

R&S[®]SMCVB-KS18

Extended SDTV Streams

User Manual



1179272502
Version 03

ROHDE & SCHWARZ
Make ideas real



This document describes the following software options:

- R&S®SMCVB-KS18 Extended SDTV Streams (1434.5211.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.

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1179.2725.02 | Version 03 | R&S®SMCVB-KS18

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

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1 Welcome to the R&S SMCVB-KS18 option

The R&S SMCVB-KS18 is a stream library that provides stream files for testing standard-definition television (SDTV) of the systems DVB, ATSC and ISDB-T. The files are additional to the SDTV stream files provided in the Basic Streams library R&S SMCVB-KS17.

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-KS18 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 (STBs) 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

Required options

The equipment layout for processing files of waveform libraries includes:

- R&S SMCV100B base unit (64 MSample ARB memory, 60 MHz RF bandwidth)
- Broadcast standard option for the "TS Player" application (R&S SMCVB-Kxxx)
- Enable Broadcast Standards option (R&S SMCVB-K519)
- Stream library option (R&S SMCVB-KSxx)

For more information on stream options, see chapter "TS Player section "Required options" in the broadcast standard option user manual of the R&S SMCV100B.

To access R&S SMCV100B libraries

R&S SMCV100B stream and waveform libraries are available for download for registered users on the "Vector Signal Generator Customer Web" at the global Rohde & Schwarz information system (GLORIS).

1. For access, register at <https://gloris.rohde-schwarz.com>:
In section "How to register", follow the instructions provided in the introduction video "How to register for GLORIS".
2. For access to the "Vector Signal Generator Customer Web", register the R&S SMCV100B:
 - a) In the menu "Support&Services", select "My Products" > "Register my product".
 - b) To register the R&S SMCV100B, click "Add Equipment".
 - c) In the section "Information about your product", specify order number ("Material no.") and serial number ("Serial No.") of the R&S SMCV100B.

Home News Center Support&Services

My Products > Vector Signal Generator Customer Web

Downloads My Products Service Portfolio

Register my product

Add Equipment

Information about your product

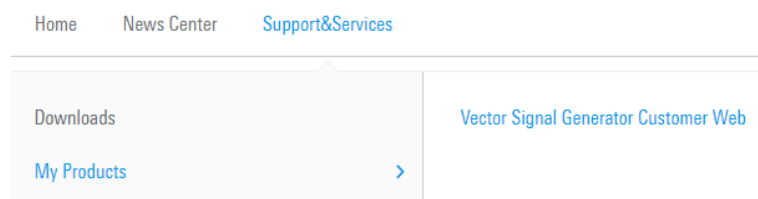
Identify product by: Device ID Material & Serial No.

*Material no.: 1432.700K02

*Serial No.: 123456

Add equipment < Back to list

3. After product registration, log in at GLORIS.
4. In the menu bar, select "Support&Services > My Products > Vector Signal Generator Customer Web".



The "R&S SMCV100B Customer Web" page opens.

5. In the selection field "Product Selection for VSG", select "R&S®SMCV100B".

A webpage opens and displays search results for products related to the R&S SMCV100B.

Product Related Documents



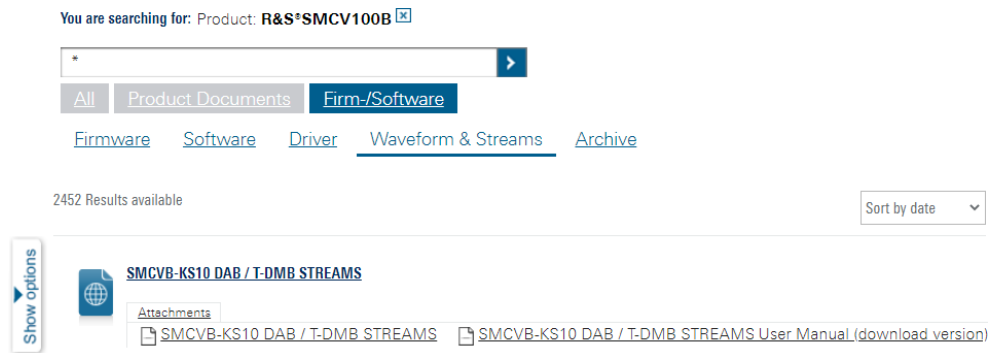
To download a library file

This procedure describes how to download library files. It provides a step-by-step description for download of a stream library file. The download of waveform library files is analogous.

1. Access the "Product Related Documents" web page as described in "[To access R&S SMCV100B libraries](#)" on page 14.
2. In the search navigation bar, select "Firm-/Software" > "Waveform & Streams".

The search lists all information related to stream and waveform libraries of the R&S SMCV100B:

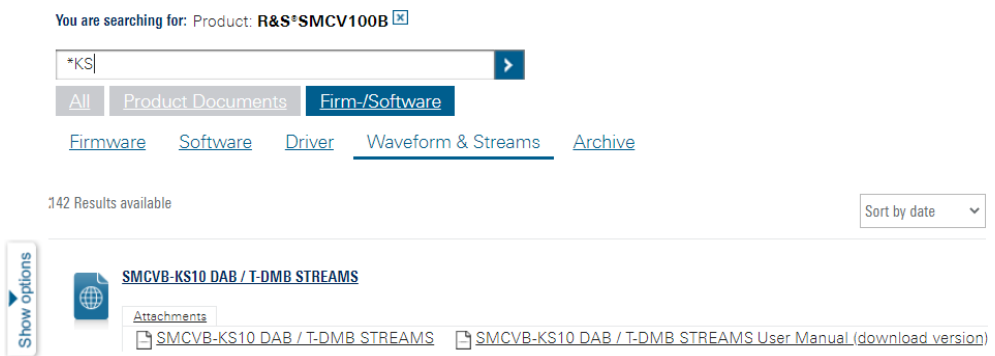
- R&S SMCVB-KSxx results relate to stream libraries.
- R&S SMCVB-KVxx results relate to waveform libraries.



3. Optionally, deactivate the filtering to display all waveform and stream library content.
 - a) On the left menu, select "Show options".
 - b) Click "Filtering on. Reset all filters."

Filtering on. Reset all filters.

4. Optionally, to filter for stream library content enter *KS in the search input field.



5. In the search result list, navigate to the required library.
6. To download required library files, click the download link in the "Attachments" section of library product page.
For example, for DAB/T-DMB streams, click the download link "R&S SMCVB-KS10 DAB / T-DMB STREAMS".

A download dialog opens to select and save files of the stream library.

To save a library file

You can save the library file to several storage locations:

- External storage device (HDD, memory stick): Use external USB storage device to save large files or complete libraries. Connect the storage device to one of the USB 3.0 connectors on the rear panel of the R&S SMCV100B. If detected correctly, you can access the files on the R&S SMCV100B in the `/usb/` directory in file-select dialogs.
The R&S SMCV100B supports the following storage formats: ext2/ext3/ext4, FAT16/FAT32, NTFS (read-only), ISO9660, UDF

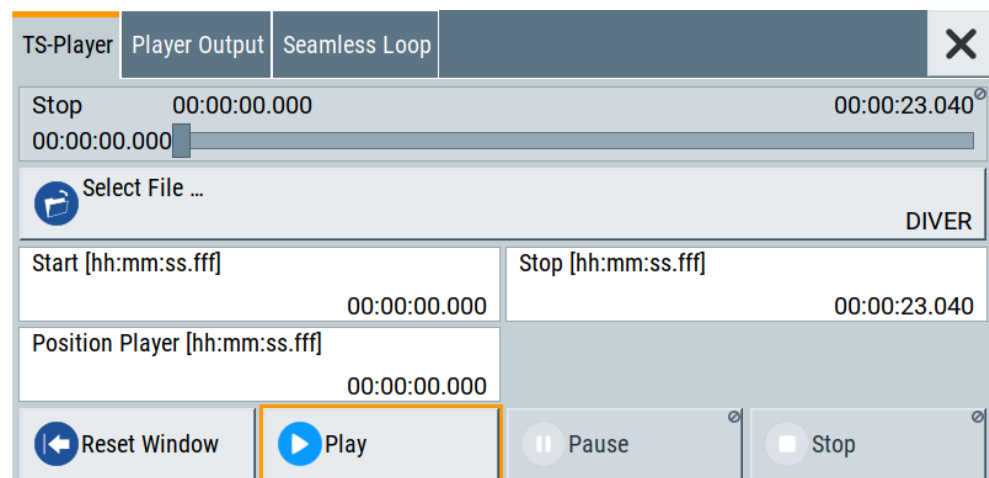
- Internal memory (SSD): Use the internal memory to save single files to the user directory `/var/user/` of the R&S SMCV100B, for example, using FTP via a LAN connection.

To load and play a stream library file

1. Load the file from its storage location:
 - External storage device (HDD, memory stick): Load the file from the `/usb/` directory.
 - Internal memory (SSD): Load the file from the user directory `/var/user/`

Note: Library files are encrypted files. Loading the library file at the R&S SMCV100B requires installation of the corresponding library option. See "[Required options](#)" on page 14.

2. To load the file at the R&S SMCV100B, open the "TS Player" application in digital broadcast standard ("`<Broadcast_Standard>`") dialogs:
 - a) Select "Baseband" > "`<Broadcast_Standard>`" > "Input Signal".
 - b) Select "Source" > "TS Player".
 - c) Select "TS Player" button.
 - d) Select "Select File".
3. To select the file, navigate to the storage location (1).
4. Select "TS-Player" > "Play".



The R&S SMCV100B processes the stream file.

5. Select "`<Broadcast_Standard>`" > "State" > "On", to activate the baseband signal.
6. In the block diagram, select "RF" > "On".

The stream file is modulated onto the RF carrier and output at the "RF 50 Ω" connector.

For more information on loading stream files, see chapter "How to generate an internal TS signal" in the broadcast standard option user manual of the R&S SMCV100B.

1.3 What's new

Compared to the previous version the documentation provides updated installation instructions to access, download and play stream library files, see [Chapter 1.2, "Installation"](#), on page 14.

1.4 Documentation overview

This section provides an overview of the R&S SMCV100B user documentation. Unless specified otherwise, you find the documents 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 software makes use of 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/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

1.4.9 Videos

Find various videos on Rohde & Schwarz products and test and measurement topics on YouTube: <https://www.youtube.com/@RohdeundSchwarz>

2 Video test patterns and audio test sequences

In this chapter, test patterns and sequences that are used in several transport streams are described in detail.

2.1 Video

2.1.1 NTC7 composite (29 Hz)

A white bar is provided at the beginning of the line followed by a 2T pulse, modulated 12.5T and a five-step grey staircase modulated with the color subcarrier.

Example of use: Test and alignment of levels, tilts, overshoots, rounding, pulse distortion, reflection, color subcarrier amplitude and delay, luminance nonlinearity.

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, differential phase and gain.

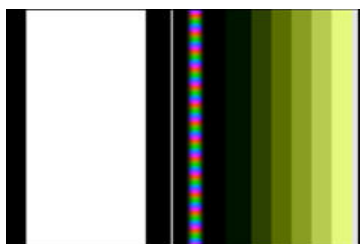


Figure 2-1: NTC7 composite

2.1.2 NTC7 combined (29 Hz)

A white bar is provided at the beginning of the line followed by a multiburst of 0.5 MHz to 4.2 MHz.

Example of use: Test and alignment of level, tilt, overshoot, rounding, pulse distortion, reflection, color subcarrier amplitude and delay frequency-response measurement.

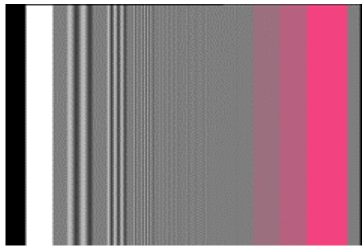


Figure 2-2: NTC7 combined

2.1.3 FCC composite (29 Hz)

A five-step grey staircase modulated with the color subcarrier is provided at the beginning of the line followed by a 2T pulse, a modulated 12.5T and a white bar.

Example of use: Test and alignment of level, tilt, overshoot, rounding, pulse distortion, reflection, color subcarrier amplitude and delay, luminance nonlinearity.

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

- Staircase
Luminance nonlinearity, differential phase and gain.
- 2T pulse
Amplitude error, pulse distortions and reflections.
- 12.T pulse
Amplitude and delay differences between luminance and chrominance of the CCVS signal.
- White bar
Level error, line-repetitive tilt, overshoot and roundings.

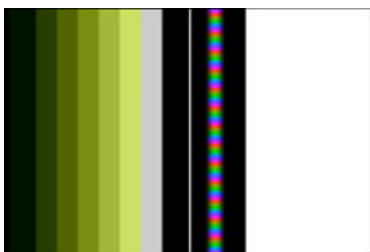


Figure 2-3: FCC composite

2.1.4 VIRS (29 Hz)

A 70 IRE luminance bar modulated with the color subcarrier is provided at the beginning of the line followed by a 40 IRE grey pulse and 7.5 IRE grey pulse.

Example of use: Test an alignment of color subcarrier amplitudes and delays.

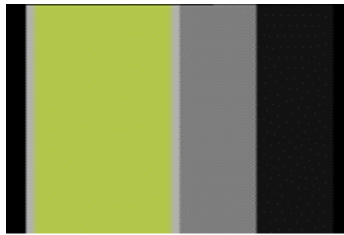


Figure 2-4: VIRS

2.1.5 CODEC test pattern for BG/PAL standard (25 Hz)

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

It consists of static picture elements for all analog measurements. Also, it consists of moving picture elements that enable you to determine whether the MPEG transmission is still valid or whether the picture last decoded is displayed.

