

R&S[®]SMCVB-KS17

Basic Streams

User Manual



1179271902
Version 02

ROHDE & SCHWARZ
Make ideas real



This document describes the following software options:

- R&S®SMCVB-KS17 Basic Streams (1434.5170.xx)

The software contained in this product makes use of valuable open-source software packages. For information, see the document `LIB-K58 K70 K71 K72 K73 OpenSourceAcknowledgement.pdf` on the "Vector Signal Generator Customer Web" at the global Rohde & Schwarz information system (GLORIS). Rohde & Schwarz would like to thank the open-source community for their valuable contribution to embedded computing.

© 2022 Rohde & Schwarz GmbH & Co. KG
Muehldorfstr. 15, 81671 Muenchen, Germany
Phone: +49 89 41 29 - 0
Email: info@rohde-schwarz.com
Internet: www.rohde-schwarz.com
Subject to change – data without tolerance limits is not binding.
R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG.
Trade names are trademarks of the owners.

1179.2719.02 | Version 02 | R&S®SMCVB-KS17

The following abbreviations are used throughout this manual: R&S®SMCV100B is abbreviated as R&S SMCV100B.

Contents

1	Welcome to the R&S SMCVB-KS17 option.....	7
1.1	Key features.....	7
1.2	Installation.....	7
1.3	What's new.....	8
1.4	Documentation overview.....	8
1.4.1	Getting started manual.....	8
1.4.2	User manuals and help.....	8
1.4.3	Service manual.....	8
1.4.4	Instrument security procedures.....	9
1.4.5	Printed safety instructions.....	9
1.4.6	Data sheets and brochures.....	9
1.4.7	Release notes and open source acknowledgment (OSA).....	9
1.4.8	Application notes, application cards, white papers, etc.....	9
2	DVB transport streams.....	10
2.1	Overview.....	10
2.2	SDTV_MPEG_Codec43 (25 Hz).....	11
2.2.1	Video.....	11
2.2.2	Audio.....	14
2.3	SDTV_AVC_Codec43 (25 Hz).....	14
2.3.1	Video.....	14
2.3.2	Audio.....	16
2.4	SDTV_MPEG_Codec169 (25 Hz).....	17
2.4.1	Video.....	17
2.4.2	Audio.....	18
2.5	SDTV_AVC_Codec169 (25 Hz).....	18
2.5.1	Video.....	19
2.5.2	Audio.....	19
2.6	HDTV_MPEG_Pattern (50 Hz).....	20
2.6.1	Video.....	20
2.6.2	Audio.....	21
2.7	HDTV_AVC_Pattern (50 Hz).....	21

2.7.1	Video.....	21
2.7.2	Audio.....	22
2.8	HDTV_MPEG_Pattern (25 Hz).....	22
2.8.1	Video.....	22
2.8.2	Audio.....	23
2.9	HDTV_AVC_Pattern (25 Hz).....	23
2.9.1	Video.....	24
2.9.2	Audio.....	24
2.10	SDTV_MPEG_Park (25 Hz).....	25
2.10.1	Video.....	25
2.10.2	Audio.....	25
2.11	SDTV_AVC_Park (25 Hz).....	26
2.11.1	Video.....	26
2.11.2	Audio.....	27
2.12	HDTV_MPEG_Park (25 Hz).....	27
2.12.1	Video.....	27
2.12.2	Audio.....	28
2.13	HDTV_AVC_Park (25 Hz).....	28
2.13.1	Video.....	28
2.13.2	Audio.....	29
3	ATSC transport streams.....	30
3.1	Overview.....	30
3.2	SDTV_MPEG_Codec43 (29 Hz).....	31
3.2.1	Video.....	32
3.2.2	Audio.....	34
3.3	SDTV_MPEG_Codec169 (29 Hz).....	34
3.3.1	Video.....	35
3.3.2	Audio.....	35
3.4	HDTV_MPEG_Pattern (59 Hz).....	36
3.4.1	Video.....	36
3.4.2	Audio.....	36
3.5	HDTV_MPEG_Pattern (29 Hz).....	37
3.5.1	Video.....	37

3.5.2	Audio.....	38
3.6	SDTV_MPEG_Park (29 Hz).....	38
3.6.1	Video.....	38
3.6.2	Audio.....	39
3.7	HDTV_MPEG_Park (29 Hz).....	39
3.7.1	Video.....	39
3.7.2	Audio.....	40
4	ISDB-T transport streams.....	41
4.1	Overview.....	41
4.2	SDTV_MPEG_Codec43 (29 Hz).....	42
4.2.1	Video.....	43
4.2.2	Audio.....	43
4.3	SDTV_MPEG_Codec169 (29 Hz).....	43
4.3.1	Video.....	44
4.3.2	Audio.....	44
4.4	HDTV_MPEG_Pattern (59 Hz).....	44
4.4.1	Video.....	45
4.4.2	Audio.....	45
4.5	HDTV_MPEG_Pattern (29 Hz).....	46
4.5.1	Video.....	46
4.5.2	Audio.....	46
4.6	SDTV_MPEG_Park (29 Hz).....	47
4.6.1	Video.....	47
4.6.2	Audio.....	48
4.7	HDTV_MPEG_Park (29 Hz).....	48
4.7.1	Video.....	48
4.7.2	Audio.....	49
	Index.....	50

1 Welcome to the R&S SMCVB-KS17 option

The R&S SMCVB-KS17 is a stream library that provides stream files for testing standard-definition television (SDTV) and high-definition television (HDTV) in the systems DVB, ATSC and ISDB-T.

This user manual contains a reference description of the functionality that the stream library provides. All functions not discussed in this manual are described in the R&S SMCV100B user manual. The latest version is available at:

www.rohde-schwarz.com/manual/SMCV100B

1.1 Key features

The R&S SMCVB-KS17 stream library consists of the following signals to provide a comprehensive functional testing on the receivers:

- Moving and video test pattern signals
- Audio and video synchronization signals

Transport streams with moving scenes

Moving picture scenes can be used for a basic functional test of decoders, multiplexers and terminals. For example, use moving picture scenes for testing SET-TOP boxes in final production. Due to the movement of the picture scenes, any interruption or transmission error in the data stream or any processing error in the decoder is immediately recognizable. Due to digital processing, the last frame that was received is always output in the decoder, even if there are transmission errors. The limitations imply that images are less useful in functional testing.

Monitor test pattern scenes/still test patterns

Besides checking the transmission of transport streams, it is also necessary to test the analog processing that occurs in the terminal equipment. Testing the D/A conversion in decoders and alignment of the picture in television sets generally involves the use of still images. The analog signal path for audio must also be tested and aligned.

