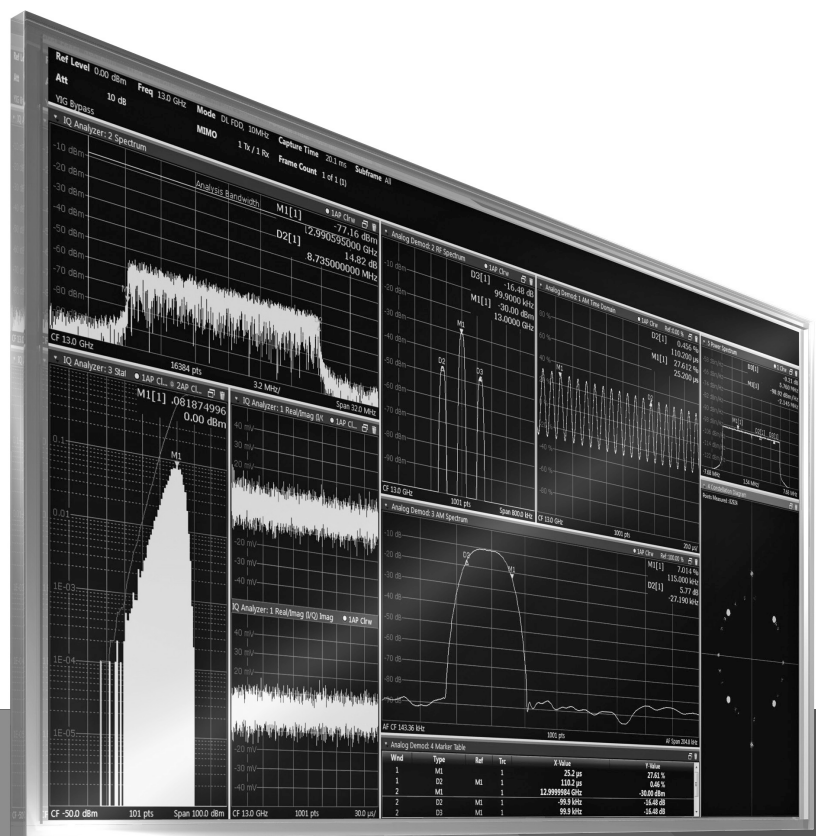


R&S®VSE VECTOR SIGNAL EXPLORER SOFTWARE

Specifications



Specifications
Version 24.00

ROHDE & SCHWARZ

Make ideas real



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Definitions

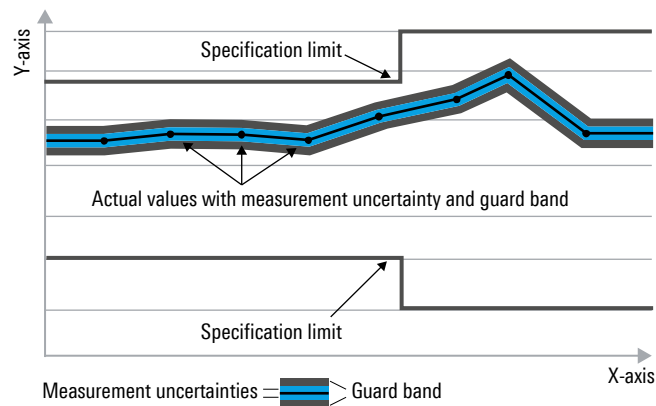
General

Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of 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 designated with the format “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 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (MSPS) or thousand symbols per second (kSPS), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, MSPS, kbps, kSPS and Msample/s are not SI units.

Specifications

The specifications of the R&S®VSE are based on the specifications documents of the FSWX, FSW, R&S®FSWP, R&S®FSVA3000, R&S®FSV3000, R&S®FSVA, R&S®FSV, R&S®FPS, FPL, R&S®FSL and R&S®ZNL analyzers, the CMP180 and CMP200 radio communication testers, the PVT360A performance vector tester as well as the R&S®RTP, R&S®RTO2000, R&S®RTO1000 and R&S®RTO6 oscilloscopes in the default operating mode. 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 (SNR).

Minimum system requirements for the R&S®VSE

Running on a PC

Operating system	Windows 10, 64 bit/Windows 11, 64 bit, version 24H2 and 25H2
Hard disk space	5 Gbyte
RAM	≥ 4 Gbyte (≥ 8 Gbyte recommended)
CPU	min. 1.5 GHz (> 2.5 GHz recommended)
Graphics resolution	≥ 1280 × 1024 pixel
USB	1 free USB port, for connecting the R&S®FSPC smart card reader (if no floating server or PC built-in smart card reader is used)
Measuring instrument connection	LAN connection (VXI-11, Hi-Slip), VISA driver ¹

Running on an instrument

Using a keyboard and mouse with the instrument is suggested for optimum operation. Front panel keys of the instrument are only for operating the firmware and not the R&S®VSE.

FSW	FSW firmware version 2.40 or newer
R&S®FSVA3000, R&S®FSV3000	R&S®FSVA3000/R&S®FSV3000 firmware version 1.10 or newer
R&S®RTP	Windows 10, 64 bit operating system
R&S®RTO	Windows 10, 64 bit operating system

R&S®VSE

Frequency

Frequency range	RF input	same as supported instrument
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Level

Level range	RF input	same as supported instrument
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¹ R&S®VISA is provided with the R&S®VSE installer.