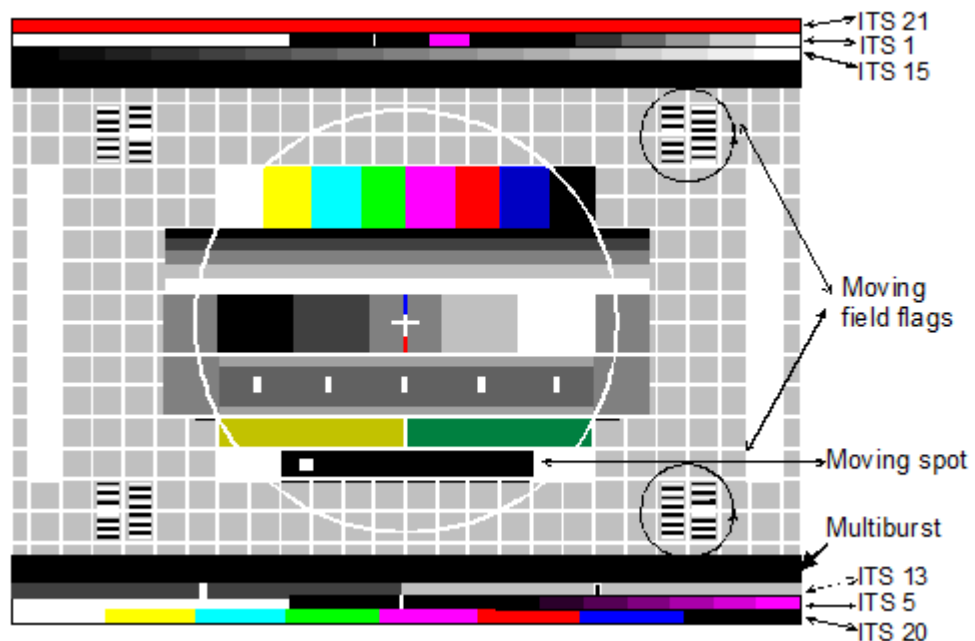


Figure 2-5: MPEG2-CODEC test pattern for standard BG/PAL

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 dur-

ing 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 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.

2.1.6 CODEC test pattern for M/NTSC standard (29 Hz)

This CODEC test pattern for standard M/NTSC consists of static picture elements for all analog measurements and at the same time of moving picture elements.

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.

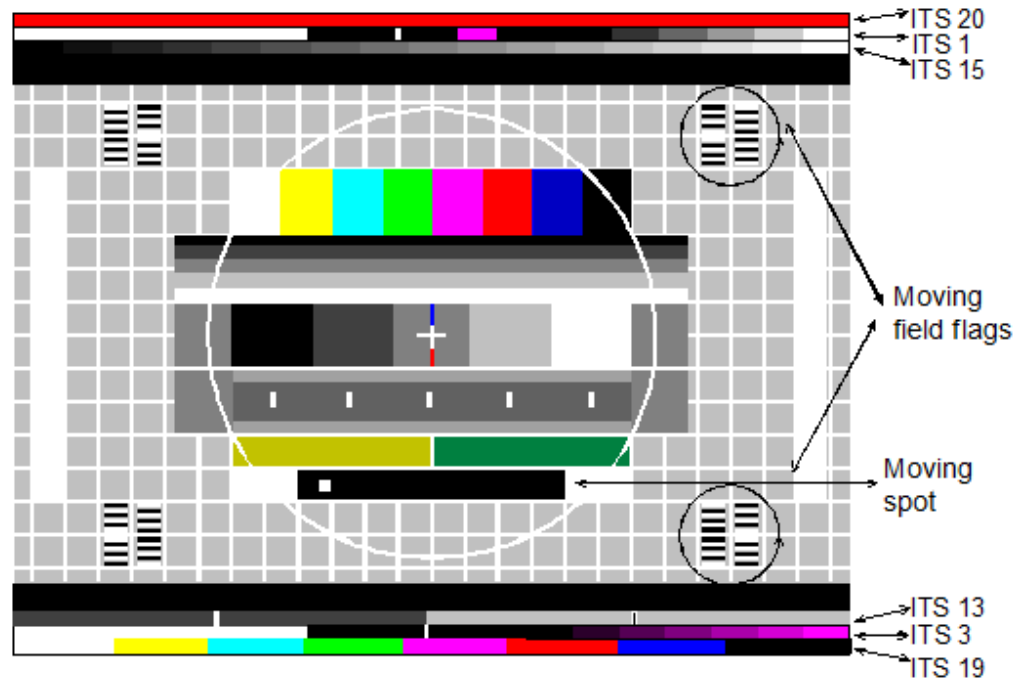


Figure 2-6: CODEC test pattern for M/NTSC standard

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 rounding.
 - 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.

2.1.7 CODEC 16:9 test pattern

CODEC 16:9 test pattern 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.

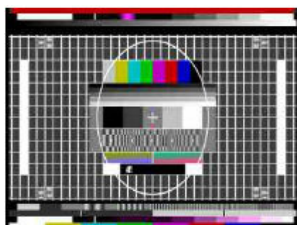


Figure 2-7: 16:9 display on a 4:3 monitor

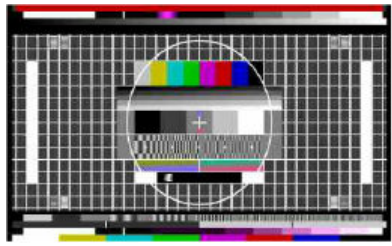


Figure 2-8: 16:9 display on a 16:9 monitor

2.1.8 SMPTEBARS (29 Hz)

SMPTEBARS consists of color bar and "reversal blue bar" information and an IWQB plus pluge signal for TV test signal.

Example of use: The "reversal blue bar" is arranged such below the regular color bars that the blue channel is at full amplitude in both signals at the same time. For correct adjustment of the color reproduction on a monitor, the red and green channels are disabled. Also, the monitor is set such that the two bars cyan/magenta and magenta/cyan appear with the same brightness. The lower part of the signal contains a white pulse and a black signal with ± 4 IRE steps (pluge). The composed signal is useful for adjusting the monitor brightness and contrast. Also, it is useful for the color reference signals -1 and +Q for adjusting the correct phase relationship with the aid of a vector scope.



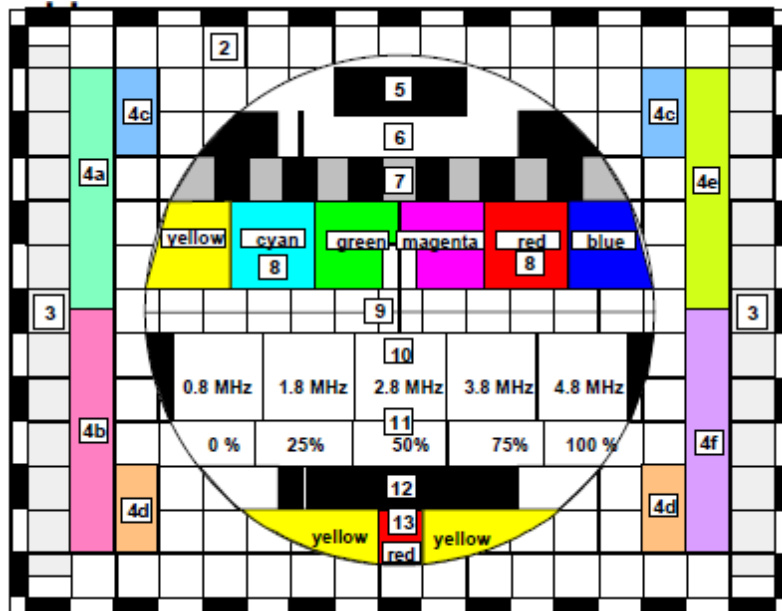
Figure 2-9: SMPTEBARS



Figure 2-10: Detail description on SMPTEBARS

2.1.9 Universal 4:3 test pattern (Philips) (25 Hz)

This universal 4:3 test pattern also known as test card, usually used for television test signal.

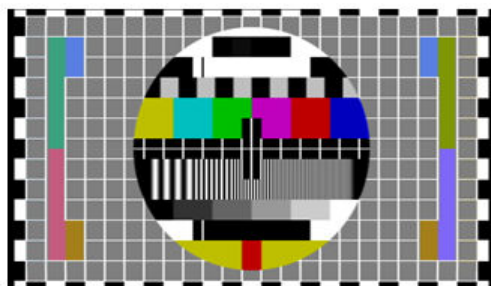


No	Designation	Aspect checked
1	border castellation	picture size, deflection, effect of blanking, synchronization
2	cross hatch, circle	convergence, linearity, beam deflection, focusing
3	anti-PAL +V, ±U	delay errors in PAL decoder, no delay errors = fields no color decoding
4	R-Y, G-Y and B-Y	
4a	B-Y = 0, $\varphi_{sc} = 270^\circ$	
4b	B-Y = 0, $\varphi_{sc} = 90^\circ$	
4c	G-Y = 0, $\varphi_{sc} = 326^\circ$	

No	Designation	Aspect checked
4d	$G-Y = 0, \varphi_{sc} = 146^\circ$	
4e	$R-Y = 0, \varphi_{sc} = 180^\circ$	
4f	$R-Y = 0, \varphi_{sc} = 0^\circ$	
5	black window + pluge	streaking, rounding, brightness adjustment of monitors
6	white window with negative going 2T pulse	reflection
7	250 kHz square wave	overshoot
8	color bars	color characteristics
9	center marker	picture centering
10	multiburst	resolution
11	5-step gray scale	linearity, brightness and contrast
12	black window with positive going 2T pulse	Reflection
13	yellow red yellow	chrominance / luminance delay differences

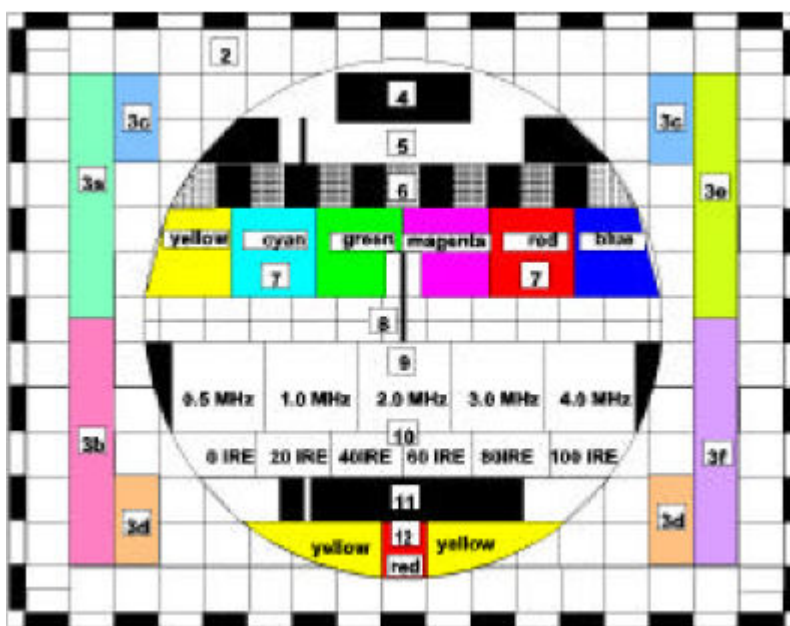
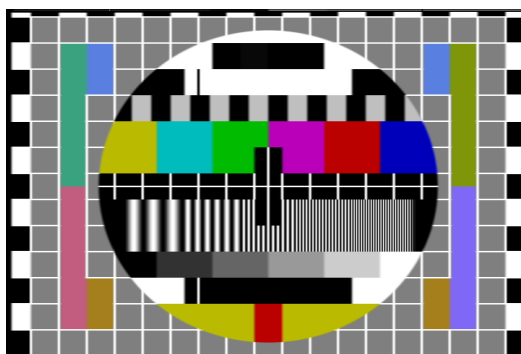
2.1.10 Universal 16:9 test pattern (Philips) (25 Hz)

This universal 16:9 test pattern also known as test card, usually used for television test signal. Same as universal 4:3 test pattern, see page 18, but for 16:9 screens.



2.1.11 Universal 4:3 test pattern (Philips) (29 Hz)

This test pattern is also known as test card, internationally used for testing TV receivers. It comprises several signal elements which permit virtually all distortions (e.g. of a receiver) to be seen at a glance.

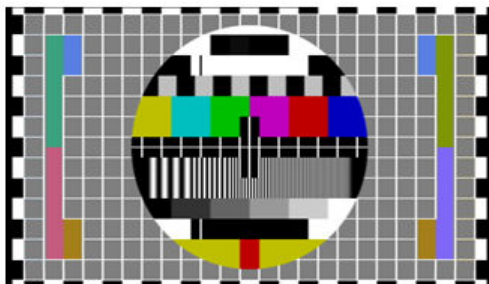


No.	Designation	Aspect checked
1	border	picture size, deflection, effect of blanking, synchronization
2	cross hatch, circle	convergence, linearity, beam deflection, focusing, geometrical distortion
3	R-Y, G-Y and B-Y	color decoding
3a	B-Y = 0, $\varphi_{sc} = 270^\circ$	
3b	B-Y = 0, $\varphi_{sc} = 90^\circ$	
3c	G-Y = 0, $\varphi_{sc} = 326^\circ$	
3d	G-Y = 0, $\varphi_{sc} = 146^\circ$	
3e	R-Y = 0, $\varphi_{sc} = 180^\circ$	
3f	R-Y = 0, $\varphi_{sc} = 0^\circ$	
4	black window (7.5 IRE) + pluge (if no text is inserted)	streaking, rounding, brightness adjustment of monitors

No.	Designation	Aspect checked
5	white window with negative going 2T pulse	reflection
6	250 KHz square wave (77IRE)	overshoot
7	color bars (77I7.5/77I7.5)	color characteristics
8	center marker	picture centering
9	multiburst	resolution
10	5-step gray scale	linearity, brightness and contrast
11	black window (7.5 IRE) with positive going 2T pulse (if no text is inserted)	reflection
12	yellow red yellow	chrominance / luminance delay differences

2.1.12 Universal 16:9 test pattern (Philips) (29 Hz)

This universal 16:9 test pattern also known as test card, usually used for television test signal. Same as universal 4:3 test pattern, see page 20, but for 16:9 screens.



2.1.13 HSWEEP (25 Hz)

The whole video frequency range is swept over a line. The sweep starts with 5.5 MHz at the beginning of the line down to 0 Hz in the middle of the line. It increases again to 5.5 MHz at the end of the line. The signal is generated with an amplitude of 100%. It has a constant frequency response over the whole frequency range at a high energy density. Also, it is superimposed to a grey level of 50% HSWEEP1 is generated with a phase of 180 degrees.

Example of use: Amplitude-frequency response and frequency-dependent phase distortions are visible through the evaluation in the time domain. If distortions are present purely from the amplitude-frequency response, the sweep envelope is distorted symmetrically about the middle of the line. Exclusively for group-delay distortion, an asymmetrical ripple of the sweep envelope regarding the middle of the line is obtained.

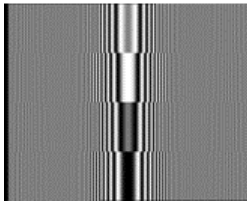


Figure 2-11: Hsweep

2.2 Audio

2.2.1 MPEG2-L1 multitone signal (matching to 25 Hz video frame rate)

Multitone signal with a duration of 38.4 s. The following shows the frequency analysis for MPEG2-L1 multitone signal.

