R&S®SMCV100B
VECTOR SIGNAL GENERATOR

Specifications

dataTec
Mess- und Prüftechnik. Die Experten.

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Specifications
Version 17.00

ROHDE&SCHWARZ
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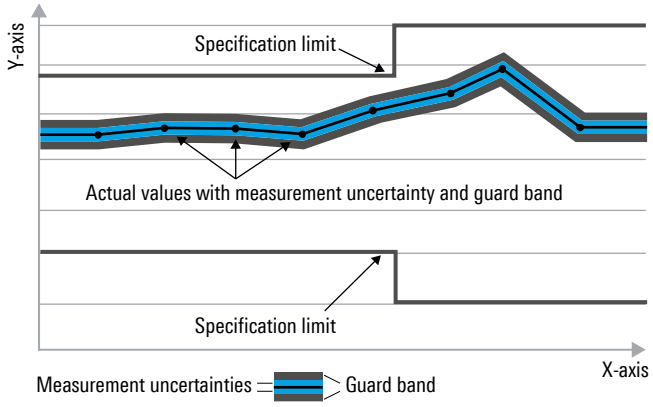
CONTENTS

Definitions

General
Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of 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.



Non-traceable specifications with limits (n. trc.)
Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

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”.

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

RF characteristics

Frequency

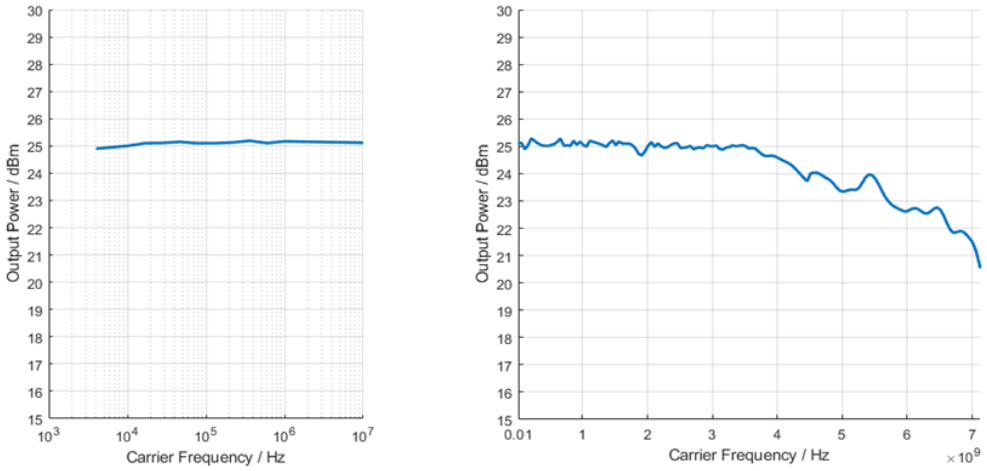
Range	with R&S®SMCVB-B103 option (mandatory)	4 kHz to 3 GHz
	with R&S®SMCVB-B103 and R&S®SMCVB-KB106 options	4 kHz to 6 GHz
	with R&S®SMCVB-B103, R&S®SMCVB-KB106 and R&S®SMCVB-KB107 options	4 kHz to 7.125 GHz
Resolution of setting		0.001 Hz
Resolution of synthesis	f = 1 GHz	2.665 µHz (nom.)
Settling time	to within < 1×10^{-7} for f > 200 MHz or < 20 Hz for f ≤ 200 MHz, with GUI update stopped, I/Q optimization mode: fast, measured from command at instrument to frequency settled within specified range, with Ethernet (fast socket) remote control, level setting characteristic: auto	< 5 ms
Range and resolution of phase offset setting		–999.99° to +999.99°, 0.01° resolution

Reference frequency

Frequency error	at time of calibration in production	< 1×10^{-7}
Aging	after 30 days of uninterrupted operation	≤ 1×10^{-6}/year
Temperature effect	in temperature range from +5 °C to +45 °C	±1.0×10^{-6}
Source		internal, external
External reference frequency modes	standard	10 MHz
Reference frequency input		
Connector type	REF IN on rear panel	BNC female
Input frequency		10 MHz, 13 MHz
Minimum frequency locking range		±25×10^{-6} (meas.)
Input level range		0 dBm to +16 dBm (meas.)
Input impedance		50 Ω (nom.)
Reference frequency output		
Connector type	REF OUT on rear panel	BNC female
Output frequency	square wave	
	source mode: internal	10 MHz
	source mode: external	10 MHz
Output level		+7 dBm to +13 dBm, +9 dBm (meas.)
Source impedance		50 Ω (nom.)

Level

Setting range		
R&S®SMCVB-B103/-KB106/-KB107	standard	
	4 kHz ≤ f < 100 kHz	–120 dBm to +16 dBm
	100 kHz ≤ f < 6 GHz	–145 dBm to +16 dBm
	6 GHz ≤ f ≤ 7.125 GHz	–145 dBm to +16 dBm
	with R&S®SMCVB-K31 option	
	4 kHz ≤ f < 100 kHz	–120 dBm to +25 dBm
	100 kHz ≤ f ≤ 6 GHz	–145 dBm to +25 dBm
	6 GHz ≤ f ≤ 7.125 GHz	–145 dBm to +25 dBm
Setting resolution		0.01 dB
Specified level range	peak envelope power (PEP)	
R&S®SMCVB-B103/-KB106/-KB107	standard	
	4 kHz < f ≤ 10 MHz	–110 dBm to +15 dBm
	10 MHz < f ≤ 6 GHz [1]	–120 dBm to +15 dBm
	6 GHz < f ≤ 7.125 GHz	–120 dBm to +15 dBm
	with R&S®SMCVB-K31 option	
	4 kHz < f ≤ 10 MHz	–110 dBm to +20 dBm
	10 MHz < f ≤ 6 GHz [1]	–120 dBm to +20 dBm
	6 GHz < f ≤ 7.125 GHz	–120 dBm to +18 dBm
Level accuracy	level setting characteristic: auto, temperature range from +18 °C to +33 °C	
	level > –80 dBm	
	4 kHz < f < 200 kHz	< 1.8 dB
	200 kHz ≤ f ≤ 10 MHz	< 0.7 dB
	10 MHz < f ≤ 2.5 GHz [1]	< 0.5 dB
	f > 2.5 GHz [1]	< 0.7 dB
	level ≤ –80 dBm	
	4 kHz < f < 200 kHz	< 1.8 dB
	200 kHz ≤ f ≤ 10 MHz	< 1.2 dB, < 1.0 dB (typ.)
	10 MHz < f ≤ 2.5 GHz [1]	< 0.8 dB
	f > 2.5 GHz [1]	< 1.1 dB
Settling time	to < 0.1 dB deviation from final value, with GUI update stopped, temperature range from +18 °C to +33 °C, f > 10 MHz, I/Q optimization mode: fast, measured from command at instrument to frequency settled within specified range, with Ethernet (fast socket) remote control, level setting characteristic: auto	< 5 ms
Interruption-free level range	level setting characteristic: uninterrupted level setting	> 20 dB



Measured maximum output power versus frequency, with R&S®SMCVB-K31 option

[1] For multiples of f = 0.5 GHz, the specified level range is limited to –100 dBm due to a discrete spurious.

Reverse power

Reverse power	maximum permissible RF power in output frequency range of RF path, from 50 Ω source; In case of too high reverse power, the RF output is switched off.	
	1 MHz < f ≤ 7.125 GHz	2 W
Maximum permissible DC voltage		35 V (nom.)

