



Vector Signal Analyzer R&S FSQ-K70

Specifications



ROHDE & SCHWARZ

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The specifications of R&S FSQ-K70 are based on the datasheet specifications of Signal Analyzers R&S FSQ and have not been checked separately.

Specifications apply under the following conditions:

15 minutes warmup time at ambient temperature, specified environmental conditions met, calibration cycle adhered to and internal calibration performed. Data with tolerances are measurement uncertainties with a confidence level of 95%. Data without tolerances are typical values. The specified level measurement errors do not take into account systematic errors due to reduced S/N ratio.

Signal acquisition

Signal acquisition	Adjustable	Up to 8k symbols
Samples per symbol	1, 2, 4, 8, 16	
Symbol clock	Internally generated	
Carrier lock	Internally locked	
Triggering	Searches data block for beginning of TDMA burst and performs analysis over detected burst length.	Single Continuous External Burst search
Data synchronization	Predefined patterns User-defined patterns	

Modulation formats

FSK	Including GFSK	2 FSK 4 FSK
MSK	Including GMSK	Yes
PSK	(EDGE)	BPSK, QPSK, OQPSK, DQPSK, $\pi/4$ DQPSK, 8PSK, D8PSK 3 $\pi/8$ 8PSK
QAM Absolute encoding Differential encoding	16QAM, 32QAM, 64QAM, 128QAM, 256QAM D16QAM, D32QAM, D64QAM, D128QAM, D256QAM	

Predefined standards

Cellular	
3GPP WCDMA (QPSK)	Forward link Reverse link
CDMA2000 1x (QPSK, OQPSK)	Forward link Reverse link
EDGE	Normal burst
GSM	Access burst Frequency correction burst Normal burst Synchronization burst
NADC	Forward link Reverse link
PDC	Downlink Uplink
PHS	Communication burst Control burst

Wireless networking		
<i>Bluetooth™</i>	BLUETOOTH is a trademark owned by Bluetooth SIG, Inc., USA and licensed to Rohde & Schwarz.	DH1 packets DH3 packets DH5 packets
Other		
DECT	Fixed part burst	
TETRA	Control burst downlink Data burst downlink	

Filtering

Filter types	Raised cosine (RC) Root raised cosine (RRC) CDMA2000 compliant Gaussian EDGE None
User- selectable	
Alpha	0.1 to 1
BxT	0.1 to 1

Symbol rate

Maximum symbol rate Maximum bandwidth	The symbol rate is limited by the max bandwidth. The analyzer automatically selects an appropriate bandwidth for the selected modulation bandwidth. Example: with raised cosine filtering Max. symbol rate $28 \text{ MHz}/(1+\alpha) \leq 20.4 \text{ MHz}$	20.4 MHz 28 MHz
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Measurement results

Formats other than FSK

Measured signal	Filtered, carrier locked, symbol locked	I/Q versus time Magnitude versus time Phase versus time PDF/CDF
Reference signal	Ideal, computed from detected symbols	I/Q versus time Magnitude versus time Phase versus time PDF/CDF
Error vector signal	Vector difference between measured and reference signal	I/Q versus time Magnitude versus time Phase versus time PDF/CDF
Error signal	Difference between measured magnitude/phase and reference magnitude/phase	Magnitude error versus time Phase error versus time PDF/CDF
Detected symbols	Symbols versus time	
Modulation accuracy	Single sweep based numerical results Statistical results over multiple sweeps	
AM/AM conversion	Gain error versus reference signal level	
AM/φM conversion	Phase error versus reference signal level	

FSK measurement results

Measured signal	Magnitude versus time Instantaneous frequency versus time PDF/CDF	
Reference signal	Magnitude versus time Instantaneous frequency versus time PDF/CDF	
Deviation signal	Difference between instantaneous frequency of measured signal and reference signal	Deviation error versus time
Magnitude error signal	Difference between measured magnitude and reference magnitude	Magnitude error versus time

Display formats

The following trace formats are available for measured data and computed ideal reference data, with complete marker and scaling capabilities and automatic grid line adjustment to ideal symbol or constellation points.

