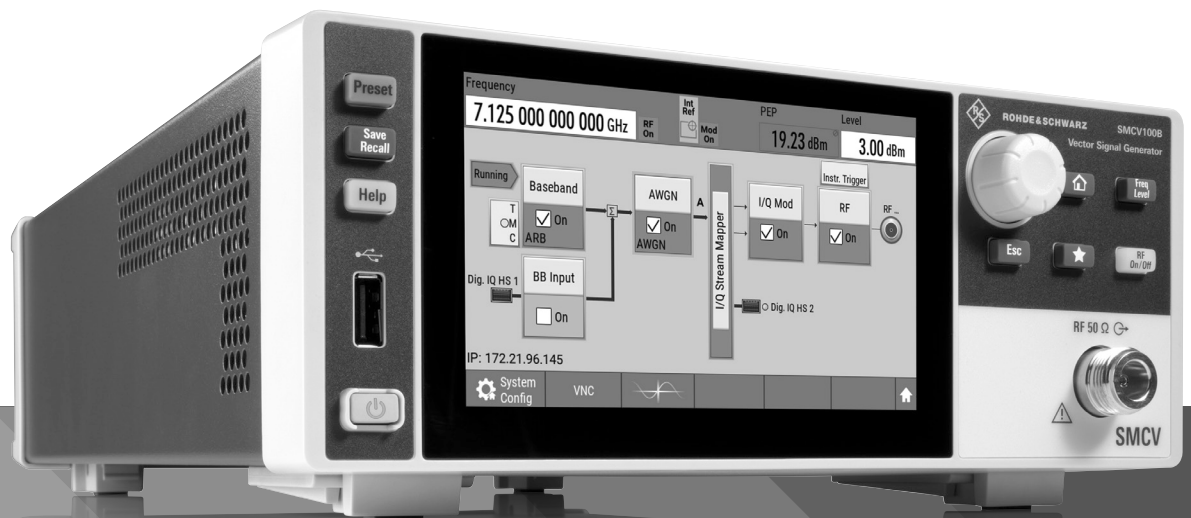


R&S® SMCV100B

VECTOR SIGNAL GENERATOR

Specifications



Specifications
Version 14.00

ROHDE & SCHWARZ

Make ideas real



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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 $<$, \leq , $>$, \geq , \pm , 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