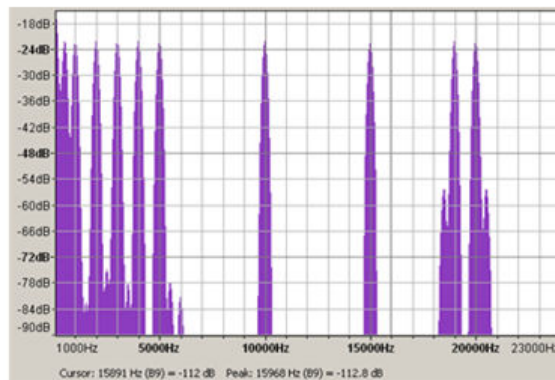


Figure 2-12: Frequency analysis for MPEG2 L1 multitone signal (25 Hz video frame rate)

Frequency analysis value =

$$\begin{aligned} &(\cos(2.0 * \pi * t * 20.0) + \\ &\cos(2.0 * \pi * t * 50.0) + \\ &\cos(2.0 * \pi * t * 100.0) + \\ &\cos(2.0 * \pi * t * 500.0) + \\ &\cos(2.0 * \pi * t * 1000.0) + \\ &\cos(2.0 * \pi * t * 2000.0) + \\ &\cos(2.0 * \pi * t * 3000.0) + \\ &\cos(2.0 * \pi * t * 4000.0) + \\ &\cos(2.0 * \pi * t * 5000.0) + \\ &\cos(2.0 * \pi * t * 10000.0) + \end{aligned}$$

$$\begin{aligned} &\cos(2.0 * \pi * t * 15000.0) + \\ &\cos(2.0 * \pi * t * 19000.0) + \\ &\cos(2.0 * \pi * t * 20000.0) \end{aligned}$$

2.2.2 AAC multitone signal (matching with 25 Hz video frame rate)

Multitone signal with a duration of 38.4 s. The following shows the frequency analysis for AAC multitone signal.

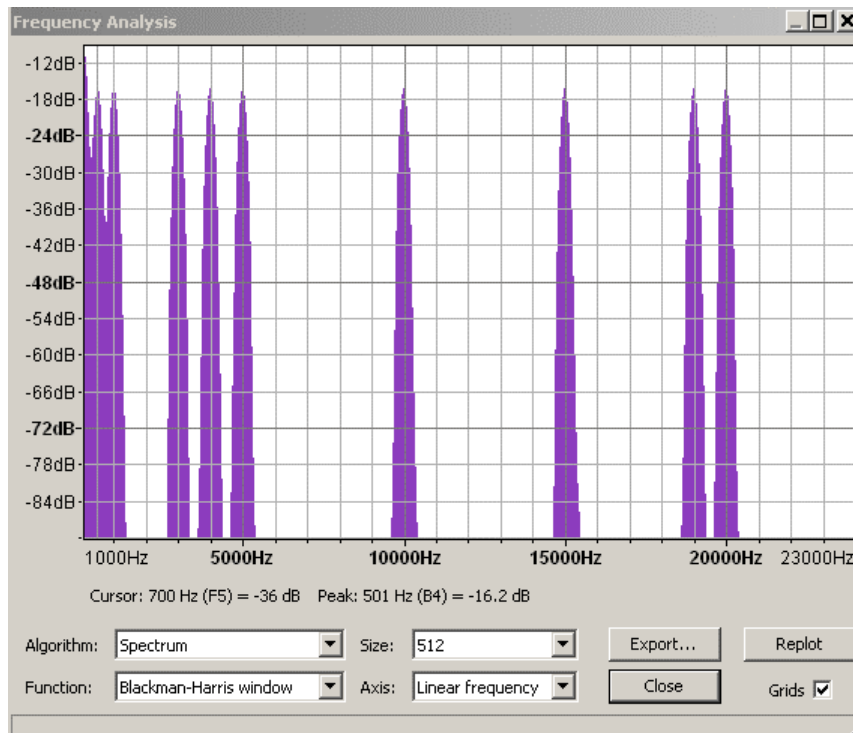


Figure 2-13: Frequency analysis for AAC multitone signal (25 Hz video frame rate)

Frequency analysis value =

$$\begin{aligned} &(\cos(2.0 * \pi * t * (768/38.4)) + //20.00 \text{ Hz} \\ &\cos(2.0 * \pi * t * (1920/38.4)) + //50.00 \text{ Hz} \\ &\cos(2.0 * \pi * t * (3840/38.4)) + //100.00 \text{ Hz} \\ &\cos(2.0 * \pi * t * 500.0) + \\ &\cos(2.0 * \pi * t * 1000.0) + \\ &\cos(2.0 * \pi * t * 3000.0) + \\ &\cos(2.0 * \pi * t * 4000.0) + \\ &\cos(2.0 * \pi * t * 5000.0) + \\ &\cos(2.0 * \pi * t * 10000.0) + \end{aligned}$$

$$\begin{aligned} &\cos(2.0 * \pi * t * 15000.0) + \\ &\cos(2.0 * \pi * t * 19000.0) + \\ &\cos(2.0 * \pi * t * 20000.0)) \end{aligned}$$

2.2.3 MPEG2-L1 multitone signal (matching to 29 Hz video frame rate)

Multitone signal with a duration of 192.192 s. The following shows the frequency analysis for MPEG2-L1 multitone signal.

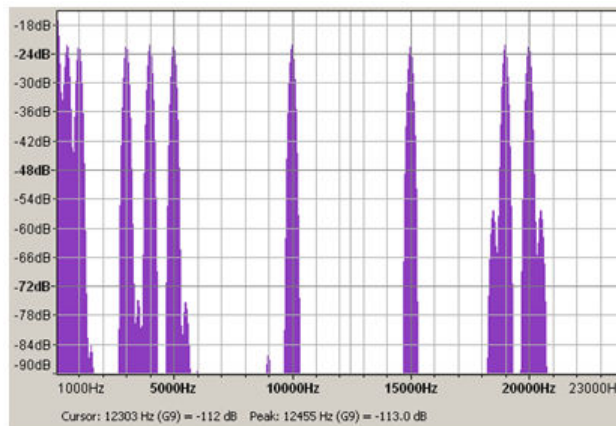


Figure 2-14: Frequency analysis for MPEG2 L1 multitone signal (29 Hz video frame rate)

Frequency analysis value =

$$\begin{aligned} &(\cos(2.0 * \pi * t * (480/24.024)) + //19.98 \text{ Hz} \\ &\cos(2.0 * \pi * t * (1201/24.024)) + //49.98 \text{ Hz} \\ &\cos(2.0 * \pi * t * (2402/24.024)) + //99.96 \text{ Hz} \\ &\cos(2.0 * \pi * t * 500.0) + \\ &\cos(2.0 * \pi * t * 1000.0) + \\ &\cos(2.0 * \pi * t * 3000.0) + \\ &\cos(2.0 * \pi * t * 4000.0) + \\ &\cos(2.0 * \pi * t * 5000.0) + \\ &\cos(2.0 * \pi * t * 10000.0) + \\ &\cos(2.0 * \pi * t * 15000.0) + \\ &\cos(2.0 * \pi * t * 19000.0) + \\ &\cos(2.0 * \pi * t * 20000.0)) \end{aligned}$$

2.2.4 AAC multitone signal (matching to 29 Hz video frame rate)

Multitone signal with a duration of 192.192 s. The following shows the frequency analysis for AAC multitone signal.

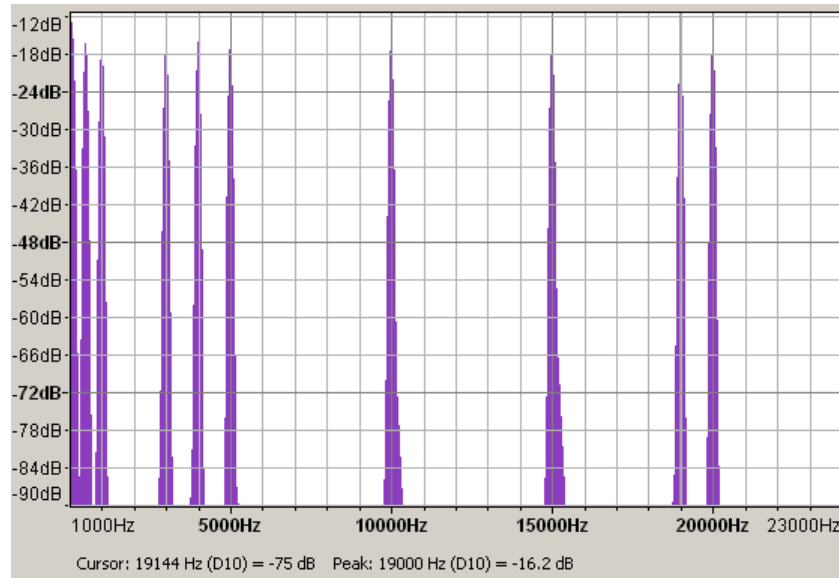


Figure 2-15: Frequency Analysis for AAC multitone signal (29 Hz video frame rate)

Frequency Analysis value =

$$\begin{aligned}
 &(\cos(2.0 * \pi * t * (1281/64.064)) + //19.98 \text{ Hz} \\
 &\cos(2.0 * \pi * t * (3203/64.064)) + //49.98 \text{ Hz} \\
 &\cos(2.0 * \pi * t * (6406/64.064)) + //99.99 \text{ Hz} \\
 &\cos(2.0 * \pi * t * 500.0) + \\
 &\cos(2.0 * \pi * t * 1000.0) + \\
 &\cos(2.0 * \pi * t * 3000.0) + \\
 &\cos(2.0 * \pi * t * 4000.0) + \\
 &\cos(2.0 * \pi * t * 5000.0) + \\
 &\cos(2.0 * \pi * t * 10000.0) + \\
 &\cos(2.0 * \pi * t * 15000.0) + \\
 &\cos(2.0 * \pi * t * 19000.0) + \\
 &\cos(2.0 * \pi * t * 20000.0))
 \end{aligned}$$

2.2.5 AC3 multitone signal (matching to 29 Hz video frame rate)

Multitone signal with a duration of 32.032 s. The following shows the frequency analysis for multitone signal for AC3.

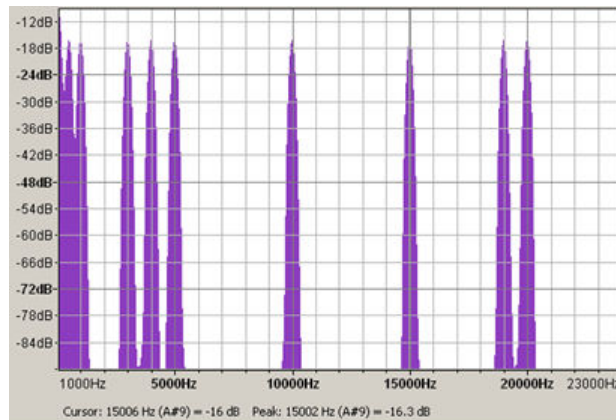


Figure 2-16: Frequency analysis for AC3 multitone signal (29 Hz video frame rate)

Frequency analysis value =

$$\begin{aligned}
 &(\cos(2.0 * \pi * t * (640/32.032))) + //19.98 \text{ Hz} \\
 &\cos(2.0 * \pi * t * (1601/32.032)) + //49.98 \text{ Hz} \\
 &\cos(2.0 * \pi * t * (3203/32.032)) + //99.96 \text{ Hz} \\
 &\cos(2.0 * \pi * t * 500.0) + \\
 &\cos(2.0 * \pi * t * 1000.0) + \\
 &\cos(2.0 * \pi * t * 3000.0) + \\
 &\cos(2.0 * \pi * t * 4000.0) + \\
 &\cos(2.0 * \pi * t * 5000.0) + \\
 &\cos(2.0 * \pi * t * 10000.0) + \\
 &\cos(2.0 * \pi * t * 15000.0) + \\
 &\cos(2.0 * \pi * t * 19000.0) + \\
 &\cos(2.0 * \pi * t * 20000.0)
 \end{aligned}$$

2.2.6 ADTS multitone signal (matching to 29 Hz video frame rate)

Multitone signal with a duration of 64.064 s. The following shows the frequency analysis for ADTS multitone signal.

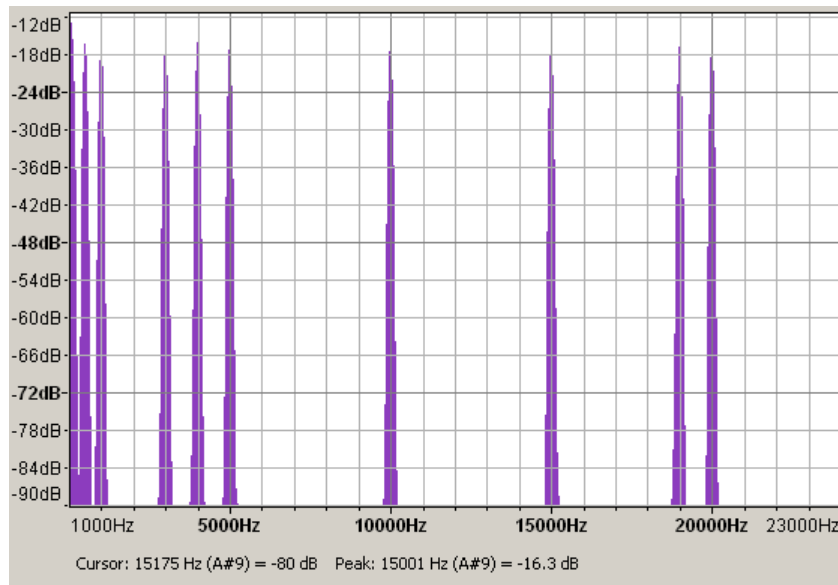


Figure 2-17: Frequency analysis for ADTS multitone signal (29 Hz video frame rate)

Frequency analysis value =

$$\begin{aligned}
 &(\cos(2.0 * \pi * t * (1281/64.064)) + //19.98 \text{ Hz} \\
 &\cos(2.0 * \pi * t * (3203/64.064)) + //49.98 \text{ Hz} \\
 &\cos(2.0 * \pi * t * (6406/64.064)) + //99.99 \text{ Hz} \\
 &\cos(2.0 * \pi * t * 500.0) + \\
 &\cos(2.0 * \pi * t * 1000.0) + \\
 &\cos(2.0 * \pi * t * 3000.0) + \\
 &\cos(2.0 * \pi * t * 4000.0) + \\
 &\cos(2.0 * \pi * t * 5000.0) + \\
 &\cos(2.0 * \pi * t * 10000.0) + \\
 &\cos(2.0 * \pi * t * 15000.0) + \\
 &\cos(2.0 * \pi * t * 19000.0) + \\
 &\cos(2.0 * \pi * t * 20000.0))
 \end{aligned}$$

2.2.7 Big6 audio test sequence

Big6 audio test sequence provides test capability to check device performance on level measurement which determines devices' gain, THD + phase measurement, cross-talk measurement and frequency response.

