WLAN Application Firmware R&S®FSQ-K91/R&S®FSP-K90

Transmitter measurements on WLAN IEEE 802.11 signals

◆ R&S®FSQ-K91 enhances the R&S®FSQ family by transmitter
measurements in accordance with the IEEE 802.11a/b/g/j
standards including IEEE 802.11 turbo mode
◆ R&S®FSP-K90 enhances the R&S®FSP family by transmitter
measurements in accordance with the IEEE 802.11a and
IEEE 802.11g-OFDM standards
◆ All measurement functions can be remote-controlled via
IEC/IEEE bus or LAN

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WLAN Application Firmware R&S®FSQ-K91 expands the application range of the Signal Analyzer R&S®FSQ by spectrum and modulation measurements on signals in accordance with the WLAN standards IEEE 802.11a/b/g/j. The R&S®FSQ's outstanding analysis and evaluation facilities, which enable measurements beyond the scope of the standard, make it ideal for applications in development and verification. The Spectrum Analyzer R&S®FSP with the R&S®FSP-K90 option is a favorably priced instrument for measurements in production. One instrument can thus be used for EVM measurements on OFDM signals (IEEE 802.11a/g-OFDM) as well as for spectral measurements on QPSK signals (IEEE 802.11b). Using a method for which a patent is pending, the R&S®FSP evaluates the carriers −14 to +14 with a demodulation bandwidth of 8 MHz and determines the modulation parameters on IEEE 802.11a/g-OFDM signals.

Highlights

◆ Frequency range from 20 MHz to 3/8/26/40 GHz, depending on base unit
◆ Very low residual EVM of <−44 dB/−46 dB
◆ Automatic or manual setting of modulation format
◆ Analysis at the RF or in the baseband (optional)
◆ High measurement rate of >12 measurements/s (54 Mbps, 16 data symbols)

