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R&S® FSG Spectrum Analyzer

Data sheet

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Specifications

Specifications apply under the following conditions:

30 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and total calibration performed. Data without tolerances: typical values only. Data designated 'nominal' applies to design parameters and is not tested.

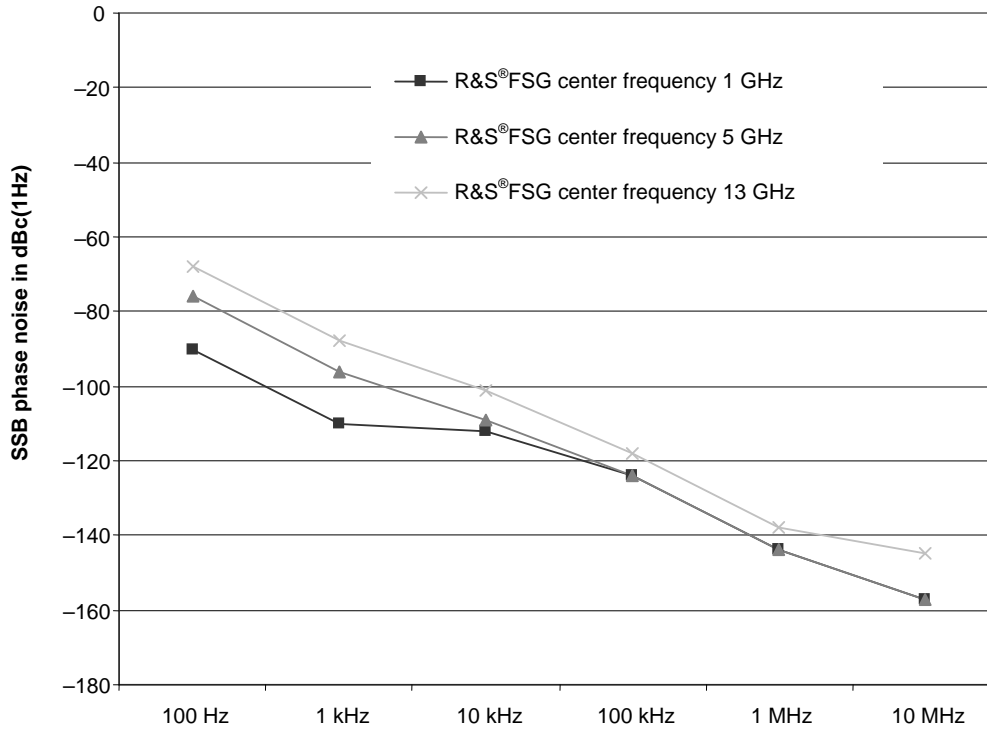
Frequency

Frequency range	R&S®FSG8	
	DC coupled	9 kHz to 8 GHz
	AC coupled	1 MHz to 8 GHz
	R&S®FSG13	
	DC coupled	9 kHz to 13.6 GHz
	AC coupled	10 MHz to 13.6 GHz
Frequency resolution		0.01 Hz

Reference frequency, internal, nominal		
Aging per day	after 30 days of continuous operation	1×10^{-9}
Aging per year	after 30 days of continuous operation	1×10^{-7}
Temperature drift	+5 °C to +45 °C	8×10^{-8}
Total error	per year	1.8×10^{-7}
External reference frequency		1 MHz to 20 MHz, 1 Hz steps

Frequency display		with marker or frequency counter
Marker resolution		span/624
Maximum deviation	sweep time >3 × auto sweep time	$\pm(\text{marker frequency} \times \text{reference error} + 0.5 \% \times \text{span} + 10 \% \times \text{resolution bandwidth} + \frac{1}{2} \text{ (last digit)})$
Frequency counter resolution	selectable	0.1 Hz to 10 kHz
Count accuracy	S/N >25 dB	$\pm(\text{frequency} \times \text{reference error} + \frac{1}{2} \text{ (last digit)})$
Display range for frequency axis		0 Hz, 10 Hz to max. frequency
Resolution		0.1 Hz
Max. span deviation		1 %

Spectral purity, SSB phase noise (1 Hz)	f = 640 MHz	
Residual FM	nominal, RBW 10 kHz, RMS	<1 Hz
Carrier offset	100 Hz	<-85 dBc
	1 kHz	<-105 dBc
	10 kHz	<-105 dBc
	100 kHz	<-120 dBc
	1 MHz	<-138 dBc
	10 MHz	typ. -150 dBc



