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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	Option R&S FSU-B4	
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

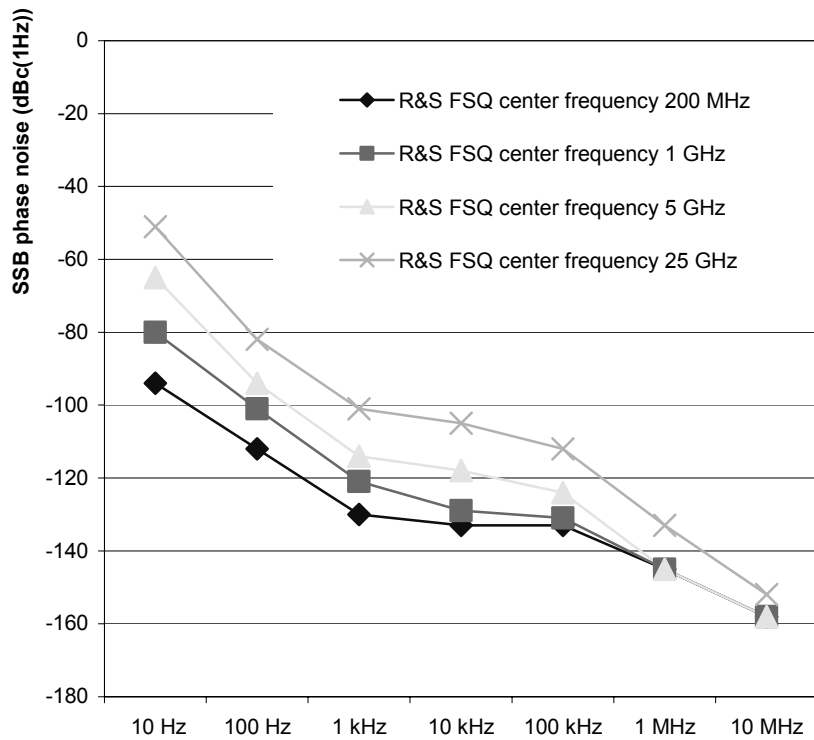
Frequency display		with marker or frequency counter
Marker resolution		span/624
Maximum deviation	sweep time >3 × auto sweep time	$\pm(\text{marker frequency} \times \text{reference error} + 0.5\% \times \text{span} + 10\% \times \text{resolution bandwidth} + \frac{1}{2} \text{ (last digit)})$
Frequency 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 (1Hz)	f = 640 MHz	
Residual FM	nominal, RBW 10 kHz, RMS	<1 Hz
Carrier offset	10 Hz	- 73 dBc, nominal
	10 Hz with option R&S FSU-B4 fitted	- 86 dBc, nominal
	100 Hz	<-98 dBc ¹ , <-90 dBc, typ. -104 dBc ¹
	1 kHz	<-116 dBc ¹ , <-112dBc, typ. -124 dBc ¹
	10 kHz	<-128 dBc ¹ , <-120 dBc, typ. -133 dBc ¹
	100 kHz	<-128 dBc ¹ , <-120 dBc, typ. -133 dBc ¹
	1 MHz	<-140 dBc ¹ , <-138 dBc, typ. -146 dBc ¹
	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)

¹ valid as of serial number 200000



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, $f \leq 3.6$ 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

