

# R&S® SMB100B MICROWAVE SIGNAL GENERATOR

Versatile, functional, up to 40 GHz,  
with upconverter up to 170 GHz



Product Brochure  
Version 04.00



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# AT A GLANCE

The versatile R&S®SMB100B microwave signal generator with a frequency range up to 40 GHz provides outstanding spectral purity and high output power in addition to easy operation and comprehensive functionality.

The R&S®SMB100B provides microwave characteristics that are exceptional in its class, making it an excellent general-purpose instrument that is ideal for a wide range of applications. The R&S®SMB100B is optimally suited for use in development, production and service, or wherever an analog microwave signal is required.

Its wide frequency range covers a large number of challenging applications. The R&S®SMB100B is the perfect choice for measuring the blocking characteristic up to a CW frequency of 12.75 GHz, as specified in various telecommunications standards. For frequently changing level settings a wear-and-tear-free electronic step attenuator is used up to 20 GHz.

Four frequency options, up to 12.75 GHz, 20 GHz, 31.8 GHz or 40 GHz, are available for the microwave range. These options are suitable for tests on radar systems and antennas in the X and K bands. For even higher frequencies, the frequency range of the R&S®SMB100B can be easily extended with the R&S®SZM frequency multiplier. This combination provides easy handling as well as precise, adjustable output levels in the frequency range from 50 GHz to 170 GHz.

In addition to pure CW signals, the R&S®SMB100B also provides the most common analog AM and FM/φM modes. Moreover, the R&S®SMB100B can be equipped with an excellent pulse generator and pulse modulator which makes it possible to generate user-programmable pulse scenarios, or “pulse trains”.

# KEY FACTS

- ▶ Wide frequency range from 8 kHz to 40 GHz
- ▶ Frequency extension from 50 GHz to 170 GHz with the R&S®SZM frequency multiplier
- ▶ Excellent signal characteristics with low SSB phase noise of  $-112$  dBc (meas.) (at 10 GHz, 20 kHz offset)
- ▶ High output power of up to  $+25$  dBm at 20 GHz (meas.) and  $+19$  dBm at 40 GHz (meas.)
- ▶ All important analog modulations with AM, FM/φM and pulse modulation options
- ▶ Compact size at just two height units

# BENEFITS

- All-purpose signal source  
▶ page 6
- Best signal quality in the mid-range  
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- High output power and wide level range  
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- Ideal for production  
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- Ready for aerospace and defense applications  
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- Frequency extension from 50 GHz to 170 GHz  
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- User-defined correction of external frequency responses  
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- Closed loop power control  
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- Flexible service concept  
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# MODEL OVERVIEW

## Hardware and software option concept for the R&S®SMB100B analog microwave signal generator

Frequency range	8 kHz to 12.75 GHz	8 kHz to 20 GHz	8 kHz to 31.8 GHz	8 kHz to 40 GHz
Frequency option	R&S®SMBB-B112	R&S®SMBB-B120	R&S®SMBB-B131	R&S®SMBB-B140(N)
With electronic step attenuator (entire frequency range)	•			–
With electronic step attenuator up to 20 GHz or with mechanical step attenuator (entire frequency range)		–		•
High power		R&S®SMBB-K33		R&S®SMBB-K35
Low harmonic filter (for f > 2 GHz)			•	
OCXO reference oscillator <sup>1)</sup>			R&S®SMBB-B1	
OCXO reference oscillator, high performance <sup>1)</sup>			R&S®SMBB-B1H	
100 MHz, 1 GHz ultra-low-noise reference input and output			R&S®SMBB-B3	
Flexible reference input, from 1 MHz to 100 MHz			R&S®SMBB-K704	

- Standard.
- Not available.

<sup>1)</sup> Only one of the following options can be installed: R&S®SMBB-B1 (OCXO reference oscillator) or R&S®SMBB-B1H (OCXO reference oscillator, high performance).

Frequency range	8 kHz to 12.75 GHz	8 kHz to 20 GHz	8 kHz to 31.8 GHz	8 kHz to 40 GHz
Frequency option	R&S®SMBB-B112	R&S®SMBB-B120	R&S®SMBB-B131	R&S®SMBB-B140(N)
AM/FM/φM			R&S®SMBB-K720	
Pulse modulator			R&S®SMBB-K22	
Pulse generator			R&S®SMBB-K23	
Multifunction generator			R&S®SMBB-K24	
Pulse train (pulse modulator is a prerequisite) <sup>2)</sup>			R&S®SMBB-K27	
R&S®SzM frequency multiplier control via USB by the R&S®SMB100B microwave signal generator			R&S®SMBB-K554	
Health and utilization monitoring service (HUMS)			R&S®SMBB-K980	
Remote control interface (GPIB and USB)			R&S®SMBB-K986	
Removable SD card			R&S®SMBB-B85	
Spare SD card			R&S®SMBB-Z10	

<sup>2)</sup> Requires the R&S®SMBB-K23 option.

<sup>3)</sup> Not for R&S®SMBB-B112.



Rear view of the R&S®SMB100B

# ALL-PURPOSE SIGNAL SOURCE

## Wide frequency range from 100 kHz to 40 GHz

The signal generator's wide frequency range, high output power and a wide variety of modulations make it a flexible signal source for a broad scope of applications. Its frequency option up to 12.75 GHz covers ISM bands as well as all important mobile radio bands. In addition, the frequency options up to 20 GHz and 40 GHz cover numerous microwave applications that require high spectral purity and high output power.

## All important analog modulations with AM, FM/φM and pulse modulation supported

The R&S®SMB100B handles the important AM and FM/φM analog modes and pulse modulation with excellent characteristics. In AM and FM/φM, the RF carrier is modulated with the internal LF generator or external signals. The two different sources of modulation can be internally added to generate two-tone-modulated signals. Due to its digital modulation processing, the R&S®SMB100B implements the modulation modes with high accuracy and minimal distortion.

## Support for R&S®NRP power sensors

The R&S®SMB100B supports a wide variety of R&S®NRP USB power sensors. The R&S®NRP40T(N) is a power sensor that ideally complements the frequency and level range of the generator up to 40 GHz. Equipped with such a power sensor, the R&S®SMB100B performs fully automated external level correction or precisely measures the power in the test setup.