Signal acquisition

Signal analysis bandwidth RF	same as supported instrument
Signal analysis bandwidth, baseband I/Q ²	same as supported instrument × 2
Signal analysis bandwidth, baseband I only ²	same as supported instrument

R&S®	FSWX	FSW	FSWP ³	FSVA3000	FSV3000	CMP, PVT360A
10 MHz	●	●	●	●	●	●
28 MHz	●	● ⁴	● ⁵	●	●	●
40 MHz	●	● ⁶	● ⁵	● ⁷	● ⁷	●
80 MHz	● ⁸	● ⁹	● ⁵	● ¹⁰	● ¹⁰	●
100 MHz	● ⁸	● ¹¹	● ¹²	● ¹⁰	● ¹⁰	●
160 MHz	● ¹³	● ¹¹	● ¹²	● ¹⁰	● ¹⁰	●
250 MHz	● ¹³	● ¹⁴	● ¹²	● ¹⁵	—	●
320 MHz	● ¹³	● ¹⁴	● ¹²	● ¹⁵	—	● ¹⁶
500 MHz	● ¹⁷	● ¹⁸	—	● ¹⁹	—	● ¹⁶
600 MHz	● ¹⁷	● ²⁰	—	● ¹⁹	—	—
1.0 GHz	● ²¹	● ²⁰	—	● ²²	—	—
1.2 GHz	● ²¹	● ²⁰	—	—	—	—
2 GHz	● ²³	● ²⁴	—	—	—	—
4 GHz	● ²⁵	● ²⁶	—	—	—	—
6 GHz	—	● ²⁷	—	—	—	—
8.3 GHz	—	● ²⁸	—	—	—	—

² Only available with the R&S®RTO or the R&S®RTP.

³ R&S®FSWP-B1 option required.

⁴ R&S®FSW-B28 option required.

⁵ R&S®FSWP-B80 option required.

⁶ R&S®FSW-B40 option required.

⁷ R&S®FSV3-B40 option required.

⁸ R&S®FSW31/32-B100 option required.

⁹ R&S®FSW-B80 option required.

¹⁰ R&S®FSV3-B200 option required.

¹¹ R&S®FSW-B160 option required.

¹² R&S®FSWP-B320 option required.

¹³ R&S®FSW31/32-B320 option required.

¹⁴ R&S®FSW-B320 option required.

¹⁵ R&S®FSV3-B400 option required.

¹⁶ R&S®CMP-K185 option required for CMP180 and CMP200, R&S®PVT-KB505 or R&S®PVT-KB605 option required for R&S®PVT-KB505.

¹⁷ R&S®FSW31/32-B600 option required.

¹⁸ R&S®FSW-B500, R&S®FSW-B512 or R&S®FSW-B1200 option required.

¹⁹ R&S®FSV3-B600 or R&S®FSV3-B601 option required.

²⁰ R&S®FSW-B1200 option required.

²¹ R&S®FSW31/32-B1G2 option required.

²² R&S®FSV3-B1000 or R&S®FSV3-B1001 option required.

²³ R&S®FSW31/32-B2G option required.

²⁴ R&S®FSW-B2000 or R&S®FSW-B2001 option required.

²⁵ R&S®FSW31/32-B4G option required.

²⁶ R&S®FSW-B4001 option required.

²⁷ R&S®FSW-B6001 option required.

²⁸ R&S®FSW-B8001 option required.

R&S®	FSVA	FSV	FPS	FPL, ZNL ²⁹	FSL
Maximum record length	see the corresponding specifications document of the instrument for details				
Available bandwidths					
10 MHz	●	●	●	●	●
28 MHz	● ³⁰	● ^{31, 32}	● ³³	● ³⁴	●
40 MHz	● ^{30, 35}	● ^{31, 32, 36}	● ^{33, 37}	● ³⁴	—
80 MHz	● ^{30, 38}	● ^{31, 32, 38}	● ^{33, 39}	—	—
160 MHz	● ^{30, 38}	● ^{31, 32, 38}	● ^{33, 39}	—	—

R&S®	RTP		RTO6 ⁴⁰ , RTO2000 ⁴⁰		RTO1000 ⁴⁰	
	Speed optimized ⁴¹	Memory optimized	Speed optimized	Memory optimized ⁴²	Speed optimized	Memory optimized ⁴²
Maximum record length	see the corresponding specifications document of the instrument for details					
Available bandwidths						
500 MHz	●	●	●	●	●	●
1 GHz ⁴³	●	●	●	●	●	●
2 GHz ⁴⁴	●	●	●	●	●	●
3 GHz ⁴⁵	●	●	●	●	●	●
4 GHz ⁴⁶	●	●	●	●	●	●
6 GHz ^{47, 48}	●	●	—	●	—	—
8 GHz ⁴⁹	●	●	—	—	—	—
13 GHz ⁵⁰	—	●	—	—	—	—
16 GHz ⁵¹	—	●	—	—	—	—

Analog baseband input

(Only available with R&S®RTO⁴⁰ or R&S®RTP)

R&S®	RTP		RTO6, RTO2000		RTO1000	
	I and Q	Differential I and Q	I and Q	Differential I and Q	I and Q	Differential I and Q
Maximum record length	see the corresponding specifications document of the instrument for details					
Available bandwidths						
1 GHz	●	●	●	●	●	●
2 GHz ⁴³	●	●	●	●	●	●
4 GHz ⁴⁴	●	●	●	●	●	●
6 GHz ⁴⁵	●	●	●	●	●	●
8 GHz ⁴⁶	●	●	●	●	●	●
12 GHz ^{47, 48, 49}	●	●	●	●	●	●
16 GHz ^{49, 50}	●	●	—	—	—	—

²⁹ R&S®ZNL3-B1 or R&S®ZNL6-B1 option required.

