Data sheet

Version 03.00

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Vector Signal Generator R&S®SMV03

Vector modulation in the analog class

- Frequency range 9 kHz to 3.3 GHz
- I/Q modulator (100 MHz RF bandwidth) with excellent vector accuracy (f > 500 MHz to 3 GHz)
- SSB phase noise –128 dBc (1 Hz)
- Setting times <10 ms
- High level accuracy <0.5 dB
- High reliability through electronic attenuator
- Digital frequency and level sweep
- AM/FM/φM
- Optional pulse modulator with integrated pulse generator
- Optional stereo coder with analog and digital audio inputs
- Three-year calibration cycle

ROHDE&SCHWARZ

The allrounder

The Vector Signal Generator R&S®SMV03 is based on the successful analog Signal Generator R&S®SML03 and features the same excellent technical characteristics. It comprises an additional broadband I/Q modulator that is able to generate any digital signal in conjunction with an external I/Q source. The R&S®SMV03 is, therefore, a way of entering the wide field of automatic test systems as well as gaining access to applications such as R&D and service. When used together with the R&S®AMIQ and R&S®WinIQSIM™, the R&S®SMV03 can generate digital signals that meet any requirement.

RF characteristics

- Frequency range from 9 kHz to 3.3 GHz with 0.1 Hz resolution
- High output level of +13 dBm with a deviation <0.5 dB
- Interruption-free level setting by means of electronic attenuator
- High spectral purity <–122 dBc (1 Hz) at f = 1 GHz and 20 kHz carrier offset
- Frequency and level setting time <10 ms

Vector modulation

- Wide I/Q bandwidth of >50 MHz (3 dB), 100 MHz RF bandwidth for f > 500 MHz to 3 GHz
- High vector accuracy

Analog modulation

- AM/FM/φM as standard
- Simultaneous AM, FM/φM, pulse and vector modulation
- Optional pulse modulator with integrated Pulse Generator R&S®SML-B3 and retrofittable Stereo/RDS Coder R&S®SML-B5

Dimensions

- Compact size 427 mm × 88 mm × 450 mm
- Low weight <9.5 kg

Low cost of ownership

- Three-year calibration cycle
- Electronic attenuator for wear-free operation
- Service-friendly (continuous selftest, access to internal test points)

Applications

Production: fast, accurate, reliable

Versatility
The R&S®SMV03 generates all kinds of I/Q-modulated signals using the integrated vector modulator. Owing to its wide I/Q bandwidth of 50 MHz, the R&S®SMV03 is also optimally suited for applications using high data rates such as WLAN standards. Signals to digital standards can be easily generated in conjunction with an external I/Q source like the Modulation Generator R&S®AMIQ (PD 0757.3970) and the associated R&S®WinIQSIM™ simulation software (PD 0758.0680).

The R&S®SMV03 therefore optimally meets production environment requirements.

Dimensions
The compact size (only 2 HU) makes the R&S®SMV03 ideal for use in production where space is often limited.

Speed
Speed is essential – especially in production. And this is exactly where the R&S®SMV03 shows what it can do with a frequency and level setting time of <10 ms.

Accuracy
Any measurement uncertainty has two components: the uncertainty due to the measuring instrument and that due to the rest of the test setup. The lower the level uncertainty of the vector signal generator, the greater the test setup tolerance that may be allowed. If greater tolerances can be allowed for the DUT because of the small level error of the R&S®SMV03, production rejects can be markedly reduced – an advantage that pays off immediately.

Reliability
A signal generator used in production must feature high reliability. The R&S®SMV03 meets this requirement, for example, through the use of a completely wear-free electronic attenuator.

Output level
In production test systems, the signal is routed to the DUT via switches and cables which introduce losses. This can be compensated for by the high output power of the R&S®SMV03.

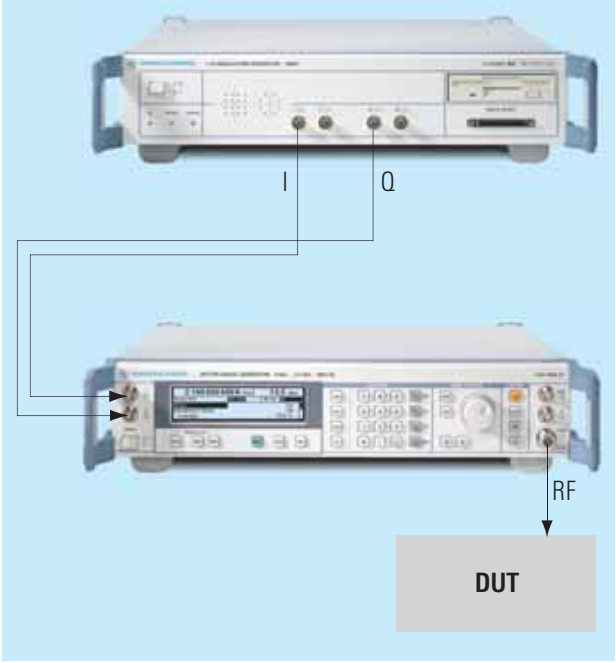
Example: component test

Tests using digital signals are becoming increasingly important for checking the functions of individual components – especially at the component production stage. In this environment, the R&S®SMV03's I/Q modulator shows what it can do. Owing to its wide signal bandwidth of 50 MHz, it can generate a great variety of digital signals when an external I/Q source is used.

