

# Extensive audio testing of TV sets

Powerful solution featuring the R&S®DVSG digital video signal generator and the R&S®UPV audio analyzer.



Setup for extensive audio testing of TV sets.

## Your task

The introduction of digital TV sets has led to the use of the high-definition multimedia interface (HDMI). Besides the video data, this digital interface also delivers the accompanying sound. As a result, it has now become necessary to convert the incoming digital audio stream in the television set into an analog signal before outputting it. For this reason, in areas such as development or quality assurance, measures must be implemented to ensure that this conversion process functions without error.

To make this possible, an HDMI generator supplies ultra-pure audio signals to the TV device under test. The quality of the analog output is then analyzed subjectively by a person performing the test or objectively and automatically using an audio analyzer.

## T & M solution

### R&S®DVSG digital video signal generator

Besides numerous types of TV interfaces, video formats and content, this versatile video generator also offers a digital HDMI audio generator with a comprehensive range of capabilities. Users can configure each of the eight possible channels as desired.

Regardless of whether ultrapure synthetic sinusoidal signals and frequency sweeps or any real-life imported waveforms are used – the R&S®DVSG delivers the right measurement stimuli for professional audio analyzers as well as for the human ear.

### Functions

- ▀ Playback of user-specific sequences
- ▀ Playback of sequences supplied with the device, such as a frequency sweep
- ▀ Generation of individual sine tones accurate to the Hz level

### R&S®UPV audio analyzer

Due to the fact that the event and time triggers can be configured flexibly, this high-end analyzer can use all signals from the R&S®DVSG in order to assess the audio quality at the TV DUT's analog output. Simultaneously, the range of functions covers all of the required measurements:

#### Signal-to-noise ratio (S/N)

Is defined as the ratio of the average useful signal's level to the average noise level. This is directly related to the bit depth used in the digital-to-analog conversion process.

#### Amplitude response

Characterizes the behavior of a linear time-invariant system. The amplitude of the output is compared with the input signal and plotted versus frequency.

#### Total harmonic distortion (THD)

Is a measure of the distortion produced by nonlinearities. The THD is the power ratio of all unwanted harmonics to the fundamental sine wave.

#### Intermodulation

Is a nonlinear measurement that – in contrast to THD – uses two sine waves of different frequency to analyze their intermodulation products.

## Linearity of D/A converters

Decreases the level of a sine wave signal in steps of 5 dB starting from the full-scale amplitude. Measures the output signal and represents it graphically versus the input signal.

## Stereo separation/crosstalk

Measures the level ratio between the output signal of a fully driven channel and the output signal of a channel that is not driven.

## Benefits

### Flexible eight-channel HDMI audio generator

The R&S®DVSG AVG pattern import software that comes with the instrument can assign any waveform to each of the eight individual HDMI audio channels in a user-defined sequence.

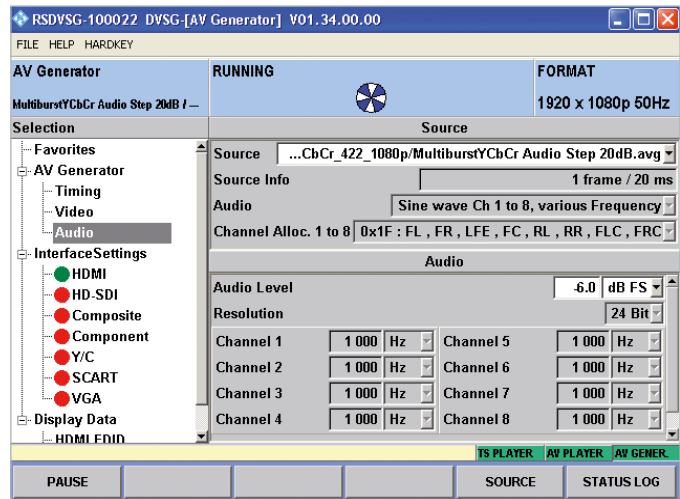
### All-in-one-box solution

Besides audio quality, the R&S®DVSG can also be used to test the other parameters for TV sets:

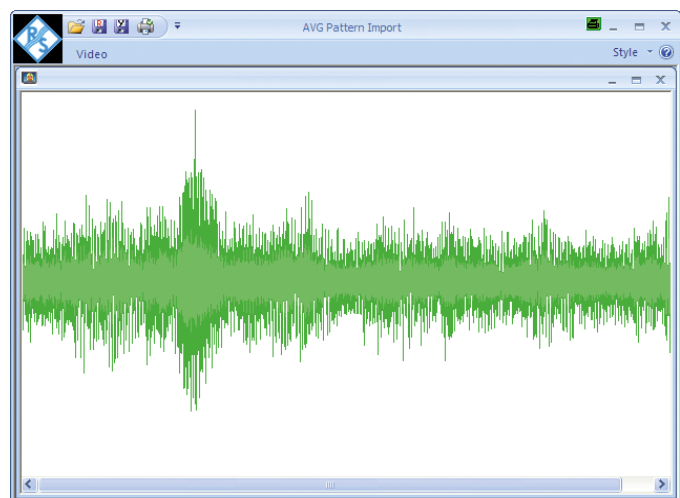
- Basic display parameters (contrast, gamut, etc.)
- Picture processing (scaling, de-interlacing, motion artifacts, etc.)
- Functional and stress tests of all common A/V interfaces

### Time savings and reproducibility

Support of the VX11 and SCPI industry standards for remote control of devices allows fast and reliable integration into automatic test systems.



The R&S®DVSG directly generates individual sine tones or a frequency sweep.



Software can be used to import the user's own audio sequences.

## Components of the test solution

Component	Description
R&S®DVSG	Digital video signal generator <b>Features:</b> <ul style="list-style-type: none"><li>Uncompressed moving sequences at high resolution and frame rates</li><li>Extensive signal library including EBU and VESA standards</li><li>WindowsXP system controller and reliable remote control in line with the VX11 and SCPI industry standards</li><li>Flexible audio generator for up to eight channels</li><li>1 Tbyte hard disk and import software for user-defined video/audio</li></ul> <b>Specifications</b> <ul style="list-style-type: none"><li>TV and VESA resolutions up to 1080p/WUXGA at 60 Hz</li><li>CCVS, RGB, YPbPr, VGA, S-Video, SCART, D4, SDI, HD-SDI, DVI, HDMI 1.3</li><li>Adjustable signal levels, EDID, HDCP, xvYCC</li></ul>
R&S®DVSG-K10	AV signal generator (including pattern library)
R&S®DVSG-B10	AV signal generator extension (hardware expansion and pattern library for outputting long moving sequences)
R&S®UPV	Audio analyzer
R&S®UPV-K4	Remote control option

### See also:

<http://www2.rohde-schwarz.com/product/DVSG.html>

<http://www2.rohde-schwarz.com/product/UPV.html>

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