Data sheet

Version 06.00
August 2004

Signal Generator R&S®SML

Economy at its best

- 9 kHz to 1.1 GHz/2.2 GHz/3.3 GHz
- SSB phase noise: –128 dBc (1 Hz) (at f = 1 GHz, Δf = 20 kHz)
- Setting times <10 ms
- High level accuracy (deviation <0.5 dB at levels >–120 dBm)
- 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
- Versatile test system consisting of the R&S®SML with the R&S®SML-B5 and the Audio Analyzer R&S®UPL
- 3-year calibration cycle

ROHDE&SCHWARZ

Unequalled universality

Frequency

- 9 kHz to 1.1 GHz/2.2 GHz/3.3 GHz
- 0.1 Hz frequency resolution

Level

- –140 dBm to +13 dBm (+19 dBm overrange)
- High level accuracy (deviation <0.5 dB at levels >–120 dBm)
- Level setting without overshoots
- Electronic attenuator
- Non-interrupting level setting

Spectral purity

- SSB phase noise <–122 dBc (1 Hz), typ. –128 dBc (1 Hz) (f = 1 GHz, carrier offset 20 kHz)
- Broadband noise <–140 dBc (1 Hz), typ. –150 dBc (1 Hz) (f = 1 GHz, carrier offset >2 MHz)

Speed

- Setting times <10 ms for frequency and level

Modulation

- AM/FM/φM as standard
- Simultaneous AM, FM/φM and pulse modulation
- Optional pulse modulator with integrated pulse generator (R&S®SML-B3)

Low cost of ownership

- 3-year calibration cycle
- Low purchase price
- High reliability through electronic attenuator (wear-free)
- Service-friendly (continuous selftest, access to internal test points)
- Options OCXO (R&S®SML-B1), pulse modulator (R&S®SML-B3) and Stereo/RDS Coder (R&S®SML-B5) retrofittable

Size

- Compact size: 427 mm × 88 mm × 450 mm
- Low weight: <8.5 kg

Applications ...

Lab and R&D: versatile

High spectral purity
Owing to its low phase noise, the R&S®SML is ideally suited to replace LOs.

Versatile modulation modes
The R&S®SML in conjunction with the optional Pulse Modulator R&S®SML-B3 handles all analog types of modulation. AM, FM/φM and pulse modulation can be used simultaneously. TDMA signals or amplitude variations in the case of FM, for example, can thus be simulated.

High and precise output level
The R&S®SML has plenty of power in reserve so level loss produced by the test setup can be easily compensated. Its high output level makes the R&S®SML an ideal source for driving high-level mixers.

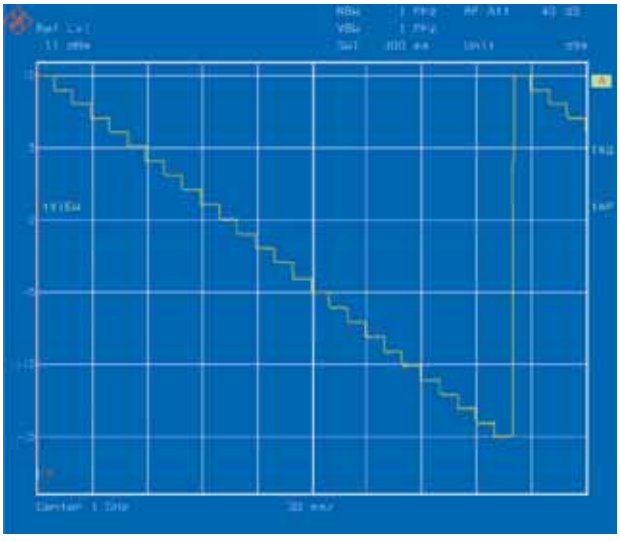
Excellent modulation characteristics
The DC-coupled FM allows the R&S®SML to be used as an accurate VCO.

