Product brochure

Version 01.00

April 2006

Broadcast Test System R&S®SFU

The all-in-one solution for broadcast and mobile TV

Main functions at a glance

- TV multistandard platform
- Realtime TV signal generation for digital and analog transmission standards
- Available as a production solution (non-realtime)
- Wide output frequency range from 100 kHz to 3 GHz
- Internal digital and analog interferers
- Realtime transmission simulations
- Bit error ratio (BER) measurement
- TS baseband generator, player, recorder
- ETI baseband generator
- I/Q arbitrary waveform generator

ROHDE&SCHWARZ

Introduction

The Broadcast Test System R&S®SFU has been designed as a platform for different applications and for future options. It provides a number of instruments and applications in a cabinet of only four height units and offers unrivaled RF and baseband characteristics.

Due to its modular design, the R&S®SFU can be optimally adapted to the requirements of different applications. It is an ideal research and development tool for making improvements to introduced standards and for generating new standard signals. Applications that previously required many different instruments are now fully covered by the R&S®SFU.

The modern, intuitive concept of the R&S®SFU ensures fast and easy operation.

You can easily switch operating parameters (e.g. roll-off, puncturing rate, QAM mode) and select operating parameters whose values exceed those defined in the standard for lab applications. For special tasks such as in DVB-T/H, modulation, individual carriers and carrier groups can be deactivated. Sweeps across the entire RF range are possible.

General characteristics

- DTV multistandard platform
- ATV signal generation
- Output frequency from 100 kHz to 3 GHz
- Generation of internal interferers
- Fully digital baseband signal processing
- Upgradeability to multifunctional broadcast test system
- Easy installation of most options at customer site

Intuitive, fast and easy operation

- Color display with 1024 × 768 pixels (XVGA format)
- Intuitive user interface with Windows XP Embedded
- Context-sensitive help system
- User-definable favorites for fast access
- Easy software update by means of USB and Windows

Outstanding signal quality

- I/Q modulator with 180 MHz RF bandwidth
- Very low SSB phase noise of typ. –135 dBc at 1 GHz (20 kHz carrier offset, 1 Hz measurement bandwidth)
- High optional output power of up to +19 dBm (PEP), overrange +26 dBm
- High-stability reference oscillator as standard

Front view of the R&S®SFU

Unrivaled flexibility for research and development

- Expandable multistandard platform
- Universal coder for realtime signal generation
- Transmission simulations
- TS baseband generator and recorder
- ETI baseband generator with universal coder for realtime signal generation
- Arbitrary waveform generator with 128 Msample, supported by R&S®WinIQSIM™ software
- Variety of signal libraries with waveforms and transport streams
- Internal hard disk as standard for storing waveforms and modulation data
- Integrated power measurement with external power sensors

Ideal for use in production

- Wear-free electronic attenuator of up to 3 GHz over the full level range
- Minimum space requirements: TS generator and test transmitter are accommodated in one instrument of only four height units
- Favorably priced and future-proof non-realtime production solution, since it can be upgraded with software at any time
- Fast, flexible software option solutions for new requirements

Easy remote access

- Remote control via GPIB and LAN (VXI 11)
- User-friendly remote operation by VNC or Remote Desktop
- USB connectors for keyboard, mouse and memory stick

One-box solution

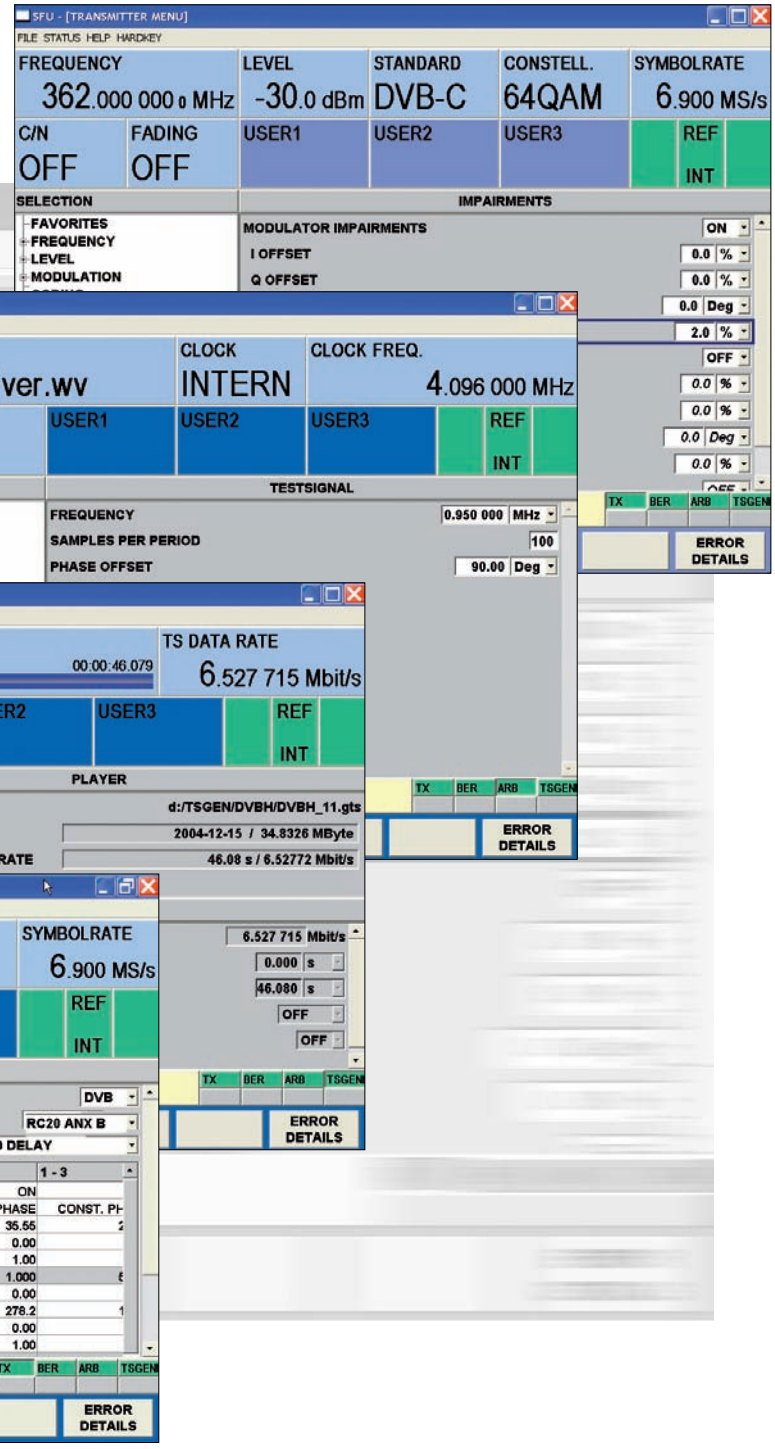
Test transmitter
RF signals for a variety of transmission standards can be transmitted over a wide, user-variable frequency range by the integrated test transmitter. All the different standards – for terrestrial, satellite or cable transmission – can be easily loaded into the multistandard test transmitter via software and generate a highly pure spectrum.

Bit error ratio meter
The integrated BER meter makes it possible to measure and evaluate errors on the transmission link. A BER value can be determined on the transport stream as well as via the data and clock circuits.

Channel simulator
Integrated transmission simulators for AWGN, phase noise, impulsive noise and fading are available for simulating real and, above all, reproducible environmental conditions in the lab.

Transport stream signal source
Video and audio applications require baseband signals. A variety of such signals are available as transport stream signal sources.

- Rohde & Schwarz libraries with ready-to-use special signals for tests and development can be replayed with the transport stream generator.
- Customer files can be easily loaded and replayed with the transport stream player.
- The internal transport stream recorder supports recording of customer transport streams from any sources.



I/Q signal generator
Customer I/Q waveforms or Rohde & Schwarz waveform libraries for different transmission standards can be replayed with the arbitrary waveform generator.

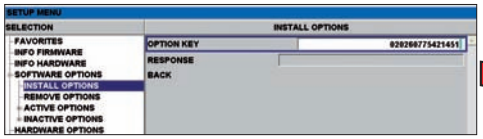
Power measurement
High-precision power measurements with power sensors from Rohde & Schwarz can be performed and displayed on the R&S®SFU's large screen.

High output power
High output levels and signal amplifiers are usually required in production. The R&S®SFU provides this high output power with its high power option.

I/Q interface
The digital I/Q interface provides the high-quality I/Q signals that are required in development as input and output signals.

Coders

All coders are software-based; with the appropriate hardware, you can activate them immediately by means of an enabling code (see right). It is thus not necessary to open the instrument.



Cable standards

DVB-C

The DVB-C coder supports all QAM modulations defined in the EN 300429 standard. The powerful coder 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 coder also supports the standard enhancement with 1024QAM.

Satellite standards

DVB-S

DVB-S (EN 300421) was introduced in 1994 as a satellite transmission standard. DVB-S uses QPSK modulation. Since its introduction, DVB-S has established itself as the world's most widely used satellite transmission standard.