To obtain reliable information on component quality, high level accuracy and high output level repeatability are essential. The R&S®SMV03 fully meets these requirements owing to a maximum level uncertainty of <0.5 dB (at levels >–120 dBm) and high reproducibility.

Extremely short frequency and level setting times (<10 ms) allow fast measurements and make the R&S®SMV03 the ideal generator for production testing.

Overshoots that occur when the level is changed may damage or even destroy the DUT. This cannot happen with the R&S®SMV03 as no overshoots are produced.



Lab and R&D: versatile

Versatile modulation modes

Particularly in research, a great variety of digital signals are used in the development of new systems, which are not always covered by a standard. Owing to its very wideband I/Q modulator, the R&S®SMV03 can handle universal tasks of this kind.

In conjunction with the optional Pulse Modulator R&S®SML-B3, the vector signal generator can also handle all types of analog modulation. AM, FM/φM and pulse modulation can be used simultaneously as can vector modulation, FM/φM and pulse modulation.

Module test with the R&S®SMV03, R&S®AMIQ and Spectrum Analyzer R&S®FSP

High spectral purity

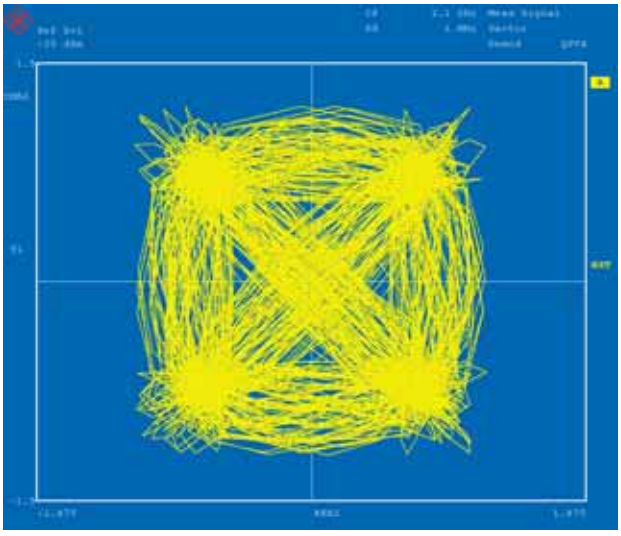
Owing to its low phase noise, the R&S®SMV03 is ideally suited to replace LOs.

High and accurate output level

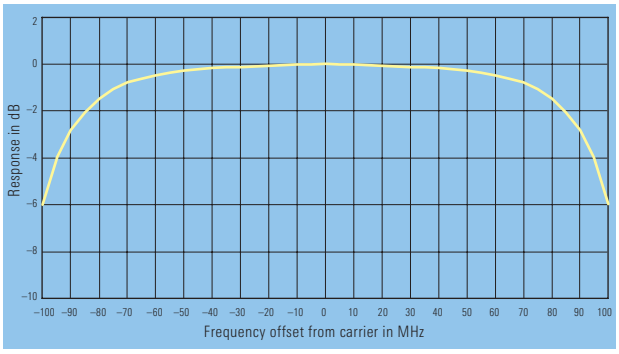
The high level accuracy of the Vector Signal Generator R&S®SMV03 is a prerequisite for highly accurate measurements on sensitive analog and digital receivers. Its high output level makes the R&S®SMV03 an ideal source for driving high-level mixers.

Excellent modulation characteristics

As the R&S®SMV03 provides high-linearity FM, it can be used as a precise VCO.



Vector diagram of QPSK signals



Frequency response of I/Q modulator (carrier frequency 1 GHz)

Example: receiver measurements

Sensitivity measurements require a signal generator with high level accuracy. High accuracy is even more critical at low output levels. Owing to its sophisticated calibration methods, the R&S®SMV03 features high level accuracy (uncertainty <0.5 dB at levels >−120 dBm).

Minimal spurious, minimal broadband noise and, above all, excellent SSB phase noise are prerequisites for using the R&S®SMV03 as an interference source. With an SSB phase noise of typ. −128 dBc/Hz (at f = 1 GHz, Δf = 20 kHz), spurious suppression of typ. −76 dBc and broadband noise of typ. −150 dBc (1 Hz), the R&S®SMV03 meets even the most exacting requirements.

The mechanical design of the R&S®SMV03 ensures excellent RF shielding of its casing. This is particularly important for measurements on highly sensitive receivers with built-in antenna.