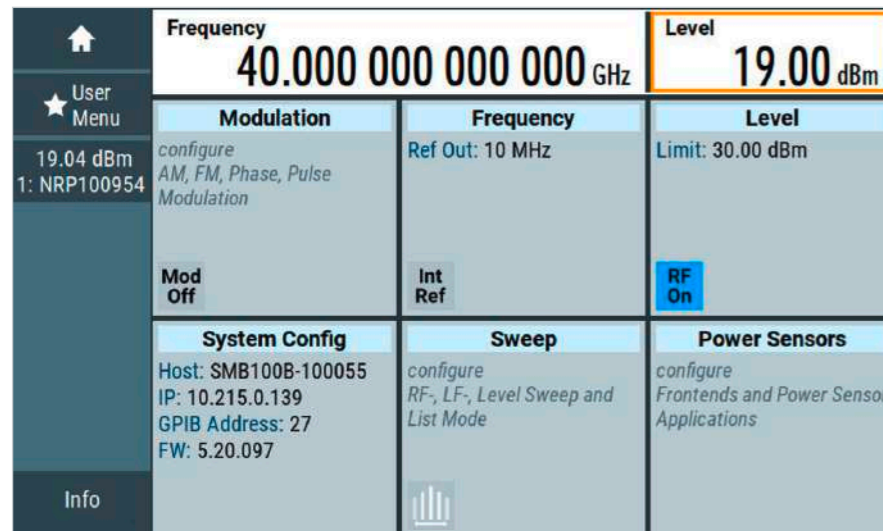
## Intuitive user interface

Intuitive operation via the graphical user interface and the integrated help system facilitate optimal use of the R&S®SMB100B for the application at hand. For graphical operation, a mouse can be connected via USB.

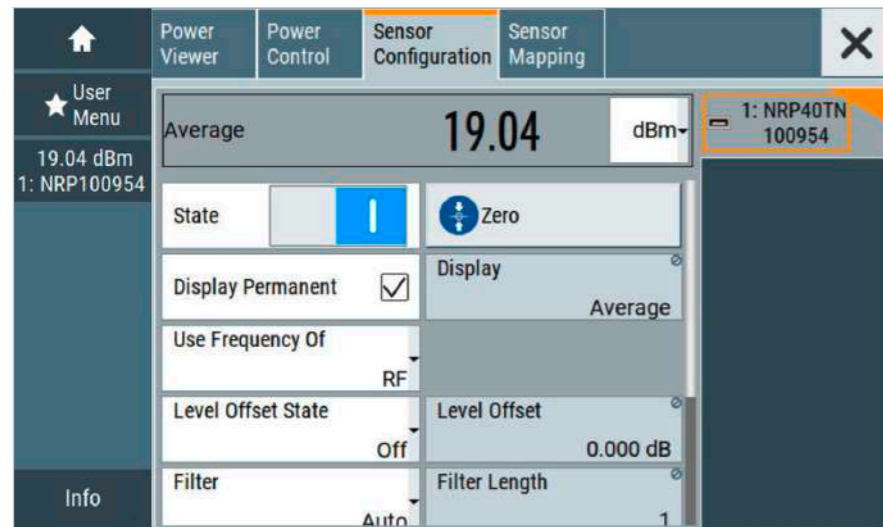
## Remote control via LAN, USB and GPIB including emulation modes

The R&S®SMB100B is also ideally equipped with regard to the remote control interface. In addition to LAN as standard, it also supports optional GPIB and USB. Signal generators are often used in automated test environments. Replacing them – e.g. due to malfunction or a standard replacement procedure – requires special care. The replacement part and the replaced part must be compatible at least in terms of electrical and remote control features. Legacy instruments often use a proprietary remote control language. Direct replacement therefore requires language emulation capability in the software of the replacement part.

To meet these requirements, the R&S®SMB100B signal generator comes with a language emulation feature. By selecting the desired language emulation, the signal generator acts like the instrument it replaced. The language list already includes a large number of emulated instruments and is updated on a regular basis.

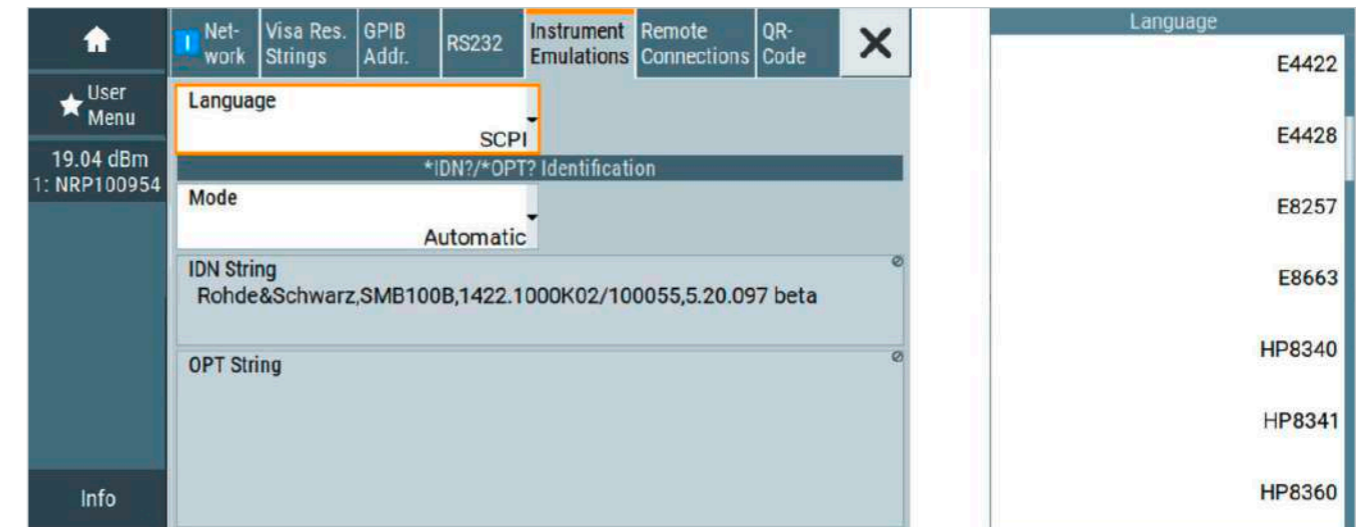


Output power measured with the R&S®NRP40TN thermal power sensor



Details of the measurement with the R&S®NRP40TN thermal power sensor

The emulation mode can be set in the remote setup menu of the R&S®SMB100B.



