



up to 50 GHz

up to 50 GHz



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Spectrum Analyzer R&S®FSU

Specifications



ROHDE & SCHWARZ

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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

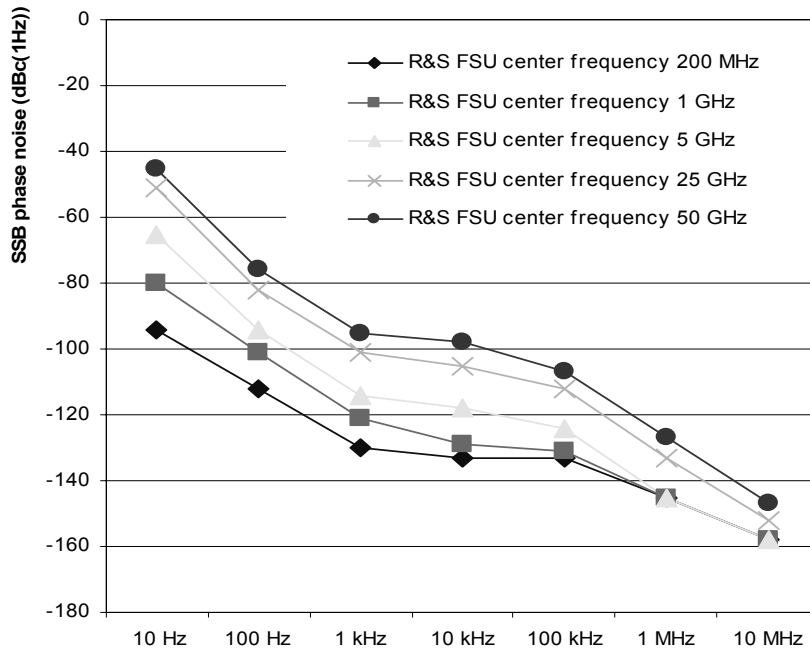
Frequency range	R&S FSU3:	DC coupled	20 Hz to 3.6 GHz
		AC coupled	1 MHz to 3.6 GHz
	R&S FSU8:	DC coupled	20 Hz to 8 GHz
		AC coupled	1 MHz to 8 GHz
	R&S FSU26:	DC coupled	20 Hz to 26.5 GHz
		AC coupled	10 MHz to 26.5 GHz
	R&S FSU43:	DC coupled	20 Hz to 43 GHz
	R&S FSU46:	DC coupled	20 Hz to 46 GHz
	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	$\pm(\text{marker frequency} \times \text{reference error} + 0.5 \% \times \text{span} + 10 \% \times \text{resolution bandwidth} + \frac{1}{2} \text{ (last digit)})$
Frequency counter resolution	selectable	0.1 Hz to 10 kHz
Count accuracy	S/N >25 dB	$\pm(\text{frequency} \times \text{reference error} + \frac{1}{2} \text{ (last digit)})$
Display range for frequency axis		0 Hz, 10 Hz to max. frequency
Resolution		0.1 Hz
Max. span deviation		1 %

Spectral purity, SSB phase noise (1 Hz)	f = 640 MHz	
Residual FM	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	$<-98 \text{ dBc}^1, <-90 \text{ dBc, typ. } -104 \text{ dBc}^1$
	1 kHz	$<-116 \text{ dBc}^1, <-112 \text{ dBc, typ. } -124 \text{ dBc}^1$
	10 kHz	$<-128 \text{ dBc}^1, <-120 \text{ dBc, typ. } -133 \text{ dBc}^1$
	100 kHz	$<-128 \text{ dBc}^1, <-120 \text{ dBc, typ. } -133 \text{ dBc}^1$
	1 MHz	$<-140 \text{ dBc}^1, <-138 \text{ dBc, typ. } -146 \text{ dBc}^1$
	10 MHz	typ. -160 dBc

¹ Valid for R&S FSU43, other models valid as of serial number 200000.



Sweep

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

Resolution bandwidths

Sweep filters		
3 dB bandwidths	R&S FSU3, R&S FSU8, R&S FSU26, R&S FSU46, R&S FSU50	10 Hz to 20 MHz in 1/2/3/5 sequence, 50 MHz
	R&S FSU43	10 Hz to 10 MHz in 1/2/3/5 sequence
Bandwidth uncertainty		
	10 Hz to 100 kHz (digital)	<3 %
	200 kHz to 5 MHz (analog)	<10 %
	10 MHz	-30 % to +10 %
	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, 1 MHz
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,

