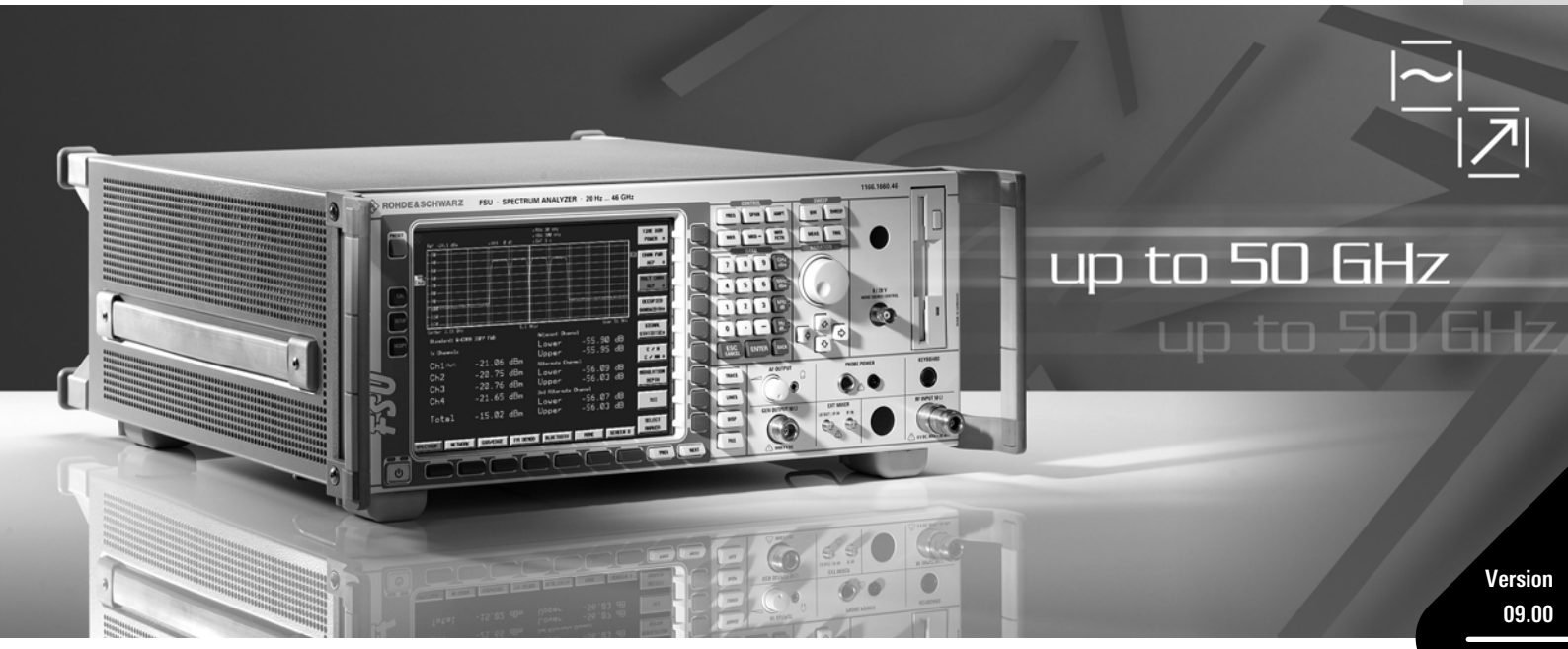
Specifications



Version
09.00

April
2005

Spectrum Analyzer R&S®FSU

Specifications

ROHDE&SCHWARZ

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

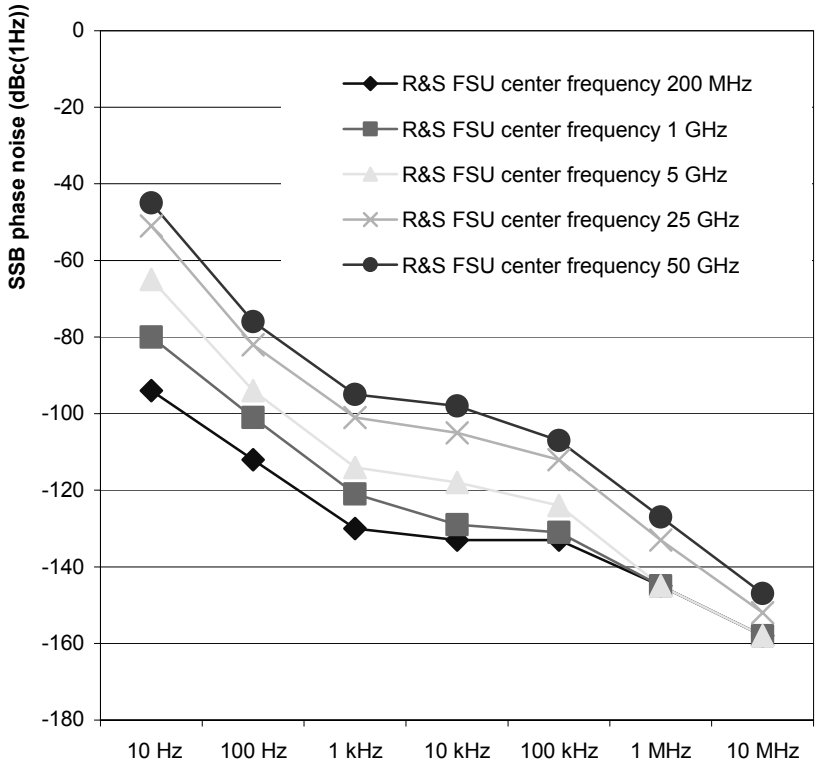
Frequency range	R&S FSU3:	DC coupled	20 Hz to 3.6 GHz
		AC coupled	1 MHz to 3.6 GHz
	R&S FSU8:	DC coupled	20 Hz to 8 GHz
		AC coupled	1 MHz to 8 GHz
	R&S FSU26:	DC coupled	20 Hz to 26.5 GHz
		AC coupled	10 MHz to 26.5 GHz
	R&S FSU46:	DC coupled	20 Hz to 46 GHz
	R&S FSU50:	DC coupled	20 Hz to 50 GHz
Frequency 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	±(marker frequency × reference error + 0.5% × span +10% × resolution bandwidth + ½ (last digit))
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[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

[1] **Valid as of serial number 200000.**



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 50 MHz, f > 3.6 GHz	–20% to +20% –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 10 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 RF input DC coupled	50 V 0 V
