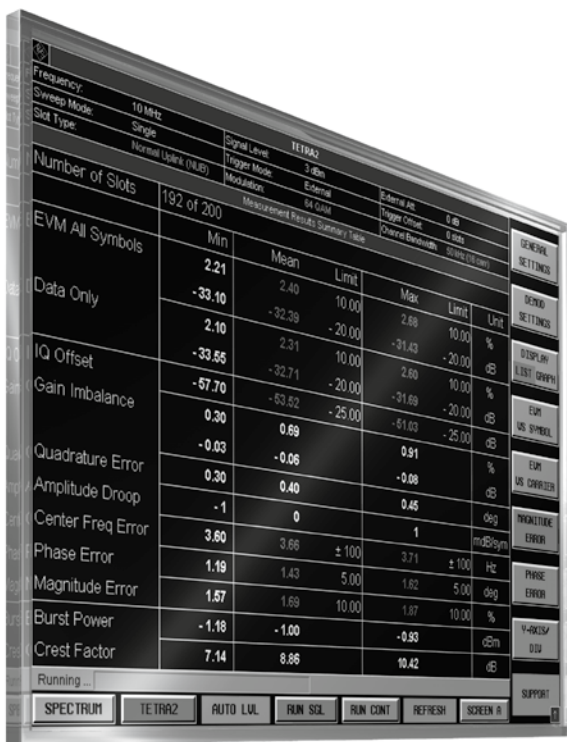


R&S®FS-K110

TETRA Release 2 Analysis

Specifications



75 Years of Driving Innovation



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The specifications of R&S®FS-K110 are based on the data sheet of the R&S®FSU/R&S®FSQ signal and spectrum analyzer. They have not been checked separately and are not verified during instrument calibration. The specified 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 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.

Specifications

Support of TETRA Release 2 (TEDS) modulation analysis requires the following options:

- R&S®FS-K110
- For the R&S®FSU: Either the R&S®FSU-B73 option (can only be factory-installed) or the R&S®FSU-U73 option (can only be retrofitted).
- Installed system memory must be at least 512 Mbyte.

Frequency

Frequency range	RF input	
	R&S®FSQ3	50 MHz ¹ to 3.6 GHz
	R&S®FSQ8	50 MHz ¹ to 8 GHz
	R&S®FSQ26	50 MHz ¹ to 26.5 GHz
	R&S®FSQ40	50 MHz ¹ to 40 GHz
	R&S®FSU3	50 MHz ¹ to 3.6 GHz
	R&S®FSU8	50 MHz ¹ to 8 GHz
	R&S®FSU26	50 MHz ¹ to 26.5 GHz
	R&S®FSU43	50 MHz ¹ to 43 GHz
	R&S®FSU46	50 MHz ¹ to 46 GHz
	R&S®FSU50	50 MHz ¹ to 50 GHz
	R&S®FSU67	50 MHz ¹ to 67 GHz
	I/Q baseband input (R&S®FSQ-B71)	DC to 36 MHz
digital baseband input (R&S®FSQ-B17)	0 Hz	
Frequency setting		manual

Level

Level ranges	RF input	-70 dBm to +30 dBm
	I/Q baseband input (R&S®FSQ-B71)	31.6 mV to 5.62 V
Level setting		manual

Signal acquisition

Supported standards		TEDS QAM signals in line with ETSI EN 300 392-2 V3.2.1
Supported slot types		control uplink burst (CB)
		random access uplink burst (RAB)
		normal uplink burst (NUB)
		normal downlink burst (NDB)
Supported number of subcarriers	CB, NUB, NDB	8 (25 kHz channel bandwidth) 16 (50 kHz channel bandwidth) 32 (100 kHz channel bandwidth) 48 (150 kHz channel bandwidth)
	RAB	8 (25 kHz channel bandwidth)
Modulation format of payload symbols	CB, NUB, NDB	4QAM 16QAM 64QAM
	RAB	4QAM
Demodulator setting		manual selection of slot type, modulation format and number of subcarriers others: auto
Capture length	continuous	2.4 slots to 108 slots, i.e. 34 ms to 1.53 s ²
Number of slots that can be analyzed	continuous	1 to 100 000
Result length	capture buffer	capture length
	EVM versus symbol and versus carrier, PVT, spectrum FFT, ACP due to transients, ACP due to modulation, magnitude error and phase error versus symbols	capture length, 1 slot to 100 000 slots
	constellation versus symbol, constellation versus carrier, bit stream	1 slot

¹ 5 MHz to 50 MHz with restricted functionality depending on bandwidth (IF power trigger, auto level, IF overload).

² For digital baseband input (R&S®FSQ-B17): The maximum capture time decreases gradually if the digital input sampling rate gets larger than 10 MHz.