Synchronization between video and audio

These sequences make it possible to detect a delay between picture and sound in transmission and decoding.

1.2 Installation

You can find detailed installation instructions in the supplement document of the R&S SMCV100B user manual and in the R&S SMCV100B user manual describing firmware versions FW 4.90.002.xx and later of the R&S SMCV100B.

1.3 What's new

Compared to the previous version there are editorial changes only.

1.4 Documentation overview

This section provides an overview of the R&S SMCV100B user documentation. Unless specified otherwise, you find the documents on the R&S SMCV100B product page at:

www.rohde-schwarz.com/manual/smcv100b

1.4.1 Getting started manual

Introduces the R&S SMCV100B and describes how to set up and start working with the product. Includes basic operations, typical measurement examples, and general information, e.g. safety instructions, etc. A printed version is delivered with the instrument.

1.4.2 User manuals and help

Separate manuals for the base unit and the software options are provided for download:

- Base unit manual
Contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.
- Software option manual
Contains the description of the specific functions of an option. Basic information on operating the R&S SMCV100B is not included.

The contents of the user manuals are available as help in the R&S SMCV100B. The help offers quick, context-sensitive access to the complete information for the base unit and the software options.

All user manuals are also available for download or for immediate display on the Internet.

1.4.3 Service manual

Describes the performance test for checking compliance with rated specifications, firmware update, troubleshooting, adjustments, installing options and maintenance.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS):

<https://gloris.rohde-schwarz.com>

1.4.4 Instrument security procedures

Deals with security issues when working with the R&S SMCV100B in secure areas. It is available for download on the Internet.

1.4.5 Printed safety instructions

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

1.4.6 Data sheets and brochures

The data sheet contains the technical specifications of the R&S SMCV100B. It also lists the options and their order numbers and optional accessories.

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

See www.rohde-schwarz.com/brochure-datasheet/smcv100b

1.4.7 Release notes and open source acknowledgment (OSA)

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

The open-source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/smcv100b

1.4.8 Application notes, application cards, white papers, etc.

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



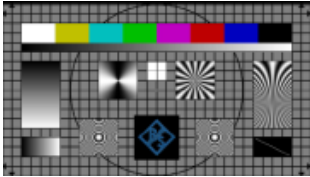
See www.rohde-schwarz.com/application/smcv100b

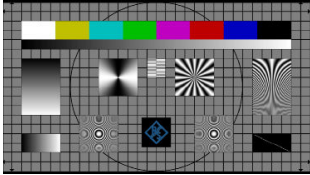


2 DVB transport streams

2.1 Overview

Each of the DVB transport streams consists of one video-elementary stream (MPEG2 or AVC) and two audio elementary streams (MPEG1-L2 and MPEG4 HE-AACv1 LOAS).

The file name gives information about the video information (scene or pattern), the size (SDTV or HDTV) and format (MPEG2 or AVC) of the coded video picture.

Video elementary stream	DVB test stream	
	25 Hz	50 Hz
Codec 4:3 Test Pattern Interlaced 4:3 576 lines 	SDTV_MPEG_Codec43 Codec43 multiburst 06 Mbps 24 frames SDTV_AVC_Codec43 Codec43 CABAC	
Codec 16:9 Test Pattern Interlaced 16:9 576 lines 	SDTV_MPEG_Codec169 Codec169 multiburst 06 Mbps 24 frames SDTV_AVC_Codec169 Codec169 CABAC	
Test Pattern Progressive 16:9 720 lines 		HDTV_MPEG_Pattern Pattern 240 frames HDTV_AVC_Pattern Pattern 720 p 240 frames CABAC Note: Rotating white square moving every frame (20.000 ms)

Video elementary stream	DVB test stream	
	25 Hz	50 Hz
Test Pattern Interlace 16:9 1080 lines 	HDTV_MPEG_Pattern Pattern 120 frames HDTV_AVC_Pattern Pattern 1080i 120 frames CABAC Note: Rotating white square moving every frame (20.000 ms)	
Park Interlaced 16:9 1080 lines 576 lines 	HDTV_MPEG_Park Park 960 frames HDTV_AVC_Park Park 1920 1080i 960 frames 09 Mbps CABAC	
Park Interlaced 16:9 576 lines 	SDTV_MPEG_Park Park 0720 0576i 960 frames 06 Mbps SDTV_AVC_Park Park 0720 0576i 960 frames 05 Mbps CABAC	

2.2 SDTV_MPEG_Codec43 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 8x24 video frames (7.68 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.2.1 Video

This universal *CODEC test pattern for standard BG/PAL* from Rohde & Schwarz offers the following tests and uses.

It consists of static picture elements for all analog measurements and, at the same time, of moving picture elements. The composition enables you to determine whether the MPEG transmission is still valid or whether the picture last decoded is displayed.

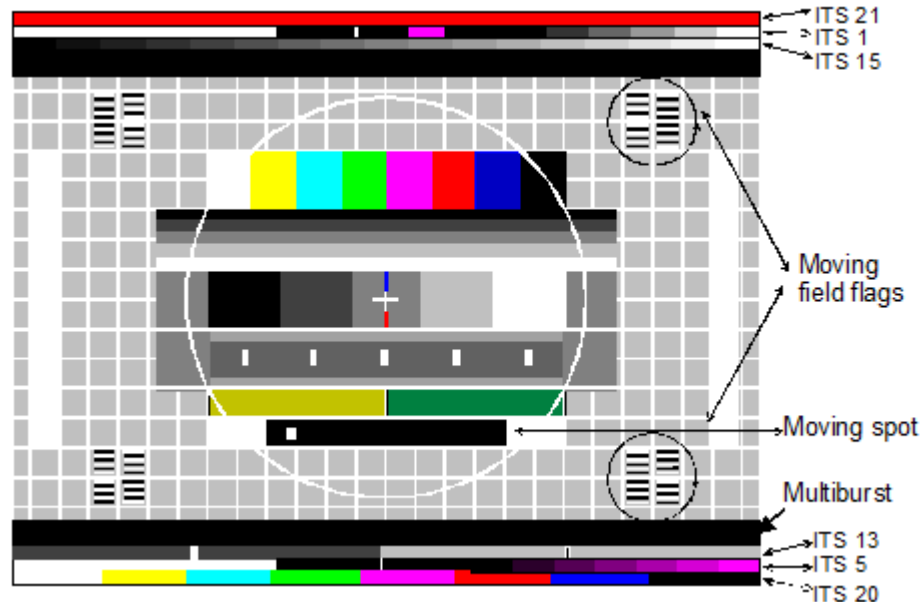


Figure 2-1: MPEG2-CODEC test pattern for standard BG/PAL

Moving picture elements

- Field flags
Four successive white areas appearing in every field indicate a continuous decoding of the transport stream. A fast rotating movement is generated.
- Moving spot
White spot that moves back and forth in the black field. A complete movement is performed in 24 frames. Thus, the errors in the time domain can be detected during decoding and also delay measurements between the different transmission paths are possible.

