R&S®SGS100A
RF Source
Specifications

ROHDE&SCHWARZ

Test & Measurement

Data Sheet | 01.01

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Key features

Dedicated ATE signal generation

- I/Q-modulated or pure CW source in frequency range from 80 MHz to 6 GHz (I/Q) and 1 MHz to 12.75 GHz (CW)
- Very fast settling times via PCIe interface
- Maximum level of typ. > +19 dBm (with electronic attenuator)
- Optional wear-free electronic attenuator
- External software (SGMA GUI) for remote control of multiple instruments
- Field-upgradeable

Space-saving operation due to small dimensions

- Smallest signal generator in its class: 1 height unit, ½ × 19"
- Lightweight

High performance at an attractive price

- Low SSB phase noise of typ. –130 dBc (20 kHz carrier offset, f = 1 GHz, 1 Hz measurement bandwidth)
- Wideband noise of < –145 dBc
- Nonharmonics of < –76 dBc (> 10 kHz carrier offset, f ≤ 1500 MHz)
- Very high level accuracy and repeatability
- Optional high-stability reference oscillator
- Optional coherent LO input/output

Minimized total cost of ownership

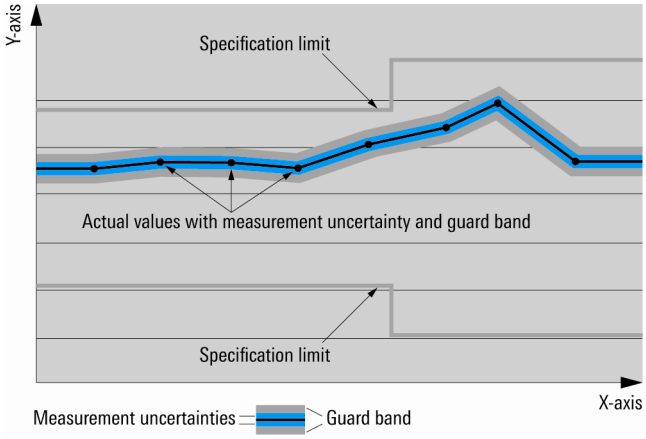
- Attractive initial cost
- Long calibration interval
- Simplified error diagnostics through built-in selftests

Definitions

General
Product data applies under the following conditions:

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

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



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

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

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

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

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

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

RF performance

Frequency

Frequency range	with the R&S®SGS-B106 option	1 MHz to 6 GHz
	with the R&S®SGS-B106 and R&S®SGS-B112 options	1 MHz to 12.75 GHz
	with the R&S®SGS-B106V option	80 MHz to 6 GHz
Resolution of setting		0.001 Hz
Resolution of synthesis	f = 1 GHz	0.174 µHz (nom.)
Setting time	to within $< 2 \times 10^{-7}$ for f > 500 MHz or < 100 Hz for f ≤ 500 MHz	
	with PCIe remote control	< 500 µs
Resolution of phase offset setting		0.1°