# BEST SIGNAL QUALITY IN THE MID-RANGE

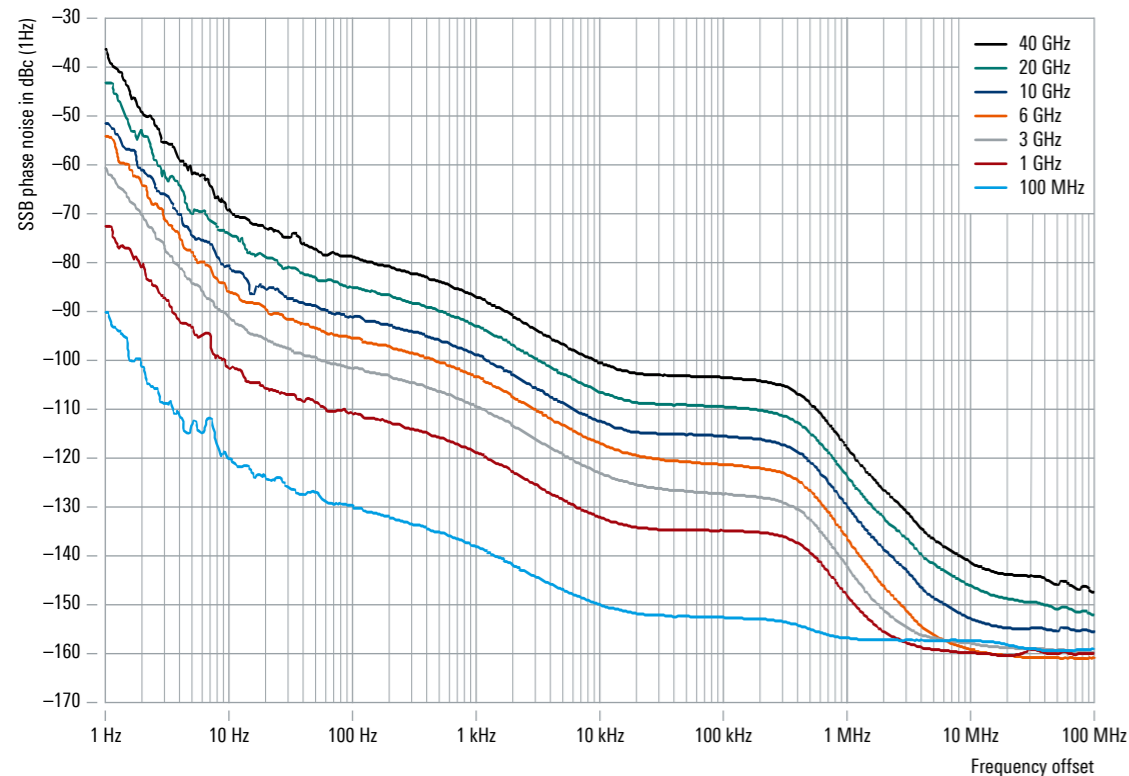
Phase noise, harmonics, nonharmonic spurious and wideband noise are key parameters when it comes to characterizing the spectral performance of analog signal generators. Many measurements focus on more than one aspect simultaneously. For example, in blocking measurements, a combination of nonharmonics and phase noise is essential when generating the usually unwanted radio frequency interference (RFI) power in the adjacent channel.

## Very low SSB phase noise

When it comes to SSB phase noise performance, the R&S®SMB100B consistently achieves excellent values over the entire frequency range from 8 kHz to 40 GHz. This is due to its remarkable concept. Below 3 GHz, the R&S®SMB100B works down to 80 MHz with frequency dividers. Below this value, the integrated DDS synthesizer generates the output signal directly. In contrast to conventional designs that use a mixer range below approximately 250 MHz, the innovative Rohde&Schwarz solution

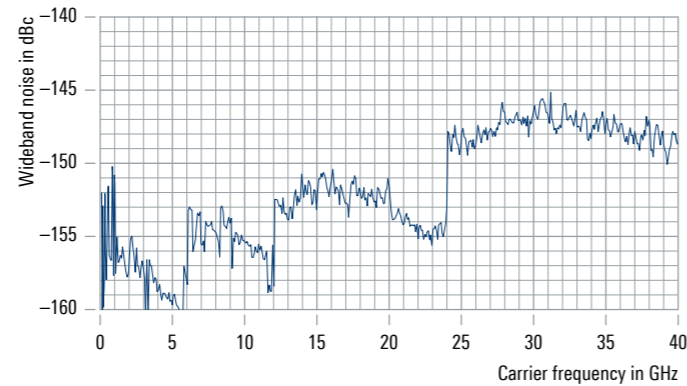
## SSB phase noise

Measured SSB phase noise with the R&S®SMBB-B1H OCXO option



## Wideband noise

Measured wideband noise with the R&S®SMBB-B140(N) frequency option



demonstrates much better phase noise performance at low frequencies. The R&S®SMB100B is therefore the ideal replacement in test circuits for fixed-frequency high-end crystal oscillators, often used as a reference signal.

The R&S®SMB100B combines equal or even improved signal performance with adjustable frequency and level, which is highly beneficial because it can be ideally adapted to the DUT. Moreover, the R&S®SMB100B makes it possible to define the DUT tolerance range relative to the reference by varying these parameters. To further improve close-in phase noise and frequency stability, two different OCXO reference oscillators are available as options. The R&S®SMB-B1H in particular offers excellent performance unprecedented in its class.

## Standard internal low harmonic filter to lower the harmonics to less than -55 dBc for f > 2 GHz

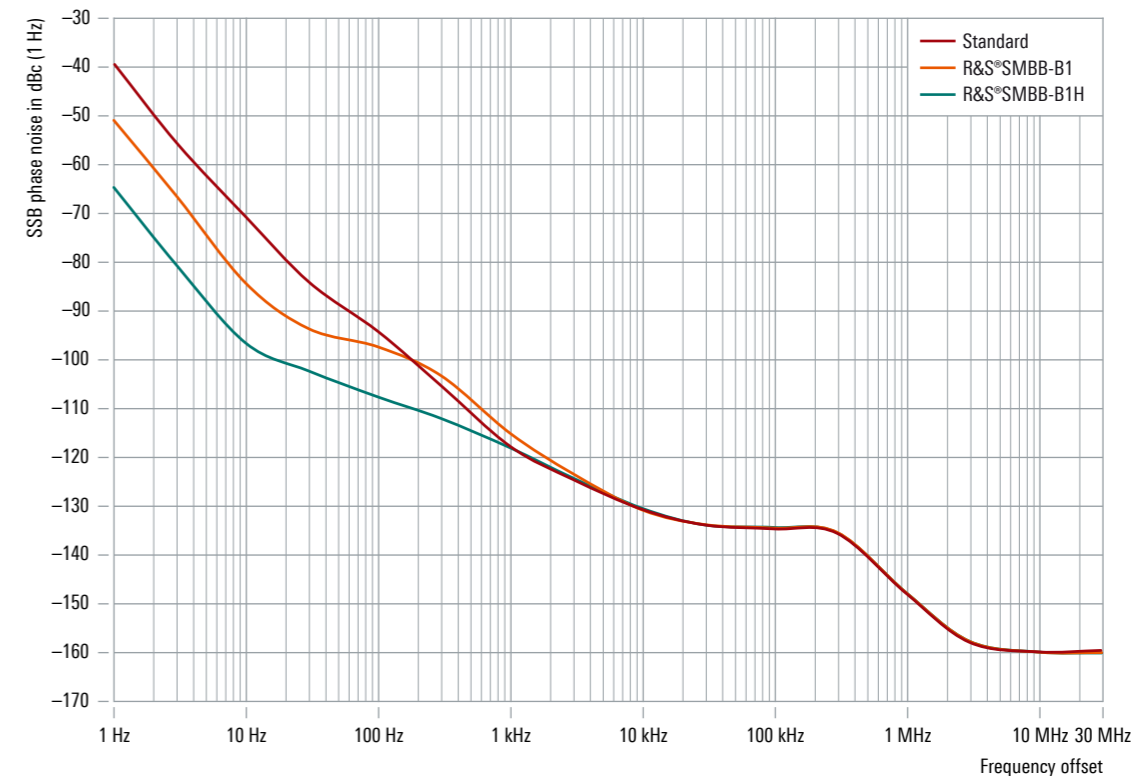
The harmonics of the R&S®SMB100B microwave signal generator are significantly reduced with its standard low harmonic filter. The low harmonic filter generally improves measurement accuracy in the entire setup for frequencies higher than 2 GHz.

