



ABN 43 064 478 842

➤ 231 osborne avenue clayton south, vic 3169
PO box 1548, clayton south, vic 3169
t 03 9265 7400 f 03 9558 0875
freecall 1800 680 680
www.tmgtestequipment.com.au

Test & Measurement

- sales
- rentals
- calibration
- repair
- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

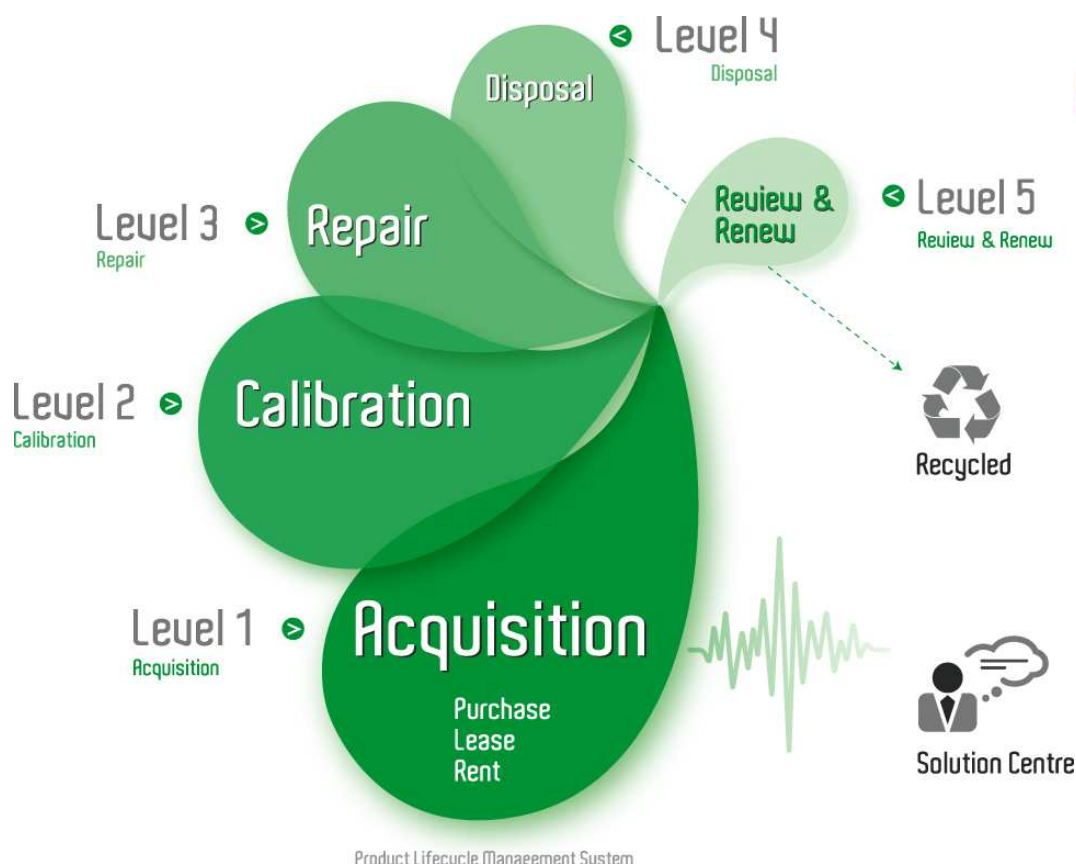
If you click on the “Click-to-Call” logo below, you can call us for FREE!

TMG Corporate Website

TMG Products Website



Click-to-Call
TMG Now



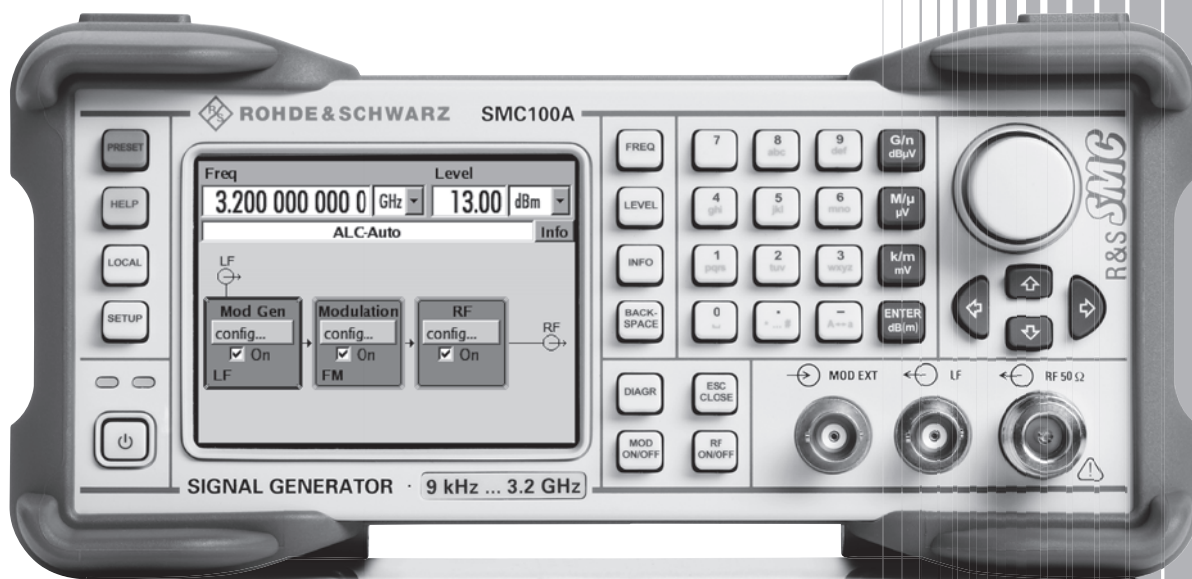
Disclaimer:

All trademarks appearing within this PDF are trademarks of their respective owners.

