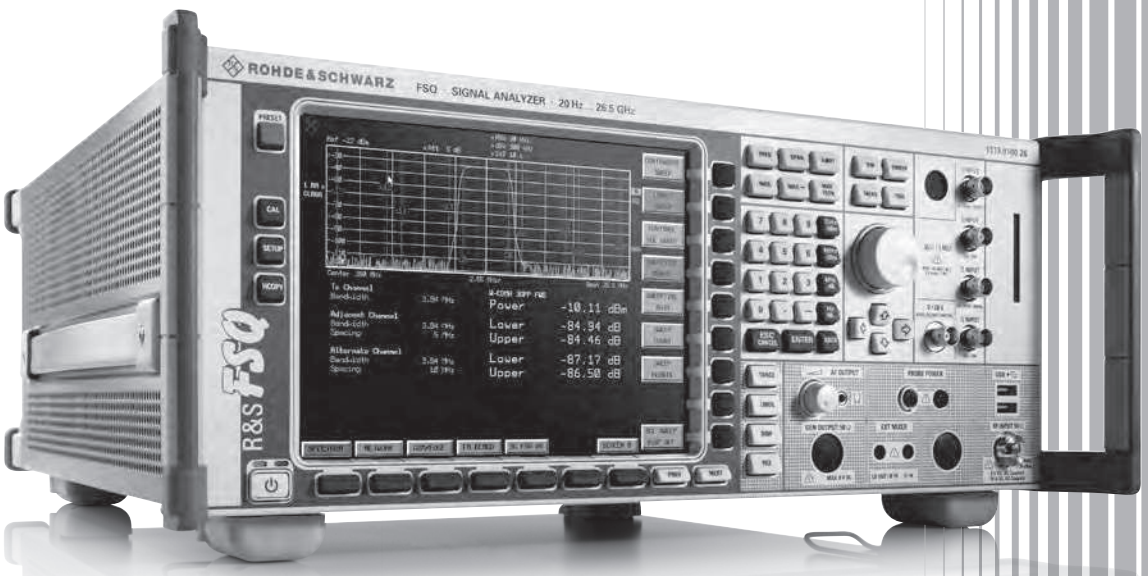
R&S®FSQ
Signal Analyzer
Specifications



ROHDE&SCHWARZ

Test & Measurement

Data Sheet | 11.00

CONTENTS

Specifications

Specifications are valid 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.

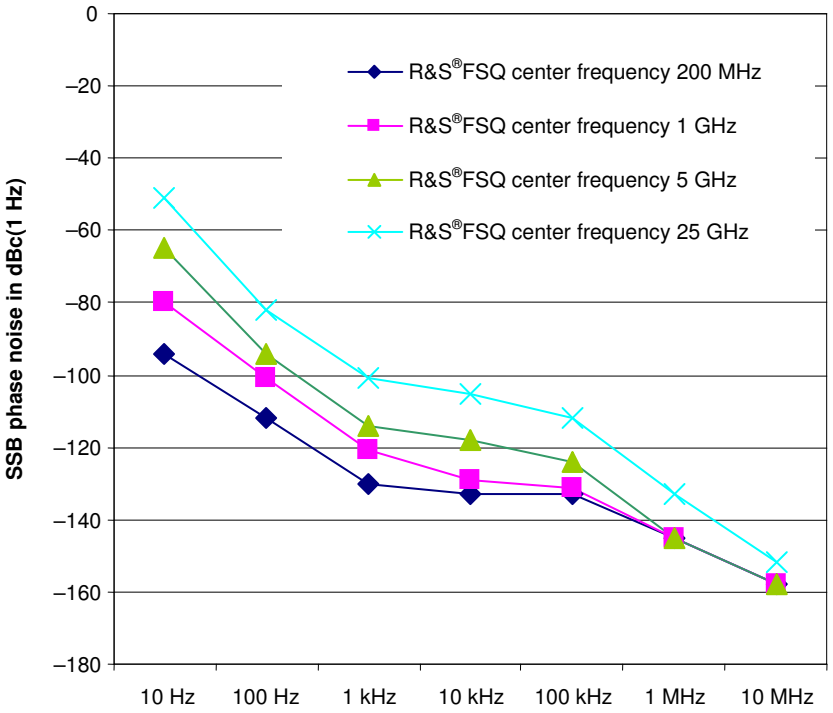
Frequency

Frequency range	R&S®FSQ3:	DC coupled	20 Hz to 3.6 GHz
		AC coupled	1 MHz to 3.6 GHz
	R&S®FSQ8:	DC coupled	20 Hz to 8 GHz
		AC coupled	1 MHz to 8 GHz
	R&S®FSQ26:	DC coupled	20 Hz to 26.5 GHz
		AC coupled	10 MHz to 26.5 GHz
	R&S®FSQ40:	DC coupled	20 Hz to 40 GHz
Frequency resolution			0.01 Hz

Reference frequency, internal, nominal	standard OCXO	
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}
Reference frequency, internal, nominal	R&S®FSU-B4 option	
Aging per day	after 30 days of continuous operation	2×10^{-10}
Aging per year	after 30 days of continuous operation	3×10^{-8}
Temperature drift	+5 °C to +45 °C	1×10^{-9}
Total error	per year	5×10^{-8}
External reference frequency		1 MHz to 20 MHz, 1 Hz steps

Frequency display		with marker or frequency counter
Marker resolution		1 Hz
Uncertainty		±(marker frequency × reference uncertainty + 10 % × resolution bandwidth + ½ (span/(sweep points -1)) + 1Hz)
Marker tuning frequency stepsize	default	span/624
	marker stepsize = sweep points	span/(sweep points – 1)
Frequency counter resolution	selectable	0.1 Hz to 10 kHz
Count accuracy	S/N > 25 dB	±(frequency × reference error + ½ (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	RBW 10 kHz, RMS	< 1 Hz, nominal
Carrier offset	10 Hz	< –73 dBc, nominal
	10 Hz with option R&S®FSU-B4 fitted	< –86 dBc, nominal
	100 Hz	< –98 dBc, typ. –104 dBc
	1 kHz	< –116 dBc, typ. –124 dBc
	10 kHz	< –128 dBc, typ. –133 dBc
	100 kHz	< –128 dBc, typ. –133 dBc
	1 MHz	< –140 dBc, typ. –146 dBc
	10 MHz	typ. –160 dBc



Sweep

Sweep time	time sweep, span = 0 Hz	1 µs to 16000 s in 5 % steps
	frequency sweep, span ≥ 10 Hz	2.5 ms to 16000 s in steps ≤ 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 20 MHz in 1/2/3/5 sequence, 50 MHz
Bandwidth uncertainty	10 Hz to 100 kHz (digital)	< 3 %
	200 kHz to 5 MHz (analog)	< 10 %
	10 MHz	–30 % to +10 %
	20 MHz	–20 % to +20 %
	50 MHz, f ≤ 3.6 GHz	–20 % to +20 %
	50 MHz, f > 3.6 GHz	–30 % to +100 %
Shape factor 60 dB:3 dB	≤ 100 kHz	< 6
	200 kHz to 2 MHz	< 12
	3 MHz to 10 MHz	< 7
	20 MHz, 50 MHz	< 6, nominal

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

EMI filters		
6 dB bandwidths		200 Hz, 9 kHz, 120 kHz
Bandwidth uncertainty		< 3 %, nominal
Shape factor 60 dB:3 dB		< 6, nominal