Some devices such as wideband receivers are affected by bad harmonics. During blocking tests, the harmonics of the signal generator can fall into the desired band and interfere the measurement result.

Measuring the total harmonic distortion (THD) of a power amplifier is another critical application for signal generators. The setup comprises a signal generator, which produces the input signal, the DUT and a spectrum analyzer for measuring amplifier performance. The harmonics must be low enough to ensure that the harmonic distortion of the device under test is measured and not the harmonics of the signal source. Finally, for scalar network analysis, good dynamic range of the overall setup is essential. Bad harmonics from the signal source will limit dynamic range, since the harmonics are unintentionally measured as well.

## SSB phase noise

Measured SSB phase noise at 1 GHz with standard reference, the R&S®SMBB-B1 OCXO option and the R&S®SMBB-B1H high performance OCXO option



# HIGH OUTPUT POWER AND WIDE LEVEL RANGE

## High power over a wide frequency range

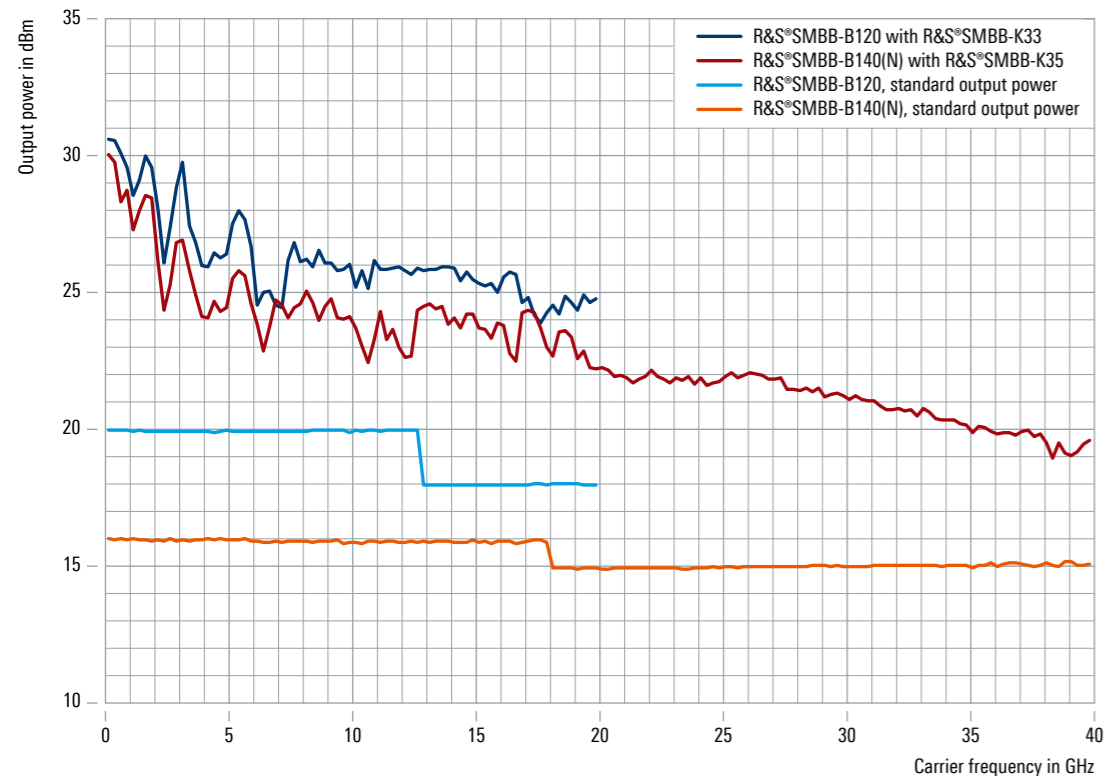
The R&S®SMB100B combines excellent signal quality with a standard output power of > +20 dBm (meas.) up to 12.75 GHz and +18 dBm (meas.) up to 20 GHz. The optional maximum available output power is at least +24 dBm (meas.) in the same frequency range, offering sufficient power reserve to easily compensate for level loss in a test setup.

When the R&S®SMBB-B131 or R&S®SMBB-B140 frequency option is installed, the standard output power is +16 dBm (meas.) up to 18 GHz and +15 dBm (meas.) up to 40 GHz. With the high output power option, standard output power is at least +22 dBm (meas.) up to 20 GHz and at least +19 dBm (meas.) up to 40 GHz. This usually eliminates the need for an additional external amplifier, which saves space and also drastically reduces the cost of the test system.

In applications, users additionally benefit from the high level accuracy that the R&S®SMB100B provides, a level accuracy that is not necessarily provided if an external amplifier is used.

## Output power

Measured output power for the base unit with the R&S®SMBB-B120/-B140(N) frequency options and with the R&S®SMBB-K33/-K35 high-output power options



