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R&S® DVG MPEG-2 Measurement Generator

Digital TV test signals at a keystroke

The R&S® DVG is a universal generator for digital TV signals. It generates in an endless loop a large variety of selectable MPEG-2 transport streams, whose contents are made up of combined video, audio and data sequences.

The R&S® DVG is an essential tool in all fields of MPEG-2, ATSC and DVB measurements, whether in development, production or service.

- ◆ Large choice of test signals and live sequences in line with ATSC and DVB standards
- ◆ Compact and easy to operate
- ◆ Generation of endless MPEG-2 sequences due to realtime updating of all time stamps (PCR, PTS and DTS)
- ◆ External synchronization

**ROHDE & SCHWARZ**



At a glance

The R&S® DVG MPEG-2 measurement generator is a signal source for MPEG-2 transport streams. The structure of the transport streams and the data reduction methods employed were developed and standardized by the Motion Picture Experts Group (MPEG) and the DVB (Digital Video Broadcasting) and the ATSC (Advanced Television Systems Committee) project. An essential feature of an MPEG-2 transport stream is that it contains several programs, each consisting of several elementary streams (video, audio and data signals). Programs are not only combined at the RF, but multiplexing of programs and signals is also performed in the baseband.

The R&S® DVG generates such a multiplex signal and is thus a cost-effective and compact alternative to an expensive MPEG-2 encoder with a multiplexer and external standard generators. It can be used for testing and commissioning MPEG-2 transmission links, as well as a substitute signal source in the event of a program failure, and for aligning and testing decoders and TV sets. The R&S® DVG takes the test signals from its RAM and can thus play them back any number of times wearfree, which makes the generator an ideal choice for applications where continuous operation is required. In short, the R&S® DVG is a practical signal source that is available whenever and wherever you need it to handle MPEG-2 signals.

Characteristics

- ◆ Endless MPEG-2 sequence length: all the required time information is continuously updated during playback of the transport stream. This means that the signal is always available without any interruption.
- ◆ The output data rate can be varied as desired and thus adapted to the characteristics of the transmission link or the device under test.
- ◆ The PIDs of the individual program elements can be set by the user, which makes the R&S® DVG ideal for use as a substitute signal source.
- ◆ A built-in PCR (program clock reference) jitter generator enables stress tests on decoder PLLs.

Via a clock input, the parallel generator output of the R&S® DVG can be externally synchronized, e.g. by a modulator supplying a master clock.

The optional R&S® DV-ASC Advanced Stream Combiner® software allows the user to create new transport streams, in addition to the stored ones, from supplied or customer-specific elementary streams (ES). Moreover, the software enables full remote control of the R&S® DVG. Communication and data exchange are via the instrument's serial and parallel interfaces. (Detailed information can be found in the R&S® DV-ASC Advanced Stream Combiner® data sheet, PD 5213.7654.32.)

A PCMCIA interface on the front of the instrument allows small exchangeable hard disks to be inserted, for example. In this way, even comprehensive, user-defined transport streams in the Rohde & Schwarz proprietary GTS format can easily be exchanged between various generators.

Applications

The digital data streams supplied by the R&S® DVG are used as test signals for a variety of equipment employed as part of digital TV transmission links – from the studio to the domestic receiver. This equipment includes modulators, remultiplexers and decoders. One field of application of the R&S® DVG, therefore, is in the development, production, quality control and service of equipment handling MPEG-2-coded signals.

Further applications are in the field of signal distribution and transmission (e.g. cable headends), where the generator can be used as a substitute signal source.

Operation

Stored signal sequences can be selected directly on the instrument via the front-panel keypad and a built-in two-line LCD. More detailed information on the selected transport stream can be output on an external VGA monitor or a printer.

Remote control

The instrument can be fully remote-controlled via one of the two built-in RS-232-C interfaces.

Test signals

The R&S® DVG offers a multitude of MPEG-2 transport streams, which can be called at a keystroke. The transport streams are made up of several elementary streams and contain video, audio and other data (e.g. teletext).

Video data streams of different contents and data rates are available. The stored signal set includes moving picture sequences as well as stationary test patterns. For rapid testing of set-top boxes, i.e. integrated receiver decoders (IRD), the R&S® DVG provides the Rohde & Schwarz codec test pattern. Integrated test signals in the upper

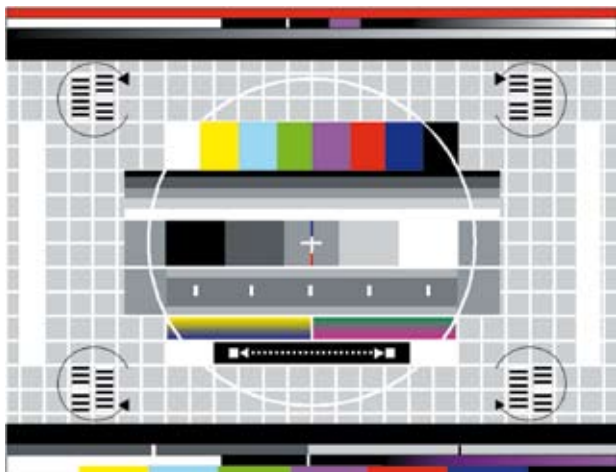
and lower picture areas enable the DUT's analog interfaces to be tested within a few seconds, using a suitable video analyzer such as the R&S® VSA. In addition, moving elements at the corners and in the center of the picture allow visual checking of the decoder functions.

