R&S®SMF100A
Microwave Signal Generator
Specifications

ROHDE&SCHWARZ

Test & Measurement

Data Sheet | 05.01

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. Data without tolerances: typical values only. Data designated “nominal” applies to design parameters and is not tested.

The equipment is designed for reliable operation and for transport up to an altitude of 4600 m above sea level.

RF characteristics

Frequency

Range	R&S®SMF-B122	1 GHz to 22 GHz
	with R&S®SMF-B2 frequency extension option 100 kHz to 1 GHz	100 kHz to 22 GHz
	R&S®SMF-B131	1 GHz to 31.8 GHz
	with R&S®SMF-B2 frequency extension option 100 kHz to 1 GHz	100 kHz to 31.8 GHz
	R&S®SMF-B144/-B144N	1 GHz to 43.5 GHz
	with R&S®SMF-B2 frequency extension option 100 kHz to 1 GHz	100 kHz to 43.5 GHz
Resolution of setting		0.001 Hz
Setting time	to within < 1×10^{-7} for f ≥ 375 MHz or < 150 Hz for f < 375 MHz after IEC/IEEE bus delimiter	< 4 ms, typ. 2 ms
Phase offset		adjustable in 0.1° steps

Frequency step sweep

Operating modes	digital sweep in discrete steps	automatic, step, single sweep, external single, external step, external start/stop, manual or external trigger, linear or logarithmic spacing
Sweep range		full frequency range
Step width	linear	full frequency range
	logarithmic	0.01 % to 100 % per step
Step time	range	2 ms to 10 s
	resolution	0.1 ms

Ramp sweep (R&S®SMF-K4 option)

Operating modes	analog frequency sweep	automatic, step, single sweep, external single, external step, external start/stop, manual or external trigger
Sweep span range		zero to full frequency range
Maximum sweep rate	100 kHz ≤ f < 375 MHz	175 MHz/ms
	375 MHz ≤ f < 750 MHz	87.5 MHz/ms
	750 MHz ≤ f < 1.5 GHz	175 MHz/ms
	1.5 GHz ≤ f < 3 GHz	350 MHz/ms
	3 GHz ≤ f < 11 GHz	700 MHz/ms
	11 GHz ≤ f < 21 GHz	1400 MHz/ms
	with R&S®SMF-B122 frequency option	
	21 GHz ≤ f ≤ 22 GHz	1400 MHz/ms
	with R&S®SMF-B131/-B144/-B144N frequency options	
	f ≥ 21 GHz	2800 MHz/ms
Frequency accuracy		(0.005 % of span)/(sweep time/s)
Sweep time	range	10 ms to 10 s
	resolution	0.1 ms
Frequency markers	number of frequency markers	10
MARKER output (BNC)		TTL signal, selectable polarity
X-AXIS output (BNC)	output can drive ≥ 1 kΩ	sawtooth signal 0 V to 10 V

Reference frequency

Aging	after 30 days of uninterrupted operation	< 1×10^{-8}/day, < 1×10^{-6}/year
	with R&S®SMF-B1/-B22 option	< 5×10^{-10}/day, < 3×10^{-8}/year
Temperature effect	in temperature range 0 °C to +55 °C	±1×10^{-6}
	with R&S®SMF-B1/-B22 option	±6×10^{-9}
Warm-up time	to nominal thermostat temperature	≤ 10 min
Output for internal reference signal	frequency (approx. sinewave)	10 MHz or external input frequency
	level	typ. 5 dBm
	source impedance	50 Ω
Input for external reference	frequency	1 MHz to 20 MHz (in steps of 1 MHz)
	maximum deviation	3×10^{-6}
	input level, limits	≥ −6 dBm, ≤ 19 dBm
	recommended	0 dBm to 19 dBm
	input impedance	50 Ω
Electronic tuning from input (EFC)	sensitivity	typ. 4×10^{-9}/V to 3×10^{-8}/V
	input voltage	−10 V to +10 V
	input impedance	typ. 10 kΩ

Level

Setting range	without attenuator (R&S®SMF-B26/-B27 options)	–20 dBm to +30 dBm
	with attenuator (R&S®SMF-B26/-B27 options)	–130 dBm to +30 dBm

The maximum specified level applies in the temperature range from +15 °C to +35 °C. Outside this temperature range the maximum specified level is typical from 0 °C to +15 °C and typically degrades by less than 2 dB from +35° C to +55 °C.

Maximum specified level with the R&S®SMF-B122 frequency option (PEP) [1]				
	without R&S®SMF-B32 high output power option		**with R&S®SMF-B32 high output power option**	
	without attenuator (R&S®SMF-B26 option)	with attenuator (R&S®SMF-B26 option)	without attenuator (R&S®SMF-B26 option)	with attenuator (R&S®SMF-B26 option)
1 GHz ≤ f < 11 GHz	+16 dBm	+14 dBm	+25 dBm	+23 dBm
11 GHz ≤ f < 21 GHz	+14 dBm	+12 dBm	+23 dBm	+21 dBm
21 GHz ≤ f ≤ 22 GHz	+12 dBm	+10 dBm	+22 dBm	+20 dBm

Maximum specified level with the R&S®SMF-B122 and R&S®SMF-B2 options (PEP) [1]				
	without R&S®SMF-B34 high output power option		**with R&S®SMF-B34 high output power option**	
	without attenuator (R&S®SMF-B26 option)	with attenuator (R&S®SMF-B26 option)	without attenuator (R&S®SMF-B26 option)	with attenuator (R&S®SMF-B26 option)
100 kHz ≤ f < 300 kHz [2]	typ. +13 dBm	typ. +13 dBm	typ. +13 dBm	typ. +13 dBm
300 kHz ≤ f < 1 GHz [3]	+16 dBm	+15 dBm	+16 dBm	+15 dBm
1 GHz ≤ f < 11 GHz	+16 dBm	+14 dBm	+24 dBm	+22 dBm
11 GHz ≤ f < 16 GHz	+14 dBm	+12 dBm	+23 dBm	+21 dBm
16 GHz ≤ f < 21 GHz	+12 dBm	+10 dBm	+21 dBm	+19 dBm
21 GHz ≤ f ≤ 22 GHz	typ. +12 dBm	typ. +10 dBm	+20 dBm	+18 dBm

Maximum specified level with the R&S®SMF-B131/-B144/-B144N frequency options (PEP) [4]				
	without R&S®SMF-B32 high output power option		**with R&S®SMF-B32 high output power option**	
	without attenuator (R&S®SMF-B27 option)	with attenuator (R&S®SMF-B27 option)	without attenuator (R&S®SMF-B27 option)	with attenuator (R&S®SMF-B27 option)
1 GHz ≤ f < 11 GHz	+14 dBm	+12 dBm	+25 dBm	+23 dBm
11 GHz ≤ f < 16 GHz	+11 dBm	+9 dBm	+22 dBm	+20 dBm
16 GHz ≤ f< 21 GHz	+10 dBm	+8 dBm	+19 dBm	+17 dBm
21 GHz ≤ f < 36 GHz	+11 dBm	+9 dBm	+16 dBm	+14 dBm
36 GHz ≤ f ≤ 40 GHz	+11 dBm	+9 dBm	+14 dBm	+12 dBm
40 GHz < f ≤ 43.5 GHz	typ. +8 dBm	typ. +6 dBm	typ. +12 dBm	typ. +9 dBm

[1] With the R&S®SMF-B81 rear connectors 22 GHz option, the maximum level is reduced by less than 0.1 dB/GHz.

[2] With active pulse modulation, the level decreases by 2.5 dB.

[3] With active pulse modulation, the level decreases by 5 dB.