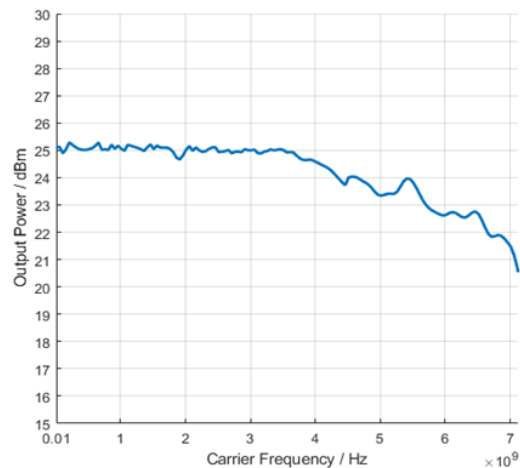
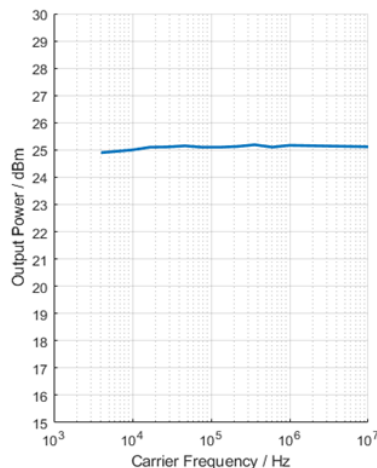
| | | |
|--|--|--|
| Range | with R&S®SMCVB-B103 option (mandatory) | 4 kHz to 3 GHz |
| | with R&S®SMCVB-B103 and R&S®SMCVB-KB106 options | 4 kHz to 6 GHz |
| | with R&S®SMCVB-B103, R&S®SMCVB-KB106 and R&S®SMCVB-KB107 options | 4 kHz to 7.125 GHz |
| Resolution of setting | | 0.001 Hz |
| Resolution of synthesis | f = 1 GHz | 2.665 μHz (nom.) |
| Settling time | to within $< 1 \times 10^{-7}$ 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 | $< 1 \times 10^{-7}$ |
| Aging | after 30 days of uninterrupted operation | $\leq 1 \times 10^{-6}$ /year |
| Temperature effect | in temperature range from +5 °C to +45 °C | $\pm 1.0 \times 10^{-6}$ |
| 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 | | $\pm 25 \times 10^{-6}$ (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 | |
| | $4 \text{ kHz} \leq f < 100 \text{ kHz}$ | -120 dBm to +16 dBm |
| | $100 \text{ kHz} \leq f < 6 \text{ GHz}$ | -145 dBm to +16 dBm |
| | $6 \text{ GHz} \leq f \leq 7.125 \text{ GHz}$ | -145 dBm to +16 dBm |
| | with R&S®SMCVB-K31 option | |
| | $4 \text{ kHz} \leq f < 100 \text{ kHz}$ | -120 dBm to +25 dBm |
| | $100 \text{ kHz} \leq f \leq 6 \text{ GHz}$ | -145 dBm to +25 dBm |
| $6 \text{ GHz} \leq f \leq 7.125 \text{ GHz}$ | -145 dBm to +25 dBm | |
| Setting resolution | | |
| 0.01 dB | | |
| Specified level range | | |
| peak envelope power (PEP) | | |
| R&S®SMCVB-B103/-KB106/-KB107 | standard | |
| | $4 \text{ kHz} < f \leq 10 \text{ MHz}$ | -110 dBm to +15 dBm |
| | $10 \text{ MHz} < f \leq 6 \text{ GHz}^1$ | -120 dBm to +15 dBm |
| | $6 \text{ GHz} < f \leq 7.125 \text{ GHz}$ | -120 dBm to +15 dBm |
| | with R&S®SMCVB-K31 option | |
| | $4 \text{ kHz} < f \leq 10 \text{ MHz}$ | -110 dBm to +20 dBm |
| | $10 \text{ MHz} < f \leq 6 \text{ GHz}^1$ | -120 dBm to +20 dBm |
| $6 \text{ GHz} < f \leq 7.125 \text{ GHz}$ | -120 dBm to +18 dBm | |
| Level accuracy | | |
| level setting characteristic: auto, temperature range from +18 °C to +33 °C | | |
| level > -80 dBm | | |
| $4 \text{ kHz} < f < 200 \text{ kHz}$ | < 1.8 dB | |
| $200 \text{ kHz} \leq f \leq 10 \text{ MHz}$ | < 0.7 dB | |
| $10 \text{ MHz} < f \leq 2.5 \text{ GHz}^1$ | < 0.5 dB | |
| $f > 2.5 \text{ GHz}^1$ | < 0.7 dB | |
| level ≤ -80 dBm | | |
| $4 \text{ kHz} < f < 200 \text{ kHz}$ | < 1.8 dB | |
| $200 \text{ kHz} \leq f \leq 10 \text{ MHz}$ | < 1.2 dB, < 1.0 dB (typ.) | |
| $10 \text{ MHz} < f \leq 2.5 \text{ GHz}^1$ | < 0.8 dB | |
| $f > 2.5 \text{ GHz}^1$ | < 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 $f = 0.5 \text{ GHz}$, 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 \leq 7.125 GHz | 2 W |
| Maximum permissible DC voltage | | 35 V (nom.) |