Displayed average noise level		
	0 dB RF attenuation, termination 50 Ω RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, trace average, sweep count = 20, mean marker, normalized to 10 Hz RBW	
	20 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz 10 MHz	<-80 dBm <-100 dBm <-110 dBm <-120 dBm <-126 dBm <-136 dBm <-143 dBm
	R&S FSQ3	
	20 MHz $\leq f < 2.0$ GHz 2.0 GHz $\leq f \leq 3.0$ GHz 3.0 GHz $\leq f \leq 3.6$ GHz	<-145 dBm, typ. -148 dBm <-143 dBm, typ. -147 dBm <-142 dBm, typ. -147 dBm
	R&S FSQ8	
	20 MHz $\leq f < 2.0$ GHz 2 GHz $\leq f \leq 3.0$ GHz 3 GHz $\leq f \leq 3.6$ GHz 3.6 GHz $\leq f < 7$ GHz 7 GHz $\leq f < 8$ GHz	<-145 dBm, typ. -148 dBm <-143 dBm, typ. -147 dBm <-142 dBm, typ. -146 dBm <-140 dBm, typ. -142 dBm <-139 dBm, typ. -142 dBm
	R&S FSQ26	
	20 MHz $\leq f < 2$ GHz 2 GHz $\leq f < 3.6$ GHz 3.6 GHz $\leq f < 8$ GHz 8 GHz $\leq f < 13$ GHz 13 GHz $\leq f < 18$ GHz 18 GHz $\leq f < 22$ GHz 22 GHz $\leq f < 26.5$ GHz	<-142 dBm, typ. -146 dBm <-140 dBm, typ. -143 dBm <-141 dBm, typ. -145 dBm <-139 dBm, typ. -143 dBm <-137 dBm, typ. -141 dBm <-135 dBm, typ. -138 dBm <-133 dBm, typ. -136 dBm
	R&S FSQ40	
	20 MHz $\leq f < 2$ GHz 2 GHz $\leq f < 8$ GHz 8 GHz $\leq f < 18$ GHz 18 GHz $\leq f < 22$ GHz 22 GHz $\leq f < 26.5$ GHz 26.5 GHz $\leq f < 40$ GHz	<-142 dBm, typ. -146 dBm <-140 dBm, typ. -143 dBm <-138 dBm, typ. -141 dBm <-135 dBm, typ. -138 dBm <-133 dBm, typ. -136 dBm <-125 dBm, typ. -128 dBm

Maximum dynamic range		
1 dB compression to DANL (1 Hz)		170 dB

Immunity to interference		
Image frequency	$f \leq 3.6$ GHz $f > 3.6$ GHz	>90 dB, typ. >110 dB >70 dB, typ. >100 dB
Intermediate frequency	$f \leq 3.6$ GHz 3.6 GHz $< f \leq 4.2$ GHz $f > 4.2$ GHz	>90 dB, typ. >110 dB typ. 70 dB >70 dB, typ. >90 dB
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, $f \leq 2.3$ GHz mixer level <-35 dBm, 2.3 GHz $< f < 4$ GHz mixer level <-10 dBm 4 GHz $\leq f < 8$ GHz 8 GHz $\leq f < 16$ GHz 16 GHz $\leq f < 26$ GHz 26.5 GHz $\leq f < 40$ GHz	<-80 dBc <-70 dBc <-70 dBc <-64 dBc <-58 dBc <-52 dBc

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 2 measurement diagrams	3 6
Trace detector		Max Peak, Min Peak, Auto Peak (Normal), Sample, RMS, Average, Quasi Peak
Number of measurement points	default value range	625 155 to 10001 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 remote measurement, display off: zero span/sweep time 1 ms span = 10 MHz, sweep time 2.5 ms	80 per second 70 per second 50 per second
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 linear level display	dBm, dBμV, dBmV, dBμA, dBpW 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 ($\sigma = 0.07$ 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 3.6 GHz $\leq f < 8$ GHz, span < 1 GHz 8 GHz $\leq f < 22$ GHz, span < 1 GHz 22 GHz $\leq f < 26.5$ GHz, span < 1 GHz 26.5 GHz $\leq f < 40$ GHz, span < 1 GHz $f \geq 3.6$ GHz, span ≥ 1 GHz +5 °C to +45 °C 10 MHz $\leq f < 3.6$ GHz 3.6 GHz $\leq f < 26.5$ GHz $f \geq 26.5$ GHz	<0.3 dB ($\sigma = 0.1$ dB) <1.5 dB ($\sigma = 0.5$ dB) <2 dB ($\sigma = 0.7$ dB) <2.5 dB ($\sigma = 0.8$ dB) <2.5 dB ($\sigma = 0.8$ dB) add 0.5 dB to above values <0.6 dB ($\sigma = 0.2$ dB) add 0.5 dB to above values add 1.0 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 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 –70 dB to –90 dB	<0.1 dB ($\sigma = 0.03$ dB) <0.3 dB ($\sigma = 0.1$ dB)
	200 kHz \leq RBW ≤ 10 MHz, S/N >16 dB 0 dB to –50 dB –50 dB to –70 dB	<0.2 dB ($\sigma = 0.07$ dB) <0.5 dB ($\sigma = 0.17$ dB)
	RBW >10 MHz, S/N >16 dB 0 dB to –50 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 200 kHz to 3 MHz 5 MHz to 50 MHz FFT filter 1 Hz to 3 kHz	<0.1 dB ($\sigma = 0.03$ dB) <0.2 dB ($\sigma = 0.07$ dB) <0.5 dB ($\sigma = 0.15$ dB) <0.2 dB ($\sigma = 0.07$ dB)

