



up to 50 GHz
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FIG 1 The new Spectrum Analyzer R&S®FSU 50 expands the product family to 50 GHz.

Spectrum Analyzer R&S®FSU 50

Excellent measurement accuracy up to 50 GHz and higher

The new Spectrum Analyzer R&S®FSU 50 extends the upper frequency limit of the successful product family to 50 GHz. While the existing members of the R&S®FSU family offer top-quality characteristics with respect to dynamic range, measurement speed and accuracy at lower frequencies, the R&S®FSU 50 provides these same excellent characteristics for frequencies that extend into the microwave range. Options for the rest of the product family can, of course, also be added to the R&S®FSU 50, enabling it to handle a wide range of applications.

Top-quality characteristics in the microwave range

The growing demand for radiocommunications calls for higher frequencies since all lower-range frequencies have already been allocated worldwide. Frequency bands above 40 GHz have traditionally been reserved mainly for military applications due to the highly sophisticated technology involved. Advances in technology will, however, result in the commercial use of the higher microwave bands. For example, a frequency range from 10 GHz to 66 GHz is planned as part of network standardization for point-to-point connections.

The commercial use of higher microwave ranges and the mass production of corresponding components present new challenges for T&M equipment. These challenges have been taken into account by Rohde & Schwarz in the development of its new Microwave Spectrum Analyzer R&S®FSU 50 (FIG 1).

The analyzer is largely based on the lower-frequency models of the R&S®FSU family [*]. It offers the same top-quality characteristics as well as the same operation and measurement functions. In addition to highly sensitive spectrum analysis with a wide dynamic range, the analyzer features top-quality characteristics with regard to measurement accuracy.

Dynamic range is one of the most important characteristics of a spectrum analyzer and is influenced by several parameters such as sensitivity, compression point (1 dB compression) and phase noise. The R&S®FSU 50 provide excellent performance with any of these. To achieve high sensitivity, the analyzer uses fundamental mixing in the entire frequency range from 20 Hz to 50 GHz. This means that the mixer uses the fundamental of the local oscillator to mix the input signal to the first IF, which yields very low conversion loss and thus very high sensitivity. In comparison, many other microwave spectrum

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► analyzers use a harmonic mixing method starting at a specific input frequency. This method significantly reduces sensitivity, which means that you cannot measure low level signals. The high sensitivity of the R&S®FSU50 also offers an advantage in speed. For achieving a specific degree of sensitivity, its low inherent noise allows the use of a filter with a high resolution bandwidth. Since measurement speed depends on the square of the resolution bandwidth, doubling the bandwidth yields a fourfold increase in measurement speed. When very small signals are measured, the low inherent noise of the R&S®FSU50 produces a large S/N ratio and thus results in excellent measurement accuracy (FIG 2).

But the R&S®FSU50 is a top-class analyzer also in other respects since the measurement accuracy of a microwave spectrum analyzer is significantly influenced by tracking preselection (YIG filter). For many analyzers, compliance

with specifications regarding level measurement accuracy depends on the use of preselector peaking. In this technique, preselection is tuned to the highest level reading by means of an applied input signal. In contrast, the R&S®FSU uses a patented frequency response correction mechanism and internal automatic adjustment to correctly set the preselection filter. This approach yields very good stability and repeatability of the measurement results even without the use of peaking. You can therefore achieve considerable savings in time, especially when you use the analyzer in production.

Applications up to 50 GHz and higher

Typical application examples of the R&S®FSU50 are measurements on microwave components and systems used in radio relay and radar links. It provides a number of built-in measurement

routines that enable you to perform complex measurements such as C/N or determine the intermodulation point by pressing a single key (FIG 3). In this case, the analyzer is not limited to frequencies under 50 GHz. Its frequency range can be extended beyond 50 GHz by means of the option External Mixer R&S®FSU-B21. Rohde & Schwarz offers the Harmonic Mixers R&S®FS-Z60 / -Z75 / -Z90 / -Z110, which cover all frequency bands from 40 GHz to 110 GHz (FIG 4). However, operation is not limited to these external mixers. The R&S®FSU50 can also be operated with any conventional mixer you may already have. It supports both three-port and two-port mixers, and the diplexer required for operation has already been integrated. Since all important parameters are displayed in the setup summary, you can quickly configure external mixing in the R&S®FSU50 (FIG 5). Preconfigured settings are available for microwave bands up to 330 GHz, but you can also generate and store

FIG 2 Inherent noise of the R&S®FSU50 over the entire frequency range, measured with a bandwidth of 1 MHz.

