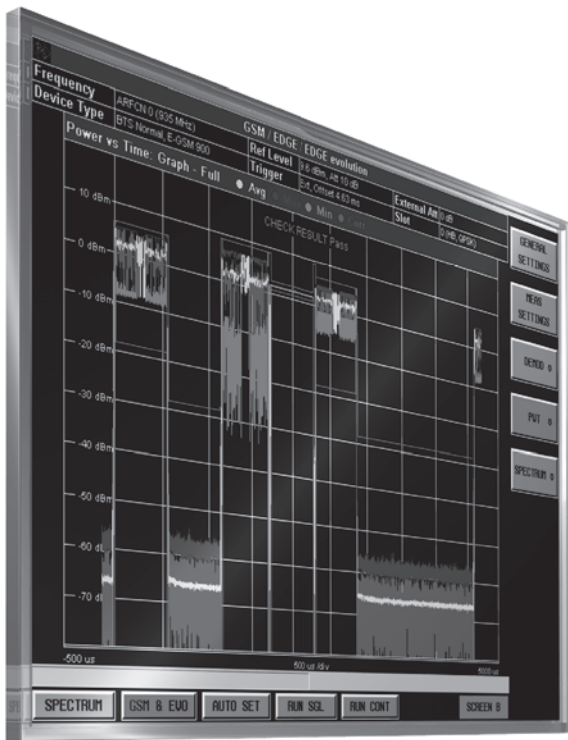


R&S® FS-K10 GSM/EDGE/EDGE Evolution Measurements Specifications



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Innovation

Specifications

The specifications of the R&S®FS-K10 GSM/EDGE/EDGE Evolution Measurements are based on the specifications of the R&S®FSQ/R&S®FSG signal and spectrum analyzer data sheets.

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 values" are designated with the abbreviation "typ." These values are verified during the final test but are not assured by Rohde & Schwarz. "Nominal values" are design parameters that are not assured by Rohde & Schwarz. These values are verified during product development but are not specifically tested during production. Data without tolerance limits is not binding.

GSM/EDGE measurements

Frequency

Frequency bands		T-GSM 380, T-GSM 410, GSM 450, GSM 480, GSM 710, GSM 750, T-GSM 810, GSM 850, P-GSM 900, E-GSM 900, R-GSM 900, T-GSM 900, DCS 1800, PCS 1900
Frequency range	RF input	
	R&S®FSQ3	20 MHz to 3.6 GHz ¹
	R&S®FSQ8	20 MHz to 8 GHz ¹
	R&S®FSQ26	20 MHz to 26.5 GHz ¹
	R&S®FSQ31	20 MHz to 31 GHz ¹
	R&S®FSQ40	20 MHz to 40 GHz ¹
	R&S®FSG8	20 MHz to 8 GHz ¹
	R&S®FSG13	20 MHz to 13.6 GHz ¹
Frequency setting		frequency frequency band and ARFCN

Level

Level range	RF input	-70 dBm to +30 dBm
Level setting		auto level manual configuration (reference level, RF attenuation, preamplifier ²)

Signal acquisition

Implemented standard versions		3GPP TS 45.004 V8.0.0 (2008-12) 3GPP TS 45.005 V8.4.0 (2009-02) 3GPP TS 45.002 V8.0.0 (2008-12)
Device types		BTS (normal, micro 1 to micro 3, pico) MS (normal, small)
Standards		GSM EDGE (EGPRS) EDGE evolution level A (EGPRS2-A) EDGE evolution level B (EGPRS2-B)
Burst types		normal burst (NB) higher symbol rate burst (HB)
Modulation formats		GMSK (NB) 3π/8-8PSK (NB) 3π/4-QPSK (HB) π/4-16QAM (NB and HB) -π/4-32QAM (NB and HB)
Symbol rates		normal (270.83333 ksymbol/s) (NB) higher (325 ksymbol/s) (HB)
Training sequence codes (TSC)		TSC0 to TSC7 (NB and HB)

¹ 4 MHz to 20 MHz with restricted functionality (power trigger, auto level, IF overload, dynamic range).

² Requires option R&S®FSU-B24 or B25.