Channel filters		
Bandwidths		100/200/300/500 Hz, 1/1.5/2/2.4/2.7/3/3.4/4/4.5/5/6/8.5/9/10/ 12.5/14/15/16/18 (RRC)/20/21/24.3 (RRC) /25/30/50/100/150/192/200/300/500 kHz, 1/1.2288/1.28 (RRC)/1.5/2/3/3.84 (RRC) /4.096 (RRC)/5 MHz
Shape factor 60 dB:3 dB		< 2, nominal
Bandwidth uncertainty		< 2 %, nominal

Video bandwidths		1 Hz to 30 MHz in 1/2/3/5 sequence

Level

Display range		displayed noise floor to +30 dBm

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)
Pulse spectral density		97 dBµV/MHz
Max. pulse voltage	RF attenuation ≥ 10 dB	150 V
Max. pulse energy	RF attenuation ≥ 10 dB, 10 µs	1 mWs

Intermodulation		
1 dB compression of input mixer	0 dB RF attenuation	
	≤ 3.6 GHz	+13 dBm, nominal
	> 3.6 GHz	
	R&S®FSQ8	+10 dBm, nominal
	R&S®FSQ26, R&S®FSQ40	+7 dBm, nominal
Third-order intercept point (TOI)	level 2 × –10 dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger	
	R&S®FSQ3	
	10 MHz ≤ f_{in} < 300 MHz	> 17 dBm, typ. 20 dBm
	300 MHz ≤ f_{in} ≤ 3.6 GHz	> 19 dBm, typ. 25 dBm
	R&S®FSQ8	
	10 MHz ≤ f_{in} < 300 MHz	> 17 dBm, typ. 20 dBm
	300 MHz ≤ f_{in} ≤ 3.6 GHz	> 20 dBm, typ. 25 dBm
	3.6 GHz ≤ f_{in} ≤ 8 GHz	> 19 dBm, typ. 23 dBm
	R&S®FSQ26	
	10 MHz ≤ f_{in} < 300 MHz	> 17 dBm, typ. 20 dBm
	300 MHz ≤ f_{in} < 3.6 GHz	> 22 dBm, typ. 27 dBm
	3.6 GHz ≤ f_{in} < 26.5 GHz	> 12 dBm, typ. 15 dBm
	R&S®FSQ40	
	10 MHz ≤ f_{in} < 300 MHz	> 17 dBm, typ. 20 dBm
	300 MHz ≤ f_{in} < 3.6 GHz	> 20 dBm, typ. 25 dBm
	3.6 GHz ≤ f_{in} ≤ 40 GHz	> 12 dBm, typ. 15 dBm
Second harmonic intercept (SHI)	f_{in} < 100 MHz	> 35 dBm
	100 MHz < f_{in} ≤ 400 MHz	> 45 dBm, typ. 55 dBm
	400 MHz < f_{in} ≤ 500 MHz	> 52 dBm, typ. 60 dBm
	500 MHz < f_{in} ≤ 1 GHz	> 45 dBm, typ. 55 dBm
	1 GHz < f_{in} ≤ 1.8 GHz	> 35 dBm
	f_{in} > 1.8 GHz	> 80 dBm, nominal

Displayed average noise level	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW; YIG filter ON or OFF f < 10 kHz: 10 Hz FFT Filter, trace average, sweep count = 20, f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker	
	20 Hz	< –90 dBm
	100 Hz	< –110 dBm
	1 kHz	< –120 dBm
	10 kHz	< –130 dBm
	100 kHz	< –136 dBm
	1 MHz	< –146 dBm
	10 MHz	< –153 dBm
	R&S®FSQ3	
	20 MHz ≤ f < 2.0 GHz	< –155 dBm, typ. –158 dBm
	2.0 GHz ≤ f ≤ 3.0 GHz	< –153 dBm, typ. –157 dBm
	3.0 GHz ≤ f ≤ 3.6 GHz	< –152 dBm, typ. –157 dBm
	R&S®FSQ8	
	20 MHz ≤ f < 2.0 GHz	< –155 dBm, typ. –158 dBm
	2 GHz ≤ f ≤ 3.0 GHz	< –153 dBm, typ. –157 dBm
	3 GHz ≤ f ≤ 3.6 GHz	< –152 dBm, typ. –156 dBm
	3.6 GHz ≤ f < 7 GHz	< –150 dBm, typ. –152 dBm
	7 GHz ≤ f < 8 GHz	< –149 dBm, typ. –152 dBm
	R&S®FSQ26	
	20 MHz ≤ f < 2 GHz	< –152 dBm, typ. –156 dBm
	2 GHz ≤ f < 3.6 GHz	< –150 dBm, typ. –153 dBm
	3.6 GHz ≤ f < 8 GHz	< –151 dBm, typ. –155 dBm
	8 GHz ≤ f < 13 GHz	< –149 dBm, typ. –153 dBm
	13 GHz ≤ f < 18 GHz	< –147 dBm, typ. –151 dBm
	18 GHz ≤ f < 22 GHz	< –145 dBm, typ. –148 dBm
	22 GHz ≤ f < 26.5 GHz	< –143 dBm, typ. –146 dBm
	R&S®FSQ40	
	20 MHz ≤ f < 2 GHz	< –152 dBm, typ. –156 dBm
	2 GHz ≤ f < 8 GHz	< –150 dBm, typ. –153 dBm
	8 GHz ≤ f < 18 GHz	< –148 dBm, typ. –151 dBm
	18 GHz ≤ f < 22 GHz	< –145 dBm, typ. –148 dBm
	22 GHz ≤ f < 26.5 GHz	< –143 dBm, typ. –146 dBm
	26.5 GHz ≤ f < 40 GHz	< –135 dBm, typ. –138 dBm
	improvement with noise correction ON	max. 13 dB, nominal

Immunity to interference		
Image frequency	f ≤ 3.6 GHz	> 90 dB suppression, typ. > 110 dB
	3.6 GHz < f ≤ 26.5 GHz	> 70 dB suppression, typ. > 100 dB
	f > 26.5 GHz	typ. > 70 dB suppression
	f = receive frequency	
Intermediate frequency	f ≤ 3.6 GHz	> 90 dB suppression, typ. > 110 dB
	3.6 GHz < f ≤ 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	Δf > 100 kHz	
	mixer level < –10 dBm, f_{in} ≤ 2.3 GHz	< –80 dBc
	mixer level < –35 dBm, 2.3 GHz< f_{in} < 4 GHz	< –70 dBc
	mixer level < –10 dBm	
	4 GHz ≤ f < 8 GHz	< –70 dBc
	8 GHz ≤ f < 16 GHz	< –64 dBc
	16 GHz ≤ f < 26 GHz	< –58 dBc
	26.5 GHz ≤ f < 40 GHz	< –52 dBc
	f = receive frequency	