DVB-S2

DVB-S2 is an innovative and efficient channel coding method that is used in combination with high-order 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®SFU supports the broadcast service mode for non-backwards-compatible broadcast services.

DIRECTV

DIRECTV (and DIRECTV legacy mode) is a proprietary standard with conditional access that is widely used in America and primarily in the United States. For transmission, a proprietary transport stream protocol with 130-byte packets is generated. After conversion to 188 bytes, DIRECTV transport streams can be replayed with the R&S®SFU-K22 TRP player option.

Terrestrial standards

DVB-T

DVB-T permits high-quality transmission of digital broadcast signals. Its success will continue with the conversion from analog to digital TV.

ISDB-T

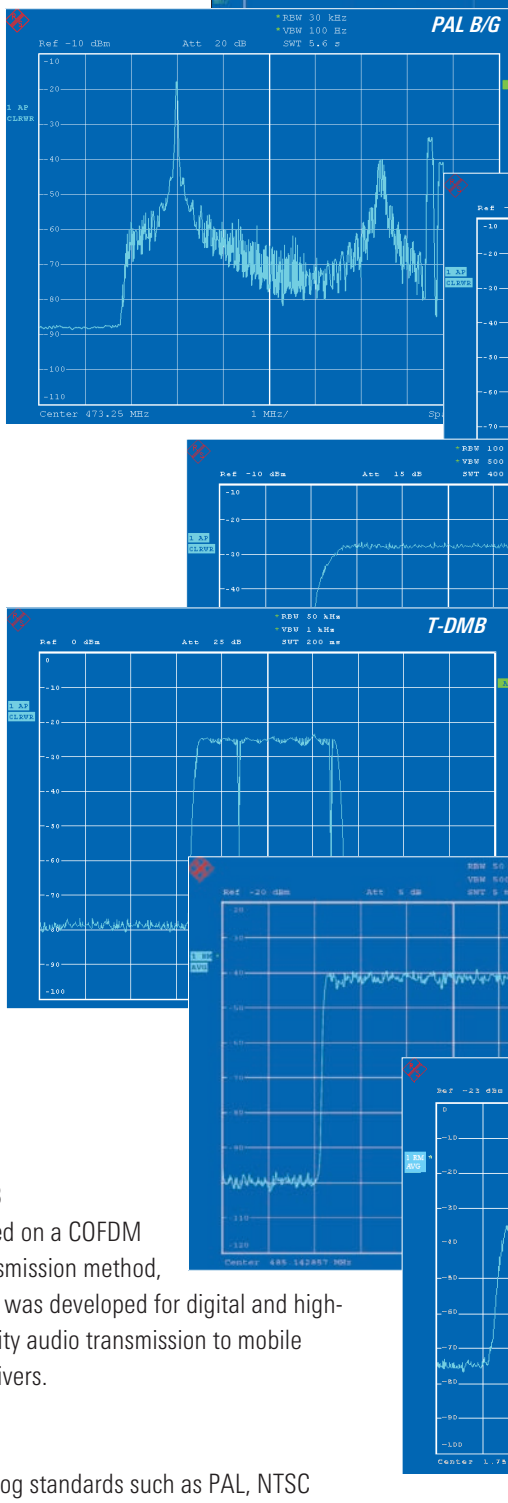
ISDB-T is a Japanese digital standard for terrestrial transmission of video, audio and data signals by means of 13 segments. ISDB-T with partial reception is for mobile operation.

DMB-T

Developed in China, DMB-T offers high-quality digital TV with excellent characteristics for mobile and portable 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 suppressed in the spectrum.



DAB

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

ATV

Analog standards such as PAL, NTSC and SECAM with B/G, D/K, M/N, L and I transmission systems are also available. The baseband signal is already integrated, eliminating the need for an additional signal generator.

Video goes mobile

The following standards are terrestrial transmission methods for broadcast applications with mobile receivers such as mobile phones and PDAs.

DVB-H

The DVB-T/H coder provides the following functions: the newly introduced 4k mode, use of the TPS carriers for time slicing signaling, the additional 5 MHz channel bandwidth and corresponding native and in-depth symbol interleavers as well as MPE forward error correction (FEC). Hierarchical coding is also possible.

T-DMB/DAB

T-DMB was developed in Korea and is based on the digital audio broadcasting (DAB) standard known in Europe, which was also developed for mobile reception with radios. The T-DMB/DAB coder in the R&S®SFU supports both the Korean and the European transmission standards.

ISDB-T (partial reception)

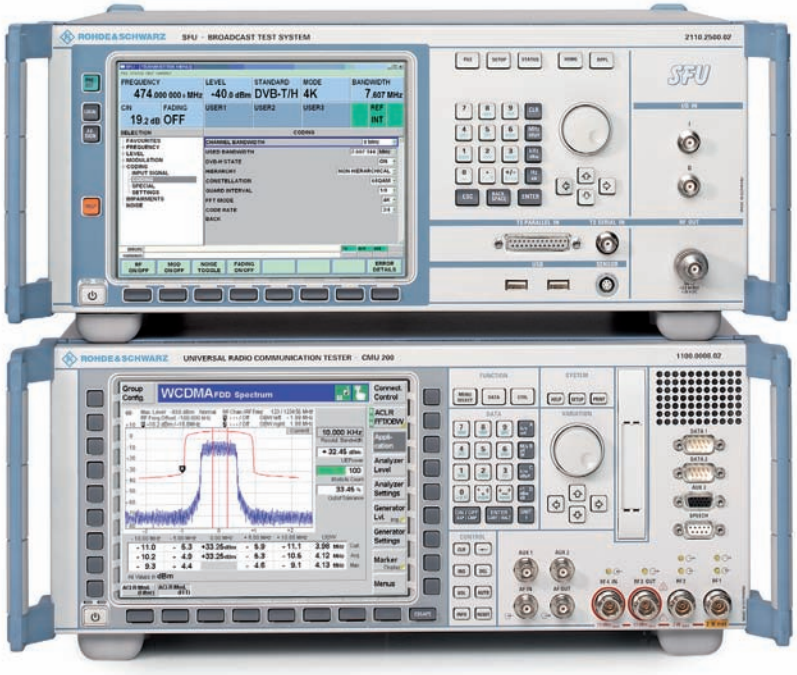
With mobile ISDB-T in accordance with ARIB 1.5, only one of altogether 13 available segments is used for transmission. The ISDB-T coder supports all 13 segments used in terrestrial TV reception.

MediaFLO™

MediaFLO™ was developed and standardized by the American company QUALCOMM. The baseband signal in this proprietary standard is based on a transport stream with 188 bytes. MediaFLO™ is currently used in a nationwide network in the USA. QPSK and 16QAM methods are used as OFDM modulation at a bandwidth of 5.5 MHz. The data rates transmitted to the mobile receiver range between 50 kbit/s and 1 Mbit/s.

DMB-TH

DMB-TH is the Chinese DMB-T, which in a modified version is also used for handheld reception. DMB-TH has evolved from DMB-T.

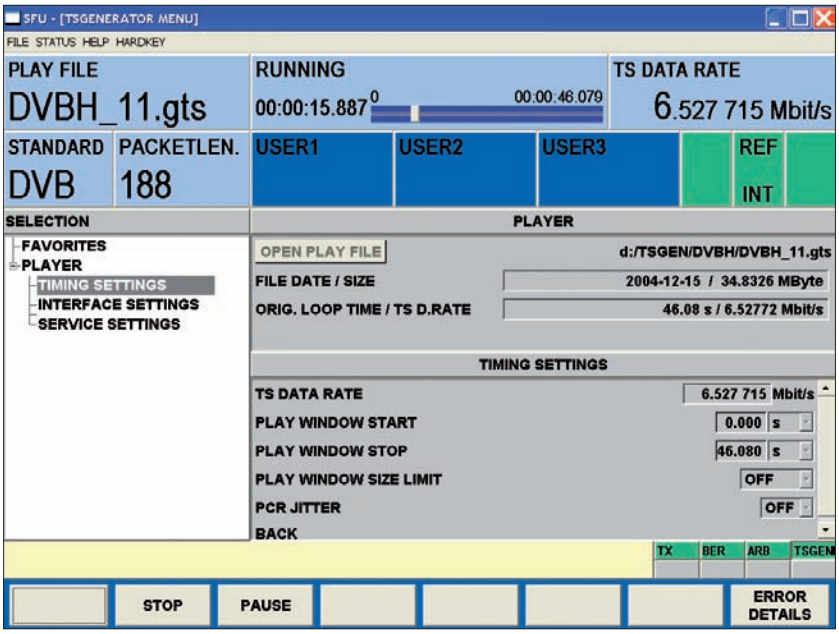


Testing mobile broadcast applications with the R&S®SFU and the R&S®CMU

TS generator (R&S®SFU-K20)

A transport stream generator in the baseband internally provides test signals for the realtime coder. For external equipment, the test signals are made available at an ASI output. An external MPEG-2 generator is therefore no longer necessary. Furthermore, the number of instruments needed for testing set-top boxes is reduced and the costs are minimized.