Reference frequency

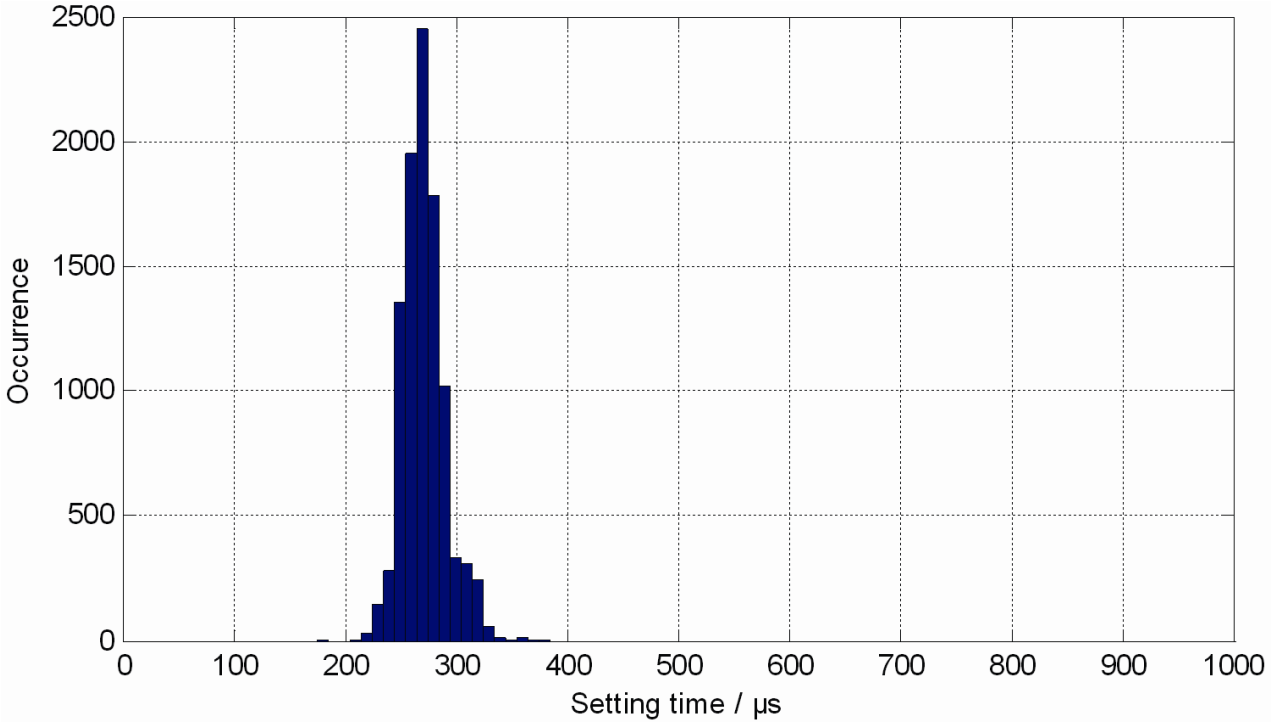
Frequency error	at time of calibration in production	$< 1 \times 10^{-7}$
	with the R&S®SGS-B1 option	$< 1 \times 10^{-8}$
Aging (after 30 days of uninterrupted operation)		$< 1 \times 10^{-6}$/year
	with the R&S®SGS-B1 option	$< 1 \times 10^{-9}$/day, $< 1 \times 10^{-7}$/year
Temperature effect (0 °C to +50 °C)		$< 2 \times 10^{-6}$
	with the R&S®SGS-B1 option	$< 1 \times 10^{-7}$
Warm-up time	to nominal thermostat temperature (with R&S®SGS-B1 option only)	≤ 10 min
Reference frequency output		
Connector type	REF/LO OUT on rear panel	SMA female
Output frequency	sine wave	
	instrument set to internal reference	10 MHz, 1000 MHz
	instrument set to external reference	applied external reference input frequency or 1000 MHz
Output level		+6 dBm to +12 dBm, 9 dBm (typ.)
Source impedance		50 Ω (nom.)
Reference frequency input		
Connector type	REF/LO IN on rear panel	SMA female
Input frequency		10 MHz, 100 MHz, 1000 MHz
Frequency locking range		$\pm 10 \times 10^{-6}$
Input level range		0 dBm to +16 dBm
Input impedance		50 Ω (nom.)

Level

Setting Characteristic AUTO: The step attenuator is switched over automatically. The output level is specified over the full range from –120 dBm to +15 dBm.