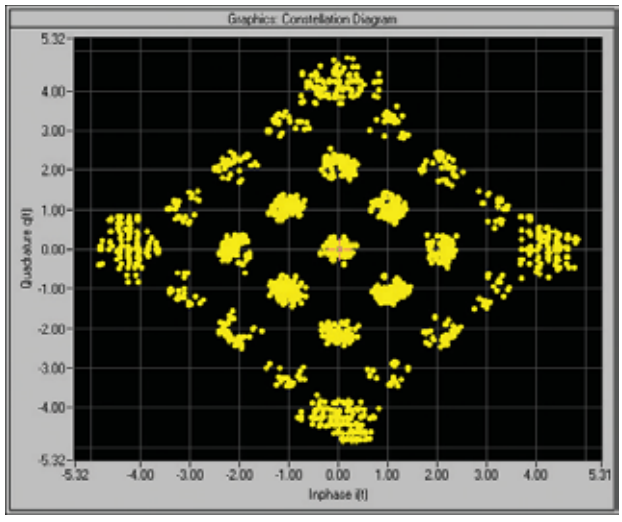
EMS measurements

Interruption-free level setting without overshoots

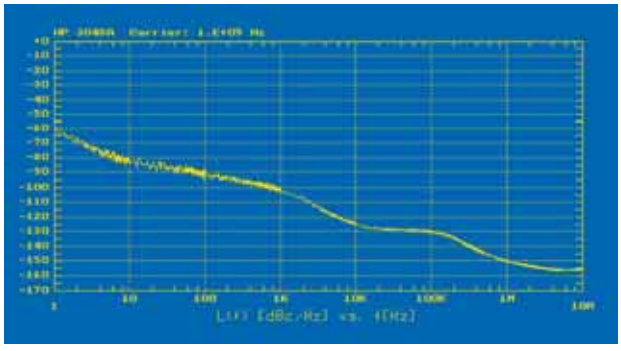
EMS measurements require interruption-free level setting which should also be overshoot-free. The R&S®SMV03 does not produce any overshoots – even at setting times <10 ms. Furthermore, it has a wide dynamic range of typ. 30 dB across which level adjustment is interruption-free.

Wide frequency range

The R&S®SMV03 features a lower frequency limit of 9 kHz as standard and thus fully covers the frequency range required for EMC measurements.



Constellation diagram of WCDMA signal in 3GPP TDD mode



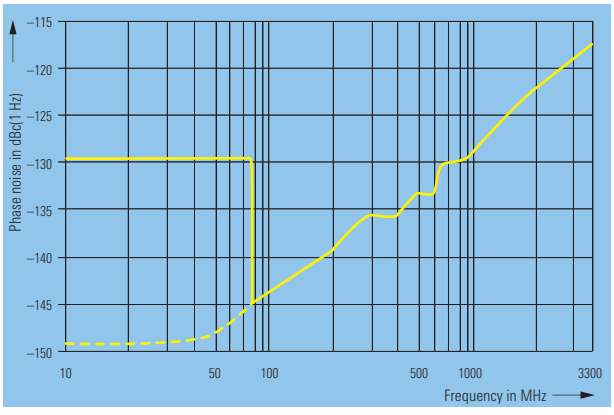
Typical SSB phase noise at 1 GHz (with OCXO option R&S®SML-B1)

Reference source

The R&S®SMV03 allows selection of the mode of frequency generation. In the extended divider range mode, the RF signal is generated by frequency division. The excellent values obtained in this mode for SSB phase noise are comparable to those from the high-grade crystal oscillators normally used as reference sources from 10 MHz to 30 MHz.

Compared to crystal oscillators, the R&S®SMV03 has the following benefits:

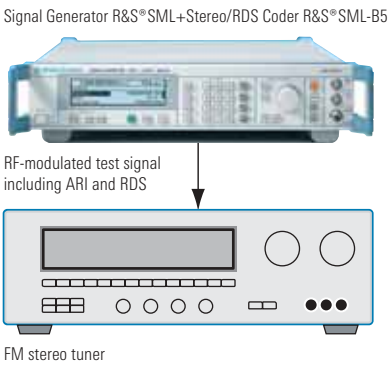
- The frequency can be set in 0.1 Hz steps and synchronized to an external reference
- All functions can be remotely controlled via the IEC/IEEE bus or serial interface



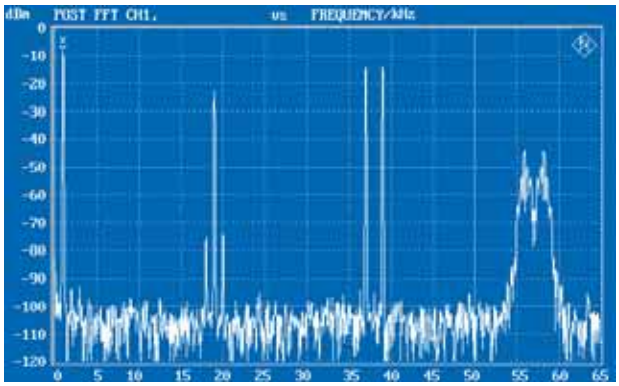
Typical SSB phase noise versus carrier frequency (carrier offset 20 kHz); dashed line: extended divider range mode

Offset from carrier	SSB phase noise, typical values
1 Hz	–95 dB
10 Hz	–120 dB
100 Hz	–130 dB
1 kHz	–138 dB
10 kHz	–148 dB

SSB phase noise at 9.5 MHz output frequency, extended divider range activated, 1 Hz measurement bandwidth



Audio signals produced by the built-in LF generator of the R&S®SML



Signal output by the stereo/RDS coder prior to FM modulation with ARI and RDS information

Generation of stereo and RDS signals

FM stereo broadcasting is still the major audio medium – especially in the automobile sector, where millions of car radios are produced every year. With its integration into mobile radio telephones, FM broadcasting becomes even more significant. For testing FM stereo receivers, audio test signals are modulated onto an RF carrier and measured after demodulation by the DUT. For the car radio sector, automotive radio information (ARI) has to be generated in addition. Test signals are also needed for the radio data system (RDS), which has been established in many countries for a long time.

