

# R&S<sup>®</sup> SMA100A Signal Generator Specifications



**75** Years of  
Driving  
Innovation

  
**ROHDE & SCHWARZ**

# CONTENTS

<b>Key features .....</b>	<b>3</b>
<b>Specifications.....</b>	<b>4</b>
RF characteristics .....	4
Frequency .....	4
Frequency sweep .....	4
Reference frequency .....	5
Level.....	5
Level sweep .....	7
Spectral purity .....	8
LIST mode.....	12
Analog modulation .....	12
Possible modulation types.....	12
Simultaneous modulation .....	12
Amplitude modulation.....	12
Frequency modulation (R&S®SMA-B20 or R&S®SMA-B22 option) .....	13
Chirped pulses (R&S®SMA-B20 or R&S®SMA-B22 option) .....	14
Phase modulation (R&S®SMA-B20 or R&S®SMA-B22 option) .....	15
Pulse modulation.....	15
VOR modulation (R&S®SMA-K25 option) .....	16
ILS modulation (R&S®SMA-K25 option).....	16
Marker beacon (MKR BCN) (R&S®SMA-K25 option).....	17
ADF mode (R&S®SMA-K25 option).....	17
Input for external modulation signals.....	18
Modulation sources.....	18
Internal modulation generator .....	18
Standard pulse generator.....	18
High-performance pulse generator (R&S®SMA-K23 option).....	19
Multifunction generator (R&S®SMA-K24 option) .....	19
Clock synthesizer (R&S®SMA-B29 option) .....	20
<b>General data .....</b>	<b>21</b>
Remote control.....	21
Operating data .....	21
<b>Ordering information .....</b>	<b>22</b>
<b>License information .....</b>	<b>23</b>

# Key features

## Excellent signal quality

- Very low SSB phase noise of typ.  $-135$  dBc (20 kHz carrier offset,  $f = 1$  GHz, 1 Hz measurement bandwidth), typ.  $-140$  dBc with the enhanced phase noise performance option (R&S<sup>®</sup>SMA-B22)
- Wideband noise of typ.  $-160$  dBc ( $>10$  MHz carrier offset,  $f = 1$  GHz, 1 Hz measurement bandwidth)
- Nonharmonics of typ.  $-100$  dBc ( $>10$  kHz carrier offset,  $f < 1500$  MHz, with the R&S<sup>®</sup>SMA-B22 option)
- High-stability reference oscillator as standard
- Very low phase noise at low frequencies due to internal division of the fundamental frequency range (750 MHz to 1500 MHz) down to 6.6 MHz

## Ideal for use in production

- Very short frequency / level setting times of typ. 1.3 ms / 1 ms across the entire frequency and level range,  $<450$   $\mu$ s in LIST mode
- Fast hopping mode with flexibly addressable frequency and level pairs, as fast as normal LIST mode
- Frequency setting time of nominal 10  $\mu$ s within a bandwidth of up to 80 MHz due to direct access to the DDS-based synthesizer (with the R&S<sup>®</sup>SMA-B20 or -B22 option; FM EXTERNAL DIGITAL mode)
- Very high level accuracy and repeatability
- High output power of up to +18 dBm, overrange up to +28 dBm
- Electronic attenuator with built-in overvoltage protection over entire frequency range
- Minimum space requirements due to compact size (only two height units)

## Mil/Aero applications

- Pulse modulator with excellent characteristics (on/off ratio typ. 100 dB, rise/fall time typ. 10 ns)
- Pulse generator integrated as standard
- Optional high-performance pulse generator with minimum pulse width of 10 ns (R&S<sup>®</sup>SMA-K23)
- Optional chirp modulation (R&S<sup>®</sup>SMA-B20 or -B22)
- Optional VOR/ILS modulation (R&S<sup>®</sup>SMA-K25)
- Optional operating altitude up to 4600 m (R&S<sup>®</sup>SMA-B46)
- Optional removable mass storage (compact flash disk, R&S<sup>®</sup>SMA-B80)

## All-purpose instrument

- Frequency range of 9 kHz to 3 GHz (R&S<sup>®</sup>SMA-B103/-B103L) or 6 GHz (R&S<sup>®</sup>SMA-B106/-B106L)
- Frequency, level and LF sweeps
- Phase-continuous frequency setting
- AM, broadband FM/ $\phi$ M (R&S<sup>®</sup>SMA-B20 or -B22), pulse modulation
- Built-in LF generator up to 1 MHz, optional multifunction generator (R&S<sup>®</sup>SMA-K24) up to 10 MHz
- Optional low-jitter clock synthesizer up to 1.5 GHz (R&S<sup>®</sup>SMA-B29)

## Intuitive operating concept

- Color display with  $320 \times 240$  pixels ( $\frac{1}{4}$  VGA)
- Intuitive user interface with graphical display of signal flow (block diagram)
- Context-sensitive online help

## Versatile interfaces

- Remote control via GPIB, LAN or USB
- Selectable control language (SCPI or remote control emulation of various signal generators)
- Control via remote operation tool (e.g. VNC)
- USB connectors (e.g. for keyboard, mouse, memory stick)
- Support of R&S<sup>®</sup>NRP-Zxx power sensors for precise power measurements

# Specifications

## RF characteristics

### Frequency

Range	R&S®SMA-B103/-B103L	9 kHz to 3 GHz
	R&S®SMA-B106/-B106L	9 kHz to 6 GHz
Resolution of setting		0.01 Hz
Resolution of synthesis	standard, fundamental frequency range	
	750 MHz to 1500 MHz	5 µHz
	with R&S®SMA-B22 option	0.2 µHz
Setting time	to within $<1 \times 10^{-7}$ for $f > 6.6$ MHz or $<35$ Hz for $f < 6.6$ MHz	
	after IEC/IEEE bus delimiter	<2 ms, typ. 1.3 ms
	in ALC OFF S&H mode	<5 ms, typ. 1.5 ms
	after trigger pulse in LIST mode	<450 µs, typ. 300 µs
Phase offset		adjustable in 0.1° steps
Multiplier for phase-continuous frequency setting	$f \leq 6.6$ MHz	$rm = 1/2$
	$6.6 \text{ MHz} < f \leq 11.71875 \text{ MHz}$	$rm = 1/128$
	$11.71875 \text{ MHz} < f \leq 23.4375 \text{ MHz}$	$rm = 1/64$
	$23.4375 \text{ MHz} < f \leq 46.875 \text{ MHz}$	$rm = 1/32$
	$46.875 \text{ MHz} < f \leq 93.75 \text{ MHz}$	$rm = 1/16$
	$93.75 \text{ MHz} < f \leq 187.5 \text{ MHz}$	$rm = 1/8$
	$187.5 \text{ MHz} < f \leq 375 \text{ MHz}$	$rm = 1/4$
	$375 \text{ MHz} < f \leq 750 \text{ MHz}$	$rm = 1/2$
	$750 \text{ MHz} < f \leq 1500 \text{ MHz}$	$rm = 1$
	$1500 \text{ MHz} < f \leq 3 \text{ GHz}$	$rm = 2$
	$f > 3 \text{ GHz}$	$rm = 4$
Phase-continuous frequency setting	frequency range	$rm \times 1 \text{ MHz}$ , nominal
	with R&S®SMA-B22 option narrow mode	$rm \times 5 \text{ MHz}$
	wide mode	$rm \times 20 \text{ MHz}$
	max. frequency step	$rm \times 2 \text{ kHz}$ , nominal
	with R&S®SMA-B22 option	$rm \times 100 \text{ kHz}$ , nominal

### Frequency sweep

Operating modes	digital sweep in discrete steps	AUTOMATIC, STEP, SINGLE SWEEP, EXTERNAL SINGLE, EXTERNAL STEP, EXTERNAL START/STOP, LINEAR/LOGARITHMIC SPACING
Sweep shape		sawtooth, triangle
Sweep range		full frequency range
Step width	linear	full frequency range
	logarithmic	0.01 % to 100 % per step
Dwell time	range	10 ms to 10 s
	resolution	0.1 ms