Sweep

Sweep time	time sweep, span = 0 Hz	1 μ s to 16000 s in 5 % steps
	frequency sweep, span \geq 10 Hz	2.5 ms to 16000 s in steps \leq 10 %
Max. deviation of sweep time		3 %
Measurement in time domain		with marker and cursor lines (resolution 31.25 ns)

Resolution bandwidths

Sweep filters		
3 dB bandwidths		10 Hz to 10 MHz in 1/2/3/5 sequence
Bandwidth uncertainty	10 Hz to 100 kHz (digital)	<3 %
	200 kHz to 5 MHz (analog)	<10 %
	10 MHz	-30 % to +10 %
Shape factor 60 dB : 3 dB	\leq 100 kHz	<6
	200 kHz to 2 MHz	<12
	3 MHz to 10 MHz	<7

FFT filters		
3 dB bandwidths		1 Hz to 30 kHz in 1/2/3/5 sequence
Bandwidth uncertainty		5 %, nominal
Shape factor 60 dB : 3 dB		<3, nominal

Video bandwidths		
		1 Hz to 10 MHz in 1/2/3/5 sequence

Level

Display range	displayed noise floor to +30 dBm
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Maximum input level		
DC voltage	RF input AC coupled	50 V
	RF input DC coupled	0 V
CW RF power	RF attenuation 0 dB	20 dBm (= 0.1 W)
	RF attenuation ≥ 10 dB	30 dBm (= 1 W)

Intermodulation		
1 dB compression of input mixer	0 dB RF attenuation	
	≤ 3.6 GHz	+13 dBm, nominal
	> 3.6 GHz	
	R&S®FSG8	+10 dBm, nominal
Third-order intercept point (TOI)	R&S®FSG13	
	level 2×-10 dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger	
	R&S®FSG8	
	$10 \text{ MHz} \leq f_{in} < 300 \text{ MHz}$	> 17 dBm, typ. 20 dBm
	$300 \text{ MHz} \leq f_{in} \leq 8 \text{ GHz}$	> 18 dBm, typ. 21 dBm
	R&S®FSG13	
	$10 \text{ MHz} \leq f_{in} < 300 \text{ MHz}$	> 17 dBm, typ. 20 dBm
	$300 \text{ MHz} \leq f_{in} < 3.6 \text{ GHz}$	> 18 dBm, typ. 21 dBm
Second harmonic intercept (SHI)	$3.6 \text{ GHz} \leq f_{in} \leq 13.6 \text{ GHz}$	> 12 dBm, typ. 15 dBm
	$f_{in} \leq 100 \text{ MHz}$	> 35 dBm
	$100 \text{ MHz} < f_{in} \leq 400 \text{ MHz}$	> 45 dBm, typ. 55 dBm
	$400 \text{ MHz} < f_{in} \leq 500 \text{ MHz}$	> 52 dBm, typ. 60 dBm
	$500 \text{ MHz} < f_{in} \leq 1 \text{ GHz}$	> 45 dBm, typ. 55 dBm
	$1 \text{ GHz} < f_{in} \leq 1.8 \text{ GHz}$	> 35 dBm
	$f_{in} > 1.8 \text{ GHz}$	80 dBm, nominal

Displayed average noise level		
0 dB RF attenuation, termination 50 Ω , RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, log. scaling, trace average, sweep count = 20, mean marker, normalized to 1 Hz RBW		
9 kHz	< -130 dBm	
100 kHz	< -130 dBm	
1 MHz	< -140 dBm	
10 MHz	< -150 dBm	
R&S®FSG8		
$20 \text{ MHz} \leq f < 2 \text{ GHz}$	< -152 dBm, typ. -155 dBm	
$2 \text{ GHz} \leq f < 3 \text{ GHz}$	< -151 dBm, typ. -154 dBm	
$3 \text{ GHz} \leq f < 7 \text{ GHz}$	< -150 dBm, typ. -153 dBm	
$7 \text{ GHz} \leq f \leq 8 \text{ GHz}$	< -149 dBm, typ. -152 dBm	
R&S®FSG13		
$20 \text{ MHz} \leq f < 2 \text{ GHz}$	< -152 dBm, typ. -155 dBm	
$2 \text{ GHz} \leq f < 8 \text{ GHz}$	< -150 dBm, typ. -153 dBm	
$8 \text{ GHz} \leq f \leq 13.6 \text{ GHz}$	< -149 dBm, typ. -152 dBm	

