

# Signal and Spectrum Analyzers from Rohde & Schwarz Product overview



# Signal and Spectrum Analyzers from Rohde & Schwarz

## At a glance

Since 1986, Rohde & Schwarz has offered innovative signal and spectrum analyzers whose unique characteristics enable them to redefine the current state-of-the-art again and again.

The success story began in 1986 with the R&S®FSA, when the newcomer spectrum analyzer set new standards in RF performance and user convenience. The R&S®FSA was the first spectrum analyzer on the market to have a color display.

Today – 25 years and many highlights later – 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 – no matter whether for general measurement applications or for 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. Therefore, 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.

▷ [page 4](#)

### 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.

▷ [page 30](#)

#### Milestones in spectrum analysis

- 2001 R&S®FSU: reference spectrum analyzer with the widest dynamic range then available
- 2002 R&S®FSH: new standards in the handheld class
- 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: first combination of full-featured signal and spectrum analyzer and real-time spectrum analyzer on the market

## Signal and spectrum analyzers from Rohde & Schwarz

	<b>R&amp;S®FSH</b> <b>Spectrum Analyzer</b> Convenient spectrum analysis	Rugged handheld spectrum analyzer up to 18 GHz, specially designed for use in the field and service ▷ <a href="#">page 7</a>
	<b>R&amp;S®ZVH</b> <b>Cable and Antenna Analyzer</b>	Rugged handheld cable and antenna analyzer up to 8 GHz, specially designed for fast and easy setup and maintenance of antenna stations ▷ <a href="#">page 10</a>
	<b>R&amp;S®FSL</b> <b>Spectrum Analyzer</b> Compact spectrum analysis	Lightweight, compact analyzer with the functionality of a high-end analyzer and 28 MHz analysis bandwidth for development, service and production ▷ <a href="#">page 12</a>

## Signal and spectrum analyzers from Rohde & Schwarz

	<p><b>R&amp;S®FSP</b> <b>Spectrum Analyzer</b> Mid-range</p>	<p>The R&amp;S®FSP family consistently implements the known benefits of the high-end analyzers from Rohde &amp; Schwarz in the mid-range class; the successor to this analyzer is the R&amp;S®FSV</p>
	<p><b>R&amp;S®FSV</b> <b>Signal and Spectrum Analyzer</b> 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 ▷ <a href="#">page 14</a></p>
	<p><b>R&amp;S®FSVR</b> <b>Real-Time Spectrum Analyzer</b> Signal and spectrum analyzer and a real-time spectrum analyzer in one box</p>	<p>The R&amp;S®FSVR combines a full-featured signal and spectrum analyzer with a real-time spectrum analyzer. In real-time operation, the R&amp;S®FSVR seamlessly measures and displays the spectrum in the time domain with a span of up to 40 MHz ▷ <a href="#">page 16</a></p>
	<p><b>R&amp;S®FSU</b> <b>Spectrum Analyzer</b> High-end analyzer</p>	<p>High-end spectrum analyzer up to 67 GHz for applications in development and production with unrivaled performance ▷ <a href="#">page 18</a></p>
	<p><b>R&amp;S®FSQ</b> <b>Signal Analyzer</b> High-end signal and spectrum 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 ▷ <a href="#">page 20</a></p>
	<p><b>R&amp;S®FSUP</b> <b>Signal Source Analyzer</b> Phase noise tester and spectrum analyzer in one instrument</p>	<p>Combines the functionality of a high-end 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 ▷ <a href="#">page 22</a></p>
	<p><b>R&amp;S®FSMR</b> <b>Measuring Receiver</b> Signal generator calibration</p>	<p>The all-in-one solution for the calibration of signal generators and attenuators ▷ <a href="#">page 24</a></p>
	<p><b>R&amp;S®FSG</b> <b>Spectrum Analyzer</b></p>	<p>Spectrum analyzer for wideband communications technologies with 28 MHz analysis bandwidth ▷ <a href="#">page 26</a></p>
	<p><b>R&amp;S®FMU</b> <b>Baseband Analyzer</b></p>	<p>All-purpose analyzer for analog baseband signals ▷ <a href="#">page 27</a></p>
	<p><b>R&amp;S®FSC</b> <b>Spectrum Analyzer</b></p>	<p>Economical spectrum analyzer up to 6 GHz for applications in the lab, service and production ▷ <a href="#">page 28</a></p>
	<p><b>Spectrum analysis in the waveguide bands above 50 GHz</b></p>	<p>External harmonic mixers expand the frequency range of Rohde &amp; Schwarz spectrum analyzers up to 110 GHz ▷ <a href="#">page 29</a></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®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®FSQ from 20 Hz	R&S®FSQ40					
	R&S®FSQ26					26.5
	R&S®FSQ8 8					
	R&S®FSQ3 3.6					
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®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®FSP from 9 kHz	R&S®FSP40					
	R&S®FSP30					
	R&S®FSP13			13.6		
	R&S®FSP7 7					
	R&S®FSP3 3					
R&S®FSL from 9 kHz	R&S®FSL18				18	
	R&S®FSL6 6					
	R&S®FSL3 3					
R&S®FSH3/6/18 from 100 kHz	R&S®FSH18				18	
	R&S®FSH6 6					
	R&S®FSH3 3					
R&S®FSH4/8 from 9 kHz	R&S®FSH8 8					
	R&S®FSH4 3.6					
R&S®ZVH from 100 kHz	R&S®ZVH8 8					
	R&S®ZVH4 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. The user can choose the most suitable solution from among twelve different product families – the R&S®FSC, R&S®FSH, R&S®ZVH, R&S®FSL, R&S®FSV (R&S®FSP), R&S®FSVR, R&S®FSG,

R&S®FSQ, R&S®FSU, R&S®FSMR, R&S®FSUP and the R&S®FMU.