## Low level range with no compromise in quality

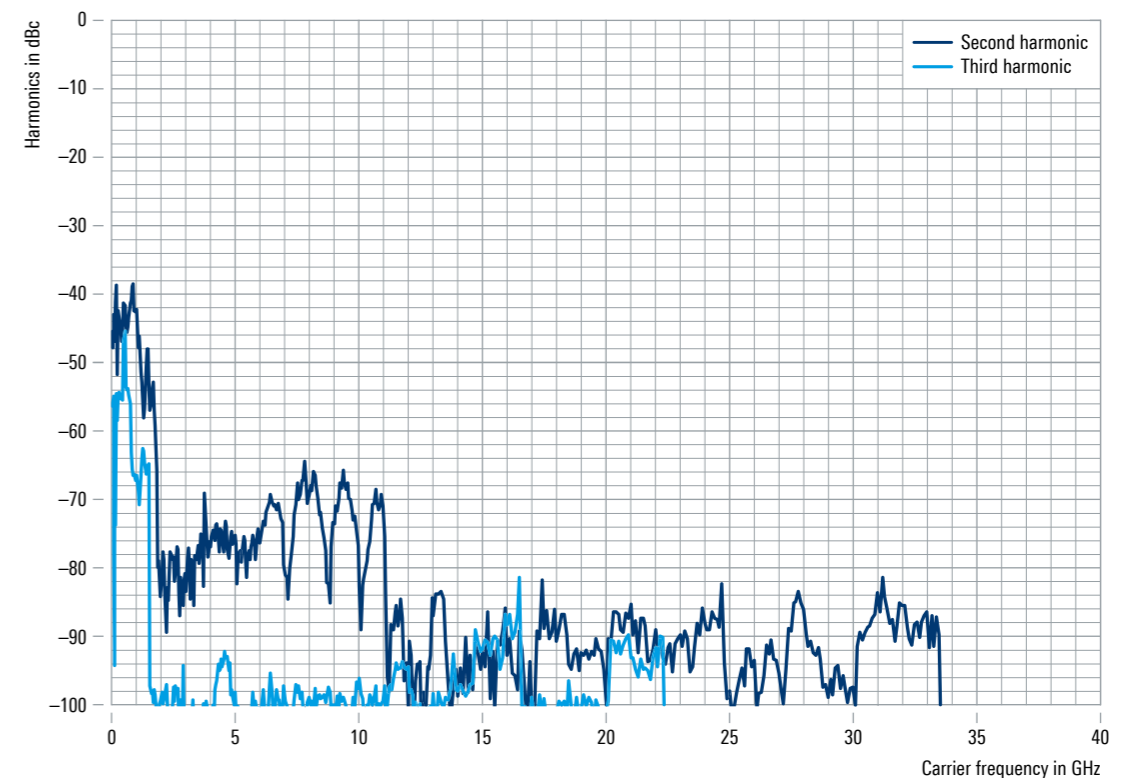
Even in the lower level range, the R&S®SMB100B does not compromise on quality. Its specified RF level is -127 dBm for frequencies of > 200 kHz with its standard step attenuator. This makes the generator ideal for sensitivity measurements on receivers.

## High harmonics suppression even at high output power

A unique feature of the R&S®SMB100B is that even at high output power, harmonics are still suppressed with < -55 dBc and  $f > 2$  GHz, ideal for amplifier design applications up to 40 GHz. Nonharmonics are even suppressed by as much as < -82 dBc at 1 GHz (spec.), for instance, or -64 dBc at 10 GHz (spec.).

## Harmonics

Measured harmonics, second and third order, with R&S®SMBB-B112/-B120/-B131/-B140(N), CW, level = +10 dBm



# IDEAL FOR PRODUCTION

## Wear-free electronic attenuator

The R&S®SMB100B wear-free electronic attenuator – in the frequency range up to 20 GHz – functions reliably, even when level values frequently change. The result is high availability in the test system and long service intervals, even in the case of heavy use in production. Devices with the 31.8 GHz or 40 GHz frequency option are equipped with a mechanical attenuator over the entire frequency range and up to 20 GHz with an electronic attenuator. So, for frequencies up to 20 GHz, the user can choose either the electronic or the mechanical attenuator.

## High level accuracy and repeatability for high production yield

The R&S®SMB100B offers high level accuracy and repeatability, as well as a very high level sweep range over the entire range. Measurements within narrow limits can be performed with high reproducibility, boosting production yield.

## Closed loop power control

Highly accurate and stable power for testing DUTs is a very important performance requirement in many applications. The real power directly applied to the DUT is affected by cables, modules and components between the signal generator and the DUT. By measuring the

incident power to the DUT with an R&S®NRP power sensor and feeding the measurement result back to the R&S®SMB100B signal generator, the R&S®SMB100B can compensate for losses or drifts in the entire setup.

## Short frequency and level settling times

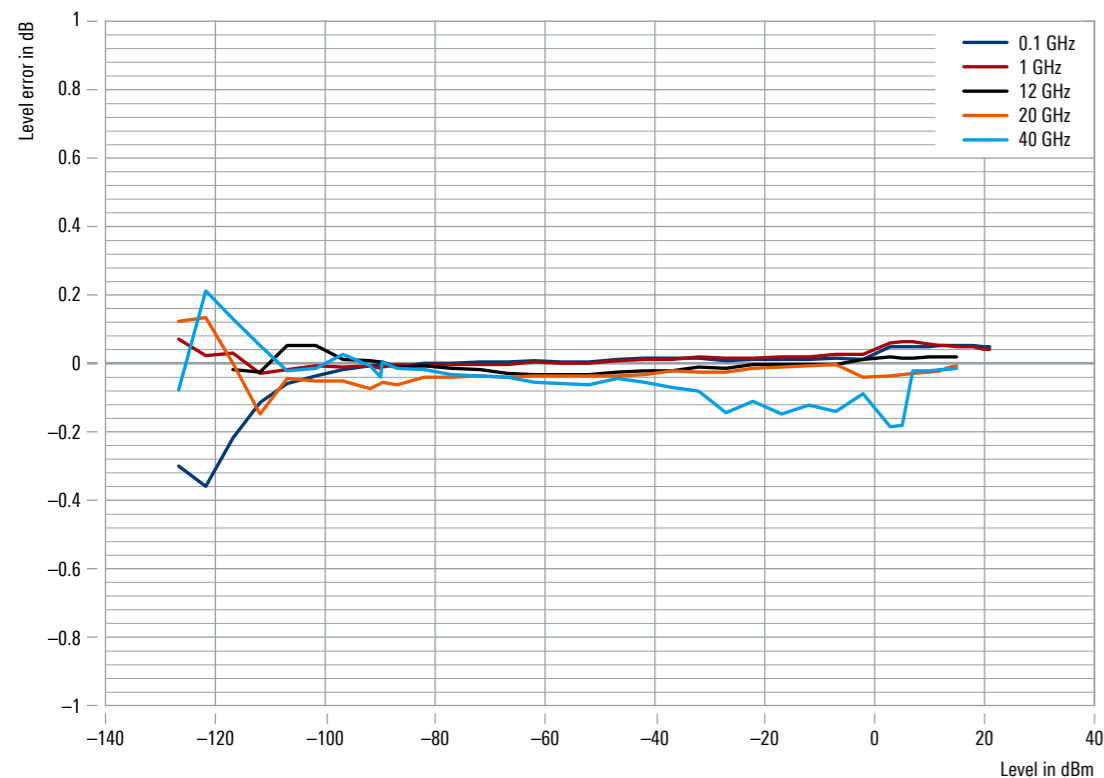
Another criterion in production is short settling time of the test instrument in order to achieve high throughput. The R&S®SMB100B meets this requirement by achieving short frequency (< 2.5 ms) and level (< 2.3 ms) settling times up to 40 GHz.

## Low power consumption

The R&S®SMB100B combines very low power consumption and effective heat dissipation. Its power consumption of only 140 W (40 GHz model) reduces expenditures for cooling in a production line rack. The efficient design of the R&S®SMB100B also has a positive impact on the MTBF.