CW RF power	RF attenuation 0 dB RF attenuation ≥10 dB	20 dBm (= 0.1 W) 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 >3.6 GHz R&S FSU8 R&S FSU26, R&S FSU46, R&S FSU50	 +13 dBm, nominal +10 dBm, nominal +7 dBm, nominal
Third-order intercept point (TOI)	level 2 × –10 dBm, Δf >5 × RBW or 10 kHz, whichever is larger R&S FSU3: 10 MHz ≤ f < 300 MHz 300 MHz ≤ f ≤ 3.6 GHz R&S FSU8: 10 MHz ≤ f < 300 MHz 300 MHz ≤ f ≤ 3.6 GHz 3.6 GHz ≤ f ≤ 8 GHz R&S FSU26, R&S FSU46, R&S FSU50: 10 MHz ≤ f < 300 MHz 300 MHz ≤ f < 3.6 GHz 3.6 GHz ≤ f < 26.5 GHz R&S FSU46: 26.5 GHz ≤ f ≤ 40 GHz f > 40 GHz R&S FSU50: 26.5 GHz ≤ f < 28 GHz 28 GHz ≤ f ≤ 40 GHz f > 40 GHz	 >17 dBm, typ. 20 dBm >19 dBm, typ. 25 dBm >17 dBm, typ. 20 dBm >20 dBm, typ. 25 dBm >18 dBm, typ. 23 dBm >17 dBm, typ. 20 dBm >22 dBm, typ. 27 dBm >12 dBm, typ. 15 dBm >12 dBm, typ. 15 dBm 12 dBm, nominal >8 dBm, typ. 11 dBm >12 dBm, typ. 15 dBm 12 dBm, nominal
Second harmonic intercept (SHI)	f <100 MHz 100 MHz < f ≤ 400 MHz 400 MHz < f ≤ 500 MHz 500 MHz < f ≤ 1 GHz 1 GHz < f ≤ 1.8 GHz > 1.8 GHz	>35 dBm >45 dBm, typ. 55 dBm >52 dBm, typ. 60 dBm >45 dBm, typ. 55 dBm >35 dBm 80 dBm, nominal