Filter		GMSK pulse (NB GMSK)
		linearized GMSK pulse (NB, not GMSK)
		narrow pulse (HB)
		wide pulse (HB)
Timeslot lengths		157 symbol/156 symbol/ 156.25 symbol (NB)
		188.4 symbol/187.2 symbol/ 187.5 symbol (HB)
Number of slots to be analyzed		1 burst (PFE ³ , MAC ³ , EVM ³ , MOD ³)
		1 burst to 8 bursts (PvT ³ , TRA ³)
Triggering	RF input	free run, power, external

Measurements

Measurement	Data displayed	Measurement configurations
Power versus time (PvT ³)	graphical results: minimum; average; maximum; current	1 slot to 8 slots, full/rising and falling/top high resolution
Demodulation (PFE ³ , MAC ³ , EVM ³)	graphical results: minimum; average; maximum; current numeric results: table	modulation accuracy (summary table) EVM versus time phase error versus time magnitude error versus time
Modulation spectrum (MOD ³)	graphical results: current; average numeric results: table	power versus frequency
Transient spectrum (TRA ³)	graphical results: current; maximum numeric results: table	power versus frequency
Limit check	values in line with standard	for PvT ³ , MOD ³ and TRA ³

Measurement specification (nominal)

Demodulation – GSM and EGPRS (EDGE)	Note	NB GMSK	NB 3π/8-8PSK	AUME ⁴
EVM ⁵	(S/N > 40 dB)			
RMS value, error floor		N/A	< 0.3 %	N/A
RMS value, uncertainty		N/A	< 0.2 %	
Peak value, error floor		N/A	< 1.0 %	
Peak value, uncertainty		N/A	< 1.0 %	
95:th percentile value, error		N/A	< 0.5 %	
Phase error ⁵	(S/N > 40 dB)			
RMS value, error floor		< 0.3°	N/A	1.5°
RMS value, uncertainty		< 0.2°	N/A	
Peak value, error floor		< 1.5°	N/A	5°
Peak value, uncertainty		< 1.0°	N/A	
Frequency error ⁵				
Frequency lock range (referenced to RF carrier frequency)		±30 kHz	±30 kHz	N/A
Uncertainty	excluding reference frequency error	< 3 Hz	< 2 Hz	GMSK: 10 Hz ⁶ 8PSK: 16 Hz
I/Q origin offset suppression				
Measurement range		N/A	-15 dBc to -50 dBc	N/A

³ PvT: power versus time, PFE: phase and frequency error, MAC: modulation accuracy, EVM: error vector magnitude, MOD: modulation spectrum, TRA: transient spectrum.

⁴ AUME = acceptable uncertainty of measurement equipment (in line with 3GPP TS 51.021 = base station requirements).

⁵ Frequency within GSM frequency band, level -70 dBm to +30 dBm, average of 200 bursts, measurement synchronized using training sequence.

⁶ GSM 400: 5 Hz.

Demodulation – EGPRS2-A	Note	NB 16QAM	NB 32QAM	AUME ⁷
EVM ⁵	(S/N > 40 dB)			
RMS value, error floor		< 0.3 %	< 0.3 %	N/A
RMS value, uncertainty		< 0.2 %	< 0.2 %	
Peak value, error floor		< 1.0 %	< 1.0 %	
Peak value, uncertainty		< 1.0 %	< 1.0 %	
95:th percentile value, error		< 1.0 %	< 1.0 %	
Frequency error ⁵				
Frequency lock range (referenced to RF carrier frequency)		±30 kHz	±30 kHz	N/A
Uncertainty	excluding reference frequency error	< 2 Hz	< 2 Hz	N/A
I/Q origin offset suppression				
Measurement range		-25 dBc to -50 dBc	-25 dBc to -50 dBc	N/A

Demodulation – EGPRS2-B	Note	HB QPSK narrow pulse	HB 16QAM narrow pulse	HB 32QAM narrow pulse	AUME ⁸
EVM ⁵	(S/N > 40 dB)				
RMS value, error floor		< 0.5 %	< 0.5 %	< 0.5 %	N/A
RMS value, uncertainty		< 0.25 %	< 0.25 %	< 0.25 %	
Peak value, error floor		< 1 %	< 1 %	< 2 %	
Peak value, uncertainty		< 0.5 %	< 0.5 %	< 1 %	
95:th percentile value, error		< 0.5 %	< 0.75 %	< 0.75 %	
Frequency error ⁵					
Frequency lock range (referenced to RF carrier frequency)		±30 kHz	±30 kHz	±30 kHz	N/A
Uncertainty	excluding reference frequency error	< 2 Hz	< 2 Hz	< 2 Hz	N/A
I/Q origin offset suppression					
Error floor		-50 dBc			N/A

