrame.

Suffix:
<hw> 1
Irrelevant

Parameters:
<arg> UNKNown | I_Picture | B_Picture | P_Picture
*RST: I_Picture

Example: `CONF:HDG:INF:MPEG:MPEG P_P`

Manual operation: See "MPEG Frame" on page 248

CONFigure<hw>:HDGenerator:INFoframe:MPEG:PBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:PBYTe<port>` on page 787.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:MPEG:VERSion?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:VERSion?` on page 788.

Usage: Query only

Manual operation: See "Version Number" on page 247

CONFigure<hw>:HDGenerator:INFoframe:SPD Subsystem

Configures the source product description InfoFrame.

CONFigure<hw>:HDGenerator:INFoframe:SPD:ACTive <Enable>

Enables or disables the SPD InfoFrame.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: ON

Example: `CONF:HDG:INF:SPD:ACT OFF`

Manual operation: See "Active" on page 246

CONFigure<hw>:HDGenerator:INFoframe:SPD:CSUM?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:CSUM?` on page 785.

Usage: Query only

Manual operation: See "Checksum (hex)" on page 246

CONFigure<hw>:HDGenerator:INFoframe:SPD:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:SPD` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:SPD:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:SPD:HBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port>` on page 785.

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:SPD:LENGth?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:LENGth?` on page 786.

Usage: Query only

Manual operation: See "Length of InfoFrame" on page 246

CONFigure<hw>:HDGenerator:INFoframe:SPD:PBYTe<port> <Byte>

Sets the packet bytes.

Suffix:
<hw> 1
Irrelevant

<port> Number of the packet byte

Parameters:
<Byte> Decimal value
Range: 0 to 255

Example: `CONF:HDG:INF:SPD:PBYT25 0`
Header byte 25: Sets 0.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:SPD:PRODuct <Description>

Sets the product description.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Description> String consisting of 16 characters
*RST: <Instrument name>

Example: `CONF:HDG:INF:SPD:PROD "Description"`

Manual operation: See "Product Description" on page 246

CONFigure<hw>:HDGenerator:INFoframe:SPD:SOURceinfo <Information>

Sets the source information.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Information> **0**
Unknown

1
Digital STB
2
DVD player
3
D-VHS
4
HDD recorder
5
DVC
6
DSC
7
Video CD
8
Game
9
PC general
10
Blu-ray disc
11
Super audio CD
12
HD DVC
13
PMP
*RST: Unknown

Example: `CONF:HDG:INF:SPD:SOUR 2`

Manual operation: See "Source Information" on page 246

CONFigure<hw>:HDGenerator:INFoframe:SPD:VENDor <Name>

Sets the vendor name.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Name> String consisting of 8 characters
*RST: R&S

Example: `CONF:HDG:INF:SPD:VEND "Company"`

Manual operation: See "Vendor Name" on page 246

CONFigure<hw>:HDGenerator:INFoframe:SPD:VERSion?

See CONFigure<hw>:HDGenerator:INFoframe:AUDio:VERSion? on page 788.

Usage: Query only

Manual operation: See "Version Number" on page 246

CONFigure<hw>:HDGenerator:INFoframe:VSIF Subsystem

Configures the vendor-specific InfoFrame.

For all vendor-specific InfoFrames, the same commands are used. To address an individual vendor-specific InfoFrame, use CONFigure<hw>:HDGenerator:INFoframe:VSIF:IDX on page 825.

See also details on "Max. number of active InfoFrames" on page 236.

CONFigure<hw>:HDGenerator:INFoframe:VSIF:ACTive <Selection>

Enables and selects the vendor-specific InfoFrame.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Selection> OFF | V_3D | VIC | V20 | VS
*RST: OFF

Example: `CONF:HDG:INF:VSIF:ACT V20`
Sets HDMI 2.0.

Manual operation: See "Active" on page 248

CONFigure<hw>:HDGenerator:INFoframe:VSIF:ADDinfo <Enable>

Enables or disables the 3D additional information present.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:VSIF:ADD ON`

Manual operation: See "3D Additional Info Present" on page 249

CONFigure<hw>:HDGenerator:INFoframe:VSIF:CSUM?

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:CSUM?` on page 785.

Usage: Query only

Manual operation: See "Checksum (hex)" on page 249

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:INFoframe:VSIF` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:INF:VSIF:DEF`

Usage: Event

Manual operation: See "Default button" on page 259

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DIPMax <Value>

Sets the maximum picture disparity.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -128 to 127
*RST: OFF

Example: `CONF:HDG:INF:VSIF:DIPM 0`

Manual operation: See "Max Picture Disparity" on page 252

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DIRegion<region> <Value>

Sets the minimum disparity region 1 to 15.

Suffix:
<hw> 1
Irrelevant

<region> 1-15
Number of the region

Parameters:
<Value> Range: -128 to 127
*RST: OFF

Example: `CONF:HDG:INF:VSIF:DIR3 0`
Region 3: Sets 0.

Manual operation: See "Min Disparity Region 1 to Min Disparity Region 15" on page 252

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DIRNull <Value>

Sets the minimum disparity region 0.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -128 to 127
*RST: OFF

Example: `CONF:HDG:INF:VSIF:DIRN 0`

Manual operation: See "Min Disparity Region 0" on page 252

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DISParity <Enable>

Enables or disables the 3D disparity present.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:VSIF:DISP ON`

Manual operation: See "3D Disparity Present" on page 249

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DIVersion <Value>

Sets the disparity version.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> **0**
None
1
Range hint
2
Multi region
3
Multi region + range hint
*RST: 0

Example: `CONF:HDG:INF:VSIF:DIV 3`

Manual operation: See "Disparity Version" on page 251

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DMAX <Value>

Sets the video maximum disparity hint.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -2048 to 2047
*RST: OFF

Example: `CONF:HDG:INF:VSIF:DMAX 0`

Manual operation: See "Video Max Disparity Hint" on page 251

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DMIN <Value>

Sets the video minimum disparity hint.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -2048 to 2047
*RST: OFF

Example: `CONF:HDG:INF:VSIF:DMIN 0`

Manual operation: See "Video Min Disparity Hint" on page 251

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DREF <Value>

Sets the D_{ref} value.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 65535
*RST: OFF

Example: `CONF:HDG:INF:VSIF:DREF 20`

Manual operation: See "Dref" on page 251

CONFigure<hw>:HDGenerator:INFoframe:VSIF:DUALview <Enable>

Enables or disables the 3D dual view.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:VSIF:DUAL ON`

Manual operation: See "3D Dual View" on page 250

CONFigure<hw>:HDGenerator:INFoframe:VSIF:EXTData <Value>

Sets the 3D extension data.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> **0**
Horizontal odd/left, odd right
1
Horizontal odd/left, even right
2
Horizontal even/left, odd right
3
Horizontal even/left, even right
4
Quincunx odd/left, odd right
5
Quincunx odd/left, even right
6
Quincunx even/left, odd right
7
Quincunx even/left, even right
*RST: 0

Example: `CONF:HDG:INF:VSIF:EXTD 5`

Manual operation: See "3D Ext Data" on page 250

CONFigure<hw>:HDGenerator:INFoframe:VSIF:HBYTe<port> <Byte>

See `CONFigure<hw>:HDGenerator:INFoframe:AUDio:HBYTe<port>` on page 785.

Manual operation: See "HB0 to HB2" on page 258

CONFigure<hw>:HDGenerator:INFoframe:VSIF:HVIC <Value>

Sets the extended HDMI video identification code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 255
*RST: OFF

Example: `CONF:HDG:INF:VSIF:HVIC 255`

Manual operation: See "Extended HDMI VIC" on page 250

CONFigure<hw>:HDGenerator:INFoframe:VSIF:IDX <Selection>

Selects an individual vendor-specific InfoFrame.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Selection> DEFault | VSIF2 | VSIF3 | VSIF4
*RST: DEF

Example: `CONF:HDG:INF:VSIF:IDX VSIF2`
Sets vendor-specific InfoFrame 2.

Manual operation: See "<Vendor-specific InfoFrame 1 to 4 parameters>" on page 248

CONFigure<hw>:HDGenerator:INFoframe:VSIF:LENGth <Value>

Sets the length of the InfoFrame.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 27
*RST: 27

Example: `CONF:HDG:INF:VSIF:LENG 25`

Manual operation: See "Length of InfoFrame" on page 248

CONFigure<hw>:HDGenerator:INFoframe:VSIF:META <Enable>

Enables or disables the 3D meta present.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:VSIF:META ON`

Manual operation: See "3D Meta Present" on page 249

CONFigure<hw>:HDGenerator:INFoframe:VSIF:METatype <Metadata>

Sets the 3D metadata type.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Metadata> PARallax | RSV
*RST: OFF

Example: `CONF:HDG:INF:VSIF:MET RSV`
Sets reserved.

Manual operation: See "Metadata Type" on page 251

CONFigure<hw>:HDGenerator:INFoframe:VSIF:NREGions <Number>

Sets the number of regions.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Number> R0 | R1 | R2 | R3 | R4 | R9 | R16 | RSV
*RST: OFF

Example: `CONF:HDG:INF:VSIF:NREG R3`
Sets region 3.

Manual operation: See "Number of Regions" on page 252

CONFigure<hw>:HDGenerator:INFoframe:VSIF:OUI <Value>

Sets the organizationally unique identifier (OUI).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Hexadecimal value
*RST: #H0

Example: `CONF:HDG:INF:VSIF:OUI #H100FF`
Sets 01 00 FF.

Manual operation: See "IEEE OUI (hex)" on page 249

CONFigure<hw>:HDGenerator:INFoframe:VSIF:PARScale <Value>

Sets the parallax scale.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 65535
*RST: OFF

Example: `CONF:HDG:INF:VSIF:PARS 10`

Manual operation: See "Parallax Scale" on page 251

CONFigure<hw>:HDGenerator:INFoframe:VSIF:PARZero <Value>

Sets the parallax zero.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 65535
*RST: OFF

Example: `CONF:HDG:INF:VSIF:PARZ 5`

Manual operation: See "Parallax Zero" on page 251

CONFigure<hw>:HDGenerator:INFoframe:VSIF:PBYTe<port> <Byte>

Sets the packet bytes.

Suffix:
<hw> 1
Irrelevant

<port> Number of the packet byte

Parameters:
<Byte> Decimal value
Range: 0 to 255

Example: `CONF:HDG:INF:VSIF:PBYT27 0`
Packet byte 27: Sets 0.

Manual operation: See "PB0 to PB27" on page 259

CONFigure<hw>:HDGenerator:INFoframe:VSIF:STRucture <Value>

Sets the 3D structure.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> **0**
Frame packing

1
Field alternative

2
Line alternative

3
Side by side (full)

4
L + depth

5
L + depth + graphics + graphics-depth

6
Top and bottom

8
Side by side (half)

*RST: 0

Example: `CONF:HDG:INF:VSIF:STR 8`

Manual operation: See "3D Structure" on page 250

CONFigure<hw>:HDGenerator:INFoframe:VSIF:VALid <Enable>

Enables or disables the 3D validation.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:INF:VSIF:VAL ON`

Manual operation: See "3D Valid" on page 249

CONFigure<hw>:HDGenerator:INFoframe:VSIF:VERSion <Value>

Sets the version.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 255
*RST: 1

Example: `CONF:HDG:INF:VSIF:VERS 2`

Manual operation: See "Version Number" on page 248

CONFigure<hw>:HDGenerator:INFoframe:VSIF:VIDeoformat <Format>

Sets the video format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Format> NONE | EXTended | FO3D
*RST: OFF

Example: `CONF:HDG:INF:VSIF:VID FO3D`
Sets 3D format.

Manual operation: See "Video Format" on page 249

CONFigure<hw>:HDGenerator:INFoframe:VSIF:VSVersion <Value>

Sets the vendor-specific InfoFrame version.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 255
*RST: OFF

Example: `CONF:HDG:INF:VSIF:VSV 255`

Manual operation: See "VSIF Version" on page 249

CONFigure<hw>:HDGenerator:INFoframe:VSIF:VWDependency <View>

Sets the 3D view dependency.

Suffix:
<hw> 1
Irrelevant

Parameters:
<View> NONE | RIGHt | LEFT | BOTH
*RST: OFF

Example: `CONF:HDG:INF:VSIF:VWD RIGH`
Sets the right view.

Manual operation: See "3D View Dependency" on page 250

CONFigure<hw>:HDGenerator:INFoframe:VSIF:VWPReferred <View>

Sets the 3D view preferred 2D view.

Suffix:
<hw> 1
Irrelevant

Parameters:
<View> NONE | RIGHt | LEFT | DONTcare
*RST: OFF

Example: `CONF:HDG:INF:VSIF:VWPR LEFT`
Sets the left view.

Manual operation: See "3D Preferred 2D View" on page 250

CONFigure<hw>:HDGenerator:INFoframe:VSIF:WREF <Value>

Sets the W_{ref} value.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 65535
*RST: OFF

Example: `CONF:HDG:INF:VSIF:WREF 50`

Manual operation: See "Wref" on page 251

14.6.2.6 CONFigure<hw>:HDGenerator:OUTPut Subsystem

CONFigure<hw>:HDGenerator:OUTPut:ENVoltage <Enable>

Enables or disables 5 V for the HDMI output.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: ON

Example: `CONF:HDG:OUTP:ENV OFF`

Manual operation: See "Enable 5V (HDMI RX/TX 600 MHz module)" on page 219

CONFigure<hw>:HDGenerator:OUTPut:HDCPout<port> <Encryption>

Enables or disables the HDCP encryption. For the HDMI RX/TX 600 MHz module (R&S VT-B2363), also sets the HDCP version.

Suffix:
<hw> 1
Irrelevant

<port> Outputs of the HDMI TX 300 MHz module (R&S VT-B360); irrelevant for the HDMI RX/TX 600 MHz module (R&S VT-B2363).

Parameters:
<Encryption> OFF | ON | HDCP14 | HDCP22

OFF | ON
HDMI TX 300 MHz module (R&S VT-B360)

OFF | ON | HDCP14 | HDCP22
HDMI RX/TX 600 MHz module (R&S VT-B2363)

Example: `CONF:HDG:OUTP:HDCP ON`

Manual operation: See "HDCP (HDMI TX 300 MHz module)" on page 219
See "HDCP (HDMI RX/TX 600 MHz module)" on page 219

CONFigure<hw>:HDGenerator:OUTPut:HDMiout<port> <Enable>

Enables or disables the output. For the HDMI TX 300 MHz module (R&S VT-B360), you can enable or disable each output separately.

Suffix:
<hw> 1
Irrelevant

<port> Outputs of the HDMI TX 300 MHz module (R&S VT-B360); irrelevant for the HDMI CTS RX/TX 600 MHz module (R&S VT-B2362) and the HDMI RX/TX 600 MHz module (R&S VT-B2363).

Parameters:
<Enable> OFF | ON

*RST: ON

Example: `CONF:HDG:OUTP:HDM OFF`

Manual operation: See "HDMI Out 1 to 4 (HDMI TX 300 MHz module)" on page 218
See "HDMI Out (HDMI CTS RX/TX 600 MHz module)" on page 218
See "HDMI 2.0 Output (HDMI RX/TX 600 MHz module)" on page 219

CONFigure<hw>:HDGenerator:OUTPut:SCRDet <Source>

Sets the source of the scrambling determination.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Source> EDID | OFF | UHD | ON
*RST: EDID

Example: `CONF:HDG:OUTP:SCRD UHD`
Sets 600 MHz only.

Manual operation: See "Scrambling Determination (HDMI RX/TX 600 MHz module)" on page 220

14.6.2.7 CONFigure<hw>:HDGenerator:SCDC Subsystem

CONFigure<hw>:HDGenerator:SCDC:MODE <Update>

Defines how the update is performed.

Parameters:
<Update> STATeful | POLL | MANual
*RST: STATeful

Example: `CONF:HDG:SCDC:MODE MAN`

Manual operation: See "Update Mode" on page 262

CONFigure<hw>:HDGenerator:SCDC:SCRambling:RESet <arg>

Resets the number of all read character errors every time the command is sent. Afterwards, the measurement continues automatically.

Parameters:
<arg> OFF | ON
The command requires a parameter, but both parameters have the same result - they cause a reset.

Example: `CONF:HDG:SCDC:SCR:RES OFF`

Manual operation: See "Reset Errors button" on page 265

CONFigure<hw>:HDGenerator:SCDC:UPDate <Enable>

Enables or disables a full, one-time update of all SCDC registers.

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:SCDC:UPD ON`

Manual operation: See "Read All button" on page 262

14.6.2.8 CONFigure<hw>:HDGenerator:SIGNal Subsystem

CONFigure<hw>:HDGenerator:SIGNal:AUDConf Subsystem

Configures the video signal.

See also "Audio Configuration" on page 229.

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:CH<port> <Enable>

Enables or disables the specified channel.

Suffix:
<hw> 1
Irrelevant

<port> Audio channel

Parameters:
<Enable> OFF | ON
*RST: ON

Example: `CONF:HDG:SIGN:AUDC:CH3 OFF`

Manual operation: See "<Audio channels>" on page 230

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:CHALlocation <Value>

Specifies the speaker allocation.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0 to 49
*RST: 19

Example: `CONF:HDG:SIGN:AUDC:CHAL 49`

Manual operation: See "Channel Allocation (hex)" on page 230

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:SIGNal:AUDConf` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:SIGN:AUDC:DEF`

Usage: Event

Manual operation: See "Default button" on page 230

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:FREQ:CH<port> <Value>

Sets the frequency of the specified channel.

Suffix:
<hw> 1
Irrelevant

<port> Audio channel

Parameters:
<Value> Range: 100 to 20000
*RST: 1000
Default unit: Hz

Example: `CONF:HDG:SIGN:AUDC:FREQ:CH4 500`
Audio channel 4: Sets 500 Hz.

Manual operation: See "<Audio channels>" on page 230

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:LEVel <Value>

Sets the audio level of all channels together.

Suffix:
<hw> 1
Irrelevant

Parameters:

<Value> Range: -99.9 to 0.0
*RST: -20.0
Default unit: DBFS

Example: `CONF:HDG:SIGN:AUDC:LEV -10`
Sets -10 dBFS.

Manual operation: See "Audio Level" on page 229

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:LEVel:CH<port> <Value>

Sets the audio level of the specified channel.

Suffix:

<hw> 1
Irrelevant

<port> Audio channel

Parameters:

<Value> Range: -99.9 to 0.0
*RST: -20.0
Default unit: DBFS

Example: `CONF:HDG:SIGN:AUDC:LEV:CH2 -10`
Audio channel 2: Sets -10 dBFS.

Manual operation: See "<Audio channels>" on page 230

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:RESolution <Audio>

Sets the audio resolution of all channels.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Audio> B16 | B20 | B24
*RST: B16

Example: `CONF:HDG:SIGN:AUDC:RES B20`
Sets 20 bit.

Manual operation: See "Resolution" on page 229

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:SAMPling:RATE <Audio>

Sets the sample rate of the contained audio signal, the audio sampling rate.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Audio> HZ32000 | HZ44100 | HZ48000 | HZ88200 | HZ96000 | HZ176400 | HZ192000

*RST: HZ44100

Example: `CONF:HDG:SIGN:AUDC:SAMP:RATE HZ32000`
Sets 32 kHz.

Manual operation: See "Sampling Rate" on page 229

CONFigure<hw>:HDGenerator:SIGNal:AUDConf:SELect <Source>

Sets the audio source.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Source> MUTE | VIDeofile | GENerator

*RST: GENerator

Example: `CONF:HDG:SIGN:AUDC:SEL MUTE`

Manual operation: See "Audio" on page 229

CONFigure<hw>:HDGenerator:SIGNal:VICD Subsystem

CONFigure<hw>:HDGenerator:SIGNal:VICD <VideoCode>

Sets the specified CEA video code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<VideoCode> Specifies the video code. See Chapter 10.4.3, "Video Codes", on page 353.

Example: `CONF:HDG:SIGN:VICD 100`

Manual operation: See "Video Code" on page 224

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:DEFault

Sets each user-defined value to its default value.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:SIGN:VICD:CUST:DEF`

Usage: Event

Manual operation: See "Default button" on page 233

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HACTive <Value>

Sets the number of horizontal active pixels.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 512 to 4096
*RST: 640

Example: `CONF:HDG:SIGN:VICD:CUST:HACT 800`

Manual operation: See "H. Active Pixels" on page 231

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HBPorch <Value>

Sets the number of horizontal back porch pixels.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 5 to 4096
*RST: 48

Example: `CONF:HDG:SIGN:VICD:CUST:HBP 96`

Manual operation: See "H. Back Porch Pixels" on page 231

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HFPorch <Value>

Sets the number of horizontal front porch pixels.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 5 to 4096
*RST: 16

Example: `CONF:HDG:SIGN:VICD:CUST:HFP 30`

Manual operation: See "H. Front Porch Pixels" on page 231

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HPOLarity <Horizontal>

Sets the horizontal synchronization polarity.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Horizontal> POSitive | NEGative
*RST: NEGative

Example: `CONF:HDG:SIGN:VICD:CUST:HPOL POS`

Manual operation: See "H. Sync. Polarity" on page 232

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:HSYNc <Value>

Sets the number of horizontal synchronization pixels.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 5 to 1024
*RST: 96

Example: `CONF:HDG:SIGN:VICD:CUST:HSYN 300`

Manual operation: See "H. Sync. Pixels" on page 231

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:PROGressive
<VideoFormat>

Sets the video format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<VideoFormat> PROGressive | INTerlaced | EVENsync
*RST: PROGressive

Example: `CONF:HDG:SIGN:VICD:CUST:PROG INT`

Manual operation: See "Video Format" on page 233

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:PXFRequency <Value>

Sets the actual pixel frequency.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range depends on the module set using `ROUTe<hw>:HDGenerator:MODule:SELect` on page 872.
Range: 25.000 to 300.000 (TX300) | 600.000 (TX600)
*RST: 25.17500
Default unit: MHz

Example: `CONF:HDG:SIGN:VICD:CUST:PXFR 126.000`

Manual operation: See "Pixel Frequency" on page 232

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:PXRepetition <Value>

Sets the number of repeated pixels.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 10
*RST: 1 (= "None")

Example: `CONF:HDG:SIGN:VICD:CUST:PXR 5`

Manual operation: See "Pixel Repetition" on page 232

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VACTive <Value>

Sets the number of vertical active lines.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 200 to 2160
*RST: 480

Example: `CONF:HDG:SIGN:VICD:CUST:VACT 500`

Manual operation: See "V. Active Lines" on page 232

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VBPorch <Value>

Sets the number of vertical back porch lines.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 512
*RST: 33

Example: `CONF:HDG:SIGN:VICD:CUST:VBP 50`

Manual operation: See "V. Back Porch Lines" on page 232

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VFPorch <Value>

Sets the number of vertical front porch lines.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 512
*RST: 10

Example: `CONF:HDG:SIGN:VICD:CUST:VFP 20`

Manual operation: See "V. Front Porch Lines" on page 232

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VFRequency <Value>

Sets the actual vertical frequency.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 20.000 to 300.000
*RST: 59.940
Default unit: Hz

Example: `CONF:HDG:SIGN:VICD:CUST:VFR 300.000`

Manual operation: See "Vertical Frequency" on page 233

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VPOLarity <Vertical>

Sets the vertical synchronization polarity.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Vertical> POSitive | NEGative
*RST: NEGative

Example: `CONF:HDG:SIGN:VICD:CUST:VPOL POS`

Manual operation: See "V. Sync. Polarity" on page 233

CONFigure<hw>:HDGenerator:SIGNal:VICD:CUSTom:VSYNc <Value>

Sets the number of vertical sync lines.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 2 to 512
*RST: 2

Example: `CONF:HDG:SIGN:VICD:CUST:VSYN 10`

Manual operation: See "V. Sync. Lines" on page 232

CONFigure<hw>:HDGenerator:SIGNal:VICD:HCODe <VideoCode>

Sets the specified HDMI video code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<VideoCode> Specifies the video code. See Chapter 10.4.3, "Video Codes", on page 353.

