

EUTRA/LTE Measurement Application Specifications

R&S®FSW-K100/101 EUTRA/LTE FDD Downlink/Uplink Measurement Application

R&S®FSW-K102 EUTRA/LTE Downlink MIMO

R&S®FSW-K103 EUTRA/LTE Advanced UL Measurements

R&S®FSW-K104/105 EUTRA/LTE TDD Downlink/Uplink Measurement Application

R&S®FSV3-K100/101 EUTRA/LTE FDD Downlink/Uplink Measurement Application

R&S®FSV3-K102 EUTRA/LTE Downlink MIMO

R&S®FSV3-K103 EUTRA/LTE Advanced UL MIMO

R&S®FSV3-K104/105 EUTRA/LTE TDD Downlink/Uplink Measurement Application

R&S®FSV-K100/101 EUTRA/LTE FDD Downlink/Uplink Measurement Application

R&S®FSV-K102 EUTRA/LTE Downlink MIMO

R&S®FSV-K103 EUTRA/LTE Advanced UL MIMO

R&S®FSV-K104/105 EUTRA/LTE TDD Downlink/Uplink Measurement Application

R&S®FPS-K100/101 EUTRA/LTE FDD Downlink/Uplink Measurement Application

R&S®FPS-K102 EUTRA/LTE Downlink MIMO

R&S®FPS-K103 EUTRA/LTE Uplink Advanced

R&S®FPS-K104/105 EUTRA/LTE TDD Downlink/Uplink Measurement Application

R&S®VSE-K100/104 EUTRA/LTE FDD Downlink/Uplink Measurement Application

R&S®VSE-K102 EUTRA/LTE Advanced and MIMO

R&S®FS-K100PC/101PC EUTRA/LTE FDD Downlink/Uplink Measurement Application

R&S®FS-K102PC/103PC LTE MIMO Downlink/Uplink PC Software

R&S®FS-K104PC/105PC LTE TDD Downlink/Uplink PC Software



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Definitions

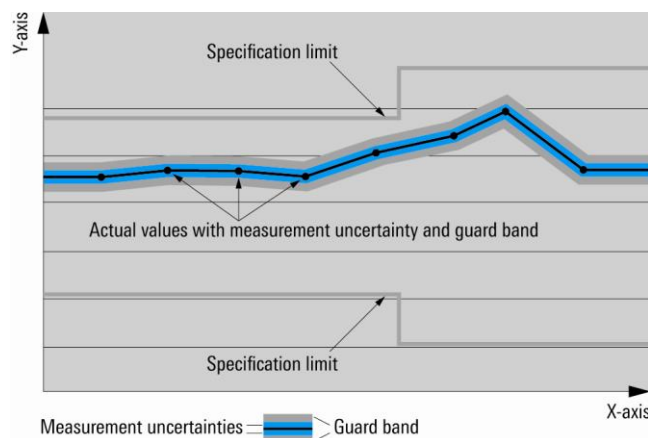
General

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.



Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under "Specifications with limits" above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

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.

Device settings and GUI parameters are indicated as follows: "parameter: value".

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP/3GPP2 standard, chip rates are specified in Mcps (million chips per second), whereas bit rates and symbol rates are specified in Mbps (million bits per second), kbps (thousand bits per second) or ksps (thousand symbols per second), and sample rates are specified in Msample/s (million samples per second). Mcps, kbps, ksps and Msample/s are not SI units.

Specifications

The specifications of the R&S®VSE-K10x, R&S®FSx-K10x are based on the data sheet specifications of the R&S®FSW, R&S®FSVA3000, R&S®FSV3000 R&S®FSVA, R&S®FSV, , R&S®FPS signal and spectrum analyzers and the R&S®RTO1044 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).

General remarks

This data sheet covers the R&S®FSW-K100/101/102/103/104/105, the R&S®FSV3-K100/101/102/103/104/105 the R&S®FSV-K100/101/102/103/104/105, the R&S®FPS-K100/101/102/103/104/105, the R&S®VSE-K100/102/104 and the R&S®FS-K100/101/102/103/104/105PC.

