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The specifications of the R&S®FS-K101PC/-K103PC/-K105PC, R&S®FSV-K101/-K103/-K105 and R&S®FSQ-K101/-K103/-K105 EUTRA/LTE uplink PC software are based on the data sheet specifications of the R&S®FSW, R&S®FSV, R&S®FSQ and R&S®FSG signal and spectrum analyzers, 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).

# Definitions

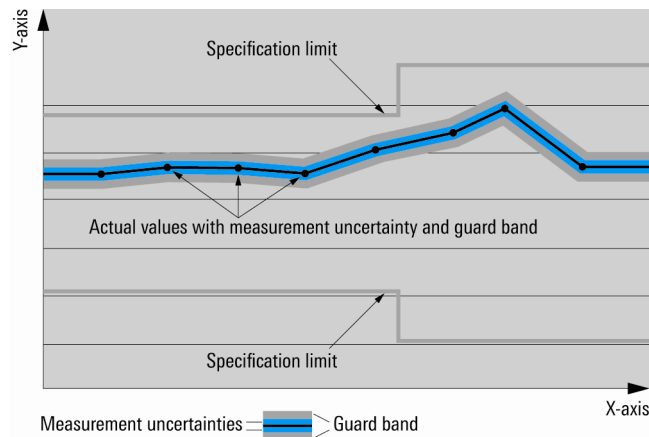
## General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

## Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as  $<$ ,  $\leq$ ,  $>$ ,  $\geq$ ,  $\pm$ , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



## Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

## 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. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

## Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

## Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

# Specifications

## Minimum system requirements

### Running on a PC

Operating system	Windows XP Professional + Service Pack 2, Windows 7
Free hard disk space	1 Gbyte
Free RAM	≥ 512 Mbyte
Graphics resolution	≥ 800 × 600 pixel
Measuring instrument connection	IEC/IEEE bus or LAN connection, VISA driver

## EUTRA/LTE uplink analysis

The R&S®FS-K101PC/-K103PC/-K105PC, R&S®FSV-K101/-K103/-K105, R&S®FSQ-K101/-K103/-K105 EUTRA/LTE uplink PC software is compatible with the following spectrum/signal analyzers: R&S®FSW, R&S®FSQ, R&S®FSG and R&S®FSV.

### Frequency

Frequency range	RF input	same as R&S®FSW/FSQ/FSG/FSV
	I/Q baseband inputs (R&S®FSQ-B71)	DC to 36 MHz
Nominal channel bandwidth		1.4 MHz to 20 MHz

### Level

Level range	RF input	-50 dBm to +30 dBm <sup>1</sup>
	I/Q baseband inputs (R&S®FSQ-B71)	31.6 mV to 5.62 V
Level setting		auto <sup>1</sup> , manual

<sup>1</sup> Restricted IF overload, IF power trigger and auto level functionality dependent on carrier frequency and bandwidth at carrier frequencies < 50 MHz.

## Signal acquisition

Supported standards		EUTRA/LTE uplink in line with [1]
Result length	capture buffer, power spectrum result summary, power versus symbol and carrier, EVM versus carrier, EVM versus symbol, EVM versus symbol and carrier, EVM versus subframe, inband emission, channel flatness, channel flatness SRS, channel flatness difference, channel group delay, constellation diagram, DFT-precoded constellation diagram, CCDF, allocation summary list, bit stream	20 ms to 50 ms <sup>2</sup> (capture length) depending on the number of analyzed subframes
Sweep time	spectrum mask adjacent channel power (ACLR)	auto 500 ms
Trigger modes	RF input I/Q baseband inputs (R&S <sup>®</sup> FSQ-B71)	free run, external, IF power <sup>1</sup> free run, external