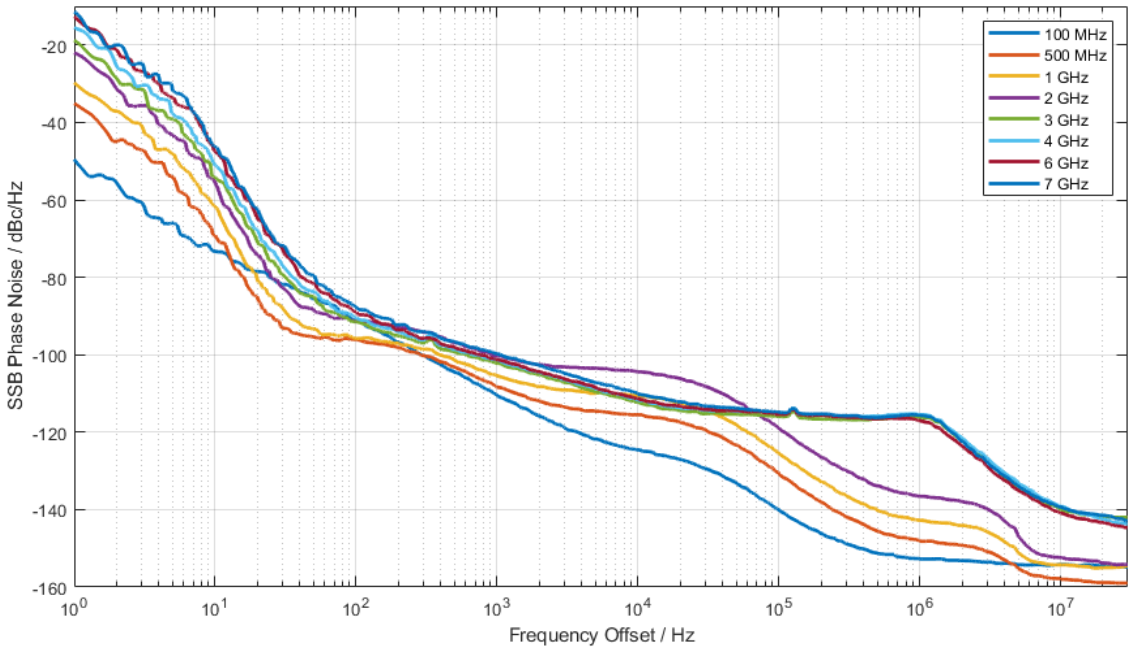
VSWR

Output impedance VSWR in 50 Ω system	level setting characteristic: auto, f > 200 kHz	
	P_{out} ≤ 5 dBm	< 2.0
	P_{out} > 5 dBm	
	200 kHz < f ≤ 4.5 GHz	< 2.0 (typ.)
	4.5 GHz < f ≤ 6 GHz	< 2.5 (typ.)

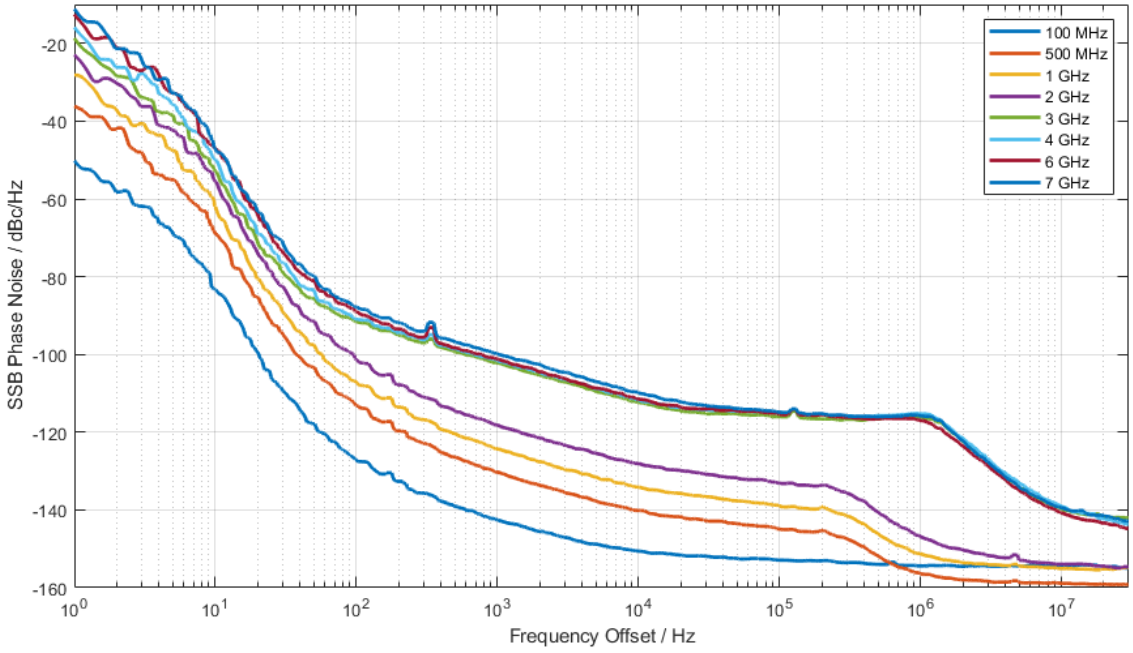
Spectral purity

Harmonics	CW, I/Q mode (full-scale internal single carrier signal), level ≤ 13 dBm	
	100 kHz ≤ f ≤ 7.125 GHz	< –30 dBc
Nonharmonics	CW, level > +10 dBm, > 10 kHz offset from carrier and outside the modulation spectrum, reference frequency internal	
	f ≤ 2.5 GHz	< –52 dBc, –58 dBc (typ.)
	2.5 GHz < f ≤ 7.125 GHz	< –52 dBc, –63 dBc (typ.)
Wideband noise	CW, level = +10 dBm, carrier offset = 30 MHz, measurement bandwidth = 1 Hz	
	20 MHz ≤ f ≤ 100 MHz	< –139 dBc
	100 MHz < f ≤ 2.5 GHz	< –142 dBc
	2.5 GHz < f ≤ 7.125 GHz	< –133 dBc
SSB phase noise	carrier offset = 20 kHz, measurement bandwidth = 1 Hz, level = +10 dBm	
	f = 100 MHz	< –110 dBc
	f = 1 GHz	< –100 dBc
	f = 2 GHz	< –100 dBc
	f = 2.5 GHz	< –100 dBc
	2.5 GHz < f ≤ 7.125 GHz	< –95 dBc
SSB phase noise with R&S®SMCVB-K709 option	carrier offset = 20 kHz, measurement bandwidth = 1 Hz, level = +10 dBm	
	f = 100 MHz	< –145 dBc
	f = 1 GHz	< –125 dBc
	f = 2 GHz	< –119 dBc
	f = 2.5 GHz	< –117 dBc
	2.5 GHz < f ≤ 7.125 GHz	< –107 dBc
Residual FM	CW, RMS values at f = 1 GHz [2]	
	300 Hz to 3 kHz, weighted (ITU-T)	< 2 Hz, 0.6 Hz (typ.)
	20 Hz to 23 kHz	< 16 Hz, 8.15 Hz (typ.)
Residual FM with R&S®SMCVB-K709 option	CW, RMS values at f = 1 GHz [2]	
	300 Hz to 3 kHz, weighted (ITU-T)	< 2 Hz, 0.12 Hz (typ.)
	20 Hz to 23 kHz	< 4 Hz, 0.7 Hz (typ.)
Residual AM	CW, f > 10 MHz, RMS value (20 Hz to 20 kHz), level = 12 dBm	
	4 kHz ≤ f ≤ 100 MHz	< 0.08 %
	100 MHz < f ≤ 7.125 GHz	< 0.05 %

[2] With internal reference frequency. May be improved using an external reference.



Measured SSB phase noise for different carrier frequencies, standard instrument



Measured SSB phase noise for different carrier frequencies, with R&S®SMCVB-K709 option

Frequency and level sweep

Operating mode		digital sweep in discrete steps
Sweep parameters		RF frequency, RF level
Trigger modes	execute sweep continuously with internal trigger source	auto
	execute one full sweep	single, extern single
	execute one step	step, extern step
	sweep start and stop controlled by external trigger signal	extern start/stop
Trigger source		external trigger signal (user 1 or user 2 at rear), rotary knob, touch panel, remote control
Sweep range		fully specified frequency and level range
	interruption-free level sweep with level setting characteristic: uninterrupted level setting	0.01 dB to 20 dB
Sweep shape		sawtooth, triangle
Step size setting resolution	frequency sweep linear	0.001 Hz
	frequency sweep logarithmic	0.01 %
	level sweep	0.01 dB
Dwell time setting range		10 ms to 100 s
Dwell time setting resolution		0.1 ms