## Reference frequency

Aging	after 30 days of uninterrupted operation	$1 \times 10^{-9}$ /day, $1 \times 10^{-7}$ /year
	with R&S <sup>®</sup> SMA-B22 option	$5 \times 10^{-10}$ /day, $3 \times 10^{-8}$ /year
Maximum temperature effect	in temperature range 0 °C to +50 °C	$\pm 6 \times 10^{-8}$
	with R&S <sup>®</sup> SMA-B22 option	$\pm 6 \times 10^{-9}$
Warm-up time	to nominal thermostat temperature	$\leq 10$ min
Output for internal reference signal	frequency (approx. sinewave)	10 MHz or external input frequency
	level	typ. 5 dBm
	source impedance	50 $\Omega$
Input for external reference	frequency	5 MHz, 10 MHz or 13 MHz
	maximum deviation	$3 \times 10^{-6}$
	with R&S <sup>®</sup> SMA-B22 option	$1.5 \times 10^{-7}$
	input level, limits	$\geq -6$ dBm, $\leq 19$ dBm
	recommended	0 dBm to 19 dBm
Electronic tuning from input (EXT. TUNE)	input impedance	50 $\Omega$
	sensitivity	typ. $2 \times 10^{-9}$ /V to $3 \times 10^{-8}$ /V
	input voltage	-10 V to +10 V
	input impedance	10 k $\Omega$ , nominal
	with R&S <sup>®</sup> SMA-B22 option	5 k $\Omega$ , nominal

## Level

The R&S<sup>®</sup>SMA100A has three different modes for level setting:

**NORMAL mode:** In this mode, the attenuator switches without wear and tear due to the exclusive use of electronic switches. The maximum specified level depends on the set frequency (see table below). A typical level overrange up to +20 dBm is available.

**HIGH POWER mode:** In this mode, the electronic attenuator is bypassed with mechanical relays for high output power (up to typ. 28 dBm overrange). The relays are not switched over in this mode. The typical minimum level is -11 dBm.

**AUTO mode:** In this mode, the mechanical relay bypass is switched automatically if the set level is higher than the specified max. level in the NORMAL mode. The output level is specified over the full range from -120 dBm up to +18 dBm (+15 dBm for R&S<sup>®</sup>SMA-B106).

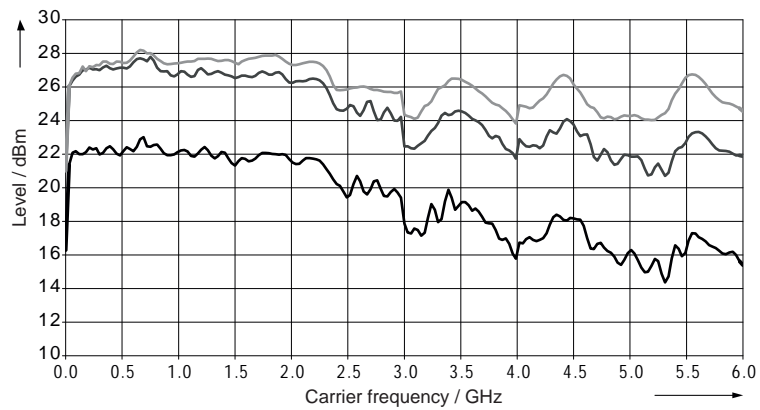
The R&S<sup>®</sup>SMA100A is also available without attenuator (R&S<sup>®</sup>SMA-B103L and R&S<sup>®</sup>SMA-B106L) options.

Setting range	with electronic attenuator (R&S <sup>®</sup> SMA-B103/-B106 option)	-145 dBm to +30 dBm <sup>1</sup>
	without attenuator (R&S <sup>®</sup> SMA-B103L/-B106L option)	-20 dBm to +30 dBm <sup>1</sup>
Specified level range with R&S <sup>®</sup> SMA-B103/-B106 frequency option	NORMAL mode	
	100 kHz < f $\leq$ 250 kHz	-120 dBm to +11 dBm (PEP) <sup>2</sup>
	250 kHz < f $\leq$ 3 GHz	-120 dBm to +13 dBm (PEP)
	f > 3 GHz	-120 dBm to +9 dBm (PEP)
	AUTO mode	
	100 kHz < f $\leq$ 30 MHz	-120 dBm to +16 dBm (PEP)
Specified level range with R&S <sup>®</sup> SMA-B103L/-B106L frequency option	30 MHz < f $\leq$ 3 GHz	-120 dBm to +18 dBm (PEP)
	f > 3 GHz	-120 dBm to +15 dBm (PEP)
	AUTO mode	
	100 kHz < f $\leq$ 30 MHz	+12 dBm to +17 dBm (PEP)
Resolution	30 MHz < f $\leq$ 3 GHz	+12 dBm to +19 dBm (PEP)
	f > 3 GHz	+10 dBm to +17 dBm (PEP)
	0.01 dB	
Level uncertainty	ALC state on, attenuator mode AUTO temperature range +18 °C to +33 °C	
	100 kHz < f $\leq$ 3 GHz	<0.5 dB
	f > 3 GHz	<0.9 dB
Additional uncertainty with ALC OFF, S&H	This mode is only needed with pulse modulation after "search once".	<0.3 dB

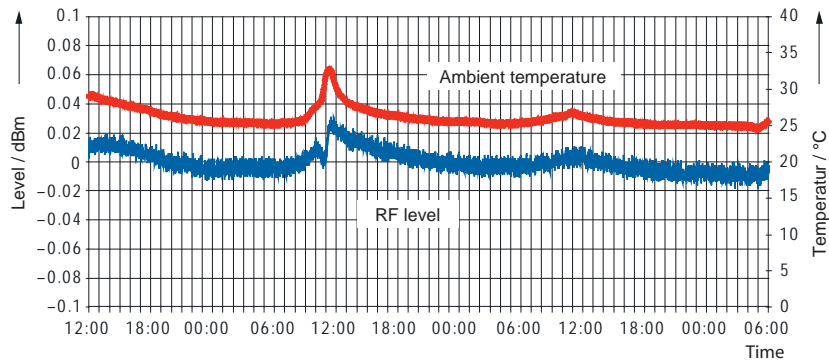
<sup>1</sup> Level uncertainty only valid within the specified level range.

<sup>2</sup> PEP = peak envelope power.

Output impedance VSWR in 50 Ω system with R&S <sup>®</sup> SMA-B103/-B106 frequency option	NORMAL mode, ALC state on	
	6.6 MHz < f ≤ 3 GHz	<1.65, typ. <1.35
	f > 3 GHz	<1.9, typ. <1.65
	HIGH POWER mode, ALC state on	
Output impedance VSWR in 50 Ω system with R&S <sup>®</sup> SMA-B103L/-B106L frequency option	without attenuator, ALC state on	
	6.6 MHz < f ≤ 3 GHz	<1.9, typ. <1.7
	f > 3 GHz	<2.3, typ. <2.0
	Setting time	
Setting time	after IEC/IEEE bus delimiter, with GUI update stopped, attenuator mode AUTO, temperature range +18 °C to +33 °C to <0.1 dB deviation from final value	
	ALC state ON	<1.5 ms, typ. 1 ms
	ALC state OFF	<5 ms, typ. 3.5 ms
	in LIST mode after trigger impulse f > 6.6 MHz	<450 μs, typ. 400 μs
	to <0.3 dB deviation from final value	
	relay switchover in AUTO mode	<10 ms, typ. 5 ms
Uninterrupted level setting	with attenuator mode FIXED, ALC state on setting range	>20 dB
Back-feed (from ≥50 Ω source) with R&S <sup>®</sup> SMA-B103/-B106	maximum permissible RF power in output frequency range of RF path for f > 1 MHz	
	1 MHz < f ≤ 3 GHz	50 W
	3 GHz < f < 6 GHz	10 W
	maximum permissible DC voltage	50 V
Back-feed (from ≥50 Ω source) with R&S <sup>®</sup> SMA-B103L/-B106L	maximum permissible RF power in output frequency range of RF path for f > 1 MHz	
		0.05 W
	maximum permissible DC voltage	5 V



Maximum available power, attenuator mode NORMAL (lower trace) or HIGH POWER (center trace) and without attenuator (upper trace)