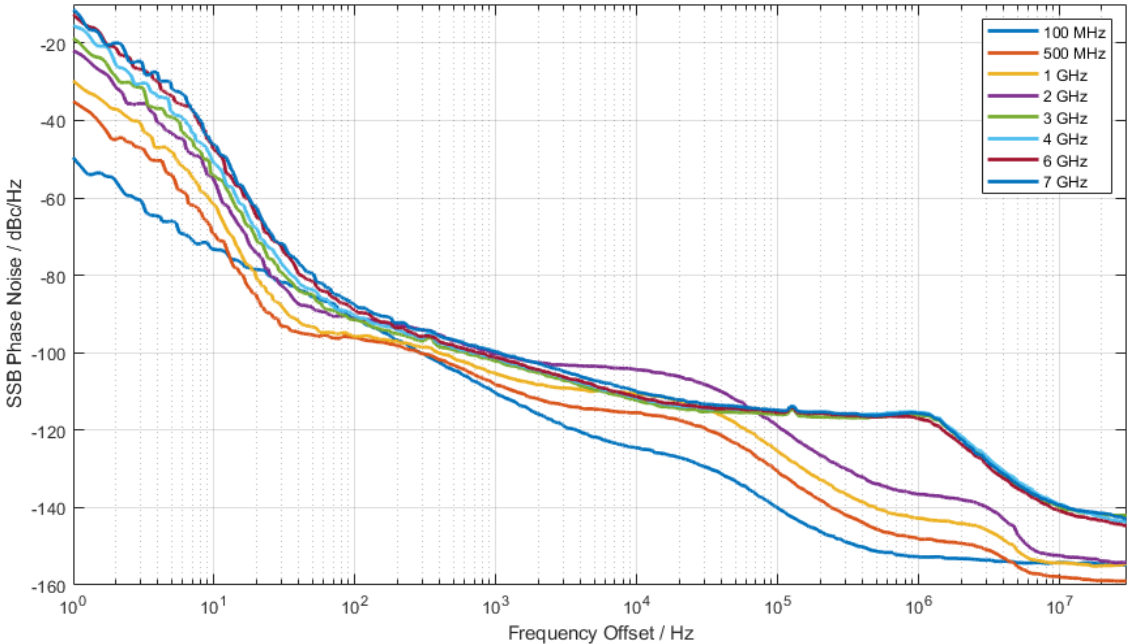
VSWR

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

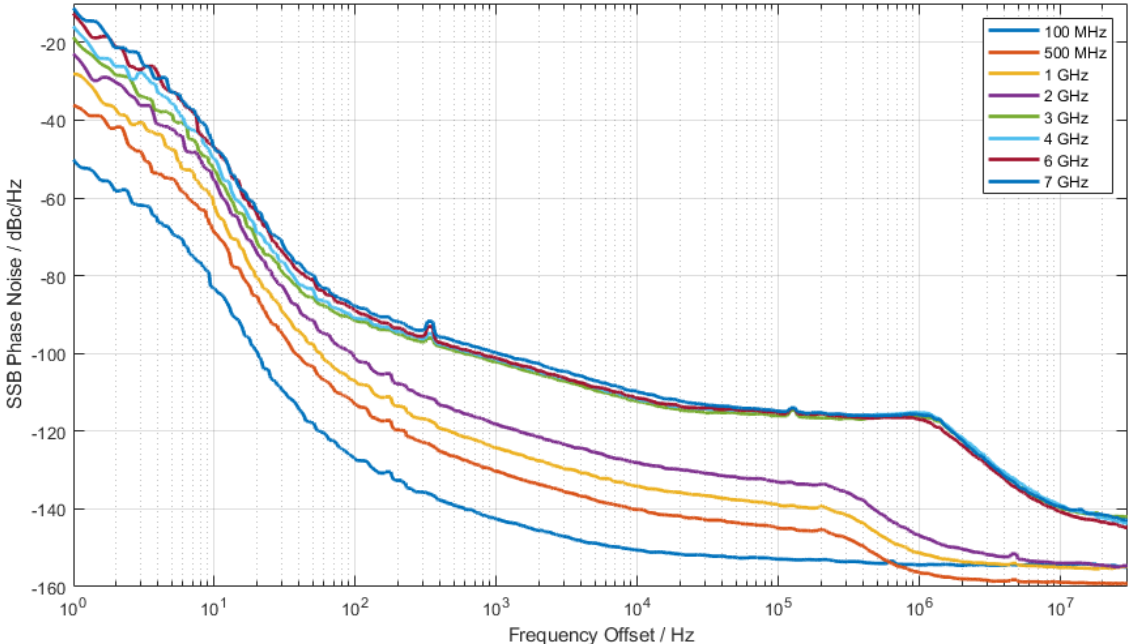
Spectral purity

| | | |
|---|---|---------------------------|
| Harmonics | CW, I/Q mode (full-scale internal single carrier signal), level \leq 13 dBm | |
| | 100 kHz \leq f \leq 7.125 GHz | < -30 dBc |
| Nonharmonics | CW, level > +10 dBm, > 10 kHz offset from carrier and outside the modulation spectrum, reference frequency internal | |
| | f \leq 2.5 GHz | < -52 dBc, -58 dBc (typ.) |
| | 2.5 GHz < f \leq 7.125 GHz | < -52 dBc, -63 dBc (typ.) |
| Wideband noise | CW, level = +10 dBm, carrier offset = 30 MHz, measurement bandwidth = 1 Hz | |
