

Now up to 26 GHz



43853/4

FIG 1 New to the analyzer family – microwave Spectrum Analyzer R&amp;S FSU26

### Spectrum Analyzer R&S FSU26

## Excellent dynamic range up to 26 GHz plus low measurement uncertainty

**This new analyzer (FIG 1) is an addition to the R&S FSU family. Excellent dynamic range and sensitivity plus unique measurement functionality such as fast ACP in the time domain or channel filters are now also available for microwave applications. New functions that can be retrofitted to the analyzer family as firmware updates mean additional upgrading and improved dynamic range for ACP measurements.**

### High-end features up into the microwave range

The Spectrum Analyzer R&S FSU26 is based on the proven 3 GHz and 8 GHz models of the FSU family and offers the same high-grade characteristics as well as identical operation and measurement functions [1]. Fundamental mixing in the entire frequency range up to 26 GHz ensures very high sensitivity to the highest input frequency (FIG 2). The R&S FSU26 thus meets a major prerequisite for wide dynamic range and allows measurement of very small signals (e.g. harmonics and nonharmonics) with sufficient S/N ratio and consequently low measurement uncertainty.

Measurement uncertainty in the upper microwave range is to a large extent

determined by the frequency response of the YIG filter. In this case, the patented frequency response correction ensures a figure of <2 dB to 22 GHz and <2.5 dB to 26 GHz without the peaking usually required.

Often just as important are repeatability and stability of measured results, especially in production. These depend not only on frequency response but, and in large part, on the stability of the local oscillators and the YIG filter. With its synchronous sweep and internal calibration of the tuning characteristic of the YIG filter, the R&S FSU26 sets standards here too.

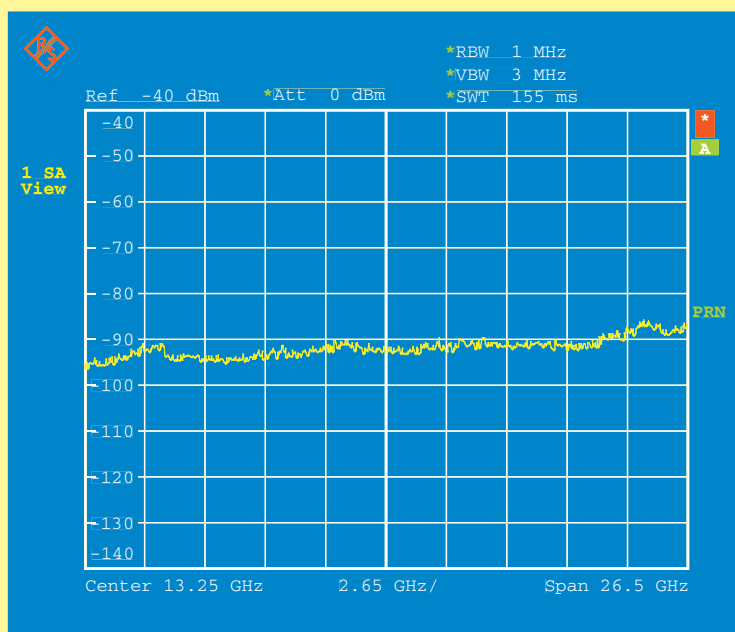
Major applications for the R&S FSU26 are measurements on radio relay, satellite link or radar systems. Large resolu-

tion bandwidths up to 50 MHz and special trigger functions such as IF POWER, selectable TRIGGER OFFSET including pretrigger and GATED TRIGGER support measurements on pulsed signals as used in radar. With integrated routines and a standard RMS detector, the R&S FSU 26 is fast and simple to operate when performing highly accurate power

and channel power measurements as well as  $C/N_0$  and  $C/N$  measurements, which are typical of radio relay or satellite links.

Another important application is the measurement of spurious emissions of wireless mobile communication systems up to 12.75 GHz. The analyzer is opti-