Immunity to interference		
Image frequency	$f \leq 3.6$ GHz	>90 dB suppression, typ. >110 dB
	3.6 GHz < $f \leq 13.6$ GHz $f =$ receive frequency	>70 dB suppression, typ. >100 dB
Intermediate frequency	$f \leq 3.6$ GHz	>90 dB suppression, typ. >110 dB
	3.6 GHz < $f \leq 4.2$ GHz	typ. 70 dB suppression
	$f > 4.2$ GHz	>70 dB suppression, typ. >90 dB
	$f =$ receive frequency	
Spurious response	$f > 1$ MHz, without input signal, 0 dB RF attenuation	<-103 dBm
Other interfering signals	$\Delta f > 100$ kHz	
	mixer level <-10 dBm, $f_{in} \leq 2.3$ GHz	<-80 dBc
	mixer level <-35 dBm, 2.3 GHz < $f_{in} < 4$ GHz	<-70 dBc
	mixer level <-10 dBm 4 GHz $\leq f < 8$ GHz	<-70 dBc
	8 GHz $\leq f \leq 13.6$ GHz	<-64 dBc
	$f =$ receive frequency	

Level display		
Screen		625 x 500 pixel (one diagram), max. 2 diagrams with independent settings
Logarithmic level axis		1 dB to 200 dB, in steps of 1/2/5
Linear level axis		10 % of reference level per level division, 10 divisions or logarithmic scaling
Number of traces	1 measurement diagram	3
	2 measurement diagrams	6
Trace detector		Max Peak, Min Peak, Auto Peak (Normal), Sample, RMS, Average
Number of measurement points	default value	625
	range	155 to 30001 in steps of about a factor of 2
Trace functions		Clear/Write, Max Hold, Min Hold, Average
Trace update rate	local measurement, display update rate, 625 points, zero span, sweep time 1 ms remote measurement, display OFF:	90/s
	zero span, sweep time 1 ms	100/s
	span = 10 MHz, sweep time 2.5 ms	70/s
Setting range of reference level	logarithmic level display	-130 dBm to (+5 dBm + RF attenuation), max. 30 dBm, in steps of 0.1 dB
	linear level display	7.0 nV to 7.07 V in steps of 1 %
Units of level axis	logarithmic level display	dBm, dB μ V, dBmV, dB μ A, dBpW
	linear level display	μ V, mV, μ A, mA, pW, nW

Level measurement uncertainty		
Absolute level uncertainty at 128 MHz	RBW = 10 kHz, level -30 dBm, reference level -30 dBm, RF attenuation 10 dB	<0.2 dB ($\sigma = 0.07$ dB)
Frequency response referenced to 128 MHz	DC coupling, RF attenuation ≥ 10 dB, +20 °C to +30 °C	
	10 MHz $\leq f < 3.6$ GHz	<0.3 dB ($\sigma = 0.1$ dB)
	3.6 GHz $\leq f < 8$ GHz, span <1 GHz	<1.5 dB ($\sigma = 0.5$ dB)
	8 GHz $\leq f \leq 13.6$ GHz, span <1 GHz	<2 dB ($\sigma = 0.7$ dB)
	RF attenuation >40 dB or $f \geq 3.6$ GHz, span ≥ 1 GHz	add 0.5 dB to above values
	+5 °C to +45 °C	
	10 MHz $\leq f < 3.6$ GHz	<0.6 dB ($\sigma = 0.2$ dB)
	3.6 GHz $\leq f \leq 13.6$ GHz RF attenuation >40 dB or $f \geq 3.6$ GHz, span ≥ 1 GHz	add 0.5 dB to above values
Attenuator switching uncertainty	$f = 128$ MHz, 0 dB to 70 dB, referenced to 10 dB attenuation	<0.2 dB ($\sigma = 0.07$ dB)
Uncertainty of reference level setting	RF attenuation 10 dB, referenced to -10 dBm reference level setting	<0.15 dB ($\sigma = 0.05$ dB)