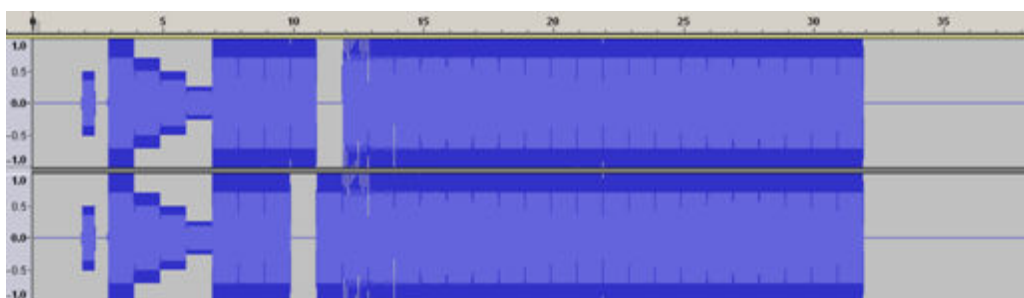


Figure 2-18: Big6 audio test sequence for MPEG2

Table 2-1: Big6 audio specification

Duration	Audio frequency @ level	Purpose
0 s - 0.5 s	1650 Hz	Signal ID
0.5 s - 1 s	Silence	Signal ID
1 s - 2 s	1 kHz @ 0 dB	Level measurement to determine DUT gain
2 s - 3 s	1 kHz @ -3 dB	Level measurement to determine DUT gain
3 s - 4 s	1 kHz @ -6 dB	Level measurement to determine DUT gain
4 s - 5 s	1 kHz @ -12 dB	Level measurement to determine DUT gain
5 s - 6 s	100 Hz @ 0 dB	THD + phase measurement (check to be done on L&R channel to determine phase different).
6 s - 7 s	1 kHz @ 0 dB	THD + phase measurement
7 s - 8 s	10 kHz @ 0 dB	THD + phase measurement
8 s - 9 s	1 kHz @ 0 dB follow by silence on the left channel.	Cross talk
9 s - 10 s	Silence, follow by 1 kHz @ 0 dB on the right channel.	Cross talk
10 s - 30 s	20 Hz, 40 Hz, 60 Hz, 80 Hz, 100 Hz, 200 Hz, 400 Hz, 600 Hz, 800 Hz, 1 kHz, 2 kHz, 3 kHz, 5 kHz, 7 kHz, 9 kHz, 10 kHz, 12 kHz, 15 kHz, 17 kHz, 20 kHz @ 0 dB	Frequency response measurement
30 s - n s	Silence	

n varies, depending on the video frame rate.

For 29 Hz, the BIG6 audio test sequence is repeated 8 times over the duration of 384.384 s for MPEG-L2 and 9 times for AAC-LC-LOAS.

For ADTS (29 Hz), the signal is repeated 2x over the duration of 64.064 s.

2.2.8 CITT O.33 waveform

Test tone sequences for automatic tone tests in mono (EBU line measurement to CITT O.33).

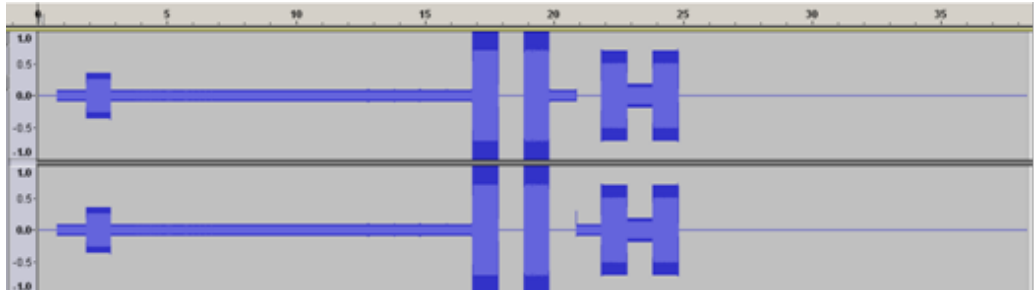


Figure 2-19: Waveform of CITT O.33

Table 2-2: CITT O.33 audio details


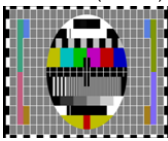


Duration	Audio frequency @ level
0 s - 1.055 s	1650 Hz/1850Hz @ -21 dB
1.055 s - 1.142 s	1020 Hz @ -21 dB
1.142 s - 2.087 s	1020 Hz @ -9 dB
2.087 s - 3.077 s	1020 Hz @ -21 dB
3.077 s - 16.09 s	40 Hz, 80 Hz, 200 Hz, 500 Hz, 820 Hz, 1900 Hz, 3000 Hz, 5000 Hz, 6300 Hz, 9500 Hz, 11500 Hz, 13500 Hz, 15000 Hz @ -21 dB
16.09 s - 17.079 s	1020 Hz @ 0 dB
17.079 s - 18.079 s	Silence
18.079 s - 19.072 s	60 Hz @ 0 dB
19.072 s - 20.101 s	2040 Hz @ -21 dB left channel, silence right channel.
20.101 s - 21.088 s	Silence left channel, 2040 Hz right channel.
21.088 s - 24.055 s	820 Hz @ -3 dB, -15 dB, -3 dB
24.055 s - n s	Silence



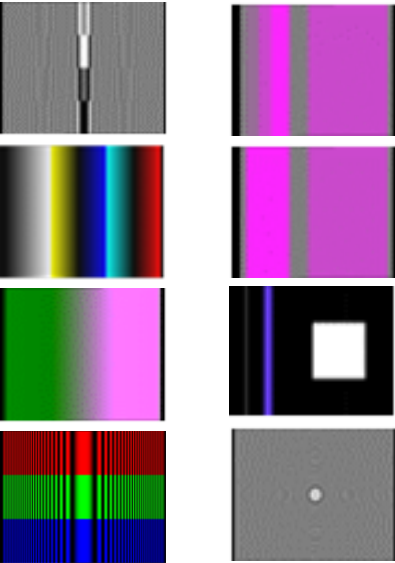

n varies, depending on the video frame rate.

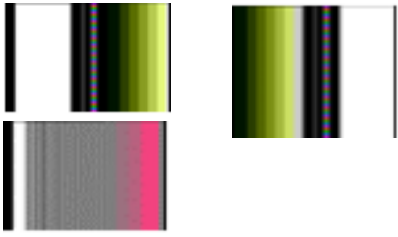
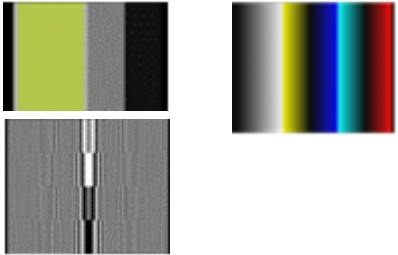
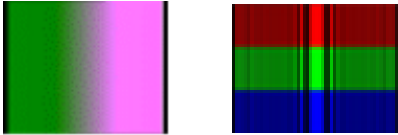


3 DVB transport streams overview

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




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

Video elementary stream	DVB test stream & video elementary stream	
	25 Hz	29 Hz
Universal 4:3 test pattern Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz) 	SDTV_MPEG_UNIVERSAL43 Universal43 30 frames SDTV_AVC_UNIVERSAL43 0.5 Mbps CABAC	SDTV_MPEG_UNIVERSAL43 Universal43 64 frames SDTV_AVC_UNIVERSAL43 0.6 Mbps CABAC
Universal 16:9 test pattern Interlaced 16:9 576 lines (25 Hz) 480 lines (29 Hz) 	SDTV_MPEG_UNIVERSAL169 Universal169 30 frames SDTV_AVC_UNIVERSAL169 0.5 Mbps CABAC	SDTV_MPEG_UNIVERSAL169 Universal169 64 frames SDTV_AVC_UNIVERSAL169 6 Mbps CABAC
Codec 16:9 test pattern Interlaced 16:9 576 lines (25 Hz) 480 lines (29 Hz) 	SDTV_MPEG_BIG6 Codec169 multiburst 06 Mbps 24 frames SDTV_AVC_Big6 1.1 Mbps CABAC 24 frames	SDTV_MPEG_BIG6 Codec169 multiburst 06 Mbps 24 frames SDTV_AVC_Big6 1.1 Mbps CABAC 24 frames
SMPTEBARS Interlaced 4:3 480 lines (29 Hz) 		SDTV_MPEG_SMPT EBARS SMPTE_Bar 16 frames SDTV_AVC_SMPTE-BARS 0.1 Mbps CABAC

<p>CBARS100 Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_CBAR S100 Cbars100 0.7 Mbps</p>	<p>SDTV_MPEG_CBAR S100 Cbars100 0.6 Mbps</p>
<p>CBARS75 Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_CBAR S75 Cbars75 0.6 Mbps</p>	<p>SDTV_MPEG_CBAR S75 Cbars75 0.6 Mbps</p>
<p>ITS Interlaced 4:3 576 lines (25 Hz)</p> 	<p>SDTV_MPEG_ITS Hsweep 2.3 Mbps Nonlin 1.4 Mbps Rampyc 1.4 Mbps Rgbsweep 2.5 Mbps Ccir3311 0.5 Mbps Ccirr3312 0.4 Mbps Window 0.5 Mbps Zoneplate 1 Mbps</p>	
<p>EMC Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_EMCC Moving CBars 06 Mbps 240 frames</p>	<p>SDTV_MPEG_EMCC Moving CBars 06 Mbps 180 frames</p>
<p>ITS1 Interlaced 4:3 480 lines (29 Hz)</p>		<p>SDTV_MPEG_ITS1 Its1 0.75 Mbps Its2 1.2 Mbps</p>

		<p>Its3 0.7 Mbps</p>
<p>ITS2 Interlaced 4:3 480 lines (29 Hz)</p> 		<p>SDTV_MPEG_ITS2 Its4 0.4 Mbps Hsweep 2.2 Mbps Nonlin 1.4 Mbps</p>
<p>ITS3 Interlaced 4:3 480 lines (29 Hz)</p> 		<p>SDTV_MPEG_ITS3 Rampyc 1.4 Mbps Rgbsweep 2.8 Mbps</p>
<p>ITS4 Interlaced 4:3 480 lines (29 Hz)</p> 		<p>ITS4 Interlaced 4:3 480 lines (29 Hz)</p>
<p>Flower Interlaced 16:9 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_FLOWER169 Flower 06 Mbps 960 frames SDTV_AVC_FLOWER169 Flower 960 frames 05 Mbps CABAC</p>	<p>SDTV_MPEG_FLOWER169 Flower 06 Mbps 960 frames SDTV_AVC_FLOWER169 Flower 960 frames 04 Mbps CABAC</p>
<p>Neuschwanstein Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz)</p>	<p>SDTV_MPEG_NEUSCHWANSTEIN Neuschwanstein 02 Mbps 192 frames</p>	<p>SDTV_MPEG_NEUSCHWANSTEIN Neuschwanstein 04 Mbps 180 frames</p>

	<p>Neuschwanstein 04 Mbps 192 frames</p> <p>Neuschwanstein 06 Mbps 192 frames</p>	
<p>Table tennis Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_TABLE_TENNIS</p> <p>Table tennis 02 Mbps 192 frames</p> <p>Table tennis 04 Mbps 192 frames</p> <p>Table tennis 06 Mbps 192 frames</p>	<p>SDTV_MPEG_TABLE_TENNIS</p> <p>Table tennis 02 Mbps 180 frames</p> <p>Table tennis 04 Mbps 180 frames</p> <p>Table tennis 06 Mbps 180 frames</p>
<p>Flower garden Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_FLOWER_GARDEN</p> <p>Flower garden 02 Mbps 192 frames</p> <p>Flower garden 04 Mbps 192 frames</p> <p>Flower garden 06 Mbps 192 frames</p>	<p>SDTV_MPEG_FLOWER_GARDEN</p> <p>Flower garden 02 Mbps 180 frames</p> <p>Flower garden 04 Mbps 180 frames</p> <p>Flower garden 06 Mbps 180 frames</p>
<p>Jump Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_JUMP</p> <p>Jump 04 Mbps 576 frames.</p>	<p>SDTV_MPEG_JUMP</p> <p>Jump 04 Mbps 720 frames.</p>
<p>Royal angel Interlaced 4:3 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_ROY-ANGEL</p> <p>Royal Angel 04 Mbps 576 frames</p>	<p>SDTV_MPEG_ROY-ANGEL</p> <p>Royal Angel 04 Mbps 720 frames</p>

<p>Grouper Interlaced 4:3 480 lines (29 Hz)</p> 		<p>SDTV_MPEG_GROUPER Grouper 04 Mbps 720 frames</p>
<p>CCITTO33 576 lines (25 Hz) 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_CCITTO33 Codec43 multiburst 06 Mbps 24 frames</p>	<p>SDTV_MPEG_CCITTO33 Codec43 multiburst 06 Mbps 24 frames</p>
<p>TELETX_G 576 lines (25 Hz)</p> 	<p>SDTV_MPEG_TELETX_G Codec43 multiburst 06 Mbps 24 frames</p>	

4 DVB transport streams (25 Hz)

4.1 SDTV_MPEG_UNIVERSAL43 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 30x32 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.1.1 Video

Universal 4:3 test pattern, see page 18.

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Static picture

4.1.2 Audio

Frequency analysis for MPEG2 L1 multitone signal (25 Hz video frame rate), see page 23.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

Frequency analysis for AAC multitone signal (25 Hz video frame rate), see page 24.

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

4.2 SDTV_AVC_UNIVERSAL43 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 240x4 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.2.1 Video

Universal 4:3 test pattern, see page 18.

MPEG4 AVC MP@L3

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.481 Mbit/s
- Static picture

4.2.2 Audio

Frequency analysis for MPEG2 L1 multitone signal (25 Hz video frame rate), see page 23.

MPEG1 layer 2

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

Frequency analysis for AAC multitone signal (25 Hz video frame rate), see page 24.

