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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.

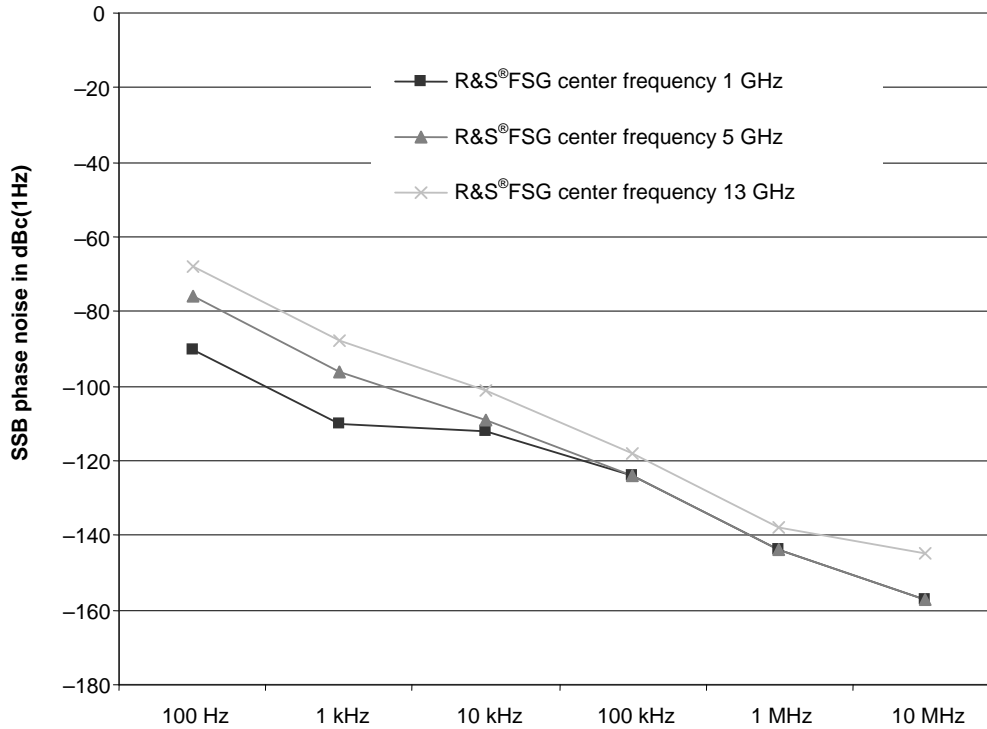
## Frequency

<b>Frequency range</b>	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
<b>Frequency resolution</b>		0.01 Hz

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

<b>Frequency display</b>		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 %

<b>Spectral purity, SSB phase noise (1 Hz)</b>	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 $\mu$ 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 $\geq 10$ dB	30 dBm (= 1 W)

Intermodulation		
1 dB compression of input mixer	0 dB RF attenuation	
	$\leq 3.6$ GHz	+13 dBm, nominal
	$> 3.6$ GHz	
	R&S®FSG8	+10 dBm, nominal
Third-order intercept point (TOI)	R&S®FSG13	
	level $2 \times -10$ 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 $\Omega$ , 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	

<b>Immunity to interference</b>		
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	

<b>Level display</b>		
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 $\mu$ V, dBmV, dB $\mu$ A, dBpW
	linear level display	$\mu$ V, mV, $\mu$ A, mA, pW, nW

<b>Level measurement uncertainty</b>		
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 $\geq 10$ 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 $\geq 1$ 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 $\geq 1$ 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)

<b>Display nonlinearity</b>	+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 (σ = 0.03 dB)
	-70 dB to -90 dB	< 0.3 dB (σ = 0.1 dB)
	200 kHz ≤ RBW ≤ 10 MHz, S/N > 16 dB	
	0 dB to -50 dB	< 0.2 dB (σ = 0.07 dB)
	-50 dB to -70 dB	< 0.5 dB (σ = 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 (σ = 0.03 dB)
	200 kHz to 3 MHz	< 0.2 dB (σ = 0.07 dB)
	5 MHz to 10 MHz	< 0.5 dB (σ = 0.15 dB)
	FFT filter 1 Hz to 3 kHz	< 0.2 dB (σ = 0.07 dB)

<b>Total measurement uncertainty</b>		
	signal level 0 dB to -70 dB below reference level, S/N > 20 dB, 10 dB ≤ 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 ≤ f < 8 GHz	1.2 dB
	8 GHz ≤ f ≤ 13.6 GHz	1.5 dB

## I/Q data

<b>General</b>		
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

<b>RF path</b>		
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	$f_{I/Q} = 81.6 \text{ MHz} - f_{\text{center}}$ mixer level = -10 dBm	typ. < -65 dBFS
Aliased DC offset	$f_{I/Q} = 20.4 \text{ MHz}$ ; within ±10 K temperature change after I/Q or total calibration	typ. < -65 dBFS

<b>Frequency response</b>		
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 $\geq 10$ 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 $\mu\text{s}$ 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)

<b>RF input</b>		
Impedance		50 $\Omega$
Connector		N female
VSWR	RF attenuation $\geq 10$ 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

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

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

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

## Inputs and outputs (rear panel)

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

<b>Video output</b>		
Impedance		BNC female 50 $\Omega$
Output voltage	RBW $\geq 200$ kHz, logarithmic scaling, full scale	0 V to 1 V (EMF)

<b>Reference output</b>		
Impedance		BNC female 50 $\Omega$
Output frequency	internal reference	10 MHz
	external reference	same as reference input signal
Level		$> 0$ dBm, nominal

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

<b>Sweep output</b>		BNC female
Output voltage		0 V to 5 V, proportional to displayed frequency

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

<b>IEC/IEEE bus control</b>		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
<b>LAN interface</b>		10/100BaseT, RJ-45
<b>USB interface</b>	upper connector	type A plug, version 1.1
	lower connector	type A plug, version 2.0
<b>Serial interface</b>		RS-232-C (COM), 9-pin female connectors
<b>Mouse interface</b>		PS/2 compatible
<b>Connector for external monitor (VGA)</b>		15-pin D-Sub

## General specifications

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

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

<b>Temperature</b>		
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)

<b>Mechanical resistance</b>		
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)

<b>Power supply</b>		
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.

<b>Electromagnetic compatibility</b>		immunity for industrial environment; class A emissions
<b>Note regarding the use of the instrument with the R&amp;S®FSQ-B17 option installed:</b>		
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.		

<b>I/Q DATA OUTPUT</b>		
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)

<b>I/Q DATA OUT</b>		
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 $\Omega$ , 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
<b>Accessories supplied</b>		
Power cable, printed quick start guide, and CD-ROM (with operating manual and service manual)		

## Options

Designation	Type	Order No.	Retrofittable	Remarks
<b>Options</b>				
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	
<b>Firmware/Software</b>				
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
<b>Matching pads, 50/75 Ω</b>		
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
<b>High-power attenuators</b>		
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
<b>Connectors and cables</b>		
Probe power connector, 3-pin		1065.9480.00



For product brochure, see PD 5213.8721.12  
and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)  
(search term: FSG)



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