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 <-80 dBm 100 Hz <-100 dBm 1 kHz <-110 dBm 10 kHz <-120 dBm 100 kHz <-120 dBm 1 MHz <-130 dBm 10 MHz <-143 dBm
	R&S FSU3
	20 MHz $\leq f < 2.0$ GHz <-145 dBm, typ. -148 dBm 2.0 GHz $\leq f \leq 3.0$ GHz <-143 dBm, typ. -147 dBm 3.0 GHz $\leq f \leq 3.6$ GHz <-142 dBm, typ. -146 dBm
	R&S FSU8
	20 MHz $\leq f < 2.0$ GHz <-145 dBm, typ. -148 dBm 2.0 GHz $\leq f < 3.0$ GHz <-143 dBm, typ. -145 dBm 3.0 GHz $\leq f < 7$ GHz <-142 dBm, typ. -144 dBm 7 GHz $\leq f < 8$ GHz <-140 dBm, typ. -142 dBm
	R&S FSU26
	20 MHz $\leq f < 2$ GHz <-142 dBm, typ. -146 dBm 2 GHz $\leq f < 3.6$ GHz <-140 dBm, typ. -143 dBm 3.6 GHz $\leq f < 8$ GHz <-142 dBm, typ. -146 dBm 8 GHz $\leq f < 13$ GHz <-140 dBm, typ. -143 dBm 13 GHz $\leq f < 18$ GHz <-138 dBm, typ. -141 dBm 18 GHz $\leq f < 22$ GHz <-137 dBm, typ. -140 dBm 22 GHz $\leq f < 26.5$ GHz <-135 dBm, typ. -138 dBm
	R&S FSU43
	20 MHz $\leq f < 2$ GHz <-142 dBm, typ. -146 dBm 2 GHz $\leq f < 13$ GHz <-140 dBm, typ. -143 dBm 13 GHz $\leq f < 18$ GHz <-138 dBm, typ. -141 dBm 18 GHz $\leq f < 22$ GHz <-137 dBm, typ. -140 dBm 22 GHz $\leq f < 26.5$ GHz <-135 dBm, typ. -138 dBm 26.5 GHz $\leq f < 40$ GHz <-128 dBm, typ. -131 dBm 40 GHz $\leq f < 43$ GHz <-123 dBm, typ. -128 dBm
	R&S FSU46
	20 MHz $\leq f < 2$ GHz <-142 dBm, typ. -146 dBm 2 GHz $\leq f < 13$ GHz <-140 dBm, typ. -143 dBm 13 GHz $\leq f < 18$ GHz <-138 dBm, typ. -141 dBm 18 GHz $\leq f < 22$ GHz <-137 dBm, typ. -140 dBm 22 GHz $\leq f < 26.5$ GHz <-135 dBm, typ. -138 dBm 26.5 GHz $\leq f < 40$ GHz <-128 dBm, typ. -131 dBm 40 GHz $\leq f < 46$ GHz <-123 dBm, typ. -128 dBm
	R&S FSU50
	20 MHz $\leq f < 2$ GHz <-142 dBm, typ. -146 dBm 2 GHz $\leq f < 13$ GHz <-140 dBm, typ. -143 dBm 13 GHz $\leq f < 18$ GHz <-138 dBm, typ. -141 dBm 18 GHz $\leq f < 22$ GHz <-137 dBm, typ. -140 dBm 22 GHz $\leq f < 26.5$ GHz <-135 dBm, typ. -138 dBm 26.5 GHz $\leq f < 32$ GHz <-128 dBm, typ. -131 dBm 32 GHz $\leq f < 46$ GHz <-123 dBm, typ. -126 dBm 46 GHz $\leq f < 50$ GHz <-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,
	EMI detectors	Quasi Peak, CISPR-RMS, CISPR-Av
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 40 GHz $\leq f < 50$ GHz, span < 1 GHz, RF attenuation ≥ 40 dB $f \geq 3.6$ 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) <3 dB ($\sigma = 1.0$ 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 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 ($\sigma = 0.03$ 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	<0.1 dB ($\sigma = 0.03$ dB)
	200 kHz to 3 MHz	<0.2 dB ($\sigma = 0.07$ dB)
	5 MHz to 50 MHz	<0.5 dB ($\sigma = 0.15$ dB)
	FFT filter 1 Hz to 3 kHz	<0.2 dB ($\sigma = 0.07$ dB)

Total measurement uncertainty		
	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 $\leq f < 8$ GHz 8 GHz $\leq f < 18$ GHz 18 GHz $\leq f < 26.5$ GHz 26.5 GHz $\leq f < 40$ GHz 40 GHz $\leq f < 50$ 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 FSU43, 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	<1.5
	R&S FSU8: 3.6 GHz ≤ f < 8 GHz	<2
	R&S FSU26, R&S FSU43, R&S FSU46, R&S FSU50: 3.6 GHz ≤ f < 18 GHz	<1.8
	18 GHz ≤ f < 26.5 GHz	<2.0
	26.5 GHz ≤ f < 40 GHz	<2.5
	40 GHz ≤ f ≤ 50 GHz	<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		
Supply voltages		±10 V and ground, max. 100 mA, nominal