	30 GHz	35 GHz	40 GHz	45 GHz	50 GHz	up to 110 GHz
			43	50		
				50		(110 GHz <sup>1)</sup> )
						(110 GHz <sup>1)</sup> )
		40				(110 GHz <sup>1)</sup> )
						(110 GHz <sup>1)</sup> )
						67 (110 GHz <sup>1)</sup> )
				50		(110 GHz <sup>1)</sup> )
			46			(110 GHz <sup>1)</sup> )
			43			
		40				(110 GHz <sup>1)</sup> )
30						(110 GHz <sup>1)</sup> )
		40				(110 GHz <sup>1)</sup> )
30						(110 GHz <sup>1)</sup> )
		40				
30						

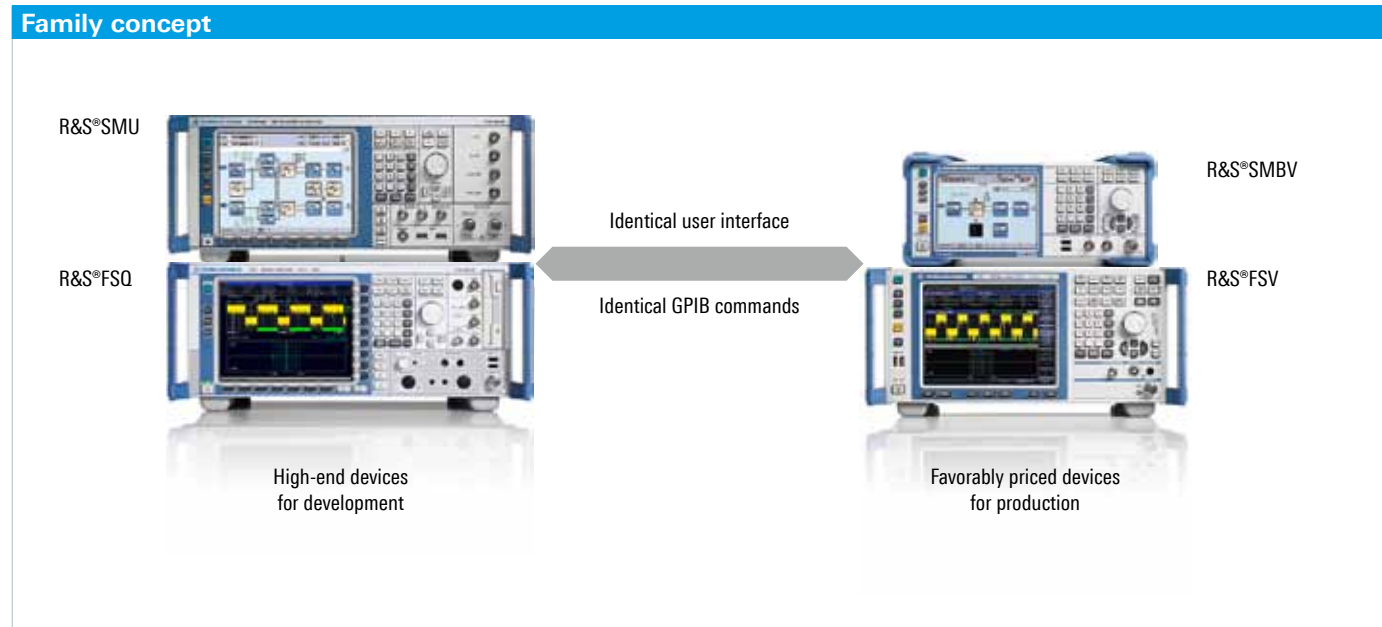
<sup>1)</sup> With external mixers.

# 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.

The user 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. The options are available for all current wireless communications standards, i.e. 2G, 2.5G or 3G as well as LTE, EDGE Evolution or the data rate increase for 3GPP (HSPA+). Furthermore, 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®FSH3/ FSH6/FSH18 Spectrum Analyzer

The R&S®FSH3/FSH6/FSH18 are rugged, handheld spectrum analyzers designed for measurement tasks in the field. The R&S®FSH6 and the R&S®FSH18 cover the WLAN frequency range. The functionality of the analyzers matches that of conventional lab instruments.

## Key facts

- ▀ Frequency range up to 3/6/18 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
- ▀ Tracking generator
- ▀ Distance-to-fault measurements
- ▀ VSWR measurements and Smith chart
- ▀  $S_{11}$  and  $S_{21}$  phase measurements
- ▀ Group delay measurements
- ▀ 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®FSH6	R&S®FSH18
Frequency range	100 kHz to 3 GHz	100 kHz to 6 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 × 4.2 in)		
Weight	2.5 kg (5.5 lb)		

# 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 3.6/8 GHz
- High sensitivity ( $< -141$  dBm (1 Hz), with preamplifier  $< -161$  dBm (1 Hz))
- Low measurement uncertainty ( $< 1$  dB)
- Measurement functions for all important measurement tasks for 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
- 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
- ▮ Power measurements up to 18 GHz
- ▮ Directional power measurements up to 4 GHz
- ▮ Analysis of 3GPP WCDMA, CDMA2000® 1xEV-DO, LTE FDD/TDD transmit signals
- ▮ Spectrogram measurements

## 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®FISH4View software for documenting measurement results
- ▮ Remote control via LAN or USB

CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA - USA).