The R&S®FSW-K100/101/102/103/104/105, R&S®FSV-K100/101/102/103/104/105, R&S®FSV3-K100/101/102/103/104/105 and the R&S®FPS-K100/101/102/103/104/105 are collectively abbreviated as R&S®FSx-K10x.

The R&S®FS-K100PC/101/102/103/104/105PC is abbreviated as R&S®FS-K10xPC.

The R&S®VSE-K100/102/104 is abbreviated as R&S®VSE-K10x.

The R&S®FSx-K10x runs on the analyzer itself.

The R&S®VSE- runs on a PC that can be connected to the analyzers and oscilloscopes as specified below.

The R&S®FS-K10xPC runs on a PC that can be connected to analyzers.

If not stated otherwise, the data sheet values are analyzer-specific, e.g. the same value applies to the R&S®FSW-K100 and the R&S®VSE-K100 with connected R&S®FSW.

Overview

Assignment of option numbers to link modes and access modes

R&S®FSx-K100, R&S®FS-K100PC	EUTRA/LTE FDD downlink
R&S®FSx-K101, R&S®FS-K101PC	EUTRA/LTE FDD uplink
R&S®FSx-K102, R&S®FS-K102PC	EUTRA/LTE advanced and MIMO downlink (requires R&S®FSx-K100 or R&S®FSx-K104)
R&S®FSx-K103, R&S®FS-K103PC	EUTRA/LTE advanced uplink (requires R&S®FSx-K101 or R&S®FSx-K105)
R&S®FSx-K104, R&S®FS-K104PC	EUTRA/LTE TDD downlink
R&S®FSx-K105, R&S®FS-K105PC	EUTRA/LTE TDD uplink
R&S®VSE-K100	EUTRA/LTE FDD downlink and uplink
R&S®VSE-K102	EUTRA/LTE advanced and MIMO downlink and uplink (requires R&S®VSE-K100 or R&S®VSE-K104)
R&S®VSE-K104	EUTRA/LTE TDD downlink and uplink

Minimum system requirements for PC software R&S®FS-K10xPC

The R&S®FS-K100/-K101/-K102/-K103/-K104/-K105PC EUTRA/LTE downlink PC software is compatible with the R&S®FSW and R&S®FSV signal and spectrum analyzers and the R&S®RTO1044 oscilloscope.

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 analysis

Signal acquisition

Supported standards		EUTRA/LTE downlink in line with [1]
Capture length	R&S®FSW-K10x downlink R&S®FSV3-K10x downlink R&S®FPS-K10x downlink R&S®VSE-K10x downlink R&S®FSx-K10xPC downlink R&S®FSW-K10x uplink R&S®FSV3-K10x uplink R&S®FPS-K10x uplink R&S®VSE-K10x uplink	2.01 ms to 50.1 ms
	R&S®FSV-K10x R&S®FSx-K10xPC uplink	20.1 ms to 50.1 ms
Trigger modes	RF input	free run, external, IF power ¹
	analog baseband input (R&S®FSW-B71)	free run, external
	digital baseband input (R&S®FSV/FSW-B17)	

¹ For signal and spectrum analyzers, restricted IF overload, IF power trigger and auto level functionality depending on carrier frequency and bandwidth at carrier frequencies < 50 MHz.
For the R&S®RTO, the R&S®RTO-K11 I/Q software interface and the R&S®RTO-B4 OCXO 10 MHz are required.