Level display		
Screen		625 × 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, Quasi Peak
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	80/s
	remote measurement, display OFF: zero span/sweep time 1 ms	70/s
	span = 10 MHz, sweep time 2.5 ms	50/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, dBµV, dBmV, dBµA, dBpW
	linear level display	µV, mV, µA, 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 (σ = 0.07 dB)
Frequency response referenced to 128 MHz	DC coupling, RF attenuation ≥ 10 dB, YIG filter ON, +20 °C to +30 °C	
	20 Hz ≤ f < 10 MHz	< 0.5 dB (σ = 0.17 dB)
	10 MHz ≤ f < 3.6 GHz	< 0.3 dB (σ = 0.1 dB)
	3.6 GHz ≤ f < 8 GHz, span < 1 GHz	< 1.5 dB (σ = 0.5 dB)
	8 GHz ≤ f < 22 GHz, span < 1 GHz	< 2 dB (σ = 0.7 dB)
	22 GHz ≤ f < 40 GHz, span < 1 GHz	< 2.5 dB (σ = 0.8 dB)
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG filter ON, +5 °C to +45 °C	
	20 Hz ≤ f < 3.6 GHz	< 0.6 dB (σ = 0.2 dB)
	3.6 GHz ≤ f < 26.5 GHz	add 0.5 dB to above values
	f ≥ 26.5 GHz	add 1.0 dB to above values
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG filter OFF, +20 °C to +30 °C	
	3.6 GHz ≤ f < 8 GHz	< 1 dB (σ = 0.3 dB)
	8 GHz ≤ f < 40 GHz	< 1.5 dB (σ = 0.5 dB)
	RF attenuation > 40 dB	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG filter OFF, +5 °C to +45 °C	
	3.6 GHz ≤ f < 26.5 GHz	add 0.5 dB to above values
	f ≥ 26.5 GHz	add 1.0 dB to above values
	RF attenuation > 40 dB	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 (σ = 0.07 dB)
Uncertainty of reference level setting	RF attenuation 10 dB, referenced to –10 dBm reference level setting	< 0.15 dB (σ = 0.05 dB)

Display non linearity	+20 °C to +30 °C, mixer level ≤ –10 dBm	
Logarithmic level display	RBW ≤ 100 kHz or channel filters, 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)
	RBW > 10 MHz, S/N > 16 dB	
	0 dB to –50 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 50 MHz	< 0.5 dB (σ = 0.15 dB)
	FFT filter 1 Hz to 3 kHz	< 0.2 dB (σ = 0.07 dB)

Total measurement uncertainty	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, YIG filter ON	
	20 Hz ≤ f < 10 MHz, RBW ≤ 100 kHz	0.4 dB
	20 Hz ≤ f < 10 MHz, RBW > 100 kHz	0.5 dB
	10 MHz ≤ f < 3.6 GHz, RBW ≤ 100 kHz	0.3 dB
	10 MHz ≤ f < 3.6 GHz, RBW > 100 kHz	0.5 dB
	3.6 GHz ≤ f < 8 GHz	1.2 dB
	8 GHz ≤ f < 22 GHz	1.5 dB
	22 GHz ≤ f < 40 GHz	1.8 dB
	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, YIG filter OFF	
	3.6 GHz ≤ f < 8 GHz	0.9 dB
	8 GHz ≤ f < 40 GHz	1.2 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	standard	16 Msample each for I and Q data
	R&S®FSQ-B100 option	235 Msample
	R&S®FSQ-B100 and R&S®FSQ-B102 options	705 Msample

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°

Audio demodulation

AF demodulation types		AM and FM
Audio output		loudspeaker and phone jack
Marker stop time in spectrum mode		100 ms to 60 s

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	±(125 ns to 100 s), resolution 125 ns min., dependent on sweep time
Max. deviation of trigger offset		±(31.25 ns + (0.1 % × 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		±(31.25 ns + (0.05 % ×·gate length))

Inputs and outputs (front panel)

RF input		
Impedance		50 Ω
Connector	R&S®FSQ3, R&S®FSQ8	N female
	R&S®FSQ26	testport adapter APC 3.5 mm/N female
	R&S®FSQ40	testport adapter 2.92 mm (K)/N female
VSWR	RF attenuation ≥ 10 dB, DC coupled	
	f < 3.6 GHz	< 1.5
	R&S®FSQ8	
	3.6 GHz ≤ f < 8 GHz	< 2
	R&S®FSQ26, R&S®FSQ40	
	3.6 GHz ≤ f < 18 GHz	< 1.8
	18 GHz ≤ f < 26.5 GHz	< 2.0
	26.5 GHz ≤ f < 40 GHz	< 2.5
	RF attenuation < 10 dB or AC coupled	1.5, typical
Setting range of attenuator		0 dB to 75 dB, in 5 dB steps

Probe power supply		
Supply voltages		+15 V DC, –12.6 V DC and ground, max. 150 mA, nominal

Power supply for antennas etc		5-pin connector
Supply voltages		±10 V and ground, max. 100 mA, nominal
Power supply for noise source		BNC female
Output voltage		0 V and 28 V, switchable, nominal

USB interface		type A plug, version 2.0

AF output		
Connector		3.5 mm mini jack
Output impedance		10 Ω
Open-circuit voltage		up to 1.5 V, adjustable

Inputs and outputs (rear panel)

IF 20.4 MHz		BNC female
Impedance		50 Ω
Bandwidth	RBW ≤ 30 kHz	1.67 × resolution bandwidth, min. 2.6 kHz
	RBW = 50 kHz, 100 kHz	400 kHz
	200 kHz ≤ 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

IF 404.4 MHz	active only if RBW > 10 MHz	BNC female
Impedance		50 Ω
Bandwidth	RBW > 10 MHz	equal to resolution bandwidth
Level	mixer level ≤ 0 dBm	mixer level typ. –10 dB

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

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

Reference Input		BNC female
Impedance		50 Ω
Input frequency range		1 MHz ≤ f_{in} ≤ 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 to 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		10/100/1000 BaseT, 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
Printer interface		parallel (Centronics compatible)
Mouse interface		PS/2 compatible
Connector for external monitor (VGA)		15-pin D-sub

General data

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

Mass memory		
Mass memory		hard disk, USB flash disk (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 in line with EN 60068-2-30

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,
	random	10 Hz to 100 Hz, acceleration 1 g (rms)
Shock		40 g shock spectrum, in line with MIL-STD-810E Method 516.4 Procedure I and MIL-PRF-28800F
Recommended calibration interval	operation with external reference	2 years
	operation with internal reference	1 year
RFI suppression		in line with EMC Directive 2004/108/EC including: IEC/EN 61326-1 [1, 2], IEC/EN 61326-2-1, CISPR 11/EN 55011 [1], IEC/EN 61000-3-2, IEC/EN 61000-3-3

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 to VDE 411
Power consumption	R&S®FSQ3, R&S®FSQ8	typ. 130 VA
	R&S®FSQ26, R&S®FSQ40	typ. 150 VA
Safety		in line with EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1-4
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, w/o options, nominal	R&S®FSQ3	14.6 kg (32.2 lb)
	R&S®FSQ8	15.4 kg (33.95 lb)
	R&S®FSQ26	16.5 kg (36.4 lb)
	R&S®FSQ40	16.8 kg (37.0 lb)

[1] Emission limits for class B equipment. With R&S®FSQ-B17 option installed: Emission limits for class A equipment.

[2] Immunity test requirement for industrial environment (EN 61326 table 2).

R&S®FSU-B9 tracking generator, R&S®FSU-B12 step attenuator for tracking generator

Unless specified otherwise, specifications not valid for frequency range from –3 × RBW to +3 × RBW, however at least not valid from –100 kHz to +100 kHz. Maximum output level +5 dBm (peak modulation in the case of amplitude-modulated signals).