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	
Dimensions (W × H × D)	194 mm × 300 mm × 69 mm (144 mm) <sup>1)</sup> 7.6 in × 11.8 in × 2.7 in (5.7 in) <sup>1)</sup>	
Weight	3 kg (6.6 lb)	

<sup>1)</sup> With carrying handle.

# 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 outdoors for the installation and maintenance of antenna systems.

When it comes to the installation or maintenance of antenna systems for mobile radio, broadcasting or radio-communications, 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, 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 or USB memory stick
- 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	
<b>Distance-to-fault (DTF) measurement</b>			
Display modes		return loss (dB), VSWR	
Resolution in meters		(1.58 × velocity factor/span)	
Horizontal display range		3 m to 1500 m	
<b>Reflection measurement</b>			
Directivity	100 kHz to 3 GHz (nominal)	> 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	
<b>Transmission measurement (R&amp;S®ZVH-K39)</b>			
Dynamic range (S <sub>21</sub> )	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)	
<b>DC voltage supply (DC bias, port 1 and port 2)</b>			
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	
<b>General data</b>			
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) <sup>1)</sup> , 7.6 in × 11.8 in × 2.7 in (5.7 in) <sup>1)</sup>	
Weight		3 kg (6.6 lb)	

<sup>1)</sup> With carrying handle.

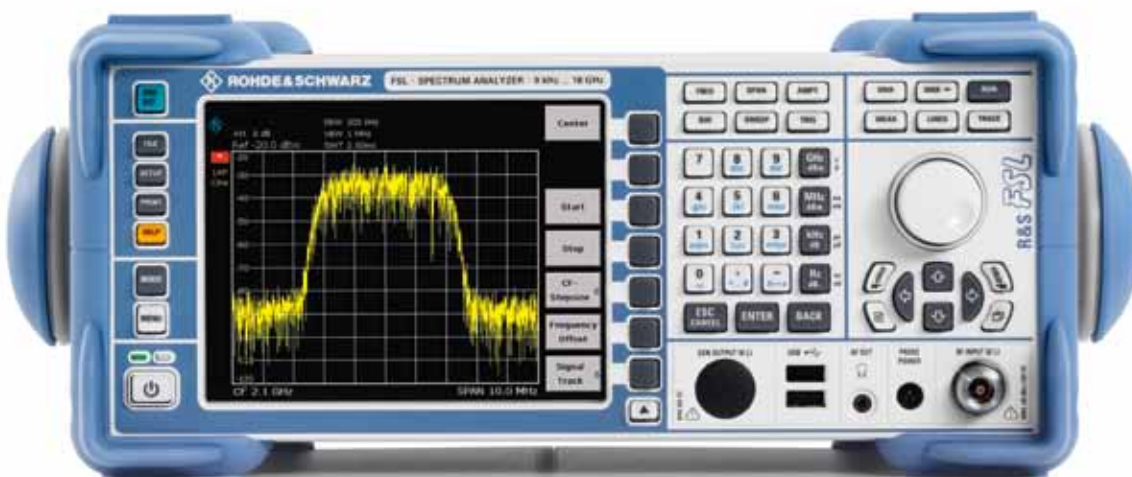
# R&S®FSL Spectrum Analyzer

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. Despite its compactness, 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, which supports frequencies of up to 18 GHz, 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-assignment function keys, with additional functions accessible using softkeys and tables. This shortens the 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 owing 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 mobile radio and 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®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.

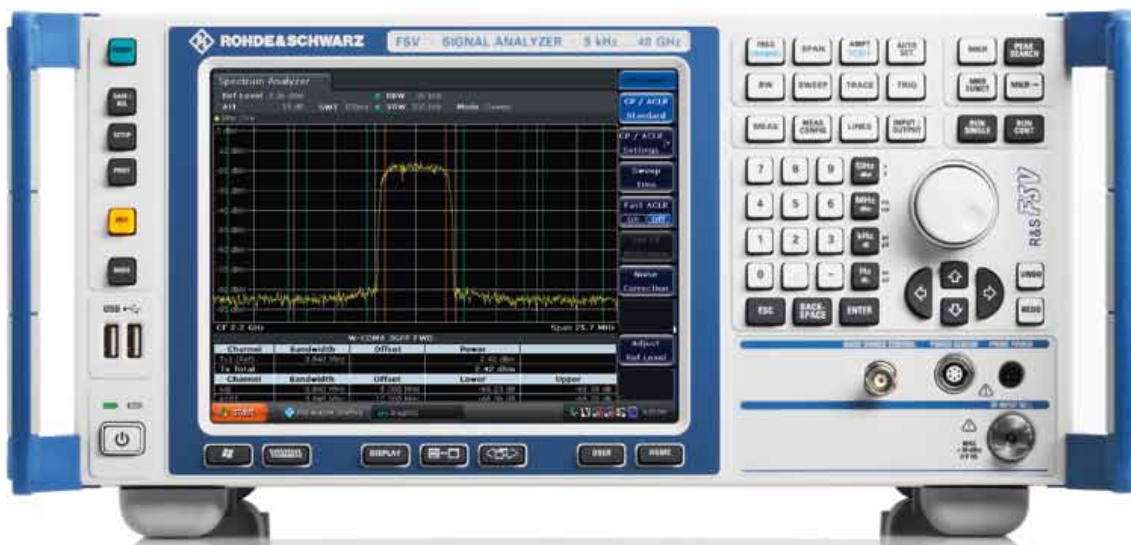
In development applications, the R&S®FSV excels due to its outstanding RF properties, a 40 MHz signal analysis bandwidth that is unmatched in its class, and a wide range of analysis packages for analog modulation modes as well as wireless and wideband communications standards.

