R&S®AdVISE
Visual Inspection Software
User Manual

ROHDE & SCHWARZ

Make ideas real

This document describes the R&S®AdVISE visual inspection software (order no. 1434.6518.02), software version **V6.00** and later, with the following options:

- R&S®ADV-K1032, Extension to 32 ROIs (order no. 1434.6524.02)
- R&S®ADV-K1050, Virtual Camera (order no. 1434.6530.02)
- R&S®ADV-K1060, OCR ROI (order no. 1434.6601.02)
- R&S®ADV-K1062, Audio Monitoring (order no. 1434.6618.02)
- R&S®ADV-K1070, Image Tracking (order no. 1434.6560.02)
- R&S®ADV-K1080, Auto Detection Assistant (order no. 1434.6576.02)

The software contained in this product uses several valuable open source software packages. For information, see the "Open Source Acknowledgment" document, which is available for download from the R&S AdVISE product page at "www.rohde-schwarz.com/product/advise" > "Software".

Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

Contents

1 Welcome

1.1 Documentation overview

This section provides an overview of the R&S AdVISE user documentation. Unless specified otherwise, you find the documents at:

www.rohde-schwarz.com/manual/advise

Further documents are available at:

www.rohde-schwarz.com/product/advise

1.1.1 User manuals and help

The user documentation is available as manual in online format `HTML` and in download format `PDF`. The document provides explanations, step-by-step procedures, figures and examples to support you during your first experience with the software, from installation and configuration to the various visual inspection measurements.

- The user manual is available at www.rohde-schwarz.com/manual/advise
- The R&S AdVISE installer also saves the user manual in `PDF` format on your computer in the following directory:
  `C:\Program Files\Rohde-Schwarz\ADVISE\x.xx.xx\Documentation`

1.1.2 Tutorials

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

1.1.3 Videos

Find various videos on R&S AdVISE, Rohde & Schwarz products and test and measurement topics on YouTube: www.youtube.com/@RohdeundSchwarz

1.1.4 Specifications and product brochures

The specifications document, also called data sheet, contains the technical specifications of the software. The brochure provides an overview of the software and deals with its specific characteristics.

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

1.1.5 Release notes and open-source acknowledgment (OSA)

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

The software uses several valuable open source software packages. An open source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/software/advise

1.1.6 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/advise

1.2 Product licensing

A smart card reader and a smart card with license keys are required for executing the R&S AdVISE software. However, you can install the software without a license.

The following table gives an overview of all R&S AdVISE options described in this manual.

Table 1-1: Licenses

License dongle	Name	Description	Remarks
R&S ADVISE-PC license dongle (1434.6660.02) including smart card and USB smart-card reader for the following licenses:	R&S AdVISE-SW	R&S AdVISE visual inspection software	Mandatory
	R&S ADV-K1032	Extension to 32 ROIs	Optional
	R&S ADV-K1050	Extension to virtual camera	Optional
	R&S ADV-K1060	Extension to OCR ROI	Optional
	R&S ADV-K1062	Extension to audio monitoring	Optional
	R&S ADV-K1070	Extension to image tracking	Optional
	R&S ADV-K1080	Extension to auto detection	Optional

1.3 Conventions used in the documentation

The following conventions are used throughout the document:

1.3.1 Typographical conventions

The following text markers are used throughout this documentation:

Convention	Description
"Graphical user interface elements"	All names of graphical user interface elements on the screen, such as dialog boxes, menus, options, buttons, and softkeys are enclosed by quotation marks.
[Keys]	Key names are enclosed by square brackets.
`Filenames, commands, program code`	Filenames, commands, coding samples and screen output are distinguished by their font.
Input	Input to be entered by you is displayed in italics.
Links	Links that you can click are displayed in blue font.
"References"	References to other parts of the documentation are enclosed by quotation marks.

1.3.2 Conventions for procedure descriptions

When describing how to operate the software, several alternative methods can be available to perform the same task. The procedure using a conventional display, mouse and keyboard is described, where available. Any elements that can be activated by clicking can also be touched in a touchscreen. An alternative procedure, for example, using an on-screen keyboard, is described only if it deviates from the standard operating procedure.

The term "select" can refer to any of the described methods. For example, can refer to using a finger on the touchscreen, a mouse pointer in the display, or a key on a keyboard.

1.3.3 Notes on screenshots

When describing the functions of the product, we use sample screenshots. These screenshots are meant to illustrate as many as possible of the provided functions and possible interdependencies between parameters. The shown values may not represent realistic usage scenarios.

The screenshots usually show a fully equipped product, that is: with all options installed. Thus, some functions shown in the screenshots may not be available in your particular product configuration.

2 System overview

R&S AdVISE is a video-based advisory system for applications that require automated monitoring and event detection in video streams. It can automate the visual detection of failures of devices under test (DUTs). Typical applications include:

- Usage as an adjunct system in EMC test environments, supporting R&S ELEKTRA or similar EMC software to provide high levels of automation
- Usage as a standalone tool for video analysis during non-EMC testing, where it can operate independent of a control system

R&S AdVISE is all the following:

- An observer to augment or replace humans in the visual analysis and sound monitoring of DUTs for detection of failures
- A tool to convert changes in media streams automatically into events, which can be filtered by user-defined rules
- A monitoring device that provides pass/fail information to EMC software
- A video player that can play back recorded video with captured sound
- A video editor that allows taking snapshots from individual frames or video clips
- An indexed video player that can skip forward or backward to detected events
- Flexible software, compatible with various video inputs and EMC systems

To perform automated visual and sound analysis, R&S AdVISE compares each video frame against a reference frame for changes in specified areas. You can define these regions of interest (ROIs) during test configuration and store the ROIs in a database. Also, the software captures sound emanating from the DUT and enables manual analysis to find abnormalities. It analyzes data in real time at rates up to 30 frames per second to detect even transitory events that a human observer can miss.
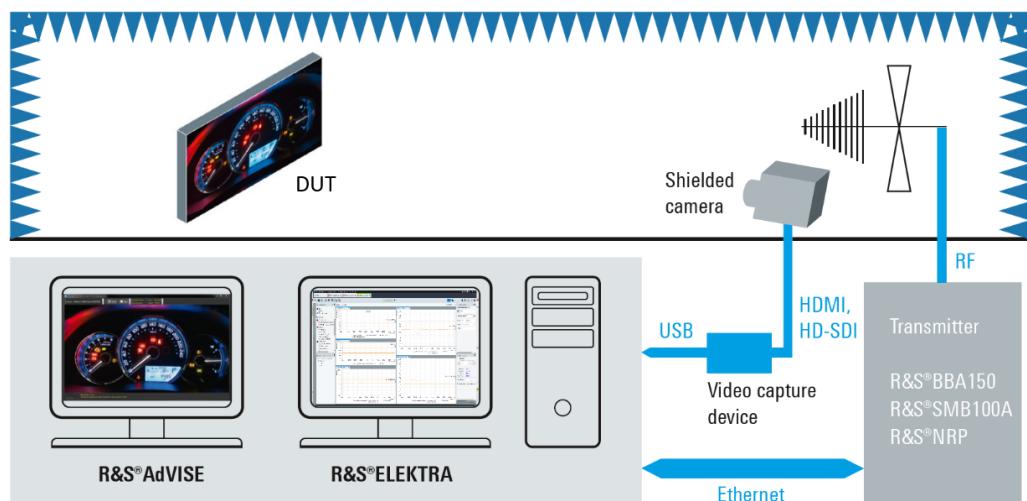

Figure 2-1: Typical hardware setup for EMC testing

Top = DUT in a shielded chamber under RF irradiation from the antenna, observed by a shielded camera
Below = Test software and instruments in the control room

3 Software installation

This chapter contains information on how to install R&S AdVISE, downloaded from www.rohde-schwarz.com/software/advise.

When the System requirements are provided, R&S AdVISE can be installed. Follow the procedure described in Chapter 3.2, "Software installation procedure", on page 11. A wizard in the setup file `AdVISE_Setup_x.x.x.xx.exe` guides the installation.

3.1 System requirements

Before installing R&S AdVISE, ensure that the computer meets the following minimum system requirements:

● CPU with support of hyper-threading technology

  – 8 core, if you use R&S AdVISE for up to 16 ROIs

  – 16 core, if you use option R&S ADV-K1032 (extension to 32 ROIs)

● Minimum base frequency 3 GHz

● Memory: 16 Gbyte RAM

● Storage: 250 Gbyte solid-state disk (SSD)

● Monitor resolution: 1920 x 1080 pixel

● Operating system: Windows 10, 64 bit

● USB interface: USB 3.0

● 100 Mbit LAN interface, 1 Gbit LAN (recommended)

Avoid additional CPU workload from other applications

To avoid interference with other software, we recommend not to run any applications simultaneously that can cause heavy workload, even in the background. For example, do not use any videoconferencing programs, and disable virus scanning and automatic updates.

3.2 Software installation procedure

To install the software on a local computer or in a network

1. Terminate other active programs (recommended).

If any **other instances of R&S AdVISE** are active, be sure to **terminate** them.

2. In your browser, navigate to www.rohde-schwarz.com/software/advise.

3. Download the R&S AdVISE setup file.

4. Navigate to your download directory.

5. Right-click `AdVISE_Setup_x.x.x.xx.exe`.

6. Wait for the R&S AdVISE installation wizard to launch.

7. The wizard automatically checks the installation prerequisites:
   - Microsoft .NET Framework 4.8
   - Visual C++ 2010 SP1 Redistributable x64
   - Visual C++ 2012 Redistributable x64
   - Visual C++ 2019 Redistributable x64
   - R&S License Server
   - R&S Smart Card Minidriver
   - R&S VISA
   - VISA Shared Components

   If any of these programs in the required versions are missing on the computer, the wizard installs them in a background process.
   Depending on the installation environment, the wizard can bring up additional messages. In this case, proceed as indicated.

8. The installation wizard brings up the following dialog:
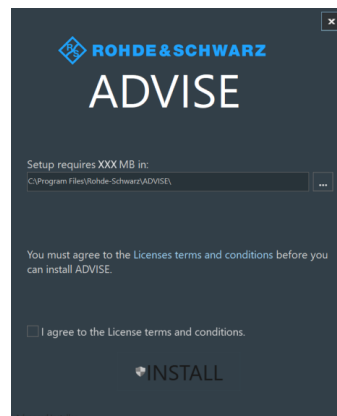
   To continue the installation, the software expects you to agree to the license terms and conditions.
   If you know the content and agree with it, activate the checkbox, click "INSTALL" and proceed with step 11.

9. Otherwise click the link for "Licenses terms and conditions" to read them.

   The following "End User License Agreement" (EULA) comes up:
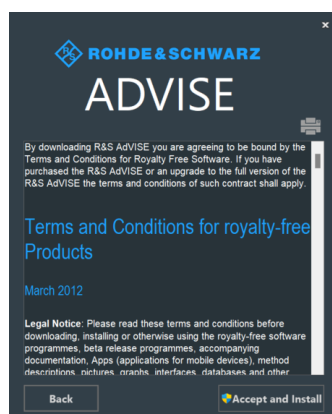
If you wish to print the license text, click the printer icon on top of the text.

10. To continue the installation, select "Accept and Install".

11. Wait while the wizard executes the installation of R&S AdVISE:
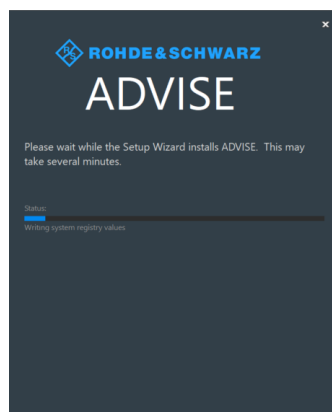
12. In the final setup dialog, select how to complete the installation:
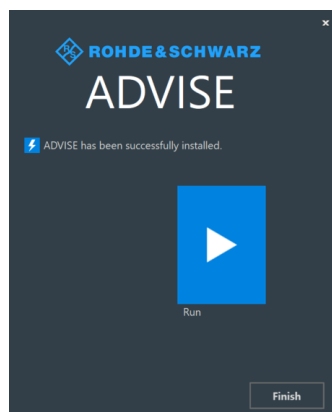
Select one of the following actions:
● "Run" the software.
● "Finish" the installation.

When the Software installation is completed, double-click the new desktop icon to start R&S AdVISE:

R&S®AdVISE
Visual Inspection Software

Starting...

3.3 License dongle

R&S AdVISE is protected by encryption. You can start the software with licenses installed only, if the **"R&S ADVISE-PC" license dongle** is connected to the computer. This dongle is a mini smart-card reader within a USB flash drive that contains a license smart card. It unlocks the licenses that have been activated for your R&S AdVISE serial number.

If your computer has a smart card reader slot, you can directly insert the license smart card into this slot, without using the dongle, as described in Chapter 3.3.1, "Using the smart card reader", on page 15.

To start R&S AdVISE with your set of licenses, connect the license dongle to a USB port of your computer.

If you start R&S AdVISE without the license dongle connected, the following dialog comes up:
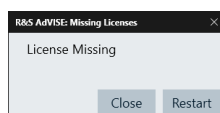
Figure 3-1: Popup message if there is a missing license dongle

In this dialog, you can select how to proceed:

- **"Close"**: Shut down the software.
- **"Restart"**: Using this button is the easiest procedure, if you have not yet connected the license dongle, but the dialog just reminded you of doing it now.
  Insert the license dongle to a USB port of your computer, then click "Restart". The software shuts down and automatically restarts.
  With the license dongle connected, the software starts with the licenses available on the dongle, see Figure 10-2.

3.3.1 Using the smart card reader

The R&S AdVISE software requires a smart card containing the software license to be connected to the PC when you are using the software. The R&S ADVISE-PC license dongle that contains the software license consists of a smart card and a USB dongle. The smart card can be used in the supplied USB dongle or in a smart card reader. The R&S ADVISE-PC license dongle is available as a separate product and *must be ordered in addition to the software*.

You can connect the smart card in two ways.

- Connect the smart card in mini-sim format.
  To connect the smart card in mini-sim format, use the USB smart card reader (dongle) provided with the smart card.
- Connect the smart card in its full size.
  To connect the full-size smart card, an interface compatible to the card format is required.

  The following devices are able to read the full-size smart card.

  – Smart card reader integrated in a keyboard, notebook, or in a desktop PC (e.g. OMNIKEY)
  – Smart card reader connected to the computer via serial bus or USB (e.g. OMNIKEY)
  – USB reader connected to a LAN-to-USB converter to distribute the license via the network (e.g DIGI AnywhereUSB/2)

ⓘ **Licensing support**
If you have any difficulties with the licensing system, support is only assured if you use the R&S ADVISE-PC license dongle.

Using the R&S ADVISE-PC USB smart card reader (dongle)

The R&S ADVISE-PC license dongle consists of a full-size smart card and a USB smart card reader (dongle).

1. Break out the smart card in mini-sim format.

2. With the label of the USB dongle facing upwards, insert the smart card with the chip facing downwards, and the angled corner facing away from the USB dongle.

3. Insert the smart card as far as possible.

The smart card reader is ready for operation with any USB interface.

Drivers

When you connect the reader to the computer, MS Windows automatically installs the necessary drivers. No manual driver installation is required. For further information, refer to the manufacturer's website at https://www.hidglobal.com/de/products/omni-key-6121-mobile-smart-card-reader.

3.4 Modify, repair or remove installation

If R&S AdVISE is already installed, rerunning `AdVISE_Setup_x.x.x.xx.exe` for the same software version does not overwrite the installation, but calls up a wizard to modify, repair or remove it:
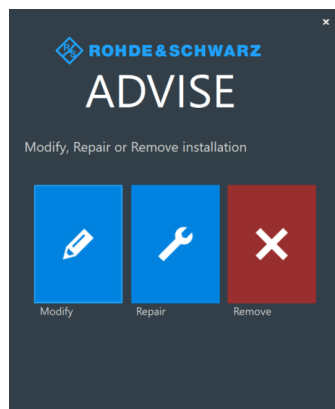
- **"Modify"** brings up a dialog for custom selection of desired components to be installed:

  To execute the installation of custom selected components, click "Modify".

- **"Repair"** brings up a dialog for running an installation repair routine:
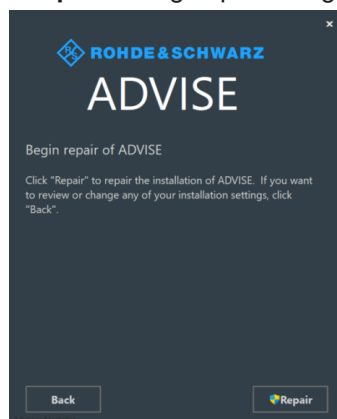
  To execute the repair procedure, click "Repair".

- **"Remove"** brings up a dialog for removing R&S AdVISE from the computer:
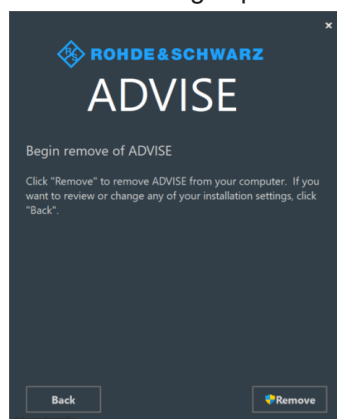
  To execute the removal procedure, click "Remove".

4 Getting started

This chapter guides through the basic steps of using the software.

4.1 Starting R&S AdVISE

To start the R&S AdVISE system, double-click the following icon on the Windows desktop:
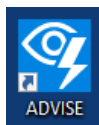
The R&S AdVISE main window opens.
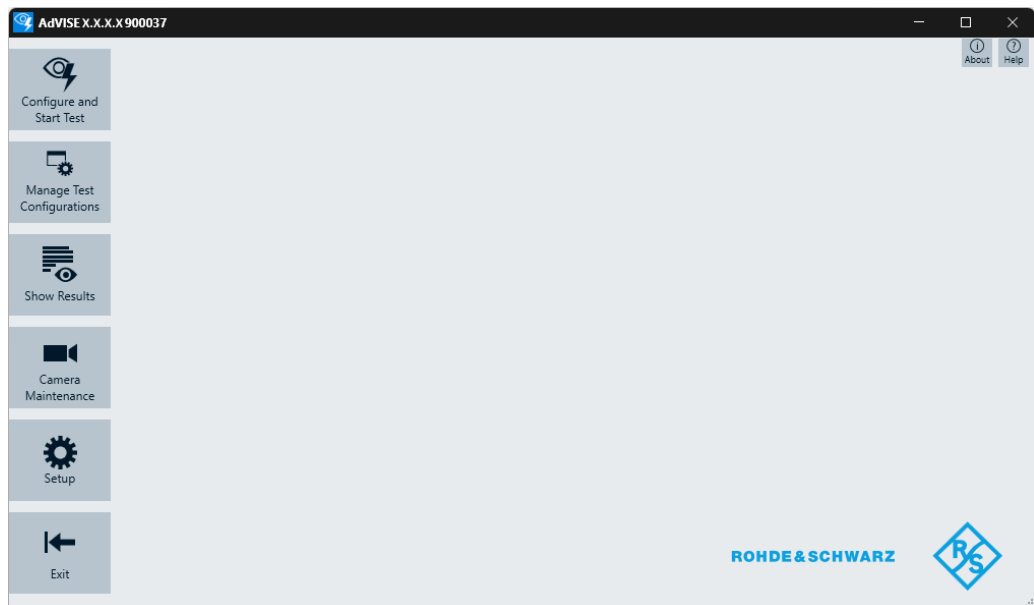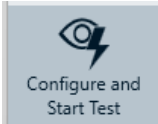
Figure 4-1: R&S AdVISE main window

The main window provides direct access to all the software components:

●

"Configure and Start Test":
Allows configuring the following testing modes.

– "Virtual Cam": Runs tests with a virtual camera.

– "Local": Runs standalone tests with a physical camera.
– "Remote": Runs remotely controlled tests with a physical camera. Hence, external software takes control of the tests via a remote interface.

See also Chapter 5.4, "Configure and Start Test", on page 34.

●
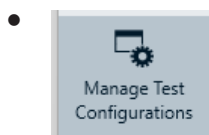
"Manage Test Configurations":
Allows creating, copying, editing or deleting tests.
See also Chapter 5.3, "Manage Test Configurations", on page 32.

●
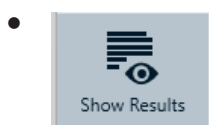
"Show Results":
Displays test reports and recorded videos. You can also delete a test run.
See also Chapter 5.5, "Show Results", on page 44.

●
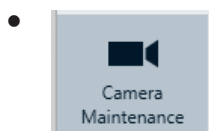
"Camera Maintenance":
Displays the camera feed to check if the correct camera is selected and working.
See also Chapter 5.2, "Camera Maintenance", on page 31.

●
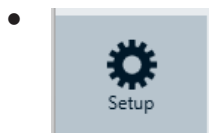
"Setup":
Allows setting up system options such as camera settings, EMC system, working directory, and more.
See also Chapter 5.1, "Setup", on page 21.

●

"Exit":
Closes the main window.

●

"About":
Provides information such as software version and device ID.

-
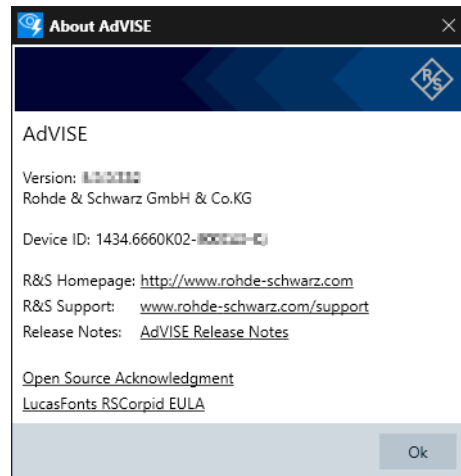
    "Help": Opens the R&S AdVISE user manual.

4.2 Setting up the R&S AdVISE system
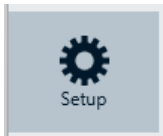
Before running a test, configure the setup of the R&S AdVISE system.

1. Click the "Setup" icon in the main window.

    The "AdVISE System Options" window appears.
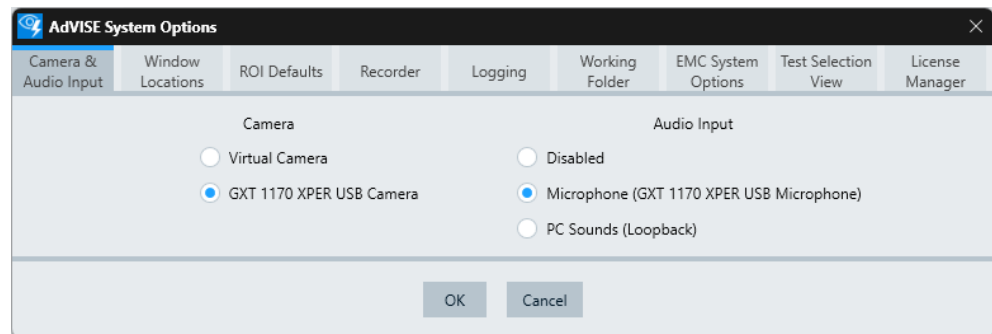
Figure 4-2: System options dialog, here for camera & audio input options

2. Select a connected camera and optionally an audio input device.

3. Optionally, select the EMC system type ("R&S" or "Generic", see Figure 5-8).

4. For more system setting options, refer to Chapter 5.1, "Setup", on page 21.

5. Click "OK".

    The software returns to the R&S AdVISE main window.

6. For the connection of Rohde & Schwarz EMC software to R&S AdVISE, refer to Chapter 9.1, "Connecting with R&S ELEKTRA", on page 119.

5 Control elements

This chapter describes the R&S AdVISE user interface and functions in detail.

After starting the R&S AdVISE system, the R&S AdVISE main window shows the main menu. See Chapter 4.1, "Starting R&S AdVISE", on page 18.

If you are starting R&S AdVISE for the first time, select a camera and create a test configuration. If these items are not configured, the "Camera Maintenance" and "Run Test" buttons remain disabled.

5.1 Setup

This chapter describes the procedures to set up the software.

Selecting the "Setup" button opens the "AdVISE System Options" dialog (Figure 4-2), which provides the following features:

5.1.1 Camera & Audio Input

The "Camera & Audio Input" tab allows selecting the video and audio input sources to be used during testing.

- "Camera":
  Selects the camera to be used for testing.

  – "Virtual Camera": Available only with option R&S ADV-K1050 (order no. 1434.6530.02). It allows analyzing previously recorded videos. If no physically connected camera is available, the software selects the virtual camera by default. See Chapter 5.4.1, "Virtual camera mode", on page 34.

  – Other cameras: Available only if the software detects one or more physically connected cameras or video streaming inputs, like video grabbers.

- "Audio Input":
Configures the audio input to be analyzed during testing.
    - "Disabled": If you add an audio ROI to a test, the software detects no audio signal. Exception: In "Virtual Camera" mode, the software receives the audio stream of the selected video file.
    - "PC Sounds (Loopback)": The software captures the audio signal that your computer's internal sound card generates. It loops back this sound, which you can hear on your computer's speakers or headphones, to its analyzer.
    - Other audio inputs: Available only if the software detects one or more physically connected microphones or other digital or analog audio inputs.
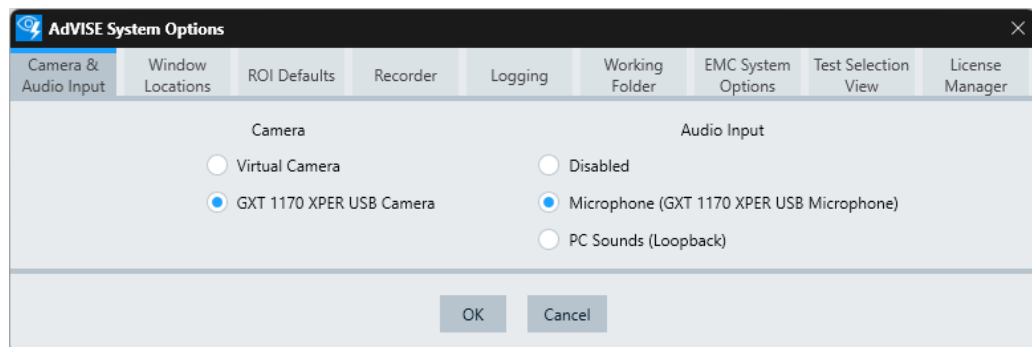
Figure 5-1: Camera & Audio Input tab in the system options dialog

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.1.2 Window Locations

The "Window Locations" tab displays the coordinates of the main window and the camera window. These X and Y coordinates represent the top left and lower right corner of the window. When you move the windows on your computer monitor, the software automatically stores the changed window coordinates.

- "Reset":
Resets the main window and the test window locations to the manufacturer's default location settings. When you move these windows to other locations, R&S AdVISE automatically saves the coordinates of these locations. "Reset" clears the saved coordinates. When you restart the software, the windows use the default location settings.
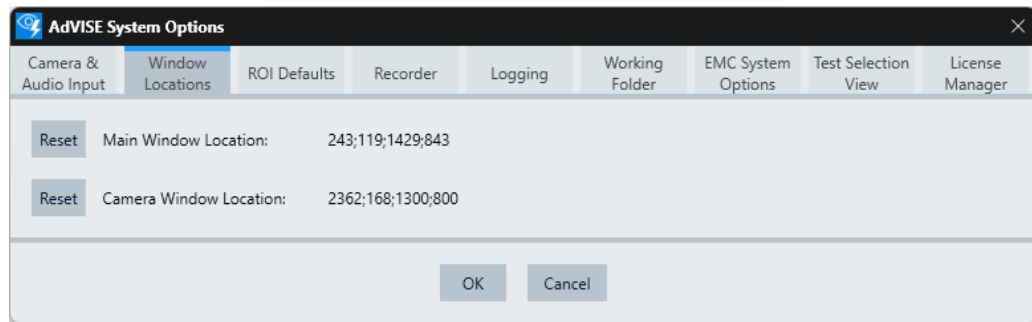
Figure 5-2: Window Locations tab in the system options dialog

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.1.3 ROI Defaults

Figure 5-3 shows the "ROI Defaults" tab, which specifies colors of ROI states and the default percentage adjust value, as described below.
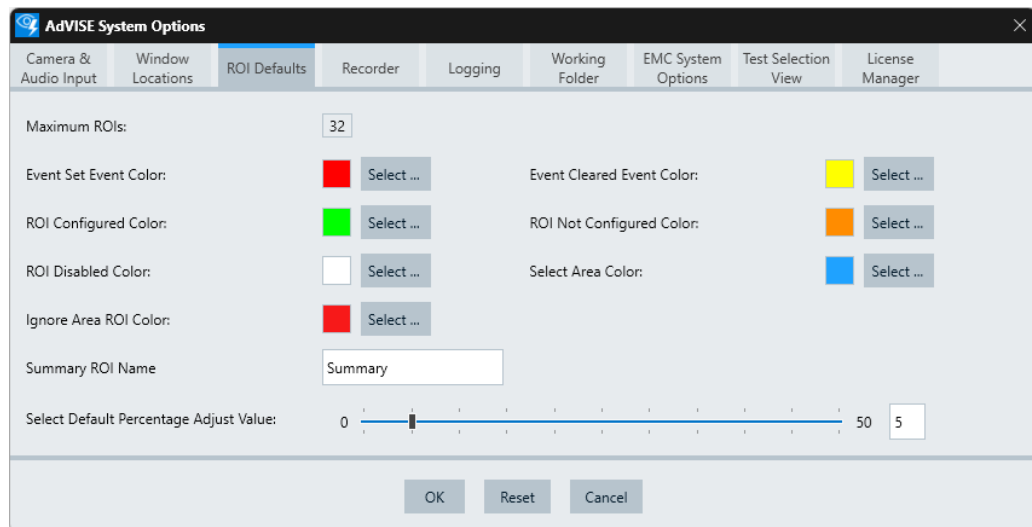
Figure 5-3: ROI Defaults tab in the system options dialog

- "Maximum ROIs":
  Shows the maximum number of ROIs that you can specify for one test configuration. By default, the R&S AdVISE software supports up to 16 ROIs. If the license for option R&S ADV-K1032 (order no. 1434.6524.02) is enabled, the software supports up to 32 ROIs.
- "Select ...":
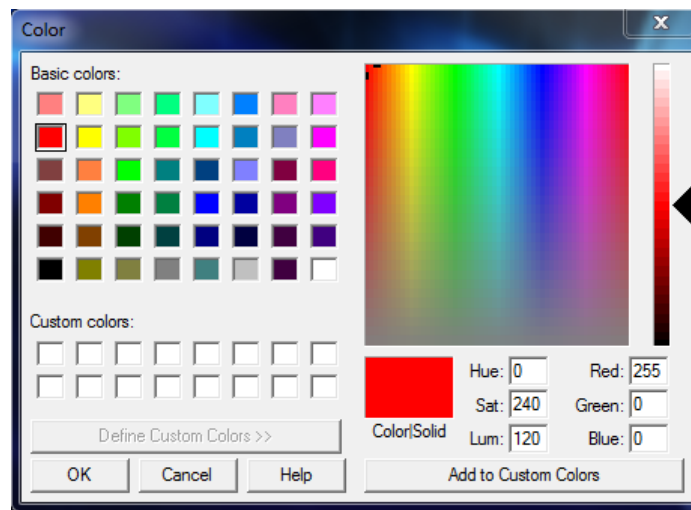
Figure 5-4: Color selection dialog

Uses the dialog in Figure 5-4 to select colors for the following states, in which an area can be:

– "Event Set Event Color":
  Selects the color for ROIs that are in an event state, hence for ROIs that have detected an event. Default color: "Red".