[4] With the R&S®SMF-B82 rear connectors 43.5 GHz option, the maximum level is reduced by less than 0.1 dB/GHz.

Maximum specified level with the R&S®SMF-SMF-B131/-B144/-B144N and R&S®SMF-B2 options (PEP) [5]				
	without R&S®SMF-B34 high output power option		**with R&S®SMF-B34 high output power option**	
	without attenuator (R&S®SMF-B27 option)	with attenuator (R&S®SMF-B27 option)	without attenuator (R&S®SMF-B27 option)	with attenuator (R&S®SMF-B27 option)
100 kHz ≤ f < 300 kHz [6]	typ. +13 dBm	typ. +13 dBm	typ. +13 dBm	typ. +13 dBm
300 kHz ≤ f < 1 GHz [7]	+16 dBm	+15 dBm	+16 dBm	+15 dBm
1 GHz ≤ f < 11 GHz	+14 dBm	+12 dBm	+23 dBm	+21 dBm
11 GHz ≤ f < 16 GHz	+11 dBm	+9 dBm	+19 dBm	+17 dBm
16 GHz ≤ f < 21 GHz	+10 dBm	+8 dBm	+17 dBm	+15 dBm
21 GHz ≤ f < 36 GHz	+11 dBm	+9 dBm	+15 dBm	+13 dBm
36 GHz ≤ f ≤ 40 GHz	+11 dBm	+9 dBm	+14 dBm	+12 dBm
40 GHz < f ≤ 43.5 GHz	typ. +8 dBm	typ. +6 dBm	typ. +11 dBm	typ. +9 dBm

Minimum specified level (PEP)	without attenuator (R&S®SMF-B26/-B27 options)	–20 dBm
	with attenuator (R&S®SMF-B26/-B27 options)	–130 dBm
Resolution		0.01 dB
Level uncertainty	in CW mode, ALC state on, attenuator mode auto (with R&S®SMF-B26/-B27 options), temperature range +15 °C to +35 °C, degradation outside this range typ. < 0.3 dB	
	100 kHz ≤ f < 50 MHz	
	> +10 dBm	< 0.6 dB
	+10 dBm to > –10 dBm	< 0.6 dB
	–10 dBm to > –70 dBm	< 0.9 dB
	–70 dBm to > –90 dBm	< 1.0 dB
	–90 dBm to –100 dBm	< 1.6 dB
	50 MHz ≤ f < 2 GHz	
	> +10 dBm	< 0.6 dB
	+10 dBm to > –10 dBm	< 0.6 dB
	–10 dBm to > –70 dBm	< 0.7 dB
	–70 dBm to > –90 dBm	< 0.8 dB
	–90 dBm to –100 dBm	< 1.4 dB
	2 GHz ≤ f < 22 GHz	
	> +10 dBm	< 0.8 dB
	+10 dBm to > –10 dBm	< 0.8 dB
	–10 dBm to > –70 dBm	< 0.9 dB
	–70 dBm to > –90 dBm	< 1.0 dB
	–90 dBm to –100 dBm	< 1.7 dB
	22 GHz ≤ f ≤ 40 GHz	
	> +10 dBm	< 1.0 dB
	+10 dBm to > –10 dBm	< 1.2 dB
	–10 dBm to > –70 dBm	< 1.2 dB
	–70 dBm to > –90 dBm	< 2.0 dB
	–90 dBm to –100 dBm	< 3.2 dB
	40 GHz < f ≤ 43.5 GHz	
	+10 dBm to > –10 dBm	< 1.0 dB
	–10 dBm to > –70 dBm	< 1.5 dB
	–70 dBm to > –90 dBm	< 2.5 dB
	–90 dBm to –100 dBm	< 4.2 dB
Output impedance VSWR in 50 Ω system	ALC state ON	
	100 kHz ≤ f ≤ 2 GHz	typ. < 1.4
	2 GHz < f ≤ 22 GHz	typ. < 1.6
	22 GHz < f ≤ 43.5 GHz	typ. < 1.8
Setting time	without attenuator (R&S®SMF-B26/-B27 options) after IEC/IEEE bus delimiter	< 3 ms
	with attenuator (R&S®SMF-B26/-B27 options) attenuator mode auto	< 25 ms

Back-feed (from ≥ 50 Ω source)	1 GHz ≤ f ≤ 43.5 GHz	
	maximum permissible RF power	0.5 W
	maximum permissible DC voltage	0 V

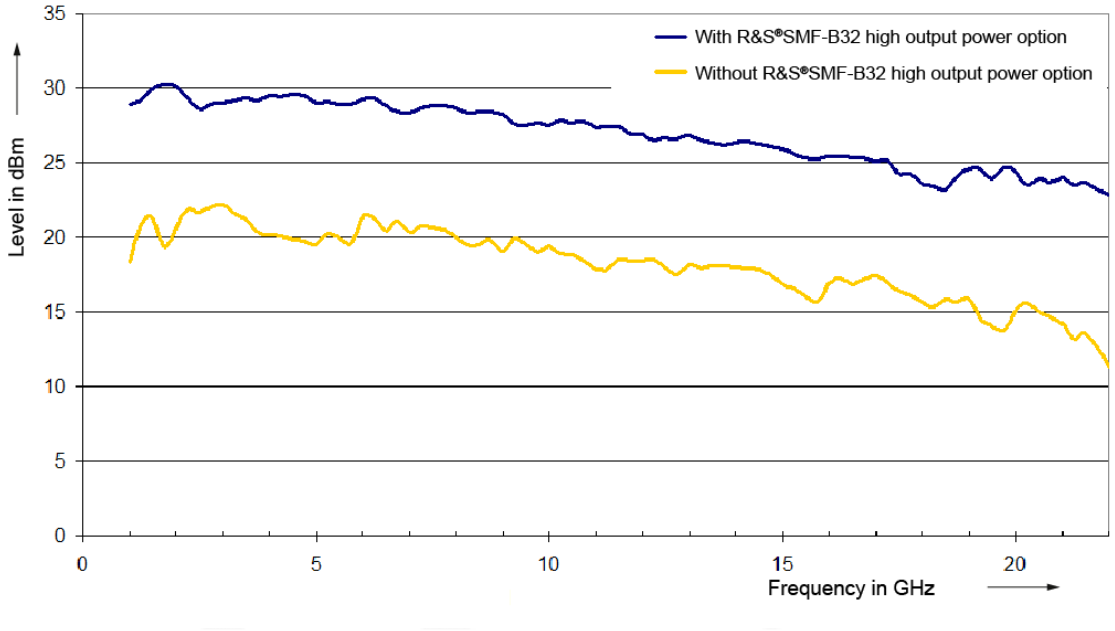
[5] With the R&S®SMF-B82 rear connectors 43.5 GHz option, the maximum level is reduced by less than 0.1 dB/GHz.

[6] With active pulse modulation, the level decreases by 2.5 dB.