| | 20 MHz \leq f \leq 100 MHz | < -139 dBc |
| | 100 MHz < f \leq 2.5 GHz | < -142 dBc |
| | 2.5 GHz < f \leq 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 \leq 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 \leq 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 \leq f \leq 100 MHz | < 0.08 % |
| | 100 MHz < f \leq 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

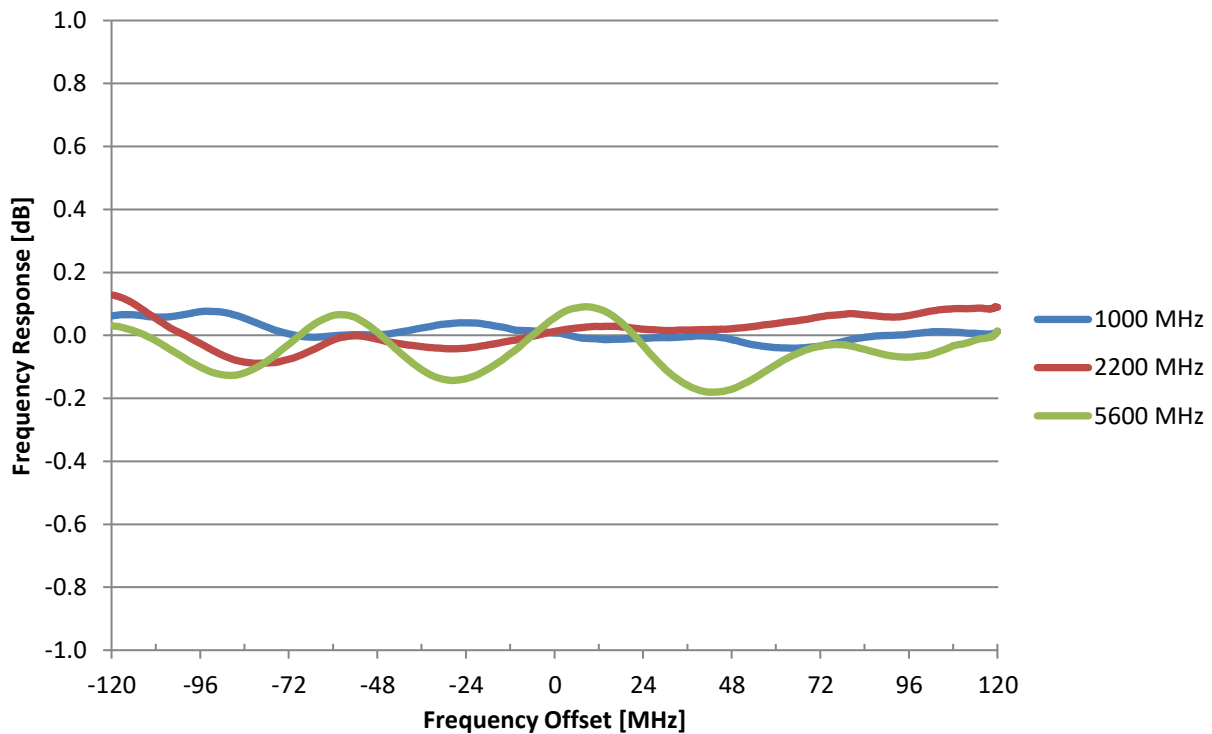
Frequency and level values can be stored in a list and triggered by an internal timer or an external trigger.

| | | |
|-------------------------------|---|------------------------------|
| 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

