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**ATSC + DVB**



## MPEG2 Measurement Generator DVG

### Digital TV test signals at a keystroke

DVG is a universal generator for digital TV signals in line with the MPEG2 standard. It generates in an endless loop a large variety of selectable MPEG2 transport streams, whose contents are made up of combined video, audio and data sequences.

DVG is an essential tool in all fields of MPEG2 and DVB measurements, whether in development, production or service.

- Large choice of test signals to ATSC and DVB standards with 525 or 625 lines
- Compact and easy to operate
- Endless MPEG2 sequence length thanks to realtime updating of all time stamps (PCR, PTS and DTS)

- External synchronization
- Extralong underwater sequences (24 s) for repetition of audio and video contents without discontinuities at frame rates of 25 Hz (625 lines) and 29.97 Hz (525 lines)

**NEW**



**ROHDE & SCHWARZ**

MPEG2 Measurement Generator DVG is a signal source for MPEG2 transport streams. The structure of these streams and the data reduction methods employed were developed and standardized by the Motion Picture Experts Group (MPEG) and the DVB (Digital Video Broadcasting) respectively the ATSC (Advanced Television System Committee) project. A main feature of the transport stream is that it contains several programs, each consisting of several substreams (video, audio and data signals). With MPEG2, programs are no longer combined in the RF range after the modulator, as is the case with conventional TV techniques, but produced at the baseband in the form of a program and signal multiplex.

DVG generates these multiplex signals, and is a favourably priced and compact alternative to expensive MPEG2 encoders with multiplexer and external standard generators. It is ideal for testing and commissioning MPEG2 transmission links and may be used as a substitution signal source in the case of program failures or for adjusting and testing decoders and TV sets. Since the test signals are taken from a RAM and can be played back time and time again without any "wear and tear", the generator is tailor-made for applications where continuous operation is required. These features make the DVG a practical, high-availability signal source wherever MPEG2 signals are dealt with.

With the optional Stream Combiner™ software the user can configure new elementary streams (ES) in addition to stored transport streams by combining supplied or customer-specific streams. Moreover, this software can be used for remote-controlling the DVG. Communication and data exchange are performed via the serial and parallel interface of the unit.

A PCMCIA interface on the front of the unit allows for instance small exchangeable hard disks to be plugged in. In this way comprehensive, user-defined transport streams can easily be exchanged between various generators.

## Applications

The digital data streams generated by DVG are used as test signals for a variety of equipment employed on dig-



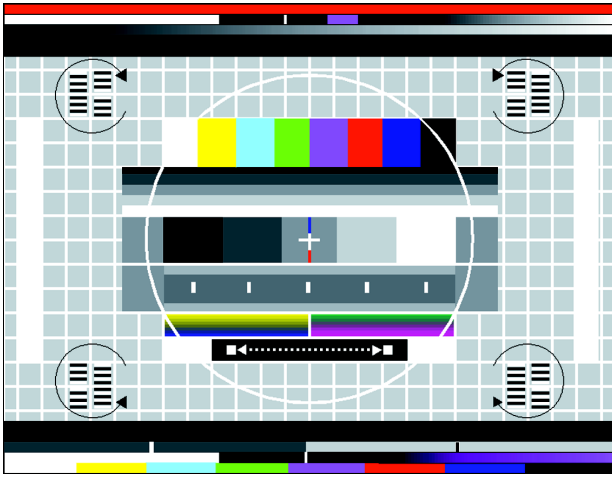
## Characteristics

- Endless MPEG2 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 specifications of the transmission link or device under test.

- Thanks to the settable PID of the program elements the DVG is ideal for use as a substitution signal source.
- A built-in PCR (program clock reference) jitter generator is available for stress testing of decoder PLLs.

The clock input enables external synchronization of the parallel generator output, eg from a modulator with master clock.

ital TV transmission links – from the studio to the domestic receiver. This equipment includes modulators, remultiplexers and decoders. One field of application of DVG therefore is in the development, production, quality management and servicing of equipment processing MPEG2-coded signals. Further applications are in the field of signal distribution and transmission (eg cable headends), where the generator can be used as a substitution signal source.



Rohde & Schwarz  
codec test pattern

set comprises moving picture sequences as well as stationary test patterns. For fast testing of set-top boxes, ie integrated receiver decoders (IRD), DVG provides the Rohde & Schwarz codec test pattern (see left). Thanks to integrated test signals in the upper and lower picture area and using a suitable video analyzer such as VSA, analog interfaces can be tested within a few seconds. 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, comprise the sound component accompanying the video sequences as well as special audio test signals.

### Operation

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

### Test signals

DVG offers a variety of different predefined MPEG2 transport streams which can be called at a keystroke. The transport streams are made up of several packetized elementary streams and include video, audio and other data (eg teletext). Video data streams of different contents and data rates are available. The stored signal

The transport streams include of course all program information and system tables specified by the ATSC respectively the DVB project.

