

R&S® SMC100A signal generator: best performance in the economy class

The new analog R&S® SMC100A signal generator offers superior specifications, a full set of standard features and a wide range of functions at an attractive price. All of this comes in a uniquely compact box.



FIG 2 The R&S®SMC100A comprises only four modules. In case of a malfunction, the defective module can be replaced by a certified Rohde&Schwarz service center, or users can replace the module on their own. Due to pre-calibrated replacement modules, the instrument will immediately be ready for use again after the replacement.



FIG 1 The size of the power sensor compared to that of the R&S®SMC100A shows how uniquely compact the new signal generator is.



Wideband noise

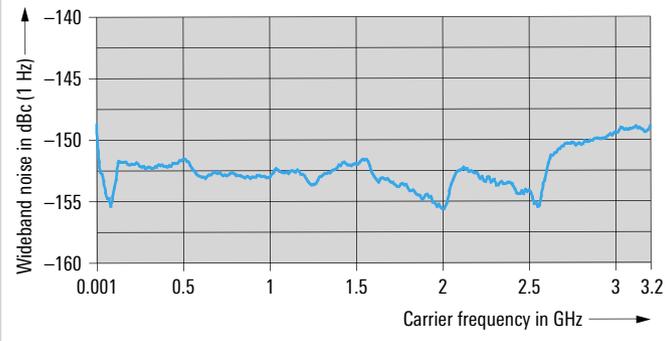


FIG 3 Wideband noise suppression at +5 dBm.

The new, attractively priced analog R&S®SMC100A signal generator (FIG 1), which covers the frequency range of 9 kHz to 3.2 GHz, is tailor-made to fulfill the above tasks. This is because the R&S®SMC100A features many important functions of the higher-end models, and its excellent specifications make it suitable for numerous applications. Using tried-and-tested engineering concepts, the generator has been accommodated in a uniquely compact box of only ½ 19" × 2 height units. This makes the instrument especially attractive for mobile applications.

Highest signal quality in its class

Despite its attractive price, the R&S®SMC100A was developed with one key criterion in mind: optimal quality of the output signal as a prerequisite for supporting a wide range of applications. For example, the single-loop synthesizer offers low phase noise of typ. -111 dBc (1 Hz; at 1 GHz and 20 kHz offset, see FIG 4). These excellent characteristics are due to the use of a highly accurate direct digital synthesizer (DDS). A special DDS technology patented by Rohde&Schwarz is used to combine outstanding frequency resolution with superior spectral purity. The concept of using a frequency synthesizer without a mixer yields excellent phase noise characteristics and minimal nonharmonics even for low output frequencies.

Nonharmonic suppression thus achieved compares to that of far more expensive instruments: With nonharmonics of typically -72 dBc at frequencies up to 1.6 GHz, the

Expansion of the analog signal generator family

The tried-and-tested analog R&S®SMA100A and R&S®SMB100A signal generators cover a broad spectrum of demanding applications owing to their outstanding performance characteristics. Many day-to-day test and measurement activities, however, place simpler demands on the test signal and have to be performed in a particularly cost-effective manner. A robust and reliable generator is nevertheless essential in order to avoid the costly consequences of instrument downtime.