Example: `CONF:HDG:SIGN:VICD:HCOD 2`

Manual operation: See "Video Code" on page 224

CONFigure<hw>:HDGenerator:SIGNal:VICD:VCODe <VideoCode>

Sets the specified VESA video code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<VideoCode> Specifies the video code. See Chapter 10.4.3, "Video Codes", on page 353.

Example: `CONF:HDG:SIGN:VICD:VCOD 44`

Manual operation: See "Video Code" on page 224

CONFigure<hw>:HDGenerator:SIGNal:VIDConf Subsystem

Configures the video signal.

See also "Video Configuration" on page 225.

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:ADJustment <Variation>

Sets the calibrated values or the variable values of the signal amplitude.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Variation> CALibrated | VARiable
*RST: CALibrated

Example: `CONF:HDG:SIGN:VIDC:ADJ VAR`

Manual operation: See "Adjustment" on page 226

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:AMPL:CHRoma <Value>

Sets the common variation of the all chroma signal level.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.000 to 2.000
*RST: 1.000

Example: `CONF:HDG:SIGN:VIDC:AMPL:CHR 0.500`

Manual operation: See "Chroma Amplification" on page 227

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:AMPL:RGB <Value>

Sets the variation of the overall signal level for RGB format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.000 to 2.000
*RST: 1.000

Example: `CONF:HDG:SIGN:VIDC:AMPL:RGB 0.500`

Manual operation: See "Overall Amplification" on page 227

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:AMPL:YCBCr <Value>

Sets the variation of the overall signal level for Y, Cb/Pb, Cr/Pr signals.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.000 to 2.000
*RST: 1.000

Example: `CONF:HDG:SIGN:VIDC:AMPL:YCBC 0.500`

Manual operation: See "Overall Amplification" on page 227

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:BOFFset
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:GOFFset
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:ROFFset <Value>

Adds a DC offset to the red, green or blue signal only.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 100.0
*RST: 0.0
Default unit: PCT

Example: `CONF:HDG:SIGN:VIDC:ROFF 50`
Sets 50.0 %.

Manual operation: See "R Offset, G Offset, B Offset" on page 228

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:CBOFfset
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:CROFfset <Value>

Adds a DC offset to the luminance signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -100.0 to 100.0
*RST: 0.0
Default unit: PCT

Example: `CONF:HDG:SIGN:VIDC:CROF 50`
Sets 50.0 %.

Manual operation: See "C_b Offset, C_r Offset" on page 228

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:CLIPping <Resolution>

Allows clipping the resolution of the video signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Resolution> OFF | B11 | B10 | B9 | B8 | B7 | B6 | B5 | B4 | B3 | B2 | B1
*RST: OFF

Example: `CONF:HDG:SIGN:VIDC:CLIP B1`
Sets 1 bit.

Manual operation: See "Resolution Clipping" on page 226

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:COMPonent:FORMat <PixelEncoding>

Sets the pixel encoding.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PixelEncoding> RGB | Y444 | Y422 | Y420
*RST: RGB

Example: `CONF:HDG:SIGN:VIDC:COMP:FORM Y444`
Sets YCbCr 4:4:4.

Manual operation: See "Component Format" on page 225

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:DEFault

Resets all commands of the `CONFigure<hw>:HDGenerator:SIGNal:VIDConf` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDG:SIGN:VIDC:DEF`

Usage: Event

Manual operation: See "Default button" on page 228

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:DEPColor <Resolution>

Sets the color resolution of the pixel.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Resolution> OFF | B10 | B12
*RST: OFF

Example: `CONF:HDG:SIGN:VIDC:DEPC B10`
Sets 10 bit.

Manual operation: See "Deep Color" on page 225

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:B
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:G
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:R <Value>

Sets the individual variation of the signal components amplitude for RGB format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 200.0
*RST: 100.0
Default unit: PCT

Example: `CONF:HDG:SIGN:VIDC:LEVel:R 50`

Manual operation: See "R Level, G Level, B Level" on page 227

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:CB
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:CR
CONFigure<hw>:HDGenerator:SIGNal:VIDConf:LEVel:Y <Value>

Sets the individual variation of the signal components amplitude for Y, Cb/Pb, Cr/Pr signals.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 200.0
*RST: 100.0
Default unit: PCT

Example: `CONF:HDG:SIGN:VIDC:LEVel:Y 50`

Manual operation: See "Y Level, C_b/P_b Level, C_r/P_r Level" on page 228

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:OFFSet <Value>

Adds a DC offset to the R, G, B signal at the same time.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 100.0
*RST: 0.0
Default unit: PCT

Example: `CONF:HDG:SIGN:VIDC:OFFS 0.5`

Manual operation: See "Overall Offset" on page 227

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:PIXelshift:HORizontal <Value>

Sets the scroll velocity and direction.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -63 to 63
*RST: 0
Default unit: lines/frame

Example: `CONF:HDG:SIGN:VIDC:PIX:HOR 10`
Moves the image 10 lines/frame to the left.

Manual operation: See "Horizontal" on page 226

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:PIXelshift:VERTical <Value>

Sets the scroll velocity and direction.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: -63 to 63
*RST: 0
Default unit: lines/frame

Example: `CONF:HDG:SIGN:VIDC:PIX:VERT 10`
Moves the image 10 lines/frame upwards.

Manual operation: See "Vertical" on page 226

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:PIXHorizontal <Enable>

Scrolls the screen contents in the selected velocity and direction.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:SIGN:VIDC:PIXH ON`

Manual operation: See "Pixelshift Horizontal" on page 226

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:PIXVertical <Enable>

Scrolls the screen contents in the selected velocity and direction.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:HDG:SIGN:VIDC:PIXV ON`

Manual operation: See "Pixelshift Vertical" on page 225

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:QUANtization <Range>

Enables or disables the full color range.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Range> LIMited | FULL
*RST: LIM

Example: `CONF:HDG:SIGN:VIDC:QUAN FULL`

Manual operation: See "Quantization Range" on page 225

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:SIGNal <Mode>

Enables or disables the HDMI data channel.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Mode> HDMI | DVI
*RST: HDMI

Example: `CONF:HDG:SIGN:VIDC:SIGN DVI`

Manual operation: See "Signaling Mode" on page 225

CONFigure<hw>:HDGenerator:SIGNal:VIDConf:YOFFset <Value>

Adds a DC offset to the luminance signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.0 to 100.0
*RST: 0.0
Default unit: PCT

Example: `CONF:HDG:SIGN:VIDC:YOFF 50`

Manual operation: See "Y Offset" on page 228

CONFigure<hw>:HDGenerator:SIGNal:... Subsystem

CONFigure<hw>:HDGenerator:SIGNal:ASPRatio <Value>

Sets the aspect ratio in the format filter.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> F4_3 | F16_9 | F64_27 | F256_135
*RST: F4_3

Example: `CONF:HDG:SIGN:ASPR F16_9`
Sets 16:9.

Manual operation: See "Aspect Ratio" on page 224

CONFigure<hw>:HDGenerator:SIGNal:COMMand <Playing>

Starts, stops or pauses playing the selected signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Playing> STOP | PAUSe | PLAY

Example: `CONF:HDG:SIGN:COMM PLAY`

Manual operation: See "Start button" on page 230
See "Stop button" on page 230
See "Pause button" on page 231

CONFigure<hw>:HDGenerator:SIGNal:FRAM <Value>

Sets the frame rate in the format filter.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> 23.97 | 24 | 25 | 29.97 | 30 | 43 | 50 | 56 | 59.94 | 60 | 65 | 70 | 72 | 75 | 85 | 100 | 119.88 | 120 | 200 | 239.76 | 240

*RST: 60
Default unit: Hz

Example: `CONF:HDG:SIGN:FRAM 59.94`
Sets 59.94 Hz.

Manual operation: See "Frame Rate" on page 224

CONFigure<hw>:HDGenerator:SIGNal:NOBLack <state>

Controls the loading process of patterns.

Suffix:
<hw> 1
Irrelevant

Parameters:
<state> OFF | ON

OFF
Every pattern change causes a reset. Black content is displayed, and the receiver synchronizes anew.

ON
Loads a pattern without switching to black content. Avoids a reset but shows the patterns superimposed for a short time. Use this setting for pattern changes that do not require a format or timing change.

*RST: ON

Manual operation: See "Content Selection dialog" on page 223

CONFigure<hw>:HDGenerator:SIGNal:PLAY:FILE <PathFile>

Loads the signal from the specified `*.avg` file.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `CONF:HDG:SIGN:PLAY:FILE "D:\VTE\UserData\RefSWB.avg"`
Loads `RefSWB.avg` from the `D:\VTE\UserData` directory.

Manual operation: See "Content Selection dialog" on page 223

CONFigure<hw>:HDGenerator:SIGNal:PLAY:PATT <Name>

Sets the signal with the specified name.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Name> Specifies the signal name. You can choose from all signals available in the database. See also Chapter 10.4, "Content and Codes", on page 347.
*RST: "Color Bar 75%"

Example: `CONF:HDG:SIGN:PLAY:PATT "H Ramp"`

Manual operation: See "Content Selection" on page 223
See "Content Selection dialog" on page 223

14.6.3 DISPlay Subsystem

DISPlay<hw>:HDGenerator:SELect:TAB <Tab>

Selects the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Tab> OUTPut | SIGNal | INFoframe | EDIDreader | CEC | CTS | SCDC
Corresponds to the tabs in the manual operation.

Example: `DISP:HDG:SEL:TAB INF`

14.6.4 INITiate Subsystem

INITiate<hw>:HDGenerator:CEC

Starts the protocol trace and performs a device discovery.

Suffix:
<hw> 1
Irrelevant

Example: `INIT:HDG:CEC`

Usage: Event

Manual operation: See "Start button" on page 282

INITiate<hw>:HDGenerator:CTS

Starts the selected test.

Suffix:
<hw> 1
Irrelevant

Example: `INIT:HDG:CTS`

Usage: Event

Manual operation: See "Start button" on page 280

14.6.5 MMEMory Subsystem

MMEMory<hw>:HDGenerator:CEC:DATA:STORe <PathFile>

Saves the CEC traffic report as a TXT file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:HDG:CEC:DATA:STOR "D:\VTE\UserData\MyReport.txt"`
Saves `MyReport.txt` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 282

MMEMory<hw>:HDGenerator:CTS:REPort:STORe <PathFile>

Saves the CTS test report as a TXT file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:HDG:CTS:REP:STOR "D:\VTE\UserData\MyReport.txt"`
Saves `MyReport.txt` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 279

14.6.6 READ Subsystem

14.6.6.1 READ<hw>:HDGenerator:CEC Subsystem

Queries the CEC communication results.

See also Chapter 10.2.9, "CEC Subtab", on page 331.

READ<hw>:HDGenerator:CEC:REPort? <Line>

Queries the content of the specified entry line in the CEC traffic report.

Suffix:
<hw> 1
Irrelevant

Query parameters:

<Line> Number of the entry line in the CTS test report. You can query the total number of lines using `READ<hw>:HDGenerator:CEC:REPort:COUNt?` on page 854.

Range: 0 (= first line) to total number

Return values:

<Result> 1,0x0000,"<contents of line>"

Example: `READ:HDG:CEC:REP? 1`
Query
1,0x0000,"TV: Present"
Response: Contents of second line.

Usage: Query only

READ<hw>:HDGenerator:CEC:REPort:COUNt?

Queries the number of entry lines in the CEC traffic report.

Suffix:

<hw> 1
Irrelevant

Return values:

<Lines> Total number of lines

Example: `READ:HDG:CEC:REP:COUN?`
Query
`16`
Response

Usage: Query only

14.6.6.2 READ<hw>:HDGenerator:CTS Subsystem

READ<hw>:HDGenerator:CTS:CONTrol:PROGress?

Queries the current measurement progress.

Suffix:

<hw> 1
Irrelevant

Return values:

<Value> Measurement progress in %

Example: `READ:HDG:CTS:CONT:PROG?`
Query
`100`
Response

Usage: Query only

Manual operation: See "<Status display>" on page 280

READ<hw>:HDGenerator:CTS:CONTrol:STATe?

Queries the status of the CTS measurement.

Suffix:
<hw> 1
Irrelevant

Return values:
<Meas> IDLE | CAPTuring | RUNNing | FINished

Example: `READ:HDG:CTS:CONT:STAT?`
Query
`IDLE`
Response

Usage: Query only

Manual operation: See "<Status display>" on page 280

READ<hw>:HDGenerator:CTS:REPort? <Line>

Queries the content of the specified entry line in the CTS test report.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<Line> Number of the entry line in the CTS test report. You can query the total number of lines using `READ<hw>:HDGenerator:CTS:REPort:COUNt?` on page 856.

Return values:
<Result> 1,0x0000,"<contents of line>"

Example: `READ:HDG:CTS:REP? 2`
Query
`1,0x0000,"Test Begin: Tuesday, December 22, 2015 4:19:30 PM"`
Response: Contents of third line.

Usage: Query only

READ<hw>:HDGenerator:CTS:REPort:COUNt?

Queries the number of entry lines in the CTS test report.

Suffix:
<hw> 1
Irrelevant

Return values:
<Lines> Total number of lines

Example: `READ:HDG:CTS:REP:COUN?`
Query
`10`
Response

Usage: Query only

14.6.6.3 READ<hw>:HDGenerator:EDID Subsystem

READ<hw>:HDGenerator:EDID:DUMP?

Queries the binary data of the EDID on the chosen output.

Suffix:
<hw> 1
Irrelevant

Return values:
<BinaryBlock> <dblock>
Response consists of #<number> and EDID data
#<number>
Example: #3256
signals the start of the data block.
3 means that the data size is indicated by 3 numbers.
256 is the data size in bytes, i.e. 256 bytes of EDID data.

Usage: Query only

Manual operation: See "Save EDID Data" on page 260

14.6.6.4 READ<hw>:HDGenerator:HDCP Subsystem

READ<hw>:HDGenerator:HDCP:AKSV?

Queries the key selection vector of the transmitter.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
Data block

Example: `READ:HDG:HDCP:AKSV?`
Query
`OK,5E73CC6B02`
Response

Usage: Query only

Manual operation: See "AKSV" on page 235

READ<hw>:HDGenerator:HDCP:AN?

Queries the session random number.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
Data block

Example: `READ:HDG:HDCP:AN?`
Query
`OK,76FCA94FDB8D1BB0`
Response

Usage: Query only

Manual operation: See "An" on page 235

READ<hw>:HDGenerator:HDCP:BKSV?

Queries the key selection vector of the receiver.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
Data block

Example: READ:HDG:HDCP:BKSV?
Query
OK,CA4E573C86
Response

Usage: Query only

Manual operation: See "BKSV" on page 235

READ<hw>:HDGenerator:HDCP:H?

Queries the hash value calculated by the receiver of the authentication protocol.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
8 data blocks

Example: READ:HDG:HDCP:H?
Query
OK,6FB30D9BA70B86ED807B5FB5DFEDD2FE
243619983C1DBFD5F6B0A4308026EA8F
Response

Usage: Query only

Manual operation: See "H" on page 235

READ<hw>:HDGenerator:HDCP:L?

Queries the locality check hash value calculated by the receiver of the locality check.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
8 data blocks

Example: READ:HDG:HDCP:L?
Query
OK,D28F28E33E217F27B9F64A9AFBD06BA9
7C132DC67EB7017B4D381485EE9E315F
Response

Usage: Query only

Manual operation: See "L" on page 236

READ<hw>:HDGenerator:HDCP:RI?

Queries the current link synchronization verification values.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
Data block

Example: `READ:HDG:HDCP:RI?`
Query
`OK,2FF8`
Response

Usage: Query only

Manual operation: See "Ri'" on page 235

READ<hw>:HDGenerator:HDCP:RN?

Queries the pseudo-random value of the locality check.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
2 data blocks

Example: `READ:HDG:HDCP:RN?`
Query
`OK,ABB6571B5C0A5DEE`
Response

Usage: Query only

Manual operation: See "r(n)" on page 235

READ<hw>:HDGenerator:HDCP:RRX?

Queries the pseudo-random value of the authentication protocol.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
2 data blocks

Example: READ:HDG:HDCP:RRX?
Query
OK,E9575AC6C63F3070
Response

Usage: Query only

Manual operation: See "r(rx)" on page 235

READ<hw>:HDGenerator:HDCP:RTX?

Queries the pseudo-random value of the authentication protocol.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
2 data blocks

Example: READ:HDG:HDCP:RTX?
Query
OK,DB71756E6E51B2D6
Response

Usage: Query only

Manual operation: See "r(tx)" on page 235

14.6.6.5 READ<hw>:HDGenerator:OUTPut Subsystem

READ<hw>:HDGenerator:OUTPut:CONTent?

Queries the content of the output pane.

Suffix:
<hw> 1
Irrelevant

Return values:
<Details> String

Usage: Query only

READ<hw>:HDGenerator:OUTPut:HDCPstate<port>?

Queries the status of the HDCP encryption.

Suffix:
<hw> 1
Irrelevant

<port> Outputs of the HDMI TX 300 MHz module (R&S VT-B360); irrelevant for the HDMI RX/TX 600 MHz module (R&S VT-B2363).

Return values:
<Encryption> String

Example: `READ:HDG:OUTP:HDCP?`
Query
`"HDCP 1.4 Active"`
Response

Usage: Query only

Manual operation: See "HDCP State (HDMI TX module and HDMI RX/TX 600 MHz module)" on page 220
See "HDCP State" on page 234

READ<hw>:HDGenerator:OUTPut:HPDout<port>[:STATe]?

Queries the status of the hot plug detect connection.

Suffix:
<hw> 1
Irrelevant

<port> Outputs of the HDMI TX 300 MHz module (R&S VT-B360); irrelevant for the HDMI CTS RX/TX 600 MHz module (R&S VT-B2362) and the HDMI RX/TX 600 MHz module (R&S VT-B2363).

Return values:
<Detect> NOTasserted | ASSerted

Example: `READ:HDG:OUTP:HPD?`
Query
`NOT`
Response

Usage: Query only

Manual operation: See "Hot Plug Detect" on page 220

READ<hw>:HDGenerator:OUTPut:SCRState?

Queries the scrambling status.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Status

Example: `READ:HDG:OUTP:SCRS?`
Query
`"Offline"`
Response

Usage: Query only

Manual operation: See "Scrambling State (HDMI RX/TX 600 MHz module)" on page 220

14.6.6.6 READ<hw>:HDGenerator:SCDC Subsystem

READ<hw>:HDGenerator:SCDC:CDIVide?

Queries the status of clock divide by 4.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:CDIV?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Clock Divide By 4" on page 263

READ<hw>:HDGenerator:SCDC:HWVersion?

Queries the hardware version.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Version

Example: `READ:HDG:SCDC:HWV?`
Query
`"15.15"`
Response

Usage: Query only

Manual operation: See "Hardware Version" on page 263

READ<hw>:HDGenerator:SCDC:IDENtifier?

Queries the identifier.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Identifier

Example: `READ:HDG:SCDC:IDEN?`
Query
`"R&S VTx"`
Response

Usage: Query only

Manual operation: See "Identifier" on page 262

READ<hw>:HDGenerator:SCDC:OUI?

Queries the organizationally unique identifier (OUI).

Suffix:
<hw> 1
Irrelevant

Return values:
<String> In hexadecimal representation

Example: `READ:HDG:SCDC:OUI?`
Query
`"FF FF FF"`
Response

Usage: Query only

Manual operation: See "OUI" on page 262

READ<hw>:HDGenerator:SCDC:RRENable?

Queries the read request enable status.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:RREN?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Read Request Enable" on page 263

READ<hw>:HDGenerator:SCDC:SCRambling:CH<channel>?

Queries the channel 1 or 2 locked status.

Suffix:
<hw> 1
Irrelevant

<channel> 1-2
Selects the channel.

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:SCR:CH2?`
Query
`ON`
Response for channel 2

Usage: Query only

Manual operation: See "Channel 0 Locked, Channel 1 Locked, Channel 2 Locked" on page 264

READ<hw>:HDGenerator:SCDC:SCRambling:CHNull?

Queries the channel 0 locked status.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:SCR:CHN?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Channel 0 Locked, Channel 1 Locked, Channel 2 Locked" on page 264

READ<hw>:HDGenerator:SCDC:SCRambling:CLOCk?

Queries the clock detected status.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:SCR:CLOC?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Clock Detected" on page 264

READ<hw>:HDGenerator:SCDC:SCRambling:DETect?

Queries the scrambling detected status.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:SCR:DET?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Scrambling Detected" on page 264

READ<hw>:HDGenerator:SCDC:SCRambling:ENABle?

Queries the scrambling enable status.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:SCR:ENAB?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Scrambling Enable" on page 263

READ<hw>:HDGenerator:SCDC:SCRambling:ERR<channel>?

Queries the errors in channel 1 or 2.

Suffix:
<hw> 1
Irrelevant

<channel> 1-2
Selects the channel.

Return values:
<Value> Numeric value

Example: `READ:HDG:SCDC:SCR:ERR2?`
Query
`32767`
Response for channel 2

Usage: Query only

Manual operation: See "Errors Channel 0, Errors Channel 1, Errors Channel 2" on page 264

READ<hw>:HDGenerator:SCDC:SCRambling:ERRChecksum?

Queries the errors checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDG:SCDC:SCR:ERRC?`
Query
`128`
Response

Usage: Query only

Manual operation: See "Last Read Checksum" on page 265

READ<hw>:HDGenerator:SCDC:SCRambling:ERRNull?

Queries the errors in channel 0.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDG:SCDC:SCR:ERRN?`
Query
`32767`
Response

Usage: Query only

Manual operation: See "Errors Channel 0, Errors Channel 1, Errors Channel 2" on page 264

READ<hw>:HDGenerator:SCDC:SCRambling:SUM<channel>?

Queries the sum of errors in channel 1 or 2.

Suffix:
<hw> 1
Irrelevant

<channel> 1-2
Selects the channel.

Return values:
<Value> Numeric value

Example: `READ:HDG:SCDC:SCR:SUM2?`
Query
`65534`
Response for channel 2

Usage: Query only

Manual operation: See "Errors Channel 0, Errors Channel 1, Errors Channel 2" on page 264

READ<hw>:HDGenerator:SCDC:SCRambling:SUMNull?

Queries the sum of errors in channel 0.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDG:SCDC:SCR:SUMN?`
Query
`65534`
Response for channel 2

Usage: Query only

Manual operation: See "Errors Channel 0, Errors Channel 1, Errors Channel 2" on page 264

READ<hw>:HDGenerator:SCDC:SINKversion?

Queries the sink version.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Version

Example: `READ:HDG:SCDC:SINK?`
Query
`255`
Response

Usage: Query only

Manual operation: See "Sink Version" on page 263

READ<hw>:HDGenerator:SCDC:SRCVersion?