R&S® SMC100A

Signal Generator

Specifications



75 Years of
Driving
Innovation

CONTENTS

Key features	3
Specifications.....	4
RF characteristics	4
<i>Frequency</i>	<i>4</i>
<i>Frequency sweep</i>	<i>4</i>
<i>Reference frequency</i>	<i>4</i>
<i>Level</i>	<i>5</i>
<i>Level sweep</i>	<i>6</i>
<i>Spectral purity</i>	<i>7</i>
Analog modulation	10
<i>Simultaneous modulation</i>	<i>10</i>
<i>Amplitude modulation</i>	<i>10</i>
<i>Frequency modulation</i>	<i>10</i>
<i>Phase modulation</i>	<i>11</i>
<i>Pulse modulation</i>	<i>11</i>
<i>Input for external modulation signals</i>	<i>11</i>
Modulation sources	12
<i>Internal modulation generator</i>	<i>12</i>
<i>Pulse generator</i>	<i>12</i>
General data	13
<i>Remote control</i>	<i>13</i>
<i>Operating data</i>	<i>13</i>
Ordering information	14

Key features

High performance at an attractive price

- Low SSB phase noise of typ. –111 dBc (20 kHz carrier offset, $f = 1$ GHz, 1 Hz measurement bandwidth)
- Wideband noise of typ. –148 dBc (>10 MHz carrier offset, $f > 1$ MHz, 1 Hz measurement bandwidth)
- Nonharmonics of typ. –72 dBc (>10 kHz carrier offset, $f \leq 1600$ MHz)
- Level uncertainty <0.9 dB
- Frequency and level setting times <5 ms
- Optional high-stability reference oscillator

Flexible and universal all-purpose signal generator

- Frequency range 9 kHz to 1.1 GHz or 3.2 GHz
- Typical maximum level of >+17 dBm
- Analog modulation modes (AM/FM/PM/pulse modulation) integrated as standard
- Remote control compatibility with other signal generators
- Integrated overvoltage protection
- Wear-free electronic attenuator

Space-saving operation due to small dimensions

- Smallest signal generator in the economy class: $\frac{1}{2} \times 19"$, 2 height units
- Lightweight

Minimized total cost of ownership

- Attractive initial cost
- Long calibration interval
- Simplified error diagnostics through built-in selftests
- Repair by users by means of precalibrated replacement modules
- Optimization of level accuracy through level correction with R&S® NRP-Zxx sensors

Ideal tool for many application fields

- Service and maintenance
- Research and education
- Field use
- Secure areas
- Simple production applications

Specifications

Specifications apply under the following conditions: 30 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to and all internal automatic adjustments performed. "Typical values" are designated with the abbreviation "typ.". These values are verified during the final test but are not assured by Rohde & Schwarz. "Nominal values" are design parameters that are not assured by Rohde & Schwarz. These values are verified during product development but are not specifically tested during production. Data without limits is not binding.

RF characteristics

Frequency

Range	R&S®SMC-B101	9 kHz to 1.1 GHz
	R&S®SMC-B103	9 kHz to 3.2 GHz
Resolution of setting		0.001 Hz
Setting time	to within $<1 \times 10^{-7}$ for $f > 200$ MHz or <20 Hz for $f \leq 200$ MHz	
	with R&S®SMC-K4 option after the IEC/IEEE bus delimiter	<5 ms, typ. 2 ms
	with R&S®SMC-K4 option after the IEC/IEEE bus delimiter in ALC OFF mode (S&H)	<7 ms, typ. 3 ms
Phase offset		adjustable in 0.1° steps

Frequency sweep

Operating modes	digital sweep in discrete steps	automatic, single sweep, step, manual or external trigger, linear or logarithmic spacing
Sweep range		full frequency range
Step size	linear	full frequency range
	logarithmic	0.01 % to 100 %
Dwell time	range	10 ms to 10 s
	resolution	0.1 ms

Reference frequency

Aging	after 30 days of uninterrupted operation	$<1 \times 10^{-6}$ /year
	with R&S®SMC-B1 option	$<1 \times 10^{-9}$ /day, $<1 \times 10^{-7}$ /year
Temperature effect	0 °C to +55 °C	$<2 \times 10^{-6}$
	with R&S®SMC-B1 option	$<1 \times 10^{-7}$
Warm-up time	to nominal thermostat temperature (only with R&S®SMC-B1 option)	≤10 min
Output for internal reference signal	frequency (waveform: sine)	10 MHz
	level	typ. +9 dBm
	source impedance	nominal 50 Ω
External reference input	frequency	10 MHz
	maximum deviation	3×10^{-6}
	limits of input level	≥0 dBm, ≤+16 dBm
	input impedance	nominal 50 Ω

