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The specifications of the R&S®FS-K96/R&S®FS-K96PC OFDM vector signal analysis software are based on the data sheet specifications of the R&S®FSQ/FSG/FSUP/FSV/FSVR/FSW signal and spectrum analyzers and the R&S®RTO digital oscilloscope. They have not been checked separately and are not verified during instrument calibration. Measurement uncertainties are given as 95 % confidence intervals. The specified level measurement errors do not take into account systematic errors due to reduced signal to noise ratio (S/N). Specifications apply under the following conditions: 30 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and all internal automatic adjustments performed.

Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter (e.g. EVM). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Specifications

Minimum system configuration

Operating system		Windows XP Professional with Service Pack 2
Free hard disk space		1 Gbyte
Free RAM		≥ 1 Gbyte
Graphics resolution		≥ XGA (800 × 600 pixel)
USB		1 free USB port for connecting the Smart Card reader (if no PC built-in Smart Card reader is used)
Measuring instrument connection	hardware	IEC/IEEE bus or LAN connection
	software	VISA driver: National Instruments VISA Version ≥ 4.2 (included)

Inputs

RF input	R&S®FSQ	frequency range same as base system
	R&S®FSG	
	R&S®FSUP	
	R&S®FSV	
	R&S®FSVR	
	R&S®FSW	
	R&S®RTO ¹	
Digital baseband input	only with R&S®FSQ-B17/FSV-B17 option	
Analog baseband input	only with R&S®FSQ-B71 option or R&S®RTO ¹	
File	*.iqw (IIIQQQ or IQIQIQ), *.dat (ASCII), *.vv (encrypted), *.iq.tar (iq-tar)	up to 10 Msample

¹ Requires R&S®RTO-K11 I/Q software interface.

Signal acquisition

Instrument connection		LAN, IEC/IEEE bus
Record length		up to 10 Msample
	The usable record length depends on the OFDM system configuration, the PC memory available for the application and the Rohde & Schwarz instrument. ² The record length is reduced if the adjustable channel filter is selected.	
Triggering	RF input	free run
		external
		IF power ³
	digital baseband input	free run
		external ⁴
	analog baseband input	free run
external		

Bandwidth

Usable I/Q bandwidth	R&S [®] FSQ	standard	28 MHz
		up to ⁵	120 MHz
	R&S [®] FSG	standard	28 MHz
	R&S [®] FSUP	standard	28 MHz
	R&S [®] FSV	standard	28 MHz
		up to ⁵	40 MHz
	R&S [®] FSVR	standard	40 MHz
	R&S [®] FSW	standard	10 MHz
		up to ⁵	160 MHz
R&S [®] RTO	up to ⁵	4 GHz (–3 dB)	
Channel filter			built-in decimation filter, adjustable software filter
Sample rate	R&S [®] FSQ	standard	400 Hz to 81.6 MHz
	R&S [®] FSQ-B72		400 Hz to 326.4 MHz
	R&S [®] FSG	standard	400 Hz to 81.6 MHz
	R&S [®] FSUP	standard	400 Hz to 81.6 MHz
	R&S [®] FSV	standard	100 Hz to 45 MHz
	R&S [®] FSV-B70		100 Hz to 128 MHz
	R&S [®] FSVR	standard	100 Hz to 128 MHz
	R&S [®] FSW	standard	100 Hz to 200 MHz
	R&S [®] RTO	standard	1 kHz to 10 GHz
The maximum sample rate is reduced if the adjustable channel filter is selected.			

OFDM system configuration

Manual settings	FFT length	8 to 32768 (all integer numbers allowed)
	cyclic prefix length	4 to FFT length
Configuration file settings	cell types	zero, pilot, data, don't care
	pilot modulation	arbitrary complex numbers
	data modulation	each data cell individually assigned to a constellation
	constellations	arbitrary complex numbers, e.g. PSK or QAM

² Example: approx. 600 Mbyte memory required for 4 Msample (FFT length 2048, CP length 64, 68 symbols per frame, 27 frames analyzed).

