R&S®SMB100A RF and Microwave Signal Generator

Specifications

Test & Measurement

Data Sheet | 09.00

ROHDE&SCHWARZ

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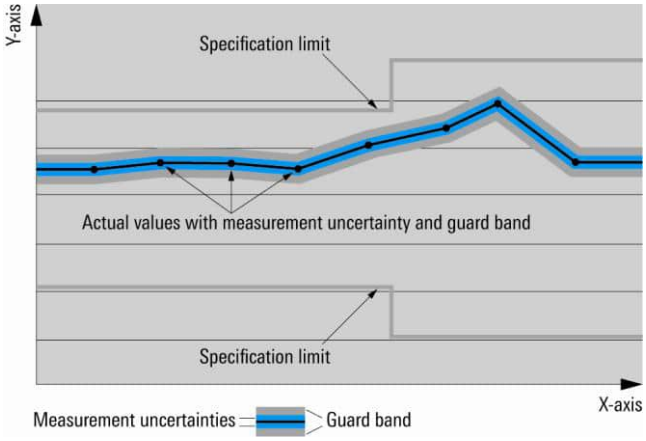
Definitions

General
Product data applies under the following conditions:

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

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



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

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

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

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

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

Device settings and GUI parameters are designated with the format “parameter: value”.

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

Specifications

Hardware and software option concept

The available frequency ranges and the corresponding hardware and software options are shown in the tables.

	9 kHz to 1.1 GHz	**9 kHz to 2.2 GHz**	**9 kHz to 3.2 GHz**	**9 kHz to 6 GHz**
With electronic step attenuator	R&S®SMB-B101	R&S®SMB-B102	R&S®SMB-B103	R&S®SMB-B106
With mechanical step attenuator	–	–	–	–
Without step attenuator	–	–	–	–
High power	standard			
OCXO reference oscillator [1]	R&S®SMB-B1			
OCXO reference oscillator, high performance [1]	R&S®SMB-B1H			
Reverse power protection	standard			
Stereo/RDS coder	R&S®SMB-B5			
Pulse modulator	R&S®SMB-K22			
Pulse generator	R&S®SMB-K23			
Pulse train [2]	R&S®SMB-K27			

	100 kHz to 12.75 GHz	**100 kHz to 20 GHz**	**100 kHz to 31.8 GHz**	**100 kHz to 40 GHz**
With electronic step attenuator	R&S®SMB-B112	–	–	–
With mechanical step attenuator	–	R&S®SMB-B120	R&S®SMB-B131	R&S®SMB-B140, R&S®SMB-B140N
Without step attenuator	R&S®SMB-B112L	R&S®SMB-B120L	–	R&S®SMB-B140L
High power	standard	R&S®SMB-B31	R&S®SMB-B32	R&S®SMB-B32
Low harmonic filter	–	R&S®SMB-B25	R&S®SMB-B26	R&S®SMB-B26
OCXO reference oscillator [1]	R&S®SMB-B1			
OCXO reference oscillator, high performance [1]	R&S®SMB-B1H			
Reverse power protection	R&S®SMB-B30	–		
Stereo/RDS coder	–	–		
Pulse modulator	R&S®SMB-K21			
Pulse generator	R&S®SMB-K23			
Pulse train [2]	R&S®SMB-K27			

RF performance

Frequency

Range	R&S®SMB-B101	9 kHz to 1.1 GHz
	R&S®SMB-B102	9 kHz to 2.2 GHz
	R&S®SMB-B103	9 kHz to 3.2 GHz
	R&S®SMB-B106	9 kHz to 6 GHz
	R&S®SMB-B112, R&S®SMB-B112L	100 kHz to 12.75 GHz
	R&S®SMB-B120, R&S®SMB-B120L	100 kHz to 20 GHz
	R&S®SMB-B131	100 kHz to 31.8 GHz
	R&S®SMB-B140, R&S®SMB-B140L, R&S®SMB-B140N	100 kHz to 40 GHz
Resolution of setting		0.001 Hz
Resolution of synthesis	f = 1 GHz	0.44 µHz (nom.)
Setting time	to within < 1×10^{-7} for f > 200 MHz or < 20 Hz for f ≤ 200 MHz Specification does not apply when frequency crosses 20 GHz. Specification does not apply to instruments equipped with R&S®SMB-B120/-B131/-B140 when frequency crosses 200 kHz.	
	after IEC/IEEE bus delimiter	
	ALC state on	< 3 ms
	ALC state sample&hold, f ≤ 20 GHz	< 7 ms
	ALC state sample&hold, f > 20 GHz	< 10 ms
	after trigger pulse in list mode	< 1 ms
Resolution of phase offset setting		0.1°

[1] Only one of the R&S®SMB-B1 or R&S®SMB-B1H option can be installed.

[2] Requires the R&S®SMB-K23 option; only available for instruments with serial number > 102400.

Frequency sweep

Operating mode		digital sweep in discrete steps
Trigger mode	free run	automatic
	full sweep	single
	execute one step	step
	external trigger only	start/stop
Trigger source		keyboard, external trigger, remote control
Trigger slope		positive, negative
Sweep range		full frequency range
Sweep shape		triangle, sawtooth
Step spacing		linear, logarithmic
Step size	linear	full frequency range, min. 0.001 Hz
	logarithmic	0.01 % to 100 %
Dwell time range		10 ms to 10 s
Dwell time resolution		0.1 ms

Reference frequency

Frequency error	at time of calibration in production	$< 1 \times 10^{-7}$
	with R&S®SMB-B1/R&S®SMB-B1H option	$< 1 \times 10^{-8}$
Aging (after 10 days of uninterrupted operation)	standard	$< 1 \times 10^{-6}$/year
	with R&S®SMB-B1 option	$< 1 \times 10^{-9}$/day, $< 1 \times 10^{-7}$/year
	with R&S®SMB-B1H option	$< 5 \times 10^{-10}$/day, $< 3 \times 10^{-8}$/year
Temperature effect (0 °C to +50 °C)	standard	$< 2 \times 10^{-6}$
	with R&S®SMB-B1 option	$< 1 \times 10^{-7}$
	with R&S®SMB-B1H option	$< 1 \times 10^{-8}$
Warm-up time	to nominal thermostat temperature with R&S®SMB-B1/R&S®SMB-B1H option	≤ 10 min
Reference frequency output		
Connector type	REF OUT on rear panel	BNC female
Output frequency	sine wave	
	instrument set to internal reference	10 MHz
	instrument set to external reference	applied external reference frequency
Output level		+7 dBm to +13 dBm, +10 dBm (typ.)
Source impedance		50 Ω (nom.)
Reference frequency input		
Connector type	REF IN on rear panel	BNC female
Input frequency		5 MHz, 10 MHz
Frequency locking range		$\pm 3 \times 10^{-6}$
Input level range		0 dBm to +16 dBm
Input impedance		50 Ω (nom.)

Level

General explanations

Instruments equipped with R&S®SMB-B101/-B102/-B103/-B106/-B112 frequency options include an electronic step attenuator with step ranges of 5 dB (6 dB with R&S®SMB-B112). Instruments equipped with R&S®SMB-B120/-B131/-B140 frequency options include a mechanical step attenuator. Instruments equipped with R&S®SMB-B112L/-B120L/-B140L frequency options do not include a step attenuator. These instruments have a limited level setting range and a limited specified level range.

Level setting modes

The R&S®SMB100A offers two different operating modes for level setting:

- AUTO MODE: The step attenuator is switched automatically
- FIXED MODE: The level is set without switching the step attenuator. The step attenuator is fixed to the current setting. If ALC is on, level changes are performed without interruption. The maximum interruption-free setting range is limited

ALC modes

The R&S®SMB100A offers different ALC modes:

- ALC STATE AUTO: The best suited ALC mode is set automatically
- ALC STATE on: The level control loop is closed. This mode is suitable for CW, AM, FM and φM
- ALC STATE SAMPLE&HOLD (S&H): At every frequency and level change, the level control loop is closed for about 1 ms and the level control voltage is sampled. The level control voltage is then clamped. This mode is used internally while in ALC state AUTO for pulse modulation

During a S&H measurement the level is decreased by 30 dB for instruments with electronic step attenuator. For instruments with mechanical attenuator or without step attenuator, the set on level is present for approximately 2 ms during a S&H procedure after level or frequency setting or after switching RF on.

Level settings

Setting range		
R&S®SMB-B101/-B102/-B103/-B106	9 kHz ≤ f < 100 kHz	–145 dBm to +8 dBm
	100 kHz ≤ f < 300 kHz	–145 dBm to +13 dBm
	300 kHz ≤ f < 1 MHz	–145 dBm to +18 dBm
	1 MHz ≤ f ≤ 6 GHz	–145 dBm to +30 dBm
R&S®SMB-B112	100 kHz ≤ f ≤ 200 kHz	–145 dBm to +1 dBm
	200 kHz < f ≤ 300 kHz	–145 dBm to +6 dBm
	300 kHz < f ≤ 1 MHz	–145 dBm to +9 dBm
	1 MHz < f ≤ 12.75 GHz	–145 dBm to +30 dBm
R&S®SMB-B112L	100 kHz ≤ f ≤ 200 kHz	–20 dBm to +5 dBm
	200 kHz < f ≤ 300 kHz	–20 dBm to +10 dBm
	300 kHz < f ≤ 1 MHz	–20 dBm to +13 dBm
	1 MHz < f ≤ 12.75 GHz	–20 dBm to +30 dBm
R&S®SMB-B120/R&S®SMB-B131, R&S®SMB-B140/R&S®SMB-B140N	standard	
	100 kHz ≤ f ≤ 200 kHz	–145 dBm to +4 dBm
	200 kHz < f ≤ 300 kHz	–145 dBm to +9 dBm
	300 kHz < f ≤ 1 MHz	–145 dBm to +12 dBm
	1 MHz < f ≤ 40 GHz	–145 dBm to 3 dB above max. specified output power
	with R&S®SMB-B31/-B32	
	100 kHz ≤ f ≤ 300 kHz	–145 dBm to +10 dBm
	300 kHz < f ≤ 50 MHz	–145 dBm to +12 dBm
	50 MHz < f ≤ 100 MHz	–145 dBm to +17 dBm
	100 MHz < f ≤ 200 MHz	–145 dBm to +20 dBm
	200 MHz < f ≤ 400 MHz	–145 dBm to +22 dBm
	400 MHz < f ≤ 40 GHz	–145 dBm to +30 dBm
R&S®SMB-B120L/R&S®SMB-B140L	standard	
	100 kHz ≤ f ≤ 200 kHz	–20 dBm to +4 dBm
	200 kHz < f ≤ 300 kHz	–20 dBm to +9 dBm
	300 kHz < f ≤ 1 MHz	–20 dBm to +12 dBm
	1 MHz < f ≤ 40 GHz	–20 dBm to 3 dB above max. specified output power
	with R&S®SMB-B31/-B32	
	100 kHz ≤ f ≤ 300 kHz	–20 dBm to +10 dBm
	300 kHz < f ≤ 50 MHz	–20 dBm to +12 dBm
	50 MHz < f ≤ 100 MHz	–20 dBm to +17 dBm
	100 MHz < f ≤ 200 MHz	–20 dBm to +20 dBm
	200 MHz < f ≤ 400 MHz	–20 dBm to +22 dBm
	400 MHz < f ≤ 40 GHz	–20 dBm to +30 dBm
Resolution of setting		0.01 dB
Interruption-free level setting range	FIXED mode, ALC state on	0 dB to 20 dB