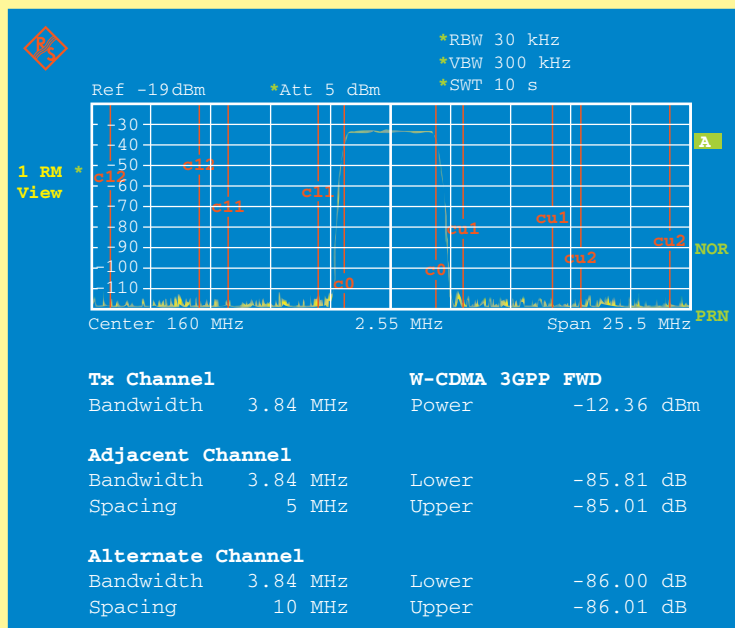
mized for such measurements on base stations to GSM standard. Here it demonstrates an excellent signal-to-phase-noise ratio of as much as  $-160$  dBc/Hz at relatively large carrier offsets of 10 MHz and a high 1 dB compression point of  $+13$  dBm. This does away with the need for elaborate test setups with tunable, band-specific – and expensive – notch filters. Combined with the application firmware packages for GSM (FS-K5) and 3GPP/FDD (FS-K72), the R&S FSU 26 is the optimum analyzer for base station tests, including spurious emission measurement up to 12.75 GHz.



**FIG 2**  
Inherent noise of R&S FSU26 over its entire frequency range, measured with 1 MHz bandwidth

### Firmware version 1.42 now with new functions

An important measurement within the 3GPP standard is adjacent channel power or ACP (referred to as adjacent channel leakage ratio or ACLR in 3G specifications). The requirements for measuring multicarrier amplifiers or D/A converters, for example, far exceed the standard specifications and often also the capabilities of much of today's T&M equipment. Wider dynamic range for ACP measurement in this case means simplified test setups and above all considerably reduced measurement uncertainty.



**FIG 3**  
Using noise correction, the R&S FSU achieves 84 dB dynamic range in the 3GPP ACLR measurement. However, this wide dynamic range can only be verified by a bandpass-filtered transmit signal.

The new noise correction function expands the dynamic range of the R&S FSU for ACP measurements from 77 dB to as much as 84 dB (FIG 3). The advantage is that an ACLR value of 74 dB with an additional error of only  $<0.5$  dB – caused by the instrument's inaccuracy – can be exactly determined. In this procedure, the RMS detector precisely identifies the instrument's inherent noise and, in a second step, compensates it.

If the mixer level is optimally set, test limits are determined equally by inherent noise and spectral regrowth due to

intermodulation. Pure noise correction would, at best, yield an improvement by only 3 dB. RF attenuation is consequently increased automatically by 5 dB, reducing the spectral regrowth share by 15 dB and allowing inherent noise compensation to produce a 7 dB improvement.

Other new functions make for easier and faster spurious emission measurement. An increase in the number of trace points up to 10001 allows the R&S FSU to perform measurements in one sweep at a 20-fold larger span with the RMS

detector and the same resolution bandwidths [2]. The PEAK LIST marker function then searches for all peaks within a selectable frequency band (maximally 100) and above a set limit line, reading out the result in the form of a table.

Also available are transducer factors for correcting the frequency-dependent insertion loss of test setups or antenna frequency response.

The firmware update can be obtained direct from the Rohde & Schwarz website.

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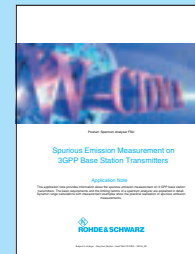
### Condensed data of R&S FSU 26

Frequency range	20 Hz to 26.5 GHz
Displayed average noise level 2 / 26 GHz	-146 dBm / -138 dBm (measured at 10 Hz bandwidth)
Resolution bandwidths	10 Hz to 50 MHz in steps of 1/2/3/5, 1 Hz to 30 kHz by FFT filters, channel filter 100 Hz to 5 MHz
Total amplitude measurement uncertainty	<0.3 dB up to 3.6 GHz, <3 dB up to 26 GHz

More information, data sheet and application note at [www.rohde-schwarz.com](http://www.rohde-schwarz.com) (search terms: FSU or 1EF45)



Data sheet R&S FSU



Application note 1EF45

### REFERENCES

- [1] Spectrum Analyzer FSU – Best RF performance – third generation of high-end analyzers. News from Rohde & Schwarz (2001) No. 171, pp 20–25
- [2] Application note 1EF45 (Rohde & Schwarz website)