Version 01.00

July 2007

R&S®SFE Broadcast Tester

The compact signal generator for all digital and analog TV and audio broadcasting standards

- Broadcast multistandard platform
- Realtime signal generation for digital and analog transmission standards
- Wide frequency range with excellent signal quality
- Integrated transport stream player and video/audio generator
- Arbitrary waveform generator
- Ideal supplement to the high-end R&S®SFU broadcast test system
- Integrated noise generator and BER tester
- Compact cabinet with convenient graphical user interface

ROHDE&SCHWARZ

Front view of the R&S®SFE

The R&S®SFE is a multistandard capable broadcast signal generator that supports all common TV standards and a number of sound broadcasting standards. Whether analog or digital terrestrial TV, cable, satellite, and mobile TV, or digital sound broadcasting – all these signals can be modulated in realtime. For this purpose, the R&S®SFE combines a high-quality RF modulator, a universal realtime coder, and baseband signal sources in one instrument.

Owing to its modular concept, the R&S®SFE can be optimally adapted to the requirements at hand – for example, with an integrated noise generator or a BER tester. And also after purchase the R&S®SFE can be quickly and easily expanded to include new modulation modes by installing software options.

The versatile baseband signal sources for digital TV standards allow the generation of test signals from Rohde&Schwarz libraries as well as the replay of proprietary transport streams. For analog TV, the R&S®SFE offers an integrated video/audio test signal generator. Alternatively, the user can feed transport streams as well as analog A/V signals from external baseband generators. Irrespective of the realtime coders used, it is possible to generate user-defined modulation signals by means of an optional arbitrary waveform generator and to replay waveform files of the customer.

Although the R&S®SFE has a compact design and does not require much space, it offers the same convenient graphical user interface as the high-end R&S®SFU as well as extensive remote control functions.

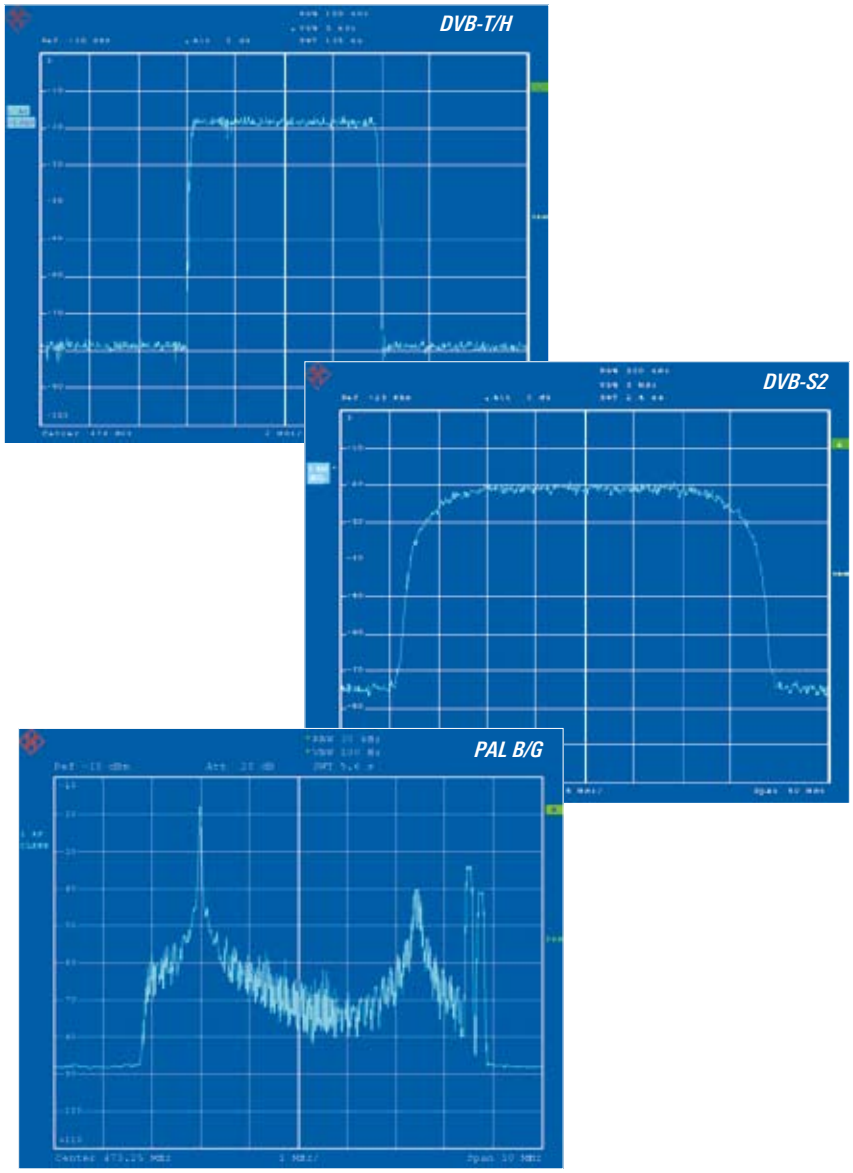
Applications

The multistandard capability and the flexible option concept make the R&S®SFE an extremely versatile instrument for many lab applications. However, due to its excellent price/performance ratio, the R&S®SFE is also ideally suited for service and quality assurance applications. In addition, the optional ARB generator in combination with the compact design make the R&S®SFE a cost-efficient solution for production applications.

Features

Broadcast multistandard platform

The R&S®SFE broadcast tester is a multistandard instrument that supports all common broadcasting standards. Whether analog or digital, terrestrial, satellite or cable, mobile TV or digital sound broadcasting – all these standards can be generated by using only one instrument. Switching over between different standards is quick and easy – a press of a button is enough. Additional and future standards can be added as software update at any time. Up to three standards can be installed simultaneously.



- Digital terrestrial TV standards
  - *DVB-T*
    The success of the European terrestrial standard DVB-T is continuing. More and more countries, also outside Europe, are switching from analog to digital TV and relying on the DVB-T technology, which has now been tried and tested many times and allows high-quality transmission of digital broadcasting signals.
  - *ISDB-T*
    ISDB-T is a Japanese standard for the digital terrestrial transmission of video, audio, and data signals by means of 13 segments. ISDB-T with partial reception is for mobile TV reception.
  - *8VSB/ATSC*
    8VSB is a terrestrial DTV standard from the USA with vestigial sideband modulation. At a bandwidth of 6 MHz, a sideband is partially suppressed in the spectrum.
  - *DTMB (GB20600-2006)*
    GB20600-2006 is the official Chinese standard for digital terrestrial TV. It combines the two former competing proposed standards DMB-T (multicarrier method) and ADTB-T (single-carrier method).