Stereo/RDS Coder R&S®SML-B5

The optional Stereo/RDS Coder R&S®SML-B5 meets all the above requirements. Built into instruments of the Signal Generator Family R&S®SML/ R&S®SMV, the solution is based on equipment featuring an excellent price/ performance ratio as well as top-class specifications and providing full coverage of the frequency range in question.

Audio signals produced by internal LF generator

The internal LF generator, which is suitable for simple receiver tests, is part of the basic configuration of the R&S®SML/ R&S®SMV. It generates sinusoidal signals at fixed frequencies, thus allowing basic functional tests to be carried out without an external signal.

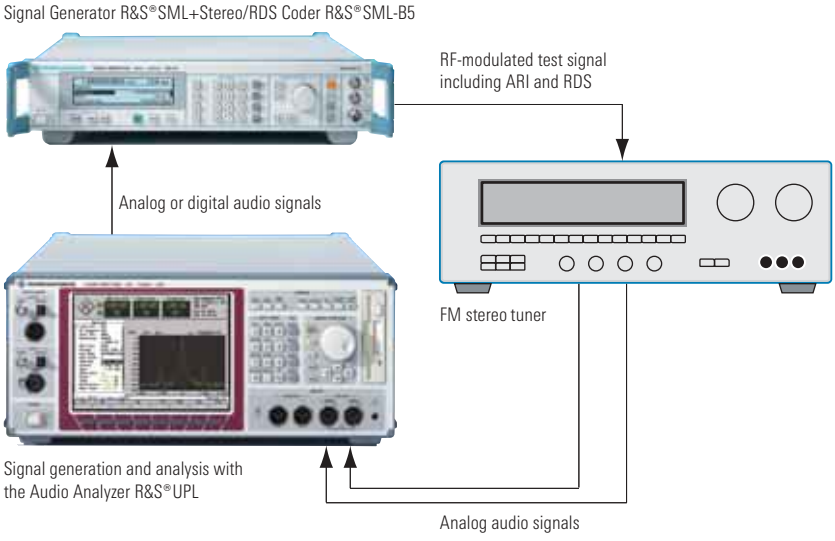
Combination with the Audio Analyzer R&S®UPL

The stereo/RDS coder can also work with external signals applied to its analog and digital modulation inputs. Combining the Signal Generator R&S®SML/ R&S®SMV and the Audio Analyzer R&S®UPL (data sheet PD 0757.2238) creates a general-purpose test system for FM tuners.

The great advantage is the automatic synchronization of measurement results. Just as in other two-port audio measurements, the test signals are produced in the generator section of the Audio Analyzer R&S®UPL, routed through the modulator and the DUT, and measured in the analyzer section of the R&S®UPL. Since generation and analysis are optimally timed, measurement times are considerably shorter than with separate instruments.

Use in production

Combining the Signal Generator R&S®SML/ R&S®SMV and the Audio Analyzer R&S®UPL enables measurements to be automated. The Universal Sequence Control R&S®UPL-B10 allows complete test programs to be generated and run on the R&S®UPL, in which case the Signal Generator R&S®SML/ R&S®SMV with the R&S®SML-B5 option is remote-controlled via the IEC/IEEE bus or RS-232-C interface. In most production environments, the complete test set can be run under an external controller.



Audio signals are generated and measured in the Audio Analyzer R&S®UPL; automatic synchronization substantially reduces the measurement time

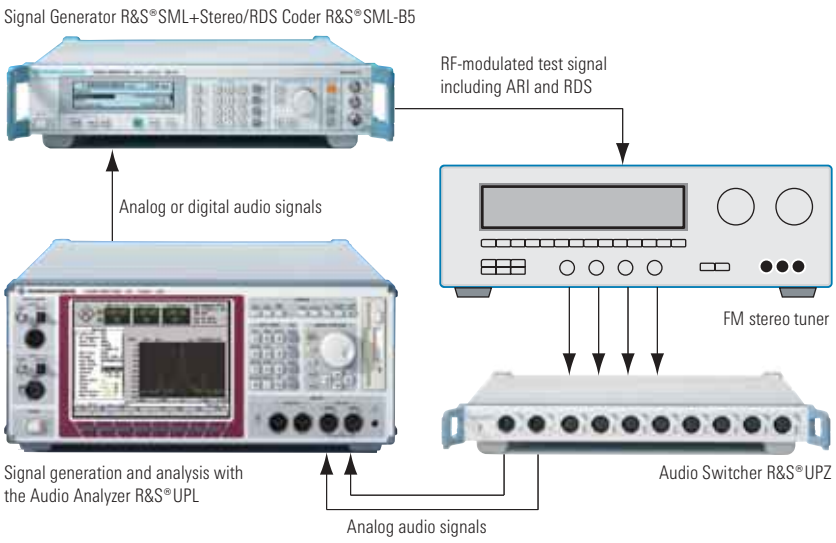
All functions of the Stereo/RDS Coder R&S®SML-B5 can of course be remote-controlled.