Queries the source version.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Version

Example: `READ:HDG:SCDC:SRCV?`
Query
`255`
Response

Usage: Query only

Manual operation: See "Source Version" on page 263

READ<hw>:HDGenerator:SCDC:SWVersion?

Queries the software version.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Version

Example: `READ:HDG:SCDC:SWV?`
Query
`"255.255"`
Response

Usage: Query only

Manual operation: See "Software Version" on page 263

READ<hw>:HDGenerator:SCDC:UPDate:CED?

Queries the CED update flag.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:UPD:CED?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Update CED" on page 264

READ<hw>:HDGenerator:SCDC:UPDate:READrequest?

Queries the update read request flag.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:UPD:READ?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Update Read Request" on page 264

READ<hw>:HDGenerator:SCDC:UPDate:STATus?

Queries the update status flag.

Suffix:
<hw> 1
Irrelevant

Return values:
<Enable> OFF | ON

Example: `READ:HDG:SCDC:UPD:STAT?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Update Status" on page 264

14.6.6.7 READ<hw>:HDGenerator:SIGNal Subsystem

READ<hw>:HDGenerator:SIGNal:STATus?

Queries the signal status.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> RUNNing | STOPped | PAUSed | CTSTest | LOADing | SCANning | CTSPlaying

Example: `READ:HDG:SIGN:STAT?`
Query
`RUNN`
Response

Usage: Query only

Manual operation: See "Start button" on page 230
See "Stop button" on page 230
See "Pause button" on page 231

READ<hw>:HDGenerator:SIGNal:VICD:CUSTom:HBLank?

Queries the number of horizontal blanking pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDG:SIGN:VICD:CUST:HBL?`
Query
`160`
Response

Usage: Query only

Manual operation: See "H. Blanking Pixels" on page 231

READ<hw>:HDGenerator:SIGNal:VICD:CUSTom:HTOPixel?

Queries the number of horizontal total pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDG:SIGN:VICD:CUST:HTOP?`
Query
`800`
Response

Usage: Query only

Manual operation: See "H. Total Pixels" on page 232

READ<hw>:HDGenerator:SIGNal:VICD:CUSTom:VBLank?

Queries the number of vertical blanking lines.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDG:SIGN:VICD:CUST:VBL?`
Query
`45`
Response

Usage: Query only

Manual operation: See "V. Blanking Lines" on page 233

READ<hw>:HDGenerator:SIGNal:VICD:CUSTom:VTOLines?

Queries the number of vertical total lines.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDG:SIGN:VICD:CUST:VTOL?`
Query
`525`
Response

Usage: Query only

Manual operation: See "V. Total Lines" on page 233

14.6.7 ROUTe Subsystem

ROUTe<hw>:HDGenerator:MODule:SELect <Output>

Sets the output signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Output> TX300 | CTSTx600 | TX600

TX300
HDMI TX 300 MHz module (R&S VT-B360)

CTSTx600
HDMI CTS RX/TX 600 MHz module (R&S VT-B2362)

TX600
HDMI RX/TX 600 MHz module (R&S VT-B2363)

Example: `ROUT:HDG:MOD:SEL CTST`

ROUTe<hw>:HDGenerator:OSELect:VERSion <Standard>

Sets the HDMI standard.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Standard> HDMI14 | HDMI20

*RST: HDMI20

Example: `ROUT:HDG:OSEL:VERS HDMI14`
Sets HDMI 1.4.

14.7 HDMI Analyzer Application

These commands correlate to the functions provided in Chapter 10.2, "HDMI Analyzer Application", on page 282.

14.7.1 ABORt Subsystem

ABORt<hw>:HDMI:CEC

Stops the running CEC measurement.

Suffix:
<hw> 1
Irrelevant

Example: ABOR:HDMI:CEC

Usage: Event

Manual operation: See "Stop button" on page 333

ABORt<hw>:HDMI:CTS

Stops the running CTS measurement.

Suffix:
<hw> 1
Irrelevant

Example: ABOR:HDMI:CTS

Usage: Event

Manual operation: See "Stop button" on page 331

14.7.2 CONFigure Subsystem

14.7.2.1 CONFigure<hw>:HDMI:CEC Subsystem

Configures the CEC communication.

See also Chapter 10.2.9, "CEC Subtab", on page 331.

Addressing opcodes

See Chapter 10.4.4, "CEC Communication", on page 364

CONFigure<hw>:HDMI:CEC:COMMand:SEND

Sends a command with the selected opcode and parameters.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:HDMI:CEC:COMM:SEND`

Usage: Event

Manual operation: See "Send button " on page 333

CONFigure<hw>:HDMI:CEC:DESTination <Address>

Sets the logical address of the DUT that receives the CEC messages sent by the R&S VTE.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Address> RD1 | RD2 | TUN1 | PD1 | AUDiosystem | TUN2 | TUN3 | PD2 | RD3 | TUN4 | PD3 | R12 | R13 | SPECificuse | BROadcast
with RD = recording device, TUN = tuner, PD = playback device, R = reserved
*RST: RD1

Example: `CONF:HDMI:CEC:DEST RD2`

Manual operation: See "Destination" on page 332

CONFigure<hw>:HDMI:CEC:OPCode <OperationCode>

Sets the operation code (opcode) of the CEC command that is sent by the R&S VTE.

Suffix:
<hw> 1
Irrelevant

Parameters:
<OperationCode> Specifies the operation code. See Chapter 10.4.4, "CEC Communication", on page 364.
*RST: OP04

Example: `CONF:HDMI:CEC:OPC OP0D`

Manual operation: See "Opcode and Parameters" on page 332

CONFigure<hw>:HDMI:CEC:OPCode:PARam <OperationCode>, <Number>, <Value>
CONFigure<hw>:HDMI:CEC:OPCode:PARam? <OperationCode>, <Number>

Sets the value of the selected parameter for the specified operation code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: #H00 to #HFF

Parameters for setting and query:
<OperationCode> Specifies the operation code. See Chapter 10.4.4, "CEC Communication", on page 364.

<Number> Parameter number

Example: `CONF:HDMI:CEC:OPC:PAR OR09, 2, #HFF`
Sets FF for parameter 2 of "Record On (0x09)".

Manual operation: See "Opcode and Parameters" on page 332

CONFigure<hw>:HDMI:CEC:OPCode:PARam:LENGth <OperationCode>, <Number>
CONFigure<hw>:HDMI:CEC:OPCode:PARam:LENGth? <OperationCode>

Sets the number of parameters for the specified operation code.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Number>

Parameters for setting and query:
<OperationCode> Specifies the operation code. See Chapter 10.4.4, "CEC Communication", on page 364.

Example: `CONF:HDMI:CEC:OPC:PAR:LENG OR09, 5`
Sets 5 parameters for "Record On (0x09)".

Manual operation: See "Opcode and Parameters" on page 332

14.7.2.2 CONFigure<hw>:HDMI:CTS Subsystem

Configures the parameters of the test cases.

See also "CTS Configuration dialog" on page 308.

Table 14-22: Addressing test cases

Test case	Remote command parameter (<test case>)	Available for following inputs		
		"HDMI 600 MHz"	"HDMI"	"HDMI CTS"
"7-16: Legal Codes"	M002_lcodes	x	x	
"7-17: Basic Protocol"	M003_basprot	x	x	
"7-18: Extended Control Period"	M004_cperiod	x	x	
"7-19: Packet Types"	M005_packet	x	x	
"7-23: Pixel Encoding - RGB to RGB-only Sink"	M006_pixelr	x	x	
"7-24: Pixel Encoding - YCbCr to YCbCr Sink"	M007_pixely	x	x	
"7-25: Video Format Timing"	M008_vformat	x	x	
"7-26: Pixel Repetition"	M009_prep	x	x	
"7-27: AVI InfoFrame"	M010_avi	x	x	
"7-28: IEC 60958 / IEC 61937"	M011_iec6	x	x	
"7-29: Audio Clock Regeneration"	M012_acr	x	x	
"7-30: Audio Sample Packet Jitter"	M013_aspjitt	x	x	
"7-31: Audio InfoFrame"	M014_audioi	x	x	
"7-32: Audio Sample Packet Layout"	M015_asplay	x	x	
"7-33: Interoperability with DVI"	M016_dvi	x	x	
"7-33a: Interoperability with multiple VSDB"	M024_vsdb	x	x	
"7-34: Deep Color"	M017_deepc	x	x	
"7-35: Gamut Metadata Transmission"	M018_gmtrans	x	x	
"7-36: High-Bitrate Audio"	M019_hbaudio	x	x	
"7-37: One Bit Audio"	M020_lbaudio	x	x	
"7-38: 3D Video Format Timing"	M021_3dvfmt	x	x	
"7-39: 4K x 2K Video Format Timing"	M022_4k2kvft	x	x	
"7-40: Extended Colorimetry Transmission"	M023_ectrans	x	x	
"HF1-10: TMDS Prot 6G - TMDS Bit Clock Ratio"	H110_stmdsp	x		x
"HF1-11: TMDS Prot 6G - 2160p Legal Codes"	H111_stmdsp	x		x
"HF1-12: TMDS Prot 6G - Basic Prot and Scrambling"	H112_stmdsp	x		x
"HF1-13: TMDS Prot - Scrambling <= 3.4Gbps"	H113_stmdsp	x		x
"HF1-14: Video Timing 6G - 2160p 24-bit Color Depth"	H114_svt	x		x
"HF1-15: Video Timing 6G - 2160p Deep Color"	H115_svt	x		x
"HF1-16: Video Timing 6G - 2160p 3D"	H116_svt	x		x

Test case	Remote command parameter (<test case>)	Available for following inputs		
		"HDMI 600 MHz"	"HDMI"	"HDMI CTS"
"HF1-18: AVI InfoFrame 6G - 2160p"	H118_saif	x		x
"HF1-21: TMDS Prot 6G - Non-2160p Legal Codes"	H121_stmdsp	x		x
"HF1-22: TMDS Protocol 6G - Non-2160p Basic Prot and Scrambling"	H122_stmdsp	x		x
"HF1-24: Video Timing 6G - Non-2160p 24-bit Color Depth"	H124_svt	x		x
"HF1-25: Video Timing 6G - Non-2160p Deep Color"	H125_svt	x		x
"HF1-26: Video Timing 6G - Non-2160p 3D"	H126_svt	x		x
"HF1-28: AVI InfoFrame 6G - Non-2160p"	H128_saif	x		x
"HF1-31: Pix Enc - YCbCr 4:2:0 - TMDS Pix Enc"	H131_spe	x	x	
"HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS"	H132_spe	x		x
"HF1-33: Video Timing - YCbCr 4:2:0"	H133_svt	x	x	
"HF1-34: Video Timing - YCbCr 4:2:0 Deep Color"	H134_svt	x		x
"HF1-35: Video Timing - 21:9 (64:27)"	H135_svt	x	x	x
"HF1-36: 3D Audio (L-PCM) - Packet Format"	H136_ae	x		x
"HF1-37: 3D Audio (One Bit) - Packet Format"	H137_ae	x		x
"HF1-38: MS Source Audio Encoding (L-PCM and 61937) Packet Format"	H138_ae	x		x
"HF1-39: MS Audio (One Bit) - Packet Format"	H139_ae	x		x
"HF1-40: CEA-861-F Audio"	H140_ae	x		x
"HF1-41: 3D Audio - IEC Sample Packet"	H141_ae	x		x
"HF1-42: MS Audio - IEC Sample Packet"	H142_ae	x		x
"HF1-43: HBR Audio - IEC Audio Stream Packet"	H143_ae	x		x
"HF1-44: 3D and MS Audio - Supported Frequency"	H144_aif	x		x
"HF1-45: Basic Audio - Allowed Rate"	H145_acs	x		x
"HF1-47: HDMI-VSIF - 3D OSD Disparity"	H147_svsif	x		x
"HF1-48: HDMI-VSIF - Dual-View"	H148_svsif	x		x
"HF1-49: HDMI-VSIF - Independent-View"	H149_svsif	x		x
"HF1-51: AVI InfoFrame - YCbCr 4:2:0"	H151	x		x
"HF1-52: AVI InfoFrame - YCbCr 4:2:0 BT.2020"	H152	x		x
"HF1-53: High Dynamic Range"	H153_sdr	x		x

CONFigure<hw>:HDMI:CTS:AFORmat <TestCase>, <AudioFormat>
CONFigure<hw>:HDMI:CTS:AFORmat? <TestCase>

Sets the audio format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<AudioFormat> AAC | V2Aac | LCAac | DRA | SURaac | SURLcaac
*RST: AAC

Parameters for setting and query:
<TestCase> **H140**
Applies only to "HF1-40: CEA-861-F Audio".

Example: `CONF:HDMI:CTS:AFOR? H140, V2A`

Manual operation: See "Audio Format" on page 325

CONFigure<hw>:HDMI:CTS:AUD:CHANnel:TYPE <TestCase>, <ChannelType>
CONFigure<hw>:HDMI:CTS:AUD:CHANnel:TYPE? <TestCase>

Sets the number of audio channels.

Suffix:
<hw> 1
Irrelevant

Parameters:
<ChannelType> CHT102 | CHT222 | CHT322

CHT102
10_2

CHT222
22_2

CHT322
30_2

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:AUD:CHAN:TYPE H136, CHT322`

Manual operation: See "Channel Type" on page 323

CONFigure<hw>:HDMI:CTS:AUD:SAMPling:FREQuency <TestCase>, <Value>
CONFigure<hw>:HDMI:CTS:AUD:SAMPling:FREQuency? <TestCase>

Sets the audio sampling frequency.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> HZ32000 | HZ44100 | HZ48000 | HZ88200 | HZ96000 | HZ176400 | HZ192000

Value in Hz

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:AUD:SAMP:FREQ M013, HZ44100`

Manual operation: See "Sampling Frequency" on page 312

CONFigure<hw>:HDMI:CTS:AUD:STReams <TestCase>, <Number>
CONFigure<hw>:HDMI:CTS:AUD:STReams? <TestCase>

Sets the number of audio streams.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Number> STR2 | STR3 | STR4

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:AUD:STR H138, STR3`

Manual operation: See "Audio Streams" on page 324

CONFigure<hw>:HDMI:CTS:AVI:CTYPe <Content>

Sets the content type.

Applies only to "7-27: AVI InfoFrame".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Content> PHOTo | CINema | GAME | UNDefined
*RST: PHOTo

Example: `CONF:HDMI:CTS:AVI:CTYP CIN`

Manual operation: See "Content Type" on page 311

CONFigure<hw>:HDMI:CTS:CDEPth <TestCase>, <ColorDepth>
CONFigure<hw>:HDMI:CTS:CDEPth? <TestCase>

Sets the color depth.

Suffix:
<hw> 1
Irrelevant

Parameters:
<ColorDepth> B30 | B36 | B48
Value in bit

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:CDEP M017, B36`

Manual operation: See "Color Depth" on page 313

CONFigure<hw>:HDMI:CTS:DATA <Source>

Sets the source of the data to be analyzed.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Source> AUTO | MANual | FILE
*RST: AUTO

Example: `CONF:HDMI:CTS:DATA MAN`

Manual operation: See "Data Source" on page 329

CONFigure<hw>:HDMI:CTS:DATA:STORe:SIZE:FRAMes <Data>

Sets the number of video frames that are saved in a file.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Data> Number of frames; cannot exceed the length of 2 seconds.
*RST: 100

Example: `CONF:HDMI:CTS:DATA:STOR:SIZE:FRAM 90`

Manual operation: See "Number of Frames" on page 330

CONFigure<hw>:HDMI:CTS:DATA:STORe:SIZE:MODE <Data>

Sets the amount of data that are saved in a file.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Data> **SEC2**
2 seconds

FRAMe
Number of frames set under `CONFigure<hw>:HDMI:CTS:DATA:STORe:SIZE:FRAMes` on page 882.

*RST: FRAM

Example: `CONF:HDMI:CTS:DATA:STOR:SIZE:MODE SEC2`

Manual operation: See "Save Capture Size" on page 330

CONFigure<hw>:HDMI:CTS:DUT <TestCase>, <Support>
CONFigure<hw>:HDMI:CTS:DUT? <TestCase>

Enables or disables the test image output.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> NO | YES

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:DUT H131, YES`

Manual operation: See "DUT Test Image Support" on page 321

CONFigure<hw>:HDMI:CTS:DVI:VSDB <TestCase>, <Length>
CONFigure<hw>:HDMI:CTS:DVI:VSDB? <TestCase>

Sets the length of the HDMI vendor-specific data block.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Length> DVI | EQ5 | GT5

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:DVI:VSDB M016, EQ5`

Manual operation: See "HDMI VSDB" on page 313
See "HDMI VSDB" on page 314

CONFigure<hw>:HDMI:CTS:EDID <TestCase>, <YCbCr>
CONFigure<hw>:HDMI:CTS:EDID? <TestCase>

Configures the test.

Suffix:
<hw> 1
Irrelevant

Parameters:
<YCbCr> **VDB**
YCbCr 4:2:0 video data block

CMDB
Only "HF1-51: AVI InfoFrame - YCbCr 4:2:0", "HF1-52: AVI InfoFrame - YCbCr 4:2:0 BT.2020": YCbCr 4:2:0 capability map data block

DBS1
Only "HF1-51: AVI InfoFrame - YCbCr 4:2:0": YCbCr 4:2:0 CMDB data block = 1

NOSupport
Only "HF1-31: Pix Enc - YCbCr 4:2:0 - TMDS Pix Enc", "HF1-51: AVI InfoFrame - YCbCr 4:2:0": No YCbCr 4:2:0 support

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:EDID H131, NOS`

Manual operation: See "EDID Setup" on page 321
See "EDID Setup" on page 328
See "EDID Setup" on page 328

CONFigure<hw>:HDMI:CTS:EDID:COLorimetry <TestCase>, <Support>
CONFigure<hw>:HDMI:CTS:EDID:COLorimetry? <TestCase>

Sets the colorimetry support that the EDID of the test equipment indicates to the DUT.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> NO | ITUR101 | ITUR110

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:EDID:COL H118, ITUR101`

Manual operation: See "EDID Setup" on page 318
See "EDID Colorimetry Setup" on page 329

CONFigure<hw>:HDMI:CTS:EDID:HDR <TestCase>, <Configuration>
CONFigure<hw>:HDMI:CTS:EDID:HDR? <TestCase>

Configures the test.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Configuration> SDR | HDR | EOTF | ST2084 | STEotf | HLG
*RST: SDR

Parameters for setting and query:
<TestCase> **H153**
Applies only to "HF1-53: High Dynamic Range".

Example: `CONF:HDMI:CTS:EDID:HDR H153, HDR`

Manual operation: See "EDID Setup" on page 329

CONFigure<hw>:HDMI:CTS:EDID:LPCM <TestCase>, <Support>
CONFigure<hw>:HDMI:CTS:EDID:LPCM? <TestCase>

Enables or disables the 3D audio support.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> NO | YES
*RST: NO

Parameters for setting and query:
<TestCase> **H136**
Applies only to "HF1-36: 3D Audio (L-PCM) - Packet Format".

Example: `CONF:HDMI:CTS:EDID:LPCM H136, YES`

Manual operation: See "EDID Setup" on page 323

CONFigure<hw>:HDMI:CTS:EDID:ODISparity <TestCase>, <3DMode>
CONFigure<hw>:HDMI:CTS:EDID:ODISparity? <TestCase>

Sets the 3D mode indication in the EDID.

Suffix:
<hw> 1
Irrelevant

Parameters:
<3DMode> D2 | D3Nosig | D3Withsig
*RST: D2

Parameters for setting and query:
<TestCase> **H147**
Applies only to "HF1-47: HDMI-VSIF - 3D OSD Disparity".

Example: `CONF:HDMI:CTS:EDID:ODIS H147, D3N`

Manual operation: See "EDID Setup" on page 327

CONFigure<hw>:HDMI:CTS:EDID:SCRambling <TestCase>, <Support>
CONFigure<hw>:HDMI:CTS:EDID:SCRambling? <TestCase>

Enables or disables scrambling for TMDS character rates at or below 340 Mcsc.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> NO | YES

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:EDID:SCR H113, YES`

Manual operation: See "EDID Setup" on page 317

CONFigure<hw>:HDMI:CTS:EDID:TMDS <TestCase>, <Support>
CONFigure<hw>:HDMI:CTS:EDID:TMDS? <TestCase>

Sets the maximum supported TMDS character rate in the EDID.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> **GT595**
595 Mcsc

GT425
Only "HF1-15: Video Timing 6G - 2160p Deep Color": 425 Mcsc

LT340
Only "HF1-25: Video Timing 6G - Non-2160p Deep Color": < 340 Mcsc

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:EDID:TMDS H115, GT425`

Manual operation: See "EDID Setup" on page 317
See "EDID Setup" on page 320

CONFigure<hw>:HDMI:CTS:EDID:VSDB <TestCase>, <Support>
CONFigure<hw>:HDMI:CTS:EDID:VSDB? <TestCase>

Enables or disables the support of 4:2:0 deep color with 30 bit, 36 bit and 48 bit in the HF-VSDB.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> YES | NO

Parameters for setting and query:
<TestCase> **H132**
Applies only to "HF1-32: Pix Enc - YCbCr 4:2:0 Deep Color - TMDS".

Example: `CONF:HDMI:CTS:EDID:VSDB H132, NO`

Manual operation: See "EDID Setup" on page 322

CONFigure<hw>:HDMI:CTS:PENCode:RGB:CDF <Support>

Sets whether the source supports the transmission of AVI InfoFrames.

Applies only to "7-23: Pixel Encoding - RGB to RGB-only Sink".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> Y | N
*RST: Y

Example: `CONF:HDMI:CTS:PENC:RGB:CDF N`

Manual operation: See "CDF Setup" on page 310

CONFigure<hw>:HDMI:CTS:PENCode:RGB:SETup <Test>

Selects the CTS subtest.

Applies only to "7-23: Pixel Encoding - RGB to RGB-only Sink".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Test> PENCode | YQ
*RST: PENCode

Example: `CONF:HDMI:CTS:PENC:RGB:SET YQ`

Manual operation: See "Test Setup" on page 309

CONFigure<hw>:HDMI:CTS:PENCode:YCBCr:CDF <Support>

Sets whether the source supports the transmission of AVI InfoFrames.

Applies only to "7-24: Pixel Encoding - YCbCr to YCbCr Sink".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> Y | N
*RST: Y

Example: `CONF:HDMI:CTS:PENC:YCBC:CDF N`

Manual operation: See "CDF Setup" on page 310

CONFigure<hw>:HDMI:CTS:PENCode:YCBCr:PENCode <PixelEncoding>

Sets the pixel encoding.

Applies only to "7-24: Pixel Encoding - YCbCr to YCbCr Sink".

Suffix:
<hw> 1
Irrelevant

Parameters:
<PixelEncoding> Y422 | Y444
*RST: Y422

Example: `CONF:HDMI:CTS:PENC:YCBC:PENC Y444`

Manual operation: See "Pixel Encoding" on page 310

CONFigure<hw>:HDMI:CTS:PENCode:YCBCr:SETup <Test>

Selects the CTS subtest.

Applies only to "7-24: Pixel Encoding - YCbCr to YCbCr Sink".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Test> PENCode | YQ
*RST: PENCode

Example: `CONF:HDMI:CTS:PENC:YCBC:SET YQ`

Manual operation: See "Test Setup" on page 310

CONFigure<hw>:HDMI:CTS:PTYPe:SETup <Indication>

Enables or disables the indication of ACP, ISRC1 and ISRC2 packets support in the EDID.