List mode

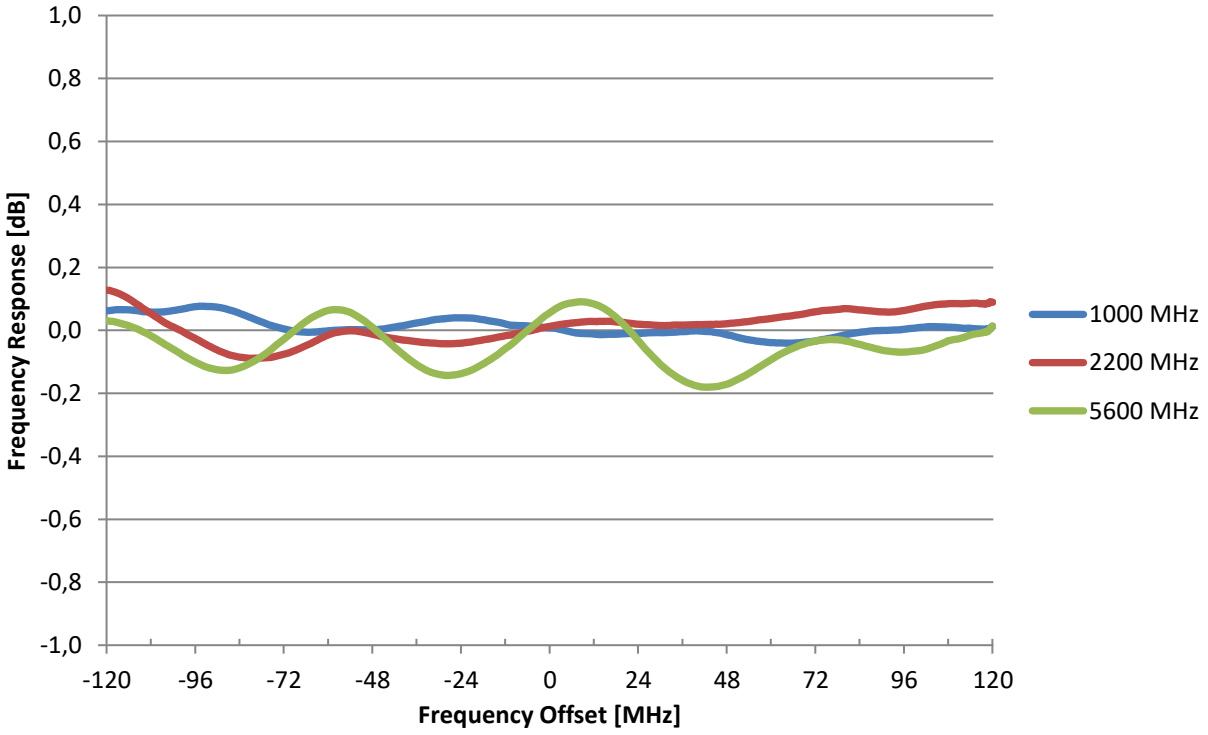
Frequency and level values can be stored in a list and triggered by an internal timer or an external trigger.

Run mode		live
Operating modes	internal trigger	auto
	internal trigger, one sweep per trigger event	single
	internal trigger, one step per trigger event	step
	external trigger, one sweep per trigger event	extern single
	external trigger, one step per trigger event	extern step
Dwell time setting range	can be set individually for each step	10 ms to 100 s
Dwell time setting resolution		0.1 ms
Setting time		see frequency and level data

I/Q modulation

I/Q modulation performance

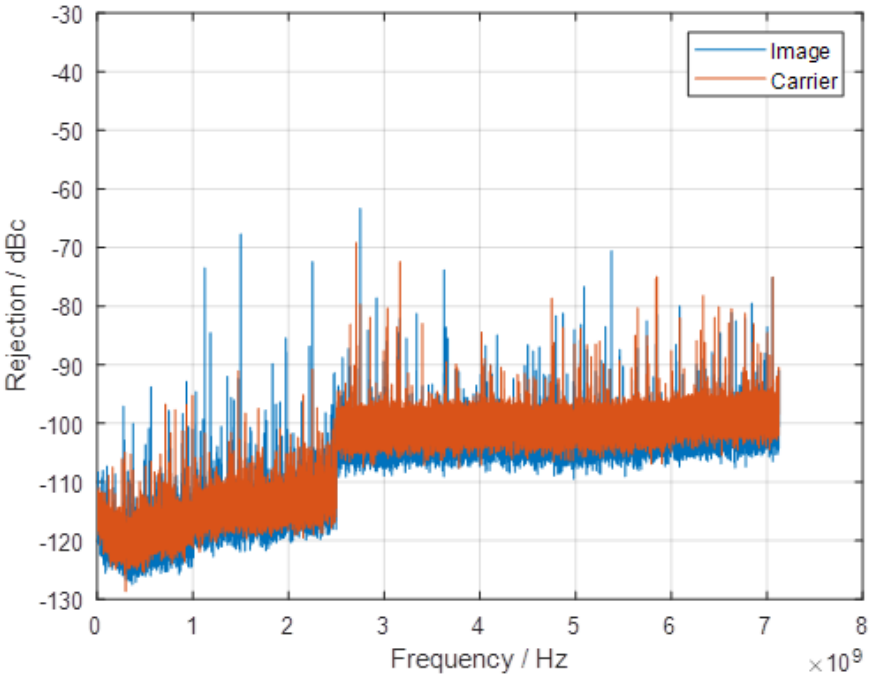
Operating modes		internal baseband I/Q
RF modulation bandwidth	The maximum signal bandwidth depends on the baseband option configuration, see I/Q baseband generator.	
	8 kHz < f ≤ 240 MHz	±50 % of carrier frequency
	f > 240 MHz	±120 MHz
RF frequency response in specified RF modulation bandwidth	standard, up to 120 MHz RF modulation bandwidth	< 3.5 dB, < 2.5 dB (meas.)
	with R&S®SMCVB-K547 option, optimization mode: high quality, up to 240 MHz RF modulation bandwidth	< 1.2 dB, < 0.3 dB (meas.)
Carrier leakage	mode: internal baseband I/Q, referenced to full-scale input	< –60 dBc, < –80 dBc (meas.)
Suppression of image sideband for entire instrument in modulation bandwidth	up to 240 MHz RF modulation bandwidth	> 80 dB (meas.) [3]
Modulation error ratio		> 40 dB (meas.) [4]



Measured RF modulation frequency response at different carrier frequencies

[3] Except for a few frequencies as shown in the figure.

[4] Measured with single carrier waveform signal (8 Msample/s, root raised cosine rolloff, α = 0.20, 64QAM) at a level of 0.0 dBm.



Measured image and carrier rejection at different RF frequencies

Baseband characteristics

Internal baseband characteristics

Aliasing filter		with amplitude, group delay and sin(x)/x correction
Bandwidth, rolloff to –0.1 dB		250 MHz (nom.)
I/Q impairments (digital baseband)	These impairments are set in the digital baseband section of the R&S®SMCV100B. They act on the I/Q signal sent to the I/Q modulator/RF section, as well as on the I/Q signals at the digital I/Q outputs (of the respective path).	
Carrier leakage		
Setting range		–10 % to +10 %
Resolution		0.01 %
I ≠ Q (imbalance)		
Setting range		–1 dB to +1 dB
Resolution		0.01 dB
Quadrature offset		
Setting range		–10° to +10°
Resolution		0.01°

Digital baseband input/output (R&S®SMCVB-K19 option)

The R&S®SMCVB-K19 option makes digital I/Q signals available on the rear panel of the instrument if set to output mode. External digital I/Q signals can be fed into the baseband section at a dedicated connector. The digital I/Q input/output can be used for the lossless connection of the R&S®SMCV100B to the digital I/Q input/output of other Rohde & Schwarz instruments (e.g. R&S®SMW200A vector signal generator). One R&S®SMCVB-K19 option can be installed.

Output parameters

Interface		
Standard		Dig. I/Q HS, in line with R&S®Digital I/Q interface 40G [5] (DIG I/Q 40G), I/Q data and control signals
Level		LVDS
Connector		QSFP+/QSFP 28
I/Q sample rate	maximum sample rate depends on connected receiving device	
	with internal baseband signal	
	standard	400 Hz to 75 MHz
	with R&S®SMCVB-K521 option	400 Hz to 150 MHz
	with R&S®SMCVB-K522 option	400 Hz to 200 MHz
	with R&S®SMCVB-K523 option	400 Hz to 300 MHz
	with external baseband signal	400 Hz to 300 MHz
Resolution		0.001 Hz
Frequency uncertainty		< (1 × 10^{-12} + relative deviation of reference frequency) × sample rate (nom.)
I/Q data		
Resolution		up to 16 bit
Logic format		two's complement
Physical signal level		
Setting range		0 dBFS
Setting resolution		0.01 dBFS
Bandwidth (RF)		0.8 × sample rate
Control signals	markers	2

[5] R&S®Digital I/Q interface 40G PAD-R is a Rohde & Schwarz internal company guideline for the transmission of digital I/Q data. It is supported by a wide range of signal generators, signal analyzers and radiocommunications testers.