The transport stream generator allows you to generate endless and seamless high-bit-rate MPEG-2 transport streams for the broadcast range. The SDTV transport stream library included as standard contains ATSC and DVB test streams. The numerous transport streams from Rohde&Schwarz cover a wide range of applications and test scenarios.



R&S®SFU transport stream generator

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
- HDTV – tests of HDTV receivers
- DVB-H – tests of mobile receivers
- ISDB-T – test streams
- H.264 – test streams
- TCM – STB tests

Further libraries will soon be available.

	1	2	3	4	5	6	7	8	9
Name	DVBH-01	DVBH-02	DVBH-03	DVBH-04	DVBH-05	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	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)	0x012F (303)	0x012F (303)	0x012F (303)	0x012F (303)
MAC address byte 6; byte 5	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05	0x06; 0x05
MPE-FEC	yes	yes	yes	yes	yes	yes	yes	yes	yes
Burst bandwidth	3000 kbit/s	1500 kbit/s	1000 kbit/s	500 kbit/s	256 kbit/s	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	250 kbit/s	250 kbit/s	250 kbit/s	250 kbit/s	250 kbit/s
Burst cycle time	7698 ms	7697 ms	7698 ms	7697 ms	7696 ms	1955 ms	3911 ms	1955 ms	3910 ms
Burst duration	641 ms	1281 ms	1922 ms	3844 ms	7508 ms	329 ms	652 ms	658 ms	1303 ms
Receiver off-time	7057 ms	6416 ms	5776 ms	3853 ms	188 ms	1626 ms	3259 ms	1297ms	2607 ms
Ratio of burst duration to burst cycle time	1:12	1 : 6	1:4	1:2	1:1	1 : 6	1 : 6	1 : 3	1 : 3
Burst size	1.816 kbit	1.816 kbit	1.816 kbit	1.816 kbit	1.816 kbit	460 kbit	920 kbit	460 kbit	920 kbit
Number of rows	1024	1024	1024	1024	1024	256	512	256	512
Number of padding columns	28	28	28	28	28	25	25	25	25
Puncturing columns	0	0	0	0	0	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		video PID 0x100 (256) 4 Mbit/s; audio PID 0x120 (272) 0.384 Mbit/s	

Example from the DVB-H transport stream library

Stream generation tools

Stream generation tools provide full flexibility when generating your own streams, which can be used with the R&S®SFU-K20 TS generator. The R&S®DV-ASC advanced stream combiner allows you to generate your own transport streams, also for DVB-H.

TS recorder (R&S®SFU-K21)

A transport stream recorder and player as an expansion of the data source is available for the R&S®SFU. It allows you to record any externally applied transport streams at data rates between 100 kbit/s and up to 90 Mbit/s.

The available recording formats are TRP with eight bits (8-bit data) and T10 (10-bit data, 1-bit data valid, 1-bit packet sync). With the 8-bit and T10 formats, the parallel SPI (LVDS) interface is used.

The amount of data that can be recorded is limited only by the size of the hard disk. The recorded transport streams can be transferred to other storage media via the USB or LAN interface. Using the TS recorder, the streams can be replayed endlessly and seamlessly with packet-exact cutting at the end-of-file/start-of-file transition.

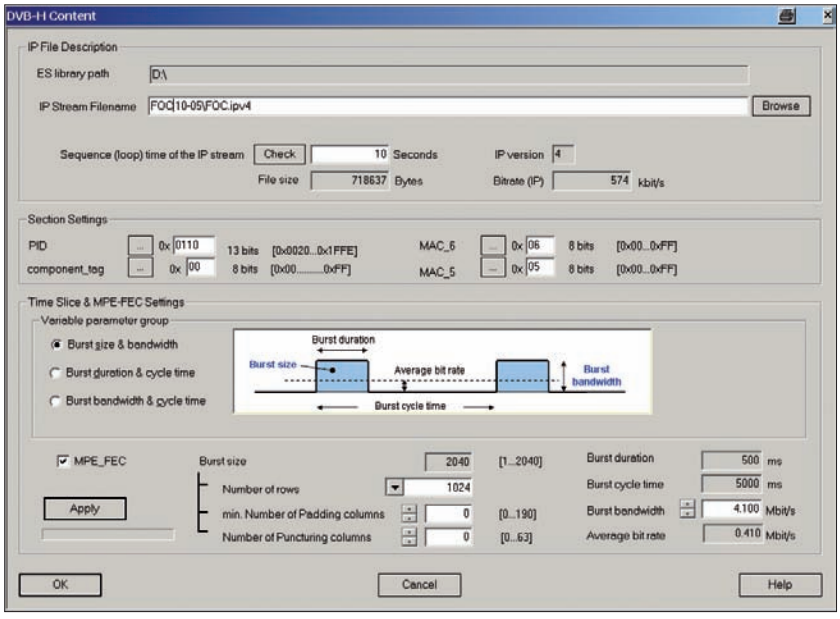
To enable R&S®SFU-K21, you require the Additional Hard Disk R&S®SFU-B6, Memory Extension 2 R&S®SFU-B4 and TRP Player R&S®SFU-K22.

TRP player (R&S®SFU-K22)

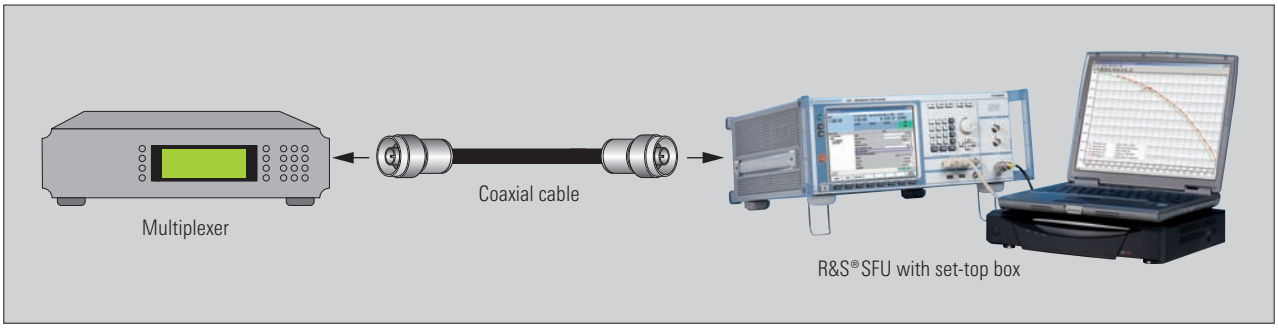
The TRP player lets you replay your own transport streams in TRP format. The transport streams can be copied via the USB or LAN interface to the R&S®SFU file system and be replayed from there.

In addition, this TRP player is used to replay T-DMB and DAB streams. For this purpose, the TRP player can replay predefined test streams for T-DMB and DAB from an optional T-DMB/DAB library (R&S®SFU-K221).

To enable the R&S®SFU-K22 TRP player option, the Additional Hard Disk R&S®SFU-B6 and Memory Extension 2 R&S®SFU-B4 are required.



R&S®DV-ASC advanced stream combiner



Recording of an external transport stream with the R&S®SFU recorder function

Arbitrary waveform generator

The integrated arbitrary waveform (ARB) generator of the R&S®SFU opens up a wide range of additional applications, such as simulating occupied adjacent channels, adding interferers to the useful signal and generating user-defined RF signals (e.g. notched noise).

It is thus possible to generate any externally computed complex modulation signals. A hardware resampler and a low oversampling rate significantly 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.

Externally generated I/Q waveform files can also be loaded into the instrument and read out via one of the computer interfaces such as USB or LAN, or via the IEC/IEEE bus.

Together with the R&S®SFU-K81 option, which switches off the realtime coder function, the ARB generator can also be used for easy, cost-efficient production solutions. If a wider scope of functions is required, the realtime coders integrated in the R&S®SFU can subsequently be enabled by means of keycode options (see figure at right).

Waveform libraries

Additional waveform libraries allow quick evaluation of new modulations. I/Q waveform libraries are available for the following signals:

- T-DMB/DAB (R&S®SFU-K351)
- DVB-T/H (R&S®SFU-K352)
- DRM (R&S®SFU-K353)
- Digital/MBRAI interferer (R&S®SFU-K354)

Further waveform libraries will soon be available.