Level performance

Specified level range, peak envelope power (PEP)		
R&S®SMB-B101/-B102/-B103/-B106	9 kHz ≤ f ≤ 200 kHz	–120 dBm to +5 dBm
	200 kHz < f ≤ 1 MHz	–120 dBm to +13 dBm
	1 MHz < f ≤ 6 GHz	–120 dBm to +18 dBm
R&S®SMB-B112	standard	
	200 kHz < f ≤ 1 MHz	–120 dBm to +6 dBm
	1 MHz < f ≤ 12.75 GHz	–120 dBm to +18 dBm
	with R&S®SMB-B30 option	
	200 kHz < f ≤ 1 MHz	–120 dBm to +5 dBm
	1 MHz < f ≤ 12.75 GHz	–120 dBm to +15 dBm
R&S®SMB-B112L	standard	
	200 kHz < f ≤ 1 MHz	–5 dBm to +10 dBm
	1 MHz < f ≤ 12.75 GHz	–5 dBm to +18 dBm
	with R&S®SMB-B30 option	
	200 kHz < f ≤ 1 MHz	–5 dBm to +9 dBm
	1 MHz < f ≤ 12.75 GHz	–5 dBm to +15 dBm
R&S®SMB-B120	standard	
	200 kHz < f ≤ 10 MHz	–120 dBm to +5 dBm
	10 MHz < f ≤ 50 MHz	–120 dBm to +10 dBm
	50 MHz < f ≤ 20 GHz	–120 dBm to +11 dBm
	with R&S®SMB-B31 option [3]	
	200 kHz < f ≤ 10 MHz	–120 dBm to +5 dBm
	10 MHz < f ≤ 50 MHz	–120 dBm to +10 dBm
	50 MHz < f ≤ 20 GHz	–120 dBm to +16 dBm
R&S®SMB-B120L	standard	
	200 kHz < f ≤ 10 MHz	0 dBm to +5 dBm
	10 MHz < f ≤ 50 MHz	0 dBm to +10 dBm
	50 MHz < f ≤ 20 GHz	0 dBm to +14 dBm
	with R&S®SMB-B31 option [3]	
	200 kHz < f ≤ 10 MHz	0 dBm to +5 dBm
	10 MHz < f ≤ 50 MHz	0 dBm to +10 dBm
	50 MHz < f ≤ 100 MHz	0 dBm to +16 dBm
	100 MHz < f ≤ 20 GHz	0 dBm to +19 dBm
R&S®SMB-B131	standard	
	200 kHz < f ≤ 10 MHz	–120 dBm to +5 dBm
	10 MHz < f ≤ 31.8 GHz	–120 dBm to +8 dBm
	with R&S®SMB-B32 option [3]	
	200 kHz < f ≤ 10 MHz	–120 dBm to +5 dBm
	10 MHz < f ≤ 50 MHz	–120 dBm to +9 dBm
	50 MHz < f ≤ 31.8 GHz	–120 dBm to +13 dBm
R&S®SMB-B140, R&S®SMB-B140N	standard	
	200 kHz < f ≤ 10 MHz	–120 dBm to +5 dBm
	10 MHz < f ≤ 40 GHz	–120 dBm to +8 dBm
	with R&S®SMB-B32 option [3]	
	200 kHz < f ≤ 10 MHz	–120 dBm to +5 dBm
	10 MHz < f ≤ 50 MHz	–120 dBm to +9 dBm
	50 MHz < f ≤ 40 GHz	–120 dBm to +13 dBm
R&S®SMB-B140L	standard	
	200 kHz < f ≤ 10 MHz	0 dBm to +5 dBm
	10 MHz < f ≤ 50 MHz	0 dBm to +9 dBm
	50 MHz < f ≤ 40 GHz	0 dBm to +11 dBm
	with R&S®SMB-B32 option [3]	
	200 kHz < f ≤ 10 MHz	0 dBm to +5 dBm
	10 MHz < f ≤ 50 MHz	0 dBm to +9 dBm
	50 MHz < f ≤ 40 GHz	0 dBm to +16 dBm

[3] For instruments equipped with R&S®SMB-B25 or R&S®SMB-B26 option, the specification is valid with low harmonic filter off. With low harmonic filter on, the standard level range is valid.

Level error	ALC state on, temperature range +18 °C to +33 °C		
R&S®SMB-B101/-B102/-B103/ -B106/-B112	9 kHz ≤ f ≤ 200 kHz [4]	< 1.0 dB	
	200 kHz < f ≤ 3 GHz	< 0.5 dB	
	f > 3 GHz	< 0.9 dB	
R&S®SMB-B112L	200 kHz < f ≤ 3 GHz	< 0.7 dB	
	f > 3 GHz	< 1.1 dB	
R&S®SMB-B120L/-B140L	200 kHz < f ≤ 3 GHz	< 0.7 dB	
	3 GHz < f ≤ 20 GHz	< 1.1 dB	
	20 GHz < f ≤ 40 GHz	< 1.2 dB	
R&S®SMB-B120/-B131, R&S®SMB-B140/-B140N		level > –90 dBm	level ≤ –90 dBm
	200 kHz < f ≤ 3 GHz	< 0.5 dB	< 0.5 dB
	3 GHz < f ≤ 20 GHz	< 0.9 dB	< 1.2 dB
	20 GHz < f ≤ 40 GHz	< 1.0 dB	< 1.5 dB
Additional level error	ALC state S&H	< 0.25 dB	

Level setting times

Setting time	level deviation < 0.1 dB [5] from final value, with GUI update stopped, temperature range +18 °C to +33 °C, without switching of the mechanical step attenuator	
	after IEC/IEEE bus delimiter	
	ALC state on	< 2.5 ms
	ALC state S&H, f ≤ 20 GHz	< 7 ms
	ALC state S&H, f > 20 GHz	< 10 ms
	in list mode after trigger pulse	< 1 ms
	with switching of the mechanical step attenuator	
	ALC state on	< 25 ms
	ALC state S&H	< 30 ms

Reverse power

The R&S®SMB100A equipped with R&S®SMB-B101/-B102/-B103/-B106 frequency options includes a reverse power protection as standard. For instruments equipped with the R&S®SMB-B112 or R&S®SMB-B112L frequency option, a reverse power protection option (R&S®SMB-B30) is available.

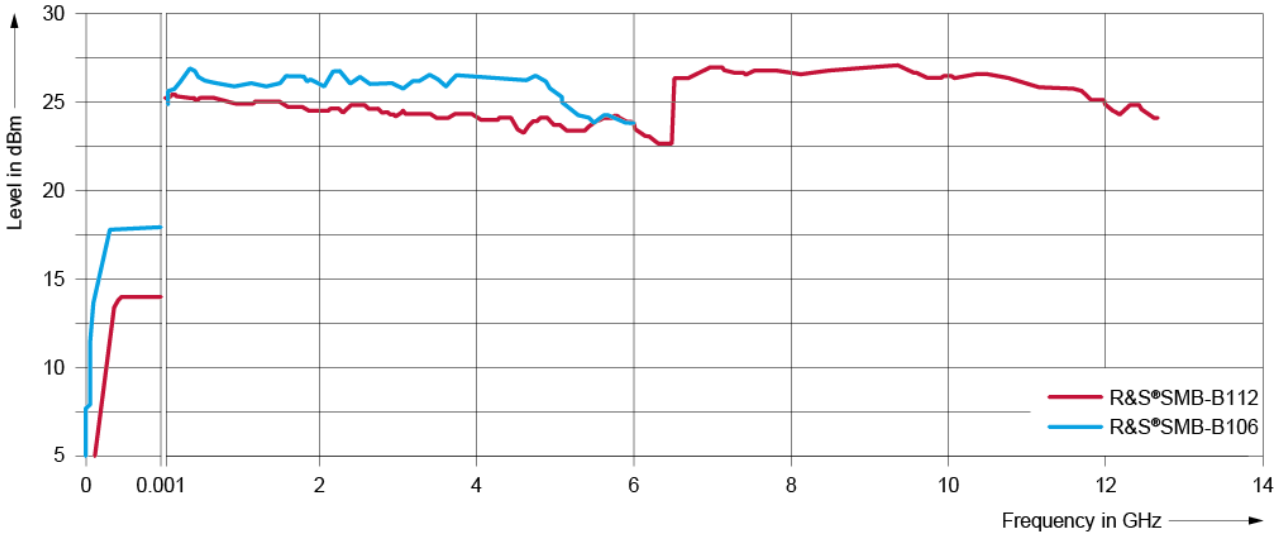
Maximum permissible RF power in output frequency range of RF path for f > 1 MHz, from source ≥ 50 Ω		
Instruments with reverse power protection		
Reverse power	1 MHz < f ≤ 1 GHz	50 W
	1 GHz < f ≤ 2 GHz	25 W
	2 GHz < f ≤ 12.75 GHz	10 W
Maximum permissible DC voltage		35 V
Instruments without reverse power protection		
Reverse power		0.5 W
Maximum permissible DC voltage	R&S®SMB-B112/-B112L	35 V
	R&S®SMB-B120/-B120L, R&S®SMB-B131, R&S®SMB-B140/-B140L/-B140N	0 V