³⁰ R&S®FSVA-B11 option required for $f > 7$ GHz.

³¹ Only for $f \leq 7$ GHz.

³² Not available for the R&S®FSV40, model .39.

³³ R&S®FPS-B11 option required for $f > 7$ GHz.

³⁴ R&S®FPL-B40 option required.

³⁵ R&S®FSVA-B40 option required.

³⁶ R&S®FSV-B70 option required.

³⁷ R&S®FPS-B40 option required.

³⁸ R&S®FSV-B160 option required.

³⁹ R&S®FPS-B160 option required.

⁴⁰ R&S®RTO-K11 or R&S®RTO6-K11 I/Q software interface required.

⁴¹ R&S®RTP-K11 I/Q software interface required. Firmware version 4.60 required.

⁴² For the R&S®RTO1000 firmware version 3.0.1.1 or higher required, for the R&S®RTO2000 firmware version 3.50.3.1 or higher required.

⁴³ R&S®RTO with 1 GHz bandwidth required.

⁴⁴ R&S®RTO with 2 GHz bandwidth required.

⁴⁵ R&S®RTO with 3 GHz bandwidth required.

⁴⁶ R&S®RTO with 4 GHz bandwidth required.

⁴⁷ R&S®RTO with 6 GHz bandwidth required.

⁴⁸ R&S®RTP with 6 GHz bandwidth required.

⁴⁹ R&S®RTP with 8 GHz bandwidth required.

⁵⁰ R&S®RTP with 13 GHz bandwidth required.

⁵¹ R&S®RTP with 16 GHz bandwidth required.

Triggering

RF input ⁵²	FSWX, FSW, R&S®FSWP, R&S®FSVA3000, R&S®FSV3000, R&S®FSVA, R&S®FSV, R&S®FPS, FPL, R&S®ZNL, R&S®FSL	same as supported instrument
I/Q file	R&S®RTP, R&S®RTO	manual ⁵³ and external trigger magnitude, time

Measurement parameters

Input		RF
Swap I/Q		on/off
FFT parameter	algorithm	single, average
	FFT length	3 to 524288
	window function	flattop, Gaussian, rectangle, 5-term, Blackman-Harris
	window length	3 to current record length
	window overlap	0 to 0.95
Spectrum display	frequency points	51 to 524288
Statistic display	histogram bins	up to 1024
Overlap processing		0 % to 99.9 %
I/Q file recording	record length	same as supported instrument ⁵⁴

Software features

I/Q file handling	recording
	playback
Hardware support	up to 30 instruments in parallel when using R&S®VSE enterprise edition
Sequencer	parallel measurement execution on different instruments when using R&S®VSE enterprise edition
	sequential measurement execution on the same instrument
Multi-measurement	configure multiple measurements in parallel

Supported measurement modes

Adjacent channel leakage ratio (ACLR)	measures the active channel or adjacent channel power for one or more carrier signals, depending on the current measurement configuration
Occupied bandwidth (OBW)	measures the occupied bandwidth, i.e. the bandwidth which must contain a defined percentage of the power
Spectrum emission mask (SEM)	defines a measurement that monitors compliance with a spectral mask; The mask is defined with reference to the input signal power.
I/Q analyzer	general I/Q data analysis

⁵² Trigger availability depends on the instrument used.

⁵³ Configuring the trigger directly on the device.

⁵⁴ The maximum record length can be restricted in case the R&S®VSE needs to use a resampler.

Result displays in I/Q analyzer

Magnitude	traces	up to 6
	markers	up to 17
	scaling	lin/log/lin with unit
Spectrum	traces	up to 6
	markers	up to 17
	scaling	lin/log/lin with unit
	marker functions	band power marker
I/Q vector	traces	up to 6
	markers	up to 17
Real/image (I/Q)	traces	up to 6
	markers	up to 17
Marker table	for each marker	X value
		Y value
		band power value
		reference marker
		trace
Statistics APD	traces	2
	markers	up to 17
Statistics CCDF	traces	1
	markers	up to 17
Phase versus time	traces	up to 6
	markers	up to 17

Remote programming

SCPI	The SCPI remote interface allows full access to the R&S®VSE features.
Remote display	To operate the R&S®VSE software or view its display from a remote PC, the use of Windows remote desktop or VNC is recommended.

File formats

MATLAB	.mat(v4)	native support, maximum file size is 2 Gbyte or 500000 complex samples, please refer to the MathWorks documentation for details
	.mat(v7.3)	native support; maximum size of the .mat file is imposed only by your native file system, please refer to the MathWorks® documentation for details
ASCII	.csv	
Rohde & Schwarz formats	.iq.tar	I/Q data is always formatted as complex and float32. For details, see www.rohde-schwarz.com .
	.iqw	float32 is always exported as (I..., QQ...).
	.wv	See R&S®WinIQSIM2 or R&S®SMW user manual for details.
	.iqx	See R&S®IQW user manual for details.
	.aid	See R&S®CA100 user manual for details.

Connectivity

	R&S®VSE basic edition	R&S®VSE enterprise edition
Maximum number of channels	3	30
Maximum number of groups	1	30
Maximum number of connected instruments	1	128

Supported instruments

For details, see the corresponding specifications documents.

