R&S®SFC
Compact Modulator and
R&S®SFC-U
Compact USB Modulator
Specifications

ROHDE&SCHWARZ

Broadcasting

Data Sheet | 05.00

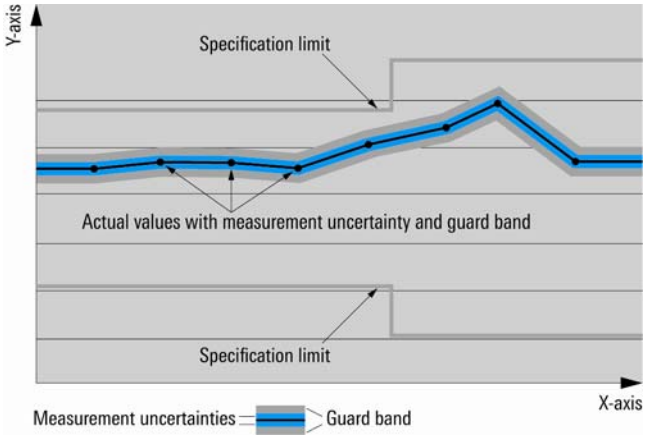
CONTENTS

Definitions

General
Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits
Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as <, ≤, >, ≥, ±, or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Specifications without limits
Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)
Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)
Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)
Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties
Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are designated with the format “parameter: value”.

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

Specifications

Rohde & Schwarz equipment is designed for reliable operation up to an altitude of 2000 m above sea level, and for transport up to an altitude of 4500 m above sea level.

RF characteristics

Frequency

Frequency range	standard	30 MHz to 900 MHz
	with R&S®SFC-K83/R&S®SFC-U-K83/ R&S®VT-K3083 option	30 MHz to 3000 MHz
Uncertainty	internal reference	see “Reference frequency”
	external reference [1]	< 0.5×10^{-9} (typ. < 1.0×10^{-10})
Setting resolution		1 Hz
Setting time	to within < 1 × 10−7 with GUI update stopped	20 ms

Reference frequency

Uncertainty		< 1.0×10^{-6}
Aging	after 14 days of uninterrupted operation	< 3.0×10^{-9}/day
Temperature effect	in operating temperature range	< 1.0×10^{-6}
Input for external reference signal	frequency (sine wave)	10 MHz
	maximum deviation	3×10^{-6}
	input level	≥ –5 dBm to ≤ 19 dBm
	recommended limits	0 dBm to 19 dBm
	input impedance	50 Ω
	connector	BNC female, front

Level

RF output	connector	SMA female, front
	output impedance	50 Ω
Maximum level	f ≤ 470 MHz	+16.5 dBm (PEP) [2]
	470 MHz < f ≤ 2.2 GHz	+13.5 dBm (PEP)
	2.2 GHz < f ≤ 3.0 GHz	+10.5 dBm (PEP)
CW [3] level back-off	modulation switched off	9.0 dB
Setting range	standard	–31.5 dBm to maximum level
	with R&S®SFC-K84/R&S®SFC-U-K84/ R&S®VT-K3084 option	–110.0 dBm to maximum level
	resolution	0.1 dB
Dynamic range of attenuator		110 dB
Level uncertainty	attenuator mode: auto, temperature range +18 °C to +33 °C	< ±1.5 dB
Output VSWR in 50 Ω system	frequency ≤ 900 MHz	< 1.8 (typ. < 1.4)
Setting time	to < 0.1 dB deviation from final value; with GUI update stopped	10 ms
Uninterruptible level setting	attenuator mode: fixed, setting range	18 dB
Back-feed (from ≥ 50 Ω source)	maximum permissible RF power in output frequency range of RF path	+30 dBm, permanent
	permissible DC voltage	±20 V

[1] Averaged over 10 minutes measurement time, 10 minutes after switching to external reference.

[2] PEP = peak envelope power; for modulation modes, RMS = root mean square; level depends on back-off.

[3] CW = continuous wave.

Spectral purity

Harmonics	level ≤ 0 dBm, CW	typ. < –30 dBc
Nonharmonics	level ≥ –20 dBm, CW, carrier offset > 10 kHz, $f_{carrier}$ = carrier frequency, $f_{spurious}$ = spurious frequency	
	30 MHz ≤ $f_{carrier}$ ≤ 900 MHz	reference: signal power
	30 MHz ≤ $f_{spurious}$ ≤ 900 MHz	< –60 dBc
	900 MHz < $f_{spurious}$ ≤ 3000 MHz	< –55 dBc
	900 MHz < $f_{carrier}$ ≤ 3000 MHz	reference: signal power
	30 MHz ≤ $f_{spurious}$ ≤ 900 MHz	< –55 dBc
	900 MHz < $f_{spurious}$ ≤ 3000 MHz	< –60 dBc (additionally limited by carrier leakage and sideband suppression)
Broadband noise	carrier offset > 10 MHz, output level ≥ +10 dBm, measurement bandwidth 1 Hz	< –130 dBc (typ. < –140 dBc)
SSB phase noise	carrier offset 20 kHz, measurement bandwidth 1 Hz	typ. < –100 dBc

I/Q modulation

I/Q modulator

Modulation frequency range		DC to 35 MHz
Modulation frequency response [4]	up to 35 MHz 900 MHz < f ≤ 3000 MHz	< ±2.0 dB
	up to 25 MHz 30 MHz < f ≤ 3000 MHz	< ±1.0 dB
	up to 5 MHz 30 MHz < f ≤ 3000 MHz	< ±0.5 dB
Carrier leakage	f ≤ 900 MHz	< –80 dBc
	f > 900 MHz	< –50 dBc
	without input signal, referenced to full-scale input [5]	typ. < –65 dBc after local adjustment
Sideband suppression	f ≤ 900 MHz	< –80 dBc
	f > 900 MHz	< –45 dBc
	modulation frequency ≤ 100 kHz, referenced to signal power	typ. < –60 dBc after local adjustment
I/Q swap	I and Q signals swapped	on, off

Internal baseband I/Q

Signal characteristics		see “Digital modulation systems”
D/A converter	sample rate	100 MHz
	resolution	12 bit
	sample rate	400 MHz (internal interpolation × 4)

Extended I/Q input (R&S®SFC-K80 option, R&S®SFC-U-K80 option, R&S®VT-K2600 option)

The R&S®SFC-K80 option/R&S®SFC-U-K80 option allows external digital signals to be fed into the baseband signal processing unit of the R&S®SFC (R&S®SFC-U). Noise signals can be superimposed on input signals if the noise option has been installed.