| IEEE 802.11a/j IEEE 802.11g-OFDM IEEE 802.11 turbo mode		R&S®FSQ with R&S®FSQ-K91	R&S®FSP with R&S®FSP-K90
17.3.9.1	Output power	✓	
17.3.9.2	Spectrum mask with limit lines and pass/fail	✓	✓
17.3.9.6.2	Spectrum flatness with limit lines and pass/fail	✓	
17.3.9.6.3	Constellation error, EVM	✓	For carriers −14 to +14
	Selectable tracking: phase, level, timing	✓	✓
17.3.9.6.1	RF carrier leakage	✓	✓
17.3.9.4, 17.3.9.5	Carrier frequency and symbol clock error	✓	✓
	Adjacent channel power	✓	✓
	Constellation diagram for all carriers or a single carrier	✓	For carriers −14 to +14
	Constellation overview (Fig. 3)	✓	For carriers −14 to +14
	EVM vs carriers, EVM vs. symbols	✓	For carriers −14 to +14
	Group delay	✓	
	Time gated spectrum (FFT)	✓	
	CCDF (also time gated) and crest factor	✓	
	Bit stream	✓	
IEEE 802.11b, IEEE 802.11g-CCK/DSSS			
18.4.7.1	TX power level	✓	
18.4.7.3	TX spectrum mask with limit lines and pass/fail	✓	
18.4.7.8	Transmit power on and power down ramp	✓	
18.4.7.8	TX modulation accuracy, EVM, EVM vs symbols	✓	
18.4.7.7	RF carrier leakage (I/Q offset)	✓	
18.4.7.4, 18.4.7.5	Carrier frequency and chip clock error	✓	
	Constellation diagram	✓	
	Gain imbalance, quadrature error	✓	
	CCDF (also time gated) and crest factor	✓	
	Bit stream	✓	
	Adjacent channel power	✓	✓
General			
	Analysis at RF, IF, inverted IF	✓	
	Analysis in the I/Q baseband (requires option R&S®FSQ-B71) .)	✓	
	Autoselection of demodulation	✓	
	Display of header information	✓	
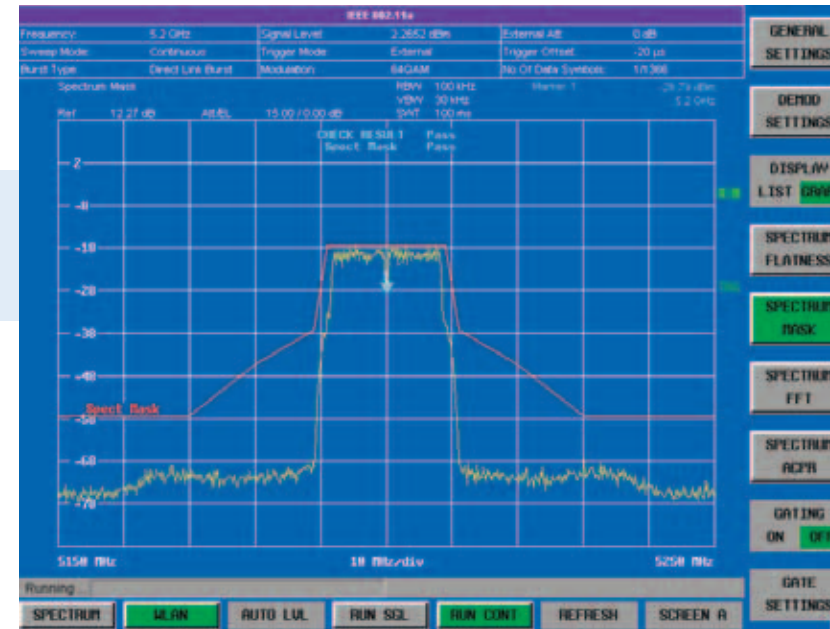
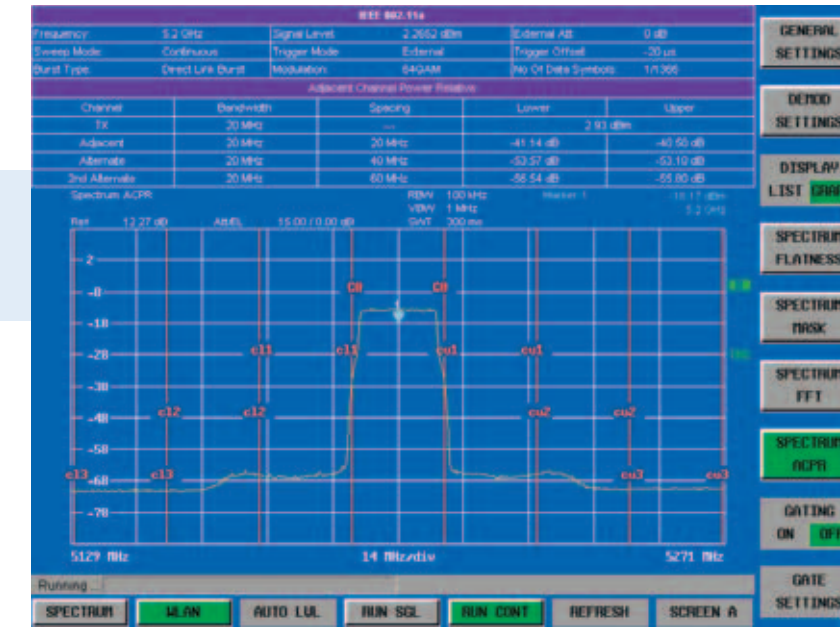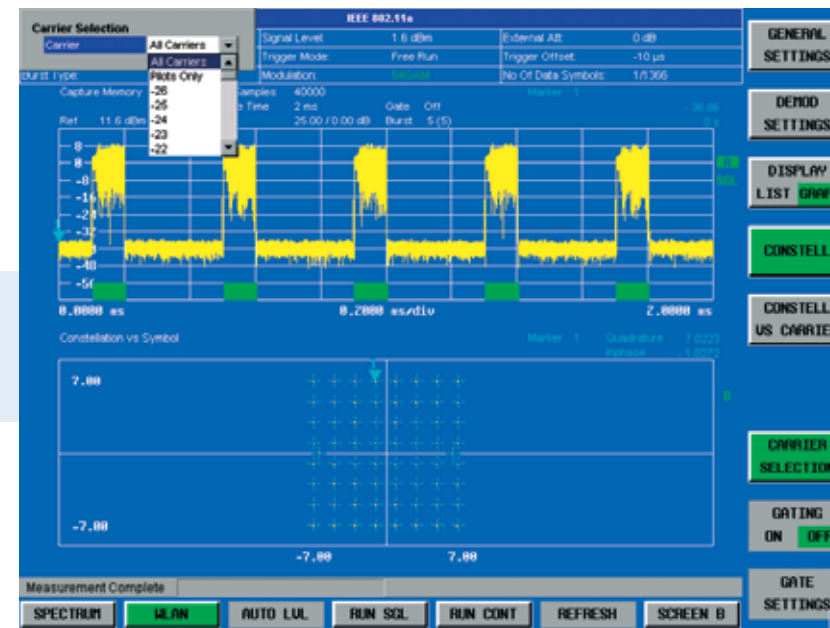Fig. 1a: Spectrum mask with standard-compliant limit lines.