### Remote control

The unit can be fully remote-controlled via one of the two built-in RS232 interfaces.

### Measurement decoder

Complementary to Generator DVG, Rohde & Schwarz offers MPEG2 Measurement Decoder DVMD (data sheet PD 757.2744), which is used for real-time monitoring, analyzing and decoding of MPEG2 transport streams.



Application-specific transport stream generation with optional PC software Stream Combiner™ DVG-B1

## Choice of available test signals

Moving pictures for general video and audio function test			525	625
Video contents	Audio contents	Video data rates		
Automatic insertion machine	Classical music	2 (only 525 lines) 3/4/6/9/15 Mbit/s	X	X
Flower garden	Classical music	2/4/6 Mbit/s	X	X
Table tennis	Applause	2/4/6 Mbit/s	X	X
Fork lift truck	Blgband music	2/3/4/6/9 (only 525 lines), 15 Mbit/s	X	X
Castle Neuschwanstein	Classical music	2 Mbit/s; 4/6 Mbit/s (only 625 lines)	X	X
Encoder test sequence DVTS	Classical music	2/4/6/9/15 Mbit/s		X
Underwater sequences (length 24 s)	Psychedelic sound	4 Mbit/s	X	X

Dynamic test signals			525	625
Video contents	Audio contents	Use		
Alternating all-black and all-white picture	L+R: 1-kHz/10 Hz sine only during all-white picture	Test of clamping circuits, delay measurements, delay between video and audio	X	X
Rohde&Schwarz CODEC test pattern (16:9)	L: sine burst 400 Hz R: sine burst 1 kHz, full scale, synchronized with moving picture elements	Test and alignment of D/A converters and analog components in the video paths of decoders Monitor geometry alignment	X	X
Monitor test pattern with moving elements		Test and alignment of D/A converters and analog components in the video paths of decoders Monitor geometry alignment	X	X
Rohde&Schwarz CODEC test pattern (4:3)		Amplitude frequency response + EBU line measurements	X	X
Monitor test pattern with moving elements	tone sequence acc. to CCITT O.33	Amplitude frequency response + EBU line measurements	X	X
Rohde&Schwarz CODEC test pattern (4:3)	L+R: sine burst 75 Hz, -12 dB	Frequency response, both horizontal and vertical	X	X

Static test signals			525	625
Video contents	Audio contents	Use		
Colour bars to ITU-R-801 (100/0/100/0)	L: sine burst 1 kHz, full scale R: silence	Test and alignment of phase and level ratios for MPEG2 decoders	X	X
Colour bars to ITU-R-801 (100/0/75/0)	L: silence R: sine burst 1 kHz, full scale	Test and alignment of phase and level ratios for MPEG2 decoders and PAL coders	X	X
CCIR17 test signal in frame	L+R: sine burst 1 kHz, -12 dB	Test and alignment of level, tilt, overshoot, rounding, pulse distortion, reflection, colour subcarrier amplitude and delay, luminance nonlinearity		X
CCIR331/1 test signal in frame				X
CCIR331/2 test signal in frame				X
NTC 7 composite signal (ITS1)	L+R: sine burst 1 kHz, -6 dB		X	
NTC 7 combined signal (ITS2)	L+R: sine burst 50 Hz, -6 dB		X	
FCC composite signal (ITS3)	L+R: sine burst 10 kHz, -6 dB		X	
Vertical interval reference signal (ITS4)	L+R: sine burst 17,5 kHz, -6 dB		X	
H-SWEEP test signal in frame	L+R: sine burst 50 Hz, -12 dB		X	X
CCIR18 test signal in frame	L+R: tone sequence 40 Hz to 15 kHz, -18 dB	Amplitude frequency response		X
Multiburst test signal in frame			X	
Ramps in RGB signal	L+R: sine burst 15 kHz, -12 dB	Test of RGB matrix	X	X
Ramps in all components in frame	L+R: sine burst 7.5 kHz, -12 dB	Missing codes and linearity of D/A converters	X	X
Sweep in RGB signal	L+R: sine burst 17,5 kHz, -12 dB	Test and alignment of RGB output stages	X	X
Sine x/x test signal in frame	L+R: sine burst 20 kHz, -12 dB	Amplitude frequency response, nonlinear distortion	X	X
All-white window	L+R: sine burst 10 kHz, -12 dB	Test of sweep voltage generation and black-level adjustment of monitors	X	X
All-blue window	L+R: 1 kHz, 32 ksamples/s, 44.1 ksamples/s, 48 ksamples/s, -6 dB	Test of audio decoder function	X	X

Special signals			525	625
Signals	Contents	Use		
DVMD test signal	Transport stream with DVB protocol errors	Test of DVB analyzers	X	X
Teletext	Data elementary stream with teletext test pages	Test of teletext transcoders	X	X
PRBS15/23	Data elementary stream with PRBS sequence	BER test	X	X

Transport streams with several programs			525	625
Number of programs	Contents			
2	See Rohde&Schwarz CODEC test pattern 4:3 and 16:9		X	X
3	See Encoder test sequence DVTS, 6/4/2 Mbit/s			X
3	See Flower garden/table tennis, 6/4/2 Mbit/s		X	X
3	See Castle Neuschwanstein, 6/4/2 Mbit/s			X
3/4	See Automatic insertion machine, 6/4/3 Mbit/s, 2 Mbit/s (only 525 lines)		X	X
4	See Fork lift truck, 6/4/3/2 Mbit/s		X	X
6	Various test signals (frame) and audio measurement signals		X	X

All signals listed above are available in 525- and/or 625-line standard (see table above).