– "Event Cleared Event Color":
  Selects the color for ROIs that have been in the event state but that state has cleared, hence for ROIs that currently do not detect an event. Default color: "Yellow".

– "ROI Configured Color":
  Selects the color for ROIs with properties configured. Default color: "Lime".

– "ROI Not Configured Color":
  Selects the color for ROIs without any properties configured. Default color: "Dark Orange".

– "ROI Disabled Color":
  Selects the color for disabled ROIs (Figure 8-11). Default color: "White".

– "Select Area Color":
  Selects the color shown while defining an "Ignore Area" region (see below). Default color: "Blue".

– "Ignore Area ROI Color":
  Selects the color for an "Ignore Area" region, see Chapter 5.4.5, "Ignore Area", on page 42. Default color: "Red".

● "Summary ROI Name":
  Available only if "EMC System Type" is set to "R&S EMC Software" in the EMC System Options.
  Specifies for this instance of R&S AdVISE its summary ROI name, for example "*Summary*" as in Figure 9-2. The option of specifying an individual name is especially helpful if your R&S EMC software controls more than one instance of R&S AdVISE. The individual summary name facilitates discerning the origin of each summary ROI.

- "Select Default Percentage Adjust Value":
  Specifies for all ROIs the default percentage of the limit's offset from the current value, which is required for detecting an event.
  To set a percentage value in the range of 0 to 50, you can move the slider on the scrollbar. Alternatively, enter the value into the field at the right end of the scrollbar.
  You can override this default setting by individual percentage settings for each ROI.

To reset all colors, the "Summary ROI Name" and the "Default Percentage Adjust Value" to their default settings, click "Reset".

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.1.4 Recorder

The "Recorder" tab selects the location for storing video files and determines the size of the reserved disk space.

- "Minimum Disk Space Preserved (GB)":
  R&S AdVISE can keep disk space free for other applications. This setting specifies the size of the available free disk space in the range from 1 GB to 10 GB (gigabyte). If the available free disk space falls below this value, you cannot start or continue a recording.

- "Create result video per measurement":
  This checkbox is available only if "EMC System Type" is set to "R&S EMC Software" in the EMC System Options.
  When enabled, the software creates a video recording for each measurement, starting when the remote software's analysis is "On" until it is "Off".
  In a release of R&S ELEKTRA later than version 5.03 (2024), we plan to support the inclusion of measurement videos into test reports. Check the release notes of future versions of R&S ELEKTRA for support of this feature.

- "Select ...":
  Defines the location for storing full-test video files. By default, the software stores these files in the folder `C:\ProgramData\Rohde-Schwarz\AdVISE\Video\`.

  Options in the "Windows File Explorer":

  – "Browse For Folder": Selects the desired directory for saving video files

  – "Make New Folder": Creates a directory

  Note that the software stores video files enabled by "Create result video per measurement" at a different location, which you cannot configure.

Figure 5-5: Recorder tab in the system options dialog

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.1.5 Logging

The "Logging" tab allows setting the level of logging that the system generates. We recommend that you leave the logging level at its factory default ("Warn") unless instructed to change it by Rohde & Schwarz support personnel. Setting the logging too high can put an undo strain on the system and could affect performance and increasing disk space usage. The time-stamped logs are located in date-stamped subfolders of the folder `C:\ProgramData\Rohde-Schwarz\ADVISE\Logs\`.

Moving the slider along the scrollbar allows you to set different logging levels:
- "Trace": Logs all messages.
- "Debug": Logs messages helpful for debugging, and higher.
- "Info": Logs information messages and higher.
- "Warn" (= default): Logs warning messages and higher.
- "Error": Logs error messages and higher.
- "Fatal": Logs fatal error messages, only.
- "Off": Does not log any messages.
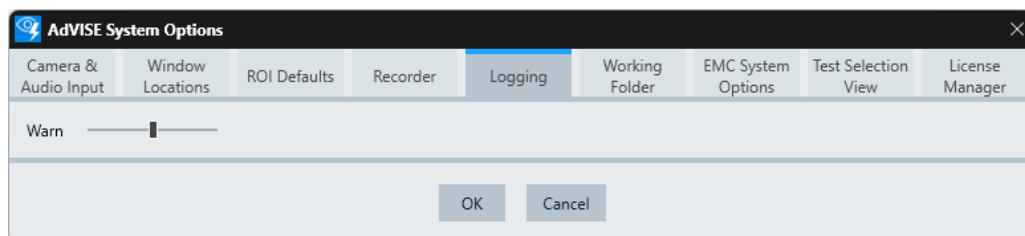
Figure 5-6: Logging tab in the system options dialog

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.1.6 Working Folder

The "Working Folder" tab allows you to select a utility folder called `Working` for per-forming certain operations. Also, you can store clips and images from videos in this location.

We recommend that you specify the `Working` folder in the directory, in which the Recorder stores its files.

ⓘ Do not change the working directory while a post-processing job is running in the back-ground. Such a job is indicated by a progress-bar dialog, which you can hide. When the progress-bar dialog is hidden, you can view the progress status of the job in the Show Results dialog.

- "Select ...":
  Specifies the location of the `Working` folder. By default, the software stores these files in the folder `C:\ProgramData\Rohde-Schwarz\AdVISE\Working\`.

  Options in the "Windows File Explorer":
  – "Browse For Folder": Selects the desired directory for saving the files.
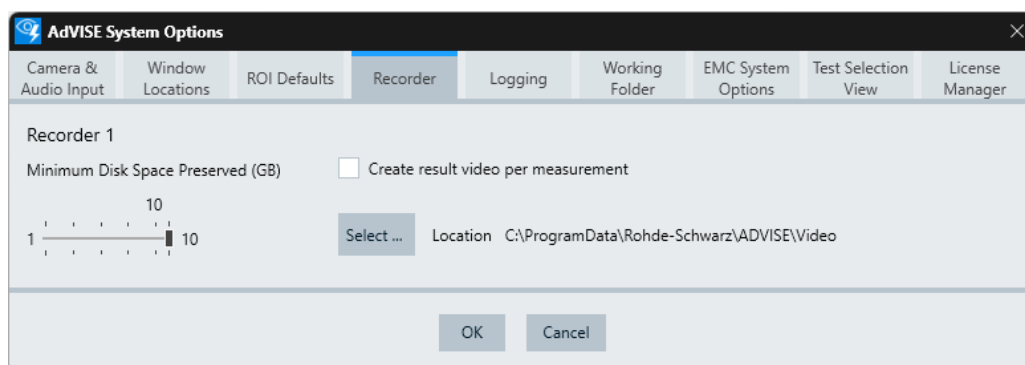 – "Make New Folder": Creates a directory.
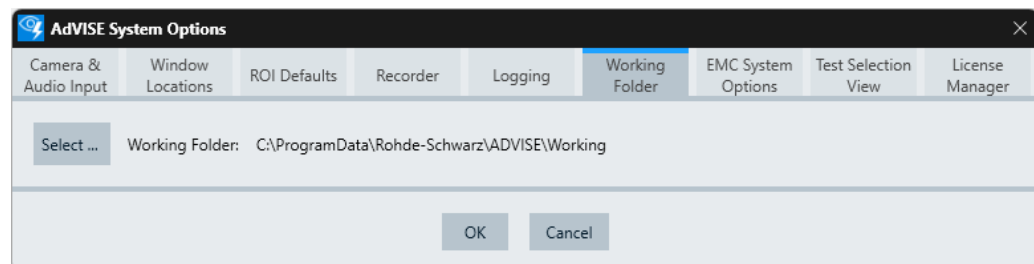
Figure 5-7: Working Folder tab in the system options dialog

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.1.7 EMC System Options

The "EMC System Options" tab (Figure 5-8) configures the communication between R&S AdVISE and EMC software.

- "EMC System Type":
  Selects the type of EMC software used in combination with R&S AdVISE.
  – "R&S EMC Software"

Selects an advanced remote control interface for using R&S AdVISE with Rohde & Schwarz EMC software R&S ELEKTRA.

The EMC software uses the measurement results of individual ROIs for graphical evaluation.

Selecting "R&S EMC Software" enables also the function "Create result video per measurement" in the Recorder. And it enables selecting a "Summary ROI Name" in the ROI Defaults dialog.

– "Generic EMC System"

Selects a generic interface for all other remote-control programs.

The interface supports the communication of "Go"/"NoGo" information for the EUT and "Pass"/"Fail" results of the test. It also supports displaying information received from the EMC software in the R&S AdVISE video stream.

- "Default TCP IP Port":

Displays the software's default TCP/IP port number. You cannot modify this number.

Use this number to connect R&S AdVISE to your EMC software, for example R&S ELEKTRA.

- "Identification Response":

Shows the software's name and version, which is sent as a reply to the `*IDN?` query. You cannot edit this string.

- "Select ...":

Selects the color of text to be displayed in the following cases:

– "EMS Info Text Color":

For the received EMS information from the remote-control software, like current frequency or immunity level.

– "Analysis ON Text Color":

For the text message that shows that R&S AdVISE has received from the remote-control software the command to run an analysis.

– "Analysis OFF Text Color":

For the text message that shows that R&S AdVISE is not in analysis mode under remote control of EMC software.

- "Select EMS Information Text Scale":

Moving the slider along the scrollbar adjusts the text size in a range from 1 (smallest) to 4 (largest).
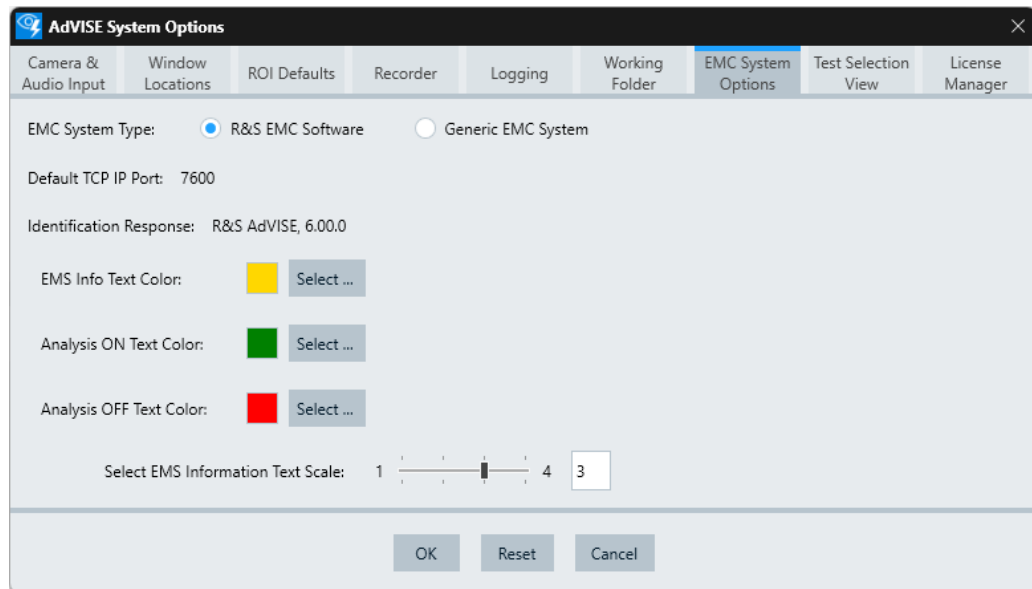
Figure 5-8: EMC System Options tab in the system options dialog

To reset the three colors and the "EMS Information Text Scale" to their default settings, click "Reset". Note that this reset does not affect the selected EMC system type.

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.1.8 Test Selection View

The "Test Selection View" tab allows you to select the columns displayed in the "Test Selection" dialog (Figure 8-4) and the "Manage Test Configurations" dialog (Figure 8-1).

- "Test ID":
  The serial number of a test created. The test ID of the test configuration is the sequence of the test created, starting from 1.
  For example, suppose that the test IDs of a 1st and 2nd test are 1 and 2, respectively. If you delete the 2nd test and create a 3rd one, the ID of the new test is 3.
- "Test Name":
  The name of a test. You cannot disable displayig the name column.
- "Test Description":
  The description of the test, if configured.
  See also Chapter 5.3, "Manage Test Configurations", on page 32.
- "Number Of Runs":
  The number of times of running a test.
- "ROI Count":
  The number of configured ROIs.
- "Created by"

The user who creates the test. R&S AdVISE automatically takes the information from the computer account.

- "Date Created":
  The date when a test is originally created.

- "Modified By":
  The user who modifies the information of a test.

- "Last Modified":
  The date and time when the information of a test is modified.

- "Test Image":
  The camera's still frame in the table.
  For example, disable this checkbox if you want to hide sensitive images from unauthorised viewers.

Figure 5-9: Test Selection View tab in the system options dialog

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.1.9 License Manager

The "License Manager" tab allows you to open the "R&S License Server". It manages the licenses installed on the R&S AdVISE license dongle or smart card. See also Chapter 3.3, "License dongle", on page 14.

Note that you can open the "R&S License Server" also by searching for "license" in the Windows start menu.

- "Show License Manager":
  Opens the "Rohde & Schwarz License Server" in a browser window.

You can do the following:

– View existing licenses

– Activate new licenses

– Discontinue existing licenses

– Export the license key file in `*.xml` format

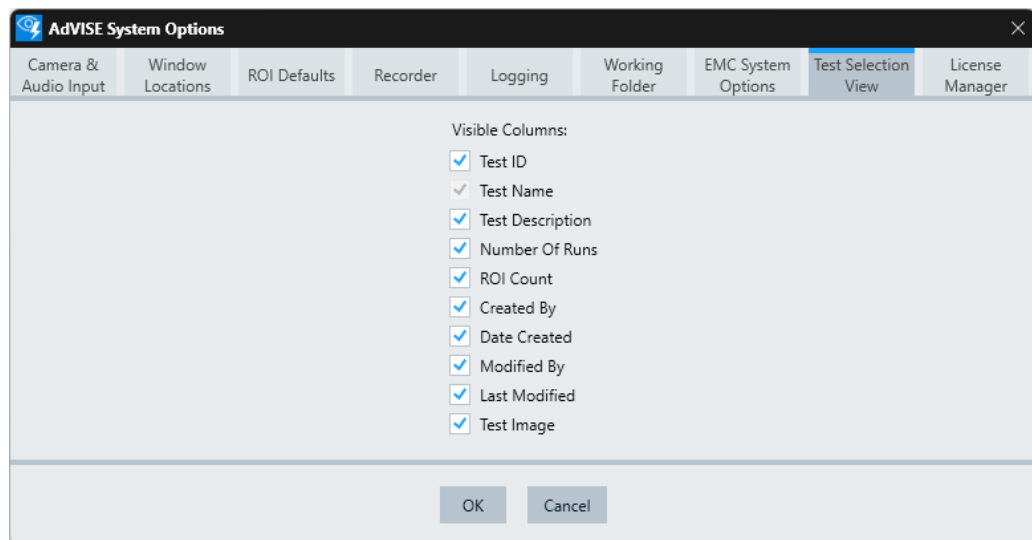Refer also to the help function that is available in the "Rohde & Schwarz License Server".
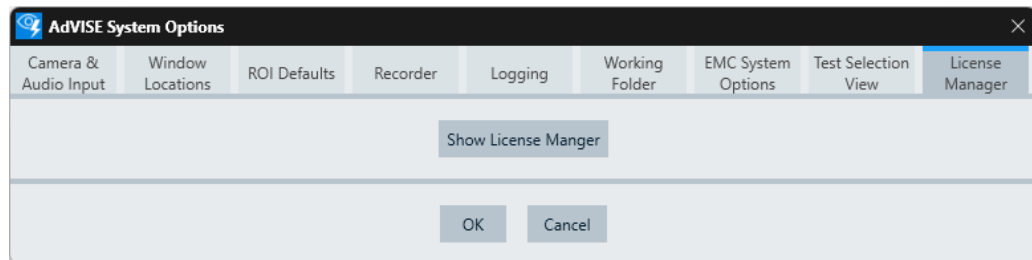
Figure 5-10: License Manager tab in the system options dialog

To abandon your changes of the settings, click the "Cancel" button, which is available only after changing any setting.

To confirm the settings and close the dialog, click "OK".

5.2 Camera Maintenance
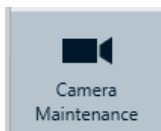
Use this function to check if the video capturing of R&S AdVISE is working.

To enable the "Camera Maintenance" button

1. Unless already available, connect a camera to your computer, typically a USB camera.

2. If necessary, power on the camera.

3. Navigate to the Setup > Camera & Audio Input tab.

4. Select the correct camera type under "Camera".

5. Click "OK" to exit the "AdVISE System Options" dialog.

   The "Camera Maintenance" button is enabled.

   Note: If you have selected a virtual camera in the "Setup", the camera maintenance button remains grayed out.

To open the "Maintenance Mode" window (Figure 5-11), click the "Camera Maintenance" button. The window displays the selected camera type in the header and its live video stream.

To return to the main window (Figure 4-1), click "Exit".
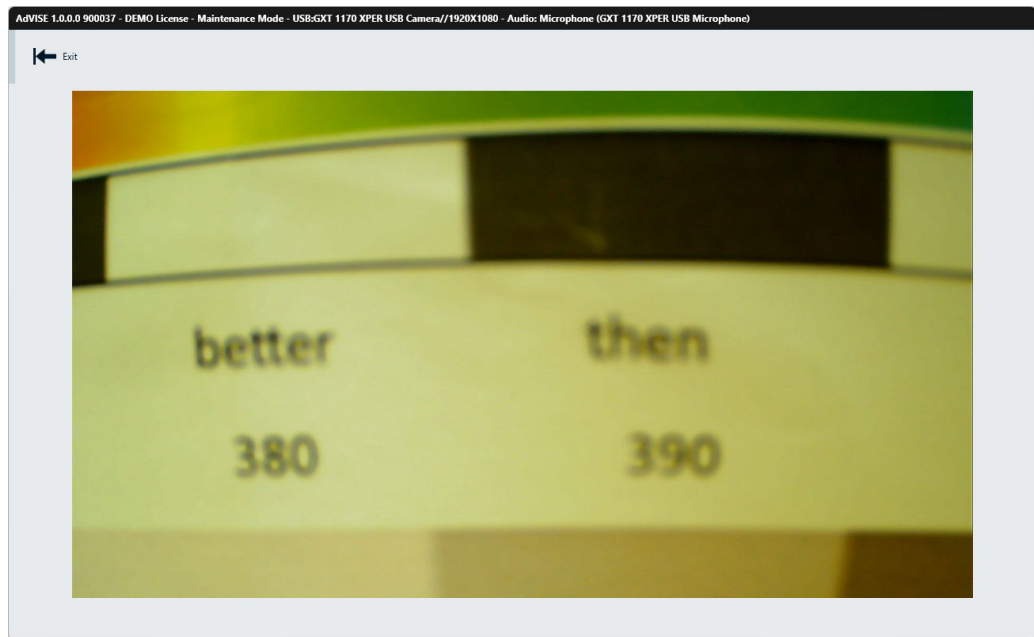
Figure 5-11: Example of a video image in the Maintenance Mode window

5.3 Manage Test Configurations
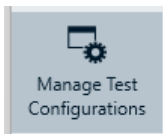
The "Manage Test Configurations" dialog allows you to create, copy, edit and delete test configurations.
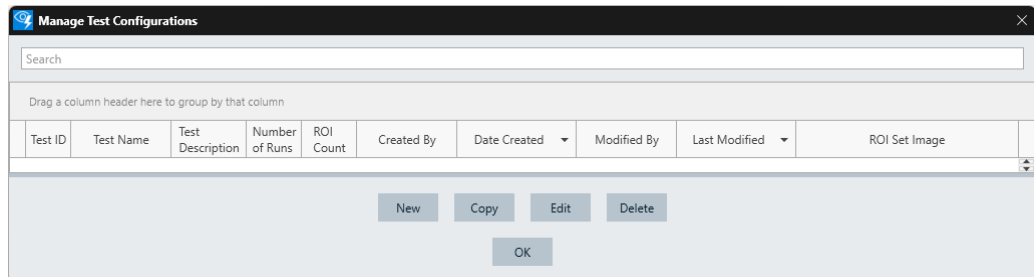
Figure 5-12: Dialog for managing test configurations

- "New":
  Creates a test configuration. Enter a test name and description in the "Test Name and Description Dialog" (Figure 5-13).
  The "OK" button for saving this test configuration appears after entering a test name or description. To return to the previous dialog without creating a test configuration, click "CANCEL".
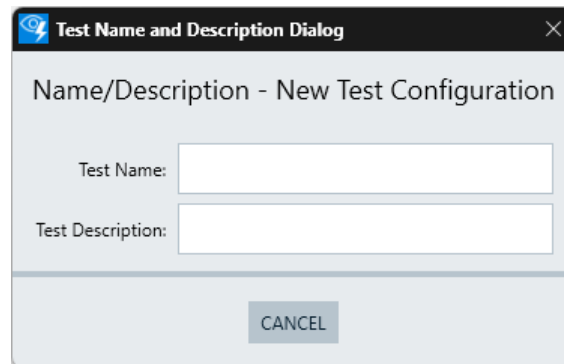
Figure 5-13: Dialog for setting up a new test configuration

A new test configuration has no "Test Image", which appears only after running a test configuration at least once (see Configure and Start Test). The "Test Image" shows a camera still frame during a test.
To open the image in its default size, click the "Test Image". To close the image, click "OK".

- "Copy":
  Duplicates the selected test configuration while allowing you to give it a new name. You cannot duplicate a test configuration with the same test name. Therefore, the initial dialog shows a "Duplicate Test Name" message:
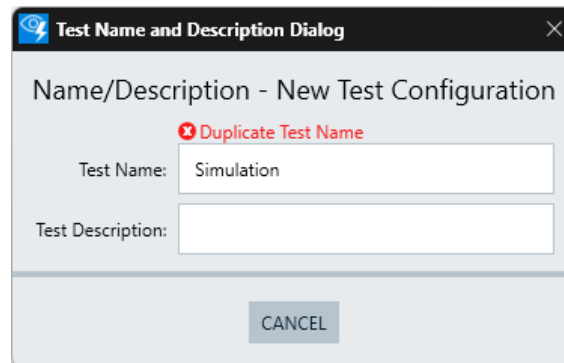
Figure 5-14: Copying an existing test configuration

Specify a different name. As for "New" (see above), the "OK" button for saving the copied test configuration appears only after entering a test name or description.

- "Edit":
  Modifies the test name and description of an existing test configuration.

- "Delete":
  Permanently deletes an existing test configuration, including all the test videos, test results and event information.
  The "Deleting Test Configuration(s)" dialog appears twice to confirm the action. The 1st dialog warns you of the risk of losing all data permanently. If you decide to continue deleting it, you must confirm your decision in a 2nd dialog.
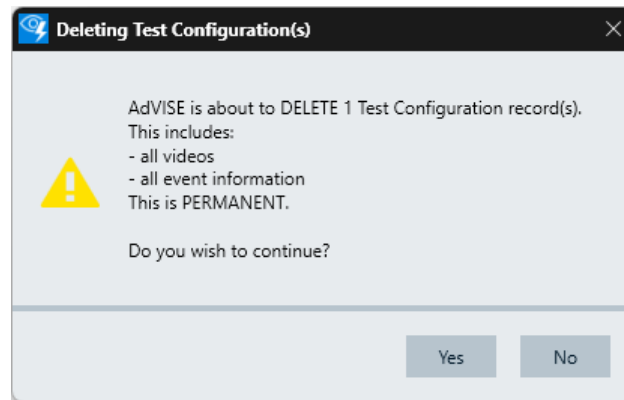
Figure 5-15: Dialog for confirming a test configuration deletion

5.4 Configure and Start Test
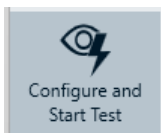
There are three different modes in which tests can be conducted. The configuration of the ROIs in the test, however, is always the same as described in Chapter 8.2, "Configuring ROIs", on page 107.

5.4.1 Virtual camera mode

Available only with option R&S ADV-K1050 (order no. 1434.6530.02). It enables R&S AdVISE to analyze video recordings of already performed tests.

See also Camera & Audio Input.

The configuration of the measurement is similar to the real-time operation. The only difference is that R&S AdVISE evaluates the content of a video data file instead of a live camera signal.

To open a test in virtual camera mode

1. Select "Virtual Cam".

    The "Test Selection" dialog opens.

2. Select the test of interest.

3. Click "Open".

    The "Windows" file selection dialog opens:
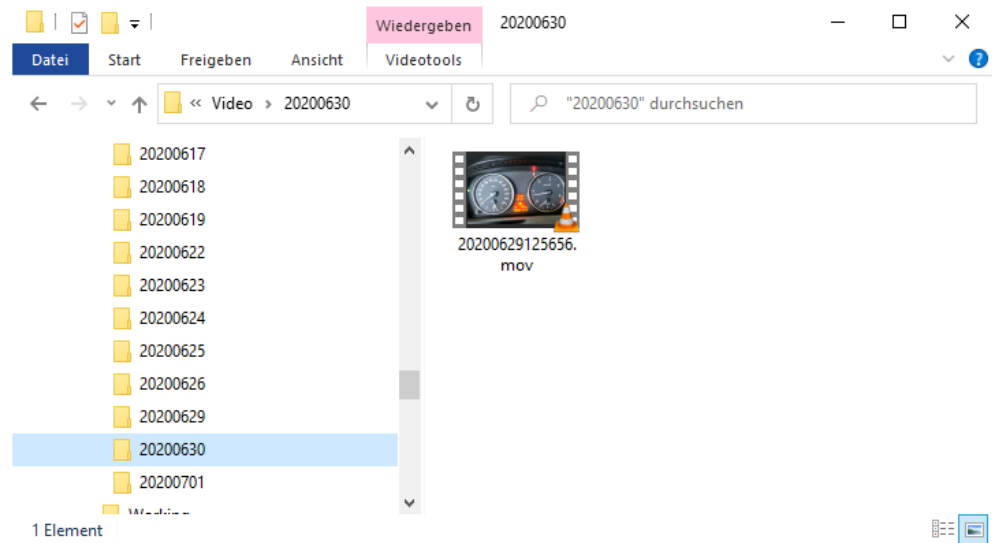
Figure 5-16: File selection dialog

4. Navigate to the video file of interest.

5. Open the video file.

   The virtual camera mode window shows the first frame of the loaded video.