Input parameters

Interface		
Standard		Dig. I/Q HS, in line with R&S®Digital I/Q interface 40G [6] (DIG I/Q 40G), I/Q data and control signals
Input level	peak level	
Setting range		–60 dB to +3 dB, referenced to full scale
Setting resolution		0.01 dB
Crest factor		
Setting range		0 dB to +30 dB
Setting resolution		0.01 dB
Adjust level function	automatically determines peak level and crest factor of input signal	
Level		LVDS
Connector		QSFP+/QSFP 28
I/Q sample rate		
Source	The sample rate will be used based on information provided by the transmitting device.	Dig. I/Q HS
Sample rate	maximum sample rate depends on connected transmitting device	400 Hz to 300 MHz
Resolution		0.001 Hz
Frequency uncertainty		< (1 × 10^{-12} + relative deviation of reference frequency) × sample rate (nom.)
I/Q data		
Resolution		16 bit
Logic format		two's complement
Bandwidth (RF)		0.8 × sample rate
Control signals	markers	2

I/Q baseband generator – arbitrary waveform mode

Waveform length	standard	1 sample to 64 Msample, in 1 sample steps
	with R&S®SMCVB-K511 option	1 sample to 512 Msample, in 1 sample steps
	with R&S®SMCVB-K512 option	1 sample to 1 Gsample, in 1 sample steps
Sample rate	standard	400 Hz to 75 MHz
	with R&S®SMCVB-K521 option	400 Hz to 150 MHz
	with R&S®SMCVB-K522 option	400 Hz to 200 MHz
	with R&S®SMCVB-K523 option	400 Hz to 300 MHz
Sample rate (HDD streaming)	standard	400 Hz to 75 MHz [7]
Sample resolution	equivalent to D/A converter	16 bit
Sample clock source		internal
Sample frequency error	internal clock	< 4 × 10^{-11} Hz + relative deviation of reference frequency × sample rate (nom.)
Bandwidth (RF)	using the maximum sample rate, rolloff to –0.1 dB	60 MHz
	using a reduced sample rate, rolloff to –0.1 dB	0.833 × sample rate
Bandwidth (RF), with R&S®SMCVB-K521 option	using the maximum sample rate, rolloff to –0.1 dB	120 MHz
	using a reduced sample rate, rolloff to –0.1 dB	0.833 × sample rate
Bandwidth (RF), with R&S®SMCVB-K522 option	using the maximum sample rate, rolloff to –0.1 dB	160 MHz
	using a reduced sample rate, rolloff to –0.1 dB	0.833 × sample rate
Bandwidth (RF), with R&S®SMCVB-K523 option	using the maximum sample rate, rolloff to –0.1 dB	240 MHz
	using a reduced sample rate, rolloff to –0.1 dB	0.833 × sample rate

[6] R&S®Digital I/Q Interface 40G PAD-R is a Rohde & Schwarz internal company guideline for the transmission of digital I/Q data. It is supported by a wide range of signal generators, signal analyzers and radiocommunications testers.

[7] With R&S®SMCVB-K505 option.

Frequency offset setting range	standard	–30 MHz to 30 MHz
	with R&S®SMCVB-K521 option	–60 MHz to 60 MHz
	with R&S®SMCVB-K522 option	–80 MHz to 80 MHz
	with R&S®SMCVB-K523 option	–120 MHz to 120 MHz
Frequency offset setting resolution		0.01 Hz
Frequency offset error		< 3 × 10^{-6} Hz + relative deviation of reference frequency × frequency offset (nom.)
Triggering	A trigger event restarts I/Q generation. The I/Q signal is then synchronous with the trigger (with a specific timing jitter).	
Trigger source	event triggered via GUI or remote command	internal
	event triggered by external trigger signal	external
Trigger modes	The signal is generated continuously.	auto [8]
	The signal is generated continuously. A trigger event causes a restart.	retrig
	The signal is started only when a trigger event occurs. Subsequent trigger events are ignored.	armed auto [8]
	The signal is started only when a trigger event occurs. Every subsequent trigger event causes a restart.	armed retrig
	The signal is started only when a trigger event occurs. Signal is generated once.	single
External trigger input		selectable from user 1 or user 2
Connector type	user 1, user 2	BNC female
Input level		0 V to 3 V (nom.)
Threshold		settable between 0.1 V and 2.0 V
Input impedance	selectable	1 kΩ or 50 Ω (nom.)
Trigger jitter		±1.67 ns

External trigger delay		
Setting range		0 sample to 2.147 × 10^9 sample
Setting resolution		3.3 ns
External trigger inhibit		
Setting range		0 sample to (21.47s × sample rate) sample
Setting resolution		3.3 ns
External trigger pulse width		> 7.5 ns
Marker signals		
Number of marker signals		1
Operating modes		unchanged, restart [8], pulse, pattern, ratio
Marker outputs		selectable from user 1 or user 2
Connector type	user 1, user 2	BNC female
Level		LVTTL
Marker delay		
Setting range		0 sample to (waveform length – 1) sample
Setting resolution		1 sample
Marker duration		
Minimum value	sample rate ≤ 300 Msample/s	1 sample
Multisegment waveform mode		
Number of segments		1 to 1024
Changeover modes		GUI, remote control, external trigger
Extended trigger modes		same segment, next segment, next segment seamless, sequencer
Seamless changeover		output up to end of current segment, followed by changeover to next segment
Sequencer play list length		max. 1024
Sequencer segment repetitions		max. 1048575

[8] Supported in HDD streaming mode.

Multicarrier waveform mode		
Number of carriers		max. 512
Total RF bandwidth	standard	max. 60 MHz
	with R&S®SMCVB-K521 option	max. 120 MHz
	with R&S®SMCVB-K522 option	max. 160 MHz
	with R&S®SMCVB-K523 option	max. 240 MHz
Carrier spacing		
Setting range		depends on number of carriers and signal RF bandwidth
Setting resolution		0.01 Hz
Crest factor modes		maximize, minimize, off
Signal period modes		longest file, shortest file, user (max. 1 s)
Single carrier gain		
Setting range		–80 dB to 0 dB
Setting resolution		0.01 dB
Single carrier start phase		
Setting range		0° to 360°
Setting resolution		0.01°
Single carrier delay		
Setting range		0 s to 1 s
Setting resolution		1 ns

Baseband enhancements

Custom digital modulation (R&S®SMCVB-K199 option)

Types of modulation		
ASK		
Modulation index		0 % to 100 %
Resolution		0.1 %
FSK		2FSK to 64FSK and MSK
Deviation		1 Hz to 15 × f_{sym}
Maximum	standard	30 MHz
	with R&S®SMCVB-K521 option	60 MHz
	with R&S®SMCVB-K522 option	80 MHz
	with R&S®SMCVB-K523 option	120 MHz
Resolution		0.5 Hz
Variable FSK		4FSK, 8FSK, 16FSK
Deviation		–15 × f_{sym} to +15 × f_{sym}
Maximum	standard	±30 MHz
	with R&S®SMCVB-K521 option	±60 MHz
	with R&S®SMCVB-K522 option	±80 MHz
	with R&S®SMCVB-K523 option	±120 MHz
Resolution		0.5 Hz
PSK		BPSK, QPSK, QPSK 45° offset, QPSK EDGE, AQPSK, OQPSK, π/4-QPSK, π/2-DBPSK, π/4-DQPSK, π/8-D8PSK, 8PSK, 8PSK EDGE, 16APSK, 32APSK
QAM		16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 1024QAM, 2048QAM π/4-16QAM, –π/4-32QAM (for EDGE+)
Symbol rate		
Operating mode		internal
Setting range	standard	
	ASK, PSK and QAM	100 Hz to 50 MHz
	FSK	100 Hz to 50 MHz
	with R&S®SMCVB-K521 option	
	ASK, PSK and QAM	100 Hz to 100 MHz
	FSK	100 Hz to 100 MHz
	with R&S®SMCVB-K522 option	
	ASK, PSK and QAM	100 Hz to 120 MHz
	FSK	100 Hz to 120 MHz
	with R&S®SMCVB-K523 option	
	ASK, PSK and QAM	100 Hz to 150 MHz
	FSK	100 Hz to 150 MHz
Resolution		0.001 Hz
Frequency uncertainty (internal)		< 4 × 10^{-11} Hz + relative deviation of reference frequency × sample rate (nom.)
Baseband filter	any filter can be used with any type of modulation	
Filter types		cosine, root cosine, Gaussian, cdmaOne, cdmaOne + equalizer, cdmaOne 705 kHz, cdmaOne 705 kHz + equalizer, CDMA2000 3x, APCO25 C4FM, EDGE narrow pulse, EDGE wide pulse rectangular, split phase, LTE, SOQPSK
Filter parameter		
Setting range	cosine, root cosine (filter parameter α)	0.05 to 1.00
	Gaussian (filter parameter B × T)	0.15 to 2.50
	split phase (filter parameter B × T)	0.15 to 2.50
Setting resolution		0.01
Coding	Not all coding methods can be used with every type of modulation.	off, differential, diff. + Gray, Gray, NADC, PDC, PHS, TETRA, APCO25 (PSK), APCO25 (8PSK), PWT, TFTS, INMARSAT, VDL, EDGE, APCO25 (FSK), ICO, CDMA2000, WCDMA