Use of the Audio Switcher R&S®UPZ is recommended for measurements on car radios or surround receivers with more than two audio outputs, as shown in the figure on the right. For more information about the Audio Switcher R&S®UPZ, see data sheet PD 0758.1170.

Interruption-free pilot tone
The R&S®SML-B5 option was designed especially for use in test systems. With other signal generators, the stereo pilot tone is briefly interrupted if the output data has to be recalculated (e.g. when the audio frequency changes). The connected tuner loses synchronization and has to switch to the stereo mode again with each frequency change, so overall measurement time may increase dramatically. This disadvantage does not occur with the R&S®SML-B5 since the audio signal is modulated onto the RF carrier independently of pilot tone generation, and consequently the pilot tone is not switched off.

Analog and digital audio inputs
The R&S®SML-B5 has separate analog inputs for left and right. In combination with the Audio Analyzer R&S®UPL, measurements are possible in the operating modes L, R, R = L, and R = –L.
A digital audio input in S/P DIF format is available alternatively. The R&S®UPL can additionally generate different signals for left and right in this format. It is possible to set one channel to a fixed frequency while sweeping the second channel through a frequency band, for example.

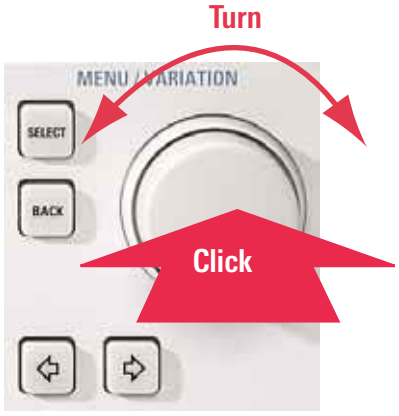
Generation of ARI and RDS signals
The R&S®SML-B5 outputs stereo multiplex as well as ARI and RDS signals. It is possible to choose between traffic announcement identification and standardized area identification A to F. The RDS traffic program or RDS traffic announcement can be switched on and off. Up to five different RDS sequences can be loaded. With a length of up to 64000 characters per sequence, future RDS applications (e.g. radio text) can also be tested.



The Audio Switcher R&S®UPZ for automated measurements on more than two audio outputs

EasyWheel

- One-hand operation with EasyWheel
- All settings simple and self-explanatory
- High-contrast LCD
- User-assignable menu keys
- Online help including IEC/IEEE bus commands



Simply select the desired menu with the rotary knob and click the button to open the submenu

Servicing: robust, compact, lightweight

Mobility
The R&S®SMV03 is lightweight (<9.5 kg) and compact and therefore very easy to transport.

Flexible control
In service environments, an IEC/IEEE bus interface is not always available to control the generator. This is not a problem as the R&S®SMV03 can also be controlled via a standard RS-232-C interface.

Protection against overvoltage
The integrated overvoltage protection of the RF output protects the R&S®SMV03 against very high external voltages such as may occur during transceiver measurements.

Specifications

Specifications are valid under the following conditions:
30 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and total calibration performed.
Data designated "nominal" is design parameters and is not tested.
Data designated "overrange" is not warranted.
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Frequency

R&S®SMV03	
I/Q modulation off	9 kHz to 3.3 GHz
I/Q modulation on	5 MHz to 3.3 GHz
Resolution	0.1 Hz
Setting time (for an offset of $<1\times10^{-7}$ or <90 Hz for f ≤ 76 MHz) after IEC/IEEE bus delimiter	
I/Q modulation off	<10 ms
I/Q modulation on	<12 ms

Reference frequency

	Standard	Option R&S®SML-B1
Aging (after 30 days of operation)	$<1\times10^{-6}$/year	$<1\times10^{-7}$/year $<5\times10^{-10}$/day
Temperature effect (0 °C to 55 °C)	$<1\times10^{-6}$	$<2\times10^{-8}$
Output for internal reference		
Frequency	10 MHz	
Output voltage, V rms, sinewave	>0.5 V into 50 Ω	
Source impedance	50 Ω	
Input for external reference		
Frequency	10 MHz	
Permissible frequency drift	5×10^{-6}	
Input voltage, V rms, sinewave	0.5 V to 2 V into 50 Ω	
Input impedance	50 Ω	

Spectral purity

Spurious signals	
Harmonics[1] (for f > 100 kHz)	<–30 dBc at levels ≤+8 dBm
Subharmonics	
f ≤ 1.1 GHz	–
f > 1.1 GHz	<–50 dBc
Nonharmonics (carrier offset >10 kHz)	
f ≤ 1.1 GHz	<–70 dBc
f > 1.1 GHz to 2.2 GHz	<–64 dBc
f > 2.2 GHz to 3.3 GHz	<–58 dBc
Broadband noise[2][3] (f = 1 GHz, carrier offset >2 MHz, 1 Hz bandwidth)	<–135 dBc, typ. –140 dBc
SSB phase noise (f = 1 GHz, 20 kHz carrier offset, 1 Hz bandwidth)	<–122 dBc, typ. –128 dBc
Spurious FM, rms (f = 1 GHz)	
0.3 kHz to 3 kHz	<4 Hz, typ. 1 Hz
0.03 kHz to 20 kHz	<10 Hz, typ. 3 Hz
Spurious AM, rms	
0.03 kHz to 20 kHz	<0.02%