Frequency		
Frequency range		100 kHz to 3.6 GHz
Resolution		1 Hz
Frequency offset		
Setting range		±200 MHz
Resolution		1 Hz

Spectral purity		
SSB phase noise	f = 500 MHz, carrier offset 10 kHz	
	normal mode	typ. –120 dBc (1 Hz)
	with frequency offset	typ. –110 dBc (1 Hz)
	with FM modulation ON	typ. –110 dBc (1 Hz)

Level		
Level setting range		–30 dBm to +5 dBm in steps of 0.1 dB
	with R&S®FSU-B12 option	–100 dBm to +5 dBm in steps of 0.1 dB

Max. deviation of output level		
Absolute	f = 128 MHz, output level –20 dBm to 0 dBm	< 1 dB (σ = 0.34 dB)
Frequency response	referenced to level at 128 MHz, sweep time > 100 ms, +5 °C to +45 °C	
	output level –20 dBm to 0 dBm, 100 kHz to 3.6 GHz	< 3 dB, typ. 1.9 dB
	output level –30 dBm to –20 dBm, f = 100 kHz to 3.6 GHz	3 dB
	additional deviation with R&S®FSU-B12, 100 kHz to 3.6 GHz	< 1 dB

Dynamic range		
Attenuation measurement range	RBW = 1 kHz, f > 10 MHz	100 dB
Harmonics	output level –10 dBm	typ. –30 dBc
Spurious, nonharmonics	output level 0 dBm	typ. –30 dBc

Level sweep		
Level range		0 dBm to –25 dBm
Max. deviation of output level	f = 100 kHz to 2 GHz	
	output level 0 dBm to –5 dBm	< 1.5 dB
	output level –5 dBm to –15 dBm	< 2 dB
	output level –15 dBm to –25 dBm	< 3 dB
	f = 2 GHz to 3 GHz	
	output level 0 dBm to –25 dBm	< 3 dB

Modulation		
Modulation format	external	I/Q, AM, FM
Input voltage	full scale	
	AM, FM, V_{pp}	1 V
	I/Q	$\sqrt{U_i^2 + U_q^2}$ = 0.5 V
AM	$f_{center} > f_{mod}$, span = 0 Hz	
Modulation depth		0 % to 99 %
Modulation frequency response	0 Hz to 5 MHz	1 dB
	0 Hz to 30 MHz	3 dB
FM	$f_{center} > f_{mod}$, span = 0 Hz	
Frequency deviation		full range: 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz
Modulation frequency range	deviation = 10 MHz	0 Hz to 1 kHz
	deviation ≤ 1 MHz	0 Hz to 100 kHz
Modulation frequency response	0 kHz to 100 kHz	1 dB
I/Q modulation	$f_{center} > f_{mod}$, span = 0 Hz	
Modulation frequency response	0 Hz to 5 MHz	1 dB
	0 Hz to 30 MHz	3 dB

Modulation deviation of tracking generator	I/Q modulation, typical values, baseband signals generated by the R&S®AMIQ	
EVM	NADC/TETRA/PDC	
	RMS	2 %
	peak	4 %
	PHS	
	RMS	2 %
	peak	5 %
Phase error	GSM/DCS1800/PCS1900	
	RMS	1.5°
	peak	5°
Rho factor	IS-95 CDMA	0.997

Inputs and outputs (front panel)		
RF output		N female, 50 Ω
VSWR	100 kHz ≤ f ≤ 2 GHz	1.2
	2 GHz ≤ f ≤ 3.6 GHz	1.5

Inputs and outputs (rear panel)		
TG I/AM IN		BNC female
Impedance		50 Ω
Input voltage	V_{pp}	1 V
TG Q/FM IN		BNC female
Impedance		50 Ω
Input voltage	V_{pp}	1 V

R&S®FSQ-B17 digital baseband interface

The R&S®FSQ-B17 option gives access to the digital baseband signals of the R&S®FSQ.
The input signals are digitized analog baseband signals, which are fed into the signal processing unit of the R&S®FSQ. The digital baseband data are applied to the I/Q DATA IN connector of the R&S®FSQ-B17 option.
The output signals are either down converted analog signals from the RF input, or digitized analog baseband input signals coming from the R&S®FSQ-B71 option. The digital baseband data (I/Q data) are accessible online 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®FSQ.

I/Q Data input		
Resolution	for each, I-data and Q-data	20 bits
Clock rate		66 MHz to 90 MHz
Transfer rate	transfer rate ≤ clock rate	max. 81.6 MHz
Sample rate of payload		100 Hz to 4 GHz
Data format	channel link serializer input	48 bit wide bus multiplexed to 8 lines
I/Q Data output		
Resolution	for each, I-data and Q-data	20 bits
Clock rate		81.6 MHz
Sample rate (= transfer rate)	measurement via RF input	10 kHz to 81.6 MHz
	measurement via analog baseband input (R&S®FSQ-B71 option)	10 kHz to 40.8 MHz
Data format	channel link serializer output	48 bit wide bus multiplexed to 8 lines

Input and Output (rear panel)

I/Q Data IN		
Connector		26 pin female Mini-D-Ribbon connector
Data lines	number of data lines (differential lines)	8
	bit rate (on each data line)	396 MHz to 540 MHz
	level	LVDS
Clock	clock rate	66 MHz to 90 MHz
	level	LVDS
I/Q Data OUT		
Connector		26 pin female 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

RFI suppression		in line with EMC Directive 2004/108/EC including: IEC/EN 61326-1 [3, 4], IEC/EN 61326-2-1, CISPR 11/EN 55011 [3], IEC/EN 61000-3-2, IEC/EN 61000-3-3

[3] With R&S®FSQ-B17 option installed: Emission limits for class A equipment.

[4] Immunity test requirement for industrial environment (EN 61326 table 2).

R&S®FSU-B21 LO/IF ports for external mixers (for R&S®FSQ26 and R&S®FSQ40 only)

LO signal		
Frequency range		7.0 GHz to 15.5 GHz
Level	+20 °C to +30 °C	+15.5 dBm ±1 dB
	+5 °C to +40 °C	+15.5 dBm ±3 dB

IF input		
IF frequency		404.4 MHz
Full scale level	2-port mixer (LO output/IF input, front panel)	–20 dBm
	3-port mixer (IF input, front panel)	–20 dBm
Level uncertainty	IF input level –30 dBm, RBW 30 kHz, 2-port mixer, LO output/IF input (front panel)	
	+20 °C to +30 °C	< 1 dB
	+5 °C to +40 °C	< 3 dB
	3-port mixer, IF input (front panel)	
	+20 °C to +30 °C	< 1 dB
	+5 °C to +40 °C	< 3 dB

Inputs and outputs (front panel)		
LO output/IF input		SMA-female, 50 Ω
IF input		SMA-female, 50 Ω

R&S®FSQ-B23 RF preamplifier (for R&S®FSQ26 only, requires R&S®FSU-B25 option)

Level measurement uncertainty		
Frequency response	preamplifier ON, YIG filter ON or OFF	
	3.6 GHz to 8 GHz	< 2.0 dB (σ = 0.7 dB)
	8 GHz to 22 GHz	< 2.5 dB (σ = 0.8 dB)
	22 GHz to 26.5 GHz	< 3.0 dB (σ = 1 dB)

