

Signal and spectrum analyzers from Rohde & Schwarz

Product overview



Signal and spectrum analyzers from Rohde & Schwarz

At a glance

Rohde & Schwarz offers innovative signal and spectrum analyzers whose unique characteristics enable them to redefine the current state-of-the-art again and again.

Rohde & Schwarz offers a large state-of-the-art product portfolio with ingenious and often unique solutions for all fields of application in spectrum analysis – for general measurement applications and special purposes.

The fast-paced development in wireless communications requires short innovation cycles and a continuous expansion of measurement equipment to provide new analysis capabilities. The signal and spectrum analyzers from Rohde & Schwarz are based on platforms that are continuously being enhanced to cover new functions. This allows quick response to new requirements. The message to the customer is clear: Invest once and reap the benefits for many years to come.

Large product portfolio

From handheld to mid-range and, ultimately, to high-end analyzers – Rohde & Schwarz offers the right signal or spectrum analyzer for any task or budget.

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Family concept

The user interface and remote-control commands of the signal and spectrum analyzers from Rohde & Schwarz are largely identical. Users can therefore migrate quickly between the various families of instruments.

[▷ page 6](#)

Application-specific solutions

Rohde & Schwarz offers a broad portfolio of application-specific firmware packages for all signal and spectrum analyzers. This makes it possible to cover highly diverse applications and to respond to the customer's exact requirements.

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Milestones in spectrum analysis

- 2001 R&S®FSU: reference spectrum analyzer with the widest dynamic range then available
- 2006 R&S®FSUP: first phase noise tester and spectrum analyzer in one instrument
- 2007 R&S®FSU67: first spectrum analyzer up to 67 GHz; still unique on the market today
- 2008 R&S®FSV: fastest signal and spectrum analyzer on the market
- 2010 R&S®FSVR: world's first combination of full-featured signal and spectrum analyzer and realtime spectrum analyzer
- 2011 R&S®FSW: first spectrum analyzer with 160 MHz analysis bandwidth and innovative touchscreen operation

Signal and spectrum analyzers from Rohde & Schwarz

	<p>R&S®FSW Signal and spectrum analyzer High-end</p>	<p>High-end spectrum analyzer to meet the highest requirements in signal and spectrum analysis ▷ page 7</p>
	<p>R&S®FSU Spectrum analyzer High-end spectrum analyzer</p>	<p>High-end spectrum analyzer up to 67 GHz for maximum performance ▷ page 10</p>
	<p>R&S®FSQ Signal analyzer High-end signal analyzer</p>	<p>Signal analysis up to 40 GHz with the dynamic range of a high-end spectrum analyzer and an analysis bandwidth up to 120 MHz ▷ page 12</p>
	<p>R&S®FSMR Measuring receiver Signal generator calibration</p>	<p>The all-in-one solution for the calibration of signal generators and attenuators ▷ page 14</p>
	<p>R&S®FSUP Signal source analyzer Phase noise tester and spectrum analyzer in one instrument</p>	<p>The R&S®FSUP combines the functionality of a high-end signal and spectrum analyzer with the advantages of a phase-noise-only tester – a unique one-box solution that enables users in development and production to measure oscillators and synthesizers ▷ page 16</p>
	<p>R&S®FSG Signal and spectrum analyzer Mid-range</p>	<p>Spectrum analyzer for wideband communications technologies with 28 MHz analysis bandwidth ▷ page 18</p>
	<p>R&S®FSVR Real-time spectrum analyzer Signal analyzer and realtime spectrum analyzer in one box</p>	<p>The R&S®FSVR combines a full-featured signal and spectrum analyzer with a realtime spectrum analyzer. In realtime operation, the R&S®FSVR seamlessly measures and displays the spectrum in the time domain with a span of up to 40 MHz ▷ page 20</p>
	<p>R&S®FSV Signal and spectrum analyzer Mid-range</p>	<p>Fastest signal and spectrum analyzer for the performance-oriented, cost-conscious user in the development, production, installation and servicing of RF systems ▷ page 22</p>
	<p>R&S®FSL Spectrum analyzer Compact spectrum analysis</p>	<p>Lightweight, compact analyzer with the functionality of a high-end analyzer and 28 MHz analysis bandwidth for development, service and production ▷ page 24</p>
	<p>R&S®ZVH Cable and antenna analyzer</p>	<p>Rugged handheld cable and antenna analyzer up to 8 GHz, specially designed for fast and easy setup and maintenance of antenna stations ▷ page 26</p>
	<p>R&S®FSH Spectrum analyzer Convenient spectrum analysis</p>	<p>Rugged handheld spectrum analyzer up to 18 GHz, specially designed for use in the field and service ▷ page 28</p>
	<p>R&S®FSC Spectrum analyzer</p>	<p>Economical spectrum analyzer up to 6 GHz for applications in the lab, service and production ▷ page 31</p>

Large product portfolio

The world of signal and spectrum analysis from Rohde & Schwarz

Frequency range	0 Hz	5 GHz	10 GHz	15 GHz	20 GHz	25 GHz
R&S®FSW from 2 Hz	R&S®FSW43					
	R&S®FSW26					26.5
	R&S®FSW13		13.6			
	R&S®FSW8	8				
R&S®FSU from 20 Hz	R&S®FSU67					
	R&S®FSU50					
	R&S®FSU46					
	R&S®FSU43					
	R&S®FSU26					26.5
	R&S®FSU8	8				
	R&S®FSU3	3.6				
R&S®FSQ from 20 Hz	R&S®FSQ40					
	R&S®FSQ26					26.5
	R&S®FSQ8	8				
	R&S®FSQ3	3.6				
R&S®FSMR from 20 Hz	R&S®FSMR50					
	R&S®FSMR43					
	R&S®FSMR26					26.5
	R&S®FSMR3	3.6				
R&S®FSUP from 20 Hz	R&S®FSUP50					
	R&S®FSUP26					26.5
	R&S®FSUP8	8				
R&S®FSG from 9 kHz	R&S®FSG13		13.6			
	R&S®FSG8	8				
R&S®FSVR from 10 Hz	R&S®FSVR40					
	R&S®FSVR30					
	R&S®FSVR13			13.6		
	R&S®FSVR7	7				
R&S®FSV from 10 Hz	R&S®FSV40					
	R&S®FSV30					
	R&S®FSV13			13.6		
	R&S®FSV7	7				
	R&S®FSV3	3.6				
R&S®FSL from 9 kHz	R&S®FSL18				18	
	R&S®FSL6	6				
	R&S®FSL3	3.6				
R&S®ZVH from 100 kHz	R&S®ZVH8	8				
	R&S®ZVH4	3.6				
R&S®FSH3/18 from 100 kHz	R&S®FSH18				18	
	R&S®FSH3	3				
R&S®FSH4/8 from 9 kHz	R&S®FSH8	8				
	R&S®FSH4	3.6				
R&S®FSC from 9 kHz	R&S®FSC6	6				
	R&S®FSC3	3				

Rohde&Schwarz offers a very broad product portfolio of signal and spectrum analyzers. Users can choose the most suitable solution from among twelve different product families – the R&S®FSW, R&S®FSU, R&S®FSQ, R&S®FSMR, R&S®FSUP, R&S®FSG, R&S®FSVR, R&S®FSV, R&S®FSL, R&S®ZVH, R&S®FSH and the R&S®FSC.

	30 GHz	35 GHz	40 GHz	45 GHz	50 GHz	up to 110 GHz
			43.5			(110 GHz ¹⁾)
						(110 GHz ¹⁾)
						67 (110 GHz ¹⁾)
				50		(110 GHz ¹⁾)
				46		(110 GHz ¹⁾)
			43			
		40				(110 GHz ¹⁾)
						(110 GHz ¹⁾)
				50		
			43			
				50		(110 GHz ¹⁾)
						(110 GHz ¹⁾)
		40				(110 GHz ¹⁾)
30						(110 GHz ¹⁾)
		40				(110 GHz ¹⁾)
30						(110 GHz ¹⁾)

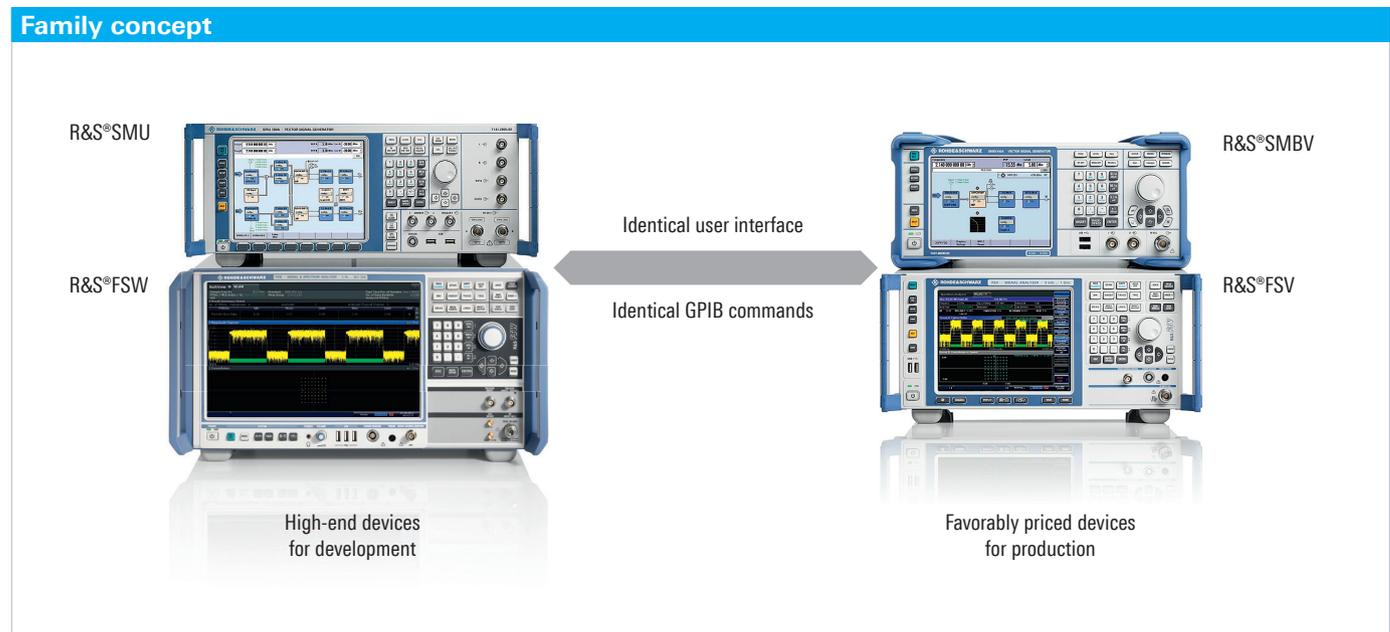
¹⁾ With external mixers.

Family concept

The signal and spectrum analyzers from Rohde & Schwarz largely share the same user interface and the same remote control routines. This concept applies not only to the individual families but to the product generations as well.

Users can easily and quickly switch between the individual instruments – for example, from an earlier to a later model or from development to production – without much effort.

This consistent concept was also implemented for the application-specific options – as far as possible taking into account the different bandwidths. Options are available for all current wireless communications standards, i.e. 2G, 2.5G or 3G as well as LTE, EDGE Evolution and the data rate increase for 3GPP (HSPA+). A general AM/FM/φM measurement demodulator and packages for general measurement applications are also available, e.g. for measuring noise figure and phase noise.



R&S®FSW signal and spectrum analyzer

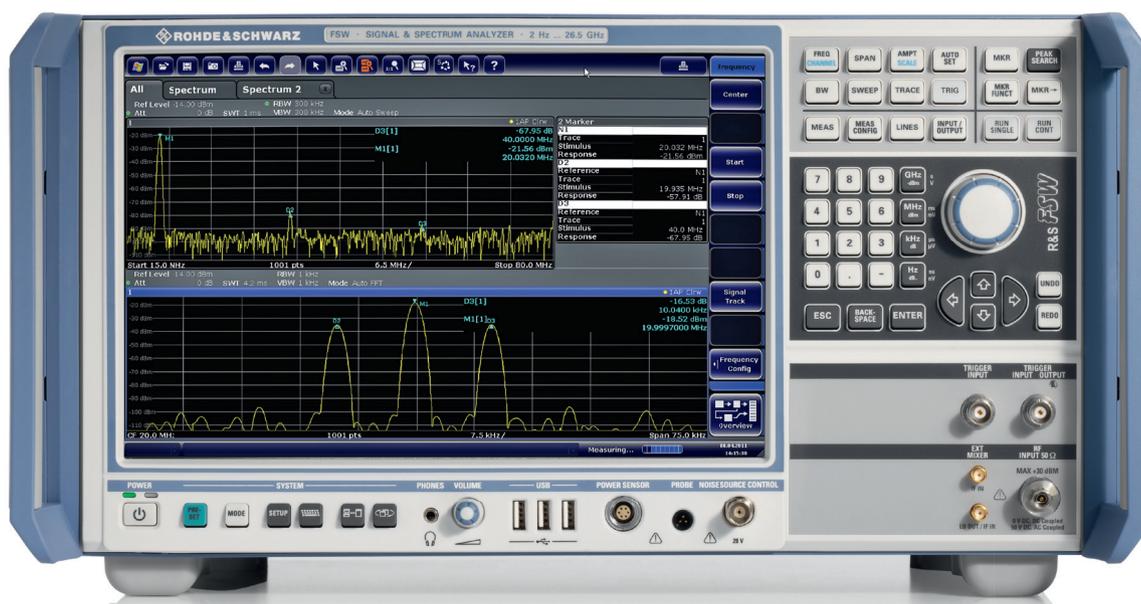
The high-performance R&S®FSW signal and spectrum analyzer was developed to meet demanding customer requirements. Offering low phase noise, wide analysis bandwidth and straightforward and intuitive operation, the analyzer makes measurements fast and easy.