- Cable TV standards
  - *DVB-C*
    The R&S®SFE supports all QAM modulation modes defined in the EN 300429 standard. Its powerful hardware is also able to cover high-order QAM modulations that have not yet been standardized.
  - *J.83/B*
    J.83/B is an American cable transmission standard. The R&S®SFE also supports the enhanced J.83/B standard with 1024QAM.

- Mobile TV standards
  - *DVB-H*
    In the R&S®SFE, DVB-H and DVB-T have been implemented in one coder. This coder supports the following specific DVB-H functions: the newly introduced 4k mode, use of the TPS carriers for time slicing signaling, the additional 5 MHz channel bandwidth and required symbol interleavers with native and in-depth interleaving, as well as MPE forward error correction (FEC). Hierarchical coding is also possible.

– *T-DMB*
T-DMB was developed in Korea and is based on the digital audio broadcasting (DAB) standard already introduced in Europe for mobile sound broadcasting reception. The T-DMB/DAB coder in the R&S®SFE supports both the Korean and the European transmission standards.

– *MediaFLO™*
MediaFLO™ is a proprietary transmission method that was developed by the American company QUALCOMM and is currently used in a nationwide network in the USA. MediaFLO™ is an OFDM method for channel bandwidths of 5 MHz and 6 MHz which uses QPSK and 16QAM for subcarrier modulation. The data rates transmitted to the mobile receiver range between 50 kbit/s and 1 Mbit/s.

– *ISDB-T 1-segment (partial reception)*
With mobile ISDB-T in accordance with ARIB B31 1.5, only one of altogether 13 available segments is used for transmission. The remaining 12 segments can transmit TV programs for stationary reception.

– *DMB-TH*
DMB-TH is a proprietary standard that has evolved from the Chinese DMB-T system. It is also suitable for mobile reception. In the meantime, DMB-T has been integrated into DTMB (GB20600-2006), the new Chinese standard for terrestrial TV.

◆ Standards for satellite TV

– *DVB-S, DVB-S/DSNG*
DVB-S (EN 300421/EN 301210) was introduced in 1994 as a satellite transmission standard. DVB-S uses QPSK modulation. It has established itself as the world's most widely used satellite transmission standard. DVB-S/DSNG also uses 8PSK and 16QAM.

– *DVB-S2*
DVB-S2 employs an innovative and efficient channel coding method that in addition to QPSK and 8PSK is also used with the high-order 16APSK and 32APSK modulation modes. The method is very robust, offers safe reception and provides up to 30 % higher data transmission rates than DVB-S. The R&S®SFE supports the non-backward-compatible broadcast services (BS-NBCBS).

– *DirecTV*
DirecTV (also DirecTV legacy mode) is a proprietary standard with encryption that is widely used in America. Transmission is performed via a special transport stream protocol with 130-byte packets. After conversion to 188 bytes, DirecTV transport streams can be replayed with the R&S®SFE baseband generator.

◆ Analog TV standards
The B/G, D/K, M/N, L, and I analog standards with the PAL, NTSC, and SECAM color transmission systems are also supported. A video/audio generator for the baseband signal can be integrated, thus eliminating the need for an additional signal generator.

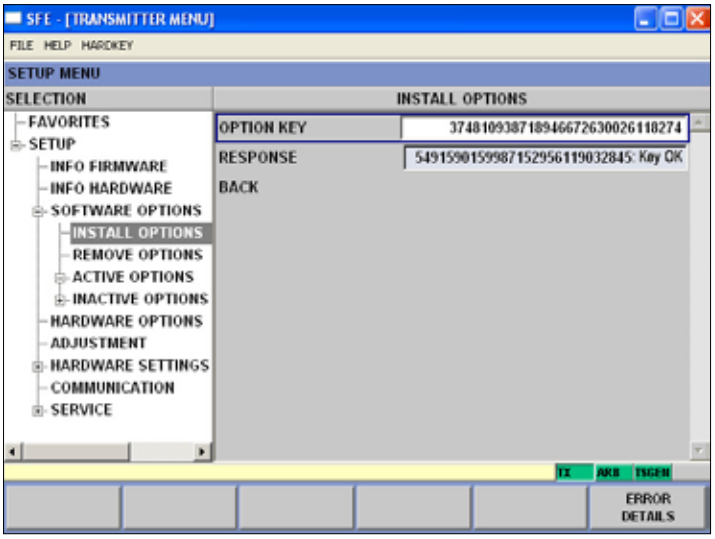
◆ Sound broadcasting standards

– *DAB*
Based on a COFDM transmission method, DAB was developed for digital and high-quality audio transmission to mobile receivers.

– *DRM (ARB waveform)*
DRM is a COFDM method for digital transmission of sound broadcasting programs via shortwave.

– *ISDB-Tsb*
ISDB-Tsb (sound broadcasting) is an expansion of the Japanese ISDB-T digital TV standard for transmitting sound broadcasting programs.

◆ Open for future standards
New transmission standards are provided from Rohde & Schwarz as software updates. These updates can be installed on the R&S®SFE and enabled by keycode at any time. The R&S®SFE can thus always be used for the latest standards.

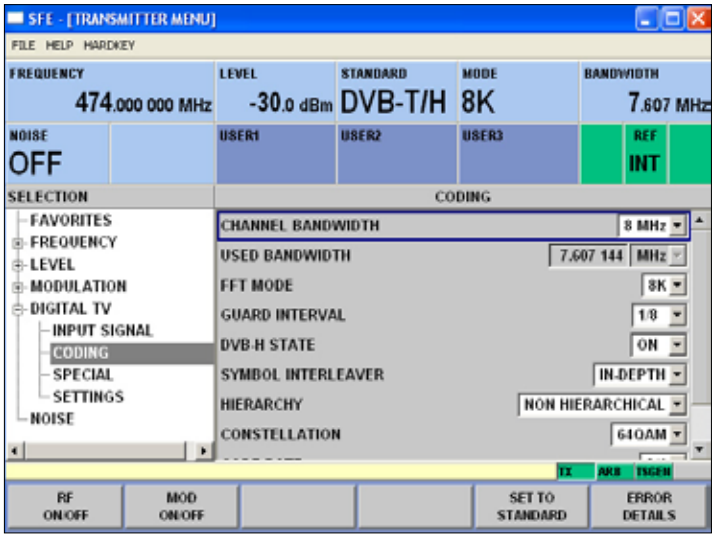


Key code entry for new options

Realtime signal generation for digital and analog transmission standards

The generation of modulated signals for various transmission standards in real-time is the key function of the R&S®SFE broadcast tester. For this purpose, the R&S®SFE uses a universal coder that in a similar form has already proven itself in the high-end R&S®SFU broadcast test system.