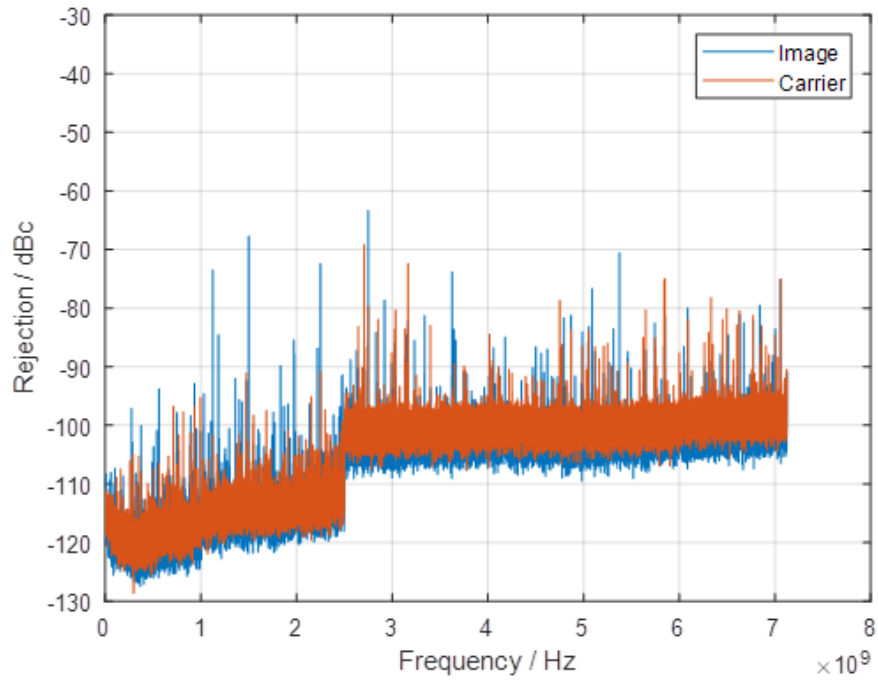
| Operating modes | | internal baseband I/Q |
|---|--|---|
| RF modulation bandwidth | The maximum signal bandwidth depends on the baseband option configuration, see I/Q baseband generator. | |
| | $8 \text{ kHz} < f \leq 240 \text{ MHz}$ | $\pm 50 \%$ of carrier frequency |
| | $f > 240 \text{ MHz}$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



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, $\alpha = 0.20$, 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% |
| $I \neq Q$ (imbalance) | | |
| Setting range | | -1 dB to $+1$ dB |
| Resolution | | 0.01 dB |
| Quadrature offset | | |
| Setting range | | -10° to $+10^\circ$ |
| 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 | | $< (1 \times 10^{-12} + \text{relative deviation of reference frequency}) \times \text{sample rate (nom.)}$ |
| 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) | | $0.8 \times \text{sample rate}$ |
| 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 | | $< (1 \times 10^{-12} + \text{relative deviation of reference frequency}) \times \text{sample rate (nom.)}$ |
| 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 | $< 4 \times 10^{-11} \text{ Hz} + \text{relative deviation of reference frequency} \times \text{sample rate (nom.)}$ |
| 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 | | $< 3 \times 10^{-6}$ Hz + relative deviation of reference frequency \times 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 k Ω 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 \times sample rate) sample |
| Setting resolution | | 3.3 ns |
| External trigger pulse width | | |
| | | > 7.5 ns |
| Marker signals | | |
| Number of marker signals | | 3 |
| Operating modes | | unchanged, restart ⁸ , pulse, pattern, ratio |
| Marker outputs | | |
| Connector type | user 1, user 2 | BNC female |
| Level | | LVTTTL |
| Marker delay | | |
| Setting range | | 0 sample to (waveform length – 1) sample |
| Setting resolution | | 1 sample |
| Marker duration | | |
| Minimum value | sample rate \leq 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 | | |
| Deviation | | 2FSK to 64FSK and MSK |
| Maximum | standard | 1 Hz to $15 \times f_{\text{sym}}$ |
| | with R&S®SMCVB-K521 option | 30 MHz |
| | with R&S®SMCVB-K522 option | 60 MHz |
| | with R&S®SMCVB-K523 option | 80 MHz |
| Resolution | | 120 MHz |
| Variable FSK | | 0.5 Hz |
| Deviation | | 4FSK, 8FSK, 16FSK |
| Maximum | standard | $-15 \times f_{\text{sym}}$ to $+15 \times f_{\text{sym}}$ |
| | with R&S®SMCVB-K521 option | ± 30 MHz |
| | with R&S®SMCVB-K522 option | ± 60 MHz |
| | with R&S®SMCVB-K523 option | ± 80 MHz |
| Resolution | | ± 120 MHz |
| PSK | | |
| Resolution | | 0.5 Hz |
| QAM | | |
| | | BPSK, QPSK, QPSK 45° offset, QPSK EDGE, AQPSK, OQPSK, $\pi/4$ -QPSK, $\pi/2$ -DBPSK, $\pi/4$ -DQPSK, $\pi/8$ -D8PSK, 8PSK, 8PSK EDGE, 16APSK, 32APSK |
| | | 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 1024QAM, 2048QAM |
| | | $\pi/4$ -16QAM, $-\pi/4$ -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) | | $< 4 \times 10^{-11}$ Hz + relative deviation of reference frequency \times sample rate (nom.) |
| Baseband filter | | |
| Filter types | any filter can be used with any type of modulation | 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 $B \times T$) | 0.15 to 2.50 |
| | split phase (filter parameter $B \times T$) | 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 \times 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 | |
| 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 k Ω or 50 Ω (nom.) |
| Trigger jitter | | ± 2.67 ns |
| External trigger delay | | |
| Setting range | | 0 symbol to 1466 s \times symbol rate |
| Setting resolution | | 0.01 symbol \pm 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 | | 3 |
| 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 | | LVTTTL |
| Marker delay | | |
| Setting range | | 0 symbol to $(2^{24} - 1)$ symbol |
| Setting resolution | | 1 symbol |
| Marker duration | | |
| Minimum value | | 1 symbol |