Users in the aerospace and defense (A&D) sector and developers of future wideband communications systems will find plenty of reasons why the R&S®FSW is the right solution for their T&M requirements. With phase noise unparalleled among signal and spectrum analyzers, the R&S®FSW facilitates the development of oscillators, e.g. for use in radar systems.

Featuring an intuitive 12.1" touchscreen user interface, a flat menu structure and straightforward result representation, the R&S®FSW offers exceptional ease of operation. From block diagrams reflecting the signal flow, the user can select a desired element and access all functions via straightforward dialogs. The R&S®FSW uses flat menu structures throughout, making it easy to navigate to a desired function or setting.

With the MultiView function, the user can display multiple results simultaneously in a clearly structured manner. For example, in one measurement diagram, the user can analyze the wanted spectrum of a radar signal. In a second diagram with separate settings, the signal harmonics can be measured. A third diagram can be activated to measure and statistically evaluate the pulse rise and fall times as well as phase shift keying within a pulse (intrapulse PSK) using the R&S®FSW-K6 application. The desired diagram (measurement application) can be activated by clicking the associated tab. Clicking the MultiView tab will simultaneously display all active measurements.

The R&S®FSW comes with a multistandard radio analyzer (MSRA) in order to examine the mutual influence between different signals. The MSRA is a new operating mode in which the signal is first fully captured over a set frequency and time interval, temporarily stored and then analyzed. This makes it easy to find interference between signals of different technologies and facilitates the development of multistandard base stations in which signals such as LTE and GSM are transmitted over a common RF path. The MSRA allows the R&S®FSW to capture 200 Msamples of signal data. At an analysis bandwidth of 160 MHz, data can be captured for up to one second. Even pulsed, non-correlated signals that are especially difficult to detect using the sweep mode are reliably captured for further analysis since the MSRA captures the entire settable time and frequency range at once.



A wide variety of measurements are needed in order to validate and verify the characteristics of RF ICs, modules and systems under various conditions, such as at different frequencies, temperatures or supply voltages. The R&S®FSW effectively supports these measurements by offering high speed, efficient measurement functions and fast switchover between instrument setups. This speeds up test sequences and reduces the time to the final product. Providing 1000 sweeps/s in remote operation and delay-free switching between instrument setups, the R&S®FSW ranks top among the signal and spectrum analyzers available on the market. The R&S®FSW speeds up measurements that require a high averaging factor, as are frequently stipulated in test specifications for communications standards.

The R&S®FSW is optimally prepared to handle ever larger analysis bandwidths. Larger bandwidths are needed, for example, when power amplifiers for multicarrier or wideband applications have to be linearized in order to make them more effective, or when the occupied bandwidth of communications systems themselves increases. The R&S®FSW offers up to 160 MHz analysis bandwidth and 400 Msample I/Q memory depth for measuring wideband-modulated or frequency-agile signals. Signals can be recorded over extended periods of time, even when analyzing large bandwidths. This makes it easier to identify and analyze sporadic errors.

In addition to A/D converter resolution, the available spurious-free dynamic range (SFDR) plays an eminent role when analyzing I/Q data. With an SFDR well over 100 dBc, the R&S®FSW offers unprecedented accuracy when it comes to linearizing amplifiers or measuring EVM.

Key facts

- Frequency range from 2 Hz to 8/13.6/26.5/43.5 GHz
- Low phase noise of -137 dBc (1 Hz) at 10 kHz offset (1 GHz carrier)
- -88 dBc dynamic range (with noise cancellation) for WCDMA ACLR measurements
- Up to 160 MHz analysis bandwidth
- < 0.4 dB total measurement uncertainty up to 8 GHz
- High-resolution 12.1" (31 cm) touchscreen for convenient operation
- Multiple measurement applications can be run and displayed in parallel

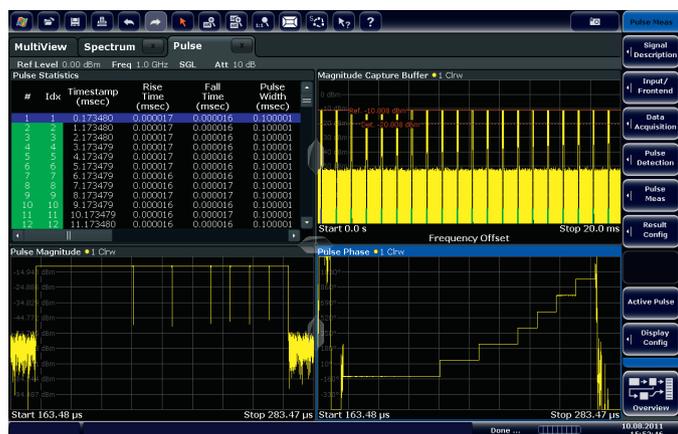
RF performance that meets exacting demands

- Unmatched phase noise – ideal for measuring oscillators for radar and communications applications
- Excellent dynamic range for spurious measurements thanks to low DANL
- Harmonic measurements made easy – due to integrated highpass filters
- High sensitivity even at low frequencies
- High accuracy
- Unparalleled dynamic range up to 1 GHz with separate receive path

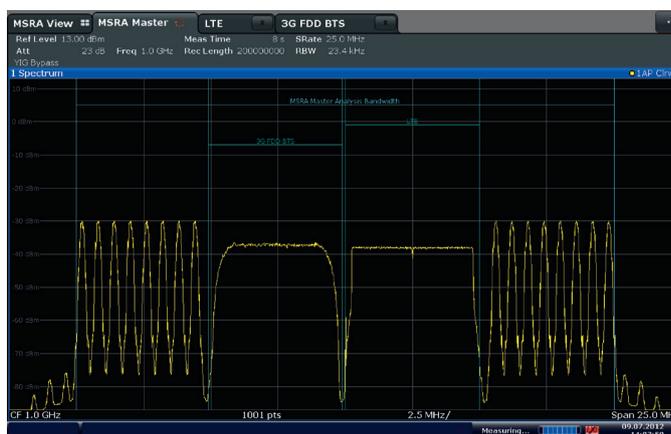
Ready for the future

- Up to 160 MHz analysis bandwidth
- High spurious-free dynamic range of > 100 dBc
- Large I/Q memory depth for seamless recording of long signal sequences
- 500 MHz wide IF path with IF output

Equipped with the R&S®FSW-K6 pulse measurements option, the R&S®FSW delivers pulse parameters at the touch of a key.



The multistandard radio analyzer fully captures and analyzes signals of different standards.



Designed for convenience – with straightforward result display

- Efficient operation with optimized user guidance
- MultiView: multiple results at a glance
- Optimum configuration and combination of measurement applications

Ideal for analyzing radar systems

- Fast identification and analysis of spurious emissions
- Low phase noise for oscillator measurements
- Pulse parameter measurements at the touch of a key
- Analysis of short pulse rise and fall times

Identifying interaction between signals

- Multistandard radio analyzer (MSRA)

When speed counts

- High measurement rates and fast sweep times with sweep rates of up to 1000 sweep/s
- Fast switchover between instrument setups
- Efficient measurement functions speed up operation
- Integrated support of R&S®NRP-Zxx power sensors

A safe investment

- Keeping pace with technological advancement
- R&S®Legacy Pro – easy replacement of obsolete analyzers
- Firmware updates always in step with new developments
- Keeping test data confidential

Specifications in brief		
Frequency range	R&S®FSW8	2 Hz to 8 GHz
	R&S®FSW13	2 Hz to 13.6 GHz
	R&S®FSW26	2 Hz to 26.5 GHz
	R&S®FSW43	2 Hz to 43.5 GHz
Aging of frequency reference		1 × 10 ⁻⁷ /year
	with R&S®FSV-B4 option	3 × 10 ⁻⁹ /year
Resolution bandwidth	standard filters	1 Hz to 10 MHz, 80 MHz (with R&S®FSW-B8 option)
	RRC filters	18 kHz (NADC), 24.3 kHz (TETRA), 3.84 MHz (3GPP)
	channel filters	100 Hz to 5 MHz
	video filters	1 Hz to 10 MHz
I/Q demodulation bandwidth	with R&S®FSW-B28 option	28 MHz
	with R&S®FSW-B40 option	40 MHz
	with R&S®FSW-B80 option	80 MHz
	with R&S®FSW-B160 option	160 MHz
Displayed average noise level (DANL)	2 GHz	typ. -156 dBm (1 Hz)
	with R&S®FSW-B13 option	typ. -159 dBm (1 Hz)
	8 GHz	typ. -156 dBm (1 Hz)
	25 GHz	typ. -150 dBm (1 Hz)
DANL with preamplifier	R&S®FSW-B24 option	
	8 GHz	typ. -169 dBm (1 Hz)
	26 GHz	typ. -161 dBm (1 Hz)
DANL with noise cancellation, preamplifier off, 2 GHz		typ. -169 dBm (1 Hz)
TOI	f < 1 GHz	typ. +30 dBm
	f < 3 GHz	typ. +25 dBm
	8 GHz to 26 GHz	+17 dBm
WCDMA ACLR dynamic range	with noise cancellation	88 dB
Phase noise	10 kHz offset from carrier	
	500 MHz carrier	typ. -140 dBc (1 Hz)
	1 GHz carrier	typ. -137 dBc (1 Hz)
	10 GHz carrier	typ. -128 dBc (1 Hz)
Total measurement uncertainty	8 GHz	< 0.4 dB

R&S®FSU Spectrum Analyzer

The R&S®FSU is a first-rate spectrum analyzer that meets any challenge in RF analysis – in aerospace and defense or for general microwave applications up to 67 GHz.

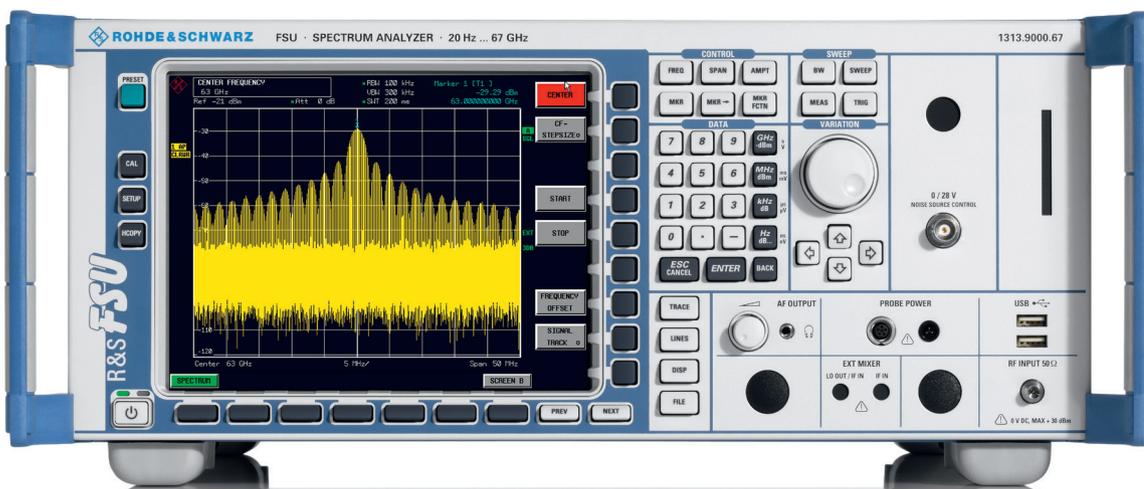
The R&S®FSU is a high-end spectrum analyzer with unrivaled performance in phase noise, dynamic range, measurement accuracy and resolution bandwidth. These factors are important for the design, characterization and manufacture of components for the next generation of products.

A very low DANL of typ. -148 dBm (1 Hz) at 26 GHz and -138 dBm (1 Hz) at 46 GHz supports accurate and sensitive measurements. The data for phase noise, the intermodulation characteristics and the 1 dB compression point speak for themselves. Featuring a 1 dB compression point of $+13$ dBm, the R&S®FSU can measure signals with a power of up to $+5$ dBm with an RF attenuation of 0 dB.

Many application-specific firmware packages cover general measurement applications such as phase noise and power measurements. In conjunction with the application firmware packages for GSM/EDGE/EDGE Evolution, 3GPP or CDMA2000®, the R&S®FSU is the right analyzer for base station tests in development or production.