Data sources		PRBS: 9, 11, 15, 16, 20, 21, 23, All0, All1, pattern (length: 1 bit to 64 bit), data lists
Data lists		
Output memory	standard	8 bit to 2 Gbit
	with R&S®SMCVB-K511 option	8 bit to 16 Gbit
	with R&S®SMCVB-K512 option	8 bit to 32 Gbit
Nonvolatile memory		internal mSATA module
Predefined settings		modulation, filter, symbol rate and coding in line with standard
Standards		APCO, Bluetooth®, CW in baseband, DECT, ETC, GSM, GSM EDGE, NADC, PDC, PHS, TETRA, WCDMA 3GPP, TD-SCDMA, CDMA2000 Forward, CDMA2000 Reverse, Worldspace, SOQPSK-TG
Frequency offset	With the aid of the frequency offset, the center frequency of the wanted baseband signal can be shifted. The restrictions caused by the modulation bandwidth still apply.	
Frequency offset setting range	standard	–30 MHz to +30 MHz
	with R&S®SMCVB-K521 option	–60 MHz to +60 MHz
	with R&S®SMCVB-K522 option	–80 MHz to +80 MHz
	with R&S®SMCVB-K523 option	–120 MHz to +120 MHz
Frequency offset setting resolution		0.01 Hz
Frequency offset error		$< 3 \times 10^{-6}$ Hz + relative deviation of reference frequency × frequency offset (nom.)
Triggering		
Trigger source	event triggered via GUI or remote command	internal
	event triggered by external trigger signal	external
Trigger modes	The signal is generated continuously.	auto
	The signal is generated continuously; a trigger event causes a restart.	retrig
	The signal is started only when a trigger event occurs; subsequent trigger events are ignored.	armed auto
	The signal is started only when a trigger event occurs; every subsequent trigger event causes a restart.	armed retrig
	The signal is started only when a trigger event occurs; signal is generated once.	single
External trigger input		selectable from user 1 or user 2
Connector type	user 1, user 2	BNC female
Input level		0 V to 3 V (nom.)
Threshold		settable between 0.1 V and 2.0 V
Input impedance	selectable	1 kΩ or 50 Ω (nom.)
Trigger jitter		±2.67 ns
External trigger delay		
Setting range		0 symbol to 1466 s × symbol rate
Setting resolution		0.01 symbol ± 5.33 ns
External trigger inhibit		
Setting range		0 symbol to 3.22×10^9 symbol
Setting resolution		1 symbol
External trigger pulse width		> 7.5 ns
Marker signals		
Number of marker signals		1
Operating modes		control list, pulse, pattern, ratio
Marker outputs		selectable from user 1 or user 2
Connector type	user 1, user 2	BNC female
Level		LVTTL
Marker delay		
Setting range		0 symbol to $(2^{24} – 1)$ symbol
Setting resolution		1 symbol
Marker duration		
Minimum value		1 symbol

Basic AM/FM/φM (via baseband, R&S®SMCVB-K197 option)

Amplitude modulation		
Modulation source	internal modulation generator	internal
AM depth		
Setting range		0 % to 100 %
Setting resolution		0.1 %
AM depth (m) error	f_{mod} = 1 kHz	< 1 % (meas.)
AM distortion	f_{mod} = 1 kHz	< –60 dB (meas.)
Incidental φM at AM	m = 30 %, f_{mod} = 1 kHz, ± peak/2	< 0.02 rad (meas.)
Frequency modulation		
Modulation source	internal modulation generator	internal
Maximum deviation		4 MHz
Resolution of setting		0.01 Hz
FM deviation error	f_{mod} = 2 kHz, deviation ≤ 1 MHz, modulation source: internal	< 1 % of setting (meas.)
FM distortion	f_{mod} = 2 kHz, deviation = 1 MHz	< –80 dB (meas.)
Synchronous AM with FM	40 kHz deviation, f_{mod} = 1 kHz, f > 10 MHz	< –80 dB (meas.)
Carrier frequency offset	f_{mod} = 2 kHz	< 23×10^{-6} of set deviation
Phase modulation		
Modulation source	internal modulation generator	internal
Maximum deviation		6 rad
Resolution of setting		1 µrad
φM deviation error	f_{mod} = 1 kHz, modulation source: internal	< (2 % of setting + 0.003 rad)
φM distortion	f_{mod} = 10 kHz, half of maximum deviation	< –80 dB
Internal modulation generator		
Signal types		sine
Frequency setting range		0.1 Hz to 100 kHz
Frequency setting resolution		0.01 Hz
Frequency error		< (0.001 Hz + relative deviation of reference frequency × modulation frequency)

Pulse modulation (via baseband, R&S®SMCVB-K198 option)

Modulation source	pulse generator	internal
On/off ratio		> 80 dB (meas.)
Rise/fall time	10 % to 90 % of RF amplitude	
	transition type: fast	< 15 ns, < 5 ns (meas.)
	transition type: smoothed	< 200 ns (meas.)
Minimum pulse width	50 %/50 % of RF amplitude, transition type: fast	50 ns (meas.)
Pulse repetition frequency		0 Hz to 10 MHz
Pulse overshoot		< 10 % (meas.)
Pulse generator		
Pulse modes		single pulse, double pulse
Pulse period		
Setting range		100 ns to 100 s
Setting resolution		5 ns
Pulse width	Pulse widths of double pulses can be set independently.	
Setting range		50 ns to 100 s
Setting resolution		5 ns
Pulse delay		
Setting range		50 ns to 100 s
Setting resolution		5 ns
Double-pulse delay		
Setting range		50 ns to 100 s
Setting resolution		5 ns

Additive white Gaussian noise (AWGN, R&S®SMCVB-K62 option)

Addition of an AWGN signal of settable bandwidth and settable C/N ratio or E_b/N_0 to a wanted signal. If the noise generator is used, a frequency offset cannot be added to the wanted signal.

Noise		
Distribution density		Gaussian, statistical, separate for I and Q
Crest factor		> 15 dB
Periodicity		> 3×10^{10} s
C/N, E_b/N_0		
Setting range	depending on the set RF level; The PEP of the sum signal (wanted signal + noise) must not exceed the maximum possible PEP of the RF path.	–50 dB to +65 dB
Setting resolution		0.01 dB
Uncertainty	for system bandwidth = symbol rate, symbol rate < 4 MHz, –24 dB < C/N < 30 dB and crest factor < 12 dB	< 0.05 dB (meas.)
System bandwidth	bandwidth for determining noise power	
Setting range	standard	1 kHz to 60 MHz
	with R&S®SMCVB-K521 option	1 kHz to 120 MHz
	with R&S®SMCVB-K522 option	1 kHz to 160 MHz
	with R&S®SMCVB-K523 option	1 kHz to 240 MHz
Setting resolution		100 Hz

Digital modulation systems

The specified data applies together with the parameters of the respective standard. The entire frequency range, the filter parameters and the symbol rates can be set by the user.

Internal digital standards

Digital standards that run on the internal baseband generator. The R&S®SMCVB-K519 option must be installed. The options are described in the Broadcast Standards for R&S®SMCV100B Vector Signal Generators specifications (PD 3608.3990.22).

Broadcast standards	Option
AM/FM/RDS	R&S®SMCVB-K155
DAB/T-DMB	R&S®SMCVB-K156
DRM	R&S®SMCVB-K160
DVB-C/ISDB-C	R&S®SMCVB-K157
J.83/B	R&S®SMCVB-K158
ATSC/ATSC-MH	R&S®SMCVB-K161
ATSC 3.0	R&S®SMCVB-K162
DVB-T	R&S®SMCVB-K163
DVB-T2	R&S®SMCVB-K164
ISDB-T/T_{SB}	R&S®SMCVB-K165
DTMB	R&S®SMCVB-K166
DVB-S/DVB-S2	R&S®SMCVB-K167
DVB-S2X	R&S®SMCVB-K168, R&S®SMCVB-K167 required

Digital standards with R&S®WinIQSIM2

R&S®WinIQSIM2 requires an external PC.

The options are described in the R&S®WinIQSIM2 specifications (PD 5213.7460.22).

Cellular standards	Option
5G NR Release 15	R&S®SMCVB-K444
5G NR Release 16	R&S®SMCVB-K448, R&S®SMCVB-K444 required
5G NR Release 17	R&S®SMCVB-K471, R&S®SMCVB-K448 required
5G NR Sidelink	R&S®SMCVB-K470
Verizon 5GTF signals	R&S®SMCVB-K418
LTE Release 8	R&S®SMCVB-K255
LTE Release 9	R&S®SMCVB-K284, R&S®SMCVB-K255 required
LTE Release 10	R&S®SMCVB-K285, R&S®SMCVB-K255 required
LTE Release 11	R&S®SMCVB-K412, R&S®SMCVB-K255 required
LTE Release 12	R&S®SMCVB-K413, R&S®SMCVB-K255 required
LTE Release 13/14/15	R&S®SMCVB-K419, R&S®SMCVB-K255 required
Cellular IoT Release 13	R&S®SMCVB-K415
Cellular IoT Release 14	R&S®SMCVB-K443, R&S®SMCVB-K415 required
Cellular IoT Release 15	R&S®SMCVB-K446, R&S®SMCVB-K415 required
3GPP FDD	R&S®SMCVB-K242
3GPP FDD HSPA/HSPA+, enhanced BS/MS tests	R&S®SMCVB-K283, R&S®SMCVB-K242 required
GSM/EDGE	R&S®SMCVB-K240
EDGE Evolution	R&S®SMCVB-K241, R&S®SMCVB-K240 required
CDMA2000	R&S®SMCVB-K246
1xEV-DO Rev A	R&S®SMCVB-K247
1xEV-DO Rev. B	R&S®SMCVB-K287, R&S®SMCVB-K247 required
TD-SCDMA (3GPP TDD LCR)	R&S®SMCVB-K250
TD-SCDMA (3GPP TDD LCR), enhanced BS/MS test including HSDPA	R&S®SMCVB-K251, R&S®SMCVB-K250 required