Designation	Type	Order No.
Analyzers		
FSWX		
Signal and spectrum analyzer, 2 Hz to 44 GHz, 1 RF	R&S®FSWX3044	1348.0000.41
Signal and spectrum analyzer, 2 Hz to 44 GHz, 2 RF	R&S®FSWX3044	1348.0000.42
FSW⁵⁵		
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®FSWP⁵⁶		
Phase noise analyzer and VCO tester, 1 MHz to 8 GHz	R&S®FSWP8	1322.8003.09 1322.8003.08 ⁵⁷
Phase noise analyzer and VCO tester, 1 MHz to 26.5 GHz	R&S®FSWP26	1322.8003.27 1322.8003.26 ⁵⁷
Phase noise analyzer and VCO tester, 1 MHz to 50 GHz	R&S®FSWP50	1322.8003.51 1322.8003.50 ⁵⁷
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 50 GHz	R&S®FSVA3050	1330.5000.50
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
Signal and spectrum analyzer, 10 Hz to 50 GHz	R&S®FSV3050	1330.5000.50
R&S®FSVA⁵⁸, R&S®FSV⁵⁹		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSVA4	1321.3008.05
Signal and spectrum analyzer, 10 Hz to 7 GHz	R&S®FSVA7	1321.3008.08
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSVA13	1321.3008.14
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSVA30	1321.3008.31
Signal and spectrum analyzer, 10 Hz to 40 GHz	R&S®FSVA40	1321.3008.41
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSV4	1321.3008.04
Signal and spectrum analyzer, 10 Hz to 7 GHz	R&S®FSV7	1321.3008.07
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSV13	1321.3008.13
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSV30	1321.3008.30
Signal and spectrum analyzer, 10 Hz to 40 GHz ⁶⁰	R&S®FSV40	1321.3008.39
Signal and spectrum analyzer, 10 Hz to 40 GHz	R&S®FSV40	1321.3008.40
R&S®FPS⁶¹		
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

⁵⁵ FSW firmware version 2.21 or higher required.

⁵⁶ R&S®FSWP-B1 option and R&S®FSWP firmware version 1.20 required.

⁵⁷ Product discontinued.

⁵⁸ R&S®FSVA firmware version 2.30 or higher required.

⁵⁹ R&S®FSV firmware version 2.30 or higher required.

⁶⁰ Maximum bandwidth 10 MHz.

⁶¹ R&S®FPS firmware version 1.30 or higher required.

Designation	Type	Order No.
FPL		
Spectrum analyzer, 5 kHz to 3 GHz	R&S®FPL1003	1304.0004.03
Spectrum analyzer, 5 kHz to 7 GHz	R&S®FPL1007	1304.0004.07
Spectrum analyzer, 5 kHz to 14 GHz	R&S®FPL1014	1304.0004.14
Spectrum analyzer, 5 kHz to 26 GHz	R&S®FPL1026	1304.0004.26
R&S®FSL ^{57, 62, 63}		
Spectrum analyzer, 9 kHz to 3 GHz	R&S®FSL3	1300.2502.03
Spectrum analyzer, 9 kHz to 3 GHz, with tracking generator	R&S®FSL3	1300.2502.13
Spectrum analyzer, 9 kHz to 6 GHz	R&S®FSL6	1300.2502.06
Spectrum analyzer, 9 kHz to 6 GHz, with tracking generator	R&S®FSL6	1300.2502.16
Spectrum analyzer, 9 kHz to 18 GHz	R&S®FSL18	1300.2502.18
Spectrum analyzer, 9 kHz to 18 GHz, with tracking generator	R&S®FSL18	1300.2502.28
R&S®ZNL		
Vector network analyzer, two ports, 3 GHz, N	R&S®ZNL3	1323.0012.03
Vector network analyzer, two ports, 6 GHz, N	R&S®ZNL6	1323.0012.06
Radio communication tester		
Radio communication tester	CMP180	1201.0002.18
Radio communication tester	CMP200	1201.0002.20
Performance vector tester		
Performance vector tester	PVT360A	1201.0002.36
Oscilloscopes		
R&S®RTP		
High-performance oscilloscope, 4 GHz, 4 channels	R&S®RTP044	320.5007.04
High-performance oscilloscope, 6 GHz, 4 channels	R&S®RTP064	320.5007.06
High-performance oscilloscope, 8 GHz, 4 channels	R&S®RTP084	320.5007.08
High-performance oscilloscope, 13 GHz, 4 channels	R&S®RTP134	320.5007.13
High-performance oscilloscope, 16 GHz, 4 channels	R&S®RTP164	320.5007.16
R&S®RTO6 ⁴⁰		
Oscilloscope, base unit, 200 Mpoints/800 Mpoints, 4 channels, bandwidth option required (600 MHz to 6 GHz)	R&S®RTO64	1802.0001.04
R&S®RTO2000 ^{40, 64}		
Oscilloscope, 600 MHz, 2 channels	R&S®RTO2002	1329.7002.02
Oscilloscope, 600 MHz, 4 channels	R&S®RTO2004	1329.7002.04
Oscilloscope, 1 GHz, 2 channels	R&S®RTO2012	1329.7002.12
Oscilloscope, 1 GHz, 4 channels	R&S®RTO2014	1329.7002.14
Oscilloscope, 2 GHz, 2 channels	R&S®RTO2022	1329.7002.22
Oscilloscope, 2 GHz, 4 channels	R&S®RTO2024	1329.7002.24
Oscilloscope, 3 GHz, 2 channels	R&S®RTO2032	1329.7002.32
Oscilloscope, 3 GHz, 4 channels	R&S®RTO2034	1329.7002.34
Oscilloscope, 4 GHz, 4 channels	R&S®RTO2044	1329.7002.44
Oscilloscope, 6 GHz, 4 channels	R&S®RTO2064	1329.7002.64
R&S®RTO1000 ^{40, 57, 65}		
Oscilloscope, 600 MHz	R&S®RTO1002	1316.1000.02
Oscilloscope, 600 MHz	R&S®RTO1004	1316.1000.04
Oscilloscope, 1 GHz	R&S®RTO1012	1316.1000.12
Oscilloscope, 1 GHz	R&S®RTO1014	1316.1000.14
Oscilloscope, 2 GHz	R&S®RTO1022	1316.1000.22
Oscilloscope, 2 GHz	R&S®RTO1024	1316.1000.24
Oscilloscope, 4 GHz	R&S®RTO1044	1316.1000.44
Power sensor		
Frequency selective power sensor	R&S®NRQ6	1421.3509.02
I/Q data interface	R&S®NRQ6-K1	1421.4705.02

⁶² R&S®FSL firmware version 2.40 or higher required.