Key facts

- Frequency range from 20 Hz to 3.6/8/26.5/43/46/50/67 GHz
- Excellent RF performance:
 - Low phase noise of -128 dBc (1 Hz), typ. -133 dBc (1 Hz) at 10 kHz carrier offset
 - DANL of -158 dBm (1 Hz)
 - Third-order intercept (TOI) of typ. $+25$ dBm
- Resolution bandwidth from 1 Hz to 50 MHz
- Many application-specific firmware packages for general measurement applications, e.g. phase noise or noise figure and amplifier measurements.
- Highest dynamic range, e.g. up to 84 dB for 3GPP ACLR measurements



Unrivalled performance: widest dynamic range for a spectrum analyzer

- ▮ TOI of typ. +25 dBm
- ▮ 1 dB compression: +13 dBm
- ▮ Phase noise of typ. -133 dBc (1 Hz) at 10 kHz
- ▮ Highly linear display of < 0.1 dB
- ▮ 84 dB ACLR/3GPP with noise correction
- ▮ DANL of -158 dBm (1 Hz), with preamplifier (R&S®FSU-B24):
typ. -168 dBm (1 Hz) at 20 GHz,
typ. -155 dBm (1 Hz) at 50 GHz

R&S®FSU67 – the only spectrum analyzer with a continuous frequency range from 20 Hz to 67 GHz

- ▮ First spectrum analyzer with full span sweep of 67 GHz
- ▮ Unambiguous frequency identification (without the image response and multiple responses known from external harmonic mixers)
- ▮ No external harmonic mixers required
- ▮ Simple coaxial connection
- ▮ Self-explanatory operating concept and easy test setup
- ▮ Excellent measurement accuracy up to 67 GHz

Large number of features

- ▮ Versatile resolution filters: Gaussian, FFT, RRC, channel, EMI
- ▮ Comprehensive measurement routines as standard
 - TOI, OBW, CCDF
 - Channel power, ACPR, multicarrier ACPR
 - Fast adjacent channel power (fast ACP)
- ▮ Wealth of detectors to choose from
- ▮ Optional electronic RF attenuator
- ▮ Standard-specific firmware packages for base station tests in development or production
 - GSM/EDGE
 - Bluetooth®
 - TD-SCDMA (BTS/MS)
 - WCDMA NodeB and UE, HSDPA
 - CDMA2000®, CDMA2000® 1xEV-DO (BTS/MS)
 - TETRA Release 2/TEDS

Wide selection of firmware options

- ▮ R&S®FS-K30 for easily measuring noise figure and gain on amplifiers or frequency-converting devices under test (DUTs) throughout the entire R&S®FSU frequency range
- ▮ Phase noise measurements (R&S®FS-K40)
- ▮ Modulation analysis for AM, FM or ϕ M (R&S®FS-K7), e.g. to measure frequency deviation or to determine the frequency settling of oscillators
- ▮ High-precision power measurements with R&S®FS-K9
- ▮ VOR/ILS measurements (R&S®FS-K15)
- ▮ General vector signal analysis (R&S®FSU-B73)
- ▮ Separate preamplifier up to 26 GHz for measuring even the smallest noise figures

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Specifications in brief		
Frequency range		20 Hz to 3.6/8/26.5/43/46/50/67 GHz
Phase noise	at 10 kHz carrier offset	< -128 dBc (1 Hz), typ. -133 dBc (1 Hz)
Resolution bandwidth		10 Hz to 50 MHz
	FFT filters	1 Hz to 30 kHz
	channel filters	100 Hz to 5 MHz
	EMI bandwidths	200 Hz, 9 kHz, 120 kHz; 10/100 Hz, 1/10/100 kHz, 1 MHz
DANL at 1 GHz (10 Hz RBW)	R&S®FSU3/FSU8	typ. -148 dBm
	R&S®FSU26/FSU43/FSU46/FSU50	typ. -146 dBm
	R&S®FSU67	typ. -142 dBm
TOI	300 MHz to 3.6 GHz	typ. 27 dBm
Total measurement uncertainty	f < 3.6 GHz	0.3 dB

R&S®FSQ Signal Analyzer

The R&S®FSQ combines the excellent RF characteristics of the R&S®FSU spectrum analyzer with the versatility of a wideband signal analyzer. Owing to the R&S®FSQ's high analysis bandwidth of 28 MHz or 120 MHz as well as its 16 Msample I/Q memory, it is also suitable for future standards.

The R&S®FSQ is a solution for all areas in development and production. It offers very low phase noise, an unsurpassed low residual EVM, a wide dynamic range as well as above-average accuracy. It is therefore an outstanding choice as a high-end measuring instrument for development applications where tolerance and limit values must often be lower than specified in the standard.

Equipped with the R&S®FSQ-B71 hardware option, the R&S®FSQ can analyze signals in the analog baseband, and even in the digital baseband if the R&S®FSQ-B17 option is used. Due to its large analysis bandwidth of up to 120 MHz (R&S®FSQ-B72), the R&S®FSQ is exactly the right instrument for measuring wideband signals (e.g. WLAN IEEE 802.11n or 3GPP WCDMA multicarrier signals), for determining the amplitude statistics with the CCDF measurement and for measuring modulation or code domain power.

Key facts

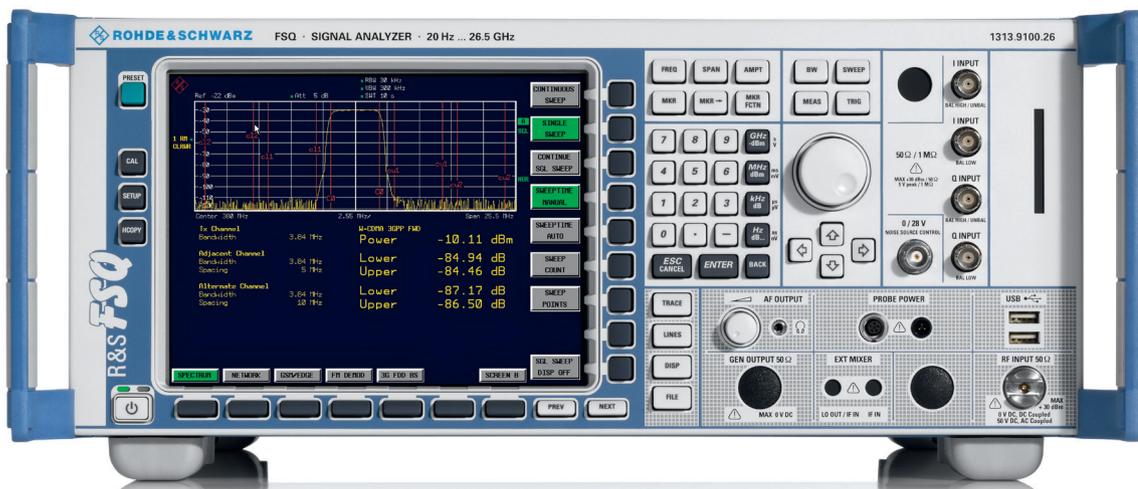
- Frequency range from 20 Hz to 3.6/8/26.5/40 GHz
- Outstanding RF characteristics
 - TOI of typ. +25 dBm
 - 1 dB compression: +13 dBm
 - 84 dB ACLR/3GPP with noise correction
- 28 MHz signal analysis bandwidth, optionally 120 MHz
- Analysis in the analog and digital baseband (optional)
- Numerous and standard-specific modulation and code domain power measurements
- General vector signal analysis and OFDM vector signal analysis
- 16 Msample I/Q memory, expandable to 705 Msample

Signal and spectrum analysis in one instrument

- Exceptional spectrum analyzer characteristics and functionality
- 28 MHz signal analysis bandwidth, optionally 120 MHz
- Ideal for applications in development and production, e.g. WLAN, WiMAX™, 3GPP, LTE
- Comprehensive analysis functions, e.g. time domain power, TOI marker, noise/phase noise marker
- I/Q data extraction, e.g. for MCPA adjustment

Shorter development cycles through versatile functions, wide dynamic range and future-ready performance

- Wideband demodulation capabilities and wide dynamic range, required for example in multicarrier measurements or for measuring spurious emissions on base stations
- Wide choice of detectors for highly diverse signal types
- Diverse resolution filter characteristics with the widest bandwidth found in a spectrum analyzer (channel, Gaussian, FFT, RRC, EMI filters)
- Versatile channel/adjacent channel power measurements with a large selection of standards and user-defined configurability
- SEM measurement with user-configurable spectrum mask



All-purpose analysis of digital radio signals using general vector signal analysis (R&S®FSQ-K70)

- Expansion to include demodulation and analysis functions for digital radio signals down to bit stream level
- High measurement speed thanks to additional DSP capacity: 40 measurements per second with GSM/EDGE
- Symbol rates up to 25 Msymbol/s, optionally 81.6 Msymbol/s
- Modulation modes FSK, MSK, PSK, QPSK, QAM to 256QAM, 8VSB
- User-definable filters, mappings and constellation diagrams
- AM/AM and AM/φM measurement
- Histogram and FFT analysis of measured signal, error signal and reference signal

Wide variety of application- and standard-specific modulation and code domain power measurements

- Optimal tool for developing and testing base stations
- Spectrum and code domain measurements for
 - 3GPP FDD/HSPA/HSPA+
 - CDMA2000®, 1xEV-DV, 1xEV-DO
 - TD-SCDMA
- Spectrum and modulation measurements for
 - GSM/EDGE/EDGE Evolution/VAMOS
 - Bluetooth®
 - TETRA Release 2/TEDS
 - WLAN IEEE 802.11a/b/g/j/n/ac
 - WiMAX™
 - 3GPP LTE (FDD/TDD)
 - Support of MIMO measurements
- Further options for general measurement applications, e.g. phase noise measurements, noise figure measurements, OFDM and vector signal analysis

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Convenient analysis with the vector signal analysis option (R&S®FSQ-K70): The upper part shows the constellation diagram of a signal with 64QAM modulation. The table below lists the most important parameters for characterizing a signal with digital modulation, including the demodulated bits.

Specifications in brief		
Frequency range		20 Hz to 3.6/8/26.5/40 GHz
Phase noise	at 10 kHz carrier offset	typ. -133 dBc (1 Hz)
Resolution bandwidth		10 Hz to 50 MHz
	FFT filters	1 Hz to 30 kHz
	channel filters	100 Hz to 5 MHz
	EMI filters	200 Hz, 9 kHz, 120 kHz
DANL at 1 GHz (10 Hz RBW)	R&S®FSQ3/FSQ8	typ. -148 dBm
	R&S®FSQ26/FSQ40	typ. -146 dBm
TOI	300 MHz to 3.6 GHz	typ. 27 dBm
Total measurement uncertainty	f < 3.6 GHz	0.3 dB

R&S®FSMR

Measuring Receiver

The R&S®FSMR measuring receiver has been specially designed to handle the measurement tasks involved in the calibration of signal generators and fixed or adjustable attenuators.

The R&S®FSMR combines the functions of multiple instruments:

- ▀ High-precision level calibration tool
- ▀ Modulation analyzer for AM/FM/ϕM
- ▀ Audio analyzer with total harmonic distortion (THD) and SINAD measurement functionality
- ▀ Power meter for connecting power sensors from the R&S®NRP family
- ▀ High-end spectrum analyzer

Key facts

- ▀ Frequency range up to 3/26.5/43/50 GHz
- ▀ High level linearity: 0.005 dB deviation per 10 dB for precise calibration of level and attenuation
- ▀ Wide level measurement range from +30 dBm to -130 dBm
- ▀ Direct connection of R&S®NRP power sensors for precise power measurements
- ▀ Support of the R&S®NRP-Z27 and R&S®NRP-Z37 power sensor modules with integrated power splitter
- ▀ Measurement of modulation depth, frequency deviation and phase deviation with < 1% measurement uncertainty
- ▀ Audio analysis with automatic measurement of modulation frequency, THD and SINAD
- ▀ Audio spectrum and time domain display
- ▀ Audio input for calibration of modulation generators
- ▀ Fast RF frequency counter with 0.01 Hz resolution
- ▀ Control of all functions, incl. power meter, from the front panel or remote control via IEC/IEEE bus or LAN
- ▀ Full-featured spectrum analyzer



Precise, repeatable, easy level calibration

- Functions and characteristics adapted to the needs of the calibration lab
- Exceptionally high linearity and level stability across a wide time and temperature range enable high-precision measurements over an extended period of time
- Large measurement bandwidth of 100 Hz to 10 MHz, therefore not sensitive to frequency offset or residual FM of the generator to be calibrated
- High-precision measurement of the absolute power and reference power with power sensors (from the R&S®NRP family or from various other manufacturers)
- Automatic VSWR correction when a power sensor with a power splitter is used
- Easy operation for level calibration across a wide level range
- Traceability to national standards, R&S®FSMR-Z2 attenuation calibration kit for verifying the linearity of the R&S®FSMR

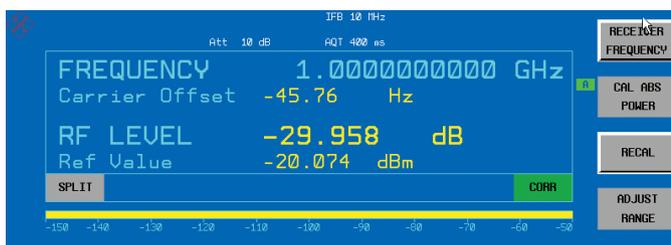
Modulation and audio analysis made easy

- Full-featured, integrated modulation and audio analyzer for the AM, FM and ϕ M analog modulation modes
- Various audio filters, deemphasis and detectors for easy performance of residual FM measurements, for example
- Separate audio input

Full-featured spectrum analyzer

- Scope of functions and performance of the built-in spectrum analyzer similar to the high-end R&S®FSU spectrum analyzer
- Broad scope of functions, e.g. for measuring harmonics or phase noise
- Best performance; with the YIG filter option installed, image frequency rejection also up into the microwave range
- Wide choice of detectors for highly diverse signal types
- Versatile resolution filter characteristic with the largest bandwidth range of any spectrum analyzer on the market

Power measurement with the R&S®FSMR.