R&S<sup>®</sup>SMA100A level repeatability at 2.1 GHz, 0 dBm, ALC ON

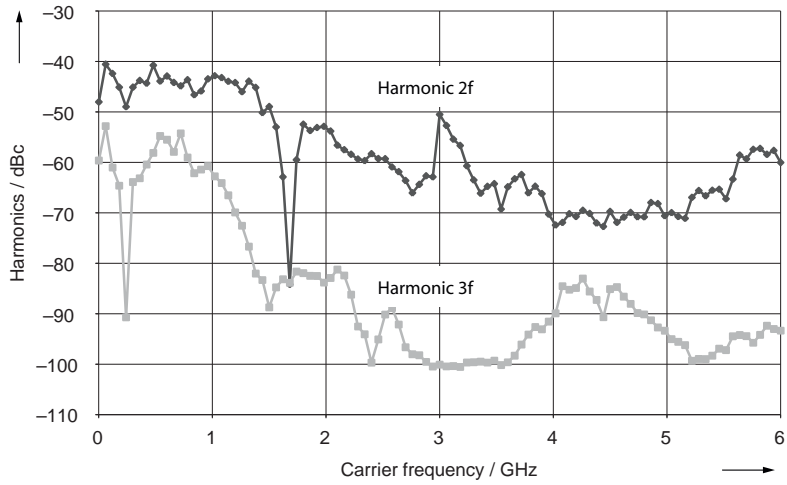
## Level sweep

Digital sweep in discrete steps	operating modes	AUTO, STEP, SINGLE SWEEP, EXTERNAL SINGLE, EXTERNAL STEP, EXTERNAL START/STOP
Sweep shape		sawtooth, triangle
Sweep range with R&S <sup>®</sup> SMA-B103/-B106 frequency option	The relay switching threshold (= maximum specified level of attenuator mode NORMAL) must not be exceeded during a sweep.	level range of attenuator modes NORMAL or HIGH POWER
	uninterrupted level sweep with attenuator mode FIXED	0.01 dB to 30 dB
Sweep range with R&S <sup>®</sup> SMA-B103L/-B106L frequency option		full level range
Step width	resolution	0.01 dB
Step time	range	10 ms to 10 s
	resolution	0.1 ms

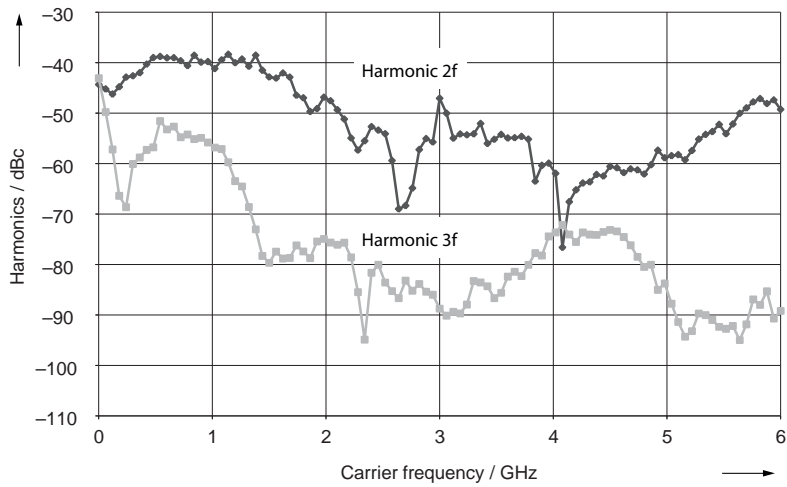
## Spectral purity

Harmonics	for $f > 1$ MHz, CW		
	with R&S <sup>®</sup> SMA-B103/-B106		
	AUTO/NORMAL mode, level $\leq 9$ dBm	$\leq -30$ dBc	
	HIGH POWER mode, level $\leq 14$ dBm	$\leq -30$ dBc	
	with R&S <sup>®</sup> SMA-B103L/-B106L		
	levels $\leq 15$ dBm	$\leq -30$ dBc	
Nonharmonics	CW, level $> -10$ dBm		
	offset $> 10$ kHz from carrier		
	$f \leq 1500$ MHz	$\leq -80$ dBc	
	$1500 \text{ MHz} < f \leq 3 \text{ GHz}$	$\leq -74$ dBc	
	$f > 3 \text{ GHz}$	$\leq -68$ dBc	
	offset $> 850$ kHz from carrier		
	$f \leq 1500$ MHz	$\leq -86$ dBc	
	$1500 \text{ MHz} < f \leq 3 \text{ GHz}$	$\leq -80$ dBc	
	$f > 3 \text{ GHz}$	$\leq -74$ dBc	
Nonharmonics with R&S <sup>®</sup> SMA-B22 option	CW, level $> -10$ dBm		
	offset $> 10$ kHz from carrier		
	$f \leq 750$ MHz	$\leq -96$ dBc	
	$750 \text{ MHz} < f \leq 1500 \text{ MHz}$	$\leq -90$ dBc	
	$1500 \text{ MHz} < f \leq 3 \text{ GHz}$	$\leq -84$ dBc	
	$f > 3 \text{ GHz}$	$\leq -78$ dBc	
Subharmonics	$f \leq 1500$ MHz	none	
	$f > 1500$ MHz	$\leq -74$ dBc	
Wideband noise	attenuator mode AUTO		
	for level $> 10$ dBm with R&S <sup>®</sup> SMA-B10xL		
	for level $> 5$ dBm with R&S <sup>®</sup> SMA-B10x		
	carrier offset $> 10$ MHz		
	measurement bandwidth 1 Hz, CW		
	$9 \text{ kHz} \leq f \leq 6.6 \text{ MHz}$	$\leq -147$ dBc	
	$6.6 \text{ MHz} < f \leq 750 \text{ MHz}$	$\leq -152$ dBc	
$750 \text{ MHz} < f \leq 1500 \text{ MHz}$	$\leq -153$ dBc		
$1.5 \text{ GHz} < f \leq 3 \text{ GHz}$	$\leq -150$ dBc		
	$f > 3 \text{ GHz}$	$\leq -148$ dBc	
SSB phase noise	carrier offset 20 kHz, measurement bandwidth 1 Hz, CW		
	$f \leq 6.6 \text{ MHz}$	$-145$ dBc, nominal	
	$f = 100 \text{ MHz}$	$\leq -147$ dBc, typ. $-151$ dBc	
	$f = 1 \text{ GHz}$	$\leq -131$ dBc, typ. $-135$ dBc	
	$f = 2 \text{ GHz}$	$\leq -125$ dBc, typ. $-129$ dBc	
	$f = 3 \text{ GHz}$	$\leq -121$ dBc, typ. $-125$ dBc	
	$f = 4 \text{ GHz}$	$\leq -119$ dBc, typ. $-123$ dBc	
	$f = 6 \text{ GHz}$	$\leq -115$ dBc, typ. $-119$ dBc	
SSB phase noise with R&S <sup>®</sup> SMA-B22 option	CW, carrier offset 20 kHz, measurement bandwidth 1 Hz		
	$f \leq 6.6 \text{ MHz}$	$-148$ dBc, nominal	
	$f = 100 \text{ MHz}$	$\leq -151$ dBc, typ. $-154$ dBc	
	$f = 1 \text{ GHz}$	$\leq -136$ dBc, typ. $-140$ dBc	
	$f = 2 \text{ GHz}$	$\leq -130$ dBc, typ. $-134$ dBc	
	$f = 3 \text{ GHz}$	$\leq -126$ dBc, typ. $-130$ dBc	
	$f = 4 \text{ GHz}$	$\leq -123$ dBc, typ. $-126$ dBc	
	$f = 6 \text{ GHz}$	$\leq -120$ dBc, typ. $-124$ dBc	
RMS jitter	carrier frequency	RMS jitter bandwidth	
	1 GHz	1 Hz to 10 MHz	typ. 430 fs (430 $\mu$ UI), nominal
	155 MHz	100 Hz to 1.5 MHz	typ. 60 fs (9 $\mu$ UI), nominal
	622 MHz	1 kHz to 5 MHz	typ. 36 fs (22 $\mu$ UI), nominal
	2.488 GHz	5 kHz to 15 MHz	typ. 22 fs (55 $\mu$ UI), nominal
RMS jitter with R&S <sup>®</sup> SMA-B22 option	carrier frequency	RMS jitter bandwidth	
	1 GHz	1 Hz to 10 MHz	typ. 72 fs (72 $\mu$ UI), nominal
	155 MHz	100 Hz to 1.5 MHz	typ. 25 fs (3.8 $\mu$ UI), nominal
	622 MHz	1 kHz to 5 MHz	typ. 21 fs (13 $\mu$ UI), nominal
	2.488 GHz	5 kHz to 15 MHz	typ. 19 fs (47 $\mu$ UI), nominal
Residual FM	RMS value at $f = 1 \text{ GHz}$		
	$0.3 \text{ kHz} \text{ to } 3 \text{ kHz}$ , weighted (ITU-T)	$< 1$ Hz	
	$0.03 \text{ kHz} \text{ to } 23 \text{ kHz}$	$< 4$ Hz	
Residual AM	RMS value (0.03 kHz to 20 kHz)		
		$< 0.02$ %	