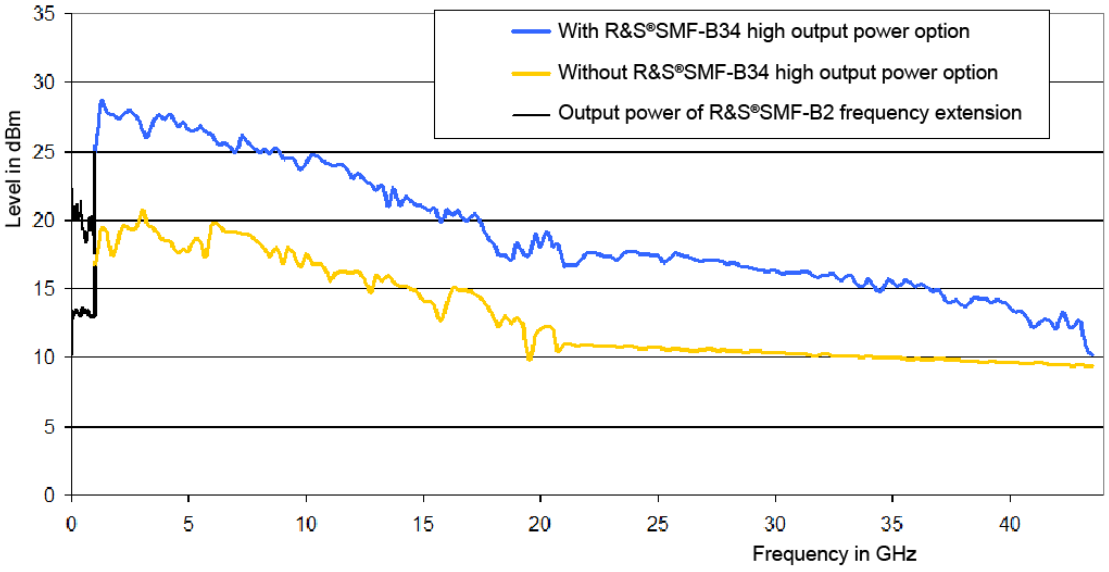
[7] With active pulse modulation, the level decreases by 5 dB.

Level sweep

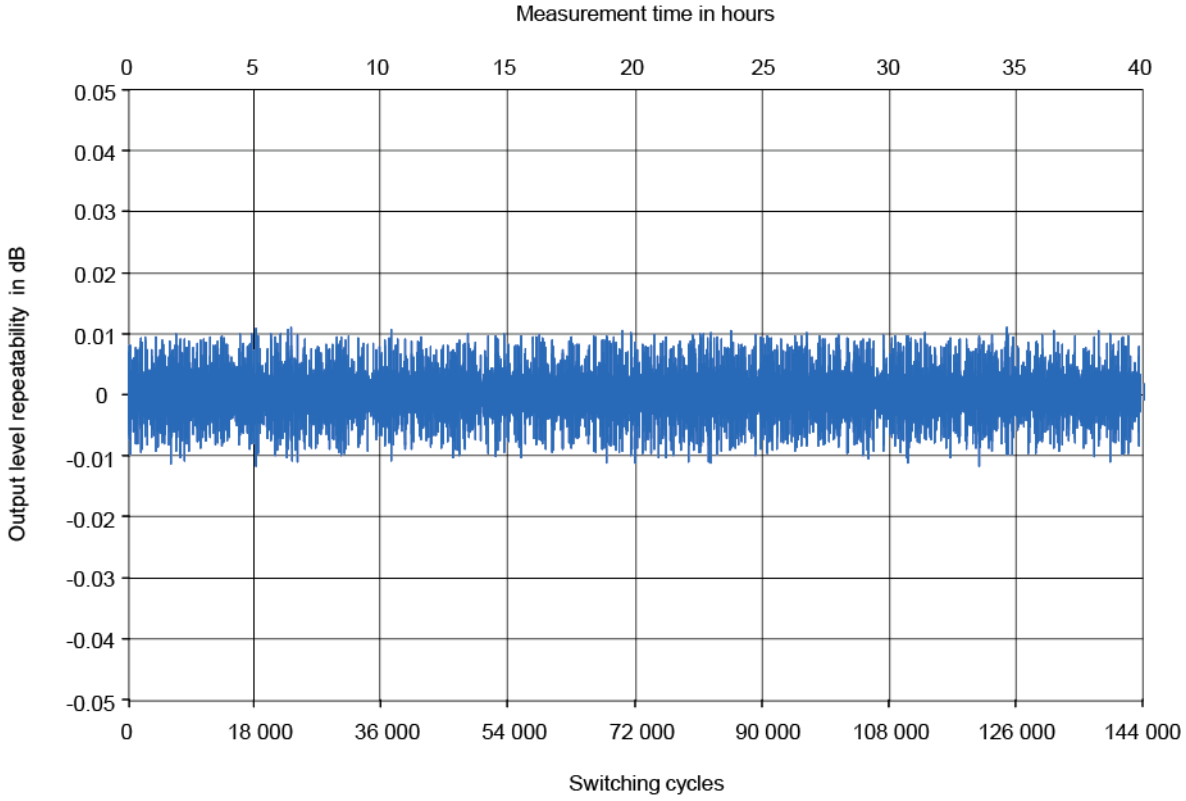
Digital sweep in discrete steps	operating modes	automatic, step, single sweep, external single, external step, external start/stop, manual or external trigger, linear spacing
	sweep range	full level range
	step width	0.01 dB to full level range in dB per step



Maximum output power with and without the R&S®SMF-B32 high output power option in the frequency range from 1 GHz to 22 GHz (R&S®SMF-B122, in both cases with the R&S®SMF-B26 step attenuator option).



Maximum output power with and without the R&S®SMF-B34 high output power option in the frequency range from 100 kHz to 43.5 GHz (R&S®SMF-B144 and SMF-B2, with the R&S®SMF-B27 step attenuator option); the lower curve in the frequency range 100 kHz to 1 GHz is with activated pulse modulator of the R&S®SMF-B2 frequency extension.



Level repeatability over time (with random frequency and level changes between measurments)

Spectral purity

Harmonics [8] with R&S®SMF-B122 frequency option, level +10 dBm (with R&S®SMF-B2 level +6 dBm for f ≥ 1 GHz)		
	without R&S®SMF-B32/-B34 high output power options	**with R&S®SMF-B32/-B34 high output power options**
100 kHz ≤ f < 300 kHz	typ. < –25 dBc	typ. < –25 dBc
300 kHz ≤ f < 10 MHz	< –30 dBc	< –30 dBc
10 MHz ≤ f < 200 MHz	< –40 dBc, typ. < –45 dBc	< –40 dBc, typ. < –45 dBc
200 MHz ≤ f < 1 GHz	< –50 dBc, typ. < –55 dBc	< –50 dBc, typ. < –55 dBc
1 GHz ≤ f ≤ 22 GHz	< –50 dBc, typ. < –55 dBc	< –30 dBc

Harmonics [8] with R&S®SMF-B131/-B144/-B144N frequency options level +10 dBm (with R&S®SMF-B2 level +6 dBm for f ≥ 1 GHz) or maximum specified level, whichever is lower		
	without R&S®SMF-B32/-B34 high output power option	**with R&S®SMF-B32/-B34 high output power option**
100 kHz ≤ f < 300 kHz	typ. < –25 dBc	typ. < –25 dBc
300 kHz ≤ f < 10 MHz	< –30 dBc	< –30 dBc
10 MHz ≤ f < 200 MHz	< –40 dBc, typ. < –45 dBc	< –40 dBc, typ. < –45 dBc
200 MHz ≤ f < 1 GHz	< –50 dBc, typ. < –55 dBc	< –50 dBc, typ. < –55 dBc
1 GHz ≤ f < 21 GHz	< –50 dBc, typ. < –55 dBc	< –30 dBc
21 GHz ≤ f ≤ 43.5 GHz	< –40 dBc	< –40 dBc