SSB phase noise

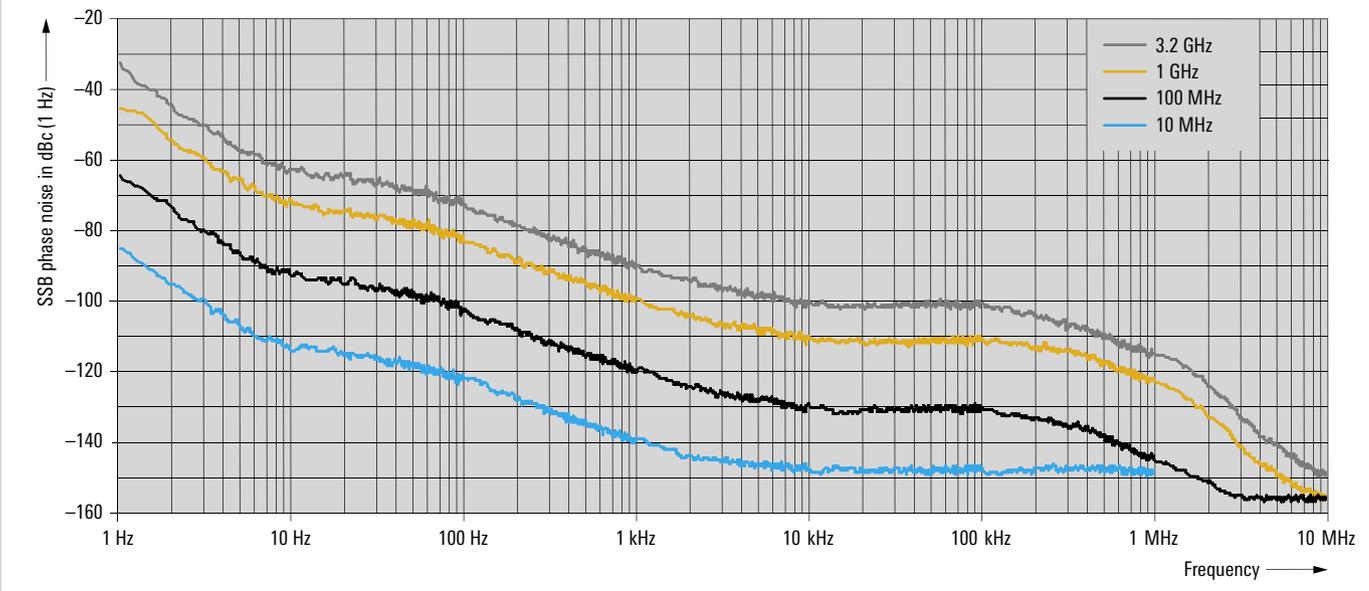


FIG 4 SSB phase noise with the internal R&S®SMC-B1 OCXO reference oscillator option.

R&S®SMC100A represents the standard in its class. For example, this outstanding signal purity makes it easier to identify spurious responses when performing receiver measurements, since there are fewer nonharmonics introduced by the signal generator itself that have to be taken into account.

Another key characteristic for many applications is wide-band noise suppression. For this reason, instead of using conventional integrated amplifiers at key points in the RF signal path, special amplifier stages made up of discrete components have been implemented that ideally combine low inherent noise, high output power and frequency-independent gain (FIG 3). The low wideband noise makes it easier to perform blocking measurements on receivers for instance, as less complex or no filters at all are required to suppress the generator noise.

With an output power of typically higher than +17 dBm for frequencies starting at 1 MHz, the R&S®SMC100A has a power margin large enough to compensate for cable losses and to perform tasks that demand high power, e.g. use of the generator as a local oscillator in mixer measurements (FIG 5).

A special temperature-compensating function for the RF signal path ensures a highly stable output power across the entire operating temperature range. This means that users can rely on the accuracy of the R&S®SMC100A not only in the lab, but also under extreme conditions in the field (FIG 6).

Output power

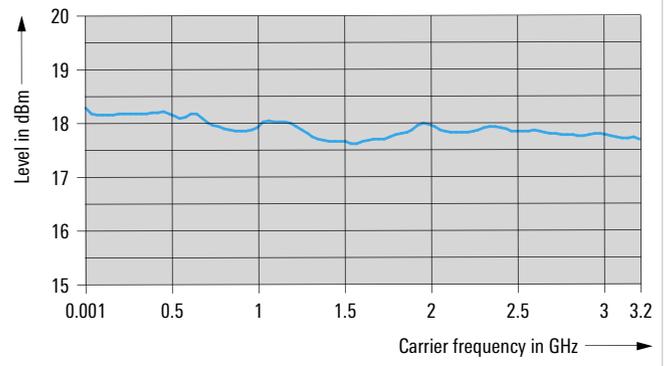


FIG 5 Measured maximum output power.

Full set of features

The newest member of the Rohde&Schwarz family of analog signal generators offers as standard a remarkably large number of features found in the higher-end members. Apart from the analog AM, FM, ϕ M and pulse modulation modes, an internal LF generator and a universal pulse generator are implemented as standard. In conjunction with integrated functions such as frequency and level sweeps, the R&S®SMC100A becomes a flexible instrument that can also master complex measurement tasks.