Polar diagrams	Samples displayed only at symbol times Display of trajectory between symbol times with 1, 2, 4, 8, 16 points/ symbol	Constellation Vector
I or Q versus time		
Eye diagrams	Formats other than FSK FSK	I/Q Frequency
Error vector magnitude versus time		
AM/AM conversion AM/φM conversion	For modulation formats with amplitude variations	
Statistical diagrams	PDF CDF	

Error summary

Formats other than FSK

Measured rms and peak values	EVM can be calculated with or without removing I/Q offset I/Q offset	Error vector magnitude Magnitude error Phase error Carrier frequency offset Origin offset Amplitude drop I/Q imbalance Statistics
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Error summary (FSK)

Measured rms and peak values	FSK errors can be calculated with measured deviation or ideal deviation	Deviation error Magnitude error Carrier frequency offset
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Detected symbols

Symbol table

Symbol formats	Binary Octal Hexadecimal Decimal	
Symbol marker	Symbol mapping is user-definable with additional utility program. Note: Synchronization patterns are required to resolve carrier phase ambiguity in non-differential modulation formats.	Synchronization patterns shown as inverse video

Measurement uncertainty

Formats other than FSK and OQPSK. Averaging = 10.

Conditions: Specifications apply from 20 °C to 30 °C, for a full-scale signal, fully contained in the selected measurement span, random data sequence;

instrument receiver mode;

RF >20 MHz;

level \geq -25 dBm;

start frequency \geq 15% of BW;

alpha/ BT \geq 0.3 ($0.3 \leq \alpha \leq 0.7$ offset QPSK) and symbol rate \geq 1 kHz;

for symbol rates <1 kHz or RF frequency >5 GHz, uncertainty may be limited by phase noise.

Residual errors

(Result = 150 symbols, averages = 10, frequency = 1 GHz)

Residual EVM	Symbol rate \leq 100 kHz	0.5% rms
	Symbol rate \leq 1 MHz	0.5% rms
	Symbol rate \leq 10 MHz	1.0% rms
	Symbol rate >10 MHz <15 MHz	2.0% rms
Residual Magnitude error	Symbol rate \leq 100 kHz	0.3% rms
	Symbol rate \leq 1 MHz	0.5% rms
	Symbol rate \leq 10 MHz	1.0% rms
	Symbol rate >10 MHz	1.5% rms
Residual Phase error	(For modulation formats with equal symbol amplitudes)	
	Symbol rate \leq 100 kHz	0.3° rms
	Symbol rate \leq 1 MHz	0.4° rms
	Symbol rate \leq 10 MHz	0.6° rms
	Symbol rate >10 MHz	1.2° rms
Frequency error	Added to frequency accuracy, if applicable	Symbol rate/500000
I/Q origin offset	-60 dB or better	

Residual errors for standard measurements

Predefined standard settings and averaging = 10, frequency = 1 GHz

Residual EVM	3GPP WCDMA (QPSK)	0.6% rms
	CDMA2000	0.4% rms
	EDGE	0.35% rms
	TETRA	0.5% rms
	NADC	0.4% rms
	PDC	0.55% rms
Residual Phase error	GSM	0.15° rms
Residual Deviation error	DECT	2.5 kHz rms

Frequency dependency of residual errors

Residual EVM	3GPP WCDMA (QPSK)	
	Frequency	
	5 GHz	0.9%
	10 GHz	1.4%
	15 GHz	2.1%
	20 GHz	2.6%
	25 GHz	4.0%
Residual EVM	QPSK, symbol rate 15 MHz, alpha = 0.22	
	Frequency	
	5 GHz	1.2%
	10 GHz	1.9%
	15 GHz	2.3%
	20 GHz	2.8%
	25 GHz	3.8%

Measurement rate for standard measurements

Predefined standard settings, external trigger, continuous sweep

Measurements	3GPP WCDMA (QPSK)	10/s
	GSM (normal burst)	15/s
	EDGE (normal burst)	15/s
	DECT	15/s
	NADC	10/s
	CDMA2000	10/s

Ordering information

Vector Signal Analyzer for R&S FSQ	R&S FSQ-K70	1161.8038.02
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 26.5 GHz	R&S FSQ26	1155.5001.26
Recommended extras and options	See data sheet Signal Analyzer R&S FSQ, PD 0757.7652	
I/Q Baseband Inputs for Signal Analyzer R&S FSQ	R&S FSQ-B71	1157.0113.02

Certified Environmental System
ISO 14001
REG. NO 1354

Certified Quality System
ISO 9001
DQS REG. NO 1354



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