Example: receiver measurements

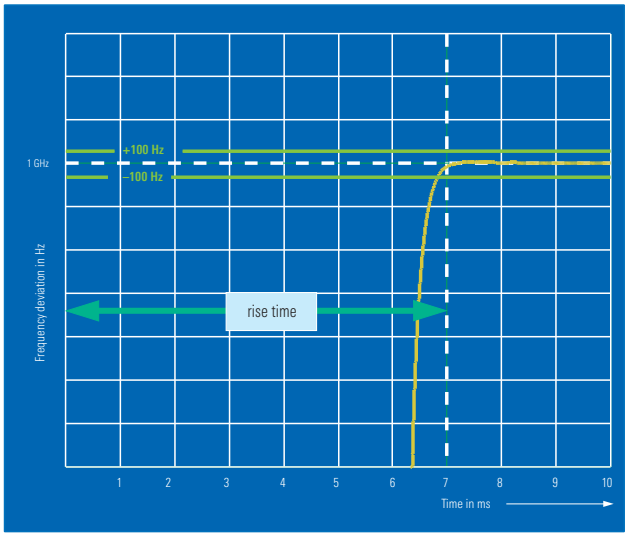
- Sensitivity measurements require a signal generator with high level accuracy. This is particularly true at low output levels. With its sophisticated calibration technique, the R&S®SML features high level accuracy (<0.5 dB at levels >–120 dBm).
- Squelch measurements call for continuous level setting. Non-interrupting level variation by typ. 30 dB makes the R&S®SML the ideal choice for squelch measurements.
- Low spurious, low broadband noise and above all excellent SSB phase noise are prerequisites for using a signal generator as an interference source. With typ. –128 dBc (1 Hz) SSB phase noise (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®SML easily meets even the most exacting requirements.

The R&S®SML offers all features required of a state-of-the-art general-purpose signal generator: wide frequency range, large variety of modulation functions and high reliability – at an extremely attractive price. The fields of application of the R&S®SML are virtually unlimited in development, servicing or production where it is used as a flexible signal source in automatic test systems. The R&S®SML benefits both from our long-standing experience in the field of signal generators and the latest technology. Its uses are as versatile as its functionalities.

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



Level sweep within 25 dB range.



Settling upon frequency change from 100 MHz to 1 GHz.

Servicing: robust, compact, lightweight

Mobility
The R&S®SML is lightweight and compact and therefore very easy to transport.

Flexible control
In service environments, an IEC/IEEE interface is not always available for controlling the generator. This is no problem for the R&S®SML since it can also be driven via a standard RS-232-C interface.

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

Production: fast, accurate, reliable

Accuracy
Measurement uncertainty can be split into the part from the instrument and that introduced by the test setup. With lower uncertainty of the generator, greater tolerances can be allowed for the setup. If the low level deviation of the analyzer is used to allow for higher DUT tolerances, the result will be a marked reduction in manufacturing rejects – an advantage that pays off immediately.

Speed
Speed is of prime importance in production. And this is precisely one of the strong points of the R&S®SML, with a setting time of <10 ms for frequency and level.

Reliability
A signal generator used in production must have high reliability. The R&S®SML meets this requirement for example through the use of a completely wear-free electronic attenuator. Should a fault nevertheless occur, the continuous self-diagnostics of the R&S®SML prevent expensive erroneous measurements.

Output level
In production test systems, the signal is taken to the DUT (device under test) via switches and cables, thus leading to level losses. These losses can be easily compensated by the high output power of the R&S®SML.

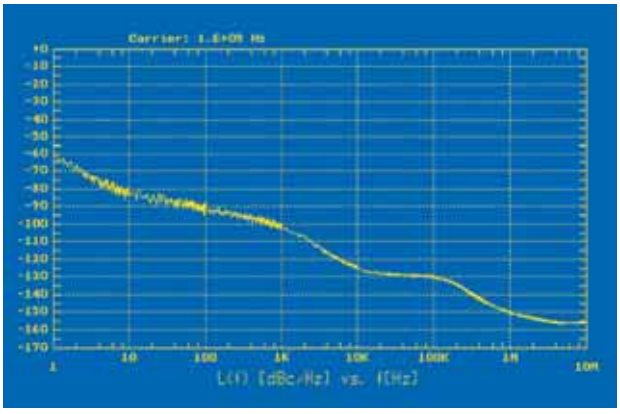
Dimensions
Space is often at a premium in production. The compact size of the R&S®SML makes it ideal for use in such environments.