Total measurement uncertainty		
	0 dB to -70 dB, S/N >20 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	2.0 dB
	8 GHz ≤ f < 18 GHz	2.5 dB
	18 GHz ≤ f < 26.5 GHz	3.0 dB
	26.5 GHz ≤ f < 40 GHz	3.0 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		16 Msamples each for I and Q data

RF path		
Max. information bandwidth		28 MHz
Harmonic distortion	full-scale input signal	typ.<-70 dBc
Third order distortion	two input tones 6 dB below full scale	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

Frequency response		
	within 2/3 RBW; RBW = 3, 5, 10, 20, 50 MHz	
	f ≤ 3.6 GHz	typ.0.3 dB
	f > 3.6 GHz, YIG filter off	typ.0.5 dB

Deviation from linear phase		
	within 2/3 RBW; RBW = 3, 5, 10, 20, 50 MHz	
	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	\pm (125 ns to 100 s), resolution 125 ns min., dependent on sweep time
Max. deviation of trigger offset		\pm (31.25 ns + (0.1% \times trigger offset))
Gated sweep		
Gate source		external, IF level, video
Gate delay		1 μ 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 ns + (0.05% \times gate length))

Inputs and outputs (front panel)

RF input		
Impedance		50 Ω
Connector	R&S FSQ3, R&S FSQ8 R&S FSQ26 R&S FSQ40	N female, testport adapter APC 3.5 mm/N female, testport adapter 2.92 mm (K)/N female
VSWR	RF attenuation ≥ 10 dB, DC coupled f < 3.6 GHz R&S FSQ8: 3.6 GHz \leq f < 8 GHz R&S FSQ26, R&S FSQ40: 3.6 GHz \leq f < 18 GHz 18 GHz \leq f < 26.5 GHz 26.5 GHz \leq f < 40 GHz	<1.5 <2 <1.8 <2.0 <2.5
	RF attenuation <10 dB or AC coupling	typ. 1.5
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		
Supply voltages		5-pin connector \pm 10 V and ground, max. 100 mA, nominal

Keyboard connector		
		PS/2 female for MF-2 keyboard
AF output		
Connector		3.5 mm mini jack
Output impedance		10 Ω
Open-circuit voltage		up to 1.5 V, adjustable
Power supply for noise source		
		BNC female
Output voltage		0 V and 28 V, switchable, nominal

Inputs and outputs (rear panel)

IF 20.4 MHz		BNC female
Impedance		50 Ω
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 $>$ -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 \leq 0 dBm	mixer level typ. -10 dB
Video output		BNC female
Impedance		50 Ω
Output voltage	RBW \geq 200 kHz, logarithmic scaling, full scale	0 V to 1 V (EMF)
Reference output		BNC female
Impedance		50 Ω
Output frequency		10 MHz
Level		$>$ 0 dBm, nominal
Reference Input		BNC female
Impedance		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		1.4 V (TTL)
Input impedance		\geq 10 k Ω
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 BaseT, RJ45
USB interface		type A plug, version 1.1
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 sub-D

General specifications

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

Mass memory		
Mass memory		1.44 Mbyte 3 ½" disk drive, hard disk, USB flash disk (not supplied)
Data storage		>500 instrument settings and traces