Measurement parameters downlink

	R&S®VSE-K100/104	R&S®FSW-K10x	R&S®FSV3-K10x	R&S®FPS-K10x	R&S®FSV-K10x	R&S®FS-K10xPC
Input						
RF	●	●	●	●	●	●
Digital baseband input	—	● ²	—	—	—	● ³
Analog baseband input	—	● ⁴	—	—	—	● ⁴
File	●	●	●	●	●	●
Channel bandwidth		1.4/3/5/10/15/20 MHz ⁵				
MIMO						
Configuration	1, 2, 4 TX antennas					
Antenna selection for one single input channel (depending on MIMO configuration)	1, 2, 3 or 4					
Number of input channels ⁶	1, 2, 4 or from antenna selection	1, 2, 4 or from antenna selection	1	1	1	1, 2, 4, 8 or from antenna selection
PDSCH resource allocation						
Number of frames to be allocated	4 frames	4 frames	4 frames	4 frames	4 frames	4 frames
Modulation	QPSK, 16QAM, 64QAM, 256QAM, 1024 QAM ⁶	QPSK, 16QAM, 64QAM, 256QAM, 1024 QAM ⁶	QPSK, 16QAM, 64QAM, 256QAM, 1024 QAM ⁶	QPSK, 16QAM, 64QAM, 256QAM, 1024 QAM ⁶	QPSK, 16QAM, 64QAM, 256QAM	QPSK, 16QAM, 64QAM, 256QAM
MIMO precoding type ⁶		none, transmit diversity, spatial multiplexing, beamforming (UE-spec. RS)				
Switchable multicarrier filter	●	●	●	●	●	●
Spectrum emission mask/adjacent channel leakage power ratio (ACLR) ⁷						
Measurements available	—	●	●	●	●	● ⁸
Category	—	A, B (option 1, option 2), local area, home				
Assumed adjacent channel carrier	—	EUTRA of same bandwidth 1.28 Mcps UTRA 3.84 Mcps UTRA 7.68 Mcps UTRA				
ACLR noise correction	—	●	●	●	●	●
Auto gating	—	●	●	●	●	●

² R&S®FSW-B17 option required.³ R&S®FSW/FSV-B17 option required.⁴ R&S®FSW-B71 option required.⁵ For R&S®FSW, R&S®FSW-B28 required for channel bandwidths > 10 MHz.⁶ R&S®FS-K102PC, R&S®FSx-K102, R&S®VSE-K102 option required.⁷ As defined in section 6.6 of 3GPP TS 36.141 v12.0.0.⁸ Not supported for R&S®RTO.

Measurement parameters uplink

	R&S®VSE-K10x	R&S®FSW-K10x	R&S®FSV3-K10x	R&S®FPS-K10x	R&S®FSV-K10x	R&S®FS-K10xPC
Input						
RF	●	●	●	●	●	●
Digital baseband input	—	● ²	—	—	—	● ³
Analog baseband input	—	● ⁴	—	—	—	● ⁴
Channel bandwidth		1.4/3/5/10/15/20 MHz ⁹				
MIMO						
Configuration		1, 2 TX antennas				
Antenna selection for one single input channel (depending on MIMO configuration)		1 or 2				
Number of input channels	1	1	1	1	1	1, 2 ¹⁰
Resource allocation						
Number of frames to be allocated		1				
Modulation	QPSK, 16QAM, 64QAM, 256 QAM ¹⁰	QPSK, 16QAM, 64QAM, 256 QAM ¹⁰	QPSK, 16QAM, 64QAM, 256 QAM ¹⁰	QPSK, 16QAM, 64QAM, 256 QAM ¹⁰	QPSK, 16QAM, 64QAM	QPSK, 16QAM, 64QAM
Multicarrier filter	●	●	●	●	●	●
Spectrum emission mask/adjacent channel leakage power ratio (ACLR) ¹¹						
Measurements available	—	●	●	●	●	● ⁸
Requirements	—		general, NS_03, NS_04, NS_06_07			
Assumed adjacent channel carrier	—	EUTRA of same bandwidth 1.28 Mcps UTRA 3.84 Mcps UTRA 7.68 Mcps UTRA				
ACLR noise correction	—	●	●	●	●	●
Auto gating	—	●	●	●	●	●

⁹ For R&S®FSW, R&S®FSW-B28 required for channel bandwidths > 10 MHz.

¹⁰ R&S®FS-K103PC, R&S®FSx-K103, R&S®VSE-K102 option required.

¹¹ As defined in section 6.6 of 3GPP TS 36.521-1 v10.0.0.