Applies only to "7-19: Packet Types".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Indication> AI0 | AI1
*RST: AI1

Example: `CONF:HDMI:CTS:PTYP:SET AI0`

Manual operation: See "Test Setup" on page 309

CONFigure<hw>:HDMI:CTS:SELect <TestCase>, <Enable>
CONFigure<hw>:HDMI:CTS:SELect? [<TestCase>]

Enables or disables the specified test case.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:SEL M002, ON`

Manual operation: See "Test Case dialog" on page 307

CONFigure<hw>:HDMI:CTS:TESTlength:FRAMes <TestCase>, <Value>
CONFigure<hw>:HDMI:CTS:TESTlength:FRAMes? <TestCase>

Sets the number of video frames that are analyzed.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value>

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:TEST:FRAM M002, 80`

Manual operation: See "Number of Frames" on page 308

CONFigure<hw>:HDMI:CTS:TESTlength:MODE <TestCase>, <Length>
CONFigure<hw>:HDMI:CTS:TESTlength:MODE? <TestCase>

Sets the length of the HDMI sequence for analysis.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Length> SEC2 | FRAMe

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:TEST:MODE M002, FRAM`

Manual operation: See "Test Length" on page 308

CONFigure<hw>:HDMI:CTS:TMDS:SCRambling:CDF <Support>

Sets whether the DUT supports scrambling for TMDS character rates at or below 340 Mcsc.

Applies only to "HF1-13: TMDS Prot - Scrambling <= 3.4Gbps".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> NO | YES
*RST: YES

Example: `CONF:HDMI:CTS:TMDS:SCR:CDF NO`

Manual operation: See "CDF Source LTE 340Mcsc Scrambling" on page 316

CONFigure<hw>:HDMI:CTS:VFORmat <TestCase>, <VideoFormat>
CONFigure<hw>:HDMI:CTS:VFORmat? <TestCase>

Sets the video format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<VideoFormat> AUTO | NONCea | C1 | C2 | C3 | C17 | C18 | C4 | C19 | C5 | C20 | C32 | C34 | C31 | C16 | C6 | C7 | C21 | C22 | C60 | C62 | C63 | C64 | C65 | C66 | C67 | C68 | C69 | C70 | C71 | C72 | C73 | C74 | C75 | C76 | C77 | C78 | C79 | C80 | C81 | C82 | C83 | C84 | C85 | C86 | C87 | C88 | C89 | C90 | C91 | C92 | C93 | C94 | C95 | C96 | C97 | C98 | C99 | C100 | C101 | C102 | C103 | C104 | C105 | C106 | C107 | VIC1 | VIC2 | VIC3 | VIC4
See also Chapter 10.4.3, "Video Codes", on page 353.

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:VFOR M002, C1`

Manual operation: See "Video Format" on page 308

CONFigure<hw>:HDMI:CTS:VFORmat:FK <TestCase>, <VideoFormat>
CONFigure<hw>:HDMI:CTS:VFORmat:FK? <TestCase>

Sets the video format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<VideoFormat> **AUTO**
Automatic video format detection

C1
4K x 2K @ 30 Hz

C2
4K x 2K @ 25 Hz

C3
4K x 2K @ 24 Hz

C4
4K x 2K @ 24 Hz (SMPTE)

*RST: AUTO

Parameters for setting and query:
<TestCase> **M022**
Applies only to "7-39: 4K x 2K Video Format Timing".

Example: `CONF:HDMI:CTS:VFOR:FK M022, C1`

Manual operation: See "Video Format" on page 315

CONFigure<hw>:HDMI:CTS:VFORmat:HDEXtension <TestCase>, <3DFormat>
CONFigure<hw>:HDMI:CTS:VFORmat:HDEXtension? <TestCase>

Sets the 3D format.

Suffix:
<hw> 1
Irrelevant

Parameters:
<3DFormat> AUTO | FPACking | TBOTtom | SBSide

Parameters for setting and query:
<TestCase> Specifies the test case. See Table 14-22.

Example: `CONF:HDMI:CTS:VFOR:HDEX M021, FPAC`

Manual operation: See "3D Format" on page 314

CONFigure<hw>:HDMI:CTS:VSIFs:DUALview:CDF <Support>

Sets whether the source supports the generation of test images for dual view transmission.

Applies only to "HF1-48: HDMI-VSIF - Dual-View".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> NO | YES
*RST: NO

Example: `CONF:HDMI:CTS:VSIFs:DUAL:CDF YES`

Manual operation: See "CDF Setup" on page 327

14.7.2.3 CONFigure<hw>:HDMI:INPut Subsystem

CONFigure<hw>:HDMI:INPut:EDID:USER <Settings>

Changes the EDID settings.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Settings> OFF | FILE | AUX | ON
*RST: OFF

Example: `CONF:HDMI:INP:EDID:USER FILE`

Manual operation: See "User Defined EDID" on page 285

CONFigure<hw>:HDMI:INPut:HDCP <Encryption>

Enables or disables the HDCP encryption. For the HDMI RX/TX 600 MHz module (R&S VT-B2363), also sets the HDCP version.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Encryption> OFF | ON | HDCP14 | HDCP22

OFF | ON
HDMI TX 300 MHz module (R&S VT-B360)

OFF | ON | HDCP14 | HDCP22
HDMI RX/TX 600 MHz module (R&S VT-B2363)

Example: `CONF:HDMI:INP:HDCP OFF`

Manual operation: See "HDCP (HDMI TX 300 MHz module)" on page 284
See "HDCP (HDMI RX/TX 600 MHz module)" on page 285

CONFigure<hw>:HDMI:INPut:HPDSignal <Enable>

Sets the hotplug detect (HPD) signal.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> ON | OFF
*RST: ON

Example: `CONF:HDMI:INP:HPDS OFF`

Manual operation: See "HPD Signal" on page 284

14.7.2.4 CONFigure<hw>:HDMI:SCDC Subsystem

CONFigure<hw>:HDMI:SCDC:SCRambling:RESet <Enable>

Resets the peak value of the detected character errors every time the command is sent. Afterwards, the measurement continues automatically.

Parameters:
<arg> OFF | ON
The command requires a parameter, but both parameters have the same result - they cause a reset.

Example: `CONF:HDMI:SCDC:SCR:RES OFF`

Manual operation: See "Reset Max Hold button" on page 301

14.7.3 DISPlay Subsystem

DISPlay<hw>:HDMI:SELect:TAB <Tab>

Selects the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Tab> INPut | VIDeo | AUDio | HDCP | INFoframe | SCDC | CTS | CEC
Corresponds to the tabs in the manual operation.

Example: `DISP:HDMI:SEL:TAB INF`

14.7.4 INITiate Subsystem

INITiate<hw>:HDMI:CEC

Starts the protocol trace and performs a device discovery.

Suffix:
<hw> 1
Irrelevant

Example: `INIT:HDMI:CEC`

Usage: Event

Manual operation: See "Start button" on page 333

INITiate<hw>:HDMI:CTS [<ManualCapture>]

Starts the selected test, or, if a string is specified, starts capturing the data source.

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<ManualCapture> Just the presence of the string counts, the contents is irrelevant.

Example: `INIT:HDMI:CTS`
Starts the selected test.

Example: `INIT:HDMI:CTS "Source"`
Starts capturing the data source.

Usage: Setting only

Manual operation: See "Capture button" on page 330
See "Start button" on page 331

14.7.5 MMEMory Subsystem

MMEMory<hw>:HDMI:CEC:DATA:STORe <PathFile>

Saves the CEC traffic report as a TXT file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:HDMI:CEC:DATA:STOR "D:\VTE\UserData\MyReport.txt"`
Saves `MyReport.txt` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 333

MMEMory<hw>:HDMI:CTS:DATA:LOAD <PathFile>

Loads the captured data from the specified `*.hdmi` file.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:HDMI:CTS:DATA:LOAD "D:\VTE\UserData\MyData.hdmi"`
Loads `MyData.hdmi` from the `D:\VTE\UserData` directory.

Manual operation: See "Load button" on page 330

MMEMory<hw>:HDMI:CTS:DATA:STORe <PathFile>

Saves the captured data as a `*.hdmi` file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:HDMI:CTS:DATA:STOR "D:\VTE\UserData\MyData.hdmi"`
Saves `MyData.hdmi` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 330

MMEMory<hw>:HDMI:CTS:REPort:STORe <PathFile>

Saves the CTS test report as a TXT file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:HDMI:CTS:REP:STOR "D:\VTE\UserData\MyReport.txt"`
Saves `MyReport.txt` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button (Test Output)" on page 330

MMEMory<hw>:HDMI:INPut:EDID:DATA:LOAD <PathFile>

Loads the user-defined EDID from the specified `*.bin` file.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:HDMI:INP:EDID:DATA:LOAD "D:\VTE\UserData\MyEDID.bin"`
Loads `MyEDID.bin` from the `D:\VTE\UserData` directory.

Manual operation: See "User Defined EDID" on page 285

MMEMory<hw>:HDMI:INPut:EDID:DATA:STORe <PathFile>

Saves the user-defined EDID as a `*.bin` file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:HDMI:INP:EDID:DATA:STOR "D:\VTE\UserData\MyEDID.bin"`
Saves `MyEDID.bin` in the `D:\VTE\UserData` directory.

Manual operation: See "User Defined EDID" on page 285

14.7.6 READ Subsystem

14.7.6.1 READ<hw>[:SCALar]:HDMI:AUDio Subsystem

READ<hw>[:SCALar]:HDMI:AUDio:ACODe?

Queries the audio coding type derived from the audio InfoFrame.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Audio coding type

Example: `READ:HDMI:AUD:ACOD?`
Query
`OK,"Refer to Stream Header"`
Response

Usage: Query only

Manual operation: See "Audio Coding" on page 292

READ<hw>[:SCALar]:HDMI:AUDio:APPLication?

Queries the application.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Application name

<String> Binary value

Example: `READ:HDMI:AUD:APPL?`
Query
`OK,"Consumer","0b0"`
Response

Usage: Query only

Manual operation: See "Application" on page 292

READ<hw>[:SCALar]:HDMI:AUDio:CACCuracy?

Queries the clock accuracy.

Suffix:
<hw> 1
Irrelevant

Return values:

<String> Accuracy indication

<String> Binary value

Example: `READ:HDMI:AUD:CACC?`
Query
`OK,"Level II","0b00"`
Response

Usage: Query only

Manual operation: See "Clock Accuracy" on page 293

READ<hw>[:SCALar]:HDMI:AUDio:CATegory?

Queries category code.

Suffix:

<hw> 1
Irrelevant

Return values:

<String> Category name

<String> Binary value

Example: `READ:HDMI:AUD:CAT?`
Query
`OK,"General","0b00000000"`
Response

Usage: Query only

Manual operation: See "Category Code" on page 292

READ<hw>[:SCALar]:HDMI:AUDio:COPYright?

Queries the copyright.

Suffix:

<hw> 1
Irrelevant

Return values:

<String> Copyright indication

<String> Binary value

Example: `READ:HDMI:AUD:COPY?`
Query
`OK,"Yes","0b0"`
Response

Usage: Query only

Manual operation: See "Copyright" on page 292

READ<hw>[:SCALar]:HDMI:AUDio:CTS?

Queries the cycle time stamp value derived from the audio clock regeneration packet.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:AUD:CTS?`
Query
`OK,28000`
Response

Usage: Query only

Manual operation: See "CTS" on page 291

READ<hw>[:SCALar]:HDMI:AUDio:FS?

Queries the f_s value.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Value

<String> Binary value

Example: `READ:HDMI:AUD:FS?`
Query
`OK,"44.1 kHz","0b0000"`
Response

Usage: Query only

Manual operation: See "fs" on page 293

READ<hw>[:SCALar]:HDMI:AUDio:LAYout?

Queries the layout value derived from the audio sample packet.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Value

Example: `READ:HDMI:AUD:LAY?`
Query
`OK,"1"`
Response

Usage: Query only

Manual operation: See "Layout" on page 292

READ<hw>[:SCALar]:HDMI:AUDio:LENGth?

Queries the audio length.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Value

<String> Binary value

Example: `READ:HDMI:AUD:LENG?`
Query
`OK,"16 bits","0b001"`
Response

Usage: Query only

Manual operation: See "Audio Length" on page 293

READ<hw>[:SCALar]:HDMI:AUDio:LENGth:MAX?

Queries the maximum audio length.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Value

<String> Binary value

Example: `READ:HDMI:AUD:LENG:MAX?`
Query
`OK,"20 bits","0b0"`
Response

Usage: Query only

Manual operation: See "Max. Audio Length" on page 293

READ<hw>[:SCALar]:HDMI:AUDio:MODE?

Queries the mode.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Value

<String> Binary value

Example: `READ:HDMI:AUD:MODE?`
Query
`OK,"0","0b00"`
Response

Usage: Query only

Manual operation: See "Mode" on page 292

READ<hw>[:SCALar]:HDMI:AUDio:N?

Queries the N value derived from the audio clock regeneration packet.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:AUD:N?`
Query
`OK,6272`
Response

Usage: Query only

Manual operation: See "N" on page 291

READ<hw>[:SCALar]:HDMI:AUDio:NCHannel?

Queries the channel number.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Indication

<String> Binary value

Example: `READ:HDMI:AUD:NCH?`
Query
`OK,"Ignore","0b0000"`
Response

Usage: Query only

Manual operation: See "Channel Number" on page 293

READ<hw>[:SCALar]:HDMI:AUDio:NSOurce?

Queries the source number.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Indication

<String> Binary value

Example: `READ:HDMI:AUD:NSO?`
Query
`OK,"Ignore","0b0000"`
Response

Usage: Query only

Manual operation: See "Source Number" on page 292

READ<hw>[:SCALar]:HDMI:AUDio:PREemphasis?

Queries the pre-emphasis.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Indication

<String> Binary value

Example: `READ:HDMI:AUD:PRE?`
Query
`OK,"No","0b000"`
Response

Usage: Query only

Manual operation: See "Pre-emphasis" on page 292

READ<hw>[:SCALar]:HDMI:AUDio:SAMPles?

Queries the audio samples.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Type

<String> Binary value

Example: `READ:HDMI:AUD:SAMP?`
Query
`OK,"L-PCM","0b0"`
Response

Usage: Query only

Manual operation: See "Audio Sample" on page 292

14.7.6.2 READ<hw>[:SCALar]:HDMI:CEC Subsystem

Queries the CEC communication results.

See also Chapter 10.2.9, "CEC Subtab", on page 331.

READ<hw>[:SCALar]:HDMI:CEC:REPort? <Line>

Queries the content of the specified entry line in the CEC traffic report.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<Line> Number of the entry line in the CTS test report. You can query the total number of lines using `READ<hw>[:SCALar]:HDMI:CEC:REPort:COUNt?` on page 905.

Range: 0 (= first line) to total number

Return values:
<Result> 1,0x0000,"<contents of line>"

Example: `READ:HDMI:CEC:REP? 1`
Query
1,0x0000,"TV: Present"
Response: Contents of second line.

Usage: Query only

READ<hw>[:SCALar]:HDMI:CEC:REPort:COUNt?

Queries the number of entry lines in the CEC traffic report.

Suffix:
<hw> 1
Irrelevant

Return values:
<Lines> Total number of lines

Example: `READ:HDMI:CEC:REP:COUN?`
Query
`16`
Response

Usage: Query only

14.7.6.3 READ<hw>[:SCALar]:HDMI:CTS Subsystem

Queries the status and the measurement results of the CTS measurements.

READ<hw>[:SCALar]:HDMI:CTS:CONTrol:PROGress?

Queries the current measurement progress.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Measurement progress in %

Example: `READ:HDMI:CTS:CONT:PROG?`
Query
`100`
Response

Usage: Query only

Manual operation: See "<Status display>" on page 331

READ<hw>[:SCALar]:HDMI:CTS:CONTrol:STATe?

Queries the status of the CTS measurement.

Suffix:
<hw> 1
Irrelevant

Return values:
<Meas> IDLE | CAPTuring | RUNNing | FINished

Example: `READ:HDMI:CTS:CONT:STAT?`
Query
`FIN`
Response

Usage: Query only

Manual operation: See "<Status display>" on page 331

READ<hw>[:SCALar]:HDMI:CTS:REPort? <Line>

Queries the content of the specified entry line in the CTS test report.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<Line> Number of the entry line in the CTS test report. You can query the total number of lines using `READ<hw>[:SCALar]:HDMI:CTS:REPort:COUNt?` on page 906.
Range: 0 (= first line) to total number

Return values:
<Result> 1,0x0000,"<contents of line>",0,0,0,0

Example: `READ:HDMI:CTS:REP? 2`
Query
`1,0x0000,"Test On:`
`Tuesday, 24. November 2015 12:38:32",0,0,0,0`
Response: Contents of third line.

Usage: Query only

READ<hw>[:SCALar]:HDMI:CTS:REPort:COUNt?

Queries the number of entry lines in the CTS test report.

Suffix:
<hw> 1
Irrelevant

Return values:
<Lines> Total number of lines

Example: `READ:HDMI:CTS:REP:COUN?`
Query
`24`
Response

Usage: Query only

14.7.6.4 READ<hw>[:SCALar]:HDMI:HDCP Subsystem

READ<hw>[:SCALar]:HDMI:HDCP:AKSV?

Queries the key selection vector of the transmitter.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
Data block

Example: `READ:HDMI:HDCP:AKSV?`
Query
`OK,868E2ECF31`
Response

Usage: Query only

Manual operation: See "AKSV" on page 295

READ<hw>[:SCALar]:HDMI:HDCP:AN?

Queries the session random number.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
Data block

Example: `READ:HDMI:HDCP:AN?`
Query
`OK,D44991309E67FCDC`
Response

Usage: Query only

Manual operation: See "An" on page 295

READ<hw>[:SCALar]:HDMI:HDCP:AUTHentic?

Queries if a high-bandwidth digital content protection (HDCP) is active.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Protection indication

Example: `READ:HDMI:HDCP:AUTH?`
Query
`OK,"Attempted"`
Response

Usage: Query only

Manual operation: See "HDCP State" on page 294

READ<hw>[:SCALar]:HDMI:HDCP:BKSV?

Queries the key selection vector of the receiver.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
Data block

Example: `READ:HDMI:HDCP:BKSV?`
Query
`OK,538B03565F`
Response

Usage: Query only

Manual operation: See "BKSV" on page 295

READ<hw>[:SCALar]:HDMI:HDCP:H?

Queries the hash value calculated by the receiver of the authentication protocol.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
8 data blocks

Example: READ:HDMI:HDCP:H?
Query
OK,0AADF3B2230BDA02B83BDC5BDCCB4BD1
6BC712F5057D01A47E9253115922335F
Response

Usage: Query only

Manual operation: See "H" on page 295

READ<hw>[:SCALar]:HDMI:HDCP:L?

Queries the locality check hash value calculated by the receiver of the locality check.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
8 data blocks

Example: READ:HDMI:HDCP:L?
Query
OK,E03DCA43225CE23CD0209FC115A8E0DF
BA8CAF89C52F41AC02C396A82F6D11EA
Response

Usage: Query only

Manual operation: See "L" on page 296

READ<hw>[:SCALar]:HDMI:HDCP:RI?

Queries the current link synchronization verification values.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
Data block

Example: READ:HDMI:HDCP:RI?
Query
OK,A6AC
Response

Usage: Query only

Manual operation: See "Ri" on page 295

READ<hw>[:SCALar]:HDMI:HDCP:RN?

Queries the pseudo-random value of the locality check.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
2 data blocks

Example: `READ:HDMI:HDCP:RN?`
Query
`OK,1018C5A4B1BB25FB`
Response

Usage: Query only

Manual operation: See "r(n)" on page 295

READ<hw>[:SCALar]:HDMI:HDCP:RRX?

Queries the pseudo-random value of the authentication protocol.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
2 data blocks

Example: `READ:HDMI:HDCP:RRX?`
Query
`OK,03BEB88CD4326327`
Response

Usage: Query only

Manual operation: See "r(rx)" on page 295

READ<hw>[:SCALar]:HDMI:HDCP:RTX?

Queries the pseudo-random value of the authentication protocol.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> <dblock>
2 data blocks

Example: `READ:HDMI:HDCP:RTX?`
Query
`OK,03D9B1DD4458FCA2`
Response

Usage: Query only

Manual operation: See "r(tx)" on page 295

14.7.6.5 READ<hw>[:SCALar]:HDMI:INFO:AUDio Subsystem

Queries the parameters of the audio InfoFrame measurement.

See also Chapter 10.2.6, "InfoFrame Subtab", on page 296.

READ<hw>[:SCALar]:HDMI:INFO:AUDio:CEXTension?

Queries the code extension.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:CEXT?`
Query
`"Refer to Audio Coding Type field"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:CHANnel:ALLocation?

Queries the channel allocation.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:CHAN:ALL?`
Query
`"RRC, RLC, RR, RL, FC, LFE, FR, FL"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:CHANnel:COUNt?

Queries the channel count.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:CHAN:COUN?`
Query
`"8 channels"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:CSUM?

Queries the checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Decimal value

Example: `READ:HDMI:INFO:AUD:CSUM?`
Query
`87`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:CTYPe?

Queries the coding type.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:CTYP?`
Query
`"Refer to Stream Header"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:DMIXinhibit?

Queries the down-mix inhibit.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:DMIX?`
Query
`"Permitted or no information about any assertion of this"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:LENGth?

Queries the length.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:LENG?`
Query
`10`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:LFE?

Queries the LFE playback level.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:LFE?`
Query
`"Unknown or refer to other information"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:LSHift?

Queries the level shift value.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:LSH?`
Query
`"0dB"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:PDATa?

Queries the header and packet bytes.

Suffix:
<hw> 1
Irrelevant

Return values:
<Bytes> <dblock>
HB0, HB1, HB2, PB0, ... , PB10 in decimal values
HB = header byte, PB = packet byte

Example: `READ:HDMI:INFO:AUD:PDAT?`
Query
`-124, 1, 10, 87, 7, 0, 0, 19, 0, 0, 0, 0, 0, 0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:SAMPling:FREQuency?

Queries the sampling frequency.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:SAMP:FREQ?`
Query
`"Refer to Stream Header"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:SAMPling:SIZE?

Queries the sampling size.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:SAMP:SIZE?`
Query
`"Refer to Stream Header"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AUDio:VERSion?

Queries the version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AUD:VERS?`
Query
`1`
Response

Usage: Query only

14.7.6.6 READ<hw>[:SCALar]:HDMI:INFO:AVI Subsystem

Queries the parameters of the AVI InfoFrame measurement.

See also Chapter 10.2.6, "InfoFrame Subtab", on page 296.

READ<hw>[:SCALar]:HDMI:INFO:AVI:AFARatio?

Queries the active format aspect ratio.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:AFAR?`
Query
`"Same as coded frame aspect ratio"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:AFINfo?

Queries the active format information present.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:AFIN?`
Query
`"Active Format Information present"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:ARATio?

Queries the picture aspect ratio.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:ARAT?`
Query
`"4:3"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:BINFo?

Queries the bar information.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:BINF?`
Query
`"Vertical and Horizontal Bar Info Present"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:COLormetry?

Queries the colorimetry.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:COL?`
Query
`"ITU-R 709"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:COMPonent:FORMat?

