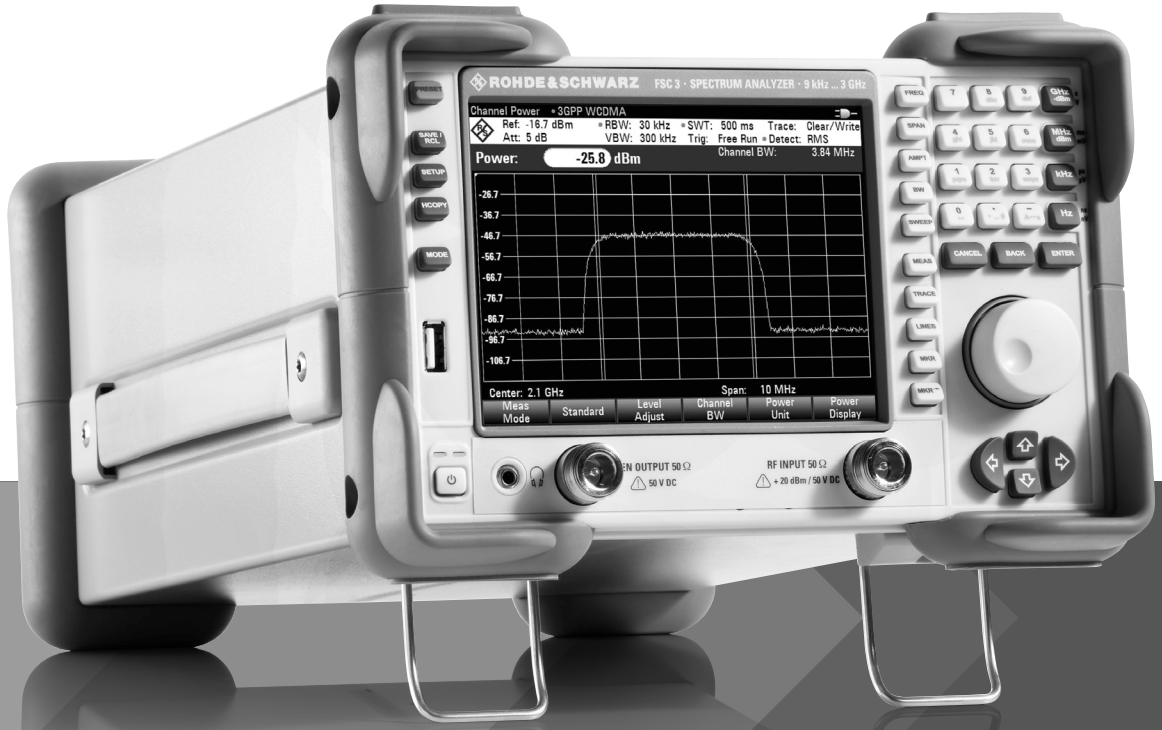
R&S®FSC SPECTRUM ANALYZER

Specifications



Specifications
Version 05.00

ROHDE&SCHWARZ
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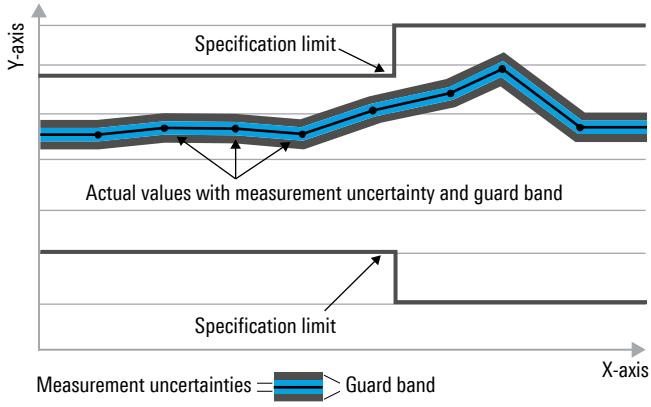
CONTENTS

Definitions

General
Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits
Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as <, ≤, >, ≥, ± or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Non-traceable specifications with limits (n. trc.)
Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

Specifications without limits
Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value, e.g. dimensions or resolution of a setting parameter. Compliance is ensured by design.

Typical data (typ.)
Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)
Characterize product performance by means of a representative value for the given parameter, e.g. nominal impedance. In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)
Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties
Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are designated with the format “parameter: value”.