Digital I/Q input	connector	Mini D Ribbon, 26 pins, rear
	level	LVDS
	word width	16 bit
	analog bandwidth	0 Hz to 35 MHz
	symbol rate	3 ksymbol/s to 100 Msymbol/s

[4] This frequency response is superimposed on all frequency responses of this specification.

[5] Value applies after 1 h warm-up time and recalibration for 4 h of operation as well as temperature variations of less than ±5 °C.

Digital baseband

Internal test signals

MPEG-2 TS packet	header + 184 byte payload PID = 1FFF (hex)	payload: PRBS
MPEG-specific TS packet	sync byte + 187 byte payload	payload: PRBS
DIRECTV TS packet	header + 127 byte payload	payload: PRBS
DIRECTV TS packet without header	130 byte payload	payload: PRBS
PRBS	PRBS in line with ITU-T O.151	$2^{23} – 1$, $2^{15} – 1$ (selectable)

MPEG-2 inputs

ASI/SMPTE310M/ETI serial input	connector	BNC female
	ASI input level	200 mV to 880 mV
	SMPTE310M input level	400 mV to 880 mV
	ETI input level	0 V to ±2.37 V (HDB3)
	input impedance	75 Ω
	ASI data rate	270 Mbit/s
	SMPTE310M data rate	19.392658 Mbit/s
	ETI data rate	2048 kbit/s
Stuffing	ASI, SMPTE310M	on, off
	stuffing packets	see MPEG-2 TS packet under “Internal test signals”
Display	measured values	packet length, input data rate, useful data rate

TRP player (R&S®SFC-K22 option, R&S®SFC-U-K22 option, R&S®VT-K22 option always included)

Replay	file format	TRP, T10, BIN, (any recorded data streams)
	length of transport stream packets	corresponding to externally applied/recorded transport stream
	replay time/sequence length	endless (but not seamless) replay with cut at transition from end of file to beginning of file; seamless in case of TRP file
	data rate	corresponding to hard disk’s recording data rate and setting (100 kbit/s to max. 90 Mbit/s)
	data volume	limited only by hard disk size

Analog baseband

Audio player

Waveform memory	sequence duration	80 s
	resolution	16 bit for AF1 and 16 bit for AF2
Audio	number of signals	2 channels, AF1 and AF2
	bandwidth	DC to 15 kHz
	level	16 bit full scale in each channel corresponds to standard deviation
	frequency response	< ±0.3 dB
Clock generation	clock rate	50 kHz
Marker	position	restart waveform

Internal audio signal generator

Audio signals	number of signals	2, can be set separately
	frequency	30 Hz to 15 kHz, in 1 Hz steps
	level	–60 dBu to +12 dBu, in 0.01 dB steps, 6 dBu corresponds to standard deviation

Internal NICAM audio signal generator

Audio signals	number of signals	2, can be set separately
	frequency	30 Hz to 15 kHz, in 1 Hz steps
	level	–60 dBu to +12 dBu, in 0.01 dB steps, 6 dBu corresponds to standard headroom

Internal video signal generator (R&S®SFC-K23 option, R&S®SFC-U-K23 option, R&S®VT-K23 option, always included)

Internal video generator		
Video signals	ATV video basic test signals	COLORBARS_75 (PAL)
		COLORBARS_75 (PAL M)
		COLORBARS_75 (PAL N)
		COLORBARS_75 (NTSC)
		COLORBARS_75 (SECAM)
		FuBK (PAL)
Insertion test signal structure	in line with country-specific standards	
PAL color bar 75 %	first field	
	line 16	2T pulse
	line 17	CCIR17
	line 18	CCIR18/1
	line 19	CCIR18/2
	line 20	data line
	line 21	teletext insertion test signal
	second field	
	line 319	ramp
	line 329	modulated ramp
	line 330	CCIR330/5
	line 331	CCIR331/1
	line 332	red line
	line 333	sin x/x
	line 334	15 kHz, 200 ns
	line 335	250 kHz, 100 ns
PAL M color bar 75 %	first field	
	line 16	2T pulse
	line 17	NTC7 composite
	line 18	FCC composite
	second field	
	line 11	ramp
	line 12	modulated ramp
	line 13	red line
	line 14	15 kHz, 250 ns
	line 15	250 kHz, 125 ns
	line 16	FCC multiburst
	line 17	NTC7 combined
	line 18	sin x/x
PAL N color bar 75 %	first field	
	line 16	2T pulse
	line 17	CCIR17
	line 18	CCIR18/1
	line 19	CCIR18/2
	line 20	data line
	line 21	teletext insertion test signal
	second field	
	line 319	ramp
	line 329	modulated ramp
	line 330	CCIR330/5
	line 331	CCIR331/1
	line 332	red line
	line 333	sin x/x
	line 334	15 kHz, 200 ns
	line 335	250 kHz, 100 ns

NTSC color bar 75 %	first field	
	line 16	2T pulse
	line 17	NTC7 composite
	line 18	FCC composite
	second field	
	line 11	ramp
	line 12	modulated ramp
	line 13	red line
	line 14	15 kHz, 250 ns
	line 15	250 kHz, 125 ns
	line 16	FCC multiburst
	line 17	NTC7 combined
	line 18	sin x/x
SECAM color bar 75 %	first field	
	lines 7 to 15	discriminating signal
	line 16	2T pulse
	line 17	CCIR17
	line 18	CCIR18/1
	line 19	CCIR18/2
	line 20	data line
	line 21	teletext insertion test signal
	second field	
	line 319	ramp
	lines 320 to 328	discriminating signal
	line 329	modulated ramp
	line 330	CCIR330/5
	line 331	CCIR331/1
	line 332	red line
	line 333	sin x/x
	line 334	15 kHz, 200 ns
	line 335	250 kHz, 100 ns
PAL FuBK	first field	
	line 16	2T pulse
	line 17	CCIR17
	line 18	CCIR18/1
	line 19	CCIR18/2
	line 20	data line
	line 21	teletext insertion test signal
	second field	
	line 319	ramp
	line 329	modulated ramp
	line 330	CCIR330/5
	line 331	CCIR331/1
	line 332	red line
	line 333	sin x/x
	line 334	15 kHz, 200 ns
	line 335	250 kHz, 100 ns
Additional signals	analog video signals	see R&S®ATV video option

Analog video library (R&S®ATV video option, R&S®LIB-K50 option)

A library with different analog standards is available to complement the R&S®SFC-K23/ R&S®SFC-U-K23/ R&S®VT-K23 analog video generator option. For more information, see the “Stream libraries for broadcasting T&M equipment from Rohde & Schwarz” data sheet.