## Result display

Result summary		EVM PUSCH QPSK EVM PUSCH 16QAM EVM DMRS PUSCH QPSK EVM DMRS PUSCH 16QAM EVM PUCCH EVM DMRS PUCCH EVM PRACH EVM physical channel EVM physical signal EVM all center frequency error sampling error I/Q offset I/Q gain imbalance I/Q quadrature error power crest factor
Power versus time		capture buffer power versus symbol and carrier
EVM		EVM versus carrier EVM versus symbol EVM versus symbol and carrier EVM versus subframe
Spectrum		power spectrum relative inband emission (all/OFF) channel flatness channel flatness SRS channel flatness difference channel group delay spectrum mask ACLR
Constellation		constellation diagram DFT-precoded constellation diagram
Statistics		CCDF allocation summary list bit stream

<sup>2</sup> Running on an R&S<sup>®</sup>FSQ with a memory size of less than 1024 Mbyte, the maximum capture length is restricted to 20 ms.

## Measurement parameters

Input	R&S®FSQ-B71 option required	RF I/Q baseband, balanced-to-unbalanced switchover
	R&S®FSQ-B17/R&S®FSV-B17 option required	digital baseband interface
Data capture settings	capture time	max. 50 ms <sup>2</sup>
	overall frame count	ON/OFF
	number of frames to analyze	1 to 1000
	auto in line with standard	ON/OFF
Duplexing		FDD <sup>3</sup> , TDD <sup>4</sup>
Channel bandwidth	sampling rate ( $F_s$ ) and $N_{FFT}$ are set depending on the channel bandwidth	1.4/3/5/10/15/20 MHz
Cyclic prefix modes		normal, extended, auto
Physical layer cell identity	cell identity group	group 0 to 167
	identity	0, 1, 2
TDD <sup>4</sup>	UL/DL allocations	configuration 0 to 6
	special subframe	configuration 0 to 8
Demodulation reference signal	sequence	3GPP, I/Q file
	relative power PUSCH/PUCCH	-25 dB ≤ relative power ≤ 12 dB
	group hopping	ON/OFF
	sequence hopping	ON/OFF
	n_DMRS	0 to 11
	delta sequence shift	0 to 29
Sounding reference signal		ON/OFF
	relative power	-25 dB ≤ relative power ≤ 12 dB
	SRS subframe conf	0 to 14 for FDD, 0 to 13 for TDD
	SRS bandwidth B_SRS	0 to 3
	frequency domain pos. n_RRC	0 to 65k
	SRS BW configuration C_SRS	0 to 7
	trans. comb. k_TC	0 to 1
	SRS cyclic shift N_CS	0 to 7
	configuration index I_SRS	0 to 636 for FDD, 1 to 644 for TDD
	hopping BW b_hop	0 to 3
	max UpPts <sup>4</sup>	ON/OFF
	PUSCH	frequency hopping mode
number of subbands		1 to 100
hopping offset		0 to 6
information in hopping bits		0 to 3
PUCCH	number of RBs for PUCCH	0 to 100
	delta shift	1 to 3
	N_PUCCH	0 to 107
	format	F1, F1a, F1b, F2, F2a, F2b
	N(1)_cs	0 to 7
	N(2)_RB	0 to 6
PRACH	configuration	0 to 63
	restricted set	ON/OFF
	frequency offset	0 to 104
	Ncs configuration	0 to 15
	logical root sequence index	0 to 837
	sequence index (v)	0 to 63
	frequency resource index <sup>4</sup>	0 to 5
	half frame indicator t1_RA <sup>4</sup>	0 to 1
Resource allocation		one frame can be allocated
	modulation	QPSK, 16QAM, 64QAM
	allocation settings <sup>5</sup>	enable PUSCH, enable PUCCH, PRB offset, PRB size, boosting, resource allocation type1, N_PUCCH

<sup>3</sup> R&S®FSQ/FSV/FS-K101(PC) required.

<sup>4</sup> R&S®FSQ/FSV/FS-K105(PC) required.