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 power sensors from the R&S®NRP family along with extensive power measurement functions
- ▮ Easy on-site upgrading with options
- ▮ Phase noise –110 dBc (1 Hz) at 10 kHz frequency offset
- ▮ Third-order intercept (TOI) +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 repeatability
- Featuring a 40 MHz signal analysis bandwidth and thus 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
- Unsurpassed 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 time due to functional compatibility with existing signal and spectrum analyzers from Rohde&Schwarz

### 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

"WiMAX Forum" is a registered trademark of the WiMAX Forum. "WiMAX", the WiMAX Forum logo, "WiMAX Forum Certified," and the WiMAX Forum Certified logo are trademarks of the WiMAX Forum.

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		1 Hz to 10 MHz
	zero span	1 Hz to 10 MHz, 20 MHz, 28 MHz, optionally 40 MHz
	FFT filters	1 Hz to 300 kHz
	channel filters	100 Hz to 5 MHz
	EMI filters	200 Hz, 9 kHz, 120 kHz, 1 MHz
Video filter		1 Hz to 10 MHz, 20 MHz, 28 MHz, 40 MHz
Signal analysis bandwidth		28 MHz, optionally 40 MHz
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
	40 GHz	-136 dBm, typ. -139 dBm
TOI	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®FSVR Real-Time Spectrum Analyzer

## At a glance

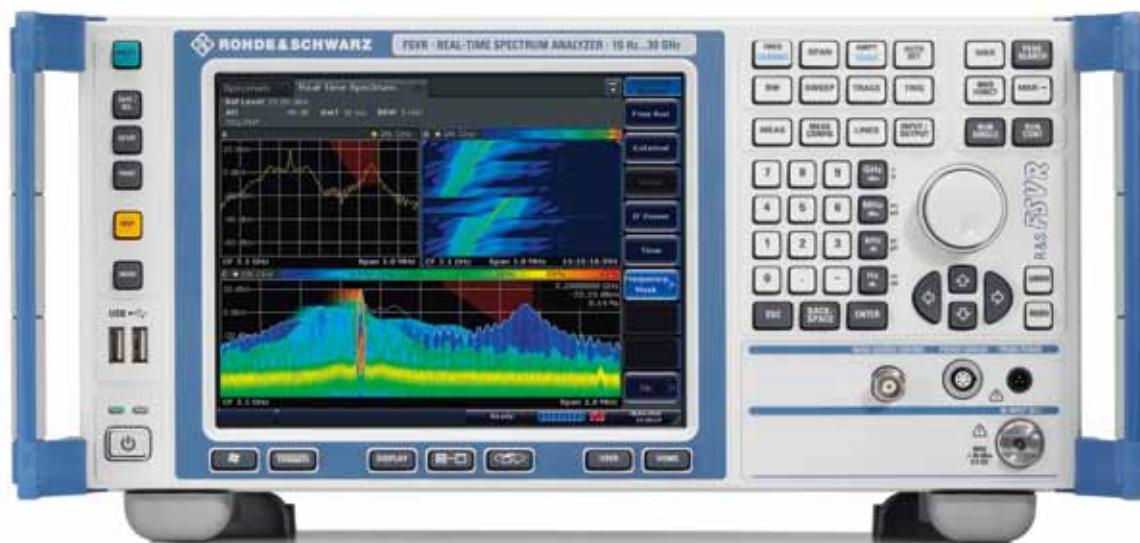
The R&S®FSVR combines a full-featured signal and spectrum analyzer with a real-time spectrum analyzer. Therefore, it provides all the capabilities and features that modern T&M instruments of this kind have to offer. In real-time operation, the R&S®FSVR seamlessly measures and displays the spectrum in 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 real-time help to analyze faults and characterize signals quickly and easily. It seamlessly measures the signal spectrum in real-time, and even with a time overlap. For visual evaluation, it offers a spectrogram in addition to the instantaneous spectrum in real-time; in persistence mode, it visualizes the real-time spectrum with color coding that indicates how often a signal occurs. Frequency-dependent masks provide support when triggering on spectral events. This makes it possible to reliably detect signals that occur sporadically in the spectrum and to investigate them effectively.

Besides its real-time 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 real-time 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





## Real-time 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
- ▀ Real-time streaming of I/Q data for recording long RF sequences

## Full-featured signal and spectrum analyzer

- ▀ Frequency sweep across the entire frequency range from 10 Hz to 40 GHz in just a few milliseconds
- ▀ Expansion of the 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 or 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		
<b>Frequency</b>		
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		$1 \times 10^{-6}$
	with R&S®FSV-B4 option	$1 \times 10^{-7}$
<b>Real-time spectrum analyzer</b>		
Real-time 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		real-time 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
<b>FMT</b>		
Frequency resolution		real-time bandwidth/801
Trigger span		real-time RF bandwidth
Dynamic range		0 dB to -80 dB below reference level

# 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 of 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, for example phase noise or 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  $-128$  dBc (1 Hz), typ.  $-133$  dBc (1 Hz) at 10 kHz carrier offset
  - DANL  $-158$  dBm (1 Hz)
  - Third-order intercept (TOI) 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 typ. +25 dBm
- ▮ 1 dB compression +13 dBm
- ▮ Phase noise typ. –133 dBc (1 Hz) at 10 kHz
- ▮ Highly linear display < 0.1 dB
- ▮ 84 dB ACLR/3GPP with noise correction
- ▮ DANL –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
- ▮ Easy 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
- ▮ 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 Node B 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 frequency range of the R&S®FSU
- ▮ Phase noise measurements (R&S®FS-K40)
- ▮ Modulation analysis for AM, FM or  $\phi$ 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

The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Rohde&Schwarz is under license.