Nonharmonics [9]	CW, level +10 dBm or maximum specified level, whichever is lower, carrier offset > 3 kHz	
	100 kHz ≤ f < 300 kHz	typ. < –67 dBc
	300 kHz ≤ f < 40 MHz	< –67 dBc
	40 MHz ≤ f < 375 MHz	< –55 dBc
	375 MHz ≤ f < 1 GHz	< –75 dBc
	1 GHz ≤ f < 3 GHz	< –68 dBc
	3 GHz ≤ f < 11 GHz	< –62 dBc
	11 GHz ≤ f < 21 GHz	< –56 dBc
	with R&S®SMF-B122 frequency option	
	21 GHz ≤ f ≤ 22 GHz	< –56 dBc
	with R&S®SMF-B131/-B144/-B144N frequency options	
	21 GHz ≤ f ≤ 43.5 GHz	< –50 dBc
Power-supply-related nonharmonics	f = 10 GHz	
	50 Hz to 3 kHz from carrier	< –50 dBc (typ. –70 dBc)

Subharmonics [10] with R&S®SMF-B122 frequency option, level +10 dBm		
	without R&S®SMF-B32/-B34 high output power option	**with R&S®SMF-B32/-B34 high output power option**
f < 11 GHz	none	none
11 GHz ≤ f ≤ 22 GHz	< –55 dBc	< –50 dBc

Subharmonics [10] with R&S®SMF-B131/-B144/-B144N frequency options, level +10 dBm or maximum specified level, whichever is lower		
	without R&S®SMF-B32/-B34 high output power options	**with R&S®SMF-B32/-B34 high output power options**
f < 11 GHz	none	none
11 GHz ≤ f < 36 GHz	< –50 dBc	< –50 dBc
36 GHz ≤ f ≤ 43.5GHz	< –30 dBc	< –30 dBc

Wideband noise with R&S®SMF-B122 frequency option, level +10 dBm, carrier offset > 10 MHz, measurement bandwidth 1 Hz, CW		
	without R&S®SMF-B32/-B34 high output power options	**with R&S®SMF-B32/-B34 high output power options**
3 GHz ≤ f < 11 GHz	typ. < –148 dBc	typ. < –140 dBc
11 GHz ≤ f ≤ 22 GHz	typ. < –145 dBc	typ. < –140 dBc

[8] Specifications are typical for harmonics beyond specified frequency range.

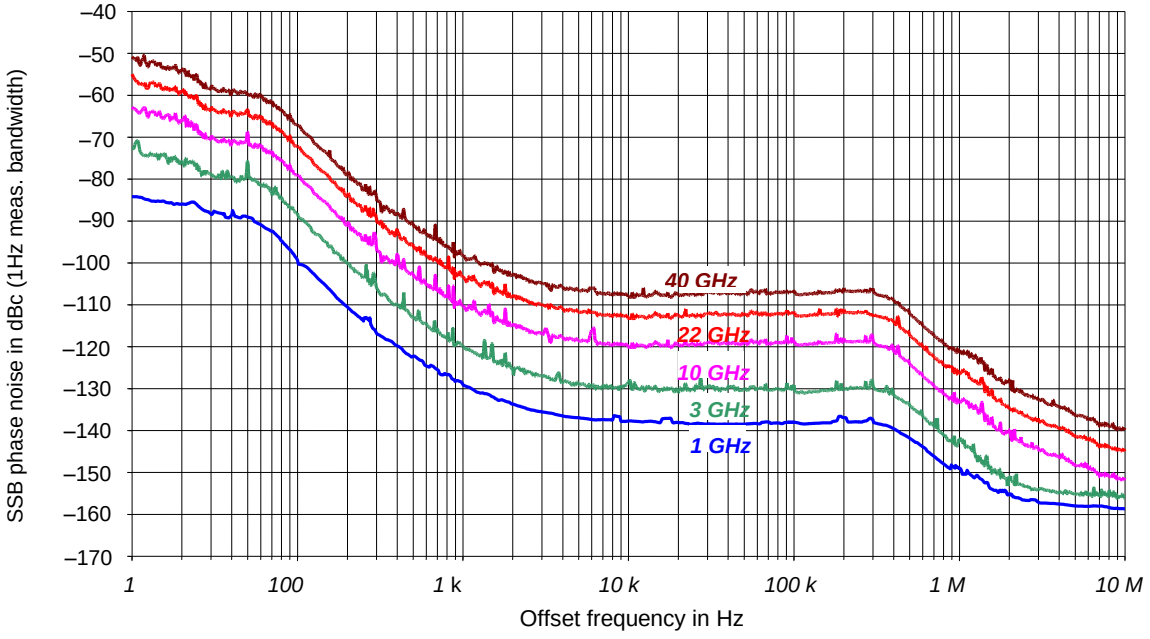
[9] Specifications are typical for nonharmonics beyond specified frequency range.

[10] Specifications are typical for subharmonics beyond specified frequency range.

Wideband noise with R&S®SMF-B131/-B144/-B144N frequency options, level +10 dBm or at maximum specified level, whichever is lower, carrier offset > 10 MHz, measurement bandwidth 1 Hz, CW		
	without R&S®SMF-B32/-B34 high output power options	**with R&S®SMF-B32/-B34 high output power options**
3 GHz ≤ f < 11 GHz	typ. < –148 dBc	typ. < –140 dBc
11 GHz ≤ f < 21 GHz	typ. < –145 dBc	typ. < –140 dBc
21 GHz ≤ f ≤ 43.5 GHz	typ. < –138 dBc	typ. < –138 dBc

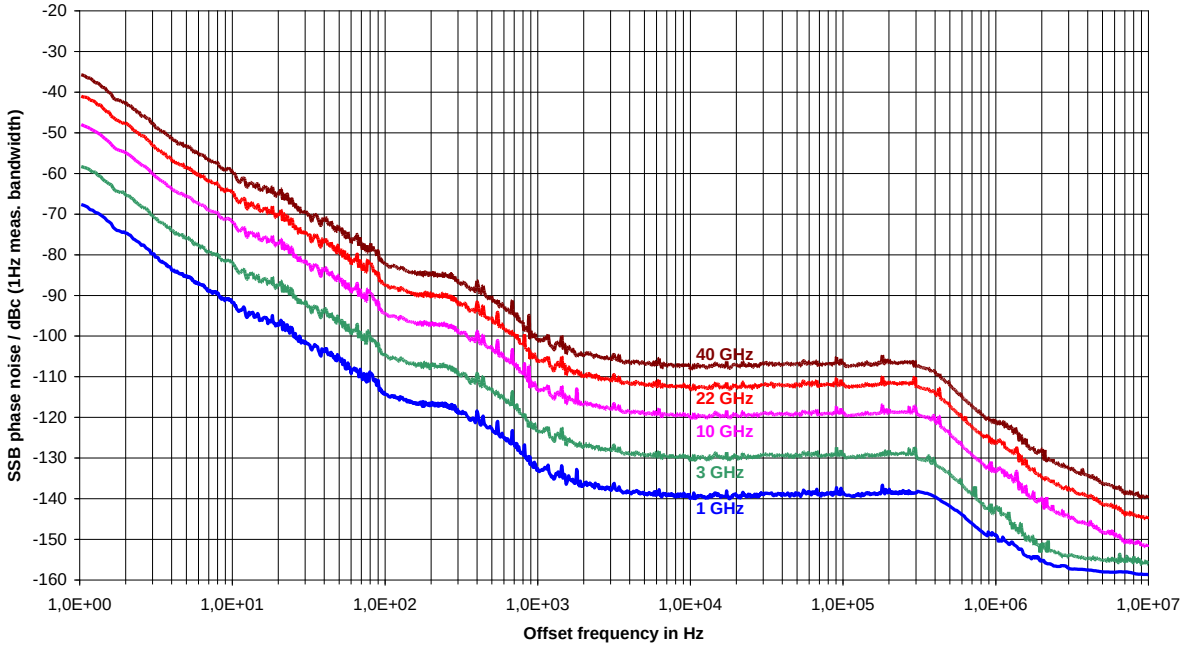
SSB phase noise	carrier offset 100 Hz, measurement bandwidth 1 Hz, CW	
	f = 250 MHz	< –90 dBc
	f = 1 GHz	< –95 dBc
	f = 2 GHz	< –89 dBc
	f = 4 GHz	< –83 dBc
	f = 10 GHz	< –75 dBc
	f = 20 GHz	< –69 dBc
	f = 30 GHz	< –65 dBc
	f = 40 GHz	< –63 dBc
	carrier offset 20 kHz, measurement bandwidth 1 Hz, CW	
	f = 250 MHz	< –126 dBc
	f = 1 GHz	< –132 dBc
	f = 2 GHz	< –128 dBc
	f = 4 GHz	< –122 dBc
	f = 10 GHz	< –115 dBc
	f = 20 GHz	< –109 dBc
	f = 30 GHz	< –105 dBc
	f = 40 GHz	< –103 dBc