- Universal coder for realtime signal generation
  The R&S®SFE has a powerful universal hardware platform for baseband signal processing. This platform provides the I and Q bit streams for the broadband vector modulator. Switching over between the different transmission standards is performed by reloading the firmware. Thus, a highly accurate spectrum is produced for all modulation modes.
- Settable modulation parameters
  Depending on the selected transmission standard, different modulation parameters such as constellation, code rate, and FFT mode must be defined. These parameters can be varied irrespective of the transport stream or A/V signal to be transmitted. All conceivable versions of a standard can thus be tested. The required signaling information for the receiver is automatically adapted by the realtime coder.
- Additional modulation modes as software options
  The various modulation modes for the realtime coder of the R&S®SFE have been completely implemented as firmware. This allows you to quickly and easily add further transmission standards. Many standards have already been preinstalled and can be enabled by entering a keycode.

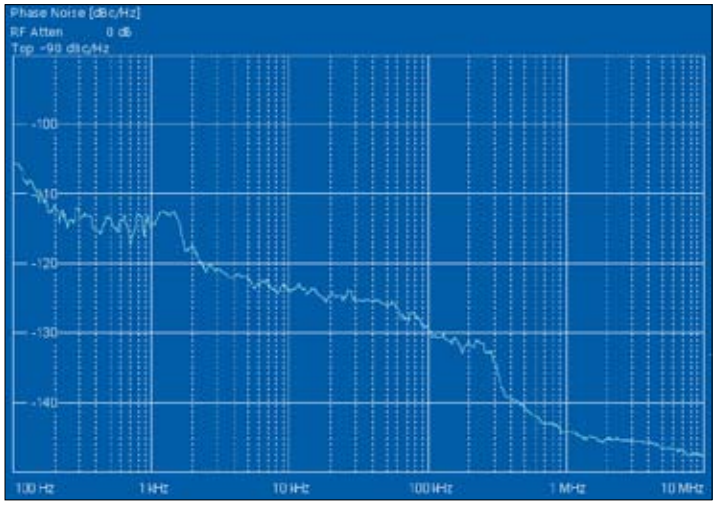


DVB-H coding menu

Wide frequency range with excellent signal quality

From IF, VHF and UHF up to the L band – the R&S®SFE covers the entire frequency range that is relevant for broadcasting applications. Despite its favorable price, the R&S®SFE makes no compromise when it comes to signal quality.

- Frequency range 100 kHz to 2.5 GHz
  The frequency can be set in 1 Hz steps. Either the center frequency or the channel number is entered, which is especially useful in analog TV.
- Signal level –100 dBm to +15 dBm
  The signal level can be set in 0.1 dB steps. The wear-free electronic attenuator permits a virtually unlimited number of switching cycles with excellent reproducibility. This is a significant advantage, especially in production applications.
- SSB phase noise at 300 MHz
  typ. <–115 dBc at 20 kHz
  Advanced COFDM modulation methods place high requirements on the stability and spectral purity of the oscillator signal. In this respect, the RF synthesizer of the R&S®SFE sets new standards in its class. The R&S®SFE excels not only in terms of its low SSB phase noise but also due to its low broadband noise and good harmonic suppression.



Typical phase noise at 300 MHz

Integrated transport stream player and video/audio generator

Digital transmission methods require video or audio transport streams as baseband signal, whereas the ATV modulator requires an analog CCVS signal. With its optional integrated transport stream player and video/audio generator, the R&S®SFE can generate both. External baseband generators are thus no longer required. This significantly reduces the number of instruments, especially in complex production systems.

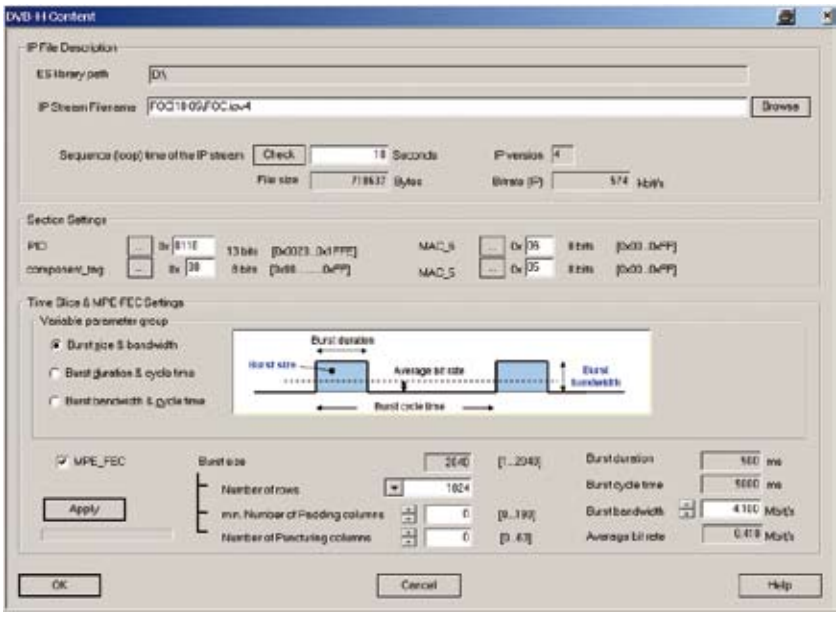
- TS generator (R&S®SFE-K20)
  An optional transport stream generator in the baseband internally provides test streams for the realtime coder and allows you to generate endless and seamless high-bit-rate MPEG-2 transport streams. An external MPEG-2 generator is thus no longer necessary. The SDTV transport stream library integrated as standard includes ATSC and DVB test streams. The numerous Rohde & Schwarz transport streams cover a wide variety of applications and test scenarios.
- Transport stream libraries
  A large number of additional libraries can be integrated. They make development faster and easier and allow new products to be tested.
  – SDTV – test streams for DVB and ATSC (included in the R&S®SFE-K20 option)
  – HDTV – tests of HDTV receivers
  – DVB-H – tests of mobile receivers
  – ISDB-T – test streams
  – H.264 – test streams
  – TCM – STB tests
  – The range of transport stream libraries is constantly being expanded.
- TRP player (R&S®SFE-K22)
  The optional TRP player ideally complements the TS generator and permits users to replay their own transport streams in TRP format. The transport streams can be copied via the USB or LAN interface to the R&S®SFE file system and be replayed from there. In addition, the TRP player is used to replay T-DMB and DAB ETI streams. For this purpose, the TRP player can replay predefined ETI test streams for T-DMB and DAB from an optional T-DMB/DAB library (R&S®SFU-K221).