Digital modulation systems

Terrestrial standards

DVB-T2 (R&S®SFC-K16 option, R&S®SFC-U-PK4 option, R&S®VT-K616 option)

DVB-T2	in line with EN 302755	Europe
Modulation	modulation	COFDM
	PLP number	1 (single PLP) to 16 (multi-PLP)
	bandwidth	1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz, (overrange 10 MHz)
	MER	> 40 dB [6]
	modulation frequency response	< ±0.2 dB
	shoulder attenuation	> 45 dB
	back-off	17.9 dB
Coding	baseband mode	normal (NM), high efficiency (HEM)
	code rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6
	constellation	QPSK, 16QAM, 64QAM, 256QAM
	rotation	on, off
	time interleaver	settable
	FFT mode	1k, 2k, 4k, 8k, 16k and 32k COFDM
	extended carrier mode	on, off
	pilot pattern	PP1, PP2, PP3, PP4, PP5, PP6, PP7, PP8
	guard interval	1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128
	T2 frames per superframe	settable
	OFDM symbols per T2 frame	settable
	PAPR	off, tone reservation (TR) [7]
Network mode		MFN, SFN
Test signals		TS test packet with settable payload (PRBS, 0x00, 0xFF) (see “Internal test signals”)

DVB-T/DVB-H (R&S®SFC-K1 option, R&S®SFC-U-PK1 option, R&S®VT-K601 option)

DVB-T/DVB-H	in line with EN 300744/EN 302304	Europe
Modulation	modulation	COFDM
	bandwidth	5 MHz, 6 MHz, 7 MHz, 8 MHz
	MER	> 40 dB [8]
	modulation frequency response	< ±0.2 dB
	shoulder distance	> 48 dB
	back-off	13.5 dB
Coding	constellation	QPSK, 16QAM, 64QAM, hierarchical coding
	code rate	1/2, 2/3, 3/4, 5/6, 7/8
	guard interval	1/4, 1/8, 1/16, 1/32
	FFT mode	2k, 4k and 8k COFDM
	interleaver	native and in-depth
	TPS	in line with DVB-T/DVB-H
Special functions	Reed-Solomon encoder	can be switched off
Network mode		MFN
Test signals		TS test packet (see “Internal test signals”), PRBS after convolutional encoder

[6] With internal test signals.

[7] Reserved carriers are always modulated with 0+j0.

[8] With internal test signals.

T-DMB/DAB (R&S®SFC-K11 option, R&S®SFC-U-PK5 option, R&S®VT-K611 option)

T-DMB/DAB	in line with T-DMB/EN 300401	Korea/Europe
Modulation	modulation	COFDM
	mode	I, II, III, IV
	bandwidth	1.536 MHz
	modulation frequency response	< 0.2 dB
	shoulder distance	> 45 dB
	back-off	13 dB
Single-frequency network	network mode	MFN
	control	MID, manual
Special function	PRBS	can be inserted into a subchannel [9]

DTMB (R&S®SFC-K12 option, R&S®SFC-U-PK1 option, R&S®VT-K612 option)

DTMB	in line with GB20600-2006	
Modulation	modulation	COFDM/single carrier
	bandwidth	6 MHz, 7 MHz, 8 MHz
	modulation frequency response	< 0.2 dB
	shoulder distance	> 50 dB
	back-off	12 dB
Coding	constellation	4QAM(QPSK), 4QAM-NR, 16QAM, 32QAM, 64QAM
	code rate	0.4, 0.6, 0.8
	guard interval	420, 595, 945 symbols
	guard interval PN	variable/constant
	time interleaver	240, 720 symbols, off
	FFT mode	4k COFDM
	dual pilot tone	on, off (single carrier)
Network mode		MFN
Test signals		TS test packet (see “Internal test signals”)

CMMB (R&S®SFC-K15 option, R&S®SFC-U-PK1 option, R&S®VT-K615 option)

CMMB	in line with GY/T 220.1-2006	
Modulation	modulation	COFDM
	bandwidth	2 MHz, 8 MHz
	modulation frequency response	< 0.2 dB
	shoulder attenuation	> 50 dB
	back-off	14 dB
Coding	FFT mode	1k, 4k
	scrambling mode	0 to 7
	number of timeslots	40
	services	
	Reed-Solomon	(240, 240)
		(240, 224)
		(240, 192)
		(240, 176)
	byte interleaver	1 to 3
	LDPC	1/2, 3/4
	constellation	BPSK, QPSK, 16QAM
Network mode		MFN

MediaFLO™ (R&S®SFC-K10 option, R&S®SFC-U-PK1 option)

MediaFLO™	in line with TIA-1099 Rev. A, AIS Rev. 1.0 and 2.0	
Modulation	modulation	COFDM
	bandwidth	5 MHz, 6 MHz, 7 MHz, 8 MHz
	modulation frequency response	< 0.2 dB
	shoulder distance	40 dB
	back-off	15.5 dB
Coding	FFT mode	2k, 4k, 8k
Network mode		MFN
Test signals		PRBS

[9] Can be inserted into an existing, user-selectable subchannel of an incoming, valid ETI data stream.

ATSC/8VSB (R&S®SFC-K4 option, R&S®SFC-U-PK1 option, R&S®VT-K618 option)

ATSC/8VSB	in line with ATSC Doc. A/53 (8VSB)	
Modulation	modulation	8VSB
	bandwidth	6 MHz
	symbol rate	10.762 Msymbol/s
	range	settable ± 5 %
	pilot	1.25
	pulse filtering	root-raised-cosine rolloff, α = 0.115
	MER	40 dB
	modulation frequency response	< ±0.25 dB
	shoulder distance	> 45 dB
	back-off	9 dB
Coding	input data rate	19.392658 Mbit/s
	range	±5 % (depending on symbol rate)
Network mode		MFN
Test signals		TS test packet (see “Internal test signals”)

ATSC-M/H (R&S®SFC-K18 option, R&S®SFC-U-PK1 option, R&S®VT-K618 option)

ATSC Mobile DTV, ATSC-M/H	in line with ATSC Doc. A/153	mobile TV USA
Modulation	modulation	8VSB
	bandwidth	6 MHz
	symbol rate	10.762 Msymbol/s
	range	settable ± 5 %
	pilot	1.25 (can be switched off)
	range	settable (from 0 to 5 in steps of 0.001)
	pulse filtering	root-raised-cosine rolloff, α = 0.115
	MER	40 dB [10]
	modulation frequency response	< ±0.25 dB
	shoulder attenuation	> 45 dB
Coding	input data rate	19.392658 Mbit/s
	range	±5 % (depending on symbol rate)
	RF watermark	supported
	MTXID	supported
Network mode		MFN
Test signals		TS test packet (see “Internal test signals”)

ISDB-T/ISDB-T_{SB}/ISDB-T_B (R&S®SFC-K6 option, R&S®SFC-U-PK1 option, R&S®VT-K606 option)