⁶³ Only the R&S®FSL with motherboard order number 2112.1800.xx supported. Limited option support.

⁶⁴ R&S®RTO2000 firmware version 3.50.3.1 or higher required.

⁶⁵ R&S®RTO1000 firmware version 2.51.1.0 or higher required.

Supported power sensors ⁶⁶

Designation	Type	Order No.
Universal power sensors		
10 MHz to 8 GHz, 100 mW, two-path	R&S®NRP-Z211	1417.0409.02
10 MHz to 8 GHz, 200 mW ⁶⁷	R&S®NRP-Z11	1138.3004.02
10 MHz to 18 GHz, 100 mW, two-path	R&S®NRP-Z221	1417.0309.02
10 MHz to 18 GHz, 200 mW ⁶⁷	R&S®NRP-Z21	1137.6000.02
10 MHz to 18 GHz, 2 W ⁶⁷	R&S®NRP-Z22	1137.7506.02
10 MHz to 18 GHz, 15 W ⁶⁷	R&S®NRP-Z23	1137.8002.02
10 MHz to 18 GHz, 30 W ⁶⁷	R&S®NRP-Z24	1137.8502.02
Power sensor modules with power splitter		
DC to 18 GHz, 500 mW	R&S®NRP-Z27	1169.4102.02
DC to 26.5 GHz, 500 mW	R&S®NRP-Z37	1169.3206.02
Thermal power sensors		
0 Hz to 18 GHz, 100 mW	R&S®NRP18T	1424.6115.02
0 Hz to 18 GHz, 100 mW	R&S®NRP18TN	1424.6121.02
0 Hz to 33 GHz, 100 mW	R&S®NRP33T	1424.6138.02
0 Hz to 33 GHz, 100 mW	R&S®NRP33TN	1424.6144.02
0 Hz to 40 GHz, 100 mW	R&S®NRP40T	1424.6150.02
0 Hz to 40 GHz, 100 mW	R&S®NRP40TN	1424.6167.02
0 Hz to 50 GHz, 100 mW	R&S®NRP50T	1424.6173.02
0 Hz to 50 GHz, 100 mW	R&S®NRP50TN	1424.6180.02
0 Hz to 67 GHz, 100 mW	R&S®NRP67T	1424.6196.02
0 Hz to 67 GHz, 100 mW	R&S®NRP67TN	1424.6209.02
0 Hz to 90 GHz, 100 mW	R&S®NRP90T	1424.6473.02
0 Hz to 90 GHz, 100 mW	R&S®NRP90TN	1424.6480.02
0 Hz to 110 GHz, 100 mW	R&S®NRP110T	1424.6215.02
Thermal waveguide power sensors		
50 GHz to 75 GHz, 100 mW	R&S®NRP75TWG	1700.2529.02
60 GHz to 90 GHz, 100 mW	R&S®NRP90TWG	1700.2312.02
75 GHz to 110 GHz, 100 mW	R&S®NRP110TWG	1173.8709.02
Average power sensors		
8 kHz to 6 GHz, 200 mW	R&S®NRP6A	1424.6796.02
8 kHz to 6 GHz, 200 mW	R&S®NRP6AN	1424.6809.02
9 kHz to 6 GHz, 200 mW ⁶⁷	R&S®NRP-Z91	1168.8004.02
8 kHz to 18 GHz, 200 mW	R&S®NRP18A	1424.6815.02
8 kHz to 18 GHz, 200 mW	R&S®NRP18AN	1424.6821.02
Three-path diode power sensors		
100 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP8S	1419.0006.02
100 pW to 200 mW, 10 MHz to 8 GHz, LAN version	R&S®NRP8SN	1419.0012.02
100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18S	1419.0029.02
100 pW to 200 mW, 10 MHz to 18 GHz, LAN version	R&S®NRP18SN	1419.0035.02
1 nW to 2 W, 10 MHz to 18 GHz	R&S®NRP18S-10	1424.6721.02
10 nW to 15 W, 10 MHz to 18 GHz	R&S®NRP18S-20	1424.6738.02
30 nW to 30 W, 10 MHz to 18 GHz	R&S®NRP18S-25	1424.6744.02
100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33S	1419.0064.02
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version	R&S®NRP33SN	1419.0070.02
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version, TVAC-compliant	R&S®NRP33SN-V	1419.0129.02
100 pW to 100 mW, 50 MHz to 40 GHz	R&S®NRP40S	1419.0041.02
100 pW to 100 mW, 50 MHz to 40 GHz, LAN version	R&S®NRP40SN	1419.0058.02
100 pW to 100 mW, 50 MHz to 50 GHz	R&S®NRP50S	1419.0087.02
100 pW to 100 mW, 50 MHz to 50 GHz, LAN version	R&S®NRP50SN	1419.0093.02
100 pW to 100 mW, 50 MHz to 67 GHz	R&S®NRP67S	1424.6396.02
100 pW to 100 mW, 50 MHz to 67 GHz, LAN version	R&S®NRP67SN	1424.6409.02
100 pW to 100 mW, 50 MHz to 67 GHz, LAN version, TVAC-compliant	R&S®NRP67SN-V	1424.6415.02
Wideband power sensors		
50 MHz to 18 GHz, 100 mW ⁶⁷	R&S®NRP-Z81	1137.9009.02
50 MHz to 40 GHz, 100 mW (2.92 mm) ⁶⁷	R&S®NRP-Z85	1411.7501.02
50 MHz to 40 GHz, 100 mW (2.40 mm) ⁶⁷	R&S®NRP-Z86	1417.0109.40
50 MHz to 44 GHz, 100 mW (2.40 mm) ⁶⁷	R&S®NRP-Z86	1417.0109.44