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

Mechanical resistance		
	sinusoidal vibration	5 Hz to 150 Hz, max. 2 g at 55 Hz; 0.5 g from 55 Hz to 150 Hz; meets DIN EN 60068-2-6: 1996-05, DIN EN 60068-2-30: 2000-02, DIN EN 61010-1, MIL-T-28800D, class 5
	random vibration	10 Hz to 100 Hz, acceleration 1 g (rms)
	shock	40 g shock spectrum, meets MIL-STD-810C and MIL-T-28800D, classes 3 and 5
Recommended calibration interval	operation with external reference operation with internal reference	2 years 1 year
RFI suppression		meets EMC directive of EU (89/336/EEC) and German EMC legislation

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 R&S FSQ26, R&S FSQ40	typ. 130 VA typ. 150 VA
Safety		meets 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 in mm	435 × 192 × 460
Weight	R&S FSQ3 R&S FSQ8 R&S FSQ26 R&S FSQ40	14.6 kg 15.4 kg 16.5 kg 16.8 kg

Tracking Generator R&S FSU-B9, Attenuator R&S FSU-B12 for Tracking Generator

Unless specified otherwise, specifications not valid for frequency range from $-3 \times \text{RBW}$ to $+3 \times \text{RBW}$, however at least not valid from -100 kHz to $+100 \text{ kHz}$. Maximum output level $+5 \text{ dBm}$ (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		$\pm 200 \text{ MHz}$
Resolution		1 Hz

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

Level		
Level setting range	with option R&S FSU-B12	-30 dBm to $+5 \text{ dBm}$ in steps of 0.1 dB -100 dBm to $+5 \text{ dBm}$ in steps of 0.1 dB

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

Dynamic range		
Attenuation measurement range	RBW = 1 kHz, f $> 10 \text{ MHz}$	100 dB
Harmonics	output level -10 dBm	typ. -30 dBc
Spurious, nonharmonics	output level 0 dBm	typ. -30 dBc

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

LO/IF Ports for External Mixers R&S FSU-B21 (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	+15.0 dBm ±1 dB
	+5 °C to +45 °C	+15.0 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)	<1 dB
	+20 °C to +30 °C	<3 dB
	+5 °C to +45 °C	<3 dB
	3-port mixer, IF input (front panel)	<1 dB
	+20 °C to +30 °C	<3 dB
	+5 °C to +45 °C	<3 dB

Inputs and outputs (front panel)

Option R&S FSU-B21		
LO output/IF input		SMA-female, 50 Ω
IF input		SMA-female, 50 Ω

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

Level measurement uncertainty		
Frequency response	preamplifier = on 3.6 GHz to 8 GHz 8 GHz to 22 GHz 22 GHz to 26.5 GHz	<2.0 dB ($\sigma = 0.7$ dB) <2.5 dB ($\sigma = 0.8$ dB) <3.0 dB ($\sigma = 1$ dB)

Displayed average noise level		
	0 dB RF attenuation, termination 50 Ω RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, trace average, sweep count = 20, mean marker, normalized to 10 Hz RBW	
	preamplifier = off	
	3.6 GHz to 8 GHz 8 GHz to 26.5 GHz	R&S FSQ26 specifications + 2 dB R&S FSQ26 specifications + 3 dB
	preamplifier = on	
	3.6 GHz to 8 GHz	<-152 dBm, typ. -155 dBm
	8 GHz to 13 GHz	<-149 dBm, typ. -152 dBm
	13 GHz to 18 GHz	<-147 dBm, typ. -150 dBm
	18 GHz to 22 GHz	<-144 dBm, typ. -149 dBm
	22 GHz to 26.5 GHz	<-140 dBm, typ. -145 dBm