ISDB-T	in line with ARIB STD-B31 version 1.5	
ISDB-T_{SB}	in line with ARIB STD-B29 ISDB-T_{SB}	
ISDB-T_B	Brazil	
Modulation	modulation	OFDM
	bandwidth	6 MHz (variable: ±1000 ppm)
	number of segments	
	STD-B31	13
	STD-B29	1, 3
	MER	> 40 dB
	modulation frequency response	< 0.2 dB
	shoulder distance	> 48 dB
	back-off	13 dB
Coding	FFT mode	2k, 4k, 8k
	number of layers	1 to 3 (1 or 2 in line with ISDB-T_{SB})
	constellation	QPSK, DQPSK, 16QAM, 64QAM
	code rate	1/2, 2/3, 3/4, 5/6, 7/8
	guard interval	1/4, 1/8, 1/16, 1/32
	time interleaver	0, 1, 2, 4, 8, 16 (additionally 32 with ISDB-T_{SB})
Special function	AC information	PRBS, All 1
Network mode		MFN
Test signals		TS test packet (see “Internal test signals”)

[10] With internal test signals.

Cable standards

DVB-C2 (R&S®SFC-K17 option, R&S®SFC-U-PK4 option, R&S®VT-K617 option)

DVB-C2	in line with EN 302 769	
Input	transport stream	
	interface	ASI
	format	MPEG-2 TS
	PLP	
	number of PLPs	1 to 4
	payload	1 live and 3 PRBS
	ID	settable
	type	normal data PLP
Modulation	modulation	OFDM
	mode	16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM
	channel raster bandwidth	6 MHz, 8 MHz
	bundled channels [11]	
	number	1 and 2 channels
	bandwidth	5.71 /7.61/11.42/15.22 MHz
	MER	> 40 dB [12]
	modulation frequency response	< ±0.2 dB
	shoulder attenuation	> 45 dB
Coding	baseband mode	normal (NM), high efficiency (HEM)
	guard interval	1/64, 1/128
	BICM	
	FEC frame	normal (64k), short (16k)
	code rate (concatenated BCH/LDPC)	2/3, 3/4, 4/5, 5/6, 8/9 (short FEC frame), 9/10 (normal FEC frame)
	data slice	
	number of data slices	1, 1 to 4 [11]
	ID	settable
	packets	type 1 [11], type 2, stuffing
	tune position	settable
	tune offset	left, right, settable
	FEC frame header type	robust, high efficiency (data slice type 2)
	number of FEC frames	1 and 2 [11] (data slice type 2)
	number of PLPs	1 to 4
	time interleaving	none, 4 symbols, 8 symbols, 16 symbols
	notch types[11]	narrowband, broadband
C2 system	C2 system ID	settable
	network ID	settable
	layer 1 part 2 signaling	
	time interleaving	none, best fit, 4 symbols, 8 symbols
	code rate (concatenated BCH/LDPC)	1/2 (16k LDPC)
	mode	16QAM
Test signals		TS test packet with settable payload (PRBS ITU-T O.151, 0x00, 0xFF) (see “Internal test signals”)

[11] In preparation.

[12] With internal test signals.

DVB-C/ISDB-C (R&S®SFC-K2 option, R&S®SFC-U-PK2 option, R&S®VT-K602 option)

DVB-C	in line with ITU-T J.83/A (EN 300429)	
ISDB-C	in line with ITU-T J.83/C	
Modulation	modulation	16QAM, 32QAM, 64QAM, 128QAM, 256QAM
	symbol rate	1 Msymbol/s to 8 Msymbol/s, settable
	pulse filtering	root-raised-cosine rolloff, α = 0.13, 0.15
	MER	40 dB
	modulation frequency response	±0.25 dB
	shoulder distance	> 48 dB
	back-off	9 dB
Special functions	Reed-Solomon encoder	can be switched off
Test signals		TS test packet (see “Internal test signals”), PRBS before mapper

J.83/B (R&S®SFC-K5 option, R&S®SFC-U-PK2 option, R&S®VT-K602 option)

J.83/B	in line with ITU-T J.83/B	
Modulation	modulation	64QAM, 256QAM, 1024QAM
	bandwidth	6 MHz
	symbol rate	
	64QAM	5.0569 Msymbol/s
	256QAM	5.3605 Msymbol/s
	1024QAM	5.3605 Msymbol/s
	pulse filtering	root-raised-cosine rolloff, α = 0.18 (64QAM), 0.12 (256/1024QAM)
	MER	40 dB
	modulation frequency response	±0.25 dB
	shoulder distance	
	64QAM	> 50 dB
	256QAM	> 45 dB
	1024QAM	> 45 dB
	back-off	9 dB
Coding	input data rate	
	64QAM	26.97035 Mbit/s
	256QAM	38.81070 Mbit/s
	1024QAM	49.02525 Mbit/s
	data interleaver	level 1 and level 2
Special functions	Reed-Solomon encoder	can be switched off
Test signals		TS test packet (see “Internal test signals”), PRBS before mapper

Satellite standards

DVB-S/DVB-DSNG (R&S®SFC-K3 option, R&S®SFC-U-PK3 option, R&S®VT-K608 option)

DVB-S/DVB-DSNG	in line with EN 300421/EN 301210	
Modulation	modulation	QPSK, 8PSK, 16QAM
	symbol rate	100 ksymbol/s to 45 Msymbol/s, settable
	pulse filtering	root-raised-cosine rolloff, α = 0.35, 0.25
	MER	38 dB (27.5 Msymbol/s)
	modulation frequency response	±0.25 dB
	shoulder distance	> 45 dB
	back-off	9 dB
Coding	code rate	QPSK: 1/2, 2/3, 3/4, 5/6, 7/8
		8PSK: 2/3, 5/6, 8/9
		16QAM: 3/4, 7/8
Special functions	Reed-Solomon encoder	can be switched off
Test signals		TS test packet (see “Internal test signals”), PRBS before convolutional encoder

DVB-S2 (R&S®SFC-K8 option, R&S®SFC-U-PK3 option, R&S®VT-K608 option)

DVB-S2	in line with EN 302307, broadcast services	
Modulation	modulation	QPSK, 8PSK, 16APSK, 32APSK
	symbol rate	
	QPSK	1 Msymbol/s to 47 Msymbol/s (overrange 53 Msymbol/s)
	8PSK	1 Msymbol/s to 40 Msymbol/s (overrange 45 Msymbol/s)
	16APSK	1 Msymbol/s to 39 Msymbol/s
	32APSK	1 Msymbol/s to 32 Msymbol/s
	pulse filtering	root-raised-cosine rolloff, α = 0.20 variable rolloff (0.15, 0.20, 0.25, 0.35)
	MER	38 dB (20 Msymbol/s)
	modulation frequency response	±0.25 dB
	shoulder distance	45 dB
	back-off	12 dB
Coding	code rate	QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
		8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
		16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
		32APSK: 3/4, 4/5, 5/6, 8/9, 9/10
	FEC frame	normal (64800 bit)/short (16200 bit)
	pilot insertion	can be switched off
Special function	error insertion	after CRC-8, BCH or LDPC
Test signals		TS test packet (see “Internal test signals”)