Figure 5-17: Virtual camera mode window with loaded video

1 = Test control toolbar
2 = Video playback control elements

For the top toolbar of this window, refer to Chapter 5.4.4, "Test control toolbar", on page 40.

| Exit | Start Test | Add ROI | Adjust ROI Settings | Add Ignore Area | ☑ Enable Real Time Tracking | Add Tracker | Adjust ROI Position | Freeze Video | Change Video |
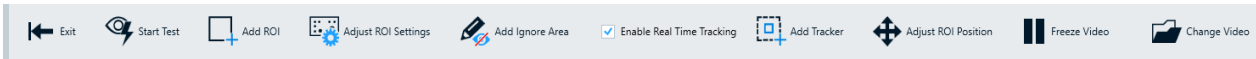
Video playback control elements

In the Virtual camera mode, only, the following video playback control elements are available at the lower edge of the window:
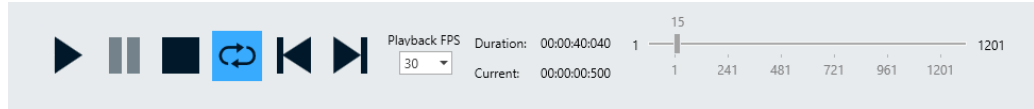
Figure 5-18: Video playback control elements of the virtual camera toolbar

*

Figure 5-19: Start

Plays the recorded video.

*

Figure 5-20: Pause

Pauses the playback of the video. If you add an ROI in the paused state, the software prevents configuring it. See also "Freeze Video" in the Test control toolbar.

*

Figure 5-21: Stop

Stops the playback of the video.

*

Figure 5-22: Toggle Looping

Enables or disables playing the video repeatedly.

*

Figure 5-23: Previous Frame

Steps one video frame backward.

*

Figure 5-24: Next Frame

Steps one video frame forward.

- "Playback FPS"
  Specifies the playback rate in frames per second (FPS).
  The default setting is 30 FPS. You can change the frame rate by selecting a value from the drop-down list.

- "Duration":
  The total length of the video.

- "Current":
  The time position of the currently displayed video frame.

- The slider shows the number of frames in the video recording, and indicates the currently displayed frame. You can drag the slider to let the software display an arbitrary frame, typically while the playback is paused.

5.4.2 Local test mode

Available only if a physical camera is connected. See Setup > Camera & Audio Input.

The local test mode is independent of a separate remote (EMC) software package or any other remote software. Typically, use this mode to create a set of ROIs before running a test in remote test mode, or to observe an object under manual control.

For the procedure of configuring ROIs, see Chapter 8.2, "Configuring ROIs", on page 107.

5.4.3 Remote test mode

Available only if a physical camera is connected. See Setup > Camera & Audio Input.

The remote test mode allows monitoring a DUT with R&S AdVISE while testing this DUT with some remote-control software, for example R&S ELEKTRA. For this purpose, R&S AdVISE can operate under the control of that remote software.

To open a test in remote test mode

1. Select "Remote".

   The "Test Selection" dialog opens.

2. Select the test of interest.

3. Click "Open".

   The "Remote Test Mode" dialog opens and shows the live camera image.

If you have preconfigured the necessary ROIs in the local test mode, you can start the test immediately. Otherwise, configure the ROIs as described in Chapter 8.3.1, "Running a test without remote control software", on page 114.
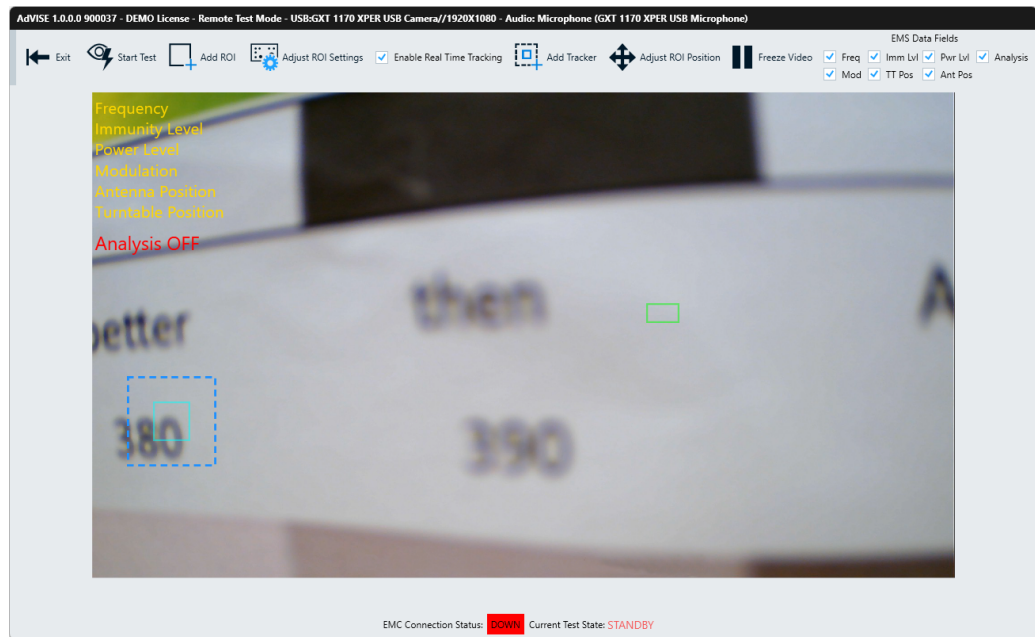
Figure 5-25: Remote test mode dialog

For the **top toolbar** of this dialog, refer to Chapter 5.4.4, "Test control toolbar", on page 40.
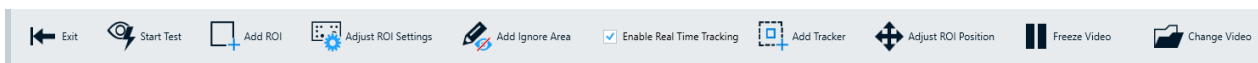
Note that "Change Video" is not available in remote test mode. In addition to the toolbar described in Chapter 5.4.4, "Test control toolbar", on page 40, the "Remote" test mode dialog has the following "EMS Data Fields" checkboxes:
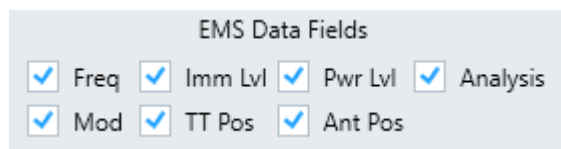
Figure 5-26: EMS Data Fields checkboxes

The video frame as in Figure 5-25 displays EMS information at the top left-hand corner of the video frame. The checkboxes (Figure 5-26) allow selecting which information to display by enabling or disabling the corresponding checkbox. By default, all boxes are checked.

To configure the text color, go to the Setup > EMC System Options dialog. To move any data text to another position, click and hold it with the left mouse button while you drag the text to that position.

The **lower status bar** displays the connection status to the remote-control software, for example EMC software, and the current test state.

● "EMC Connection Status":

If R&S AdVISE detects a connection with remote-control software, the status "UP" is shown on a green background. Otherwise, the status "DOWN" is shown on a red background.

- "Current Test State":
    - "STANDBY"
      The message remains "STANDBY" (red, flashing) until a test starts. When the 1st ROI is defined, the "Start Test" button is available in the Test control toolbar. When you click "Start Test", R&S AdVISE goes into remote testing mode and waits for control commands from the remote software. The message "New State: AdVISE Ready for Test" appears.
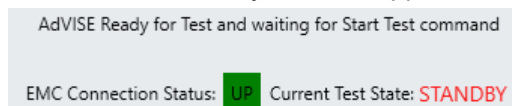
Figure 5-27: Example of messages in the lower status bar

    - "ACTIVE"
      When the EMC software starts a remote-controlled test, the "Current Test State" message changes to "ACTIVE" (green, not flashing).
    - "PAUSED"
      The remote-controlled test is paused in the EMC software.
    - "STOPPED"
      The remote-controlled test is stopped in the EMC software.
- "New state" messages (top line in Figure 5-27):
    - "AdVISE Ready for Test and waiting for Start Test command"
      R&S AdVISE waits for a "Start Test" command from the remote software.
    - "Camera is Disconnected"
      The USB camera is disconnected from the computer that runs R&S AdVISE.
    - "Test Completed Received from EMC System"
      R&S AdVISE received the information from the remote software that it has completed the test.
    - "Start Test Received from EMC System"
      R&S AdVISE received the information from the remote software that it has started the test.
    - "Restart Test Received from EMC System"
      R&S AdVISE received the information from the remote software that it has restarted the test.
    - "Pause Test Received from EMC System"
      R&S AdVISE received the information from the remote software that it pauses the test.
    - "Test Stop Received from EMC System"
      R&S AdVISE received the information from the remote software that it has stopped the test.
    - "Test ABORTED by EMC System"
      R&S AdVISE received the information from the remote software that it has aborted the test.
    - "Test ABORTED by AdVISE User"

You have aborted the test in R&S AdVISE.

Refer also to the following application note:

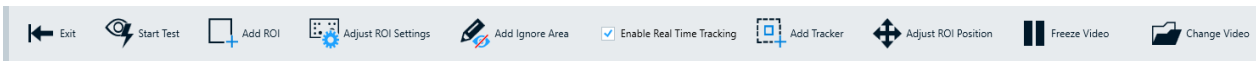- Generic Remote Interface R&S AdVISE

5.4.4 Test control toolbar

Figure 5-28: Control elements at the upper edge of the test dialog

These test control elements are available in the Virtual camera mode (Figure 5-17) and in the Remote test mode (Figure 5-25).

You can use these elements to control the test as follows.

- "Exit":
  Quits the test and returns to the main window.
- "Start Test":
  Available only if at least one ROI exists and all existing ROIs are configured. If the "Start Test" button is not available, use the function "Adjust ROI Settings".

  – In the Virtual camera mode, starting the test starts the playback of the video and its analysis.
  The test control toolbar changes: It shows only the buttons "Exit", "Stop Test" and "Record".
  When you click "Record", a "Pause" button and a "Stop" button appear, and the software starts capturing a sequence of the loaded video file together with the detected events. In a status line, it shows the elapsed time. After 30 s, it shows also the remaining time (in minutes) for recording, depending on the availabe storage size.

  – In the Local test mode, starting the test starts the analysis of the live video stream.
  The test control toolbar changes: It shows only the buttons "Exit", "Stop Test" and "Record".
  When you click "Record", a "Pause" button and a "Stop" button appear, and the software starts capturing a sequence of the life video together with the detected events. In a status line, it shows the elapsed time. After 30 s, it shows also the remaining time (in minutes) for recording, depending on the availabe storage size.

  – In the Remote test mode, starting the test puts R&S AdVISE into a waiting mode.
  The test control toolbar changes: It shows only the buttons "Exit" and "Stop Test".
  The visual inspection test is now under control of the remote (EMC) software and waits for its commands. When a control command starts the recording remotely, the waiting mode of R&S AdVISE ends. The "Stop Test" button disappears, because the remote software is now in control of running the test.
  R&S AdVISE starts capturing and analysing the life video together with the detected events, and it communicates these events to the remote software.

When the remote software sends the command to stop the test, the "Restart Test" button appears.

|← Exit   ⟳ Restart Test

If you want to restart the current test from the remote software, press this button. It closes and reloads the same test, which enables the remote software to restart the test, hence to perform the measurement again.

- "Add ROI":
  Allows adding new ROIs from the list of available ROIs. To do so, click "Add ROI" and select the ROI type from the dialog that opens. Draw a rectangle that defines the ROI's position. The "Set ROI Properties" dialog opens, which is specific for each type of ROI. It allows configuring the ROI properties, making the ROI "configured". If you close the dialog without setting properties, or if you change its position, the ROI border color (e.g. orange, see ROI Defaults) indicates an incomplete configuration: The ROI is "not configured".
  For details on how to configure the various types of ROIs, see Chapter 6, "Regions of interest (ROIs)", on page 62.
  When the 1st ROI is defined, the "Start Test" button is available in the Test control toolbar.

- "Adjust ROI Settings":
  Available only if at least one ROI is specified.
  Allows adjusting the range or settings of the ROIs. See Chapter 8.2.3, "Adjust ROI Settings", on page 111.

- "Add Ignore Area":
  Defines an "Ignore Area" region, which all other ROIs ignore. See Chapter 5.4.5, "Ignore Area", on page 42.

- "Enable Real Time Tracking":
  Available only if an "Add Tracker" ROI is specified.
  Allows starting real-time tracking. See also Chapter 7.2, "Real Time Tracking", on page 104.

- "Add Tracker":
  Available only if the license for the R&S ADV-K1070 tracking option is enabled.
  Allows adding a tracking reference. See also Chapter 7.1, "Configuration of tracking ROIs", on page 102.

- "Adjust ROI Position":
  Available only if an "Add Tracker" ROI is specified.
  Allows adjusting the ROI position back to their reference location. See also Chapter 7.3, "Adjust ROI position", on page 105.

- "Freeze Video":
  Freezes the playback of the incoming video, which still runs in the background.
  See also Chapter 8.2.4, "Freeze Video", on page 113.

- "Change Video":
  Available only in the Virtual camera mode.
  Opens a dialog for selecting a different recorded video file.

5.4.5 Ignore Area
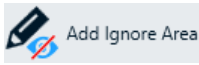
The "Ignore Area" function is available in the Test control toolbar. It allows defining an arbitrary number of polygon areas, which all other ROIs ignore. Hence, changes in these areas cannot throw any events.

To define an "ignore area"

1. Draw a polygon in the camera image by multiple successive left clicks.

   Each click defines a corner point of the polygon.
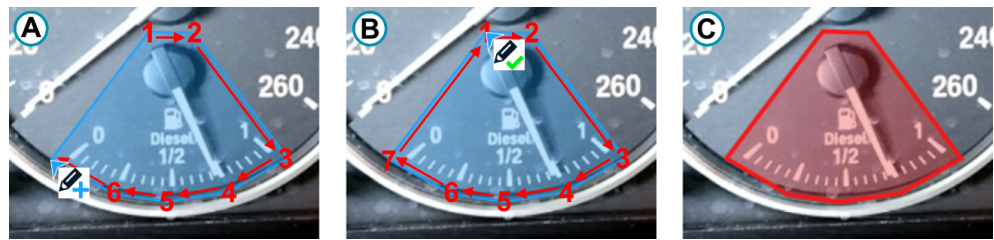   The minimum number of points is two, the maximum number is 15.

Figure 5-29: Defining an Ignore Area polygon

A = Add corner points with left clicks while the cursor has a blue "plus" icon
B = Complete by clicking the first point while the cursor has a green "checkmark" icon
C = The resulting polygon area after confirming the properties dialog (Figure 5-30)

2. To remove the latest point, right-click anywhere.

3. To abort drawing the polygon, remove all points by right clicks.

4. To complete drawing the polygon:
   - Either left-click the first point again.
   - Or reach the limit of 15 points, which leads to automatic completion of the polygon.

   The properties dialog (Figure 5-30) for configuration of the "ignore area" opens.

5. To complete the configuration, close the dialog by clicking "OK".

Figure 5-30 shows the "Ignore Area" properties dialog, which is described below.
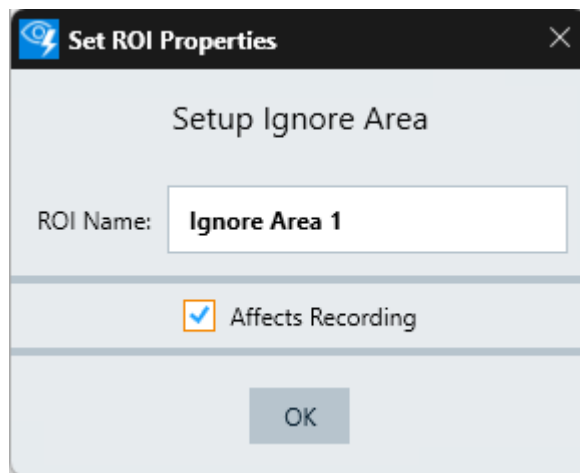
Figure 5-30: Properties dialog for Ignore Area

- "ROI Name":
  Specifies a unique name for this ignored region.
- "Affects Recording":
  - If enabled, the recorded video shows this area blacked out and with colored lines. By default this color is red, see "Ignore Area ROI Color" in Chapter 5.1.3, "ROI Defaults", on page 23.
  - If disabled, the recorded video leaves this area visible, but shaded with colored lines to indicate that the analyzer ignores this area. By default this color is white, see "ROI Disabled Color" in Chapter 5.1.3, "ROI Defaults", on page 23. Note that disabling this feature creates full copies of each frame, which consumes ressources.

Figure 5-31: Example of a recording with two Ignore Area polygons

Left polygon   = "Affects Recording" enabled, the video content is invisible in this area
Right polygon = "Affects Recording" disabled, the video content is visible but still ignored

In the Show results procedure, during playback of the video, the analyzer detects no events inside any "Ignore Area" polygon.

5.5 Show Results

The "Show Results" dialog (Figure 5-32) allows viewing recorded test videos and creating reports.
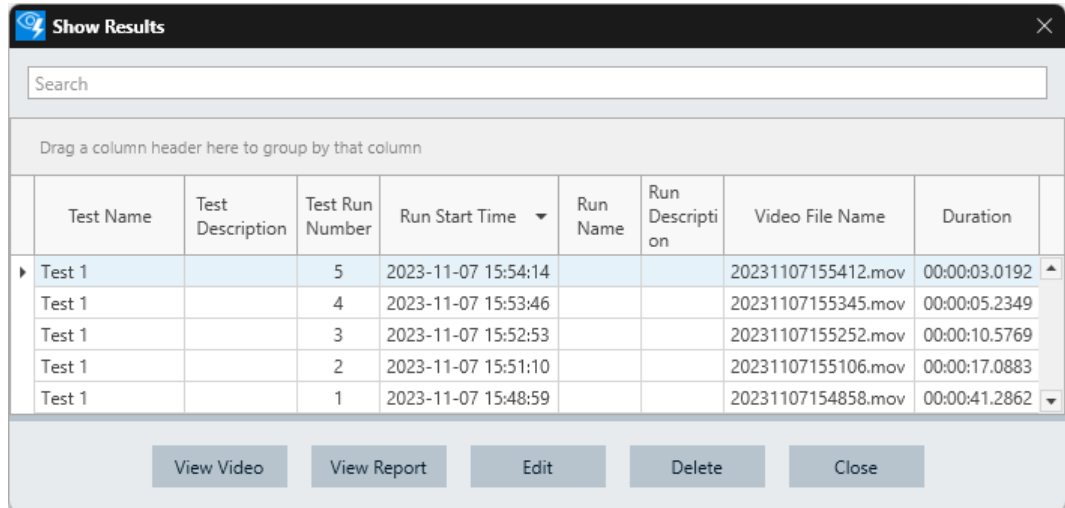
Figure 5-32: Show Results dialog

To search for a specific test run, enter a search string in the upper text box. The software displays the search results, with the search string highlighted in yellow as in Figure 5-33.

Figure 5-33: Dialog with highlighted search results

Functions in the "Show Results" dialog:

- "View Video":
  Opens the R&S AdVISE media player of the selected test run record. See also Chapter 5.5.1, "R&S AdVISE Media Player", on page 46.
- "View Report":

Opens the report generator and creates a report for the selected test. See also Figure 5-35.
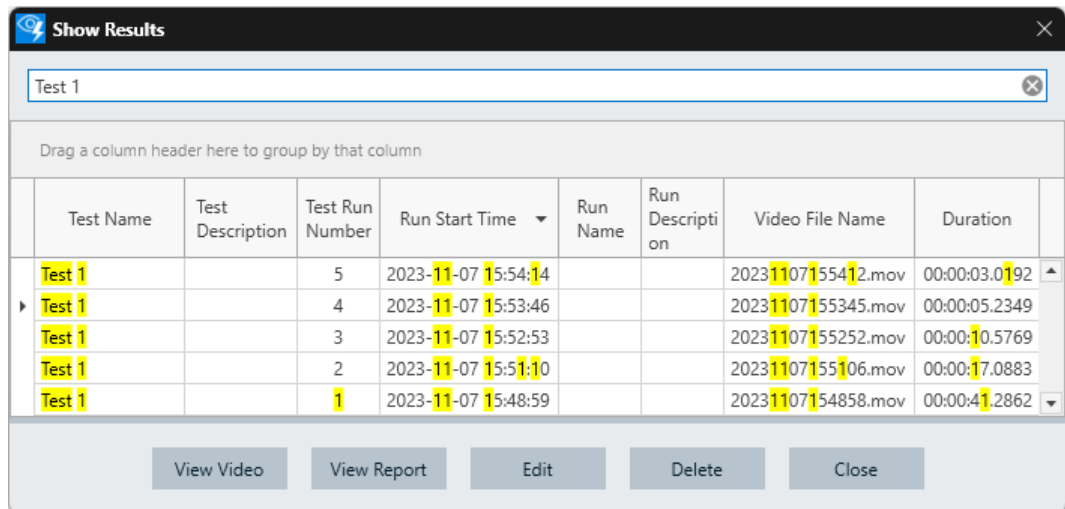To save the report in `*.pdf` format, select "Export". To print the report, select "Print".

- "Edit":
  Allows editing the name and description of the test run.
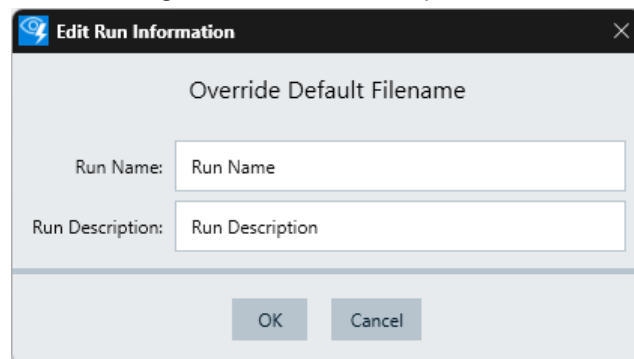
Figure 5-34: Dialog for editing a test run

- "Delete":
  Deletes a test run, including its video recording and all associated events.
  R&S AdVISE prompts you for confirmation before deleting the test run. However, unlike when deleting a test configuration (Figure 5-15), R&S AdVISE does not prompt you twice.
- "Close":
  Closes the "Show Results" dialog and returns to the main window.
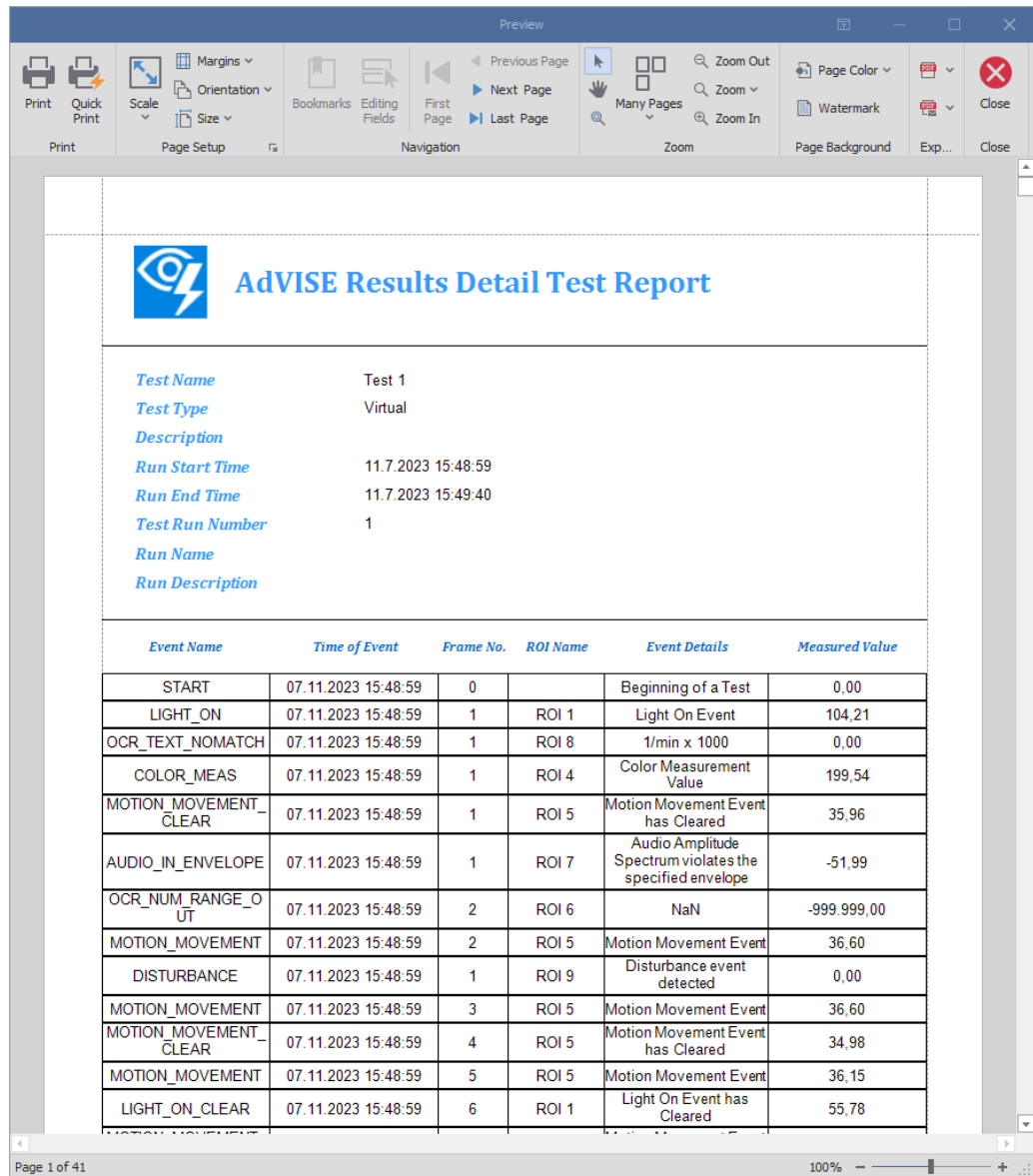
Figure 5-35: Report generator

5.5.1 R&S AdVISE Media Player

To open the media player, click "View Video" for a selected result in the "Show Results" dialog.

Figure 5-36: The R&S AdVISE media player

Top playback control buttons

You can control the video by the top playback control buttons as follows:

●

Figure 5-37: Start

Plays the recorded video.

●

Figure 5-38: Pause

Pauses the playing video.

●

Figure 5-39: Stop

Stops playing a video.

-

  Figure 5-40: Previous Frame

  Steps one video frame backward.

-

  Figure 5-41: Next Frame

  Steps one video frame forward.

-

  Figure 5-42: Looping / Not Looping

  Enables or disables playing the video repeatedly in a loop.

-

  Figure 5-43: Show Events

  Displays all events that were detected during a recording. See also "The Playback Event List dialog" on page 50.

-

  Figure 5-44: Previous Event

  Jumps to the previous event.

-

  Figure 5-45: Next Event

  Jumps to the next event.

-

  Figure 5-46: Snapshot

  Opens a dialog for saving a screen copy of the selected video frame.

-

  Figure 5-47: Clip

Provides functions for saving a selected part (or clip) of the video.
It activates a start slider and a stop slider with positions 2 seconds before and after the previously selected video frame. You can move the sliders to the desired start and stop positions for your clip.
To save the clipped video in a selected folder, click "OK". Alternatively, to cancel the creation of a clip, click "Cancel Trimming".

-

Figure 5-48: Anonymize entire recording

Performs face anonymization for the complete length of the video recording, but not for areas covered by ROIs in the edited recording. The software excludes the most recently configured ROI areas from anonymization. Therefore, if you want to anonymize the recording, we recommend doing so before changing the position of any ROI, for example immediately after a test run. Otherwise, if the ROIs differ from their original position at the time of recording, the anonymization result can be invalid.
When you click the button, a confirmation dialog suggests using full anonymization for videos with faces appearing most of the time. If faces appear only sporadically, use partial anonymization for faster video processing.
When you confirm using full anonymization, R&S AdVISE creates a copy of the video sequence with pixelation of detected facial characteristics. However, because this function uses artificial intelligence with inherent imperfections, expect false positive and false negative detection of faces. For example:

- False positive detection can occur for objects with shapes similar to faces.

- False negative detection can occur for side views or reflections of faces.

If you notice detection errors, consider cleaning the unsaved anonymized parts and retrying a new anonymization run. This repetition can lead to different results because of changed internal memory states.
When you save the anonymized video, the software automatically overwrites the original recording with the modified copy.

-

Figure 5-49: Start creation of new anonymized part from current frame

Performs partial face anonymization, starting from the current video frame until stopped by the user or the end of the recording has been reached.
In the top toolbar a new panel appears. It shows the live processing speed in frames per second (fps), which depends on your PC's computing power. It also shows a button for stopping the current partial anonymization run:
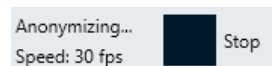

Figure 5-50: Panel with current framerate and a button for stopping this anonymization

When you have executed a partial run of face anonymization, three additional buttons appear. These buttons serve for managing the unsaved anonymized recording:

Figure 5-51: Full set of face anonymization control buttons

●

Figure 5-52: Save anonymized parts

Overwrites the originally recorded video stream with the anonymized parts.

●

Figure 5-53: Clean this unsaved anonymized part

Available only if you have stopped a partial anonymization run, and if you have moved the video slider to an anonymized section. Deletes this section in the anonymized copy. After deletion, the original section is restored and visible.
If you try to close a video player window that contains unsaved anonymized parts, a dialog warns you of the risk of losing these changes in the recording.

●

Figure 5-54: Clean all unsaved anonymized parts

Removes the data of all partial face anonymization runs that are not saved.