Specifications in brief		
Frequency range		100 kHz to 3/26/43/50 GHz
Relative level measurement, linearity		0.01 dB + 0.005 dB per 10 dB step
Measurement uncertainty		
Level measurement	with R&S®NRP-Z27/-Z37 power sensor module	0.083 dB
Modulation depth		1%
Frequency deviation		1%
Spectrum analysis data		see R&S®FSU

R&S®FSUP Signal Source Analyzer

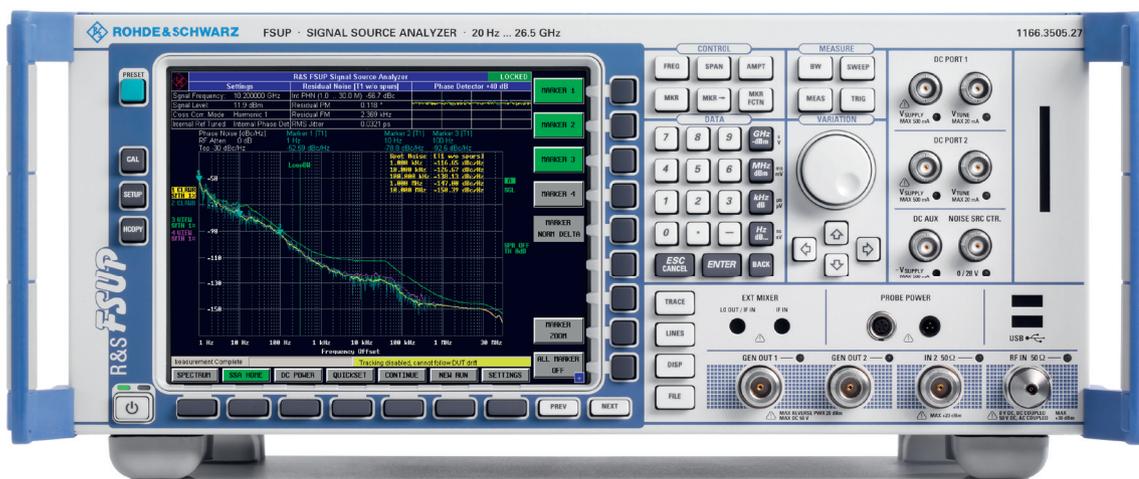
The R&S®FSUP combines the scope of functions of a high-end signal and spectrum analyzer with the benefits of a phase-noise-only tester. It is a uniquely user-friendly one-box solution that enables users in development and production to measure oscillators and synthesizers. Moreover, it can significantly reduce costs.

Measuring the phase noise of oscillators is a primary task in the development of transmit and receive modules of all kinds. This is necessary not only in the development and production of state-of-the-art communications and broadcast systems, but also in special high-tech applications such as radar. Apart from phase noise, other parameters that need to be measured when characterizing oscillators include tuning slope, transient response, power, harmonics and spurious emissions. Noise from amplifiers is also of interest. All of these measurements can be carried out with the R&S®FSUP, the only signal source analyzer that covers frequencies up to the microwave range in a single box. The R&S®FSUP also features very-low-noise DC sources to enable a wide range of measurements.

This unique combination of a phase noise tester with low-noise DC sources and a signal and spectrum analyzer in a single box enables simple, cost-optimized test setups for development and production.

Key facts

- Frequency range up to 8/26.5/50 GHz
- Frequency range with external mixers up to 110 GHz
- Low-noise DC outputs for supply and tuning voltages
- Maximum flexibility in phase noise measurements
- Noise figure and gain measurements
- Oscillator characterization
- Analysis of signals with digital and analog modulation



Highly flexible phase noise tester with versatile measurement capabilities

- ▮ Phase detector method with internal/external reference
- ▮ Two-DUT method
- ▮ High sensitivity
- ▮ Automatic setting of all important parameters
- ▮ Easy operation
- ▮ Detection, suppression and listing of interference
- ▮ Measurement of reference points as a function of frequency
- ▮ Residual phase noise measurements
- ▮ AM noise measurements

Maximum dynamic range through cross-correlation

- ▮ Sensitivity improved by up to 20 dB
- ▮ Cross-correlation up to 50 GHz in a single box

Unique combination of phase noise tester and spectrum analyzer

- ▮ Measurement of phase noise using spectrum analyzer method
- ▮ Typical spectrum measurements such as ACP or interference search
- ▮ Noise figure measurements

Analysis in time domain

- ▮ Transient response of oscillators

Characteristics at the press of a button

- ▮ Low-noise source for supply and tuning voltage
- ▮ Full characterization of oscillators

Analysis of signals with digital and analog modulation

- ▮ General vector signal analysis of signals with digital modulation
- ▮ Special analysis option for digital communications standards
- ▮ Analysis of signals with analog modulation (AM/FM/φM)

Specifications in brief		
Frequency range		
Signal and spectrum analyzer		20 Hz to 8/26.5/50 GHz
Signal source analyzer		1 MHz to 8/26.5/50 GHz
Phase noise measurement with		
Spectrum analyzer		10 MHz to 50 GHz
Phase detector (PD)		1 MHz to 50 GHz
PD with cross-correlation		1 MHz to 50 GHz
Phase noise sensitivity at 1 GHz	at 10 kHz offset	-143 dBc
	at 10 MHz offset	-172 dBc
Measurement uncertainty		< 1 dB
Offset frequency range		10 mHz to 30 MHz (10 GHz, combined mode)
Residual phase noise measurement	with internal detector	1 MHz to 8 GHz
	with external detector	frequency range depending on detector
AM noise measurements		frequency range depending on detector
Measurement of baseband noise		
Low-noise internal DC sources for VCO characterization		
Analysis of signals with digital and analog modulation (optional)		

R&S®FSG

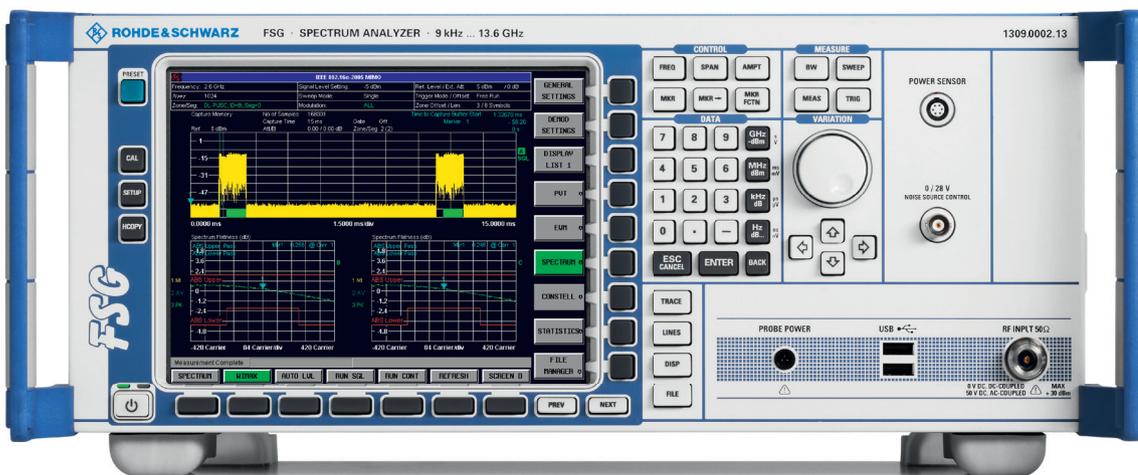
Spectrum Analyzer

The R&S®FSG is based on the architecture of the R&S®FSQ and R&S®FSU families. It complements these instruments by offering applications in mobile radio and wireless communications.

The R&S®FSG supports frequencies up to 13.6 GHz and excels due to its high measurement speed and its performance, which is optimized for applications in mobile radio and wireless communications. Its signal analysis bandwidth of 28 MHz makes it the perfect measuring instrument for standards such as WiMAX™ or 3GPP LTE, both in development and in production.

Key facts

- ▀ Frequency range from 9 kHz to 8/13.6 GHz
- ▀ I/Q demodulation bandwidth: 28 MHz
- ▀ 4 Msample I and Q memory
- ▀ I/Q data extraction
- ▀ Spectrum and code domain power measurements for 3GPP FDD/HSPA/HSPA+, CDMA2000® 1xRTT, CDMA2000® 1xEV-DV, CDMA2000® 1xEV-DO, TD-SCDMA
- ▀ Spectrum and modulation measurements for GSM/EDGE/EDGE Evolution/VAMOS, Bluetooth®, WLAN IEEE 802.11a/b/g/j/n, WiMAX™, 3GPP LTE; support of MIMO measurements
- ▀ Fast vector signal analysis
- ▀ Dynamic range of a high-end spectrum analyzer
 - TOI of typ. +25 dBm
 - 1 dB compression: +13 dBm
 - 84 dB ACLR/3GPP with noise correction
- ▀ Power sensor compatibility
- ▀ Analysis in the digital baseband (optional)



Shorter development cycles through versatile functions

To handle the wide variety of measurement tasks in product development, an instrument should provide ample functionality and excellent performance in all areas of interest. The R&S®FSG meets these requirements. It offers a wide choice of detectors for adapting to highly diverse signal types:

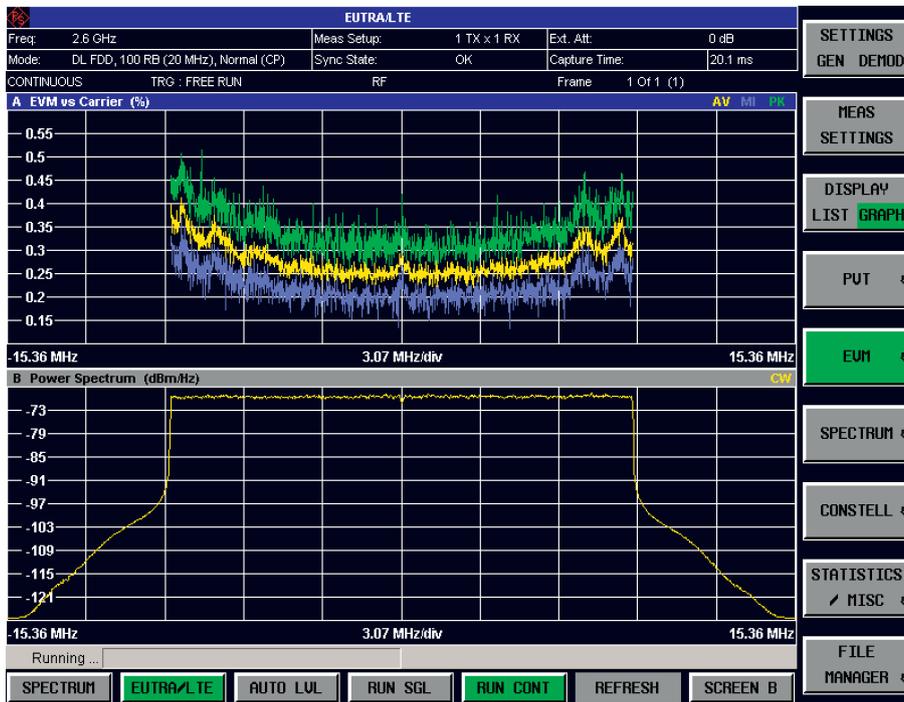
- ▮ RMS
- ▮ Auto peak
- ▮ Max. peak
- ▮ Min. peak
- ▮ Sample
- ▮ Average

Versatile resolution filters

- ▮ Standard resolution filters from 10 Hz to 10 MHz in increments of 1, 2, 3, 5
- ▮ FFT filters from 1 Hz to 30 kHz
- ▮ Channel filters in line with numerous test specifications

Extensive analysis functions

- ▮ Power measurements in the time domain turn the R&S®FSG into a full-fledged channel power meter
- ▮ TOI marker
- ▮ Noise/phase-noise marker
- ▮ Versatile channel/adjacent channel power measurements with a large selection of standards; user-configurable
- ▮ Split screen mode with independent settings
- ▮ CCDF measurement function
- ▮ Peak list marker for fast search of all peaks in the set frequency range (search for spurious)



Analysis of a EUTRA/LTE FDD downlink signal with a bandwidth of 20 MHz. The upper part shows the EVM versus carrier.

Specifications in brief		
Frequency range		9 kHz to 8/13.6 GHz
Phase noise	f = 1 GHz	typ. -114 dBc (1 Hz), 10 kHz carrier offset
Resolution bandwidth		1 Hz to 10 MHz
DANL	1 GHz, 1 Hz RBW	typ. -155 dBm
	1 GHz, 1 Hz RBW, preamplifier on	typ. -162 dBm
TOI	DC to 20 MHz	typ. 25 dBm
Total measurement uncertainty	f < 3.6 GHz	0.3 dB
Signal analysis bandwidth		28 MHz

R&S®FSVR Real-Time Spectrum Analyzer

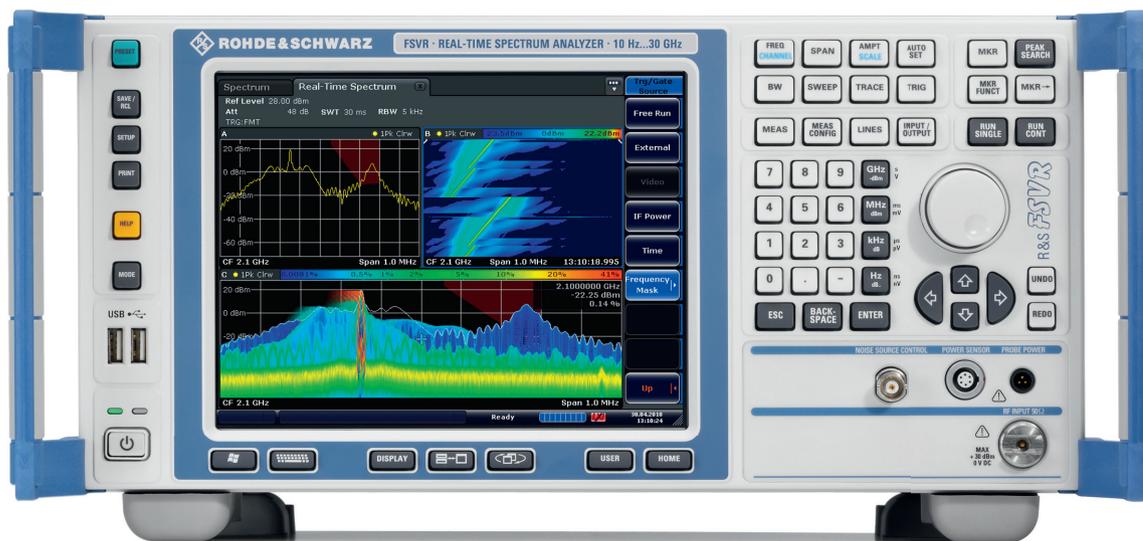
The R&S®FSVR combines a full-featured signal and spectrum analyzer with a realtime spectrum analyzer. It provides all the capabilities and features that modern T&M instruments of this kind have to offer. In realtime operation, the R&S®FSVR seamlessly measures and displays the spectrum in the time domain with a span of up to 40 MHz. As a result, it captures every event for analysis, no matter how brief that event might be.