Specifications in brief		
Frequency range		20 Hz to 3.6/8/26.5/46/50/67 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	39, from 100 Hz to 5 MHz
	EMI filters	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 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
- Signal analysis bandwidth 28 MHz, 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 due 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 IEEE802.11a/b/g/j/n
  - 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



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	32, from 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®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.

The measurement of 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 the 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 measurement		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®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 measuring receiver for calibration 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 power sensors from the R&S®NRP family for precise power measurements
- ▀ Support of the R&S®NRP-Z27 and R&S®NRP-Z37 power sensors 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





## Level calibration – precise, repeatable and easy to operate

- 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

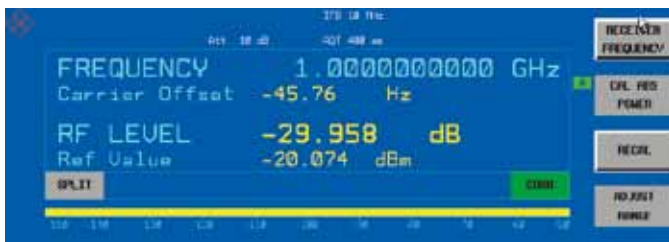
## Modulation and audio analysis made easy

- Full-featured, integrated modulation and audio analyzer for the AM, FM and  $\phi$ 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	per 10 dB step	0.01 dB + 0.005 dB
Measurement uncertainty		
Level measurement	with R&S®NRP-Z271-Z37 power sensor	0.083 dB
Modulation depth		1%
Frequency deviation		1%
Spectrum analysis data		see R&S®FSU

# 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
  - Third-order intercept (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)



### 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® FMU36

## Baseband Analyzer

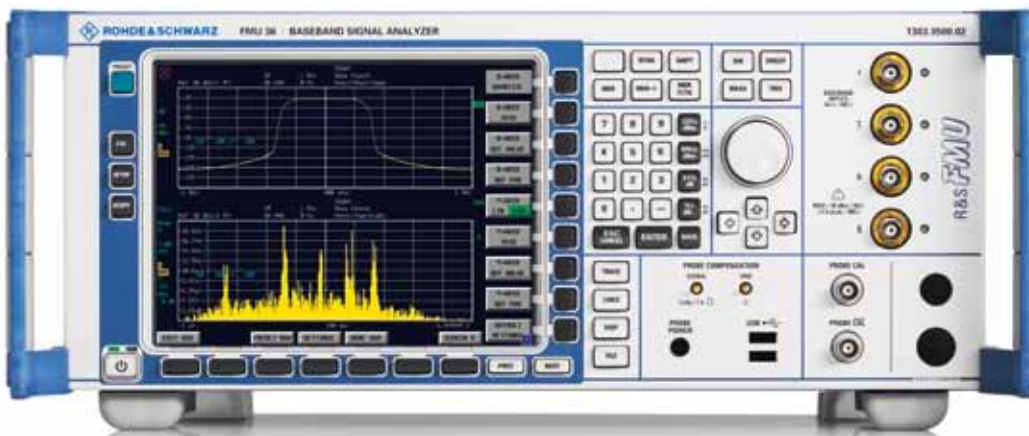
The R&S® FMU36 is an all-purpose analyzer for analog and digital baseband signals. Moreover, the FFT-based structure enables users to analyze extremely weak signals at low frequencies where analyzers with superheterodyne structure exhibit lower sensitivity.

The R&S® FMU36 is the ideal choice for the analysis of low frequency signals, such as mechanical vibrations, audio signals, ADSL modems or RFID readers.

In state-of-the-art wireless communications systems, more and more transmit and receive functions are being conducted in the baseband, both in user equipment and in base stations. The R&S® FMU36 enables users to easily analyze these signals from or to the baseband. This, for example, makes it possible for baseband designers to test the modulation quality of a signal immediately after it leaves the baseband. A receiver designer can verify the quality of the signal before it enters the baseband.

### Key facts

- FFT-based spectrum analyzer with 36 MHz I and Q bandwidth
- Analog baseband input: balanced/unbalanced, 50 Ω/1 MΩ
- Digital I/Q interface (optional)
- Time domain analyzer
- Efficient vector signal analyzer for all-purpose demodulation and analysis of digital signals
- Firmware options for various applications
- 16 Msample I and Q memory, extendable up to 705 Msample for measuring long signal sequences
- Spectrum analyzer functions (ACP, TOI, trace, etc.)
- High sensitivity also at low frequencies



### Specifications in brief

Frequency range		DC to 36 MHz
Phase noise	f = 10 MHz	-135 dBc (1 Hz) at 1 kHz carrier offset
Resolution bandwidth	FFT filters	0.5 Hz to 20 MHz
Signal-to-noise ratio		typ. > 143 dB (1 Hz)
TOI	DC to 20 MHz	< -70 dBc
Total measurement uncertainty	at 1 MHz (full scale)	< 0.25 dB
I/Q imbalance		< 0.1 dB

# R&S®FSC

## Spectrum Analyzer

The R&S®FSC is a compact, universal spectrum analyzer. At an affordable price, it 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)
- ▀ Remote control via USB or LAN
- ▀ 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	

# Spectrum analysis in the waveguide bands above 50 GHz

Frequencies in the high GHz range still require the use of external harmonics mixers.