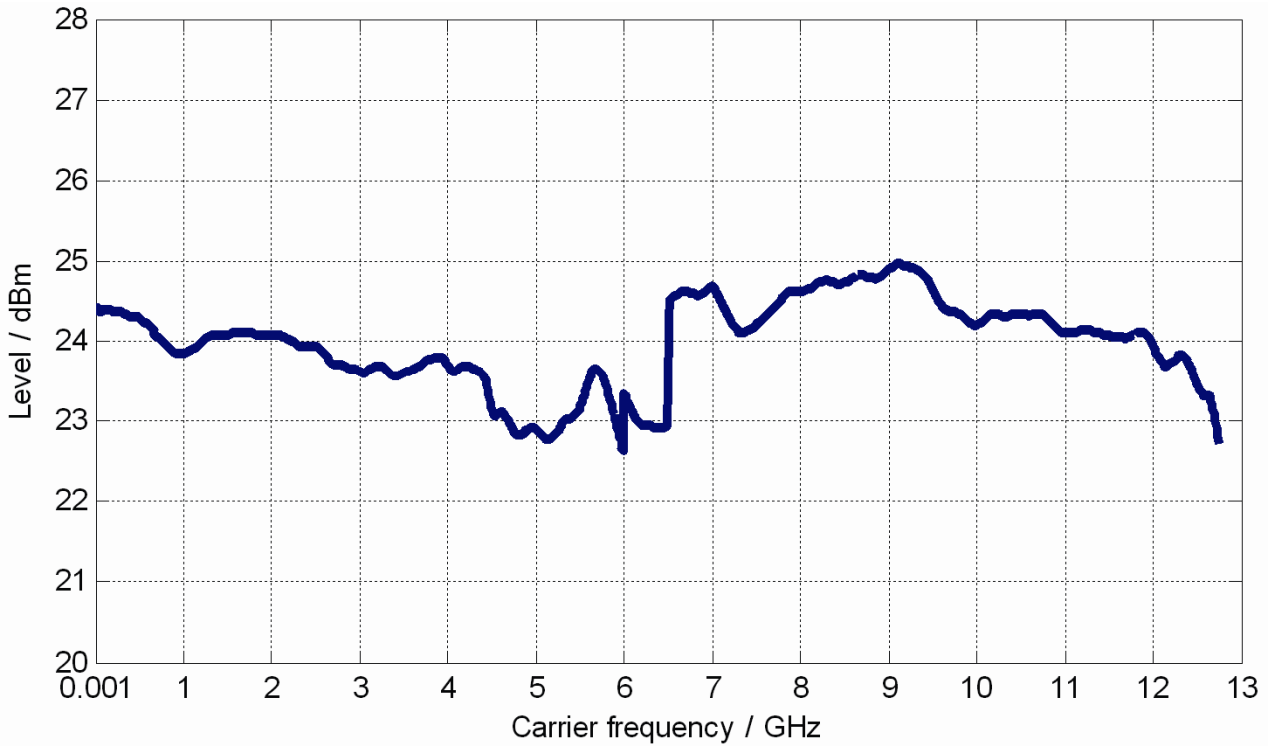
Setting Characteristic Uninterrupted level setting: The level is set without changing the step attenuator. The step attenuator is fixed to the current setting. Level changes are performed without interruption. The maximum interruption-free setting range is limited. If this range is exceeded, the spectral purity of the output signal decreases.

Setting range		–20 dBm to +25 dBm
	with the R&S®SGS-B26 option	–120 dBm to +25 dBm
Specified level range		–10 dBm to +15 dBm (PEP) [1]
	with the R&S®SGS-B26 option	–120 dBm to +15 dBm (PEP) [1]
Resolution of setting		0.01 dB
Level error	Setting Characteristic AUTO, temperature range from +18 °C to +33 °C	
	1 MHz ≤ f ≤ 3 GHz	< 0.5 dB
	3 GHz < f ≤ 12.75 GHz	< 0.9 dB
Output impedance VSWR in 50 Ω system	in full frequency range, Setting Characteristic AUTO	< 2.0
	in full frequency range, with the R&S®SGS-B26 option	< 1.8
Setting time	to < 0.1 dB deviation from final value, Setting Characteristic AUTO, with PCIe remote control	< 500 µs
Interruption-free level setting range	Setting Characteristic Uninterrupted level setting	0 dB to +20 dB
Reverse power from 50 Ω	maximum permissible RF power in output	0.5 W
Maximum permissible DC voltage	at RF power connector	35 V



Histogram of level setting times measured via PCIe interface, Setting Characteristic AUTO.

[1] PEP = peak envelope power.

