



Spectrum Analyzers from Rohde & Schwarz

Product overview

Common features

Numerous shared functions

The R&S® FSP, R&S® FSU and R&S® FSQ all feature the same user interface and remote control commands. This means that important, complex measurement routines are the same in all three families. Once you learn one instrument, you know them all. Programs, too, can in most cases be used unchanged.

The functions supplied with the R&S® FSP, R&S® FSU and R&S® FSQ include, for example:

- ◆ Fast ACP mode and List mode
- ◆ CCDF measurement
- ◆ 23 predefined standards for adjacent channel power measurements

- ◆ Versatile measurement functions for channel power and adjacent channel power, including for multicarrier signals with up to 12 carriers
- ◆ Probably the widest choice of filter characteristics available, ranging from FFT and channel filters to RRC filters
- ◆ Full range of detectors, including RMS and quasi-peak
- ◆ TOI measurement function
- ◆ Rapid frequency counter (1 Hz resolution at a measuring time of 30 ms)
- ◆ Occupied bandwidth
- ◆ Split-screen display with independent measurement settings in both windows and three active traces in each window
- ◆ Automatic output of all signals in a spectrum as a list, e.g. for spurious measurements
- ◆ Noise and phase noise markers
- ◆ C/N and C/N₀ measurement functions
- ◆ Command set compatible with 8566/8586 A/B, 856x, 859x and series 70000

To the extent allowed by the bandwidth, the application-specific firmware packages that are available are also highly similar. They cover all common mobile radio standards (2G, 2.5G, 3G), plus the increased data rate for 3GPP (HSDPA) and the new TD-SCDMA standard. In addition, packages for general-purpose measurement applications, e.g. for measuring noise factors or phase noise, as well as a general-purpose AM/FM/ϕM measurement demodulator are available.

Frequency ranges

R&S® FSUP	R&S® FSUP 50	50 GHz	110 GHz
	R&S® FSUP 26	26.5 GHz	110 GHz
	R&S® FSUP 8	8 GHz	
R&S® FSMR	R&S® FSMR 50	50 GHz	
	R&S® FSMR 26	26.5 GHz	
	R&S® FSMR 3	3.6 GHz	
R&S® FSQ	R&S® FSQ 40	40 GHz	110 GHz
	R&S® FSQ 26	26.5 GHz	110 GHz
	R&S® FSQ 8	8 GHz	
	R&S® FSQ 3	3.6 GHz	
R&S® FSU	R&S® FSU 50	50 GHz	110 GHz
	R&S® FSU 46	46 GHz	110 GHz
	R&S® FSU 43	43 GHz	110 GHz
	R&S® FSU 26	26.5 GHz	110 GHz
	R&S® FSU 8	8 GHz	
	R&S® FSU 3	3.6 GHz	
R&S® FSP	R&S® FSP 40	40 GHz	110 GHz
	R&S® FSP 30	30 GHz	
	R&S® FSP 13	13.6 GHz	
	R&S® FSP 7	7 GHz	
R&S® FSL	R&S® FSL 6	6 GHz	
	R&S® FSL 3		
R&S® FSH	R&S® FSH 6	6 GHz	
	R&S® FSH 3	3 GHz	
R&S® FS300	3 GHz		
R&S® FS315	3 GHz		

Smart spectrum analysis

Spectrum Analyzer R&S®FS300

The R&S®FS300 is a compact and universal spectrum analyzer. At an affordable price, it offers properties previously found only in more expensive instruments.

- ◆ Frequency range up to 3 GHz
- ◆ Resolution bandwidths 200 Hz to 1 MHz
- ◆ Maximum input level +33 dBm (2 W)
- ◆ Remote control via USB
- ◆ Frequency counter with 1 Hz resolution
- ◆ Phase noise -90 dBc (1 Hz)
- ◆ Compact case taking up only half a 19" slot
- ◆ R&S®FS315: built-in tracking generator, also suitable for generating fixed-frequency signals



Condensed data

	R&S®FS300	R&S®FS315
Frequency range	9 kHz to 3 GHz	
Resolution bandwidth (-3 dB) (RBW)	200 Hz to 1 MHz	200 Hz to 20 MHz
Video bandwidth	10 Hz to 1 MHz	10 Hz to 20 MHz
Displayed average noise level (DANL)	< -110 dBm, typ. -115 dBm (300 Hz)	
Intermodulation-free range	< -70 dBc at -36 dBm input level	
SSB phase noise, 10 kHz offset	< -90 dBc (1 Hz)	
Level measurement uncertainty	< 1.5 dB, typ. 0.7 dB	
Detector	peak	max/min peak, sample, average, RMS
Measurement functions	TOI, TDMA power, frequency counter, noise marker	TOI, TDMA power, frequency counter, noise marker, occupied bandwidth (OBW), return loss, transmission, channel power
Tracking generator	-	9 kHz to 3 GHz
Audio demodulator	-	AM/FM
Measurement with antenna factors	-	yes

Handy spectrum analysis

Spectrum Analyzer R&S®FSH

The R&S®FSH is a robust, handheld spectrum analyzer designed for measurement tasks in the field. The 6 GHz model covers the WLAN frequency range. The functionality of the R&S®FSH matches that of conventional lab instruments.