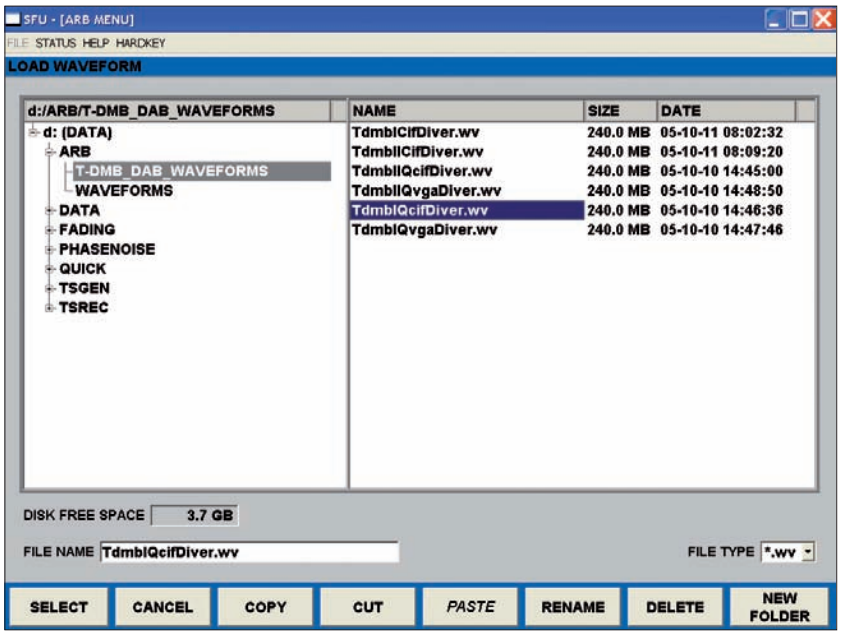
Simulation tools

The R&S®SFU allows full use of R&S®WinIQSIM™ simulation software. All waveforms generated with R&S®WinIQSIM™ can be loaded into the ARB generator of the R&S®SFU. Other software tools that utilize R&S®WinIQSIM™ can also be used.

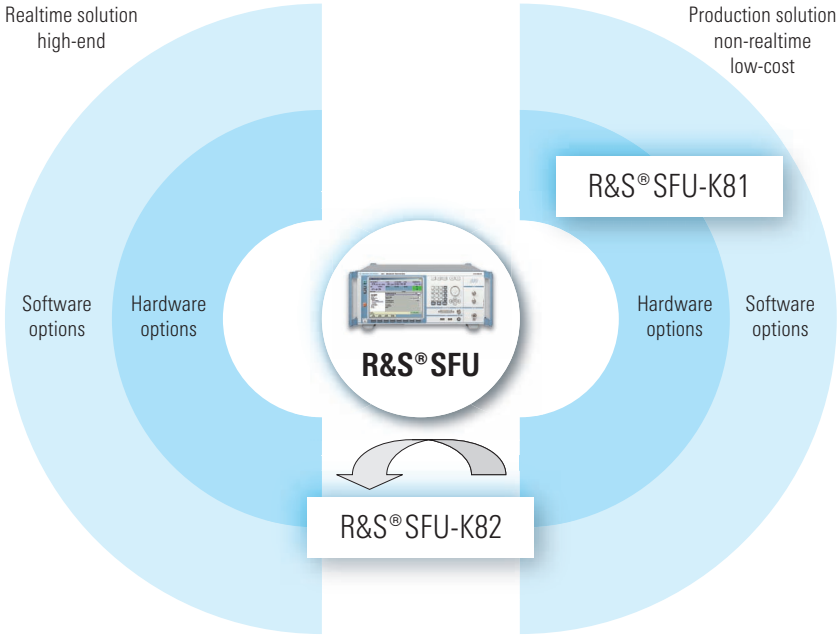
Technical details

As an I/Q modulation source, the ARB generator features the following:

- 128 Msample memory for I and Q
- 100 Msample/s clock



Selection of T-DMB waveforms in the ARB generator

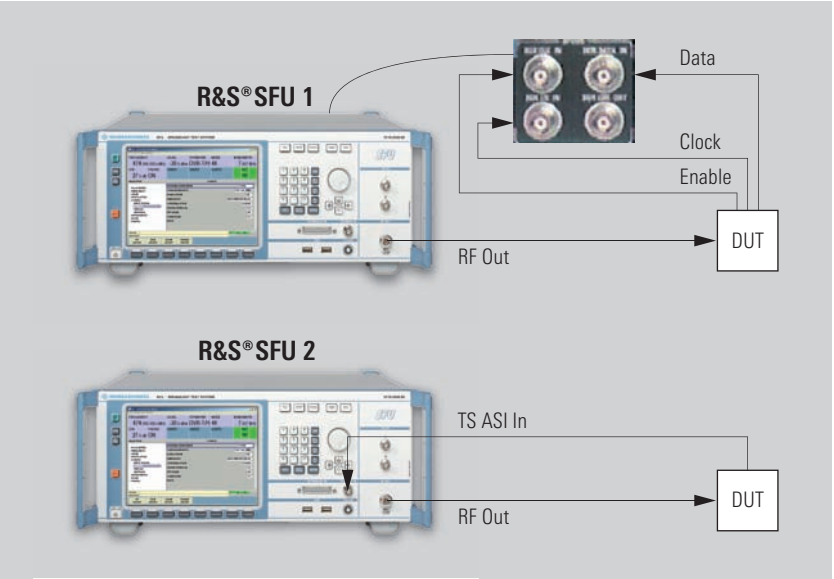


Expansion of a low-cost production solution into a high-end solution

BER measurement

The BER measurement, which operates independently of other applications, is used to check channel conditions. The integrated BER tester allows you to evaluate a signal demodulated and decoded by the DUT by means of the BER measurement. Two general methods are available for this purpose.

A measurement with a pure pseudo-random binary sequence (PRBS) can check the demodulation section of the receiver. A known PRBS-modulated data sequence is sent to the DUT, which decodes the sequence and feeds the data and the associated clock back to the R&S®SFU. If the error ratio of the decoding branch must also be measured, the MPEG-2 TS can be returned. In this case, the test signal comprises an MPEG-2 TS that contains a PRBS as payload. If path measurements on a live MPEG-2 signal are to be performed, the null packets must contain a PRBS payload. The BER tester of the R&S®SFU synchronizes to the returned, known PRBS and counts the bit errors. The quotient obtained by dividing the number of error bits by the total number of bits is the BER.



Block diagram of BER measurement

Power measurement

To allow you to determine the input power directly on the DUT, the R&S®SFU provides a power measurement function. Software is available for controlling and evaluating the measurement.

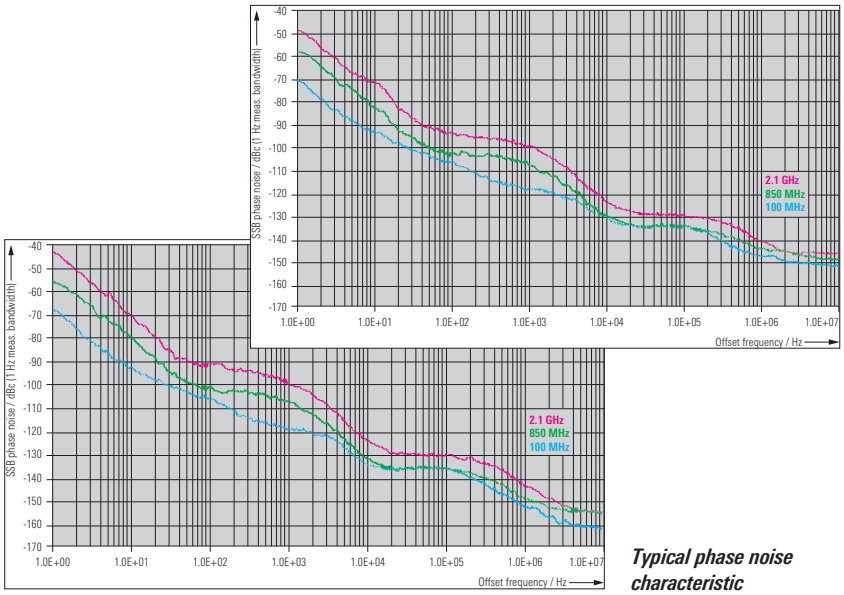
Available R&S®NRP power sensors:

- Average power sensors
  - R&S®NRP-Z11
  - R&S®NRP-Z21
  - R&S®NRP-Z24
  - R&S®NRP-Z33
- Thermal power sensors
  - R&S®NRP-Z51
  - R&S®NRP-Z55

Power measurement with the R&S®SFU and R&S®NRP-Z11

Signal quality

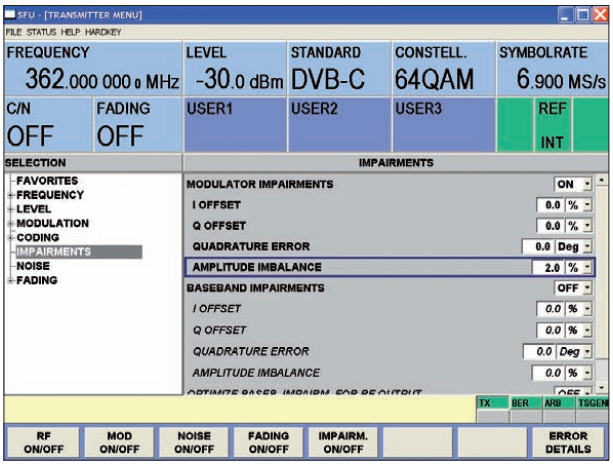
High signal quality and digital signal processing in the baseband make for accurate and reproducible measurements. A new type of digital level control ensures high precision. The overall level accuracy is less than 0.5 dB. The phase noise of the R&S®SFU synthesizer is typically less than –135 dBc/Hz (1 GHz, 20 kHz offset) with minimal modulation errors in the near-carrier range.