Example: component test

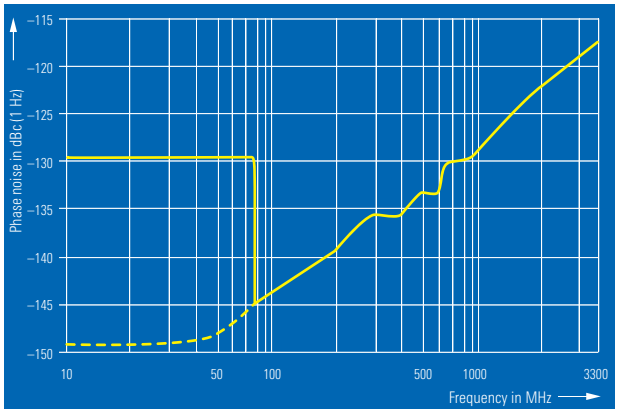
- To obtain reliable information on component quality, high level accuracy and precise reproducibility of the output level are called for. The R&S®SML fully meets these requirements owing to the level deviation of <0.5 dB (at levels >–120 dBm) and high reproducibility.
- With unrivalled short times (<10 ms) for frequency and level setting, the R&S®SML enables fast testing and is ideal for use in production.
- Overshoots in case of level change may damage or destroy the DUT. This cannot happen with the R&S®SML since it operates without any overshoots.

EMS measurements

Non-interrupting level setting without overshoots
EMS measurements call for non-interrupting level setting, which should moreover be performed without any overshoots. The R&S®SML operates free of overshoots and offers a wide dynamic range of typ. 30 dB for non-interrupting level variation (with Attenuator Mode Fixed).



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



Typical SSB phase noise versus carrier frequency (carrier offset 20 kHz); dashed line: Extended Divider Range mode.

Wide frequency range

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

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

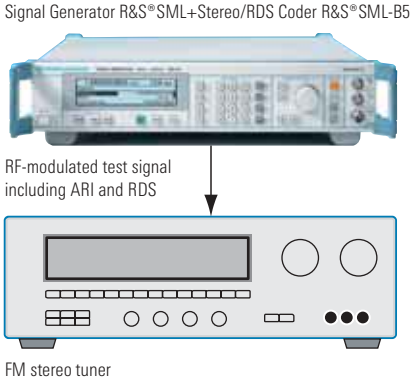
SSB phase noise at 9.5 MHz output frequency, extended divider range activated, 1 Hz measurement bandwidth.

Reference source

The R&S®SML allows the mode of frequency generation to be selected. 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 with the high-grade crystal oscillators normally used as reference sources from 10 MHz to 30 MHz.

Compared to crystal oscillators, the R&S®SML provides the following benefits:

- 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



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

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, 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. It generates sinusoidal signals at fixed frequencies, thus allowing basic functional tests to be carried out without an external signal (see figure on left).

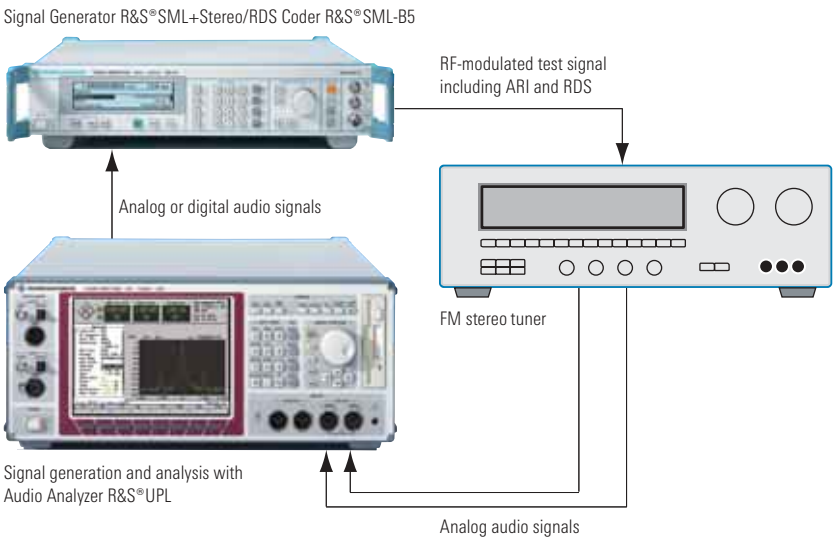
Combination with the Audio Analyzer R&S®UPL

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 and the Audio Analyzer R&S®UPL (data sheet PD 0757.2238) creates a general-purpose test system for FM tuners (see figure on next page).