	1	2	3	4	5
Name	DVBH-01	DVBH-02	DVBH-03	DVBH-04	DVBH-05
DVB-H content	video, CIF, H264 coded, 128 kbit/s, IPv6	video, CIF, H264 coded, 128 kbit/s, IPv6	video, CIF, H264 coded, 128 kbit/s, IPv6	video, CIF, H264 coded, 128 kbit/s, IPv6	video, CIF, H264 coded, 128 kbit/s, IPv6
PID (dec)	0x012F (303)	0x012F (303)	0x012F (303)	0x012F (303)	0x012F (303)
MAC address byte 6; byte 5	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05
MPE-FEC	yes	yes	yes	yes	yes
Burst bandwidth	3000 kbit/s	1500 kbit/s	1000 kbit/s	500 kbit/s	256 kbit/s
Constant bandwidth	250 kbit/s	250 kbit/s	250 kbit/s	250 kbit/s	250 kbit/s
Burst cycle time	7686 ms	7697 ms	7680 ms	7697 ms	7686 ms
Burst duration	641 ms	1291 ms	1922 ms	3844 ms	7508 ms
Receiver off-time	7057 ms	6416 ms	5776 ms	3853 ms	188 ms
Ratio of burst duration to burst cycle time	1:12	1:6	1:4	1:2	1:1
Burst size	1.816 kbit	1.816 kbit	1.816 kbit	1.816 kbit	1.816 kbit
Number of rows	1024	1024	1024	1024	1024
Number of padding columns	28	28	28	28	28
Puncturing columns	0	0	0	0	0
Broadcast content	video PID 0x100 (256) 4 Mbit/s; audio PID 0x120 (272) 0.384 Mbit/s				

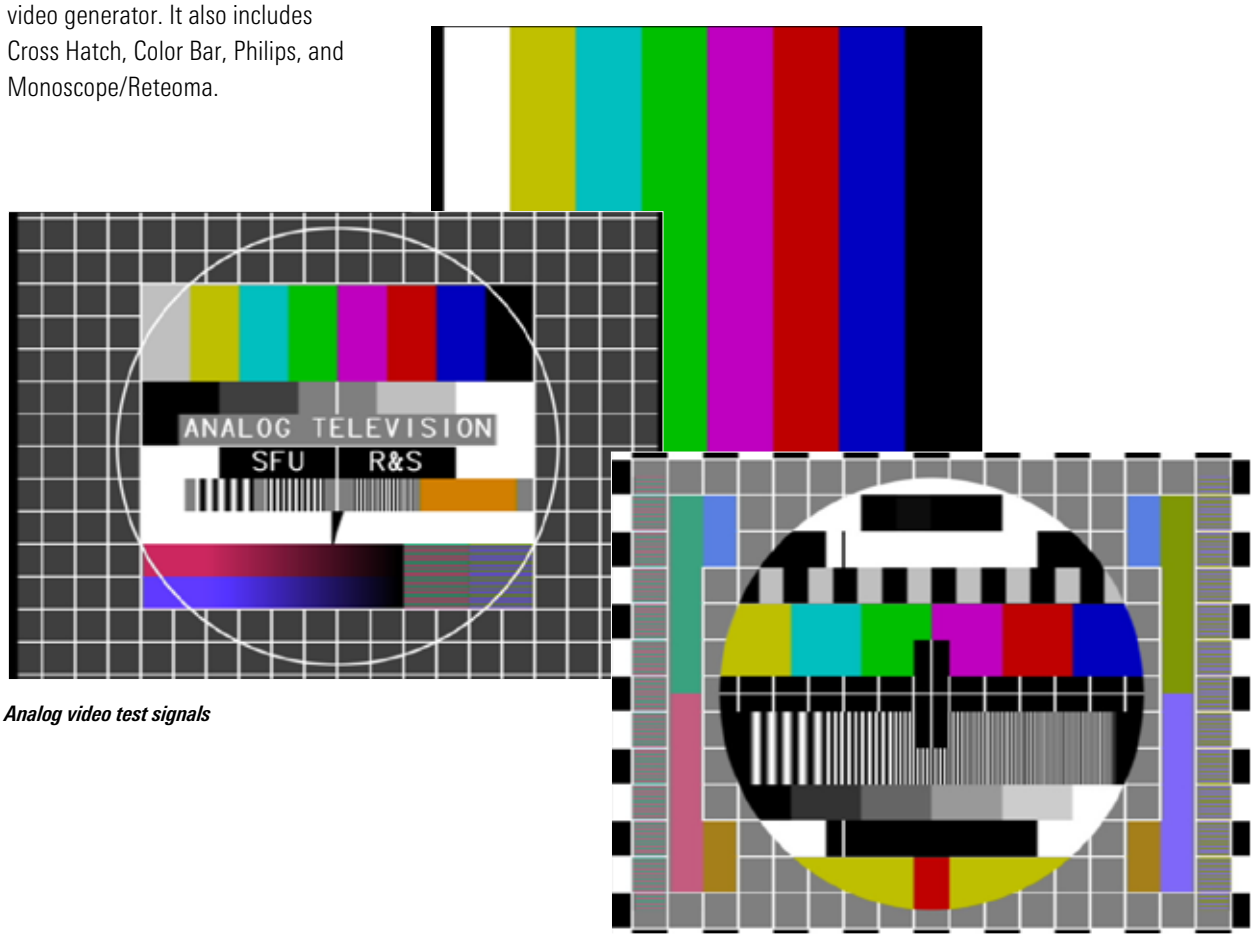
	6	7	8	9
Name	DVBH-06	DVBH-07	DVBH-08	DVBH-09
DVB-H content	video, CIF, H264 coded, 128 kbit/s, IPv6	video, CIF, H264 coded, 128 kbit/s, IPv6	video, CIF, H264 coded, 128 kbit/s, IPv6	video, CIF, H264 coded, 128 kbit/s, IPv6
PID (dec)	0x012F (303)	0x012F (303)	0x012F (303)	0x012F (303)
MAC address byte 6; byte 5	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05
MPE-FEC	yes	yes	yes	yes
Burst bandwidth	1500 kbit/s	1500 kbit/s	750 kbit/s	750 kbit/s
Constant bandwidth	250 kbit/s	250 kbit/s	250 kbit/s	250 kbit/s
Burst cycle time	1955 ms	3911 ms	1955 ms	3910 ms
Burst duration	329 ms	652 ms	658 ms	1303 ms
Receiver off-time	1626 ms	3259 ms	1297 ms	2607 ms
Ratio of burst duration to burst cycle time	1:6	1:6	1:3	1:3
Burst size	460 kbit	920 kbit	460 kbit	920 kbit
Number of rows	256	512	256	512
Number of padding columns	25	25	25	25
Puncturing columns	0	0	0	0
Broadcast content	video PID 0x100 (256) 4 Mbit/s; audio PID 0x120 (272) 0.384 Mbit/s		video PID 0x100 (256) 4 Mbit/s; audio PID 0x120 (272) 0.384 Mbit/s	