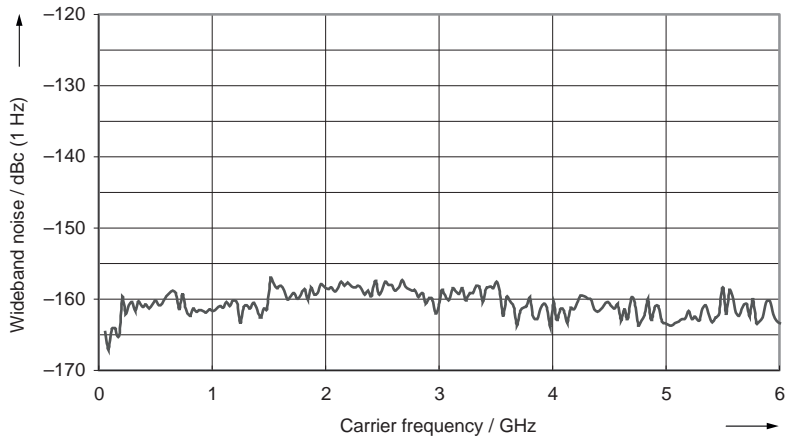




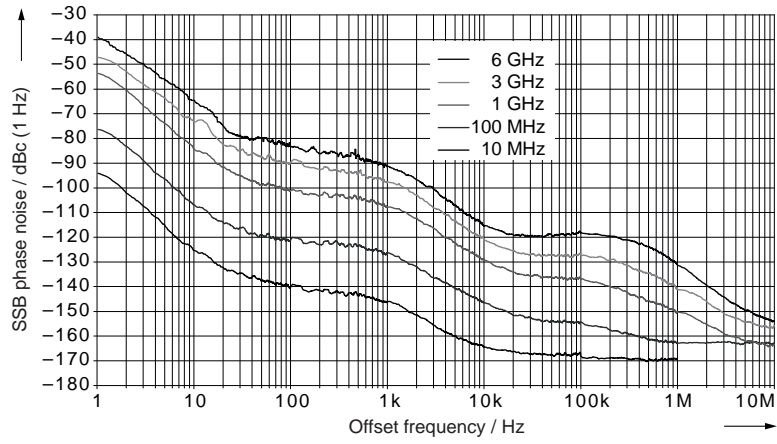
Measured harmonics at +9 dBm versus carrier frequency (level mode AUTO)



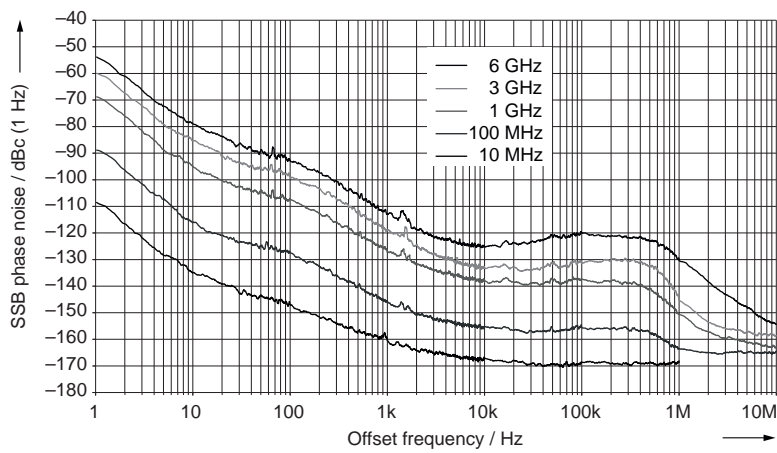
Measured harmonics at +18 dBm versus carrier frequency (level mode AUTO)



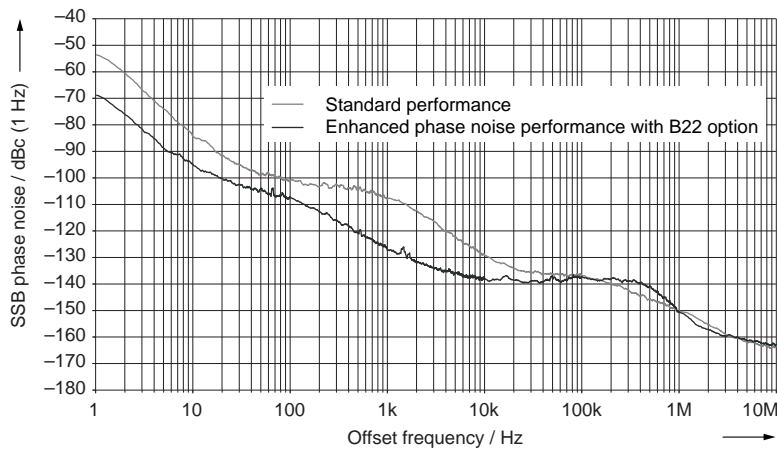
Wideband noise at 40 MHz offset and +9 dBm versus carrier frequency measured with R&S®FSQ8 signal analyzer



Measured SSB phase noise with internal reference oscillator (standard instrument)

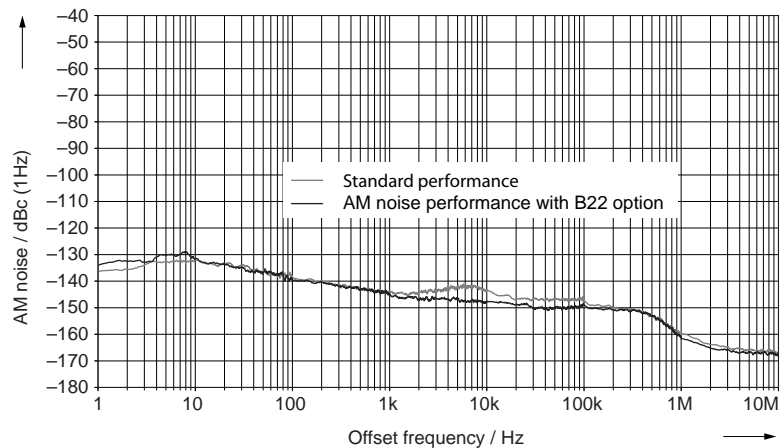


Measured SSB phase noise with internal reference oscillator (with R&S<sup>®</sup> SMA-B22 enhanced phase noise performance and FM/ϕM modulator option)



Measured SSB phase noise,  $f = 1$  GHz, comparison of standard performance and performance with R&S<sup>®</sup> SMA-B22 option