Interference caused by sporadic and brief events in the frequency domain, by the spectral behavior of signal sources during frequency switching or by the influence of digital circuits on RF signals presents a problem familiar to all development engineers and service technicians who work in the field of RF engineering. Pinpointing the cause of such problems is usually a difficult and time-consuming chore. In such situations, the R&S®FSVR's unique capabilities for capturing and displaying RF spectra in realtime help users analyze faults and characterize signals quickly and easily. It seamlessly measures the signal spectrum in realtime, even with a time overlap. For visual evaluation, it offers a spectrogram in addition to the instantaneous realtime spectrum; in persistence mode, it visualizes the realtime spectrum with color coding that indicates how often a signal occurs. Frequency-dependent masks provide support when triggering on spectral events, making it possible to reliably detect and effectively investigate signals that occur sporadically in the spectrum.

In addition to its realtime capabilities, the R&S®FSVR offers all functions of the R&S®FSV signal and spectrum analyzer.

Key facts

- Frequency range from 10 Hz to 7/13.6/30/40 GHz
- 40 MHz realtime analysis bandwidth for
 - Spectrum with persistence function
 - Spectrogram display
 - Display of power versus time
- Triggering on frequency masks
- Full-featured signal and spectrum analyzer with analysis software for GSM/EDGE, WCDMA/HSPA+, LTE, WiMAX™, WLAN, analog and digital modulation, noise figure and phase noise measurements
- Exchangeable hard disk for applications that involve the use of confidential data



Realtime spectrum analysis up to 40 GHz

- ▀ Spectrogram function for gapless spectrum display in the time domain
- ▀ Frequency mask trigger (FMT) for triggering the measurement on individual, sporadic events in the spectrum
- ▀ Persistence mode for visualizing how frequently signals occur
- ▀ Power versus time for analyzing the length/time variance of signals
- ▀ Realtime streaming of I/Q data for recording long RF sequences

Full-featured signal and spectrum analyzer

- ▀ Frequency sweep across entire frequency range from 10 Hz to 40 GHz in just a few milliseconds
- ▀ Expansion of maximum input frequency to 110 GHz using external mixers
- ▀ Outstanding level measurement accuracy up to 7 GHz
- ▀ Excellent dynamic range and low phase noise
- ▀ High measurement speed
- ▀ Power measurement functions and statistical evaluations for analyzing digitally modulated signals
- ▀ Versatile marker and trace evaluation functions
- ▀ Measurement software for determining noise figure and phase noise
- ▀ General vector signal analysis and special analysis options for GSM/EDGE, WCDMA/HSPA+, LTE, WiMAX™, WLAN as well as analog modulation methods
- ▀ Large I/Q memory depth

Specifications in brief		
Frequency range	R&S®FSVR7	10 Hz to 7 GHz
	R&S®FSVR13	10 Hz to 13.6 GHz
	R&S®FSVR30	10 Hz to 30 GHz
	R&S®FSVR40	10 Hz to 40 GHz
Aging of frequency reference		1×10^{-6}
	with R&S®FSV-B4 option	1×10^{-7}
Realtime spectrum analyzer		
Realtime RF bandwidth		100 Hz to 40 MHz
A/D converter		128 Msample/s, 16 bit
Windowing		Blackman Harris, Gauss, flat top, rectangular, Hanning, Kaiser
Measurement points per trace		801
Resolution bandwidth		realtime RF bandwidth/(100 to 400), depending on windowing
Number of spectra per second		250 000/s
Spectrogram update rate		10 000/s
Screen update rate		30/s
Detectors		average (linear or RMS), max. peak, min. peak, sample
Trace functions		max. hold, min. hold, average
FMT		
Frequency resolution		realtime bandwidth/801
Trigger span		realtime RF bandwidth
Dynamic range		0 dB to -80 dB below reference level

R&S®FSV Signal and Spectrum Analyzer

The R&S®FSV is a fast, versatile signal and spectrum analyzer for performance-oriented, cost-conscious users working in the development, production, installation and servicing of RF systems.

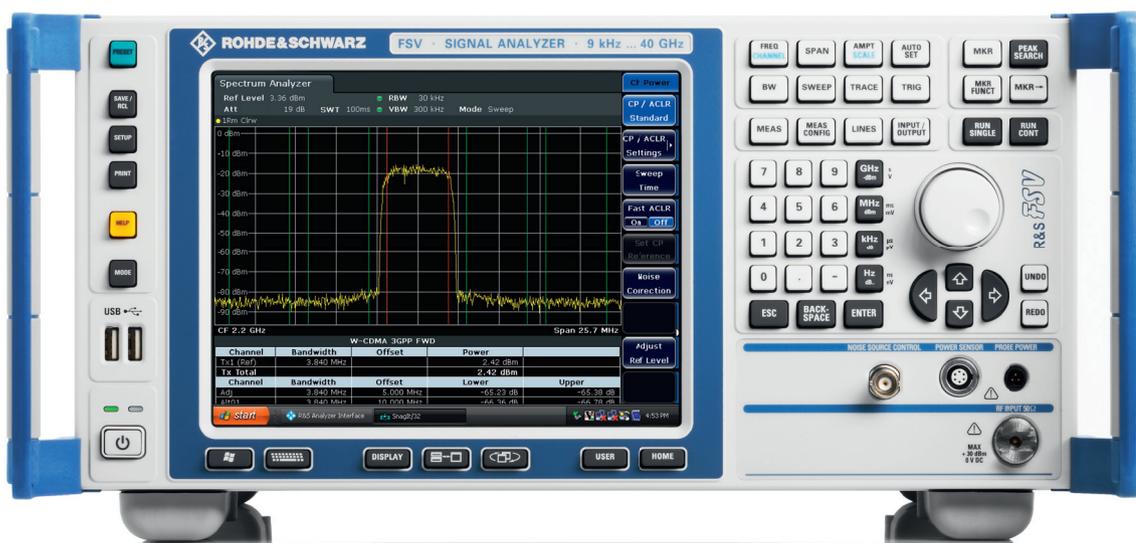
In development applications, the R&S®FSV excels due to its outstanding RF properties, a 40 MHz signal analysis bandwidth that is unmatched in its class, and a wide range of analysis packages for analog modulation modes as well as wireless and wideband communications standards.

The R&S®FSV is five times faster than comparable signal and spectrum analyzers and provides measurement routines that are optimized for speed and high data throughput. This is a crucial advantage in production applications.

With its touchscreen and easy operation, its compact dimensions, low weight and direct support of power sensors, the R&S®FSV is the best possible choice for installation and service work.

Key facts

- ▮ Frequency range from 10 Hz to 3.6/7/13.6/30/40 GHz
- ▮ 40 MHz analysis bandwidth
- ▮ 0.4 dB level measurement uncertainty up to 7 GHz
- ▮ Analysis software for GSM/EDGE/EDGE Evolution (incl. VAMOS), WCDMA/HSPA, LTE, WiMAX™, WLAN, analog modulation modes, general-purpose vector signal analysis
- ▮ Support of the R&S®NRP family of power sensors, with extensive power measurement functions
- ▮ Easy on-site upgrading with options
- ▮ Phase noise of -110 dBc (1 Hz) at 10 kHz frequency offset
- ▮ TOI of typ. $+15$ dBm
- ▮ DANL in 1 Hz bandwidth:
 -155 dBm at 1 GHz, -147 dBm at 30 GHz
- ▮ Removable hard drive for security-critical applications



Today and tomorrow: firm grip on standards

- Fully digital back-end ensures high measurement accuracy and excellent reproducibility
- Featuring a 40 MHz signal analysis bandwidth for the largest bandwidth in its class; suitable for all WiMAX™ profiles and WLAN IEEE 802.11n
- Largest I/Q memory depth in its class for recording long signal sequences

Low test costs and high throughput for competitive production

- Up to five times faster than other signal and spectrum analyzers
- Customized test routines for production applications
- Efficient remote-control operation

Wealth of functions and excellent performance for efficient use in labs

- Outstanding RF performance for a mid-range analyzer
- Outstanding level measurement accuracy up to 7 GHz
- Power measurement functions for analyzing digital communications systems
- Versatile marker and trace functions
- Scalar network analysis: frequency response, bandwidth, gain quickly determined

Easy, intuitive operation

- Touchscreen operation
- Hotkeys for fast access to all important functions

Migration to next generation: signal analysis made easy

- Easy transition due to remote-control compatibility with the R&S®FSP and R&S®FSU
- Fast learning curve due to functional compatibility with existing Rohde&Schwarz signal and spectrum analyzers

Low life-cycle costs

- Easy on-site upgrading with options
- Easy scalability for adapting to application-specific requirements
- Always state-of-the-art with free firmware updates

Specifications in brief			
Frequency range		10 Hz to 3.6/7/13.6/30/40 GHz	
Phase noise, 1 GHz carrier frequency	10 kHz carrier offset	-106 dBc (1 Hz), typ. -110 dBc (1 Hz)	
Resolution bandwidth	standard sweep	1 Hz to 10 MHz	
	standard sweep, zero span	1 Hz to 10 MHz, 20 MHz, 28 MHz, optionally 40 MHz	
	FFT sweep	1 Hz to 300 kHz	
	channel filters	100 Hz to 5 MHz	
Video filter	EMI filters	200 Hz, 9 kHz, 120 kHz, 1 MHz	
		1 Hz to 10 MHz, 20 MHz, 28 MHz, 40 MHz	
		28 MHz, optionally 40 MHz	
Signal analysis bandwidth			
	DANL (1 Hz bandwidth)	1 GHz	-152 dBm, typ. -155 dBm
		3 GHz	-150 dBm, typ. -153 dBm
		7 GHz	-146 dBm, typ. -149 dBm
		13.6 GHz	-148 dBm, typ. -151 dBm
		30 GHz	-144 dBm, typ. -147 dBm
TOI	40 GHz	-136 dBm, typ. -139 dBm	
	f < 3.6 GHz	+13 dBm, typ. +16 dBm	
	3.6 GHz to 40 GHz	+15 dBm, typ. +18 dBm	
Total measurement uncertainty	3.6 GHz	0.29 dB	
	7 GHz	0.39 dB	
	13.6 GHz	1 dB	
	30 GHz	1.32 dB	
	40 GHz	1.65 dB	

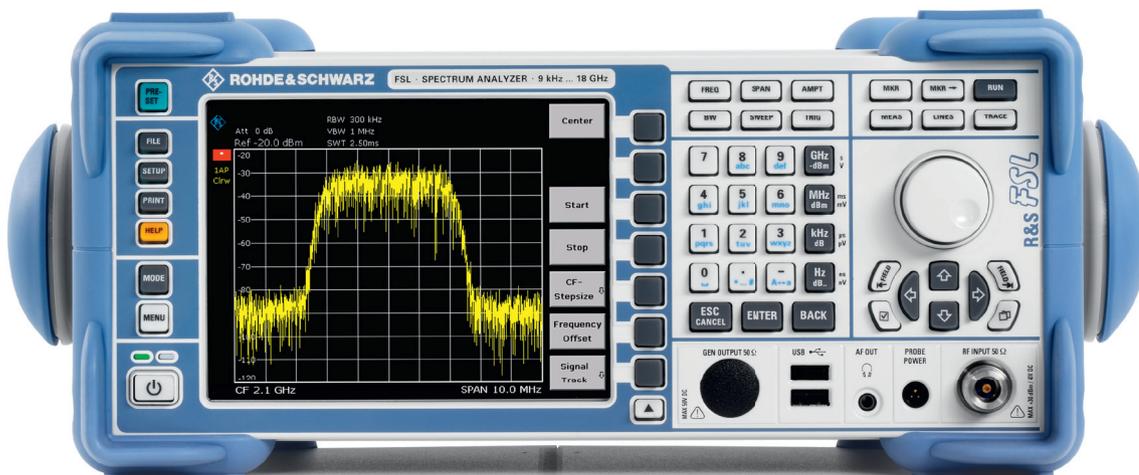
R&S®FSL Spectrum Analyzer

The R&S®FSL is a lightweight, compact spectrum analyzer for cost-conscious users who want the functionality of high-end instruments.

The lightweight, compact R&S®FSL spectrum analyzer is ideal for a wide variety of applications in development, service and production. Although compact, it offers functionality that matches a high-end instrument in all aspects; in other words, it offers an outstanding price/performance ratio. The R&S®FSL can analyze signals with a bandwidth of up to 28 MHz. The R&S®FSL18 supports frequencies of up to 18 GHz and is also suitable for applications in the microwave range. The R&S®FSL is the only instrument in its class that has a tracking generator up to 18 GHz, making it an easily transportable scalar network analyzer for the microwave range.

The high-end approach is also evident in the operating concept. As with the higher-class analyzers from Rohde&Schwarz, the main functions of the R&S®FSL can be directly accessed by fixed function keys, and additional functions are accessible using softkeys and tables. The result is a fast learning curve.

Its compact size and low weight, plus its optional battery pack, make the R&S®FSL a companion for mobile use. The R&S®FSL offers a unique plug & play concept for expansion via options. All options can be added later without opening the instrument.