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Seamless at sequence end
- Service

4.3 SDTV_MPEG_UNIVERSAL169 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 30x32 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.3.1 Video

Universal 16:9 test pattern, see page 19.

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Static picture

4.3.2 Audio

Frequency analysis for MPEG2 L1 multitone signal (video frame rate 25 Hz), see page 23.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

Frequency analysis for AAC multitone signal (video frame rate 25 Hz), see page 24.

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

4.4 SDTV_AVC_UNIVERSAL169 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 240x4 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.4.1 Video

Universal 16:9 test pattern, see page 19.

MPEG4 AVC MP@L3

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.531 Mbit/s
- Static picture

4.4.2 Audio

Frequency analysis for MPEG2 L1 multitone signal (video frame rate 25 Hz), see page 23.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

Frequency analysis for AAC multitone signal (video frame rate 25 Hz), see page 24.

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

4.5 SDTV_MPEG_BIG6 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 24x90 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.5.1 Video

CODEC 16:9 test pattern for BG/PAL standard, see page .

MPEG2 MP@ML

- 25 frames/s

- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

4.5.2 Audio

Big6 audio test sequence, see page 29.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

4.6 SDTV_AVC_BIG6 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 24x40 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.6.1 Video

CODEC 16:9 test pattern for BG/PAL standard, see page 12.

MPEG4 AVC MP-L3

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.858 Mbit/s
- Moving picture

4.6.2 Audio

Big6 audio test sequence, see page 29.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

4.7 SDTV_MPEG_CBARS100 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 12x80 video frames (38.4s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.7.1 Video

Color bar with luminance amplitude of 100% and a color saturation of 100%.

Example of use: Test and alignment of phase and level ratios for MPEG2 decoders and PPAL coders. The color coding can easily be checked with a vector scope.

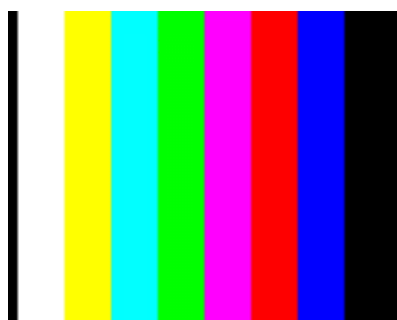


Figure 4-1: Color bar 100

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture

- 720 pixels/line
- 0.667 Mbit/s
- Static picture

4.7.2 Audio

Audio frequency of 440 Hz @ -6 dB at left channel and silence tone at right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (AAC-LC LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

4.8 SDTV_MPEG_CBARS75 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 12x80 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.8.1 Video

Color bar with luminance amplitude of 100% and a color saturation of 75%.

Example of use: Test and alignment of phase and level ratios for MPEG2 decoders and PAL coders. The color coding can easily be checked with a vector scope.



Figure 4-2: Color bar 75

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.559 Mbit/s
- Static picture

4.8.2 Audio

Audio frequency of 440 Hz @ -6 dB at right channel and silence tone at left channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

4.9 SDTV_MPEG_ITS (25 Hz)

TS ID: 2011 (0x07DB)

Length: 24x80 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1, CH 2, CH 3, CH 4, CH 5, CH 6, CH 7, CH 8

4.9.1 Video

There are altogether 8 different program services in this stream. The video services namely: HSWEET, NONLIN, RAMPYC, RGBSWEET, CCIR3311, CCIR3312, WINDOW, ZONEPLATE provide a comprehensive range of television test signal.

4.9.1.1 HSWEET

See page 22.

MPEG2 MP@ML

- 25 frames/s

- 576 lines/picture
- 720 pixels/line
- 2.295 Mbit/s
- Static picture

4.9.1.2 NONLIN

A line signal with the ramp signals in Y, CB and CR, yielding full-range ramps with different slopes in analog RGB display.

Example of use: Test of nonlinearities in Y, CB and CR and test of RGB matrix.

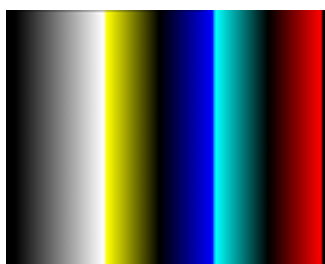


Figure 4-3: Nonlin

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 1.434 Mbit/s
- Static picture

4.9.1.3 RAMPYC

Still picture with ramps in all components.

Example of use: Test of missing codes and linearity of D/A converters.

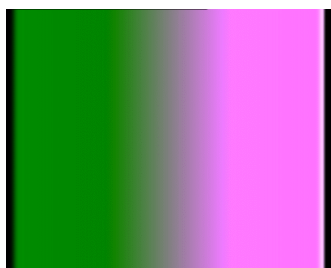


Figure 4-4: Rampyc

MPEG2 MP@ML

- 25 frames/s

- 576 lines/picture
- 720 pixels/line
- 1.396 Mbit/s
- Static picture

4.9.1.4 RGBSWEEP

For the H sweep, the video frequency range for each of the RGB components is swept over a line. The sweep starts with 5.8 MHz at the beginning of the line down to 0 Hz in the middle of the line. It increases again to 5.8 MHz at the end of the line. The corresponding components are generated with an amplitude of 100%, i.e. full range from 0 to 700mv with analog signal. The R sweep is transmitted in the first third of the frame, followed by G sweep and B sweep in the second and third.

Example of use: Test and alignment of RGB output stages. Measurement of amplitude-frequency response and group delay in RGB channels.

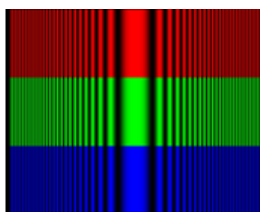


Figure 4-5: Rgb sweep

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 2.536 Mbit/s
- Static picture

4.9.1.5 CCIR311

CCIR31-1 test signal to test measurement of color subcarrier generation in PAL coders (SET-TOP BOX). Nonlinearity of amplitude and phase. Luminance-chrominance intermodulation.



Figure 4-6: CCIR31-1

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.476 Mbit/s
- Static picture

4.9.1.6 CCIR312

CCIR31-1 test signal to test measurement of color subcarrier generation in PAL coders (SET-TOP BOX). Nonlinearity of amplitude and phase. Luminance-chrominance inter-modulation.

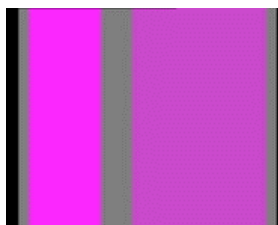


Figure 4-7: CCIR31-2

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.438 Mbit/s
- Static picture

4.9.1.7 WINDOW

This signal consists of a white window (100% amplitude) and a PLUGE signal ($\pm 2\%$ Amplitude). Also, it consists of a 2T pulse and a modulated 20T pulse with 100% amplitude each.

Example of use: Test of sweep voltage generation and black-level adjustment of monitors with the PLUGE signal. With the inserted window, field-frequency (50 Hz) and line-frequency (15 kHz) tilts are made visible on the monitor or oscilloscope.

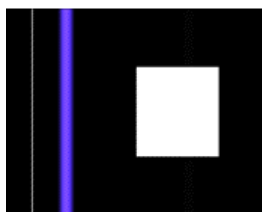


Figure 4-8: Window

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 0.484 Mbit/s
- Static picture

4.9.1.8 ZONEPLATE

Zoneplate test signal to test measurement of frequency response, horizontal and vertical direction.

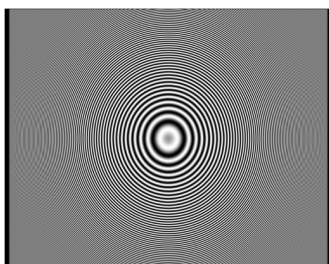


Figure 4-9: Zone Plate

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 15 Mbit/s
- Moving picture

4.9.2 Audio

There are altogether 8 different audio services in this stream.

Program1: 55 Hz @ -6 dB

Program2: 110 Hz @ -6 dB

Program3: 220 Hz @ -6 dB

Program4: 880 Hz @ -6 dB

Program5: 1760 Hz @ -6 dB

Program6: 3520 Hz @ -6 dB

Program7: 7040 Hz @ -6 dB

Program8: 14080 Hz @ -6 dB

All audio is encoded with both MPEG1-L2 and HE-AACv1 LOAS format except for 14080 Hz, it is encoded with MPEG1-L2 and AAC-LC LOAS format.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

4.10 SDTV_MPEG_EMC (25 Hz)

TS ID: 2011 (0x07DB)

Length: 160x6 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.10.1 Video

Moving color bar test signal.

Example of use: Measurement of electromagnetic compatibility (immunity to gradated interference) TV sets.



Figure 4-10: Moving color bar

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

4.10.2 Audio

Audio frequency of 1 kHz @ -6 dB at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

4.11 SDTV_MPEG_FLOWER169 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 960x1 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.11.1 Video

Live video with flowers and bee.

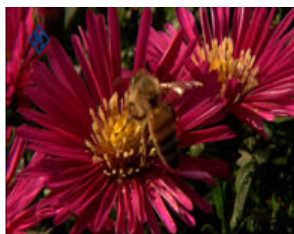


Figure 4-11: 16:9 Flowers with bee

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

4.11.2 Audio

Background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

4.12 SDTV_AVC_FLOWER169 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 960x1 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.12.1 Video

Live video with flowers and bee.

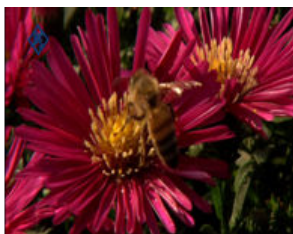


Figure 4-12: 16:9 Flowers with bee

MPEG4 AVC MP@L3

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 5.169 Mbit/s
- Moving picture

4.12.2 Audio

Background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

4.13 SDTV_MPEG_NEUSCHWANSTEIN (25 Hz)

TS ID: 2011 (0x07DB)

Length: 192x2 video frames (15.36 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1, CH2, CH3

4.13.1 Video

Live video with aerial view of Neuschwanstein and the Bavarian Alps. There are altogether 3 program services of Neuschwanstein and the Bavarian Alps video content in the test stream. Each of the video services is encoded with different data rate @ 2 Mbps, 4 Mbps and 6 Mbps respectively.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.



Figure 4-13: Neuschwanstein

4.13.1.1 Neuschwanstein @ 2Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 2 Mbit/s
- Moving picture

4.13.1.2 Neuschwanstein @ 4Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

4.13.1.3 Neuschwanstein @ 6Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

4.13.2 Audio

Background-classical musical at both left and right channel for all 3 program services.

MPEG1 layer 2

- 44.1 ksample/s
- 384 kbit/s
- Stereo

4.14 SDTV_MPEG_TABLE_TENNIS (25 Hz)

TS ID: 2011 (0x07DB)

Length: 192x2 video frames (15.36 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1, CH2, CH3

4.14.1 Video

Live video with table tennis match scene. There are altogether 3 program services of table tennis match video content in the test stream. Each of the video services is encoded with different data rate @ 2 Mbps, 4 Mbps and 6 Mbps respectively.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.



Figure 4-14: Table tennis

4.14.1.1 Tabel_tennis @ 2Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 2 Mbit/s
- Moving picture

4.14.1.2 Tabel_tennis @ 4Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

4.14.1.3 Tabel_tennis @ 6Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

4.14.2 Audio

Background applause at both left and right channel for all 3 program services.

MPEG1 layer 2

- 44.1 ksample/s
- 192 kbit/s
- Stereo

4.15 SDTV_MPEG_FLOWERGARDEN (25 Hz)

TS ID: 2011 (0x07DB)

Length: 192x2 video frames (15.36 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1, CH2, CH3

4.15.1 Video

Live video with pan shot across a flower garden with windmill in the background. There are altogether 3 program services of flower garden with windmill in the background

video content in the test stream. Each of the video services is encoded with different data rate @ 2 Mbps, 4 Mbps and 6 Mbps respectively.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.



Figure 4-15: Flower garden

4.15.1.1 Flower garden @ 2Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 2 Mbit/s
- Moving picture

4.15.1.2 Flower garden @ 4Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

4.15.1.3 Flower garden @ 6Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

4.15.2 Audio

Background musical at both left and right channel for all 3 program services.

MPEG1 layer 2

- 44.1 ksample/s
- 384 kbit/s
- Stereo

4.16 SDTV_MPEG_JUMP (25 Hz)

TS ID: 2011 (0x07DB)

Length: 576x1 video frames (23.040 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.16.1 Video

Live video with diver jumping into the water.

Example of use: General function test for vision and sound.

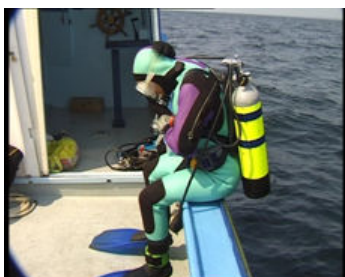


Figure 4-16: Jump @ 4Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

4.16.2 Audio

Background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

4.17 SDTV_MPEG_ROYANGEL (25 Hz)

TS ID: 2011 (0x07DB)

Length: 8x24 video frames (7.68 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.17.1 Video

Live video with Royal Angel fish.

Example of use: General function test for vision and sound.



Figure 4-17: Royal angel @ 4Mbps

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

4.17.2 Audio

Background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

4.18 SDTV_MPEG_CCITTO33 (25 Hz)

TS ID: 2011 (0x07DB)

Length: 24x40 video frames (38.4 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.18.1 Video

CODEC test pattern for BG/PAL standard from Rohde & Schwarz, see page 12.

MPEG2 MP@ML

- 25 frames/s
- 576 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

4.18.2 Audio

CITT O.33 waveform, see page 30.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

4.19 SDTV_MPEG_TELETX_G (25 Hz)

TS ID: 2011 (0x07DB)

Length: 24x20 video frames (19.2 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

4.19.1 Video

CODEC test pattern for BG/PAL standard from Rohde & Schwarz, see page 12.

4.19.2 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
- Stereo

4.19.3 Data

Teletext test pages used for testing teletext transcoders.

Teletext test pages used for testing teletext transcoders.