<sup>5</sup> If resource allocation type1 or simultaneous PUSCH/PUCCH transmission is enabled, R&S®FSQ/FSV/FS-K103(PC) required.

Analysis mode		PUSCH/PUCCH or PRACH
Phase tracking		OFF, pilot only, pilot and payload
Timing tracking		ON/OFF
Channel estimation range		pilot only, pilot and payload
EVM with exclusion period		ON/OFF
Compensate DC offset		ON/OFF
Scrambling of coded bits		ON/OFF
Auto demodulation		ON/OFF
Subframe configuration detection		ON/OFF
UE ID/n_RNTI		0 to 65535
Suppressed interference synchronization		ON/OFF
Spectrum emission mask/adjacent channel leakage power ratio (ACLR)	category	A, B
	assumed adjacent channel carrier	EUTRA of same bandwidth, 1.28 Mcps UTRA, 3.84 Mcps UTRA, 7.68 Mcps UTRA
	ACLR noise correction	ON/OFF
	auto gating	ON/OFF
Spectrum flatness	operating band index	0 to 40
	extreme conditions	ON/OFF

### EVM measurement specification (nominal)

Measured with the following signal: FDD, bandwidth = 10 MHz, normal cyclic prefix, no sounding reference signal present, no PUCCH present, all 50 PRBs are assigned to one allocation with 16QAM modulation.

EVM		R&S®FSW	R&S®FSQ	R&S®FSG	R&S®FSV
Residual EVM	level -25 dBm to +15 dBm input = RF (0.6 GHz < f < 2.7 GHz) channel estimation range: pilot and payload phase tracking: OFF timing tracking: OFF	< -48 dB	< -46 dB	< -45 dB	< -45 dB

### References

- [1] 3GPP TS 36.211 V10.0.0 (2010-12), 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 10).

## Ordering information

Designation	Type	Order No.
LTE FDD Uplink PC Software (requires R&S®FSPC)	R&S®FS-K101PC	1309.9922.02
LTE MIMO Uplink PC Software (requires either R&S®FS-K101PC or R&S®FS-K105PC)	R&S®FS-K103PC	1309.9945.02
LTE TDD Uplink PC Software (requires R&S®FSPC)	R&S®FS-K105PC	1309.9968.02
FSPC Licence Dongle	R&S®FSPC	1310.0002.02
EUTRA/LTE FDD Uplink PC Software	R&S®FSQ-K101	1308.9058.02
EUTRA/LTE Advance UL MIMO PC Software (requires either R&S®FSQ-K101 or R&S®FSQ-K105)	R&S®FSQ-K103	1309.9097.02
EUTRA/LTE TDD Uplink PC Software	R&S®FSQ-K105	1309.9516.02
EUTRA/LTE FDD Uplink PC Software	R&S®FSV-K101	1310.9100.02
EUTRA/LTE Advance UL MIMO PC Software (requires either R&S®FSV-K101 or R&S®FSV-K105)	R&S®FSV-K103	1310.9200.02
EUTRA/LTE TDD Uplink PC Software	R&S®FSV-K105	1309.9780.02
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
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, 9 kHz to 3.6 GHz	R&S®FSV3	1307.9002.03
Signal Analyzer, 9 kHz to 7 GHz	R&S®FSV7	1307.9002.07
Signal Analyzer, 9 kHz to 13.6 GHz	R&S®FSV13	1307.9002.13
Signal Analyzer, 9 kHz to 30 GHz	R&S®FSV30	1307.9002.30
Signal Analyzer, 9 kHz to 40 GHz	R&S®FSV40	1307.9002.40
<b>Recommended options and extras</b>		
I/Q Baseband Inputs	R&S®FSQ-B71	1157.0113.03
Digital Baseband Interface	R&S®FSQ-B17	1163.0063.02
See also specifications for the R&S®FSQ signal analyzer (PD 0758.0945.22)		



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- | ISO 14001-certified environmental management system

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