VSWR

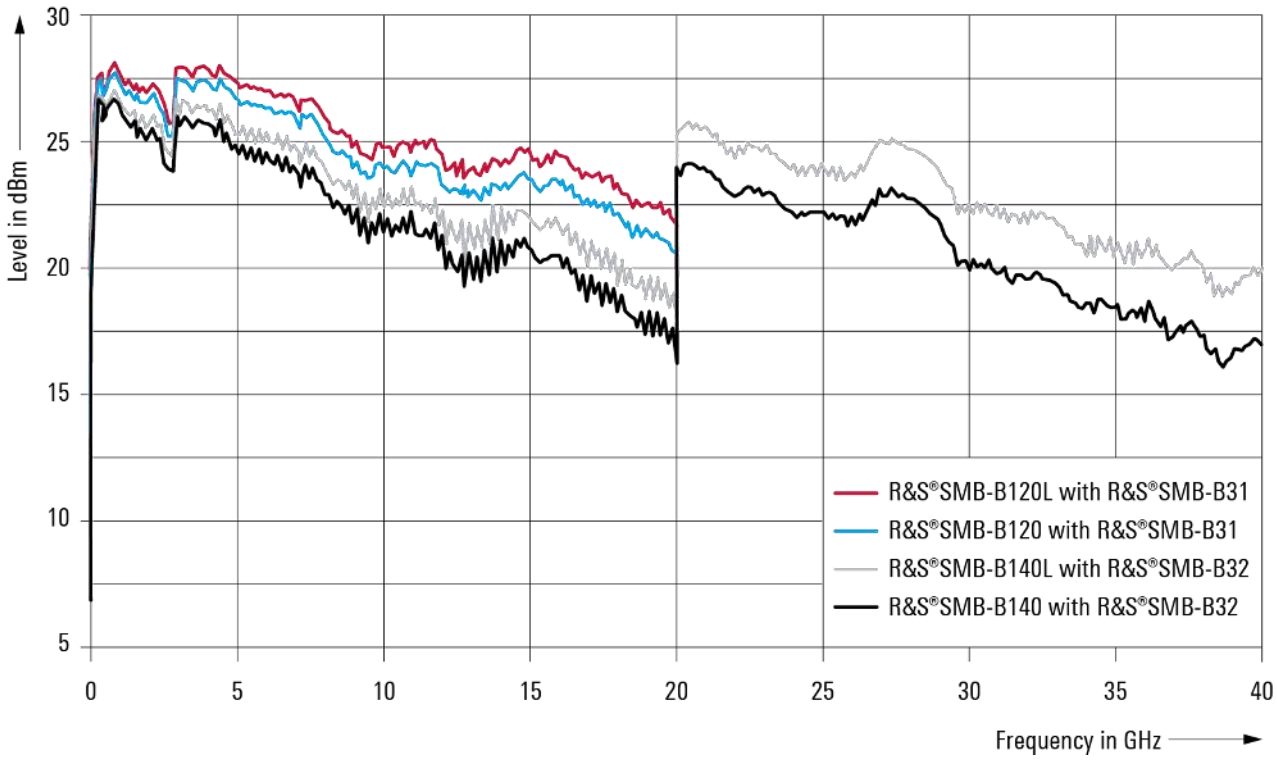
Output impedance VSWR in 50 Ω system, ALC state on		
R&S®SMB-B101/-B102/-B103/-B106/ -B112	f > 200 kHz	< 1.8
R&S®SMB-B112L/-B30	f > 200 kHz	< 2.0
R&S®SMB-B120/-B131, R&S®SMB -B140/-B140N	1 MHz < f ≤ 20 GHz	< 1.6 (meas.)
	20 GHz < f ≤ 40 GHz	< 1.8 (meas.)

[4] Only for instruments equipped with an R&S®SMB-B101, R&S®SMB-B102, R&S®SMB-B103 or R&S®SMB-B106 option.

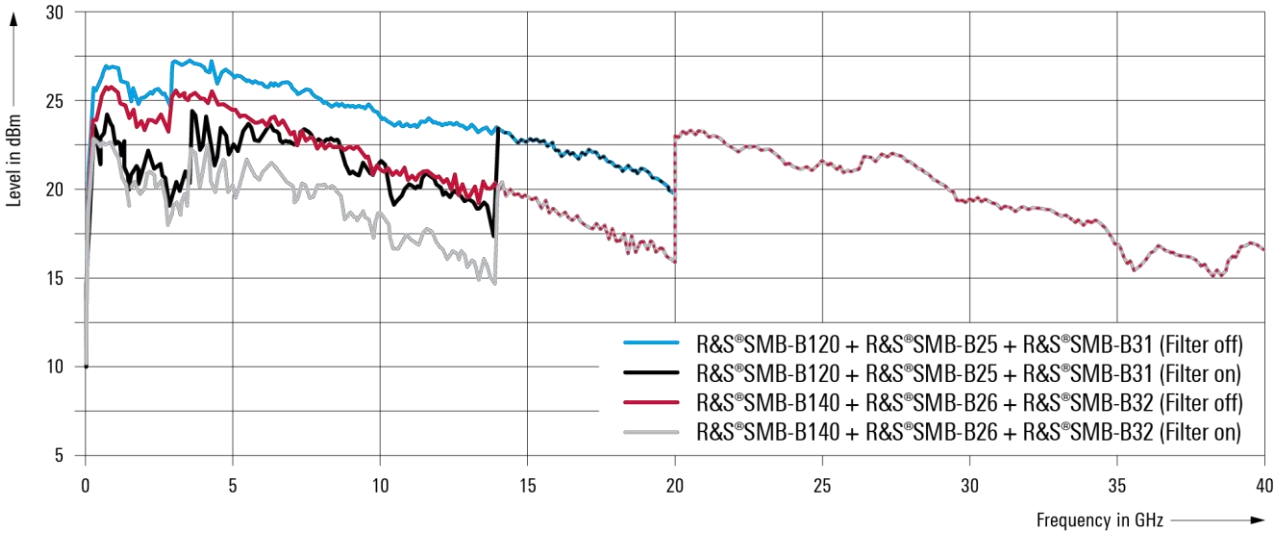
[5] Level deviation < 0.25 dB for f ≤ 23.4375 MHz for instruments equipped with an R&S®SMB-B112/-B112L/-B120/-B120L/-B131/-B140/-B140L/-B140N option



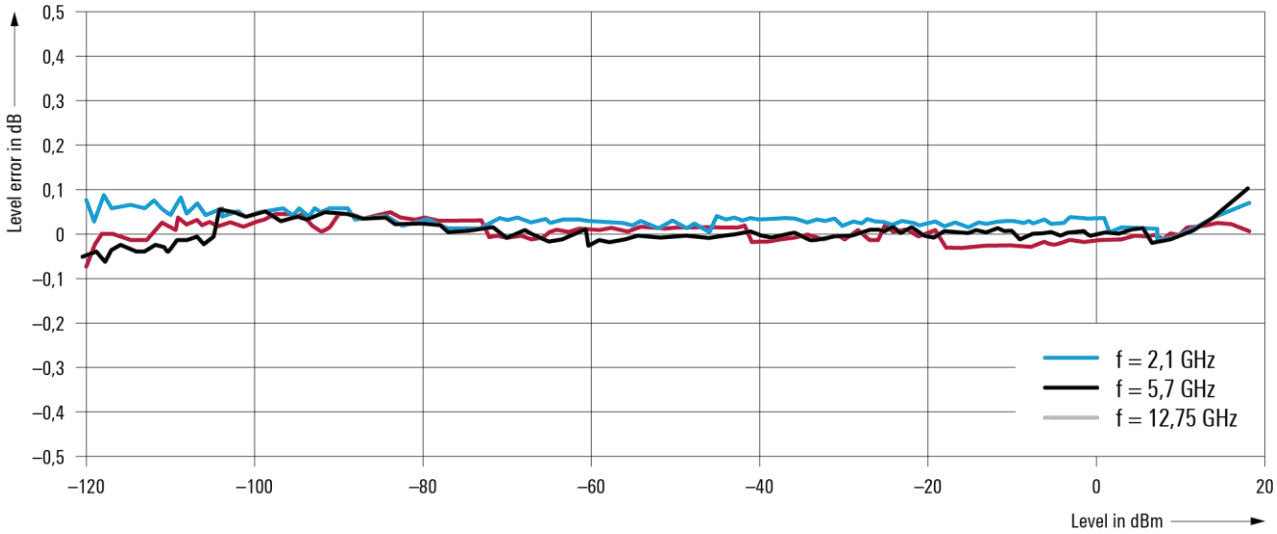
Maximum available output level versus frequency (meas.).



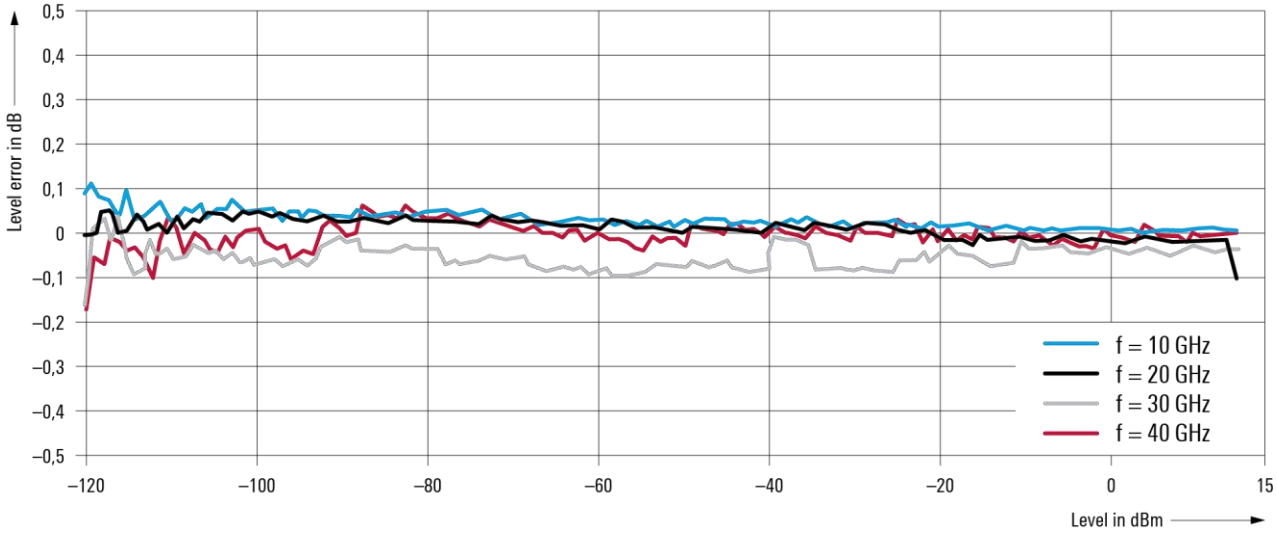
Maximum available output level versus frequency (meas.).



Maximum available output level versus frequency, Low Harmonic Filter off and on (meas.).



Level linearity with R&S®SMB-B112 option, ALC on (meas.).



Level linearity with R&S®SMB-B140 option and R&S®SMB-B32, ALC on (meas.).