- ◆ Frequency ranges up to 3 GHz and 6 GHz
- ◆ Easy operation, low weight and sturdy 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 (DTF) measurements on cables
- ◆ VSWR measurements and Smith chart of reflection
- ◆ S_{11} and S_{21} phase measurement
- ◆ Group delay measurement
- ◆ Receiver mode
- ◆ Power sensors up to 18 GHz
- ◆ Directional power sensor up to 4 GHz
- ◆ Test system for EMF measurements (R&S®TS-EMF)
- ◆ Code domain power measurements on 3GPP base stations

Condensed data

	R&S®FSH 3	R&S®FSH 6
Frequency range	100 kHz to 3 GHz	100 kHz to 6 GHz
Resolution bandwidths	1 kHz to 1 MHz (model .13) 100 Hz to 1 MHz (models .03 and .23)	100 Hz to 1 MHz
Video bandwidth	10 Hz to 1 MHz	
Displayed average noise level	typ. -114 dBm (1 kHz) (model .13) typ. -135 dBm (100 Hz) (models .03 and .23)	typ. -135 dBm (100 Hz)
TOI	typ. 13 dBm	
SSB phase noise	<-100 dBc (1 Hz) at 100 kHz from carrier	
Detectors	sample, max/min peak, auto peak, RMS, average, quasi-peak	
Level measurement uncertainty	<1.5 dB, typ. 0.5 dB	
Dimensions	170 mm × 120 mm × 270 mm	
Weight	2.5 kg	

Product	Application	TDMA power measurements	Channel power measurements	Field strength measurements/ measurements with isotropic antenna	C/N measurements	Channel tables	Receiver mode	Code domain power measurements on 3GPP base stations ¹⁾	Power measurements up to 8 GHz/18 GHz	Directional power measurements	Measurements on cables (distance-to-fault)	Scalar transmission measurements	Vector transmission measurements ²⁾	Scalar reflection measurements ²⁾	Vector reflection measurements ²⁾	Remote control via RS-Z32-C interface	One-port cable loss measurements
R&S®FSH (models .03/.06) with preamplifier	■	■	■	■	■	+R&S® FSH-K3	-	+R&S® FSH-Z1/ -Z18	+R&S® FSH-Z14/ -Z44	-	-	-	+R&S® FSH-K1	-	-	-	-
R&S®FSH (model .13) with tracking generator	■	■	■	■	■	+R&S® FSH-K3	-	+R&S® FSH-Z1/ -Z18	+R&S® FSH-Z14/ -Z44	+R&S® FSH-Z2/Z3 +R&S® FSH-B1	■	+R&S® FSH-Z2	+R&S® FSH-K1	+R&S® FSH-Z2/Z3 +R&S® FSH-K2	-	-	-
R&S®FSH (models .23/.26) with tracking generator and preamplifier	■	■	■	■	■	+R&S® FSH-K3	+R&S® FSH-K4	+R&S® FSH-Z1/ -Z18	+R&S® FSH-Z14/ -Z44	+R&S® FSH-Z2/Z3 +R&S® FSH-B1	■	+R&S® FSH-Z2/Z3	+R&S® FSH-K1	+R&S® FSH-Z2/Z3 +R&S® FSH-K2	-	-	-

¹⁾ For R&S®FSH 3 model .23 with serial number 103500 or later.

²⁾ R&S®FSH-K2 required.

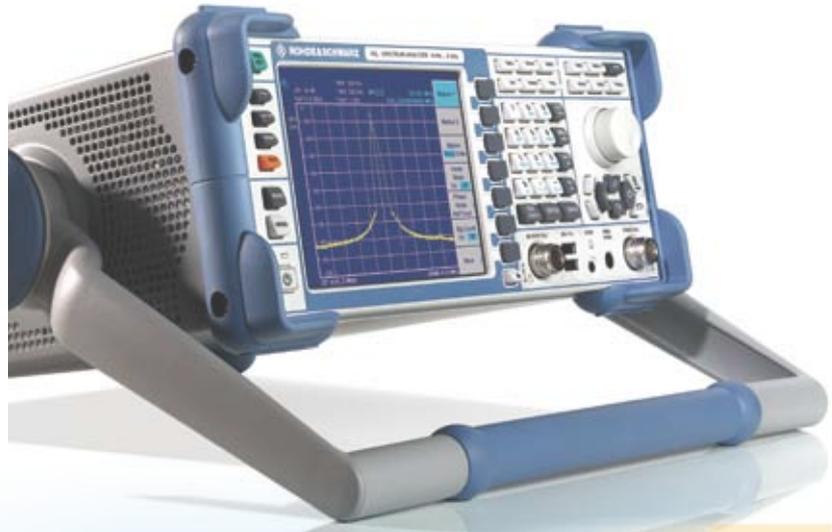
■ R&S®FSH standard function

- Not available

Compact spectrum analysis

Spectrum Analyzer R&S®FSL

The R&S®FSL spectrum analyzer is ideal for a wide variety of applications in R&D, service and production where budget has priority over RF performance. The R&S®FSL's scope of applications includes simple spectrum measurements as well as modulation analysis of WLAN signals. Its compact size, low weight and optional battery operation make the R&S®FSL ideal for portable and mobile use. Owing to its speed, wear-free electronic attenuator and fast analysis routines, the R&S®FSL excels in production applications.