Lower banner elements

The banner at the lower edge of the dialog consists of the following elements:
● The slider shows the number of frames in the video recording, and indicates the currently displayed frame.
● "Current Time":
Displays the current position of the video.
● "Total Time":
Displays the total length of the video.

The Playback Event List dialog

The "Playback Event List" dialog (Figure 5-55) lists all events of the video recording.

To open the "Playback Event List" dialog, click the "Show Events" button (▦).

The events are listed in a chronological order. The list begins with the "START" event and ends with the "STOP" event. To view the video frame of a specific event, click this event.

For reliable checking, we recommend waiting until all events are loaded, especially in long tests with many events. A constantly updated status message in the lower left of the playback window shows the remaining events to be loaded.

For the best access to the events, we recommend that you open and place both the "Playback Event List" dialog and the "Media Player" side by side.

There are different effects of the "Exit" icon (⊠) in the top-right corner of the two dialogs and the "Close" button at the lower edge of the "Playback Event List" dialog:

- When you click the "Exit" icon (⊠) in either dialog, **both** dialogs close
- When you click "Close", **only** the "Playback Event List" dialog closes

Figure 5-55: Playback Event List dialog

To sort, group or filter the "Playback Event List", proceed as described in Chapter 5.5.2, "Table management tools", on page 51.

View Report

To generate a report, optionally after filtering the event list, click "View Report". See also Chapter 8.4.2, "View the test report", on page 117.

To close the "Playback Event List", click "Close".

5.5.2 Table management tools

R&S AdVISE uses table-management tools for sorting, grouping and filtering entries. This chapter describes the main features in brief.

To open a context menu for managing a table, right-click the header of a column. The following options are available:

- "Sort Ascending":
  Sorts the list by the entries in this column in ascending order.

- "Sort Descending":
  Sorts the list by the entries in this column in descending order.
- "Clear Sorting":
  Removes a previously selected sorting.
- "Group By This Column":
  Groups the list according to the selected column.
- "Show Group Panel" or "Hide Group Panel":
  Shows or hides the group panel, into which you can drag a column header to group the events by this column.
  To exit from grouping table entries, select "Show Group Panel", right-click the entry in the group panel and select "Ungroup".
- "Show Column Chooser" or "Hide Column Chooser":
  Shows or hides a subdialog for selecting the table columns to be displayed.
- "Best Fit":
  Fit the selected column to the best column width.
- "Best Fit (all columns)":
  Fit all columns to the best column width.
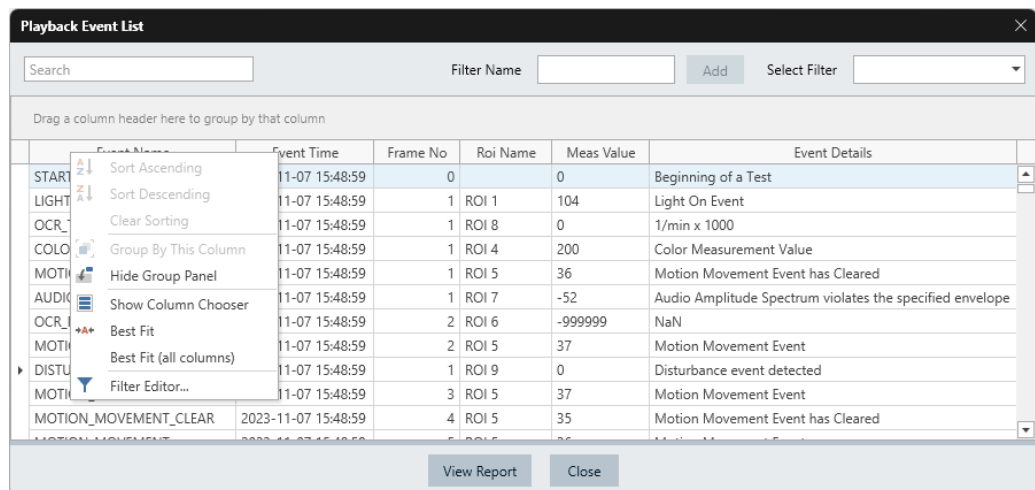- "Filter Editor...":
  Change a defined filter.

Figure 5-56: Context menu of the table headers, for example in an events list

Filtering a table using a search term

To filter a table by a search term, enter a term into the search field. The table shows all entries that contain this term and hides all entries that do not contain it. Also, it highlights the search term in yellow.

In tables like in Figure 5-57, you can save the filter by adding a filter name. See "Saving a filter name" on page 60.

Figure 5-57: Using the search field for simple textual filtering

1 = Search term field
2 = Filtered event list

To remove the search filter, click the ⊗ icon on the right side of the search field. To delete a saved filter, click its ᵪ icon in the "Select Filter" field.

Filtering tables by content in a selected column

You can set different "Filter Rules" and "Filter Values" to filter by columns. To do so, right-click a column header and select "Filter Editor" in its context menu. Or hover the mouse pointer over a column header and click the filter ▼ icon:

Figure 5-58: Filter icon in a column header

Columns can have different data types, for example string, date or number. Depending on the data type, you can define filter rules (conditions) or filter values for a column:
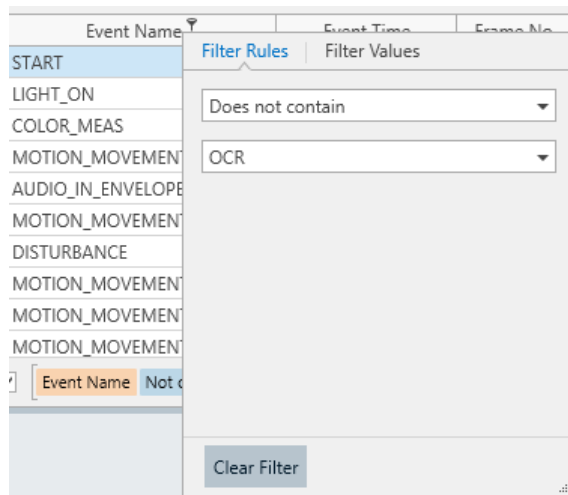
Figure 5-59: One of the table-header filter dialogs

- For "Filter Rules", select a filter option from the drop-down list. Enter or select the value by which you want to filter the column.
- For "Filter Values", select one or more entries in the list of values by which you want to filter the column.

Click outside the filter dialog. The table automatically filters the entries and shows the filter conditions below the entries.

To remove a column filter, click "Clear Filter" below the table or in the filter dialog.

Filtering tables by using the Filter Editor

The filter editor allows filtering across many events from different ROIs, using complex filter expressions. To open the "Filter Editor ...", select it from the context menu (see Figure 5-56).
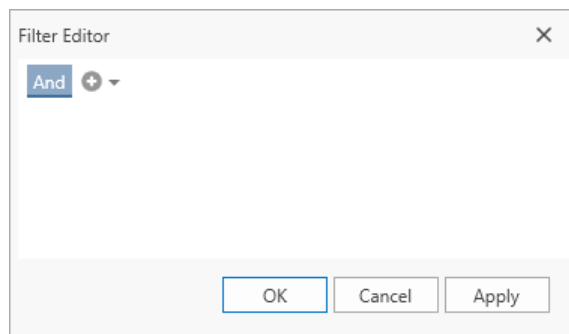
Figure 5-60: The Filter Editor, still empty

To specify a filter expression, click the "Add Condition" (⊕) button.

Each filter expression consists of three parts:

- **Search column**
  This **orange** field has a drop-down list that contains all column names. The example in Figure 5-61 selects the "Event name" column.

- **Condition type**
  This **light-blue** field has a drop-down list that contains all applicable filter conditions. The example in Figure 5-61 selects the filter condition "Starts with" for the "Event Name" column.
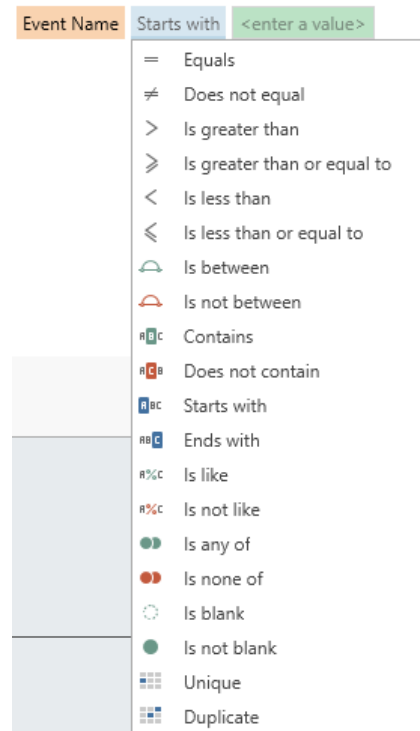
Figure 5-61: Drop-down list with all available filter conditions

- **Filter value**
  This **green** field has a drop-down list that contains all available values. The quantity next to each value shows how often it occurs, hence, for example, the number of events that are associated with this value in the search column.
  The blue "Sort: Value" or "Sort: Quantity" toggle switch sorts the drop-down list by values (alphanumerically) or by the quantity of occurrences.
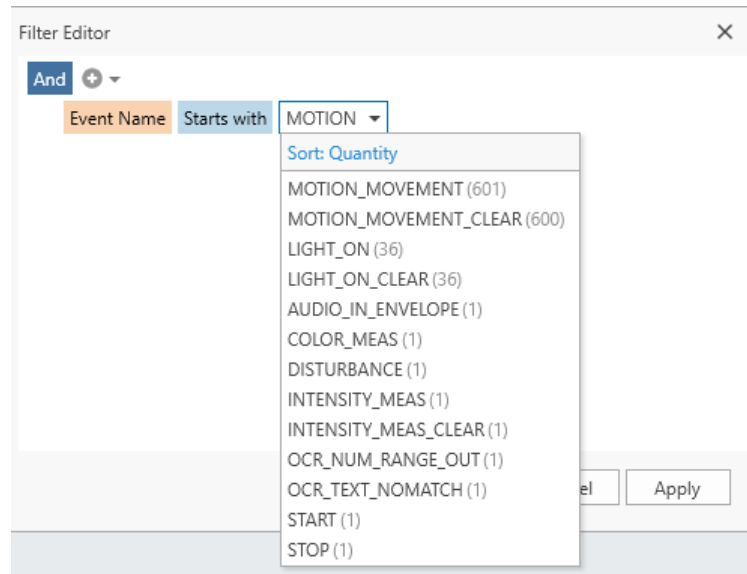
Figure 5-62: Drop-down list with all available filter values

If necessary, add more lines for filter expressions by clicking the ⊕ button, and proceed with selecting the desired parts of the expression as above.

The software combines multiple expressions by one of the following Boolean operators: "AND", "OR", "NOT AND", "NOT OR". The default operator is "AND" (highlighted with a dark-blue background in Figure 5-62). You can select one operator for all expressions in a group. For groups, see "Options for advanced filtering" on page 56.

To delete any expression, hover over it to display a delete ⊗ button:
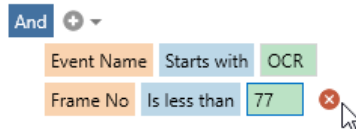
Figure 5-63: A delete button appears when you hover over an expression

Options for advanced filtering

The small down-arrow button next to the "Add Condition" (⊕) button provides advanced filtering options.
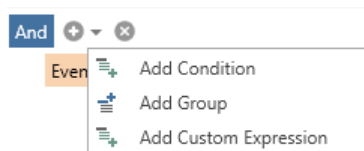
Figure 5-64: Drop-down list with options for advanced filtering

The following options are available:

● "Add Condition":
  Adds a filter condition in the same way as the "Add Condition" (⊕) button itself.

- "Add Group":
  Adds a group, in which you can combine filtering expressions. The grouping of expressions allows selecting different Boolean operators for expressions in each group and across groups.
- "Add Custom Expression":
  Adds a customized expression, which you can define in a text field. A click in this field opens the "Expression Editor":

The Expression Editor

To open this dialog, click the small down-arrow button (Figure 5-64) next to the ⊕ button in the "Filter Editor" dialog. Select "Add Custom Expression".

The "Expression Editor" dialog allows creating customized mathematics and programming expressions (docs.devexpress.com/WPF/7788). The expression returns a `TRUE` or `FALSE` value, depending on the values of the events fields.
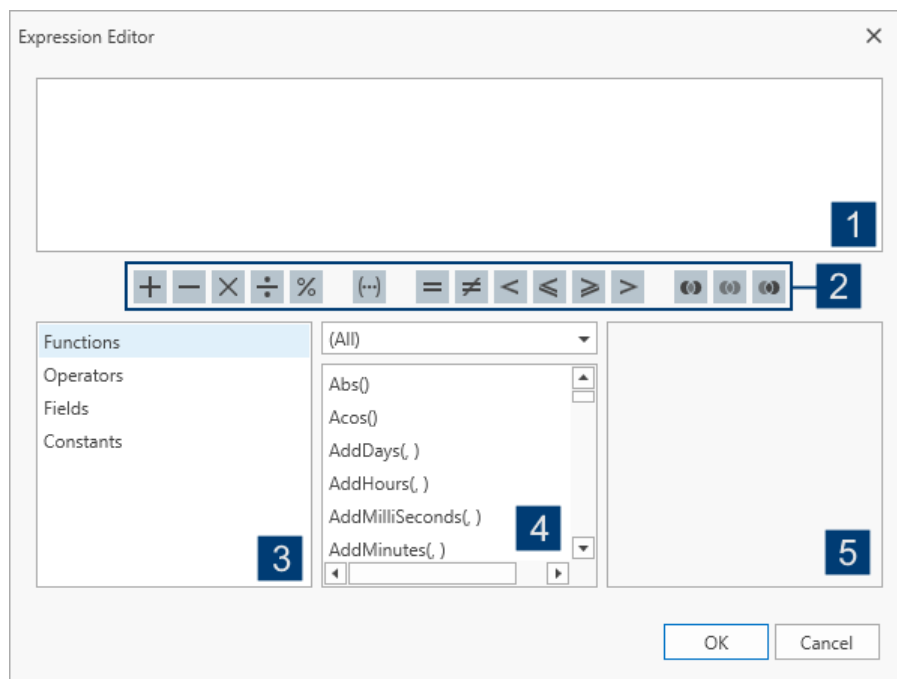
Figure 5-65: The Expression Editor, which is part of the Filter Editor

1 = Dialog for editing the expression. We recommend you not to use it.
2 = Shortcut panel for frequently used operators, and brackets
3 = Categories available for creating an expression
4 = All entry options that are available for each category
5 = Description of the selected entry option

ⓘ We recommend using simple filters and avoiding to edit filter expressions (1), because noncompliant expressions can lead to errors and instabilities.

Application examples for the expression editor:

- Retrieving information such as the current time, date, day or month, without having to change this value manually every time you open the test run recording
- Computing complex mathematical calculations, e.g. trigonometric functions, taking powers and absolutes, int64 calculations
- Performing string operations, e.g. replacing, trimming, concatenating, converting strings to other data types, taking substrings
- Applying bitwise logical "OR" or "AND" operations
- Reading the definitions of all the available functions and operators

The expression components that this editor can use are grouped into four categories: "Functions", "Operators", "Fields" and "Constants", as shown on the lower left in Figure 5-65. The lower center of the dialog lists the available entry options (expression components) in the selected category. When you select an entry, the field on its right shows a description.

To create a customized expression

1. Select a category (3 in Figure 5-65).

2. To add an entry from this category to the expression, double-click the entry in the list (4).
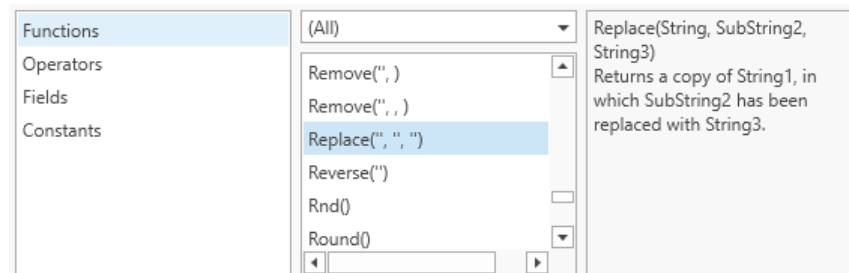
Figure 5-66: The list of functions and its explanation panel

3. To add an operator from the shortcut panel (2), click it.
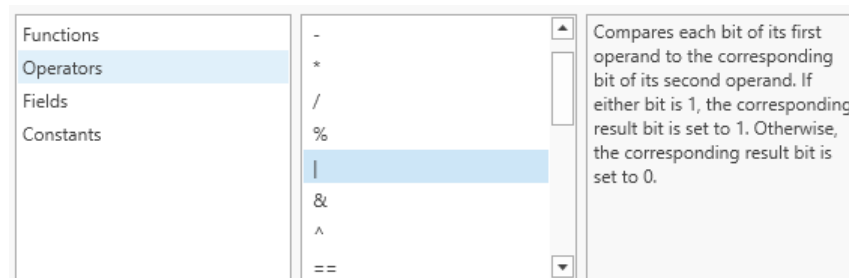
Figure 5-67: The list of operators and its explanation panel

4. To add the expression to the current filter, click "OK".
   Alternatively, to cancel or undo any changes, click "Cancel".

   The "Expression Editor" dialog closes and returns to the "Filter Editor" dialog.

5. To view the filtered table while keeping the "Filter Editor" open, click "Apply".

6. To apply the filter and close the "Filter Editor", click "OK".
   Alternatively, to close the "Filter Editor" without applying any changes, click "Cancel".
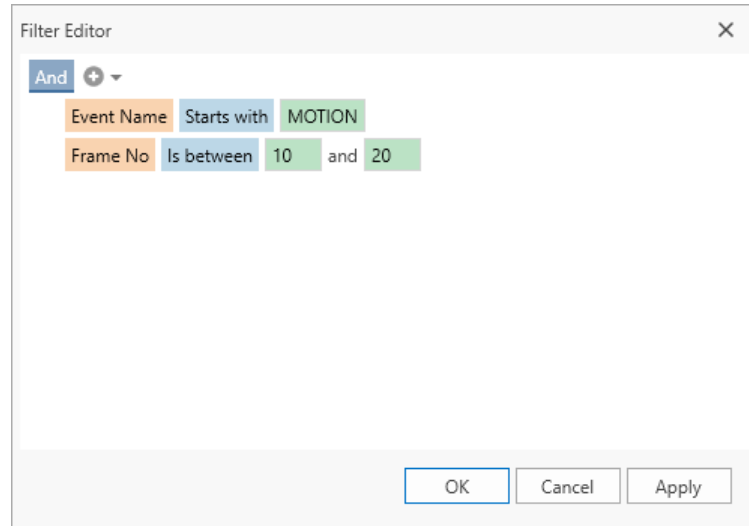
Figure 5-68: Filter Editor with two combined filtering expressions

The table dialog shows the filtering expression at its lower edge:
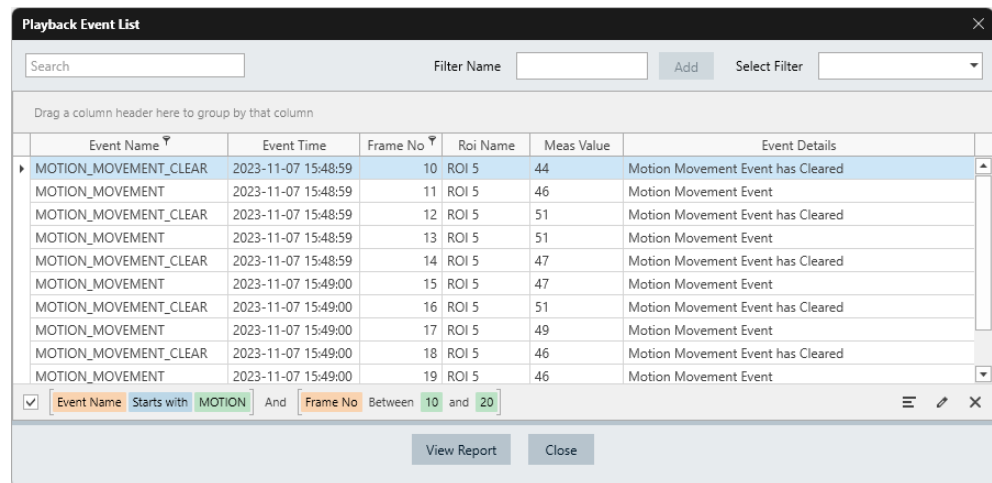
Figure 5-69: Table with two combined filtering expressions applied

To remove a part of an expression, hover over the part to be removed. A small "X" button appears at the top right-hand corner of the expression. Click this "X" button to remove the selected part of the expression.
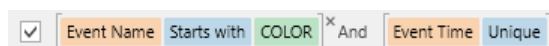
Figure 5-70: Small X button for removing part of an expression from a filter

Also, there are three buttons at the far right of the expression in the lower filter toolbar:

≡ ✎ ✕

Figure 5-71: Three buttons in the lower filter toolbar

- List ≡ :
  Shows a list of the recently used filter expressions. You can select an expression, for example to undo a change that you made in a previous version of the filter.
- Edit ✎ :
  To modify the expression, click the "Edit Filter" ✎ button. It opens the "Filter Editor" dialog for the selected filter.
- Remove ✕ :
  Removes the selected filter.

To save a filter for later use in the same test run record, see "Saving a filter name" on page 60.

Saving a filter name

For easy reproduction of a filtering action, you can save a filter name in a result record: Enter a name in the "Filter Name" field and click "Add". Note that saving a filter does not make it available in other records.

To filter a table by using a saved filter, select its name from the drop-down list in the "Select Filter" field (1 in Figure 5-72). To remove a filter name, click the ▾ₓ icon associated with this filter.
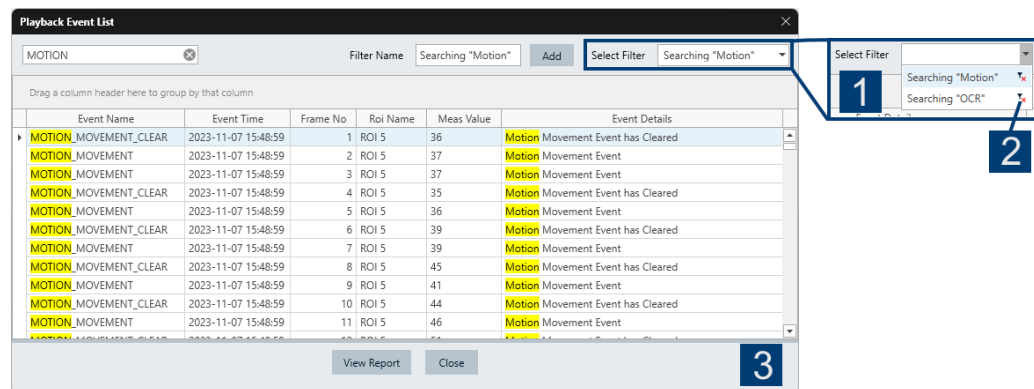
Figure 5-72: Adding a filter by entering a filter name and clicking Add

1 = Enlarged view of the "Search Filter" field
2 = Delete filter icon
3 = Filtered event list, with the filtered term highlighted in yellow

5.6 Exit

The "Exit" button closes the main window and terminates executing R&S AdVISE.

6 Regions of interest (ROIs)

Regions of interest (ROIs) are the mechanism by which you define how to use the R&S AdVISE system.

ROIs are sections of the video surface that you can specify by drawing a box, typically a small rectangle, around the area that you want the software to inspect. As a result, the analyzer algorithms focus on the areas in the video frames defined by the ROIs. This focus on defined areas increases the speed in which the software captures events and ensures real-time processing. The R&S AdVISE system supports the monitoring of up to 32 ROIs in parallel.

Each ROI that you create is assigned to one of the following specific types of event that you want the software to monitor in this area:
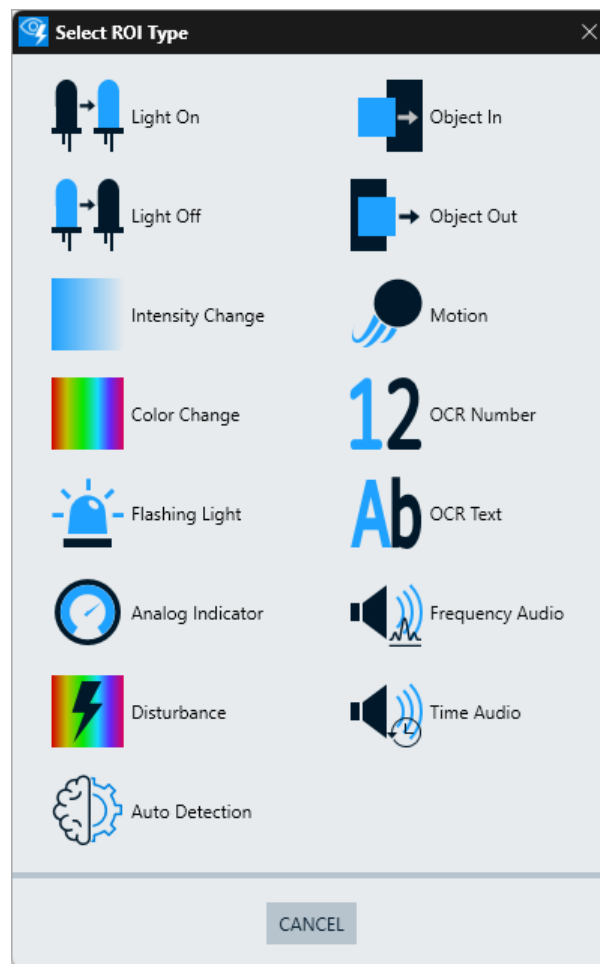
Figure 6-1: Dialog for selecting the type of ROI

The following chapters describe these ROIs in detail.

6.1 Light On, Light Off

"Light On" and "Light Off" indicate drastic changes in brightness, typically of a lamp, which is either on or off. The analyzer declares an event when the state of illumination in the ROI changes from off to on or from on to off.

Examples of this detection type are:

● Headlights

● Dashboard indicator lights (ABS, engine oil, temperature, warning, etc.)

● Taillights

● Cockpit warning indicators

● Interior or exterior lighting

The "Light On" ROI throws an event when a light goes on, whereas the "Light Off" ROI throws an event when a light goes off.

Figure 6-2 and Figure 6-3 show the "Light On" and "Light Off" properties dialogs, which are described below.

Figure 6-2: ROI properties dialog for Light On
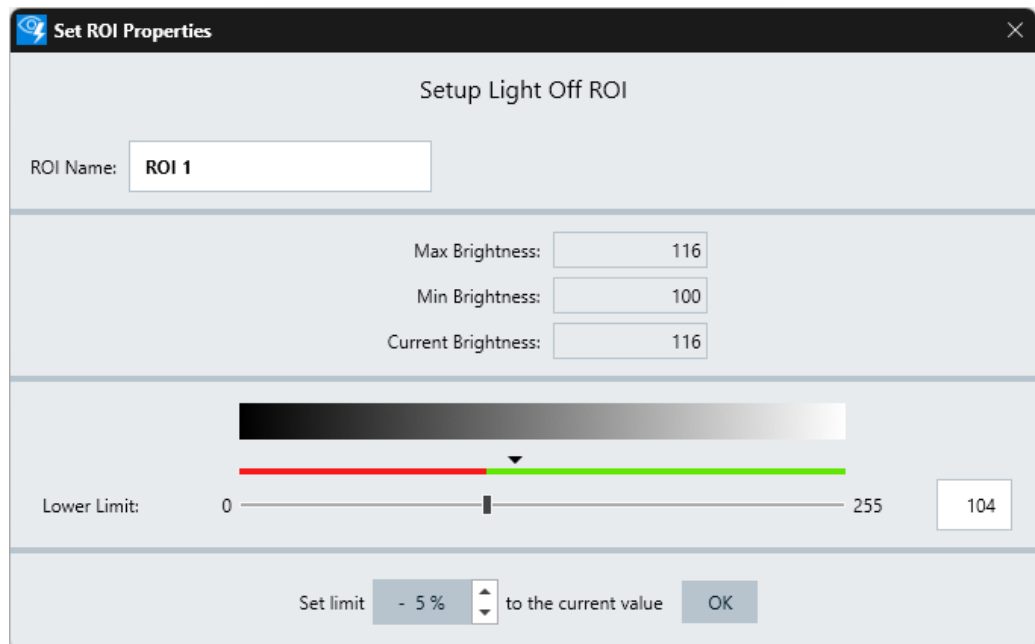
Figure 6-3: ROI properties dialog for Light Off

- "ROI Name":
  Specifies a unique name for this region of interest.
- "Max Brightness":
  Displays the maximum brightness of a "Light On" or "Light Off" event.
- "Min Brightness":
  Displays the minimum brightness of a "Light On" or "Light Off" event.

- "Current Brightness":
  Displays the current brightness of a "Light On" or "Light Off" event.
- "Upper Limit":
  Selects the upper limit of the brightness when the light-on event is detected. To do so, move the slider or type a number between 0 (dark) and 255 (bright) directly in the field right beside the slider. The region above the upper limit is indicated in red and the region below the upper limit is indicated in green.
- "Lower Limit":
  Selects the lower limit of the brightness when the light-off event is detected. To do so, move the slider or type a number between 0 (dark) and 255 (bright) directly in the field right beside the slider. The region below the lower limit is indicated in red and the region above the lower limit is indicated in green.
- "Set Limit +/- x % to the current value":
  Sets the tolerance level of the current value on a scale from 0 to 255. The set limit is the given percentage times 255.
  - In the "Light On" ROI, a light-on event is detected when the current brightness value is above the set "Upper Limit".
  - In the "Light Off" ROI, a light-off event is detected when the current brightness value is below the set "Lower Limit".