Displayed average noise level		
	0 dB RF attenuation, termination 50 Ω, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, 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 <–120 dBm <–130 dBm <–143 dBm
	R&S FSU3	
	20 MHz ≤ f < 2.0 GHz 2.0 GHz ≤ f ≤ 3.0 GHz 3.0 GHz ≤ f ≤ 3.6 GHz	<–145 dBm, typ. –148 dBm <–143 dBm, typ. –147 dBm <–142 dBm, typ. –146 dBm
	R&S FSU8	
	20 MHz ≤ f < 2.0 GHz 2.0 GHz ≤ f < 3.0 GHz 3.0 GHz ≤ f < 7 GHz 7 GHz ≤ f < 8 GHz	<–145 dBm, typ. –148 dBm <–143 dBm, typ. –145 dBm <–142 dBm, typ. –144 dBm <–140 dBm, typ. –142 dBm
	R&S FSU26	
	20 MHz ≤ f < 2 GHz 2 GHz ≤ f < 3.6 GHz 3.6 GHz ≤ f < 8 GHz 8 GHz ≤ f < 13 GHz 13 GHz ≤ f < 18 GHz 18 GHz ≤ f < 22 GHz 22 GHz ≤ f < 26.5 GHz	<–142 dBm, typ. –146 dBm <–140 dBm, typ. –143 dBm <–142 dBm, typ. –146 dBm <–140 dBm, typ. –143 dBm <–138 dBm, typ. –141 dBm <–137 dBm, typ. –140 dBm <–135 dBm, typ. –138 dBm
	R&S FSU46	
	20 MHz ≤ f < 2 GHz 2 GHz ≤ f < 13 GHz 13 GHz ≤ f < 18 GHz 18 GHz ≤ f < 22 GHz 22 GHz ≤ f < 26.5 GHz 26.5 GHz ≤ f < 40 GHz 40 GHz ≤ f < 46 GHz	<–142 dBm, typ. –146 dBm <–140 dBm, typ. –143 dBm <–138 dBm, typ. –141 dBm <–137 dBm, typ. –140 dBm <–135 dBm, typ. –138 dBm <–128 dBm, typ. –131 dBm <–123 dBm, typ. –128 dBm
	R&S FSU50	
	20 MHz ≤ f < 2 GHz 2 GHz ≤ f < 13 GHz 13 GHz ≤ f < 18 GHz 18 GHz ≤ f < 22 GHz 22 GHz ≤ f < 26.5 GHz 26.5 GHz ≤ f < 32 GHz 32 GHz ≤ f < 46 GHz 46 GHz ≤ f < 50 GHz	<–142 dBm, typ. –146 dBm <–140 dBm, typ. –143 dBm <–138 dBm, typ. –141 dBm <–137 dBm, typ. –140 dBm <–135 dBm, typ. –138 dBm <–128 dBm, typ. –131 dBm <–123 dBm, typ. –126 dBm <–118 dBm, typ. –121 dBm

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

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

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 (σ = 0.07 dB)
Frequency response referenced to 128 MHz	DC coupling, RF attenuation ≥10 dB, +20 °C to +30 °C 10 MHz ≤ f < 3.6 GHz 3.6 GHz ≤ f < 8 GHz, span < 1 GHz 8 GHz ≤ f < 22 GHz, span < 1 GHz 22 GHz ≤ f < 26.5 GHz, span < 1 GHz 26.5 GHz ≤ f < 40 GHz, span < 1 GHz 40 GHz ≤ f < 50 GHz, span < 1 GHz, RF attenuation ≤ 40 dB f ≥ 3.6 GHz, span ≥ 1 GHz +5 °C to +45 °C 10 MHz ≤ f <3.6 GHz 3.6 GHz ≤ f < 26.5 GHz f ≥ 26.5 GHz	 <0.3 dB (σ = 0.1 dB) <1.5 dB (σ = 0.5 dB) <2 dB (σ = 0.7 dB) <2.5 dB (σ = 0.8 dB) <2.5 dB (σ = 0.8 dB) <3 dB (σ = 1.0 dB) add 0.5 dB to above values <0.6 dB (σ = 0.2 dB) add 0.5 dB to above values add 1.0 dB to above values
Attenuator switching uncertainty	f = 128 MHz 0 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 nonlinearity	+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 (σ = 0.03 dB) <0.3 dB (σ =0.1 dB)
	200 kHz ≤ RBW ≤10 MHz, S/N >16 dB 0 dB to –50 dB –50 dB to –70 dB	 <0.2 dB (σ =0.07 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 200 kHz to 3 MHz 5 MHz to 50 MHz FFT filter 1 Hz to 3 kHz	 <0.1 dB (σ =0.03 dB) <0.2 dB (σ =0.07 dB) <0.5 dB (σ =0.15 dB) <0.2 dB (σ =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 f < 3.6 GHz, RBW >100 kHz 3.6 GHz ≤ f <8 GHz 8 GHz ≤ f <18 GHz 18 GHz ≤ f <26.5 GHz 26.5 GHz ≤ f < 40 GHz 40 GHz ≤ f < 50 GHz	 0.3 dB 0.5 dB 2.0 dB 2.5 dB 3.0 dB 3.0 dB 3.5 dB