Level

Range	–140 dBm to +13 dBm[2][4] (overrange +19 dBm)
Resolution	0.1 dB
Level accuracy [2][3] (level >–120 dBm)	
100 kHz to ≤2 GHz	<0.5 dB
f > 2 GHz	<0.9 dB
Frequency response at 0 dBm[2][3]	
100 kHz to ≤2 GHz	<0.7 dB
f > 2 GHz	<1.0 dB
Characteristic impedance	50 Ω
SWR	
100 kHz to 1.5 GHz	typ. 1.6
f > 1.5 GHz	typ. 2.3
Setting time (IEC/IEEE bus), f > 100 kHz	<10 ms, typ. 5 ms
Interruption-free level setting[5] (for f > 100 kHz)	
I/Q modulation off	20 dB, overrange 30 dB
I/Q modulation on	15 dB, overrange 20 dB

Overvoltage protection

safeguards instrument against externally applied RF power and DC voltage (50 Ω source)

Max. permissible RF power	
f ≤ 2.2 GHz	50 W
f > 2.2 GHz	25 W
Max. permissible DC voltage	35 V

Modulation

Internal modulation generator

Frequency range	0.01 Hz to 1 MHz
Resolution	0.01 Hz
Frequency accuracy	as for reference frequency + 2.4×10^{-3} Hz
Frequency response (up to 500 kHz, level >100 mV)	<0.5 dB
THD (up to 100 kHz, level 4 V, R_L = 600 Ω)	<0.1%
Open-circuit voltage V_p (LF connector)	1 mV to 4 V
Resolution	1 mV
Setting accuracy (at 1 kHz)	1% of V_p + 1 mV
Output impedance	approx. 10 Ω
Frequency setting time (after reception of last IEC/IEEE bus character)	<10 ms

Simultaneous modulation

AM, FM/φM and pulse modulation or vector modulation, FM/φM and pulse modulation

Amplitude modulation[6]

Operating modes	internal, external AC/DC, internal/external two-tone
Modulation depth	0% to 100% settable modulation depth continuously decreasing between +7 dBm and +13 dBm[7] while adhering to AM specifications; a status message is output when the modulation depth is too high
Resolution	0.1%
Setting accuracy at 1 kHz (m < 80%)[8]	<4% of reading +1%
AM distortion at 1 kHz	
m = 30%	<1%
m = 80%	<2%
Modulation frequency range (<3 dB)	DC/10 Hz to 50 kHz

Incidental φM at AM (30%), AF = 1 kHz	<0.2 rad
Modulation input EXT	
Input impedance	>100 kΩ
Input voltage V_p for set modulation depth	1 V

Vector modulation

Additional level inaccuracy in case of vector modulation (ALC OFF), referenced to CW mode	<0.3 dB
Operating mode	external DC
I and Q modulation inputs	
Input impedance	50 Ω
SWR (DC to 30 MHz)	<1.2
Input voltage for full-scale level	$\sqrt{I^2 + Q^2} = 0.5\,V$ (1 V EMF with 50 Ω source)
Static error vector[9]	
Level <+8 dBm	
rms value	
f < 2.6 GHz	<0.5%
f > 2.6 GHz to f=3 GHz	<0.7%
Peak value	
f < 2.6 GHz	<1%
f > 2.6 GHz to f=3 GHz	<1.4%
Modulation frequency response	
f > 500 MHz to 3 GHz	
DC to 5 MHz	<0.4 dB
DC to 50 MHz	<3 dB
f < 500 MHz and f > 3 GHz[10]	
DC to 5 MHz	<0.4 dB
DC to 30 MHz	<3 dB
Residual carrier at 0 V input voltage referenced to max. input voltage	<–45 dBc (at f=5 MHz to 3 GHz)
I/Q imbalance	
Carrier leakage	
Setting range	0% to 50%
Resolution	0.5%
I ≠ Q	
Setting range	–12% to +12%
Resolution	0.1%
Quadrature offset	
Setting range	–10° to +10°
Resolution	0.1°
Adjacent-channel leakage ratio (ACLR) WCDMA 3GPP FDD (f = 2.14 GHz) Test model 1 (64 DPCHs)	
Offset 5 MHz	nom. >60 dB, typ. 62 dB
Offset 10 MHz	nom. >64 dB, typ. 66 dB