  When you click the value in the percentage field, the software adjusts the limit relative to the current value as follows:
  - In the "Light On" ROI with a set limit of x%, it adjusts the "Upper Limit" to the current value + x * 255 / 100.
  - In the "Light Off" ROI with a set limit of x%, it adjusts the "Lower Limit" to the current value - x * 255 / 100.

6.2 Object In, Object Out

"Object In" and "Object Out" reports any variation within the defined ROI. The variation can be caused by an object that moves into or out of this area. Or it can be caused by changes of the identified object.

Examples of this type of detection are:
- Symbols
- Numerical and alphanumerical characters
- Indicator positions

"Object In" throws an event when an object enters into the ROI, while "Object Out" throws an event when an object leaves the ROI.

Figure 6-4 and Figure 6-5 show the "Object In" and "Object Out" properties dialogs, which are described below.

When you create this type of ROI, the "OK" button for saving the ROI appears only after capturing a reference image.
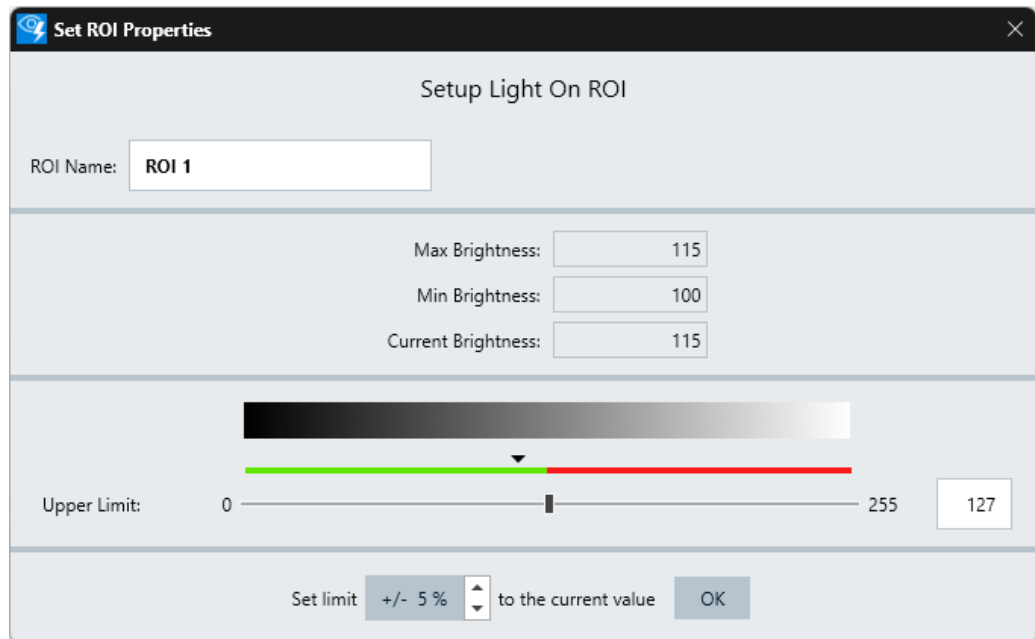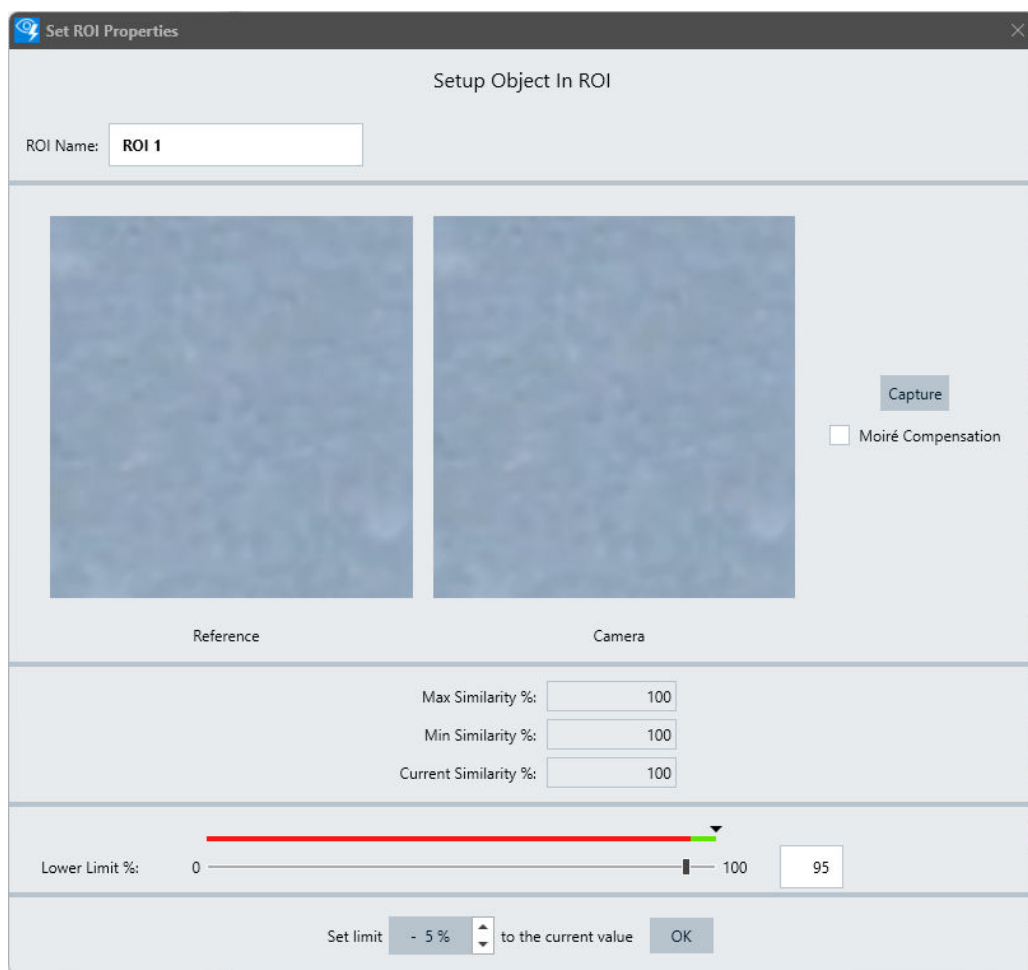
Figure 6-4: ROI properties dialog for Object In
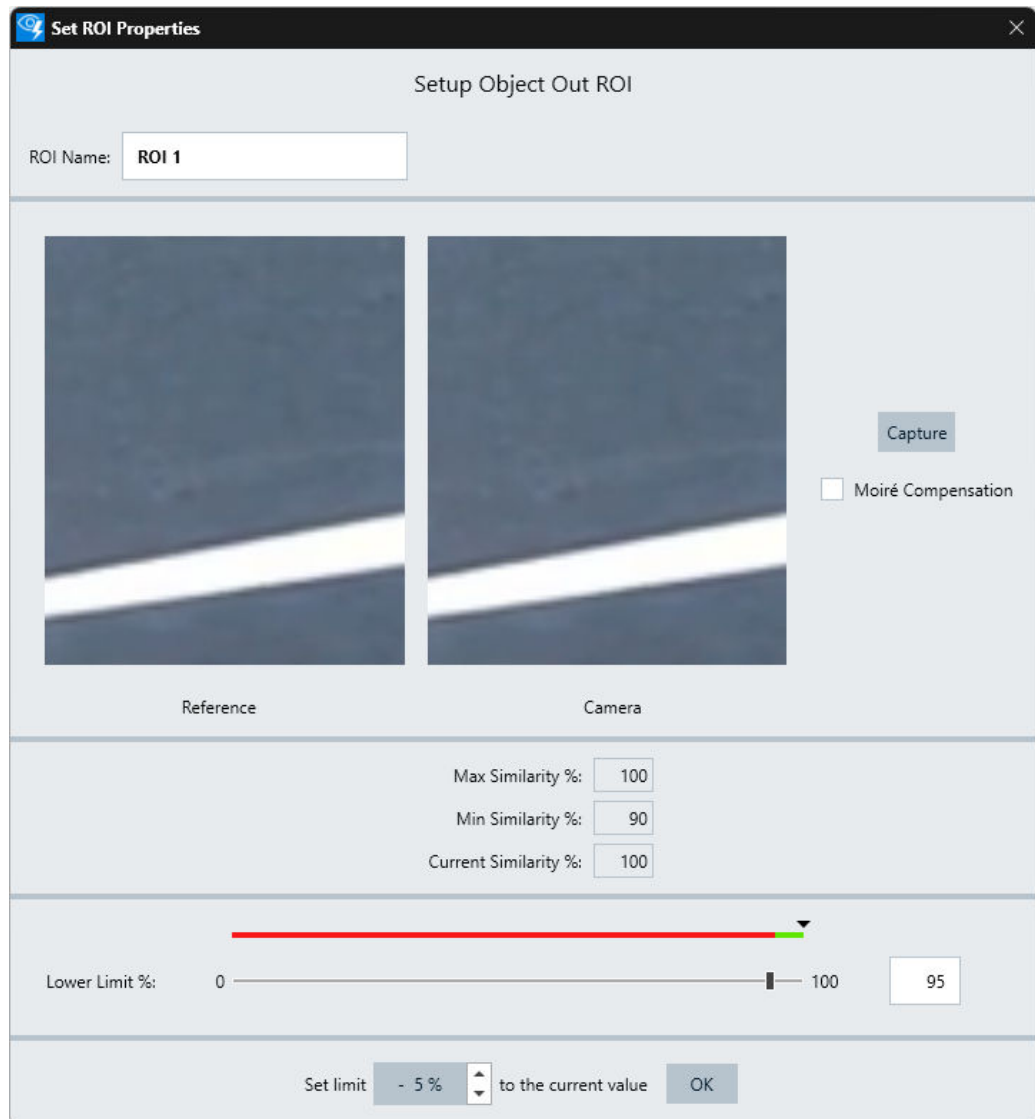
Figure 6-5: ROI properties dialog for Object Out

- "ROI Name":
  Specifies a unique name for this region of interest.
- "Reference":
  Shows a copy of the image captured by the camera when clicking "Capture".
- "Camera":
  Shows a live feed of the camera image.
- "Capture":
  Pastes the image currently captured by the "Camera" into the "Reference" field.
  During tests, the analyzer takes this picture as a reference and check for changes.
- "Moiré Compensation":
  Selects showing images with or without resolution compensation.
  Moiré patterns can result from different resolutions of the camera and the display.
  We recommend enabling compensation also to improve the video in the presence

of severe image noise. To compare the video feed with and without compensation, toggle the checkbox.

After checking or unchecking this option, recapture the reference.

- "Max Similarity %":
  Displays the highest similarity (a percentage value) between the displayed image and the reference image in percent.

- "Min Similarity %":
  Displays the lowest similarity value between the displayed image and the reference image in percentage.

- "Current Similarity %":
  Displays the current similarity value between the displayed image and the reference image in percentage.

- "Lower Limit %":
  Sets the lower limit in percent of the similarity when the event is detected. 0% similarity means that the images are completely different. 100% similarity means that the images are identical.
  To set the limit, move the slider or type a number between 0 and 100 directly in the field right beside the slider. The region below the lower limit is indicated in red and the region above the lower limit is indicated in green.

- "Set limit x % to the current value":
  Sets a tolerance level x in the range from 0 to 100 relative to the current value. When you click the value in the percentage field, the software adjusts the "Lower Limit" to the current value - x.
  For example, if you choose a tolerance of x = 5% and the current value is 75, the limit is 70.

6.3 Intensity Change

The "Intensity Change" ROI monitors the brightness (or luminance) of the observed area. The analyzer detects an event when the average brightness in the ROI leaves or enters a specified range.

Examples of this type of detection are:

- Lamps
- Background illumination

Figure 6-6 shows the "Intensity Change" properties dialog, which is described below.
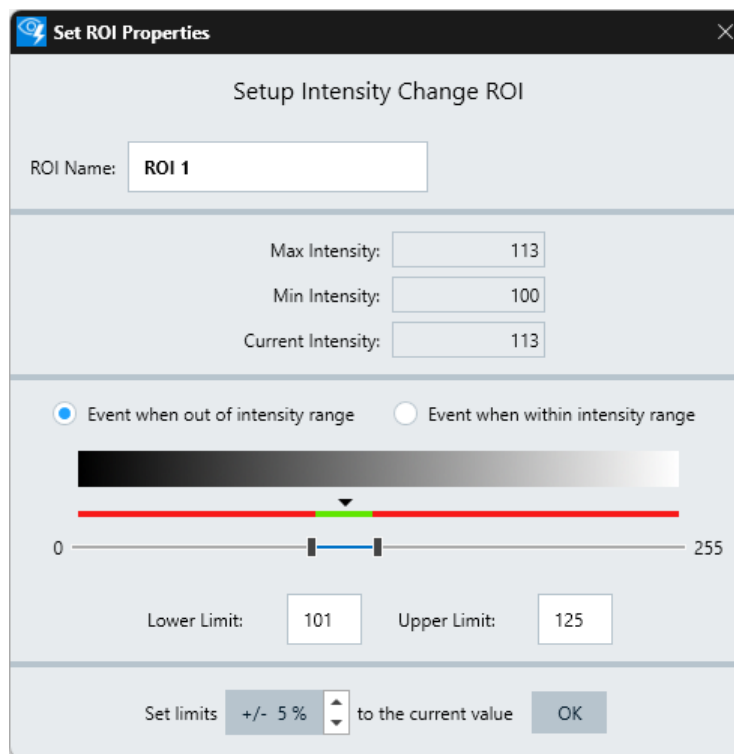
Figure 6-6: ROI properties dialog for Intensity Change

- "ROI Name":
  Specifies a unique name for this region of interest.

- "Max Intensity":
  Displays the detected maximum intensity value.
  The intensity value 255 stands for maximum brightness.

- "Min Intensity":
  Displays the detected minimum intensity value.
  The intensity value 0 stands for darkness.

- "Current Intensity":
  Displays the current intensity value.

- "Event when out of intensity range" / "Event when within intensity range":
  Selects, if the software must detect an event when the intensity measured is within
  or out of the range, which you specify by setting the limits.

- "Lower Limit" /"Upper Limit":
  Defines the thresholds for raising an event depending on the intensity value detec-
  ted during the test in the observed area.
  Triggering an event depends on the selection, whether the intensity changes to
  something within or outside of the defined range.
  The range inside or outside the lower and upper limit, wherever an event is to be
  triggered, is displayed in red. The other range, in which no event is triggered, is
  displayed in green.

- "Set limit x % to the current value":
  Specifies the tolerance level of the current value.

The lower limit is the current value minus the percentage times 255. The upper limit is the current value plus the percentage times 255.

6.4 Color Change

The "Color Change" ROI detects defined color changes in the observed area. The analyzer triggers an event when the hue in the ROI leaves or enters a specified range.

Examples of such detection are:

- Indicator that is normally green but turns to amber or red
- A material changing its color

Figure 6-7 shows the "Color Change" properties dialog, which is described below.

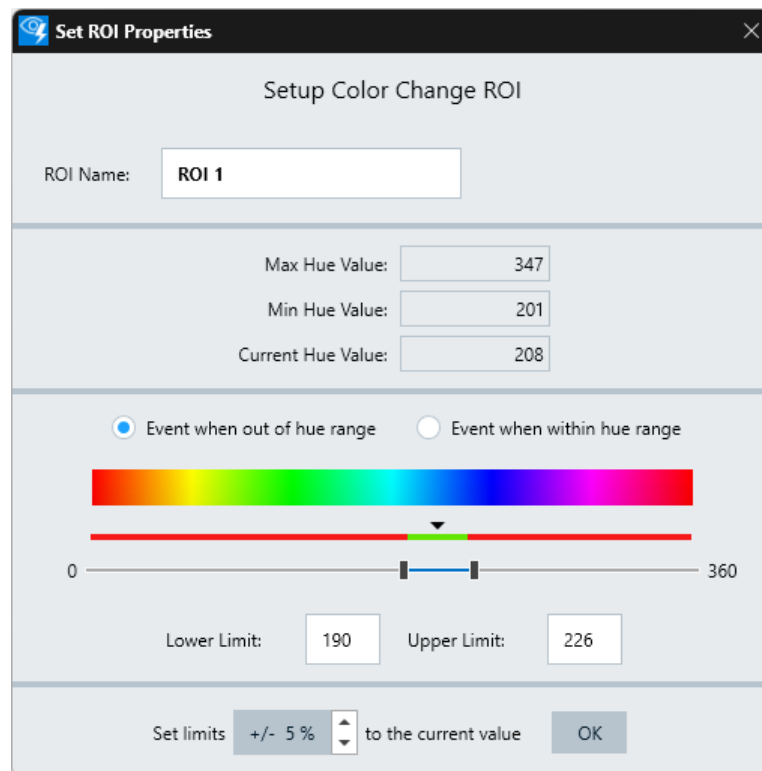*Figure 6-7: ROI properties dialog for Color Change*

- "ROI Name":
  Specifies a unique name for this region of interest.
- "Max Hue Value":
  Displays the maximum detected hue value in the observed region, given in the range from 0 degrees to 360 degrees.
- "Min Hue Value":
  Displays the minimum detected hue value in the observed region, given in the range from 0 degrees to 360 degrees.
- "Current Hue Value":

Displays the current hue value in degrees.

- "Event when out of hue range" / "Event when within hue range":
  Selects, if the software must detect an event when the hue value measured is within or out of range.
  The hue range for red color is in the region close to 360 ° and 0 °. If the "Event when out of hue range" is selected, and the selected red goes from 350 ° to 360 ° and from 0 ° to 10 °, the event mode is changed automatically to "Event when within hue range". This setting ensures that an event is detected when the color is between 10 ° and 350 °.

- Color scale
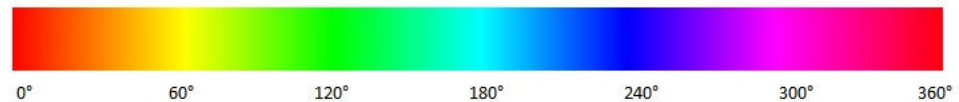
Figure 6-8: Color scale

Figure 6-8 shows the scale for all hue values in degrees, in which you can set the "Upper Limit" and "Lower Limit".

- "Lower Limit" /"Upper Limit":
  Defines the thresholds of the values detected during the test for triggering an event. Depending on the selection, the software triggers an event if the color changes to something within or out of the defined hue range.
  The range inside or outside the lower and upper limit, wherever an event is to be triggered, is displayed in red. The other range, in which no event is triggered, is displayed in green.

- "Set limit x % to the current value":
  Specifies the tolerance level of the current value.
  The lower limit is the current value minus the percentage times 360. The upper limit is the current value plus the percentage times 360.

6.5 Motion

The "Motion" ROI checks whether an element starts or stops moving. The analyzer reports an event when the monitored element in this ROI stops moving or starts moving for a defined time.

Examples of this type of detection are:

- Activity indicators
- Mechanical relays
- Running counters
- Running engines

To calculate the difference between two consecutive frames, the software uses the peak signal-to-noise ratio (PSNR) algorithm. A high PSNR value indicates a frozen motion, a low PSNR value indicates a moving object. The PSNR value is capped at 100.

Figure 6-9 shows the "Motion" properties dialog, which is described below.

Figure 6-9: ROI properties dialog for Motion

- "ROI Name"
  Specifies a unique name for this region of interest.

- "Maximum PSNR dB":
  Displays the maximum peak signal-to-noise ratio in dB.

- "Minimum PSNR dB":
  Displays the minimum peak signal-to-noise ratio in dB.

- "Current PSNR dB":
  Displays the current peak signal-to-noise ratio in dB.

- "Frames Above Limit":
  Displays the number of frames detected with a value above the upper limit.

- "Frames Below Limit":
  Displays the number of frames detected with a value below the lower limit.

- "Event when Movement detected" or "Event when Freeze detected":
  Determines if an event is triggered when the software detects a movement or a motion freeze.

For the following settings: You can type your setting into the field at the right-hand side of the slider.

- "Lower Limit dB" or "Upper Limit dB":
  Availability depends on the selection of "Event when Movement detected" or "Event when Freeze detected".

  – "Lower Limit dB" (for "Event when Movement detected"):
    The software records a motion event when the current parameter value is below the "Lower Limit dB" for more than the permitted number of frames. The region below the lower limit is indicated in red and the region above the lower limit is indicated in green.

- "Upper Limit dB" (for "Event when Freeze detected"):
  The software records a freeze event when the current parameter value is above the "Upper Limit dB" for more than the permitted number of frames. The region below the upper limit is indicated in green and the region above the upper limit is indicated in red.
- Tolerance for raising an event:
  - "Consecutive Number of Frames Above Limit for Event" (for "Event when Movement detected"):
    Specifies the number of consecutive video frames that must have a value above the limit, so that the software raises a motion event.
    For example, if the setting is 20 frames, an event occurs when the software detects motion during at least 20 frames.
  - "Consecutive Number of Frames Below Limit for Event" (for "Event when Freeze detected"):
    Specifies the number of consecutive video frames that must have a value below the limit, so that the software raises a freeze event.
    For example, if the setting is 20 frames, an event occurs when the software detects no motion during at least 20 frames.
- Tolerance for clearing an event:
  - "Consecutive Number of Frames Below Limit for Clear" (for "Event when Movement detected"):
    Specifies the number of consecutive video frames that must have a value below the limit, so that the software clears a motion event.
    For example, if the setting is 5 frames, the software clears a previously raised motion event when it detects no motion during at least five frames.
  - "Consecutive Number of Frames Above Limit for Clear" (for "Event when Freeze detected"):
    Specifies the number of consecutive video frames that must have a value above the limit, so that the software clears a freeze event.
    For example, if the setting is 5 frames, the software clears a previously raised freeze event when it detects motion during at least five frames.
- "Set limit x % to the current value":
  Sets the lower limit to the current value - x (minus the percentage times 100). Sets the upper limit to the current value + x (plus the percentage times 100).

6.6 OCR Number

"OCR Number" is available only with a license for option R&S ADV-K1060 (order no. 1434.6601.02). This ROI is a version of optical character recognition (OCR), specialized on converting images of numbers into number characters, other than the OCR Text ROI. Typically, use the "OCR Number" function to check if a value is within or outside of a defined range.

Figure 6-10 shows the "OCR Number" properties dialog, which is described below.

Figure 6-10: ROI properties dialog for OCR Number

- "ROI Name":
  Specifies a unique name for this region of interest.
- "Type":
  Selects the number style according to the following languages:
  - "7-Segment"
  - "Custom"
  - "German"
  - "English"
  - "French"
  - "Spanish Castilian"
- "Decimal separator":
  Allows choosing between a "Point" or "Comma".
  Available only if the "Significant digits" is set to "Auto".
- "Black/White Threshold":
  Sets the black/white threshold to adjust the readability of the numbers. We recommend using the default value 0.6, unless you experience better results with a different value.

For proper character recognition, ideally the numbers are solid black and have a white background. The threshold value influences the recognition algorithm in its interpretation of grayscale levels as either black or white.
When you place the cursor in the field, you can use the mouse wheel to increase or decrease the threshold. "Reset" sets the threshold value to its default of 0.6.

- "Alignment":
  Adjust the alignment value until the number appears straight. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the threshold so that the number is straightened.
  Select "Reset" to set the value to its default.

- "Smoothing":
  Sets the value to smooth the characters and increase the readability of the numbers. Smoothing also ensures that the numbers are whole, hence no white in the numbers.
  When you place the cursor in the field, you can use the mouse wheel to increase or decrease the amount of smoothing. "Reset" sets the smoothing value to its default of 0.

- "Tolerated faults":
  Defines the minimum number of frames even with matching conditions, before declaring an event. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.
  For example, if you want to tolerate 3 faults, the software does not raise an event, even if the recognized characters are in the specified range during 3 consecutive frames. If the matching recognition remains for 4 or more consecutive frames, the software raises an event.
  Use this setting to prevent false events when the image quality is poor or if there are screen-tearing effects, frame drops, low-resolution images or other issues with the video stream. "Reset" sets the tolerance value to its default of 2.

- "Significant Digits":
  Specifies the number of significant digits in the detected value and in the high and low limit values.
  - "Auto":
    Keeps the number of significant digits that it finds behind the decimal separator.
  - Any number between 0 and 9:
    Sets the number of significant digits after the decimal point.

  Without any significant digits set, R&S AdVISE searches for a decimal separator. However, if you set a significant digit, R&S AdVISE puts a dot between the selected number of significant digits and the rest of the number.

- "Current":
  Displays the number currently recognized in the image.

- "Event when out of numerical range" / "Event when within numerical range":
  Selects, if the software must detect an event when the current values are within or out of the upper and lower limit.

- "Lower Limit":
  Sets the lower limit for the range check. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.

- "Upper Limit":

Sets the upper limit for the range check. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.

- "Set limit x % using the current value":
  Specifies the tolerance level of the current value.

  – The upper limit is the current value plus the percentage times the current value:
    "Upper Limit" = current value * (1 + x / 100)

  – The lower limit is the current value minus the percentage times the current value:
    "Lower Limit" = current value * (1 - x / 100)

Recommendation

To improve OCR results, set the "Tolerated faults" to at least 2. Refer also to "To improve the OCR results" on page 78.

6.7 OCR Text

"OCR Text" is available only with a license for option R&S ADV-K1060 (order no. 1434.6601.02). This ROI is a version of optical character recognition (OCR), specialized on converting images of text into text characters, other than the OCR Number ROI. Typically, use the "OCR Text" function to check if text in your video stream does or does not match with specified content.

Figure 6-11 shows the "OCR Text" properties dialog, which is described below.

Figure 6-11: ROI properties dialog for OCR Text

- "ROI Name":
  Specifies a unique name for this region of interest.
- "Type":
  Selects the text styles for different languages.
- "Only one line of text":
  Selects, if you want to recognize one line of text (= default) or allow multiple lines.
  To recognize multiple lines, uncheck this checkbox.
- "Black/White Threshold":
  Sets the black/white threshold to adjust the readability of the text. We recommend using the default value 0.6, unless you experience better results with a different value.

For proper character recognition, ideally the text is solid black and has a white background. The threshold value influences the recognition algorithm in its interpretation of grayscale levels as either black or white.

When you place the cursor in the field, you can use the mouse wheel to increase or decrease the threshold. "Reset" set the threshold value to its default of 0.6.

- "Smoothing":
  Sets the value to smooth the characters and increase the readability of the text. Smoothing also ensures that the text is whole, hence no white in the letter.

  When you place the cursor in the field, you can use the mouse wheel to increase or decrease the amount of smoothing. "Reset" set the smoothing value to its default of 0.

- "Tolerated faults":
  Defines the minimum number of frames even with matching conditions, before declaring an event. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.

  For example, if the number of tolerated faults is 3, the software does not raise an event, even if the recognized characters match some search text during 3 consecutive frames. If the matching recognition remains for 4 or more consecutive frames, the software raises an event.

  Use this setting to prevent false events when the image quality is poor or if there are screen-tearing effects, frame drops, low-resolution images or other issues with the video stream. "Reset" sets the tolerance value to its default of 2.

- "Current":
  Displays the characters currently recognized in the image.

- "Event when not matching" / "Event when matching":
  Selects, if matching or non-matching characters recognized in the image establish an event.

  - "Event when matching": the software raises an event if the recognized characters match the text in any of the checked text boxes.
    "Event when not matching": the software raises an event if the recognized characters do not match the text in any of the checked text boxes.

- "Set to current":
  Sets the selected text field to the recognized characters in the "Current" field.

- Checkboxes next to the text fields:

  - If enabled, the OCR algorithm includes this text field into the comparison with the recognized characters.

  - If disabled, this text field is ignored for the comparison.