Monitor test pattern

- Grid and circle
Adjustment of geometry of picture tubes/monitors
- Color bar
Color purity / interchange of components etc.
- Y ramp
D/A converter test
- Convergence cross (luminance)+ blue and red pulse
Adjustment of monitor center and delays between Y, Cb and Cr
- Multiburst
Frequency response, horizontal resolution

Insertion test signals (ITS)

- ITS 21 red area
Used for PAL, SECAM or NTSC conversion in terminals (CCVS signal): In the red area, spurious amplitude and phase noise of the color subcarrier that are common for television recording equipment can especially well be detected and measured.
- ITS 1 CCIR 17
Standard line for automatic measurement and monitoring of the signal. The following distortions can be measured at the single elements of the signal:
 - White bar: level error, line-repetitive tilt, overshoot and roundings
 - 2T pulse: amplitude error, pulse distortions and reflections
 - 20T pulse: amplitude and delay differences between luminance and chrominance of the CCVS signal
 - Staircase: luminance nonlinearity
- ITS 15 ramp
Measurement of luminance nonlinearity, interfering voltage over the whole dynamic range and quantization noise of D/A converters.
- ITS CCIR18 multiburst
Frequency response measurement
- ITS 13 SIN X/X
Frequency response and group-delay measurement
- ITS 5 CCIR 330/5
Similar to ITS 1 /CCIR 17 without 20T pulse and with a 5-level staircase superimposed by a color subcarrier. Therefore, nonlinearities in the range of color subcarrier can be measured.
- ITS 20 color bar
Check of color coding and the phase and level ratios especially in the CCVS signal.

Test signal	Location
ITS 21 red area	Lines 24 to 31 and lines 336 to 343
ITS 1 CCIR 17	Lines 32 to 39 and lines 344 to 351
ITS 15 ramp	Lines 40 to 47 and lines 352 to 359
Black	Lines 48 to 55 and lines 360 to 367
ITS CCIR18 Multiburst	Lines 280 to 287 and lines 592 to 599
ITS 13 SIN X/X	Lines 288 to 295 and lines 600 to 607
ITS 5 CCIR 330/5	Lines 296 to 303 and lines 608 to 615
ITS 20 color bar	Lines 304 to 310 and lines 616 to 623

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Seamless at sequence end

- Moving picture

2.2.2 Audio

Sine burst of 400 Hz with 0 dBFS for every 24th frame with a duration of 40 ms. If the "moving spot" is located on the left side (and is moving to the right), the 400 Hz burst sounds in the left channel. If the "moving spot" is located on the right side (and is moving to the left), the 1 kHz burst sounds in the right channel. There is no burst for the remaining time.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.3 SDTV_AVC_Codec43 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 8x24 video frames (7.68 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.3.1 Video

This universal *CODEC test pattern for standard BG/PAL* from Rohde & Schwarz offers the following tests and uses.

It consists of static picture elements for all analog measurements and at the same time of moving picture elements. The composition enables you to determine whether the MPEG transmission is still valid or whether the picture last decoded is displayed.

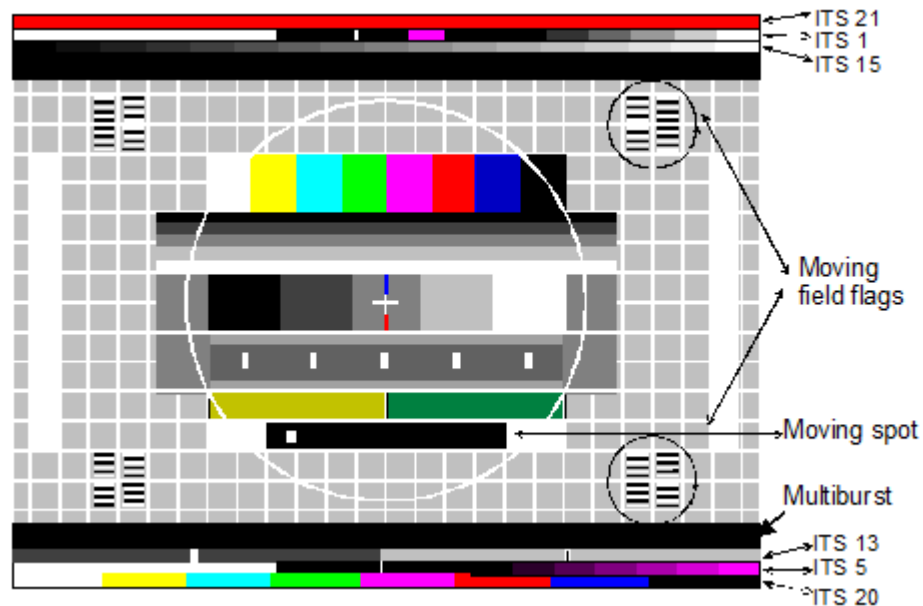


Figure 2-2: MPEG2-CODEC test pattern for standard BG/PAL

Moving picture elements

- Field flags
Four successive white areas appearing in every field indicate a continuous decoding of the transport stream. A fast rotating movement is generated.
- Moving spot
White spot that moves back and forth in the black field. A complete movement is performed in 24 frames. Thus, the errors in the time domain can be detected during decoding and also delay measurements between the different transmission paths are possible.

Monitor test pattern

- Grid and circle
Adjustment of geometry of picture tubes/monitors
- Y ramp
D/A converter test
- Convergence cross (luminance)+ blue and red pulse
Adjustment of monitor center and delays between Y, Cb and Cr
- Multiburst
Frequency response, horizontal resolution

Insertion test signals (ITS)

- ITS 21 red area
Used for PAL, SECAM or NTSC conversion in terminals (CCVS signal): In the red area-spurious amplitude and phase noise of the color subcarrier as are common for television recording equipment can especially well be detected and measured.
- ITS 1 CCIR 17

Standard line for automatic measurement and monitoring of the signal. The following distortions can be measured at the single elements of the signal:

- White bar: level error, line-repetitive tilt, overshoot and roundings
- 2T pulse: amplitude error, pulse distortions and reflections
- 20T pulse: amplitude and delay differences between luminance and chrominance of the CCVS signal
- Staircase: luminance nonlinearity

- ITS 15 ramp
Measurement of luminance nonlinearity, interfering voltage over the whole dynamic range and quantization noise of D/A converters.
- ITS CCIR18 multiburst
Frequency response measurement
- ITS 13 SIN X/X
Frequency response and group-delay measurement
- ITS 5 CCIR 330/5
Similar to ITS 1 /CCIR 17 without 20T pulse and with a 5-level staircase superimposed by a color subcarrier. Therefore, nonlinearities in the range of color subcarrier can be measured.
- ITS 20 color bar
Check of color coding and the phase and level ratios especially in the CCVS signal.