Displayed average noise level	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker	
	preamplifier OFF, YIG filter ON or OFF	
	3.6 GHz to 8 GHz	R&S®FSQ26 specifications + 2 dB
	8 GHz to 26.5 GHz	R&S®FSQ26 specifications + 3 dB
	preamplifier ON, YIG filter ON	
	3.6 GHz to 8 GHz	< –162 dBm, typ. –165 dBm
	8 GHz to 13 GHz	< –159 dBm, typ. –162 dBm
	13 GHz to 18 GHz	< –157 dBm, typ. –160 dBm
	18 GHz to 22 GHz	< –154 dBm, typ. –159 dBm
	22 GHz to 26.5 GHz	< –150 dBm, typ. –155 dBm
	preamplifier ON, YIG filter OFF	specifications with YIG filter OFF + 2 dB, nominal
	improvement with noise correction ON	max. 13 dB, nominal

R&S®FSU-B24 preamplifier (for R&S®FSQ26 and R&S®FSQ40 only)

Frequency range	R&S®FSQ 26	100 kHz to 26.6 GHz
	R&S®FSQ 40	100 kHz to 40 GHz
Nominal gain		30 dB

Displayed average noise level (DANL)	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, YIG filter ON or OFF, preamplifier OFF f < 10 kHz: RBW = 10 Hz FFT filter, trace average, sweep count = 20, f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time = 50 ms, trace average, sample detector , sweep count = 20, mean marker	
	20 Hz	< –90 dBm
	100 Hz	< –110 dBm
	1 kHz	< –120 dBm
	10 kHz	< –130 dBm
	100 kHz	< –130 dBm
	1 MHz	< –140 dBm
	10 MHz	< –150 dBm
	20 MHz ≤ f < 2 GHz	< –151 dBm, typ. –154 dBm
	2 GHz ≤ f < 3.6 GHz	< –149 dBm, typ. –152 dBm
	3.6 GHz ≤ f < 8 GHz	< –147 dBm, typ. –150 dBm
	8 GHz ≤ f < 13 GHz	< –145 dBm, typ. –148 dBm
	13 GHz ≤ f < 18 GHz	< –144 dBm, typ. –147 dBm
	18 GHz ≤ f < 22 GHz	< –142 dBm, typ. –145 dBm
	22 GHz ≤ f < 26.5 GHz	< –138 dBm, typ. –141 dBm
	26.5 GHz ≤ f < 32 GHz	< –131 dBm, typ. –134 dBm
	32 GHz ≤ f ≤ 40 GHz	< –129 dBm, typ. –132 dBm
	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, YIG filter ON, preamplifier ON RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time = 50 ms, trace average, sample detector, sweep count = 20, mean marker	
	100 kHz	< –140 dBm
	1 MHz	< –150 dBm
	10 MHz	< –161 dBm
	20 MHz ≤ f < 2 GHz	< –163 dBm, typ. –166 dBm
	2 GHz ≤ f < 3.6 GHz	< –161 dBm, typ. –164 dBm
	3.6 GHz ≤ f < 26.5 GHz	< –162 dBm, typ. –165 dBm
	26.5 GHz ≤ f < 32 GHz	< –160 dBm, typ. –162 dBm
	32 GHz ≤ f ≤ 40 GHz	< –158 dBm, typ. –161 dBm
	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, YIG filter OFF, preamplifier ON RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time = 50 ms, trace average, sample detector, sweep count = 20, mean marker	
	100 kHz	< –140 dBm
	1 MHz	< –150 dBm
	10 MHz	< –161 dBm
	20 MHz ≤ f < 2 GHz	< –163 dBm, typ. –166 dBm
	2 GHz ≤ f < 3.6 GHz	< –161 dBm, typ. –164 dBm
	3.6 GHz ≤ f < 22 GHz	< –160 dBm, typ. –163 dBm
	22 GHz ≤ f < 26.5 GHz	< –157 dBm, typ. –160 dBm
	26.5 GHz ≤ f < 32 GHz	< –156 dBm, typ. –159 dBm
	32 GHz ≤ f ≤ 40 GHz	< –153 dBm, typ. –156 dBm
	improvement with noise correction ON	max. 13 dB, nominal

Level measurement uncertainty		
Absolute level uncertainty at 128 MHz	RBW = 10 kHz, level –30 dBm, reference level –30 dBm, RF attenuation 10 dB	
	preamplifier OFF	< 0.2 dB (σ = 0.07 dB)
	preamplifier ON	< 0.3 dB (σ = 0.1 dB)
Frequency response referenced to 128 MHz	DC coupling, RF attenuation ≥ 10 dB, YIG filter ON, preamplifier OFF, +20 °C to +30 °C	
	20 Hz ≤ f < 10 MHz	< 0.5 dB (σ = 0.16 dB)
	10 MHz ≤ f < 3.6 GHz	< 0.3 dB (σ = 0.1 dB)
	3.6 GHz ≤ f < 8 GHz, span < 1 GHz	< 1.5 dB (σ = 0.5 dB)
	8 GHz ≤ f < 22 GHz, span < 1 GHz	< 2.0 dB (σ = 0.7 dB)
	22 GHz ≤ f < 40 GHz, span < 1 GHz	< 2.5 dB (σ = 0.8 dB)
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG filter ON, preamplifier OFF, +5 °C to +45 °C	
	20 Hz ≤ f < 3.6 GHz	< 0.6 dB (σ = 0.2 dB)
	3.6 GHz ≤ f < 26.5 GHz	add 0.5 dB to above values
	26.5 GHz ≤ f ≤ 40 GHz	add 1.0 dB to above values
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG-Filter = ON, preamplifier ON, +20 °C to +30 °C	
	100 kHz ≤ f < 10 MHz	< 0.8 dB (σ = 0.27 dB)
	10 MHz ≤ f < 3.6 GHz	< 0.6 dB (σ = 0.2 dB)
	3.6 GHz ≤ f < 8 GHz, span < 1 GHz	< 2.0 dB (σ = 0.7 dB)
	8 GHz ≤ f < 22 GHz, span < 1 GHz	< 2.5 dB (σ = 0.8 dB)
	22 GHz ≤ f < 40 GHz, span < 1 GHz	< 3.0 dB (σ = 1 dB)
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG filter ON, preamplifier ON, +5 °C to +45 °C	
	100 kHz ≤ f < 10 MHz	< 1.0 dB (σ = 0.3 dB)
	10 MHz ≤ f < 3.6 GHz	< 0.8 dB (σ = 0.27 dB)
	3.6 GHz ≤ f < 26.5 GHz	add 0.5 dB to above values
	26.5 GHz ≤ f ≤ 40 GHz	add 1.0 dB to above values
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG filter OFF, preamplifier OFF, +20 °C to +30 °C	
	3.6 GHz ≤ f < 8 GHz	< 1.0 dB (σ = 0.3 dB)
	8 GHz ≤ f < 40 GHz	< 1.5 dB (σ = 0.5 dB)
	RF attenuation > 40 dB	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG filter OFF, preamplifier OFF, +5 °C to +45 °C	
	3.6 GHz ≤ f < 26.5 GHz	add 0.5 dB to above values
	26.5 GHz ≤ f ≤ 40 GHz	add 1.0 dB to above values
	RF attenuation > 40 dB	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG-Filter = OFF, preamplifier ON, +20 °C to +30 °C	
	3.6 GHz ≤ f < 8 GHz	< 1.5 dB (σ = 0.5 dB)
	8 GHz ≤ f < 22 GHz	< 2.0 dB (σ = 0.7 dB)
	22 GHz ≤ f < 40 GHz	< 2.5 dB (σ = 0.8 dB)
	RF attenuation > 40 dB	add 0.5 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, YIG filter OFF, preamplifier ON, +5 °C to +45 °C	
	3.6 GHz ≤ f < 26.5 GHz	add 0.5 dB to above values
	26.5 GHz ≤ f ≤ 40 GHz	add 1.0 dB to above values
	RF attenuation > 40 dB	add 0.5 dB to above values