Basic AM/FM/ ϕ M (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 | $f_{\text{mod}} = 1 \text{ kHz}$ | < 1 % (meas.) |
| AM distortion | $f_{\text{mod}} = 1 \text{ kHz}$ | < -60 dB (meas.) |
| Incidental ϕ M at AM | $m = 30 \%$, $f_{\text{mod}} = 1 \text{ kHz}$, $\pm \text{peak}/2$ | < 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 | $f_{\text{mod}} = 2 \text{ kHz}$, deviation $\leq 1 \text{ MHz}$, modulation source: internal | < 1 % of setting (meas.) |
| FM distortion | $f_{\text{mod}} = 2 \text{ kHz}$, deviation = 1 MHz | < -80 dB (meas.) |
| Synchronous AM with FM | 40 kHz deviation, $f_{\text{mod}} = 1 \text{ kHz}$, $f > 10 \text{ MHz}$ | < -80 dB (meas.) |
| Carrier frequency offset | $f_{\text{mod}} = 2 \text{ kHz}$ | < 23×10^{-6} of set deviation |
| Phase modulation | | |
| Modulation source | internal modulation generator | internal |
| Maximum deviation | | 6 rad |
| Resolution of setting | | 1 μ rad |
| ϕ M deviation error | $f_{\text{mod}} = 1 \text{ kHz}$, modulation source: internal | < (2 % of setting + 0.003 rad) |
| ϕ M distortion | $f_{\text{mod}} = 10 \text{ kHz}$, 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 \times 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 | | |
| Setting range | Pulse widths of double pulses can be set independently. | |
| 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 | | |
| 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 data sheet (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 data sheet (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 |
| 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 |