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

Base unit

Frequency

Frequency range	models .03/.13	9 kHz to 3 GHz
	models .06/.16	9 kHz to 6 GHz
Frequency resolution		1 Hz

Reference frequency, internal, nominal		
Aging per year		1×10^{-6}
Temperature drift	0 °C to +30 °C	1×10^{-6}
	+30 °C to +50 °C	3×10^{-6}
Achievable initial adjustment accuracy		5×10^{-7}
Total reference uncertainty		(time since last adjustment × aging rate) + temperature drift + calibration accuracy

Frequency readout		
Marker resolution		0.1 Hz
Uncertainty		±(marker frequency × reference uncertainty + 10 % × resolution bandwidth + ½ (span/(sweep points – 1)) + 1 Hz)
Number of sweep (trace) points		631
Marker tuning frequency step size		span/630
Frequency counter resolution		0.1 Hz
Count uncertainty	S/N > 25 dB	±(frequency × reference uncertainty + ½ (last digit))
Frequency span		0 Hz, 10 Hz to 3 GHz/6 GHz
Span setting uncertainty		±(span/630)

Spectral purity, SSB phase noise	f = 500 MHz, carrier offset	
	30 kHz	< –95 dBc (1 Hz), –105 dBc (1 Hz) (typ.)
	100 kHz	< –100 dBc (1 Hz), –110 dBc (1 Hz) (typ.)
	1 MHz	< –120 dBc (1 Hz), –127 dBc (1 Hz) (typ.)

Sweep time

Sweep time	span = 0 Hz	200 µs to 100 s
	10 Hz ≤ span ≤ 600 MHz	20 ms to 1000 s
	span > 600 MHz	(20 ms × span/600 MHz) to 1000 s
Uncertainty	span = 0 Hz	1 % (nom.)
	span ≥ 10 Hz	3 % (nom.)

Bandwidths

Resolution bandwidths (RBW)		
Range	–3 dB bandwidth	10 Hz to 3 MHz in 1/3 sequence
Bandwidth accuracy	10 Hz ≤ RBW ≤ 300 kHz	< 5 % (nom.)
	RBW > 300 kHz	< 10 % (nom.)
Selectivity	60 dB:3 dB	< 5 (Gaussian type filters) (nom.)
Video filters		
Range	–3 dB bandwidth	10 Hz to 3 MHz in 1/3 sequence

Level

Display range		displayed noise floor to +30 dBm
Maximum rated input level with RF attenuation ≥ 10 dB		
DC voltage		50 V
CW RF power		30 dBm (= 1 W)
Peak RF power	duration < 3 s	33 dBm (= 2 W)
Maximum pulse voltage		150 V
Maximum pulse energy	pulse width: 10 µs	10 mWs
Maximum rated input level with RF attenuation < 10 dB		
DC voltage		50 V
CW RF power		20 dBm (= 100 mW)
Peak RF power	duration < 3 s	23 dBm (= 200 mW)
Maximum pulse voltage		50 V
Maximum pulse energy	pulse width: 10 µs	1 mWs
Intermodulation		
Third order intermodulation (TOI), nominal values	intermodulation-free dynamic range, signal level: 2 × –20 dBm, RF attenuation = 0 dB, without RF preamplifier (R&S®FSC-B22 option) or RF preamplifier: off	
	f_{in} < 300 MHz	> 54 dBc (TOI > +7 dBm +11 dBm (typ.))
	300 MHz ≤ f_{in} < 3.6 GHz	> 60 dBc (TOI > +10 dBm +15 dBm (typ.))
	3.6 GHz ≤ f_{in} ≤ 6 GHz	> 46 dBc (TOI > +3 dBm +10 dBm (typ.))
	signal level: 2 × –40 dBm, RF attenuation = 0 dB, RF preamplifier (R&S®FSC-B22 option): on	
	f_{in} < 300 MHz	> 50 dBc (TOI = –15 dBm)
	300 MHz ≤ f_{in} ≤ 6 GHz	> 56 dBc (TOI = –12 dBm)
Second harmonic intercept (SHI), nominal values	RF attenuation = 0 dB, without RF preamplifier (R&S®FSC-B22 option) or RF preamplifier: off	
	f_{in} = 20 MHz to 1.5 GHz	+40 dBm
	f_{in} = 1.5 GHz to 3 GHz	+30 dBm
	RF attenuation 0 dB, RF preamplifier (R&S®FSC-B22 option): on	
	f_{in} = 100 MHz to 3 GHz	0 dBm
Displayed average noise level	RF attenuation 0 dB, termination 50 Ω, RBW = 100 Hz, VBW = 10 Hz, sample detector, log scaling, tracking generator: off, normalized to 1 Hz, without RF preamplifier (R&S®FSC-B22 option) or RF preamplifier: off	
	9 kHz to 100 kHz	< –108 dBm, –118 dBm (typ.)
	100 kHz to 1 MHz	< –115 dBm, –125 dBm (typ.)
	1 MHz to 10 MHz	< –136 dBm, –144 dBm (typ.)
	10 MHz to 2 GHz	< –141 dBm, –146 dBm (typ.)
	2 GHz to 3.6 GHz	< –138 dBm, –143 dBm (typ.)
	3.6 GHz to 5 GHz	< –142 dBm, –146 dBm (typ.)
	5 GHz to 6 GHz	< –140 dBm, –144 dBm (typ.)
	RF attenuation 0 dB, termination 50 Ω, RBW = 100 Hz, VBW = 10 Hz, sample detector, log scaling, tracking generator: off, normalized to 1 Hz, RF preamplifier (R&S®FSC-B22 option): on	
	100 kHz to 1 MHz	< –133 dBm, –143 dBm (typ.)
	1 MHz to 10 MHz	< –157 dBm, –161 dBm (typ.)
	10 MHz to 1 GHz	< –161 dBm, –165 dBm (typ.)
	1 GHz to 2 GHz	< –159 dBm, –163 dBm (typ.)
	2 GHz to 5 GHz	< –155 dBm, –159 dBm (typ.)
	5 GHz to 6 GHz	< –151 dBm, –155 dBm (typ.)