Example of a section of the DVB-H transport stream library

- Compatible with the advanced stream combiner from Rohde & Schwarz
  The R&S®DV-ASC advanced stream combiner provides full flexibility when generating your own streams, which can be used with the R&S®SFE-K20 TS generator. It allows you to generate your own transport streams, also for DVB-H.
- ATV video generator (R&S®SFE-K23)
  By means of the ATV video generator, test patterns and audio signals for analog TV can be generated. The ATV video generator includes FuBK and color bar test patterns for PAL, SECAM, and NTSC.
- ATV video library from Rohde & Schwarz
  The ATV video library provides a broad range of test patterns for analog TV that far exceeds the scope of the basic equipment of the ATV video generator. It also includes Cross Hatch, Color Bar, Philips, and Monoscope/Reteoma.



R&S®DV-ASC advanced stream combiner



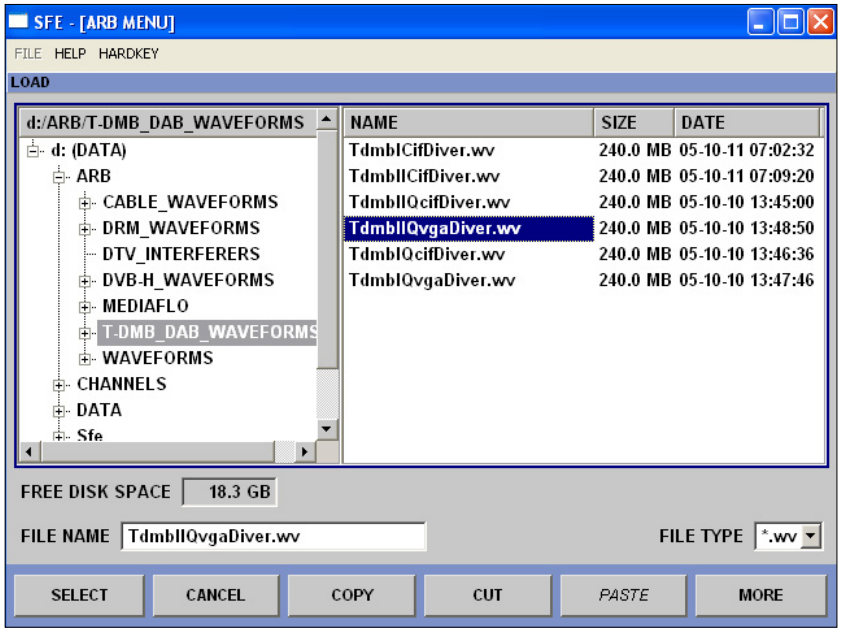
Analog video test signals

Arbitrary waveform generator (R&S®SFE-K35)

The optional integrated arbitrary waveform (ARB) generator of the R&S®SFE can replay proprietary I/Q waveforms as well as waveform libraries from Rohde&Schwarz for various transmission standards and thus opens up a wide range of additional applications. It is thus possible to generate any externally computed RF signals – from complex modulation signals to special interferers as, for example, notched noise. In particular, modulation signals can be generated irrespective of the realtime coders installed. Externally generated I/Q waveform files can be loaded into the R&S®SFE via one of the computer interfaces (USB or LAN) and read out from the internal memory.

- At least 128 Msamples memory space
  A hardware resampler and the resulting large sequence length reduce the memory space needed to store I/Q waveforms on the hard disk. This allows you to store a large number of I/Q waveforms directly on the hard disk.
- Sample rate up to 100 Msamples/s
  Due to its high sample rate, the ARB generator can generate signals with a baseband bandwidth up to 30 MHz.
- Compatible with R&S®WinIQSim™
  The R&S®SFE allows the use of the R&S®WinIQSIM™ simulation software. Waveforms generated with R&S®WinIQSim™ can be loaded into the ARB generator of the R&S®SFE and be replayed.
- Waveform libraries from Rohde&Schwarz
  Additional waveform libraries allow quick evaluation of new modulation modes. I/Q waveform libraries are available for the following signals: T-DMB/DAB (R&S®SFU-K351), DVB-H (R&S®SFU-K352), DRM (R&S®SFU-K353), and MediaFLO™ (R&S®SFU-K355). The range of waveform libraries is constantly being expanded.