Intermodulation		
Second harmonic intercept (SHI)	f_{in} > 1.8 GHz	> 65 dBm, nominal

R&S®FSU-B25 electronic attenuator

Frequency		
Frequency range	R&S®FSQ3	100 kHz to 3.6 GHz
	R&S®FSQ8	100 kHz to 8 GHz
	R&S®FSQ26	100 kHz to 3.6 GHz
	R&S®FSQ40	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 (σ = 0.34 dB)
	50 MHz to 3.6 GHz	< 0.6 dB (σ = 0.2 dB)
	3.6 MHz to 8 GHz	< 2.0 dB (σ = 0.7 dB)
Reference error	at 128 MHz, RBW ≤ 100 kHz, reference level –30 dBm, RF attenuation 10 dB	
	electronic attenuator	< 0.3 dB (σ = 0.1 dB)
	preamplifier	< 0.3 dB (σ = 0.1 dB)

Displayed average noise level	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker	
	preamplifier ON	
	R&S®FSQ3, R&S®FSQ8, R&S®FSQ26	
	10 MHz to 2.0 GHz	< –162 dBm
	2.0 GHz to 3.6 GHz	< –160 dBm
	R&S®FSQ8	
	3.6 GHz to 8 GHz	< –157 dBm
	R&S®FSQ40	
	10 MHz to 40 MHz	< –160 dBm
	40 MHz to 2 GHz	< –162 dBm
	2 GHz to 3.6 GHz	< –160 dBm
	with the R&S®FSU-B25 option built in, the average noise level values displayed by the base units degrade by	
	preamplifier OFF, electronic attenuator = OFF	
	20 Hz to 3.6 GHz	1 dB
	R&S®FSQ8	
	3.6 GHz to 8 GHz	2 dB
	preamplifier OFF, electronic attenuator 0 dB	
	20 Hz to 3.6 GHz	typ. 2.5 dB
	R&S®FSQ8	
	3.6 GHz to 8 GHz	typ. 3.5 dB
	improvement with noise correction ON	max. 13 dB, nominal

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

R&S®FSQ-B71 I/Q baseband inputs

I/Q baseband inputs for unbalanced and balanced signals. Input impedance selectable 50 Ω/1 MΩ. All data specified with 1 MΩ input impedance setting apply to 50 Ω source impedance. Specifications are valid under the following conditions:
30 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and baseband calibration performed. Data without tolerances: typical values only. Data designated “nominal“ apply to design parameters and are not tested.

Frequency

Sampling		
ADC sampling rate		81.6 MHz
ADC resolution		14 bit
Frequency range		
Useful bandwidth with specified frequency response	f_s = output data rate	
	f_s = 40.8 MHz to 81.6 MHz	DC to 0.441 × f_s
	f_s > 20.4 MHz to < 40.8 MHz	DC to 0.34 × f_s
	f_s = 10 kHz to 20.4 MHz	DC to 0.40 × f_s

Spectral purity

Phase noise at f_{in} = 20 MHz	1 kHz offset	typ. –135 dBc (1 Hz)

Amplitude

Maximum safe input level	50 Ω, power from 50 Ω source	+30 dBm (1 W)
	1 MΩ, peak voltage	±5 V
Input level range (full scale)	with balanced setting: differential voltage	
	50 Ω	±31.6 mV to ±5.62 V (5 dB steps)
	1 MΩ	±31.6 mV to ±1.78 V (5 dB steps)
Max. common mode input voltage	50 Ω	±2 × range, max. ±5 V
	1 MΩ, any range	–2.5 V to +3.5 V
Level uncertainty		
Level uncertainty	at 1 MHz (full scale)	< 0.25 dB
	I/Q imbalance at 1 MHz	< 0.1 dB
Frequency response	50 Ω, f_s = 81.6 MHz	
	DC to 30 MHz, filter ON	< 0.3 dB
	DC to 36 MHz, filter OFF	< 0.3 dB
	I/Q imbalance, DC to 30 MHz, filter ON	< 0.15 dB
	I/Q imbalance, DC to 36 MHz, filter OFF	< 0.15 dB
Frequency response	1 MΩ	
	DC to 10 MHz	< 0.30 dB
	I/Q imbalance, DC to 10 MHz	< 0.15 dB
Amplitude linearity	0 dB to –90 dB with dither ON	typ. signal analyzer 0.1 dB
I/Q offset	50 Ω balanced setting	< 0.15 % of range ±0.2 mV
	50 Ω unbalanced setting	< 2 mV
	1 MΩ	< 2 mV

Dynamic range

Noise level		
Signal to noise ratio	range = 1 V, signal level equal to range	typ. 143 dBc (1 Hz)
Noise floor	range = 31.6 mV, RMS voltage in 1 Hz bandwidth	
	50 Ω, unbalanced setting	typ. < 4 nV
	50 Ω, balanced setting	typ. < 6 nV
	1 MΩ, unbalanced setting	typ.< 16 nV
	1 MΩ, balanced setting	typ. < 16 nV
Spurious and harmonics	single signal, level equal to range 50 Ω: DC to 36 MHz 1 MΩ: DC to 10 MHz, range ≤ 1 V	typ. –60 dBc
Intermodulation distortion 2nd and 3rd order	two signals, level equal to range –6 dB	
	50 Ω: DC to 20 MHz	typ. –75 dBc
	50 Ω: 20 MHz to 36 MHz	typ. –70 dBc
	1 MΩ: DC to 10 MHz, range ≤ 1 V	typ. –75 dBc
Image rejection	aliasing into useful bandwidth from single out of band signal equal to range	typ. –75 dB
I/Q crosstalk	DC to 36 MHz	typ. –70 dB

Phase

Group delay variation versus frequency	aliasing filter ON, DC to 30 MHz	typ. 1 ns
	aliasing filter OFF, DC to 36 MHz	typ. 1 ns
Differential phase between I and Q	DC to 10 MHz	typ. 1°
	aliasing filter ON, > 10 MHz to 30 MHz	typ. 2°
	aliasing filter OFF, > 10 MHz to 36 MHz	typ. 2°

Input ports

Channels		2 (I and Q)
Connector	each channel balanced or unbalanced	4 × BNC female
Input impedance	unbalanced setting	
	common mode	50 Ω/1 MΩ nominal
	balanced setting	
	common mode	50 Ω/1 MΩ nominal
	differential	100 Ω/2 MΩ nominal
Return loss	50 Ω input impedance	
	DC to 10 MHz	typ. 30 dB
	> 10 MHz to 36 MHz	typ. 20 dB
Input capacitance	with 1 MΩ input impedance setting, common mode	typ. 9 pF

R&S®FSQ-B72 I/Q bandwidth extension

Activation of the 120 MHz I/Q bandwidth extension R&S®FSQ-B72 depends on the selected sampling rate.

It is active for sampling rates > 81.6 MHz. For sampling rates up to 81.6 MHz (max demodulation bandwidth 28 MHz) the standard I/Q path is used and the IQ data specifications of the basic unit apply. For sampling rates between 20.4 MHz and 81.6 MHz the 120 MHz bandwidth extension can be selected alternatively.