Fig. 1b: ACP measurement.

Fig. 2: Display of the main modulation parameters in the Result Summary: The measurement covering 20 bursts shows an EVM of −47.12 dB for the best burst (min. peak) and −45.92 dB for the worst burst (max. peak) as well as an average EVM of −46.55 dB for all bursts. Output power (with regard to burst) and crest factor are also displayed. Quick and easy determination, for example, of the EVM dependence on the output power of an amplifier is thus possible. The analyzer's auto level function allows it to follow level changes without manual setting or corrections.

Fig. 3: Constellation diagram of all or (selectable) single carriers.

Fig. 4: Setup tables provide a quick overview of the selected settings and quick access to the setting parameters.

Fig. 5: Measurement of the rise and fall times for an IEEE 802.11b signal. Adjustable averaging ensures repeatable and stable results.

The usual spectrum analysis functions of the base unit expand measurement functionality, making the instrument even more versatile.

Other typical development tasks can be performed with the following measurement functions:

◆ Channel- and user-configurable adjacent channel power measurement
◆ Multicarrier adjacent channel power measurement
◆ TOI marker for automatic determination of third-order intercept
◆ Noise measurement (with R&S®FS-K3) or phase noise measurement (with R&S®FS-K4)

The Signal Analyzer R&S®FSQ26 covers the entire frequency range to be measured for spurious emissions.
The R&S®FSQ-K70 option expands the R&S®FSQ by universal demodulation and analysis functions for digitally modulated signals up to a symbol rate of 25 Msps. Thus, the AM/AM and AM/φM distortion curve of an amplifier, for example, can be determined directly from a digitally modulated signal, i.e. very realistically.
For analysis down to the chip layer, the option R&S®FSQ-B71 has selectable balanced or unbalanced I and Q baseband inputs.
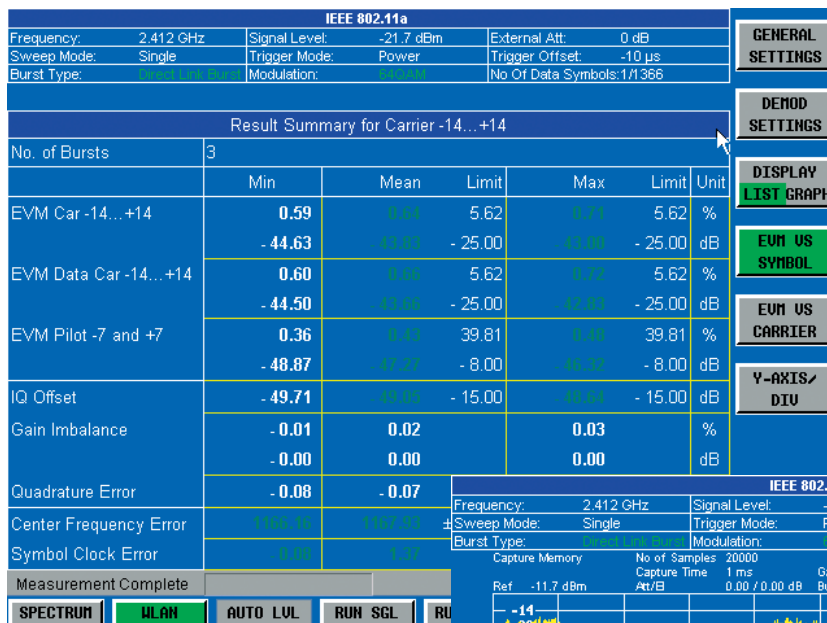
Fig. 6: Display of the main modulation parameters versus carriers –14 to +14 (measured with the R&S®FSP).
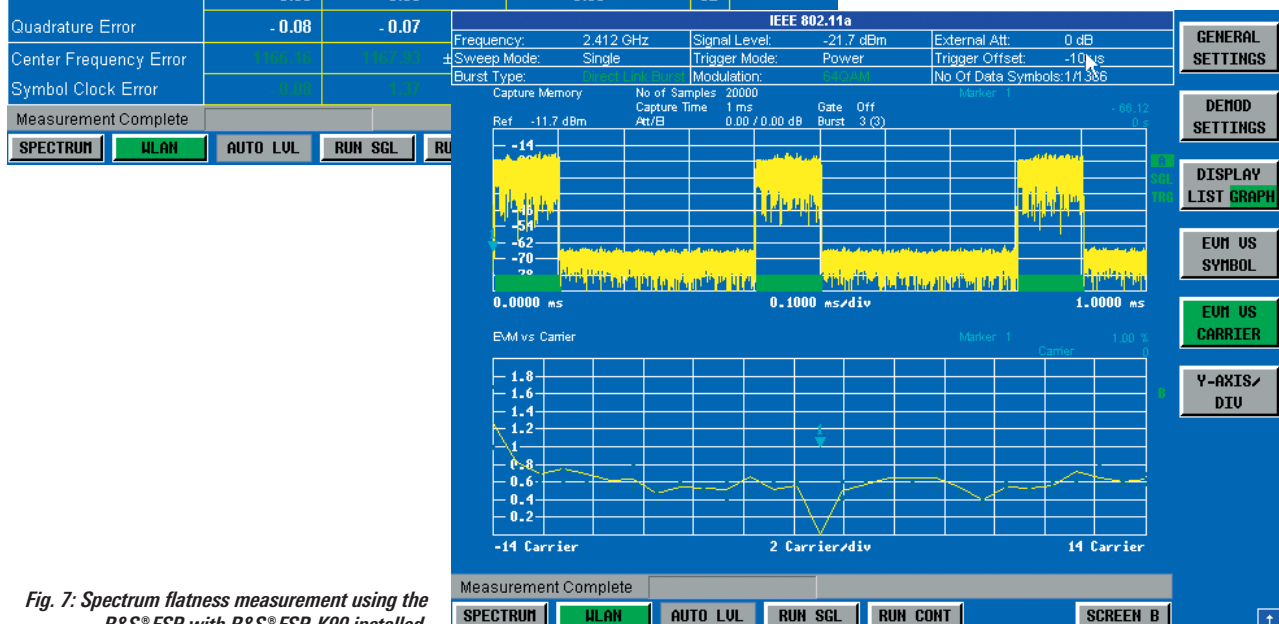
Fig. 7: Spectrum flatness measurement using the R&S®FSP with R&S®FSP-K90 installed.