Display nonlinearity	+20 °C to +30 °C, mixer level ≤ -10 dBm	
Logarithmic level display	RBW ≤ 100 kHz, S/N > 20 dB	
	0 dB to -70 dB	<0.1 dB ($\sigma = 0.03$ dB)
	-70 dB to -90 dB	<0.3 dB ($\sigma = 0.1$ dB)
	200 kHz \leq RBW ≤ 10 MHz, S/N > 16 dB	
	0 dB to -50 dB	<0.2 dB ($\sigma = 0.07$ dB)
	-50 dB to -70 dB	<0.5 dB ($\sigma = 0.17$ dB)
Linear level display		5 % of reference level
Bandwidth switching error	referenced to RBW = 10 kHz	
	1 Hz to 100 kHz	<0.1 dB ($\sigma = 0.03$ dB)
	200 kHz to 3 MHz	<0.2 dB ($\sigma = 0.07$ dB)
	5 MHz to 10 MHz	<0.5 dB ($\sigma = 0.15$ dB)
	FFT filter 1 Hz to 3 kHz	<0.2 dB ($\sigma = 0.07$ dB)

Total measurement uncertainty		
	signal level 0 dB to -70 dB below reference level, S/N > 20 dB, 10 dB \leq RF attenuation ≤ 40 dB, span/RBW < 100 , 95 % confidence level, +20 °C to +30 °C, mixer level ≤ -10 dBm	
	f < 3.6 GHz, RBW ≤ 100 kHz	0.3 dB
	f < 3.6 GHz, RBW > 100 kHz	0.5 dB
	3.6 GHz \leq f < 8 GHz	1.2 dB
	8 GHz \leq f ≤ 13.6 GHz	1.5 dB

I/Q data

General		
Interface		GPIB or LAN interface
Sampling rate		programmable: 10 kHz to 81.6 MHz in 0.1 Hz steps
ADC resolution		14 bit
I/Q memory		4 Msample each for I and Q data

RF path		
Max. information bandwidth		28 MHz
Spurious	full-scale input signal	typ. < -70 dBc
Third-order distortion	two tones -6 dBFS each	typ. < -80 dBc
LO feedthrough	$f_{I/Q} = 81.6$ MHz - f_{center} mixer level = -10 dBm	typ. < -65 dBFS
Aliased DC offset	$f_{I/Q} = 20.4$ MHz; within ± 10 K temperature change after I/Q or total calibration	typ. < -65 dBFS

Frequency response		
Equalized bandwidth	RBW setting:	equalized bandwidth:
	3 MHz	2 MHz
	5 MHz	3 MHz
	10 MHz	7 MHz
	20 MHz	17 MHz
	50 MHz	28 MHz
Amplitude flatness within equalized bandwidth	f ≤ 3.6 GHz	typ. 0.3 dB
	f > 3.6 GHz, YIG filter OFF	typ. 0.5 dB
Deviation from linear phase within equalized bandwidth	f ≤ 3.6 GHz	typ. 1°
	f > 3.6 GHz, YIG filter OFF	typ. 2°

Trigger functions

Trigger		
Trigger source		free run, video, external, IF level (mixer level 10 dBm to -50 dBm)
Trigger offset	span ≥ 10 Hz	125 ns to 100 s, resolution 125 ns min. (or 1 % of offset)
	span = 0 Hz	$\pm(125 \text{ ns to } 100 \text{ s})$, resolution 125 ns min., dependent on sweep time
Max. deviation of trigger offset		$\pm(31.25 \text{ ns} + (0.1 \% \times \text{trigger offset}))$
Gated sweep		
Gate source		external, IF level, video
Gate delay		1 μs to 100 s
Gate length		125 ns to 100 s, resolution min. 125 ns or 1 % of gate length
Max. deviation of gate length		$\pm(31.25 \text{ ns} + (0.05 \% \times \text{gate length}))$

Inputs and outputs (front panel)

RF input		
Impedance		50 Ω
Connector		N female
VSWR	RF attenuation ≥ 10 dB, DC coupled	
	$f < 3.6$ GHz	1.5
	R&S®FSG8:	
	3.6 GHz $\leq f < 8$ GHz	< 2
	R&S®FSG13:	
3.6 GHz $\leq f < 13.6$ GHz	< 1.8	
	RF attenuation < 10 dB or AC coupling	typ. 1.5
Setting range of attenuator		0 dB to 75 dB, in 5 dB steps