³ Restricted IF power trigger functionality for carrier frequencies < 50 MHz. IF power trigger not available for R&S[®]RTO.

⁴ Available only for R&S[®]FSV-B17.

⁵ Depends on the hardware configuration. For details, see R&S[®]FSV/FSQ/FSW and R&S[®]RTO data sheets.

Result display

Result summary	min./mean/max.	EVM all
		EVM data
		EVM pilot
		frequency error
		sample clock error
		I/Q offset
		gain imbalance
		quadrature error
		frame power
		crest factor
		Power
power versus carrier		
power versus symbol		
capture buffer		
power spectrum		
EVM		EVM versus symbol × carrier
		EVM versus carrier
		EVM versus symbol
		error frequency/phase
Channel		flatness
		group delay
		impulse response
Constellation		constellation diagram
		constellation versus carrier
		constellation versus symbol
Miscellaneous and statistics		CCDF
		signal flow
		demodulation report
		allocation matrix as defined in configuration file

Measurement parameters

Burst search		on/off
Synchronization	time synchronization	cyclic prefix/repetitive preamble
	parameter estimation and channel estimation	pilot aided/pilot and data aided
Modulation detection		defined by configuration file/ per symbol/per carrier
Compensation	phase tracking	on/off
	timing tracking	on/off
	level tracking	on/off
	channel compensation	on/off

EVM measurement specification (nominal)

Averaged EVM of pilots and data measured using the following signals:

- WLAN IEEE 802.11g OFDM, 64QAM, 100 symbols per frame
- WiMAX™ IEEE 802.16 OFDM, 16QAM, 14 MHz bandwidth, 100 symbols per frame
- DVB-T 2k mode, QPSK, 6 MHz bandwidth, 68 symbols per frame

EVM normalization is set to "RMS Pilots & Data"

EVM		
Residual EVM WLAN IEEE 802.11g OFDM	level -25 dBm to +10 dBm, properly adjusted reference level, center frequency 2.4 GHz, parameter estimation: pilot and data aided	
	R&S®FSQ	< -45 dB
	R&S®FSG	< -44 dB
	R&S®FSUP	< -44 dB
	R&S®FSV	< -44 dB
	R&S®FSVR	< -44 dB
	R&S®FSW	< -47 dB
	R&S®RTO	< -42 dB
Residual EVM WiMAX™ IEEE 802.16 OFDM	level -25 dBm to +10 dBm, properly adjusted reference level, center frequency 3.417 GHz, parameter estimation: pilot and data aided	
	R&S®FSQ	< -48 dB
	R&S®FSG	< -47 dB
	R&S®FSUP	< -47 dB
	R&S®FSV	< -45 dB
	R&S®FSVR	< -45 dB
	R&S®FSW	< -49 dB
	R&S®RTO	< -42 dB
Residual EVM DVB-T 2k mode	level -25 dBm to +10 dBm, properly adjusted reference level, center frequency 800 MHz, parameter estimation: pilot and data aided	
	R&S®FSQ	< -51 dB
	R&S®FSG	< -50 dB
	R&S®FSUP	< -50 dB
	R&S®FSV	< -49 dB
	R&S®FSVR	< -49 dB
	R&S®FSW	< -54 dB
	R&S®RTO	< -43 dB