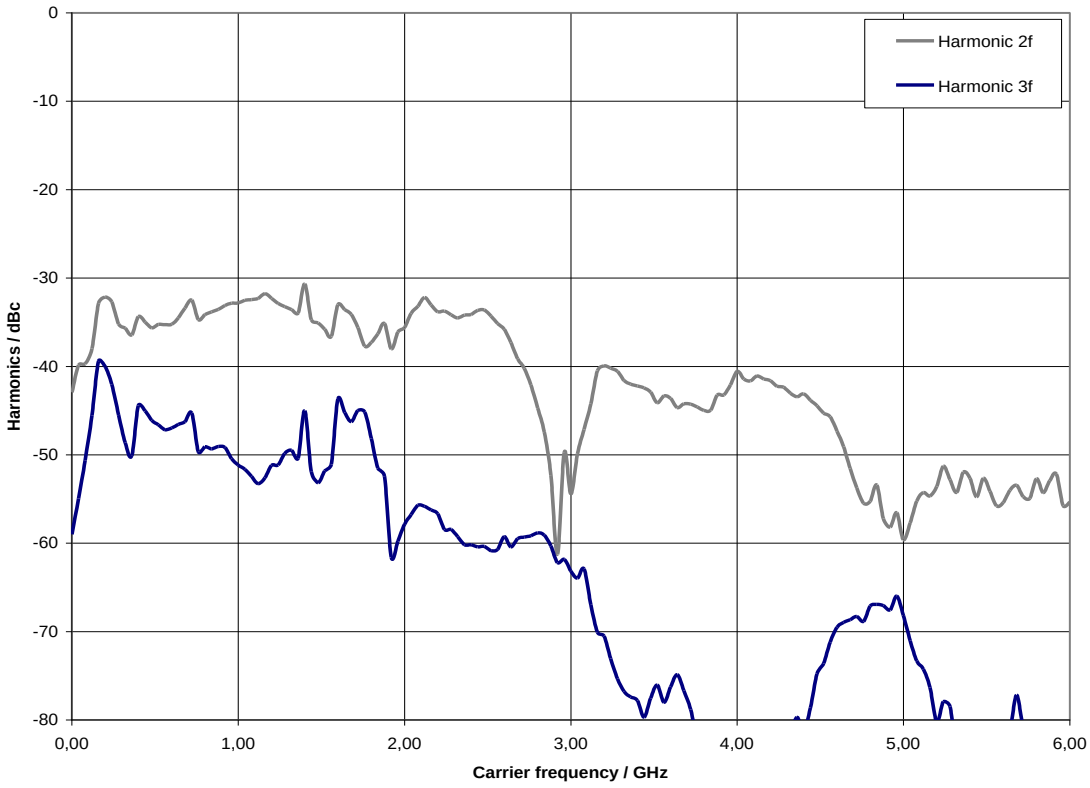
Level sweep

Operating mode		digital sweep in discrete steps
Trigger mode	free run	automatic
	full sweep	single
	execute one step	step
	external trigger only	start/stop
Trigger source		keyboard, external connector, remote control
Trigger slope	with external trigger	positive, negative
Sweep range		full specified level range
	interruption-free	–20 dB to +20 dB
Sweep shape		triangle, sawtooth
Step spacing		logarithmic
Step size setting resolution		0.01 dB
Dwell time setting range		10 ms to 10 s
Dwell time setting resolution		0.1 ms

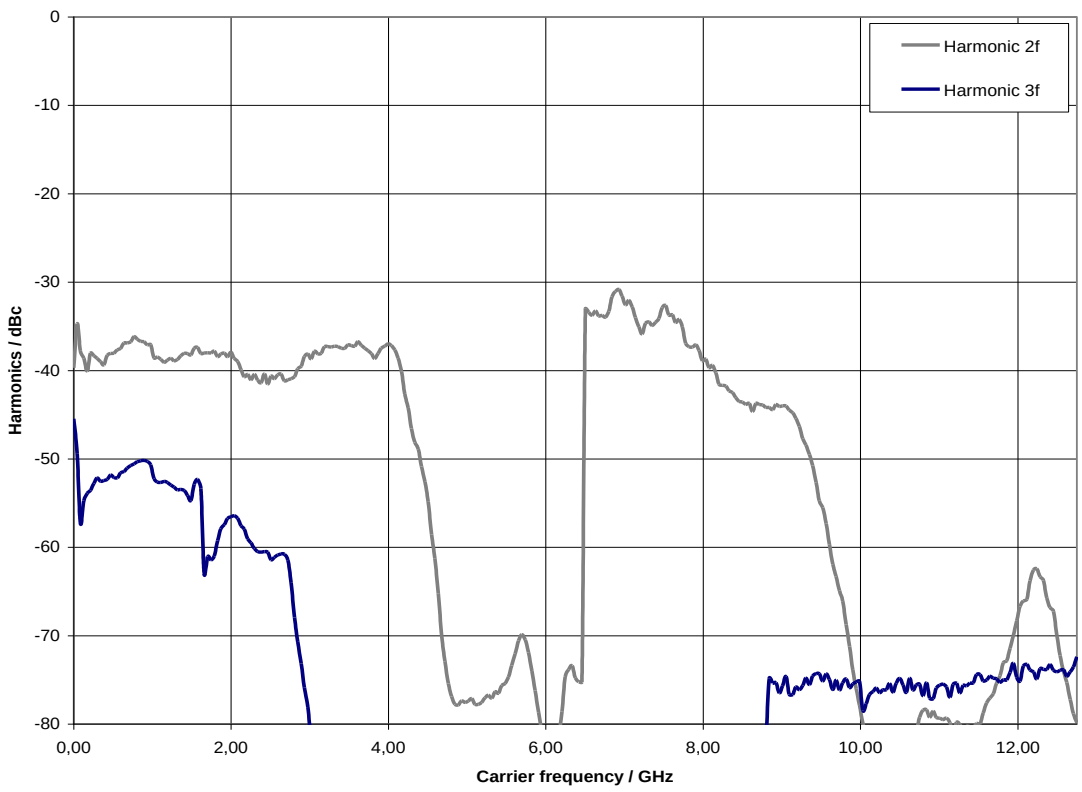
Spectral purity

Harmonics		
R&S®SMB-B101/-B102/-B103/-B106/ -B112/-B112L	1 MHz < f ≤ 6 GHz; level ≤ 13 dBm [6] f > 6 GHz; level ≤ 10 dBm [6]	< –30 dBc
R&S®SMB-B120/-B120L/-B131, R&S®SMB-B140/-B140L/-B140N	standard; level ≤ 8 dBm [6]	
	f > 1 MHz	< –30 dBc
	with R&S®SMB-B25, R&S®SMB-B26 option low harmonic, low harmonic filter on, level ≤ 10 dBm [6]	
	1 MHz < f ≤ 150 MHz	< –30 dBc
	150 MHz < f ≤ 3 GHz	< –58 dBc
	3 GHz < f ≤ 20 GHz	< –50 dBc
	f > 20 GHz	< –60 dBc (meas)
Nonharmonics	CW, level > –10 dBm (level > 0 dBm for instruments without step attenuator), offset > 10 kHz from carrier	
	f ≤ 23.4375 MHz	< –70 dBc
	23.4375 MHz < f ≤ 1500 MHz	< –70 dBc, < –84 dBc (typ.)
	1500 MHz < f ≤ 3 GHz	< –64 dBc, < –78 dBc (typ.)
	3 GHz < f ≤ 6.375 GHz	< –58 dBc, < –72 dBc (typ.)
	6.375 GHz < f ≤ 12.75 GHz	< –52 dBc, < –66 dBc (typ.)
	12.75 GHz < f ≤ 25.5 GHz	< –46 dBc, < –60 dBc (typ.)
	25.5 GHz < f ≤ 40 GHz	< –40 dBc, < –54 dBc (typ.)
Subharmonics	level > –10 dBm (level > 0 dBm for instruments without step attenuator)	
	f < 6.375 GHz	none
	6.375 GHz < f ≤ 20 GHz	< –55 dBc
	20 GHz < f ≤ 40 GHz	< –50 dBc
Wideband noise	level operating mode auto, level > 10 dBm [6], measurement bandwidth 1 Hz, CW	
	carrier offset 10 MHz	
	15 MHz < f ≤ 6.375 GHz	< –142 dBc
	carrier offset 30 MHz	
	6.375 GHz < f ≤ 12.75 GHz	< –138 dBc
	12.75 GHz < f ≤ 20 GHz	< –135 dBc
	20 GHz < f ≤ 40 GHz	< –132 dBc
SSB phase noise	carrier offset 20 kHz, measurement bandwidth 1 Hz, CW	
	f = 100 MHz, level = 10 dBm	< –141 dBc, –145 dBc (typ.)
	f = 1 GHz	< –122 dBc, –128 dBc (typ.)
	f = 2 GHz	< –116 dBc, –122 dBc (typ.)
	f = 3 GHz	< –112 dBc, –118 dBc (typ.)
	f = 4 GHz	< –110 dBc, –116 dBc (typ.)
	f = 6 GHz	< –106 dBc, –112 dBc (typ.)
	f = 10 GHz	< –102 dBc, –108 dBc (typ.)
	f = 20 GHz	< –96 dBc, –102 dBc (typ.)
	f = 30 GHz	< –92 dBc, –98 dBc (typ.)
	f = 40 GHz	< –90 dBc, –96 dBc (typ.)
RMS jitter	f = 1 GHz, BW = 1 Hz to 10 MHz, CW	
	standard	7.2 ps (meas.), (7.2 mUI)
	with R&S®SMB-B1 option	1.3 ps (meas.), (1.3 mUI)
	with R&S®SMB-B1H option	105 fs (meas.), (105 µUI)
	f = 155 MHz, bandwidth = 100 Hz to 1.5 MHz, CW	83 fs (meas.), (12.9 µUI)
	f = 622 MHz, bandwidth = 1 kHz to 5 MHz, CW	63 fs (meas.), (39.2 µUI)
	f = 2.488 GHz, bandwidth = 5 kHz to 15 MHz, CW	55 fs (meas.), (137 µUI)
Residual FM	RMS value at f = 1 GHz, CW	
	0.3 kHz to 3 kHz, weighted (ITU-T)	< 4 Hz, 0.22 Hz (typ.)
	0.03 kHz to 23 kHz	< 10 Hz, 1.35 Hz (typ.)
Residual AM	RMS value (0.03 kHz to 20 kHz), CW level = 8 dBm	< 0.02 %

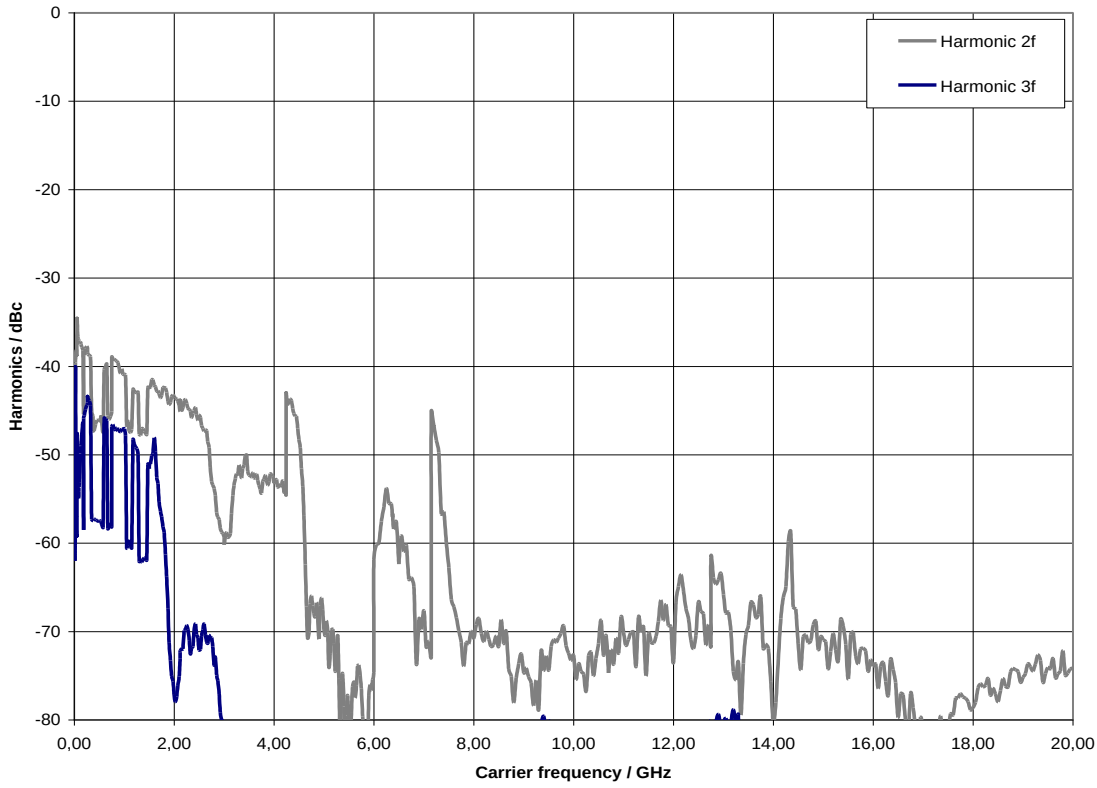
[6] Or maximum specified output power, whichever is lower.