MPEG4 AVC MP@L3

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.771 Mbit/s
- Seamless at sequence end
- Moving picture
- CABAC coding mode

2.3.2 Audio

Sine burst of 400 Hz with 0 dBFS for every 24th frame with a duration of 40 ms. If the "moving spot" is located on the left side (and is moving to the right), the 400 Hz burst sounds in the left channel. If the "moving spot" is located on the right side (and is moving to the left), the 1 kHz burst sounds in the right channel. There is no burst for the remaining time.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.4 SDTV_MPEG_Codec169 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 8x24 video frames (7.68 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.4.1 Video

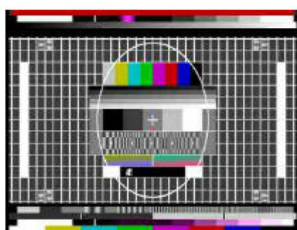


Figure 2-3: 16:9 display on a 4:3 monitor

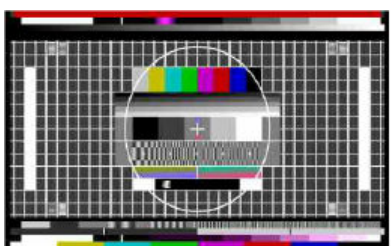


Figure 2-4: 16:9 display on a 16:9 monitor

CODEC 16:9 test pattern for standard BG/PAL

CODEC 4:3 test pattern for standard BG/PAL with modified circle and grid. The structure and elements of this test sequence correspond to the CODEC43 sequence. The picture format corresponds to the 16:9 aspect ratio. Thus it is possible to check format switchover of terminals and the screen geometry of 16:9 TV CRTs.

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture

- 720 pixels/line
- 6 Mbit/s
- Seamless at sequence end
- Moving picture

2.4.2 Audio

Sine burst of 400 Hz with 0 dBFS for every 24th frame with a duration of 40 ms. If the "moving spot" is located on the left side (and is moving to the right), the 400 Hz burst sounds in the left channel. If the "moving spot" is located on the right side (and is moving to the left), the 1 kHz burst sounds in the right channel. There is no burst for the remaining time.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.5 SDTV_AVC_Codec169 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 8x24 video frames (7.68 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.5.1 Video

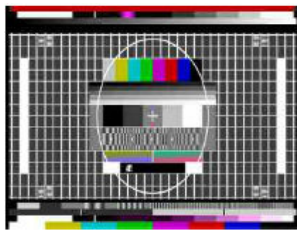


Figure 2-5: 16:9 display on a 4:3 monitor

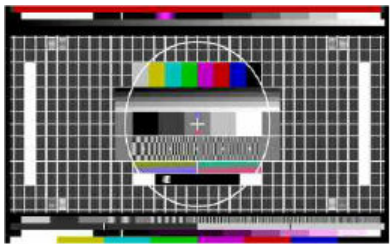


Figure 2-6: 16:9 display on a 16:9 monitor

CODEC 16:9 test pattern for standard BG/PAL

CODEC 4:3 test pattern for standard BG/PAL with modified circle and grid. The structure and elements of this test sequence correspond to the CODEC43 sequence. The picture format corresponds to the 16:9 aspect ratio. Thus it is possible to check format switchover of terminals and the screen geometry of 16:9 TV CRTs.

MPEG4 AVC MP@L3

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.858 bit/s
- Seamless at sequence end
- Moving picture

2.5.2 Audio

Sine burst of 400 Hz with 0 dBFS for every 24th frame with a duration of 40 ms. If the "moving spot" is located on the left side (and is moving to the right), the 400 Hz burst sounds in the left channel. If the "moving spot" is located on the right side (and is moving to the left), the 1 kHz burst sounds in the right channel. There is no burst for the remaining time.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s

- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.6 HDTV_MPEG_Pattern (50 Hz)

TS ID: 2011 (0x07DB)

Length: 8x240 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.6.1 Video

This test pattern allows you to assess the screen geometry, sharpness, quantization and display of all fields.

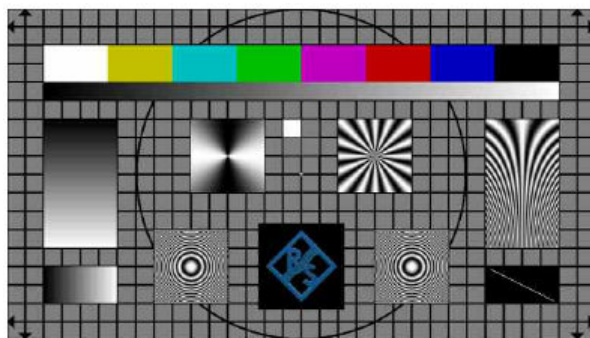


Figure 2-7: Test pattern

MPEG2 MP@HL

- 50 frames/s
- 720 lines/picture
- 1280 pixels/line
- 16 Mbit/s
- Seamless at sequence end
- Moving picture

2.6.2 Audio

Sine burst of 1 kHz with 0 dBFS on both left and right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.7 HDTV_AVC_Pattern (50 Hz)

TS ID: 2011 (0x07DB)

Length: 8x240 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.7.1 Video

This test pattern allows you to assess the screen geometry, sharpness, quantization and display of all fields.

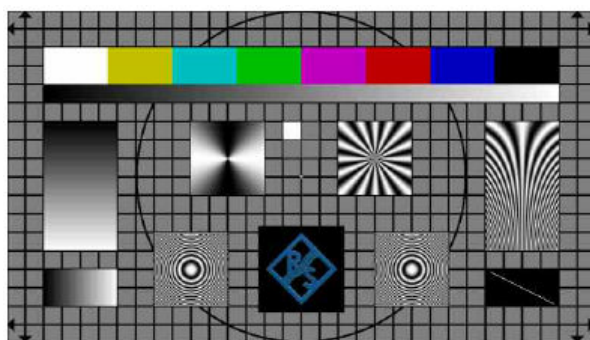


Figure 2-8: Test pattern

MPEG4 AVC HP@L4

- 50 frames/s

- 720 lines/picture
- 1280 pixels/line
- 4.632 Mbit/s
- Seamless at sequence end
- Moving picture
- CABAC coding mode

2.7.2 Audio

Sine burst of 1 kHz with 0 dBFS on both left and right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.8 HDTV_MPEG_Pattern (25 Hz)

TS ID: 2011 (0x07DB)

Length: 8x120 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.8.1 Video

This test pattern allows you to assess the screen geometry, sharpness, quantization and display of all fields.