Electronic Attenuator R&S FSU-B25

Frequency		
Frequency range	R&S FSQ3	100 kHz ² , 10 MHz to 3.6 GHz
	R&S FSQ8	100 kHz ² , 10 MHz to 8 GHz
	R&S FSQ26	100 kHz ² , 10 MHz to 3.6 GHz
	R&S FSQ40	100 kHz ² , 10 MHz 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, trace average, sweep count = 20, mean marker, normalized to 10 Hz RBW	
	preamplifier on	
	R&S FSQ3, R&S FSQ8, R&S FSQ26 10 MHz to 2.0 GHz 2.0 GHz to 3.6 GHz	<-152 dBm <-150 dBm
	R&S FSQ8 3.6 GHz to 8 GHz	<-147 dBm
	R&S FSQ40 10 MHz to 40 MHz 40 MHz to 2 GHz 2 GHz to 3.6 GHz	<-150 dBm <-152 dBm <-150 dBm
	with the R&S FSU-B25 built in, the average noise level values displayed by the base units degrade by (R&S FSU-B25 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

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

² Valid as of R&S FSU-B25 serial number xxxxxx/004.

I/Q Baseband Inputs R&S FSQ-B71

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 guaranteed 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 $f_s > 20.4$ MHz to < 40.8 MHz f_s = 10 kHz to 20.4 MHz	DC to $0.441 \times f_s$ DC to $0.34 \times f_s$ DC to $0.40 \times f_s$

Spectral purity

Phase noise at $f_{in} = 20$ MHz	1 kHz offset	typ. -135 dBc/Hz
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Amplitude

Maximum safe input level		
	50 Ω, power from 50 Ω source	+30 dBm (1 Watt)
	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. 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 & 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 order 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

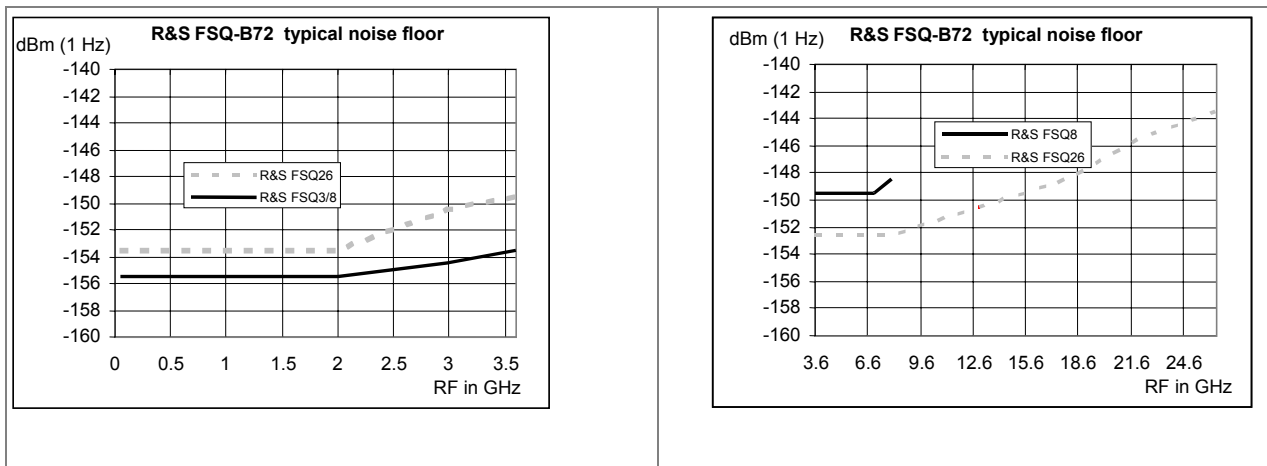
Group delay variation versus frequency		
	aliasing filter on, DC to 30 MHz	typ. 1 ns
	aliasing filter off, DC to 36 MHz	typ. 1 ns
Differential phase between I and Q		
	DC to 10 MHz	typ. 1°
	aliasing filter on, >10 MHz to 30 MHz	typ. 2°
	aliasing filter off, >10 MHz to 36 MHz	typ. 2°

Input ports

Channels		2 (I & 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 differential	50 Ω / 1 MΩ nominal 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