Ordering information

Designation	Type	Order No.
OFDM Vector Signal Analysis Software, PC and analyzer required (requires R&S®FSPC)	R&S®FS-K96	1310.0202.06
OFDM Vector Signal Analysis Software, usable with and without analyzer (requires R&S®FSPC)	R&S®FS-K96PC	1310.0219.06
Upgrade from R&S®FS-K96 to R&S®FS-K96PC (requires R&S®FSPC)	R&S®FS-K96U	1310.0225.06
License Dongle	R&S®FSPC	1310.0002.03
Signal Analyzer, 20 Hz to 3.6 GHz	R&S®FSQ3	1313.9100.03
Signal Analyzer, 20 Hz to 8 GHz	R&S®FSQ8	1313.9100.08
Signal Analyzer, 20 Hz to 26.5 GHz	R&S®FSQ26	1313.9100.26
Signal Analyzer, 20 Hz to 40 GHz	R&S®FSQ40	1313.9100.40
Signal Analyzer, 9 kHz to 8 GHz	R&S®FSG8	1309.0002.08
Signal Analyzer, 9 kHz to 13.6 GHz	R&S®FSG13	1309.0002.13
Signal Analyzer, 20 Hz to 8 GHz	R&S®FSUP8	1166.3505.09
Signal Analyzer, 20 Hz to 26.5 GHz	R&S®FSUP26	1166.3505.27
Signal Analyzer, 20 Hz to 50 GHz	R&S®FSUP50	1166.3505.51
Signal Analyzer, 9 kHz to 4 GHz	R&S®FSV4	1321.3008.04
Signal Analyzer, 9 kHz to 7 GHz	R&S®FSV7	1321.3008.07
Signal Analyzer, 9 kHz to 13.6 GHz	R&S®FSV13	1321.3008.13
Signal Analyzer, 9 kHz to 30 GHz	R&S®FSV30	1321.3008.30
Signal Analyzer, 9 kHz to 40 GHz	R&S®FSV40	1321.3008.40
Real-Time Spectrum Analyzer, 10 Hz to 7 GHz	R&S®FSVR7	1311.0006.07
Real-Time Spectrum Analyzer, 10 Hz to 13.6 GHz	R&S®FSVR13	1311.0006.13
Real-Time Spectrum Analyzer, 10 Hz to 30 GHz	R&S®FSVR30	1311.0006.30
Real-Time Spectrum Analyzer, 10 Hz to 40 GHz	R&S®FSVR40	1311.0006.40
Signal Analyzer, 2 Hz to 8 GHz	R&S®FSW8	1312.8000.08
Signal Analyzer, 2 Hz to 13.6 GHz	R&S®FSW13	1312.8000.13
Signal Analyzer, 2 Hz to 26.5 GHz	R&S®FSW26	1312.8000.26
Digital Oscilloscope, 600 MHz, 10 Gsample/s, 20/40 Msample, 2 channels	R&S®RTO1002	1316.1000.02
Digital Oscilloscope, 600 MHz, 10 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1004	1316.1000.04
Digital Oscilloscope, 1 GHz, 10 Gsample/s, 20/40 Msample, 2 channels	R&S®RTO1012	1316.1000.12
Digital Oscilloscope, 1 GHz, 10 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1014	1316.1000.14
Digital Oscilloscope, 2 GHz, 10 Gsample/s, 20/40 Msample, 2 channels	R&S®RTO1022	1316.1000.22
Digital Oscilloscope, 2 GHz, 10 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1024	1316.1000.24
Digital Oscilloscope, 4 GHz, 20 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1044	1316.1000.44
I/Q Software Interface	R&S®RTO-K11	1317.2975.02
Recommended options and extras		
Analog Baseband Inputs	R&S®FSQ-B71	1157.0113.03
Digital Baseband Interface	R&S®FSQ-B17	1163.0063.02
	R&S®FSV-B17	1310.9568.02
I/Q Bandwidth Extension	R&S®FSQ-B72	1157.0336.12
	R&S®FSV-B70	1310.9645.02
	R&S®FSW-B28	1313.1645.02
	R&S®FSW-B40	1313.0861.02
	R&S®FSW-B80	1313.0878.02
	R&S®FSW-B160	1313.1668.02
OCXO 10 MHz	R&S®RTO-B4	1304.8305.02
Accessories supplied		
Software and operating manual (on CD-ROM), National Instruments VISA Version (on CD-ROM)		

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