Temperature stability of output power

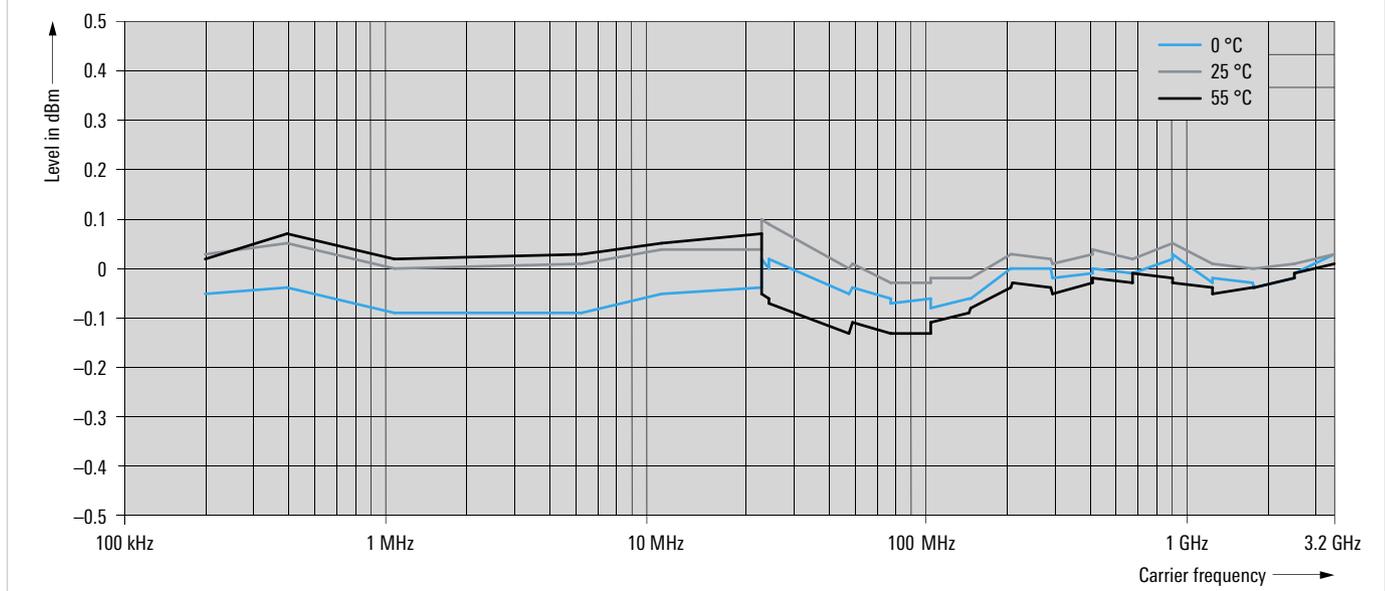


FIG 6 Output power measured at different temperatures at 0 dBm.

Connecting an R&S®NRP-Zxx power sensor to the generator's USB interface (FIG 1) adds power meter functionality to the R&S®SMC100A. The instrument is thus capable of performing high-precision power measurements also on external signals without requiring any extra equipment.

The frequency accuracy of the generator can be further increased by installing the R&S®SMC-B1 OCXO reference oscillator option. This simply requires inserting the R&S®SMC-B1 plug-in module on the rear of the instrument and activating it with a key code (FIG 7). For remote operation, the generator is equipped with all common interfaces: LAN, USB and an optional IEC/IEEE bus interface.

If required, the R&S®SMC100A can even emulate several widely used types of signal generators, and translate and implement the associated remote control commands. Legacy instruments in existing test setups can thus easily be replaced without the tedious effort of modifying the measurement software.