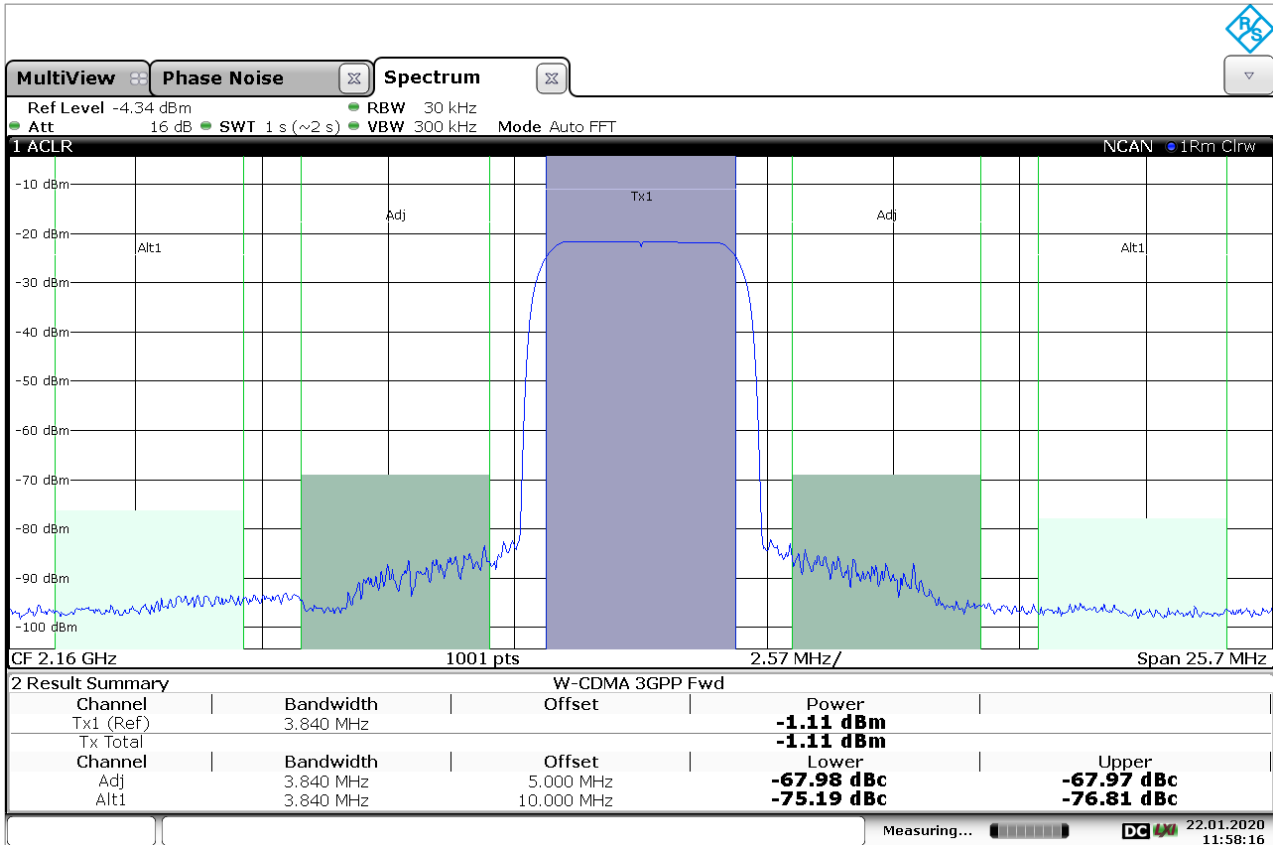
| Broadcast standards | Option |
|----------------------------|---|
| DVB-H/DVB-T | R&S®SMCVB-K252 |
| DAB/T-DMB | R&S®SMCVB-K253 |
| DVB-S2/DVB-S2X | R&S®SMCVB-K416 |
| DVB-S2X-E (Annex E) | R&S®SMCVB-K476, R&S®SMCVB-K416 required |
| DVB-RCS2 | R&S®SMCVB-K469 |