Result displays downlink

	R&S®VSE-K10x	R&S®FSW-K10x	R&S®FSV3-K10x	R&S®FPS-K10x	R&S®FSV-K10x	R&S®FS-K10xPC
Result summary						
EVM PDSCH QPSK	•	•	•	•	•	•
EVM PDSCH 16QAM	•	•	•	•	•	•
EVM PDSCH 64QAM	•	•	•	•	•	•
EVM PDSCH 256QAM	•	•	•	•	•	•
EVM PDSCH 1024QAM ¹²	•	•	•	•	—	—
EVM physical channel	•	•	•	•	•	•
EVM physical signal	•	•	•	•	•	•
EVM all	•	•	•	•	•	•
Center frequency error	•	•	•	•	•	•
Sampling error	•	•	•	•	•	•
Time alignment error $\Delta 2.1$, $\Delta 3.1$, $\Delta 4.1$ ¹²	•	•	•	•	•	•
I/Q offset	•	•	•	•	•	•
I/Q gain imbalance	•	•	•	•	•	•
I/Q quadrature error	•	•	•	•	•	•
RSTP (reference signal TX power)	•	•	•	•	•	•
OSTP (OFDM symbol TX power)	•	•	•	•	•	•
Power	•	•	•	•	•	•
Crest factor	•	•	•	•	•	•
Power versus time						
Capture buffer	•	•	•	•	•	•
On/off power (only TDD-mode) ¹²	—	•	—	•	•	•
Power versus symbol and carrier	•	•	•	•	—	•
EVM						
EVM versus carrier	•	•	•	•	•	•
EVM versus symbol	•	•	•	•	•	•
EVM versus symbol and carrier	•	•	•	•	—	•
EVM versus resource block	•	•	•	—	•	•
frequency error versus symbol	•	•	•	•	•	•
EVM versus subframe	•	•	•	•	•	•
Spectrum						
Power spectrum	•	•	•	•	•	•
Power versus resource block	•	•	•	•	•	•
Channel flatness	•	•	•	•	•	•
Channel flatness difference	•	•	•	•	•	•
Channel group delay	•	•	•	•	•	•
Spectrum mask	—	•	•	•	•	•
Spectrum Mask for up to 3CCs ¹²	—	•	•	•	—	—
ACLR	—	•	•	•	•	•
Multi Carrier ACLR (ACLR for CA) ¹²	—	•	•	•	—	—

¹² R&S®VSE/FSW/FSV/FSV3/FS-K102(PC) option required.

	R&S®VSE-K10x	R&S®FSW-K10x	R&S®FSV3-K10x	R&S®FPS-K10x	R&S®FSV-K10x	R&S®FS-K10xPC
Constellation						
Constellation diagram	•	•	•	•	•	•
Statistics/miscellaneous						
CCDF	•	•	•	•	•	•
Allocation summary list	•	•	•	•	•	•
Bit stream	•	•	•	•	•	•
Allocation ID versus symbol and carrier	•	•	•	•	—	•
Channel decoder results	•	•	•	•	—	•
Beamforming						
UE RS magnitude ¹²	•	•	•	•	—	•
UE RS phase ¹²	•	•	•	•	—	•
Cell RS magnitude ¹²	•	•	•	•	—	—
Cell RS phase ¹²	•	•	•	•	—	—
CSI RS magnitude ¹²	•	•	•	•	—	—
CSI RS phase ¹²	•	•	•	•	—	—
Beamforming allocation summary ¹²	•	•	•	•	—	—

Result displays uplink

	R&S®VSE-K10x	R&S®FSW-K10x	R&S®FSV3-K10x	R&S®FPS-K10x	R&S®FSV-K10x	R&S®FS-K10xPC
Result summary						
EVM PUSCH QPSK	•	•	•	•	•	•
EVM PUSCH 16QAM	•	•	•	•	•	•
EVM PUSCH 64QAM	•	•	•	•	•	•
EVM PUSCH 256QAM ¹³	•	•	•	•	—	—
EVM DMRS PUSCH QPSK	•	•	•	•	•	•
EVM DMRS PUSCH 16QAM	•	•	•	•	•	•
EVM DMRS PUSCH 64QAM	•	•	•	•	•	•
EVM DMRS PUSCH 256QAM ¹³	•	•	•	•	—	—
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	•	•	•	•	•	•

¹³ R&S®VSE/FSW/FSV/FSV3/FS-K103(PC) option required.