To improve the OCR results

1. To reduce image distortions, position the camera perpendicular to the surface captured in the ROI.

2. Restrict the ROI to contain only relevant content.

3. Adjust the ROI to be as small as possible.
   Ideally, the ROI contains only the text with no other characters, such as patterns or icons that are irrelevant for analysis.
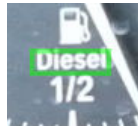
Figure 6-12: Good outline of the OCR text ROI

Figure 6-13: Bad outline of the OCR text ROI

With a good outline, the detection is perfect with a monochrome background. Otherwise, the detection is affected.
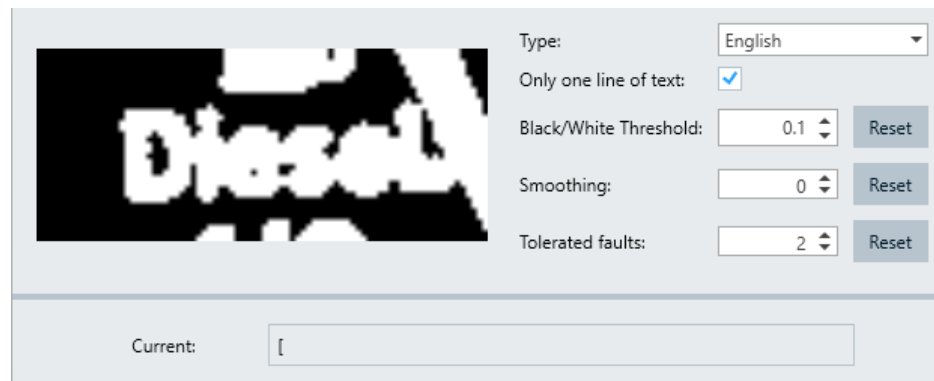

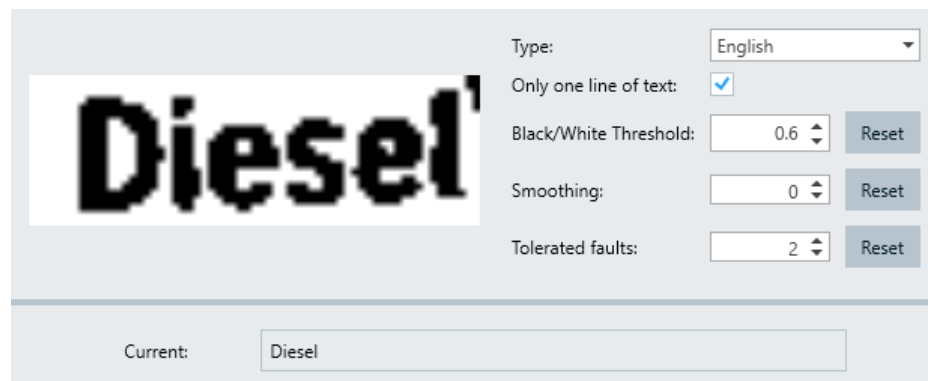*Figure 6-14: Bad text detection due to patterns in the background*

Figure 6-15: Good detection due to monochrome background

4. In the configuration dialog:

   ● Avoid settings that lead to white text on a black background as in Figure 6-14.
   ● Use a "Black/White Threshold" value, which best ensures that the detected contents (the characters to be recognized) appear as black text on a white background as in Figure 6-15.
   ● We recommend using a "Tolerated faults" level of at least 2.

6.8 Flashing Light

The "Flashing Light" ROI monitors the frequency, pulse duration and duty cycle of flashing elements, either individually or together. The analyzer reports an event if at least one of the measured values exceeds the defined limit values.

Examples of this type of detection are:

● Turn indicator

● Alarms

● Running lights

Figure 6-16 shows the "Flashing Light" properties dialog, which is described below.

Figure 6-16: ROI properties dialog for Flashing Light

This dialog is divided into several sections:

● "ROI Name":
Specifies a unique name for this region of interest.

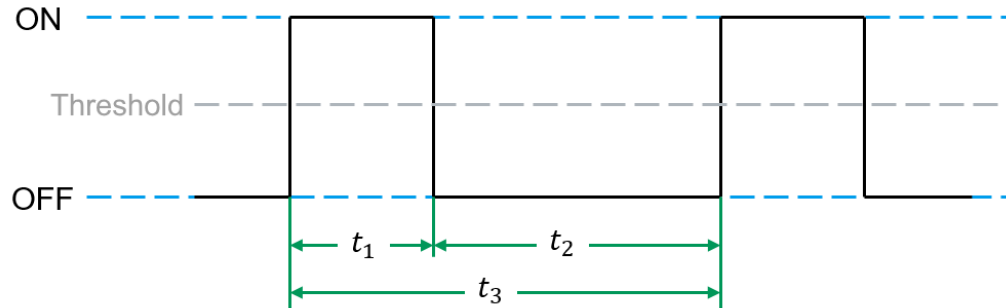● "Pulse Width (ms)" / "Duty Cycle (%)" / "Frequency (Hz)"

Frequency is selected by default, but you can enable measuring pulse width and duty cycle, too.

This section provides the following features for the ROI:

– Enables or disables the measurement of the selected physical quantity

– Displays the maximum, minimum and current value

– Specifies the upper and lower limit for the measurement of the selected physical quantity.
When you place the cursor in the field, you can use the mouse wheel to increase or decrease the limit.

● "Status":
Shows the status of the flashing light.

– "Cycle Count":
Displays the number of cycles occurred.

– "Calculating Transition Threshold":
Calculation begins when creating a "Flashing Light ROI" or after you press the "Renew Transition Threshold" button.
It takes approximately 20 seconds to complete. You cannot change any parameters in this state.

– "Flash Detected":
The analyzer detects a flash and increases the "Cycle Count".

– "No Flash Detected":
The flash is too dim to be counted.

● "Brightness Threshold For Light ON/OFF Detection (%)":
Sets a fixed value for discriminating if the light is on or off.

– "Presets":
"Robust": Automatically sets the light-off threshold to 40 % and the light-on threshold to 60 %.
"Sensitive": Automatically sets the light-off threshold to 10 % and the light-on threshold to 90 % for detecting smaller changes.

– "OFF Detection":
Depending on the preset selection, displays the fixed light off threshold.

– "ON Detection":
Depending on the preset selection, displays the fixed light on threshold.

● "Set limit x % to the current value":
Specifies the tolerance level of the current value for the enabled parameters.

– **"Pulse Width"** (maximum 4900 ms, minimum 100 ms):
Sets the upper limit to the current value plus the percentage times 4900.
Sets the lower limit to the current value minus the percentage times 4900.

– **"Duty Cycle"** (maximum 100 %, minimum 1 %):
Sets the upper limit to the current value plus the percentage times 100.
Sets the lower limit to the current value minus the percentage times 100.

– **"Frequency"** (maximum 10 Hz, minimum 0.2 Hz):
Sets the upper limit to the current value plus the percentage times 10.
Sets the lower limit to the current value minus the percentage times 10.

● "Renew Transition Threshold":

Restarts the detection and recalculates the pulse width, duty cycle and frequency, which can take a few seconds. When completed, you must renew the threshold by setting the upper and lower limits of the monitoring parameters again.

$$\text{Pulse Width (ms)} = t_1$$

$$\text{Duty Cycle (\%)} = \frac{t_1}{t_3}$$

$$\text{Frequency (Hz)} = \frac{1}{t_3}$$

Figure 6-17: Definition of pulse width, duty cycle and frequency

For more information on the adjustment of the thresholds, refer to the R&S AdVISE application note "Monitoring dynamic turn indicators with R&S AdVISE".

6.9 Analog Indicator

The "Analog Indicator" ROI converts indicator positions on a circular or linear gauge to numbers for verification.

Examples of such detection are:

● Analog meter
● Speedometer
● Clock

Figure 6-18 shows the "Analog Indicator" properties dialog, which is described below.

Figure 6-18: ROI properties dialog for Analog Indicator

- "ROI Name":
  Specifies a unique name for this region of interest.
- "Mark Circle Gauge":
  See "Mark Circular Gauge / Mark Linear Gauge" on page 85.
- "Mark Linear Gauge":
  See "Mark Circular Gauge / Mark Linear Gauge" on page 85.

- "Indicator":
  See "Indicator types" on page 86.
- "Additional Pointer Stop Range (%)":
  Specifies a percentage to extend the monitored area. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.
  A needle detected slightly below the start value is considered to be at the start value of the scale. A detection slightly above the end value is considered to be the end value of the scale.
  The extended areas are presented with a thin line.
- "Position of Indicator Detection Line":
  Adjusts the line of the detected indicator in relation to the defined area in the video frame. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.
  The indicator is monitored on a linear or circular line within the defined region.
  See "Position of Indicator Detection Line" on page 88.
- "Start Value":
  Defines the value of the start of the scale. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.
- "End Value":
  Defines the value of the end of the scale. When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.
- "Current Value":
  Shows the current position along the scale. You can also jump to a position by entering a value.
- "Event when out of numeric range" / "Event when within numeric range":
  Selects, if the software must detect an event when the detected value is within or out of range.
- "Lower Limit" / "Upper Limit":
  Sets the lower and upper limit for the range check.
  The range inside or outside the lower and upper limit, wherever an event is to be triggered, is displayed in red. The other range, in which no event is triggered, is displayed in green.
- "Set limit x % to the current value":
  Sets a tolerance level x in the range from 0 to 100 relative to the current value.
  When you place the cursor in the field, you can use the mouse wheel to increase or decrease the value.

  When you click the value in the percentage field, the software adjusts the limits as follows:

  – It sets the "Lower Limit" to the current value minus the tolerance level x times the difference of the start and end value.

  – It sets the "Upper Limit" to the current value plus the tolerance level x times the difference of the start and end value.

  For example, if the start value is 50, the end value is 100, and the tolerance percentage is 10% of this difference (100 - 50), the tolerance value is 5. If the current value is 75, clicking the percentage field adjusts the lower limit to 70 and the upper limit to 80.

Mark Circular Gauge / Mark Linear Gauge

Access: "Set ROI Properties" > "Mark Circular Gauge" / "Set ROI Properties" > "Mark Linear Gauge"

The "Mark Circular Gauge" window allows you to set up the ROI, if your scale is circular as in Figure 6-19.

To specify the circular gauge

Click the circular gauge's characteristic points in the following sequence:

1. Click the start position.

2. Click the end position.

3. Click the estimated middle position.

4. Click the peak of the indicator's current position.

    A red arc or semi-circle and a blue line appear, marking the gauge and the indicator.

5. If the gauge or the indicator is not in the right place, click "Clear" to repeat the marking procedure.
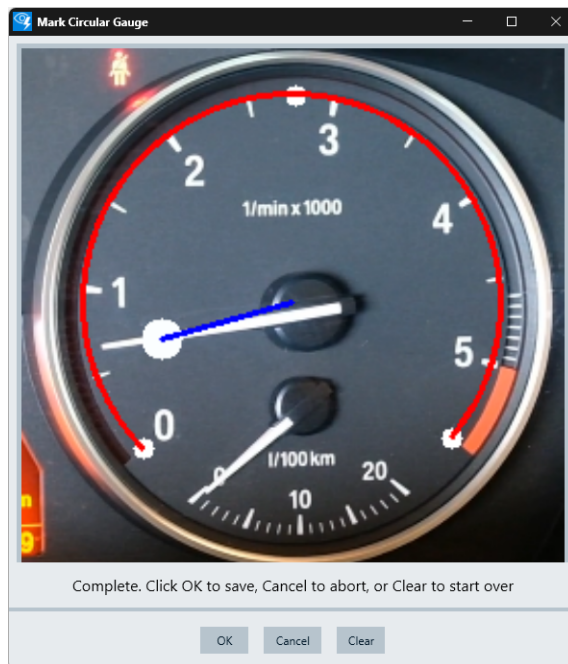

Figure 6-19: Dialog for specifying a circular gauge

0   = Start position
5.5   = End position
2.75 = Middle position
0.7   = Indicator's current position

The "Mark Linear Gauge" window allows you to set up the ROI, if your scale is linear as in Figure 6-20.

To specify the linear gauge

Click the linear gauge's characteristic points in the following sequence:

1. Click the start position.

2. Click the end position.

3. Click the center of the indicator's current position.

   A red line and a blue dot appear, marking the gauge and the indicator.

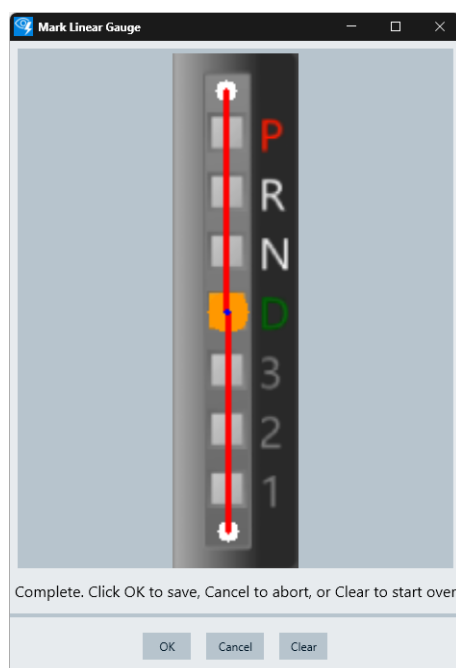4. If the gauge or the indicator is not in the right place, click "Clear" to repeat the marking procedure.

Figure 6-20: Dialog for specifying a linear gauge

< 1 = Start position
> P = End position
D   = Indicator's current position

Indicator types

R&S AdVISE supports three different indicator types:

● **"Pointer"**
A classic needle-type pointer for most gauges.
Select "Pointer" if a needle or a similar pointer indicates the value.
See Figure 6-21 (left) for an example of the "Pointer" indicator type.
You can define the limits through an angle, see Figure 6-21 (right).

Figure 6-21: Configured needle-type pointer

Left   = Original image
Right = With ROI configured

- **"Bar from Start" / "Bar from End"**
  A gauge type with accumulative presentation of the values.
  Select "Bar from Start" for a monitoring area between the start value and the current value.
  Select "Bar from End" for a monitoring area between the current value and the end value.
  See Figure 6-22 (left) for an example of the "Bar from Start" indicator type.
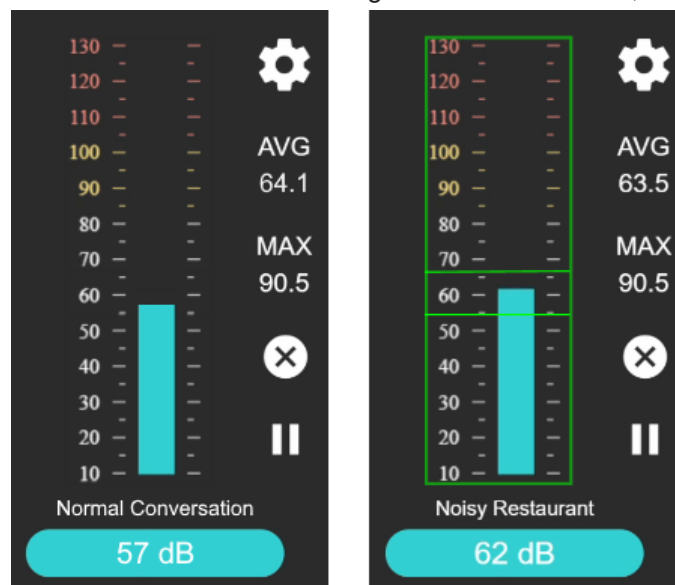 You can define the limits through two horizontal lines, see Figure 6-22 (right).

Figure 6-22: Configured indicator type Bar from Start

Left   = Original image
Right = With ROI configured

Depending on the settings, an event can be triggered if the indicator is within or outside the defined limits. When an event occurs, the limit lines change from green to red.

Position of Indicator Detection Line

The "Position of Indicator Detection Line" option allows you to adjust the position of the detection line in relation to the defined area in the video frame.

- For a circular gauge, the selected value makes the arc larger or smaller.
- For a linear gauge, the selected value shifts the line to the left or right.

The indicator is monitored on a linear or circular line within the defined region, depending on the type of gauge.

The graph below the image of the gauge shows the detection result. Multiple blue peaks indicate that there are multiple indication sources, as on the right in Figure 6-23. For perfect detection, ensure that only one blue indicator peak is above the red line. To do so, reduce the value for "Position of Indicator Detection Line" to reduce the radius, as on the left in Figure 6-23.

Figure 6-23: Bad and good choice for the radius of an indicator detection line

1 = Bad choice
2 = Good choice

6.10 Frequency Audio

"Frequency Audio" is available only with a license for option R&S ADV-K1062 (order no. 1434.6618.02). As opposed to Time Audio, this ROI allows monitoring the audio content of a video stream in the **frequency domain**. For this function, specify a range of frequencies to be observed, and offsets for a lower and upper envelope.

You can set only **one** "Frequency Audio" ROI in a test. When you position this ROI in the video area, do not let it cover essential content such as a gauge or indicators. For an example, see Figure 6-24.

Figure 6-24: Possible positioning of the Frequency Audio ROI

For this function to work, select the audio source as described in Chapter 5.1.1, "Camera & Audio Input", on page 21. Figure 6-25 shows the "Frequency Audio ROI" properties dialog, which is described below.
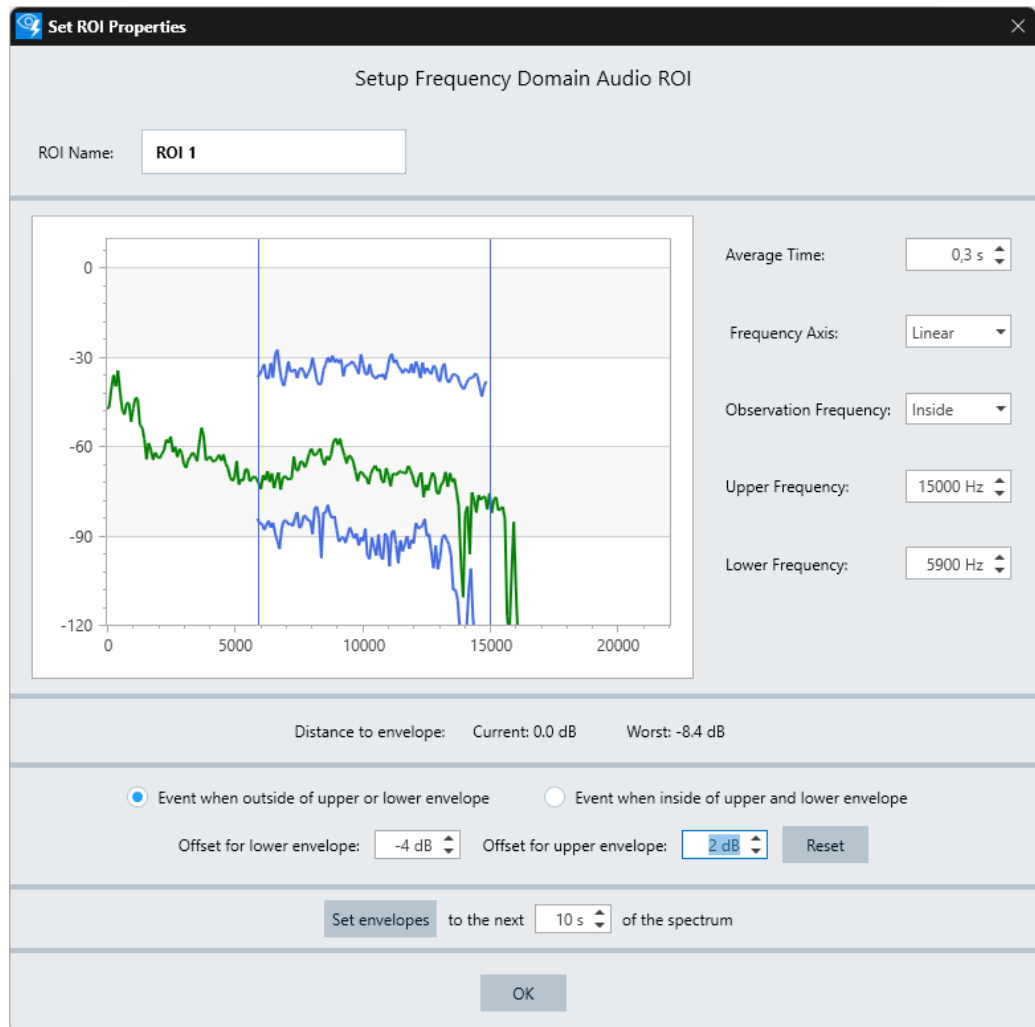
Figure 6-25: ROI properties dialog for Frequency Audio

- "ROI Name":
  Specifies a unique name for this region of interest.

- "Average Time":
  Defines a duration over which the signal is averaged to smooth the signal.
  When you click inside the field, you can use the mouse wheel to increase or decrease the value.

- "Frequency Axis":

  Selects the scale type for the frequency axis:

  – "Logarithmic"

  – "Linear"

- "Observation Frequency":
  Specifies whether the observed frequency spectrum lies inside or outside of the upper and lower limit.

- "Upper Frequency":
  Sets the upper limit for the observed frequency spectrum.

When you click inside the field, you can use the mouse wheel to increase or decrease the value.

- "Lower Frequency":
  Sets the lower limit for the observed frequency spectrum.
  When you click inside the field, you can use the mouse wheel to increase or decrease the value.

- "Distance to envelope":
  Shows the spectrum's current distance from the envelope, which describes how the sound changes over time.
  - "Current":
    The distance of the spectrum from the lower envelope in the current audio sample.
  - "Worst":
    The largest detected distance of the spectrum from the lower envelope.

- "Event when outside of upper or lower envelope" / "Event when inside of upper and lower envelope":
  Selects, if the software must detect an event when the current values are within or out of the upper and lower envelope.

- "Offset for lower envelope":
  Specifies the offset of the lower envelope in comparison to the current value.
  When you click inside the field, you can use the mouse wheel to increase or decrease the value.

- "Offset for upper envelope":
  Specifies the offset of the upper envelope in comparison to the current value.
  When you click inside the field, you can use the mouse wheel to increase or decrease the value.

- "Set envelopes":
  Evaluates the current spectrum during the specified "Average Time" and automatically generates the upper and lower envelopes, including the defined offsets.
  When you click inside the field, you can use the mouse wheel to increase or decrease the number of seconds for the average time.

To configure the frequency-domain audio ROI correctly

1. Set the following parameters of the spectrum to be monitored:
   - "Average Time"
   - "Frequency Axis"
   - "Observation Frequency"
   - "Upper Frequency"
   - "Lower Frequency"

2. Set the adjusted envelopes to the frequency spectrum to be monitored using "Set envelopes".

3. Determine the condition to trigger an event by selecting either one of the following:
   - "Event when outside of upper or lower envelope"
   - "Event when inside of upper or lower envelope"

6.11 Time Audio

"Time Audio" is available only with a license for option R&S ADV-K1062 (order no. 1434.6618.02). As opposed to Frequency Audio, this ROI allows monitoring the periodicity of a specific level of audio content of a video stream in the **time domain**.

You can set only **one** "Time Audio" ROI in a test. When you position this ROI in the video area, do not let it cover essential content such as a gauge or indicators. For an example, see Figure 6-26.

Figure 6-26: Possible positioning of the Time Audio ROI

For this function to work, select the audio source as described in Chapter 5.1.1, "Camera & Audio Input", on page 21. Figure 6-27 shows the "Time Domain Audio ROI" properties dialog, which is described below.
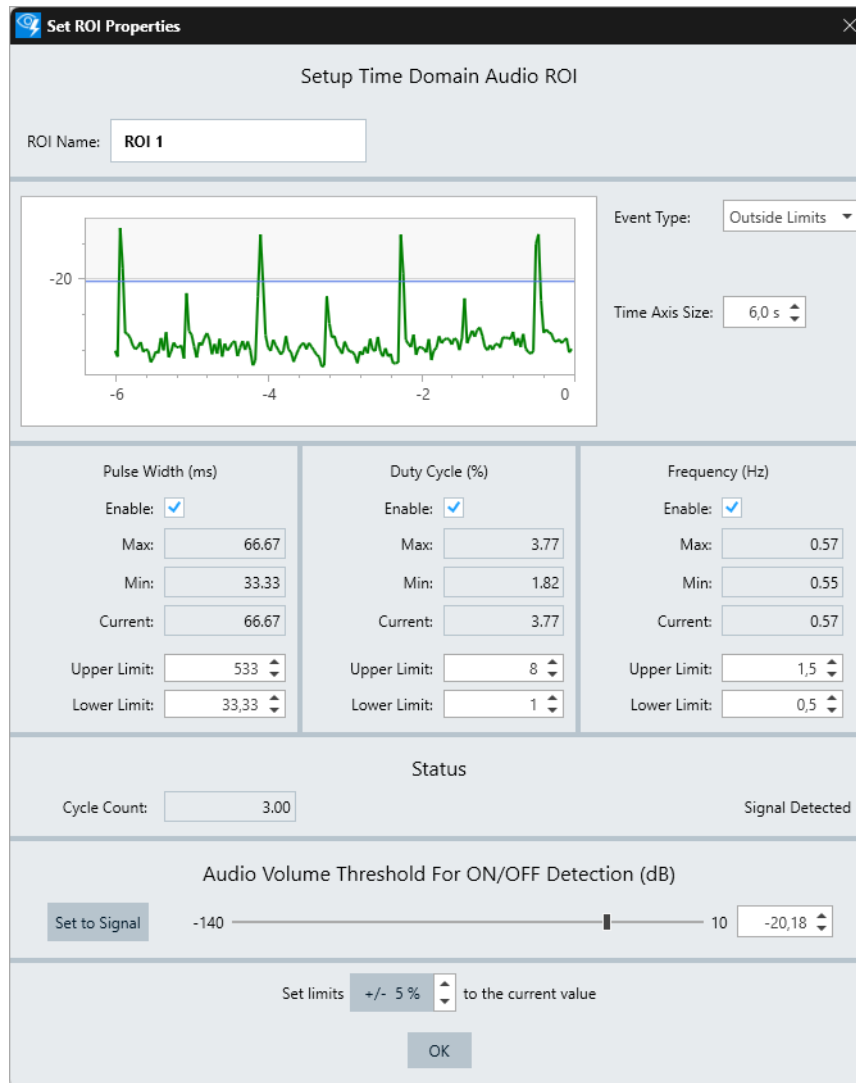
Figure 6-27: ROI properties dialog for Time Domain Audio

- "ROI Name":
  Specifies a unique name for this region of interest.
- "Event Type":
  - "Outside Limits"
    Selects that the software must detect an event when the current values are outside the limits.
  - "Inside Limits"
    Selects that the software must detect an event when the current values are inside the limits.
  - "Not Starting"
    Available only in Virtual camera mode.
    If the test in the selected video does not start immediately, selecting "Not Starting" ignores analysis during a duration that you can specify: Enter this duration

in the "Within ... from start" field. After this duration, the analysis starts with the default event type "Outside Limits".

- "Time Axis Size":
Specifies the length of the chart's horizontal time axis. When you click inside the field, you can use the mouse wheel to increase or decrease the value.

- "Pulse Width (ms)" / "Duty Cycle (%)" / "Frequency (Hz)"
Frequency is selected by default, but you can enable measuring pulse width and duty cycle, too.
This section provides the following features for the ROI:
  - Enables or disables the measurement of the selected physical quantity
  - Displays the maximum, minimum and current value
  - Specifies the upper and lower limit for the measurement of the selected physical quantity.
  When you click inside a field, you can use the mouse wheel to increase or decrease the limit value.

- "Status":
Shows the status of the audio signal.
  - "Cycle Count":
  Displays the number of cycles occurred.
  - "Signal Detected":
  The analyzer detects an audio signal and increases the "Cycle Count".
  - "No Signal Detected":
  The audio signal is too low to be detected and counted.

- "Audio Volume Threshold For ON/OFF Detection (dB)":
Specifies a volume level for discriminating if an audio signal is detected. To specify the level, you can move the slider or enter a value in the field at the right. Or when you click inside the field, you can use the mouse wheel to increase or decrease the value.
"Set to Signal" evaluates the current audio signal and automatically sets a threshold to its average level. The averaging algorithm uses all available level values up to the duration specified in "Time Axis Size". We recommend adjusting the threshold manually to a level that ensures optimized detection of the desired signal. The threshold does not influence the upper and lower limits.

- "Set limits x % to the current value":
When you click the value in the percentage field, the software adjusts the upper and lower limits for "Pulse Width (ms)", "Duty Cycle (%)" and "Frequency (Hz)" relative to the current values as follows:
  - Sets the upper limits to the current values + x % of the difference between "Min" and "Max".
  - Sets the lower limits to the current values - x % of the difference between "Min" and "Max".

To configure the time-domain audio ROI correctly

1. Set the following parameters of the spectrum to be monitored:
   - "Event Type"

- "Time Axis Size"

2. Select the physical quantities to be monitored:
   - "Pulse Width (ms)"
   - "Duty Cycle (%)"
   - "Frequency (Hz)"

3. Determine the volume threshold for audio signals that the software must detect.

4. Specify the upper and lower limits for the measurement of the selected physical quantities.
   Optionally do so by setting the limits to a given percentage above and below the current values.

6.12 Disturbance

"Disturbance" supports observing video output devices like televisions, computer monitors or other types of displays, while they are in an EMC chamber. It is a sensitive ROI that reports any deviation within the defined range. A deviation (or disturbance) is defined as a color change, brightness change, or visual artifacts that can result, for example, from electromagnetic interference.

The disturbance ROI triggers an event when a deviation is detected within its defined range. To do so, R&S AdVISE uses an algorithm that compares each incoming image with a reference image.

While disturbance ROI shares some of the characteristics of object-in and object-out ROI, it is much more sensitive to changes in pixels within its boundaries.