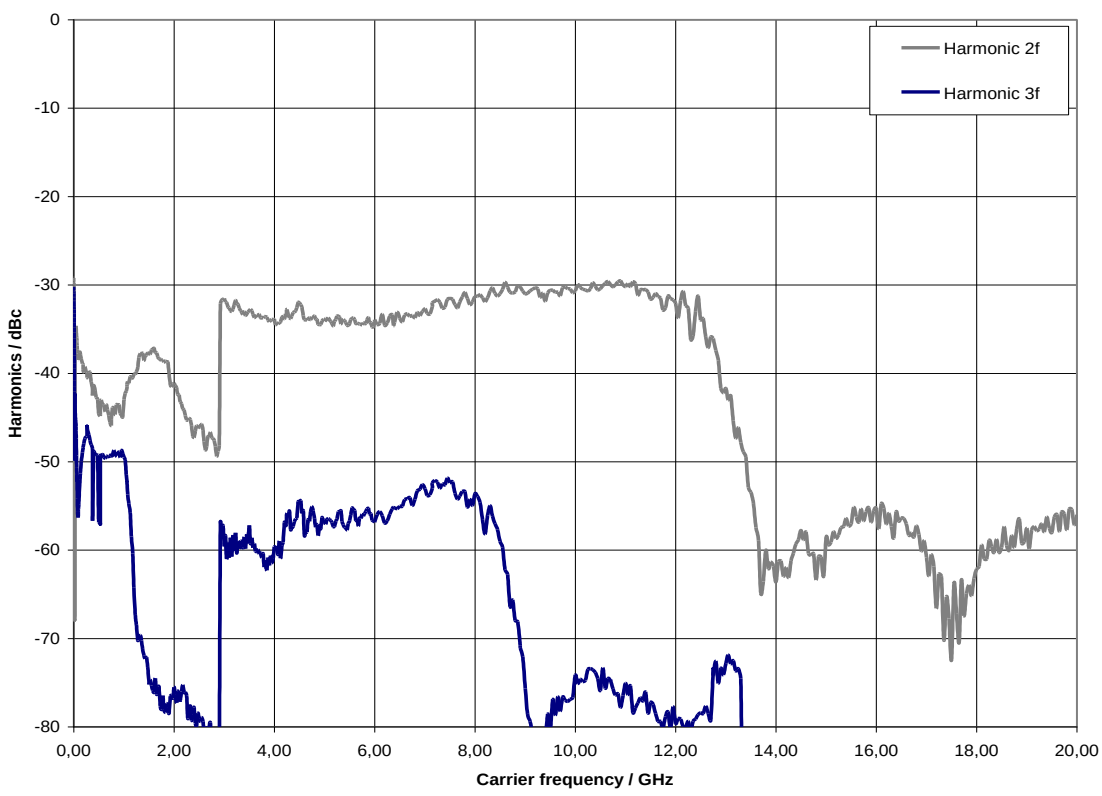
Harmonics versus carrier frequency at +15 dBm output level with R&S®SMB-B106 option (meas.).



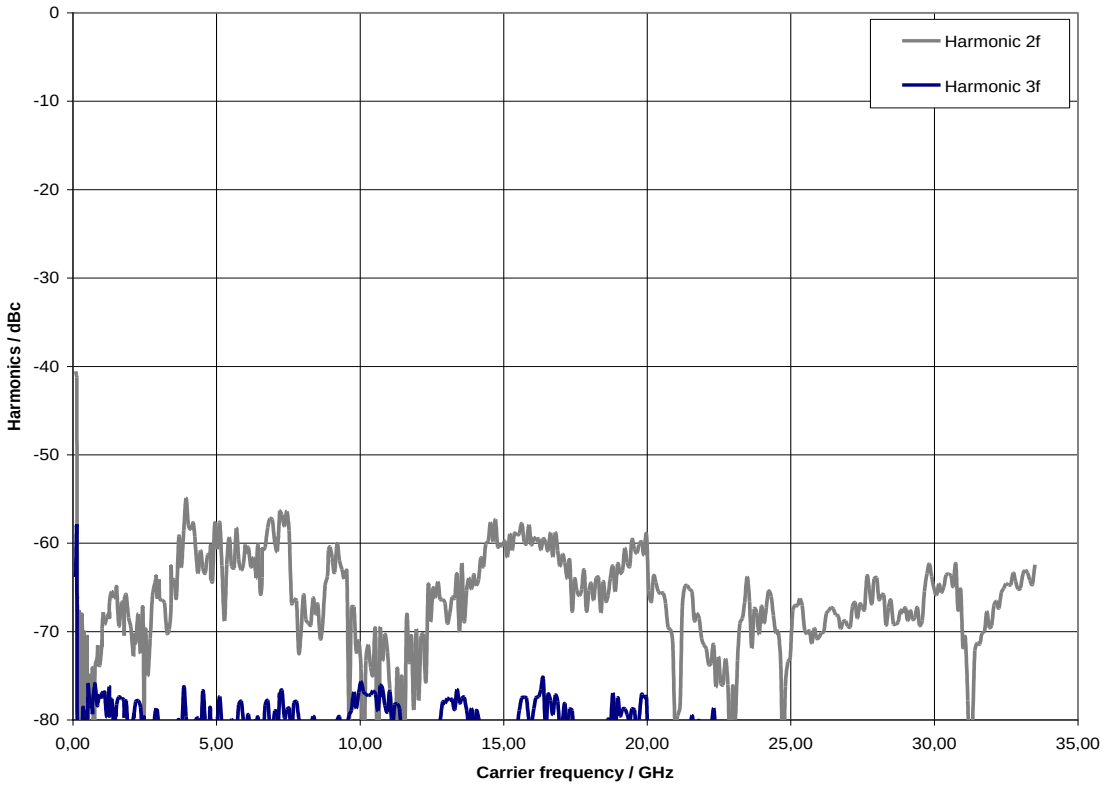
Harmonics versus carrier frequency at +15 dBm output level with R&S®SMB-B112 option (meas.).



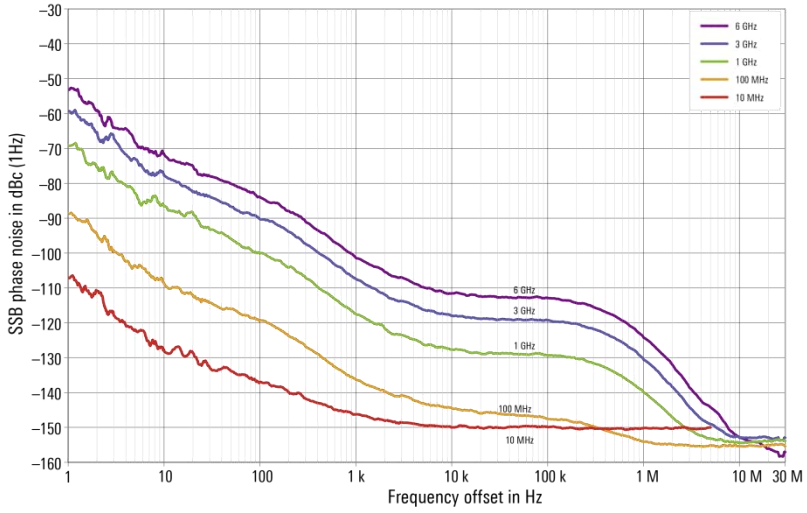
Harmonics versus carrier frequency at +8 dBm output level with R&S®SMB-B140 option (meas.).



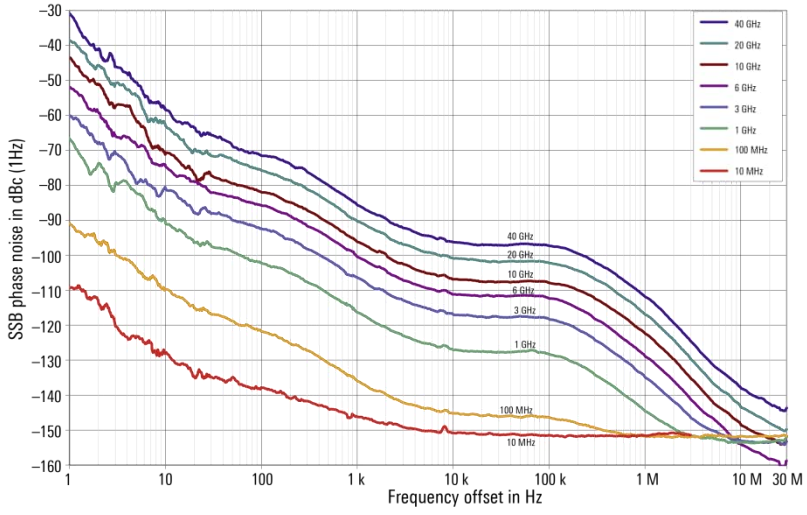
Harmonics versus carrier frequency at +13 dBm output level with R&S®SMB-B140 option and R&S®SMB-B32 (meas.).



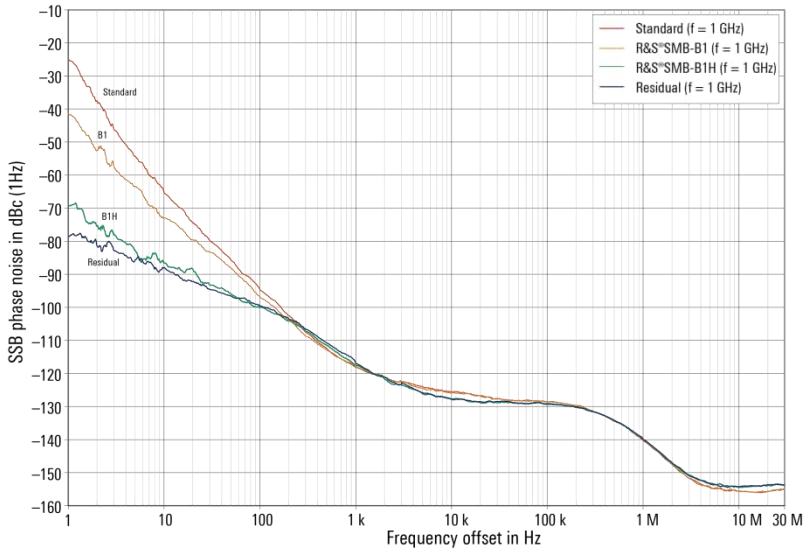
Harmonics versus carrier frequency at +10 dBm output level with R&S®SMB-B140 option, R&S®SMB-B32 and R&S®SMB-B26, low harmonic filter on (meas.).