Such 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 ports option for external mixers. Mixers available 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 of the R&S®FSV/FSP/FSU/FSQ families do this automatically by 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. 23 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 R&S®FSQ26/40 with R&S®FSU-B21 R&S®FSUP26/50 with R&S®FSUP-B21
LO frequency range	7.7 GHz to 15.2 GHz	7 GHz to 15.5 GHz
LO level	+15 dBm	+15 dBm
IF	729.9 MHz	404.4 MHz

# Application-specific solutions

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

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. They 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 the analysis of multicarrier signals expand the application range even further.

General measurement applications	R&S®FSU	R&S®FSQ	R&S®FSG	R&S®FSV	R&S®FSVR
VOR/ILS measurements	•	•	–	–	–
Modulation analysis for AM/FM/φM including THD and SINAD measurements	•	•	•	•	•
Measurement with power sensors	•	•	•	•	•
Noise figure and gain measurements	•	•	•	•	•
Phase noise measurements	•	•	•	•	•
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 radio standards	R&S®FSU	R&S®FSQ	R&S®FSG	R&S®FSV	R&S®FSVR
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®FSU	R&S®FSQ	R&S®FSG	R&S®FSV	R&S®FSVR
IEEE802.16e-2005 WiMAX™	–	•	•	•	•
IEEE802.16 WiMAX™ MIMO	–	•	•	–	–
IEEE802.11 a/b/g/j WLAN	–	•	•	•	•
IEEE802.11 n WLAN	–	•	•	•	•
IEEE802.15.1 Bluetooth® EDR	•	•	•	•	•

<sup>1)</sup> Standard.

<sup>2)</sup> Base station only.

<sup>3)</sup> WiBro only.

<sup>4)</sup> IEEE802.11 a/g: OFDM only.

In addition to general measurement applications, there are standard-specific measurements for all 2G, 2.5G and 3G mobile radio 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®FSP	R&S®FSL	R&S®FSMR	R&S®FSUP	R&S®FMU36	R&S®FSH4/ FSH8	R&S®ZVH
	–	–	•	–	–	–	–
	•	•	•	• <sup>1)</sup>	•	–	–
	•	•	•	•	–	•	•
	•	•	•	•	–	–	–
	•	–	•	• <sup>1)</sup>	–	–	–
	–	–	•	•	• <sup>1)</sup>	–	–
	–	–	–	•	–	–	–
	–	•	–	–	–	–	–
	–	•	–	–	–	•	•
	–	–	–	–	–	–	–

	R&S®FSP	R&S®FSL	R&S®FSMR	R&S®FSUP	R&S®FMU36	R&S®FSH4/ FSH8	R&S®ZVH
	•	–	•	•	•	–	–
	–	–	–	–	–	–	–
	•	• <sup>2)</sup>	•	•	•	• <sup>2)</sup>	–
	•	•	•	•	•	–	–
	•	–	–	–	•	–	–
	•	• <sup>2)</sup>	•	•	•	• <sup>2)</sup>	–
	•	–	•	•	•	• <sup>2)</sup>	–
	•	–	•	•	•	–	–
	–	–	–	–	–	• <sup>2)</sup>	–
	–	–	–	–	–	• <sup>2)</sup>	–
	–	–	–	–	–	• <sup>2)</sup>	–
	–	–	–	–	–	–	–

	R&S®FSP	R&S®FSL	R&S®FSMR	R&S®FSUP	R&S®FMU36	R&S®FSH4/ FSH8	R&S®ZVH
	• <sup>3)</sup>	•	–	–	•	–	–
	–	–	–	–	–	–	–
	–	•	–	–	•	–	–
	–	•	–	–	–	–	–
	•	•	•	•	•	–	–

# 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®FSC	R&S®FSH3/ FSH6/FSH18	R&S®FSH4/ FSH8	R&S®ZVH	R&S®FSL	R&S®FSP
<b>Frequency</b>						
Frequency range	9 kHz to 3/6 GHz	100 kHz/10 MHz to 3/6/18 GHz	9/100 kHz to 3.6/8 GHz	100 kHz to 3.6/8 GHz	9 kHz to 3/6/18 GHz	20 Hz to 3/7/13.6/30/40 GHz
Phase noise (10 kHz offset, 1 GHz input frequency, normalized to 1 Hz RBW)	< -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)	typ. -97 dBc	typ. -107 dBc
<b>Bandwidth</b>						
Resolution bandwidth	10 Hz to 3 MHz	100 Hz to 1 MHz	100 Hz to 3 MHz	1 Hz to 3 MHz	1 Hz to 20 MHz	1 Hz to 10 MHz
I/Q signal analysis bandwidth	–	–	10 MHz, 20 MHz (for serial numbers $\geq 105000$ )	–	28 MHz	8.75 MHz
<b>Level</b>						
TOI	typ. 13 dBm	typ. 13 dBm	typ. 13 dBm	typ. 13 dBm	typ. 15 dBm	typ. 15 dBm
DANL (at 1 GHz, 1 Hz RBW)	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)	typ. -142 dBm, typ. -152 dBm (with preamplifier ON)	typ. -155 dBm, typ. -160 dBm (with preamplifier ON)
Detectors	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	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	< 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)	0.5 dB (f < 3 GHz)	0.5 dB (f < 3 GHz)
<b>I/Q data</b>						
I/Q memory	–	–	–	–	512 ksample	512 ksample
I/Q baseband inputs	–	–	–	–	–	–
Digital baseband inputs	–	–	–	–	–	–
<b>Miscellaneous</b>						
Dynamic range for 3GPP ACLR in adjacent channel	–	–	–	–	55 dB	66 dB
Tracking generator (model, frequency range)	model .13: 100 kHz to 3 GHz model .16: 100 kHz to 6 GHz	models .13 and .23: 100 kHz to 3 GHz, model .26: 100 kHz to 6 GHz	models .14 and .24: 100 kHz to 3.6 GHz, models .18 and .28: 100 kHz to 8 GHz	model .24: 100 kHz to 3.6 GHz, model .28: 100 kHz to 8 GHz	model .13: 9 kHz to 3 GHz, model .16: 9 kHz to 6 GHz, model .28: 9 kHz to 18 GHz	optional (R&S®FSP-B99: 9 kHz to 3 GHz)
Battery operation	–	standard	standard	standard	optional (R&S®FSL-B30 and R&S®FSL-B31)	optional (R&S®FSP-B1, R&S®FSP-B30 and R&S®FSP-B31)
Weight	4.5 kg (9.9 lb)	2.5 kg (5.5 lb)	< 3 kg (6.6 lb)	3 kg (6.6 lb)	< 7 kg (15.4 lb) (without options), < 8 kg (17.6 lb) (with battery)	10.5 kg to 12 kg (23.1 lb to 26.5 lb) (depending on model)