Figure 6-28 shows the "Disturbance ROI" properties dialog, which is described below.
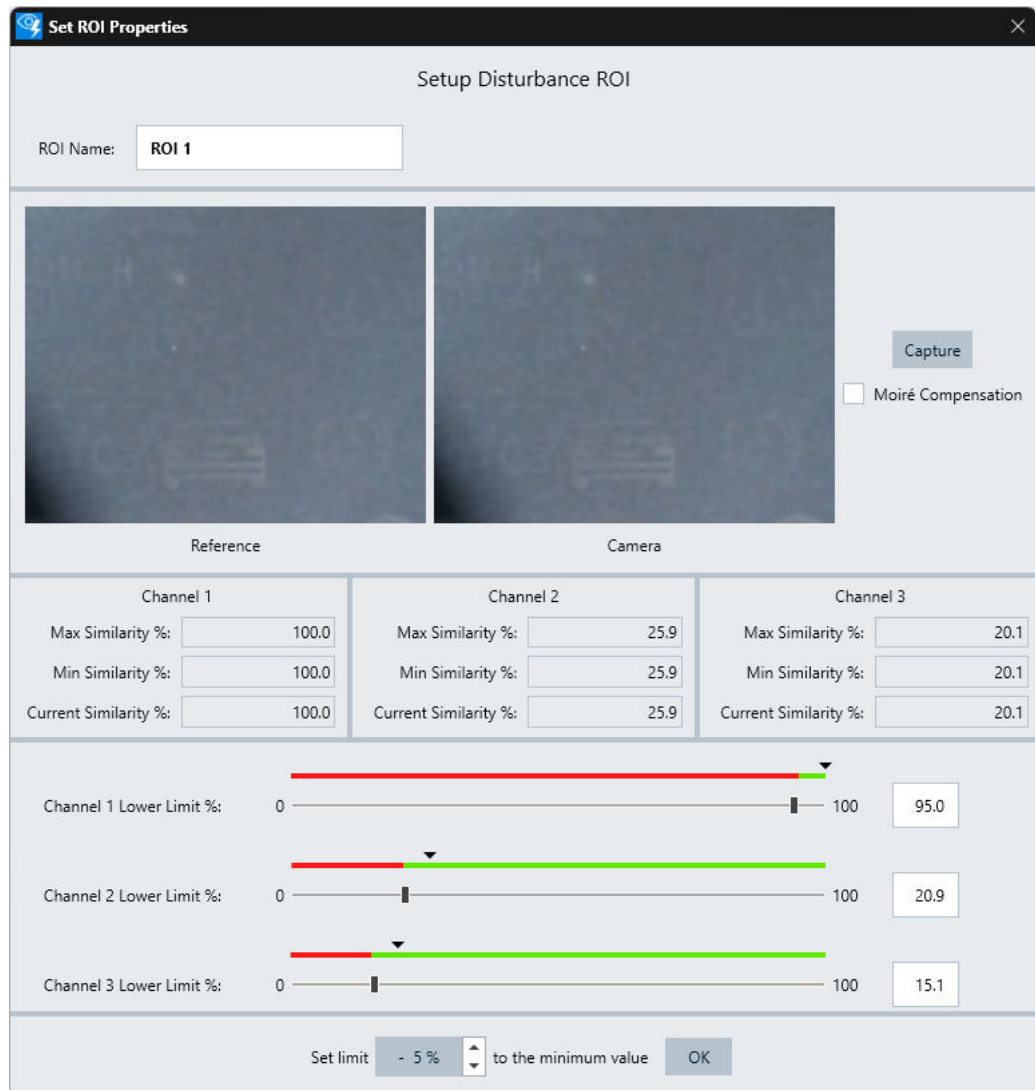
Figure 6-28: ROI properties dialog for Disturbance

- "ROI Name":
  Specifies a unique name for this region of interest.

- "Reference":
  Displays a copy of the image captured by the "Camera".

- "Camera":
  Shows an image of the object to be monitored.

- "Capture":
  Copies the image captured by the "Camera" and pastes it into the "Reference" field.
  During a test, the analyzer takes this picture as a reference and check for changes.

- "Moiré Compensation":
  Selects showing images with or without resolution compensation.
  Moiré patterns can result from different resolutions of the camera and the display.
  We recommend enabling compensation also to improve the video in the presence

of severe image noise. To compare the video feed with and without compensation, toggle the checkbox.
After checking or unchecking this option, recapture the reference.

- "Channel 1" (Red) / "Channel 2" (Green) / "Channel 3" (Blue):
Shows the similarity value of the respective channels. The value represents the similarity of the current "Camera" image in comparison with the "Reference" image. You can use these similarity values to set up optimum lower limits.
  - "Max Similarity %": Shows the highest similarity value in percentage.
  - "Min Similarity %": Shows the lowest similarity value in percentage.
  - "Current Similarity %": Shows the current similarity value in percentage.
- "Channel 1 Lower Limit %" / "Channel 2 Lower Limit %" / "Channel 3 Lower Limit %":
Sets a lower limit for each channel separately.
You can set the lower limit using the slider, which is stepped at one decimal digit precision to provide more sensitivity. Alternatively, type a number between 0 and 100 directly in the field right beside the slider. Or when you click inside the field, you can use the mouse wheel to increase or decrease the value.
The region above the lower limit is indicated in green and the region below the lower limit is indicated in red.
- "Set limit x % to the minimum value":
Sets a tolerance level x for all channels in the range from 0 to 100 relative to the "Min Similarity %" values. When you click the value in the percentage field, the software adjusts the "Lower Limit" for all channels to their minimum values - x, hence minimum values minus the percentage times 100.

Considerations for a good disturbance ROI setup

The disturbance ROI is sensitive to small deviations. To achieve accurate results, ensure the following:

- Position the camera directly in front of the EUT to avoid deflections.
- Perform the ROI adjustment and the test in a closed chamber with controlled lighting.
- Set the lower limits of the disturbance ROI as close to the minimum value (e.g. 1 %) as possible, for more accurate detection of deviations.
- Set the camera to perform no white balance or automatic brightness adjustment during the test.
- Ensure that the camera provides a video stream with consistent quality.
- The minimum similarity of the three channels of the disturbance ROI has little to no drift before the start of the test.

6.13 Auto Detection

The "Auto Detection" assistant is available only with a license for option R&S ADV-K1080 (order no. 1434.6576.02).

It uses artificial intelligence to detect changes automatically in the selected region.

Features of this assistant:

- You can set only **one** "Auto Detection" ROI in a test
- Unlike other ROIs, you cannot rotate the "Auto Detection" ROI
- It is designed for spatially unchanged video streams, also without large changes in background illumination
- It can cover up to the full size of the video frame, but we recommend covering only the relevant area
- It allows overlapping other specific ROIs and ignores their areas. To be precise:
  - It ignores the pixels covered by ROIs that exist **before** you capture the reference of the "Auto Detection" ROI.
    But for pixels overlapping with audio ROIs (Frequency Audio or Time Audio), it brings up a validation failure message. It asks you to place all audio ROIs away from any other ROI.
  - If you add other overlapping ROIs **afterwards**, or if moving of ROIs changes any overlap, capture the reference of the "Auto Detection" ROI again.
  - Ignoring does not apply to Frequency Audio, Time Audio and Tracking ROIs, because these ROIs do not analyze the video.
- It works best with the camera's automatic white balancing turned off
- It is intended for video streams that contain one or more flashing lights or similar small regions with periodic temporal or spatial changes
- It is not suited for monitoring small characters in a large ROI
- For precise detection of temporal changes, for example periodic events, we recommend using the "Auto Detection" ROI in combination with the Flashing Light ROI.

The auto detection ROI triggers an event when R&S AdVISE detects one or more changes in the live video, compared with the information collected in the captured reference video.

Figure 6-29 shows the "Auto Detection ROI" properties dialog, which is described below.
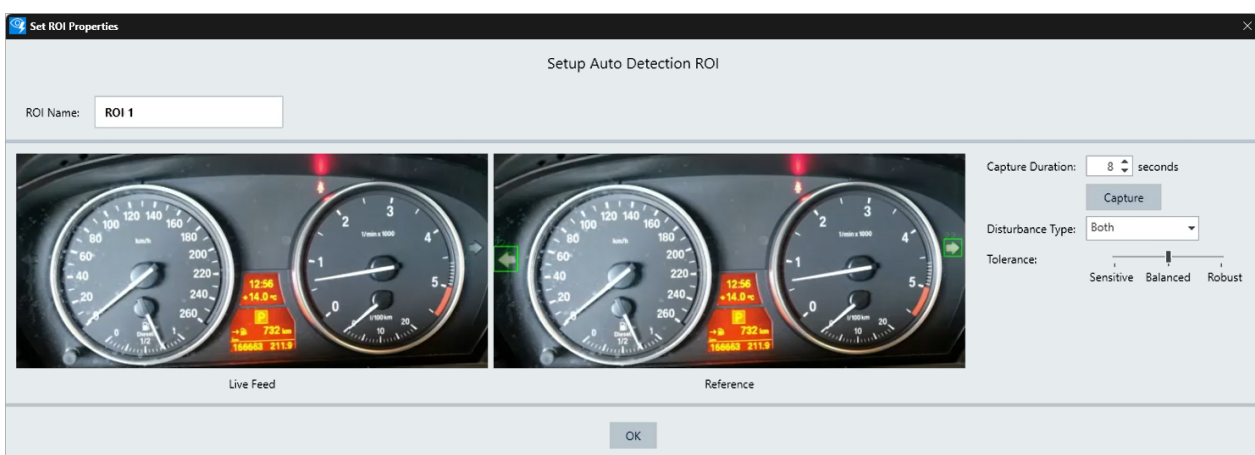
Figure 6-29: ROI properties dialog for Auto Detection

- "ROI Name":
  Specifies a unique name for this region of interest.

- "Live Feed":
  Displays an image of the region to be monitored.

- "Reference":
  Displays an image of the captured reference video.

- "Capture Duration":
  Specifies the duration for training the detection model with live frames. A longer duration provides more frames and trains the model better. However, changes during the acquisition can lead to blur.
  When you click inside the field, you can use the mouse wheel to increase or decrease the number of seconds for the duration value.

- "Capture":
  Captures all video frames during the time specified in "Capture Duration". These frames serve as a reference to train the detection model for detecting spatial and temporal anomalies, independent of any selected "Disturbance Type" and "Tolerance".
  While capturing the reference information, a progress bar indicates the state of the procedure. Note that this procedure can take longer than the specified "Capture Duration", because processing the captured frames takes additional time. The total time depends also on the processing power of your computer.
  When completed, an image of the resulting reference video feed information appears in the "Reference" field.
  During a test, the analyzer uses the information from the captured video as a reference and checks the live feed for changes.

- "Disturbance Type":
  Available only before you click "Capture", and only if R&S AdVISE detects both temporal and spatial changes. If the software detects, for example, no region of temporal changes in the reference capture, it automatically sets the disturbance type to "Spatial" and disables the selection. However, if the software later detects temporal changes, you can override the automatic setting: Manually select "Temporal" to evaluate temporal changes in the regions marked with green rectangles. Note that it is not necessary to capture new reference frames after changing the "Disturbance Type".

  Selects one of the following disturbance evaluation modes:

  - "Spatial":
    Used for sceneries in which you want to focus on spatial changes, like movement, lights going on and off, color changes, brightness changes or change of shape.

  - "Temporal":
    Used for sceneries in which you want to focus on periodic temporal changes, like indicators that change their frequency (speed) of flashing. To detect small temporal changes, we recommend using the Flashing Light ROI.
    If the software detects regions of temporal changes, it marks these regions with green rectangles in the reference image.

  - "Both":
    Used for sceneries in which you expect both spatial and temporal changes. The software marks regions of temporal changes with green rectangles.

  After capturing the reference image, you cannot change the disturbance type. If you need a different type, configure a new "Auto Detection" ROI.

- "Tolerance":

  Selects one of the following modes:

  – "Sensitive":
  If the scenery is steady with constant lighting and no vibration, a sensitive setting allows detecting small changes.

  – "Balanced":
  A compromise between "Sensitive" and "Robust".

  – "Robust":
  If the scenery is less controlled, a robust setting can help raise events only for relevant changes, reducing the number of false alarms. Examples are sceneries with movement in the background, with daylight, with vibrating objects, or with minor unexpected changes.

  Note that it is not necessary to capture new reference frames after changing the "Tolerance".

Running a test with Auto Detection

During a test, the software records the video frames to be compared to the reference.

After stopping the test recording, if one or more events were detected, the "Evaluate Events" dialog opens:
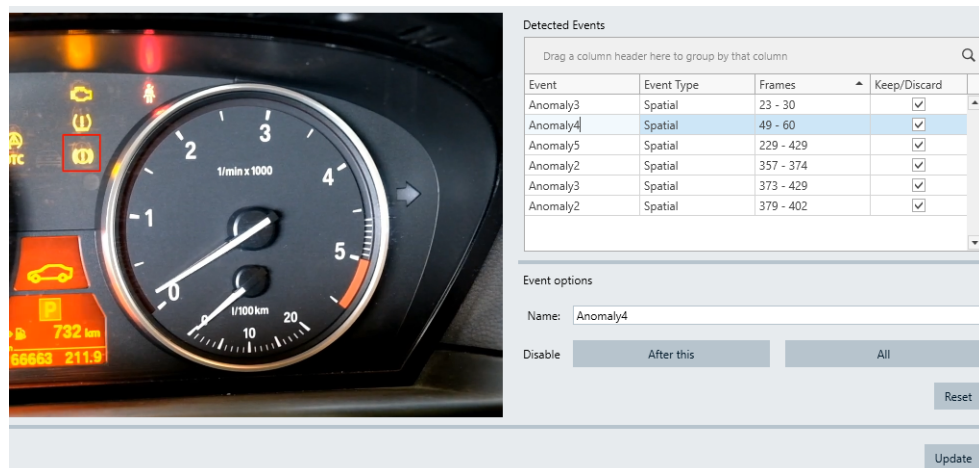
Figure 6-30: Evaluate Events dialog

- It allows evaluating the automatically detected events. The dialog lists all detected events in a table, together with an automatically assigned event name, the event's "Disturbance Type" and its frame number.
- The analyzer automatically assigns event names like "Anomaly1", "Anomaly2" and so on. Anomalies of the same kind get the same number and hence the same name. You can discern these related events by their different frame numbers.
  If the dialog shows an event with name "Anomaly0" and event type "Unkown", reasons can be:

  – The analyzer cannot evaluate if the detected event is of spatial or temporal type

  – The location of the anomaly is unknown

- When you select an individual event, the dialog shows the frame captured for this event. You can rename the event and keep it in the recording or discard it. To discard an event, uncheck its "Keep/Discard" checkbox. When you click "Update", the software deletes all discarded events.

- The functions "After this" and "All" facilitate discarding multiple events of the same kind, either those events after the current selection or all events. For example, "After this" applied to one of the events labeled "Anomaly2" discards all events of this kind with frame numbers higher than the selected event. Likewise, "All" discards all "Anomaly2" events.

- For handling the table, see also Chapter 5.5.2, "Table management tools", on page 51.
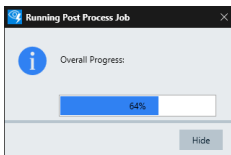
When you close the "Evaluate Events" dialog by clicking "Update", the software starts a post-processing job in the background. A progress-bar dialog indicates the state of this job. When you "Hide" the dialog, the post-processing job continues in the background, so you can deal with other tasks. If you shut down R&S AdVISE before completion of the post-processing job, it restarts from the beginning after restarting R&S AdVISE.

In the Show results procedure, during playback of the video, the analyzer marks each event by displaying a rectangle around it while the change is present.

6.14 Ignore Area is an exclusion from ROIs
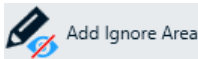
For using the "Ignore Area" function, see Chapter 5.4.5, "Ignore Area", on page 42.

7 Tracking

The tracking function (option R&S ADV-K1070, order no. 1434.6560.02) allows you to add up to three trackers to the video frame. If there are any changes to the trackers compared to the tracking reference of the picture, the trackers and all the ROIs adapt accordingly. This adaptation can improve real-time rendering, for example, to balance vibrations or to adjust the ROI position after the camera position has been changed.

One tracker can correct two-dimensional changes (x, y). Two trackers can correct distance (x, y, z). Three trackers can also balance distortions like a wide-angle lens.

7.1 Configuration of tracking ROIs

You can add a tracker using the properties menu shown in Figure 7-1.

The properties menu displays an image with the following:

- Tracking reference: inner area with solid outline
- Searching area: external area with dotted outline

There are two sliders at the bottom and the right-hand side of the window to adjust the tracking reference and searching areas.

For achieving the best results, we recommend the following:

- Set the tracking reference to picture areas that contain the horizontal and vertical structures similar to Figure 7-1.
- Set the searching area such that the tracking reference is unique within this area. But also set it wide enough so that all estimated movement of the tracking reference stays within this area.

To let the software capture the tracking reference, click "OK". The captured image serves as the reference for calculating the similarity and for the change of positions.
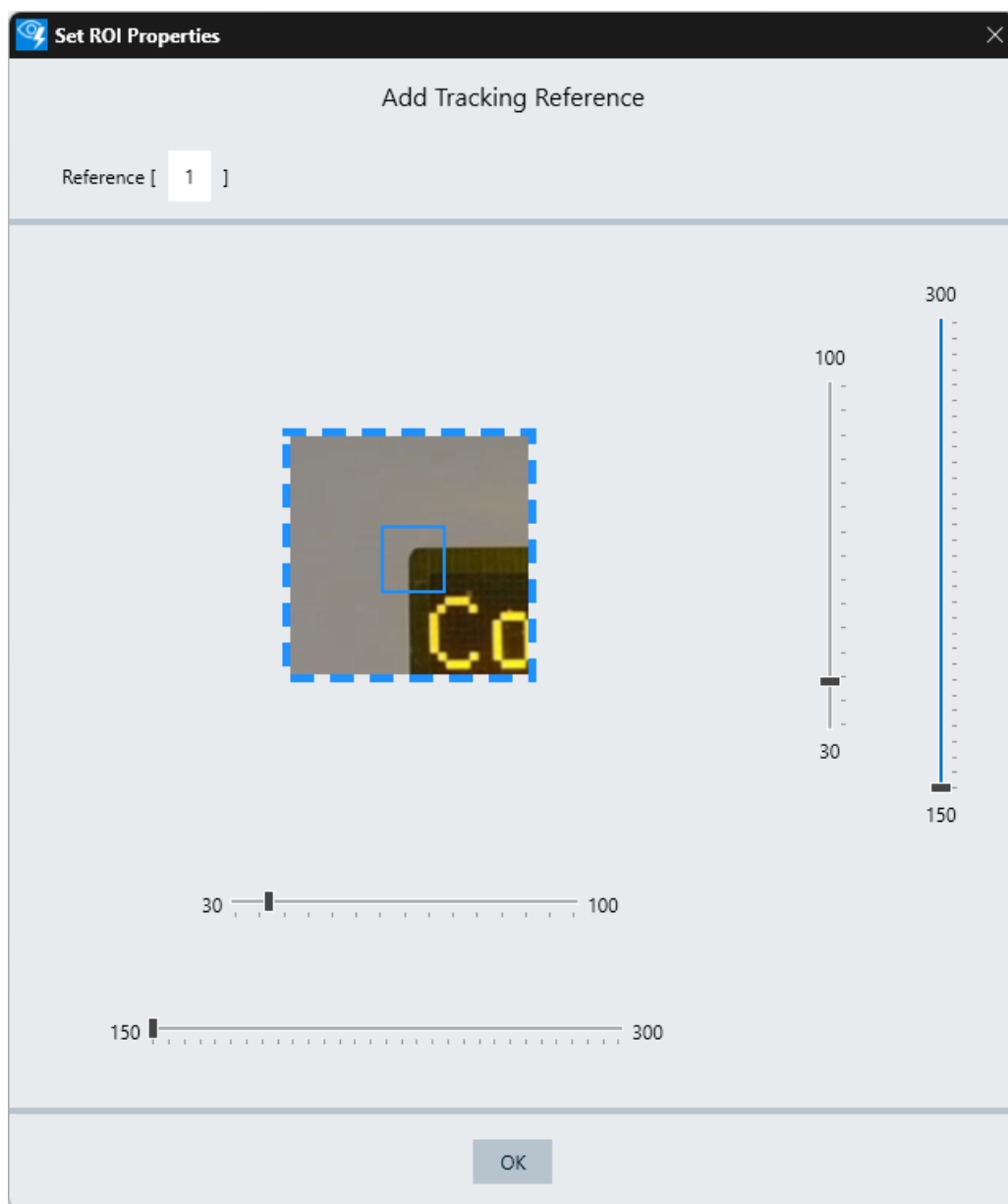
Figure 7-1: Property window for tracking reference

You can check the match rate of the tracker (Figure 7-2) using the tooltip. See also "ROI tooltip" on page 111.

A match rate higher than 80 % depicts good tracking results. Otherwise, we recommend that you adjust and recapture the tracking reference.

To do so, either adjust each tracker manually or use the function "Adjust ROI Settings", see Chapter 8.2.3, "Adjust ROI Settings", on page 111.
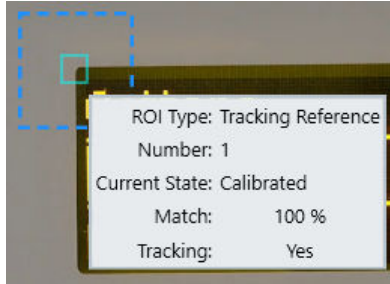
Figure 7-2: Tooltip of Tracking ROI

7.2 Real Time Tracking

The real-time tracking function allows R&S AdVISE to track the relative position of all ROIs during a test. It starts immediately when a test is started. During the test, the software adjusts the positions of all ROIs to their relative position in the picture. This adjustment prevents losing the tracking reference of the ROIs due to vibrations or small movements of the picture. The function only works if the movement stays within the searching area of the trackers.
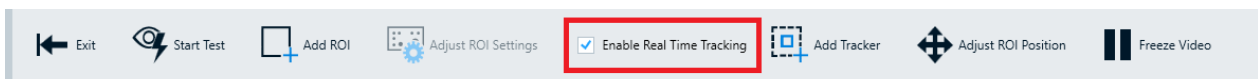
Figure 7-3: The Enable Real Time Tracking option

If three trackers are used to balance distortions due to movements like the rolling shutter effect, place the three trackers in a diagonal line within the picture for optimized results.

An example is given in Figure 7-4.

Figure 7-4: Three tracking references

7.3 Adjust ROI position

Due to changes in the camera position, the ROIs can lose their reference. For accurate results, the tracking references have to be within the searching area of the trackers. To place the reference back in place, use the "Adjust ROI Position" option.

If the anticipated changes concern only the x and y direction, one tracker is sufficient for "Adjust ROI position" to work.

However, you need at least two trackers for changes that concern the z direction. In this case, set the searching area to a rather narrow one. The change in the object size due to a change of distance to the camera cannot be adapted automatically. Therefore, if the searching area is small enough, it can be manually adapted to the new setting.

For additional expected deformations in the test like rolling shutter effects or wide angle optics, you need a third tracker. For optimized results, position the three trackers in a diagonal line across the video frame like in Figure 7-4.

We recommend that you run "Adjust ROI Settings" after the ROI positions have been adjusted, especially with trackers positions changed and with "Object In" / "Object Out" ROIs.

See also Chapter 5.4.4, "Test control toolbar", on page 40.

8 Running tests

This chapter describes the steps to run the R&S AdVISE system.

Before running a test, ensure the following:

- A camera is connected to the computer via the video capture device.
  See Figure 2-1).
- R&S AdVISE is installed in a computer equipped with a NVIDIA graphical card.
  The display driver version is of v392.00 or higher.
  See Chapter 3, "Software installation", on page 11
- The license dongle is connected to the computer.
  See Chapter 1.2, "Product licensing", on page 8.
- R&S AdVISE is set up and running.
  See Chapter 5.1, "Setup", on page 21.

8.1 Creating a test configuration

This section describes the procedure to create a test configuration.

To create a test configuration

1. Click the "Manage Test Configurations" icon.
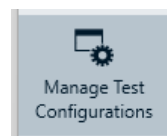
The "Manage Test Configurations" dialog opens.
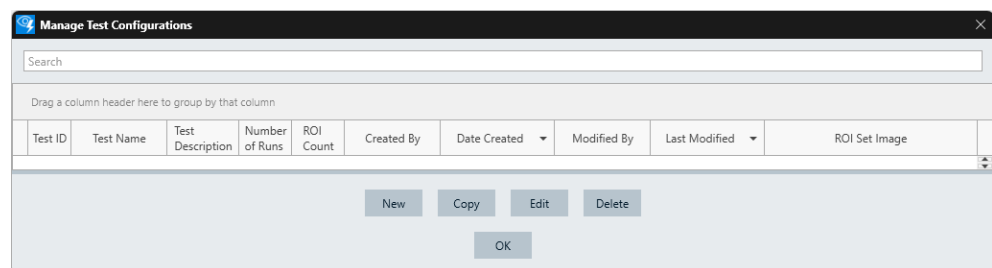
Figure 8-1: Manage Test Configurations dialog

2. To create a test configuration, click "New".

3. Enter a name for the test and its description.
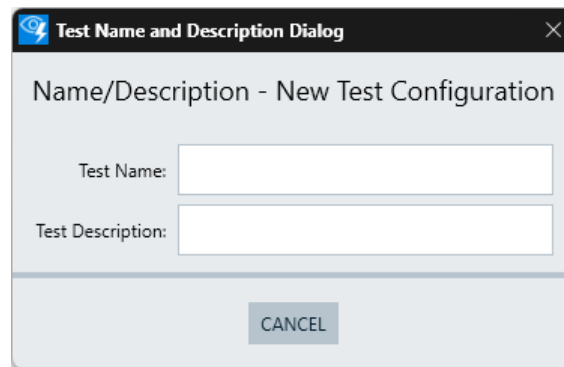
Figure 8-2: Test Name and Description dialog

The "OK" button appears.

4. Click "OK".

   The software creates a test configuration and displays it as a table row in the "Manage Test Configurations" dialog.
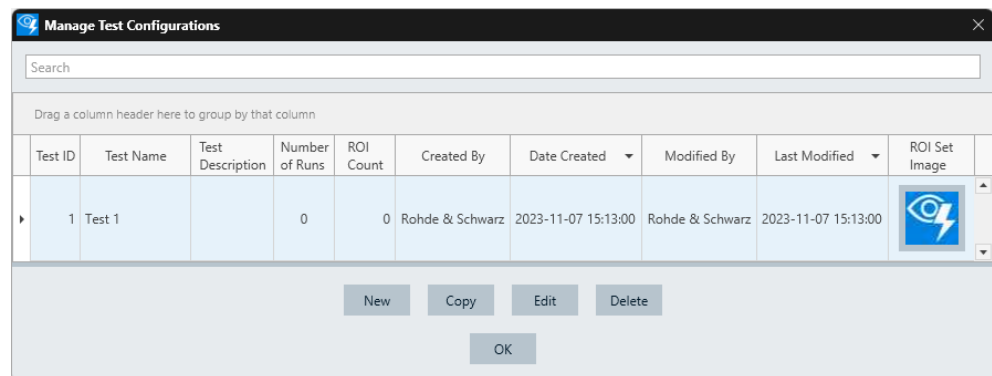
Figure 8-3: Manage Test Configurations dialog with newly created configuration "Test 1"

5. To return to the main window, click "OK".

8.2 Configuring ROIs

This chapter describes the procedure to set up and assign ROIs to a test configuration before running a test.

See also Chapter 6, "Regions of interest (ROIs)", on page 62.

8.2.1 Test configuration in local test mode

The local test mode is used for creating ROIs, see Chapter 5.4.2, "Local test mode", on page 37.

Depending on the installed options, you can create up to 16 ROIs (standard) or 32 ROIs (option R&S ADV-K1032) respectively.

To configure ROIs

1. In the main window, click "Configure and Start Test" > "Local".
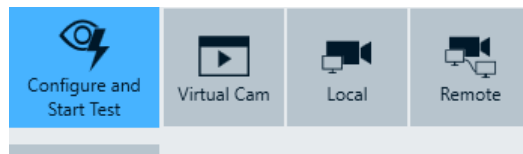
2. In the "Test Selection" dialog, do the following:

   a) Select the test to run.
   b) Click "Run Test".
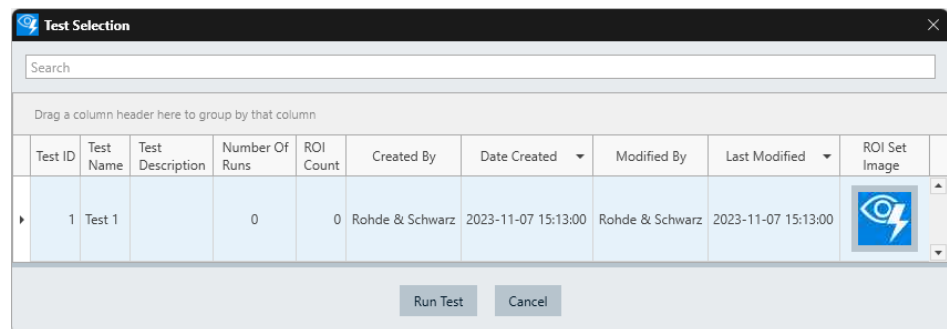
Figure 8-4: Test Selection dialog

The window with the device under test in the video image opens.
R&S AdVISE displays its status in yellow font at the lower edge of the video image.
The software is in the connected state, and you can create ROIs.
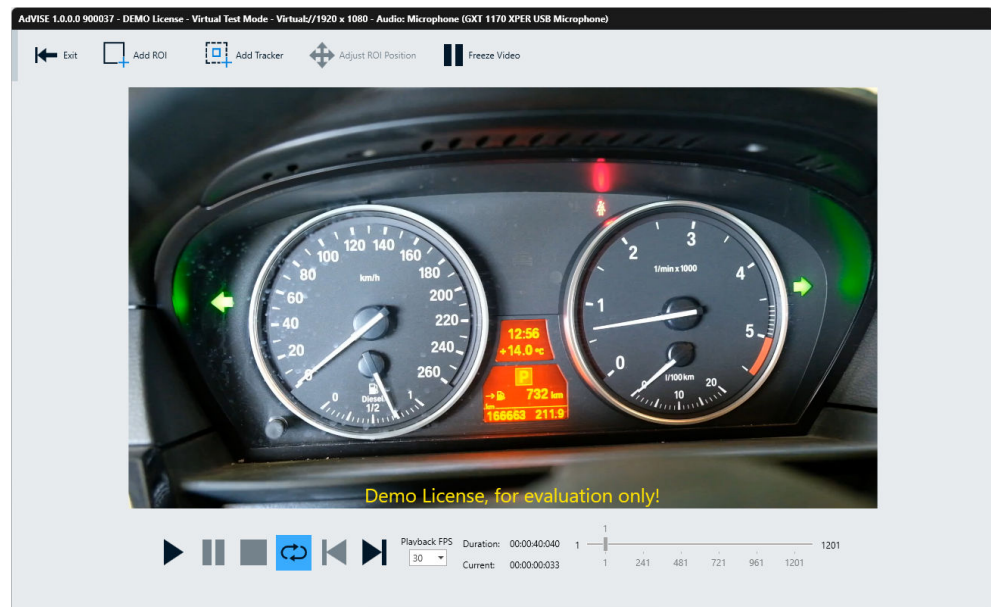
Figure 8-5: Video image window

3. Click "Add ROI".

4. Select a ROI type, for example "Light On".

   The cursor has the icon of the selected ROI attached to it.