Measured SSB phase noise with R&S®SMB-B1H OCXO option for the 1/2/3/6 GHz model.



Measured SSB phase noise with R&S®SMB-B1H OCXO option for the 12.75/20/40 GHz model.



Measured SSB phase noise, f = 1 GHz, comparison with standard internal reference, R&S®SMB-B1 OCXO option, R&S®SMB-B1H OCXO option and residual phase noise.

List mode settings

Frequency and level pairs can be stored in a list and set in an extremely short amount of time.

Trigger mode	free run	automatic
	full sweep	single
	execute one step	step
Trigger source		keyboard, external trigger, remote control
Max. number of stored settings		2000
Dwell time setting range		1 ms to 1 s
Dwell time setting resolution		0.1 ms
Setting time	after external trigger	see frequency and level data

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: No specification applies to AM distortion, AM depth error and on/off ratio with pulse modulation.

Amplitude modulation

For f ≥ 200 kHz, level setting mode auto, AM envelope within specified level range.

Modulation source		internal, external, internal + external	
External coupling		AC, DC	
AM depth setting range	at high levels; modulation is clipped when the maximum PEP is reached.	0 % to 100 %	
Resolution of setting		0.1 %	
AM depth (m) error	f_{mod} = 1 kHz and m < 80 %		
	R&S®SMB-B101/-B102/-B103/-B106		
	f ≤ 23.4375 MHz	< (1 % of setting + 1 %)	
	f > 23.4375 MHz	< (4 % of setting + 1 %)	
	R&S®SMB-B112/-B112L/-B120/-B120L/-B131/-B140/-B140L/-B140N		
	f > 1 MHz, PEP ≤ 15 dBm [7, 8]	< (4 % of setting + 1 %)	
AM distortion	f_{mod} = 1 kHz	m = 30 %	m = 80 %
	R&S®SMB-B101/-B102/-B103/-B106		
	f ≤ 23.4375 MHz	< 0.25 %	< 0.5 %
	f > 23.4375 MHz	< 1.5 %	< 3 %
	R&S®SMB-B112/-B112L/-B120/-B120L		
	f > 5 MHz, PEP ≤ 15 dBm [7]	< 1.5 %	< 3 %
	R&S®SMB-B131/-B140/-B140L/-B140N		
	5 MHz < f ≤ 20 GHz, PEP ≤ 13 dBm [7]	< 1.5 %	< 3 %
	20 GHz < f ≤ 40 GHz, PEP ≤ 10 dBm [7, 8]	< 2 %	< 4 %
Modulation frequency response	m = 60 %, DC coupling: 0 Hz to 50 kHz, AC coupling: 10 Hz to 50 kHz	< 3 dB	
Synchronous φM at AM	m = 30 %, f_{mod} = 1 kHz, ± peak/2		
	f ≤ 20 GHz	< 0.2 rad	
	20 GHz < f ≤ 40 GHz	< 0.4 rad	

Frequency bands for frequency and phase modulation

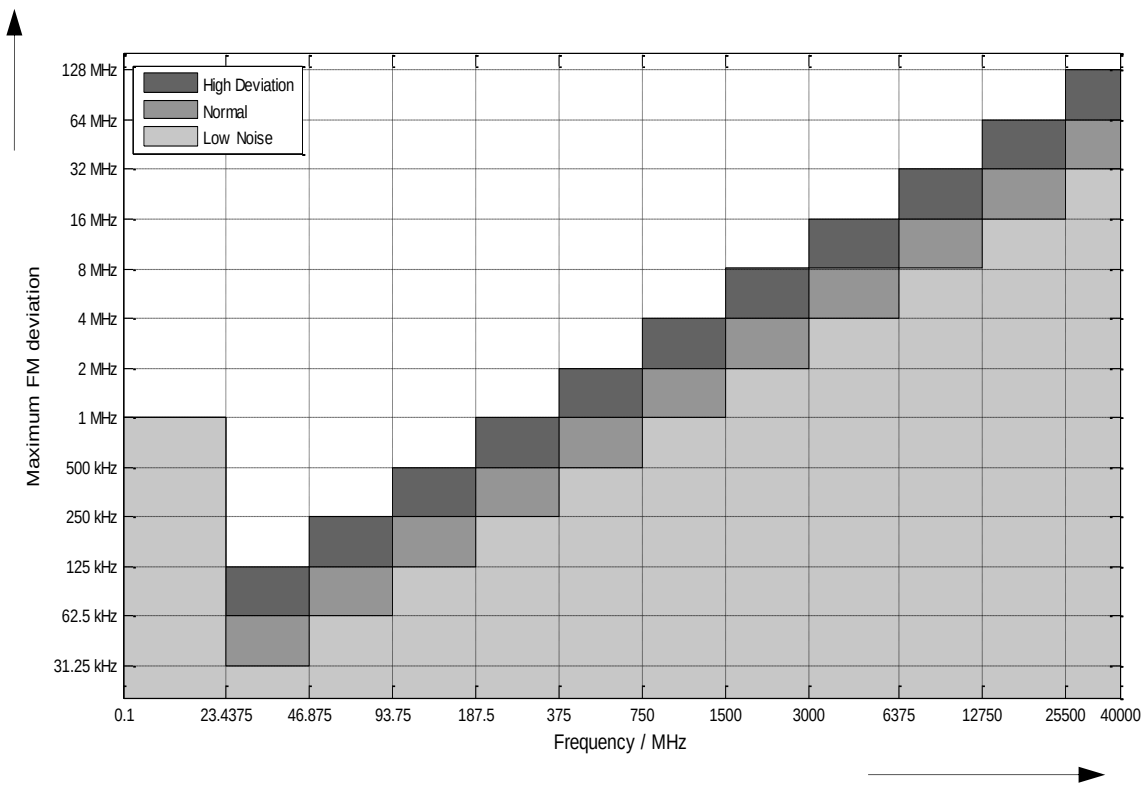
Multiplier N is used to define FM and φM specifications within this document.

Multiplier N for different frequency ranges	f ≤ 23.4375 MHz	1/4
	23.4375 MHz < f ≤ 46.875 MHz	1/32
	46.875 MHz < f ≤ 93.75 MHz	1/16
	93.75 MHz < f ≤ 187.5 MHz	1/8
	187.5 MHz < f ≤ 375 MHz	1/4
	375 MHz < f ≤ 750 MHz	1/2
	750 MHz < f ≤ 1500 MHz	1
	1500 MHz < f ≤ 3 GHz	2
	3 GHz < f ≤ 6.375 GHz	4
	6.375 GHz < f ≤ 12.75 GHz	8
	12.75 GHz < f ≤ 25.5 GHz	16
	25.5 GHz < f ≤ 40 GHz	32

[7] Or maximum specified output power, whichever is lower.
[8] Temperature range 0 °C to +33 °C for f > 20 GHz.

Frequency modulation

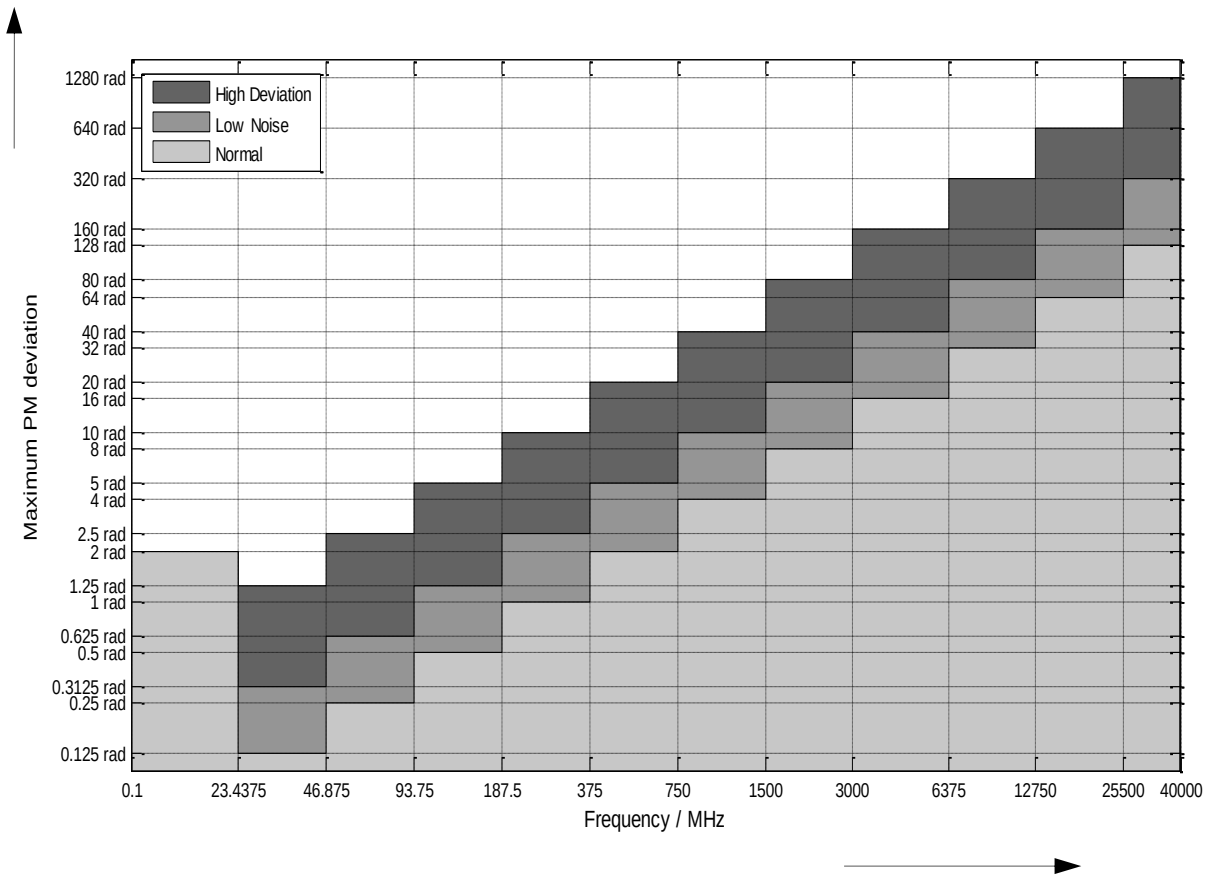
Modulation source		internal, external, internal + external
External coupling		AC, DC
Operating modes		FM mode low noise FM mode normal FM mode high deviation
Maximum deviation	f ≤ 23.4375 MHz	1 MHz
	f > 23.4375 MHz	
	FM mode normal	N × 2 MHz
	FM mode low noise	N × 1 MHz
	FM mode high deviation	N × 4 MHz
Resolution		< 0.02 % of set deviation, min. N × 0.1 Hz
FM deviation error	f_{mod} = 1 kHz, deviation ≤ N × 1 MHz	
	internal	< (2 % of setting + 20 Hz)
	external	< (3 % of setting + 20 Hz)
FM distortion	f_{mod} = 2 kHz, deviation = N × 1 MHz	< 0.2 %
Modulation frequency response	FM modes low noise and high deviation	
	DC coupling: 0 Hz to 100 kHz, AC coupling: 10 Hz to 100 kHz	< 3 dB
	FM mode normal	
	DC coupling: 0 Hz to 500 kHz, AC coupling: 10 Hz to 500 kHz	< 3 dB
Synchronous AM with FM	40 kHz deviation, f_{mod} = 1 kHz, f > 10 MHz	< 0.2 %
Carrier frequency offset with FM DC	after FM offset adjustment	< 0.2 % of set deviation



FM deviation versus frequency and operating mode.