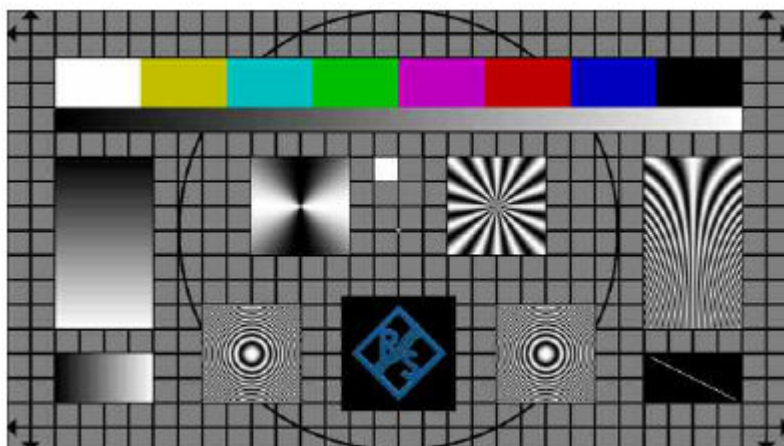


Figure 2-9: Test pattern

MPEG2 MP@HL

- 25 frames/s
- 1080 lines/picture
- 1920 pixels/line
- 16 Mbit/s
- Seamless at sequence end
- Moving picture

2.8.2 Audio

Sine burst of 1 kHz with 0 dBFS at both left and right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.9 HDTV_AVC_Pattern (25 Hz)

TS ID: 2011 (0x07DB)

Length: 8x120 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.9.1 Video

This test pattern allows you to assess the screen geometry, sharpness, quantization and display of all fields.

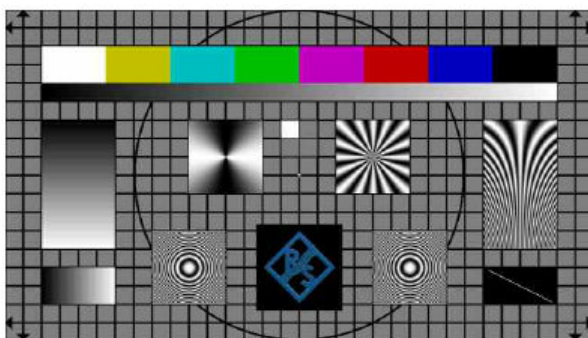


Figure 2-10: Test pattern

MPEG4 AVC HP@L4

- 25 frames/s
- 1080 lines/picture
- 1920 pixels/line
- 5.32 Mbit/s
- Seamless at sequence end
- Moving picture
- CABAC coding mode

2.9.2 Audio

Sine burst of 1 kHz with 0 dBFS at both left and right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s

- 128 kbit/s
- Seamless at sequence end
- Stereo

2.10 SDTV_MPEG_Park (25 Hz)

TS ID: 2011 (0x07DB)

Length: 960 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.10.1 Video

This scene shows many details at a less critical rate of motion.



Figure 2-11: Park scene

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Seamless at sequence end
- Moving picture

2.10.2 Audio

Background noise at both left and right channel.

MPEG1 layer 2

- 48 ksample/s

- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.11 SDTV_AVC_Park (25 hz)

TS ID: 2011 (0x07DB)

Length: 960 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.11.1 Video

This scene shows many details at a less critical rate of motion.



Figure 2-12: Park scene

MPEG4 AVC MP@L3

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 5.22 Mbit/s
- Seamless at sequence end
- Moving picture
- CABAC coding mode

2.11.2 Audio

Background noise at both left and right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.12 HDTV_MPEG_Park (25 Hz)

TS ID: 2011 (0x07DB)

Length: 960 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.12.1 Video

This scene shows many details at a less critical rate of motion.



Figure 2-13: Park scene

MPEG2 MP@HL

- 25 frames/s
- 1080 lines/picture
- 1920 pixels/line
- 16 Mbit/s
- Seamless at sequence end
- Moving picture

2.12.2 Audio

Background noise at both left and right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

2.13 HDTV_AVC_Park (25 Hz)

TS ID: 2011 (0x07DB)

Length: 960 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

2.13.1 Video

This scene shows many details at a less critical rate of motion.



Figure 2-14: Park scene

MPEG4 AVC HP@L4

- 25 frames/s
- 1080 lines/picture
- 1920 pixels/line
- 9.493 Mbit/s
- Seamless at sequence end
- Moving picture

2.13.2 Audio

Background noise at both left and right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- Stereo

MPEG4 (HE-AACv1 LOAS)



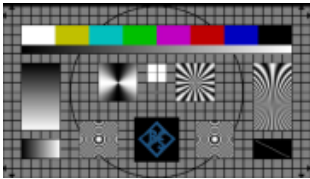
- 24 ksample/s
- 128 kbit/s
- Seamless at sequence end
- Stereo

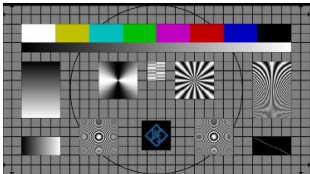


3 ATSC transport streams

3.1 Overview

Each of the ATSC transport streams consists of a video elementary stream (MPEG2) and an AC3 audio elementary stream.

The file name gives information about the video information (scene or pattern) and the size (SDTV or HDTV) of the coded video picture.

Video elementary stream	ATSC test stream & video elementary stream	
	29 Hz	59 Hz
Codec 4:3 Test Pattern Interlaced 4:3 480 lines 	SDTV_MPEG_Codec43 Codec43 multiburst 06 Mbps 24 frames	
Codec 16:9 Test Pattern Interlaced 16:9 480 lines 	SDTV_MPEG_Codec169 Codec169 multiburst 06 Mbps 24 frames	
Test Pattern Progressive 16:9 720 lines 		HDTV_MPEG_Pattern Pattern 240 frames Note: Rotating white square moving every field (16.683 ms)

Video elementary stream	ATSC test stream & video elementary stream	
	29 Hz	59 Hz
Test Pattern Interlace 16:9 1080 lines 	HDTV_MPEG_Pattern Pattern 120 frames Note: Rotating white square moving every field (16.683 ms)	
Park Interlaced 16:9 1080 lines 576 lines 	HDTV_MPEG_Park Park 960 frames	
Park Interlaced 16:9 480 lines 	SDTV_MPEG_Park Park 0704 0480i 960 frames 06 Mbps	

3.2 SDTV_MPEG_Codec43 (29 Hz)

TS ID: 2011 (0x07DB)

Length: 40x24 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

3.2.1 Video

R&S CODEC 4:3 test pattern for standard M/NTSC is a universal MPEG2CODEC test pattern for standard M/NTSC from Rohde & Schwarz that offers the following tests and uses.