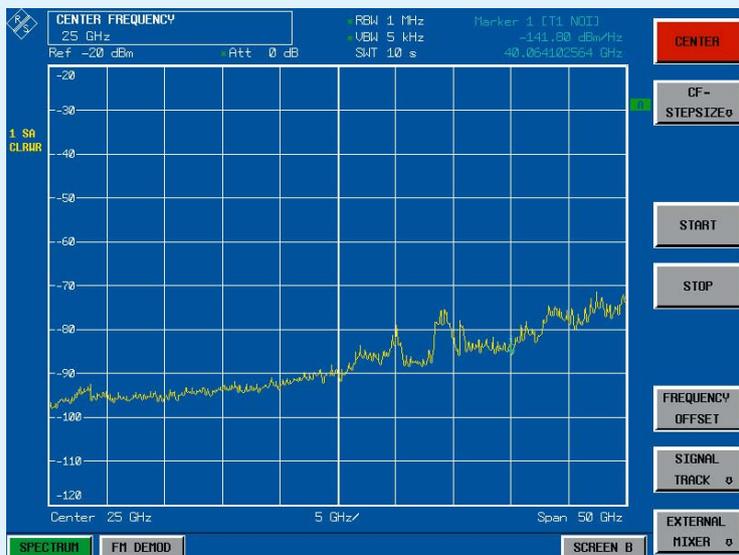
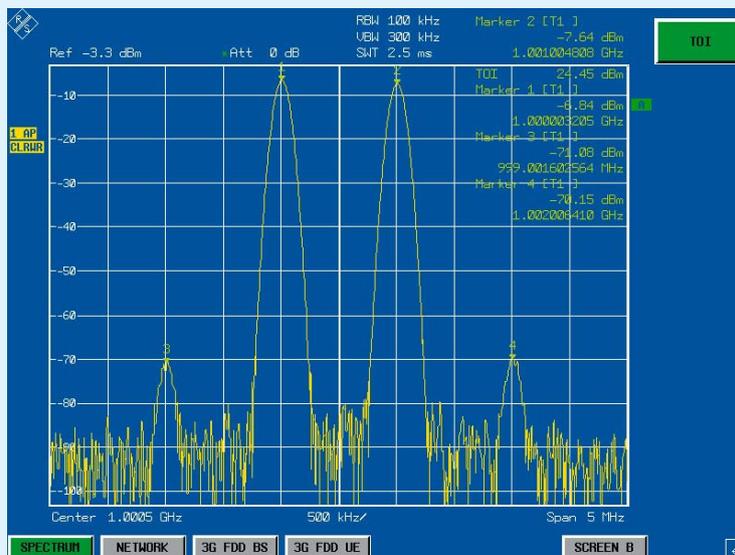


FIG 3 Measurement of the third-order intercept point.



the specific settings you need. The harmonic that is used is especially important for measurements at very high frequencies since it influences the sensitivity and the phase noise of the measurement. And this is where the R&S®FSU 50

shows its particular strength. Its internal local oscillator covers the frequency range from 7 GHz to 15 GHz. Thus, the R&S®FSU 50 uses a harmonic with a far lower order than that used by conventional microwave spectrum analyzers.

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More information and data sheet at www.rohde-schwarz.com
(search term: FSU)



Condensed data of the R&S®FSU 50

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|---------------------------------|---|
| Frequency range | 20 Hz to 50 GHz |
| Resolution bandwidths (-3 dB) | 1 Hz to 50 MHz |
| Video bandwidths | 1 Hz to 10 MHz |
| SSB phase noise (10 kHz offset) | -120 dBc (1 Hz) at 640 MHz |
| Displayed average noise level | <-142 dBm (10 Hz) at 1 GHz <-118 dBm (10 Hz) at 50 GHz |
| Level measurement uncertainty | <0.3 dB (f <3.6 GHz) |
| Detectors | Max / Min / Auto Peak, Sample, AVG, RMS, Quasi Peak |

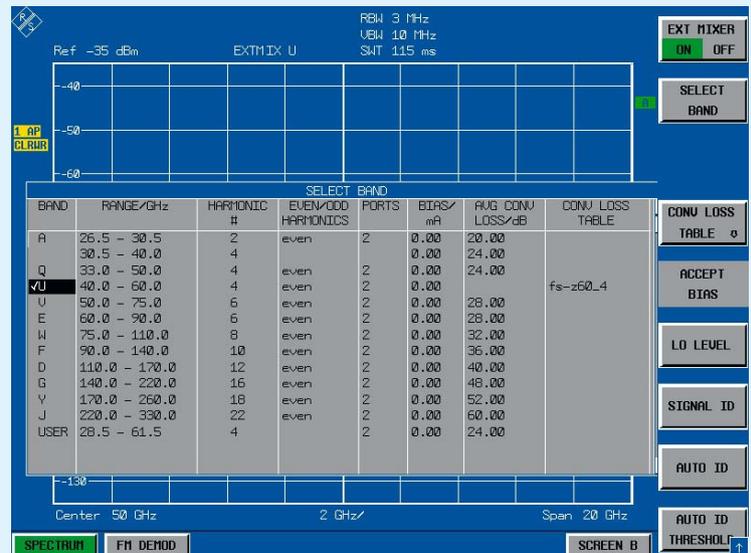
REFERENCE

[*] Spectrum and signal analyzers for every requirement – an overview. News from Rohde & Schwarz (2004) No. 182, pp 30–36

FIG 4 The harmonic mixers from Rohde & Schwarz cover all frequency bands from 40 GHz to 110 GHz.



FIG 5 Configuration menu for external mixing in the R&S®FSU 50.



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