R&S®FSV	R&S®FSVR	R&S®FSG	R&S®FSQ	R&S®FSU	R&S®FSUP	R&S®FSMR	R&S®FMU36
10 Hz to 3.6/7/13/30/40 GHz	10 Hz to 7/13/30/40 GHz	9 kHz to 8/13.6 GHz	20 Hz to 3.6/8/26.5/40 GHz	20 Hz to 3.6/8/26.5/43/46/50/67 GHz	20 Hz to 8/26.5/50 GHz	20 Hz to 3.6/26.5/43/50 GHz	DC to 36 MHz
typ. -106 dBc	typ. -106 dBc	typ. -114 dBc	typ. -129 dBc	typ. -129 dBc	typ. -133 dBc	typ. -129 dBc	typ. -143 dBc (10 MHz input frequency)
1 Hz to 40 MHz	1 Hz to 40 MHz	1 Hz to 10 MHz	1 Hz to 50 MHz	1 Hz to 50 MHz, R&S®FSU43: 1 Hz to 10 MHz	1 Hz to 50 MHz	1 Hz to 50 MHz	0.5 Hz to 20 MHz
28 MHz, optionally 40 MHz (R&S®FSV-B70)	40 MHz	28 MHz	28 MHz, optionally 120 MHz (R&S®FSQ-B72)	8 MHz	8 MHz	8 MHz	72 MHz
typ. 17 dBm	typ. 17 dBm	typ. 25 dBm	typ. 27 dBm	typ. 27 dBm	typ. 27 dBm	typ. 27 dBm	–
typ. -150 dBm, typ. -160 dBm (with preamplifier ON)	typ. -150 dBm, typ. -160 dBm (with preamplifier ON)	typ. -155 dBm, typ. -162 dBm (with preamplifier ON)	typ. -156 dBm	typ. -156 dBm	typ. -156 dBm	typ. -156 dBm	typ. -151.5 dBm (1 MHz)
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	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
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)	0.3 dB (f < 3.6 GHz)	0.3 dB (f < 3.6 GHz)	0.3 dB
200 Msample	200 Msample	4 Msample	16 Msample, optionally 235/705 Msample	512 ksamples	16 Msample	512 ksamples	16 Msample, optionally 235/705 Msamples
–	–	–	optional, 50 Ω/1 MΩ (R&S®FSQ-B71)	–	–	–	50 Ω/1 MΩ (balanced, unbalanced)
optional (R&S®FSV-B17)	optional (R&S®FSV-B17)	optional (R&S®FSQ-B17)	optional (R&S®FSQ-B17)	–	–	–	optional (R&S®FSQ-B17)
73 dB	73 dB	84 dB	84 dB	84 dB	84 dB	84 dB	–
R&S®FSV-B9: 100 kHz to 3.6 GHz (R&S®FSV3) 100 kHz to 7 GHz (R&S®FSV7/13/30/40)	–	–	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)	–
R&S®FSV-B30 and R&S®FSV-B31	–	–	–	–	–	–	–
9.5 kg to 10.7 kg (20.9 lb to 23.6 lb) (depending on model)	12.8 kg to 14.0 kg (28.2 lb to 30.7 lb) (depending on model)	15.4 kg (34 lb) (R&S®FSG8), 16.5 kg (36.4 lb) (R&S®FSG13)	14.6 kg to 16.8 kg (32.2 lb to 37 lb) (depending on model)	14.6 kg to 17.4 kg (32.2 lb to 38.4 lb) (depending on model)	17.6 kg to 18.6 kg 38.8 lb to 41 lb (depending on model)	14.6 kg to 16.8 kg (32.2 lb to 37 lb) (depending on model)	11.5 kg (25.4 lb) (without options)

# 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 measuring 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/N<sub>0</sub>)
- ▮ 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 choice of detectors
- ▮ Frequency counter
- ▮ n-dB down marker
- ▮ Limit lines with pass/fail display
- ▮ Transducer factors

	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)	---	---	---
Sweep Time Mode	---	---	Channel	---	---	---
Sweep Time	32 ms	---	RRC	---	---	---
Ref. Level	-10 dBm	---	5-Pole	---	---	---
RF Att. Mode	Auto	---	-10 dBm	---	---	---
RF Attenuator	10 dB	---	Auto	---	---	---
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 sweep list can be configured by the user, who can set all parameters as required and add further ranges, if needed.