Frequency

RF Frequency range	R&S®FSQ3	40 MHz [5] to 3.6 GHz
	R&S®FSQ8	40 MHz [5] to 8 GHz
	R&S®FSQ26	40 MHz [5] to 26.5 GHz
	R&S®FSQ40	40 MHz [5] to 40 GHz

Useful bandwidth Bandwidth with equalized frequency response as specified below	20.4 MHz < f_s ≤ 81.6 MHz	0.8 × f_s
	81.6 MHz < f_s < 163.2 MHz	0.68 × f_s
	163.2 MHz ≤ f_s ≤ 326.4 MHz	120 MHz
	f_s = output sampling rate	

Frequency response	within useful bandwidth, referenced to center frequency RF attenuation ≥ 10 dB, mixer level ≤ –10 dBm

Amplitude flatness	+20 °C to +30 °C		
	≤ 3.6 GHz	±40 MHz	< 0.3 dB
		±60 MHz	< 0.6 dB
	> 3.6 GHz to 26.5 GHz		< 0.6 dB
	> 26.5 GHz		typ. 0.6 dB
	+5 °C to +45 °C		
	≤ 3.6 GHz	±40 MHz	< 0.4 dB
		±60 MHz	< 0.8 dB
	> 3.6 GHz to 26.5 GHz		< 1 dB
	> 26.5 GHz		typ. 1 dB

Deviation from linear phase	+20 °C to +30 °C		
	≤ 3.6 GHz	±40 MHz	typ. ±2°
		±60 MHz	typ. ±3°
	> 3.6 GHz to 26.5 GHz		typ. ±3°
	+5 °C to +45 °C		
	≤ 3.6 GHz	±40 MHz	typ. ±3°
		±60 MHz	typ. ±4°
	> 3.6 GHz to 26.5 GHz		typ. ±4°

Output sampling rate	min.	> 20.4 MHz
	max.	326.4 MHz

ADC sampling rate		326.4 MHz

[5] With center frequency < 120 MHz specifications apply for: reference level ≥ 0 dBm and RF attenuation/dB ≤ reference level/dBm

Level

Level uncertainty	at center frequency, RF attenuation ≥ 10 dB, mixer level ≤ 0 dBm signal level = reference level	
	+20 °C to +30 °C	
	≤ 3.6 GHz	< 0.8 dB
	3.6 GHz to 8 GHz	< 1.5 dB
	8 GHz to 26.5 GHz	< 2.5 dB
	26.5 GHz to 40 GHz	< 2.5 dB
	+5 °C to +45 °C	
	≤ 3.6 GHz	< 1.2 dB
	3.6 GHz to 8 GHz	< 2.0 dB
	8 GHz to 26.5 GHz	< 3.0 dB
	26.5 GHz to 40 GHz	< 3.5 dB

Level nonlinearity	0 dB to –70 dB, dither ON	< 0.15 dB

Dynamic

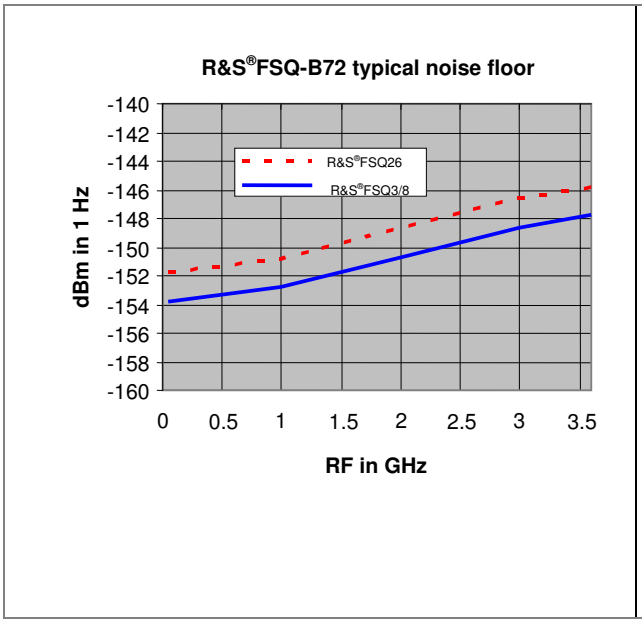
Spurious response		
Without input signal (I/Q offset not included)	0 dB RF attenuation, reference level –20 dBm	
	80 MHz ≤ f ≤ 3345 MHz	< –95 dBm
	3345 MHz < f < 3470 MHz	< –75 dBm
	3470 MHz ≤ f ≤ 3600 MHz	< –95 dBm
	f > 3600 MHz	< –80 dBm
With full scale input signal (I/Q offset not included)	mixer level ≤ –10 dBm, center frequency ≥ 120 MHz	< –56 dBc, typ. –70 dBc
I/Q offset	mixer level > –20 dBm	< –70 dBfs
IF rejection	IF frequency range 408 MHz ± 60 MHz	
	center frequency ≤ 400 MHz	> 40 dB
	center frequency > 400 MHz	> 70 dB

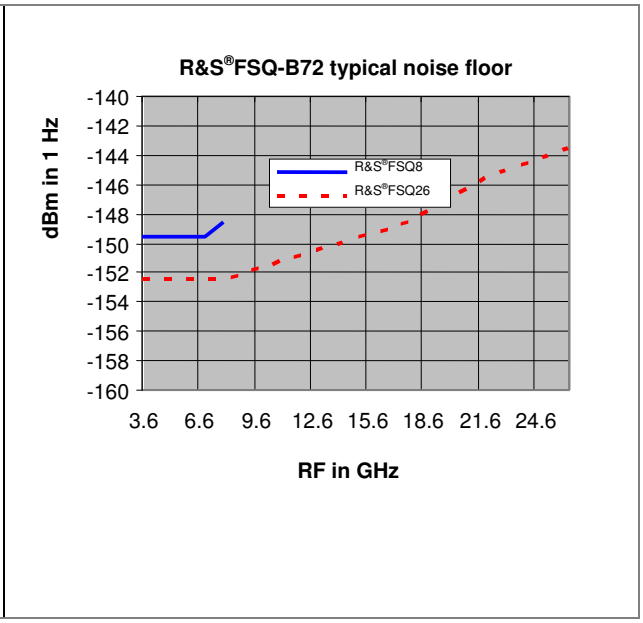
Third order intermodulation	two signals, –6 dBfs each, mixer level (each signal): ≤ 3.6 GHz ≤ –20 dBm > 3.6 GHz ≤ –25 dBm	< –60 dBc, typ. –68 dBc

Rejection of out of band signals	≤ 3.6 GHz	typ. 60 dB
	> 3.6 GHz up to ±750 MHz offset	typ. 60 dB
	> ±750 MHz offset	0 dB nominal

Signal to noise ratio	mixer level = 0 dBm	
	≤ 26.5 GHz	> 135 dBfs (1 Hz)
	26.5 GHz to 40 GHz	> 130 dBfs (1 Hz)

Noise floor	RF attenuation 0 dB, reference level ≤ –20 dBm	
	R&S®FSQ3/8 1 GHz	< –150 dBm (1 Hz)
	R&S®FSQ8 5 GHz	< –147 dBm (1 Hz)
	R&S®FSQ26/40 1 GHz	< –148 dBm (1 Hz)
	R&S®FSQ26/40 5 GHz	< –149 dBm (1 Hz)
	R&S®FSQ26/40 13 GHz	< –146 dBm (1 Hz)
	R&S®FSQ26/40 22 GHz	< –142 dBm (1 Hz)