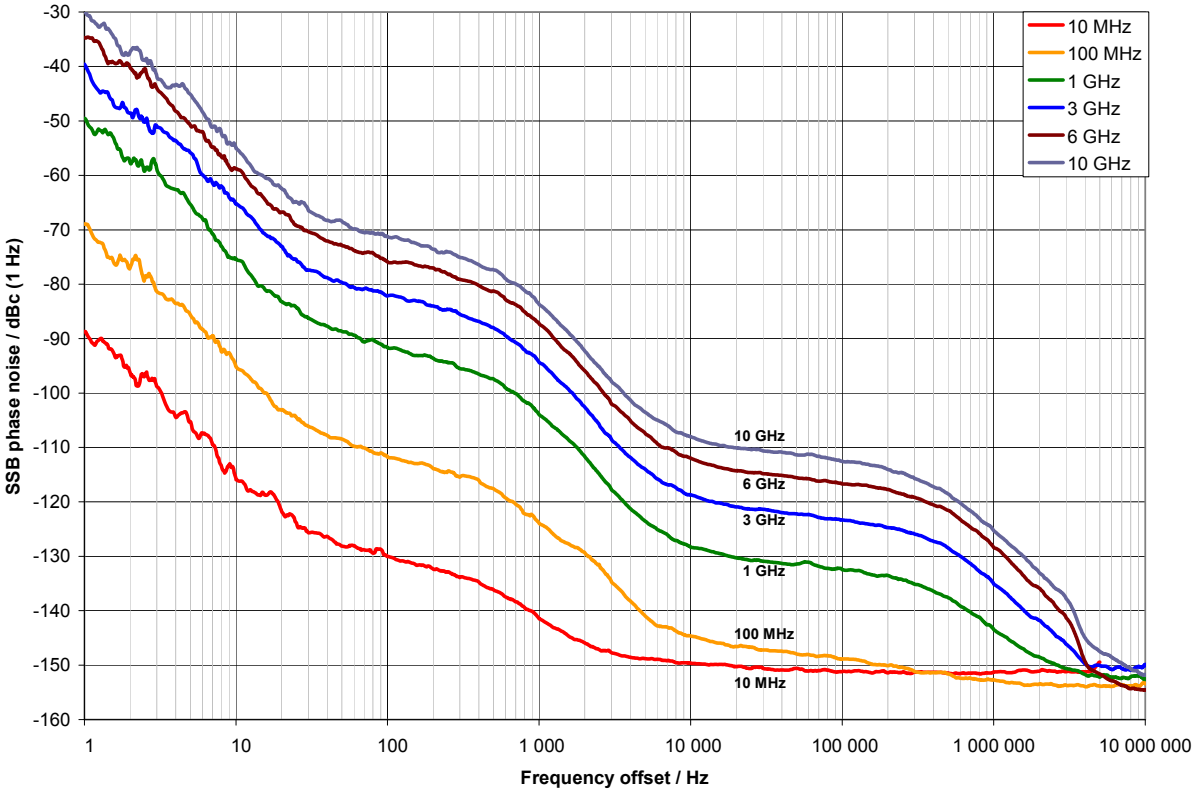


Maximum available level for a CW, Setting Characteristic AUTO, with the R&S®SGS-B26 electronic step attenuator option (meas.).

Spectral purity

Harmonics	level ≤ 8 dBm, CW, I/Q wideband off	< –30 dBc
Nonharmonics	level > –10 dBm [2], offset > 10 kHz from carrier	
	f ≤ 1500 MHz	< –76 dBc
	1500 MHz < f ≤ 3000 MHz	< –70 dBc
	3000 MHz < f ≤ 6000 MHz	< –64 dBc
	6000 MHz < f ≤ 12750 MHz	< –58 dBc
Subharmonics	level > –10 dBm [2]	
	f ≤ 3000 MHz	< –76 dBc
	3000 MHz < f ≤ 6500 MHz	< –68 dBc
	6500 MHz ≤ f ≤ 12750 MHz	< –60 dBc
Wideband noise	1 MHz ≤ f ≤ 6 GHz and carrier offset 10 MHz, 6 GHz < f ≤ 12.75 GHz and carrier offset 30 MHz, level > 5 dBm, Setting Characteristic AUTO, 1 Hz measurement bandwidth, CW	< –145 dBc
	200 MHz ≤ f ≤ 6 GHz and carrier offset 10 MHz, level > 5 dBm, Setting Characteristic AUTO, 1 Hz measurement bandwidth, I/Q	< –135 dBc
SSB phase noise	20 kHz carrier offset, 1 Hz measurement bandwidth	
	f = 1 GHz	< –126 dBc, –130 dBc (typ.)
	f = 2 GHz	< –120 dBc, –124 dBc (typ.)
	f = 10 GHz	< –106 dBc, –110 dBc (typ.)

[2] > 0 dBm for instruments without the R&S®SGS-B26 electronic step attenuator.



SSB phase noise with the R&S®SGS-B1 internal OCXO option (meas.).

Phase coherence (R&S®SGS-K90 option)

The R&S®SGS-K90 option provides phase-coherent RF outputs for two or more instruments. For frequencies above 6.5 GHz (instruments equipped with the R&S®SGS-B112 frequency extension), the LO output and input frequency are set to half the output frequency.