Highlights

- ◆ Best RF characteristics in its class
- ◆ Largest I/Q demodulation bandwidth in its class
- ◆ High measurement accuracy
- ◆ High resolution filter accuracy owing to all-digital implementation
- ◆ Robust and compact
- ◆ Carrying handle and low weight (<8 kg/18 lbs) for mobile use
- ◆ Optional battery operation
- ◆ Wide range of functions, simple operation
- ◆ Easy on-site upgradeability

Condensed data

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

Spectrum analyzers from medium class ...

Spectrum Analyzer R&S®FSP

The R&S®FSP is far more than just the right analyzer for general applications in development, service and in the field if an extremely high dynamic range is not required. It is also the fastest RF spectrum analyzer currently available, which makes it of particular interest for use in production and manufacturing.

Integrated complex measurement and analysis routines such as the List mode (measurement on frequency lists) and the Fast ACP routine (ACP measurements in the time domain with channel filters) significantly speed up measurements. By using these functions, the R&S®FSP operates like a fast selective power meter. Both high measurement speed and intelligent analysis routines shorten test times and increase throughput, yielding highly effective production.



Highlights

- ◆ Frequency range up to 40 GHz
- ◆ Resolution bandwidths up to 10 MHz
- ◆ Same functionality as high-end instrument
- ◆ Wear-free electronic attenuator for applications in production
- ◆ Wide variety of application- and standard-specific modulation and code domain power measurements
- ◆ Modulation measurements on WLAN signals in accordance with IEEE 802.11a
- ◆ Low weight
- ◆ Optional battery power supply for operation independently of AC supply

Condensed data

Frequency range	9 kHz to 3 GHz/7 GHz/13 GHz/30 GHz/40 GHz
Phase noise	typ. -113 dBc (1 Hz) at 10 kHz carrier offset
Resolution bandwidths	10 Hz to 10 MHz, FFT filter: 1 Hz to 30 kHz, channel filter, EMI bandwidth
DANL at 1 GHz (RBW 10 Hz)	typ. -145 dBm
TOI (200 MHz to 3 GHz)	typ. 10 dBm
Level measurement uncertainty, $f < 3$ GHz	0.5 dB
Weight	R&S®FSP 3: 10.5 kg, R&S®FSP 7: 11.3 kg, R&S®FSP 13/30/40: 12 kg

... to high-end

Spectrum Analyzer R&S®FSU

The high-end Spectrum Analyzer R&S®FSU differs from the R&S®FSP primarily in that the R&S®FSU offers a maximally expanded dynamic range and RF performance. This is evident in the phase noise data, the intermodulation characteristics and the 1 dB compression point. With a 1 dB compression point of +13 dBm, the R&S®FSU can measure signals with a power of up to +5 dBm at an RF attenuation setting of 0 dB.

If operated together with the application firmware packages for GSM/EDGE, 3GPP or CDMA2000®, the R&S®FSU is the ideal analyzer for base station tests in development and production.

The models R&S®FSU26, R&S®FSU46 and R&S®FSU50 have been optimized for the special requirements in the microwave frequency range.



The low displayed average noise level of typ. -148 dBm in a 1 Hz bandwidth at 26 GHz, and -138 dBm (1 Hz) at 46 GHz, supports accurate and sensitive measurements.

Highlights

- ◆ Frequency range up to 50 GHz
- ◆ Resolution bandwidths up to 50 MHz
- ◆ Maximum dynamic range, e.g. up to 84 dB for 3GPP ACLR measurements
- ◆ Low phase noise of -128 dBc (1 Hz), typ. -133 dBc (1 Hz) at 10 kHz carrier offset
- ◆ Wide variety of application- and standard-specific modulation and code domain power measurements

Condensed data

Frequency range	20 Hz to 3.6 GHz/8 GHz/26.5 GHz/46 GHz/50 GHz
Phase noise	-128 dBc (1 Hz), typ. -133 dBc (1 Hz) at 10 kHz carrier offset
Resolution bandwidths	10 Hz to 50 MHz, FFT filter: 1 Hz to 30 kHz, channel filter, EMI bandwidth
DANL at 1 GHz (RBW 10 Hz)	R&S®FSU 3/8: typ. -148 dBm, R&S®FSU 26/46/50: typ. -146 dBm
TOI (300 MHz to 3.6 GHz)	typ. +27 dBm
Level measurement uncertainty, $f < 3.6$ GHz	0.3 dB

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

Calibration of signal generators

Measuring Receiver R&S®FSMR

The Measuring Receiver R&S®FSMR 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 functionality of several instruments in one:

- ◆ Highly accurate level calibrator
- ◆ Modulation analyzer
- ◆ Audio analyzer with THD and SINAD measurement functionality
- ◆ Power meter for connection of R&S®NRP power sensors
- ◆ High-performance spectrum analyzer