	R&S®VSE-K10x	R&S®FSW-K10x	R&S®FSV3-K10x	R&S®FPS-K10x	R&S®FSV-K10x	R&S®FS-K10xPC
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 emissions	•	•	•	•	•	•
Channel flatness	•	•	•	•	•	•
Channel flatness SRS	•	•	•	•	—	•
Channel flatness difference	•	•	•	•	•	•
Channel group delay	•	•	•	•	•	•
Spectrum mask	—	•	•	•	•	•
Spectrum mask for 2CCs ¹³	—	•	•	•	•	—
ACLR	—	•	•	•	•	•
Multi Carrier ACLR (ACLR for CA) ¹³	—	•	•	•	•	—
Constellation						
Constellation diagram	•	•	•	•	•	•
Statistics/miscellaneous						
CCDF	•	•	•	•	•	•
Allocation summary list	•	•	•	•	•	•
Bit stream	•	•	•	•	•	•

Measurement uncertainty (nominal)

Specifications apply under the following conditions: temperature from +20 °C to +30 °C; signal level ≥ -25 dBm; properly adjusted reference level; external reference frequency applied.

Base station and UE output power

Base station and UE output power	R&S®FSW	R&S®FSVA3000	R&S®FSV3000	R&S®FPS R&S®FSV R&S®FSVA	R&S®RTO1044	AUTS ¹⁴
Level uncertainty		same as R&S®FSW/FSV3000/FSVA3000/FSV/FSVA/FPS/RTO (see R&S®FSW/FSV3000/FSVA3000/FSV/FSVA/FPS/RTO total measurement uncertainty)				0.7 dB

Transmitted signal quality base station

EVM		R&S®FSW	R&S®FSVA3000	R&S®FSV3000	R&S®FPS R&S®FSV R&S®FSVA	R&S®RTO1044	AUTS ¹⁴
Residual EVM	test model 3.1, 10 MHz ¹⁵ level –25 dBm to +15 dBm input = RF (0.6 GHz < f < 2.7 GHz) channel estimation: “3GPP EVM definition” EVM calculation method: “3GPP EVM definition” phase tracking: off timing tracking: off	< 0.33 % (–49.5 dB)	< 0.34 % (-49.4 dB)	< 0.35 % (--49,1 dB)	< 0.36 % (–48.8 dB)	< 0.79 % (–42 dB)	
Frequency error							
Uncertainty		1 Hz + R&S®FSW/FSVA3000/FSV3000/FSV/FSVA/FPS/RTO frequency uncertainty (see R&S®FSW/FSVA3000/FSV3000/FSV/FSVA/FPS/RTO reference frequency)					12 Hz
Time alignment between transmitter branches							
Uncertainty	test model 1.1, 10 MHz ¹⁵	< 2.5 ns	< 2.5 ns	< 2.5 ns	< 2.5 ns	< 2.5 ns	25 ns

¹⁴ Acceptable uncertainty of test system, in line with 3GPP TS 36.141 v15.4.0.

¹⁵ Test model as defined in section 6.1 of 3GPP TS 36.141 v15.4.0.

Transmitted signal quality UE

EVM		R&S®FSW	R&S®FSVA3000	R&S®FSV3000	R&S®FSVA R&S®FSV R&S®FPS	R&S®RTO1044	AUTS ¹⁶
Residual EVM	FDD, 10 MHz, normal cyclic prefix, no SRS, no PUCCH, one allocation with 16QAM on all PRBs level –25 dBm to +15 dBm input = RF (0.6 GHz < f < 2.7 GHz) channel estimation: pilot and payload phase tracking: off timing tracking: off	< 0.3 % (–50.5 dB)	< 0.31 % (–50.2 dB)	< 0.33 % (–49.5 dB)	< 0.33 % (–49.5 dB)	< 0.89 % (–41.0 dB)	
Frequency error							
Uncertainty		1 Hz + R&S®FSW/FSVA3000/FSV3000/FSV/FSVA/FPS/RTO frequency uncertainty (see R&S®FSW/FSVA3000/FSV3000/FSV/FSVA/FPS/RTO reference frequency)					15 Hz

References

- [1] 3GPP TS 36.211 V13.2.0 , 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation.

¹⁶ Acceptable uncertainty of test system, in line with 3GPP TS 36.521 v14.3.0.