It consists of static picture elements for all analog measurements and, at the same time, of moving picture elements. The composition enables you to determine whether the MPEG transmission is still valid or whether the picture last decoded is displayed.

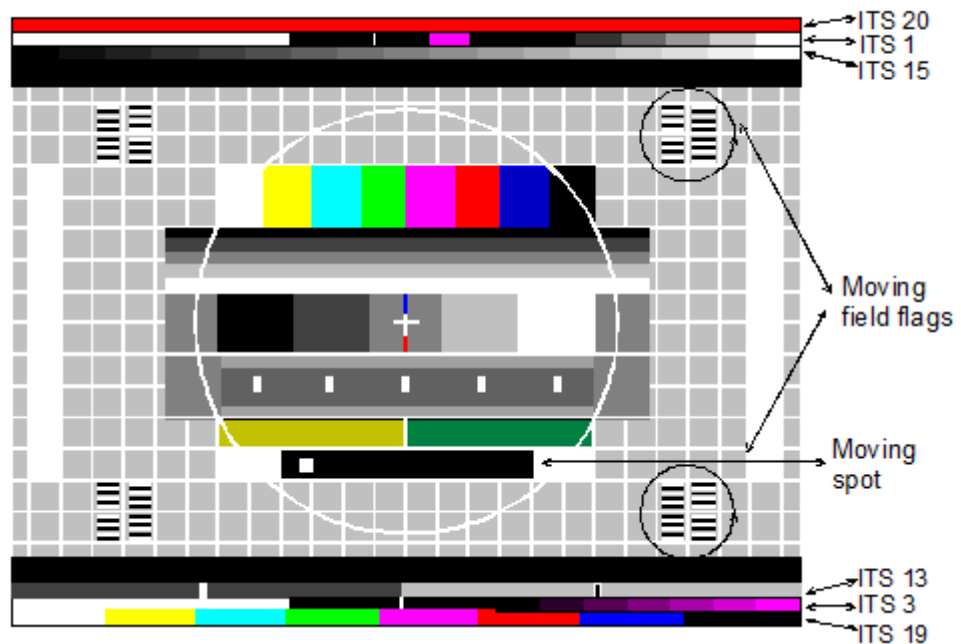


Figure 3-1: R&S MPEG2-CODEC test pattern for standard M/NTSC

Moving picture elements

- Field flags
Four successive white areas appearing in every field indicate a continuous decoding of the transport stream. A fast rotating movement is generated.
- Moving spot
White spot that moves back and forth in the black field. A complete movement is performed in 24 frames. Thus, the errors in the time domain can be detected during decoding and also delay measurements between the different transmission paths are possible.

Monitor test pattern

- Grid and circle
Adjustment of geometry of picture tubes/monitors
- Color bar
Color purity / interchange of components etc.
- Y ramp
D/A converter test

- Convergence cross (luminance)+blue and red pulse
Adjustment of monitor center and delays between Y, Cb and Cr.
- Multiburst
Frequency response, horizontal resolution

Insertion test signals (ITS)

- ITS 20 read area
Used for PAL or NTSC conversion in terminals (CCVS signal): In the red area-spurious amplitude and phase noise of the color subcarrier as are common for television recording equipment can especially well be detected and measured.
- ITS 1 NTC7
Standard line for automatic measurement and monitoring of the signal. The following distortions can be measured at the single elements of the signal:
 - White bar: level error, line-repetitive tilt, overshoot and roundings.
 - 2T pulse: amplitude error, pulse distortions and reflections.
 - 12.5T pulse: amplitude and delay differences between luminance and chrominance of the CCVS signal.
 - Staircase: luminance nonlinearity.
- ITS 15 ramp
Measurement of luminance nonlinearity, interfering voltage over the whole dynamic range and quantization noise of D/A converters.
- ITS 13 SIN X/X
Frequency response and group-delay measurement.
- ITS 3 FCC
Similar to IST 1 / CCIR 17 with inverted signal components. The first signal component is a 5-step staircase superimposed by a color subcarrier. On this component, nonlinearities in the range of color subcarrier can be measured.
- ITS 19 color bar
Check of color coding and the phase and level ratios especially in the CCVS signal.

Test signal	Location
ITS 21 red area	Lines 23 to 30 and lines 286 to 293
ITS 1 NTC7 (Combined)	Lines 31 to 38 and lines 294 to 301
ITS 15 ramp	Lines 39 to 46 and lines 302 to 309
Black	Lines 47 to 54 and lines 310 to 317
ITS Multiburst	Lines 280 to 287 and lines 494 to 501
ITS 13 SIN X/X	Lines 239 to 246 and lines 502 to 509
ITS 3 FCC Composite	Lines 247 to 254 and lines 510 to 517
ITS 19 color bar	Lines 255 to 262 and lines 518 to 525

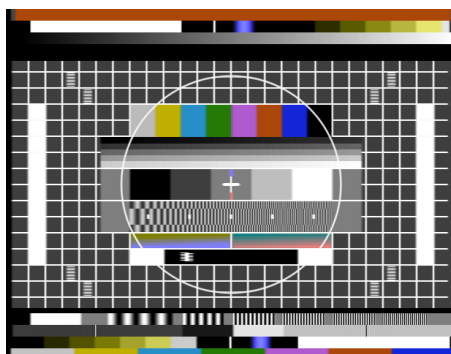


Figure 3-2: Codec 4:3 test pattern

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 6 Mbit/s
- Seamless at sequence end
- Moving picture
- ATSC identifier

3.2.2 Audio

Sine burst of 400 Hz with 0 dBFS for every 24th frame with a duration of 40 ms. If the "moving spot" is located on the left side (and is moving to the right), the 400 Hz burst sounds in the left channel. If the "moving spot" is located on the right side (and is moving to the left), the 1 kHz burst sounds in the right channel. There is no burst for the remaining time.