Typical phase noise characteristic

Modulation impairments

You can easily switch operating parameters (e.g. roll-off, puncturing rate, QAM mode) and select operating parameters whose values exceed those defined in the standard for lab applications. Non-ideal behavior of the I/Q modulator can be simulated by selectively changing amplitude, phase and carrier leakage before the signal enters the I/Q modulator.

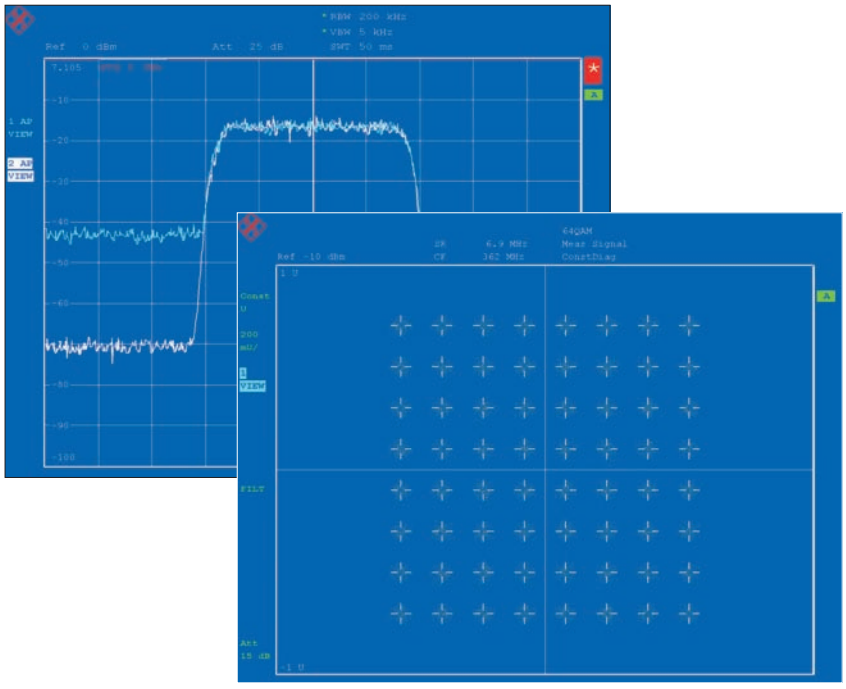


User interface for setting modulator impairments

AWGN generator (R&S®SFU-K40)

The 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 can be simulated in the transmission path – via satellite, cable or antenna – by generating a 96 MHz broadband AWGN signal with a Gaussian amplitude distribution in the digital baseband.

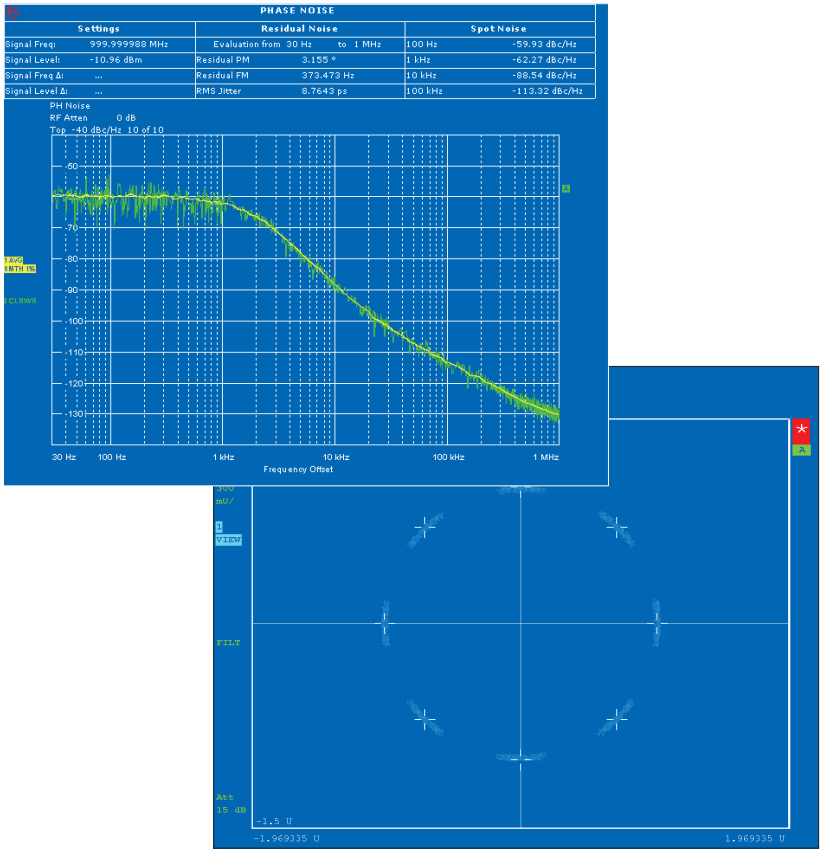
The AWGN generator can be used if the R&S®SFU-K40 software option has been enabled.



Useful signal with AWGN

Phase noise (R&S®SFU-K41)

The phase noise of the R&S®SFU synthesizer is typically less than –135 dBc/Hz (1 GHz, 20 kHz offset). The R&S®SFU is therefore ideal for simulating phase noise. The option allows you to simulate phase noise in oscillators and phase lock loops. In the setting range from –10 dBc/Hz to –110 dBc/Hz, the wanted phase noise can be loaded as a profile. User-defined profiles can be generated with conventional simulation programs such as MATLAB®, ported as a file to the R&S®SFU by means of a USB stick and stored on the hard disk. The phase noise functionality can be used if the R&S®SFU-K41 software option has been enabled.



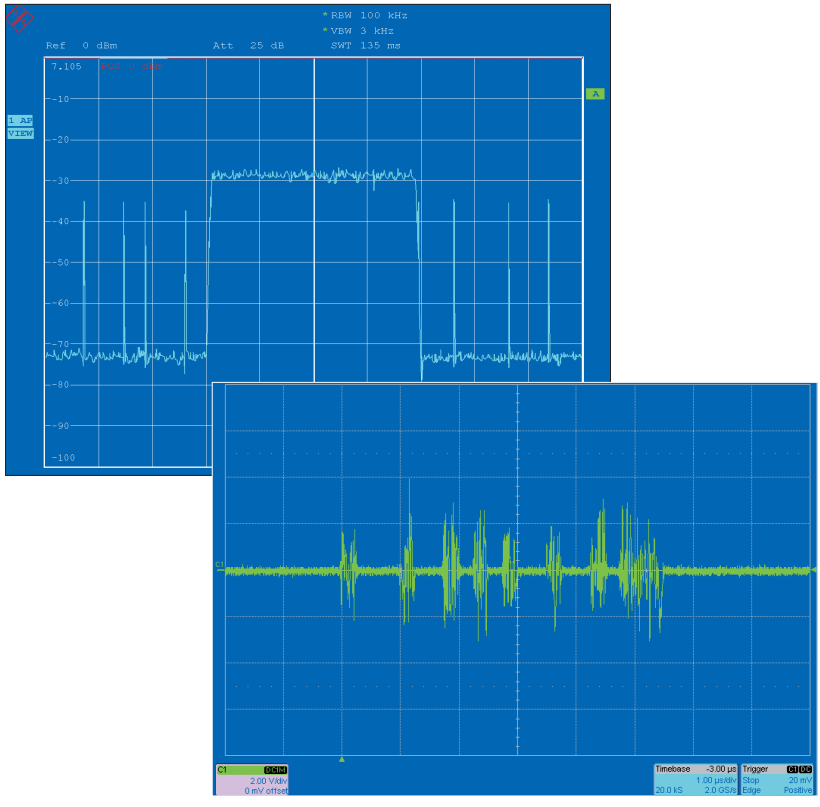
Phase noise simulation and phase noise with 8PSK

Impulsive noise (R&S®SFU-K42)

Impulsive noise permits the pulsed addition of an AWGN signal to the useful signal with a settable number of pulses. In addition, the statistical distribution of the pulse intervals can be selected. The pulse generator required for the pulses is integrated in the R&S®SFU. An additional external signal generator and the associated cabling are thus no longer necessary. The pulse times, the number of pulses and the pulse duration can be configured very easily. The impulsive noise functionality can be used if the R&S®SFU-K42 software option has been enabled.

Multinoise use (R&S®SFU-K43)

The multinoise use functionality can be used if the R&S®SFU-K43 software option has been enabled. It permits the simultaneous use of multiple noise sources in the form of an additive noise signal which, in turn, can be added to the useful signal.



Impulsive noise with DVB-T

Fading simulator (R&S®SFU-B30/R&S®SFU-B31)

The channel simulator (fading simulator) of the R&S®SFU is ideal for realtime simulation of multipath and mobile reception. The basic version (R&S®SFU-B30) provides up to 20 paths; with the full version (R&S®SFU-B31), up to 40 paths are available.