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 separately operating instruments.

Use in production

Combining the Signal Generator R&S®SML 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 with the R&S®SML-B5 option is remote-controlled via the IEC 60625 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

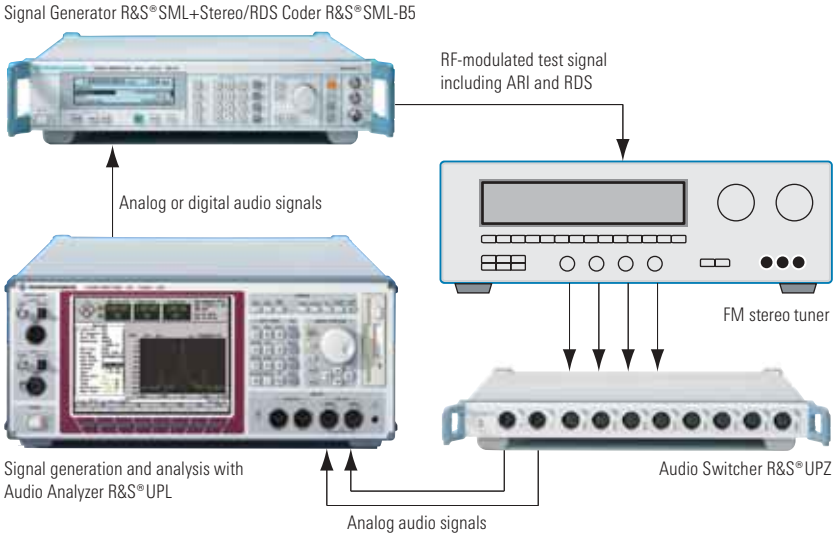
The R&S®SML-B5 option was designed especially for use in test systems. With other signal generators, the stereo pilot tone is briefly interrupted if the output data has to be recalculated (e.g. when the audio frequency changes). The connected tuner loses synchronization and has to switch to the stereo 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

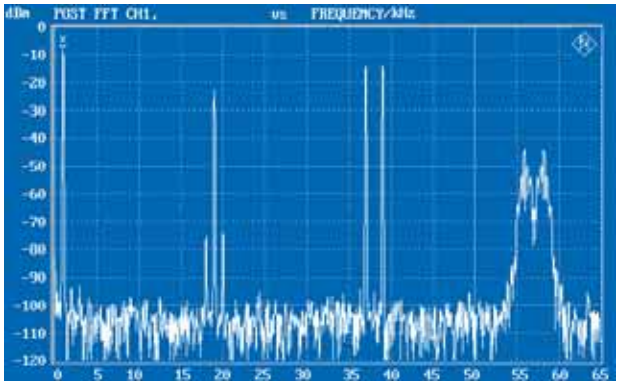
The R&S®SML-B5 has separate analog inputs for left and right. In combination with the Audio Analyzer R&S®UPL, measurements are possible in the operating modes L, R, R = L, and R = –L. A digital audio input in S/P DIF format is available alternatively. The R&S®UPL can additionally generate different signals 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



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

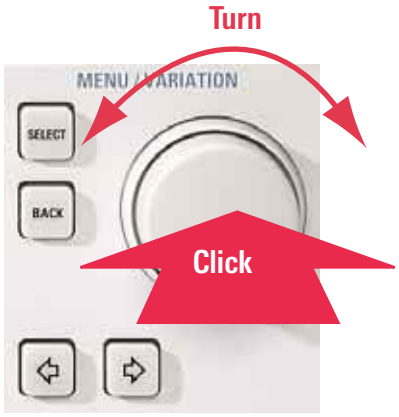


Signal output by the stereo/RDS coder prior to FM modulation with ARI and RDS information.

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.

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 spin-wheel and click the button to open the submenu.

Certified Quality System ISO 9001 DQS REG. NO 1954 QM

Certified Environmental System ISO 14001 DQS REG. NO 1954 UM

Specifications

Specifications apply under the following conditions:
15 minutes warmup time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and total calibration performed.
Data designated "nominal" apply to design parameters and are not tested.
Data designated "overrange" are not warranted.
Warranted specs do not apply to the Extended Divider Range mode.