Example: PES header

The example comprises a PES header.

```

data_identifier      : 0x10 (EBU data)
data_identifier      : 0x10 (EBU data)
packet_start_code_prefix : 0x000001
stream_id            : 189 (private stream 1 e.g. videotext)
PES_packet_length    : 362
10                   : 0x02
PES_scrambling_control : 0
PES_priority         : 0
data_alignment_indicator : 1
copyright           : 0
original_or_copy     : 1
PTS_DTS_flags        : 0x02
ESCR_flag            : 0
ES_rate_flag         : 1
DSM_trick_mode_flag  : 0
additional_copy_info_flag : 0
PES_CRC_flag         : 0
PES_extension_flag   : 0
PES_header_data_length : 36 (0x24)
'0010'               : 0x02
PTS[32..30]          : 0x00
marker_bit           : 1
PTS[29..15]          : 0x0000
marker_bit           : 1
PTS[14..0]           : 0x10AE
marker_bit           : 1
                    (Time_stamp: 00:00:00.047)
                    (actual_STC: 00:00:00.001)
marker_bit           : 1
ES_rate              : 97 (* 50 Bytes/s = 38800 Bit/s)
marker_bit           : 1

```

Example: PES package

The example comprises a PES package.

```

data_identifier      : 0x10 (EBU data)
INFO :Data_unit contains:
data_unit_id        : 0x02 (EBU Teletext non-subtitle data)
data_unit_length    : 44
field_parity        : 1 = first video field
line_offset         : 20 = video line 20
(= 1st line in transport stream)
framing_code        : 0xE4 (bit reverse 0x27)
magazine_and_packet_address : 0x40A8 (magazine: 1 row: 0)
data_block          : 0xA8 0xA8 0x7A 0x40 0xA8 0x40 0xA8 0xE3
data_block          : 0x23 0x6B 0x43 0xB5 0x2A 0xA7 0x37 0xA7
data_block          : 0x2F 0xA7 0x1F 0x2F 0x04 0x04 0x04 0x04
data_block          : 0x04 0x04 0x04 0x04 0x04 0x04 0x04 0x04
data_block          : 0x04 0x04 0x04 0x04 0x04 0x04 0x04 0x04
Page_header!
Page_header (row 0) contains:
page                : 100
time                : 10:13
erase               : 0
newsflash           : 0
subtitle            : 0
suppress header     : 0
update              : 0
interrupted sequence : 0
inhibit display     : 0
magazine serial     : 1
unallocated         : 0
unallocated         : 0
unallocated         : 0
data block in bit reverse : DVB-Teletext

```

5 DVB transport streams (29 Hz)

5.1 SDTV_MPEG_UNIVERSAL43 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 64x90 video frames (192.192 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.1.1 Video

Universal 4:3 test pattern, see page 20.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Static picture

5.1.2 Audio

Frequency analysis for MPEG2 L1 multitone signal (29 Hz video frame rate), see page 25.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

Frequency analysis for AAC multitone signal (29 Hz video frame rate), see page 26.

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

5.2 SDTV_AVC_UNIVERSAL43 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 64x90 video frames (192.192 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.2.1 Video

Universal 4:3 test pattern, see page 20.

MPEG4 MP-L3

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.616 Mbit/s
- Static picture

5.2.2 Audio

Frequency analysis for MPEG2 L1 multitone signal (29 Hz video frame rate), see page 25.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

Frequency analysis for AAC multitone signal (29 Hz video frame rate), see page 26.

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

5.3 SDTV_MPEG_UNIVERSAL169 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 64x90 video frames (192.192 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.3.1 Video

Universal 16:9 test pattern, see page 21.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Static picture

5.3.2 Audio

Frequency analysis for MPEG2 L1 multitone signal (29 Hz video frame rate), see page 25.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

Frequency analysis for AAC multitone signal (29 Hz video frame rate), see page 26.

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

5.4 SDTV_AVC_UNIVERSAL169 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 64x90 video frames (192.192 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.4.1 Video

Universal 16:9 test pattern, see page 21.

MPEG4 MP@L3

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.675 Mbit/s
- Static picture

5.4.2 Audio

Frequency analysis for MPEG2 L1 multitone signal (29 Hz video frame rate), see page 25.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

Frequency analysis for AAC multitone signal (29 Hz video frame rate), see page 26.

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

5.5 SDTV_MPEG_SMPTEBARS (29 Hz)

TS ID: 1999 (0x07CF)

Length: 16x720 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.5.1 Video

SMPTEBARS, see page 17.

MPEG2 MP@ML

- 29.97 frames/s

- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Static picture

5.5.2 Audio

Audio frequency of 439.997 Hz @ -6 dB at right channel and left audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.6 SDTV_AVC_SMPTEBARS (29 Hz)

TS ID: 1999 (0x07CF)

Length: 16x720 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.6.1 Video

SMPTEBARS, see page 17.

MPEG4 MP@L3

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.111 Mbit/s
- Static picture

5.6.2 Audio

Audio frequency of 439.997 Hz @ -6 dB at right channel and left audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.7 SDTV_MPEG_BIG6 (29 Hz)

TS ID: 1999 (0x07F)

Length: 24x480 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.7.1 Video

CODEC 16:9 test pattern for BG/PAL standard, see page 16.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

5.7.2 Audio

Big6 audio test sequence, see page 29.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

5.8 SDTV_AVC_BIG6 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 24x40 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: R&S CH 1

5.8.1 Video

CODEC 16:9 test pattern for BG/PAL standard, see page 16.

MPEG4 AVC MP-L3

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 1.132 Mbit/s
- Moving picture

5.8.2 Audio

Big6 audio test sequence, see page 29.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

5.9 SDTV_MPEG_CBARS100 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 12x960 video frames (384.384s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.9.1 Video

Color bar with luminance amplitude of 100% and a color saturation of 100%.

Example of use: Test and alignment of phase and level ratios for MPEG2 decoders and PPAL coders. The color coding can easily be checked with a vector scope.

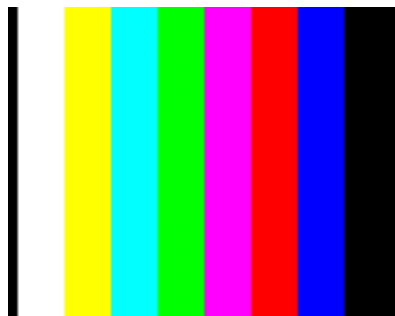


Figure 5-1: Color bar 100

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.579 Mbit/s
- Static picture

5.9.2 Audio

Audio frequency of 439.997 Hz @ -6 dB at left channel and silence tone at right channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.10 SDTV_MPEG_CBARS75 (29 Hz)

TS ID: 2011 (0x07DB)

Length: 12x960 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.10.1 Video

Color bar with luminance amplitude of 100% and a color saturation of 75%.

Example of use: Test and alignment of phase and level ratios for MPEG2 decoders and PPAL coders. The color coding can easily be checked with a vector scope.

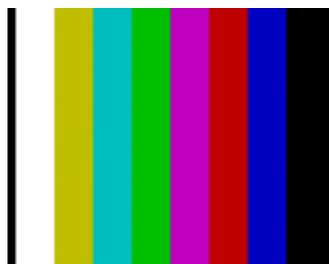


Figure 5-2: Color bar 75

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.559 Mbit/s
- Static picture

5.10.2 Audio

Audio frequency of 439.997 Hz @ -6 dB at right channel and silence tone at left channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.11 SDTV_MPEG EMC (29 Hz)

TS ID: 1999 (0x07CF)

Length: 180x64 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.11.1 Video

Moving color bar test signal

Example of use: Measurement of electromagnetic compatibility (immunity to gradated interference) TV sets.

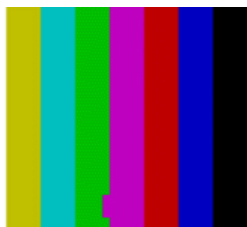


Figure 5-3: Moving color bar

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

5.11.2 Audio

Audio frequency of 1 kHz @ -6 dB at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.12 SDTV_MPEG_ITS1 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 12x960 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1, CH 2, CH 3

5.12.1 Video

There are altogether 3 different program services in this stream. The video services namely: ITS1, ITS2, ITS3 provide a comprehensive range of television test signal.

5.12.1.1 ITS1

See page 9.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.754 Mbit/s
- Static picture

5.12.1.2 ITS2

See page 10.

MPEG2 MP@ML

- 29 frames/s
- 480 lines/picture
- 720 pixels/line
- 1.212 Mbit/s
- Static picture

5.12.1.3 ITS3

See page 10.

MPEG2 MP@ML

- 29 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.698 Mbit/s
- Static picture

5.12.2 Audio

There are altogether 3 different audio services in this stream.

Program1: 55 Hz @ -6 dB

Program2: 110 Hz @ -6 dB

Program2: 220 Hz @ -6 dB

All audio is encoded with both MPEG1-L2 and HE-AACv1 LOAS format.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.13 SDTV_MPEG_ITS2 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 12x960 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1, CH 2, CH 3

5.13.1 Video

There are altogether 3 different program services in this stream. The video services namely: ITS4, HSWEEP, NONLIN provide a comprehensive range of television test signal.

5.13.1.1 ITS4

See page 11.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.402 Mbit/s
- Static picture

5.13.1.2 HSWEEP

See page 22.

MPEG2 MP@ML

- 29 frames/s
- 480 lines/picture
- 720 pixels/line
- 2.236 Mbit/s
- Static picture

5.13.1.3 NONLIN

A line signal with the ramp signals in Y, CB and CR, yielding full-range ramps(from 0 to 700mv) with different slopes in analog RGB display

Example of use: Test of nonlinearities in Y, CB and CR and test of RGB matrix.

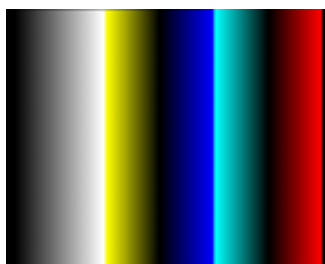


Figure 5-4: Nonlin

MPEG2 MP@ML

- 29 frames/s
- 480 lines/picture
- 720 pixels/line
- 1.392 Mbit/s
- Static picture

5.13.2 Audio

There are altogether 3 different audio services in this stream.

Program1: 440 Hz @ -6 dB

Program2: 1760 Hz @ -6 dB

All audio is encoded with both MPEG1-L2 and HE-AACv1 LOAS format.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.14 SDTV_MPEG_ITS3 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 12x960 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1, CH 2

5.14.1 Video

There are altogether 2 different program services in this stream. The video services namely: RAMPYC, RGBSWEEP provide a comprehensive range of television test signal.

5.14.1.1 RAMPYC

Still picture with ramps in all components.

Example of use: Test of missing codes and linearity of D/A converters.

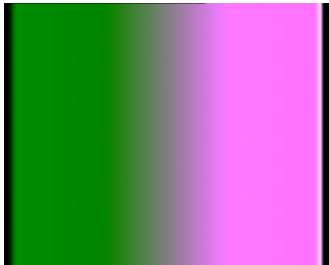


Figure 5-5: Rampyc

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 1.396 Mbit/s
- Static picture

5.14.1.2 RGBSWEEP

For the H sweep, the video frequency range for each of the RGB components is swept over a line. The sweep starts with 5.8 MHz at the beginning of the line down to 0 Hz in the middle of the line. It increases again to 5.8 MHz at the end of the line. The corresponding components are generated with an amplitude of 100%, i.e. full range from 0 to 700mv with analog signal. The R sweep is transmitted in the first third of the frame, followed by G sweep and B sweep in the second and third.

Example of use: Test and alignment of RGB output stages. Measurement of amplitude-frequency response and group delay in RGB channels.

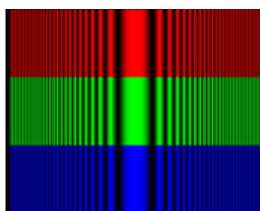


Figure 5-6: Rgbsweep

MPEG2 MP@ML

- 29 frames/s
- 480 lines/picture
- 720 pixels/line
- 2.759 Mbit/s
- Static picture

5.14.2 Audio

There are altogether 2 different audio services in this stream.

Program1: 3520 Hz @ -6 dB

Program2: 7040 Hz @ -6 dB

All audio is encoded with both MPEG1-L2 and HE-AACv1 LOAS format.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.15 SDTV_MPEG_ITS4 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 12x960 video frames (192.192 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1 & CH2

5.15.1 Video

There are altogether 2 different program services in this stream. The video services namely: Window, Zoneplate provide a comprehensive range of television test signal.

5.15.1.1 WINDOW

This signal consists of a white window (100% amplitude) and a PLUGE signal ($\pm 2\%$ amplitude). Also, it consists of a 2T pulse and a modulated 20T pulse with 100% amplitude each.

Example of use: Test of sweep voltage generation and black-level adjustment of monitors with the PLUGE signal. With the inserted window, field-frequency (50 Hz) and line-frequency (15 kHz) tilts are made visible on the monitor or oscilloscope.

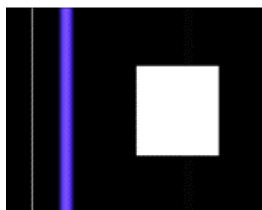


Figure 5-7: Window

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.476 Mbit/s
- Static picture

5.15.1.2 ZONEPLATE

Zoneplate test signal to test measurement of frequency response, horizontal and vertical direction.

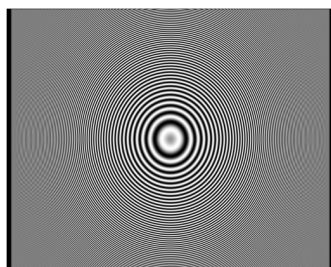


Figure 5-8: Zone Plate

MPEG2 MP@ML

- 29 frames/s

- 480 lines/picture
- 720 pixels/line
- 14.998 Mbit/s
- Moving picture

5.15.2 Audio

There are altogether 8 different audio services in this stream.

Program1: 14080 Hz @ -6 dB

Program2: 16896 Hz @ -6 dB

All AAC audio is encoded with both MPEG1-L2 and AAC-LC LOAS format.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (AAC-LC LOAS)

- 48 ksample/s
- 256 kbit/s
- Stereo

5.16 SDTV_MPEG_FLOWER169 (25 Hz)

TS ID: 1999 (0x07CF)

Length: 960x1 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.16.1 Video

Live video with flowers and bee.

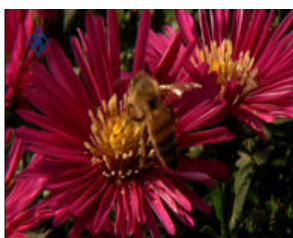


Figure 5-9: 16:9 Flowers with bee

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

5.16.2 Audio

Background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.17 SDTV_AVC_FLOWER169 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 960x1 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.17.1 Video

Live video with flowers and bee.