Profiles

The fading simulator supports profiles in accordance with DVB and ATSC. Several fading profiles per path can be selected and simulated. You may choose from the following profiles:

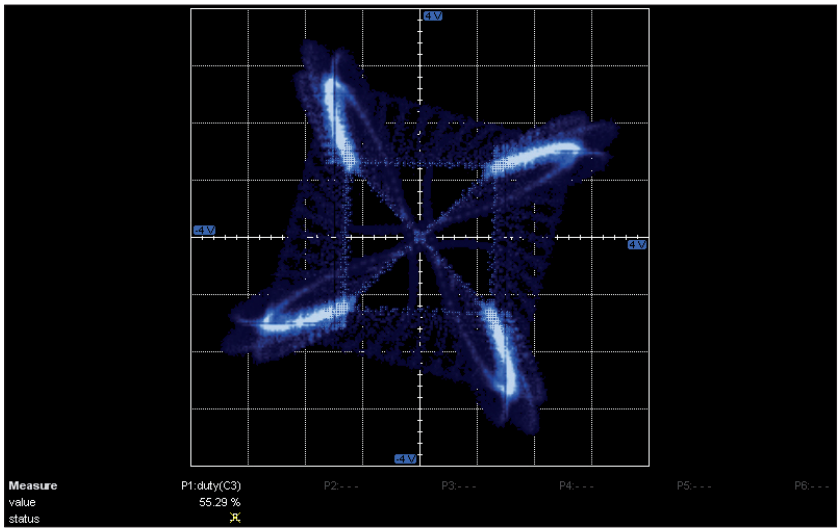
- Pure Doppler
- Rice
- Rayleigh
- Constant phase
- Lognormal
- Suzuki
- Gaussian

Dynamic fading profiles can be used with the R&S®SFU-K30 enhanced fading option.

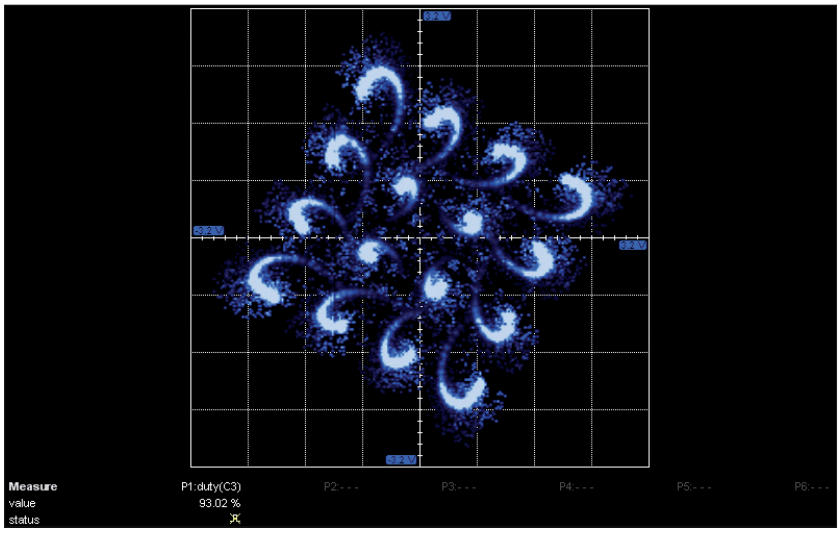
You can vary all fading parameters such as attenuation, phase, delay and Doppler speed, frequency and direction.

DAB with Gaussian fading

The Gaussian fading (R&S®SFU-K32) used for DAB and for the Korean T-DMB mobile standard is included in the realtime T-DMB/DAB coder (R&S®SFU-K11) and in the T-DMB/DAB waveforms option (R&S®SFU-K351), respectively, and permits the corresponding channel simulations.



QPSK with Rayleigh profile



16QAM with Rice profile

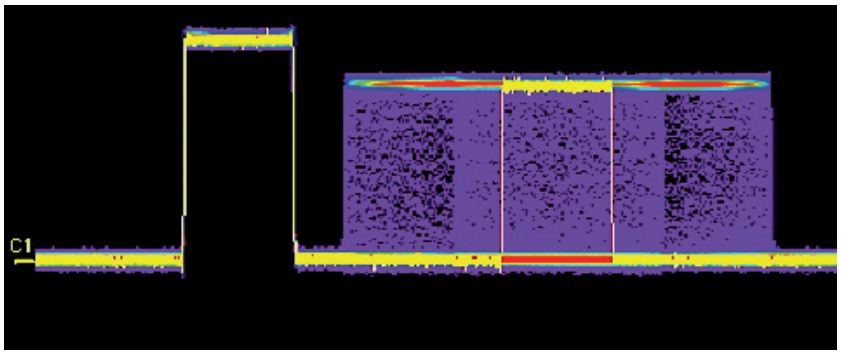
	1 - 1	1 - 2	1 - 3
STATE	ON	ON	
PROFILE	RAYLEIGH	RAYLEIGH	RAYLI
PATH LOSS [dB]	3.00	0.00	
BASIC DELAY [us]	0.00	0.00	
ADDIT. DELAY [us]	0.00	0.20	
RESULTING DELAY [us]	0.000	0.200	0
POWER RATIO [dB]	0.00	0.00	
CONST PHASE [Deg]	0.0	0.0	
SPEED [m/s]	13.90	13.90	1
FREQ RATIO	1.00	1.00	
RES DOPPLER SHIFT [Hz]	46.37	46.37	4
CORRELATION PATH	OFF	OFF	
COEFFICIENT [%]	0	0	
PHASE [Deg]	0.00	0.00	

Fading table of the R&S®SFU with a selection of fading profiles

Enhanced fading (R&S®SFU-K30)

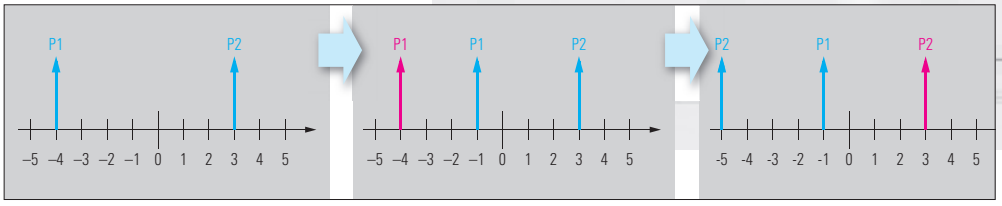
The moving propagation and birth-death dynamic fading configurations as well as fine delay configurations can be used to increase the resolution of the fading path delay and to simulate dynamic propagation conditions. These configurations are provided by the enhanced fading option.

The enhanced fading functionality can be used if the R&S®SFU-K30 software option has been enabled. It requires an installed R&S®SFU-B30 option (or R&S®SFU-B30 and R&S®SFU-B31).



Dynamic fading with moving propagation

Dynamic fading with birth-death



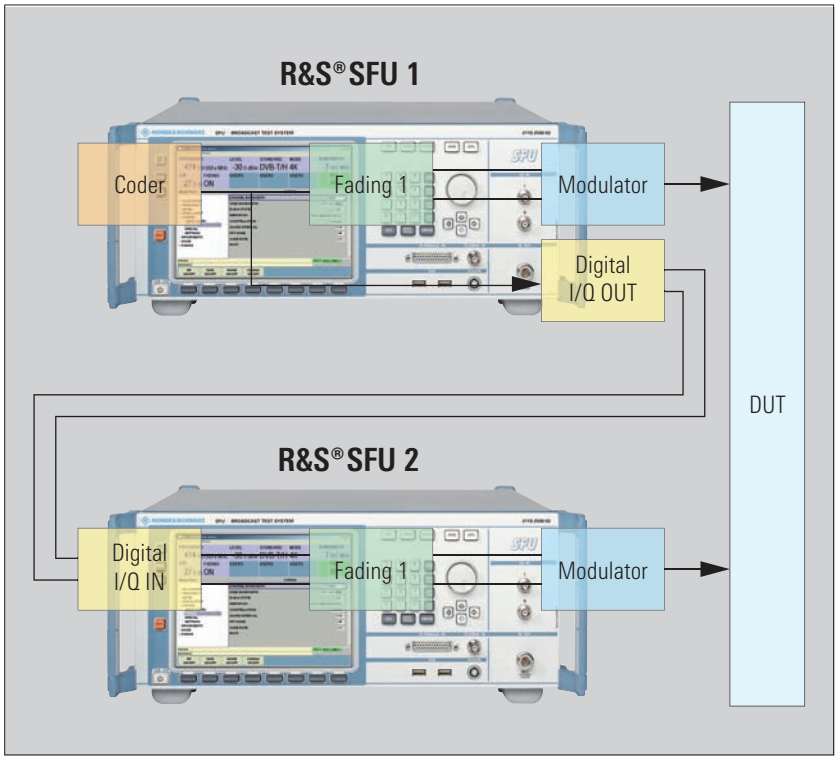
Diversity simulation

When testing diversity receivers, a separate RF receive signal must be provided for each antenna of the receiver. The receive signals must have the same baseband signal and the RF signal must be coupled. The noise and fading signals, however, must show no correlation; this is only possible with one R&S®SFU per antenna.

The RF signals of the two R&S®SFUs are coupled with each other as master/slave by means of the reference frequency.

The digital I/Q baseband signals are interconnected quickly, reliably and without loss of quality via the extended I/Q interface between the R&S®SFUs.

The functions of the digital I/Q interface can be used after the R&S®SFU-K80 software option has been activated.