Queries the component format.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:COMP:FORM?`
Query
`"RGB"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:CSUM?

Queries the checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Decimal value

Example: `READ:HDMI:INFO:AVI:CSUM?`
Query
`64`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:CTYPe?

Queries the content type.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:CTYP?`
Query
`"Graphics"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:ECOLormetry?

Queries the extended colorimetry.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:ECOL?`
Query
`"xvYCC601"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:ITContent?

Queries the IT content.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:ITC?`
Query
`"IT Content"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:LENGth?

Queries the length.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:LENG?`
Query
`13`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:LINE:END?

Queries the line number of the top bar end.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:LINE:END?`
Query
`0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:LINE:STARt?

Queries the line number of the bottom bar start.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:LINE:STAR?`
Query
`0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:NUPScaling?

Queries the nonuniform picture scaling.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:NUPS?`
Query
`"No known non-uniform Scaling"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:PDATa?

Queries the header and packet bytes.

Suffix:
<hw> 1
Irrelevant

Return values:
<Bytes> <dblock>
HB0, HB1, HB2, PB0, ... , PB13 in decimal values
HB = header byte, PB = packet byte

Example: `READ:HDMI:INFO:AVI:PDAT?`
Query
`-126, 2, 13, 64, 18, 24, 4, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:PIXel:LEFT?

Queries the pixel number of the left bar end.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:PIX:LEFT?`
Query
`0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:PIXel:RIGHt?

Queries the pixel number of the right bar start.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:PIX:RIGH?`
Query
`0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:PREPetition?

Queries the pixel repetition.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:PREP?`
Query
`"No Repetition"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:RGBQrange?

Queries the RGB quantization range.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:RGBQ?`
Query
`"Limited Range"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:SINFo?

Queries the scan information.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:SINF?`
Query
`"Composed for an underscanned display"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:VERSion?

Queries the version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:VERS?`
Query
`2`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:VIDCode?

Queries the video identification code.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:VIDC?`
Query
`"640 x 480 (VGA) @ 59.94/60Hz (1)"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:AVI:YCCQ?

Queries the YCC quantization.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:AVI:YCCQ?`
Query
`"Limited Range"`
Response

Usage: Query only

14.7.6.7 READ<hw>[:SCALar]:HDMI:INFO:DRMI Subsystem

Requires the HDMI RX/TX 600 MHz module (R&S VT-B2363) as input, see `ROUTe<hw>:HDMI:MODule:SELect` on page 961.

Queries the parameters of the dynamic range and mastering InfoFrame measurement.

See also Chapter 10.2.6, "InfoFrame Subtab", on page 296.

READ<hw>[:SCALar]:HDMI:INFO:DRMI:CLL?

Queries the max. content light level.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:CLL?`
Query
`0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:CSUM?

Queries the checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Decimal value

Example: `READ:HDMI:INFO:DRMI:CSUM?`
Query
`251`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:DPX<idx>?

Queries display primaries x[1|2].

Suffix:
<hw> 1
Irrelevant

<idx> 1-2
Primaries

Example: `READ:HDMI:INFO:DRMI:DPX1?`
Query
`6.000000E-001`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:DPXNull?

Queries display primaries x[0].

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:DPXN?`
Query
`1.000000E-001`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:DPY<idx>?

Queries display primaries y[1|2].

Suffix:
<hw> 1
Irrelevant

<idx> 1-2
Primaries

Example: `READ:HDMI:INFO:DRMI:DPY2?`
Query
`1.200000E-001`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:DPYNull?

Queries display primaries y[0].

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:DPYN?`
Query
`1.000000E-001`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:EOTF?

Queries the electro-optical transfer function.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:EOTF?`
Query
`"HDR Luminance Processing"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:FALL?

Queries the max. frame average light level.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:FALL?`
Query
`0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:LENGth?

Queries the length.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:LENG?`
Query
`26`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:LMAX?

Queries the max. display mastering luminance.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:LMAX?`
Query
`0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:LMIN?

Queries the min. display mastering luminance.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:LMIN?`
Query
`0.000000E+000`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:PDATa?

Queries the header and packet bytes.

Suffix:
<hw> 1
Irrelevant

Return values:
<Bytes> <dblock>
HB0, HB1, HB2, PB0, ... , PB27 in decimal values
HB = header byte, PB = packet byte

Example: `READ:HDMI:INFO:DRMI:PDAT?`
Query
`-121, 1, 26, -5, 1, 0, -120, 19, -120, 19, 48, 117, -56, -81, -56, -81, 112, 23, -88, 97, -88, 97, 0, 0, 0, 0, 0, 0, 0, 0, 0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:SMD?

Queries the static metadata.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:SMD?`
Query
`"Static Metadata Descriptor 1"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:VERSion?

Queries the version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:VERS?`
Query
`1`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:WPX?

Queries the white point X.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:WPX?`
Query
`5.000000E-001`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:DRMI:WPY?

Queries the white point Y.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:DRMI:WPY?`
Query
`5.000000E-001`
Response

Usage: Query only

14.7.6.8 READ<hw>[:SCALar]:HDMI:INFO:HFVendor Subsystem

Queries the parameters of the HDMI forum vendor-specific InfoFrame measurement.

See also Chapter 10.2.6, "InfoFrame Subtab", on page 296.

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:CSUM?

Queries the checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Decimal value

Example: `READ:HDMI:INFO:HFV:CSUM?`
Query
`4`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:HFVersion?

Queries the HF VSIF version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:HFV?`
Query
`1`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:IEEE?

Queries the IEEE registration ID.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:IEEE?`
Query
`12869080`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:LENGth?

Queries the length.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:LENG?`
Query
`18`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:PDATa?

Queries the header and packet bytes.

Suffix:
<hw> 1
Irrelevant

Return values:
<Bytes> <dblock>
HB0, HB1, HB2, PB0, ... , PB27 in decimal values
HB = header byte, PB = packet byte

Example: `READ:HDMI:INFO:HFV:PDAT?`
Query
`-127, 1, 18, 4, -40, 93, -60, 1, 1, 14, 22, 65, 0, 8, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDDDispdata?

Queries the 3D disparity data present.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDDD?`
Query
`"00 "`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDDMetadata?

Queries the 3D meta present.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDDM?`
Query
`"00 00 00 00 00 00 00 00 "`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDDualview?

Queries the 3D dual view.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDD?`
Query
`"Dual View mode enabled"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDDView?

Queries the 3D view dependency.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDDV?`
Query
`"Right view originates from coded view"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDFextdata?

Queries the 3D F extended data.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDF?`
Query
`OK,"Horizontal sub-sampling"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDFStructure?

Queries the 3D F structure.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDFS?`
Query
`"Side-by-Side(Full)"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDLDispdata?

Queries the 3D disparity data length.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDLD?`
Query
`"1"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDLMetadata?

Queries the 3D metadata length.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDLM?`
Query
`"8"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDPaddinfo?

Queries the 3D additional info present.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDP?`
Query
`"1"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDPDispdata?

Queries the 3D disparity data.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDPD?`
Query
`"1"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDPMeta?

Queries the 3D metadata.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDPM?`
Query
`"1"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDPReferred?

Queries the 3D preferred 2D view.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDPR?`
Query
`"Use left 3D view"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDTMetadata?

Queries the 3D metadata type.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDTM?`
Query
`"0"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDValid?

Queries the 3D validity.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDV?`
Query
`"1"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:TDVDispdata?

Queries the 3D disparity data version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:TDVD?`
Query
`"2"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:HFVendor:VERSion?

Queries the version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:HFV:VERS?`
Query
`1`
Response

Usage: Query only

14.7.6.9 READ<hw>[:SCALar]:HDMI:INFO:MPEG Subsystem

Queries the parameters of the MPEG InfoFrame measurement.

See also Chapter 10.2.6, "InfoFrame Subtab", on page 296.

READ<hw>[:SCALar]:HDMI:INFO:MPEG:CSUM?

Queries the checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Decimal value

Example: `READ:HDMI:INFO:MPEG:CSUM?`
Query
`77`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:MPEG:FREPeat?

Queries the field repeat (for 3:2 pull-down).

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:MPEG:FREP?`
Query
`"New field (picture)"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:MPEG:LENGth?

Queries the length.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:MPEG:LENG?`
Query
`10`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:MPEG:MPEG:BRATe?

Queries the MPEG bit rate.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:MPEG:MPEG:BRAT?`
Query
`2000000`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:MPEG:MPEG:FRAMe?

Queries the MPEG frame.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:MPEG:MPEG:FRAM?`
Query
`"I Picture"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:MPEG:PDATa?

Queries the header and packet bytes.

Suffix:
<hw> 1
Irrelevant

Return values:
<Bytes> <dblock>
HB0, HB1, HB2, PB0, ... , PB10 in decimal values
HB = header byte, PB = packet byte

Example: `READ:HDMI:INFO:MPEG:PDAT?`
Query
`-123, 1, 10, 77, -128, -124, 30, 0, 1, 0, 0, 0, 0, 0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:MPEG:VERSion?

Queries the version.

Suffix:
<hw> 1
Irrelevant

Example: READ:HDMI:INFO:MPEG:VERS?
Query
1
Response

Usage: Query only

14.7.6.10 READ<hw>[:SCALar]:HDMI:INFO:SPD Subsystem

Queries the parameters of the SPD InfoFrame measurement.

See also Chapter 10.2.6, "InfoFrame Subtab", on page 296.

READ<hw>[:SCALar]:HDMI:INFO:SPD:CSUM?

Queries the checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Decimal value

Example: READ:HDMI:INFO:SPD:CSUM?
Query
171
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:SPD:LENGth?

Queries the length.

Suffix:
<hw> 1
Irrelevant

Example: READ:HDMI:INFO:SPD:LENG?
Query
25
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:SPD:PDATa?

Queries the header and packet bytes.

Suffix:
<hw> 1
Irrelevant

Return values:
<Bytes> <dblock>
HB0, HB1, HB2, PB0, ... , PB25 in decimal values
HB = header byte, PB = packet byte

Example: `READ:HDMI:INFO:SPD:PDAT?`
Query
`-125, 1, 25, -85, 82, 38, 83, 0, 0, 0, 0, 0, 86, 84, 67, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:SPD:PRODuct?

Queries the product description.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:SPD:PROD?`
Query
`"VTE"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:SPD:VENDor?

Queries the vendor name.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:SPD:VEND?`
Query
`"R&S"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:SPD:VERSion?

Queries the version.

Suffix:
<hw> 1
Irrelevant

Example: READ:HDMI:INFO:SPD:VERS?
Query
1
Response

Usage: Query only

14.7.6.11 READ<hw>[:SCALar]:HDMI:INFO:VENDor Subsystem

Queries the parameters of the HDMI vendor-specific InfoFrame measurement.

See also Chapter 10.2.6, "InfoFrame Subtab", on page 296.

READ<hw>[:SCALar]:HDMI:INFO:VENDor:CSUM?

Queries the checksum.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Decimal value

Example: READ:HDMI:INFO:VEND:CSUM?
Query
70
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:VENDor:IEEE?

Queries the IEEE registration ID.

Suffix:
<hw> 1
Irrelevant

Example: READ:HDMI:INFO:VEND:IEEE?
Query
3075
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:VENDor:LENGth?

Queries the length.

Suffix:
<hw> 1
Irrelevant

Example: READ:HDMI:INFO:VEND:LENG?
Query
5
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:VENDor:PDATa?

Queries the header and packet bytes.

Suffix:
<hw> 1
Irrelevant

Return values:
<Bytes> <dblock>
HB0, HB1, HB2, PB0, ... , PB10 in decimal values
HB = header byte, PB = packet byte

Example: READ:HDMI:INFO:VEND:PDAT?
Query
-127, 1, 5, 70, 3, 12, 0, 32, 4, 0, 0, 0, 0, 0
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:VENDor:TDData?

Queries the 3D extended data.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:VEND:TDD?`
Query
`"Horizontal sub-sampling"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:VENDor:TDSTructure?

Queries the 3D structure.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:VEND:TDST?`
Query
`"Frame packing"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:VENDor:VERSion?

Queries the version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:VEND:VERS?`
Query
`1`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:VENDor:VIC?

Queries the HDMI video code.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:VEND:VIC?`
Query
`"4K x 2K 23.98/24Hz SMPTE (4)"`
Response

Usage: Query only

READ<hw>[:SCALar]:HDMI:INFO:VENDor:VIDeoformat?

Queries the HDMI video format.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:INFO:VEND:VID?`
Query
`"Extended resolution format"`
Response

Usage: Query only

14.7.6.12 READ<hw>[:SCALar]:HDMI:INPut Subsystem

READ<hw>[:SCALar]:HDMI:INPut:ACODe?

Queries the audio coding type derived from audio InfoFrame.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Audio coding type

Example: `READ:HDMI:INP:ACOD?`
Query
`OK,"Refer to Stream Header (L-PCM)"`
Response

Usage: Query only

Manual operation: See "Audio Coding" on page 287

READ<hw>[:SCALar]:HDMI:INPut:HDCP?

Queries the HDCP status.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> INValid | ACTive | ACT2.2 | INACtive

Example: `READ:HDMI:INP:HDCP?`
Query
`ACT`
Response

Usage: Query only

Manual operation: See "HDCP State" on page 286

READ<hw>[:SCALar]:HDMI:INPut:HPOWer?

Queries whether the R&S VTE has detected a valid voltage at the HDMI input. For querying the detected voltage value, use `READ<hw>[:SCALar]:HDMI:INPut:VOLTage?`.

Suffix:
<hw> 1
Irrelevant

Return values:
<Voltage> NASSerted | ASSerted

NASSerted
Voltage is less than 4.465 V.

ASSerted
Voltage is over 4.465 V.

Example: `READ:HDMI:INP:HPOW?`
Query
`ASS`
Response

Usage: Query only

Manual operation: See "HDMI +5V Power" on page 285

READ<hw>[:SCALar]:HDMI:INPut:PCLock?

Queries the pixel clock rate.

Suffix:
<hw> 1
Irrelevant

Return values:
<Rate> Value in MHz

Example: `READ:HDMI:INP:PCL?`
Query
`2.520018E+001`
Response: 25.200 MHz

Usage: Query only

Manual operation: See "Pixel Clock" on page 286

READ<hw>[:SCALar]:HDMI:INPut:PCLock:STATe?

Queries whether the R&S VTE has detected a valid HDMI input clock.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> LOCKed | UNLocked

Example: `READ:HDMI:INP:PCL:STAT?`
Query
`LOCK`
Response

Usage: Query only

Manual operation: See "PCLK Locked" on page 285

READ<hw>[:SCALar]:HDMI:INPut:TMDSclock?

Queries the TMDS character clock rate.

Suffix:
<hw> 1
Irrelevant

Return values:
<Rate> Value in MHz

Example: `READ:HDMI:INP:TMDS?`
Query
`2.520018E+001`
Response: 25.200 MHz

Usage: Query only

Manual operation: See "TMDS Char. Clk." on page 286

READ<hw>[:SCALar]:HDMI:INPut:VCODe?

Queries the transmission of dynamic range and mastering InfoFrame together with the video code derived from the AVI (auxiliary video information) InfoFrame.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Transmission status,"<dynamic range> <video code>"

Example: `READ:HDMI:INP:VCOD?`
Query
`OK,"HDR 640 x 480 (VGA) @ 59.94/60Hz (1)"`
Response

Usage: Query only

Manual operation: See "Video Code" on page 286

READ<hw>[:SCALar]:HDMI:INPut:VCOLor?

Queries the colorimetry derived from the AVI (auxiliary video information) InfoFrame and, for HDR, the electro optical transfer function derived from the dynamic range and mastering InfoFrame.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Video code
Transmission status,"<colorimetry> [<electro optical transfer function>]"

Example: `READ:HDMI:INP:VCOL?`
Query
`OK,"ITU-R B.2020 Y'c C'bc C'rc SMPTE ST 2084"`
Response

Usage: Query only

Manual operation: See "Video Color" on page 286

READ<hw>[:SCALar]:HDMI:INPut:VFEature?

Queries the video color coding, video level range and whether deep color is enabled.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Video code
Transmission status,"<video color coding> <video level range> [<deep color>]"

Example: READ:HDMI:INP:VFE?
Query
OK,"YCbCr 4:2:0 10bit DeepColor"
Response

Usage: Query only

Manual operation: See "Video Feature" on page 286

READ<hw>[:SCALar]:HDMI:INPut:VOLTage?

Queries the voltage detected at the HDMI input.

Suffix:
<hw> 1
Irrelevant

Example: READ:HDMI:INP:VOLT?
Query
5.036298E+000
Response: 5.04 V

Usage: Query only

Manual operation: See "HDMI +5V Power" on page 285

14.7.6.13 READ<hw>[:SCALar]:HDMI:SCDC Subsystem

Requires the HDMI RX/TX 600 MHz module (R&S VT-B2363) as input, see ROUTe<hw>:HDMI:MODule:SELect on page 961.

Queries the parameters of the status and control data channel (SCDC).

See also Chapter 10.2.7, "SCDC Subtab", on page 298.

READ<hw>[:SCALar]:HDMI:SCDC:CDIVide?

Queries the clock divider status.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:CDIV?`
Query
`OFF`
Response

Usage: Query only

Manual operation: See "Clock Divide By 4" on page 299

READ<hw>[:SCALar]:HDMI:SCDC:HWVersion?

Queries the hardware version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:HWV?`
Query
`"0.1"`
Response

Usage: Query only

Manual operation: See "Hardware Version" on page 299

READ<hw>[:SCALar]:HDMI:SCDC:IDENtifier?

Queries the identifier.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:IDEN?`
Query
`"R&S VTx"`
Response

Usage: Query only

Manual operation: See "Identifier" on page 298

READ<hw>[:SCALar]:HDMI:SCDC:OUI?

Queries the OUI.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:OUI?`
Query
`"00 90 B8"`
Response

Usage: Query only

Manual operation: See "OUI" on page 298

READ<hw>[:SCALar]:HDMI:SCDC:RRENable?

Queries the status of read request enable.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:RREN?`
Query
`OFF`
Response

Usage: Query only

Manual operation: See "Read Request Enable" on page 299

READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:CH<channel>?

Queries the channel lock status of channel 1 and 2.

Suffix:
<hw> 1
Irrelevant

<channel> 1-2
Channel number

Example: `READ:HDMI:SCDC:SCR:CH1?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Channel 0 Locked, Channel 1 Locked, Channel 2 Locked" on page 300

READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:CHNull?

Queries the channel lock status of channel 0.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SCR:CHN?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Channel 0 Locked, Channel 1 Locked, Channel 2 Locked" on page 300

READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:CLOCk?

Queries the status of clock detected.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SCR:CLOC?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Clock Detected" on page 300

READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:DETect?

Queries the status of scrambling detected.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SCR:DET?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Scrambling Detected" on page 300

READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:ENABle?

Queries the status of scrambling enable.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SCR:ENAB?`
Query
`ON`
Response

Usage: Query only

Manual operation: See "Scrambling Enable" on page 299

READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:ERR<channel>?

Queries the errors in channel 1 and 2.

Suffix:
<hw> 1
Irrelevant

<channel> 1-2
Channel number

Example: `READ:HDMI:SCDC:SCR:ERR2?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Errors Channel 0, Errors Channel 1, Errors Channel 2" on page 300

READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:ERRChecksum?

Queries the errors checksum.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SCR:ERRC?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Last Read Checksum" on page 301

READ<hw>[:SCALar]:HDMI:SCDC:SCRambling:ERRNull?

Queries the errors in channel 0.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SCR:ERRN?`
Query
`0`
Response

Usage: Query only

Manual operation: See "Errors Channel 0, Errors Channel 1, Errors Channel 2" on page 300

READ<hw>[:SCALar]:HDMI:SCDC:SINKversion?

Queries the sink version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SINK?`
Query
`1`
Response

Usage: Query only

Manual operation: See "Sink Version" on page 299

READ<hw>[:SCALar]:HDMI:SCDC:SRCVersion?

Queries the source version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SRCV?`
Query
`1`
Response

Usage: Query only

Manual operation: See "Source Version" on page 299

READ<hw>[:SCALar]:HDMI:SCDC:SWVersion?

Queries the software version.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:SWV?`
Query
`"0.0"`
Response

Usage: Query only

Manual operation: See "Software Version" on page 299

READ<hw>[:SCALar]:HDMI:SCDC:UPDate:CED?

Queries the CED update status.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:UPD:CED?`
Query
`OFF`
Response

Usage: Query only

Manual operation: See "Update CED" on page 300

READ<hw>[:SCALar]:HDMI:SCDC:UPDate:READreqest?

Queries the status of the update read request.

Suffix:
<hw> 1
Irrelevant

Example: `READ:HDMI:SCDC:UPD:READ?`
Query
`OFF`
Response

Usage: Query only

Manual operation: See "Update Read Request" on page 300

READ<hw>[:SCALar]:HDMI:SCDC:UPDate:STATe?

Queries the status of the update status.

Suffix:
<hw> 1
Irrelevant

Example: READ:HDMI:SCDC:UPD:STAT?
Query
ON
Response

Usage: Query only

Manual operation: See "Update Status" on page 300

14.7.6.14 READ<hw>[:SCALar]:HDMI:VIDeo Subsystem

READ<hw>[:SCALar]:HDMI:VIDeo:HFRequency?

Queries the measured horizontal frequency of the HDMI video content.

Suffix:
<hw> 1
Irrelevant

Return values:
<HorizontalFreq> Value in Hz

Example: READ:HDMI:VID:HFR?
Query
OK,31500.2
Response

Usage: Query only

Manual operation: See "Horizontal Frequency" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:ACTive?

Queries the number of horizontal back porch pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:HPIX:ACT?`
Query
`OK,640`
Response

Usage: Query only

Manual operation: See "H Active Pixels" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:BPORch?

Queries the number of horizontal back porch pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:HPIX:BPOR?`
Query
`OK,48`
Response

Usage: Query only

Manual operation: See "H Back Porch Pixels" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:FPORch?

Queries the number of horizontal front porch pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:HPIX:FPOR?`
Query
`OK,16`
Response

Usage: Query only

Manual operation: See "H Front Porch Pixels" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:SYNC?

Queries the number of horizontal synchronization pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:HPIX:SYNC?`
Query
`INV,96`
Response

Usage: Query only

Manual operation: See "H Sync Pixels" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:SYNC:POLarity?

Queries horizontal synchronization polarity.

Suffix:
<hw> 1
Irrelevant

Return values:
<Polarity> POSitive | NEGative

Example: `READ:HDMI:VID:HPIX:SYNC:POL?`
Query
`OK,NEG`
Response

Usage: Query only

Manual operation: See "H Sync Polarity" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:HPIXel:TOTal?

Queries the number of horizontal total pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:HPIX:TOT?`
Query
`OK,800`
Response

Usage: Query only

Manual operation: See "H Total Pixels" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:PCLock?

Queries the measured pixel clock of the HDMI input signal.

Suffix:
<hw> 1
Irrelevant

Return values:
<Rate> Value in Hz

Example: `READ:HDMI:VID:PCL?`
Query
`OK,2.52002e+007`
Response: 25.2002 MHz

Usage: Query only

Manual operation: See "Pixel Clock" on page 288

READ<hw>[:SCALar]:HDMI:VIDeo:VCODe?

Queries the video code derived from the AVI InfoFrame.