Ordering information

Designation	Type	Order No.
EUTRA/LTE measurement applications		
R&S®FSW		
EUTRA/LTE FDD downlink measurement application	R&S®FSW-K100	1313.1545.02
EUTRA/LTE FDD uplink measurement application	R&S®FSW-K101	1313.1551.02
EUTRA/LTE downlink MIMO (requires R&S®FSW-K100 or R&S®FSW-K104)	R&S®FSW-K102	1313.1568.02
EUTRA/LTE advanced UL measurements (requires R&S®FSW-K101 or R&S®FSW-K105)	R&S®FSW-K103	1313.2487.02
EUTRA/LTE TDD downlink measurement application	R&S®FSW-K104	1313.1574.02
EUTRA/LTE TDD uplink measurement application	R&S®FSW-K105	1313.1580.02
R&S®FSVA3000, R&S®FSV3000		
EUTRA/LTE FDD downlink measurement application	R&S®FSV3-K100	1330.5145.02
EUTRA/LTE FDD uplink measurement application	R&S®FSV3-K101	1330.5151.02
EUTRA/LTE downlink MIMO (requires R&S®FSV3-K100 or R&S®FSV3-K104)	R&S®FSV3-K102	1330.5168.02
EUTRA/LTE advanced UL MIMO (requires R&S®FSV3-K101 or R&S®FSV3-K105)	R&S®FSV3-K103	1330.7231.02
EUTRA/LTE TDD downlink measurement application	R&S®FSV3-K104	1330.5174.02
EUTRA/LTE TDD uplink measurement application	R&S®FSV3-K105	1330.5180.02
R&S®FSVA, R&S®FSV		
EUTRA/LTE FDD downlink measurement application	R&S®FSV-K100	1310.9051.02
EUTRA/LTE FDD uplink measurement application	R&S®FSV-K101	1310.9100.02
EUTRA/LTE downlink MIMO (requires R&S®FSV-K100 or R&S®FSV-K104)	R&S®FSV-K102	1310.9151.02
EUTRA/LTE advanced UL MIMO (requires R&S®FSV-K101 or R&S®FSV-K105)	R&S®FSV-K103	1310.9200.02
EUTRA/LTE TDD downlink measurement application	R&S®FSV-K104	1309.9774.02
EUTRA/LTE TDD uplink measurement application	R&S®FSV-K105	1309.9780.02
R&S®FPS		
EUTRA/LTE FDD downlink measurement application	R&S®FPS-K100	1321.4227.02
EUTRA/LTE FDD uplink measurement application	R&S®FPS-K101	1321.4340.02
EUTRA/LTE downlink MIMO (requires either R&S®FPS-K100 or R&S®FPS-K104)	R&S®FPS-K102	1321.4333.02
EUTRA/LTE uplink advanced (requires either R&S®FPS-K101 or R&S®FPS-K105)	R&S®FPS-K103	1321.4356.02
EUTRA/LTE TDD downlink measurement application	R&S®FPS-K104	1321.4233.02
EUTRA/LTE TDD uplink measurement application	R&S®FPS-K105	1321.4362.02
R&S®VSE		
EUTRA/LTE FDD uplink and downlink measurement application	R&S®VSE-K100	1320.7545.02
EUTRA/LTE advanced and MIMO (downlink) (requires either R&S®VSE-K100 or R&S®VSE-K104)	R&S®VSE-K102	1320.7551.02
EUTRA/LTE TDD uplink and downlink measurement application	R&S®VSE-K104	1320.7568.02
R&S®FS-K10xPC		
LTE FDD downlink PC software (requires R&S®FSPC)	R&S®FS-K100PC	1309.9916.06
LTE FDD uplink PC software (requires R&S®FSPC)	R&S®FS-K101PC	1309.9922.06
LTE MIMO downlink PC software (requires either R&S®FS-K100PC or R&S®FS-K104PC)	R&S®FS-K102PC	1309.9939.06
LTE MIMO uplink PC software (requires R&S®FS-K101PC or R&S®FS-K105PC)	R&S®FS-K103PC	1309.9945.06
LTE TDD downlink PC software (requires R&S®FSPC)	R&S®FS-K104PC	1309.9951.06
LTE TDD uplink PC software (requires R&S®FSPC)	R&S®FS-K105PC	1309.9968.06
FSPC licence dongle	R&S®FSPC	1310.0002.02