Setup for testing diversity receivers

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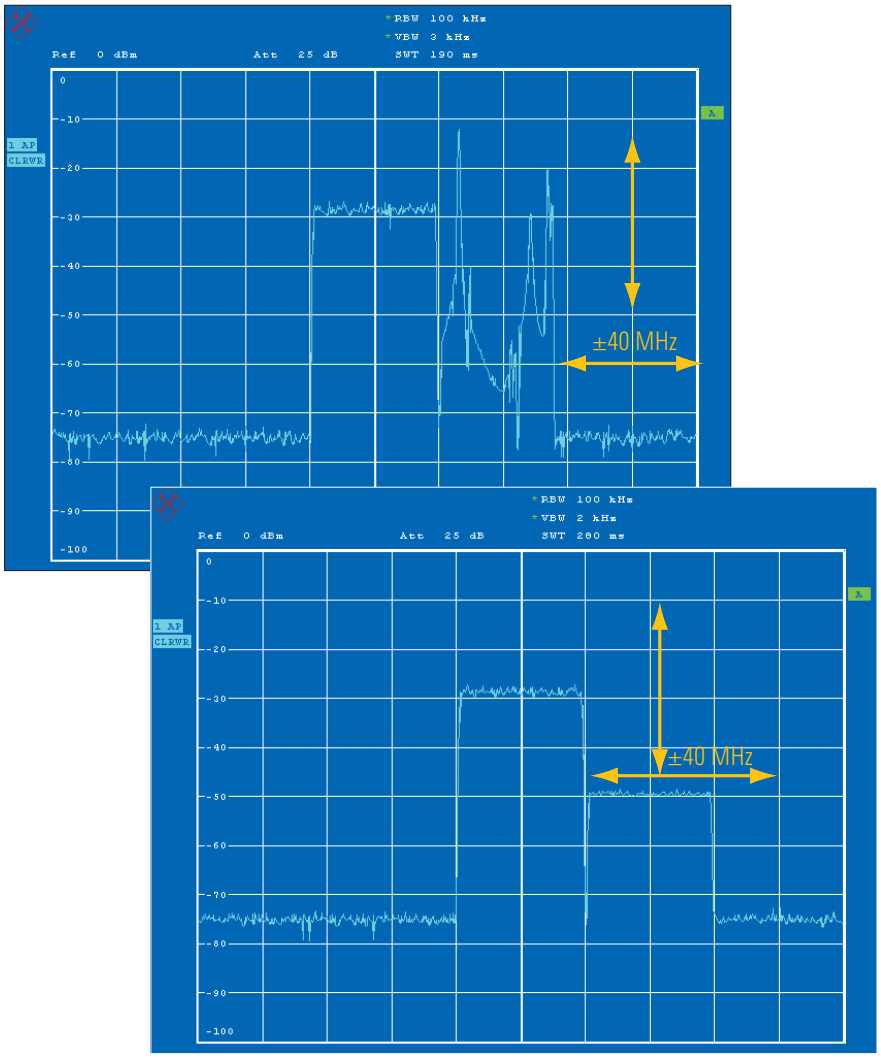
Interferers

Interferers can be added to the useful signals at different points along the transmission path. When adding the interferers, the level can be varied within a wide range. The maximum bandwidth to the useful signal can be ±40 MHz.

Transmission simulations can be used for the mixed signals. The R&S®SFU can simulate the impairment of the useful signal by interferers very compactly and without requiring any external signal sources.

In addition to the signals and signal libraries already available from Rohde & Schwarz (such as the multi ATV predefined option with analog TV signals), you can define other interferers by means of the R&S® WinIQSIM™ software and use them on the R&S®SFU.

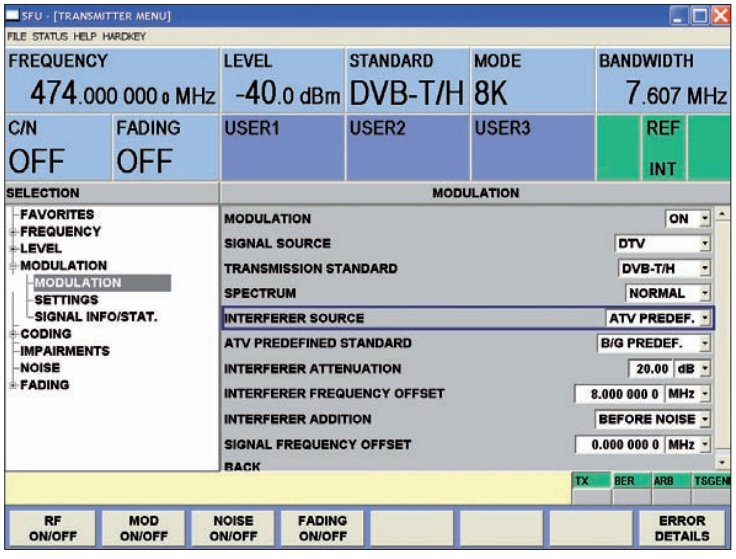


Useful signal with analog (top) and digital interferer

Interferer management

The R&S®SFU-K37 option permits easy and straightforward interferer management. Level, frequency, frequency offset and signal can be set.

External interferers can be applied via the R&S®SFU-K80 analog or digital I/Q interface while ARB sequences or analog TV signals can be provided internally.



Interferer GUI

Connectivity

LAN (100BaseT), GPIB and a USB connector are available as interfaces on the instrument's rear panel. Files, firmware updates and modulation data can be loaded fast and easily via these interfaces.

Remote operation and remote control

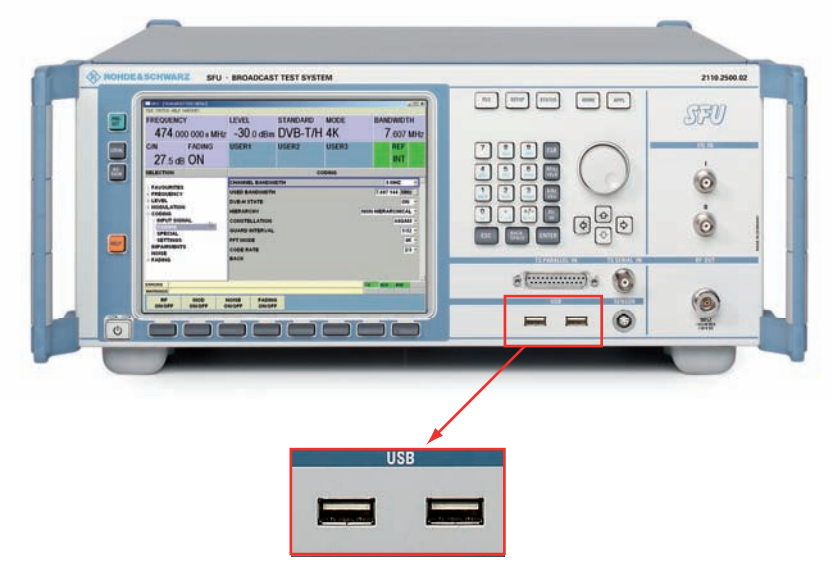
The R&S®SFU can be remote-operated via an Ethernet connection or in a LAN network over IP and is preconfigured for DHCP use. The preinstalled Remote Desktop software or the VNC software that comes with the instrument makes this very easy to do.

Remote control is possible by means of control commands via the IEC/IEEE bus (GPIB). The R&S®SFU can thus be integrated into existing test programs and remote-controlled.

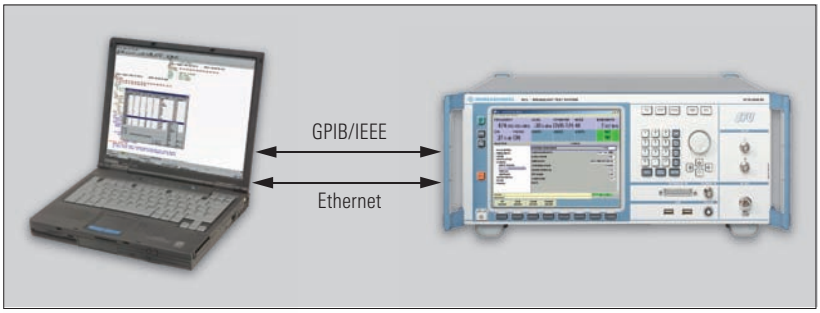
Looking forward

The R&S®SFU's modular design makes it a future-proof investment. Options can usually be activated quickly and conveniently on-site at any time by means of firmware update and license code.

This feature ensures fast and easy availability without time loss and is a big advantage for use in production and development. The R&S®SFU can be adapted to perfectly match current requirements, and its configuration can be tailored to meet customer-specific needs. It thus saves a lot of money yet offers full flexibility and openness for new, evolving fields of application.