Carrier frequency in MHz	nominal phase noise in dBc (1 Hz) with R&S®SMA-B22 option							
	frequency offset from carrier							
	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
0.1 to 6.6	-100	-110	-130	-142	-150	-152	-155	-
6.6 to 15.625	-103	-131	-144	-160	-167	-167	-169	-169
15.625 to 23.4375	-99	-127	-140	-159	-165	-167	-169	-169
23.4375 to 31.25	-97	-125	-138	-156	-162	-164	-168	-168
31.25 to 46.875	-93	-121	-134	-152	-162	-162	-167	-167
46.875 to 62.5	-91	-119	-132	-150	-159	-160	-165	-165
62.5 to 93.75	-87	-115	-128	-147	-158	-159	-165	-165
93.75 to 125	-85	-113	-126	-144	-154	-155	-163	-165
125 to 187.5	-81	-109	-122	-141	-151	-153	-161	-162
187.5 to 250	-79	-107	-120	-139	-148	-149	-159	-162
250 to 375	-75	-103	-116	-136	-148	-147	-158	-161
375 to 500	-73	-101	-114	-133	-143	-143	-155	-161
500 to 750	-69	-97	-110	-130	-143	-142	-154	-160
750 to 1000	-67	-95	-108	-127	-138	-137	-150	-163
1000 to 1500	-63	-91	-104	-124	-138	-136	-149	-162
1500 to 2000	-61	-89	-102	-121	-132	-131	-144	-158
2000 to 3000	-57	-85	-98	-118	-132	-131	-143	-158
3000 to 4000	-55	-83	-96	-116	-127	-124	-134	-156
4000 to 6000	-51	-79	-92	-112	-125	-120	-130	-154



Measured AM noise,  $f = 1$  GHz, level = +14 dBm, ALC ON, comparison of standard performance and performance with R&S®SMA-B22 option

## LIST mode

Frequency and level values can be stored in a list and set in an extremely short amount of time		
Operating modes		AUTOMATIC, SINGLE SWEEP, MANUAL/EXTERNAL TRIGGER fast hopping with immediate and external trigger
Max. number of stored settings		2000
Dwell time		1 ms to 1 s
	resolution	0.1 ms
Setting time	after external trigger	see frequency and level data

## Analog modulation

### Possible modulation types

Amplitude modulation, frequency modulation, phase modulation, pulse modulation, chirped pulses, avionics modulation (VOR, ILS, MKR BCN, ADF).

### Simultaneous modulation

	Amplitude modulation	Frequency modulation	Phase modulation	Pulse modulation
Amplitude modulation		+	+	–
Frequency modulation	+		–	+
Phase modulation	+	–		+
Pulse modulation	–	+	+	

+ = compatible, – = incompatible.

With chirped pulses and avionics modulation no other modulation is possible simultaneously.

### Amplitude modulation

For  $f \geq 100$  kHz, attenuator mode AUTO, level (PEP)<sup>3</sup> within specified level range.

Operating modes		INTERNAL, EXTERNAL, INTERNAL + EXTERNAL, AC/DC
Modulation depth	At high levels, modulation is clipped when the maximum PEP is reached.	0 % to 100 %
Resolution		0.1 %
Setting uncertainty	$f_{\text{mod}} = 1$ kHz and $m < 80$ %	<(3 % of reading + 1 %)
AM distortion	$f_{\text{mod}} = 1$ kHz	
	$m = 30$ %	<1 %
	$m = 80$ %	<2 %
Modulation frequency response	$m = 60$ %, up to 100 kHz	<3 dB
Incidental $\phi M$ at AM	$m = 30$ %, $f_{\text{mod}} = 1$ kHz, $\pm \text{peak}/2$	<0.1 rad

<sup>3</sup> PEP = peak envelope power.

## Frequency modulation (R&S<sup>®</sup>SMA-B20 or R&S<sup>®</sup>SMA-B22 option)

FM multiplier for different frequency ranges	$f \leq 46.875$ MHz	rm = 1/2 (all modes except LOW NOISE)
	$f \leq 6.6$ MHz	rm = 1/2 (only in LOW NOISE mode)
	$6.6 \text{ MHz} < f \leq 11.71875$ MHz	rm = 1/128 (only in LOW NOISE mode)
	$11.71875 \text{ MHz} < f \leq 23.4375$ MHz	rm = 1/64 (only in LOW NOISE mode)
	$23.4375 \text{ MHz} < f \leq 46.875$ MHz	rm = 1/32 (only in LOW NOISE mode)
	$46.875 \text{ MHz} < f \leq 93.75$ MHz	rm = 1/16
	$93.75 \text{ MHz} < f \leq 187.5$ MHz	rm = 1/8
	$187.5 \text{ MHz} < f \leq 375$ MHz	rm = 1/4
	$375 \text{ MHz} < f \leq 750$ MHz	rm = 1/2
	$750 \text{ MHz} < f \leq 1500$ MHz	rm = 1
	$1500 \text{ MHz} < f \leq 3$ GHz	rm = 2
	$f > 3$ GHz	rm = 4
Operating modes		INTERNAL, EXTERNAL, INTERNAL + EXTERNAL, AC/DC, EXTERNAL DIGITAL, FM mode NORMAL, FM mode LOW NOISE (with R&S <sup>®</sup> SMA-B22 option only)
Maximum deviation	FM mode NORMAL	rm x 10 MHz
	FM mode LOW NOISE	rm x 100 kHz
Resolution		<0.02 % of set deviation min. rm x 0.1 Hz
Setting uncertainty	$f_{\text{mod}} = 10$ kHz, deviation $\leq$ half of max. deviation	
	internal	<(1.5 % of reading + 20 Hz)
	external	<(2 % of reading + 20 Hz)
FM distortion	$f_{\text{mod}} = 10$ kHz, deviation = rm x 1 MHz	<0.1 %
Modulation frequency response	FM mode NORMAL	
	DC/10 Hz to 100 kHz	<0.5 dB
	DC/10 Hz to 10 MHz	<3 dB
	FM mode LOW NOISE	
	DC/10 Hz to 100 kHz	<3 dB
Synchronous AM	40 kHz deviation, $f_{\text{mod}} = 1$ kHz	
	$f > 5$ MHz	<0.1 %
	$f > 3$ GHz	<0.2 %
Carrier frequency offset with FM DC	after FM offset calibration	
	input impedance 50 $\Omega$	<0.2 % of set deviation

## Chirped pulses (R&S<sup>®</sup>SMA-B20 or R&S<sup>®</sup>SMA-B22 option)

The R&S<sup>®</sup>SMA100A always uses chirp modulation together with pulse modulation. When chirp modulation is activated, the ALC state of the instrument is automatically changed to ALC OFF (sample & hold). In this state, the ALC loop is opened and the output level is set directly.

In order to set the correct output level, a sample & hold measurement is performed after each frequency or level setting.

In the following cases, the nominal ON level is present for nominal 3 ms to 5 ms during a sample & hold measurement after level or frequency setting:

- No attenuator is installed (R&S<sup>®</sup>SMA-B103L/-B106L frequency option)
- In HIGH POWER mode
- In AUTO mode if the level is in the high power range, i.e. the mechanical relay bypass is switched.

Otherwise, the level is decreased by 30 dB during a sample & hold measurement.

Chirp bandwidth multiplier for different frequency ranges	$f \leq 46.875 \text{ MHz}$	$rm = 1/2$
	$46.875 \text{ MHz} < f \leq 93.75 \text{ MHz}$	$rm = 1/16$
	$93.75 \text{ MHz} < f \leq 187.5 \text{ MHz}$	$rm = 1/8$
	$187.5 \text{ MHz} < f \leq 375 \text{ MHz}$	$rm = 1/4$
	$375 \text{ MHz} < f \leq 750 \text{ MHz}$	$rm = 1/2$
	$750 \text{ MHz} < f \leq 1500 \text{ MHz}$	$rm = 1$
	$1500 \text{ MHz} < f \leq 3 \text{ GHz}$	$rm = 2$
	$f > 3 \text{ GHz}$	$rm = 4$
Operating modes		AUTO, EXTERNAL TRIGGER, EXTERNAL GATE
Chirp direction		up, down
Maximum bandwidth		$rm \times 20 \text{ MHz}$
Pulse period		see pulse generator
Pulse width		see pulse generator pulse width < (pulse period – 1 $\mu$ s)
Maximum chirp rate		$rm \times 10 \text{ MHz}/\mu\text{s}$ , nominal

