

R&S®SMB100A generator: now with electronic step attenuator and expanded range up to 12.75 GHz

The new R&S®SMB-B112 frequency option extends the frequency range of the R&S®SMB100A signal generator to cover the 100 kHz to 12.75 GHz range, opening up new fields of application. The option also equips the generator with a fast, wear-free electronic step attenuator – a feature not found in any other signal generator in the frequency range up to 12.75 GHz.

Now up to 12.75 GHz – and fit for additional applications

The current R&S®SMB100A analog signal generator family covers the frequency ranges of 9 kHz to 1.1 / 2.2 / 3.2 / 6 GHz. Some of its most important characteristics are an electronic attenuator, a fast VCO-based synthesizer and high output power. The new R&S®SMB-B112 option covers the frequency range from 100 kHz to 12.75 GHz. All other characteristics of this compact ¾ 19", 2 HU generator remain identical (FIG 1). The upper frequency limit of 12.75 GHz opens up new applications, such as the blocking tests specified in digital standards (CW interferers) or tests on radar systems and communications satellites in the X band.

Unique up to 12.75 GHz: rapid level changing thanks to electronic attenuator

Irrespective of whether it is an analog or vector signal generator, users must be able to quickly set the required level – over as wide a range as possible. Therefore, the instruments are equipped with attenuators consisting of several attenuator pads with different attenuation. Together with appropriate

amplifier stages, these components provide an excellent signal/noise ratio and outstanding linearity. The individual attenuator pads are switched on and off either mechanically (with relays) or electronically (with electronic switches). The level is usually attenuated electronically in the range up to 6 GHz, and until now it has always been attenuated mechanically in the range above approx. 10 GHz.

The new R&S®SMB-B112 frequency option provides the R&S®SMB100A generator with a feature that is unique on the market: The option's electronic attenuator sets levels up to 12.75 GHz electronically – with fast setting speed and outstanding resistance to wear. The generator is the ideal choice when a large number of level settings need to be made within a short time period, such as during level sweep, in automatic test systems and on production lines. Its level setting times of just a few hundred microseconds reduce measuring costs relative to the overall test setup. The CMOS switches in the electronic attenuator have been specially developed for strict requirements. They are superior to conventional methods, since there is no level drift after switching – a crucial advantage when it comes to high level accuracy and reproducibility.

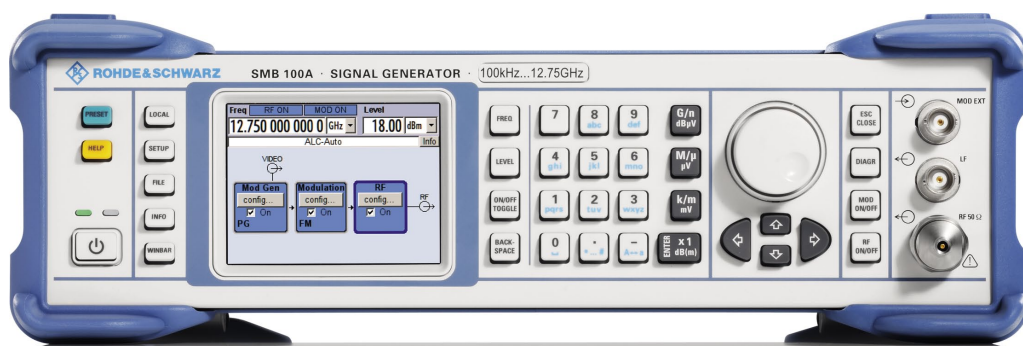


FIG 1 The new R&S®SMB-B112 frequency option extends the frequency range of the R&S®SMB100A signal generator to cover the 100 kHz to 12.75 GHz range – all other characteristics remain unchanged.

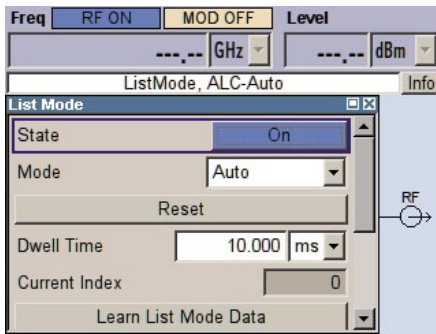


FIG 2 The List mode menu.

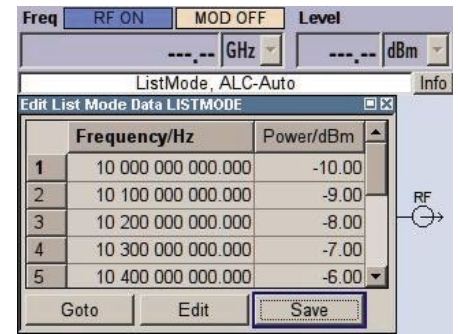


FIG 3 Frequency and level pairs in the List mode editor.

VCO for fast frequency change

Short frequency setting times and low phase noise are essential criteria for generators that are used in the development of electronic components. Yttrium iron garnet (YIG) oscillators, which feature broadband capabilities and low noise, have been used for quite some time in the high-frequency area.

When extremely short frequency setting times are required, VCOs are the first choice, since their frequency setting times of several microseconds are clearly superior to those of YIG oscillators (several hundred microseconds). This is particularly noticeable during a frequency sweep or in List mode (FIGs 2 and 3), where the R&S®SMB100A processes a large number of stored frequency and level pairs, making parameter changes even faster. The advantages of the new R&S®SMB-B112 frequency option with its VCO-based concept are reflected in decisive cost benefits in automatic test systems and on production lines.

Comparison of frequency and level setting times

The new option has two outstanding advantages: fast frequency change using a VCO and fast level change using the electronic attenuator. A comparison of instruments based on the above concepts versus instruments based on YIG technology and mechanical attenuation clearly shows the time savings that can be achieved (FIG 4). If, for example, an auto-

matic test system requires 1000 different frequency settings per DUT, it is possible to save up to 13 s per DUT.

However, switching times are just one side of the coin. The other side is the number of possible switching operations. Mechanical attenuators reach the end of their life after several million switching operations and must be replaced, with the associated service effort and cost. Electronic attenuators are practically wear-free.

Summary

The R&S®SMB-B112 option extends the frequency range of the R&S®SMB100A signal generator to 12.75 GHz and includes an electronic step attenuator. The generator's many unique characteristics are unrestrictedly available in the extended frequency range. Overvoltage protection up to 12.75 GHz is optionally available.

No compromises have been made in terms of operation and service, either. The modular design of the generator family allows users to keep calibrated spare components on hand and replace them themselves if necessary; the instrument does not have to leave the premises. The instrument's appearance and handling, the remote control commands and the front panel (including the display for block diagrams) have all been retained.

Frank-Werner Thümmeler

Setting times	R&S®SMB100A signal generator	Typical microwave signal generator
	100 kHz to 12.75 GHz, with electronic attenuator and VCO	10 MHz to 20 GHz, with mechanical attenuator and YIG
Frequency change (10 GHz to 12 GHz)	< 3 ms (< 1 ms in List mode)	< 14 ms
Level change (-20 dBm to 0 dBm)	< 2.5 ms (< 1 ms in List mode)	< 25 ms

FIG 4 Comparison of time required for frequency and level changes with the R&S®SMB100A signal generator and a typical microwave generator.