Generation of ARB waveforms with R&S®WinIQSim™

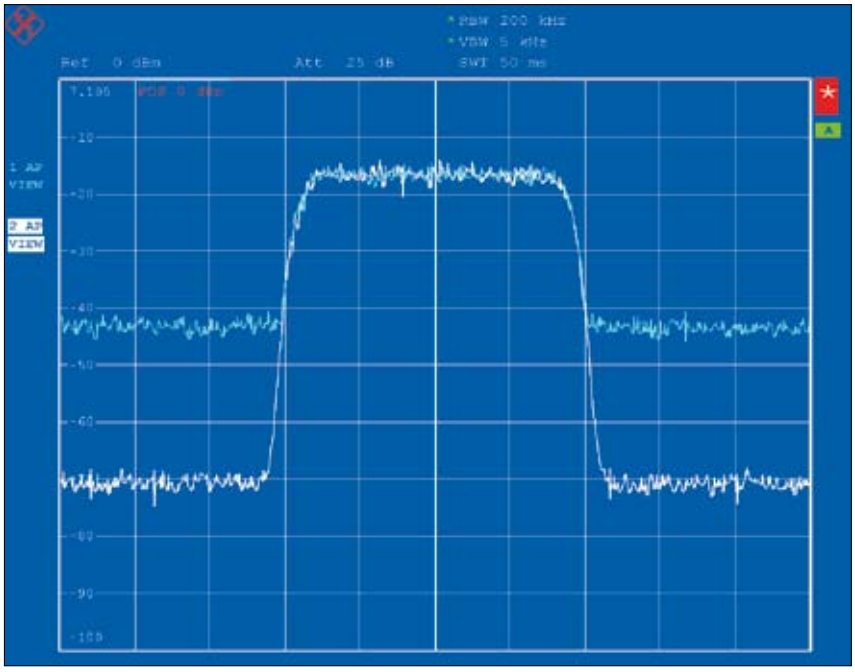


Selection of waveforms in the ARB generator

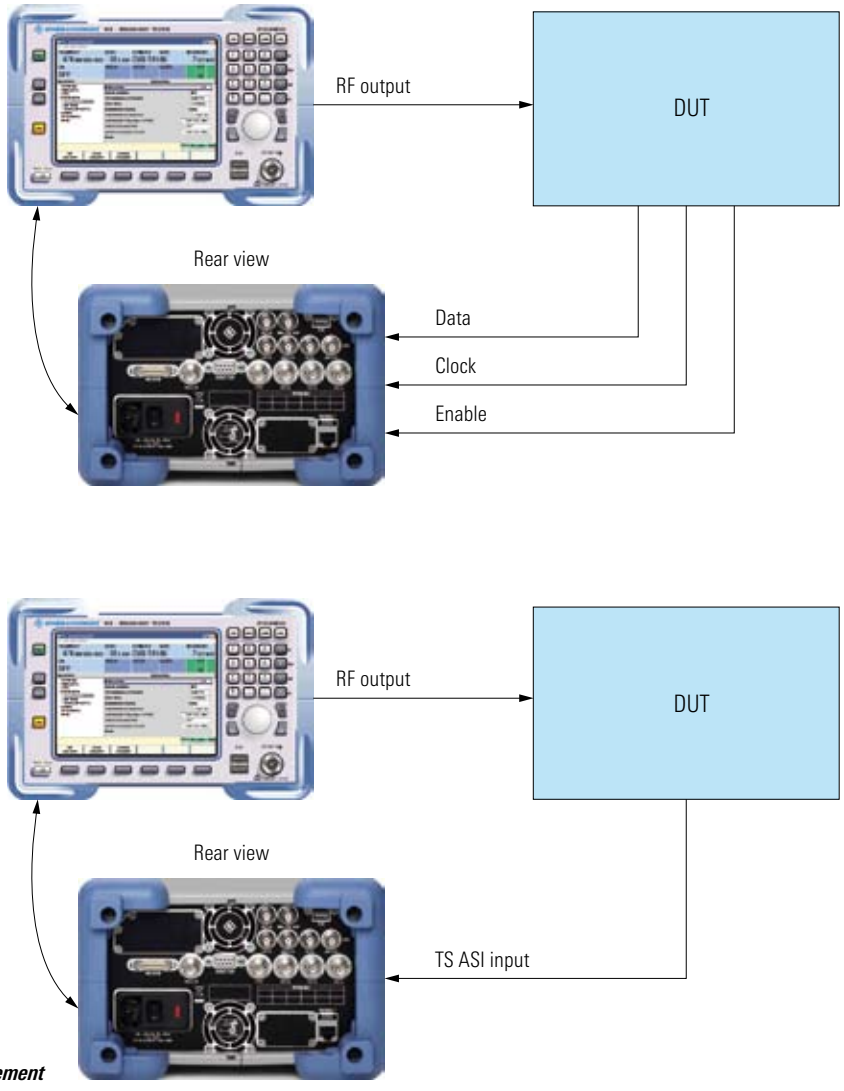
Integrated noise generator and BER tester

In addition to generating signals, the R&S®SFE offers a number of additional functions for special measurements and for simulating interference in real transmission channels.

- Broadband AWGN generator (R&S®SFE-K40)
  The optional digital additive white Gaussian noise (AWGN) generator is used as a source for generating a pure noise signal modulated onto the carrier and for influencing the actual useful signal. Realistic noise in the transmission path – via satellite, cable, or antenna – can be simulated by generating a 96 MHz AWGN signal with Gaussian amplitude distribution and settable S/N ratio in the digital baseband processing unit of the R&S®SFE.
- BER measurement at transport stream or bit level (R&S®SFE-K60)
  The optional BER measurement is used to check the transmission quality in the channel and the reception quality in the device under test (DUT). For this purpose, the R&S®SFE generates a baseband signal with a pseudo random binary sequence (PRBS) as useful data. Either the bit stream received from the DUT or the decoded transport stream can be looped back to the R&S®SFE. The R&S®SFE uses this information to determine the bit error ratio by comparing the sent and received data.