## Level linearity

Measured level linearity, ALC ON, with the R&S®SMBB-B140 frequency option and with the R&S®SMBB-K35 high output power option



# READY FOR AEROSPACE AND DEFENSE APPLICATIONS

## Optional high-performance pulse modulator and pulse generator

Pulsed signals are frequently required in aerospace and defense applications to test radar systems. To meet this need, the R&S®SMB100B can be equipped with an integrated pulse modulator (R&S®SMBB-K22) and a pulse generator (R&S®SMBB-K23) with superb characteristics such as a minimum pulse width of 20 ns for radar system testing. The pulse modulator, for example, makes it possible to perform radar tests with a high on/off ratio of > 80 dB and very short rise/fall times of < 5 ns (meas.). The pulse modulator is either controlled by an external pulse signal or is supplied with single or double pulses or pulse trains as modulation signals by the internal pulse generator.

## Versatile pulse trains

An optional feature of the built-in pulse generator is an option to generate pulse trains (R&S®SMBB-K27 option), which are commonly used for radar applications. An example of a pulse train is shown in the figure below. In contrast to a single or double pulse, a pulse train is a combination of different pulses, which can be a periodic or

non-periodic set of pulses. Pulse width and pulse pause can be set individually and separately for each pulse. This makes it possible to generate staggered pulses or apply jitter to pulse width and pulse pause. Up to 2047 different pulses with a repetition of 1 to 32 768 are possible. This yields very long pulse train sequences for testing.

## Wide temperature range and high permissible operating altitude

The R&S®SMB100B functions reliably under extreme conditions, owing to its wide temperature range of 0°C to +55°C and a maximum permissible operating altitude of 4600 m above sea level.

## Sanitizing of user data for secured areas

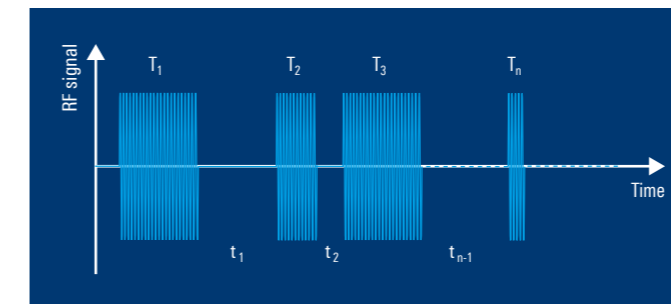
To meet requirements for secured areas, an erase and sanitize procedure has been developed that reliably erases user data from the instrument. This ensures that no sensitive data leaves the secured area. Moreover, LAN and USB ports can be disabled with a security password and the display can be disabled as well.

## High-quality shielding

Sensitivity measurements on low-noise satellite receivers can only be made with RF-leakage-proof signal sources. The comprehensive shielding of the R&S®SMB100B based on sophisticated technologies ensures low RF leakage exactly for this purpose.

## Pulse train

Combination of pulses with different pulse widths and pulse pauses



## Editing pulse train data

ON-Time (µs)	OFF-Time (µs)	Count
10.00	20.00	1
30.00	5.00	1
5.00	5.00	3
20.00	10.00	1
10.00	10.00	1

## Diagram of the pulse train



# FREQUENCY EXTENSION FROM 50 GHz TO 170 GHz

Frequencies in the range from 50 GHz to 170 GHz can be easily generated with the R&S®SMB100B signal generator (20 GHz, 31.8 GHz or 40 GHz model) plus an external R&S®SZM frequency multiplier. The frequency multiplier family consists of the models R&S®SZM75 (from 50 GHz to 75 GHz), R&S®SZM90 (from 60 GHz to 90 GHz), R&S®SZM110 (from 75 GHz to 110 GHz), R&S®SMZ140 (from 90 GHz to 140 GHz) and the R&S®SZM170 (from 110 GHz to 170 GHz). An additional attenuator is required to change the output power of the frequency multiplier. For simpler handling, the attenuator is integrated into the same housing as the frequency multiplier.

The R&S®SZM can be easily controlled by the R&S®SMB100B microwave signal generator via USB link. To enable control of the R&S®SZM via USB, the R&S®SMBB-K554 option must be installed on the R&S®SMB100B signal generator. This combination operates as a single unit, allowing users to directly enter the desired frequency and the target level at the R&S®SZM output on the R&S®SMB100B GUI.



R&S®SZM170 frequency multiplier including mechanically controlled attenuator

Compared with conventional setups, this one-box solution significantly simplifies setup and operation. The R&S®SMB100B receives all necessary data from the connected R&S®SZM, such as the configuration, the multiplication factor and in particular the precalibrated frequency response. The R&S®SMB100B can perform automatic correction, which ensures that the frequency and level values set on the R&S®SMB100B will actually be available at the R&S®SZM output. Costly, error-prone and time-consuming level measurement using level detectors or power sensors, which is common for conventional setups, is no longer required.

Signals in the frequency range from 50 GHz to 170 GHz are used in both the civil sector and in aerospace and defense applications. Here, the R&S®SMB100B microwave signal generator in combination with the R&S®SZM frequency multiplier is mainly used as a local oscillator (LO). An ideal CW signal with high spectral purity and an accurate level is required. The easiest way to obtain this signal is to use the R&S®SMB100B plus the R&S®SZM frequency multiplier with built-in electronically controlled attenuator: the frequency and the level are set on the R&S®SMB100B and measurement can begin immediately.

# USER-DEFINED CORRECTION OF EXTERNAL FREQUENCY RESPONSES

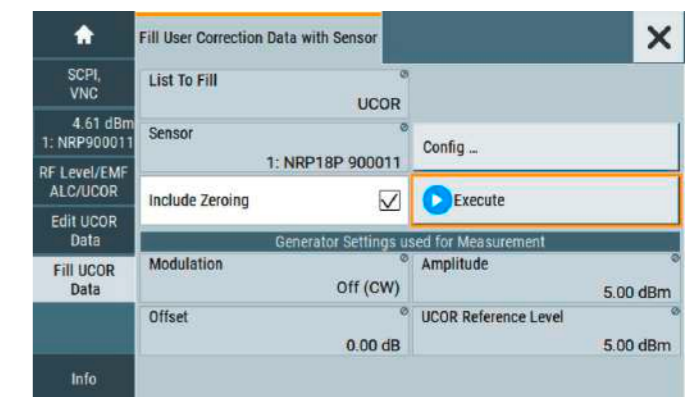
Test setups including cables, power amplifiers and filters always have frequency responses. The signal generator can compensate for the frequency response. The R&S®SMB100B features the user correction function for precisely this purpose. For a known frequency response that needs to be corrected, the user can enter the level correction values as a function of the frequency. Automatic interpolation of the correction values is performed between these frequency points. To simplify this, the R&S®SMB100B can also automatically include the level correction values at the press of a button by using a directly connected R&S®NRP18P power sensor.