⁶⁶ For average power measurement only.⁶⁷ Product discontinued.

Available measurement applications

The following table lists the general connectivity and I/Q capture capability of the measurement applications with a listed instrument.

For performance values (if applicable), see the corresponding application specific specifications documents.

Applications R&S®VSE- Instruments	I/Q	K6	K7	K8 K8E	K10 K72 K96	K18 K18F K18D K18M K60 K60C K60D K60M	K70 K70M K70P	K91 K91p K91n K91ac K91ax K91be	K100 K102 K104 K106	K144 K146 K148 K171 K175	K91X K144X	K149	K201
FSWX	•	•	•	•	•	•	•	•	•	•	•	•	•
FSW	•	•	•	•	•	•	•	•	•	•	•	•	•
R&S®FSWP ⁶⁸	•	•	•	•	•	•	•	•	•	•	–	•	•
R&S®FSVA3000, R&S®FSV3000	•	•	•	•	•	•	•	•	•	•	–	–	•
R&S®FSVA, R&S®FSV	•	•	•	–	•	•	•	•	•	•	–	–	•
R&S®FPS	•	•	•	–	•	•	•	•	•	•	–	–	•
FPL	•	–	•	•	•	•	•	–	•	•	–	–	•
R&S®FSL	•	–	•	–	•	•	•	–	•	–	–	–	–
R&S®ZNL ⁶⁹	•	–	•	–	•	•	•	–	•	•	–	–	•
CMP180	•	–	–	–	–	–	•	–	–	–	–	–	–
CMP200	•	–	–	–	–	–	•	–	–	–	–	–	•
PVT360A	•	•	•	–	•	•	•	•	•	•	•	–	•
R&S®RTP	•	•	•	•	• ⁴¹	•	•	• ⁴¹	• ⁴¹	• ⁴¹	•	•	• ⁴¹
R&S®RTO6 ⁴⁰ , R&S®RTO2000 ⁴⁰ , R&S®RTO1000 ⁴⁰	•	•	•	•	•	•	•	•	•	•	•	–	•
R&S®NRQ6 ⁷⁰	•	•	•	–	•	•	•	•	•	•	–	–	•

⁶⁸ R&S®FSWP-B1 option required.

⁶⁹ R&S®ZNL3-B1 or R&S®ZNL6-B1 option required.

⁷⁰ R&S®NRQ6-K1 required.

Ordering information

Designation	Type	Order No. ⁷¹
Vector signal explorer software		
R&S®VSE basic edition ^{72, 73}	R&S®VSE	1345.1011.06
R&S®VSE enterprise edition ⁷⁴	R&S®VSE	1345.1105.06
R&S®VSE software maintenance	R&S®VSE-SWM	1320.7622.81
Measurement applications for analyzers ^{74, 75}		
Pulse measurement application	R&S®VSE-K6	1320.7516.06
Phased array measurements ⁷⁶	R&S®VSE-K6A	1345.1286.06
AM/FM/PM modulation analysis	R&S®VSE-K7	1320.7539.06
Bluetooth® Basic Rate/Enhanced Data Rate/Low Energy measurement application	R&S®VSE-K8	1345.1970.06
Bluetooth® 6.0 Channel Sounding measurement application ⁷⁷	R&S®VSE-K8E	1345.2982.06
GSM measurements	R&S®VSE-K10	1313.1368.06
Amplifier measurements	R&S®VSE-K18	1345.1434.06
Direct DPD measurements ⁷⁸	R&S®VSE-K18D	1345.1440.06
Memory polynomial DPD ⁷⁸	R&S®VSE-K18M	1345.1492.06
Frequency response measurements ⁷⁸	R&S®VSE-K18F	1345.1457.06
Transient measurements	R&S®VSE-K60	1320.7868.06
Transient chirp measurements ⁷⁹	R&S®VSE-K60C	1320.7874.06
Transient hop measurements ⁷⁹	R&S®VSE-K60H	1320.7880.06
Transient phase noise ⁷⁹	R&S®VSE-K60P	1345.2230.06
Vector signal analysis	R&S®VSE-K70	1320.7522.06
Multi-modulation vector signal analysis ⁸⁰	R&S®VSE-K70M	1345.1211.06
BER measurements with PRBS data ⁸⁰	R&S®VSE-K70P	1345.1228.06
3GPP FDD measurements	R&S®VSE-K72	1320.7580.06
IEEE 802.11a/b/g measurements	R&S®VSE-K91	1320.7597.06
IEEE 802.11p measurements ⁸¹	R&S®VSE-K91p	1320.7680.06
IEEE 802.11n measurements ⁸¹	R&S®VSE-K91n	1320.7600.06
IEEE 802.11ac measurements ⁸¹	R&S®VSE-K91ac	1320.7616.06
IEEE 802.11ax measurements ⁸¹	R&S®VSE-K91ax	1345.1411.06
IEEE 802.11be measurements ⁸¹	R&S®VSE-K91be	1345.1428.06
IEEE 802.11bn measurements ⁸¹	R&S®VSE-K91bn	1345.3043.06
WLAN cross-correlation measurements ⁸¹	R&S®VSE-K91X	1345.2724.06
OFDM signal analysis	R&S®VSE-K96	1320.7922.06
EUTRA/LTE FDD uplink and downlink measurement application	R&S®VSE-K100	1320.7545.06
EUTRA/LTE Advanced and MIMO (downlink) ⁸²	R&S®VSE-K102	1320.7551.06
EUTRA/LTE TDD uplink and downlink measurement application	R&S®VSE-K104	1320.7568.06
EUTRA/LTE narrowband IoT analysis	R&S®VSE-K106	1320.7900.06
3GPP 5G NR downlink and uplink measurement application	R&S®VSE-K144	1309.9574.06
3GPP 5G NR cross-correlation measurements ⁸⁴	R&S®VSE-K144X	1345.2718.06
3GPP 5G NR downlink MIMO measurements ⁸⁴	R&S®VSE-K146	1345.1305.06
3GPP 5G NR Release 16 extension, for uplink/downlink ⁸⁴	R&S®VSE-K148	1345.1392.06
HRP UWB measurements ⁸⁴	R&S®VSE-K149	1345.1463.06
3GPP 5G NR Release 17 extension, for uplink/downlink ^{83, 84}	R&S®VSE-K171	1345.1663.06
O-RAN measurements ⁸⁴	R&S®VSE-K175	1350.7020.06
Beyond 5G measurements	R&S®VSE-K184	1345.3037.06
OneWeb reverse link measurements	R&S®VSE-K201	1345.2001.06
User defined frequency correction by SnP file	R&S®VSE-K544	1309.9580.06