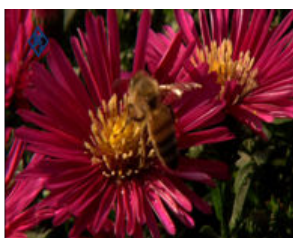


Figure 5-10: 16:9 Flowers with bee

MPEG4 AVC MP@L3

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4.003 Mbit/s
- Moving picture

5.17.2 Audio

Background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (HE-AACv1 LOAS)

- 24 ksample/s
- 128 kbit/s
- Stereo

5.18 SDTV_MPEG_NEUSCHWANSTEIN (29 Hz)

TS ID: 1999 (0x07CF)

Length: 180x4 video frames (24.024 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.18.1 Video

Live video with aerial view of Neuschwanstein and the Bavarian Alps.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.

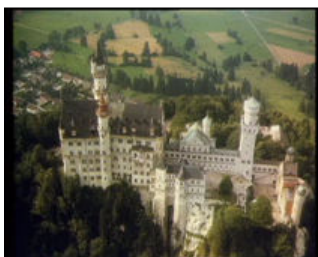


Figure 5-11: Neuschwanstein @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

5.18.2 Audio

Background-classical musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

5.19 SDTV_MPEG_TABLE_TENNIS (29 Hz)

TS ID: 1999 (0x07CF)

Length: 180x4 video frames (24.024 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1, CH2, CH3

5.19.1 Video

Live video with table tennis match scene. There are altogether 3 program services of table tennis match video content in the test stream. Each of the video services is encoded with different data rate @ 2 Mbps, 4 Mbps and 6 Mbps respectively.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.



Figure 5-12: Table tennis

5.19.1.1 Tabel_tennis @ 2Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 2 Mbit/s
- Moving picture

5.19.1.2 Tabel_tennis @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

5.19.1.3 Tabel_tennis @ 6Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

5.19.2 Audio

Background applause at both left and right channel for all 3 program services.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

5.20 SDTV_MPEG_FLOWERGARDEN (29 Hz)

TS ID: 1999 (0x07CF)

Length: 180x4 video frames (24.024 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1, CH2, CH3

5.20.1 Video

Live video with pan shot across a flower garden with windmill in the background. There are altogether 3 program services of flower garden with windmill in the background video content in the test stream. Each of the video services is encoded with different data rate @ 2 Mbps, 4 Mbps and 6 Mbps respectively.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.

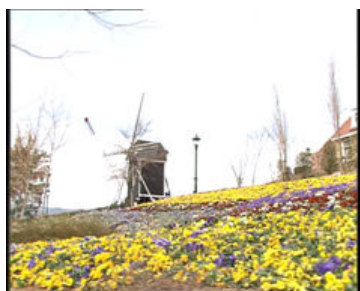


Figure 5-13: Flower garden

5.20.1.1 Flower garden @ 2Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 2 Mbit/s
- Moving picture

5.20.1.2 Flower garden @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

5.20.1.3 Flower garden @ 6Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

5.20.2 Audio

Background musical at both left and right channel for all 3 program services.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

5.21 SDTV_MPEG_JUMP (29 Hz)

TS ID: 1999 (0x07CF)

Length: 720x1 video frames (24.024 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.21.1 Video

Live video with diver jumping into the water.

Example of use: General function test for vision and sound.

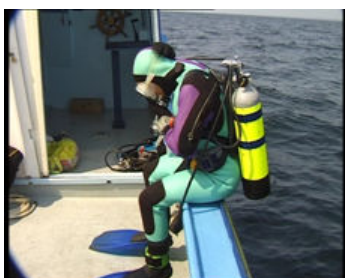


Figure 5-14: Jump @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

5.21.2 Audio

Instrumental background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

5.22 SDTV_MPEG_GROUPER (29 Hz)

TS ID: 1999 (0x07CF)

Length: 720x1 video frames (24.024 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.22.1 Video

Live video with grouper swimming in the water.

Example of use: General function test for vision and sound.



Figure 5-15: Grouper @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

5.22.2 Audio

Instrumental background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

5.23 SDTV_MPEG_ROYANGEL (29 Hz)

TS ID: 1999 (0x07CF)

Length: 720x1 video frames (24.024 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.23.1 Video

Live video with Royal Angel fish.

Example of use: General function test for vision and sound.



Figure 5-16: Royal angel @ 4Mbps

MPEG2 MP@ML

- 29 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

5.23.2 Audio

Instrumental background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

5.24 SDTV_MPEG_CCITTO33 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 24x480 video frames (384.384 s)

Tables: DVB T (terrestrial)

Program

Service_name: CH 1

5.24.1 Video

CODEC test pattern for M/NTSC standard from Rohde & Schwarz, see page 14.

MPEG2 MP@ML

- 29.97 frames/s

- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

5.24.2 Audio

CITT O.33 waveform, see page 30.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

MPEG4 (AAC-LC LOAS)





- 48 ksample/s
- 256 kbit/s
- Stereo


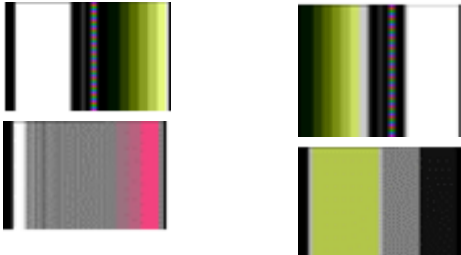
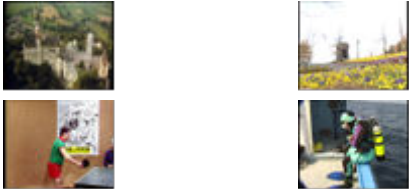
6 ATSC transport streams



6.1 Overview

Each of the ATSC transport streams consists of one or more video elementary streams (MPEG2) and an AC3 audio elementary stream with respective number of video streams.

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

Video elementary stream	ATSC test stream & video elementary stream, 29 Hz
Universal 4:3 test pattern Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_UNIVERSAL43 Universal43 06 Mbps
Universal 16:9 test pattern Interlaced 16:9 480 lines (29 Hz) 	SDTV_MPEG_UNIVERSAL169 Universal169 06 Mbps
SMPTEBARS Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_SMPTEBARS Pattern 06 Mbps
CCITTO33 Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_CCITTO33 Codec43 multiburst 06 Mbps 24 frames

Video elementary stream	ATSC test stream & video elementary stream, 29 Hz
<p>Codec 16:9 test pattern Interlaced 16:9 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_BIG6 Codec169 multiburst 06 Mbps 24 frames</p>
<p>ITS Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_ITS ITS1 0.936 Mbps ITS2 1 Mbps ITS3 0.933 Mbps ITS4 1 Mbps</p>
<p>EMC Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_EMCC Moving CBars 06 Mbps 240 frames</p>
<p>Flower Interlaced 16:9 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_FLOWER169 Flower 06 Mbps 960 frames</p>
<p>TERRESTRIAL Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_MUX_TERRESTRIAL Neuschwanstein 04 Mbps 192 frames Table tennis 04 Mbps 192 frames Flower garden 04 Mbps 192 frames Jump 04 Mbps 480 frames.</p>

Video elementary stream	ATSC test stream & video elementary stream, 29 Hz
Grouper Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_GROUPER Grouper 04 Mbps 480 frames
Royal angel Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_ROYANGEL Royal angel 04 Mbps 480 frames

6.2 SDTV_MPEG_Universal43 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 16x60 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.2.1 Video

Universal 4:3 test pattern, see page 20.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 6 Mbit/s
- Static picture
- ATSC identifier

6.2.2 Audio

Frequency analysis for AC3 multitone signal (29 Hz video frame rate), see page 27.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.3 SDTV_MPEG_UNIVERSAL169 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 16x60 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.3.1 Video

Universal 16:9 test pattern, see page 21.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 6 Mbit/s
- Static picture
- ATSC identifier

6.3.2 Audio

Frequency analysis for AC3 multitone signal (29 Hz video frame rate), see page 27.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.4 SDTV_MPEG_SMPTEBARS (29 Hz)

TS ID: 1999 (0x07CF)

Length: 16x60 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.4.1 Video

SMPTEBARS, see page 17.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 5.999 Mbit/s
- Static picture
- ATSC identifier

6.4.2 Audio

Audio frequency of 439.997 Hz @ -6 dB for both right and left audio channel.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.5 SDTV_MPEG_CCITTO33 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 24x40 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.5.1 Video

CODEC test pattern for M/NTSC standard from Rohde & Schwarz, see page 14.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 6 Mbit/s
- Static picture
- ATSC identifier

6.5.2 Audio

CITT O.33 waveform, see page 30.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.6 SDRV_MPEG_BIG6 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 24x40 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.6.1 Video

CODEC 16:9 test pattern for M/NTSC standard, see page 14.

MPEG2 MP@ML

- 29.97 frames/s

- 480 lines/picture
- 704 pixels/line
- 6 Mbit/s
- Static picture
- ATSC identifier

6.6.2 Audio

Big6 audio test sequence, see page 29.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.7 SDTV_MPEG_ITS (29 Hz)

TS ID: 1999 (0x07CF)

Length: 24x40 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1 Program 1: minor_channel_number 1 Short_name: CH1

Program2: minor_channel_number 2 Short_name: CH2

Program 3: minor_channel_number 3 Short_name: CH3

Program4: minor_channel_number 4 Short_name: CH4

6.7.1 Video

There are altogether 4 different program services in this stream. The video services namely: ITS1, ITS2, ITS3, ITS4 provide a comprehensive range of television test signal.

6.7.1.1 NTC7 composite

See page 9.

MPEG2 MP@ML

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

- 0.936 Mbit/s
- Static picture
- ATSC identifier

6.7.1.2 NTC7 combined

See page 10.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 1 Mbit/s
- Static picture
- ATSC identifier

6.7.1.3 FCC composite

See page 10.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 0.933 Mbit/s
- Static picture
- ATSC identifier

6.7.1.4 VIRS

See page 11.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 1 Mbit/s
- Static picture
- ATSC identifier

6.7.2 Audio

There are altogether 4 different audio services in this stream.

Program1: 55 Hz @ -6 dB

Program2: 220 Hz @ -6 dB

Program3: 3520 Hz @ -6 dB

Program4: 14080 Hz @ -6 dB

All audio is encoded with in AC-3 format.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.8 SDTV_MPEG_EMC (29 Hz)

TS ID: 1999 (0x07CF)

Length: 160x6 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.8.1 Video

Moving color bar test signal.

Example of use: Measurement of electromagnetic compatibility (immunity to gradated interference) TV sets.



Figure 6-1: Moving color bar

MPEG2 MP@ML

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

- 6 Mbit/s
- Static picture
- ATSC identifier

6.8.2 Audio

Audio frequency of 1 kHz @ -6 dB at both left and right audio channel.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.9 SDTV_MPEG_FLOWER169 (29 Hz)

TS ID: 1999 (0x07CF)

Length: 960x1 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.9.1 Video

Live video with flowers and bee.

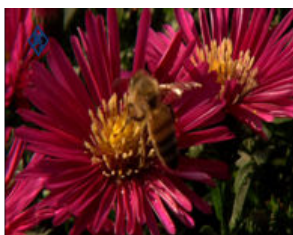


Figure 6-2: 16:9 Flowers with bee

MPEG2 MP@ML

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

- 6 Mbit/s
- Static picture
- ATSC identifier

6.9.2 Audio

Background musical at both left and right audio channel.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.10 SDTV_MPEG_MUX_TERRESTRIAL (29 Hz)

TS ID: 1999 (0x07CF)

Length: 192x5 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1, short name CH1

Program2: minor_channel_number 2, short name

CH2 Program 3: minor_channel_number 3, short name CH3

Program4: minor_channel_number 4, short name CH4

6.10.1 Video

There are altogether 4 different program services in this stream. The video services namely: Neuschwanstein, Table tennis, Flower garden, Jump provide a good range of general function to test vision and sound quality.

6.10.1.1 NEUSCHWANSTEIN

Live video with aerial view of Neuschwanstein and the Bavarian Alps.

Example of use: General function test for vision and sound.



Figure 6-3: Neuschwanstein @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4 Mbit/s
- Moving picture
- ATSC identifier

6.10.1.2 TABLE_TENNIS

Live video with table tennis match scene.

Example of use: General function test for vision and sound.



Figure 6-4: Table tennis @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4 Mbit/s
- Moving picture
- ATSC identifier

6.10.1.3 FLOWER GARDEN

Live video with pan shot across a flower garden with windmill in the background.

Example of use: General function test for vision and sound.

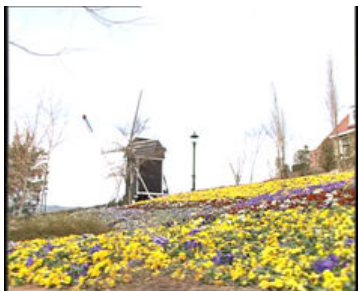


Figure 6-5: Flower garden @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4 Mbit/s
- Moving picture
- ATSC identifier

6.10.1.4 JUMP

Live video with diver jumping into the water.

Example of use: General function test for vision and sound.



Figure 6-6: Jump @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4 Mbit/s
- Moving picture
- ATSC identifier

6.10.2 Audio

There are altogether 4 different audio services in this stream.

Program1: Background-classical music

Program2: Background applause

Program3: Instrumental background music.

Program4: Instrumental background music.

All audio is encoded with AC-3 format.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.11 SDTV_MPEG_MUX_CABLE (29 Hz)

TS ID: 1999 (0x07CF)

Length: 192x5 video frames (32.032 s)

Tables: ATSC Cable(CVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1, short_name: CH1

Program2: minor_channel_number 2, short_name: CH2

Program 3: minor_channel_number 3, short_name: CH3

Program4: minor_channel_number 4, short_name: CH4

6.11.1 Video

There are altogether 4 different program services in this stream. The video services namely: Neuschwanstein, Table tennis, Flower garden, Jump provide a good range of general function to test vision and sound quality.

6.11.1.1 NEUSCHWANSTEIN

Live video with aerial view of Neuschwanstein and the Bavarian Alps.

Example of use: General function test for vision and sound.



Figure 6-7: Neuschwanstein @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4 Mbit/s
- Moving picture
- ATSC identifier

6.11.1.2 TABLE_TENNIS

Live video with table tennis match scene.

Example of use: General function test for vision and sound.



Figure 6-8: Table tennis @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4 Mbit/s
- Moving picture
- ATSC identifier

6.11.1.3 FLOWER GARDEN

Live video with pan shot across a flower garden with windmill in the background.

Example of use: General function test for vision and sound.