| 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

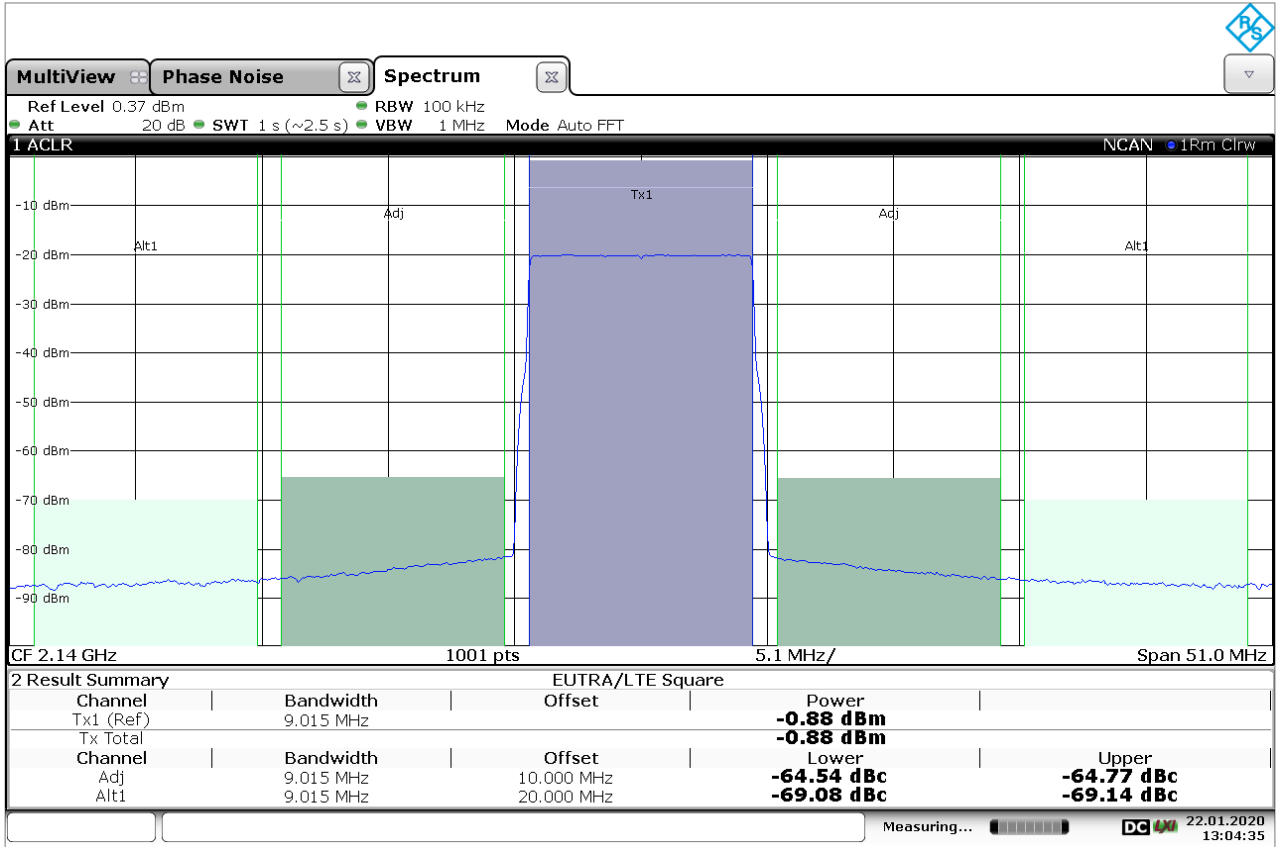
3GPP FDD (with R&S[®]SMCVB-K242 option)

| | | |
|--------------------------------|---|---------------------------|
| 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 EVM performance versus channel power 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 $B \times T = 0.2$ 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 $B \times T = 0.2$ to 0.7, $f = 1$ GHz | |
| | bit rate up to 10 MHz | 0.3° (meas.) |
| EVM with QPSK, OQPSK, $\pi/4$ -DQPSK, 8PSK, 16QAM, 32QAM, 64QAM | cosine, root cosine filter with $\alpha = 0.2$ 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 | <ul style="list-style-type: none"> • SNMP (v1, v2c, v3) • REST (JSON) • SCPI • device web |
| Services | information provided | <ul style="list-style-type: none"> • 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 | <p>These command sets can be selected in order to emulate another instrument. A subset of common commands is supported.</p> <p>For each emulated instrument, the *IDN? and *OPT? strings can be configured to meet the specific requirements.</p> | <ul style="list-style-type: none"> • R&S®SFE • R&S®SFE100 • R&S®SGT100A |
| Ethernet/LAN protocols and services | | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • 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 2014/30/EC, UK: in line with Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091) | applied harmonized standards: <ul style="list-style-type: none"> EN 61326-1 (industrial environment) EN 55011 (class B) |
| | 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 | cCSA _{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 |
| Dimensions | W x H x D | 222 mm x 97 mm x 366 mm (8.74 in x 3.82 in x 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 x 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 |
| 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 |
| 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 |
| Calibration | up to five years ¹³ | pay per calibration |
| Warranty and repair | up to five years ¹³ | standard price repair |
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| www.rohde-schwarz.com/service-support/service/overview/service-overview_229461.html | | |

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