Highlights

- ◆ Frequency range from 20 Hz to 3/26.5/50 GHz
- ◆ High level linearity of 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 for accurate power measurements
- ◆ Power sensor module with integrated power splitter
- ◆ Measurement of modulation depth, frequency deviation and phase deviation with <1% measurement uncertainty
- ◆ Audio input for calibration of modulation generators
- ◆ Audio analysis with automatic measurement of modulation frequency, THD and SINAD
- ◆ Display of audio signals and demodulated signals in frequency and time domain
- ◆ Fast RF frequency counter with 0.001 Hz resolution
- ◆ Control of all functions incl. power meter from front panel or via IEC/IEEE bus or LAN
- ◆ Full-featured spectrum analyzer
- ◆ Supports the Power Sensor Modules R&S®NRP-Z27/-Z37 with built-in power splitter

Condensed data

Frequency range	100 kHz to 3/26/50 GHz
Relative level linearity	0.01 dB ± 0.005 dB per 10 dB step
Measurement uncertainty, level measurement	with Power Sensor Module R&S®NRP-Z27/-Z37
Measurement uncertainty, modulation depth	1 %
Measurement uncertainty, frequency deviation	1 %
Specifications valid for spectrum analysis	see R&S®FSU

High-end signal analysis

Signal Analyzer R&S®FSQ

The Signal Analyzer R&S®FSQ is based on the R&S®FSU and combines the R&S®FSU's excellent RF characteristics with the versatility of a broadband signal analyzer. The main difference is the digital signal analysis, which was developed for the large demodulation bandwidth of 28 MHz or 120 MHz, respectively, and provides additional DSP power as well as a 16 Msample I/Q memory.



Its large demodulation bandwidth makes the R&S®FSQ precisely the right instrument for measurements on 3GPP WCDMA multicarrier signals, whether for determining the amplitude statistics by means of the CCDF measurement function or for measuring the code domain power.

- ◆ Frequency range up to 40 GHz
- ◆ Spectrum analyzer characteristics same as with the R&S®FSU
- ◆ Demodulation bandwidth 28 MHz, optionally 120 MHz
- ◆ Wide variety of application- and standard-specific modulation and code domain power measurements
- ◆ 16 Msample I/Q memory, expandable to 705 Msample

- ◆ 3GPP code domain power analysis over max. 100 frames
- ◆ Universal vector signal analysis
- ◆ Modulation measurements in accordance with IEEE 802.11a/b/g/j (WLAN)
- ◆ Baseband analysis via balanced and unbalanced baseband inputs with 36 MHz bandwidth
- ◆ Measurements on IEEE 802.16 and IEEE 802.16e (WiMAX, WiBro)

Highlights

- ◆ Symbol rates up to 25 Msymbol/s, optionally 81.6 Msymbol/s
- ◆ FSK, MSK, PSK, QPSK, QAM to 256QAM, 8VSB modulation modes
- ◆ User-defined filters, mappings and constellation diagrams
- ◆ AM/AM and AM/φM measurements
- ◆ Histogram and FFT analysis of measured signal, error signal and reference signal
- ◆ High measurement speed: 40 measurements/s for GSM/EDGE

Condensed data

Frequency range	20 Hz to 3.6 GHz/8 GHz/26.5 GHz/40 GHz
Phase noise	typ. -133 dBc (1 Hz) at 10 kHz from carrier
Resolution bandwidths	10 Hz to 50 MHz, FFT filter: 1 Hz to 30 kHz, channel filter, EMI bandwidths
DANL at 1 GHz (RBW 10 Hz)	R&S®FSQ 3/8: typ. -148 dBm, R&S®FSQ 26/40: typ. -146 dBm
TOI (300 MHz to 3.6 GHz)	typ. +27 dBm
Total measurement uncertainty, f < 3.6 GHz	0.3 dB

Signal source analysis

R&S®FSUP – phase noise tester and spectrum analyzer in a single box

The R&S®FSUP is the only signal source analyzer covering the frequencies up to the microwave range in a single box. It combines the functionality of the high-end Spectrum Analyzer R&S®FSU with the advantages of a pure phase noise tester with very low-noise DC sources, thus enabling you to perform a wide range of measurements. For example, phase noise measurements of VCOs, DROs or XCOs, plus the determination of harmonics and spurious emissions are possible.



Highlights

- ◆ Frequency range up to 8/26.5/50 GHz without external downconverter
- ◆ Up to 110 GHz with external mixers
- ◆ Maximum flexibility in phase noise measurements:
 - Phase detector method or PLL method
 - Spectrum analyzer method
 - Internal/external reference
 - Phase detector method with cross-correlation
- ◆ Complete characterization of VCOs:
 - Phase noise
 - Characteristics
 - Transient response
 - Harmonics
- ◆ Fast and easy operation
- ◆ Max. sensitivity in phase noise measurements at 1 GHz input frequency:
 - at 10 kHz offset –134 dBc (1 Hz)
 - at 10 MHz offset –170 dBc (1 Hz)
- ◆ Unrivaled dynamic range:
 - TOI typ. +25 dBm
 - DANL: –160 dBm
- ◆ Display settling and switching times
- ◆ Higher harmonics
- ◆ Higher harmonics versus frequency
- ◆ DC sources for measurement of VCO characteristics
- ◆ Output power versus frequency
- ◆ Influence of supply voltage (pushing)
- ◆ High-end spectrum analyzer:
 - ACPR measurement
 - Spurious emissions measurement