## Specifications

<b>Output signals</b>	transport stream to 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 24 Mbit/s
Data quantity of video/audio contents	up to 228 Mbit
MPEG2 sequence length	endless loop
Length of transport stream packets	ATSC: 188/208 (settable) DVB: 188/204 (settable)
Video-/audio sequence length	ATSC: typ. 720 Videoframes (24,024 s) DVB: typ. 192 Videoframes (7,68 s), depending on data rate for video/audio contents
Stored signals	various transport streams, moving picture sequences, test patterns and test tones (see Table)
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 U <sub>pp</sub> (10 Hz to 100 kHz)
Asynchronous serial interface/ASI outputs	typ. <0.1 U <sub>pp</sub> (10 Hz to 8 MHz)
Synchronous parallel output	typ. <0.02 U <sub>pp</sub> (10 Hz to 200 kHz)
<b>Signal outputs</b>	
Synchronous parallel MPEG2 data stream, LVDS (to DVB-A010)	25-pin connector on front panel, 410 mV(V <sub>pp</sub> ), 1.25 V DC, 100 Ω
Synchronous parallel MPEG2 data stream (SPI), RS 422	25-pin connector on rear panel, 0 V (lo) to 4 V (hi) with external clock input
Asynchronous serial MPEG2 transport stream (ASI), 270 Mbit/s (to DVB-A010)	BNC (front and rear panel), 800 mV (V <sub>pp</sub> ), 75 Ω
Interfaces of integrated PC	1 connector for PC keyboard, 1 connector for VGA monitor, 2 serial RS232 interfaces, 1 parallel printer interface, 1 PCMCIA interface
<b>Controls and indicators</b>	6 front-panel keys and two-line LCD, optionally external VGA monitor and printer for calling up detailed signal information, remote control via RS232 interface
<b>Special features</b>	PID of elementary streams in instrument user-definable; PCR jitter settable in 0.1 μs steps from 0 ms to 10 ms

## General data

Rated temperature range	+5 °C to +40 °C (guaranteed specs)
Operating temperature range	0 °C to +50 °C
Storage temperature range	40 °C to +70 °C
Mechanical resistance	
Sine vibration	5 Hz to 150 Hz, max. 2 g at 55 Hz, max. 0.5 g in range 55 Hz to 150 Hz, complies with IEC 68-2-6, IEC 1010-1 and MIL-T-28800D class 5
Random vibration	10 Hz to 300 Hz, acceleration 1.2 g (rms)
Shock	40 g shock spectrum, complies with MIL-STD-810D and MIL-T-28800D class 3 and 5
Climatic conditions	+25 °C/+40 °C cyclically at 95% rel. humidity, complies with IEC 68-2-30
Electromagnetic compatibility	complies with EN 50081-1 and EN 50082-2 (EMC directive of EU)
Power supply	88 V to 264 V, 47 V to 63 Hz
Power consumption	50 W
Electrical safety	according to EN 61010-1
Dimensions (W x H x D)	434 mm x 43 mm x 460 mm
Weight	5 kg

## Ordering information

<b>MPEG2 Measurement Generator</b>	DVG	2068.8600.03
Accessories supplied	power cable, operating manual, null modem cable	

## Options

Software Stream Combiner™ <sup>1)</sup>	DVG-B1	2068.9835.02
Calibration Data Documentation	DVG-DCV	2082.0490.14
Upgrade transport streams on CD-ROM with special parallel cable	DVG-Z1	2069.0419.00

## Recommended extras

19" Adapter (1 HU)	ZZA-91	0396.4870.00
Service Manual		2069.0354.24

<sup>1)</sup> see data sheet PD 757.3611



Rear view of DVG





Fax Reply (MPEG2 Measurement Generator DVG)

- Please send me an offer
- I would like a demo
- Please call me
- I would like to receive your free-of-charge CD-ROM catalogs
- I would like to receive your free-of-charge CD-ROM with demo of Stream Combiner™, Stream Explorer™ and Quality Explorer™

Others: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name: \_\_\_\_\_

Company/Department: \_\_\_\_\_

Position: \_\_\_\_\_

Address: \_\_\_\_\_  
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E-mail: \_\_\_\_\_



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