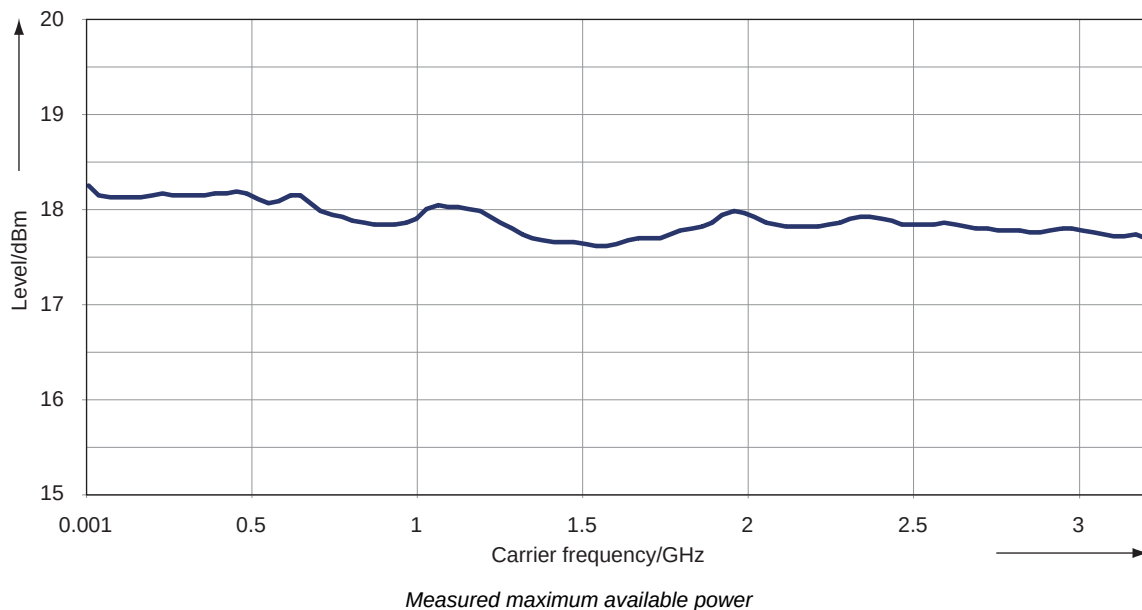
Level

The R&S®SMC100A has two different operating modes for setting the level:

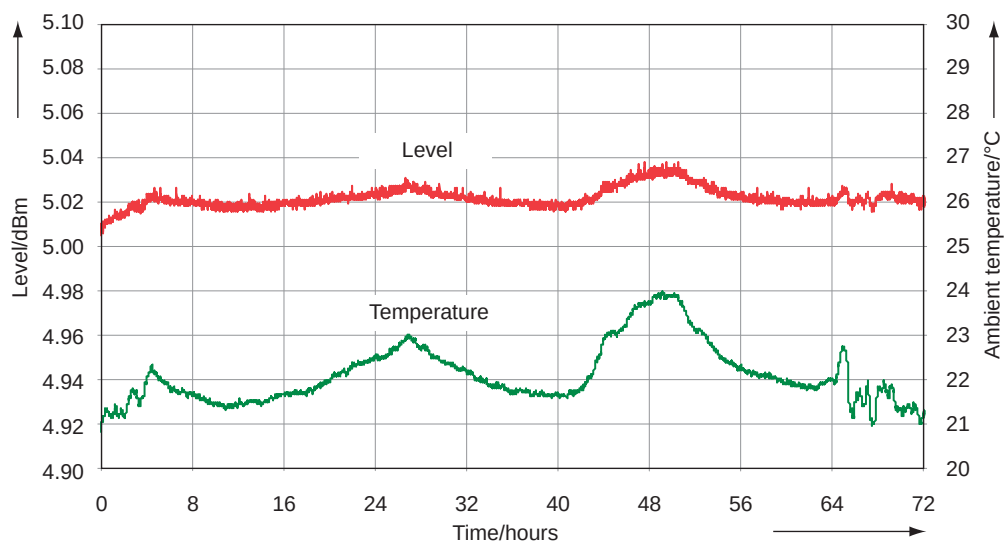
AUTO MODE: The step attenuator is switched over automatically. The output level is specified over the full range from –120 dBm to +13 dBm.