Condensed data

Frequency range	spectrum analyzer mode: 20 Hz to 8/26.5/50 GHz phase noise tester: 10 MHz to 8/26.5/50 GHz
Phase noise	–134 dBc at 10 kHz offset and 1 GHz input frequency –170 dBc at 10 MHz offset and 1 GHz input frequency
Control bandwidths	control of external reference or DUT: 1 Hz to 100 kHz
Control of internal reference	1 Hz to 30 kHz
Measurement accuracy	<1 dB
Improvement of phase noise sensitivity by means of cross-correlation	100 averages: ~ 10 dB 1000 averages: ~ 20 dB
Power supply	voltage: 0 V to 12 V, max. current: 500 mA, noise voltage <10 nV (1 Hz) at 10 kHz
Tuning voltage	voltage: –10 V to +28 V, max. current: 20 mA, noise voltage <1 nV (1 Hz) at 10 kHz

Analysis in frequency range above 50 GHz

Frequencies in the high GHz range still require the use of external harmonics mixers even today. Such mixers can be connected to the R&S®FSP40, R&S®FSU26/46/50 or R&S®FSQ26/40 provided that these are equipped with the option LO/IF Ports for External Mixers. Mixers available from Rohde&Schwarz cover the frequency range up to 110 GHz. If other suitable mixers are used, a range of up to 1.1 THz is possible. The use of external mixers results in unwanted intermodulation products that have to be determined and suppressed, which normally takes a lot of time. The analyzers of the R&S®FSP and R&S®FSU/FSQ families do this automatically by using a software pre-selector.



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 mixers, no bias required			
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
Harmonic number	4	6	6	8

Option LO/IF Ports for External Mixers

	R&S®FSP40 with R&S®FSP-B21	R&S®FSU26/46/50, R&S®FSQ26/40 with R&S®FSU-B21
LO frequency range	7 GHz to 13.2 GHz	7 GHz to 15.5 GHz
LO level	+15 dBm	+15 dBm
IF	404.4 MHz	404.4 MHz

Application-specific solutions

Standard	Measurements on mobile stations	Measurements on base stations
GSM/EDGE	R&S®FS-K5	R&S®FS-K5
WCDMA 3GPP UMTS	R&S®FS-K73	R&S®FS-K72
HSDPA for 3GPP	R&S®FS-K73	R&S®FS-K74
CDMA2000®	R&S®FS-K83	R&S®FS-K82
CDMA2000® 1xEV-DV	R&S®FS-K83	R&S®FS-K82
CDMA2000® 1xEV-DO	R&S®FS-K85	R&S®FS-K84
TD-SCDMA	R&S®FS-K77	R&S®FS-K76

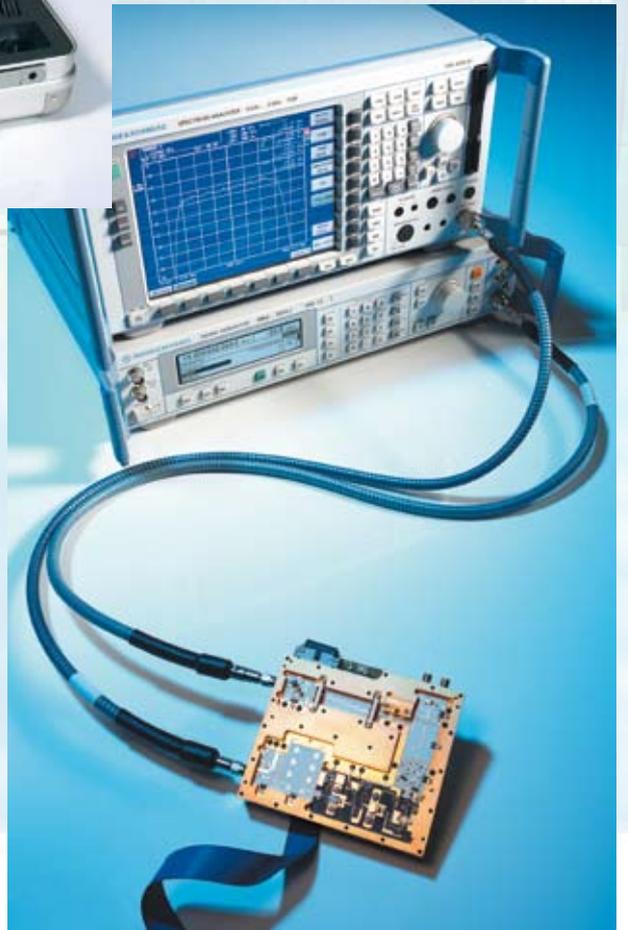
Mobile-radio-specific application firmware packages.