Carrier frequency	SSB phase noise with R&S®SMF-B1 option, measurement bandwidth 1 Hz, CW				
	frequency offset from carrier				
	10 Hz	**100 Hz**	**1 kHz**	**10 kHz**	**100 kHz**
250 MHz	< –72 dBc	< –90 dBc	< –115 dBc	< –126 dBc	< –128 dBc
1 GHz	< –77 dBc	< –95 dBc	< –120 dBc	< –132 dBc	< –133 dBc
2 GHz	< –71 dBc	< –89 dBc	< –114 dBc	< –128 dBc	< –127 dBc
4 GHz	< –65 dBc	< –83 dBc	< –108 dBc	< –122 dBc	< –121 dBc
10 GHz	< –57 dBc	< –75 dBc	< –100 dBc	< –115 dBc	< –113 dBc
20 GHz	< –51 dBc	< –69 dBc	< –94 dBc	< –109 dBc	< –107 dBc
30 GHz	< –47 dBc	< –65 dBc	< –90 dBc	< –105 dBc	< –103 dBc
40 GHz	< –45 dBc	< –63 dBc	< –88 dBc	< –103 dBc	< –101 dBc



Single sideband phase noise for various frequencies (each with the R&S®SMF-B1 OCXO reference oscillator option).

Carrier frequency	SSB phase noise with R&S®SMF-B22 option, measurement bandwidth 1 Hz, CW					
	frequency offset from carrier					
	1 Hz	**10 Hz**	**100 Hz**	**1 kHz**	**10 kHz**	**100 kHz**
250 MHz	< –52 dBc	< –80 dBc	< –97 dBc	< –116 dBc	< –126 dBc	< –128 dBc
1 GHz	< –57 dBc	< –85 dBc	< –101 dBc	< –121 dBc	< –132 dBc	< –133 dBc
2 GHz	< –51 dBc	< –79 dBc	< –96 dBc	< –115 dBc	< –128 dBc	< –127 dBc
4 GHz	< –45 dBc	< –73 dBc	< –89 dBc	< –109 dBc	< –122 dBc	< –121 dBc
10 GHz	< –37 dBc	< –65 dBc	< –81 dBc	< –101 dBc	< –115 dBc	< –113 dBc
20 GHz	< –31 dBc	< –59 dBc	< –75 dBc	< –95 dBc	< –109 dBc	< –107 dBc
30 GHz	< –27 dBc	< –55 dBc	< –71 dBc	< –91 dBc	< –105 dBc	< –103 dBc
40 GHz	< –25 dBc	< –53 dBc	< –69 dBc	< –89 dBc	< –103 dBc	< –101 dBc



Single sideband phase noise for various frequencies with R&S®SMF-B22 enhanced phase noise performance 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, step, single sweep, external single, external step, manual or external trigger
Max. number of stored settings		2000
Dwell time		0.7 ms to 10 s
	resolution	0.1 ms
Setting time	after external trigger	
	to within < 1×10^{-6} for f ≥ 375 MHz or < 150 Hz for f < 375 MHz	typ. < 0.75 ms
	to within < 1×10^{-6} for f = 3.001 GHz to f = 10.999 GHz	< 1.1 ms

Analog modulation

Possible modulation types

Amplitude modulation (AM), amplitude shift keying (ASK), logarithmic AM (LOG AM),
frequency modulation (FM), frequency shift keying (FSK), phase modulation (φM), phase shift keying (PSK),
pulse modulation

Simultaneous modulation

	FM	φM	AM	LOG AM	Pulse mod.	FSK	PSK	ASK
FM	●	–	●	●	●	–	–	●
φM	–	●	●	●	●	–	–	●
AM	●	●	●	–	○	●	●	–
LOG AM	●	●	–	●	○	●	●	–
Pulse mod.	●	●	○	○		●	●	*
FSK	–	–	●	●	●		–	●
PSK	–	–	●	●	●	–		●
ASK	●	●	–	–	○	●	●	

● = possible with no restrictions ○ = possible with restrictions – = not feasible

Amplitude modulation (R&S®SMF-B20 option)

Attenuator mode auto

Operating modes		EXT1-AC/EXT1-DC
		EXT2-AC/EXT2-DC
		LF1/LF2/noise
Modulation depth	At high levels, modulation is clipped when the maximum PEP is reached.	0 % to 100 %
Resolution		0.1 %
Setting uncertainty	f_{mod} = 1 kHz, m < 80 %	< (5 % of reading + 1 %)
AM distortion [11]	f_{mod} = 1 kHz, m = 60 %	
	100 kHz ≤ f < 1 MHz	typ. < 5 %
	1 MHz ≤ f < 10 MHz	< 2.5 %
	10 MHz ≤ f < 1 GHz	< 1 %
	1 GHz ≤ f ≤ 43.5 GHz	< 1.5 %
Modulation frequency response [11]	10 MHz ≤ f ≤ 43.5 GHz, m = 60 %	
	DC/10 Hz to 20 kHz	< 1 dB
	DC/10 Hz to 100 kHz	< 3 dB

[11] For level up to maximum specified level.

Logarithmic amplitude modulation (R&S®SMF-B20 option)

Attenuator mode AUTO

Operating modes		EXT1-AC/EXT1-DC
		EXT2-AC/EXT2-DC
		LF1/LF2/noise
Dynamic range		30 dB
Sensitivity		–10 dB/V to +10 dB/V
Resolution		0.01 dB/V
Rise/fall time (10 %/90 %) [11]	10 MHz ≤ f ≤ 43.5 GHz	< 10 µs

Frequency modulation (R&S®SMF-B20 option)

Operating modes		EXT1-AC/EXT1-DC
		EXT2-AC/EXT2-DC
		LF1/LF2/noise
FM multiplier for different frequency ranges	100 kHz ≤ f < 375 MHz	n = ½
	375 MHz ≤ f < 750 MHz	n = ⅛
	750 MHz ≤ f < 1.5 GHz	n = ¼
	1.5 GHz ≤ f < 3 GHz	n = ½
	3 GHz ≤ f < 11 GHz	n = 1
	11 GHz ≤ f < 21 GHz	n = 2
	with R&S®SMF-B122 frequency option	
	21 GHz ≤ f ≤ 22 GHz	n = 2
	with R&S®SMF-B131/-B144/-B144N frequency options	
	f ≥ 21 GHz	n = 4
Maximum deviation		n × 10 MHz
Resolution		< 1 %, min. 10 Hz
Setting uncertainty	10 MHz ≤ f ≤ 43.5 GHz	
	f_{mod} = 1 kHz, deviation = 100 kHz	< (3 % of reading + 20 Hz)
	f_{mod} = 1 MHz, deviation = 100 kHz	< (10 % of reading + 20 Hz)
FM distortion	10 MHz ≤ f ≤ 43.5 GHz	
	f_{mod} ≤ 50 kHz, deviation = 500 kHz	< 0.5 %
Modulation frequency response	deviation = 100 kHz, DC/10 Hz to 10 MHz	
	10 MHz ≤ f < 1 GHz, DC/10 Hz to 3 MHz	< 3 dB
	1 GHz ≤ f ≤ 43.5 GHz, DC/10 Hz to 10 MHz	< 3 dB
Carrier frequency offset		< 0.2 % of set deviation