Demodulation – EGPRS2-B	Note	HB QPSK wide pulse	HB 16QAM wide pulse	HB 32QAM wide pulse	AUME ⁸
EVM ⁵	(S/N > 40 dB)				
RMS value, error floor		< 0.2 %	< 0.3 %	< 0.3 %	N/A
RMS value, uncertainty		< 0.25 %	< 0.25 %	< 0.25 %	
Peak value, error floor		< 0.4 %	< 0.6 %	< 0.6 %	
Peak value, uncertainty		< 0.5 %	< 0.5 %	< 0.5 %	
95:th percentile value, error		< 0.5 %	< 0.5 %	< 0.5 %	
Frequency error ⁵					
Frequency lock range (referenced to RF carrier frequency)		±30 kHz	±30 kHz	±30 kHz	N/A
Uncertainty	excluding reference frequency error	< 2 Hz	< 2 Hz	< 2 Hz	N/A
I/Q origin offset suppression					
Error floor		-50 dBc			N/A

Level measurements		All modulations	AUME ⁸
Absolute level uncertainty		see R&S [®] FSQ/R&S [®] FSG data sheets: "Level measurement uncertainty"	1.0 dB ⁹
Relative level uncertainty		see R&S [®] FSQ/R&S [®] FSG data sheets: "Level measurement uncertainty"	0.7 dB ¹⁰

⁷ AUME = acceptable uncertainty of measurement equipment (in line with 3GPP TS 51.021 = base station requirements); in the case of multiple limits, the most stringent limit applies.

⁸ AUME = acceptable uncertainty of measurement equipment (in line with 3GPP TS 51.021, Chapter 4.7 for base station requirements).

⁹ For static power step 0.

¹⁰ For power steps other than 0.

Power versus time		All modulations	
Absolute level uncertainty		see R&S®FSQ/R&S®FSG data sheets: "Level measurement uncertainty"	1.0 dB
Dynamic range (PvT filter = 500 kHz)	detector average	> 72 dB	N/A
For all modulations	detector peak hold	> 70 dB	N/A

Spectrum due to modulation and noise		GMSK and 8PSK	
Level measurement uncertainty			
Absolute		see R&S®FSQ/R&S®FSQ data sheets: "Level measurement uncertainty"	1.0 dB
Relative			
$\Delta f \leq 0.1$ MHz		see R&S®FSQ/R&S®FSQ data sheets: "Level – Display nonlinearity" and "I/Q data – Amplitude flatness"	0.5 dB
0.1 MHz $\leq \Delta f \leq 1.8$ MHz			0.7 dB ¹¹
Dynamic range at offset frequency	carrier power 30 dBm		
200 kHz ¹²	RBW = 30 kHz	> 70 dB	N/A
400 kHz ¹²	RBW = 30 kHz	> 75 dB	N/A
600 kHz	RBW = 30 kHz	> 74 dB	N/A
1200 kHz	RBW = 30 kHz	> 75 dB	N/A
1800 kHz	RBW = 30 kHz	> 73 dB	N/A

Spectrum due to switching transients		GMSK and 8PSK	
Level measurement uncertainty			
Absolute		see R&S®FSQ/R&S®FSQ data sheets: "Level measurement uncertainty"	1.5 dB
Relative			
0 dBc to 50 dBc		see R&S®FSQ/R&S®FSQ data sheets: "Level – Display nonlinearity" and "I/Q data – Amplitude flatness"	0.7 dB
> 50 dBc			1.5 dB
Dynamic range at offset frequency	carrier power 30 dBm RBW = 30 kHz, VBW = 100 kHz		
400 kHz		> 67 dB	N/A
600 kHz		> 67 dB	N/A
1200 kHz		> 67 dB	N/A
1800 kHz		> 65 dB	N/A

Ordering information

Designation	Type	Order No.
GSM/EDGE/EDGE Evolution Measurements	R&S®FS-K10	1309.9700.02
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
Signal Analyzer, 20 Hz to 31 GHz	R&S®FSQ31	1155.5001.31
Signal Analyzer, 20 Hz to 40 GHz	R&S®FSQ40	1155.5001.40
Spectrum Analyzer, 9 kHz to 8 GHz	R&S®FSG8	1309.0002.08
Spectrum Analyzer, 9 kHz to 13.6 GHz	R&S®FSG13	1309.0002.13
Recommended options and extras		
Preamplifier 30 dB 100 kHz to 50 GHz	R&S®FSU-B24	1157.2100.50
Electronic Attenuator and Preamplifier	R&S®FSU-B25	1144.9298.02
See also specifications for the R&S®FSQ signal analyzer (PD 0758.0945.22) and R&S®FSG spectrum analyzer (PD 5213.8721.22).		

¹¹ 0.7 dB for power differences smaller than 50 dBc, or 1.5 dB otherwise.

¹² Due to the nominal GSM signal bandwidth, the dynamic range cannot be measured directly but is computed from phase noise measurements with CW carriers.

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For product brochure,
see PD 5214.0982.12
and www.rohde-schwarz.com

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