## Phase modulation (R&S<sup>®</sup>SMA-B20 or R&S<sup>®</sup>SMA-B22 option)

φM multiplier for different frequency ranges	f ≤ 46.875 MHz	rm = 1/2 (all modes except LOW NOISE)
	f ≤ 6.6 MHz	rm = 1/2 (only in LOW NOISE mode)
	6.6 MHz < f ≤ 11.71875 MHz	rm = 1/128 (only in LOW NOISE mode)
	11.71875 MHz < f ≤ 23.4375 MHz	rm = 1/64 (only in LOW NOISE mode)
	23.4375 MHz < f ≤ 46.875 MHz	rm = 1/32 (only in LOW NOISE mode)
	46.875 MHz < f ≤ 93.75 MHz	rm = 1/16
	93.75 MHz < f ≤ 187.5 MHz	rm = 1/8
	187.5 MHz < f ≤ 375 MHz	rm = 1/4
	375 MHz < f ≤ 750 MHz	rm = 1/2
	750 MHz < f ≤ 1500 MHz	rm = 1
	1500 MHz < f ≤ 3 GHz	rm = 2
	f > 3 GHz	rm = 4
Operating modes		INTERNAL, EXTERNAL, INTERNAL + EXTERNAL, AC/DC, EXTERNAL DIGITAL, φM mode LOW NOISE (with R&S <sup>®</sup> SMA-B22 option only), φM mode HIGH DEVIATION, φM mode HIGH BANDWIDTH
Maximum deviation	φM mode LOW NOISE	rm × 0.25 rad
	φM mode HIGH DEVIATION	rm × 20 rad
	φM mode HIGH BANDWIDTH	rm × 1 rad
Resolution	φM mode LOW NOISE/HIGH DEVIATION	<0.02 % of set deviation, min. rm × 20 μrad
	φM mode HIGH BANDWIDTH	<0.1 % of set deviation, min. rm × 20 μrad
Setting uncertainty	f <sub>mod</sub> = 10 kHz, deviation ≤ half of max. deviation	
	internal	<(1.5 % of reading + 0.003 rad)
	external	<(2 % of reading + 0.003 rad)
Distortion	f <sub>mod</sub> = 10 kHz, half of max. deviation	
Modulation frequency response	φM mode HIGH DEVIATION	
	deviation ≤ rm × 5 rad DC/10 Hz to 500 kHz	<1 dB
	deviation > rm × 5 rad DC/10 Hz to 10 kHz	<1 dB
	φM mode HIGH BANDWIDTH	
	DC/10 Hz to 100 kHz	<0.5 dB
	DC/10 Hz to 10 MHz	<3 dB
	φM mode LOW NOISE	
DC/10 Hz to 100 kHz	<3 dB	

## Pulse modulation

When pulse modulation is activated, the ALC state of the R&S<sup>®</sup>SMA100A is automatically changed to ALC OFF (sample & hold).

In this state, the ALC loop is opened and the output level is set directly.

In order to set the correct output level, a sample & hold measurement is performed after each frequency or level setting.

In the following cases, the nominal ON level is present for nominal 3 ms to 5 ms during a sample & hold measurement after level or frequency setting:

- No attenuator is installed (R&S<sup>®</sup>SMA-B103L/-B106L frequency option)
- In HIGH POWER mode
- In AUTO mode if the level is in the high power range, i.e. the mechanical relay bypass is switched.

Otherwise, the level is decreased by 30 dB during a sample & hold measurement

Operating modes		EXTERNAL, INTERNAL
On/off ratio		>80 dB, typ. 100 dB
Rise/fall time	f > 180 MHz	
	10 %/90 % of RF amplitude	20 ns, typ. 10 ns
Pulse repetition frequency		0 Hz to 10 MHz
Video crosstalk	spectral line of fundamental of 100 kHz squarewave modulation	<-30 dBc

## VOR modulation (R&S® SMA-K25 option)

Attenuator mode AUTO, level (PEP)<sup>4</sup> within specified level range.

VOR specification valid for carrier frequency range from 108 MHz to 118 MHz.

VOR operating modes	NORM	VOR signal + COM/ID tone (can be switched off)
	VAR	30 Hz VAR tone
	subcarrier	9.96 kHz carrier, unmodulated
	subcarrier + FM	9.96 kHz carrier, modulated
Modulation tones		
30 Hz (VAR, REF)	frequency uncertainty	<(0.005 Hz + relative deviation of reference frequency)
30 Hz REF	frequency setting range	10 Hz to 60 Hz
	resolution	0.1 Hz
9.96 kHz FM carrier	frequency setting range	5 kHz to 15 kHz
	resolution	0.1 Hz
	frequency deviation	0 Hz to 960 Hz
	resolution	1 Hz
	FM error (at 480 Hz deviation)	<1 Hz
COM/ID tone	default	1020 Hz
External AM tone	input	AM EXT
	frequency setting range	0.1 Hz to 20 kHz
	resolution	0.1 Hz
Phase (VAR, REF)	default	0.00°
	setting range	0° to 360°
	resolution	0.01°
	bearing error	<0.05°
Modulation depth	Sum of modulation depths of 30 Hz (VAR) signal, 9.96 kHz FM carrier, COM/ID and external AM signal must not exceed 100 %.	
30 Hz (VAR, REF)	setting range of AM depth	0 % to 100 %
	resolution	0.1 %
	setting uncertainty	<0.5 % AM depth at 30 % AM depth
9.96 kHz FM carrier	setting range of AM depth	0 % to 100 %
	resolution	0.1 %
	setting uncertainty	<0.5 % AM depth at 30 % AM depth
COM/ID tone	setting range of AM depth	0 % to 100 %
	resolution	0.1 %
	setting uncertainty (COM/ID = 1020 Hz)	<0.5 % AM depth at 10 % AM depth
External AM tone	sensitivity	0.01 V/%

## ILS modulation (R&S® SMA-K25 option)

Attenuator mode AUTO, level (PEP)<sup>4</sup> within specified level range.

ILS-LOC specification valid for carrier frequency range from 108 MHz to 118 MHz.

ILS-GS specification valid for carrier frequency range from 329 MHz to 335 MHz.

ILS operating modes	ILS-LOC/ILS-GS	
	NORM	standard localizer/glideslope signal + COM/ID tone (can be switched off)
	90 Hz	suppression of 150 Hz modulation tone
	150 Hz	suppression of 90 Hz modulation tone
ILS modulation tones	If the frequency of the 90 Hz or 150 Hz tone is varied, the other tone is automatically changed in proportion.	
	frequency uncertainty	<0.02 Hz + relative deviation of reference frequency
90 Hz tone	frequency setting range	60 Hz to 120 Hz
	resolution	0.3 Hz
150 Hz tone	frequency setting range	100 Hz to 200 Hz
	resolution	0.5 Hz

<sup>4</sup> PEP = peak envelope power.



COM/ID tone	default	1020 Hz
	frequency setting range	0.1 Hz to 20 kHz
	resolution	0.1 Hz
External AM tone	input	AM EXT
Modulation depth	Sum of modulation depths of 90 Hz, 150 Hz, COM/ID and external AM signal must not exceed 100 %.	
Sum of depth of modulation (SDM) of 90 Hz tone and 150 Hz tone	setting range of AM depth/resolution	0 % to 100 %/0.1 %
	default, localizer	40 %
	default, glideslope	80 %
	setting uncertainty	<0.8 % AM depth at 40 % SDM <1.6 % AM depth at 80 % SDM
COM/ID tone	setting range of AM depth	0 % to 100 %
	resolution	0.1 %
	setting uncertainty (COM/ID = 1020 Hz)	<0.5 % AM depth at 10 % AM depth
External AM tone	sensitivity	0.01 V/%
Difference in depth of modulation (DDM)	setting range	0 to $\pm$ SDM
	setting resolution	0.0001
	setting uncertainty	<0.0003 + 2 % of DDM reading
Phase setting	setting range	0° to 120°
	resolution	0.01°
	setting uncertainty	<0.05°

### Marker beacon (MKR BCN) (R&S® SMA-K25 option)

Attenuator mode AUTO, level (PEP) within specified level range.

MKR-BCN specification valid for carrier frequency range from 74 MHz to 76 MHz.

MKR BCN tones	frequency uncertainty	<0.005 Hz + relative deviation of reference frequency
Marker frequencies		400 Hz, 1300 Hz and 3000 Hz
COM/ID tone	default	1020 Hz
	frequency setting range	0.1 Hz to 20 kHz
	resolution	0.1 Hz
Modulation depth	Sum of modulation depths of marker tone and COM/ID signal must not exceed 100 %.	
Marker frequency	setting range of AM depth	0 % to 100 %
	resolution	0.1 %
	default	95 %
	setting uncertainty marker depth = 95 %	<4 %
COM/ID tone	setting range of AM depth	0 % to 100 %
	resolution	0.1 %
	setting uncertainty COM/ID = 1020 Hz	<0.5 % AM depth at 5 % AM depth

### ADF mode (R&S® SMA-K25 option)

The ADF mode provides a carrier frequency of 190 kHz with 30 % AM depth at 1 kHz modulation rate.