Ordering information

Designation	Type	Order No.
WLAN 802.11a/b/g/j Application Firmware	R&S®FSQ-K91	1157.3129.02
Upgrade of R&S®FSQ-K90 to R&S®FSQ-K91	R&S®FSQ-K90U	1300.8000.02
Signal Analyzer 20 Hz to 3.6 GHz	R&S®FSQ3	1155.5001.03
Signal Analyzer 20 Hz to 8 GHz	R&S®FSQ8	1155.5001.08
Signal Analyzer 20 Hz to 26 GHz	R&S®FSQ26	1155.5001.26
Signal Analyzer 20 Hz to 40 GHz	R&S®FSQ40	1155.5001.40
Spectrum Analyzer 9 kHz to 3 GHz	R&S®FSP3	1164.4391.03
Spectrum Analyzer 9 kHz to 7 GHz	R&S®FSP7	1164.4391.07
Spectrum Analyzer 9 kHz to 13.6 GHz	R&S®FSP13	1164.4391.13
Spectrum Analyzer 9 kHz to 30 GHz	R&S®FSP30	1164.4391.30
Spectrum Analyzer 9 kHz to 40 GHz	R&S®FSP40	1164.4391.40
Recommended options and extras See specifications Spectrum Analyzer R&S®FSP (PD 0758.1206.22) and specifications Signal Analyzer R&S®FSQ (PD 0758.0945.22)		
I/Q Baseband Input for the Signal Analyzer R&S®FSQ	R&S®FSQ-B71	1157.0113.02
I/Q Bandwidth Extension	R&S®FSQ-B72	1157.0336.02

For specifications see PD0758.0916.22/
PD 0758.1435.22
and www.rohde-schwarz.com
(search term: FSP, FSQ)

Certified Quality System
ISO 9001
DQS REG. NO 1954 QM

Certified Environmental System
ISO 14001
DQS REG. NO 1954 UM

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