⁷¹ Floating variant is xxxx.xxx.51 and requires R&S®FSPC-FL.

⁷² R&S®FSPC required.

⁷³ Not available for R&S®FSPC-FL.

⁷⁴ R&S®FSPC or R&S®FSPC-FL required.

⁷⁵ R&S®VSE basic edition or R&S®VSE enterprise edition required.

⁷⁶ R&S®VSE-K6 and a supported measurement device required (see R&S®VSE-K6 specifications document for list of devices supported with R&S®VSE-K6A option).

⁷⁷ R&S®VSE-K8 required.

⁷⁸ R&S®VSE-K18 required.

⁷⁹ R&S®VSE-K60 required.

⁸⁰ R&S®VSE-K70 required.

⁸¹ R&S®VSE-K91 required.

⁸² R&S®VSE-K100 or R&S®VSE-K104 required.

⁸³ R&S®VSE-K148 required.

⁸⁴ R&S®VSE-K144 required.

Designation	Type	Order No. ⁷¹
License dongles		
License dongle	R&S®FSPC	1310.0002.03
Floating license dongle	R&S®FSPC-FL	1310.0002.04
Measurement applications for R&S®RTO2000 and R&S®RTP ⁸⁵		
Pulse measurement application	R&S®VSE-KT6	1345.1934.02
Phased array measurements ⁸⁶	R&S®VSE-KT6A	1345.2101.02
AM/FM/PM modulation analysis	R&S®VSE-KT7	1345.1928.02
Bluetooth® Basic Rate/Enhanced Data Rate/Low Energy measurement application	R&S®VSE-KT8	1345.2399.02
Bluetooth® 6.0 Channel Sounding measurement application ⁸⁷	R&S®VSE-KT8E	1358.5233.02
GSM measurements	R&S®VSE-KT10	1345.1705.02
Amplifier measurements	R&S®VSE-KT18	1345.2060.02
Direct DPD measurements ⁸⁸	R&S®VSE-KT18D	1345.2053.02
Memory polynomial DPD ⁸⁸	R&S®VSE-KT18M	1345.2030.02
Frequency response measurements ⁸⁸	R&S®VSE-KT18F	1345.2047.02
Transient measurements	R&S®VSE-KT60	1345.1905.02
Transient chirp measurements ⁸⁹	R&S®VSE-KT60C	1345.1892.02
Transient hop measurements ⁸⁹	R&S®VSE-KT60H	1345.1886.02
Vector signal analysis	R&S®VSE-KT70	1345.1870.02
Multi-modulation vector signal analysis ⁹⁰	R&S®VSE-KT70M	1345.1863.02
BER measurements with PRBS data ⁹⁰	R&S®VSE-KT70P	1345.1711.02
3GPP FDD measurements	R&S®VSE-KT72	1345.1857.02
IEEE 802.11a/b/g measurements	R&S®VSE-KT91	1345.1840.02
IEEE 802.11p measurements ⁹¹	R&S®VSE-KT91p	1345.1692.02
IEEE 802.11n measurements ⁹¹	R&S®VSE-KT91n	1345.1828.02
IEEE 802.11ac measurements ⁹¹	R&S®VSE-KT91ac	1345.1811.02
IEEE 802.11ax measurements ⁹¹	R&S®VSE-KT91ax	1345.1805.02
IEEE 802.11bn measurements ⁹¹	R&S®VSE-KT91bn	1358.5240.02
WLAN cross-correlation measurements ⁹¹	R&S®VSE-KT91X	1358.5262.02
OFDM signal analysis	R&S®VSE-KT96	1345.1792.02
EUTRA/LTE FDD uplink and downlink measurement application	R&S®VSE-KT100	1345.1786.02
EUTRA/LTE Advanced and MIMO (downlink) ⁹²	R&S®VSE-KT102	1345.1770.02
EUTRA/LTE TDD uplink and downlink measurement application	R&S®VSE-KT104	1345.1763.02
EUTRA/LTE narrowband IoT analysis	R&S®VSE-KT106	1345.1757.02
3GPP 5G NR downlink and uplink measurement application	R&S®VSE-KT144	1345.1740.02
3GPP 5G NR cross-correlation measurements ⁹⁴	R&S®VSE-KT144X	1358.5279.02
3GPP 5G NR downlink MIMO measurements ⁹⁴	R&S®VSE-KT146	1345.1734.02
3GPP 5G NR Release 16 extension, for uplink/downlink ⁹⁴	R&S®VSE-KT148	1345.2099.02
HRP UWB measurements	R&S®VSE-KT149	1345.2082.02
3GPP 5G NR Release 17 extension, for uplink/downlink ^{93, 94}	R&S®VSE-KT171	1345.1992.02
O-RAN measurements ⁹⁴	R&S®VSE-KT175	1345.2076.02
Beyond 5G measurements	R&S®VSE-KT184	1358.5256.02
OneWeb reverse link measurements	R&S®VSE-KT201	1345.2018.02
User defined frequency correction by SnP file	R&S®VSE-KT544	1345.1728.02
Measurement applications for CMP180		
Signal analysis base software	R&S®CMP-KM150	1212.3972.02
Signal analysis digital	R&S®CMP-KM152	1212.3989.02
Measurement applications for CMP200		
Signal analysis base software	R&S®CMP-KM150	1212.3972.02
Signal analysis digital	R&S®CMP-KM152	1212.3989.02
OneWeb reverse link measurements	R&S®CMP-KM580	1212.4085.02