FIXED MODE: The level is set without changing the step attenuator. The step attenuator is thus fixed to the current setting. If ALC is ON, 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		–120 dBm to +19 dBm
Specified level range	$200 \text{ kHz} \leq f \leq 3.2 \text{ GHz}$	–120 dBm to +13 dBm (PEP) ¹
Resolution		0.01 dB
Absolute level error	ALC ON, AUTO mode, temperature range +18 °C to +33 °C $200 \text{ kHz} \leq f \leq 3.2 \text{ GHz}$	<0.9 dB
Output impedance VSWR in 50 Ω system	$200 \text{ kHz} \leq f \leq 3.2 \text{ GHz}$	<1.8
Setting time	to <0.1 dB deviation from final value with R&S®SMC-K4 option after the IEC/IEEE bus delimiter	<5 ms, typ. 2 ms
	with R&S®SMC-K4 option after the IEC/IEEE bus delimiter in ALC OFF mode (S&H)	<7 ms, typ. 3 ms
Interruption-free level setting	FIXED MODE, ALC ON	
	setting range	>20 dB
Reverse power from 50 Ω source at R&S®SMC-B101, R&S®SMC-B103	maximum permissible RF power in output frequency range of RF path for $f \geq 1 \text{ MHz}$	
	$1 \text{ MHz} \leq f \leq 1 \text{ GHz}$	50 W
	$1 \text{ GHz} < f \leq 2 \text{ GHz}$	25 W
	$2 \text{ GHz} < f \leq 3.2 \text{ GHz}$	10 W
	maximum permissible DC voltage	50 V



¹ PEP = peak envelope power.



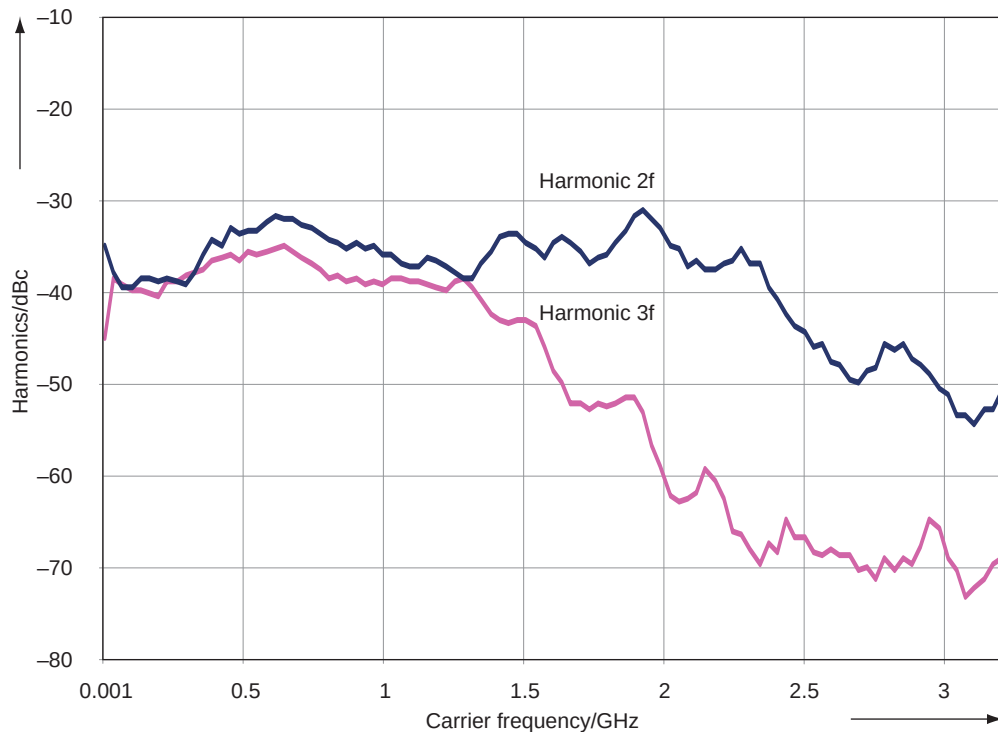
Measured level repeatability at 3 GHz, +5 dBm, ALC ON

Level sweep

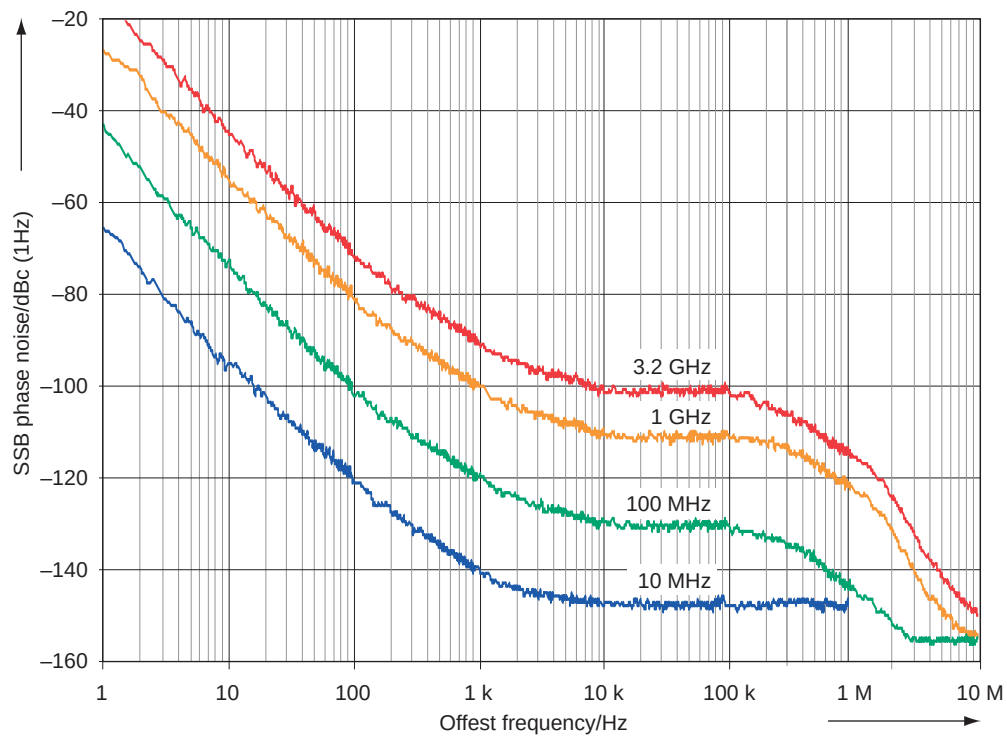
Operating modes	digital sweep in discrete steps	automatic, single sweep, step, manual or external trigger, linear in dB
Sweep range		full level range
	interruption-free	+0.01 dB to +20 dB
Step size		full level range

