R&S®FSMR Measuring Receiver / R&S®FSU Spectrum Analyzer

Optional enhancements for vector signal analysis

General vector signal analysis functions that were previously provided only by the R&S®FSQ signal analyzer are now also available for the R&S®FSMR calibration measuring receiver and the R&S®FSU spectrum analyzer.

More information and data sheets at
www.rohde-schwarz.com
(search term: type designation)

R&S®FSMR-B73 option for the R&S®FSMR measuring receiver

The R&S®FSMR measuring receiver, an expert for calibrating signal generators, focuses primarily on testing level and modulation characteristics, especially evaluating modulation errors. Compared with analog methods such as AM, FM and φM, digital modulation methods have significantly gained in importance.
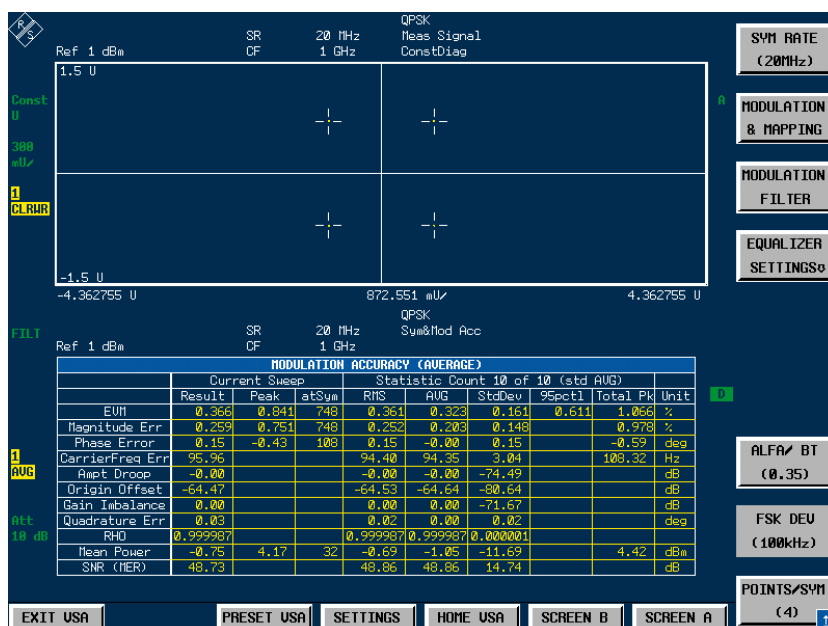
The R&S®FSMR has always taken this situation into account because it could be equipped with standard-specific options for determining modulation errors in signals of the GSM/EDGE (R&S®FS-K5), 3GPP (R&S®FS-K7x), CDMA2000® (R&S®FS-K8x), TD-SCDMA, or Bluetooth® standards. Equipped with the R&S®FSMR-B73 option, the measuring receiver can also analyze digitally

modulated signals (up to 256QAM) with a symbol rate up to 25 Msymbol/s – irrespective of the mobile radio standard. This standard-independent evaluation of the modulation characteristics of signal generators is possible because important settings such as modulation mode (PSK, QAM, MSK, FSK, 8VSB, etc), symbol rates, and filtering are user-definable. The option displays key parameters such as EVM, I/Q offset, quadrature error, or I/Q imbalance in an easy-to-read table (FIG 1).

In addition to predefined settings for the most important standards, you can store customized configurations as default settings (user-defined standards). Thus, it becomes easier to make recurring settings, which in turn will yield measurement results faster and reduce the danger of incorrect measurements due to operating errors.

Owing to its low inherent EVM, the R&S®FSMR-B73 option can even determine minor modulation errors accurately.

R&S®FSU-B73 option for the R&S®FSU spectrum analyzer

Compared with a combination of the R&S®FSQ signal analyzer and the R&S®FSQ-K70 option, the R&S®FSU-B73 option is a more cost-efficient and narrowband solution to complement the R&S®FSU spectrum analyzer family. The option enhances the spectrum analyzer's scope of applications when it comes to highly accurate and flexible measurements of the modulation parameters of digitally modulated signals. Existing instruments can be retrofitted with the R&S®FSU-U73 option.

FIG 1 The numeric result display provides the key quality parameters of a modulator in an easy-to-read table. Signal generator performance can thus be quickly and efficiently verified.

	R&S®FSU with R&S®FSU-B73	R&S®FSMR with R&S®FSMR-B73	R&S®FSQ with R&S®FSQ-K70
Maximum symbol rate	6.4 Msymbol/s	25 Msymbol/s	25 Msymbol/s, with R&S®FSQ-B72: 81.6 Msymbol/s
I/Q demodulation bandwidth	7 MHz	28 MHz	28 MHz, with R&S®FSQ-B72: 120 MHz
Inherent EVM (QPSK, 1 MHz symbol rate, 1 GHz carrier frequency)	<0.5%	<0.5%	<0.5%
YIG filter bypass in the microwave reception range > 3.6 GHz	no	standard: without YIG filter, with R&S®FSMR-B2 or R&S®FSMR-B223: yes	yes
Functionality	same as with R&S®FSQ-K70	same as with R&S®FSQ-K70	
120 MHz bandwidth expansion	no	no	with R&S®FSQ-B72
I/Q data memory	16 Msamples	16 Msamples	16 Msamples
Recording length for GSM/EDGE signal	15.4 s	15.4 s	15.4 s
Memory extension for I/Q data	no	no	with R&S®FSQ-B100 and R&S®FSQ-B102 up to 705 Msamples
Recording length for GSM/EDGE signal with memory extension	–	–	678.5 s

FIG 2 Comparison of the key characteristics of the vector signal analysis functions in the R&S®FSU, R&S®FSMR, and R&S®FSQ.

Compared with the solution for the R&S®FSQ, the maximum settable symbol rate and the behavior in the frequency range above 3.6 GHz (FIG 2) are different with the new option. The R&S®FSU's maximum symbol rate with specified inherent EVM is 6.4 Msymbol/s.

The tracking preselection, i. e. the YIG filter, is bypassed in the VSA mode in the R&S®FSQ above 3.6 GHz as it causes group delay and amplitude-frequency response. This, in turn, leads to significantly higher residual EVM if the symbol rates are high. Owing to its lower maximum symbol rate, the R&S®FSU does not need such a bypass.

Scope of functions similar to the R&S®FSQ spectrum analyzer

You won't have to do without the extensive range of functions of the R&S®FSQ-K70 option when using the new options for the measuring receiver and the spectrum analyzer. In general lab applications, constellation and eye diagrams as well as error signals need to be displayed. Moreover, extensive functionality for setting burst and synchronization parameters is required. This allows you to define and position the section of a burst to be analyzed, as well as demodulate and measure bursts that contain different modulation modes, for example.

Additional evaluation capabilities are beneficial when troubleshooting a generator or the user-specific setup. Both options perform analyses that by far

exceed normal vector signal analysis functions, for example spectral and statistical evaluations of measurement and error signals, determination of the AM/AM and AM/φM distortion parameters directly from the modulated signal, or analysis of customer-specific modulation constellations.

The statistical evaluation of the modulation summary table includes average values as well as the standard deviation across the number of measurements, providing additional information that is useful for determining the measurement error.

The two new options show that the platform concept provides maximum function and operation uniformity, thus ensuring optimum interoperability between the different families of instruments.

Herbert Schmitt