Application		R&S®FSP	R&S®FSU	R&S®FSMR	R&S®FSQ	R&S®FSL
Mobile radio						
GSM/EDGE	Modulation and spectrum measurements on mobile and base stations	●	●	●	●	
3GPP	Modulation, code domain and spectrum measurements on base stations	●	●	●	●	
HSDPA	Expansion for R&S®FS-K72	●	●	●	●	
3GPP	Modulation, code domain and spectrum measurements on mobile stations	●	●	●	●	
TD-SCDMA	Modulation, code domain and spectrum measurements on base stations	●	●	●	●	
TD-SCDMA	Modulation, code domain and spectrum measurements on mobile stations	●	●	●	●	
CDMA2000® incl. IS-95/ cdmaOne and 1xEV DV	Modulation, code domain and spectrum measurements on base stations	●	●	●	●	
CDMA2000®incl. 1xEV-DV	Modulation, code domain and spectrum measurements on mobile stations	●	●	●	●	
CDMA2000® 1xEV-DO	Modulation, code domain and spectrum measurements on base stations	●	●	●	●	
CDMA2000® 1xEV-DO	Modulation, code domain and spectrum measurements on mobile stations	●	●	●	●	
Other wireless applications						
Bluetooth®		●	●	●	●	R&S®FSL-K8 ¹⁾
WLAN 802.11a/b/g/j		–	–	–	●	R&S®FSL-K91
WLAN 802.11a		●	–	–		
WiMAX 802.16 OFDM		–	–	–	●	R&S®FSL-K92
WiMAX 802.16 OFDM, OFDMA, 802.16e, WiBro		–	–	–	●	
General-purpose measurement applications						
AM/FM/ϕM demodulation, including THD and SINAD measurements		●	●	●	●	R&S®FSL-K7
Measurements with power sensors		●	●	●	●	R&S®FSL-K9
Noise factor and gain measurements		●	●	●	●	
Phase noise measurements		●	●	●	●	
Universal vector signal analysis		–	–	–	●	

Overview of application-specific options for the R&S®FSP, R&S®FSU, R&S®FSMR, R&S®FSQ and R&S®FSL families.

¹⁾ Incl. EDR.

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Comparison of main specifications and functions

	R&S® FS300/315	R&S® FSH
	Cost-efficient spectrum analyzer for universal applications in service and production	3 GHz/6 GHz handheld spectrum analyzer for mobile applications in service and installation
Frequency range	9 kHz to 3 GHz	100 kHz to 6 GHz
With external mixer	–	–
Frequency accuracy at 1 GHz	2000 Hz	2000 Hz
Optional	–	–
Resolution bandwidths		
Standard filter	200 Hz to 1 MHz R&S® FS 315: 200 Hz to 20 MHz	100 Hz to 1 MHz, 1 kHz to 1 MHz (model dependent)
FFT filter	–	–
Channel filter	–	–
RRC filter	–	–
EMI filter	–	200 Hz, 9 kHz, 120 kHz
Level		
Level measurement range	displayed noise floor to +33 dBm	–
Setting range of RF attenuation	0 dB to 70 dB, in steps of 2 dB	0 dB to 30 dB, in steps of 10 dB
Display range	80 dB, 40 dB, 16 dB, 8 dB	100 dB, 50 dB, 20 dB, 10 dB
Displayed average noise level		
At 1 GHz	–120 dBm (300 Hz)	–114 dBm (1 kHz)
At 26 GHz	–	–
At 40 GHz	–	–
At 50 GHz	–	–
Third order intercept (TOI)	5 dBm	13 dBm
Dynamic range for 3GPP ACLR in adjacent channel	–	–
Phase noise		
10 kHz offset	–90 dBc (1 Hz)	–85 dBc (1 Hz), 30 kHz offset
Total measurement uncertainty	1.5 dB	1.5 dB
Display linearity	–	–
Display and traces		
Display	TFT color display	transflective LC color display
Size and resolution	13.7 cm, 320 × 240 pixel	14 cm, 320 × 240 pixel
Number of traces	1 active trace, 1 memory trace	1 active trace, 1 memory trace
Number of sweep points	900	301 DTF (R&S® FSH-B1): 1024
Detectors	max peak R&S® FS 315: max/min peak, sample, average, RMS	max peak, min peak, auto peak, sample, RMS quasi-peak (R&S® FSH-K3, receiver mode)
I/Q demodulation		
Bandwidth of I/Q demodulation	–	–
I/Q memory	–	–
I/Q baseband inputs	–	–
Speed		
Sweep time, span >10 Hz	100 ms to 1000 s R&S® FS 315: 30 ms to 1000 s	100 ms to 1000 s