LO coupling modes	This mode corresponds to internal LO operation. The REF/LO OUT connector can provide the internal LO oscillator signal to enable phase-coherent coupling on other instruments.	internal
	This mode corresponds to external LO operation at the REF/LO IN connector. The REF/LO OUT connector can provide the external LO oscillator signal to enable phase-coherent coupling on additional instruments.	external
REF/LO OUT states	The active local oscillator signal can be routed to the REF/LO OUT connector (in order to couple two or more instruments).	REF/LO/OFF

Input of phase coherence signal		
Connector type	REF/LO IN on rear panel	SMA female
Input impedance		50 Ω (nom.)
Input level range of external local oscillator signal		7 dBm to 13 dBm
Frequency range of external local oscillator signal	for RF setting 80 MHz to 6.5 GHz	80 MHz to 6.5 GHz
	for RF setting > 6.5 GHz to 12.75 GHz	3.25 GHz to 6.375 GHz
Output of phase coherence signal		
Connector type	REF/LO OUT on rear panel	SMA female
Output impedance		50 Ω (nom.)
Output level range of internal local oscillator signal		7 dBm to 13 dBm
Frequency range of internal local oscillator signal	for RF setting 80 MHz to 6.5 GHz	80 MHz to 6.5 GHz
	for RF setting > 6.5 GHz to 12.75 GHz	3.25 GHz to 6.375 GHz

I/Q modulation

I/Q modulator

Modulation bandwidth	80 MHz < f ≤ 1 GHz	±5 % of carrier frequency
	1 GHz < f ≤ 6 GHz	±50 MHz
	100 MHz < f ≤ 2.5 GHz, I/Q wideband	±20 % of carrier frequency
	2.5 GHz < f ≤ 6 GHz, I/Q wideband	±500 MHz
RF frequency response	80 MHz < f ≤ 1 GHz, up to ±5 % of carrier frequency	< 3 dB (meas.)
	f > 1 GHz, up to ±50 MHz	< 3 dB (meas.)
	100 MHz < f ≤ 2.5 GHz, up to ±20 % of carrier frequency, I/Q wideband	< 6 dB (meas.)
	2.5 GHz < f ≤ 6 GHz, up to ±500 MHz, I/Q wideband	< 9 dB (meas.)
Carrier leakage	without input signal, referenced to full-scale input [3]	< –45 dBc, < –55 dBc (meas.)
Suppression of image sideband	up to ±10 MHz	40 dB (meas.)
Error vector	measured with 16QAM, filter root cosine α = 0.5, 10 kHz symbol rate	
	f > 80 MHz, RMS	< (0.4 % + 0.2 % × f/GHz)
	f > 80 MHz, peak value	< (0.8 % + 0.4 % × f/GHz)
3GPP FDD digital standard, adjacent-channel leakage ratio (ACLR)	test model 1, 64 DPCHs level ≤ 10 dBm [4] PEP frequency range from 1800 MHz to 2200 MHz	
	5 MHz offset	> 67 dB, 69.5 dB (meas.)
	10 MHz offset	> 69 dB, 71 dB (meas.)
I/Q impairment settings		
Offset setting range		–5 % to +5 %
Offset setting resolution		0.01 %
Gain imbalance setting range		–1.0 dB to +1.0 dB
Gain imbalance setting resolution		0.001 dB
Quadrature offset setting range		–8° to +8°
Quadrature offset setting resolution		0.01°

[3] Value applies after internal readjustment.

[4] 5 dBm for instruments without the R&S®SGS-B26 electronic step attenuator.

Baseband Bypass mode

The Baseband Bypass mode allows to generate modulated signals below the specified frequency range of the I/Q modulator. Externally generated signals applied to the I or Q baseband input connector can be leveled and amplified by the instrument and are provided at the RF output connector.

For the Baseband Bypass mode, only the data specified in this section is valid.

Level setting range		–10 dBm to +25 dBm
	with the R&S®SGS-B26 option	–120 dBm to +25 dBm
Specified level range		–5 dBm to +15 dBm
	with the R&S®SGS-B26 option	–120 dBm to +15 dBm
Frequency response	1 MHz ≤ f ≤ 80 MHz, level = 10 dBm	< 3 dB, < 1 dB (meas.)
Level error	Attenuator mode AUTO, temperature range from +18 °C to +33 °C, referenced to full-scale input at I or Q connector, 1 MHz ≤ f ≤ 80 MHz	< 3 dB
Level linearity	Attenuator mode FIXED, for setting range of 0 dB to +20 dB	< 2 dB, < 0.5 dB (meas.)