⁸⁵ R&S®VSE-KT options are functionally identical to the corresponding R&S®VSE-K options, but require an R&S®RTO6, R&S®RTO2000 or R&S®RTP. Options are installed on the oscilloscope directly and not on an R&S®FSPC or R&S®FSPC-FL. These options require the R&S®VSE to be installed on the oscilloscope directly.

⁸⁶ R&S®VSE-KT6 required.

⁸⁷ R&S®VSE-KT8 required.

⁸⁸ R&S®VSE-KT18 required.

⁸⁹ R&S®VSE-KT60 required.

⁹⁰ R&S®VSE-KT70 required.

⁹¹ R&S®VSE-KT91 required.

⁹² R&S®VSE-KT100 or R&S®VSE-KT104 required.

⁹³ R&S®VSE-KT148 required.

⁹⁴ R&S®VSE-KT144 required.

Measurement applications for PVT360A ⁹⁵		
R&S®VSE base software with PVT360A	R&S®VSE-PVT	1345.2401.02
Analog modulation analysis (AM/FM/PM)	R&S®VSE-KP7	1345.2460.02
GSM, EDGE, EDGE Evolution and VAMOS measurements	R&S®VSE-KP10	1345.2501.02
Amplifier measurements	R&S®VSE-KP18	1345.2418.02
Direct DPD measurements ⁹⁶	R&S®VSE-KP18D	1345.2424.02
Frequency response measurements ⁹⁶	R&S®VSE-KP18F	1345.2430.02
Memory polynomial DPD ⁹⁶	R&S®VSE-KP18M	1345.2447.02
Vector signal analysis	R&S®VSE-KP70	1345.2453.02
Multi-modulation analysis ⁹⁷	R&S®VSE-KP70M	1345.2476.02
BER PRBS measurements ⁹⁷	R&S®VSE-KP70P	1345.2482.02
WCDMA FDD measurements, uplink/downlink	R&S®VSE-KP72	1345.2518.02
OFDM signal analysis	R&S®VSE-KP96	1345.2499.02
LTE FDD measurements, uplink/downlink	R&S®VSE-KP100	1345.2524.02
LTE-A and MIMO downlink measurements ⁹⁸	R&S®VSE-KP102	1345.2530.02
LTE TDD measurements, uplink/downlink	R&S®VSE-KP104	1345.2547.02
LTE NB-IoT measurements, uplink/downlink	R&S®VSE-KP106	1345.2553.02
5G NR measurements, uplink/downlink, Rel. 15	R&S®VSE-KP144	1345.2560.02
5G NR MIMO measurements, downlink ⁹⁹	R&S®VSE-KP146	1345.2576.02
5G NR measurements, uplink/downlink, Rel. 16 ⁹⁹	R&S®VSE-KP148	1345.2582.02
5G NR measurements, uplink/downlink, Rel. 17 ^{99, 100}	R&S®VSE-KP171	1345.2599.02
O-RAN measurements ⁹⁹	R&S®VSE-KP175	1345.2601.02
OneWeb measurements	R&S®VSE-KP201	1345.2618.02
Supported instruments		
For details, see table of supported instruments on page 9.		

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⁹⁵ R&S®VSE-KP options are functionally identical to the corresponding R&S®VSE-K options, but require a PVT360A. Options are installed on the analyzer directly and not on an R&S®FSPC or R&S®FSPC-FL. These options require the R&S®VSE-PVT base license.

⁹⁶ R&S®VSE-KP18 required.

⁹⁷ R&S®VSE-KP70 required.

⁹⁸ R&S®VSE-KP100 or R&S®VSE-KP104 required.

⁹⁹ R&S®VSE-KP144 required.

¹⁰⁰ R&S®VSE-KP148 required.

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