Phase modulation (R&S®SMF-B20 option)

Operating modes		EXT1-AC/EXT1-DC
		EXT2-AC/EXT2-DC
		LF1/LF2/noise
φM multiplier for different frequency ranges	100 kHz ≤ f < 375 MHz	n = ½
	375 MHz ≤ f < 750 MHz	n = ⅛
	750 MHz ≤ f < 1.5 GHz	n = ¼
	1.5 GHz ≤ f < 3 GHz	n = ½
	3 GHz ≤ f < 11 GHz	n = 1
	11 GHz ≤ f < 21 GHz	n = 2
	with R&S®SMF-B122 frequency option	
	21 GHz ≤ f ≤ 22 GHz	n = 2
	with R&S®SMF-B131/-B144/-B144N frequency options	
	f ≥ 21 GHz	n = 4
Maximum deviation		n × 160 rad
Resolution		< 1 %
Setting uncertainty	10 MHz ≤ f ≤ 43.5 GHz	
	f_{mod} = 1 kHz, deviation = 80 rad	< 5 %
	f_{mod} = 10 kHz, deviation = 80 rad	< 10 %
Distortion	10 MHz ≤ f ≤ 43.5 GHz	
	f_{mod} ≤ 50 kHz, deviation = 80 rad	< 0.5 %
Modulation frequency response	10 MHz ≤ f ≤ 43.5 GHz	
	DC/10 Hz to 1 MHz	< 3 dB

ASK modulation (R&S®SMF-B20 option)

Attenuator mode auto

Operating modes		EXT1
		EXT2
		pulse generator
		random (noise generator)
Modulation depth	At high levels, modulation is clipped when the maximum PEP is reached	0 % to 100 %
Resolution		0.1 %
Data rate		0 bit to 200 kbit/s
Rise/fall time (10 %/90 %) [12]	10 MHz ≤ f ≤ 43.5 GHz	< 10 µs

FSK modulation (R&S®SMF-B20 option)

Operating modes		EXT1
		EXT2
		pulse generator
		random (noise generator)
FSK multiplier for different frequency ranges	100 kHz ≤ f < 375 MHz	n = ½
	375 MHz ≤ f < 750 MHz	n = ⅛
	750 MHz ≤ f < 1.5 GHz	n = ¼
	1.5 GHz ≤ f < 3 GHz	n = ½
	3 GHz ≤ f < 11 GHz	n = 1
	11 GHz ≤ f < 21 GHz	n = 2
	with R&S®SMF-B122 frequency option	
	21 GHz ≤ f ≤ 22 GHz	n = 2
	with R&S®SMF-B131/-B144/-B144N frequency options	
	f ≥ 21 GHz	n = 4
Maximum deviation		n × 10 MHz
Resolution		< 1 %, min. 10 Hz
Data rate	10 MHz ≤ f ≤ 43.5 GHz	0 bit/s to 2 Mbit/s

PSK modulation (R&S®SMF-B20 option)

Operating modes		EXT1
		EXT2
		pulse generator
		random (noise generator)
PSK multiplier for different frequency ranges	100 kHz ≤ f < 375 MHz	n = ½
	375 MHz ≤ f < 750 MHz	n = ⅛
	750 MHz ≤ f < 1.5 GHz	n = ¼
	1.5 GHz ≤ f < 3 GHz	n = ½
	3 GHz ≤ f < 11 GHz	n = 1
	11 GHz ≤ f < 21 GHz	n = 2
	with R&S®SMF-B122 frequency option	
	21 GHz ≤ f ≤ 22 GHz	n = 2
	with R&S®SMF-B131/-B144/-B144N frequency options	
	f ≥ 21 GHz	n = 4
Maximum deviation		n × 160 rad
Resolution		< 1 %
Data rate	10 MHz ≤ f ≤ 43.5 GHz	0 bit/s to 500 kbit/s

[12] For level up to maximum specified level.

Narrow pulse modulation (R&S®SMF-K3 option)

Operating modes		external, internal with R&S®SMF-K23 option
On/off ratio		> 80 dB
Rise/fall time	10 %/90 % of RF amplitude	
	10 MHz ≤ f < 1 GHz	< 20 ns
	1 GHz ≤ f ≤ 43.5 GHz	< 10 ns
Pulse repetition frequency		0 Hz to 10 MHz
Minimum pulse width	with ALC state on	
	10 MHz ≤ f < 1 GHz	50 ns
	f ≥ 1 GHz	500 ns [13]
	with ALC state off with R&S®SMF-B122, R&S®SMF-B131, R&S®SMF-B144 options	
	10 MHz ≤ f < 1 GHz	50 ns
	f ≥ 1 GHz	20 ns
	with ALC state off with R&S®SMF-B144N option	
	10 MHz ≤ f < 1 GHz	50 ns
	1 GHz ≤ f ≤ 21 GHz	20 ns
	f > 21 GHz	30 ns
Pulse overshoot		typ. < 10 %
RF delay	video output pulse to RF pulse	typ. 35 ns
Video crosstalk	10 MHz ≤ f < 1 GHz	< 150 mV (peak-to-peak)
	1 GHz ≤ f < 3 GHz	
	without R&S®SMF-B32/-B34 options	< 75 mV (peak-to-peak)
	with R&S®SMF-B32/-B34 options	< 150 mV (peak-to-peak)
	3 GHz ≤ f ≤ 43.5 GHz	
	without R&S®SMF-B32/-B34 options	< 5 mV (peak-to-peak)
	with R&S®SMF-B32/-B34 options	< 10 mV (peak-to-peak)

Chirped pulses (R&S®SMF-B20 option, in combination with the R&S®SMF-K3 and R&S®SMF-K23 options)

Chirp bandwidth multiplier for different frequency ranges	100 kHz ≤ f < 375 MHz	n = ½
	375 MHz ≤ f < 750 MHz	n = ⅛
	750 MHz ≤ f < 1.5 GHz	n = ¼
	1.5 GHz ≤ f < 3 GHz	n = ½
	3 GHz ≤ f < 11 GHz	n = 1
	11 GHz ≤ f < 21 GHz	n = 2
	with R&S®SMF-B122 frequency option	
	21 GHz ≤ f ≤ 22 GHz	n = 2
	with R&S®SMF-B131/-B144/-B144N frequency options	
	f ≥ 21 GHz	n = 4
Operating modes		auto, external trigger, external gate
Chirp direction		up, down
Maximum bandwidth		n × 20 MHz
Pulse period		≥ 200 ns
Pulse width		≥ 100 ns
Maximum chirp rate		n × 10 MHz/µs, nominal

[13] With attenuator (R&S®SMF-B26/-B27 option), Attenuator mode auto. Without attenuator (R&S®SMF-B26/-B27 option), level ≥ 0 dBm.