I/Q data

Interface		GPIB or LAN interface
Memory length		max. 512 k samples I and Q
Sample length		24 bit, each I and Q
Sample rate	settable in steps of 0.5 (32 MHz × 2–n, n = 0 to 11)	15.625 kHz to 32 MHz
Max. signal bandwidth	sample rate ≤2 MHz 4 MHz 8 MHz 16 MHz 32 MHz	0.8 × sample rate 2.8 MHz 4.8 MHz 7 MHz 9 MHz
IF pre-filter bandwidth		300 kHz to 10 MHz, 1/2/3/5 steps

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 FSU3, R&S FSU8 R&S FSU26 R&S FSU46 R&S FSU50	N female test port adapter APC 3.5 mm/N female test port adapter 2.92 mm (K)/N female test port adapter 2.4 mm/N female
VSWR	RF attenuation ≥10 dB, DC coupled f < 3.6 GHz R&S FSU8: 3.6 GHz ≤ f <8 GHz R&S FSU26, R&S FSU46, R&S FSU50: 3.6 GHz ≤ f < 18 GHz 18 GHz ≤ f < 26.5 GHz 26.5 GHz ≤ f < 40 GHz 40 GHz ≤ f ≤ 50 GHz	 <1.5 <2 <1.8 <2.0 <2.5 <3, nominal
	RF attenuation <10 dB or AC coupling	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

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 ≤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 (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 ≤ 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		1.4 V (TTL)
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 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
Mass memory	option R&S FSU-B20	hard disk replaced by a flash disk

Temperature		
Temperature	operating temperature range permissible temperature range storage temperature range option R&S FSU-B20: operating temperature range permissible temperature range	+5° C to +40 °C +0° C to +50 °C –40°C to +70 °C 0 °C to +50 °C 0 °C to +55 °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
	option R&S FSU-B20: random vibration	10 Hz to 300 Hz, acceleration 1.9 g (RMS)
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 FSU3, R&S FSU8 R&S FSU26, R&S FSU46, R&S FSU50	typ. 130 VA typ. 150 VA
Safety		meets EN 61010-1, UL 3111-1, CSA C22.2 No. 1010-1, DIN EN 61010-1
Test mark		VDE, GS, CSA, CSA-NRTL
Dimensions	W × H × D in mm	435 × 192 × 460
Weight	R&S FSU3 R&S FSU8 R&S FSU26 R&S FSU46 R&S FSU50	14.6 kg 15.4 kg 16.5 kg 16.8 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 × 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 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 dBm in steps of 0.1 dB –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 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 dB, typ. 1.9 dB 3 dB <1 dB

Dynamic range		
Attenuation measurement range	RBW = 1 kHz, f >10 MHz	100 dB
Harmonics Spurious, nonharmonics	output level –10 dBm output level 0 dBm	typ. –30 dBc 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 V
AM	$f_{Center} > f_{Mod}$, 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	$f_{Center} > f_{Mod}$, span = 0 Hz	
Frequency deviation		full range: 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz
Modulation frequency range	deviation ≤10 MHz deviation ≤1 MHz	0 Hz to 1 kHz 0 Hz to 100 kHz
Modulation frequency response	0 kHz to 100 kHz	1 dB
I/Q modulation	$f_{Center} > f_{Mod}$, 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 2 GHz ≤ f ≤ 3.6 GHz	1.2 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 FSU26, R&S FSU46 and R&S FSU50 only)

LO signal		
Frequency range		7.0 GHz to 15.5 GHz
Level	+20 °C to +30 °C +5 °C to +45 °C	+15.0 dBm ±1 dB +15.0 dBm ±3 dB

