The analog R&S®SMA100A signal generator is outstanding for its excellent signal quality and high setting speed. It is now available even up to 6 GHz. Moreover, equipped with a new option, the R&S®SMA100A can generate VOR/ILS signals for tests on air navigation receivers.

High-end analog signal generator

The R&S®SMA100A (FIG 1) is a premium-class analog signal generator [*]. Its extreme signal purity, high output power, and very short frequency and level setting times make it a highly versatile tool. The instrument is available with a wear-free, fully electronic attenuator, which allows the output level to be set from –145 dBm to +18 dBm (3 GHz) or +15 dBm (6 GHz) (R&S®SMA-B103 / -B106 options). It can also be equipped with frequency options without attenuator (R&S®SMA-B103L / -B106L) for applications that require only a limited level range – for example, if the generator is to be used as a local oscillator substitute in ATE test systems, or for measuring mixers.

Up to 6 GHz, the R&S®SMA100A features high maximum output power as standard, thus making the use of external amplifiers in many cases superfluous (FIG 2). Equipped with the R&S®SMA-B103 / -B106 frequency options (with electronic attenuator), the generator includes integrated overvoltage protection up to 6 GHz as standard, which is a unique feature on the mar-
The maximum permissible reverse power is 50 W for \( \leq 3 \) GHz and 10 W for \( \leq 6 \) GHz. The maximum permissible DC voltage is 50 V.

Its extremely short frequency and level setting times make the R&S® SMA100A ideal for applications in production, where reduced setting times ensure shorter test times and thus increase throughput.

The generator features very low SSB phase noise (FIGs 3 and 4) of typ. \(-135 \) dBc (1 Hz) at \( f = 1 \) GHz and 20 kHz carrier offset or typ. \(-140 \) dBc (1 Hz) (with the R&S® SMA-B22 enhanced phase noise and FM/\( \phi \)M option). Its broadband noise of typ. \(-160 \) dBc (1 Hz) at 10 MHz carrier offset and \( f = 1 \) GHz is also very low.

In addition, nonharmonic noise signals are excellently suppressed (typ. \(-100 \) dBc at \( >10 \) kHz carrier offset, \( f < 1500 \) MHz with the R&S® SMA-B22 enhanced phase noise performance and FM/\( \phi \)M option). Owing to a wide frequency division range, the excellent SSB phase noise of the generator is available down to carrier frequencies of 6.6 MHz, allowing the R&S® SMA100A to be used as a substitute for reference oscillators or crystals, for example.

Due to its very high spectral purity, the R&S® SMA100A is an excellent signal source, for example for generating noise signals for mobile radio applications (inband rejection tests, blocking tests), as a reference source in phase noise test systems, or as a source of very pure signals for testing mixed signal ICs (A/D and D/A converters).

Instrument settings stored on CompactFlash™

For use in security-critical applications, the generator can be equipped with an option for ejecting the CompactFlash™ card (R&S® SMA-B80 option). The memory card and the signal generator can thus be stored separately. The instrument can be removed from the security area without any problem as the instrument settings are stored on the memory card and will not leave the closed area.

The current operating manual can be downloaded from the Rohde & Schwarz Internet pages. It includes a chapter called “Resolving Security Issues When Working With the R&S® SMA100A in Secure Areas” which explicitly describes the generator’s features for users with high security requirements. It also details the different memory types and locations where user-specific data is stored in the generator.

Tests on air navigation receivers

Equipped with the new R&S® SMA-K25 option, the R&S® SMA100A generates avionics signals (VOR/ILS) in line with the ICAO standard. The receiver operates in the following modes:

- VOR
- ILS glide slope signal (ILS-GS)
- ILS localizer signal (ILS-LOC)
- Marker beacon (MKR-BCN)
- Automatic direction finding (ADF)

Because of its low modulation errors and very high level accuracy, the R&S® SMA100A is the ideal source for generating high-precision VOR/ILS signals for tests on air navigation receivers when equipped with this option.

Thomas Rieger, Günther Klage

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**Condensed data of the R&S® SMA100A**

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>9 kHz to 3 GHz / 6 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>(-145 ) dBm to (+18 ) dBm (up to ( 28 ) dBm overrange)</td>
</tr>
<tr>
<td>Setting times for frequency and level</td>
<td>(&lt;3 ) ms</td>
</tr>
<tr>
<td>Setting times in list mode / fast hopping mode</td>
<td>(&lt;450 ) ( \mu )s</td>
</tr>
</tbody>
</table>

**Spectral purity (at \( f = 1 \) GHz)**

- Nonharmonics (carrier offset \( >10 \) kHz, \( f \leq 1500 \) MHz) \(<-80 \) dBc (typ. \(-90 \) dBc)
- SSB phase noise (300 kHz carrier offset, 1 Hz measurement bandwidth) \(<-90 \) dBc (typ. \(-100 \) dBc) with R&S® SMA-B22 option
- Broadband noise (carrier offset \( >10 \) MHz, 1 Hz measurement bandwidth, 750 MHz \( < f \leq 1500 \) MHz) \(<-131 \) dBc (typ. \(-135 \) dBc)
- \(<-136 \) dBc (typ. \(-140 \) dBc) with R&S® SMA-B22 option
- \(<-153 \) dBc (typ. \(-160 \) dBc)

**Modulation modes**

- AM
- FM / \( \phi \)M
- Pulse
- VOR/ILS

**Clock generation**

- Frequency range
- Interfaces

| Interface | IEEE 488.2, LAN (10/100BaseT), 1 x USB, 1 x USB slave |

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FIG 2 Maximum output power across the entire frequency range at different level modes
(orange: without attenuator, yellow: high-power mode, blue: normal mode).

FIG 3 Typical SSB phase noise of the R&S® SMA100A with internal reference oscillator (base unit).

FIG 4 Typical SSB phase noise of the R&S® SMA100A with internal reference oscillator and the R&S® SMA-B22 enhanced phase noise and FM / ϕM option.

REFERENCES

More information, product brochure and specifications at
www.rohde-schwarz.com
(search term: SMA100A)