Inputs for external modulation signals

Modulation inputs EXT1 and EXT2 for FM, φM, AM, LOG AM, FSK, PSK and ASK	input voltage for FM, φM and AM (peak value for selected modulation depth or deviation)	1 V
	input voltage range for LOG AM	–6 V to + 6 V
	input level for FSK, PSK and ASK	TTL-compatible signal
	input impedance	50 Ω, 600 Ω or 100 kΩ
	polarity for FSK, PSK and ASK	selectable
	modulation input bandwidth for FM, φM, AM and LOG AM	200 kHz or 10 MHz
Modulation input PULSE IN	input level	threshold TTL, 0.5 V or –2.5 V
	input impedance	50 Ω or 10 kΩ
	polarity	selectable

Modulation sources

Internal modulation generators (LF generator 1, LF generator 2, noise generator) (R&S®SMF-B20 option)

Waveforms	LF generator 1, LF generator 2	sine, pulse, triangle, user-programmable trapezoid ΔT = 20 ns
	noise generator	noise amplitude distribution: Gaussian, equal
Sine	frequency range	0.1 Hz to 10 MHz
	frequency uncertainty	< 0.003 Hz + relative deviation of reference frequency
	resolution of setting	0.1 Hz
	setting time to within < 1×10^{-7}, after IEC/IEEE bus delimiter	< 3 ms
	distortion at f < 100 kHz, R_L > 50 Ω, level (V_p) 0.5 V	< 0.5 %
Pulse	period	1 µs to 100 s
	width	1 µs to 100 s
	resolution of setting	20 µs
Triangle	period	1 µs to 100 s
	rise time	1 µs to 100 s
	resolution of setting	20 ns
Trapezoid	period	1 µs to 100 s
	rise time	1 µs to 100 s
	high time	1 µs to 100 s
	fall time	1 µs to 100 s
	resolution of setting	20 ns
Noise generator	noise amplitude distribution	Gaussian, equal
	noise bandwidth	100 kHz to 10 MHz
Frequency response	f ≤ 500 kHz	< 0.5 dB
	f ≤ 10 MHz	< 3 dB
Output voltage	V_p at LF connector, open circuit voltage	1 mV to 6 V
	EMF resolution	1 mV
	EMF setting accuracy at 1 kHz, level (V_p) 1 V	< 11 mV
Output impedance		50 Ω
Sweep	digital sweep in discrete steps	
	operating modes	automatic, step, single sweep, external single, external step, external start/stop, 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 % per step

Pulse generator (R&S®SMF-K23 option)

Operating modes		automatic, 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
Uncertainty		relative deviation of reference frequency
Pulse width	Pulse width of double pulses can be set independently.	5 ns to 100 s
Resolution		5 ns
Uncertainty	Pulse width of double pulses can be set independently.	relative deviation of reference frequency
Pulse delay		10 ns to 100 s
Resolution		5 ns
Uncertainty		relative deviation of reference frequency
Double-pulse delay		10 ns to 100 s
Resolution		5 ns
Uncertainty		relative deviation of reference frequency
External trigger		
Delay	external input pulse to SYNC output pulse	typ. 55 ns
Jitter		< 5 ns
Generator output pulse out		LVC signal (R_L ≥ 50 Ω)

Pulse train (R&S®SMF-K27 option)

Option R&S®SMF-K27 extends the functionality of the high performance pulse generator (R&S®SMF-K23 option). With this option pulses and sequences of pulses can be defined freely, in order to generate jittered or staggered pulse scenarios widely used in radar applications.

Parameter	Description/condition	Value
Pulse mode	freely settable pulse width, pulse spacing and pulse sequences	train
Trigger mode	continuous trigger with internal trigger source	auto
		external triggered
Number of bursts		1 to 2047
Number of identical pulses per burst		1 to 65535
Pulse on time range		0 s to 5 ms
Pulse off time range		5 ns to 5 ms
Pulse on and off time resolution		5 ns

R&S®NRP-Zxx power analysis (option R&S®SMF-K28)

Parameter	Description/condition	Value
Modes	sweep power versus frequency	frequency
	sweep power versus power	power
	sweep power versus time (trace function)	time
General settings		
Number of points per sweep (steps)		10 to 1000
Frequency range		depending on R&S®NRP-Z power sensor and R&S®SMF100A frequency option support of frequency converting DUTs
Y-axis setting range		–100 dBm to +100 dBm
Uncertainty of measured power		determined by used power sensor
Sweep mode		single
		continuous
Display modes	block diagram still visible, markers not visible	small
	maximum size with markers	full screen marker
	maximum size, markers not visible	full screen
Number of traces	used for sensor data or as reference trace	3
Number of markers		4
Trace data export	supported file formats	JPG, BMP, XPM, PNG, CSV
Resolution of saved graphic		320×240, 640×480, 800×600 or 1024×768
Mode frequency (sweep power versus frequency)		
Spacing		linear, logarithmic
Timing mode	aperture time and averaging depends on power sensor and timing mode see table below for details	fast, normal
Sweep time	set automatically	depends on timing mode, steps and power sensor
	e.g. R&S®NRP-Z21 timing mode fast, 200 steps	approx. 2.5 s
Mode power (sweep power versus power)		
Spacing	dB steps	linear
Timing mode	Aperture time and averaging depends on power sensor and timing mode see table below for details.	fast, normal
Sweep time	set automatically	depends on timing mode, steps and power sensor
	e.g. R&S®NRP-Z21 timing mode fast, 200 steps	approx. 2.5 s
Mode time (sweep power versus time)		
Spacing		linear
Sweep time	R&S®NRP-Z11, -Z21, -Z22, -Z23, -Z24, -Z28, -Z31	
	setting range	100 µs to 300 ms
	resolution	10 µs
	R&S®NRP-Z81, -Z85	
	setting range	100 ns to 1 s
	resolution (sweep time/steps) ≥ 12.5 ns	12.5 ns
	resolution (sweep time/steps) < 12.5 ns periodic signals trigger mode internal triggered	2 ns
Trace offset		positive, negative
Average		1 to 1024
Trigger modes	internal triggered	auto
	external triggered, R&S®NRP-Z3 required	external
Trigger level setting range		full level range
Trigger hysteresis setting range		0 dB to 10 dB
Trigger drop out time setting range		0 s to 10 s

Available measurements in time mode		
Gate mode		on/off
Number of gates	freely settable	2
Power measurements		peak power, average power
Pulse data measurement	only with R&S®NRP-Z81, -Z85	on/off
Timing measurements		duty cycle, pulse width, pulse period, pulse off time, rise time, pulse start time, overshoot, fall time, pulse stop time
Power measurements		peak power, average power, minimal power, top power, base power, distal power, mesial power, proximal power
Setting range for distal, mesial and proximal threshold	voltage or power related	0 % to 100 %

Overview of power sensor functionalities

Latest power sensor firmware version is recommended.