Suffix:
<hw> 1
Irrelevant

Return values:
<String> Video code

Example: `READ:HDMI:VID:VCOD?`
Query
`OK,"640 x 480 (VGA) @ 59.94/60Hz (1)"`
Response

Usage: Query only

Manual operation: See "Video Code" on page 288

READ<hw>[:SCALar]:HDMI:VIDeo:VFORmat?

Queries the video format of the HDMI video content.

Suffix:
<hw> 1
Irrelevant

Return values:
<VideoFormat> PROGressive | INTerlaced

Example: `READ:HDMI:VID:VFOR?`
Query
`OK,PROG`
Response

Usage: Query only

Manual operation: See "Video Format" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:VFRequency?

Queries the measured vertical frequency of the HDMI video content.

Suffix:
<hw> 1
Irrelevant

Return values:
<VerticalFreq> Value in Hz

Example: `READ:HDMI:VID:VFR?`
Query
`OK,60.0004`
Response

Usage: Query only

Manual operation: See "Vertical Frequency" on page 289

READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:ACTive?

Queries the number of vertical active pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:VLIN:ACT?`
Query
`OK,480`
Response

Usage: Query only

Manual operation: See "V Active Lines" on page 290

READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:BPORch?

Queries the number of vertical back porch pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:VLIN:BPOR?`
Query
`OK,33`
Response

Usage: Query only

Manual operation: See "V Back Porch Lines" on page 290

READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:FPORch?

Queries the number of vertical front porch pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:VLIN:FPOR?`
Query
`OK,10`
Response

Usage: Query only

Manual operation: See "V Front Porch Lines" on page 290

READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:SYNC?

Queries the number of vertical synchronization pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:VLIN:SYNC?`
Query
`OK,2`
Response

Usage: Query only

Manual operation: See "V Sync Lines" on page 290

READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:SYNC:POLarity?

Queries the vertical synchronization polarity.

Suffix:
<hw> 1
Irrelevant

Return values:
<Polarity> POSitive | NEGative

Example: `READ:HDMI:VID:VLIN:SYNC:POL?`
Query
`OK,NEG`
Response

Usage: Query only

Manual operation: See "V Sync Polarity" on page 290

READ<hw>[:SCALar]:HDMI:VIDeo:VLINe:TOTal?

Queries the number of vertical total pixels.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Numeric value

Example: `READ:HDMI:VID:VLIN:TOT?`
Query
`OK,525`
Response

Usage: Query only

Manual operation: See "V Total Lines" on page 290

14.7.7 ROUTe Subsystem

Table 14-23: Addressing HDMI input types

<Input type>	Required option
HDMI	HDMI RX 225 MHz module (R&S VT-B2360) HDMI RX 300 MHz module (R&S VT-B2361)
HDMI CTS	HDMI CTS RX/TX 600 MHz module (R&S VT-B2362)
HDMI 600MHz	HDMI RX/TX 600 MHz module (R&S VT-B2363)

ROUTe<hw>:HDMI:ISELect:VERSion <Standard>

Sets the HDMI standard.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Standard> HDMI14 | HDMI20
*RST: HDMI20

Example: `ROUT:HDMI:ISEL:VERS HDMI14`
Sets HDMI 1.4.

ROUTe<hw>:HDMI:MODule:CATalog?

Queries the available input types and the slot position of the corresponding module.

Suffix:
<hw> 1
Irrelevant

Return values:
<Input> "<input type> [<module slot>], <input type> [<module slot>], ..."
with <input type> see Table 14-23
and [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:HDMI:MOD:CAT?`
Query
`"HDMI [L1], HDMI CTS [R2]"`
Response

Usage: Query only

Manual operation: See "Input" on page 287

ROUTe<hw>:HDMI:MODule:SELect <Input>

Sets the input signal.

To determine the available input types, use `ROUTe<hw>:HDMI:MODule:CATalog?` on page 960.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Input> "<input type> [<module slot>]"
with <input type> see Table 14-23
and [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:HDMI:MOD:SEL "HDMI [L1]"`
Selects the HDMI input signal, slot 1.

Manual operation: See "Input" on page 287

14.8 CEC/DDC Analyzer Application

These commands correlate to the functions provided in Chapter 10.3, "CEC/DDC Analyzer Application", on page 333.

14.8.1 ABORt Subsystem

ABORt<hw>:CECDdc:TRACer

Stops the tracer function.

Suffix:
<hw> 1
Irrelevant

Example: `ABOR:CECD:TRAC`

Usage: Event

Manual operation: See "Stop button" on page 345

14.8.2 CLEar Subsystem

CLEar<hw>:CECDdc:TRACer

Clears the content in all tracer panes.

Suffix:
<hw> 1
Irrelevant

Example: `CLE:CECD:TRAC`

Usage: Event

Manual operation: See "Clear button" on page 345

14.8.3 CONFigure Subsystem

14.8.3.1 CONFigure<hw>:CECDdc:COMMand Subsystem

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:BROadcast:DATA <Enable>

Enables or disables the broadcast data for debugging.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: ON

Example: `CONF:CECD:COMM:CEC:DEB:BRO:DATA OFF`

Manual operation: See "Enable Acks" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:BROadcast:HEADer <Enable>

Enables or disables the broadcast header for debugging.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: ON

Example: `CONF:CECD:COMM:CEC:DEB:BRO:HEAD OFF`

Manual operation: See "Enable Acks" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:DEFault

Resets the debugger settings, that means all commands of the `CONFigure<hw>:CECDdc:COMMand:CEC:DEBug` subsystem.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:CECD:COMM:CEC:DEB:DEF`

Usage: Event

Manual operation: See "Default button" on page 340

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:DIRected:DATA <Enable>

Enables or disables the directed data for debugging.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: ON

Example: `CONF:CECD:COMM:CEC:DEB:DIR:DATA OFF`

Manual operation: See "Enable Acks" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:DIRected:HEADer <Enable>

Enables or disables the directed header for debugging.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: ON

Example: `CONF:CECD:COMM:CEC:DEB:DIR:HEAD OFF`

Manual operation: See "Enable Acks" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:ONEBit:LOW <Value>

Sets the one bit low period for debugging.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 0.400000 to 0.800000
*RST: 0.600000
Default unit: ms

Example: `CONF:CECD:COMM:CEC:DEB:ONEB:LOW 0.795`

Manual operation: See "Control Timing" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:ONEBit:TOTal <Value>

Sets the one bit total period for debugging.

Suffix:
<hw> 1
Irrelevant

Parameters:

<Value>
Range: 2.050000 to 2.750000
*RST: 2.400000
Default unit: ms

Example: `CONF:CECD:COMM:CEC:DEB:ONEB:TOT 2.55`

Manual operation: See "Control Timing" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:STARtbit:LOW <Value>

Sets the start bit low period for debugging.

Suffix:

<hw>
1
Irrelevant

Parameters:

<Value>
Range: 3.500000 to 3.900000
*RST: 3.700000
Default unit: ms

Example: `CONF:CECD:COMM:CEC:DEB:STAR:LOW 3.765`

Manual operation: See "Control Timing" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:STARtbit:TOTal <Value>

Sets the start bit total period for debugging.

Suffix:

<hw>
1
Irrelevant

Parameters:

<Value>
Range: 4.300000 to 4.700000
*RST: 4.500000
Default unit: ms

Example: `CONF:CECD:COMM:CEC:DEB:STAR:TOT 4.68`

Manual operation: See "Control Timing" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:ZERobit:LOW <Value>

Sets the zero bit total period for debugging.

Suffix:

<hw>
1
Irrelevant

Parameters:

<Value>
Range: 1.300000 to 1.700000
*RST: 1.500000
Default unit: ms

Example: `CONF:CECD:COMM:CEC:DEB:ZER:LOW 1.639`

Manual operation: See "Control Timing" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DEBug:ZERobit:TOTal <Value>

Sets the zero bit total period for debugging.

Suffix:

<hw>
1
Irrelevant

Parameters:

<Value>
Range: 2.050000 to 2.750000
*RST: 2.400000
Default unit: ms

Example: `CONF:CECD:COMM:CEC:DEB:ZER:TOT 2.6387`

Manual operation: See "Control Timing" on page 341

CONFigure<hw>:CECDdc:COMMand:CEC:DESTination <Address>

Sets the logical address of the DUT that should receive the CEC messages sent by the R&S VTE.

Suffix:

<hw>
1
Irrelevant

Parameters:

<Address>
TV | RD1 | RD2 | TUN1 | PD1 | AUDiosystem | TUN2 | TUN3 | PD2 | RD3 | TUN4 | PD311 | R12 | R13 | SPECificuse | BROadcast | BAK1 | BAK2

with RD = recording device, TUN = tuner, PD = playback device, R = reserved
See also Chapter 10.3.5, "Addressing the DUT", on page 346.

*RST: TV

Example: `CONF:CECD:COMM:CEC:DEST AUD`
Sets the audio system.

Manual operation: See "Destination" on page 338

CONFigure<hw>:CECDdc:COMMand:CEC:HOTKey <Index>, <Name>

Assigns a name to a user-defined hotkey.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Index> Number of the user-defined hotkey.
0 in the remote control corresponds to "1. Undefined" in manual operation.
Range: 0 to 19

<Name> Name of the hotkey as a string

Example: `CONF:CECD:COMM:CEC:OPC CUST,"0x9D"`
Sets the customized opcode to 0x9D
`CONF:CECD:COMM:CEC:OPER 2,#H00,#HFF`
Defines 2 parameters for the opcode.
`CONF:CECD:COMM:CEC:HOTK 1,"MyHotkey"`
Names the second hotkey. See also Chapter 10.3.6, "Customizing CEC Command Hotkeys", on page 347.

Manual operation: See "Assign Hotkey button" on page 340

CONFigure<hw>:CECDdc:COMMand:CEC:MODE <Setting>

Sets the way how to select a command.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> QUICk | ADVanced
*RST: QUICk

Example: `CONF:CECD:COMM:CEC:MODE ADV`

Manual operation: See "Mode" on page 338

CONFigure<hw>:CECDdc:COMMand:CEC:OPCode <Group>, <String>

Sets the group and the CEC command/opcode. The mode is adjusted automatically (`CONFigure<hw>:CECDdc:COMMand:CEC:MODE` on page 967).

Suffix:
<hw> 1
Irrelevant

Parameters:

<Group> OTP | RC | OTR | DC | TP | SI | CDC | TC | VSC | OD | DOT | DMC | RPC | PS | GP | SAC | ARC | AR | DL | PRESet | UDEFined | CUSTom

Quick mode: PRESet | UDEFined
Advanced mode: OTP | RC | OTR | DC | TP | SI | CDC | TC | VSC | OD | DOT | DMC | RPC | PS | GP | SAC | ARC | AR | DL | CUSTom

*RST: PRESet

<String> Quick mode: CEC command, see Table 10-9.
Advanced mode: opcode as hexadecimal value, see also Chapter 10.4.4, "CEC Communication", on page 364. Define the operands by using `CONFigure<hw>:CECDdc:COMMand:CEC:OPERands` on page 968.

*RST: "User Control Pressed: Volume Up"

Example: `CONF:CECD:COMM:CEC:OPC OTR,"0x09"`
Sets the "Record On (0x09)" opcode and adjusts to advanced mode, if necessary.

Example:
```
CONF:CECD:COMM:CEC:
OPC PRES,"User Control Pressed: Volume Down"
```
Sets the specified common CEC command and adjusts to quick mode, if necessary.

Manual operation: See "<CEC command> button" on page 338
See "Opcode button" on page 339
See "CEC Opcodes dialog" on page 339

CONFigure<hw>:CECDdc:COMMand:CEC:OPERands <Number>, <Parameters>

Sets the additional parameters (operands) and their number.

Suffix:

<hw> 1
Irrelevant

Parameters:

<Number> Total number of required additional parameters

<Parameters> Hexadecimal value for each required parameter

Example: `CONF:CECD:COMM:CEC:OPC RC,"0x80"`
Sets the "Routing Change (0x80)" opcode and adjusts to advanced mode, if necessary.
`CONF:CECD:COMM:CEC:OPER 4,#H00,#H00,#H00,#H00`
Sets all 4 parameters to 0.

Manual operation: See "No. of Param." on page 339
See "Parameter 1 to 14" on page 340

CONFigure<hw>:CECDdc:COMMand:DEBug <Enable>

Enables or disables the CEC debugger.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
*RST: OFF

Example: `CONF:CECD:COMM:DEB ON`

Manual operation: See "Debug" on page 340

CONFigure<hw>:CECDdc:COMMand:DISCover

Starts the device discovery process.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:CECD:COMMand:DISC`

Usage: Event

Manual operation: See "Discover Devices button" on page 341

CONFigure<hw>:CECDdc:COMMand:EDID:READ

Starts reading the EDID data from the sink DUT.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:CECD:COMM:EDID:READ`

Usage: Event

Manual operation: See "Read EDID Data button" on page 341

CONFigure<hw>:CECDdc:COMMand:PORT <HDMI>

Sets the port of the HDMI RX/TX 600 MHz module (R&S VT-B2363) at which the commands are send.

Suffix:
<hw> 1
Irrelevant

Parameters:
<HDMI> HIN | HOUT
*RST: HIN

Example: `CONF:CECD:COMM:PORT HOUT`

Manual operation: See "Port" on page 340

CONFigure<hw>:CECDdc:COMMand:SCDC:READ

Starts reading the SCDC registers using the HDMI OUT port.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:CECD:COMM:SCDC:READ`

Usage: Event

Manual operation: See "Read SCDC button" on page 342

CONFigure<hw>:CECDdc:COMMand:SCDC:READ:BYTes <Value>

Sets the number of bytes for reading the status and control data channel (SCDC).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 16
*RST: 1

Example: `CONF:CECD:COMM:SCDC:READ:BYT 2`

Manual operation: See "Number of Bytes" on page 342

CONFigure<hw>:CECDdc:COMMand:SCDC:READ:OFFSet <Value>

Sets the offset for reading the status and control data channel (SCDC).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: #H0 to #HFF
*RST: #H0

Example: `CONF:CECD:COMM:SCDC:READ:OFFS #H2E`

Manual operation: See "Offset" on page 342

CONFigure<hw>:CECDdc:COMMand:SCDC:WRITe

Starts writing the SCDC registers using the HDMI OUT port.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:CECD:COMM:SCDC:WRIT`

Usage: Event

Manual operation: See "Write SCDC button" on page 343

CONFigure<hw>:CECDdc:COMMand:SCDC:WRITe:BYTes <Number>, <Value>, <Value>, ...

Sets the bytes for writing the status and control data channel (SCDC).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Number> Total number of bytes
Range: 1 to 16
*RST: 1

<Value> The number of values equals the total number fo bytes.
Range: #H0 to #HFF
*RST: #H0

Example: `CONF:CECD:COMM:SCDC:WRIT:BYT 2,#HAB,#H3E`

Manual operation: See "Number of Bytes" on page 342
See "Value [Offset], Value [Offset+1], ..., Value [Offset+15]" on page 342

CONFigure<hw>:CECDdc:COMMand:SCDC:WRITe:OFFSet <Value>

Sets the offset for writing the status and control data channel (SCDC).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: #H0 to #HFF
*RST: #H0

Example: `CONF:CECD:COMM:SCDC:WRIT:OFFS #HA`

Manual operation: See "Offset" on page 342

CONFigure<hw>:CECDdc:COMMand:SEND

Sends a command as specified.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:CECD:COMM:SEND`

Usage: Event

Manual operation: See "Send button" on page 341

CONFigure<hw>:CECDdc:COMMand:TYPE <Setting>

Sets the command type.

Suffix:
<hw> 1

Parameters:
<Setting> CECuser | CECDiscovery | EREad | SREad | SWRite
*RST: CECuser

Example: `CONF:CECD:COMM:TYPE ERE`
Reads the EDID data.

Manual operation: See "Type" on page 338

14.8.3.2 CONFigure<hw>:CECDdc:CONFigure Subsystem

CONFigure<hw>:CECDdc:CONFigure:CHANnel <Sampling>

Sets the data channel for the sniffing and tracing function.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Sampling> CEC | DDC
*RST: CEC

Example: `CONF:CECD:CONF:CHAN DDC`

Manual operation: See "Data Channel" on page 335

CONFigure<hw>:CECDdc:CONFigure:INITiator:HIN <Address>
CONFigure<hw>:CECDdc:CONFigure:INITiator:HOUT <Address>

Sets the DUT type addressed at the HDMI IN/HDMI OUT port of the HDMI RX/TX 600 MHz module (R&S VT-B2363).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Address> UNASsigned | TV | RD1 | RD2 | TUN1 | PD1 | AUDio | TUN2 | TUN3 | PD2 | RD3 | TUN4 | PD311 | R12 | R13 | SPECific | UNRegistered | BAK1 | BAK2

with RD = recording device, TUN = tuner, PD = playback device, R = reserved
See also Chapter 10.3.5, "Addressing the DUT", on page 346.

*RST: UNASsigned

Example: `CONF:CECD:CONF:INIT:HIN TUN4`

Example: `CONF:CECD:CONF:INIT:HOUT PD2`

Manual operation: See "HDMI OUT" on page 336

CONFigure<hw>:CECDdc:CONFigure:PORT <HDMI>

Sets the port of the HDMI RX/TX 600 MHz module (R&S VT-B2363).

Suffix:
<hw> 1
Irrelevant

Parameters:
<HDMI> HIN | HOUT

*RST: HIN

Example: `CONF:CECD:CONF:PORT HOUT`

Manual operation: See "VT-B2363 HDMI Port" on page 335

14.8.3.3 CONFigure<hw>:CECDdc:TRACer Subsystem

CONFigure<hw>:CECDdc:TRACer:DEVice:ONE <Address>
CONFigure<hw>:CECDdc:TRACer:DEVice:TWO <Address>

Sets the device types. Used to monitor communications between 2 device types.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Address> ALL | TV | RD1 | RD2 | TUN1 | PD1 | AUDio | TUN2 | TUN3 | PD2 | RD3 | TUN4 | PD3 | R12 | R13 | SPECific | UORBroadcast | VTX | DUT | BAK1 | BAK2
with RD = recording device, TUN = tuner, PD = playback device, R = reserved
See also Chapter 10.3.5, "Addressing the DUT", on page 346.
*RST: ALL

Example:
```
CONF:CECD:TRAC:DEV:ONE TV
CONF:CECD:TRAC:DEV:TWO PD1
```

Manual operation: See "Device 1, Device 2" on page 345

CONFigure<hw>:CECDdc:TRACer:PACKet <Type>

Used to monitor only specific packet types.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Type> ALL | CEC | EDID | SCDC | HDCP | DDC
*RST: ALL

Example:
```
CONF:CECD:TRAC:PACK EDID
```

Manual operation: See "Packet" on page 346

CONFigure<hw>:CECDdc:TRACer:STATus <Error>

Used to check for errors.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Error> ALL | NERRor | ERRor
*RST: ALL

Example:
```
CONF:CECD:TRAC:STAT ERR
```

Manual operation: See "Status" on page 346

CONFigure<hw>:CECDdc:TRACer:TABLe:SELect <Index>

Selects the specified entry in the packet data table. If you specify the number of the selected entry, it is deselected.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<Index> Number of the table entry. The first entry (index = 0) is always the most recent entry.
This index is used in remote control only. Do not confuse it with the row count in manual operation ("No." column).
Range: 0 to <total number>

Example: `CONF:CECD:TRAC:TABL:SEL 4107`

Manual operation: See "<Packet data table>" on page 344

14.8.4 DISPlay Subsystem

DISPlay<hw>:CECDdc:SELect:TAB <Tab>

Selects the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Tab> CONFigure | COMMand | TRACer
Corresponds to the tabs in the manual operation.

Example: `DISP:CECD:SEL:TAB TRAC`

14.8.5 INITiate Subsystem

INITiate<hw>:CECDdc:TRACer

Starts the tracer function.

Suffix:
<hw> 1
Irrelevant

Example: `INIT:CECD:TRAC`

Usage: Event

Manual operation: See "Start button" on page 345

14.8.6 MMEMory Subsystem

MMEMory<hw>:CECDdc:COMMand:EDID:DATA:STORe <PathFile>

Saves the read EDID data as a BIN file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a new directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:CECD:COMM:EDID:DATA:STOR "D:\VTE\UserData\MyEDIDdata.bin"`
Saves `MyEDIDdata.bin` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 342

MMEMory<hw>:CECDdc:TRACer:DATA:STORe <PathFile>

Saves the tracer test results (packet data) as a TXT file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a new directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:CECD:TRAC:DATA:STOR "D:\VTE\UserData\MyResults.txt"`
Saves `MyResults.txt` in the `D:\VTE\UserData` directory.

Manual operation: See "Save button" on page 345

14.8.7 READ Subsystem

READ<hw>:CECDdc:COMMand:CEC:QMODe:DESCription?

Queries the information on the opcode and the operands of the CEC command.

Suffix:
<hw> 1
Irrelevant

Return values:
<Command> Command description as string

Example: `READ:CECD:COMM:CEC:QMOD:DESC?`
Query
`"Opcode:`
`0x44 <User Control Pressed><br>Operands: 0x41`
`[UI Command = Volume Up] "`
Response

Usage: Query only

Manual operation: See "<CEC command> button" on page 338

READ<hw>:CECDdc:COMMand:OUTPut?

Reads the test reports that are generated according to the command type.

Suffix:
<hw> 1
Irrelevant

Return values:
<TestReport> String

Example: `READ:CECD:COMM:OUTP?`
Query
`"Sent:`
`<br></br><b>TV</b> -> <b>TV</b> <br></br>Opcode:`
`<b>0x44 (User Control Pressed)</b><br></br> Operands:`
`<b>0x41 [UI Command] = Volume Up</b><br></br>Status:`
`<b>Acknowledged</b><br></br>"`
Response

Usage: Query only

READ<hw>:CECDdc:STATus:IN?

Queries the status of the HDMI IN port.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> Status as string

Example: `READ:CECD:STAT:IN?`
Query
`"CEC Active Mode"`
Response

Usage: Query only

READ<hw>:CECDdc:STATus:OUT?

Queries the status of the HDMI OUT port.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> Status as string

Example: `READ:CECD:STAT:OUT?`
Query
`"DUT Connected"`
Response

Usage: Query only

READ<hw>:CECDdc:TRACer:DESCription?

Queries the description of the row selected in the packet data table.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> Description of the row selected by `CONFigure<hw>:CECDdc:TRACer:TABLe:SELect` on page 975.

Example: `READ:CECD:TRAC:DESC?`
Query
`"Frame #10683 Packet Type: SCDC(I2C Address: 0xa8,WRITE) Raw Data: START 0xa8 0x41 Frame Error: None"`
Response

Usage: Query only

Manual operation: See "<Description>" on page 344

READ<hw>:CECDdc:TRACer:TABLe:COUNt?

Queries the total number of rows in the packet data table.