The screenshots show the frequency response correction for an RF cable up to 10 GHz. Without frequency response correction, the level error (measured with the R&S®NRP18P) amounts to approximately 1.5 dB at 10 GHz due to cable loss. Once the correction values in the range from 8 GHz to 10 GHz have been automatically measured and stored with the R&S®NRP18P, the level error is automatically compensated for when the user correction function is activated.

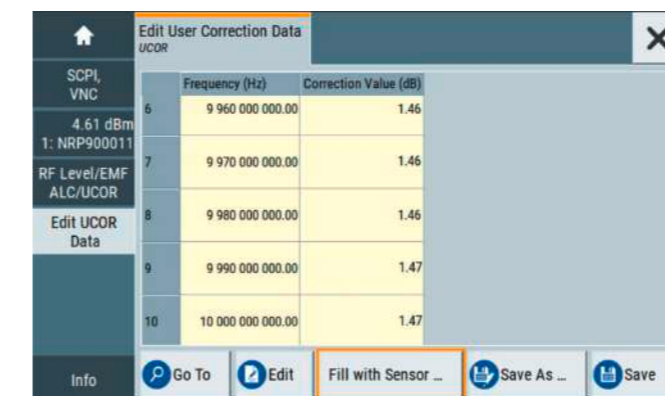
Without frequency response correction of the RF cable, the level error (measured with the R&S®NRP18P power sensor) is approximately 1.5 dB at 10 GHz (nominal value: 5 dBm).



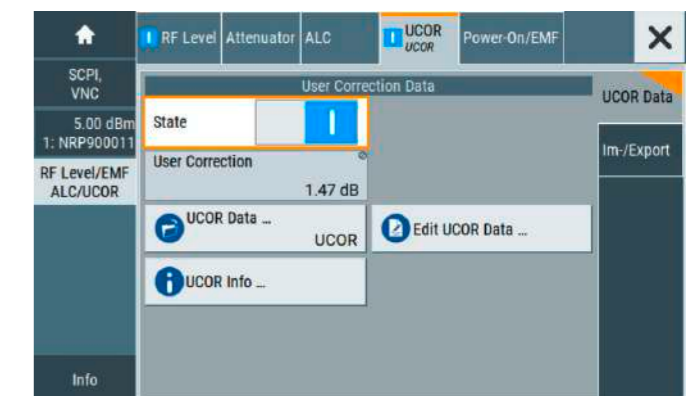
The R&S®NRP18P power sensor automatically measures and stores the frequency response of the RF cable.



The measured level correction values are stored in a table with the user-selected frequencies.



After the user correction table has been activated, the R&S®SMB100B adapts its output power to compensate for the frequency response of the RF cable.



# CLOSED LOOP POWER CONTROL

One important performance requirement in many applications is generating highly accurate and stable power for testing DUTs (e.g. power amplifiers). This is not a trivial task since the real power directly applied to the DUT is affected by the level accuracy of the signal generator, losses due to cables, losses due to modules or components and, last but not least, by mismatching. In addition, the frequency response of an amplifier in the setup might show an unwanted temperature dependency.

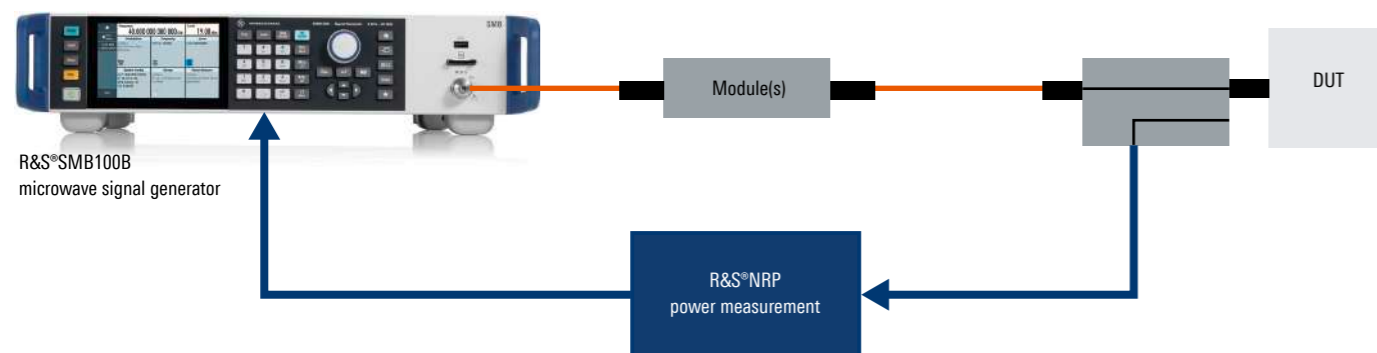
The best solution to this problem is closed loop power control – a standard feature of the R&S®SMB100B. In the setup below, it ensures highly accurate and very stable input power to the DUT, irrespective of unwanted power drifts or changes in the setup.

For measuring DUT input power, a directional coupler plus the R&S®NRP power sensor connected to a directional coupler can be used. An attractive alternative to the directional coupler plus the R&S®NRP power sensor is the R&S®NRP-Z28 level control sensor. The measurement result from the R&S®NRP power sensor or the R&S®NRP-Z28 is fed back to the R&S®SMB100B, which immediately adjusts its output power to compensate for the discrepancy between desired and measured level.

The 1GP141 application note describes in great detail the closed loop power control function, signals that can be used, suitable signal generators and R&S®NRPxx power sensors and what must be taken into account. The note is available for download from the Rohde&Schwarz web page: [www.rohde-schwarz.com/appnote/1GP141](http://www.rohde-schwarz.com/appnote/1GP141)

## Closed-loop power control

Closed-loop power control ensures highly accurate and stable input power to the DUT irrespective of unwanted power drifts or changes in the setup.



- Loss/gain
- Mismatch
- Cable loss

# FLEXIBLE SERVICE CONCEPT

## Servicing on-site or at a Rohde & Schwarz service center

The R&S®SMB100B is designed for maximum reliability and easy servicing to maximize uptime in all application fields and significantly reduce cost of ownership. Customers can choose between calling on a certified Rohde&Schwarz service center as usual or servicing the instrument themselves.

## Built-in self-test of modules to support troubleshooting

A built-in self-test carries out an operational check of the instrument and serves as a troubleshooting aid during servicing. The simple and straightforward architecture with very few modules cuts the time required for troubleshooting and repair to a minimum. A simple function check is usually sufficient to ensure the outstanding specifications of the R&S®SMB100B. Do-it-yourself servicing can be completed in just 45 minutes on average.

## Complete calibration only every three years

A complete calibration is recommended for the R&S®SMB100B only every three years and can, of course, also be performed on-site.