DIRECTV legacy modulation (R&S®SFC-K9 option, R&S®SFC-U-PK3 option, R&S®VT-K609 option)

DIRECTV legacy modulation	in line with DIRECTV transmission specifications	
Modulation	modulation	QPSK
	symbol rate	20 Msymbol/s
	overrange	1 Msymbol/s to 30 Msymbol/s
	pulse filtering	root-raised-cosine rolloff, α = 0.20 variable rolloff (0.15, 0.20, 0.25, 0.35)
	MER	38 dB (20 Msymbol/s)
	modulation frequency response	< ±0.25 dB
	shoulder distance	45 dB
	back-off	11.5 dB
Coding	code rate	1/2, 2/3, 6/7
Special functions	customer-specific DIRECTV streams error insertion	can be replayed in 188-byte format after convolutional encoder
Test signals		TS test packet (see “Internal test signals”)

Analog modulation systems

FM/RDS (R&S®SFC-K170 option, R&S®SFC-U-PK5 option, R&S®VT-K670 option)

FM	FM operating modes	stereo, mono
	audio signals	
	internal audio signal generator	see “Internal audio signal generator”
	AF frequency range	30 Hz to 15 kHz
	AF frequency response	< 0.2 dB
	preemphasis	off, 50 µs, 75 µs
	residual AM	< 0.1 % (at AF = 1 kHz, deviation ±50 kHz)
FM stereo	stereo operating modes	L, R, L = R, L = –R, L ≠ R internal generation of RDS signal, simultaneous generation of MPX and RDS signals possible
	MPX frequency deviation	
	deviation	0 Hz to ±100 kHz
	resolution	10 Hz
	stereo crosstalk attenuation [13]	typ. 52 dB (RMS) (at AF = 30 Hz to 15 kHz)
	total harmonic distortion [10, 14]	≤ 0.2 % (at 60 kHz audio frequency deviation, AF = 1 kHz)
	SNR (stereo/RDS signal) [14]	at ±40 kHz audio frequency deviation
	ITU-R weighted (quasi-peak)	typ. 47 dB
	ITU-R unweighted (RMS)	typ. 58 dB
	pilot tone	
	frequency	19 kHz ± 1 Hz
	deviation	0 Hz to ±15 kHz
	resolution	10 Hz
	phase	0° to ±180°
	resolution	0.1°
	RDS	
	subcarrier frequency	57 kHz ± 3 Hz
	deviation	0 Hz to ±10 kHz
	resolution	10 Hz
FM mono	mono frequency deviation	
	deviation	0 Hz to ±100 kHz
	resolution	10 Hz
	total harmonic distortion [10, 15]	≤ 0.4 % (at ±67.5 kHz audio frequency deviation, AF = 1 kHz)

[13] Selective measurement, relative to useful signal.

[14] Generator without preemphasis, receiver with deemphasis.

[15] Generator and receiver without preemphasis/deemphasis.

B/G standard (R&S®SFC-K190 option, R&S®SFC-U-PK6 option, R&S®VT-K695 option)

B/G standard	in line with country-specific standard	
Vision modulation	modulation	B/G
	group delay	
	precorrection	CCIR – B/G general half (can be switched off), B/G Australia (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	B/G (can be switched off)
	amplitude frequency response	< 0.5 dB (–0.6 MHz to +4.8 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	signal-to-noise ratio	
	video	> 60 dB, weighted
	back-off	6 dB
Sound modulation	operating mode	mono, stereo, dual tone, NICAM, mono/NICAM
	modulation of sound carrier 1, 2	
	modulation mode	FM
	frequency deviation	30 kHz (settable)
	preemphasis	50 µs/75 µs (can be switched off)
	vision/sound intercarrier frequency	5.5 MHz/5.742 MHz (settable)
	vision/sound carrier power ratio	13 dB/20 dB (settable)
	pilot tone	in sound carrier 2 (can be switched off)
	signal-to-noise ratio	
	sound	> 60 dB, weighted (CCIR)
Video signals	internal video signal generator	see R&S®SFC-K23
Audio signals	internal audio generator	see “Internal audio signal generator”
		see “Internal NICAM audio signal generator”
	audio player	see “Audio player”

D/K standard (R&S®SFC-K191 option, R&S®SFC-U-PK6 option, R&S®VT-K695 option)

D/K standard	in line with country-specific standard	
Vision modulation	modulation	D/K
	group delay	
	precorrection	OIRT – D/K half (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	DK, DK-FM2, DK-NICAM (can be switched off)
	amplitude frequency response	< 0.5 dB (–1 MHz to +5.8 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	signal-to-noise ratio	
	video	> 60 dB, weighted
	back-off	6 dB
Sound modulation	operating mode	mono, stereo, dual tone, NICAM, mono/NICAM
	modulation of sound carrier 1, 2	
	modulation mode	FM
	frequency deviation	30 kHz (settable)
	preemphasis	50 µs/75 µs (can be switched off)
	vision/sound intercarrier frequency	6.5 MHz/6.742 MHz (settable)
	vision/sound carrier power ratio	13 dB/20 dB (settable)
	pilot tone	in sound carrier 2 (can be switched off)
	signal-to-noise ratio	
	sound	> 60 dB, weighted (CCIR)
Video signals	internal video signal generator	see R&S®SFC-K23
Audio signals	internal audio generator	see “Internal audio signal generator” see “Internal NICAM audio signal generator”
	audio player	see “Audio player”

I standard (R&S®SFC-K192 option, R&S®SFC-U-PK6 option, R&S®VT-K695 option)

I standard	in line with country-specific standard	
Vision modulation	modulation	I
	group delay	
	precorrection	UK: I (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	I, I1 (can be switched off)
	amplitude frequency response	< 0.5 dB (–1 MHz to +4.8 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	signal-to-noise ratio	
	video	> 60 dB, weighted
	back-off	6 dB
Sound modulation	operating mode	mono, NICAM, mono/NICAM
	modulation of sound carrier 1	
	modulation mode	FM
	frequency deviation	30 kHz (settable)
	preemphasis	50 µs/75 µs (can be switched off)
	vision/sound intercarrier frequency	6 MHz (settable)
	vision/sound carrier power ratio	13 dB (settable)
	modulation of sound carrier 2	
	modulation mode	NICAM
	vision/sound intercarrier frequency	6.552 MHz (settable)
	vision/sound carrier power ratio	20 dB (settable)
	signal-to-noise ratio	
	sound	> 60 dB, weighted (CCIR)
Video signals	internal video signal generator	see R&S®SFC-K23
Audio signals	internal audio generator	see “Internal audio signal generator”
		see “Internal NICAM audio signal generator”
	audio player	see “Audio player”

