



up to 50 GHz

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Version
09.00

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Spectrum Analyzer R&S®FSU

Specifications



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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

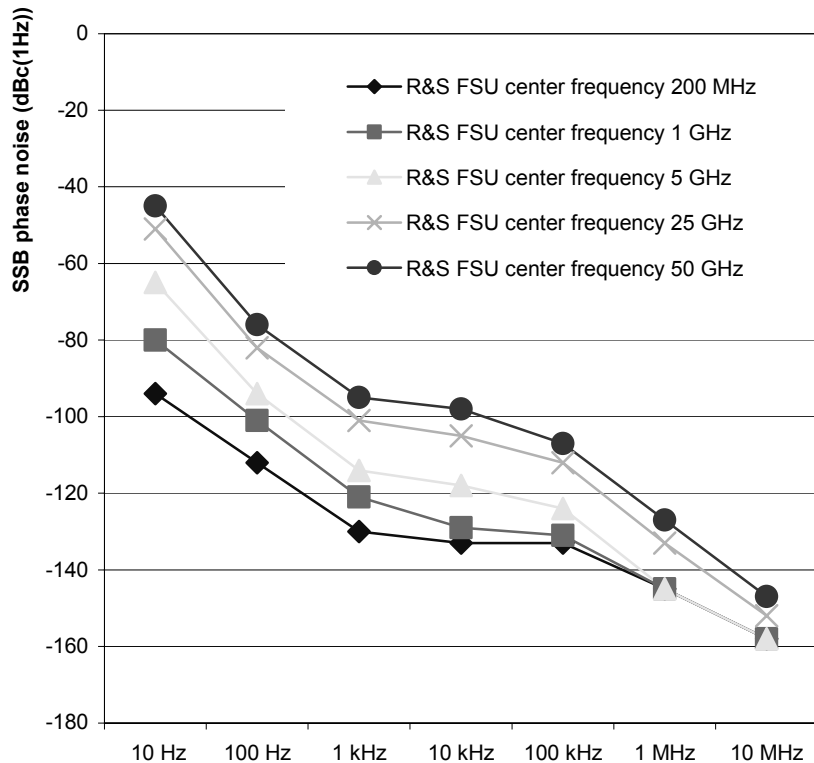
Frequency range	R&S FSU3:	DC coupled	20 Hz to 3.6 GHz
		AC coupled	1 MHz to 3.6 GHz
	R&S FSU8:	DC coupled	20 Hz to 8 GHz
		AC coupled	1 MHz to 8 GHz
	R&S FSU26:	DC coupled	20 Hz to 26.5 GHz
		AC coupled	10 MHz to 26.5 GHz
	R&S FSU46:	DC coupled	20 Hz to 46 GHz
	R&S FSU50:	DC coupled	20 Hz to 50 GHz
Frequency 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 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		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		
	\leq 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 <-120 dBm <-130 dBm <-143 dBm
	R&S FSU3	
	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. -146 dBm
	R&S FSU8	
	20 MHz $\leq f < 2.0$ GHz 2.0 GHz $\leq f < 3.0$ GHz 3.0 GHz $\leq f < 7$ GHz 7 GHz $\leq f < 8$ 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 $\leq f < 2$ 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 <-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 $\leq f < 2$ GHz 2 GHz $\leq f < 13$ GHz 13 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 40 GHz $\leq f < 46$ 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 $\leq f < 2$ GHz 2 GHz $\leq f < 13$ GHz 13 GHz $\leq f < 18$ GHz 18 GHz $\leq f < 22$ GHz 22 GHz $\leq f < 26.5$ GHz 26.5 GHz $\leq f < 32$ GHz 32 GHz $\leq f < 46$ GHz 46 GHz $\leq f < 50$ 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	$f \leq 3.6$ GHz $f > 3.6$ GHz $f > 40$ GHz	>90 dB, typ. >110 dB >70 dB, typ. >100 dB typ. 70 dB
Intermediate frequency	$f \leq 3.6$ 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 $f \geq 40$ 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, dB μ V, dBmV, dB μ A, dBpW μ V, mV, μ A, 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 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 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 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		GPIO 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 $-3 \times \text{RBW}$ 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 ≤ 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	$f_{\text{Center}} > f_{\text{Mod}}$, 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 $\leq f \leq$ 2 GHz 2 GHz $\leq f \leq$ 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 ($\sigma = 0.7$ 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 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 ($\sigma = 0.34$ 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 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, $\Delta f > 5 \times$ 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 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 Preamp, 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 Preamp (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



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



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