Phase modulation

Modulation source		internal, external, internal + external
External coupling		AC, DC
Operating modes	φM modes low noise/normal/high deviation	
Maximum deviation	f ≤ 23.4375 MHz	2 rad
	f > 23.4375 MHz	
	φM mode normal	N × 4 rad
	φM mode low noise	N × 10 rad
	φM mode high deviation	N × 40 rad
Resolution		< 0.02 % of set deviation, min. N × 20 µrad
φM deviation error	f_{mod} = 1 kHz, deviation ≤ half of max. deviation	
	internal	< (2 % of setting + 0.003 rad)
	external	< (3 % of setting + 0.003 rad)
φM distortion	f_{mod} = 10 kHz, half of max. deviation	< 0.2 %
Modulation frequency response	φM modes low noise and high deviation	
	DC coupling: 0 Hz to 100 kHz, AC coupling: 10 Hz to 100 kHz	< 3 dB
	φM mode normal	
	DC coupling: 0 Hz to 500 kHz, AC coupling: 10 Hz to 500 kHz	< 3 dB



φM deviation versus frequency and operating mode.

Pulse modulation (R&S®SMB-K21 or R&S®SMB-K22 option)

When pulse modulation is activated, the R&S®SMB100A automatically switches to ALC state 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 S&H measurement is performed prior to each frequency or level setting or after switching RF on.

In the following cases, the nominal on level is present for approximately 2 ms during a S&H measurement after level or frequency setting or after switching RF on:

- No attenuator is installed (R&S®SMB-B112L/-B120L/-B140L frequency option)
- A mechanical step attenuator is installed (R&S®SMB-B120/-B131/-B140/-B140N frequency option)

For instruments with electronic step attenuator (R&S®SMB-B101/-B102/-B103/-B106 or R&S®SMB-B112 frequency option), the level during a sample and hold measurement is decreased by 30 dB:

- The R&S®SMB-K21 option is available for R&S®SMB-B112/-B112L/-B120/-B120L/-B131/-B140/-B140L/-B140N
- The R&S®SMB-K22 option is available for R&S®SMB-B101/-B102/-B103/-B106

Modulation source		external, internal
On/off ratio	level > 0 dBm for instruments without step attenuator	> 80 dB
Rise/fall time	10 % to 90 % of RF amplitude	
	23.4375 MHz < f ≤ 20 GHz	< 15 ns, < 5 ns (typ.)
	f > 20 GHz	< 15 ns, < 9 ns (typ.)
Minimum pulse width	50 %/50 % of RF amplitude	
	with R&S®SMB-B101, R&S®SMB-B102, R&S®SMB-B103, R&S®SMB-B106, R&S®SMB-B112, R&S®SMB-B112L, R&S®SMB-B120, R&S®SMB-B120L, R&S®SMB-B131, R&S®SMB-B140, R&S®SMB-B140L frequency options	20 ns
	with R&S®SMB-B140N frequency option	
	f ≤ 20.0 GHz	20 ns
	f > 20.0 GHz	30 ns
Pulse repetition frequency		0 Hz to 25 MHz
Video crosstalk for R&S®SMB-B101/-B102/-B103/-B106	spectral line of fundamental of 100 kHz pulse repetition frequency	< –25 dBc
Video crosstalk for R&S®SMB-B112/-B112L/-B120/-B120L/ -B140/-B140L/-B140N	spectral line of fundamental of 100 kHz pulse repetition frequency	< –30 dBc

Input for external modulation signals

Modulation input EXT for AM/FM/φM		
Connector type	MOD EXT on rear panel	BNC female
Input impedance	selectable	220 kΩ or 600 Ω (nom.)
Input sensitivity	peak value for set modulation factor or deviation	1 V (nom.)
Maximum input voltage		1 V (nom.)
Input damage voltage		±10 V
Modulation input PULSE EXT		
Connector type	PULSE EXT on rear panel	BNC female
Input impedance	selectable	10 kΩ or 50 Ω (nom.)
Input voltage	TTL, CMOS compatible, threshold low	0.5 V (nom.)
	TTL, CMOS compatible, threshold high	1.5 V (nom.)
Input damage voltage		± 5 V
Input polarity	selectable	normal, inverse

Modulation sources

Internal modulation generator (LF)

Waveforms		sine wave, square wave, sawtooth
Frequency range	sine wave	0.1 Hz to 1 MHz
	square wave, sawtooth	0.1 Hz to 20 kHz
Resolution of frequency setting		0.1 Hz
Frequency error	< (0.005 Hz + relative error of reference frequency × modulation frequency)	
Frequency response	sine wave, 0.1 Hz to 1 MHz	< 1 dB
Frequency setting time	to within < 1×10^{-7}, after IEC/IEEE bus delimiter	< 5 ms (meas.)
Distortion	sine wave, f ≤ 100 kHz at R_L > 200 Ω, V_p = 1 V	< 0.1 %
Output voltage range	V_p at LF connector, open circuit voltage	1 mV to 3 V
Resolution of output voltage setting		1 mV
Output voltage setting error	at 1 kHz, R_L ≥ 10 kΩ	< (1 % of setting + 1 mV)
Output impedance	selectable	10 Ω or 600 Ω (nom.)

LF frequency sweep

Operating mode		digital sweep in discrete steps
Trigger mode	free run	automatic
	full sweep	single
	execute one step	step
	external trigger only	start/stop
Trigger source		keyboard, external trigger, remote control
Trigger slope		positive, negative
Sweep range		full frequency range, min. 0.1 Hz
Sweep shape		triangle, sawtooth
Step spacing		linear, logarithmic
Step size setting resolution	linear	0.1 Hz
	logarithmic	0.01 %
Dwell time setting range		10 ms to 10 s
Dwell time setting resolution		0.1 ms

Pulse generator (R&S®SMB-K23 option)

The pulse generator is fully digital; the clock is derived directly from the instrument's reference frequency.

Pulse mode		single pulse, double pulse
Trigger modes	free run, internally triggered	automatic
		externally triggered, externally gated
Active trigger edge		positive or negative
Pulse period setting range		40 ns to 85 s
Pulse period setting resolution		10 ns
Pulse width setting range	pulse widths of double pulses can be set independently	10 ns to 1 s
Pulse width setting resolution		10 ns
Pulse delay setting range	with external trigger	10 ns to 1 s
Pulse delay setting resolution	with external trigger	10 ns
Double-pulse spacing setting range		20 ns to 1 s
Double-pulse spacing setting resolution		10 ns
External trigger delay		50 ns (meas.)
External trigger jitter of delay		< 10 ns
PULSE/VIDEO output signal	without load	digital signal 0 V/3.3 V (nom.)

Pulse train (R&S®SMB-K27 option)

The R&S®SMB-K27 option enhances the functionality of the pulse generator (R&S®SMB-K23 option). With this option, pulses and pulse sequences can be user-defined, e.g. to generate jittered or staggered pulse scenarios widely used in radar applications.

Pulse modes	setting of pulse width, pulse spacing and pulse sequences	user-programmable
Trigger modes		automatic (free run)
		externally triggered
Active trigger edge		positive or negative
Number of pulses		1 to 2047
Number of repetitions per pulse		1 to 65535
Pulse width and pulse spacing setting range		10 ns to 5 ms
Pulse width and pulse spacing setting resolution		10 ns

Stereo/RDS coder (R&S®SMB-B5 option)

The specifications apply to RF frequencies in the range from 66 MHz to 110 MHz. This option is only available for instruments equipped with the R&S®SMB-B101/-B102/-B103/-B106 frequency options.

Stereo modes	internal with modulation generator	L, R, R = L, R = –L
	external analog (via L and R inputs) or external digital (via S/P DIF input)	L, R, R = L, R = –L, R ≠ L
MPX frequency deviation range		0 Hz to 80 kHz
MPX frequency deviation setting resolution		10 Hz
AF frequency range	L, R signal	20 Hz to 15 kHz
AF frequency response	L, R signal (referenced to 500 Hz)	
	AF = 20 Hz to 40 Hz	< 0.3 dB
	AF = 40 Hz to 15 kHz	< 0.2 dB
Stereo crosstalk attenuation	AF = 1 kHz	> 50 dB
Distortion	67.5 kHz MPX frequency deviation, AF = 1 kHz	< 0.1 %
S/N ratio	stereo/RDS signal generator without preemphasis, receiver with deemphasis	
	ITU-R weighted (quasi-peak)	> 60 dB
	ITU-R unweighted (RMS)	> 70 dB
	A-weighted (RMS)	> 70 dB
Preemphasis	selectable	off, 50 µs, 75 µs
Pilot tone 19 kHz		
Frequency error		< 2 Hz
Deviation range		0 Hz to 10 kHz
Deviation setting resolution		10 Hz
Phase setting range		–5° to +5°
Phase setting resolution		0.1°
ARI/RDS subcarrier 57 kHz		
Frequency error		< 6 Hz
Deviation range		0 Hz to 10 kHz
Deviation setting resolution		10 Hz
ARI		
Identification modes	traffic announcement identification (DK), area identification (BK)	off, DK, BK, DK + BK
BK area identification		A to F
RDS		
Traffic program		off/on
Traffic announcement		off/on
Data set	user-selectable	1 to 5
Maximum data length		64 kbyte
Analog modulation inputs L, R		
Connector type	L and R on rear panel	BNC female
Input impedance	selectable	600 Ω or 100 kΩ (nom.)
Input sensitivity	peak value for set deviation	1 V (nom.)
Digital modulation input S/P DIF		
Connector type	S/P DIF on rear panel	BNC female
Input impedance		75 Ω (nom.)
Input voltage range	peak-to-peak voltage	400 mV to 5 V

Remote control

Interfaces	remote control	IEC 60625 (GPIB IEEE-488.2)
	Ethernet/LAN	10/100BASE-T
	USB	2.0 (high speed)
	serial	RS-232 [9]
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 E442x
		Agilent/HP E443x
		Agilent/HP E8663
		Agilent/HP E8257/67
		Agilent/HP N51xx Analog Parts
		Agilent/HP 8642
		Agilent/HP 8643A
		Agilent/HP 8644A/B
		Agilent/HP 8645
		Agilent/HP 8647A
		Agilent/HP 8648A/B/C/D
		Agilent/HP 8656A/B
		Agilent/HP 8657A/B
		Agilent/HP 8664/65
		Agilent N5161A, 5181A (MXG analog)
		Aeroflex/IFR 2023/2024
		Aeroflex/IFR 203x, 204x, 205x
		Panasonic PA8303
		R&S®SML
		R&S®SMT
		R&S®SMY
	additional command sets for instruments equipped with R&S®SMB-B112/B112L, R&S®SMB-B120/-B120L/-B131, R&S®SMB-B140/-B140L/-B140N	Anritsu 68017/37
		Agilent/HP 834x
		Agilent/HP 8360
		Agilent/HP 8362x
		Agilent/HP 83630
		Agilent/HP 8371x
		Agilent/HP 8373x
		Agilent/HP 8662/63
		Agilent/HP 8673
		Agilent N5183A (MXG microwave)
		Agilent E8257D; 8663 B/D (PSG analog)
		R&S®SMR
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

[9] Requires the R&S®TS-USB1 serial adapter (recommended extra).