Frequency modulation

Operating modes	internal, external AC/DC, internal/external two-tone
Frequency deviation	
9 kHz to 76 MHz	0 Hz to 1 MHz
>76 MHz to 151.3125 MHz	0 Hz to 125 kHz
>151.3125 MHz to 302.625 MHz	0 Hz to 250 kHz
>302.625 MHz to 605.25 MHz	0 Hz to 500 kHz
>605.25 MHz to 1.2105 GHz	0 Hz to 1 MHz
>1.2105 GHz to 1.818 GHz	0 Hz to 2 MHz
>1.818 GHz to 2.655 GHz	0 Hz to 3 MHz
>2.655 GHz to 3.300 GHz	0 Hz to 4 MHz
Resolution	<1% of set deviation, minimum 10 Hz
Setting accuracy (at AF = 1 kHz)	<4% of reading + 20 Hz
FM distortion (at AF = 1 kHz and 50% of max. deviation)	<0.2%, typ. 0.1%
Modulation frequency range (<3 dB)	
Standard	DC to 100 kHz
Wide	10 Hz to 500 kHz
Incidental AM (at AF = 1 kHz, f > 10 MHz, 40 kHz deviation)	<0.1%
Stereo modulation at 40 kHz useful deviation, AF = 1 kHz, RF = 87 MHz to 108 MHz	
Crosstalk	>50 dB
S/N ratio unweighted, rms	>70 dB
S/N ratio weighted, rms	>70 dB
Distortion	<0.2%, typ. 0.1%
Carrier frequency offset at FM DC	typ. 0.1% of set deviation
Modulation input EXT	
Input impedance	>100 kΩ
Input voltage V_p for set deviation (nominal value)	1 V

Phase modulation

Operating modes	internal, external AC/DC, internal/external two-tone
Phase deviation[11]	
9 kHz to 76 MHz	0 rad to 10 (2) rad
>76 MHz to 151.3125 MHz	0 rad to 1.25 (0.25) rad
>151.3125 MHz to 302.625 MHz	0 rad to 2.5 (0.5) rad
>302.625 MHz to 605.25 MHz	0 rad to 5 (1) rad
>605.25 MHz to 1.2105 GHz	0 rad to 10 (2) rad
>1.2105 GHz to 1.818 GHz	0 rad to 20 (4) rad
>1.818 GHz to 2.655 GHz	0 rad to 30 (6) rad
>2.655 GHz to 3.300 GHz	0 rad to 40 (8) rad
Resolution	<1%, min. 0.001 rad
Setting accuracy at AF = 1 kHz	<4% of reading + 0.02 rad
Phase distortion (at AF = 1 kHz and 50% of maximum deviation)	<0.2%, typ. 0.1%
Modulation frequency range (–3 dB)	
Standard	DC to 100 kHz
Wide	10 Hz to 500 kHz
Modulation inputs EXT	
Input impedance	>100 kΩ
Input voltage V_p for set deviation (nominal value)	1 V

Pulse modulation (with option R&S®SML-B3)

Operating modes	internal, external
On/off ratio	>80 dB
Rise/fall time (10%/90%)	<20 ns, typ. 10 ns
Pulse repetition frequency	0 Hz to 2.5 MHz
Pulse delay	typ. 50 ns
Video crosstalk (V_p)	<30 mV
Modulation input PULSE	
Input level	TTL level (HCT)
Input impedance	10 kΩ or 50 Ω, selectable with internal link

Pulse generator (with option R&S®SML-B3)

Operating modes	automatic, externally triggered, external gate mode, single pulse, double pulse, delayed pulse (externally triggered)
Active trigger edge	positive or negative
Pulse period Resolution Accuracy	100 ns to 85 s 5 digits, min. 20 ns <1 × 10^{-4}
Pulse width Resolution Accuracy	20 ns to 1 s 4 digits, min. 20 ns <1 × 10^{-4} + 3 ns
Pulse delay Resolution Accuracy	20 ns to 1 s 4 digits, min. 20 ns <1 × 10^{-4} + 3 ns
Double-pulse spacing Resolution Accuracy	20 ns to 1 s 4 digits, min. 20 ns <1 × 10^{-4} + 3 ns
Trigger delay	typ. 50 ns
Jitter	<10 ns
PULSE/VIDEO output	TTL signal (R_L ≥50 Ω)

Stereo/RDS coder (with option R&S®SML-B5)