	R&S®FSL	R&S®FSP	R&S®FSU/R
Applications in ser-	3 GHz/6 GHz general-purpose spectrum analyzer for service and production	General-purpose spectrum analyzer up to 40 GHz for most lab applications, service and measurements in production	Spectrum analyzer up to 50 GHz for a with high demands R&S®FSMR: additionally calibrator fo
	9 kHz to 3/6 GHz	9 kHz to 40 GHz	20 Hz to
	–	optional lower limit of 20 Hz (R&S®FSP-B29)	
	1000 Hz	up to 1.12 THz (R&S®FSP-B21, only for R&S®FSP 40)	up to 1. (R&S®FSU-B21, only fo
	180 Hz (R&S®FSL-B4)	1000 Hz	180
		180 Hz (R&S®FSP-B4)	50 Hz (R&S
13)	300 Hz to 10 MHz 10 Hz to 10 MHz (optional) zero span: additionally 20 MHz	10 Hz to 10 MHz	10 Hz to 5
	300 Hz to 30 kHz 1 Hz to 30 kHz (optional)	1 Hz to 30 kHz	1 Hz to 3
			100/200/30 1/1.5/2/2.4/2.7/3/3.4/4/4.5/5/6/8.5/9/10/12.5/14/15/ 1/1.2288/1.5
		18 kHz, 24.3 kHz, 1.28 MHz, 3.84 MHz, 4.096 MHz	
	200 Hz (optional), 9 kHz, 120 kHz, 1 MHz		
displayed noise floor to +20 dBm			
	0 dB to 30 dB, in steps of 5 dB	0 dB to 70 dB, in steps of 10 dB	
	100 dB to 10 dB	200 dB to 1 dB	
	–117 dBm (300 Hz) –152 dBm (1 Hz, preamplifier)	–155 dBm (1 Hz)	–158 dBm
	–	–138 dBm (1 Hz)	–148 dBm
	–	–130 dBm (1 Hz)	–143 dBm
	–	–	–131 dBm
	15 dBm	15 dBm	27 dB
	55 dB	66 dB	84 dB
	typ. –103 dBc (1 Hz)	–113 dBc (1 Hz)	–128 dBc
	0.5 dB (to 3 GHz)	0.5 dB (to 3 GHz)	0.3 dB (to
	0.2 dB	0.2 dB	0.1 dB
	TFT color display	TFT color display	TFT color
	VGA	21 cm, VGA	21 cm, VGA
	max. 4 active traces	max. 6 active traces	max. 6 active
	501, 101 to 32001	501, 101 to 8001	625, 151 to
peak, average			max peak, min peak, auto peak, sa
	20 MHz	8 MHz	8 MHz
	512 ksample	128 ksample, optionally 512 ksample	512 ksample
	–	–	–
	2.5 ms to 16000 s		

R&S®FSMR	R&S®FSQ	R&S®FSUP
applications in R&D and production on dynamic range for signal generators and attenuators	Signal analyzer with integrated spectrum analyzer up to 40 GHz and demodulation bandwidth up to 120 MHz	Signal Source Analyzer up to 50 GHz Phase noise tester and high-end spectrum analyzer
50 GHz	20 Hz to 40 GHz	20 Hz to 50 GHz
12 THz for R&S®FSU26/46/50	up to 1.12 THz (R&S®FSU-B21, only for R&S®FSQ26/40)	up to 1.12 THz (R&S®FSU-B21, only for R&S®FSU26/46/50)
180 Hz	180 Hz	180 Hz
R&S®FSU-B4)	50 Hz (R&S®FSU-B4)	50 Hz (R&S®FSU-B4)
50 MHz	10 Hz to 50 MHz	10 Hz to 50 MHz
30 kHz	1 Hz to 30 kHz	1 Hz to 30 kHz
10/500 Hz/ 1/16/20/21/25/30/50/100/150/192/300/300/500 kHz 1/2/3/5 MHz		
200 Hz, 9 kHz, 120 kHz		
displayed noise floor to +30 dBm		
	0 dB to 75 dB, in steps of 5 dB	
	200 dB to 1 dB	
noise floor (1 Hz)	-158 dBm (1 Hz)	-158 dBm (1 Hz)
noise floor (1 Hz)	-146 dBm (1 Hz)	-148 dBm (1 Hz)
noise floor (1 Hz)	-138 dBm (1 Hz)	-143 dBm (1 Hz)
noise floor (1 Hz)		-131 dBm (1 Hz)
max. output power	27 dBm	27 dBm
dynamic range	84 dB	84 dB
phase noise (1 Hz)	-128 dBc (1 Hz)	-134 dBc (1 Hz)
phase noise (3.6 GHz)	0.3 dB (to 3.6 GHz)	0.3 dB (to 3.6 GHz)
phase noise (100 kHz)	0.1 dB	0.1 dB
display	TFT color display	TFT color display
display size	21 cm, SVGA	21 cm, SVGA
max. active traces	max. 6 active traces	max. 6 active traces
max. resolution	625, 151 to 30001	625, 151 to 10001
triggering	edge, RMS, average, quasi-peak	
update rate	28 MHz, optionally 120 MHz (R&S®FSQ-B72)	8 MHz
sample rate	16 Msample optional (R&S®FSQ-B71)	512 ksamples -
acquisition time	2.5 ms to 16000 s	