Spectral purity

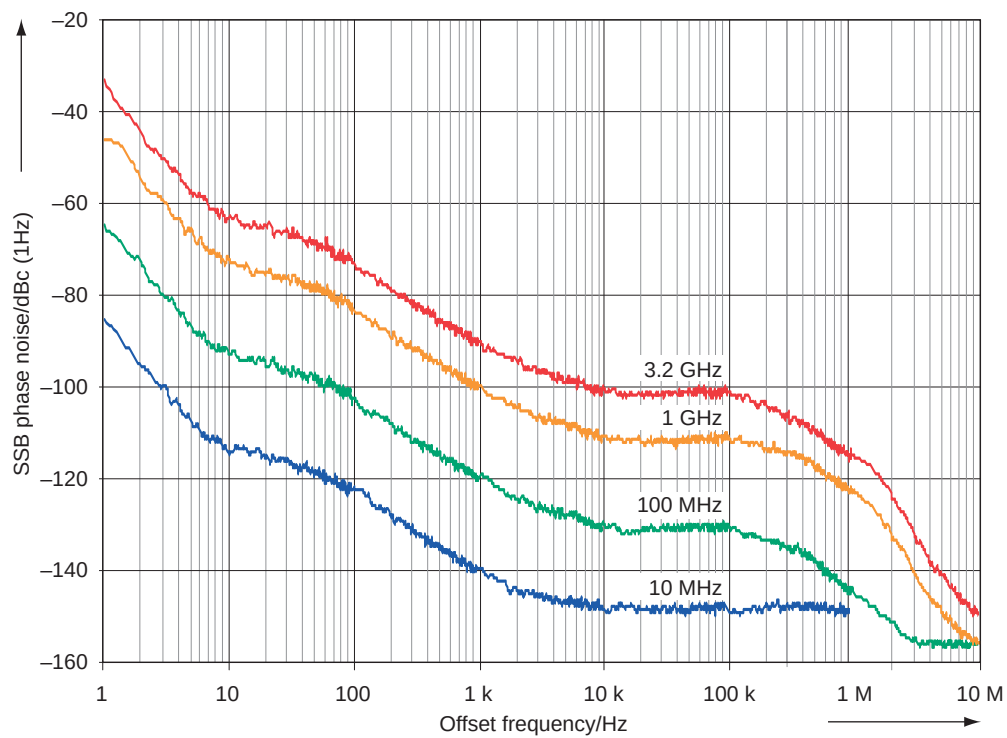
Harmonics	$f > 1 \text{ MHz}$, level $\leq 8 \text{ dBm}$	$< -30 \text{ dBc}$
Nonharmonics	CW, level $> -10 \text{ dBm}$, offset $> 10 \text{ kHz}$ from carrier	
	$f \leq 1600 \text{ MHz}$	$< -60 \text{ dBc}$ (typ. -72 dBc)
	$1600 \text{ MHz} < f \leq 3200 \text{ MHz}$	$< -54 \text{ dBc}$
Wideband noise	$f > 1 \text{ MHz}$, carrier offset $> 10 \text{ MHz}$, level $> 5 \text{ dBm}$, measurement bandwidth 1 Hz , CW	$< -138 \text{ dBc}$ (typ. -148 dBc)
SSB phase noise	carrier offset 20 kHz , measurement bandwidth 1 Hz	
	$f = 1 \text{ GHz}$	$< -105 \text{ dBc}$ (typ. -111 dBc)
	$f = 2 \text{ GHz}$	$< -99 \text{ dBc}$ (typ. -105 dBc)
	$f = 3.2 \text{ GHz}$	$< -95 \text{ dBc}$ (typ. -101 dBc)
Residual FM	RMS value at $f = 1 \text{ GHz}$, CW	
	0.3 kHz to 3 kHz	typ. 1 Hz
	0.03 kHz to 20 kHz	typ. 9 Hz
Residual AM	RMS value (0.03 kHz to 20 kHz)	typ. $< 0.02 \%$