Wireless connectivity standards	Option
IEEE 802.11a/b/g/n	R&S®SMCVB-K254
IEEE 802.11ac	R&S®SMCVB-K286, R&S®SMCVB-K254 required
IEEE 802.11ax	R&S®SMCVB-K442, R&S®SMCVB-K254 required
IEEE 802.11be	R&S®SMCVB-K447, R&S®SMCVB-K254 required
Bluetooth® EDR/Low Energy	R&S®SMCVB-K260
Bluetooth® 5.x	R&S®SMCVB-K417, R&S®SMCVB-K260 required
Bluetooth® 6.0	R&S®SMCVB-K478, R&S®SMCVB-K417 required
LoRa	R&S®SMCVB-K431

Navigation standards	Option
GPS 1 satellite	R&S®SMCVB-K244
Galileo 1 satellite	R&S®SMCVB-K266
GLONASS 1 satellite	R&S®SMCVB-K294
IRNSS 1 satellite	R&S®SMCVB-K297
Modernized GPS	R&S®SMCVB-K298
BeiDou 1 satellite	R&S®SMCVB-K407
Modernized GLONASS	R&S®SMCVB-K423
Modernized BeiDou	R&S®SMCVB-K432

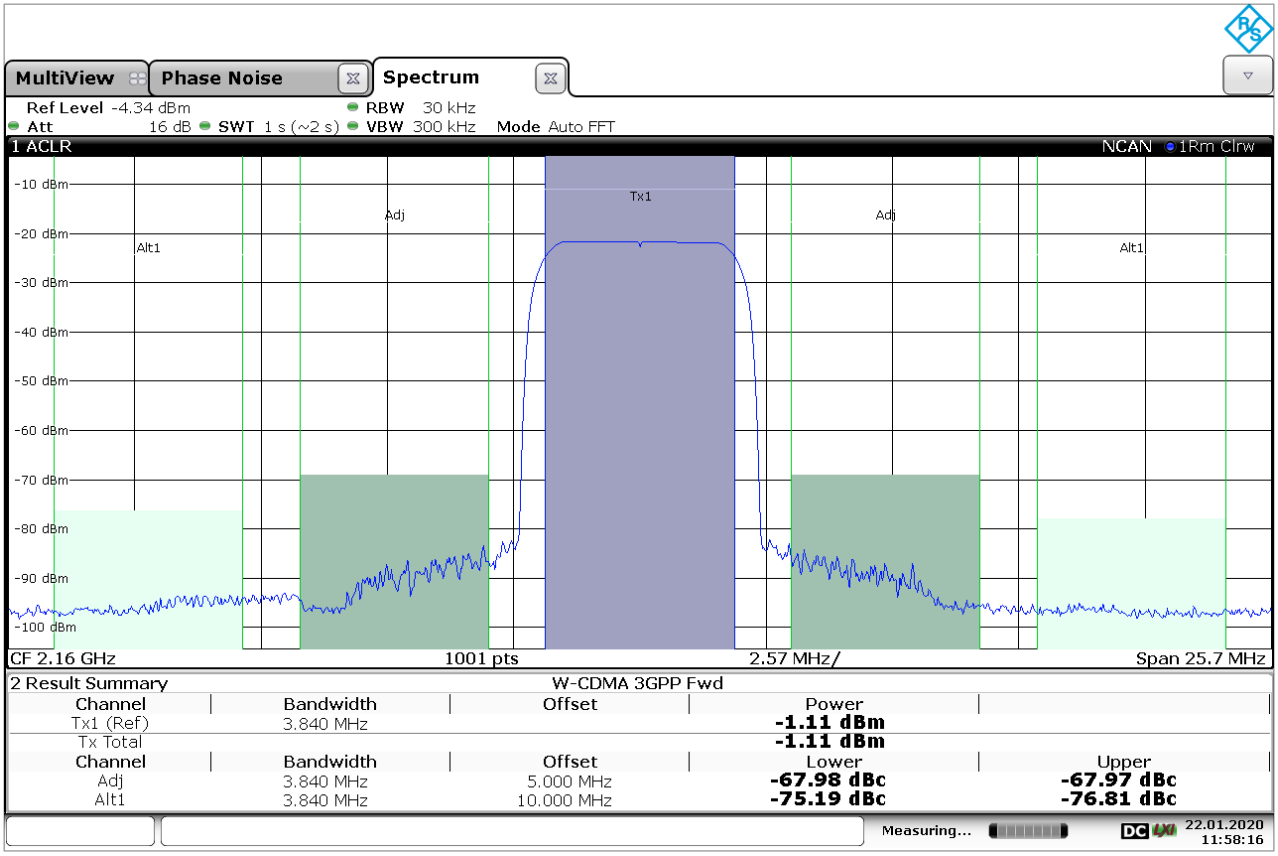
Broadcast standards	Option
DVB-H/DVB-T	R&S®SMCVB-K252
DAB/T-DMB	R&S®SMCVB-K253
DVB-S2/DVB-S2X	R&S®SMCVB-K416
DVB-S2X-E (Annex E)	R&S®SMCVB-K476, R&S®SMCVB-K416 required
DVB-RCS2	R&S®SMCVB-K469

Other standards and modulation systems	Option
OFDM signal generation	R&S®SMCVB-K414
Multicarrier CW signal generation	R&S®SMCVB-K261
Additive white Gaussian noise (AWGN)	R&S®SMCVB-K262
NFC A/B/F	R&S®SMCVB-K289

Signal performance for digital standards and modulation systems

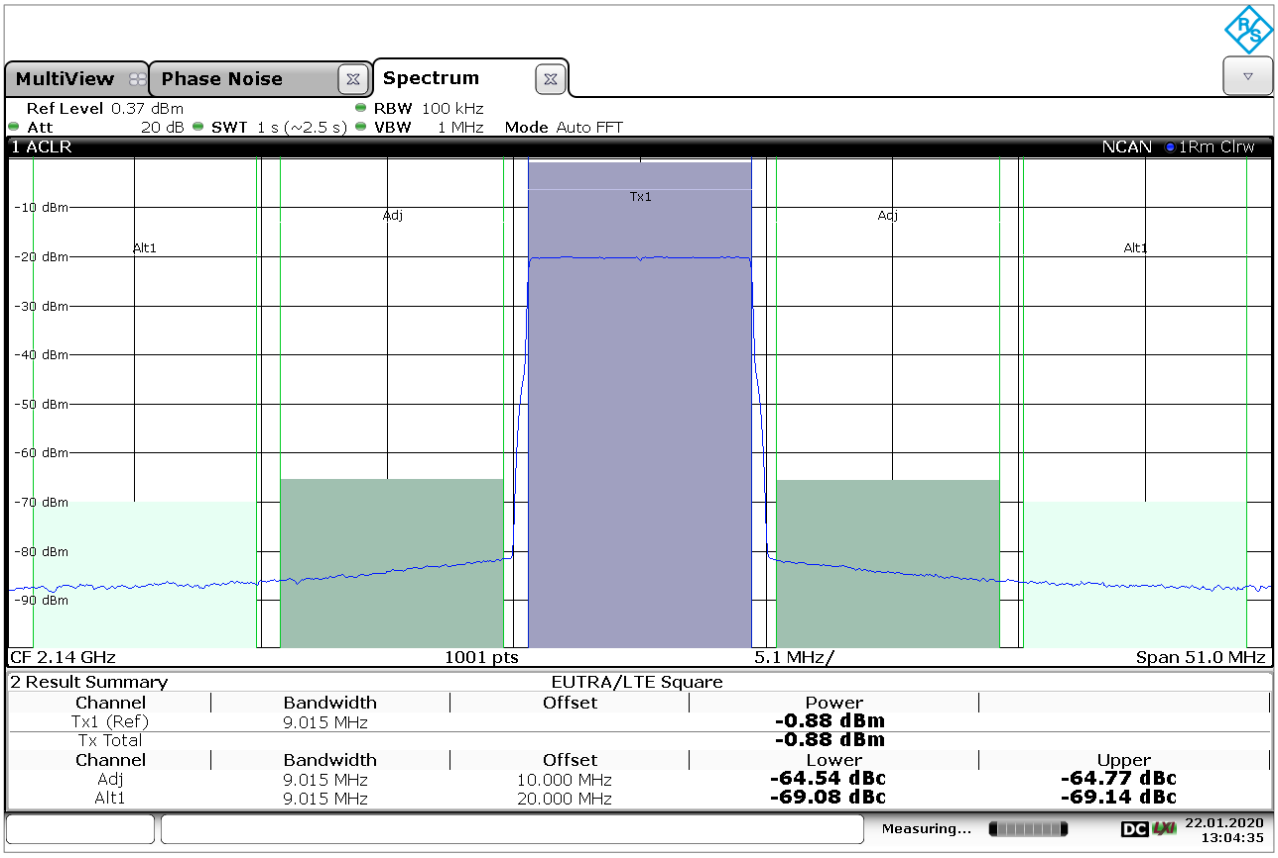
3GPP FDD (with R&S®SMCVB-K242 option)

Error vector magnitude	1 DPCH, RMS, frequency: 1800 MHz to 2200 MHz	< 0.8 %, 0.3 % (meas.)
Adjacent channel leakage ratio	test model 1, 64 DPCH, frequency: 1800 MHz to 2200 MHz, average channel power ≤ 0 dBm, optimization mode: fast, temperature range from +18 °C to +33 °C	
	5 MHz offset	< –63 dBc, –65 dBc (typ.)
	10 MHz offset	< –67 dBc, –69 dBc (typ.)