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Total number of rows

Example: `READ:CECD:TRAC:TABL:COUN?`
Query
`4108`
Response

Usage: Query only

Manual operation: See "<Packet data table>" on page 344

READ<hw>:CECDdc:TRACer:TABLe:ITEM? <Index>, <Column>

Queries the content of the specified cell in the packet data table.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<Index> Number of the table entry. The first entry (index = 0) is always the most recent entry.
This index is used in remote control only. The row count in manual operation ("No." column) is queried by using the `NUMBer` parameter under <Column>.
Range: 0 to <total number>

<Column> NUMBer | TIME | INITiator | DESTination | PACKet | PORT

Return values:
<CellContent> Content of the cell specified by index and column

Example: `READ:CECD:TRAC:TABL:ITEM? 182,TIME`
Query
`"16:28:51.480"`
Response

Usage: Query only

Manual operation: See "<Packet data table>" on page 344

READ<hw>:CECDdc:TRACer:TRACe? <TraceNumber>

Queries the output of the specified trace.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<TraceNumber> 1 | 2 | 3

Return values:
<x- and y-Values> <dblock>
Response consists of #<number>, list of all x-values and list of all y-values. Each x- and y-value is a 8 byte value.
#<number>
Example: #3128
signals the start of the data block.
3 means that the data size is indicated by 3 numbers.
128 is the data size in bytes, i.e. 128 byte. As each x/y-value requires 8 byte, 128 byte equals 16 values - 8 x-values and 8 y-values.

Usage: Query only

Manual operation: See "<Waveform scope>" on page 345

14.8.8 ROUTe Subsystem

ROUTe<hw>:CECDdc:SELect:VERSion <Standard>

Sets the HDMI standard.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Standard> HDMI14 | HDMI20
*RST: HDMI14

Example: `ROUT:CECD:SEL:VERS HDMI20`
Sets HDMI 2.0.

Manual operation: See "Standard" on page 335

14.9 Time Domain Analyzer Application

These commands correlate to the functions provided in Chapter 11, "Time Domain Analyzer Application", on page 368.

14.9.1 ABORt Subsystem

ABORt<hw>:TDA

Stops the running measurement.

Suffix:

<hw> 1
Irrelevant

Example: `ABOR:TDA`

Usage: Event

Manual operation: See "Stop button" on page 379
See "Stop button" on page 388

14.9.2 CONFigure Subsystem

14.9.2.1 CONFigure<hw>:TDA:CTS Subsystem

Configures the parameters of the CTS test cases.

See also "CTS Configuration dialog" on page 384.

Addressing test cases

Table 14-24: HDMI 1.4 tests

Test case	Remote command parameter (<TestCase>)
"7-1: EDID Related Behavior"	H017_h0701
"7-2: TMDS -V_L"	H000_h0702
"7-3: TMDS-V_{Off}"	H001_h0703

Test case	Remote command parameter (<TestCase>)
"7-4: TMDS-T_{Rise}/T_{Fall}"	H002_h0704
"7-6: TMDS Inter Pair Skew"	H003_h0706
"7-7: TMDS Intra Pair Skew"	H004_h0707
"7-8: Clock Duty Cycle"	H010_h0708
"7-9: TMDS Clock Jitter"	H011_h0709
"7-10: Data Eye Diagram"	H012_h0710
"7-11: +5 V Power"	H013_h0711
"7-12: Hotplug Detect"	H014_h0712
"7-13: DDC/CEC Capacitance"	H015_h0713
"7-15: CEC Line Degradation"	H016_h0715

Table 14-25: HDMI 2.0 tests

Test case	Remote command parameter (<TestCase>)
"HF 1-1: TMDS 6G V_L and V_{Swing}"	H005_hf0101
"HF 1-2: TMDS 6G T_{Rise}/T_{Fall}"	H006_hf0102
"HF 1-3: TMDS 6G Inter Pair Skew"	H007_hf0103
"HF 1-4: TMDS 6G Intra Pair Skew"	H008_hf0104
"HF 1-5: TMDS 6G Differential Voltage"	H009_hf0105
"HF 1-6: TMDS 6G Clock Duty Cycle"	H018_hf0106
"HF 1-7: TMDS 6G Clock Jitter"	H019_hf0107

CONFigure<hw>:TDA:CTS:HDMI:CHANnel:SELect <TestCase>, <Channel>
CONFigure<hw>:TDA:CTS:HDMI:CHANnel:SELect? <TestCase>

Sets the channel of the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Channel> Not every channel value is available for every test case, see Table 11-1 and Table 11-2.

ALL
All

D0PGnd
Data 0+ and GND

D0MGnd
Data 0- and GND

D1PGnd
Data 1+ and GND

D1MGnd
Data 1- and GND

D2PGnd
Data 2+ and GND

D2MGnd
Data 2- and GND

D0P0minus
Data 0+ and 0-

D1P1minus
Data 1+ and 1-

D2P2minus
Data 2+ and 2-

TD01
Data 0 and 1

TD02
Data 0 and 2

TD12
Data 1 and 2

CPGNd
Clock+ and GND

CMGNd
Clock- and GND

CPCMinus
Clock+ Clock-

Parameters for setting and query:

<TestCase> Specifies the test case. See "Addressing test cases" on page 981.

Example: `CONF:TDA:CTS:HDMI:CHAN:SEL H003,TD02`

Manual operation: See "Channel (default favorite)" on page 382

CONFigure<hw>:TDA:CTS:HDMI:HVL:HPCLck <Support>

Sets the length of the test sequence corresponding to the CDF (capabilities declaration form) field for the DUT. Applies only to "7-2: TMDS -V_L".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> YES | NO
*RST: YES

Example: `CONF:TDA:CTS:HDMI:HVL:HPCL NO`

Manual operation: See "Sink Supports Pixel Clock > 165 MHz" on page 384

CONFigure<hw>:TDA:CTS:HDMI:LDEGradation:CECProtocol <Support>

Selects the measurements that are performed on the DUT. Applies only to "7-15: CEC Line Degradation".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> YES | NO
*RST: NO

Example: `CONF:TDA:CTS:HDMI:LDEG:CECP YES`

Manual operation: See "CDF CEC Protocol" on page 386

CONFigure<hw>:TDA:CTS:HDMI:LDEGradation:SPMexists <TestCase>, <Support>
CONFigure<hw>:TDA:CTS:HDMI:LDEGradation:SPMexists? <TestCase>

Sets whether the DUT has a standby mode in addition to power-on and power-off mode.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> YES | NO
*RST: NO

Parameters for setting and query:
<TestCase> H001_h0703 | H016_h0715
Specifies the test case. See "Addressing test cases" on page 981.

Example: `CONF:TDA:CTS:HDMI:LDEG:SPM H001,YES`

Manual operation: See "Standby Power Mode Exists" on page 385

CONFigure<hw>:TDA:CTS:HDMI:SDCPower <Support>

Determines the mode in which the capacitance of the SDA and SCL lines is measured. Applies only to "7-13: DDC/CEC Capacitance".

Suffix:
<hw> 1
Irrelevant

Parameters:
<Support> YES | NO
*RST: YES

Example: `CONF:TDA:CTS:HDMI:SDCP NO`

Manual operation: See "Source DDC Cap Power On" on page 386

CONFigure<hw>:TDA:CTS:HDMI:SELect <TestCase>

Sets the test case.

Suffix:
<hw> 1
Irrelevant

Parameters:
<TestCase> Specifies the test case. See "Addressing test cases" on page 981.
*RST: H000

Example: `CONF:TDA:CTS:HDMI:SEL H001`

Manual operation: See "Test Case dialog" on page 384

14.9.2.2 CONFigure<hw>:TDA:FREQuency Subsystem

CONFigure<hw>:TDA:FREQuency <Value>

Sets an EDID to force the DUT to produce the test frequencies.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> The range of test frequencies depends on the standard.
25175000 | 25200175 | 27000000 | 27027000 | 54000000 | 54054000 | 59341000 | 59400000 | 72000000 | 74176000 | 74250000 | 108000000 | 108108000 | 148352000 | 148500000 | 148648500 | 296703000 | 296710000 | 29700000
For HDMI 1.4b
356043600 | 593406000 | 594000000
For HDMI 2.0

*RST: 25175000
Default unit: Hz

Example: `CONF:TDA:FREQ 594000000`

Manual operation: See "TMDS Character Clock" on page 371

14.9.2.3 CONFigure<hw>:TDA:INPut Subsystem

CONFigure<hw>:TDA:INPut:EDID:USER <Enable>

Enables or disables the usage of a user-defined EDID file.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Enable> OFF | ON
Before enabling, define an EDID file using `MMEMory<hw>:TDA:INPut:EDID:DATA:LOAD` on page 991.

Example: `CONF:TDA:INP:EDID:USER ON`

Manual operation: See "User-Defined EDID" on page 371

14.9.2.4 CONFigure<hw>:TDA:SCOPe Subsystem

Configures the parameters of the scope measurement.

CONFigure<hw>:TDA:SCOPe <Meas>

Sets the measurement function of the scope.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Meas> CURSor | MASK | HHIStogram | VHIStogram
*RST: CURSor

Example: `CONF:TDA:SCOP MASK`

Manual operation: See "View" on page 374
See "Cursor View" on page 374
See "Mask View" on page 375
See "Horizontal Histogram View" on page 376
See "Vertical Histogram View" on page 377

CONFigure<hw>:TDA:SCOPe:CURSor<cursor> <Time>, <Voltage>

Sets the x and y value of the cursors.

Suffix:
<hw> 1
Irrelevant

<cursor> 1-2
Cursor number

Parameters:
<Time> Numeric value in the unit set by `UNIT<hw>:TDA:SCOPe:TIME` on page 1004.
Range: -1200 mV to 1200 mV
*RST: C1: -873 mV; C2: 873 mV

<Voltage> Numeric value in the unit set by `UNIT<hw>:TDA:SCOPe:VOLTage` on page 1004.
Range: -0.600 UI to 0.600 UI
*RST: C1: -0.500 UI; C2: 0.500 UI

Example:
```
CONF:TDA:SCOP:CURS2 0.4,900
```

Manual operation: See "C1, C2" on page 374

CONFigure<hw>:TDA:SCOPe:MASK <OuterVoltage>, <InnerVoltage>, <OuterTime>, <InnerTime>

Configures the mask.

Suffix:
<hw> 1
Irrelevant

Parameters:
<OuterVoltage> Range: 0 to 1.200
*RST: 0.780
Default unit: V

<InnerVoltage> Range: 0 to 1.200
*RST: 0.200
Default unit: V

<OuterTime> Range: 0 to 0.500
*RST: 0.250
Default unit: UI

<InnerTime> Range: 0 to 0.500
*RST: 0.150
Default unit: UI

Example: `CONF:TDA:SCOP:MASK 0.9, 0.3, 0.3, 0.2`

Manual operation: See "Mask" on page 375

CONFigure<hw>:TDA:SCOPe:MASK:RESet

Resets the mask to the default values, see `CONFigure<hw>:TDA:SCOPe:MASK` on page 987.

Suffix:
<hw> 1
Irrelevant

Example: `CONF:TDA:SCOP:MASK:RES`

Usage: Event

Manual operation: See "Mask" on page 375

CONFigure<hw>:TDA:SCOPe:PERSistence <Setting>

Defines the processing and display of the sampling data over time.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> INFinite | LIMited
*RST: LIMited

Example: `CONF:TDA:SCOP:PERS INF`

Manual operation: See "Persistence" on page 378

CONFigure<hw>:TDA:SCOPe:PERSistence:COUNt <Value>

Sets the memory time of samples.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> Range: 1 to 256
*RST: 3

Example: `CONF:TDA:SCOP:PERS:COUN 10`

Manual operation: See "Number of Scans" on page 378

CONFigure<hw>:TDA:SCOPe:RESolution <Setting>

Sets the quality of the scope measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Setting> HIGH | MEDium
*RST: HIGH

Example: `CONF:TDA:SCOP:RES MED`

Manual operation: See "Resolution" on page 378

CONFigure<hw>:TDA:SCOPe:SPAN <Value>

Sets the range of the scan over the TMDS data bit.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Value> 1.2 | 1.5 | 2 | 3
*RST: 1.2
Default unit: UI

Example: `CONF:TDA:SCOP:SPAN 1.5`

Manual operation: See "Span" on page 379

14.9.3 DISPlay Subsystem

DISPlay<hw>:TDA:SELect:TAB <Tab>

Selects the measurement.

Suffix:
<hw> 1
Irrelevant

Parameters:
<Tab> INPut | SCOPe | CTS
Corresponds to the tabs in the manual control.

Example: `DISP:TDA:SEL:TAB CTS`

14.9.4 INITiate Subsystem

INITiate<hw>:TDA [<Measurement>]

Starts the selected measurement.

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<Measurement> SCOPe | CTS

Example: `INIT:TDA CTS`

Usage: Setting only

Manual operation: See "Start button" on page 380
See "Start button" on page 388

14.9.5 MMEMory Subsystem

MMEMory<hw>:TDA:CTS:DATA:STORe <PathFile>

Saves the test report as a file in the specified directory.

You can use `D:\VTE\UserData` as directory. The current directory is set using `MMEMory:CDIRectory` on page 501.

Alternatively, you can create a new directory using `MMEMory:MDIRectory` on page 504.

Suffix:
<hw> 1
Irrelevant

Setting parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.
If file extension is `*.mht`, the file is written in MHTML format. Otherwise, a simple TXT file is written.

Example:
```
MMEM:TDA:CTS:DATA:STOR "D:
\VTE\UserData\MyReport.mht"
```
Saves `MyReport.mht` in the `D:\VTE\UserData` directory.

Usage: Setting only

Manual operation: See "Save button" on page 387

MMEMory<hw>:TDA:INPut:EDID:DATA:LOAD <PathFile>

Loads a user-defined EDID file from the specified `*.bin` file.

Suffix:
<hw> 1
Irrelevant

Parameters:
<PathFile> Filename including the extension. If the path is omitted, the current directory is used.

Example: `MMEM:TDA:INP:EDID:DATA:LOAD "D:\VTE\UserData\MyEDIDdata.bin"`
Loads `MyEDIDdata.bin` from the `D:\VTE\UserData` directory.

Manual operation: See "Load" on page 371

14.9.6 READ Subsystem

READ<hw>:ARRay:TDA:SCOPe:EYE?

Queries the measured values of the eye diagram (scope measurement).

Suffix:
<hw> 1
Irrelevant

Return values:

<Result> <dblock>
Response consists of #<number>, list of measured values.

Usage: Query only

READ<hw>[:SCALar]:TDA:BTOLink?

Queries how long a unit interval (UI) takes.

Suffix:

<hw> 1
Irrelevant

Return values:

<Value> Default unit: s

Example: `READ:TDA:BTOL?`
Query
`1.683502E-010`
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:CLOCk:CHARacter?

Queries the status and the measured frequency of the TMDS clock rate.

Suffix:

<hw> 1
Irrelevant

Return values:

<Status> OK | INValid | NAVailable

<Value> Default unit: Hz

Example: `READ:TDA:CLOC:CHAR?`
Query
`OK,1.485000E+008`
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:COMMand:STATe?

Queries which measurement is running.

Suffix:

<hw> 1
Irrelevant

Return values:

<Measurement> NONE | SCOPe | CTS

Example: `READ:TDA:COMM:STAT?`
Query
`SCOP`
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:CTS:CONTrol:PROGress?

Queries the current measurement progress (CTS measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Value> Measurement progress in %

Example: `READ:TDA:CTS:CONT:PROG?`
Query
`1.000000E+002`
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:CTS:CONTrol:STATe?

Queries the status of the CTS measurement.

Suffix:
<hw> 1
Irrelevant

Return values:
<Meas> IDLE | RUNNing | FINished | ERROr | WAITforuser

Example: `READ:TDA:CTS:CONT:STAT?`
Query
`FIN`
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:CTS:HDMI:SELect:NAME?

Queries the name of the selected CTS test case.

Suffix:
<hw> 1
Irrelevant

Return values:
<TestCase> Test case name as string

Example: `READ:TDA:CTS:HDMI:SEL:NAME?`
Query
`"7-2 TMDS VL"`
Response

Usage: Query only

Manual operation: See "Test Case dialog" on page 384

READ<hw>[:SCALar]:TDA:CTS:REPort? <Line>

Queries the content of the specified entry line in the CTS test report.

Suffix:
<hw> 1
Irrelevant

Query parameters:
<Line> Number of the entry line in the CTS test report. You can query the total number of lines using `READ<hw>[:SCALar]:TDA:CTS:REPort:COUNt?` on page 994.
Range: 0 (= first line) to total number

Return values:
<Result> 1,0x0000,"<contents of line>"

Example: `READ:TDA:CTS:REP? 0`
Query
1,0x0001," HDMI SOURCE TEST"
Response: Contents of the first line.

Usage: Query only

READ<hw>[:SCALar]:TDA:CTS:REPort:COUNt?

Queries the number of entry lines in the CTS test report.

Suffix:
<hw> 1
Irrelevant

Return values:
<Lines> Total number of lines

Example: `READ:TDA:CTS:REP:COUN?`
Query
`6`
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:CTS:RESult?

Queries the result of the last CTS test.

Suffix:
<hw> 1
Irrelevant

Return values:
<Result> PASS | FAIL | NONE
Final test result

Example: `READ:TDA:CTS:RES?`
Query
`FAIL`
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:CTS:UACTion?

Queries whether a user action is required and what kind of user action (CTS measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Action> Describes the required action.

Example: `READ:TDA:CTS:UACT?`
Query
`"None"`
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:INPut:EDID?

Queries the status of reading the EDID from the DUT.

Suffix:
<hw> 1
Irrelevant

Return values:
<Status> READy | ISReading | COMPlete

Example: `READ:TDA:INP:EDID?`
Query
`COMP`
Response

Usage: Query only

Manual operation: See "DDC EDID" on page 371

READ<hw>[:SCALar]:TDA:LIST:INPut?

Queries the available channels for the current configuration (scope measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Channels> **T0PMinus**
Data 0+ and 0-

T0PGround
Data 0+ and GND

T0MGround
Data 0- and GND

T1PMinus
Data 1+ and 1-

T1PGround
Data 1+ and GND

T1MGround
Data 1- and GND

T2PMinus
Data 2+ and 2-

T2PGround
Data 2+ and GND

T2MGround
Data 2- and GND

Example: `READ:TDA:LIST:INP?`
Query
`T0PM, T0PG, T0MG, T1PM, T1PG, T1MG, T2PM, T2PG, T2MG`
Response

Usage: Query only

Manual operation: See "Channel (default favorite)" on page 373

READ<hw>[:SCALar]:TDA:SCOPe:CURSor:DIFFerence?

Queries the differences between the cursors (scope measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Time> Numeric value in the unit set by `UNIT<hw>:TDA:SCOPe:TIME` on page 1004.

<Voltage> Numeric value in the unit set by `UNIT<hw>:TDA:SCOPe:VOLTage` on page 1004.

<Frequency> Default unit: Hz

Example:
```
READ:TDA:SCOP:CURS:DIFF?
```
Query
```
9.000000E-001, 1.773000E+003, 6.600000E+009
```
Response

Usage: Query only

Manual operation: See "U_{C2-C1}" on page 374
See "t_{C2-C1}" on page 375
See "f_{C2-C1}" on page 375

READ<hw>[:SCALar]:TDA:SCOPe:HHIStogram?

Queries the values for the horizontal histogram (scope measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<(R-L)Mean> Mean value of the difference between the right histogram calculation and the left histogram calculation.
Default unit: UI

<(R-L)Min> Minimum value of the difference between the right histogram calculation and the left histogram calculation.
Default unit: UI

<(R-L)Max> Maximum value of the difference between the right histogram calculation and the left histogram calculation.
Default unit: UI

<LMean> Mean value of the left histogram.
Default unit: UI

<LMin> Minimum value of the left histogram.
Default unit: UI

<LMax> Maximum value of the left histogram.
Default unit: UI

<LStdDev> Standard deviation of the left histogram.
Default unit: UI

<RMean> Mean value of the right histogram.
Default unit: UI

<RMin> Minimum value of the right histogram.
Default unit: UI

<RMax> Maximum value of the right histogram.
Default unit: UI

<RStdDev> Standard deviation of the right histogram.
Default unit: UI

Example:
```
READ:TDA:SCOP:HHIS?
```
Query
```
2.510000E-001, -3.420000E-001, 8.580000E-001,
-1.940000E-001, -4.830000E-001, 1.170000E-001,
2.250000E-001, 5.700000E-002, -2.250000E-001,
3.750000E-001, 1.940000E-001
```
Response

Usage: Query only

Manual operation: See "Right - Left (H2 - H1)" on page 376
See "Left Histogram (H1), Right Histogram (H2)" on page 376

READ<hw>[:SCALar]:TDA:SCOPe:HHIStogram:VALues?

Queries the raw data of the horizontal histogram (scope measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Pos> Numeric value

<Width> Numeric value

<Data> Numeric value

Example:
`READ:TDA:SCOP:HHIS:VAL?`
Query
```
-6.000000E-001, 4.166667E-003, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 237, 674, 2081, 1915, 494,
29, 3, 0, 0, 0, 0, 22, 107, 217, 930, 2525,
1683, 211, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 10,
102, 254, 516, 1384, 1395, 229, 5, 0, 0, 0, 0,
0, 0, 29, 129, 230, 616, 1660, 1077, 158, 7, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 10, 112, 222, 694,
2268, 1971, 329, 10, 0, 0, 0, 0, 0, 0, 4, 74,
170, 416, 1473, 2349, 865, 60, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 5, 98, 248, 569, 1614, 1020, 161, 2,
0, 0, 0, 0, 0, 0, 0, 14, 105, 278, 454, 1415,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0
```
Response

Usage: Query only

Manual operation: See "Horizontal Histogram View" on page 376

READ<hw>[:SCALar]:TDA:SCOPe:MASK:VIOLation?

Queries the counts of mask violations (scope measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Upper> Numeric value

<Lower> Numeric value

<Inner> Numeric value

Example:
`READ:TDA:SCOP:MASK:VIOL?`
Query
`0,0,861`
Response

Usage: Query only

Manual operation: See "Violations" on page 375

READ<hw>[:SCALar]:TDA:SCOPe:PERSistence:COUNt?

Queries the number of the currently running scan (scope measurement).

Suffix:

<hw> 1
Irrelevant

Return values:

<Scan> Numeric value

Example: `READ:TDA:SCOPe:PERS:COUN?`
Query
3
Response

Usage: Query only

READ<hw>[:SCALar]:TDA:SCOPe:VHIStogram?

Queries the values for the horizontal histogram (scope measurement).

Suffix:

<hw> 1
Irrelevant

Return values:

<(U-L)Mean> Mean value of the difference between upper histogram calculation and lower histogram calculation.

<(U-L)Min> Minimum value of the difference between upper histogram calculation and lower histogram calculation.

<(U-L)Max> Maximum value of the difference between upper histogram calculation and lower histogram calculation.

<UMean> Mean value of the upper histogram.

<UMin> Minimum value of the upper histogram.

<UMax> Maximum value of the upper histogram.

<UStdDev> Standard deviation of the upper histogram.

<LMean> Mean value of the lower histogram.

<LMin> Minimum value of the lower histogram.

<LMax> Maximum value of the lower histogram.

<LStdDev> Standard deviation of the lower histogram.

Example:
```
READ:TDA:SCOP:VHIS?
```
Query
```
9.150000E+002, 5.080000E+002, 1.101400E+003,
4.470000E+002, 2.500000E+002, 5.234000E+002,
5.290000E+001, -4.680000E+002, -5.780000E+002,
-2.578000E+002, 6.240000E+001
```
Response

Usage: Query only

Manual operation: See "Upper - Lower" on page 377
See "Upper Histogram, Lower Histogram" on page 378

READ<hw>[:SCALar]:TDA:SCOPe:VHIStogram:VALues?

Queries the raw data of the vertical histogram (scope measurement).