USB interface		type A plug, version 2.0
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Probe power supply		
Supply voltages		+15 V DC, -12.6 V DC and ground, max. 150 mA, nominal

Power sensor		
Connector		6-pin LEMOSA female for supported R&S®NRP-Zxx power sensors

Power supply for noise source		
Output voltage		BNC female 0 V and 28 V, switchable, nominal

Inputs and outputs (rear panel)

IF 20.4 MHz		
Impedance		BNC female 50 Ω
Bandwidth	RBW ≤ 30 kHz	1.67 \times resolution bandwidth, min. 2.6 kHz
	RBW = 50 kHz, 100 kHz	400 kHz
	200 kHz \leq RBW ≤ 10 MHz	equal to resolution bandwidth
Level	RBW ≤ 100 kHz, FFT filter, mixer level ≥ -70 dBm	-20 dBm at reference level
	RBW = 200 kHz to 10 MHz, mixer level ≥ -50 dBm	0 dBm at reference level

Video output		
Impedance		BNC female 50 Ω
Output voltage	RBW ≥ 200 kHz, logarithmic scaling, full scale	0 V to 1 V (EMF)

Reference output		
Impedance		BNC female 50 Ω
Output frequency	internal reference	10 MHz
	external reference	same as reference input signal
Level		> 0 dBm, nominal

Reference Input		
Impedance		BNC female 50 Ω
Input frequency range		1 MHz $\leq f_{in} \leq 20$ MHz, in 1 Hz steps
Required level		> 0 dBm from 50 Ω

Sweep output		BNC female
Output voltage		0 V to 5 V, proportional to displayed frequency

External trigger/gate input		BNC female
Trigger voltage		0.5 V to 3.5 V
Input impedance		≥10 kΩ

IEC/IEEE bus control		interface in line with IEC 625-2 (IEEE 488.2)
Command set		SCPI 1997.0 or HP8566 compatible
Connector		24-pin Amphenol female
Interface functions		SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0
LAN interface		10/100BaseT, RJ-45
USB interface	upper connector	type A plug, version 1.1
	lower connector	type A plug, version 2.0
Serial interface		RS-232-C (COM), 9-pin female connectors
Mouse interface		PS/2 compatible
Connector for external monitor (VGA)		15-pin D-Sub

General specifications

Display		21 cm LC TFT color display (8.4")
Resolution		800 × 600 pixel (SVGA resolution)
Pixel failure rate		$<1 \times 10^{-5}$

Mass memory		
Mass memory		hard disk, USB memory stick (not supplied)
Data storage		>500 instrument settings and traces

Temperature		
Temperature	operating temperature range	+5 °C to +40 °C
	permissible temperature range	+0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+40 °C at 95 % relative humidity (EN 60068-2-30: 2000-02)

Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz; 0.5 g from 55 Hz to 150 Hz; in line with EN 60068-2-6: 1996-05, EN 60068-2-30: 2000-02, EN 61010-1, MIL-T-28800D, class 5
	random	10 Hz to 100 Hz, acceleration 1 g (rms)
Shock		40 g shock spectrum, in line with MIL-STD-810C and MIL-T-28800D, classes 3 and 5
Recommended calibration interval	operation with external reference	2 years
	operation with internal reference	1 year
EMC		in line with European EMC Directive 89/336/EEC and EMC Directive 2004/108/EC including: IEC/EN 61326 class B (emission), (with R&S®FSG-B17 option installed: class A) CISPR 11/EN 55011/ group 1 class B (emission), (with R&S®FSG-B17 option installed: class A) IEC/EN 61326 table A.1 (immunity, industrial)

Power supply		
AC supply		100 V to 240 V, 3.1 A to 1.3 A; 50 Hz to 400 Hz, class of protection I in line with VDE 411
Power consumption	R&S®FSG8	typ. 130 VA
	R&S®FSG13	typ. 140 VA
Safety		in line with EN 61010-1, UL 3111-1, CSA C22.2 No. 1010-1, IEC 1010-1
Test mark		VDE, GS, CSA, CSA-NRTL
Dimensions	W × H × D	435 mm × 192 mm × 460 mm
		(17.13 in × 7.56 in × 18.11 in)
Weight net without options, nominal	R&S®FSG8	15.4 kg (33.95 lb)
	R&S®FSG13	16.5 kg (36.4 lb)

R&S®FSQ-B17 digital baseband interface

The R&S®FSQ-B17 option provides access to the digital baseband signals of the R&S®FSG. These signals are downconverted analog signals from the RF input.