Useful signal with AWGN

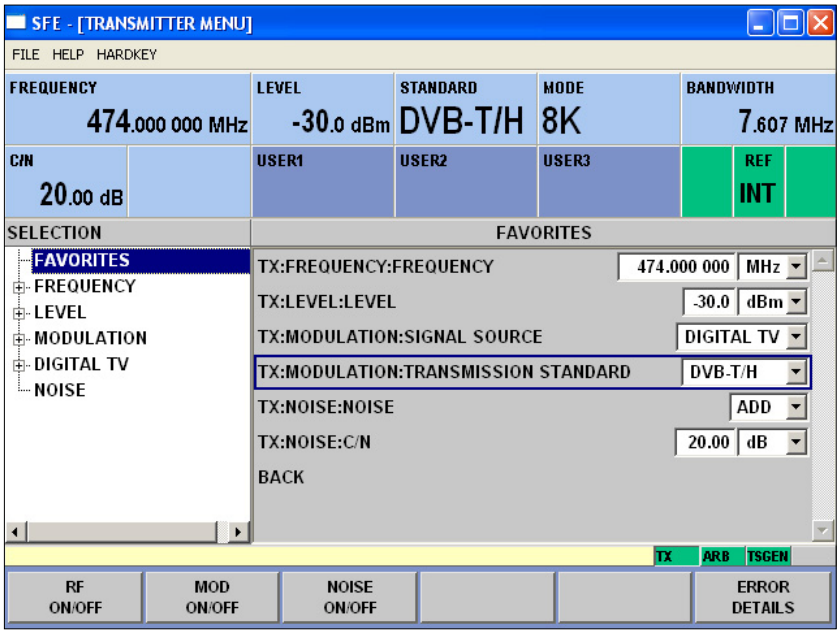


Block diagram of the BER measurement

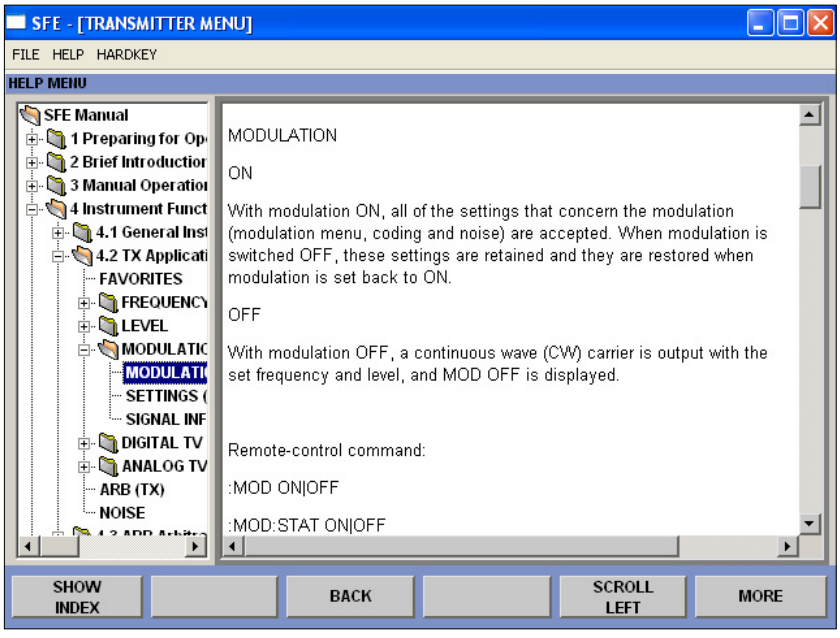
Compact cabinet with convenient graphical user interface

Compact design and convenient operation need not be mutually exclusive: Although the R&S®SFE is only half as wide as the R&S®SFU, it provides the same controls and user interfaces – both locally on the front panel and by means of remote control.

- ½ 19" × 3 height units
  The cabinet of the R&S®SFE, which is only ½ 19" in width, makes it an extremely compact instrument. This is an advantage particularly in production applications, when many instruments have to be installed in racks without much space.
- Large VGA color display with 640 × 480 pixels
  The R&S®SFE has a 5.7" easy-to-read VGA color display. Together with the straightforward graphical user interface, the display allows quick, easy, and reliable operation of the instrument. The most important operating parameters are always clearly visible.
- Intuitive user interface under Windows XP Embedded
  The R&S®SFE has the same graphical user interface that is already successfully used in the R&S®SFU. The user interface is straightforward, with a tree on the left side and a work view on the right side. The instrument is operated via a keypad and a rotary knob. Additionally, a keyboard and mouse can be connected to the USB interfaces.
- Context-sensitive help system
  Even during ongoing operation, the R&S®SFE allows you to access the extensive help system, which includes the entire information of the user manual. The help system always starts context-sensitively, i.e. with information on the currently selected operating parameter.
- User-definable favorites for quick access
  Parameters that are often used can be copied to the Favorites menu, which makes operation even quicker and easier. This function is particularly useful when you have to often change parameters from different submenus.
- Easy software updates via LAN or USB 2.0
  Owing to USB 2.0 and LAN interfaces, software updates for the R&S®SFE can be performed very quickly and easily. For this purpose, you just copy the new software to the R&S®SFE by means of a USB memory stick or via FTP and start the fully automatic installation.



User-definable favorites



Context-sensitive online help

- Remote operation via Remote Desktop or VNC
  The R&S®SFE can be easily remote-operated via an Ethernet connection or in a LAN network over IP and preconfigured for DHCP use by means of the preinstalled Remote Desktop software or the VNC software that comes with the instrument.
- Remote control via LAN
  Remote control is possible by means of SCPI control commands via LAN (VXI11). The R&S®SFE can thus be integrated into existing test programs very easily.
- Remote control commands are compatible with those of the R&S®SFU.

Benefits

- **Expandable for future standards**
  In the last few years, digital broadcasting and TV technology has made dramatic advances and will continue to evolve also in the future. Existing standards are continuously being improved, and new standards and technologies are launched on the market. Rohde&Schwarz keeps a close eye on these developments and, in many cases, actively contributes its expertise – and is therefore always able to provide its customers with signal generators for new standards early on. The multistandard broadcasting signal generators from Rohde&Schwarz can be quickly and easily converted to new standards by means of software update at any time – without any hardware modifications.
- **Modular concept**
  The R&S®SFE has a completely modular design. Customers can select between various transmission standards and also between a number of optional extra functions. The R&S®SFE can thus be optimally adapted to customer requirements – with regard to application area as well as scope of functions. Since almost all options have been implemented as software options, the instrument can be expanded on-site by the customer at any time. That means that the R&S®SFE always provides maximum flexibility despite customized optimization.
- **The same look&feel as the R&S®SFU**
  Both the tried-and-tested operating concept and the straightforward graphical user interface of the R&S®SFU were completely transferred to the R&S®SFE. Customers who already know the R&S®SFU will be able to operate the R&S®SFE immediately and without training. It is thus very easy to change between the R&S®SFU and R&S®SFE.