AC-3

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- 2/0 (L,R)

3.3 SDTV_MPEG_Codec169 (29 Hz)

TS ID: 2011 (0x07DB)

Length: 40x24 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

3.3.1 Video

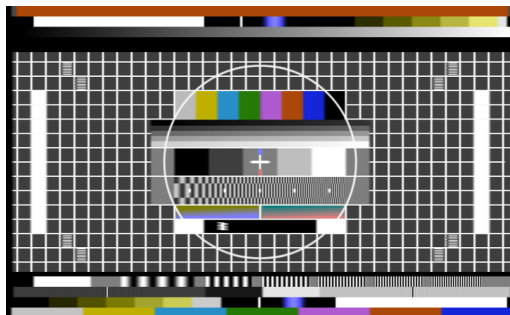


Figure 3-3: Codec 16:9 test pattern

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 6 Mbit/s
- Seamless at sequence end
- Moving picture
- ATSC identifier

3.3.2 Audio

Sine burst of 400 Hz with 0 dBFS for every 24th frame with a duration of 40 ms. If the "moving spot" is located on the left side (and is moving to the right), the 400 Hz burst sounds in the left channel. If the "moving spot" is located on the right side (and is moving to the left), the 1 kHz burst sounds in the right channel. There is no burst for the remaining time.

AC-3

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- 2/0(L, R)

3.4 HDTV_MPEG_Pattern (59 Hz)

TS ID: 2011 (0x07DB)

Length: 8x240 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

3.4.1 Video

This test pattern allows you to assess the screen geometry, sharpness, quantization and display of all fields.

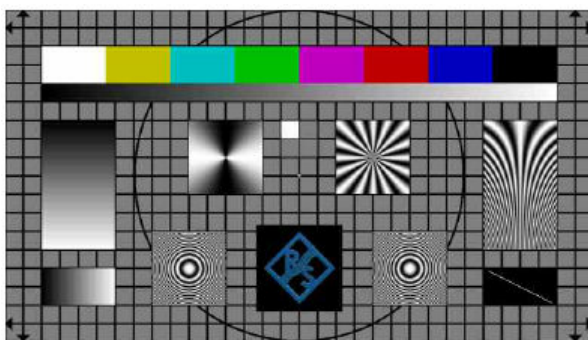


Figure 3-4: Test pattern

MPEG2 MP@HL

- 59.94 frames/s
- 720 lines/picture
- 1280 pixels/line
- 16 Mbit/s
- Seamless at sequence end
- Moving picture
- ATSC identifier

3.4.2 Audio

Sine burst of 1 kHz with 0 dBFS at both left and right channel.

AC-3

- 48 ksample/s

- 224 kbit/s
- Seamless at sequence end
- 3/2(L,C,R,SL,SR) LFE

3.5 HDTV_MPEG_Pattern (29 Hz)

TS ID: 2011 (0x07DB)

Length: 8x120 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

3.5.1 Video

This test pattern allows you to assess the screen geometry, sharpness, quantization and display of all fields.

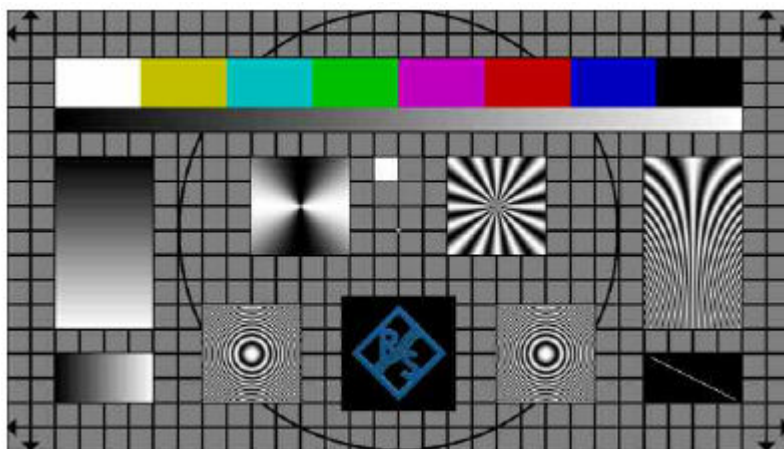


Figure 3-5: Test pattern

MPEG2 MP@HL

- 29.97 frames/s
- 1080 lines/picture
- 1920 pixels/line
- 16 Mbit/s
- Seamless at sequence end
- Moving picture

- ATSC identifier

3.5.2 Audio

Sine burst of 1 kHz with 0 dBFS at both left and right channel.

AC-3

- 48 ksample/s
- 224 kbit/s
- Seamless at sequence end
- 3/2(L,C,R,SL,SR) LFE

3.6 SDTV_MPEG_Park (29 Hz)

TS ID: 2011 (0x07DB)

Length: 960 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

3.6.1 Video

This scene shows many details at a less critical rate of motion.



Figure 3-6: Park scene

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line

- 6 Mbit/s
- Seamless at sequence end
- Moving picture
- ATSC identifier

3.6.2 Audio

Background noise at both left and right channel.

AC-3

- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- 3/2(L,C,R,SL,SR) LFE

3.7 HDTV_MPEG_Park (29 Hz)

TS ID: 2011 (0x07DB)

Length: 960 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

3.7.1 Video

This scene shows many details at a less critical rate of motion.



Figure 3-7: Park scene

MPEG2 MP@HL

- 29.97 frames/s
- 1080 lines/picture
- 1920 pixels/line
- 16 Mbit/s
- Seamless at sequence end
- Moving picture
- ATSC identifier

3.7.2 Audio

Background noise at both left and right channel.

AC-3



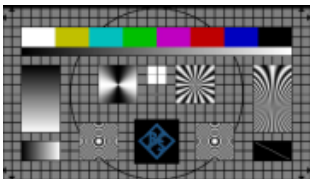
- 48 ksample/s
- 384 kbit/s
- Seamless at sequence end
- 3/2(L,C,R,SL,SR) LFE

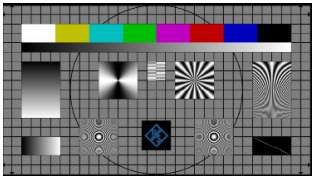


4 ISDB-T transport streams

4.1 Overview

Each of the ISDB T transport streams consists of a video elementary stream (MPEG2) and an AAC-LC ADTS audio elementary stream.

The file name gives information about the video information (scene or pattern) and the size (SDTV or HDTV) of the coded video picture.