The digital baseband data (I/Q data) is available at the I/Q DATA OUT connector of the R&S®FSQ-B17 option.

The sampling rate is programmable within the limits defined by the resampling and decimation capabilities of the R&S®FSG.

The R&S®FSQ-B17 option supports the output of digital baseband signals.

The characteristics of the output signal are specified below.

The configuration of this option is performed exclusively via remote control.

Electromagnetic compatibility		immunity for industrial environment; class A emissions
Note regarding the use of the instrument with the R&S®FSQ-B17 option installed:		
The instrument complies with the emission requirements stipulated by EN 55011 class A. This means that the instrument is suitable for use in industrial environments. In accordance with EN 61000-6-4, operation is not covered in residential, commercial, and business areas nor in small-size companies.		
The instrument must not be operated in residential, commercial, and business areas nor in small-size companies, unless additional measures are taken to ensure that EN 61000-6-3 is met.		

I/Q DATA OUTPUT		
Resolution	for I and Q data each	20 bit
Data rate		81.6 MHz
Sampling rate		10 kHz to 81.6 MHz
Data format	channel link serializer output	48-bit-wide bus multiplexed to 8 lines

Output (rear panel)

I/Q DATA OUT		
Connector		26-pin female 0.050" Mini D Ribbon connector
Data lines	number of data lines (differential lines)	8
	bit rate (on each data line)	489.6 MHz
	level	LVDS
Clock	clock rate	81.6 MHz
	level	LVDS

R&S® FSU-B25 electronic attenuator

Frequency range		
	R&S®FSG8	
	electronic attenuator	10 MHz to 8 GHz
	preamplifier	100 kHz to 8 GHz
	R&S®FSG13	
	electronic attenuator	10 MHz to 3.6 GHz
	preamplifier	100 kHz to 3.6 GHz

Setting range		
Electronic attenuator		0 dB to 30 dB, in 5 dB steps
Preamplifier		20 dB, switchable

Level measurement uncertainty		
Frequency response	with preamplifier or electronic attenuator	
	10 MHz to 50 MHz	<1 dB ($\sigma = 0.34$ dB)
	50 MHz to 3.6 GHz	<0.6 dB ($\sigma = 0.2$ dB)
	3.6 MHz to 8 GHz	<2.0 dB ($\sigma = 0.7$ dB)
Reference error	at 128 MHz, RBW \leq 100 kHz, reference level -30 dBm, RF attenuation 10 dB	
	electronic attenuator	<0.3 dB ($\sigma = 0.1$ dB)
	preamplifier	<0.3 dB ($\sigma = 0.1$ dB)

Displayed average noise level		
	0 dB RF attenuation, termination 50 Ω , RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, log. scaling, trace average, sweep count = 20, mean marker, normalized to 1 Hz RBW	
	preamplifier = ON	
	R&S®FSG8, R&S®FSG13	
	10 MHz to 2.0 GHz	<-162 dBm
	2.0 GHz to 3.6 GHz	<-160 dBm
	R&S®FSG8	
	3.6 GHz to 8 GHz	<-157 dBm
	with the R&S®FSU-B25 built in, the average noise level values displayed by the base units degrade by the following values (R&S®FSU-B25 OFF):	
	R&S®FSG8, R&S®FSG13	
	9 kHz to 3.6 GHz	1 dB
	R&S®FSG8	
	3.6 GHz to 8 GHz	2 dB
	preamplifier = OFF, electronic attenuator 0 dB	
	R&S®FSG8, R&S®FSG13	
	9 kHz to 3.6 GHz	typ. 2.5 dB
	R&S®FSG8	
	3.6 GHz to 8 GHz	typ. 3.5 dB

Intermodulation		
Third-order intercept point (TOI)	electronic attenuator on, $\Delta f > 5 \times$ RBW or 10 kHz	
	10 MHz to 300 MHz	>17 dBm
	300 MHz to 3.6 GHz	>20 dBm
	3.6 GHz to 8 GHz	>18 dBm