Connectors

Front panel connectors

RF 50 Ω	RF output	
	R&S®SMB-B101/-B102/-B103/B-B106	N female
	R&S®SMB-B112/-B112L/-B120/-B120L	test port adapter, PC 3.5 mm female (interchangeable port connector system)
	R&S®SMB-B131/-B140/-B140L/-B140N	test port adapter, PC 2.92 mm female (interchangeable port connector system)
LF	modulation generator output	BNC female
MOD EXT	input for external analog modulation	BNC female

Rear panel connectors

REF IN	reference frequency input	BNC female
REF OUT	reference frequency output	BNC female
PULSE EXT	input for external pulse modulation	BNC female
PULSE VIDEO	pulse generator output	BNC female
INST TRIG	trigger input, TTL 5 V compatible	BNC female
SIGNAL VALID	output for triggering external devices; function 1: low state indicates that the instrument has settled to its final value function 2 [10]: If the pulse generator is active and pulse sync is enabled, a pulse sync signal is provided at the beginning of a pulse sequence (e.g. pulse train). Pulse sync is not available for a pulse sequence < 100 ns.	BNC female
L	stereo signal input for L signal, only available with R&S®SMB-B5 option	BNC female
R	stereo signal input for R signal, only available with R&S®SMB-B5 option	BNC female
S/P DIF	stereo signal input for digital stereo signal	BNC female
USB IN	USB 2.0 (high speed) remote control of instrument (USB-TMC)	USB type B
USB	USB 2.0 (high speed) connector for external USB devices, • Mouse and keyboard for enhanced operation • R&S®NRP-Zxx power sensors (with R&S®NRP-Z4 adapter cable) for external power measurements and level adjustment of instrument • Memory stick for software update and data exchange • USB serial adapter for RS-232 remote control	USB type A
LAN	provides remote control functionality and remote operation via VNC and file transfer via FTP	RJ-45
IEEE 488	remote control of instrument via GPIB	24-pin Amphenol series 57 female

[10] Requires the R&S®SMB-K23 option; only available for instruments with serial number > 102400.

General data

Power supply		
AC input voltage range		90 V to 264 V
AC supply frequency	100 V to 240 V	45 Hz to 66 Hz
	100 V to 120 V	380 Hz to 440 Hz
Max. input current		1.4 A (100 V) to 0.6 A (240 V)
	instruments with options	
	R&S®SMB-B101/-B102/-B103/-B106	60 W (meas.)
	R&S®SMB-B112	80 W (meas.)
	R&S®SMB-B120 and R&S®SMB-B31	90 W (meas.)
	R&S®SMB-B120, R&S®SMB-B25 and R&S®SMB-B31	105 W (meas.)
	R&S®SMB-B131/-B140/-B140N and R&S®SMB-B32	125 W (meas.)
	R&S® SMB-B131/-B140/-B140N, R&S®SMB-B26 and R&S®SMB-B32	140 W (meas.)
Power factor correction		in line with EN 61000-3-2
Electrical safety		
Compliance	80 % relative humidity for temperatures up to +31 °C, decreasing linearly to 50 % humidity at +55 °C	in line with IEC 61010-1, EN 61010-1, CAN/CSA-C22.2 No. 61010-1-04, UL 61010-1
Test mark		VDE-GS, CCSAUS
EMC		
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 B), EN 61000-3-2, EN 61000-3-3
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, const. 0.5 g at 55 Hz to 150 Hz, in line with EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E, method no. 516.4, procedure I
Environmental conditions		
Temperature range	operating	0 °C to +55 °C in line with DIN EN 60068-2-1, DIN EN 60068-2-2
	storage	–40 °C to +71 °C
Climatic resistance	+40 °C, 95 % relative humidity	in line with DIN EN 60068-2-78
Altitude	operating, max. ambient temperature = +45 °C	up to 4600 m (15000 ft)
	storage	up to 4600 m (15000 ft)
Dimensions and weight		
Dimensions (W × H × D)	instruments with R&S®SMB-B101/-B102/-B103/-B106 option	344 mm × 112 mm × 368 mm (13.5 in × 4.4 in × 14.5 in)
	instruments with R&S®SMB-B112/-B112L/-B120/-B120L/-B131/-B140/-B140L/-B140N option	344 mm × 112 mm × 418 mm (13.5 in × 4.4 in × 16.5 in)
Weight	when fully equipped	
	instruments with R&S®SMB-B101/-B102/-B103/-B106 option	5.3 kg (11.7 lb)
	instruments with R&S®SMB-B112 option	5.6 kg (12.3 lb)
	instruments with R&S®SMB-B120/-B120L/-B131/-B140/-B140/-B140N option	6.9 kg (15.2 lb)
Calibration interval		
Recommended calibration interval	when operated 40 h/week in the full range of the specified environmental conditions	3 years

Ordering information

Designation	Type	Order No.
Base unit		
RF and Microwave Signal Generator [11]	R&S®SMB100A	1406.6000.02
Including power cable, quick start guide and CD-ROM (with operating and service manual)		
Options		
RF path/frequency option		
9 kHz to 1.1 GHz	R&S®SMB-B101	1407.2509.02
9 kHz to 2.2 GHz	R&S®SMB-B102	1407.2609.02
9 kHz to 3.2 GHz	R&S®SMB-B103	1407.2709.02
9 kHz to 6 GHz	R&S®SMB-B106	1407.2909.02
100 kHz to 12.75 GHz, with electronic step attenuator	R&S®SMB-B112	1407.2109.02
100 kHz to 12.75 GHz, without step attenuator	R&S®SMB-B112L	1407.2150.02
100 kHz to 20 GHz, with mechanical step attenuator	R&S®SMB-B120	1407.2209.02
100 kHz to 20 GHz, without step attenuator	R&S®SMB-B120L	1407.2250.02
100 kHz to 31.8 GHz, with mechanical step attenuator	R&S®SMB-B131	1407.2280.02
100 kHz to 40 GHz, with mechanical step attenuator	R&S®SMB-B140	1407.2309.02
100 kHz to 40 GHz, without step attenuator	R&S®SMB-B140L	1407.2350.02
100 kHz to 40 GHz, with mechanical step attenuator, minimum pulse width limited	R&S®SMB-B140N	1407.2380.02
OCXO Reference Oscillator [12]	R&S®SMB-B1	1407.3005.02
OCXO Reference Oscillator, High Performance [12]	R&S®SMB-B1H	1407.3070.02
Stereo/RDS Coder [13]	R&S®SMB-B5	1407.3205.02
Harmonic filter option		
150 MHz to 20 GHz (only available with R&S®SMB-B120/-B120L)	R&S®SMB-B25	1407.1660.02
150 MHz to 40 GHz (only available with R&S®SMB-B131/-B140/-B140L/-B140N)	R&S®SMB-B26	1407.1760.02
Reverse Power Protection (only available with R&S®SMB-B112, R&S®SMB-B112L)	R&S®SMB-B30	1407.1160.02
High-power option		
50 MHz to 20 GHz (only available with R&S®SMB-B120/-B120L)	R&S®SMB-B31	1407.1260.02
50 MHz to 40 GHz (only available with R&S® SMB-B131/-B140/-B140L/-B140N)	R&S®SMB-B32	1407.1360.02
Pulse Modulator, for R&S®SMB-B112/-B112L/-B120/-B120L/-B131/-B140/-B140L/-B140N	R&S®SMB-K21	1407.3811.02
Pulse Modulator, for R&S®SMB-B101/-B102/-B103/-B106	R&S®SMB-K22	1407.3770.02
Pulse Generator	R&S®SMB-K23	1407.3786.02
Pulse Train [14]	R&S®SMB-K27	1407.3828.02
Recommended extras		
19" Rack Adapter	R&S®ZZA-S234	1109.4493.00
Power Sensor, 9 kHz to 6 GHz, for levels up to 33 dBm; incl. USB adapter cable	R&S®NRP-Z92	1171.7005.42
Power Sensor, DC to 40 GHz, for levels up to 20 dBm	R&S®NRP-Z55	1138.2008.03
Power Sensor, 10 MHz to 18 GHz, for levels up to 33 dBm	R&S®NRP-Z22	1137.7506.02
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
Adapters for instruments with an R&S®SMB-B112/-B112L/-B120/-B120L frequency option		
Test port adapter, PC 3.5 mm female		1021.0512.00
Test port adapter, PC 3.5 mm male		1021.0529.00
Test port adapter, N female		1021.0535.00
Test port adapter, N male		1021.0541.00
Adapters for instruments with an R&S®SMB-B131/-B140/-B140L/-B140N frequency option		
Test port adapter, 2.4 mm female		1088.1627.02
Test port adapter, 2.92 mm female		1036.4790.00
Test port adapter, 2.92 male		1036.4802.00
Test port adapter, N female		1036.4777.00
Test port adapter, N male		1036.4783.00

[11] The base unit must be ordered together with an R&S®SMB-B101/-B102/-B103/-B106/-B112/-B112L/-B120/-B120L/-B131/-B140/-B140L/-B140N frequency option.

[12] Only one of the R&S®SMB-B1 or R&S®SMB-B1H option can be installed.

[13] Only available with an R&S®SMB-B101, R&S®SMB-B102, R&S®SMB-B103 or R&S®SMB-B106 frequency option.

[14] Requires the R&S®SMB-K23 option; only available for instruments with serial number > 102400.

Designation	Type	Order No.
Documentation		
Documentation of Calibration Values	R&S®DCV-2	0240.2193.18
DKD (ISO 17025) Calibration including ISO 9000 calibration	R&S®SMB-DKD	1161.3607.02

Warranty		
Base unit		3 years
All other items		1 year
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 with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	

Extended warranty with a term of one and two years (WE1 and WE2)
Repairs carried out during the contract term are free of charge [15]. Necessary calibration and adjustments carried out during repairs are also covered.

Extended warranty with calibration coverage (CW1 and CW2)
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 [15] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

For product brochure, see PD 5213.8396.12 and www.rohde-schwarz.com

[15] 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, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

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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R&S®SMB100A RF and Microwave Signal Generator
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