Measured ACPR for 3GPP test model 1, 64 DPCH

LTE (with R&S®SMCVB-K255 option)



Measured ACPR for a 10 MHz LTE E-TM 3.1 signal, carrier frequency 2.14 GHz

Custom digital modulation (with R&S®SMCVB-K199 option)

Deviation error with 2FSK, 4FSK	deviation: 0.2 to 0.7 × symbol rate, Gaussian filter with B × T = 0.2 to 0.7, f = 1 GHz	
	symbol rate up to 2 MHz	0.4 % (meas.)
	symbol rate up to 10 MHz	1.2 % (meas.)
Phase error with MSK	Gaussian filter with B × T = 0.2 to 0.7, f = 1 GHz	
	bit rate up to 10 MHz	0.3° (meas.)
EVM with QPSK, OQPSK, π/4-DQPSK, 8PSK, 16QAM, 32QAM, 64QAM	cosine, root cosine filter with α = 0.2 to 0.7, f = 1 GHz	
	symbol rate up to 5 MHz	0.5 % RMS (meas.)
	symbol rate up to 20 MHz	2.0 % RMS (meas.)

Health and utilization monitoring service (HUMS) (R&S®SMCVB-K980 option)

Interfaces	protocols and interfaces supported for data readout and display	• SNMP (v1, v2c, v3) • REST (JSON) • SCPI • device web
Services	information provided	• device information (model, serial number, BIOS, date, time, system, HUMS and software information) • user-defined information tags (e.g. for asset management) • equipment information (hardware, options, software, licenses) • system operating status • instrument security information • service related information (due dates etc.) • mass storage related information • instrument utilization data • device history (event log)

Remote control

Interfaces/systems	standard	Ethernet/LAN 10/100/1000BASE-T
Command set		SCPI 1999.5 or compatible command sets
Compatible command sets	These command sets can be selected in order to emulate another instrument. A subset of common commands is supported. For each emulated instrument, the *IDN? and *OPT? strings can be configured to meet the specific requirements.	• R&S®SFE • R&S®SFE100 • R&S®SGT100A
Ethernet/LAN protocols and services		• VISA VXI-11 (remote control) • Telnet/RawEthernet (remote control) • VNC (remote operation with web browser) • FTP (file transfer protocol) • SMB (mapping parts of the instrument to a host file system)
Ethernet/LAN addressing		DHCP, static; support of ZeroConf and M-DNS to facilitate direct connection to a system controller

Connectors

Front panel connectors

RF 50 Ω	RF output	N female
USB	• USB 2.0 (high speed) connector for external USB devices • mouse and keyboard for enhanced operation • R&S®NRPx power sensors (with R&S®NRP-Z4 or R&S®NRP-ZKU adapter cable) for external power measurements and level adjustment of instrument • memory stick for software update and data exchange	
	connector type	USB type A

Rear panel connectors

Ref. In	reference frequency input	BNC female
Ref. Out	reference frequency output	BNC female
User 1, User 2	user-configurable inputs or outputs, e.g. as trigger input or marker output	BNC female
Dig. IQ HS 1, Dig. IQ HS 2	high speed digital input or output, connectivity in line with R&S®Digital I/Q interface	QSFP+/QSFP 28
IP Data	IP input for transport stream (TS) or EDI	SFP+
USB (2 connectors)	• USB 3.0 (high speed) connector for external USB devices • mouse and keyboard for enhanced operation • R&S®NRPx power sensors (with R&S®NRP-Z4 or R&S®NRP-ZKU adapter cable) for external power measurements and level adjustment of instrument • memory stick for software update and data exchange	
	connector type	USB type A
LAN	provides remote control functionality and other services, see section Remote control	RJ-45
DisplayPort	external monitor	

General data

Environmental conditions		
Temperature	operating temperature range	+5 °C to +45 °C
	storage temperature range	–20 °C to +70 °C
Damp heat		+25 °C/+40 °C, 90 % rel. humidity, cyclic, in line with EN 60068-2-78
Altitude	operating	up to 4600 m (15000 ft)
	transport	up to 4600 m (15000 ft)
Degree of protection	IP code	IP20, in line with EN 60529
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz, 0.15 mm amplitude const., 55 Hz to 150 Hz, 0.5 g const., in line with EN 60068-2-6
	random	8 Hz to 500 Hz, acceleration: 1.2 g RMS, in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E, method no. 516.4, procedure I
Power rating		
Rated connector		in line with IEC/EN 60320-1/C14
Rated voltage		100 V to 240 V AC (± 10 %)
Rated frequency		50 Hz to 60 Hz
Rated current		3.6 A to 1.5 A
Rated power	no USB load connected, fans full speed	360 W, 110 W (meas.)
	standby	< 2 W
Fuse		T6.3H/250 V, in line with IEC60127-2/5
Product conformity		
Electromagnetic compatibility	EU: in line with EMC Directive 2014/30EC, UK: in line with Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091)	applied harmonized standards: • EN 61326-1 (industrial environment) • EN 55011 (class A)
	Korea: KC registration	KC registration number: R-R-RnS-GSMCV1HBG
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EU, UK: in line with Electrical Equipment (Safety) Regulations 2016 (S.I. 2016/1101)	applied harmonized standard: EN 61010-1
	USA	UL 61010-1
	Canada	CAN/CSA-C22.2 No. 61010-1
International safety approvals	VDE – Association for Electrical, Electronic and Information Technologies	VDE certificate in line with IEC 61010-1, number of certificate: 40050925
	CSA – Canadian Standards Association	$_{C}$CSA$_{US}$ mark certificate: 80021036
Restriction of the use of hazardous substances in electrical and electronic equipment	EU: in line with RoHS Directive 2011/65/EC, UK: in line with Electrical and Electronic Equipment Regulations 2012 (S.I. 2012/3032)	applied harmonized standard: EN IEC 63000
Acoustic noise emission	sound power level, +23 °C ambient temperature	53 dB(A) (meas.), in line with DIN EN ISO 3744:2010
EU legislation	for details, see user documentation	EU: in line with Data Act - Regulation (EU) 2023/2854
Dimensions	W × H × D	222 mm × 97 mm × 366 mm (8.74 in × 3.82 in × 14.41 in) (½ 19", 2 HU)
Weight		4.7 kg (10.36 lb)
Display		5" color display with capacitive touch functionality
Resolution	RGB	800 × 480 pixel
Non-volatile memory	standard	M.2 SATA, 128 Gbyte
Calibration interval		
Recommended calibration interval	when operated 40 h/week in the full range of the specified environmental conditions	3 years