The specifications apply to RF frequencies in the range 66 MHz to 110 MHz.	
Stereo modes Internal with modulation generator External analog (via L and R inputs) or external digital (via S/P DIF input)	 L, R, R = L, R = –L L, R, R = L, R = –L, R ≠ L internal generation of ARI/RDS signals, 5 user-selectable RDS data sets, simultaneous generation of MPX, ARI and RDS signals possible
MPX frequency deviation Resolution	0 Hz to 80 kHz 10 Hz
L, R signal AF frequency range AF frequency response (referenced to 500 Hz) AF = 20 Hz to 40 Hz AF = 40 Hz to 15 kHz	 20 Hz to 15 kHz <0.3 dB <0.2 dB
Stereo crosstalk attenuation (at AF = 1 kHz)	>50 dB
Distortion (at 67.5 kHz MPX frequency deviation, AF = 1 kHz)	<0.1%, typ. 0.05%
S/N ratio[12] (stereo/RDS signal) ITU-R weighted (quasi-peak) ITU-R unweighted (rms) A-weighted (rms)	 >60 dB, typ. 63 dB >70 dB, typ. 74 dB >70 dB, typ. 76 dB
Preemphasis	off, 50 µs, 75 µs
Pilot tone Frequency Deviation Resolution Phase (relative to 38 kHz phase) Resolution	 19 kHz ±2 Hz 0 Hz to 10 kHz 10 Hz 0° to ±5° 0.1°
ARI/RDS subcarrier frequency	57 kHz ±6 Hz
ARI frequency deviation Resolution	0 Hz to 10 kHz 10 Hz
RDS frequency deviation Resolution	0 Hz to 10 kHz 10 Hz
ARI/RDS	functions (directly selectable by menu or remote control)
ARI identification	selection of traffic announcement identification (DK) or area identification (BK), OFF, DK, BK, DK + BK
ARI BK	selection of standardized area identification A to F
RDS traffic program	traffic program off/on
RDS traffic announcement	traffic announcement off/on
RDS data set	selection of RDS data set 1 to 5
Maximum data length	64 kbyte, can be loaded via IEC60625 or RS-232-C interface
Analog modulation inputs L, R Input impedance Input voltage V_p for selected deviation (nominal value)	2 × BNC 600 Ω or 100 kΩ 1 V
Digital modulation input S/P DIF Input impedance Input voltage V_{pp}	BNC 75 Ω 1 V (400 mV to 5 V)

Sweep

digital in discrete steps

RF sweep, AF sweep Operating modes Sweep range Step width (lin) Step width (log)	 automatic, single-shot, manually or externally triggered, linear or logarithmic user-selectable user-selectable 0.01% to 100%
Level sweep Operating modes Sweep range Step width (log)	 automatic, single-shot, manually or externally triggered, logarithmic user-selectable user-selectable
Step time Resolution	10 ms to 1 s 0.1 ms
Trigger input Input level Input impedance	 TTL (HCT) 10 kΩ (pull-up)

Memory for device settings

Number of storable settings	100

Remote control

System	IEC60625 (IEEE488) and RS-232-C
Command set	SCPI 1995.0
Connector	Amphenol, 24-pin and 9-pin
IEC/IEEE bus address	0 to 30
Interface functions	SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0

General data

Operating temperature range	0 °C to 55 °C; meets DIN EN 60068-2-1: 1995-03 and DIN EN 60068-2-2: 1994-08
Storage temperature range	–40 °C to +70 °C
Climatic resistance Damp heat	 95% relative humidity at +25 °C/ +40 °C cyclically; meets IEC 60068
Mechanical resistance Vibration, sinusoidal Vibration, random Shock	 5 Hz to 150 Hz, max. 2 g at 55 Hz, max. 0.5 g between 55 Hz and 150 Hz, meets IEC 60068, IEC 61010 and MIL-T-28800D, class 5 10 Hz to 300 Hz, acceleration 1.2 g (rms) 40 g shock spectrum, meets MIL-STD-810D and MIL-T-28800D, class 3/5
Electromagnetic compatibility	meets EN 55011 and EN 61326-1 (EMC directive of EU)
Immunity to radiated interference	10 V/m
Power supply	100 V to 120 V (AC), 50 Hz to 400 Hz, 200 V to 240 V (AC), 50 Hz to 60 Hz, autoranging, max. 250 VA
Safety	meets DIN EN 61010-1, IEC 1010-1, UL 3111-1, CSA 22.2 No. 1010-1
Dimensions (W × H × D)	427 mm × 88 mm × 450 mm
Weight	9.5 kg when fully equipped

1) With option R&S®SML-B3 only for f > 20 MHz.
2) With attenuator mode auto.
3) Temperature range 20 °C to 30 °C.
4) –140 dBm to 11 dBm at f ≤ 5 MHz, f > 3 GHz.
5) With attenuator mode fixed.
6) With attenuator mode auto, f ≥ 100 kHz.
7) +5 dBm to +11 dBm at f ≤ 5 MHz, f > 3 GHz.
8) With option R&S®SML-B3 only for f > 10 MHz.
9) After 1 hour warm-up and recalibration within 4 hours of operation after temperature variations <5 °C.
10) The modulation bandwidth continuously decreases upon approaching 5 MHz or. 3.3 GHz.
11) Values in brackets apply to wide modulation bandwidth.
12) Generator without preemphasis, receiver with deemphasis.

Ordering information

Designation	Type	Order No.
Vector Signal Generator	R&S®SMV03	1147.7509.13
Accessories supplied	power cable, user manual	
Options		
Reference Oscillator OCXO	R&S®SML-B1	1090.5790.02
Pulse Modulator	R&S®SML-B3	1090.5403.02[1]
Stereo/RDS Coder	R&S®SML-B5	1147.8805.02
Rear Connectors for AF, RF	R&S®SML-B19	1090.5303.02[1]
Recommended extras		
Service Kit	R&S®SML-Z2	1090.5203.02
19" Rack Adapter	R&S®ZZA-211	1096.3260.00
Transport Bag	R&S®ZZT-214	1109.5119.00
Service Manual, Modules		1090.3123.24

1) Factory-fitted only.

More information at
www.rohde-schwarz.com
(search term: SMV03)

www.rohde-schwarz.com

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