# 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](http://www.rohde-schwarz.com).

Instrument/title of printed material	Order No. of printed material
<b>R&amp;S®FSH3, R&amp;S®FSH6, R&amp;S®FSH18</b>	
R&S®FSH Handheld Spectrum Analyzer – data sheet	PD 0758.1593.32
<b>R&amp;S®FSH4, R&amp;S®FSH8</b>	
R&S®FSH4/FSH8 Spectrum Analyzer – product brochure	PD 5214.0482.12
R&S®FSH4/FSH8 Spectrum Analyzer – data sheet	PD 5214.0482.22
<b>R&amp;S®ZVH4, R&amp;S®ZVH8</b>	
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
<b>R&amp;S®FSL3, R&amp;S®FSL6, R&amp;S®FSL18</b>	
R&S®FSL Spectrum Analyzer – product brochure	PD 0758.2790.12
R&S®FSL Spectrum Analyzer – data sheet	PD 0758.2790.22
<b>R&amp;S®FSP3, R&amp;S®FSP7, R&amp;S®FSP13, R&amp;S®FSP30, R&amp;S®FSP40</b>	
R&S®FSP Spectrum Analyzer – product brochure	PD 0758.1206.12
R&S®FSP Spectrum Analyzer – data sheet	PD 0758.1206.22
<b>R&amp;S®FSV3, R&amp;S®FSV7, R&amp;S®FSV13, R&amp;S®FSV30, R&amp;S®FSV40</b>	
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
<b>R&amp;S®FSVR7, R&amp;S®FSVR13, R&amp;S®FSVR30, R&amp;S®FSVR40</b>	
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
<b>R&amp;S®FSU3, R&amp;S®FSU8, R&amp;S®FSU26, R&amp;S®FSU43, R&amp;S®FSU46, R&amp;S®FSU50, R&amp;S®FSU67</b>	
R&S®FSU Spectrum Analyzer – product brochure	PD 0758.0016.12
R&S®FSU Spectrum Analyzer – data sheet	PD 0758.0016.22
<b>R&amp;S®FSQ3, R&amp;S®FSQ8, R&amp;S®FSQ26, R&amp;S®FSQ40</b>	
R&S®FSQ Signal Analyzer – product brochure	PD 0758.0945.12
R&S®FSQ Signal Analyzer – data sheet	PD 0758.0945.22
<b>R&amp;S®FSUP8, R&amp;S®FSUP26, R&amp;S®FSUP50</b>	
R&S®FSUP Signal Source Analyzer – product brochure	PD 5213.6729.12
R&S®FSUP Signal Source Analyzer – data sheet	PD 5213.6729.22
<b>R&amp;S®FSMR3, R&amp;S®FSMR26, R&amp;S®FSMR43, R&amp;S®FSMR50</b>	
R&S®FSMR Measuring Receiver – product brochure	PD 0758.2319.12
R&S®FSMR Measuring Receiver – data sheet	PD 0758.2319.22
<b>R&amp;S®FSG8, R&amp;S®FSG13</b>	
R&S®FSG Spectrum Analyzer – product brochure	PD 5213.8721.32
R&S®FSG Spectrum Analyzer – data sheet	PD 5213.8721.22
<b>R&amp;S®FMU36</b>	
R&S®FMU36 Baseband Signal Analyzer – product brochure	PD 5213.7025.12
R&S®FMU36 Baseband Signal Analyzer – data sheet	PD 5213.7025.22
<b>R&amp;S®FSC3, R&amp;S®FSC6</b>	
R&S®FSC Spectrum Analyzer – product flyer	PD 5214.3830.32
R&S®FSC Spectrum Analyzer – data sheet	PD 5214.3330.22

Your local Rohde & Schwarz expert will help you determine the optimum solution for your requirements.

To find your nearest Rohde & Schwarz representative, visit

[www.sales.rohde-schwarz.com](http://www.sales.rohde-schwarz.com)

## Service you can rely on

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

## About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

## Environmental commitment

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

Certified Quality System  
**ISO 9001**

## Rohde & Schwarz GmbH & Co. KG

[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## Regional contact

- | Europe, Africa, Middle East  
+49 89 4129 123 45  
[customersupport@rohde-schwarz.com](mailto:customersupport@rohde-schwarz.com)
- | North America  
1 888 TEST RSA (1 888 837 87 72)  
[customer.support@rsa.rohde-schwarz.com](mailto:customer.support@rsa.rohde-schwarz.com)
- | Latin America  
+1 410 910 79 88  
[customersupport.la@rohde-schwarz.com](mailto:customersupport.la@rohde-schwarz.com)
- | Asia/Pacific  
+65 65 13 04 88  
[customersupport.asia@rohde-schwarz.com](mailto:customersupport.asia@rohde-schwarz.com)

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG  
Trade names are trademarks of the owners | Printed in Germany (ch)  
PD 0758.1735.12 | Version 04.00 | January 2011 | Signal and Spectrum Analyzers  
Data without tolerance limits is not binding | Subject to change  
© 2004 - 2011 Rohde & Schwarz GmbH & Co. KG | 81671 München, Germany



0758173512