Susceptibility to radiated emission	relative to full scale, RF attenuation 0 dB, reference level ≤ –10 dBm, field strengths 10 V/m	
	IF frequency band 348 MHz to 468 MHz	typ. < –55 dB
	image frequency 837.6 MHz to 957.6 MHz	typ. < –60 dB
	other frequencies	typ. < –75 dB

General data

Interface		GPIB or LAN interface
I/Q memory	standard	16 Msample each for I and Q data
	R&S®FSQ-B100 option	235 Msample
	R&S®FSQ-B100 and R&S®FSQ-B102 options	705 Msample
Sampling rate		programmable > 20.4 MHz to 326.4 MHz in 0.1 Hz steps
IF pre-filter 3 dB bandwidth	≤ 3.6 GHz	typ. 125 MHz
	> 3.6 GHz, YIG filter OFF	typ. 125 MHz

Ordering information

Designation	Type	Order No.
Signal Analyzer 20 Hz to 3.6 GHz	R&S®FSQ3	1313.9100.03
Signal Analyzer 20 Hz to 8 GHz	R&S®FSQ8	1313.9100.08
Signal Analyzer 20 Hz to 26.5 GHz	R&S®FSQ26	1313.9100.26
Signal Analyzer 20 Hz to 40 GHz	R&S®FSQ40	1313.9100.40
Accessories supplied		
Power cable, printed quick start guide, CD-ROM (with operating manual and service manual) R&S®FSQ26: test port adapter with 3.5 mm female (1021.0512.00) and N female (1021.0535.00) connector R&S®FSQ40: test port adapter with K female (10366.4790.00) and N female (1036.4777.00) connector		

Options

Designation	Type	Order No.	Retrofittable	Remarks
Options				
OCXO, low aging/improved phase noise at 10 Hz carrier offset	R&S®FSU-B4	1144.9000.02	yes	
Tracking Generator, 100 kHz to 3.6 GHz	R&S®FSU-B9	1142.8994.02	yes	
External Generator Control	R&S®FSP-B10	1129.7246.03	yes	excludes R&S®FSQ-B100
Output Attenuator, 0 dB to 70 dB, for R&S®FSU-B9	R&S®FSU-B12	1142.9349.02	yes	requires R&S®FSU-B9
Removable Hard Disk	R&S®FSQ-B18	1303.0400.13	no	
Digital Baseband Interface	R&S®FSQ-B17	1163.0063.02	no	
Second Hard Disk for R&S®FSQ-B18	R&S®FSQ-B19	1303.0600.03		requires R&S®FSU-B18
LO/IF Ports for external mixers	R&S®FSU-B21	1157.1090.03	yes	only for R&S®FSQ26 and R&S®FSQ40
20 dB Preamplifier, 3.6 GHz to 26.5 GHz, for R&S®FSQ26	R&S®FSQ-B23	1157.0907.03	no	only for R&S®FSQ26, requires R&S®FSU-B25
30 dB Preamplifier, 100 kHz to 50 GHz	R&S®FSU-B24	1157.2100.50	yes	only for R&S®FSQ26 and R&S®FSQ40
Electronic Attenuator, 0 dB to 30 dB, and 20 dB Preamplifier (3.6 GHz)	R&S®FSU-B25	1144.9298.02	yes	
Analog Baseband Inputs	R&S®FSQ-B71	1157.0113.03	yes	
I/Q Bandwidth Extension	R&S®FSQ-B72	1157.0336.12	no	
I/Q Memory Extension to 235 Msample	R&S®FSQ-B100	1169.5244.02	no	excludes R&S®FSP-B10
IQ Memory Extension from 235 Msample to 705 Msample	R&S®FSQ-B102	1169.5444.04	no	requires R&S®FSQ-B100

Designation	Type	Order No.	Retrofittable	Remarks
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		
GSM/EDGE/EDGE Evolution Measurements	R&S®FS-K10	1309.9700.02		
VOR/ILS Measurement Demodulator	R&S®FS-K15	1302.0936.02		
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 HSPA+ UE Application Firmware	R&S®FS-K73+	1309.9274.02		requires R&S®FS-K73
3GPP HSDPA BTS Application Firmware	R&S®FS-K74	1300.7156.02		requires R&S®FS-K72
3GPP HSPA+ BTS Application Firmware	R&S®FS-K74+	1309.9180.02		requires R&S®FS-K74
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 Analysis	R&S®FSQ-K70	1161.8038.02		
WLAN 802.11a/b/g/j Application Firmware	R&S®FSQ-K91	1157.3129.02		
Upgrade from R&S®FSQ-K91 to 802.11n	R&S®FSQ-K91n	1308.9387.02		
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		
WiMAX 802.16e MIMO Application Firmware	R&S®FSQ-K94	1308.9770.02		
OFDM Vector Signal Analysis	R&S®FSQ-K96	1308.9570.02		
Analysis of EUTRA/LTE FDD Downlink Signals	R&S®FSQ-K100	1308.9006.02		
Analysis of EUTRA/LTE FDD Uplink Signals	R&S®FSQ-K101	1308.9058.02		
Analysis of EUTRA/LTE Downlink MIMO Signals	R&S®FSQ-K102	1309.9000.02		
Analysis of EUTRA/LTE TDD Downlink Signals	R&S®FSQ-K104	1309.9422.02		
Analysis of EUTRA/LTE TDD Uplink Signals	R&S®FSQ-K105	1309.9516.02		
TETRA Release 2 Analysis	R&S®FSQ-K110	1309.9668.02		

Recommended extras

Designation	Type	Order No.
Headphones		0708.9010.00
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 19” Adapter R&S®ZZA-411)	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
SWR Bridges, 50 Ω		
SWR Bridge, 5 MHz to 3 GHz	R&S®ZRB2	0373.9017.5X
SWR Bridge, 40 kHz to 4 GHz	R&S®ZRC	1039.9492.5X
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		
N-type adapter for R&S RT-Zx probes	R&S®RT-ZA9	1417.0909.02
Probe Power Connector, 3 pin		1065.9480.00
Cable for connecting Digital Baseband Interfaces	R&S®SMU-Z6	1415.0201.02
DC blocks		
DC Block, 10 kHz to 18 GHz (Type N)	R&S®FSE-Z4	1084.7443.02
External harmonic mixers (for R&S®FSQ26, R&S®FSQ40 with option R&S®FSU-B21)		
Harmonic Mixer 40 GHz to 60 GHz	R&S®FS-Z60	1089.0799.02
Harmonic Mixer 50 GHz to 75 GHz	R&S®FS-Z75	1089.0847.02
Harmonic Mixer 60 GHz to 90 GHz	R&S®FS-Z90	1089.0899.02
Harmonic Mixer 75 GHz to 110 GHz	R&S®FS-Z110	1089.0976.04
For R&S®FSQ26 only		
Test Port Adapter N male		1021.0541.00
Test Port Adapter 3.5 mm male		1021.0529.00
Microwave Measurement Cable with test port adapter set N male and 3.5 mm male	R&S®FSE-Z15	1046.2002.02
For R&S®FSQ40 only		
Test Port Adapter N male		1036.4783.00
Test Port Adapter K male		1036.4802.00
Test Port Adapter 2.4 mm female	R&S®FSE-Z5	1088.1627.02

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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

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- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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