Video elementary stream	ATSC test stream & video elementary stream	
	29 Hz	59 Hz
Codec 4:3 Test Pattern Interlaced 4:3 480 lines 	SDTV_MPEG_Codec43 Codec43 multiburst 06 Mbps 24 frames	
Codec 16:9 Test Pattern Interlaced 16:9 480 lines 	SDTV_MPEG_Codec169 Codec169 multiburst 06 Mbps 24 frames	
Test Pattern Progressive 16:9 720 lines 		HDTV_MPEG_Pattern Pattern 240 frames Note: Rotating white square moving every field (16.683 ms)

Video elementary stream	ATSC test stream & video elementary stream	
	29 Hz	59 Hz
Test Pattern Interlace 16:9 1080 lines 	HDTV_MPEG_Pattern Pattern 120 frames Note: Rotating white square moving every field (16.683 ms)	
Park Interlaced 16:9 1080 lines 576 lines 	HDTV_MPEG_Park Park 960 frames	
Park Interlaced 16:9 480 lines 	SDTV_MPEG_Park Park 0720 0480i 960 frames 06 Mbps	

4.2 SDTV_MPEG_Codec43 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 80x24 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

4.2.1 Video

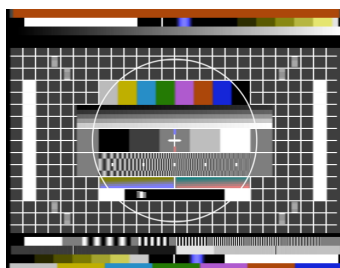


Figure 4-1: Codec 4:3 test pattern

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Seamless at sequence end
- Moving picture

4.2.2 Audio

Sine burst of 400 Hz with 0 dBFS for every 24th frame with a duration of 40 ms. If the "moving spot" is located on the left side (and is moving to the right), the 400 Hz burst sounds in the left channel. If the "moving spot" is located on the right side (and is moving to the left), the 1 kHz burst sounds in the right channel. There is no burst for the remaining time.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Seamless at sequence end
- Stereo

4.3 SDTV_MPEG_Codec169 (29 Hz)

TS ID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 80x24 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

4.3.1 Video

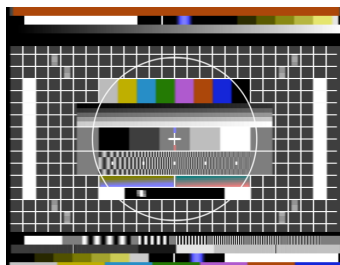


Figure 4-2: Codec 4:3 test pattern

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Seamless at sequence end
- Moving picture

4.3.2 Audio

Sine burst of 400 Hz with 0 dBFS for every 24th frame with a duration of 40 ms. If the "moving spot" is located on the left side (and is moving to the right), the 400 Hz burst sounds in the left channel. If the "moving spot" is located on the right side (and is moving to the left), the 1 kHz burst sounds in the right channel. There is no burst for the remaining time.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Seamless at sequence end
- Stereo

4.4 HDTV_MPEG_Pattern (59 Hz)

TS ID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 16x120 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

4.4.1 Video

This test pattern allows you to assess the screen geometry, sharpness, quantization and display of all fields.

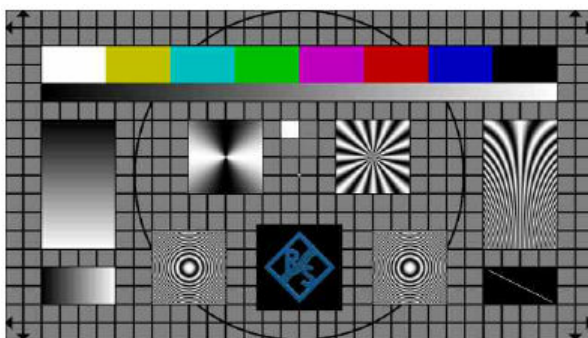


Figure 4-3: Test pattern

MPEG2 MP@HL

- 59.94 frames/s
- 720 lines/picture
- 1280 pixels/line
- 16 Mbit/s
- Seamless at sequence end
- Moving picture

4.4.2 Audio

Sine burst of 1 kHz with 0 dBFS at both left and right channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Seamless at sequence end
- Stereo

4.5 HDTV_MPEG_Pattern (29 Hz)

TS ID: 32736 (0x7FE0)

SID: 1024 (0x400)

Length: 16x120 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

4.5.1 Video

This test pattern allows you to assess the screen geometry, sharpness, quantization and display of all fields.

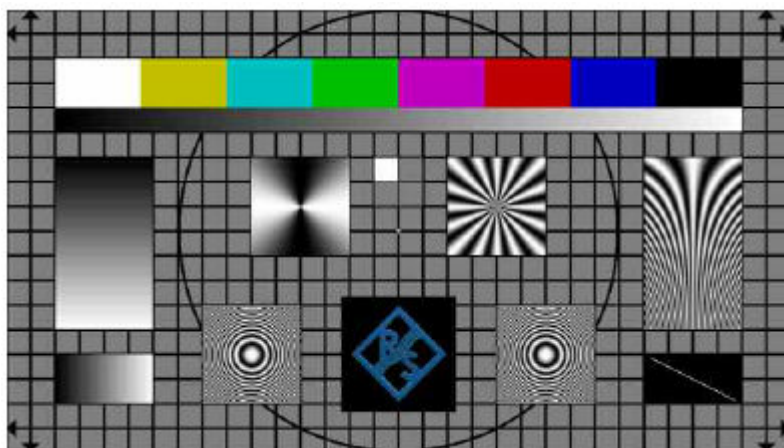


Figure 4-4: Test pattern

MPEG2 MP@HL

- 29.97 frames/s
- 1080 lines/picture
- 1920 pixels/line
- 16 Mbit/s
- Seamless at sequence end
- Moving picture

4.5.2 Audio

Sine burst of 1 kHz with 0 dBFS at both left and right channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Seamless at sequence end
- Stereo

4.6 SDTV_MPEG_Park (29 Hz)

TS ID: 32736 (0x7FE0)

SID: 1024 (0x400)

Length: 2x960 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

4.6.1 Video

This scene shows many details at a less critical rate of motion.



Figure 4-5: Park scene

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Seamless at sequence end
- Moving picture

4.6.2 Audio

Background noise at both left and right channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Seamless at sequence end
- Stereo

4.7 HDTV_MPEG_Park (29 Hz)

TS ID: 32736 (0x7FE0)

SID: 1024 (0x400)

Length: 2x960 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

4.7.1 Video

This scene shows many details at a less critical rate of motion.



Figure 4-6: Park scene

MPEG2 MP@HL

- 29.97 frames/s
- 1080 lines/picture
- 1920 pixels/line

- 16 Mbit/s
- Seamless at sequence end
- Moving picture

4.7.2 Audio

Background noise at both left and right channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Seamless at sequence end
- Stereo

Index

A

Application cards	9
Application notes	9
ATSC transport streams	30

B

Brochures	9
-----------------	---

D

Data sheets	9
Documentation overview	8
DVB transport streams	10

G

Getting started	8
-----------------------	---

H

Help	8
------------	---

I

Installation	7
Instrument help	8
Instrument security procedures	9
ISDB-T transport streams	41

K

Key features	7
--------------------	---

O

Open source acknowledgment (OSA)	9
--	---

R

Release notes	9
---------------------	---

S

Safety instructions	9
Security procedures	9
Service manual	8

U

User manual	8
-------------------	---

W

Welcome	7
What's new	8
White papers	9