	R&S® FS300/315	R&S® FSH
Zero span	100 µs to 20 s	1 ms to 100 s
Measurement rate on IEC/IEEE bus	–	–
Measurement rate, vector signal analysis, GSM signal	–	–
Measurement functions		
AM/FM audio demodulation	–	–
AM/FM/ϕM measurement demodulator	–	–
Time domain power	–	–
Gated sweep	–	–
Pre-/post-trigger	–	–
TOI	standard	–
Channel power measurement	–	standard, predefined for CDMA2000®, WCDMA
ACP	–	–
Multicarrier ACP	–	–
Fast ACP	–	–
CCDF	–	–
Modulation depth marker	–	–
Limit lines	–	–
Split-screen display with independent measurement settings	–	–
Transducer factors	–	2 sets
Logarithmic sweep	–	–
Trigger	video, external, line	video, external
Interfaces		
Remote control	USB (R&S®FS300-K1)	RS-232-C (R&S®FSH-K1)
Command set	ASCII	
	–	–
IVI-Com driver	–	–
VXI plug & play driver	–	–
LabView/LabWindows driver	–	–
External monitor	–	–
LAN	–	–
Other options		
Preamplifier	–	models .03 and .23, .06 and .26
Wear-free electronic attenuator	–	–
Tracking generator		
Internal	–	models .13 and .23: up to 3 GHz standard model .26: up to 6 GHz standard
Modulation	–	–
Output level	–	model .23: –20 dBm, 0 dBm model .26: –10 dBm at f < 3 GHz –20 dBm at f > 3 GHz
External	–	–
Battery operation	–	standard
Support of power sensor	–	standard
Suitable power sensors	–	R&S®FSH-Z1, R&S®FSH-Z18, R&S®FSH-Z19
Distance-to-fault measurement	–	R&S®FSH-B1
Receiver mode	–	R&S®FSH-K3

	R&S®FSL	R&S®FSP	R&S®FSU/R
	1 μs to 16000 s		
	80/s	80/s	70/
		–	–
	standard	optional (R&S®FSP-B3)	stand
	optional (R&S®FSL-K7)	optional (R&S®FS-K7)	optional (R&
	standard		
	optional (R&S®FSL-B8)		
	standard		
	standard		
DMA			standard, 23 predefined standard
			standard, 23 predefined standard
			standard, 23 predefined standard
			stand
			stand
			stand
			standard
	–		stand
			stand
	–		
	video, external, power, TV (optional)	video, external, IF/RF power, TV (optional)	
	IEC/IEEE bus optional, LAN		SCPI com
	–		
			standard, available on the Intern
		standard, available on the Internet at www.rohde-schwarz.com	
		standard, available on the Internet at www.rohde-schwarz.com	
	–	VGA	
	standard	optional (R&S®FSP-B16)	
	R&S®FSL-B22	up to 7 GHz	
standard		for R&S®FSP3/7 (R&S®FSP-B25)	up to 8 GHz (R&
rd	models .13 and .16	up to 3 GHz (R&S®FSP-B9)	up to 3.6 GHz (F
	–	I/Q, FM, AM	I/Q, FM
	0 dBm to –20 dBm	0 dBm to – 20 dBm	+5 dBm to – optionally +5 dBm
	–	–	–
		with R&S®FSP-B30, R&S®FSP-B31	–
	with R&S®FSL-K9	with R&S®FS-K9	with R&S
244		R&S®NRP-Z11/-Z21/-Z22/-Z23/-Z24, R&S®NRP-Z51/-Z55, R&S®NRP-Z91 with R&S	
		–	–
		–	–

R&S®FSMR	R&S®FSQ	R&S®FSUP
1 μs to 16000 s		
s	70/s	70/s
	40/s	–
ard	standard	standard
R&S®FS-K7)	optional (R&S®FS-K7)	optional (R&S®FS-K7)
	standard	
s plus user-definable standards		
s plus user-definable standards		
s plus user-definable standards		
ard		
	standard	
	video, external, IF/RF power	
	IEC/IEEE bus, LAN, RS-232-C	
patible		
	compatible with 8566/8586 A/B, 856x, 859x and series 70000	
et at www.rohde-schwarz.com		
	SVGA	
	standard	
	up to 26 GHz	
R&S®FSU-B25)	up to 8 GHz, (R&S®FSU-B25)	up to 8 GHz (R&S®FSU-B25)
R&S®FSU-B9)	up to 3.6 GHz (R&S®FSU-B9)	up to 3.6 GHz (R&S®FSU-B9)
I, AM	I/Q, FM, AM	I/Q, FM, AM
– 30 dBm m to –100 dBm	0 dBm to –20 dBm optionally +5 dBm to –100 dBm	+5 dBm to –30 dBm optionally +5 dBm to –100 dBm
	with External Generator Control R&S®FSP-B10 and signal generators such as the R&S®SMR, R&S®SMP, R&S®SMIQ, R&S®SMU	–
	–	–
®FS-K9	with R&S®FS-K9	with R&S®FS-K9
®NRP-Z3/-Z4 adapter (R&S®FSL with NRP-Z3/-Z4 adapter or option R&S®FSL-B5)		
	–	–
	–	–



Weitere Informationen unter
www.rohde-schwarz.com
(Suchbegriff: Spectrum analysis)



www.rohde-schwarz.com

Europe: +49 1805 12 4242, customersupport@rohde-schwarz.com
USA and Canada: +1-888-837-8772, customer.support@rsa.rohde-schwarz.com
Asia: +65 65 130 488, customersupport.asia@rohde-schwarz.com