Suffix:
<hw> 1
Irrelevant

Return values:
<Pos> Numeric value

<Width> Numeric value

<Data> Numeric value

Example:
```
READ:TDA:SCOP:VHIS:VAL?
```
Query
```
-1.000000E+000, 7.843137E-003, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 52, 1277, 2907, 3836, 3995, 3767, 2256,
4684, 5073, 1489, 421, 3154, 5157, 7599, 13132,
8944, 7551, 2007, 323, 723, 1023, 810, 1002,
1289, 1562, 1336, 3165, 2189, 2124, 1982, 1176,
797, 413, 483, 344, 376, 219, 78, 48, 5, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
2, 10, 26, 43, 61, 81, 132, 205, 379, 878,
1509, 2180, 2272, 2222, 2088, 1378, 2425, 1204,
993, 666, 335, 513, 1751, 5837, 4359, 7584,
7625, 7080, 8908, 6277, 3509, 8462, 7279, 9035,
504, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
```
Response

Usage: Query only

Manual operation: See "Vertical Histogram View" on page 377

READ<hw>[:SCALar]:TDA:SIGNal:STATe?

Queries if the TMDS time domain analyzer module (R&S VT-B2380) was able to synchronize to the detected HDMI or MHL input clock.

Suffix:
<hw> 1
Irrelevant

Return values:
<InputClock> LOCKed | UNLocked

Example: `READ:TDA:SIGN:STAT?`
Query
`LOCK`
Response

Usage: Query only

14.9.7 ROUTe Subsystem

ROUTe<hw>:TDA:MODule:CATalog?

Queries whether a TDA module is available and its slot position.

Suffix:
<hw> 1
Irrelevant

Return values:
<Module> "<TDA> [<module slot>]"
with [<module slot>] see Chapter 14.1.1, "Addressing Module Slots", on page 489

Example: `ROUT:TDA:MOD:CAT?`
Query
`"TDA [L2]"`
Response

Usage: Query only

ROUTe<hw>:TDA:REConnect

Forces the DUT to reread the EDID.

Suffix:
<hw> 1
Irrelevant

Example: `ROUT:TDA:REC`

Usage: Event

Manual operation: See "Reconnect button" on page 371

ROUTe<hw>:TDA:SCOPe:HDMI:CHANnel:SELect <Channel>

Sets the channel (scope measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Channel> T0PMinus | T0PGround | T0MGround | T1PMinus | T1PGround | T1MGround | T2PMinus | T2PGround | T2MGround

See `READ<hw>[:SCALar]:TDA:LIST:INPut?` on page 996.

*RST: T0PM

Example: `ROUT:TDA:SCOP:HDMI:CHAN:SEL T1PM`

Manual operation: See "Channel (default favorite)" on page 373

14.9.8 SENSe Subsystem

SENSe<hw>[:SCALar]:TDA:INPut:PROBe?

Queries the probe type connected to the TMDS time domain analyzer module (R&S VT-B2380).

Suffix:
<hw> 1
Irrelevant

Return values:
<Type> Module name

Example: `SENS:TDA:INP:PROB?`
Query
`"VT-Z2385", 101450, 5.0`
Response

Usage: Query only

14.9.9 UNIT Subsystem

UNIT<hw>:TDA:SCOPe:TIME <Unit>

Sets the unit for the time settings (scope measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Unit> UI | NS | PS
*RST: UI

Example: `UNIT:TDA:SCOP:TIME NS`

Manual operation: See "Time" on page 379

UNIT<hw>:TDA:SCOPe:VOLTage <Unit>

Sets the unit for the voltage settings (scope measurement).

Suffix:
<hw> 1
Irrelevant

Parameters:
<Unit> V | MV | PCT
*RST: MV

Example: `UNIT:TDA:SCOP:VOLT V`

Manual operation: See "Voltage" on page 379

14.10 MHL Applications

These commands correlate to the functions provided in:

- Chapter 12.1, "MHL Generator Application", on page 411
- Chapter 12.2, "MHL Analyzer Application", on page 445

For information on the available commands see these chapters.

15 Installed Software

The firmware and the operating system are already installed on the R&S VTE.

Further information:

- Performing a firmware update: see the release notes.
- Installing software options
  See the installation instructions for options or Chapter 6.3.2, "Installing License Keys", on page 102.

15.1 Operating System

The R&S VTE is equipped with the Windows 7 Embedded operating system in the 32-bit version. When the R&S VTE is delivered, the operating system is configured for optimum operation. Changes to the system settings are required only if you install peripherals such as a keyboard and printer or if you configure the network and the settings do not conform to the default settings.

To prevent malfunctions and to avoid instrument repair, only install service packs approved by Rohde & Schwarz. In particular, do not use service packs for other Windows 7 editions.

15.1.1 Login

Windows 7 requires that you identify yourself by entering a user name and password in a login window. The R&S VTE provides a factory–installed auto login function, i.e. login is carried out automatically in the background. The ID used for auto login has administrator rights.

User name and password are factory-set as follows.

- User name = *instrument*
- Password: A label on the casing of the R&S VTE indicates the default password. If there is no such label, the default password is *894129*.

If the R&S VTE is connected to a network and if the login data under Windows 7 and on the network is identical, you log on to operating system and the network at the same time.

15.1.2 Windows 7 Start Menu

The Windows 7 Start menu provides access to the Windows 7 functionality and the installed programs. Under "Control Panel", the system settings are grouped. For details, see the Windows 7 documentation.

To open the Start menu

► In the toolbar, tap .

15.1.3 Using the Windows Server Update Services (WSUS)

Windows provides a scenario in which system administrators set up a server running Windows Server Update Services (WSUS) inside the corporate firewall, which synchronizes content directly with Microsoft® Update and distributes updates to client computers and instruments.

Your company can use Windows Server Update Services (WSUS) to deploy updates. Contact your local system administrator or IT-department for information about your company's update strategy.

15.2 Additional Software

The instrument is equipped with the Windows 7 operating system. Additional software can therefore be installed on the instrument. The use and installation of additional software can impair instrument function. Thus, run only programs that Rohde & Schwarz has tested for compatibility with the instrument software.

The drivers and programs used on the instrument under Windows 7 have been adapted to the instrument. Modify existing instrument software only by using update software released by Rohde & Schwarz.

15.3 Backup and Restore Application

Using the backup and restore application, you can back up the instrument installations and their configuration so that they can be restored if necessary. When restoring, you can choose between various states.

- Factory default state
  If, for example, the system crashes, you can restore the factory default state.
- Intermediate states that you have saved
  For example, you can back up the current system partition before a firmware update or provide different system configurations for different environments.

In the restore process, the system partition is deleted, formatted and written newly. The data partition is not affected.

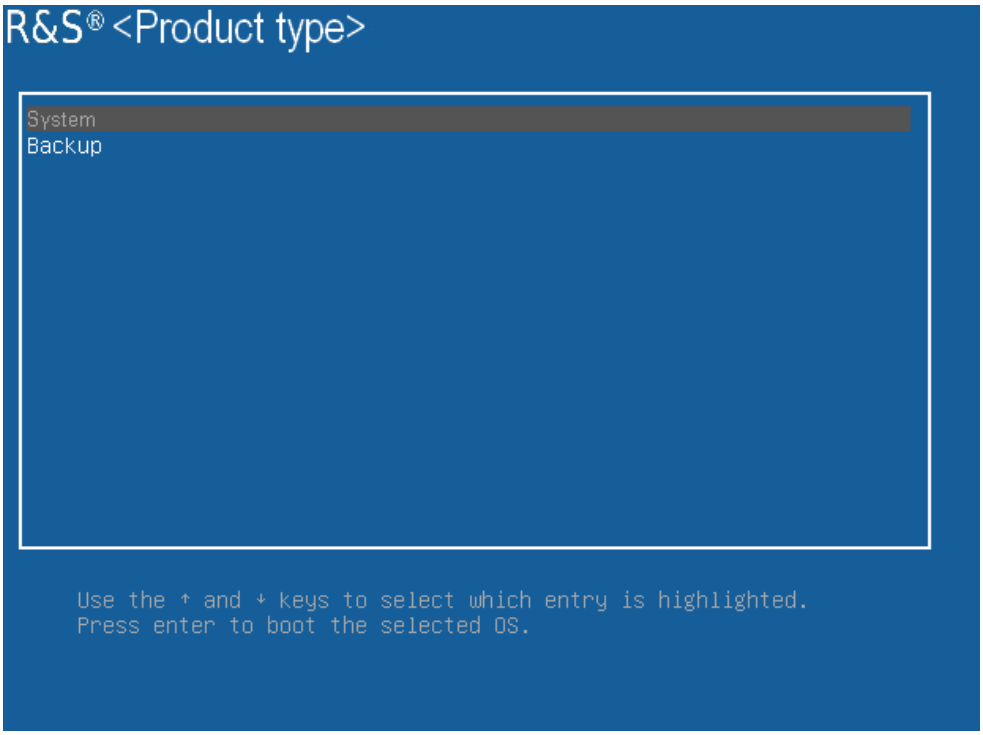
Connect an external keyboard.
If the instrument does not have a monitor, connect also an external monitor.

To display the main dialog for backup and restore

1. Restart the R&S VTE.

The boot screen is displayed. By default, "System" is selected. If you do not perform the next step within 4 seconds, the dialog vanishes and the booting process continues.

2. Select the "Backup" partition and press [ENTER].



The main dialog is displayed. It provides access to all functions of the backup and restore application.

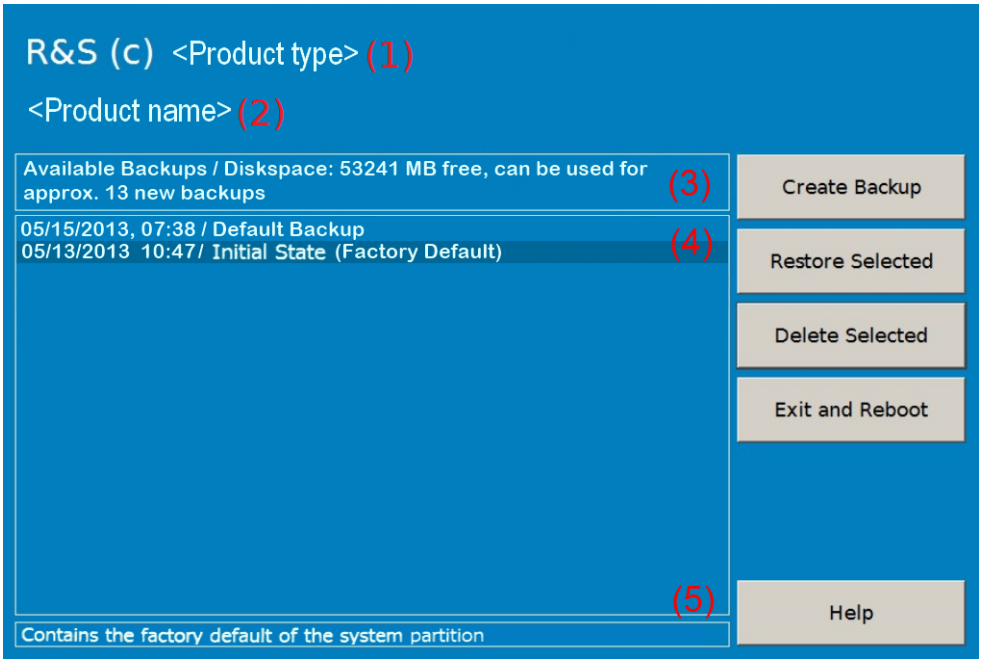


Figure 15-1: Main dialog (example)

(1) = Header showing instrument type
(2) = Header showing instrument name
(3) = Free memory space on backup partition
(4) = List of backups already created
(5) = Description of currently selected backup

To continue, see one of the following chapters:

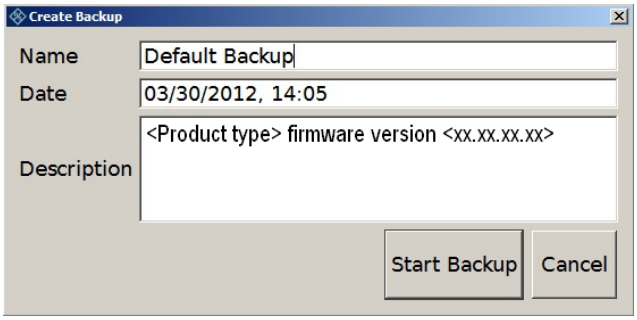
- Chapter 15.3.1, "Creating a Backup", on page 1008
- Chapter 15.3.2, "Restoring a Selected Backup Version", on page 1009
- Chapter 15.3.3, "Deleting a Backup", on page 1010

15.3.1 Creating a Backup

Using this function, you can create a backup of the current instrument installation and its configuration.

1. In the main dialog (see Figure 15-1), select "Create Backup".

   The "Create Backup" dialog is displayed. Under "Description", the current version of the firmware is displayed.



2. Enter a name for the backup and the date. If necessary, you can add information to the description.
3. Select "Start Backup".

   During the backup process, a progress information dialog is displayed. You can terminate at any time ("Cancel").

   After the process has been finished, the dialog is closed automatically, and the main dialog is displayed again.

   Note: If you activate "Keep open when finished", the progress information dialog remains open until you close it.
4. In the main dialog, select "Exit and Reboot".

   The backup and restore application is closed, and the R&S VTE is restarted.

15.3.2 Restoring a Selected Backup Version

Using this function, you can restore the selected instrument installation and its configuration.

Malware protection

When restoring a backup, the Windows operating system and installed anti-malware software are probably outdated. To minimize the risk of malware threats after restoring a backup, verify and adjust the "Windows Update" settings. Follow the recommendations from Rohde & Schwarz applicable to your instrument. Also, install all Windows security updates that have been published in the meanwhile.

1. In the main dialog (see Figure 15-1), select the backup you want to restore.
2. Select "Restore Selected".
3. In the "Restore Selected" dialog, select "Yes".

   During the restoring process, a progress information dialog is displayed. You can terminate at any time ("Cancel").

   After the process has been finished, the application is closed automatically, and the R&S VTE is restarted.

Note: If you activate "Keep open when finished", the progress information dialog remains open until you close it.

15.3.3 Deleting a Backup

Using this function, you can delete the selected instrument installation and its configuration.

To provide space for new backups, you can remove older backups. The factory default cannot be deleted.

1. In the main dialog (see Figure 15-1), select the backup you want to delete.
2. Select "Delete Selected".
3. In the "Delete Selected" dialog, select "Yes".

   Note: You are not authorized to delete a factory default backup. If you have selected one, an error message is displayed and the backup is not deleted.
4. In the main dialog, select "Exit and Reboot", or continue with Chapter 15.3.1, "Creating a Backup", on page 1008.

16 Troubleshooting

This chapter gives information on issues, errors and warnings of the R&S VTE.

If you need to transport or ship the product, see Chapter 17, "Transporting", on page 1018.

16.1 Issues

Known issues are listed in the release notes of your firmware version. The release notes are delivered with the firmware, or you can download them from the Rohde & Schwarz home page.

16.2 Device-Specific Errors Messages

If an error occurs, a dialog is displayed containing information about the error and what to do to eliminate it. Follow the instructions to ensure correct operation of the R&S VTE. Some errors must be eliminated before continuing operation.

In the title bar, 3 error messages are displayed. A complete list of all error messages is provided in the "Error Details" dialog.

To open the "Error Details" dialog

► In the title bar, tap next to the error messages.

The table contains the following information:

- "Lev" column
  Severity of the error
- "SCPI" column
  Number of the SCPI error
- "Error Text" column
  Error message displayed in the title bar

If you select an error, in the pane below the table, more detailed information and instructions how to eliminate the error are displayed.

16.3 SCPI Error Messages

During remote control, error messages are entered in the error/event queue of the status reporting system.

To query the error/event queue

► Send the `SYSTem:ERRor:ALL?` command.

If the error queue is empty, 0 ("no error") is returned. Otherwise, all errors/events are listed that have occurred since the last query. See `SYSTem:ERRor:ALL?` on page 517.

All SCPI instruments use the same SCPI error messages. The messages are assigned negative numbers. The following list contains the messages used by the R&S VTE, ordered by number (descending). For each message, an explanation is given. If you need information on SCPI syntax rules, see Chapter 13.2, "SCPI Command Syntax", on page 470.

In the `ESR` register, the bit corresponding to the error type is set. See Chapter 13.3.3.3, "Event Status Register (ESR) and Event Status Enable Register (ESE)", on page 482.

[0] No error
The error queue does not contain entries.

[-100] Command error
Generic error message; a more specific error cannot be detected. Command error.

[-101] Invalid character
The command contains an invalid sign. Command error.

Example: A header contains an ampersand, e.g. `SOURce&`.

[-102] Syntax error
The command is invalid. Command error.

Example: The command contains block data the R&S VTE does not accept.

[-103] Invalid separator
The command contains an impermissible sign instead of a separator. Command error.

Example: A semicolon is missing after the first command in a command line with several commands.

[-104] Data type error
The command contains an invalid value indication. Command error.

Example: ON is indicated instead of a numeric value for frequency setting.

[-105] GET not allowed
A group execute trigger (GET) is within a command line. Command error.

Note: A group execute trigger (GET) is only allowed at the end of a command line or in a separate command line.

[-108] Parameter not allowed
The command contains too many parameters. Command error.

[-109] Missing parameter
The command does not contain the required parameters. Command error.

Example: Command requires the indication of a parameter.

[-112] Program mnemonic too long
The header contains more than 12 characters. Command error.

[-113] Undefined header
The command header has not been defined. Command error.

[-114] Header suffix out of range
The command contains an illegal numeric suffix. Command error.

Example: `SOURce22` is not defined for the R&S VTE.

[-123] Exponent too large
The magnitude of the exponent is too large. Command error.

[-124] Too many digits
The decimal numeric data element contains too many digits. Command error.

[-128] Numeric data not allowed
The command contains a numeric data element the device does not accept in this position. Command error.

[-131] Invalid suffix
The suffix is not appropriate for this command. Command error.

Example: The used unit is not defined for this command.

[-134] Suffix too long
The suffix contains more than 12 characters. Command error.

[-138] Suffix not allowed
A suffix is not allowed for this command or at this point of the command. Command error.

[-144] Character data too long
The character data element contains more than 12 characters. Command error.

[-148] Character data not allowed
The character data is prohibited for this command or at this point of the command. Command error.

Example: Command requires a numeric parameter.

[-158] String data not allowed
The command contains a legal string data element that is not allowed at this point. Command error.

Example: A text parameter is set in quotation marks.

[-168] Block data not allowed
The command contains legal block data which is not allowed at this point. Command error.

Example: Command requires a numeric parameter.

[-178] Expression data not allowed
The command contains a mathematical expression at an impermissible position. Command error.

[-161] Invalid block data
The command contains illegal block data. Command error.

Example: An END message was received before the expected number of data had been received or no numeric data element is sent after the introductory #.

[-203] Command protected
The desired command could not be executed as it was protected by a password. Execution error.

[-221] Settings conflict ...
There is a setting conflict between the two parameters indicated after the semicolon. One of the given values has to be corrected to obtain a valid output signal. Execution error.

[-222] Data out of range
A value of the transmitted command was outside the legal range. Execution error.

Example: Command only permits entries in the range of minimum to maximum frequency.

[-223] Too much data
The host sent more data than the signal generator can handle. Execution error.

[-224] Illegal parameter value
The parameter value is invalid. Execution error.

[-225] Out of memory
The storage space available in the R&S VTE is exhausted. Execution error.

[-226] Lists not same length
The parts of a list have different lengths. This error message is also displayed if only part of a list has been transmitted via remote control. All parts of the list have to be transmitted always before it is executed. Execution error.

[-240] Hardware error
A legal program command or a query could not be executed because of a hardware problem in the device. Execution error.

[-241] Hardware missing
A legal program command or a query could not be executed because of a missing device hardware. Execution error.

[-300] Device-specific error
Device-specific error not defined in greater detail. Device-specific error.

[-310] System error
This error message suggests an error within the R&S VTE. Please inform the Rohde & Schwarz service. Device-specific error.

[-330] Self test failed ...
An error was detected in the self test named after the semicolon. An error-free operation of the module concerned is no longer ensured. Device-specific error.

[-350] Queue overflow
This error code is entered into the queue instead of the actual error code if the queue is full. It indicates that an error has occurred but not been recorded in the queue. The original error message is lost. Device-specific error.

Clear the queue by reading out the error messages, e.g. by using `SYSTem:ERRor:ALL?` on page 517.

[-420] Query unterminated
This query is missing or incomplete. Query error.

Example: The R&S VTE is addressed as a talker and receives incomplete data.

[-410] Query interrupted
This query has been interrupted. Query error.

Example: After a query, the R&S VTE receives new data before the response has been sent completely.

[-430] Query deadlocked
This query cannot be processed. Query error.

Example: The input and output buffers are full, the R&S VTE cannot be operated.

16.4 Contacting Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:

Figure 16-1: QR code to the Rohde & Schwarz support page

17 Transporting

Lifting and carrying

See:

- "Lifting and carrying the product" on page 16 (safety instructions)
- Chapter 4.1.1, "Lifting and Carrying", on page 54

Packing

Use the original packaging material. It consists of antistatic wrap for electrostatic protection and packing material designed for the product.

If you do not have the original packaging, use similar materials that provide the same level of protection.

Securing

When moving the product in a vehicle or using transporting equipment, make sure that the product is properly secured. Only use items intended for securing objects.

Transport altitude

Unless otherwise specified in the data sheet, the maximum transport altitude without pressure compensation is 4500 m above sea level.

18 Maintenance, Storage and Disposal

The product does not require regular maintenance. It only requires occasional cleaning. It is however advisable to check the nominal data from time to time.

18.1 Cleaning

How to clean the product is described in "Cleaning the product" on page 18.

Do not use any liquids for cleaning. Cleaning agents, solvents (thinners, acetone), acids and bases can damage the front panel labeling, plastic parts and display.

18.2 Changing Fuses

If the product does not start, it is possible that a blown fuse is the cause. The fuses are located in the socket of the power supply.

1. **WARNING!** The fuse is part of the main power supply. Handling the fuse while the power is on can lead to electric shock.

   Before changing the fuse:

   a) Shut down the product.
   b) Set the switch on the power supply to position [0].
   c) Disconnect the product from the power source.

2. Open the lid of the use holder.
3. Lift the fuse holder out of its slot.
4. Check the condition of the fuses.
5. Replace the blown fuse.

   Only use a fuse of the specified type. The fuse type and its characteristics are indicated next to the power supply socket.

6. Put the fuse holder back in its slot.
7. Close the lid of the use holder.

18.3 Storage

Protect the product against dust. Ensure that the environmental conditions, e.g. temperature range and climatic load, meet the values specified in the data sheet.

18.4 Disposal

Rohde & Schwarz is committed to making careful, ecologically sound use of natural resources and minimizing the environmental footprint of our products. Help us by disposing of waste in a way that causes minimum environmental impact.

Electrical and electronic equipment

A product that is labeled as follows cannot be disposed of in normal household waste after it has come to the end of its service life. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.

Figure 18-1: Labeling in line with EN 50419

Rohde & Schwarz has developed a disposal concept for the eco-friendly disposal or recycling of waste material. As a manufacturer, Rohde & Schwarz completely fulfills its obligation to take back and dispose of electrical and electronic waste. Contact your local service representative to dispose of the product.

List of Commands