M/N standard (R&S®SFC-K193 option, R&S®SFC-U-PK6 option, R&S®VT-K695 option)

M/N standard	in line with country-specific standard	
Vision modulation	modulation	M/N
	group delay	
	precorrection	FCC: M/N (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	M, N (can be switched off)
	amplitude frequency response	< 0.5 dB (–0.6 MHz to +4 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	signal-to-noise ratio	
	video	> 60 dB, weighted
	back-off	6 dB
Sound modulation	operating mode	BTSC mono, stereo Korea, dual Korea
	modulation of sound carrier 1, 2	
	modulation mode	FM
	frequency deviation	25 kHz (settable)
	preemphasis	50 µs/75 µs (can be switched off)
	vision/sound intercarrier frequency	4.5 MHz/4.742 MHz (settable)
	vision/sound carrier power ratio	13 dB/20 dB (settable)
	pilot tone	in sound carrier 2 (can be switched off)
	signal-to-noise ratio	
	sound	> 60 dB, weighted (CCIR)
Video signals	internal video signal generator	see R&S®SFC-K23
Audio signals	internal audio generator	see “Internal audio signal generator”
	audio player	see “Audio player”

L standard (R&S®SFC-K194 option, R&S®SFC-U-PK6 option, R&S®VT-K695 option)

L standard	in line with country-specific standard	
Vision modulation	modulation	L
	group delay	
	precorrection	TDF: L (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	L, L NICAM (can be switched off)
	amplitude frequency response	< 0.5 dB (–1 MHz to +5.8 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	signal-to-noise ratio	
	video	> 60 dB, weighted
	back-off	6 dB
Sound modulation	operating mode	AM mono, NICAM, AM mono/NICAM
	modulation of sound carrier 1	
	modulation mode	mono/NICAM
	vision/sound intercarrier frequency	5.85 MHz (settable)
	vision/sound carrier power ratio	27 dB (settable)
	modulation of sound carrier 2	
	modulation mode	AM
	frequency deviation	modulation depth 54 % (settable)
	vision/sound intercarrier frequency	6.5 MHz (settable)
	vision/sound carrier power ratio	10 dB (settable)
Video signals	internal video signal generator	see R&S®SFC-K23
Audio signals	internal audio generator	see “Internal audio signal generator”
		see “Internal NICAM audio signal generator”
	audio player	see “Audio player”

ATV multistandard (R&S®SFC-K195 option, R&S®VT-K695 option)

B/G standard		see R&S®SFC-K190
D/K standard		see R&S®SFC-K191
I standard		see R&S®SFC-K192
M/N standard		see R&S®SFC-K193
L standard		see R&S®SFC-K194

Internal NICAM encoder

Included in the following options: R&S®SFC-K190, R&S®SFC-K191, R&S®SFC-K192, R&S®SFC-K194, R&S®SFC-K195, R&S®SFC-U-PK6 and R&S®VT-K695.

Audio coding	internal audio generator	see “Internal NICAM audio signal generator”
	audio player	see “Audio player”
	operating mode	mono, stereo, dual tone
	preemphasis	J.17 (can be switched off)
	headroom (400 Hz)	–6 dB to +6 dB, can be set different from standard
Encoder	data	audio coding, NICAM728 data input, PRBS, NICAM audio generator
	pulse filtering	root-raised-cosine rolloff, α = 0.40 (B/G, D/K, L standards) α = 1.00 (I standard)

Simulation

AWGN generator (R&S®SFC-K40 option, R&S®SFC-U-K40 option, R&S®VT-K1340 option)

Maximum 3 dB spectrum (AWGN)	DVB-T/DVB-H	2.2 × channel bandwidth
	DVB-T2	2.2 × channel bandwidth
	T-DMB/DAB	7.9 MHz
	DTMB	3.6 × channel bandwidth
	CMMB	2.4 × channel bandwidth
	MediaFLO™	1.8 × channel bandwidth
	ATSC/8VSB	20.7 MHz
	ATSC-M/H	20.7 MHz
	ISDB-T/ISDB-T_{SB}/ISDB-T_B	15.6 MHz
	DVB-C2	
	6 MHz channel bandwidth	26.3 MHz
	8 MHz channel bandwidth	35.1 MHz
	DVB-C/ISDB-C	1.9 × symbol rate
	J.83/B	1.9 × symbol rate
	DVB-S/DVB-DSNG	
	symbol rate < 1 Msymbol/s	15.2 × symbol rate
	symbol rate < 9.357 Msymbol/s	7.6 × symbol rate
	symbol rate < 18.75 Msymbol/s	3.8 × symbol rate
	symbol rate < 25 Msymbol/s	2.9 × symbol rate
	symbol rate < 45 Msymbol/s	1.9 × symbol rate
	DVB-S2	90.2 MHz
	DIRECTV	80.6 MHz
	audio broadcast	5.5 MHz
	analog TV	25.2 MHz
Noise	density distribution function	Gaussian, statistical, separate for I and Q
	crest factor	18 dB
C/N	setting range	–30 dB to +60 dB
	resolution	0.01 dB
	uncertainty (for system bandwidth = symbol rate and C/N < 20 dB)	< 0.2 dB
System bandwidth (bandwidth for calculating noise power)	range	100 kHz to 80 MHz

Trigger inputs/outputs

1 PPS input	connector	BNC female, rear
	input impedance	high impedance
	input level	LVTTL

General data

General data is not applicable for R&S®VT-B600 Broadcast TX Modulator as R&S®VTC/VTE/VTS base unit specification applies.