IF input		
IF frequency		404.4 MHz
Full scale level	2-port mixer (LO output / IF input, front panel) 3-port mixer (IF input, front panel)	–20 dBm –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 +5 °C to +45 °C 3-port mixer, IF input (front panel) +20 °C to +30 °C +5 °C to +45 °C	 <1 dB <3 dB <1 dB <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 FSU-B23 (for R&S FSU26 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 (σ = 0.7 dB) <2.5 dB (σ = 0.8 dB) <3.0 dB (σ = 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 FSU26 specifications + 2 dB R&S FSU26 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 FSU3	100 kHz[2], 10 MHz to 3.6 GHz
	R&S FSU8	100 kHz[2], 10 MHz to 8 GHz
	R&S FSU26	100 kHz[2], 10 MHz to 3.6 GHz
	R&S FSU46	100 kHz[2], 10 MHz to 3.6 GHz
	R&S FSU50	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 (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, 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 FSU3, R&S FSU8, R&S FSU26 10 MHz to 2.0 GHz 2.0 GHz to 3.6 GHz	 <–152 dBm <–150 dBm
	R&S FSU8 3.6 GHz to 8 GHz	 <–147 dBm
	R&S FSU46, R&S FSU50 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 8, 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 8, 3.6 GHz to 8 GHz	typ. 3.5 dB

Intermodulation		
Third-order intercept point (TOI)	electronic attenuator on, Δf >5 × 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 200000.**

Broadband FM demodulator output R&S FSU-B27

Frequency deviation		
Frequency deviation		≤ 5 MHz
Deviation + modulation frequency		≤ 5 MHz
FM slope	Load impedance 50 Ω	280 mV / MHz ± 20%
Frequency Response		
	DC to 1MHz (<1MHz deviation)	< 0,4 dB
	4 MHz (<1MHz deviation)	3 dB typ.
Distortion		
	1 MHz deviation + 1 MHz modulation frequency	> 30 dBc
Residual FM		
	LF- Lowpass 100 kHz	< 100 Hz RMS
Lowpass filters	3-dB bandwidth	30 kHz, 100 kHz, 300 kHz, 1 MHz

Ordering information

Order designation	Type	Order No.
Spectrum Analyzer 20 Hz to 3.6 GHz	R&S FSU3	1166.1660.03
Spectrum Analyzer 20 Hz to 8 GHz	R&S FSU8	1166.1660.08
Spectrum Analyzer 20 Hz to 26.5 GHz	R&S FSU26	1166.1660.26
Spectrum Analyzer 20 Hz to 46 GHz	R&S FSU46	1166.1660.46
Spectrum Analyzer 20 Hz to 50 GHz	R&S FSU50	1166.1660.50
Accessories supplied		
Power cable, operating manual, service manual, R&S FSU26: test port adapter with 3.5 mm female (1021.0512.00) and N female (1021.0535.00) connector R&S FSU46: test port adapter with K female (1036.4790.00) and N female (1036.4777.00) connector R&S FSU50: test port adapter with 2.4 mm female (1088.1627.02) 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 FSU-B18	1145.0242.0x	no	excludes R&S FSU-B20
Second Hard Disk for R&S FSU-B18	R&S FSU-B19	1145.0394.0x		requires R&S FSU-B18
Extended Environmental Specifications	R&S FSU-B20	1155.1606.08	no	
LO/IF Ports for External Mixers	R&S FSU-B21	1157.1090.02	yes	only for R&S FSU26, R&S FSU46 and R&S FSU50
20 dB Preamplifier, 3.6 GHz to 26.5 GHz, for R&S FSU26	R&S FSU-B23	1157.0907.02	no	only for R&S FSU26, 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	
Broadband FM demodulator output, max. dev. 5MHz	R&S FSU-B27	1157.2000.02	yes	
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		
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		

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 FSU26, R&S FSU46, R&S FSU50 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 FSU26 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 FSU46 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
For R&S FSU50 only:		
Test port adapter N male		1036.4783.00
Test port adapter K female		1036.4790.00
Test port adapter K male		1036.4802.00

Certified Quality System
ISO 9001
DQS REG. NO 1954 QM

Certified Environmental System
ISO 14001
DQS REG. NO 1954 UM

For product brochure, see PD 0758.0016.12
and www.rohde-schwarz.com
(search term: FSU)

ROHDE&SCHWARZ

www.rohde-schwarz.com

Europe: Tel. +49 1805 12 4242, e-mail: customersupport@rohde-schwarz.com · North America: Tel. +1 410-910-7988, e-mail: customer.support@rsa.rohde-schwarz.com
Asia: Tel. +65 68463710, e-mail: customer-service@rssg.rohde-schwarz.com