Compact and ergonomic

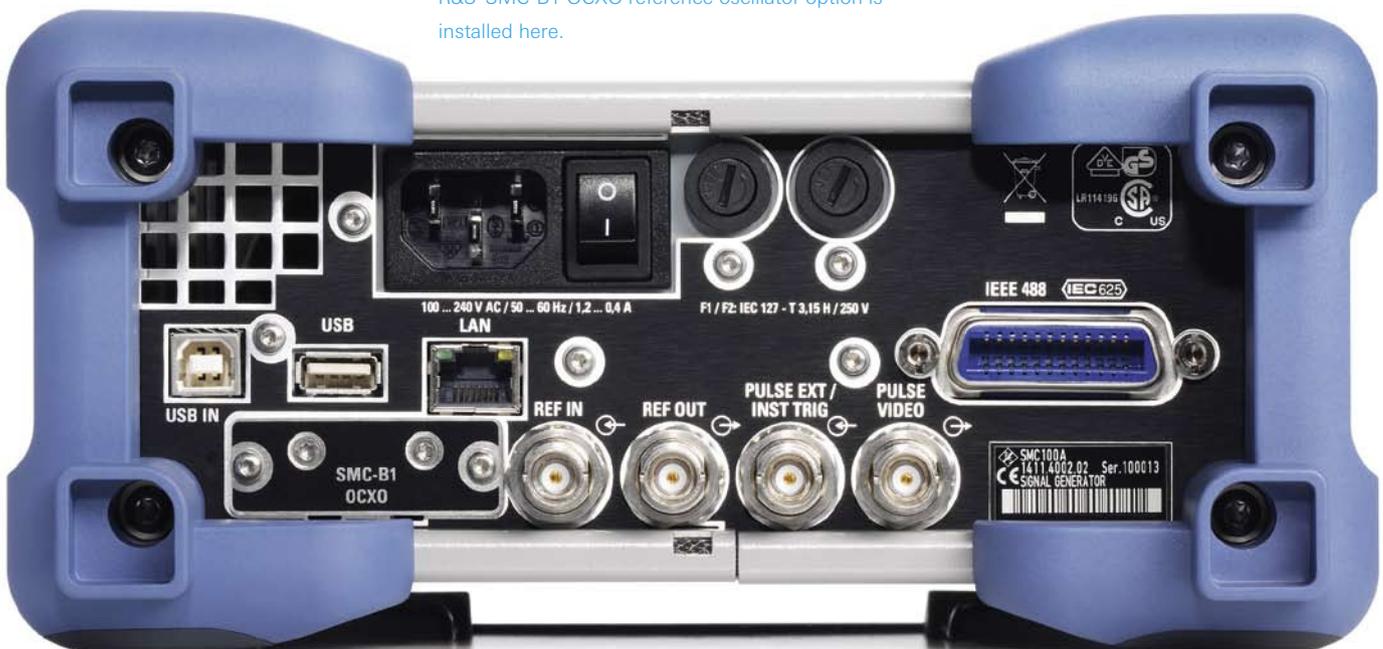
Requiring only ½ 19" and two height units, the R&S®SMC100A is ideally suited for applications where space is at a premium. Despite its best-in-class dimensions, the instrument is equipped with a full-featured control unit that includes a color display, an incremental rotary knob and all necessary input keys. The lightweight design (3.9 kg) together with low power consumption (typ. 40 W) makes the R&S®SMC100A the signal generator of choice for mobile applications. The instrument's dimensions are also advantageous for use in 19" racks because two generators can be installed side-by-side to save space.

As with the other signal generators currently offered by Rohde&Schwarz, the R&S®SMC100A is easy to operate due to its straightforward, dynamic graphic block diagram (FIG 1). In addition, the detailed online help facilitates the use of rarely employed functions and explains all remote control commands.

Robust design and superior service features

The compact design and attractive price of the R&S®SMC100A do not come at the expense of mechanical and electrical quality. On the contrary, its simple design and the small number of modules used make the R&S®SMC100A an extremely reliable instrument (FIG 2).

FIG 7 R&S®SMC100A connectivity options. The R&S®SMC-B1 OCXO reference oscillator option is installed here.



The electronics are also optimized for robustness and long life. The RF output is actively protected against reverse power surges, and all other signal connectors contain protective circuits to prevent damage caused by short circuits or inadvertently applied DC power. The fully electronic attenuator functions without the use of wear-prone relays. A generously dimensioned cooling system keeps the instrument's internal temperature low, thus enhancing failsafety of the instrument.

Even when a malfunction does occur, the built-in selftest helps pinpoint the cause. Defective modules can be replaced by a certified Rohde&Schwarz service center or by the users themselves. Replacement modules are precalibrated so that the instrument is immediately ready for use again after the replacement.

Summary

The R&S®SMC100A expands the successful family of signal generators from Rohde&Schwarz. It is another valuable model that combines outstanding performance data with a unique design and an attractive price. This makes the instrument an ideal choice for a wide variety of applications ranging from standard measurements in the lab and simple production applications through to use in service and training.

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FIG 8 From compact to high-end: the analog signal generator family from Rohde&Schwarz.

Condensed data of the R&S®SMC100A

Frequency range	9 kHz to 3.2 GHz
Level range	-120 dBm to +13 dBm (typ. >+17 dBm in overrange mode)
Setting time	<5 ms, typ. 2 ms
Spectral purity (f = 1 GHz)	
SSB phase noise (carrier offset 20 kHz, measurement bandwidth 1 Hz)	<-105 dBc, typ. -111 dBc
Nonharmonics (carrier offset >10 kHz, carrier frequency ≤1.6 GHz)	<-60 dBc, typ. -72 dBc
Wideband noise (carrier offset >10 MHz, measurement bandwidth 1 Hz)	<-138 dBc, typ. -148 dBc
Modulation modes	AM, FM/φM, pulse
Sweep functions	RF frequency, RF level, LF frequency
Interfaces	IEC/IEEE bus, IEC 60625 (IEEE 488), Ethernet (TCP/IP), USB