Frequency

Range	9 kHz to 1.1 GHz
R&S®SML01 R&S®SML02 R&S®SML03	9 kHz to 1.1 GHz 9 kHz to 2.2 GHz 9 kHz to 3.3 GHz
Resolution	0.1 Hz
Resolution of synthesis (standard, f <1.1 GHz)	<0.5 µHz
Setting time (for an offset of $<1 \times 10^{-7}$ or <90 Hz for f ≤76 MHz) after IEC/IEEE-bus delimiter	<10 ms

Reference frequency

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

Spectral purity

Spurious signals Harmonics (for f >100 kHz)[1] R&S®SML01 R&S®SML02/03 Subharmonics f ≤1.1 GHz f >1.1 GHz Nonharmonics (carrier offset >10 kHz) f ≤1.1 GHz f >1.1 GHz to 2.2 GHz f >2.2 GHz to 3.3 GHz	 <–30 dBc at levels ≤+10 dBm <–30 dBc at levels ≤+8 dBm none <–50 dBc <–70 dBc <–64 dBc <–58 dBc
Broadband noise[2] (f = 1 GHz, carrier offset >2 MHz, 1 Hz bandwidth)	<–140 dBc, typ. –150 dBc
SSB phase noise (f = 1 GHz, 20 kHz carrier offset, 1 Hz bandwidth)	<–122 dBc, typ. –128 dBc
Residual FM, rms (f = 1 GHz) 0.3 kHz to 3 kHz 0.03 kHz to 20 kHz	 <4 Hz, typ. 1 Hz <10 Hz, typ. 3 Hz
Residual AM, rms (0.03 kHz to 20 kHz)	<0.02%

Level

Range	–140 dBm to +13 dBm[2][3] (overrange +19 dBm)
Resolution	0.1 dB
Level accuracy[2][4] (level >–120 dBm) R&S®SML01 (for f >100 kHz) R&S®SML02/03 100 kHz to ≤2 GHz f >2 GHz	 <0.5 dB <0.5 dB <0.9 dB
Frequency response at 0 dBm[2][4] R&S®SML01 (for f >100 kHz) R&S®SML02/03 100 kHz to ≤2 GHz f >2 GHz	 <0.5 dB, typ. 0.3 dB <0.7 dB <1.0 dB
Characteristic impedance	50 Ω
VSWR R&S®SML01 R&S®SML02/03 100 kHz to 1.5 GHz f >1.5 GHz	 <1.5 typ. 1.6 typ. 2.3
Setting time (IEC/IEEE bus), f >100 kHz	<10 ms, typ. 5 ms
Non-interrupting level setting (for f >100 kHz)[5]	20 dB, overrange 30 dB

Overvoltage protection

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

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

Internal modulation generator

Frequency range Resolution	0.01 Hz to 1 MHz 0.01 Hz
Frequency accuracy	same 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) Resolution Setting accuracy (at 1 kHz)	1 mV to 4 V 1 mV 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

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 modulation depth is too high
Resolution	0.1%
Setting accuracy at AF = 1 kHz (m <80%)[8]	<4% of reading +1%
AM distortion[8] at AF = 1 kHz m = 30% m = 80%	 <1% <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 Input voltage V_p for set modulation depth	 >100 kΩ 1 V

Frequency modulation

Operating modes	internal, external AC/DC, internal/external two-tone
Frequency deviation 9 kHz to 76 MHz >76 MHz to 151.3125 MHz >151.3125 MHz to 302.625 MHz >302.625 MHz to 605.25 MHz >605.25 MHz to 1.2105 GHz >1.2105 GHz to 1.818 GHz >1.818 GHz to 2.655 GHz >2.655 GHz to 3.300 GHz	 0 Hz to 1 MHz 0 Hz to 125 kHz 0 Hz to 250 kHz 0 Hz to 500 kHz 0 Hz to 1 MHz 0 Hz to 2 MHz 0 Hz to 3 MHz 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/wide	DC/10 Hz to 100 kHz/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 attenuation S/N ratio unweighted, rms S/N ratio weighted, rms Distortion	(for external multiplex signal) >50 dB >70 dB >70 dB <0.2%, typ. 0.1%
Carrier frequency offset at FM DC	typ. 0.1% of set deviation
Modulation input EXT Input impedance Input voltage V_p for set deviation (nominal value)	 >100 kΩ 1 V