5. Select the ROI by drawing a rectangular box with the cursor.

   The rectangle of the ROI is displayed.

6. Set the parameters accordingly. See Chapter 6, "Regions of interest (ROIs)", on page 62.

7. Click "OK".

   R&S AdVISE returns to the video image window.

Figure 8-6: Video image window with one ROI

8. Add more ROIs:

a) To add more ROI of the same type, draw another rectangular box for the next ROI.

b) To add ROIs of **other** types, click "Add ROI".

c) Select the ROI type.

Tip: The cursor continues to display the icon of the last created ROI.
To change the cursor back to its original state, press [Esc] on your keyboard or click the image outside of any ROI.

(i) **ROI tooltip**

R&S AdVISE offers a special tooltip inspection tool for ROIs in a running test:
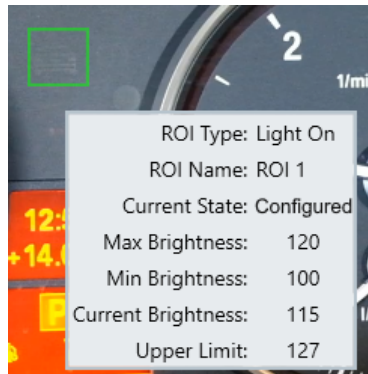
Figure 8-7: Tooltip inspection tool

By hovering the mouse pointer over an ROI while a test is running, an information box appears. It contains the most important information about that ROI, for example the current brightness (Figure 6-2) or the current similarity with a reference image (Figure 6-4). This information can help with debugging a test setup.

8.2.2 Changing ROI positions

If the position of an ROI is changed, the "Start Test" button automatically disappears. You cannot start a test without adapting the ROI to the new position.

To adjust the ROI position, do either one of the following:

- **Manually:**
  Right click the ROI > "Set Properties"
- **Automatically:**
  Use "Adjust ROI Settings", see Chapter 8.2.3, "Adjust ROI Settings", on page 111.

8.2.3 Adjust ROI Settings

Opens a dialog for adjusting the ROI settings (Figure 8-8) for the following ROI types:
- Light On, Light Off
- Object In, Object Out
- Intensity Change
- Color Change
- Disturbance

For all other types of ROIs, especially the Auto Detection ROI, use their configuration dialog to adjust the settings.

This function serves for automatically adjusting the configuration of your ROIs to unwanted changes, such as minor movements or different light situations. It can

change limit values for intensity, light on/off, color change, object in/out and disturbance ROIs. Also it updates the reference for object in/out and disturbance ROIs. When you execute the function, it assigns the "configured" state to all adjusted ROIs.

Using these adjustments has the same effect as editing the properties of all ROIs without changing any limits and clicking "OK", which executes the adjustments specified in the dialog.

(i) Closing the "Adjust ROI Settings" dialog by the "X" button in the top right corner also executes the adjustments. To close the dialog without executing the adjustments, click "Cancel".

Exceptions, besides "Auto Detection", are the following ROIs: "Object In", "Object Out" and "Disturbance", which the dialog only sets to "configured" if you enable capturing a new reference image. This action also adjusts the percentage to the given value for these ROIs, even if in their properties dialog that adjustment is not selected.

For example, you cannot restore the exact former position of "Object In" / "Object Out" ROIs. Hence, it is convenient to reconfigure these ROIs automatically with new reference images and with an adjustment of their lower limits, which are sensitive to illumination.
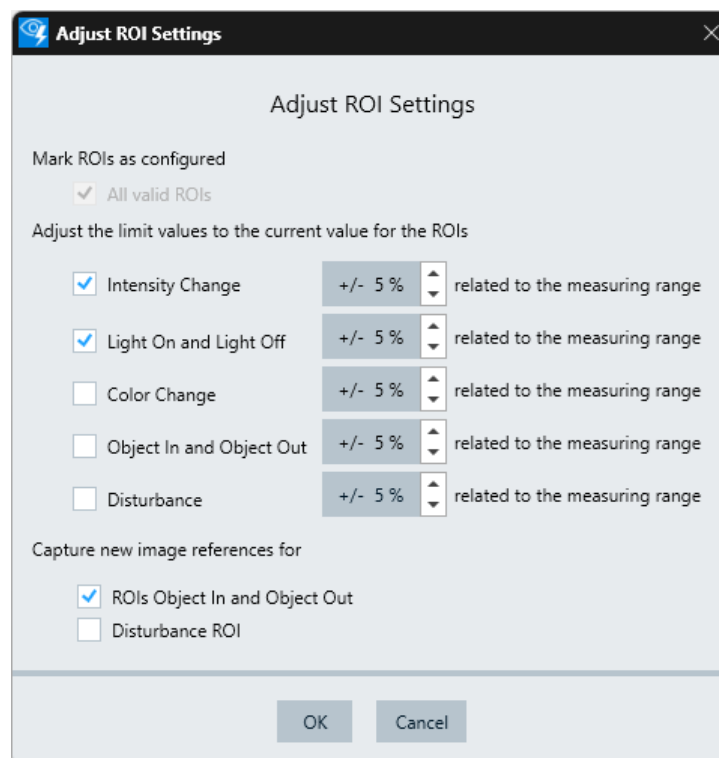
Figure 8-8: Example of a dialog for adjusting the settings of ROIs in a given test

The "Adjust ROI Settings" dialog provides the following features:
- "Mark ROIs as configured":

If enabled, the software allows applying the configuration settings (hence, percentage tolerance levels) to "All valid ROIs".

For multiple instances of the same type of ROI, it applies the specified percentage to all these ROIs.

- "Adjust the limit values to the current value for the ROIs":
Selects the ROIs, for which the software adjusts the limits to the current value, plus or minus the specified percentage. Only those ROI types are available, for which at least one ROI is set.

  To let the software update the limits, click "OK".

  The default limit value for all ROIs is the same as the value set for "Select Default Percentage Adjust Value". See also Chapter 5.1.3, "ROI Defaults", on page 23.

  Examples as in Figure 8-8:
  - "Intensity Change"
  - "Light On and Light Off"
  - "Color Change"
  - "Object In and Object Out"
  - "Disturbance"

- "Capture new image references for":
Selects the ROI type for capturing a new image reference. Only those ROI types are available, for which at least one ROI is set.

  Both the following options capture a selected region of the picture and use that as a reference to calculate similarity. If there are changes in the ROI position, the reference ROI has to be captured again for accurate results.

  Examples as in Figure 8-8:
  - "ROIs Object In and Object Out". See also Chapter 6.2, "Object In, Object Out", on page 65
  - "Disturbance ROI". See also Chapter 6.12, "Disturbance", on page 95

The function "Capture new image references for" is available for the "Tracking Reference", too, if at least one tracking ROI is set. If the positions of any trackers have changed, enabling the "Tracking Reference" option makes the software capture new tracking positions as reference, when you click "OK".

8.2.4 Freeze Video

The "Freeze Video" facilitates adding ROIs to a fast-moving video. Also, if the video is unstable (wiggly image), freezing it facilitates placing a tracker or other ROIs precisely.

Click "Freeze Video" to freeze the current video frame. With this mouse click, the following happens:

- The text on the "Freeze Video" button changes to "Continue Video".
- The video image has a text overlay indication as in Figure 8-9
- You can configure ROIs in this state, which is not possible when you pause the video by the "Pause" button in the Video playback control elements at the lower edge of the window.

When you click the "Continue Video" button, the video starts playing again, and the text on the button changes to "Freeze Video".
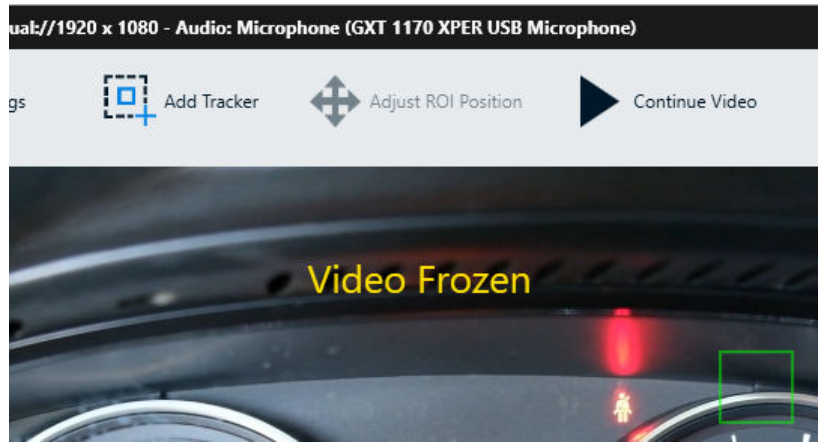
Figure 8-9: Video Frozen text overlay

8.3 Running a test

This chapter describes the procedure to run a test with or without remote control software.

8.3.1 Running a test without remote control software

To start a test, click "Start Test" in the Test control toolbar of the video image window. If the "Start Test" button is not available, first use the function Adjust ROI Settings, or adjust the Auto Detection ROI in its configuration dialog.

The software checks all ROIs, starts testing and recording.

Figure 8-10: Video analysis window during a running test

As long as the left-turn light is off, hence this ROI has not raised any event yet, the ROI rectangle's color is green.

When the left-turn light is on, hence an event is active and recorded in this ROI, the rectangle's color changes to red.

When the light is off again, after at least one event was raised and recorded in this ROI, the rectangle's color changes to yellow.

To readjust the ROIs, click "Stop Test". R&S AdVISE switches back to the configuration mode.

To record a video and all its events in a log file, click "Record".

To interrupt the recording and the analysis, click "Pause".

To continue the recording and the analysis, click "Continue".

To stop and save the recording, click "Stop". This action also closes the video image window.

If you know an ROI to be faulty and do not want it to fill up the log file with events, right-click the ROI to disable it. The rectangle shows a crossed-eye icon:

Figure 8-11: Crossed-eye icon of a disabled ROI

Disabling an ROI is available only in the dialog for recording a video.

8.3.2   Running a test with remote control software

You can run a test and use remote control software to control the R&S AdVISE system. See Chapter 5.4.3, "Remote test mode", on page 37 and Chapter 9, "Using R&S AdVISE with R&S ELEKTRA", on page 119.

8.4   Show results

The "Show Results" dialog allows you to do the following:

- Play back a video captured during a test
- View a test report
- Edit or delete test runs in the "Show Results" dialog

To access this dialog, click "Show Results" in the main window.

The "Show Results" dialog opens and displays all the test runs.
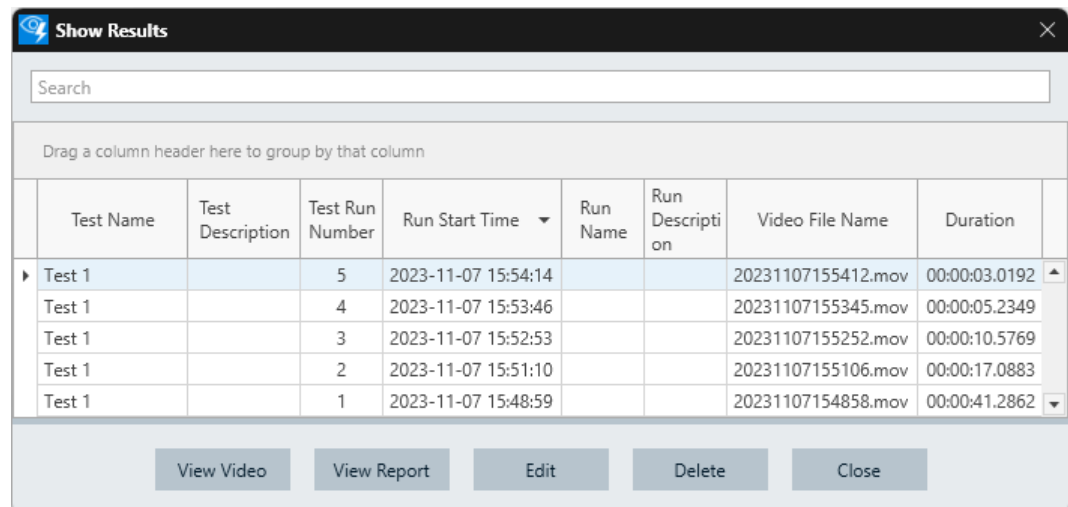
Figure 8-12: Show Results dialog

8.4.1   Playback a video

You can play back a recording. To do so, select a test in the result list and click "View Video".

The "Media Player" dialog opens. See Chapter 5.5.1, "R&S AdVISE Media Player", on page 46.

Figure 8-13: The R&S AdVISE Media Player

8.4.2 View the test report

The "View Report" option allows you to generate a detailed test report. You can also edit the report, for example:

● Adjust the page margins

● Add a watermark

● Save as PDF

● Print

To generate a report, click "View Report" in the "Playback Event List" dialog or "Show Results" dialog.

Figure 8-14: Test report dialog with an example report

9 Using R&S AdVISE with R&S ELEKTRA

This chapter describes the configuration for using R&S AdVISE with the R&S ELEK-TRA EMC test software. For details, refer also to the user manual at www.rohde-schwarz.com/manual/elektra or to the embedded context-sensitive help in R&S ELEK-TRA.

9.1 Connecting with R&S ELEKTRA

In the R&S ELEKTRA device list, create a "Monitoring" device of the type "AdVISE". Enter the following connection data for this device:

- Interface Type: TCP/IP
- IP Address: IP address of R&S AdVISE
- Mode: Raw socket IPv4
- Port: 7600
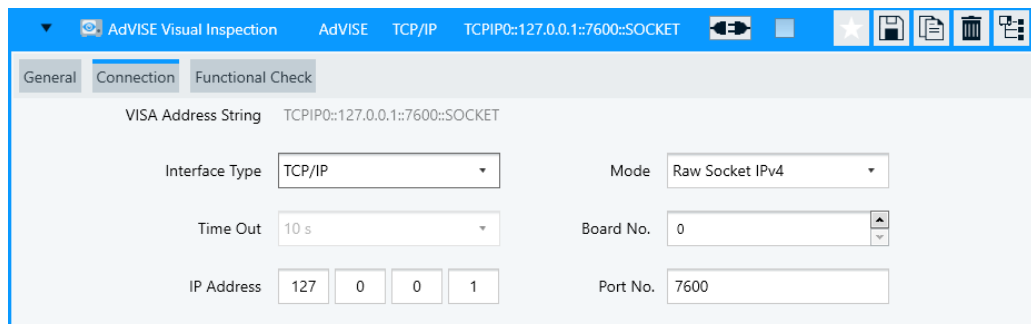
Figure 9-1: Connection settings in R&S ELEKTRA

To establish the connection, click the ⬛ button. If connecting is possible, the icon changes to ⬛. You can verify the connection also in the "Functional Check" tab of this "Monitoring" device in R&S ELEKTRA.

9.2 Configuring an EUT Monitoring template

An "EUT Monitoring" template in R&S ELEKTRA allows it to monitor the state of an EUT via R&S AdVISE. To enable this cooperation of the two software packages, con-figure an "EUT Monitoring" template in R&S ELEKTRA. After starting a test in R&S AdVISE, the monitoring template can query the ROIs configured in that software package.

A new "EUT Monitoring" template in R&S ELEKTRA originally contains one monitoring channel. In this channel, select the connected R&S AdVISE as the monitoring device:
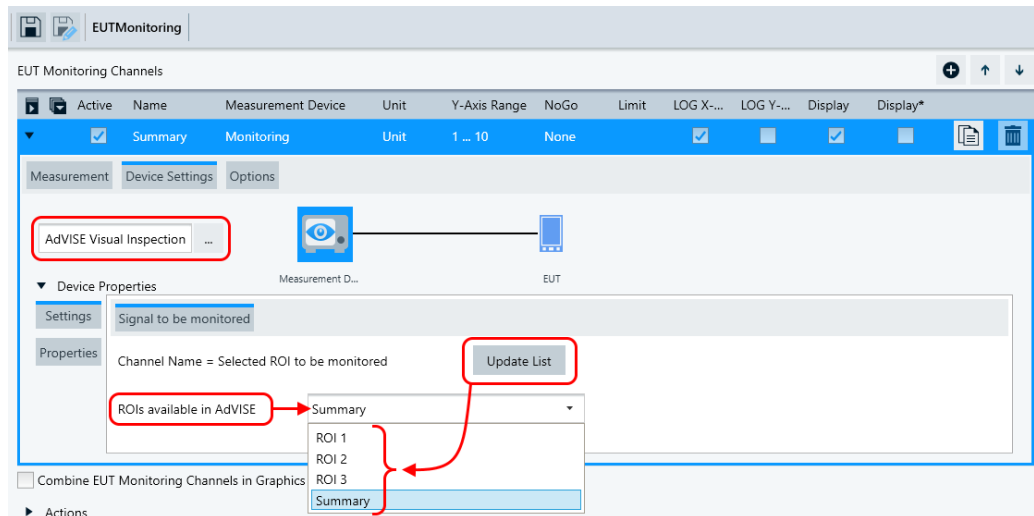
Figure 9-2: Device Settings tab of the EUT Monitoring template in R&S ELEKTRA

The "Device Settings" dialog of the EUT monitoring channel offers the following functions in the "Signal to be monitored" submenu:

- "Update List":
  R&S ELEKTRA queries the ROI names, parameters and limits from the running test in R&S AdVISE. The ROI parameters include, for example, the "Go"/"NoGo" values.

- "ROIs available in AdVISE"
  The drop-down list shows the queried ROIs available in R&S AdVISE. From this list, you can select each individual ROI to be monitored in this channel in real time. Alternatively, select the "Summary", which reflects the combined results of all ROIs. If at least one ROI throws a "NoGo" event, the summary is in "NoGo" state. Only if all ROIs are in "GO" state, the summary is in "GO" state, too. Note that you can specify an individual name for the summary ROI in each instance of R&S AdVISE, as described in Chapter 5.1.3, "ROI Defaults", on page 23.
  R&S ELEKTRA uses the name of the selected ROI (or the name of the summary ROI) as the channel name.

In the "Measurement" dialog of the same channel:

- Ensure that the "Trigger Mode" is set to "Before Dwell Time". The "Measurement" dialog for "EUT Monitoring Channels" can look like in Figure 9-3, with the "Trigger Mode" already locked to "Before Dwell Time":
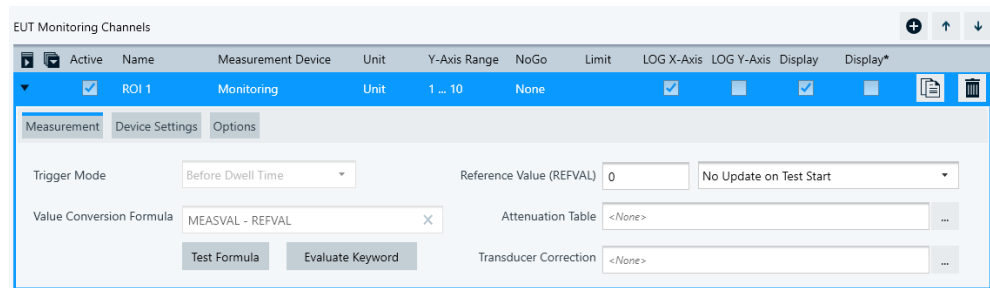
Figure 9-3: Device Settings tab of the EUT Monitoring template in R&S ELEKTRA

Optionally, you can add more monitoring channels in R&S ELEKTRA for individual ROIs. To do so, click the "Add Monitoring Channel" ⊕ button in the top-right corner of the "EUT Monitoring" template.

9.3 Running an EMS test in R&S ELEKTRA

1. Create a test template for EMS tests.

2. In the "General Settings" of this EMS test template, select your "EUT Monitoring" template:
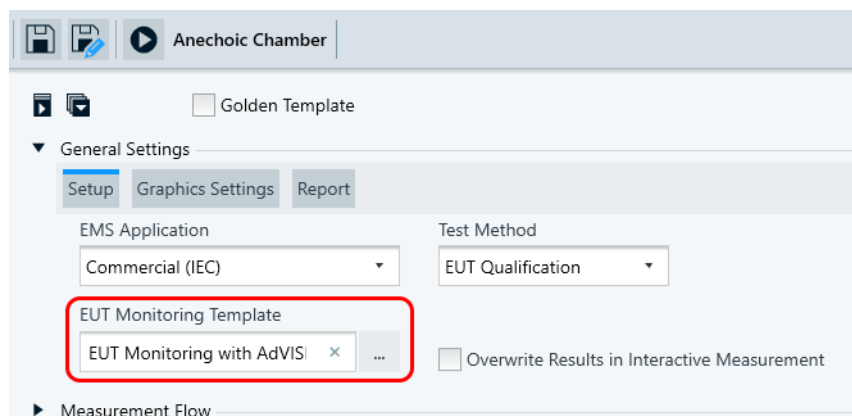
Figure 9-4: EMS test template in R&S ELEKTRA

3. Configure all other settings in the test template according to your requirements.

4. Save the test template.

   R&S ELEKTRA is ready to perform a test with EUT monitoring by R&S AdVISE.

10 Troubleshooting

This chapter describes some possible troubles and their solution.

Verify that your computer meets the System requirements on page 11.

If the errors persist, contact Rohde & Schwarz. See also Chapter 10.5, "Contacting customer support", on page 124.

10.1 License issues

If you run R&S AdVISE and receive an information dialog as shown in Figure 10-1, do the following:

- Check that the license dongle or smart card is connected to your computer.
- Open the license server browser.
  To do so, click the ⊞ icon in the icon tray then "Open Manager".
  You can also access the license server via `localhost:9444` in your browser's address bar. See Figure 10-2.
- Ensure that the license information is valid.
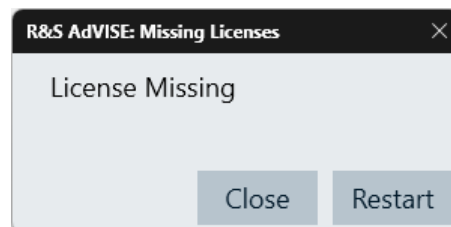
Figure 10-1: Message dialog after starting R&S AdVISE

If the license information is empty, click the ⊞ icon in the icon tray then "Restart License Server". You can also update the license from the license server browser directly.

If you receive an error indicating that the license server manager site cannot be reached, the license server is not running. To resolve the issue, do the following:

- Remove the license dongle or smart card then put it back again.
- Reload the browser page.
- Ensure that the license server is started.
  To do so, click the ⊞ icon in the icon tray then "Start License Server".
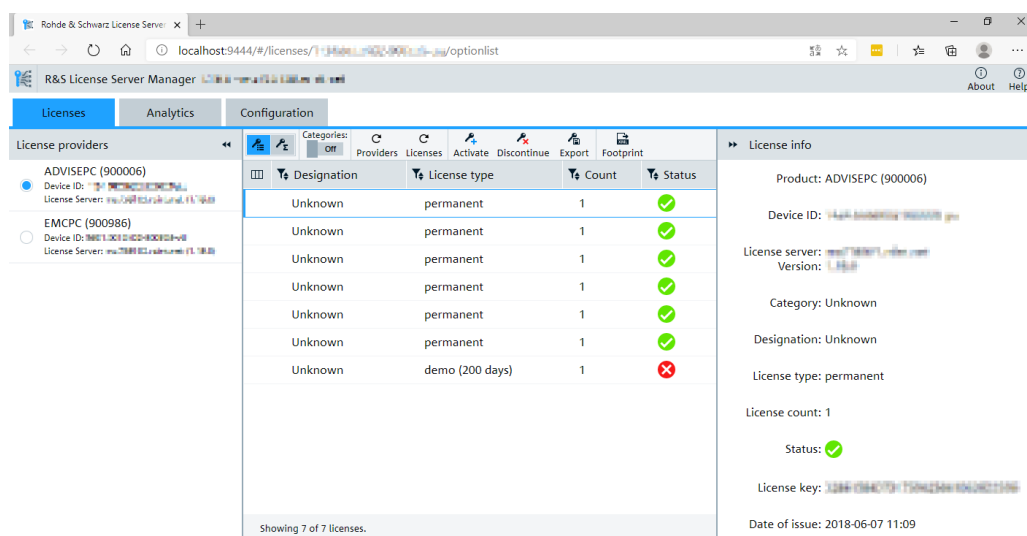 If the license server is started, the texts are grayed out.

Figure 10-2: License server manager

10.2 No camera selected

If there is no camera configured in R&S AdVISE, the "Camera Maintenance" and "Run Test" icons are inactive.

To activate the icons, select a camera. See Chapter 5.1.1, "Camera & Audio Input", on page 21.

10.3 Removal of orphaned records

If your PC crashes while running a test in R&S AdVISE, all data of this test becomes orphaned. When you restart the software, it finds the unusable data. Also, there can be some inconsistent or unreferenced records in the database from a previous installation. When you update R&S AdVISE to a new version, it finds these unusable records. In either case, the software starts a cleanup procedure for orphaned data with the following messages:
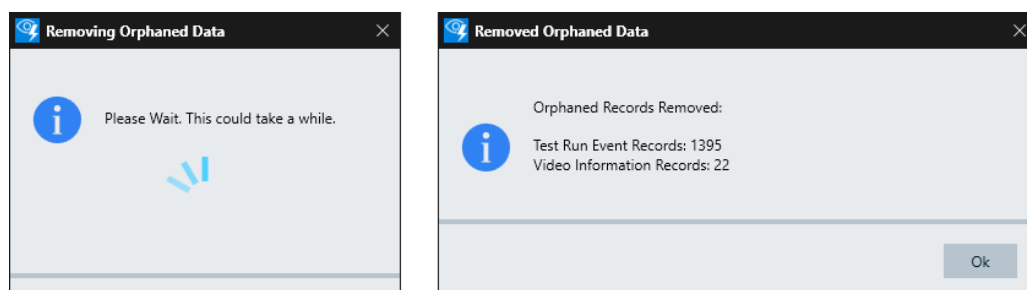
Figure 10-3: Left: cleanup progress. Right: information on deleted orphaned records

10.4 R&S AdVISE has stopped working

If you receive the following error message after updating R&S AdVISE to a newer version, repair the installation:

● "AdVISE has stopped working"

To do so, start the R&S AdVISE installer again and choose "Repair":
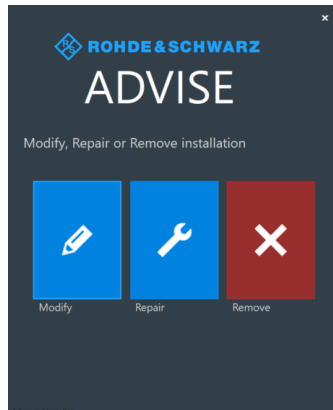
Figure 10-4: The R&S AdVISE installer dialog

10.5 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 10-5: QR code to the Rohde & Schwarz support page

Glossary: Frequently used terms and abbreviations

D

DUT: Device under test, equivalent with EUT

E

EMC: Electromagnetic compatibility

EMI: Electromagnetic interference, the EMC test type for measuring a DUT's RF emissions

EMS: Electromagnetic susceptibility, the EMC test type that evaluates a DUT's sensitivity for incoming RF power.

EUT: Equipment under test, equivalent with DUT

F

FPS: Frames per second, the rate of individual images being captured or displayed in a video stream

M

Moiré pattern: An image interference phenomenon that occurs, for example, when the video captured has a higher resolution than the display.

O

OCR: Optical character recognition, the conversion of images of text or numbers into machine-readable characters

R

R&S ELEKTRA: See www.rohde-schwarz.com/product/elektra

ROI: Region of interest in a video stream, in which R&S AdVISE can detect specified changes or other features.

Index