I/Q inputs

Connector types	I, Q on rear panel	SMA female
Input impedance		50 Ω (nom.)
VSWR	up to 100 MHz	< 1.2
	100 MHz up to 500 MHz	< 1.5
Input voltage for full-scale input		$\sqrt{V_i^2 + V_q^2} = 0.5\ V$ (nom.)
Input damage voltage		±1 V

Remote control

Systems		PCIe (single lane)
		Ethernet (TCP/IP) 10/100/1000BaseT
		USB 2.0
Command set	remote control via Ethernet, USB	SCPI 1999.5 or compatible command sets
	remote control via PCIe	Rohde & Schwarz instrument driver

Connectors

Rear panel connectors

RF 50 Ω	RF output	SMA female
REF/LO IN	reference frequency input or external LO signal input	SMA female
REF/LO OUT	reference frequency output or internal LO signal output	SMA female
I, Q	input connector for I and Q baseband signals input for I/Q vector-modulated IF signals up to 80 MHz	SMA female
INST TRIG	trigger input/output	SMA female
USB IN	remote control of instrument	USB (micro USB)
LAN	remote control of instrument	RJ-45
PCI Express	remote control of instrument	single lane, according to PCI Express external cabling specification

General data

Power supply		
AC input voltage range		100 V to 240 V ± 10 %
AC supply frequency		50 Hz to 60 Hz, –5 %/+5 %
Max. input current		1.7 A
Power consumption		70 W (meas.)
Power factor correction		in line with EN 61000-3-2
Electrical safety		
Compliance		in line with IEC 61010-1, EN 61010-1, CAN/CSA-C22.2 No. 61010-1-04, UL 61010-1
Test mark		VDE-GS, $_{C}$CSA$_{US}$
EMC		
Electromagnetic compatibility		in line with EN 55011 class B, EN 61326-1 (industrial environment), EN 61326-2-1
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, const. 0.5 g at 55 Hz to 150 Hz, in line with EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
Shock		in line with MIL-STD-810E, method no. 516.4, procedure I, 40 g shock spectrum
Environmental conditions		
Temperature range	operating temperature range	0 °C to +50 °C, in line with EN 60068-2-1, EN 60068-2-2
	storage temperature range	–40 °C to +71 °C
Climatic resistance		+40 °C/95 % rel. humidity, in line with EN 60068-2-30
Altitude	operating	up to 4600 m
	storage	up to 4600 m
Dimensions	W × H × D	250 mm × 52.5 mm × 401 mm (9.84 in × 2.07 in × 15.79 in) 1 HU, ½ 19" rack width
Weight	when fully equipped	4.0 kg (8.82 lb)
Calibration interval		
Recommended calibration interval	40 h/week operation in the full range of the specified environmental conditions	3 years

Ordering information

Designation	Type	Order No.
RF Source [5]	R&S®SGS100A	1416.0505.02
Including power cable, Quick Start Guide and CD-ROM (with operating and service manual)		
Options		
1 MHz to 6 GHz, CW (no modulation)	R&S®SGS-B106	1416.2308.02
1 MHz to 6 GHz, I/Q (with vector modulation)	R&S®SGS-B106V	1416.2350.02
Frequency Extension to 12.75 GHz, CW [6]	R&S®SGS-B112	1416.1553.02
Electronic Step Attenuator	R&S®SGS-B26	1416.1353.02
Reference Oscillator OCXO	R&S®SGS-B1	1416.2408.02
Phase Coherent Input/Output	R&S®SGS-K90	1416.2608.02
Recommended extras		
19" Rack Adapter (for two 1 HU instruments next to each other), suitable for installation of two R&S®SGMA instruments	R&S®ZZA-KN20	1175.3191.00
19" Rack Adapter (for one instrument and spacing module)	R&S®ZZA-KN21	1175.3204.00
Accessories		
Documentation of Calibration Values	R&S®DCV-2	0240.2193.18

Service options		
Two-Year Calibration Service	R&S®CO2SGS100A	Please contact your local Rohde & Schwarz sales office.
Three-Year Calibration Service	R&S®CO3SGS100A	
Five-Year Calibration Service	R&S®CO5SGS100A	
One-Year Repair Service following the warranty period	R&S®RO2SGS100A	
Two-Year Repair Service following the warranty period	R&S®RO3SGS100A	
Four-Year Repair Service following the warranty period	R&S®RO5SGS100A	

For product brochure, see PD 5214.5703.12 and www.rohde-schwarz.com

[5] The base unit must be ordered together with an R&S®SGS-B106 or R&S®SGS-B106V frequency option.

[6] Requires R&S®SGS-B106.

Service you can rely on

- Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

About Rohde&Schwarz

Rohde&Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde&Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Environmental commitment

- Energy-efficient products
- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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Subject to change

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