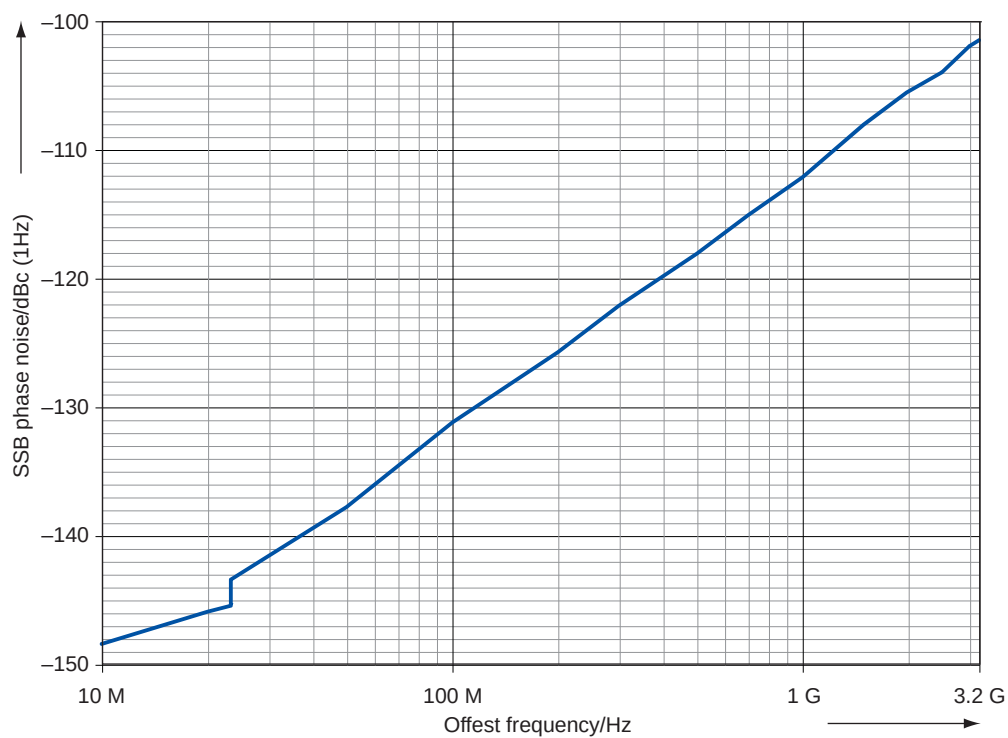
Measured harmonics at +13 dBm versus carrier frequency (level mode AUTO)



Measured SSB phase noise with internal reference oscillator



Measured SSB phase noise with internal OCXO R&S®SMC-B1



Measured SSB phase noise at 20 kHz offset versus frequency

Analog modulation

Simultaneous modulation

	Amplitude modulation	Frequency modulation	Phase modulation	Pulse modulation
Amplitude modulation		+	+	(+)
Frequency modulation	+		-	+
Phase modulation	+	-		+
Pulse modulation	(+)	+	+	

+ = compatible, - = incompatible, (+) = compatible with limitations

Amplitude modulation

For $f > 100$ kHz, attenuator mode AUTO, level (PEP) $\leq +8$ dBm

Operating modes	AM	internal, external, AC/DC
Modulation factor	at high levels, modulation is clipped when the maximum PEP is reached	0 % to 100 %
Resolution		1 %
AM depth error	at $f_{\text{mod}} = 1$ kHz and $m < 80$ %	
	$f \leq 23.4375$ MHz	$< (1 \text{ % of setting} + 1 \text{ %})$
	$f > 23.4375$ MHz	$< (4 \text{ % of setting} + 1 \text{ %})$
AM distortion	at $f_{\text{mod}} = 1$ kHz	
	$m = 30 \text{ %}$, $f \leq 23.4375$ MHz	$< 1 \text{ %}$
	$m = 30 \text{ %}$, $f > 23.4375$ MHz	$< 3 \text{ %}$
Modulation frequency response	$m = 60 \text{ %}$, DC/10 Hz to 50 kHz	< 3 dB
Synchronous ϕ M at AM	$m = 30 \text{ %}$, $f_{\text{mod}} = 1$ kHz, peak	typ. < 0.2 rad

Frequency modulation

Operating modes	FM	internal, external, AC/DC
Maximum deviation	$f \leq 23.4375$ MHz	500 kHz
	$23.4375 \text{ MHz} < f \leq 25$ MHz	31.25 kHz
	$25 \text{ MHz} < f \leq 50$ MHz	62.5 kHz
	$50 \text{ MHz} < f \leq 100$ MHz	125 kHz
	$100 \text{ MHz} < f \leq 200$ MHz	250 kHz
	$200 \text{ MHz} < f \leq 400$ MHz	500 kHz
	$400 \text{ MHz} < f \leq 800$ MHz	1 MHz
	$800 \text{ MHz} < f \leq 1.6$ GHz	2 MHz
	$1.6 \text{ GHz} < f \leq 3.2$ GHz	4 MHz
Resolution		$< 1 \text{ %}$ of maximum deviation, minimum 10 Hz
FM deviation error	$f_{\text{mod}} = 1$ kHz	$< (4 \text{ % of setting} + 20 \text{ Hz})$
FM total harmonic distortion	at $f_{\text{mod}} = 2$ kHz and half the maximum deviation	$< 0.2 \text{ %}$
Modulation frequency response	DC/10 Hz to 100 kHz	< 3 dB
Synchronous AM at FM	40 kHz deviation, $f_{\text{mod}} = 1$ kHz, $f > 10$ MHz	typ. $< 0.2 \text{ %}$
Carrier frequency offset with FM DC	after FM offset adjustment	$< 0.4 \text{ %}$ of set deviation