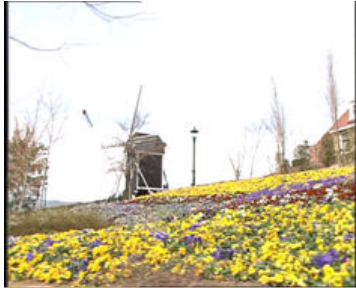


Figure 6-9: Flower garden @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4 Mbit/s
- Moving picture
- ATSC identifier

6.11.1.4 JUMP

Live video with diver jumping into the water.

Example of use: General function test for vision and sound.



Figure 6-10: Jump @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4 Mbit/s
- Moving picture
- ATSC identifier

6.11.2 Audio

There are altogether 4 different audio services in this stream.

Program1: Background-classical music

Program2: Background applause

Program3: Instrumental background music.

Program4: Instrumental background music.

All audio is encoded with AC-3 format.

AC-3

- 48 ksample/s
- 384 kbit/s
- 2/0 (L,R)

6.12 SDTV_MPEG_GROUPER (29 Hz)

TS ID: 1999 (0x07CF)

Length: 480x2 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.12.1 Video

Live video with grouper swimming in the water.

Example of use: General function test for vision and sound.



Figure 6-11: Grouper @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4.003 Mbit/s
- Moving picture
- ATSC identifier

6.12.2 Audio

Instrumental background musical at both left and right audio channel.

MPEG1 layer 2

- 48 ksample/s
- 384 kbit/s
- Stereo

6.13 SDTV_MPEG_ROYANGEL (29 Hz)

TS ID: 1999 (0x07CF)

Length: 480x2 video frames (32.032 s)

Tables: ATSC terrestrial (TVCT)

Program

Major_channel_number: 1

Program 1: minor_channel_number 1

Short_name: CH1

6.13.1 Video

Live video with Royal Angel fish.

Example of use: General function test for vision and sound.



Figure 6-12: Royal angel @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 704 pixels/line
- 4.002 Mbit/s
- Moving picture
- ATSC identifier

6.13.2 Audio

Instrumental background musical at both left and right audio channel.

MPEG1 layer 2





- 48 ksample/s
- 384 kbit/s
- Stereo





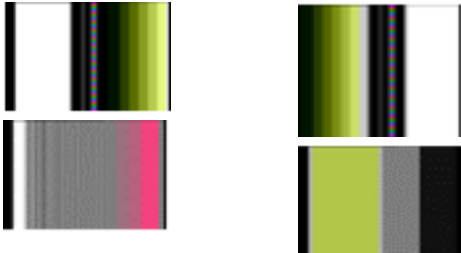
7 ISDB-T transport streams




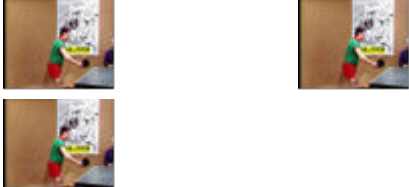

7.1 Overview




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) of the coded picture.

Video elementary stream	ATSC test stream & video elementary stream, 29 Hz
Universal 4:3 test pattern Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_UNIVERSAL43 Universal43 06 Mbps
Universal 16:9 test pattern Interlaced 16:9 480 lines (29 Hz) 	SDTV_MPEG_UNIVERSAL169 Universal169 06 Mbps
SMPTEBARS Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_SMPTEBARS Pattern 06 Mbps
CCITTO33 Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_CCITTO33 Codec43 multiburst 06 Mbps 24 frames

Video elementary stream	ATSC test stream & video elementary stream, 29 Hz
<p>Codec 16:9 test pattern Interlaced 16:9 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_BIG6 Codec169 multiburst 06 Mbps 24 frames</p>
<p>CBARS100 Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_CBARS100 Cbars100 0.579 Mbps</p>
<p>CBARS75 Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_CBARS75 Cbars75 0.559 Mbps</p>
<p>EMC Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_EMCC Moving CBars 06 Mbps 192 frames</p>
<p>ITS Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_ITS ITS1 0.754 Mbps ITS2 1.212 Mbps ITS3 0.698 Mbps ITS4 0.402 Mbps</p>

Video elementary stream	ATSC test stream & video elementary stream, 29 Hz
<p>HSWEEP Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_HSWEEP1 HSWEEP 2.236 Mbps</p>
<p>Flower Interlaced 16:9 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_FLOWER169 Flower 06 Mbps 960 frames</p>
<p>Neuschwanstein Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_NEUSCHWANSTEIN Neuschwanstein 04 Mbps 192 frames</p>
<p>Table tennis Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_TABLE_TENNIS Table tennis 02 Mbps 192 frames Table tennis 04 Mbps 192 frames Table tennis 06 Mbps 192 frames</p>
<p>Flower garden Interlaced 4:3 480 lines (29 Hz)</p> 	<p>SDTV_MPEG_FLOWER-GARDEN Flower garden 02 Mbps 192 frames Flower garden 04 Mbps 192 frames Flower garden 06 Mbps 192 frames</p>

Video elementary stream	ATSC test stream & video elementary stream, 29 Hz
Jump Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_JUMP Jump 04 Mbps 720 frames.
Grouper Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_GROUPER Grouper 04 Mbps 480 frames
Royal angel Interlaced 4:3 480 lines (29 Hz) 	SDTV_MPEG_ROYANGEL Royal angel 04 Mbps 480 frames

7.2 SDTV_MPEG_Universal43 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 64x30 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.2.1 Video

Universal 4:3 test pattern, see page 20.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s

- Static picture

7.2.2 Audio

Frequency analysis for ADTS multitone signal (29 Hz video frame rate), see page 28.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 288 kbit/s
- Stereo

7.3 SDTV_MPEG_UNIVERSAL169 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 64x30 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.3.1 Video

Universal 16:9 test pattern, see page 21.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Static picture

7.3.2 Audio

Frequency analysis for ADTS multitone signal (29 Hz video frame rate), see page 28.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 288 kbit/s

- Stereo

7.4 SDTV_MPEG_SMPTEBARS (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 16x120 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.4.1 Video

SMPTEBARS, see page 17.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Static picture

7.4.2 Audio

Audio frequency of 439.997 Hz @ -6 dB at both right and left audio channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.5 SDTV_MPEG_CCITTO33 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 24x80 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.5.1 Video

CODEC test pattern for M/NTSC standard from Rohde & Schwarz, see page 14.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

7.5.2 Audio

CITT O.33 waveform, see page 30.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.6 SDTV_MPEG_BIG6 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 24x80 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.6.1 Video

CODEC 16:9 test pattern for M/NTSC standard, see page 14.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

7.6.2 Audio

Big6 audio test sequence, see page 29.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 288 kbit/s
- Stereo

7.7 SDTV_MPEG_CBARS100 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 12x160 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.7.1 Video

Color bar with luminance amplitude of 100% and a color saturation of 100%.

Example of use: Test and alignment of phase and level ratios for MPEG2 decoders and PPAL coders. The color coding can easily be checked with a vector scope.

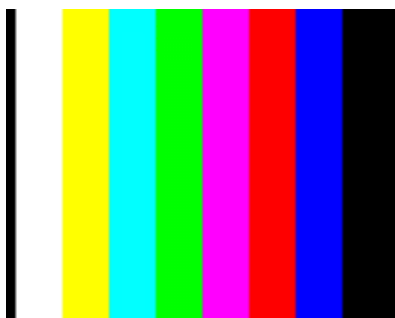


Figure 7-1: Color bar 100

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.579 Mbit/s
- Static picture

7.7.2 Audio

Audio frequency of 439.997 Hz @ -6 dB at left channel and silence tone at right channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.8 SDTV_MPEG_CBARS75 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 12x160 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.8.1 Video

Color bar with luminance amplitude of 100% and a color saturation of 75%.

Example of use: Test and alignment of phase and level ratios for MPEG2 decoders and PPAL coders. The color coding can easily be checked with a vector scope.

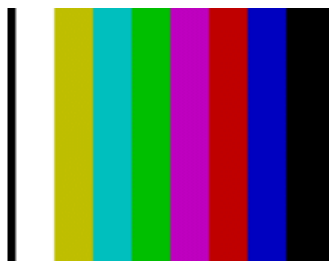


Figure 7-2: Color bar 75

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.559 Mbit/s
- Static picture

7.8.2 Audio

Audio frequency of 439.997 Hz @ -6 dB at right channel and silence tone at left channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.9 SDTV_MPEG_EMC (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 192x10 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.9.1 Video

Moving color bar test signal.

Example of use: Measurement of electromagnetic compatibility (immunity to gradated interference) TV sets.

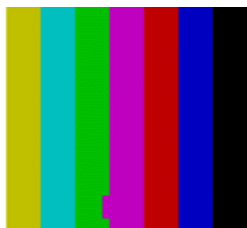


Figure 7-3: Moving color bar

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

7.9.2 Audio

Audio frequency of 1 kHz @ -6 dB at both left and right channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.10 SDTV_MPEG_ITS (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 12x160 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024, Service name: CH 1

Program number: 1025, Service name: CH 2

Program number: 1026, Service name: CH 3

Program number: 1027, Service name: CH 4

7.10.1 Video

There are altogether 4 different program services in this stream. The video services namely: ITS1, ITS2, ITS3, ITS4 provide a comprehensive range of television test signal.

7.10.1.1 NTC7 composite

See page 9.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.754 Mbit/s
- Static picture

7.10.1.2 NTC7 combined

See page 10.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 1.212 Mbit/s
- Static picture

7.10.1.3 FCC composite

See page 10.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.698 Mbit/s
- Static picture

7.10.1.4 VIRS

See page 11.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 0.402 Mbit/s
- Static picture

7.10.2 Audio

There are altogether 4 different audio services in this stream.

Program1: 55 Hz @ -6 dB

Program2: 220 Hz @ -6 dB

Program3: 3520 Hz @ -6 dB

Program4: 14080 Hz @ -6 dB

All audio is encoded with in MPEG4 (AAC-LC ADTS) format.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.11 SDTV_MPEG_HSWEEP1 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 192x10 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.11.1 Video

See page 22.

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 2.236 Mbit/s
- Static picture

7.11.2 Audio

Audio frequency of 16896 Hz @ -6 dB at both left and right audio channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 288 kbit/s
- Stereo

7.12 SDTV_MPEG_FLOWER169 (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 960x2 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.12.1 Video

Live video with flowers and bee.

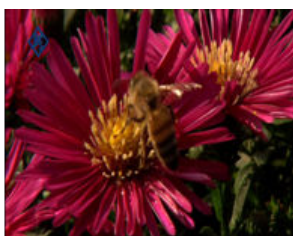


Figure 7-4: 16:9 Flowers with bee

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

7.12.2 Audio

Background musical at both left and right audio channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.13 SDTV_MPEG_NEUSCHWANSTEIN (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 192x10 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.13.1 Video

Live video with aerial view of Neuschwanstein and the Bavarian Alps.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.



Figure 7-5: Neuschwanstein @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

7.13.2 Audio

Background-classical musical at both left and right audio channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.14 SDTV_MPEG_TABLE_TENNIS (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 192x10 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024, Service name: CH 1

Program number: 1025, Service name: CH 2

Program number: 1026, Service name: CH 3

7.14.1 Video

Live video with table tennis match scene. There are altogether 3 program services of table tennis match video content in the test stream. Each of the video services is encoded with different data rate @ 2 Mbps, 4 Mbps and 6 Mbps respectively.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.



Figure 7-6: Table tennis

7.14.1.1 Tabel_tennis @ 2Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 2 Mbit/s
- Moving picture

7.14.1.2 Tabel_tennis @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

7.14.1.3 Tabel_tennis @ 6Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

7.14.2 Audio

Background applause at both left and right channel for all 3 program services.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.15 SDTV_MPEG_FLOWERGARDEN (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 192x10 video frames (64.064 s)

Tables: ISDB T

Program

Program number: 1024, Service name: CH 1

Program number: 1025, Service name: CH 2

Program number: 1026, Service name: CH 3

7.15.1 Video

Live video with pan shot across a flower garden with windmill in the background. There are altogether 3 program services of flower garden with windmill in the background video content in the test stream. Each of the video services is encoded with different data rate @ 2 Mbps, 4 Mbps and 6 Mbps respectively.

Example of use: General function test for vision and sound, demonstration of picture quality as a function of data rate.

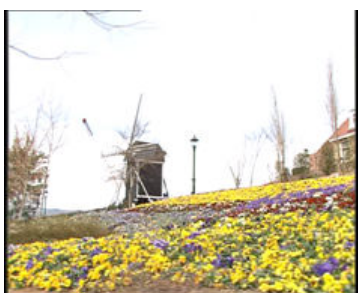


Figure 7-7: Flower garden

7.15.1.1 Flower garden @ 2Mbps

MPEG2 MP@ML

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

- 2 Mbit/s
- Moving picture

7.15.1.2 Flower garden @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

7.15.1.3 Flower garden @ 6Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 6 Mbit/s
- Moving picture

7.15.2 Audio

Background musical at both left and right channel for all 3 program services.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.16 SDTV_MPEG_JUMP (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 720x8 video frames (192.192 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.16.1 Video

Live video with diver jumping into the water.

Example of use: General function test for vision and sound.

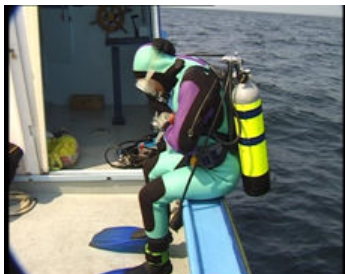


Figure 7-8: Jump @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

7.16.2 Audio

Instrumental background musical at both left and right audio channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.17 SDTV_MPEG_GROUPER (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 720x8 video frames (192.192 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.17.1 Video

Live video with grouper swimming in the water.

Example of use: General function test for vision and sound.



Figure 7-9: Grouper @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

7.17.2 Audio

Instrumental background musical at both left and right audio channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

7.18 SDTV_MPEG_ROYANGEL (29 Hz)

TSID: 32736 (0x7FE0)

SID: 1024 (0x0400)

Length: 720x8 video frames (192.192 s)

Tables: ISDB T

Program

Program number: 1024

Service name: CH 1

7.18.1 Video

Live video with Royal Angel fish.

Example of use: General function test for vision and sound.



Figure 7-10: Royal Angel @ 4Mbps

MPEG2 MP@ML

- 29.97 frames/s
- 480 lines/picture
- 720 pixels/line
- 4 Mbit/s
- Moving picture

7.18.2 Audio

Instrumental background musical at both left and right audio channel.

MPEG4 (AAC-LC ADTS)

- 48 ksample/s
- 144 kbit/s
- Stereo

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