Key facts

- Frequency range from 9 kHz to 3/6/18 GHz
- All models available with and without tracking generator
- Best RF characteristics in this class
- Largest signal analysis bandwidth in this class (28 MHz)
- Low measurement uncertainty even in the microwave range
- High resolution filter accuracy owing to all-digital implementation
- Rugged and compact
- Carrying handle and low weight (< 8 kg)
- Optional battery operation
- Wide range of functions – simple operation
- Easy on-site upgrading with options

Best performance in its class

- Continuous RF frequency range from 9 kHz to 18 GHz
- Signal analysis bandwidth of 28 MHz
- Low measurement uncertainty, even in the microwave range

Fast and versatile in production

- Higher throughput thanks to high measurement speed and optimized measurement routines
- Remote control via LAN or IEC/IEEE bus in line with SCPI

The universal tool for every developer

- Excellent price/performance ratio
- General-purpose signal analysis
- Large selection of options for the various wireless communications standards
- General measurement applications, e.g. spectrogram

Lightweight and compact for on-site installation, maintenance and service

- Easy portability due to small size and low weight
- Optional internal battery pack for mains-independent use
- Power measurements with R&S®NRP-Zxx power sensors

Easy expansion, many interfaces

- On-site plug & play installation of options without opening the instrument
- Additional interfaces to expand the application range of the R&S®FSL

Wide range of functions – simple operation

- Comprehensive set of measurement functions unique in this class
- Built-in measurement routines and versatile selection of firmware options

Specifications in brief		
Frequency range		9 kHz to 3/6/18 GHz
Phase noise	10 kHz carrier offset	-103 dBc (1 Hz)
Resolution bandwidth		300 Hz to 10 MHz, additionally 20 MHz in zero span, optionally 1 Hz to 100 Hz, channel filters, EMI filters
DANL at 1 GHz	300 Hz RBW	-117 dBm
TOI		typ. +18 dBm
Total measurement uncertainty	up to 3 GHz	< 0.5 dB
Weight		7 kg (15.4 lb)
	with battery option	< 8 kg (17.6 lb)

R&S®ZVH

Cable and Antenna Analyzer

The rugged, handy R&S®ZVH cable and antenna analyzer is designed for use in the field. Its low weight and simple operation make it indispensable for anyone who needs an efficient measuring instrument for outdoor installation and maintenance of antenna systems.

When it comes to the installation or maintenance of antenna systems for mobile telecommunications, broadcasting or radiocommunications, the R&S®ZVH cable and antenna analyzer performs fast, reliable and highly accurate measurements. Even in its basic configuration, the R&S®ZVH detects cable faults, measures the matching of filters and amplifiers and checks the loss of cable connections – the three most important tasks involved in setting up transmitter systems and putting them into operation. For further measurements such as the isolation between transmit and receive antennas or the output power of output amplifiers, suitable options are available to the RF service engineer or maintenance team.

Weighing only 3 kg (6.6 lb), the R&S®ZVH is a handy instrument. Frequently used functions have their own function keys and are within fingertip reach. The built-in wizard lets users perform even extended test sequences fast and flawlessly. The R&S®ZVHView software makes it easy to generate test reports in just a few operating steps. The brilliant color display is easy to read even under poor lighting conditions, and it has a monochrome mode for extreme conditions.

The capacity of the R&S®ZVH battery enables uninterrupted operation for up to 4.5 hours. The battery is changed within seconds. And if it rains? No problem – all connectors are splash-proof.

Key facts

- Frequency range from 100 kHz to 3.6 GHz or 8 GHz
- 100 dB (typ.) dynamic range for filter and antenna isolation measurements
- Built-in DC voltage supply (bias) for active components such as amplifiers
- Power meter option
- Saving of measurement results on SD memory card
- Easy operation with user-configurable test sequences (wizard)
- Easy-to-replace Li-ion battery for up to 4.5 h of operation
- Rugged, splash-proof housing for rough work in the field
- Easy handling due to low weight (3 kg with battery) and easy-to-reach function keys



Installation and maintenance of antenna systems

- ▮ Distance-to-fault measurements
- ▮ One-port cable loss measurements
- ▮ Reflection measurements
- ▮ Transmission measurements
- ▮ Built-in DC voltage supply
- ▮ Terminating power measurements
- ▮ Directional power measurements
- ▮ Position finding using GPS receiver
- ▮ Spectrum analysis
- ▮ Spectrogram measurements

Easy operation

- ▮ Test report in just a few steps using the R&S®ZVH wizard
- ▮ Channel tables for frequency setting
- ▮ Optimal reading of measurement results in any situation
- ▮ Operation in different languages
- ▮ Easy-to-access, well-protected connectors

Documentation and remote control

- ▮ R&S®ZVHView software for documenting measurement results
- ▮ Remote control via LAN or USB

Specifications in brief			
		R&S®ZVH4	R&S®ZVH8
Frequency range		100 kHz to 3.6 GHz	100 kHz to 8 GHz
Standard measurement functions		reflection measurement, distance-to-fault measurement, one-port cable loss measurement	
Output power (port 1, port 2)		0 dBm to –40 dBm (nominal), in 1 dB steps	
Maximum permissible spurious signal level		+17 dBm (nominal)	
Number of points		631	
Distance-to-fault (DTF) measurement			
Display modes		return loss (dB), VSWR	
Resolution in meters		(1.58 × velocity factor/span)	
Horizontal display range		3 m to 1500 m	
Reflection measurements			
Directivity	100 kHz to 3 GHz	> 43 dB (nominal)	> 43 dB (nominal)
	3 GHz to 3.6 GHz	> 37 dB (nominal)	> 37 dB (nominal)
	3.6 GHz to 6 GHz	–	> 37 dB (nominal)
	6 GHz to 8 GHz	–	> 31 dB (nominal)
Display modes		return loss (dB), VSWR, one-port cable loss	
Transmission measurement (R&S®ZVH-K39)			
Dynamic range (S_{21})	100 kHz to 300 kHz	> 50 dB (nominal)	> 50 dB (nominal)
	300 kHz to 2.5 GHz	> 80 dB, typ. 100 dB	> 80 dB, typ. 100 dB
	2.5 GHz to 3.6 GHz	> 70 dB, typ. 90 dB	> 70 dB, typ. 90 dB
	3.6 GHz to 6 GHz	–	> 70 dB, typ. 90 dB
	6 GHz to 8 GHz	–	> 50 dB (nominal)
Display modes		magnitude in dB (loss, gain)	
DC voltage supply (DC bias, port 1 and port 2)			
Voltage range	internal voltage supply	+12 V to +32 V, in 1 V steps	
Maximum output power		4 W (battery), 10 W (AC supply)	
Maximum current		500 mA	
Maximum voltage	external voltage supply	50 V	
Maximum current		600 mA	
General data			
Display		6.5" color LCD with VGA resolution	
Battery operating time	R&S®HA-Z204, 4.5 Ah	up to 3 h	
	R&S®HA-Z206, 6.75 Ah	up to 4.5 h	
Dimensions (W × H × D)		194 mm × 300 mm × 69 mm (144 mm) ¹⁾	
Weight		< 3 kg (6.6 lb)	

¹⁾ With carrying handle.

R&S®FSH4/FSH8 Spectrum Analyzer

The R&S®FSH4/FSH8 are rugged, handy spectrum analyzers designed for use in the field. Their low weight, simple, well-conceived operation and large number of measurement functions make them an indispensable tool for anyone who needs an efficient measuring instrument for outdoor work.

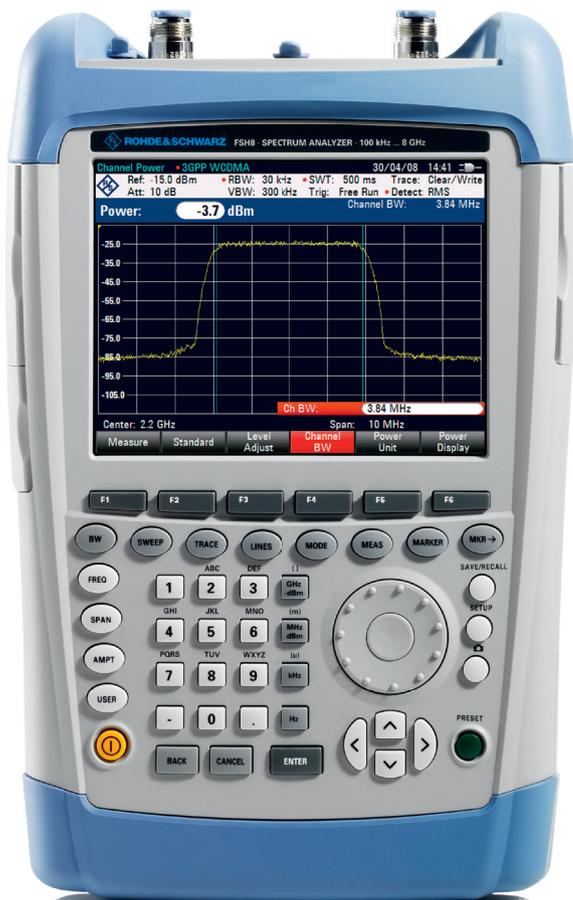
The R&S®FSH4/FSH8 are spectrum analyzers and – depending on the model and the options installed – power meters, cable and antenna testers and two-port vector network analyzers. They provide the three most important RF analysis functions that an RF service technician or an installation and maintenance team needs in order to handle daily routine measurement tasks. For example, they can be used to maintain or install transmitter systems, to check cables and antennas, to assess signal quality in broadcasting, radiocommunications or service, to measure electric field strength or to carry out simple lab applications. The R&S®FSH4/FSH8 can perform any of these tasks quickly, reliably and with high measurement accuracy.

Weighing only 3 kg, the R&S®FSH4 or R&S®FSH8 is a handy instrument. All frequently used functions have their own function keys and are within fingertip reach. The brilliant color display is easy to read even under poor lighting conditions, and it has a monochrome mode for extreme conditions.

Work with the R&S®FSH4/FSH8 rarely needs to be interrupted because a battery charge lasts up to 4.5 hours. The battery can be changed within seconds. Even rain is no problem because all connectors are splash-proof.

Key facts

- Frequency range up to 3.6 GHz or 8 GHz
- High sensitivity (< -141 dBm (1 Hz), with preamplifier < -161 dBm (1 Hz))
- Low measurement uncertainty (< 1 dB)
- 20 MHz demodulation bandwidth for LTE signal analysis
- Measurement functions for all important measurement tasks during startup and maintenance of transmitter systems
- Internal tracking generator and VSWR bridge with built-in DC voltage supply (bias)
- Two-port network analyzer
- Easy-to-replace Li-ion battery for up to 4.5 h of operation
- Rugged, splash-proof housing for use in the field
- Easy handling due to low weight (3 kg with battery) and easy-to-reach function keys
- Measurement results saved to SD card or USB memory stick
- LAN and USB interface for remote control and transfer of measurement data
- R&S®FSH4View software for simple documentation of measurement results



Installation and maintenance of transmitter systems

- ▮ Power measurements on pulsed signals
- ▮ Channel power measurements
- ▮ Distance-to-fault measurements
- ▮ Two-port vector network analysis
- ▮ Scalar network analysis
- ▮ One-port cable loss measurements
- ▮ Terminating power measurements
- ▮ Directional power measurements
- ▮ Analysis of 3GPP WCDMA, CDMA2000® 1xEV-DO, LTE FDD/TDD, TD-SCDMA transmit signals
- ▮ Spectrogram measurements
- ▮ Position finding using GPS receiver

Measurements of electromagnetic fields

- ▮ Field strength measurements with directional antenna
- ▮ Field strength measurements with isotropic antenna

Diagnostic applications in the lab or in service

- ▮ General spectrum analysis
- ▮ Location of EMC problems

Easy operation

- ▮ Quick function selection via keypad and rotary knob
- ▮ Optimal reading of measurement results in any situation
- ▮ Setting of frequency via channel tables
- ▮ Easy-to-access, well-protected connectors

Documentation and remote control

- ▮ R&S®FSH4View software for documenting measurement results
- ▮ Remote control via LAN or USB

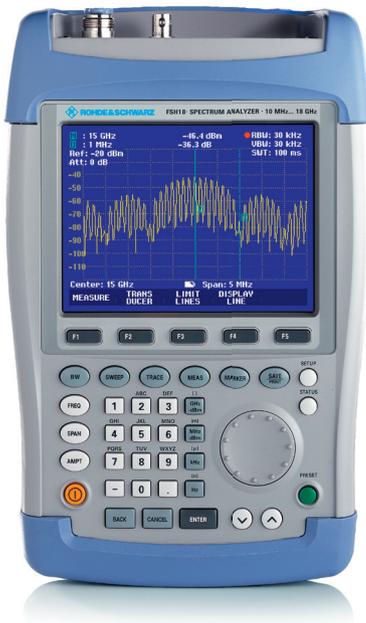
Specifications in brief		
Spectrum analysis	R&S®FSH4	R&S®FSH8
Frequency range		
Model .04/.14 or model .08/.18	9 kHz to 3.6 GHz	9 kHz to 8 GHz
Model .24 or model .28	100 kHz to 3.6 GHz	100 kHz to 8 GHz
Phase noise (f = 500 MHz)	-95 dBc (1 Hz) at 30 kHz carrier offset	
Resolution bandwidth	1 Hz to 3 MHz	
DANL (f = 2 GHz)		
Without preamplifier	< -141 dBm, typ. -146 dBm	
With preamplifier	< -161 dBm, typ. -65 dBm	
TOI		
300 MHz to 3.6 GHz	> +10 dBm, typ. +15 dBm	> +10 dBm, typ. +15 dBm
3.6 GHz to 8 GHz	-	> +3 dBm, typ. +10 dBm
Total measurement uncertainty		
10 MHz to 3.6 GHz	< 1 dB, typ. 0.5 dB	< 1 dB, typ. 0.5 dB
3.6 GHz to 8 GHz	-	< 1.5 dB, typ. 1 dB
Detectors	sample, max. peak, min. peak, auto peak, RMS	
Vector network analysis	model .24 only	model .28 only
Frequency range	300 kHz to 3.6 GHz	300 kHz to 8 GHz
Reflection measurement (S_{11} , S_{22})		
Directivity (f = 3 GHz)	> 43 dB	
Display modes	magnitude, phase, magnitude and phase, Smith chart, VSWR, return loss (dB), reflection coefficient, mp	
Transmission measurement (S_{21} , S_{12})		
Dynamic range (f = 3 GHz)	typ. 100 dB	
Display modes	magnitude (loss, gain), phase, magnitude + phase	
Battery operating time (without tracking generator)	up to 4.5 h	
Weight	< 3 kg (6.6 lb)	

R&S®FSH3/FSH18 Spectrum Analyzer

The R&S®FSH3/FSH18 are rugged, handheld spectrum analyzers designed for measurement tasks in the field. At 6 GHz, the R&S®FSH18 covers the WLAN frequency range. The functionality of the analyzers matches that of conventional lab instruments.