Phase modulation

Operating modes	ϕM	internal, external, AC/DC
Maximum deviation	$f \leq 23.4375 \text{ MHz}$	5 rad
	$23.4375 \text{ MHz} < f \leq 25 \text{ MHz}$	0.3125 rad
	$25 \text{ MHz} < f \leq 50 \text{ MHz}$	0.625 rad
	$50 \text{ MHz} < f \leq 100 \text{ MHz}$	1.25 rad
	$100 \text{ MHz} < f \leq 200 \text{ MHz}$	2.5 rad
	$200 \text{ MHz} < f \leq 400 \text{ MHz}$	5 rad
	$400 \text{ MHz} < f \leq 800 \text{ MHz}$	10 rad
	$800 \text{ MHz} < f \leq 1.6 \text{ GHz}$	20 rad
	$1.6 \text{ GHz} < f \leq 3.2 \text{ GHz}$	40 rad
Resolution		<1 % of maximum deviation, minimum 0.001 rad
Setting error	$f_{\text{mod}} = 1 \text{ kHz}$	<(4 % of setting + 0.01 rad)
ϕM distortion	at $f_{\text{mod}} = 10 \text{ kHz}$ and half the maximum deviation	<0.2 %
Modulation frequency response	DC/10 Hz to 100 kHz	<3 dB

Pulse modulation

When pulse modulation is activated, the R&S®SMC100A automatically switches to the ALC mode S&H. In this case, the ALC loop is opened and the output level is set directly. In order to set the correct level, a sample & hold measurement is performed prior to each frequency and level setting.

Operating modes		internal, external
On/off ratio		>80 dB
Rise/fall time	10 % to 90 % of RF amplitude	<500 ns (typ. 100 ns)
Pulse repetition frequency		0 Hz to 500 kHz
Video crosstalk	spectral line of fundamental of 100 kHz square wave modulation	<-30 dBc

Input for external modulation signals

Modulation input AM/FM/ ϕM EXT	input impedance	nominal 220 k Ω or 600 Ω
	input sensitivity (peak value for set modulation factor or deviation)	nominal 1 V
	maximum permissible input voltage	$\pm 10 \text{ V}$
Modulation input PULSE	nominal input level	
	threshold Low	nominal 0.5 V
	threshold High	nominal 1.5 V
	maximum permissible input voltage	$\pm 10 \text{ V}$
	input impedance	nominal > 5 k Ω
	polarity	selectable

Modulation sources

Internal modulation generator

Waveform		sine wave
Frequency range		0.1 Hz to 100 kHz
Resolution of setting		0.1 Hz
Frequency error		<(0.005 Hz + relative deviation of reference frequency × modulation frequency)
Frequency response	≤ 10 kHz	<0.1 dB
	≤ 100 kHz	<1 dB
Distortion	$f \leq 10 \text{ kHz}$ at $R_L = 50 \Omega$, $V_p = 1 \text{ V}$	<1 %
Output voltage amplitude	V_p at LF connector at $R_L \geq 50 \Omega$	10 mV to 2.55 V
	resolution	10 mV
	setting error at 1 kHz, $R_L \geq 1 \text{ k}\Omega$	<(2 % of setting + 10 mV)
Output impedance		nominal 1 Ω
Frequency setting time	to within $<1 \times 10^{-7}$	typ. <5 ms
Sweep	digital sweep in discrete steps	
	operating modes	automatic, single sweep, step, manual or external trigger, linear or logarithmic spacing
	sweep range	full frequency range
	step width (lin)	full frequency range
	step width (log)	0.01 % to 100 %

Pulse generator

The pulse generator is fully digitally implemented, the clock is directly derived from the instrument's reference frequency.

Operating modes		automatic, external trigger, external gate mode, single pulse, double pulse, delayed pulse (external trigger)
Active trigger edge		positive or negative
Pulse period setting	range	2 μs to 85 s
	resolution	100 ns
Pulse width setting	range	1 μs to 1 s
	resolution	100 ns
	The pulse widths of double pulses can be set independently.	
Pulse delay setting	range	100 ns to 1 s
	resolution	100 ns
Double-pulse spacing setting	range	1 μs to 1 s
	resolution	100 ns
External trigger	delay	nominal 50 ns
	jitter of delay	<20 ns
PULSE/VIDEO output	output signal without load	digital signal 0 V/3.3 V
	internal impedance	nominal 50 Ω

General data

Remote control

Systems	IEC/IEEE bus, IEC 60625 (IEEE 488) (R&S® SMC-K4 option)	
	Ethernet (TCP/IP)	
	USB	
Command set	SCPI 1999.5 or compatible command sets	
Compatible command sets	supports a subset of common commands	Agilent/HP 8643A
		Agilent/HP 8644A/B
		Agilent/HP 8647A
		Agilent/HP 8648A/B/C/D
		Agilent/HP 8656A/B
		Agilent/HP 8657A/B
Interface	IEC/IEEE bus	24-contact Amphenol
	Ethernet	Western
	USB host	USB type A
	USB device	USB type B
IEC/IEEE bus address	0 to 30	
IEC interface functions	SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0	
LAN interface	10/100BaseT	