Ordering information

R&S®SMCVB-Bxxx = hardware option
R&S®SMCVB-Kxxx/KBxxx = software/keycode option

Designation	Type	Order No.
Vector signal generator [9] including baseband generator with ARB (64 Msample, 60 MHz RF bandwidth), power cable and quick start guide	R&S®SMCV100B	1432.7000.02
Options		
Frequency options		
4 kHz to 3 GHz	R&S®SMCVB-B103	1433.2002.02
Frequency extension to 6 GHz [10]	R&S®SMCVB-KB106	1433.2202.02
Frequency extension to 7.125 GHz [11]	R&S®SMCVB-KB107	1433.2402.02
RF options		
High output power	R&S®SMCVB-K31	1434.4115.02
Low phase noise	R&S®SMCVB-K709	1434.3590.02
Baseband options		
ARB waveform streaming	R&S®SMCVB-K505	1434.5328.02
ARB memory extension to 512 Msample	R&S®SMCVB-K511	1434.3519.02
ARB memory extension to 1 Gsample	R&S®SMCVB-K512	1434.3531.02
Baseband extension to 120 MHz RF bandwidth	R&S®SMCVB-K521	1434.3554.02
Baseband extension to 160 MHz RF bandwidth	R&S®SMCVB-K522	1434.3577.02
Baseband extension to 240 MHz RF bandwidth	R&S®SMCVB-K523	1434.4050.02
Baseband enhancements		
Digital baseband interface	R&S®SMCVB-K19	1434.4073.02
Additive white Gaussian noise (AWGN)	R&S®SMCVB-K62	1434.3654.02
Basic AM/FM/φM	R&S®SMCVB-K197	1434.3619.02
Pulse modulation	R&S®SMCVB-K198	1434.3631.02
Custom digital modulation	R&S®SMCVB-K199	1434.3990.02
Enable broadcast standards	R&S®SMCVB-K519	1434.3690.02
Improved modulation frequency response	R&S®SMCVB-K547	1434.4138.02
Crest factor reduction	R&S®SMCVB-K548	1434.5640.02
Other options		
Health and utilization monitoring service (HUMS)	R&S®SMCVB-K980	1434.5757.02
Broadcast standards		
AM/FM/RDS	R&S®SMCVB-K155	1434.3719.02
DAB/T-DMB	R&S®SMCVB-K156	1434.3731.02
DVB-C/ISDB-C	R&S®SMCVB-K157	1434.3754.02
J.83/B	R&S®SMCVB-K158	1434.3777.02
DRM	R&S®SMCVB-K160	1434.3819.02
ATSC/ATSC-MH	R&S®SMCVB-K161	1434.3831.02
ATSC 3.0	R&S®SMCVB-K162	1434.3854.02
DVB-T	R&S®SMCVB-K163	1434.3877.02
DVB-T2	R&S®SMCVB-K164	1434.3890.02
ISDB-T/T_{sb}	R&S®SMCVB-K165	1434.3919.02
DTMB	R&S®SMCVB-K166	1434.3931.02
DVB-S/DVB-S2	R&S®SMCVB-K167	1434.3954.02
DVB-S2x	R&S®SMCVB-K168	1434.3977.02
Digital standards using R&S®WinIQSIM2 [12]		
GSM/EDGE	R&S®SMCVB-K240	1434.4150.02
EDGE Evolution	R&S®SMCVB-K241	1434.4173.02
3GPP FDD	R&S®SMCVB-K242	1434.4196.02
GPS	R&S®SMCVB-K244	1434.4215.02
CDMA2000	R&S®SMCVB-K246	1434.4238.02
1xEV-DO Rev A	R&S®SMCVB-K247	1434.4250.02
TD-SCDMA	R&S®SMCVB-K250	1434.4273.02
TD-SCDMA, enhanced BS/MS tests	R&S®SMCVB-K251	1434.4296.02
DVB-H	R&S®SMCVB-K252	1434.4315.02
DAB/T-DMB	R&S®SMCVB-K253	1434.4338.02
IEEE 802.11a/b/g/n	R&S®SMCVB-K254	1434.4350.02

[9] The base unit can only be ordered with an R&S®SMCVB-B103 frequency option.
[10] Requires R&S®SMCVB-B103 option.
[11] Requires R&S®SMCVB-B103 and R&S®SMCVB-KB106 options.
[12] R&S®WinIQSIM2 requires an external PC.

Designation	Type	Order No.
LTE Release 8	R&S®SMCVB-K255	1434.4373.02
Bluetooth® EDR	R&S®SMCVB-K260	1434.4396.02
Multicarrier CW signal generation	R&S®SMCVB-K261	1434.4415.02
Additive white Gaussian noise (AWGN)	R&S®SMCVB-K262	1434.4438.02
Galileo	R&S®SMCVB-K266	1434.4450.02
3GPP FDD HSPA/HSPA+, enhanced BS/MS tests	R&S®SMCVB-K283	1434.4473.02
LTE Release 9	R&S®SMCVB-K284	1434.4496.02
LTE Release 10	R&S®SMCVB-K285	1434.4415.02
IEEE 802.11ac	R&S®SMCVB-K286	1434.4538.02
1xEV-DO Rev. B	R&S®SMCVB-K287	1434.4550.02
NFC A/B/F	R&S®SMCVB-K289	1434.4573.02
GLONASS 1 satellite	R&S®SMCVB-K294	1434.4596.02
IRNSS 1 satellite	R&S®SMCVB-K297	1434.5734.02
Modernized GPS	R&S®SMCVB-K298	1434.4615.02
BeiDou	R&S®SMCVB-K407	1434.4638.02
LTE Release 11	R&S®SMCVB-K412	1434.4650.02
LTE Release 12	R&S®SMCVB-K413	1434.4673.02
OFDM signal generation	R&S®SMCVB-K414	1434.4696.02
Cellular IoT Release 13	R&S®SMCVB-K415	1434.4738.02
DVB-S2/DVB-S2X	R&S®SMCVB-K416	1434.4715.02
Bluetooth® 5.x	R&S®SMCVB-K417	1434.4750.02
Verizon 5GTF signals	R&S®SMCVB-K418	1434.4773.02
LTE Release 13/14/15	R&S®SMCVB-K419	1434.4796.02
Modernized GLONASS	R&S®SMCVB-K423	1434.5911.02
LoRa	R&S®SMCVB-K431	1434.4815.02
Modernized BeiDou	R&S®SMCVB-K432	1434.5740.02
IEEE 802.11ax	R&S®SMCVB-K442	1434.4838.02
Cellular IoT Release 14	R&S®SMCVB-K443	1434.4850.02
5G NR Release 15	R&S®SMCVB-K444	1434.4873.02
Cellular IoT Release 15	R&S®SMCVB-K446	1434.5705.02
IEEE 802.11be	R&S®SMCVB-K447	1434.5870.02
5G NR Release 16	R&S®SMCVB-K448	1434.5686.02
DVB-RCS2	R&S®SMCVB-K469	1434.5940.02
5G NR Sidelink	R&S®SMCVB-K470	1434.5857.02
5G NR Release 17	R&S®SMCVB-K471	1434.4880.02
DVB-S2X-E (Annex E)	R&S®SMCVB-K476	1434.5934.02
Bluetooth® 6.0	R&S®SMCVB-K478	1434.4996.02
Waveform packages, for signals from R&S®WinIQSIM2, R&S®SMCVB-KVxx		
1 waveform	R&S®SMCVB-K200	1434.5728.71
5 waveforms	R&S®SMCVB-K200	1434.5728.72
50 waveforms	R&S®SMCVB-K200	1434.5728.75
Waveform libraries (available for download at customer web)		
DAB/T-DMB waveforms	R&S®SMCVB-KV10	1434.5340.02
DRM waveforms	R&S®SMCVB-KV11	1434.5370.02
DRM+ waveforms	R&S®SMCVB-KV12	1434.5405.02
HD radio waveforms	R&S®SMCVB-KV13	1434.5434.02
XM radio waveforms	R&S®SMCVB-KV14	1434.5463.02
DVB-T2 waveforms	R&S®SMCVB-KV15	1434.5492.02
ATSC 3.0 waveforms	R&S®SMCVB-KV16	1434.5528.02
Digital TV interferer waveforms	R&S®SMCVB-KV17	1434.5557.02
Cable interferer waveforms	R&S®SMCVB-KV18	1434.5586.02
Satellite interferer waveforms	R&S®SMCVB-KV19	1434.5611.02
China digital radio waveforms	R&S®SMCVB-KV20	1434.5892.02
GPS predefined waveforms	R&S®SMCVB-KV50	1434.5770.02
Galileo predefined waveforms	R&S®SMCVB-KV51	1434.5792.02
GLONASS predefined waveforms	R&S®SMCVB-KV52	1434.5811.02
BeiDou predefined waveforms	R&S®SMCVB-KV53	1434.5834.02

Designation	Type	Order No.
Transport stream libraries, for broadcast standards (available for download at customer web)		
DAB/T-DMB stream library	R&S®SMCVB-KS10	1434.4896.02
DAB+ stream library	R&S®SMCVB-KS11	1434.4938.02
ISDB-T stream library	R&S®SMCVB-KS12	1434.4973.02
ATSC/ATSC and mobile DTV stream library	R&S®SMCVB-KS13	1434.5011.02
DVB-T2 MI stream library	R&S®SMCVB-KS14	1434.5057.02
EMC stream library	R&S®SMCVB-KS15	1434.5092.02
DRM stream library	R&S®SMCVB-KS16	1434.5134.02
Basic stream library	R&S®SMCVB-KS17	1434.5170.02
Extended SDTV stream library	R&S®SMCVB-KS18	1434.5211.02
Extended HDTV stream library	R&S®SMCVB-KS19	1434.5257.02
HEVC stream library	R&S®SMCVB-KS20	1434.5292.02
Recommended extras		
19" rack adapter	R&S®HZN96	3638.7813.02
19" rack adapter, with handles and feedthrough	R&S®HZN96	3638.7813.03
Documentation of calibration values	R&S®DCV-2	0240.2193.18
R&S®SMCV100B accredited calibration	R&S®ACASMCV100B	3598.5600.03

Warranty and service

Warranty		
Base unit		1 year
All other items		1 year
Service options		
	Service plans	**On demand**
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Warranty and repair	up to five years [13]	standard price repair
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