Key facts

- ▀ Frequency range up to 3 GHz or 18 GHz
- ▀ Easy operation, low weight and rugged design for field use
- ▀ Channel power measurements, burst power measurements in time domain
- ▀ RMS detector
- ▀ Quasi-peak detector
- ▀ AM/FM audio demodulator
- ▀ Receiver mode
- ▀ Terminating power sensors up to 18 GHz
- ▀ Directional power sensors up to 4 GHz
- ▀ Test system for EMF measurements (R&S®TS-EMF)
- ▀ Code domain power measurements on 3GPP base stations



Specifications in brief

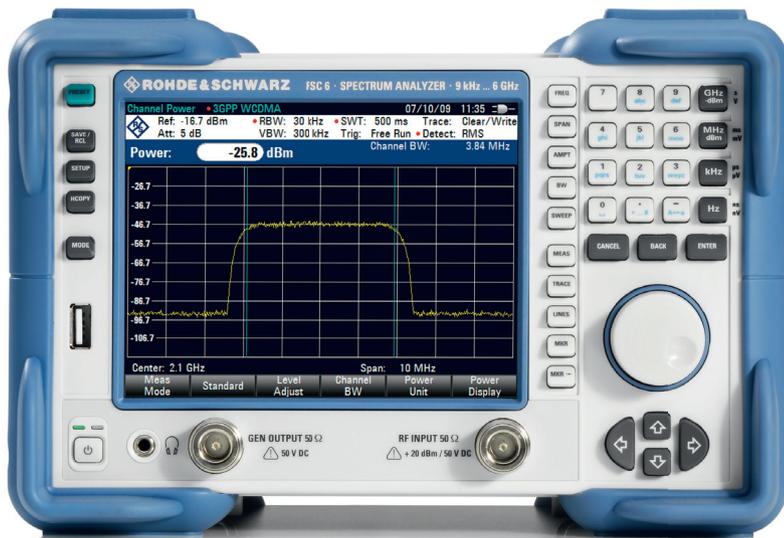
Spectrum analysis	R&S®FSH3	R&S®FSH18
Frequency range	100 kHz to 3 GHz	10 MHz to 18 GHz
Resolution bandwidth	100 Hz to 1 MHz	
Video bandwidth	10 Hz to 1 MHz	
Displayed average noise level (DANL)	typ. -135 dBm (100 Hz)	typ. -128 dBm (100 Hz)
TOI	typ. 13 dBm	typ. 7 dBm
SSB phase noise at 100 kHz carrier offset	< -100 dBc (1 Hz)	≤ -90 dBc (1 Hz)
Detectors	sample, max. peak, min. peak, auto peak, RMS, average, quasi peak	
Level measurement uncertainty	< 1.5 dB, typ. 0.5 dB	< 1.5 dB up to 6 GHz < 2.5 dB up to 16 GHz < 3 dB up to 18 GHz
Dimensions (W × H × D)	170 mm × 270 mm × 120 mm (6.7 in × 10.6 in × 4.7 in)	
Weight	2.5 kg (5.5 lb)	

R&S®FSC Spectrum Analyzer

The R&S®FSC is a compact, universal spectrum analyzer. This attractively priced analyzer offers properties previously found only in more expensive instruments.

Key facts

- Frequency range from 9 kHz to 3/6 GHz
- Resolution bandwidth from 10 Hz to 3 MHz
- Maximum input level +33 dBm (2 W)
- Frequency counter with 0.1 Hz resolution
- Phase noise <100 dBc (1 Hz) at 100 kHz carrier offset
- Compact case taking up only half a 19" slot
- Integrated tracking generator, which can also be used as a fixed frequency generator



Specifications in brief

Spectrum analysis	R&S®FSC3	R&S®FSC6
Frequency range	9 kHz to 3 GHz	9 kHz to 6 GHz
Resolution bandwidth (-3 dB)	10 Hz to 3 MHz	
DANL (f = 1 GHz)	< -141 dBm, typ. -146 dBm	
TOI (300 MHz to 3.6 GHz)	> +10 dBm, typ. +15 dBm	
SSB phase noise, 100 kHz offset	< -100 dBc (1 Hz), typ. < -110 dBc (1 Hz)	
Level measurement uncertainty (10 MHz to 3.6 GHz)	< 1 dB, typ. 0.5 dB	
Detector	max. peak, min. peak, auto peak, sample, average, RMS	
Tracking generator	100 kHz to 3 GHz (model .13)	100 kHz to 6 GHz (model .16)
Audio frequency demodulator	AM and FM	
Dimensions (W x H x D)	233 mm x 158 mm x 350 mm (9.2 in x 6.2 in x 13.8 in)	
Weight	4.5 kg (9.9 lb)	

Large scope of functions

Signal and spectrum analyzers from Rohde & Schwarz offer comprehensive measurement functions even in the base unit. These and the preconfigured, integrated measurement routines support the user when conducting complex measurements and make daily measurement tasks easier and faster.

Depending on the base unit, the following measurement routines and functions come as standard.

Measurement routines for:

- ▮ Measurement of third-order intercept point (TOI)
- ▮ Occupied bandwidth (OBW)
- ▮ Power measurement in time domain
- ▮ Gated sweep
- ▮ Channel power measurement (CP)
- ▮ Adjacent channel power measurement and multicarrier adjacent channel power measurement (ACP, MC-ACP)
- ▮ Fast adjacent channel power measurement (fast ACP)
- ▮ Measurement of carrier/noise power ratio (C/N, C/N₀)
- ▮ Signal statistics (CCDF, ADP)
- ▮ Measurement of harmonics (harmonic distortions)
- ▮ Measurement of modulation depth (AM%)
- ▮ Measurement of spurious emissions
- ▮ Spectrum emission mask measurement (SEM)

Measurement functions:

- ▮ AM/FM audio frequency demodulator
- ▮ AM/FM/φM measurement demodulator
- ▮ Pre-/post-trigger
- ▮ Split screen with independent settings
- ▮ Logarithmic sweep
- ▮ Full range of detectors
- ▮ Frequency counter
- ▮ n-dB down marker
- ▮ Limit lines with pass/fail display
- ▮ Transducer factors

Sweep List						
	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6
Range Start	-12.75 MHz	-8 MHz	-4 MHz	-3.515 MHz	-2.715 MHz	-2.515 MHz
Range Stop	-8 MHz	-4 MHz	-3.515 MHz	-2.715 MHz	-2.515 MHz	-2.515 MHz
Fast SEM	On	On	On	On	On	On
Filter Type	Channel	---	Gaussian	---	---	---
RBW	1 MHz	---	Gaussian	---	---	---
VBW	10 MHz	---	EMI (6 dB) Channel	---	---	---
Sweep Time Mode	---	---	RRC	---	---	---
Sweep Time	32 ms	---	5-Pole	---	---	---
Ref. Level	-10 dBm	---	-10 dBm	---	---	---
RF Att. Mode	Auto	---	Auto	---	---	---
RF Attenuator	10 dB	---	10 dB	---	---	---
Preamp	Off	---	Off	---	---	---
Transd. Factor	None	None	None	None	None	None
Limit Check 1	Absolute	Absolute	Absolute	Absolute	Absolute	Absolute
Abs Limit Start 1	-23.5 dBm	-19.5 dBm	-32.5 dBm	-32.5 dBm	-20.5 dBm	-20.5 dBm
Abs Limit Stop 1	-23.5 dBm	-19.5 dBm	-32.5 dBm	-20.5 dBm	-20.5 dBm	-20.5 dBm
Rel Limit Start 1	-50 dBc	-50 dBc	-50 dBc	-50 dBc	-50 dBc	-50 dBc
Rel Limit Stop 1	-50 dBc	-50 dBc	-50 dBc	-50 dBc	-50 dBc	-50 dBc
Limit Check 2	Relative	Relative	Relative	Relative	Relative	Relative
Abs Limit Start 2	-13 dBm	-13 dBm	-13 dBm	-13 dBm	-13 dBm	-13 dBm
Abs Limit Stop 2	-13 dBm	-13 dBm	-13 dBm	-13 dBm	-13 dBm	-13 dBm

The spectrum emission mask measurement is implemented as standard in the R&S®FSV base unit. The user can configure the sweep list, set all parameters as required and add further ranges, if needed.

Spectrum analysis in the waveguide bands above 50 GHz

Frequencies in the high GHz range still require the use of external harmonics mixers such as the R&SFS-Zxx.

These mixers can be connected to an R&S®FSUP26/50, R&S®FSP40, R&S®FSV30/40, R&S®FSVR30/40, R&S®FSU26/43/46/50/67 or R&S®FSQ26/40 provided that these are equipped with the LO/IF port option for external mixers. Mixers from Rohde&Schwarz cover the frequency range up to 110 GHz. If other suitable mixers are used, up to 1.1 THz is possible.

It normally takes a lot of time to identify and suppress unwanted mixing products. The analyzers in the R&S®FSV/FSP/FSU/FSQ families do this automatically using a software preselector.



Overview of external mixers				
	R&S®FS-Z60	R&S®FS-Z75	R&S®FS-Z90	R&S®FS-Z110
Frequency range	40 GHz to 60 GHz	50 GHz to 75 GHz	60 GHz to 90 GHz	75 GHz to 110 GHz
Type	balanced dual-diode mixer, no biasing			
Conversion loss	typ. 18 dB	typ. 25 dB	typ. 34 dB	typ. 32 dB
LO frequency range	9.81 GHz to 15.19 GHz	8.61 GHz to 12.62 GHz	8.61 GHz to 12.62 GHz	9.4 GHz to 14 GHz
Number of harmonics	4	6	6	8

LO/IF ports option			
	R&S®FSV30/40 with R&S®FSV-B21 R&S®FSVR30/40 with R&S®FSV-B21	R&S®FSU26/46/50/67 R&S®FSQ26/40 with R&S®FSU-B21 R&S®FSUP26/50 with R&S®FSU-B21	R&S®FSW26/43 with R&S®FSW-B21
LO frequency range	7.7 GHz to 15.2 GHz	7 GHz to 15.5 GHz	7.65 GHz to 17.45 GHz
LO level	+15.5 dBm	+15.5 dBm	+15.5 dBm
IF	729.9 MHz	404.4 MHz	> 1.3 GHz, depending on the analysis bandwidth

Application-specific solutions

The tables provide an overview of the application firmware packages offered and show the wide range of applications covered by Rohde&Schwarz signal and spectrum analyzers.

In addition to the standard measurement functions included in the base unit, such as SEM, ACP and OBW, Rohde&Schwarz offers a wide variety of application-specific firmware packages. These cover general measurement applications such as the measurement of phase noise or power (see first table). The general vector signal analysis software for the analysis of single-carrier signals and the OFDM vector signal analysis software for analyzing multicarrier signals expand the application range even further.

General measurement applications	R&S®FSW	R&S®FSU	R&S®FSQ	R&S®FSMR	R&S®FSUP
VOR/ILS measurements	–	•	•	•	–
Modulation analysis for AM/FM/φM, including THD and SINAD measurements	•	•	•	•	• ¹⁾
Measurement with power sensors	•	•	•	•	•
Noise figure and gain measurements	•	•	•	•	•
Phase noise measurements	•	•	•	•	• ¹⁾
General vector signal analysis	•	•	•	•	•
General OFDM vector signal analysis	•	–	•	–	•
Cable TV measurements, analog and digital	–	–	–	–	–
Spectrogram measurements	•	–	–	–	–
Distortion analysis software	•	–	•	–	–

Measurements in line with mobile telecommunications standards	R&S®FSW	R&S®FSU	R&S®FSQ	R&S®FSMR	R&S®FSUP
GSM/EDGE	•	•	•	•	•
EDGE Evolution/VAMOS	•	–	•	–	–
3GPP WCDMA	•	•	•	•	•
3GPP WCDMA HSPA	•	•	•	•	•
3GPP WCDMA HSPA+	•	•	•	–	–
CDMA2000® 1xEV-DV	•	•	•	•	•
CDMA2000® 1xEV-DO	•	•	•	•	•
3GPP TD-SCDMA	•	•	•	•	•
3GPP LTE	•	–	•	–	–
3GPP LTE TDD	•	–	•	–	–
3GPP LTE MIMO	•	–	•	–	–
TETRA Release 2/TEDS	–	•	•	–	–

Other wireless applications	R&S®FSW	R&S®FSU	R&S®FSQ	R&S®FSMR	R&S®FSUP
IEEE802.16e-2005 WiMAX™	–	–	•	–	–
IEEE802.16 WiMAX™ MIMO	–	–	•	–	–
IEEE802.11 a/b/g/j WLAN	•	–	•	–	–
IEEE802.11 n WLAN	•	–	•	–	–
IEEE802.11 a/c WLAN	•	–	•	–	–
IEEE802.15.1 Bluetooth® EDR	–	•	•	•	•

¹⁾ Standard.