Triggering	RF input	free run, IF power, external
	I/Q baseband input	free run, envelope of I/Q voltage, external
	digital baseband input (R&S®FSQ-B17)	free run

Result display

Result list	min./mean/max.	EVM of all symbols
	min./mean/max.	EVM of data/data + sync + pilot/data + header/sync + pilot
	min./mean/max.	I/Q offset
		gain imbalance
quadrature error		
Power versus time	min./mean/max./current	amplitude droop
		center frequency error
		phase error
		magnitude error
EVM	min./mean/max./current	mean power of all symbols in slot
		crest factor
		power versus time trace
		absolute and relative average power before and after burst
Spectrum		reference power
		slot power derived from PVT trace
		trigger to sync
		EVM versus symbol
Constellation	symbol types and carrier index selection	EVM versus carrier
		phase error versus symbol
	symbol types selection	magnitude error versus symbol
Statistics		ACP due to transients
Limit check	values in line with standard or user-defined limits	ACP due to modulation
		spectrum FFT
		constellation diagram
Statistics		constellation versus carrier
		bit stream
Limit check	values in line with standard or user-defined limits	in result list: EVM, I/Q offset, center frequency error, phase error, magnitude error
		ACP due to transients
		ACP due to modulation

Adjustable parameters

Input		RF
	R&S®FSQ-B71	I and Q baseband, unbalanced, balanced
	R&S®FSQ-B17	digital input sampling rate, full-scale level
Pilot tracking		ON/OFF
Compensate amplitude droop		ON/OFF
Compensate I/Q offset		ON/OFF
Swap I/Q		ON/OFF
Demodulator frequency lock range	SNR better than 10 dB	±1 kHz/±10 kHz

Measurement uncertainty (nominal)

Frequency error uncertainty	SNR better than 20 dB	±1 Hz + R&S®FSQ/R&S®FSU frequency uncertainty (see R&S®FSQ/R&S®FSU reference frequency)
Level uncertainty	slot power	same as R&S®FSQ/R&S®FSU (see R&S®FSQ/R&S®FSU total measurement uncertainty)
	ACP	same as R&S®FSQ/R&S®FSU (see R&S®FSQ/R&S®FSU total measurement uncertainty)

Ordering information

Designation	Type	Order No.
TETRA Release 2 Analysis	R&S®FS-K110	1309.9668.02
Signal and Spectrum Analyzer, 20 Hz to 3.6 GHz	R&S®FSQ3	1155.5001.03
Signal and Spectrum Analyzer, 20 Hz to 8 GHz	R&S®FSQ8	1155.5001.08
Signal and Spectrum Analyzer, 20 Hz to 26.5 GHz	R&S®FSQ26	1155.5001.26
Signal and Spectrum Analyzer, 20 Hz to 40 GHz	R&S®FSQ40	1155.5001.40
Spectrum Analyzer, 20 Hz to 3.6 GHz	R&S®FSU3	1166.1660.03
Spectrum Analyzer, 20 Hz to 8 GHz	R&S®FSU8	1166.1660.08
Spectrum Analyzer, 20 Hz to 26.5 GHz	R&S®FSU26	1166.1660.26
Spectrum Analyzer, 20 Hz to 43 GHz	R&S®FSU43	1166.1660.43
Spectrum Analyzer, 20 Hz to 46 GHz	R&S®FSU46	1166.1660.46
Spectrum Analyzer, 20 Hz to 50 GHz	R&S®FSU50	1166.1660.50
Spectrum Analyzer, 20 Hz to 67 GHz	R&S®FSU67	1166.1660.67
Vector Signal Analyzer	R&S®FSU-B73 (not retrofittable)	1169.5696.03
Vector Signal Analyzer	R&S®FSU-U73 (retrofittable)	1169.5696.04
Recommended options and extras	see also the data sheets for the R&S®FSQ/R&S®FSU signal and spectrum analyzer	
Analog Baseband Inputs	R&S®FSQ-B71	1157.0113.03
Electronic Attenuator, 0 dB to 30 dB, and 20 dB Preamplifier (3.6 GHz)	R&S®FSU-B25	1144.9298.02
Digital Baseband Interface	R&S®FSQ-B17	1163.0063.02
512 Mbyte Memory for CPU board with order no. 1091.2520.00 (for R&S®FSQ)	R&S®FSQ-B512	1157.1590.02
512 Mbyte Memory for CPU board with order no. 1091.2520.00 (for R&S®FSU or R&S®FSP)	R&S®FSP-B512	1157.1590.03
512 Mbyte Memory for CPU board with order no. 1091.2808.00 or 1091.2814.00 (for R&S®FSU or R&S®FSP)	R&S®FSP-B512	1157.1590.04

In order to determine the order no. of the CPU board, press the following hardkeys and softkeys to call up the HARDWARE INFO dialog:

SETUP | SYSTEM INFO | HARDWARE INFO

The CPU board order no. is indicated in the 'CPU Board' row in the ORDER #, MODEL columns.

In order to check the current size of the R&S®FSQ or R&S®FSU memory, press the following hardkeys and softkeys to call up the FIRMWARE VERSIONS – STATISTICS dialog:

SETUP | SYSTEM INFO | STATISTICS

The 'Memory Size' field shows the currently available memory capacity of the R&S®FSQ or R&S®FSU.

The product brochure containing further information is available under PD 5214.1095.12 and at www.rohde-schwarz.com.

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Environmental commitment

- | Energy-efficient products
- | Continuous improvement in environmental sustainability
- | ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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