Ordering information

Designation	Type	Order No.
Spectrum Analyzer 9 kHz to 8 GHz	R&S®FSG8	1309.0002.08
Spectrum Analyzer 9 kHz to 13.6 GHz	R&S®FSG13	1309.0002.13
Accessories supplied		
Power cable, printed quick start guide, and CD-ROM (with operating manual and service manual)		

Options

Designation	Type	Order No.	Retrofittable	Remarks
Options				
Digital Baseband Interface	R&S®FSQ-B17	1163.0063.02	no	
Electronic Attenuator, 0 dB to 30 dB, and 20 dB Preamplicifier (3.6 GHz)	R&S®FSU-B25	1144.9298.02	yes	
Firmware/Software				
GSM/EDGE Application Firmware	R&S®FS-K5	1141.1496.02		
FM Measurement Demodulator	R&S®FS-K7	1141.1796.02		
Bluetooth® Application Firmware	R&S®FS-K8	1157.2568.02		
Power Sensor Measurements	R&S®FS-K9	1157.3006.02		
Application Firmware for Noise Figure and Gain Measurements	R&S®FS-K30	1300.6508.02		preamplifier recommended (e.g. R&S®FSU-B25)
Application Firmware for Phase Noise Measurement	R&S®FS-K40	1161.8138.02		
3GPP BTS/Node B FDD Application Firmware	R&S®FS-K72	1154.7000.02		
3GPP UE FDD Application Firmware	R&S®FS-K73	1154.7252.02		
3GPP HSDPA BTS Application Firmware	R&S®FS-K74	1300.7156.02		requires R&S®FS-K72
3GPP TD-SCDMA BTS Application Firmware	R&S®FS-K76	1300.7291.02		
3GPP TD-SCDMA UE Application Firmware	R&S®FS-K77	1300.8100.02		
CDMA2000®/IS-95 (cdmaOne)/1xEV-DV BTS Application Firmware	R&S®FS-K82	1157.2316.02		
CDMA2000®/1xEV-DV MS Application Firmware	R&S®FS-K83	1157.2416.02		
CDMA2000®/1xEV-DO BTS Application Firmware	R&S®FS-K84	1157.2851.02		
CDMA2000®/1xEV-DO MS Application Firmware	R&S®FS-K85	1300.6689.02		
Vector Signal Analyzer	R&S®FSQ-K70	1161.8038.02		
WLAN 802.11a Application Firmware	R&S®FSQ-K90	1157.3064.02		
WLAN 802.11a/b/g/j Application Firmware	R&S®FSQ-K91	1157.3129.02		
Upgrade from R&S®FSQ-K90 to R&S®FSQ-K91	R&S®FSQ-K90U	1300.8000.02		
WiMAX 802.16-2004 OFDM Application Firmware	R&S®FSQ-K92	1300.7410.02		
WiMAX 802.16e, WiBro Application Firmware	R&S®FSQ-K93	1300.8600.02		
Upgrade from R&S®FSQ-K92 to R&S®FSQ-K93	R&S®FSQ-K92U	1300.8500.02		
EUTRA/LTE Downlink External PC Software	R&S®FSQ-K100	1308.5244.02		

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Recommended extras

Designation	Type	Order No.
Printed manuals (include operating and service manual)		1309.0102.32
IEC/IEEE Bus Cable, 1 m	R&S®PCK	0292.2013.10
IEC/IEEE Bus Cable, 2 m	R&S®PCK	0292.2013.20
19" Rack Adapter	R&S®ZZA-411	1096.3283.00
Adapter for mounting on telescopic rails (only with R&S®ZZA-411 19" Rack Adapter)	R&S®ZZA-T45	1109.3774.00
Matching pads, 50/75 Ω		
L Section, matching at both ends	R&S®RAM	0358.5414.02
Series Resistor, 25 Ω, matching at one end (taken into account in instrument function RF INPUT 75 Ω)	R&S®RAZ	0358.5714.02
High-power attenuators		
100 W, 3/6/10/20/30 dB, 1 GHz	R&S®RBU100	1073.8495.XX (XX = 03/06/10/20/30)
50 W, 3/6/10/20/30 dB, 2 GHz	R&S®RBU50	1073.8695.XX (XX = 03/06/10/20/30)
50 W, 20 dB, 6 GHz	R&S®RDL50	1035.1700.52
Connectors and cables		
Probe power connector, 3-pin		1065.9480.00



For product brochure, see PD 5213.8721.12
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