Signal and spectrum analyzers		
R&S®FSW		
Signal and spectrum analyzer, 2 Hz to 8 GHz	R&S®FSW8	1331.5003.08
Signal and spectrum analyzer, 2 Hz to 13.6 GHz	R&S®FSW13	1331.5003.13
Signal and spectrum analyzer, 2 Hz to 26.5 GHz	R&S®FSW26	1331.5003.26
Signal and spectrum analyzer, 2 Hz to 43.5 GHz	R&S®FSW43	1331.5003.43
Signal and spectrum analyzer, 2 Hz to 50 GHz	R&S®FSW50	1331.5003.50
Signal and spectrum analyzer, 2 Hz to 67 GHz	R&S®FSW67	1331.5003.67
Signal and spectrum analyzer, 2 Hz to 85 GHz	R&S®FSW85	1331.5003.85
R&S®FSVA3000, R&S®FSV3000		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSVA3004	1330.5000.05
Signal and spectrum analyzer, 10 Hz to 7.5 GHz	R&S®FSVA3007	1330.5000.08
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSVA3013	1330.5000.14
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSVA3030	1330.5000.31
Signal and spectrum analyzer, 10 Hz to 44 GHz	R&S®FSVA3044	1330.5000.44
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSV3004	1330.5000.04
Signal and spectrum analyzer, 10 Hz to 7.5 GHz	R&S®FSV3007	1330.5000.07
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSV3013	1330.5000.13
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSV3030	1330.5000.30
Signal and spectrum analyzer, 10 Hz to 44 GHz	R&S®FSV3044	1330.5000.43
R&S®FSVA, R&S®FSV		
Signal and spectrum analyzer	R&S®FSVA4	1321.3008.05
Signal and spectrum analyzer	R&S®FSVA7	1321.3008.08
Signal and spectrum analyzer	R&S®FSVA13	1321.3008.14
Signal and spectrum analyzer	R&S®FSVA30	1321.3008.31
Signal and spectrum analyzer ¹⁷	R&S®FSVA40	1321.3008.41
Signal and spectrum analyzer	R&S®FSV4	1321.3008.04
Signal and spectrum analyzer	R&S®FSV7	1321.3008.07
Signal and spectrum analyzer	R&S®FSV13	1321.3008.13
Signal and spectrum analyzer	R&S®FSV30	1321.3008.30
Signal and spectrum analyzer ¹⁷	R&S®FSV40	1321.3008.39
Signal and spectrum analyzer	R&S®FSV40	1321.3008.40
R&S®FPS		
Signal and spectrum analyzer 10 Hz to 4 GHz	R&S®FPS4	1319.2008.04
Signal and spectrum analyzer 10 Hz to 7 GHz	R&S®FPS7	1319.2008.07
Signal and spectrum analyzer 10 Hz to 13.6 GHz	R&S®FPS13	1319.2008.13
Signal and spectrum analyzer 10 Hz to 30 GHz	R&S®FPS30	1319.2008.30
Signal and spectrum analyzer 10 Hz to 40 GHz	R&S®FPS40	1319.2008.40

¹⁷ Max. bandwidth 10 MHz.

Oscilloscope		
Oscilloscope, 4 GHz, 4 channels (requires R&S®RTO-K11 and R&S®RTO-B4)	R&S®RTO1044	1316.1000.44
I/Q software interface	R&S®RTO-K11	1317.2975.02
OCXO 10 MHz	R&S®RTO-B4	1304.8305.02
Vector signal explorer		
R&S®VSE basic edition	R&S®VSE	1345.1011.06
R&S®VSE enterprise edition	R&S®VSE Enterprise Edition	1345.1105.06
R&S®VSE software maintenance	R&S®VSE-SWM	1320.7622.81
Recommended options and extras		
28 MHz analysis bandwidth	R&S®FSW-B28	1313.1645.02
RF preamplifier	R&S®FSW-B24	1313.0832.13/.26
Electronic attenuator, 1 dB steps	R&S®FSW-B25	1313.0990.02
Analog baseband inputs	R&S®FSW-B71	1313.1651.13/.26
Digital baseband interface	R&S®FSW-B17	1313.0784.02
Digital baseband interface	R&S®FSV-B17	1310.9568.02
Trigger unit	R&S®FS-Z11	5013.4547.02