Phase modulation

Operating modes	internal, external AC/DC, internal/external two-tone
Phase deviation[9] 9 kHz to 76 MHz >76 MHz to 151.3125 MHz >151.3125 MHz to 302.625 MHz >302.625 MHz to 605.25 MHz >605.25 MHz to 1.2105 GHz >1.2105 GHz to 1.818 GHz >1.818 GHz to 2.655 GHz >2.655 GHz to 3.300 GHz	 0 rad to 10 (2) rad 0 rad to 1.25 (0.25) rad 0 rad to 2.5 (0.5) rad 0 rad to 5 (1) rad 0 rad to 10 (2) rad 0 rad to 20 (4) rad 0 rad to 30 (6) rad 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/wide	DC/10 Hz to 100 kHz/500 kHz
Modulation inputs EXT Input impedance Input voltage V_p for set deviation (nominal value)	 >100 kΩ 1 V

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

Operating modes	internal, external
On/off ratio	>90 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 Input impedance	 TTL level (HCT) 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 $<1 \times 10^{-4}$
Pulse width Resolution Accuracy	20 ns to 1 s 4 digits, min. 20 ns $<(1 \times 10^{-4} + 3$ ns)
Pulse delay Resolution Accuracy	20 ns to 1 s 4 digits, min. 20 ns $<(1 \times 10^{-4} + 3$ ns)
Double-pulse spacing Resolution Accuracy	20 ns to 1 s 4 digits, min. 20 ns $<(1 \times 10^{-4} + 3$ ns)
Trigger delay	typ. 50 ns
Jitter	<10 ns
PULSE/VIDEO output	TTL signal ($R_L \geq 50$ 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[10] (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 IEC 60625 or RS-232-C interface
Analog modulation inputs L, R	2 × BNC
Input impedance	600 Ω or 100 kΩ
Input voltage V_p for selected deviation (nominal value)	1 V
Digital modulation input S/P DIF	BNC
Input impedance	75 Ω
Input voltage V_{pp}	1 V (400 mV to 5 V)

Sweep

	digital in discrete steps
RF sweep, AF sweep	
Operating modes	automatic, single-shot, manually or externally triggered, linear or logarithmic
Sweep range	user-selectable
Step width (lin)	user-selectable
Step width (log)	0.01% to 100%
Level sweep	
Operating modes	automatic, single-shot, manually or externally triggered, logarithmic
Sweep range	user-selectable
Step width (log)	user-selectable
Step time	10 ms to 1 s
Resolution	0.1 ms

Memory for device settings

Storable settings	100

Remote control

System	IEC 60625 (IEEE 488) 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

Temperature loading	
Specs complied with between	0 °C and 55 °C; meets EN 60068-2-1: 1995-03 and 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 EN 60068-2-30: 2000-02
Mechanical resistance	
Vibration, sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, max. 0.5 g between 55 Hz and 150 Hz, meets EN 60068-2-6: 1996-05, EN 61010-1 and MIL-T-28800D, class 5
Vibration, random	10 Hz to 300 Hz, acceleration 1.2 g (rms)
Shock	40 g shock spectrum, meets MIL-STD-810E and MIL-T-28800D, class 3/5
Electromagnetic compatibility	meets EN 61000-6-3 and EN 61000-6-4 (EMC directive of EU)
Susceptibility 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. 200 VA
Safety	meets EN 61010-1, UL 3111-1, CSA 22.2 No. 1010-1
Dimensions (W × H × D)	427 mm × 88 mm × 450 mm
Weight	8.5 kg when fully equipped

1) With option R&S®SML-B3 only for f >20 MHz.
2) With Attenuator Mode Auto.
3) –140 dBm to +11 dBm at f ≤5 MHz, f >3 GHz for R&S®SML02 and R&S®SML03.
4) Temperature range 20 °C to 30 °C.
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) Values in brackets apply to wide modulation bandwidth.
10) Generator without preemphasis, receiver with deemphasis.

Ordering information

Signal Generator	R&S®SML01 R&S®SML02 R&S®SML03	1090.3000.11 1090.3000.12 1090.3000.13
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[1]
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.

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