Audio data streams, which are also available at different data rates, carry the sound component accompanying the video sequences as well as special audio test signals.

The transport streams include of course all program information and system tables as stipulated by the ATSC or DVB standard. The "Stream Libraries" data sheet (PD 5213.7202.32) offers a detailed overview of supplied and additionally available transport streams.



Generation of application-specific transport streams with the optional R&S® DV-ASC Advanced Stream Combiner® PC software



*Rohde & Schwarz
codec test pattern*

Specifications

Output signals	transport stream in line with ISO/IEC 1-13818
Data rate (incl. null packets)	0.6 Mbit/s to 160 Mbit/s (settable in 1 Hz steps)
Data rate for video/audio contents	up to 18 Mbit/s
Data quantity for video/audio contents	up to 228 Mbit
MPEG-2 sequence length	endless loop
Length of transport stream packets	ATSC: 188/208 byte (settable) DVB: 188/204 byte (settable)
Length of video/audio sequence	ATSC: typ. 960 video frames (32.032 s) DVB: typ. 192 video frames (7.68 s)
Stored signal set for transport streams	transport stream files in Rohde & Schwarz proprietary GTS format are played back exclusively
R&S® DVG base unit	moving picture sequences, test patterns and test tones (see "Stream Libraries" data sheet, PD 5213.7202.32)
Options	R&S® DV-HDTV, R&S® DV-TCM (see "Stream Libraries" data sheet, PD 5213.7202.32)
Customized	signals generated with R&S® DV-ASC in Rohde & Schwarz proprietary GTS format (see R&S® DV-ASC Advanced Stream Combiner® data sheet, PD 5213.7654.32)
Error of data rate	±3 ppm (calibration interval: 1 year), without calibration: additional error of ±0.5 ppm per year
Data jitter	typ. <0.05 UI _{pp} (10 Hz to 100 kHz)
Asynchronous serial interface (ASI) outputs	typ. <0.1 UI _{pp} (10 Hz to 8 MHz)
Synchronous parallel output	typ. <0.02 UI _{pp} (10 Hz to 200 kHz)
Signal outputs	
MPEG-2 transport stream synchronous parallel (SPI), LVDS (in line with DVB-A010)	25-pin female connector on front panel, 410 mV (V _{pp}), 1.25 V DC, 100 Ω
MPEG-2 transport stream synchronous parallel (SPI), RS-422	25-pin female connector on rear panel, 0 V (Lo) to 4 V (Hi) with external clock input
MPEG-2 transport stream asynchronous serial (ASI), 270 Mbit/s (in line with DVB-A010)	BNC connector (on front and rear panel), 800 mV (V _{pp}), 75 Ω

MPEG-2 transport stream synchronous serial (SSI), 19.392658 Mbit/s (in line with SMPTE 310-11)	BNC connector (on front and rear panel), replaces MPEG-2 transport stream asynchronous serial (ASI) on rear panel (requires R&S® DV-B310 option)
Interfaces of integrated PC	1 connector for PC keyboard, 1 connector for VGA monitor, 2 serial RS-232-C interfaces, 1 parallel printer interface, 1 type I/II PCMCIA interface
Control and display elements	6 control keys and two-line LCD on front panel, optionally external VGA monitor and printer for outputting detailed signal information, remote control via RS-232-C interface
Special features	PIDs of elementary streams in instrument can be user-defined; PCR jitter settable from 0 ms to 10 ms in steps of 0.1 μs
General data	
Operating temperature range	+5 °C to +40 °C (specifications complied with)
Permissible temperature range	0 °C to +50 °C
Storage temperature range	-40 °C to +70 °C
Mechanical resistance	
Sinusoidal vibration	5 Hz to 150 Hz, max. 2 g at 55 Hz, 0.5 g from 55 Hz to 150 Hz, in line with IEC 68-2-6, IEC 1010-1, MIL-T-28800 D class 5
Random vibration	10 Hz to 300 Hz, at 1.2 g _{rms}
Shock	40 g shock spectrum, in line with MIL-STD-810 D and MIL-T-28800 D classes 3 and 5
Environmental specifications	+25 °C/+40 °C cyclically at 95 % relative humidity, in line with IEC 68-2-30
Electromagnetic compatibility	in line with EN 50081-1 and EN 50082-2 (European EMC directive)
Power supply	100 V to 240 V, 50 Hz to to 60 Hz
Power consumption	50 VA
Electrical safety	in line with EN 61010-1
Dimensions (W × H × D)	434 mm × 43 mm × 460 mm (17.09 in × 1.69 in × 18.11 in)
Weight	5 kg (11.02 lb)



Ordering information

Order designation	Type	Order No.
MPEG-2 Measurement Generator	R&S® DVG	2068.8600.03
Accessories supplied: power cable, operating manual, null modem cable		
Options		
SMPTE 310 Interface	R&S® DV-B310	2085.7543.02
HDTV Sequences	R&S® DV-HDTV	2085.7650.02
Test Card M Sequences	R&S® DV-TCM	2085.7708.02
Advanced Stream Combiner® software with hardware dongle for parallel printer interface	R&S® DV-ASC	2085.8804.02
Advanced Stream Combiner® software with hardware dongle for USB interface	R&S® DV-ASC	2085.8804.03
Documentation of Calibration Values	R&S® DVG-DCV	2082.0490.14
Recommended extras		
19" Adapter (1 HU)	R&S® ZZA-91	0396.4870.00
Service manual		2069.0354.24



More information at
www.rohde-schwarz.com
(search term: DVG)



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