Operating data

Power supply	input voltage range, AC, nominal	100 V to 240 V (AC) $\pm 10\%$
	AC supply frequency	50 Hz to 60 Hz, $-5\%/+10\%$
	max. input current	1.2 A (100 V) to 0.4 A (240 V)
	power factor correction	in line with EN 61000-3-2
Electromagnetic compatibility		in line with EN 55011 class B, EN 61326
Immunity to interfering field strength		up to 10 V/m
Environmental conditions	operating temperature range	0 °C to +55 °C in line with: DIN EN 60068-2-1, DIN EN 60068-2-2
	storage temperature range	-40 °C to +71 °C
	climatic resistance, test: +40 °C/95 % rel. humidity	in line with DIN EN 60068-2-78
	operating altitude	up to 4600 m
	sinusoidal vibration	5 Hz to 150 Hz, max. 2 g at 55 Hz, max. 0.5 g at 55 Hz to 150 Hz, in line with DIN EN 60068-2-6
Mechanical resistance	random	10 Hz to 300 Hz, acceleration 1.2 g (rms) in line with DIN EN 60068-2-64
	shock	40 g shock spectrum in line with DIN EN 60068-2-27, MIL-STD-810E
Electrical safety		in line with IEC 61010-1, EN 61010-1, CAN/CSA-C22.2 No. 61010-1-04, UL 61010-1
Approvals		VDE-GS, cCSA _{US}
Dimensions	width × height × depth	236 mm × 112 mm × 368 mm
Weight	when fully equipped	nominal 3.9 kg
Recommended calibration interval		3 years

Ordering information

Designation	Type	Order No.
Signal Generator ²	R&S® SMC100A	1411.4002.02
Including power cable, Quick Start Guide and CD-ROM (with operating and service manual)		
Options		
RF Path		
9 kHz to 1.1 GHz	R&S® SMC-B101	1411.6505.02
9 kHz to 3.2 GHz	R&S® SMC-B103	1411.6605.02
Reference Oscillator OCXO	R&S® SMC-B1	1411.6705.02
GPIO/IEEE488 Interface	R&S® SMC-K4	1411.3506.02
Service options		
Two-Year Calibration Service	R&S® CO2SMC100A	please contact your local sales office
Three-Year Calibration Service	R&S® CO3SMC100A	please contact your local sales office
Five-Year Calibration Service	R&S® CO5SMC100A	please contact your local sales office
One-Year Repair Service following the warranty period	R&S® RO2SMC100A	please contact your local sales office
Two-Year Repair Service following the warranty period	R&S® RO3SMC100A	please contact your local sales office
Four-Year Repair Service following the warranty period	R&S® RO5SMC100A	please contact your local sales office
Documentation of calibration values	R&S® DCV-2	0240.2193.18
DKD (ISO 17025) calibration including ISO 9000 calibration (can only be ordered with the device)	R&S® SMC-DKD	1415.7512.02
Recommended extras		
Hardcopy manuals (in English, UK)		1411.4060.32
Hardcopy manuals (in English, US)		1411.4060.39
19" Rack Adapter (for two 2-HU instruments next to each other) Suitable for installation of two R&S® SMC100A instruments	R&S® ZZA-T35	1109.4506.00
19" Rack Adapter (for one 2-HU instruments + spacing module)	R&S® ZZA-T36	1109.4512.00
Power Sensor 9 kHz to 6 GHz, +23 dBm	R&S® NRP-Z91	1168.8004.02
Power Sensor 9 kHz to 6 GHz, +33 dBm	R&S® NRP-Z92	1171.7005.02
Keyboard with USB Interface (US character set)	R&S® PSL-Z2	1157.6870.04
Mouse with USB Interface, optical	R&S® PSL-Z10	1157.7060.03

² The base unit must be ordered together with an R&S® SMC-B101/R&S® SMC-B103 frequency option.

Service you can rely on

- | In 70 countries
- | Person-to-person
- | Customized and flexible
- | Quality with a warranty
- | No hidden terms

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 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Regional contact

Europe, Africa, Middle East

+49 1805 12 42 42* or +49 89 4129 137 74

customersupport@rohde-schwarz.com

North America

1-888-TEST-RSA (1-888-837-8772)

customer.support@rsa.rohde-schwarz.com

Latin America

+1-410-910-7988

customersupport.la@rohde-schwarz.com

Asia/Pacific

+65 65 13 04 88

customersupport.asia@rohde-schwarz.com

Certified Quality System
ISO 9001
DQS REG. NO 1954 QM

Certified Environmental System
ISO 14001
DQS REG. NO 1954 UM

For product brochure,
see PD 5214.1143.12
and www.rohde-schwarz.com

Rohde & Schwarz GmbH & Co. KG

Mühldorfstraße 15 | 81671 München

Phone +49 89 41 290 | Fax +49 89 41 29 121 64

www.rohde-schwarz.com

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG
Trade names are trademarks of the owners | Printed in Germany (ed)
PD 5214.1143.22 | Version 01.00 | July 2008 | R&S®SMC100A
Subject to change

*0,14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.