# SPECIFICATIONS IN BRIEF

## Specifications in brief

### Frequency

Frequency range	R&S®SMBB-B112	8 kHz to 12.75 GHz
	R&S®SMBB-B120	8 kHz to 20 GHz
	R&S®SMBB-B131	8 kHz to 31.8 GHz
	R&S®SMBB-B140/-B140N	8 kHz to 40 GHz
Settling time	R&S®SMBB-B112/-B120	< 2.2 ms
	R&S®SMBB-B131/-B140/-B140N	< 2.5 ms

### Level

Maximum specified output power (PEP)	R&S®SMBB-B112/-B120	
	80 MHz < f ≤ 6 GHz	+21 dBm
	6 GHz < f ≤ 20 GHz	+20 dBm
	R&S®SMBB-B131/-B140/-B140N	
	80 MHz < f ≤ 3 GHz	+19 dBm
	3 GHz < f ≤ 18 GHz	+17 dBm
Minimum specified output power	18 GHz < f ≤ 36 GHz	+16 dBm
	36 GHz < f ≤ 40 GHz	+14 dBm
	R&S®SMBB-B112/-B120/-B131/-B140/-B140N; f > 200 kHz	-127 dBm
Settling time (without switching of the mechanical attenuator)	R&S®SMBB-B112/-B120	< 2.0 ms
	R&S®SMBB-B131/-B140/-B140N	< 2.3 ms

### Spectral purity

SSB phase noise	f = 1 GHz, carrier offset = 20 kHz, 1 Hz measurement bandwidth	< -126 dBc, typ. -132 dBc
	f = 10 GHz, carrier offset = 20 kHz, 1 Hz measurement bandwidth	< -106 dBc, -112 dBc (meas.)

Specifications in brief		
<b>Harmonics</b>		
	R&S®SMBB-B112/-B120/-B131/-B140/-B140N	
	200 kHz < f ≤ 2 GHz, level ≤ 10 dBm	< -30 dBc
	2 GHz < f ≤ 40 GHz, level = 10 dBm	< -55 dBc
<b>Supported modulation modes</b>		
AM	R&S®SMBB-K720	
AM depth		0% to 100%
FM/φM	R&S®SMBB-K720	
Maximum FM deviation	f = 10 GHz	80 MHz
Maximum φM deviation	f = 10 GHz	320 rad
Pulse	R&S®SMBB-K22/-K23 pulse modulator/generator	
Rise/fall time		< 15 ns, < 5 ns (meas.)
On/off ratio		> 80 dB, > 92 dB (typ.)
Minimum pulse width of pulse generator output		20 ns
<b>Connectivity</b>		
Remote control	standard	Ethernet/LAN, 10/100/1000BASE-T
	R&S®SMBB-K986	IEC 60625 (GPIB IEEE488.2), USB 2.0 (according to VISA USB-TMC)

Designation	Type	Order No.
Other options		
Health and utilization monitoring service (HUMS)	R&S®SMBB-K980	1422.6347.02
Remote control interface (GPIB and USB), for R&S®SMBB-B112/-B120/-B131/-B140/-B140N	R&S®SMBB-K986	1422.9969.02
Removable SD card, for R&S®SMBB-B112/-B120/-B131/-B140/-B140N	R&S®SMBB-B85	1422.5770.02
Spare SD card, for R&S®SMBB-B112/-B120/-B131/-B140/-B140N	R&S®SMBB-Z10	1422.5840.02
<b>Recommended extras</b>		
19" rack adapter, for R&S®SMBB-B112/-B120/-B131/-B140/-B140N	R&S®ZZA-KNP21	1177.8803.00
R&S®SZM frequency multiplier control via USB by the R&S®SMB100B microwave signal generator	R&S®SMBB-K554	1422.6253.02
Power sensor, 10 MHz to 18 GHz, for levels up to 15 W	R&S®NRP18S-20	1424.6738.02
USB interface cable, for R&S®NRPS18-20	R&S®NRP-ZKU	1419.0658.02
USB serial adapter, for RS-232 remote control	R&S®TS-USB1	6124.2531.00
<b>Documentation</b>		
Documentation of calibration values	R&S®DCV-2	0240.2193.18
R&S®SMB100B accredited calibration, 12.75 GHz to 20 GHz	R&S®ACASMB100B	3599.7429.03
R&S®SMB100B accredited calibration, 31.8 GHz to 40 GHz	R&S®ACASMB100B	3599.7435.03

## ORDERING INFORMATION

Designation	Type	Order No.
Microwave signal generator <sup>1)</sup> , including power cable and quick start guide	R&S®SMB100B	1422.1000.02
<b>Options</b>		
Frequency options		
8 kHz to 12.75 GHz	R&S®SMBB-B112	1422.9030.02
8 kHz to 20 GHz	R&S®SMBB-B120	1422.9100.02
8 kHz to 31.8 GHz	R&S®SMBB-B131	1422.9175.02
8 kHz to 40 GHz	R&S®SMBB-B140	1422.9246.02
8 kHz to 40 GHz	R&S®SMBB-B140N	1422.9300.02
Reference oscillator options		
OCXO reference oscillator <sup>2)</sup>	R&S®SMBB-B1	1422.5305.02
OCXO reference oscillator, high performance <sup>2)</sup>	R&S®SMBB-B1H	1422.5405.02
100 MHz, 1 GHz ultra-low-noise reference input and output	R&S®SMBB-B3	1422.5505.02
Flexible reference input, from 1 MHz to 100 MHz	R&S®SMBB-K704	1422.6301.02
Output power options		
High output power, 12.75 GHz/20 GHz	R&S®SMBB-K33	1422.9946.02
High output power, 31.8 GHz/40 GHz	R&S®SMBB-K35	1422.9952.02
Analog modulation options		
High-performance pulse modulator	R&S®SMBB-K22	1422.5905.02
Pulse generator	R&S®SMBB-K23	1422.6001.02
Multifunction generator	R&S®SMBB-K24	1422.6053.02
Pulse train <sup>3)</sup>	R&S®SMBB-K27	1422.6101.02
AM/FM/φM	R&S®SMBB-K720	1422.6201.02

<sup>1)</sup> The base unit must be ordered together with an R&S®SMBB-B112, R&S®SMBB-B120, R&S®SMBB-B131, R&S®SMBB-B140 or R&S®SMBB-B140N frequency option.

<sup>2)</sup> Only one of the R&S®SMBB-B1 or R&S®SMBB-B1H options can be installed.

<sup>3)</sup> Requires the R&S®SMBB-K23 option.

Your local Rohde&Schwarz expert will help find the best solution for you. Contact your local Rohde&Schwarz sales office for more information.

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Warranty and repair	Up to five years <sup>1)</sup>	Standard price repair

<sup>1)</sup> For extended periods, contact your Rohde & Schwarz sales office.

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