R&S®SFC system data

System	internal operating system	PC platform
		Windows XP Embedded
		min. 160 Gbyte internal hard disk
External control	control	external mouse and keyboard via USB
	monitor interface	DVI-D
Remote control	command set	SCPI 1999.5
	Ethernet	10/100BaseT
Connectors	Ethernet	RJ-45, rear
	USB	USB 2.0
	AC supply input	IEC 60320 C14, rear

R&S®SFC-U system data

System	minimum requirements on external operating system (customer PC)	PC platform
		Windows XP service pack 3, 32 bit
		Windows 7
	external controlling interface	USB 2.0 (recommended: root hub only)
Number of supported R&S®SFC-U modulators	per customer PC	one
Remote control	command set	SCPI 1999.5
Connectors	USB	USB 2.0 (type B)
	DC supply input	DC barrel power jack (5.5 mm × 9.5 mm × 2.5 mm) (0.21 in × 0.37 in × 0.10 in)

Operating data

Power supply (R&S®SFC)		
AC input voltage range		100 V to 240 V ± 10 %
Supply frequency		50 Hz to 60 Hz ± 5 %
Input current		1.7 A to 0.8 A
Power consumption		
R&S®SFC-B15 active		typ. 44 W
R&S®SFC-B15 inactive		typ. 37 W
Power supply (R&S®SFC-U)	always use the power supply delivered with the R&S®SFC-U; use of other power supplies may cause malfunction and loss of warranty	
DC input voltage range		12 V ± 5 %
Input current		max. 3.0 A
Electromagnetic compatibility	power factor correction	in line with EN 55011 class B, EN 61326, EN 61000-3-2, EN 61000-3-3
Immunity against RF fields		up to 10 V/m

Environmental conditions		
Operating temperature range	standalone operation	+5 °C to +45 °C in line with EN 60068-2-1, EN 60068-2-2
	R&S®SFC installed in R&S®ZZA-KN99	+5 °C to +40 °C
Permissible temperature range		0 °C to +50 °C
Storage temperature range		–20 °C to +60 °C
Climatic resistance		85 % rel. humidity, cyclic test at +25 °C/+40 °C
Mechanical resistance	vibration, sinusoidal	5 Hz to 150 Hz, max. 1.8 g at 55 Hz, 55 Hz to 150 Hz, 0.5 g constant, in line with EN 60068-2-6
	vibration, random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
	shock	40 g shock spectrum, in line with EN 60068-2-27, MIL-STD-810E
Electrical safety		in line with IEC 61010-1, EN 61010-1 and UL 61010-1, CSA C22.2 No. 61010-1
Dimensions	R&S®SFC (without handles)	229 mm × 54.4 mm × 406 mm (9.02 in × 2.14 in × 15.98 in)
	R&S®SFC-U (without handles)	177 mm × 40 mm × 241 mm (6.97 in × 1.57 in × 9.49 in)
Weight	R&S®SFC	4 kg (8.82 lb)
	R&S®SFC-U (without power supply)	1.5 kg (3.31 lb)
Recommended calibration interval		3 years
Standard warranty period		1 year

Ordering information R&S®SFC/R&S®SFC-U

Option identification: R&S®SFC-Bxy = hardware option, R&S®SFC-Kxy = software option.
The R&S®SFC base unit must be ordered with at least one modulation system.

Designation	Type	Order No.
Compact Modulator	R&S®SFC	2115.3510.02
(including power cable, Quick Start Guide, CD-ROM with operating manuals)		
Compact USB Modulator	R&S®SFC-U	2115.3540.02
(including R&S®SFC-U-B15, external power supply, power cable, Quick Start Guide, CD-ROM with operating manuals)		

R&S®SFC options		
Digital modulation systems		
DVB-T/DVB-H Coder	R&S®SFC-K1	2115.5271.02
DVB-C/ISDB-C Coder	R&S®SFC-K2	2115.5294.02
DVB-S/DVB-DSNG Coder	R&S®SFC-K3	2115.5313.02
DVB-S2 Coder	R&S®SFC-K8	2115.5394.02
ATSC/8VSB Coder	R&S®SFC-K4	2115.5336.02
J.83/B Coder	R&S®SFC-K5	2115.5359.02
ISDB-T/ISDB-T_{SB}/ISDB-T_B Coder	R&S®SFC-K6	2115.5371.02
MediaFLO™ Coder	R&S®SFC-K10	2115.5859.02
T-DMB/DAB Coder	R&S®SFC-K11	2115.5436.02
DTMB/DMB-TH Coder	R&S®SFC-K12	2115.5459.02
DIRECTV Legacy Modulation Coder	R&S®SFC-K9	2115.5413.02
CMMB Coder	R&S®SFC-K15	2115.5471.02
DVB-T2 Coder (R&S®SFC-B15 option required)	R&S®SFC-K16	2115.5494.02
DVB-C2 Coder (R&S®SFC-B15 option required)	R&S®SFC-K17	2115.5871.02
ATSC-M/H Coder	R&S®SFC-K18	2115.5513.02
Analog modulation systems		
FM/RDS Coder	R&S®SFC-K170	2115.5536.02
ATV Standard B/G Coder	R&S®SFC-K190	2115.5559.02
ATV Standard D/K Coder	R&S®SFC-K191	2115.5571.02
ATV Standard I Coder	R&S®SFC-K192	2115.5594.02
ATV Standard M/N Coder	R&S®SFC-K193	2115.5613.02
ATV Standard L Coder	R&S®SFC-K194	2115.5636.02
ATV Multistandard	R&S®SFC-K195	2115.5659.02

Modulation systems for R&S®SFC-U		
Terrestrial TV Option Package (includes DVB-T, DVB-H, ISDB-T, ISDB-T_B, ISDB-T_{SB}, DTMB, CMMB, ATSC/8VSB, ATSC-M/H, MediaFLO™)	R&S®SFC-U-PK1	2115.5888.02
Cable TV Option Package (includes DVB-C, J.83/B, ISDB-C)	R&S®SFC-U-PK2	2115.5894.02
Satellite TV Option Package (includes DVB-S2, DVB-S, DIRECTV, R&S®SFC-U-K83 frequency extension)	R&S®SFC-U-PK3	2115.5907.02
T2/C2 Option Package (includes DVB-T2, DVB-C2)	R&S®SFC-U-PK4	2115.5913.02
Audio Broadcasting Option Package (includes DAB, DAB+, T-DMB, FM/RDS) **Note:** For L-band operation, DAB, DAB+ and T-DMB require the R&S®SFC-U-K83 frequency extension.	R&S®SFC-U-PK5	2115.5920.02
Analog TV Option Package (includes standards B/G, D/K, I, M/N, L)	R&S®SFC-U-PK6	2115.5936.02

Simulation				
AWGN Generator	R&S®SFC-K40	2115.5794.02	R&S®SFC-U-K40	2115.5788.02
Baseband inputs/outputs				
Extended I/Q Input	R&S®SFC-K80	2115.5771.02	R&S®SFC-U-K80	2115.5765.02