Power sensor	Power versus frequency and Power versus power	Aperture time/average factor for timing modes fast and normal	Power versus time	Pulse data measurement
R&S®NRP-Z11, -Z21, -Z22, -Z23, -Z24, -Z31	•	Fast: 2 ms/1 Normal: 20 ms/1	•	–
R&S®NRP-Z28	•	Fast: 2 ms/1 Normal: 20 ms/1	•	–
R&S®NRP-Z51, -Z52, -Z55, -Z56, -Z57	•	Fast: 2 ms/1 Normal: 10 ms/1	–	–
R&S®NRP-Z81, -Z85	•	Fast: 10 µs/256 Normal: 10 µs/2048	•	•
R&S®NRP-Z91, -Z92	•	Fast: not available Normal: 10 ms/1	–	–
R&S®NRP-Z98	•	Fast: not available Normal: 10 ms/1	–	–
R&S®NRP-Z27	only for use with R&S®FSMR			
R&S®NRP-Z37	only for use with R&S®FSMR			

• = supported, – = not supported

General data

Remote control

Parameter	Description/condition	Value
Interfaces	with R&S®SMF-B83 option	IEC 60625 (GPIB IEEE-488.2)
		Ethernet/LAN (10/100BASE-T)
		USB 2.0 (high speed)
		serial (RS-232) [14]
Command set		SCPI 1999.5 or compatible command sets
Compatible command sets	These command sets can be selected in order to emulate another instrument.	Agilent/HP 4028 Agilent/HP 8340A/B Agilent/HP 8341A/B Agilent/HP 83620A/B Agilent/HP 83630A/B Anritsu/Wiltron 68037B Anritsu/Wiltron 68045B Anritsu/Wiltron 68047B Racal 3102 full list can be found on the web: https://www.rohde-schwarz.com/en/solutions/aerospace-defense/legacypro/legacypro-overview_103915.html
IEC/IEEE bus address		0 to 30
Ethernet/LAN protocols and services		VISA VXI-11 (remote control)
		Telnet/RawEthernet (remote control)
		VNC (remote operation with web browser)
		FTP (file transfer protocol)
		SMB (mapping parts of the instrument to a host file system)
Ethernet/LAN addressing		DHCP, static Support of ZeroConf and M-DNS to ease the direct connection to a system controller
USB protocol		VISA USB-TMC

[14] Requires recommended extra TS-USB1.

Operating data

Power supply	input voltage range	
	50 Hz to 60 Hz, –5 %/+10 %	100 V to 240 V (AC) ±10 %
	50 Hz to 400 Hz, –5 %/+10 %	100 V to 120 V (AC) ±10 %
	power consumption	250 VA
Power factor correction		in line with EN 61000-3-2
Electromagnetic compatibility	EU: in line with EMC Directive 2004/108/EC	applied harmonized standards: EN 61326-1 (industrial environment), EN 61326-2-1, EN 55011 (class A), EN 61000-3-2, EN 61000-3-3
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
	maximum operating altitude	4600 m
	storage temperature range	–40 °C to +75 °C
	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
	vibration, 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
Approvals		VDE-GS, $_{C}$CSA$_{US}$
Dimensions (W × H × D)		427 mm × 132 mm × 550 mm (16.81 in × 5.2 in × 21.65 in)
Weight	when fully equipped	18 kg (39.68 lb)
Recommended calibration interval		3 years

Ordering information

Designation	Type	Order No.
Microwave Signal Generator [15]	R&S®SMF100A	1167.0000.02
Including power cable, quick start guide, and CD-ROM (with operating and service manual)		
Options		
Frequency Range, 1 GHz to 22 GHz [16] (Adapter 3.5 mm female included)	R&S®SMF-B122	1167.7004.03
Frequency Range, 1 GHz to 31.8 GHz [16] (Adapter 2.9 mm female included)	R&S®SMF-B131	1167.7140.02
Frequency Range, 1 GHz to 43.5 GHz [16] (Adapter 2.4 mm female + 2.9 mm female included)	R&S®SMF-B144	1167.7204.03
Frequency Range, 1 GHz to 43.5 GHz, minimum pulse width limited [16] (Adapter 2.4 mm female + 2.9 mm female included)	R&S®SMF-B144N	1167.7240.02
OCXO Reference Oscillator [17, 18]	R&S®SMF-B1	1167.9159.02
Frequency Extension, 100 kHz to 1 GHz [17]	R&S®SMF-B2	1167.4005.02
AM/FM/φM/LOG AM Modulator [17]	R&S®SMF-B20	1167.9594.02
Enhanced Phase Noise Performance [17]	R&S®SMF-B22	1415.2204.02
Step Attenuator, 100 kHz to 22 GHz [17]	R&S®SMF-B26	1167.5553.02
Step Attenuator, 100 kHz to 43.5 GHz [17]	R&S®SMF-B27	1167.5776.02
High Output Power (not in combination with R&S®SMF-B2) [17]	R&S®SMF-B32	1415.2304.02
High Output Power (in combination with R&S®SMF-B2) [17]	R&S®SMF-B34	1415.2404.02
Rear Connectors 22 GHz [17]	R&S®SMF-B81	1167.5999.02
Rear Connectors 43.5 GHz [17]	R&S®SMF-B82	1167.6208.02
Removable GPIB [19]	R&S®SMF-B83	1167.6408.02
Removable USB [19]	R&S®SMF-B84	1167.6608.02
Removable Flash Disk [17, 19]	R&S®SMF-B85	1167.6808.02
Narrow Pulse Modulation	R&S®SMF-K3	1167.7804.02
Ramp Sweep	R&S®SMF-K4	1167.7604.02
Pulse Generator	R&S®SMF-K23	1167.7704.02
Pulse Train [20]	R&S®SMF-K27	1415.2004.02
Power Analysis	R&S®SMF-K28	1415.2104.02
Documentation of Calibration Values	R&S®DCV-2	0240.2193.19
DKD (ISO 17025) Calibration including ISO 9000 Calibration	R&S®SMF22-DKD	1161.3594.00
(can only be ordered with the device)	R&S®SMF44-DKD	1161.3620.00
Recommended extras		
Wideband Power Sensor (for use with R&S®SMF-K28)	R&S®NRP-Z81	1137.9009.02
Hardcopy Manuals (in English, UK)		1167.2319.32
Hardcopy Manuals (in English, US)		1167.2319.39
Spare Compact Flash Card (R&S®SMF-B85 required)	R&S®SMF-Z10	1167.8100.02
19“ Rack Adapter	R&S®ZZA-311	1096.3277.00
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
USB adapter for R&S®NRP-Zxx power sensors	R&S®NRP-Z4	1146.8001.02
USB serial adapter for RS-232 remote control	R&S®TS-USB1	6124.2531.00
External USB DVD Drive	R&S®PSP-B6	1134.8201.22
Adapters for R&S®SMF100A with R&S®SMF-B122 frequency option		
3.5 mm female		1021.0512.00
3.5 mm male		1021.0529.00
N female		1021.0535.00
N male		1021.0541.00
Adapters for R&S®SMF100A with R&S®SMF-B131/-B144/-B144N frequency options		
2.4 mm female		1088.1627.02
2.9 mm female		1036.4790.00
2.9 mm male		1036.4802.00
N female		1036.4777.00
N male		1036.4783.00

[15] The base unit can only be ordered together with frequency option R&S®SMF-B122 or R&S®SMF-B144.

[16] Option fitted by factory.

[17] Option fitted by factory or especially equipped Rohde & Schwarz service department.

[18] Option cannot be installed with enhanced phase noise performance option R&S®SMF-B22 (then not required).

[19] Only two of the three options R&S®SMF-B83/84/85 can be installed simultaneously.

[20] Requires R&S®SMF-K23 pulse generator option.

Service options		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty, three years	R&S®WE3	
Extended Warranty, four years	R&S®WE4	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Calibration Coverage, three years	R&S®CW3	
Extended Warranty with Calibration Coverage, four years	R&S®CW4	

Extended warranty with a term of one to four years (WE1 to WE4)
Repairs carried out during the contract term are free of charge [21]. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

Extended warranty with calibration (CW1 to CW4)
Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs [21] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

[21] Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

Service that adds value

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

About Rohde&Schwarz

The Rohde&Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. Founded more than 80 years ago, this independent company has an extensive sales and service network and is present in more than 70 countries. The electronics group is among the world market leaders in its established business fields. The company is headquartered in Munich, Germany. It also has regional headquarters in Singapore and Columbia, Maryland, USA, to manage its operations in these regions.

Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

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