Dynamic

Spurious response		
Without input signal	0 dB RF attenuation	<-80 dBm, typ. -100 dBm
With full scale input signal	mixer level \leq -10 dBm	<-50 dBc, typ. -58 dBc
Third order intermodulation	two signals, level equal to reference level -6 dB mixer level \leq -20 dBm (each signal)	<-50 dBc, typ. -58 dBc,
Rejection of out of band signals	\leq 3.6 GHz > 3.6 GHz up to \pm 750 MHz offset > \pm 750 MHz offset	typ. 100 dB typ. 60 dB typ. 0 dB
Signal to noise ratio	mixer level \geq -20 dBm signal level equal to reference level	>125 dBc (1 Hz), typ. 128 dBc (1 Hz)
Noise floor	RF attenuator 0 dB, reference level \leq -30 dBm R&S FSQ3/R&S FSQ8 1 GHz R&S FSQ8 5 GHz R&S FSQ26/R&S FSQ40 1 GHz R&S FSQ26/R&S FSQ40 5 GHz	<-153 dBm (1 Hz) <-148 dBm (1 Hz) <-150 dBm (1 Hz) <-150 dBm (1 Hz)



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

Interface		GPIB or LAN interface
I/Q memory		16 Msample each for I and Q data
Sampling rate		programmable >20.4 MHz to 326.4 MHz in 0.1 Hz steps
IF pre-filter 3 dB bandwidth	\leq 3.6 GHz	typ. 55 MHz
	>3.6 GHz YIG filter switched off	typ. 125 MHz

Ordering information

Order designation	Type	Order No.
Signal Analyzer 20 Hz to 3.6 GHz	R&S FSQ3	1155.5001.03
Signal Analyzer 20 Hz to 8 GHz	R&S FSQ8	1155.5001.08
Signal Analyzer 20 Hz to 26.5 GHz	R&S FSQ26	1155.5001.26
Signal Analyzer 20 Hz to 40 GHz	R&S FSQ40	1155.5001.40
Accessories supplied		
Power cable, operating manual, 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

Order 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	1129.7246.02	yes	
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	1145.0242.05	no	
Second Hard Disk for R&S FSQ-B18	R&S FSQ-B19	1145.0394.05		requires R&S FSU-B18
LO/IF ports for external mixers	R&S FSU-B21	1157.1090.02	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		no	only for R&S FSQ26, requires R&S FSU-B25
Electronic Attenuator, 0 dB to 30 dB, and 20 dB Preamplifier (3.6 GHz)	R&S FSU-B25	1044.9298.02	yes	
Analog Baseband Inputs	R&S FSQ-B71	1157.0113.03	yes	
I/Q Bandwidth Extension	R&S FSQ-B72	1157.0336.02	no	
Firmware/Software				
Noise Measurement Software	R&S FS-K3	1057.3028.02		preamplifier (e.g. R&S FSU-B25) recommended
Phase Noise Measurement Software	R&S FS-K4	1108.0088.02		
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 (e.g. R&S FSU-B25) recommended
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		
3 GPP HSDPA BTS Application Firmware	R&S FS-K74	1300.7156.02		requires R&S FS-K72
3 GPP TD-SCDMA BTS Application Firmware	R&S FS-K76	1300.7291.02		
3 GPP TD-SCDMA UE Application Firmware	R&S FS-K77	1300.8100.02		
CDMA2000/IS-95 (cdma one)/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 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		

Recommended extras

Order designation	Type	Order No.
Headphones		0708.9010.00
US Keyboard with trackball	R&S PSP-Z2	1091.4100.02
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		
Probe power connector, 3 pin		1065.9480.02
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 90 GHz to 110 GHz	R&S FS-Z110	1089.0976.02
For R&S FSQ26 only:		
Test port adapter N male for R&S FSU26		1021.0541.00
Test port adapter 3.5 mm male for R&S FSU26		1021.0529.00
Microwave Measurement Cable with test port adapter set N male and 3.5 mm male for R&S FSQ26 and R&S FSU26	R&S FSE-Z15	1046.2002.02
For R&S FSQ40 only:		
Test port adapter N male for R&S FSQ40		1036.4783.00
Test port adapter K male for R&S FSQ40		1036.4802.00
Test port adapter 2.4 mm female for R&S FSQ40	R&S FSE-Z5	1088.1627.02