Designation	Type	Order No.
Digital baseband		
TRP Player	R&S®SFC-K22	included in R&S®SFC base unit
	R&S®SFC-U-K22	included in R&S®SFC-U base unit
Basic Stream Library	R&S®LIB-K70	2116.9558.02
Extended SDTV Library	R&S®LIB-K71	2116.9564.02
Extended HDTV Library	R&S®LIB-K72	2116.9570.02
3D TV Library	R&S®LIB-K73	2116.9587.02
T-DMB/DAB Streams	R&S®SFU-K221	2113.4348.04
MediaFLO™ Streams	R&S®SFU-K222	2110.2968.02
DAB+ Streams	R&S®SFU-K223	2110.4760.02
ISDB-T_B Streams	R&S®SFU-K224	2110.4777.02
CMMB Streams	R&S®SFU-K225	2112.3649.02
ATSC and ATSC Mobile DTV Streams	R&S®SFU-K226	2110.3812.02
DVB-T2 MI Streams	R&S®SFU-K227	2115.2120.02
EMC Streams	R&S®SFU-K228	2115.2520.02
Customer-Specific Transport Streams	R&S®DV-SCA	on request
Analog baseband		
Video Generator	R&S®SFC-K23	included in R&S®SFC base unit
	R&S®SFC-U-K23	included in R&S®SFC-U base unit
ATV Video Signals	R&S®ATV Video	2110.4831.02
Customer-Specific Analog Signals	R&S®ATV-SCA	on request

Extensions				
Coder Extension Board	R&S®SFC-B15	2115.5836.02	included in R&S®SFC-U base unit	
Frequency Extension 3 GHz	R&S®SFC-K83	2115.5759.02	R&S®SFC-U-K83	2115.5742.02
Electronic Attenuator 110 dB	R&S®SFC-K84	2115.5736.02	R&S®SFC-U-K84	2115.5720.02

Recommended extras		
Documentation of R&S®SFC calibration values	R&S®SFC-DCV	2082.0490.40
Keyboard with USB Interface (US assignment)	R&S®PSL-Z2	1157.6870.03
Mouse with USB Interface, optical	R&S®PSL-Z10	1157.7060.02
External USB CD-RW Drive	R&S®PSP-B6	1134.8201.12
19" Rackmount Kit for R&S®SFC and cover	R&S®ZZA-KN26	1175.3256.00
19'' Adapter 7 HU for 10 instruments	R&S®ZZA-KN99	2115.6790.02
LVDS Cable for digital I/Q interface, length 2 m		1130.1302.00

Service options (can only be ordered in connection with the purchase of an instrument)			
One-Year Warranty Extension	R&S®WE1SFC	R&S®WE1SFC-U	Please contact your local Rohde & Schwarz sales office.
Two-Year Warranty Extension	R&S®WE2SFC	R&S®WE2SFC-U	
Three-Year Warranty Extension	R&S®WE3SFC	R&S®WE3SFC-U	
Four-Year Warranty Extension	R&S®WE4SFC	R&S®WE4SFC-U	
One-Year Warranty Extension and Calibration Coverage	R&S®CW1SFC	R&S®CW1SFC-U	
Two-Year Warranty Extension and Calibration Coverage	R&S®CW2SFC	R&S®CW2SFC-U	
Three-Year Warranty Extension and Calibration Coverage	R&S®CW3SFC	R&S®CW3SFC-U	
Four-Year Warranty Extension and Calibration Coverage	R&S®CW4SFC	R&S®CW4SFC-U	

Extended warranty with a term of one to four years (WE1 to WE4)
Repairs carried out during the contract term are free of charge [16]. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

Extended warranty with calibration (CW1 to CW4)
Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs [16] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

For R&S®SFC/R&S®SFC-U product brochure, see PD 5214.5910.32 and www.rohde-schwarz.com

[16] Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

Ordering information R&S®VT-B600

Option identification: R&S®VT-Bxy = hardware option, R&S®VT-Kxy = software option.
The R&S®VT-B600 base module must be ordered with at least one modulation system.

Designation	Type	Order No.
Broadcast TX Modulator	R&S®VT-B600	2115.7522.06
Frequency Extension 3 GHz	R&S®VT-K3083	2115.8335.02
Electronic Attenuator 110 dB	R&S®VT-K3084	2115.8341.02

R&S®VT-B600 options		
Digital modulation systems		
DVB-T/DVB-H Coder	R&S®VT-K601	2115.8106.02
DVB-C/ISDB-C/J.83/B Coder	R&S®VT-K602	2115.8112.02
DVB-S/DVB-DSNG Coder	R&S®SFC-K3	2115.5313.02
ISDB-T/ISDB-T_{SB}/ISDB-T_B Coder	R&S®VT-K606	2115.8129.02
T-DMB/DAB Coder	R&S®VT-K611	2115.8158.02
DTMB(GB20600-2006) Coder	R&S®VT-K612	2115.8164.02
DIRECTV Legacy Modulation Coder	R&S®VT-K609	2115.8141.02
CMMB Coder	R&S®VT-K615	2115.8170.02
DVB-T2 Coder	R&S®VT-K616	2115.8187.02
DVB-C2 Coder	R&S®VT-K617	2115.8193.02
ATSC-M/H 8VSB Coder	R&S®VT-K618	2115.8206.02
Analog modulation systems		
FM/RDS Coder	R&S®VT-K670	2115.8212.02
ATV Multistandard Coder	R&S®VT-K695	2115.8229.02

Digital baseband		
TRP Player	R&S®VT-K22	included in R&S®VT-B600
Basic Stream Library	R&S®LIB-K70	2116.9558.02
Extended SDTV Library	R&S®LIB-K71	2116.9564.02
Extended HDTV Library	R&S®LIB-K72	2116.9570.02
3D TV Library	R&S®LIB-K73	2116.9587.02
T-DMB/DAB Streams	R&S®LIB-K51	2116.9364.02
DAB+ Streams	R&S®LIB-K53	2116.9387.02
ISDB-T_B Streams	R&S®LIB-K54	2116.9393.02
CMMB Streams	R&S®LIB-K55	2116.9406.02
ATSC and ATSC Mobile DTV Streams	R&S®LIB-K56	2116.9412.02
DVB-T2 MI Streams	R&S®LIB-K57	2116.9429.02
EMC Streams	R&S®LIB-K58	2116.9435.02
DMB Streams France	R&S®LIB-K59	2116.9441.02
Customer-Specific Transport Streams	R&S®DV-SCA	on request
Analog baseband		
Video Generator	R&S®VT-K23	included in R&S®VT-B600
ATV Video Signals	R&S®LIB-K50	2116.9358.02
Customer-Specific Analog Signals	R&S®ATV-SCA	on request

Simulation		
AWGN Generator	R&S®VT-K1340	2115.8329.02
Baseband inputs/outputs		
Extended I/Q Input	R&S®VT-K2600	2115.8358.02

For R&S®VTC/R&S®VTE/R&S®VTS product brochure, see PD 3606.8143.12 and www.rohde-schwarz.com

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