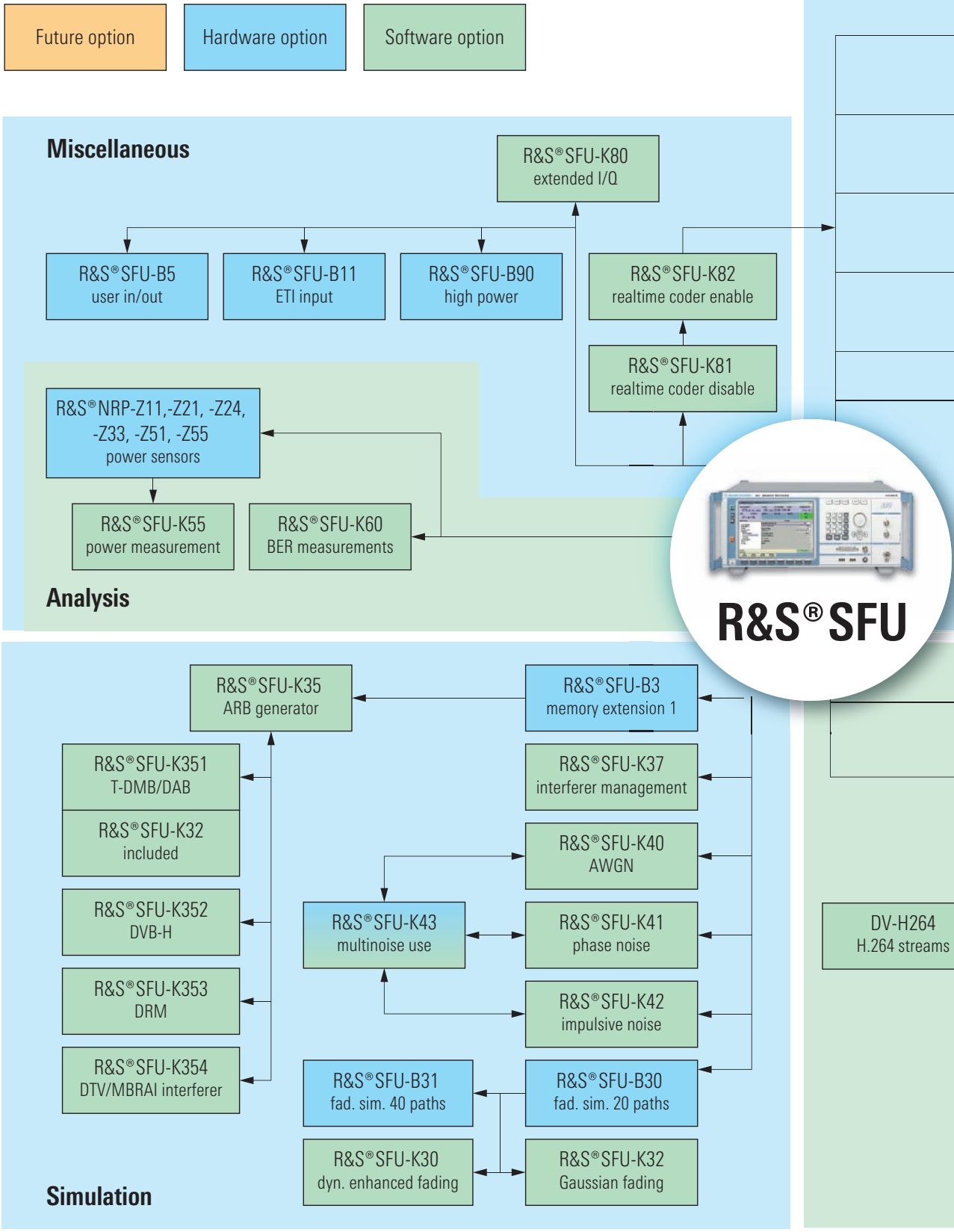


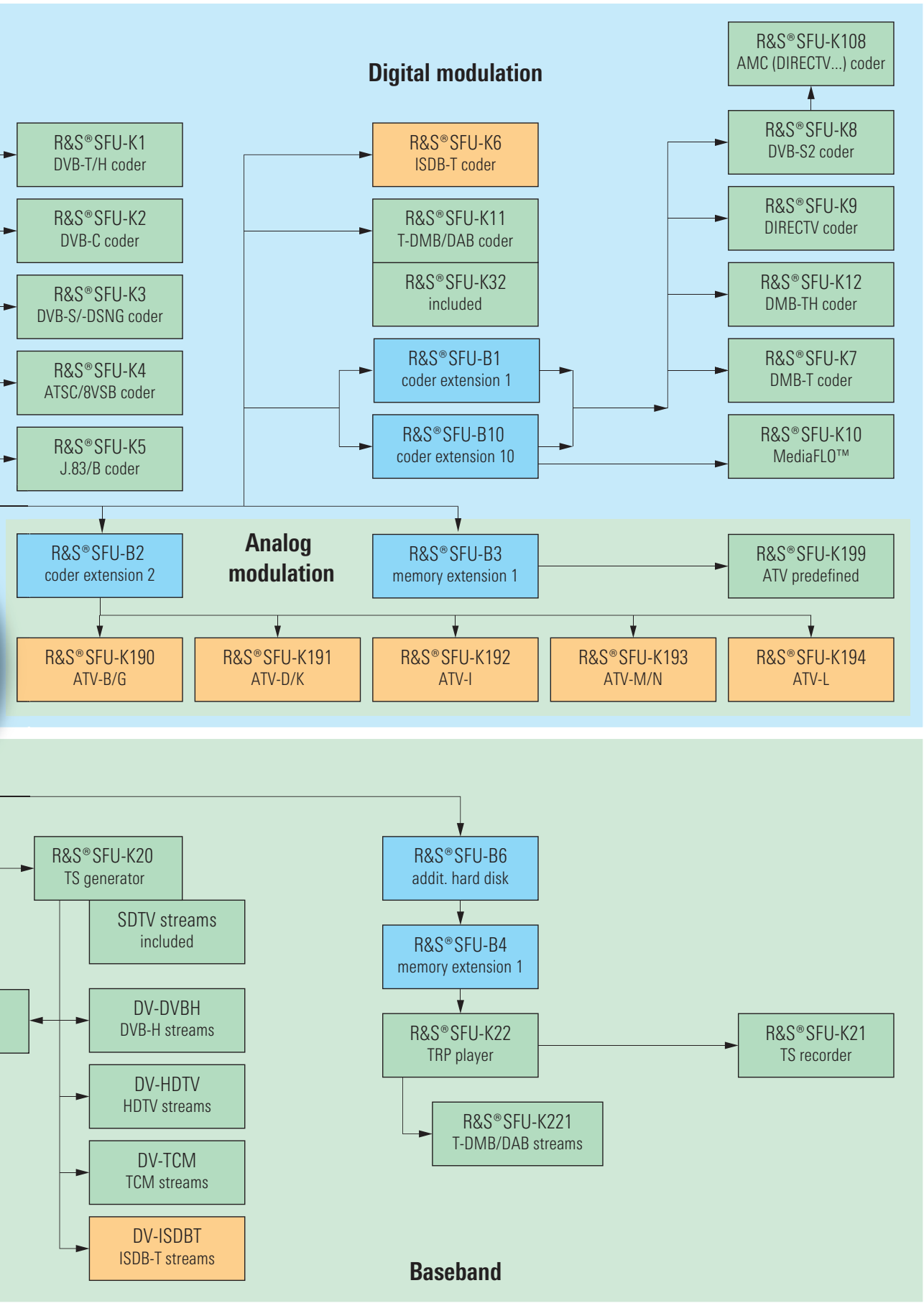
USB interfaces on the front panel



Possible remote control variants with the R&S®SFU

Overview of options




Digital modulation
R&S®SFU-K1
DVB-T/H coder
R&S®SFU-K2
DVB-C coder
R&S®SFU-K3
DVB-S/-DSNG coder
R&S®SFU-K4
ATSC/8VSB coder
R&S®SFU-K5
J.83/B coder
R&S®SFU-K6
ISDB-T coder
R&S®SFU-K11
T-DMB/DAB coder
R&S®SFU-K32
included
R&S®SFU-B1
coder extension 1
R&S®SFU-B10
coder extension 10
R&S®SFU-K108
AMC (DIRECTV...) coder
R&S®SFU-K8
DVB-S2 coder
R&S®SFU-K9
DIRECTV coder
R&S®SFU-K12
DMB-TH coder
R&S®SFU-K7
DMB-T coder
R&S®SFU-K10
MediaFLO™
Analog modulation
R&S®SFU-B2
coder extension 2
R&S®SFU-B3
memory extension 1
R&S®SFU-K199
ATV predefined
R&S®SFU-K190
ATV-B/G
R&S®SFU-K191
ATV-D/K
R&S®SFU-K192
ATV-I
R&S®SFU-K193
ATV-M/N
R&S®SFU-K194
ATV-L
R&S®SFU-K20
TS generator
SDTV streams
included
DV-DVBH
DVB-H streams
DV-HDTV
HDTV streams
DV-TCM
TCM streams
DV-ISDBT
ISDB-T streams
R&S®SFU-B6
addit. hard disk
R&S®SFU-B4
memory extension 1
R&S®SFU-K22
TRP player
R&S®SFU-K21
TS recorder
R&S®SFU-K221
T-DMB/DAB streams
Baseband

For specifications, see PD 0758.1658.22
and www.rohde-schwarz.com
(search term: SFU)

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