Keyboard connector		PS/2 female for MF-2 keyboard
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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		
Output voltage		0 V and 28 V, switchable, nominal

Inputs and outputs (rear panel)

IF 20.4 MHz		
Impedance		BNC female
Bandwidth		50 Ω
Level	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		
Impedance	Not available with R&S FSU43, active only if RBW $>$ 10 MHz	BNC female
Bandwidth	RBW $>$ 10 MHz	50 Ω
Level	mixer level \leq 0 dBm	equal to resolution bandwidth
		mixer level typ. -10 dB

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

Reference output		
Impedance		BNC female
Output frequency	Internal reference	50 Ω
	External reference	10 MHz
Level		Same as reference input signal
		$>$ 0 dBm, nominal

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

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

External trigger/gate input		
Trigger voltage		BNC female
Input impedance		1.4 V (TTL)
		\geq 10 k Ω

IEC/IEEE bus control		
Command set		interface to IEC 625-2 (IEEE 488.2)
Connector		SCPI 1997.0 or HP8566 compatible
Interface functions		24-pin Amphenol female
		SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0

LAN interface		
USB interface		
Serial interface		
Printer interface		
Mouse interface		
Connector for external monitor (VGA)		
		10/100 BaseT, RJ45
		type A plug, version 1.1
		RS-232-C (COM), 9-pin female connectors
		parallel (Centronics compatible)
		PS/2 compatible
		15-pin D-Sub

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 FSU43, 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	435 mm × 192 mm × 460 mm
Weight	R&S FSU3 R&S FSU8 R&S FSU26 R&S FSU43, 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 $-3 \times \text{RBW}$ 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

Level sweep		
Level range		0 to -25 dBm
Max. deviation of output level	f = 100 kHz to 2 GHz output level 0 dBm to -5 dBm output level -5 dBm to -15 dBm output level -15 to -25 dBm	$<1.5 \text{ dB}$ $<2 \text{ dB}$ $<3 \text{ dB}$
	f = 2 GHz to 3 GHz output level 0 dBm to -25 dBm	$<3 \text{ dB}$

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 $\leq f \leq$ 2 GHz	1.2
	2 GHz $\leq f \leq$ 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 FSU26, R&S FSU43, R&S FSU46 and R&S FSU50 only)

LO signal		
Frequency range		7 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)	
	+20 °C to +30 °C	<1 dB
	+5 °C to +45 °C	<3 dB
	3-port mixer, IF input (front panel)	
	+20 °C to +30 °C	<1 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 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 ($\sigma = 0.7$ 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	R&S FSU26 specifications + 2 dB
	8 GHz to 26.5 GHz	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, R&S FSU26, R&S FSU43, R&S FSU46, R&S FSU50 electronic attenuator preamplifier	10 MHz to 3.6 GHz 100 kHz ² , 10 MHz to 3.6 GHz
	R&S FSU8 electronic attenuator preamplifier	10 MHz to 8 GHz 100 kHz ² , 10 MHz to 8 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 FSU3, R&S FSU8, R&S FSU26	
	10 MHz to 2.0 GHz	<-152 dBm
	2.0 GHz to 3.6 GHz	<-150 dBm
	R&S FSU8	
	3.6 GHz to 8 GHz	<-147 dBm
	R&S FSU43, R&S FSU46, R&S FSU50	
	10 MHz to 40 MHz	<-150 dBm
	40 MHz to 2 GHz	<-152 dBm
	2 GHz to 3.6 GHz	<-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 FSU8	
	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 FSU8	
	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 electronic attenuator board stock number 1137.0724.02 (see instrument HW info).

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 1 MHz (<1MHz deviation)	<0,4 dB
	4 MHz (<1 MHz 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

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 43 GHz	R&S FSU43	1166.1660.43
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 FSU43, 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

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	for R&S FSU26, R&S FSU43, R&S FSU46 and R&S FSU50 only
20 dB Preamplifier, 3.6 GHz to 26.5 GHz	R&S FSU-B23	1157.0907.02	no	for R&S FSU26 only, 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. 5 MHz	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 (incl HSUPA)	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 (incl Rev A)	R&S FS-K84	1157.2851.02		
CDMA2000® 1xEV-DO MS Application Firmware	R&S FS-K85	1300.6689.02		

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Recommended extras

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 FSU43, 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 and FSU43 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



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



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