ADF tone	frequency uncertainty	<0.005 Hz + relative deviation of reference frequency
ADF frequencies	frequency setting range	0.1 Hz to 20 kHz
	resolution	0.1 Hz
Modulation depth	setting range of AM depth	0 % to 100 %
	resolution	0.1 %
	default	30 %

## Input for external modulation signals

Modulation input AM EXT	input impedance	>100 k $\Omega$
	input sensitivity (peak value for set modulation depth or deviation)	1 V
Modulation input PULSE	input level	threshold 0.8 V
	input impedance	>10 k $\Omega$ or 50 $\Omega$
	polarity	selectable

### With R&S®SMA-B20/-B22 option (FM/ $\phi$ M)

Modulation input FM/ $\phi$ M EXT	input impedance	>100 k $\Omega$ or 50 $\Omega$
	input sensitivity (peak value for set modulation depth or deviation)	1 V

## Modulation sources

### Internal modulation generator

Frequency range		0.1 Hz to 1 MHz
Resolution of setting		0.1 Hz
Frequency accuracy		<0.005 Hz + relative deviation of reference frequency
Frequency response		<0.3 dB
Distortion	f < 100 kHz at R <sub>L</sub> > 50 $\Omega$ , level (V <sub>EMF</sub> ) < 1 V	<0.1 %
Output voltage	V <sub>p</sub> at LF connector, open circuit voltage EMF	1 mV to 4 V
	resolution	1 mV
	setting accuracy at 1 kHz	<(1 % of reading + 1 mV)
Output impedance		50 $\Omega$
Frequency setting time	to within <1 × 10 <sup>-7</sup> , after IEC/IEEE bus delimiter	<3 ms
Sweep	digital sweep in discrete steps	
	operating modes	AUTO, STEP, SINGLE SWEEP, EXTERNAL SINGLE, EXTERNAL STEP, EXTERNAL START/STOP, LINEAR/LOGARITHMIC SPACING
	sweep shape	sawtooth, triangle
	sweep range	full frequency range
	step width (lin)	full frequency range
	step width (log)	0.01 % to 100 % per step
	dwel time range	10 ms to 10 s
	dwel time resolution	0.1 ms

### Standard pulse generator

Pulse period		5 $\mu$ s to 100 s
	resolution	1 $\mu$ s
Pulse width		2 $\mu$ s to 100 s
	resolution	1 $\mu$ s
PULSE/VIDEO output		LVTTL signal (R <sub>L</sub> ≥ 50 $\Omega$ )

## High-performance pulse generator (R&S® SMA-K23 option)

Operating modes		AUTO, EXTERNAL TRIGGER, EXTERNAL GATE, SINGLE PULSE, DOUBLE PULSE, DELAYED PULSE (EXTERNAL TRIGGER)
Active trigger edge		positive or negative
Pulse period		20 ns to 100 s
	resolution	5 ns
Pulse width	The pulse width of double pulses can be set independently.	5 ns to 100 s
	resolution	5 ns
Pulse delay		10 ns to 100 s
	resolution	5 ns
Double-pulse spacing		10 ns to 100 s
	resolution	5 ns
Uncertainty for pulse period	pulse timing generated digitally; ensured by design	relative deviation of reference frequency
External trigger	delay	50 ns, nominal
	jitter	<5 ns
PULSE VIDEO output		LVTTTL signal ( $R_L \geq 50 \Omega$ )
PULSE SYNC output		LVTTTL signal ( $R_L \geq 50 \Omega$ )
	SYNC pulse width	
	pulse period < 100 ns	10 ns
	pulse period $\geq 100$ ns or externally triggered	50 ns

## Multifunction generator (R&S® SMA-K24 option)

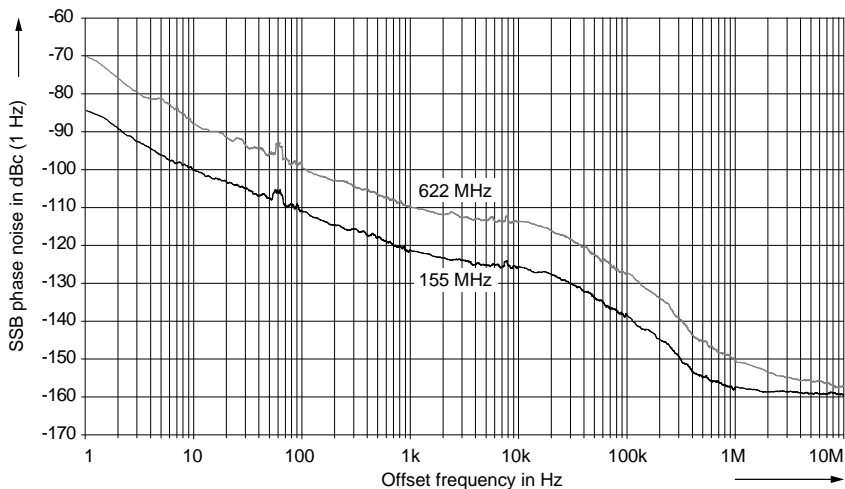
The multifunction generator option (R&S® SMA-K24) consists of three function generators that can be set independently. Two of the three signal sources can be added with different weighting. The total voltage is limited by the maximum output voltage.

Waveforms	LF generator 1	sine
	LF generator 2	sine, square, triangle user-programmable ramp $\Delta T = 20$ ns
	noise generator noise amplitude distribution	Gaussian, equal
Frequency range	sine	0.1 Hz to 10 MHz
	triangle, square	0.1 Hz to 1 MHz
	noise bandwidth	100 kHz to 10 MHz
Resolution of setting	sine, triangle, square	0.1 Hz
	ramp: rise, fall, low and high time	20 ns
Frequency uncertainty		<0.005 Hz + relative deviation of reference frequency
Frequency response	sine	
	up to 1 MHz	<0.3 dB
	up to 10 MHz	<1 dB
Distortion	f < 100 kHz	
	at $R_L > 50 \Omega$ , level ( $V_{EMF}$ ) < 1 V	<0.1 %
Output voltage	$V_p$ at LF connector, open circuit voltage EMF	1 mV to 4 V
	resolution	1 mV
	setting accuracy at 1 kHz	<(1 % of reading + 1 mV)
Output impedance		50 $\Omega$
Frequency setting time	to within $<1 \times 10^{-7}$ , after IEC/IEEE bus delimiter	<3 ms
Sweep	digital sweep in discrete steps	
	operating modes	AUTO, STEP, SINGLE SWEEP, EXTERNAL SINGLE, EXTERNAL STEP, EXTERNAL START/STOP, LINEAR/LOGARITHMIC SPACING
	sweep shape	sawtooth, triangle
	sweep range	full frequency range
	step width (lin)	full frequency range
	step width (log)	0.01 % to 100 % per step
	dwll time range	10 ms to 10 s
	dwll time resolution	0.1 ms

## Clock synthesizer (R&S<sup>®</sup> SMA-B29 option)

The frequency of the clock synthesizer (R&S<sup>®</sup> SMA-B29 option) can be set independently of the RF frequency of the R&S<sup>®</sup> SMA100A. It provides a differential clock signal (AC-coupled, symmetric square) on the rear panel of the R&S<sup>®</sup> SMA100A.