²⁾ Base station only.

In addition to general measurement applications, there are standard-specific measurements for all 2G, 2.5G and 3G mobile telecommunications standards (see second table) and other wireless applications (see third table). Depending on the application, the user is offered spectrum, code domain power and modulation measurements.

	R&S®FSG	R&S®FSVR	R&S®FSV	R&S®FSL	R&S®ZVH	R&S®FSH4/FSH8
	–	–	–	–	–	–
•		•	•	•	–	–
•		•	•	•	•	•
•		•	•	•	–	–
•		•	•	–	–	–
•		•	•	–	–	–
•		•	•	–	–	–
–	–	–	–	•	–	–
–		•	•	•	•	•
•		•	•	–	–	–

	R&S®FSG	R&S®FSVR	R&S®FSV	R&S®FSL	R&S®ZVH	R&S®FSH4/FSH8
•		•	•	–	–	–
•		•	•	–	–	–
•		•	•	• ²⁾	–	• ²⁾
•		•	•	•	–	–
•		•	•	–	–	–
•		•	•	• ²⁾	–	• ²⁾
•		•	•	–	–	• ²⁾
•		•	•	–	–	• ²⁾
•		•	•	–	–	• ²⁾
•		•	•	–	–	• ²⁾
–	–	–	–	–	–	–

	R&S®FSG	R&S®FSVR	R&S®FSV	R&S®FSL	R&S®ZVH	R&S®FSH4/FSH8
•		•	•	•	–	–
•		–	–	–	–	–
•		•	•	•	–	–
•		•	•	•	–	–
–	–	–	–	–	–	–
•		•	•	•	–	–

Specifications in brief

The table below provides a comparison of the most important specifications and functions. Detailed data is provided in the data sheet for the individual signal or spectrum analyzer.

	R&S®FSW	R&S®FSU	R&S®FSQ	R&S®FSMR	R&S®FSUP	R&S®FSG
Frequency						
Frequency range	2 Hz to 8/13.6/26.5/43.5 GHz	20 Hz to 3.6/8/26.5/43/46/50/67 GHz	20 Hz to 3.6/8/26.5/40 GHz	20 Hz to 3.6/26.5/43/50 GHz	20 Hz to 8/26.5/50 GHz	9 kHz to 8/13.6 GHz
	typ. –137 dBc	typ. –129 dBc	typ. –129 dBc	typ. –129 dBc	typ. –133 dBc	typ. –114 dBc
Bandwidth						
Resolution bandwidth	1 Hz to 10 MHz, optionally to 80 MHz (R&S®FSW-B8)	1 Hz to 50 MHz, R&S®FSU43: 1 Hz to 10 MHz	1 Hz to 50 MHz	1 Hz to 50 MHz	1 Hz to 50 MHz	1 Hz to 10 MHz
I/Q signal analysis bandwidth	10 MHz, optionally 28/40/80/160 MHz (R&S®FSW-B28/-B40/-B80/-B160)	8 MHz	28 MHz, optionally 120 MHz (R&S®FSQ-B72)	8 MHz	8 MHz	28 MHz
Level						
TOI	typ. + 30 dBm (f < 1 GHz)	typ. 27 dBm	typ. 27 dBm	typ. 27 dBm	typ. 27 dBm	typ. 25 dBm
DANL (at 1 GHz, 1 Hz RBW)	typ. –156 dBm, optional (R&S®FSU-B13: typ. –159 dBm)	typ. –156 dBm	typ. –156 dBm	typ. –156 dBm	typ. –156 dBm	typ. –155 dBm, typ. –162 dBm (with preamplifier on)
Detectors	max. peak, min. peak, auto peak, sample, RMS, average	max. peak, min. peak, auto peak, sample, RMS, average, quasi peak	max. peak, min. peak, auto peak, sample, RMS, average, quasi peak	max. peak, min. peak, auto peak, sample, RMS, average, quasi peak	max. peak, min. peak, auto peak, sample, RMS, average, quasi peak	max. peak, min. peak, auto peak, sample, RMS, average, quasi peak
Total/level uncertainty	0.3 dB (f < 3.6 GHz), 0.4 dB (f < 8 GHz)	0.3 dB (f < 3.6 GHz)	0.3 dB (f < 3.6 GHz)	0.3 dB (f < 3.6 GHz)	0.3 dB (f < 3.6 GHz)	0.3 dB (f < 3.6 GHz)
I/Q data						
I/Q memory	400 Msample	512 ksample	16 Msample, optionally 235/705 Msample	512 ksample	16 Msample	4 Msample
I/Q baseband inputs	–	–	optional, 50 Ω/1 MΩ (R&S®FSQ-B71)	–	–	–
Digital baseband inputs	optional (R&S®FSW-B17)	–	optional (R&S®FSQ-B17)	–	–	optional (R&S®FSQ-B17)
Miscellaneous						
Dynamic range for 3GPP ACLR in adjacent channel	88 dB with noise correction	84 dB				
Tracking generator (model: frequency range)	–	optional (R&S®FSU-B9: 100 kHz to 3.6 GHz)	optional (R&S®FSU-B9: 100 kHz to 3.6 GHz)	optional (R&S®FSU-B9: 100 kHz to 3.6 GHz)	–	–
Battery operation	–	–	–	–	–	–
Weight	18.6 kg to 20.2 kg (41 lb to 44.5 lb) (depending on model)	14.6 kg to 17.4 kg (32.2 lb to 38.4 lb) (depending on model)	14.6 kg to 16.8 kg (32.2 lb to 37 lb) (depending on model)	14.6 kg to 16.8 kg (32.2 lb to 37 lb) (depending on model)	17.6 kg to 18.6 kg (38.8 lb to 41 lb) (depending on model)	15.4 kg (34 lb) (R&S®FSG8), 16.5 kg (36.4 lb) (R&S®FSG13)

R&S®FSVR	R&S®FSV	R&S®FSL	R&S®ZVH	R&S®FSH3/ FSH18	R&S®FSH4/ FSH8	R&S®FSC
10 Hz to 7/13/30/40 GHz	10 Hz to 3.6/7/13/30/40 GHz	9 kHz to 3/6/18 GHz	100 kHz to 3.6/8 GHz	100 kHz/10 MHz to 3/6/18 GHz	9/100 kHz to 3.6/8 GHz	9 kHz to 3/6 GHz
typ. -106 dBc	typ. -106 dBc	typ. -97 dBc	< -100 dBc (100 kHz offset, 500 MHz input frequency)	< -100 dBc (100 kHz offset, 500 MHz input frequency)	< -110 dBc (100 kHz offset, 500 MHz input frequency)	< -100 dBc (100 kHz offset, 500 MHz input frequency)
1 Hz to 40 MHz	1 Hz to 40 MHz	1 Hz to 20 MHz	1 Hz to 3 MHz	100 Hz to 1 MHz	100 Hz to 3 MHz	10 Hz to 3 MHz
40 MHz	28 MHz, optionally 40 MHz (R&S®FSV-B70)	28 MHz	–	–	10 MHz, 20 MHz (for serial numbers ≥ 105000)	–
typ. 17 dBm	typ. 17 dBm	typ. 15 dBm	typ. 13 dBm	typ. 13 dBm	typ. 13 dBm	typ. 13 dBm
typ. -150 dBm, typ. -160 dBm (with preamplifier on)	typ. -150 dBm, typ. -160 dBm (with preamplifier on)	typ. -142 dBm, typ. -152 dBm (with preamplifier on)	typ. -146 dBm, typ. -163 dBm (with preamplifier on)	typ. -142 dBm, typ. -155 dBm (with preamplifier on)	typ. -146 dBm, typ. -163 dBm (with preamplifier on)	typ. -146 dBm, typ. -163 dBm (with preamplifier on)
max. peak, min. peak, auto peak, sample, RMS, average, quasi peak	max. peak, min. peak, auto peak, sample, RMS, average, quasi peak	max. peak, min. peak, auto peak, sample, RMS, average, quasi peak	sample, max. peak, min. peak, auto peak, RMS	sample, max. peak, min. peak, auto peak, RMS, average, quasi peak	sample, max. peak, min. peak, auto peak, RMS	sample, max. peak, min. peak, auto peak, RMS
0.3 dB (f < 3.6 GHz)	0.3 dB (f < 3.6 GHz)	0.5 dB (f < 3 GHz)	< 1 dB, typ. 0.5 dB (f < 3.6 GHz)	< 1.5 dB, typ. 0.5 dB (f < 6 GHz)	< 1 dB, typ. 0.5 dB (f < 3.6 GHz)	< 1 dB, typ. 0.5 dB (f < 3.6 GHz)
200 Msample	200 Msample	512 ksample	–	–	–	–
optional (R&S®FSV-B17)	optional (R&S®FSV-B17)	–	–	–	–	–
73 dB	73 dB	55 dB	> 55 dB (nom.)	–	> 55 dB (nom.)	–
–	R&S®FSV-B9: 100 kHz to 3.6 GHz (R&S®FSV3) 100 kHz to 7 GHz (R&S®FSV7/13/30/40)	model .13: 9 kHz to 3 GHz, model .16: 9 kHz to 6 GHz, model .28: 9 kHz to 18 GHz	model .24: 100 kHz to 3.6 GHz, model .28: 100 kHz to 8 GHz	models .13 and .23: 5 MHz to 3 GHz, model .26: 5 MHz to 6 GHz	models .14 and .24: 100 kHz to 3.6 GHz, models .18 and .28: 100 kHz to 8 GHz	model .13: 100 kHz to 3 GHz model .16: 100 kHz to 6 GHz
–	R&S®FSV-B30 and R&S®FSV-B31	optional (R&S®FSL-B30 and R&S®FSL-B31)	standard	standard	standard	–
12.8 kg to 14.0 kg (28.2 lb to 30.7 lb) (depending on model)	9.5 kg to 10.7 kg (20.9 lb to 23.6 lb) (depending on model)	< 7 kg (15.4 lb) (without options), < 8 kg (17.6 lb) (with battery)	< 3 kg (6.6 lb)	2.5 kg (5.5 lb)	< 3 kg (6.6 lb)	4.5 kg (9.9 lb)

Further information

Product brochures with further information and data sheets with complete specifications are available under the order number listed in the table and at www.rohde-schwarz.com.

Instrument/title of printed material	Order No. of printed material
R&S®FSW8, R&S®FSW13, R&S®FSW26, R&S®FSW43	
R&S®FSW Signal and Spectrum Analyzer – product brochure	PD 5214.5984.11
R&S®FSW Signal and Spectrum Analyzer – data sheet	PD 5214.5984.22
R&S®FSU3, R&S®FSU8, R&S®FSU26, R&S®FSU43, R&S®FSU46, R&S®FSU50, R&S®FSU67	
R&S®FSU Spectrum Analyzer – product brochure	PD 0758.0016.12
R&S®FSU Spectrum Analyzer – data sheet	PD 0758.0016.22
R&S®FSQ3, R&S®FSQ8, R&S®FSQ26, R&S®FSQ40	
R&S®FSQ Signal Analyzer – product brochure	PD 0758.0945.12
R&S®FSQ Signal Analyzer – data sheet	PD 0758.0945.22
R&S®FSMR3, R&S®FSMR26, R&S®FSMR43, R&S®FSMR50	
R&S®FSMR Measuring Receiver – product brochure	PD 0758.2319.12
R&S®FSMR Measuring Receiver – data sheet	PD 0758.2319.22
R&S®FSUP8, R&S®FSUP26, R&S®FSUP50	
R&S®FSUP Signal Source Analyzer – product brochure	PD 5213.6729.12
R&S®FSUP Signal Source Analyzer – data sheet	PD 5213.6729.22
R&S®FSG8, R&S®FSG13	
R&S®FSG Spectrum Analyzer – product brochure	PD 5213.8721.32
R&S®FSG Spectrum Analyzer – data sheet	PD 5213.8721.22
R&S®FSVR7, R&S®FSVR13, R&S®FSVR30, R&S®FSVR40	
R&S®FSVR Real-Time Spectrum Analyzer – product brochure	PD 5214.3381.12
R&S®FSVR Real-Time Spectrum Analyzer – data sheet	PD 5214.3381.22
R&S®FSV3, R&S®FSV7, R&S®FSV13, R&S®FSV30, R&S®FSV40	
R&S®FSV Signal and Spectrum Analyzer – product brochure	PD 5214.0499.12
R&S®FSV Signal and Spectrum Analyzer – data sheet	PD 5214.0499.22
R&S®FSL3, R&S®FSL6, R&S®FSL18	
R&S®FSL Spectrum Analyzer – product brochure	PD 0758.2790.12
R&S®FSL Spectrum Analyzer – data sheet	PD 0758.2790.22
R&S®ZVH4, R&S®ZVH8	
R&S®ZVH Cable and Antenna Analyzer – product brochure	PD 5214.4588.12
R&S®ZVH Cable and Antenna Analyzer – data sheet	PD 5214.4588.22
R&S®FSH3, R&S®FSH18	
R&S®FSH Handheld Spectrum Analyzer – data sheet	PD 0758.1593.32
R&S®FSH4, R&S®FSH8	
R&S®FSH4/FSH8 Spectrum Analyzer – product brochure	PD 5214.0482.12
R&S®FSH4/R&S®FSH8 Spectrum Analyzer – data sheet	PD 5214.0482.22
R&S®FSC3, R&S®FSC6	
R&S®FSC Spectrum Analyzer – product flyer	PD 5214.3830.32
R&S®FSC Spectrum Analyzer – data sheet	PD 5214.3330.22

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