Rear view

Specifications in brief

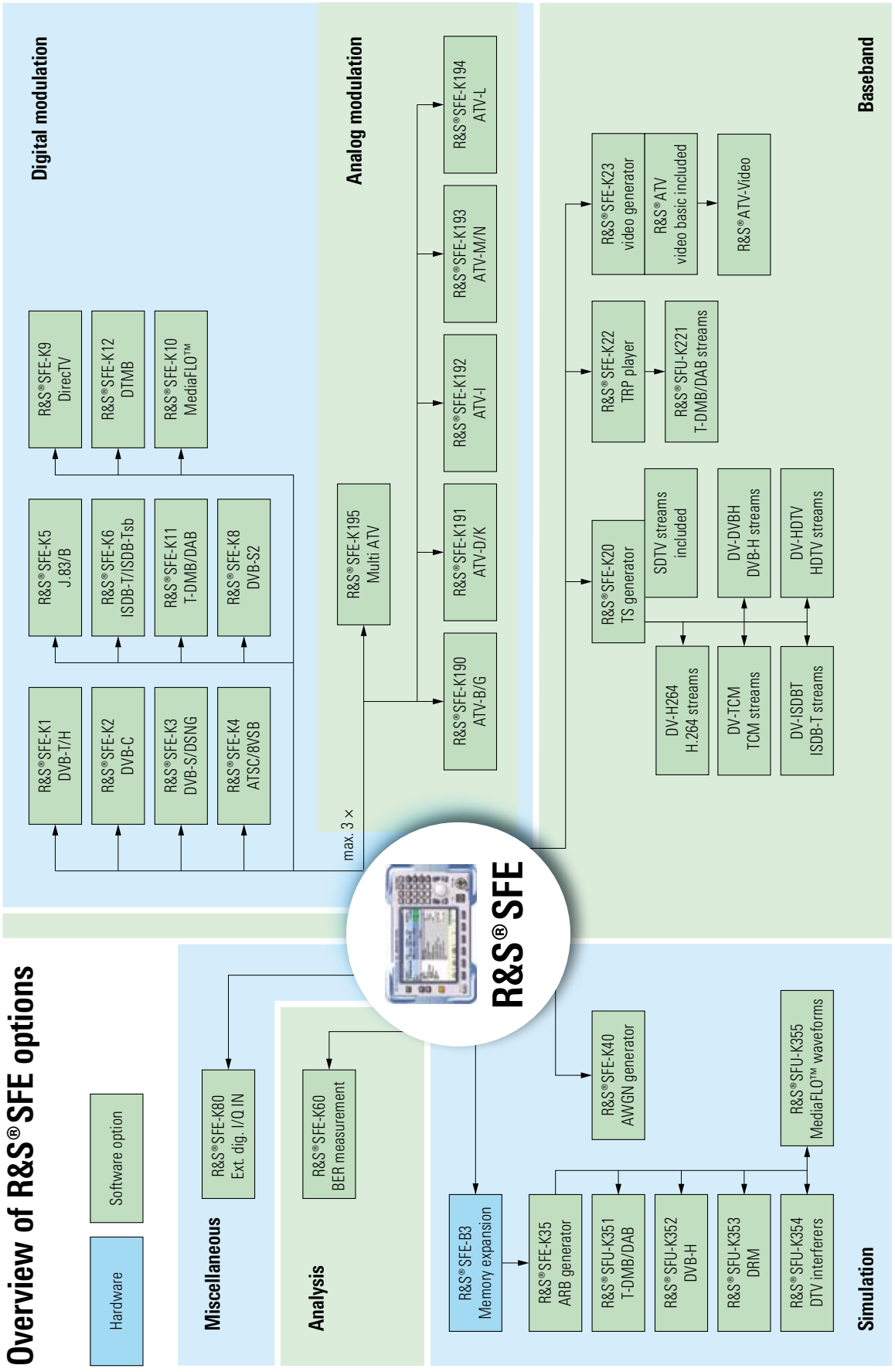
Parameter	Condition	Value
RF signal	frequency range	100 kHz to 2.5 GHz
	frequency resolution	1 Hz
	level	–100 dBm to +15 dBm
	level accuracy	<1.0 dB
Spectral purity	SSB phase noise, at 300 MHz with 20 kHz offset	<–115 dBc/Hz
	broadband noise >10 MHz	<–135 dBc/Hz
Digital modulation modes	terrestrial TV	DVB-T, DTMB, ISDB-T, ATSC/8VSB
	cable TV	DVB-C, J.83/B
	satellite TV	DVB-S/DSNG, DVB-S2, DirecTV
	mobile TV	DVB-H, T-DMB, ISDB-T1-segment (partial reception), DMB-TH, MediaFLO™
	digital sound broadcasting	DAB, DRM (waveform), ISDB-Tsb
Analog modulation modes	analog TV	B/G, D/K, I, M/N, L
	analog sound broadcasting	AM/FM/RDS
I/Q modulator	frequency range	DC to 35 MHz
Noise generator	RF bandwidth	96 MHz
	distribution function	Gaussian, statistical, separate for I and Q
BER measurement	PRBS measurement	BER clock input, data, enable
	MPEG-2 TS measurement	ASI input
TS generator	net data rate	max. 90 Mbit/s
General information	PC platform	Windows XP Embedded
	remote control	SCPI 199.5
	Ethernet	10/100BaseT, RJ-45
	USB	2.0
	operating temperature range	+5 °C to +45 °C
	power supply	90 V AC to 240 V AC, 50 Hz to 60 Hz
	dimensions	235 mm × 55 mm × 465 mm 9.25 in × 6.1 in × 18.3 in
	weight	<6 kg <13.23 lb

Ordering information

Designation	Type	Order No.
Base unit		
Broadcast Tester	R&S®SFE	2112.4300.02
Options		
Digital modulation modes		
DVB-T/H	R&S®SFE-K1	2113.4010.02
DVB-C[1)]	R&S®SFE-K2	2113.4032.02
DVB-S/DSNG[1)]	R&S®SFE-K3	2113.4055.02
ATSC/8VSB[1)]	R&S®SFE-K4	2113.4078.02
J.83/B[1)]	R&S®SFE-K5	2113.4090.02
ISDB-T/ISDB-Tsb[1)]	R&S®SFE-K6	2113.4110.02
DVB-S2[1)]	R&S®SFE-K8	2113.4132.02
DirecTV[1)]	R&S®SFE-K9	2113.4155.02
MediaFLO™[1)]	R&S®SFE-K10	2113.4178.02
T-DMB/DAB	R&S®SFE-K11	2113.4190.02
DTMB[1)]	R&S®SFE-K12	2113.4210.02
Analog modulation modes[1)]		
ATV-B/G	R&S®SFE-K190	2113.4655.02
ATV-D/K	R&S®SFE-K191	2113.4678.02
ATV-I	R&S®SFE-K192	2113.4690.02
ATV-M/N	R&S®SFE-K193	2113.4710.02
ATV-L	R&S®SFE-K194	2113.4732.02
Multi ATV	R&S®SFE-K195	2113.4755.02
Baseband		
TS Generator, includes SDTV stream library	R&S®SFE-K20	2113.4878.02
TRP Player	R&S®SFE-K22	2113.5274.02
Video Generator	R&S®SFE-K23	2113.4890.02
Simulation		
ARB Generator	R&S®SFE-K35	2113.4932.02
AWGN Generator	R&S®SFE-K40	2113.4910.02
Measurement and analysis function		
BER Measurement[1)]	R&S®SFE-K60	2113.5151.02
Baseband inputs		
Extended I/Q Input[1)]	R&S®SFE-K80	2113.5251.02
Other expansions		
Memory Expansion	R&S®SFE-B3	2113.4500.02

[1)] In preparation.

Option overview



For data sheet, see PD 5213.8596.22
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(search term: SFE)

ROHDE&SCHWARZ

www.rohde-schwarz.com
Europe: +49 1805 12 4242, customersupport@rohde-schwarz.com
USA and Canada: +1-888-837-8772, customer.support@rsa.rohde-schwarz.com
Asia: +65 65 130 488, customersupport.asia@rohde-schwarz.com