Frequency range		100 kHz to 1.5 GHz	
Resolution of setting		0.01 Hz	
Resolution of synthesis		<100 $\mu$ Hz	
Frequency setting time	to within $<1 \times 10^{-7}$ , after IEC/IEEE bus delimiter	<30 ms	
Output voltage (CLK SYN, CLK SYN_N)	into 50 $\Omega$ , peak to peak, f = 10 MHz	typ. 0.5 V	
DC offset voltage	setting range	-5 V to +5 V	
	resolution	10 mV	
	source impedance	2 k $\Omega$ , nominal	
Frequency response	100 kHz to 1.5 GHz both outputs terminated with 50 $\Omega$	typ. 4 dB	
Back-feed (from $\geq 50 \Omega$ source)	maximum permissible RF power in output frequency range of CLKSYN path for f > 1 MHz	0.05 W	
	maximum permissible DC voltage	3 V	
Spectral purity			
Nonharmonics	>10 kHz offset from carrier		
	f $\leq$ 325 MHz	<-82 dBc	
	325 MHz < f $\leq$ 650 MHz	<-76 dBc	
	650 MHz < f $\leq$ 1300 MHz	<-70 dBc	
	1300 MHz < f $\leq$ 1500 MHz	<-64 dBc	
Wideband noise	carrier offset >10 MHz, measurement bandwidth 1 Hz	typ. <-154 dBc	
SSB phase noise	carrier offset 20 kHz, measurement bandwidth 1 Hz		
	f = 100 MHz	<-123 dBc, typ. -129 dBc	
	f = 250 MHz	<-113 dBc, typ. -119 dBc	
	f = 500 MHz	<-109 dBc, typ. -115 dBc	
	f = 1000 MHz	<-103 dBc, typ. -109 dBc	
SSB phase noise with R&S <sup>®</sup> SMA-B22 option	carrier offset 20 kHz, measurement bandwidth 1 Hz		
	f = 100 MHz	<-125 dBc, typ. -131 dBc	
	f = 250 MHz	<-115 dBc, typ. -121 dBc	
	f = 500 MHz	<-111 dBc, typ. -117 dBc	
	f = 1000 MHz	<-105 dBc, typ. -111 dBc	
RMS jitter	carrier frequency	RMS jitter bandwidth	
	100 MHz	1 Hz to 10 MHz	300 fs (30 $\mu$ UI), nominal
	155 MHz	100 Hz to 1.5 MHz	220 fs (34 $\mu$ UI), nominal
	622 MHz	1 kHz to 5 MHz	190 fs (118 $\mu$ UI), nominal
RMS jitter with R&S <sup>®</sup> SMA-B22 option	carrier frequency	RMS jitter bandwidth	
	100 MHz	1 Hz to 10 MHz	220 fs (22 $\mu$ UI), nominal
	155 MHz	100 Hz to 1.5 MHz	160 fs (25 $\mu$ UI), nominal
	622 MHz	1 kHz to 5 MHz	140 fs (87 $\mu$ UI), nominal



Clock synthesizer (R&S<sup>®</sup> SMA-B29 option): SSB phase noise  
measured with R&S<sup>®</sup> SMA-B22 option

# General data

## Remote control

Systems	IEC/IEEE bus, in line with IEC 60625 (IEEE 488)	
	Ethernet (TCP/IP)	
	USB	
Command set	SCPI 1999.5 or compatible languages	
Compatible languages	supporting a subset of common commands	Agilent/HP 8662A/8663A
		Agilent/HP 8643A/8644A/8645A
		Agilent/HP 8644B
		Aeroflex/IFR/Marconi 2030 series
		Aeroflex/IFR/Marconi 2040 series
		Racal 3102/9087
Interfaces	IEC	24-contact Amphenol
	Ethernet	Western
	USB	USB
IEC/IEEE bus address		0 to 30
Interface functions IEC	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 400 Hz, $\pm 10\%$
	power consumption	250 VA
Power factor correction		in line with EN 61000-3-2
EMC		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 EN 60068-2-1, EN 60068-2-2
	storage temperature range	-40 °C to +71 °C
	operating altitude	
	standard	$\leq 3000$ m
	with R&S <sup>®</sup> SMA-B46	$\leq 4600$ m
	climatic resistance, +40 °C/95 % rel. humidity	in line with EN 60068-2-3
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, max. 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		40 g shock spectrum in line with 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
Certification marks		VDE-GS, cCSA <sub>US</sub>
Dimensions (W x H x D)		427 mm x 88 mm x 450 mm (16.81 in x 3.46 in x 17.72 in)
Weight	when fully equipped	10 kg (22 lb)
Recommended calibration interval		3 years

# Ordering information

Designation	Type	Order No.
Signal Generator <sup>5</sup>	R&S <sup>®</sup> SMA100A	1400.0000.02
Including power cable, Quick Start Guide and CD-ROM (with operating and service manual)		
<b>Options</b>		
RF Path		
9 kHz to 3 GHz with electronic attenuator	R&S <sup>®</sup> SMA-B103	1405.0209.02
9 kHz to 6 GHz with electronic attenuator	R&S <sup>®</sup> SMA-B106	1405.0809.02
9 kHz to 3 GHz without attenuator	R&S <sup>®</sup> SMA-B103L	1405.0609.02
9 kHz to 6 GHz without attenuator	R&S <sup>®</sup> SMA-B106L	1405.1005.02
FM/φM Modulator	R&S <sup>®</sup> SMA-B20	1405.1605.02
Enhanced Phase Noise Performance and FM/φM Modulator	R&S <sup>®</sup> SMA-B22	1405.1805.02
Clock Synthesizer	R&S <sup>®</sup> SMA-B29	1400.2503.02
Operating Altitude up to 4600 m	R&S <sup>®</sup> SMA-B46	1405.1305.02
Removable Mass Storage (compact flash disk)	R&S <sup>®</sup> SMA-B80	1405.2001.02
Rear Connectors	R&S <sup>®</sup> SMA-B81	1405.2401.02
High-Performance Pulse Generator	R&S <sup>®</sup> SMA-K23	1405.2801.02
Multifunction Generator	R&S <sup>®</sup> SMA-K24	1405.2901.02
VOR/ILS Modulation	R&S <sup>®</sup> SMA-K25	1405.3008.02
<b>Service options</b>		
Two-Year Calibration Service	R&S <sup>®</sup> CO2SMA100A	please contact your local sales office
Three-Year Calibration Service	R&S <sup>®</sup> CO3SMA100A	
Five-Year Calibration Service	R&S <sup>®</sup> CO5SMA100A	
One-Year Repair Service following the warranty period	R&S <sup>®</sup> RO2SMA100A	
Two-Year Repair Service following the warranty period	R&S <sup>®</sup> RO3SMA100A	
Four-Year Repair Service following the warranty period	R&S <sup>®</sup> RO5SMA100A	
Documentation of Calibration Values	R&S <sup>®</sup> DCV-2	0240.2193.18
DKD (ISO 17025) Calibration including ISO 9000 calibration (can only be ordered with the device)	R&S <sup>®</sup> SMA-DKD	1161.3571.00
<b>Recommended extras</b>		
Hardcopy manuals (in English, UK)		1400.0075.32
Hardcopy manuals (in English, US)		1400.0075.39
Spare Compact Flash Card (R&S <sup>®</sup> SMA-B80 required)	R&S <sup>®</sup> SMA-Z10	1405.4004.02
19" Rack Adapter	R&S <sup>®</sup> ZZA-211	1096.3260.00
Keyboard with USB Interface (US character set)	R&S <sup>®</sup> PSL-Z2	1157.6870.04
Mouse with USB Interface, optical	R&S <sup>®</sup> PSL-Z10	1157.7060.03
External USB DVD Drive	R&S <sup>®</sup> PSP-B6	1134.8201.22
Power Sensor 9 kHz to 6 GHz, 33 dBm	R&S <sup>®</sup> NRP-Z92	1171.7005.02

<sup>5</sup> The base unit must be ordered together with an R&S<sup>®</sup>SMA-B103/R&S<sup>®</sup>SMA-B106/R&S<sup>®</sup>SMA-B103L/R&S<sup>®</sup>SMA-B106L frequency option.

# License information

The firmware of this device contains open source software. Details as well as license agreements can be found in release notes and operating manual.

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.

Rohde & Schwarz equipment is designed for reliable operation up to an altitude of 3000 m above sea level, and for transport up to an altitude of 4500 m above sea level.

## 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 5213.6412.12  
and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)  
(search term: SMA100A)

## 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](http://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 (we/sv)  
PD 5213.6412.22 | Version 03.00 | May 2008 | R&S®SMA100A  
Data without tolerance limits is not binding | Subject to change

\*0.14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.