Immunity to interference, nominal values		
Image frequencies	f_{in} – 2 × 21.4 MHz	< –70 dBc, –80 dBc (typ.)
	f_{in} – 2 × 831.4 MHz	< –70 dBc, –90 dBc (typ.)
	f_{in} – 2 × 4881 MHz	–60 dBc
Intermediate frequencies	21.4 MHz, 831.4 MHz, 4881.4 MHz	–60 dBc, –80 dBc (typ.)
	8931.4 MHz	–50 dBc
Other interfering signals, signal level – RF attenuation < –20 dBm	f ≤ 3.6 GHz, spurious at f_{in} – 2440.7 MHz	< –60 dBc
	3.6 GHz < f ≤ 6 GHz, spurious at f_{in} – 4465.7 MHz	< –60 dBc
Other interfering signals, related to local oscillators	f ≤ 3.6 GHz	
	Δf < 300 kHz	–60 dBc
	Δf ≥ 300 kHz	< –60 dBc
	f > 3.6 GHz	
	Δf < 300 kHz	–54 dBc
	Δf ≥ 300 kHz	< –54 dBc
	f = receive frequency	
Residual spurious response	input matched with 50 Ω, without input signal, RBW ≤ 30 kHz, f ≥ 3 MHz, RF attenuation = 0 dB, tracking generator: off	< –90 dBm

Level display		
Logarithmic level axis		1/2/5/10/20/50/100 dB, 10 divisions
Linear level axis		0 % to 100 %, 10 divisions
Number of traces		2
Trace detectors		Max. peak, min. peak, auto peak, sample, RMS
Trace functions		clear/write, max. hold, min. hold, average, view
Setting range of reference level		–80 dBm to +30 dBm
Units of level axis		dBm, dBmV, dBµV, V, W

Level measurement uncertainty		
Absolute level uncertainty at 100 MHz	+20 °C to +30 °C	±0.3 dB (σ = 0.1 dB)
Frequency response (+20 °C to +30 °C)	9 kHz ≤ f < 10 MHz	±1.5 dB (nom.)
	10 MHz ≤ f ≤ 3.6 GHz	±1 dB (σ = 0.33 dB)
	3.6 GHz < f ≤ 6 GHz	±1.5 dB (σ = 0.5 dB)
Attenuator uncertainty		±0.3 dB (σ = 0.1 dB)
Uncertainty of reference level setting		±0.1 dB (nom.)
Display nonlinearity	S/N > 16 dB, 0 dB to –50 dB, logarithmic level display	±0.2 dB (σ = 0.067 dB)
Bandwidth switching uncertainty	reference: RBW = 10 kHz	±0.1 dB (nom.)
Total measurement uncertainty	95 % confidence level, +20 °C to +30 °C, S/N > 16 dB, 0 dB to –50 dB below reference level, RF attenuation auto	
	10 MHz < f ≤ 3.6 GHz	±1 dB, ±0.5 dB (typ.)
	3.6 GHz < f ≤ 6 GHz	±1.5 dB, ±1 dB (typ.)

Trigger functions

Trigger		
Trigger source		free run, video, external
External trigger level	low → high transition	2.4 V (nom.)
	high → low transition	0.7 V (nom.)

Tracking generator (models .13/.16 only)

Frequency range	model .13	100 kHz to 3 GHz
	model .16	100 kHz to 6 GHz
Connector		N female, 50 Ω
VSWR	100 kHz ≤ f ≤ 1 GHz	< 1.5 (nom.)
	1 GHz < f ≤ 3 GHz	< 2 (nom.)
	3 GHz < f ≤ 6 GHz (model .16 only)	< 2 (nom.)
Output level	tracking generator attenuation = 0 dB	0 dBm (nom.)
Tracking generator attenuator		0 dB to 40 dB in 1 dB steps
Dynamic range	RF attenuation = 0 dB, tracking generator attenuation = 10 dB, RBW = 1 kHz	
	100 kHz ≤ f < 300 kHz	> 60 dB, 80 dB (typ.)
	300 kHz ≤ f < 3 GHz	> 70 dB, 90 dB (typ.)
	3 GHz ≤ f < 6 GHz (model .16 only)	> 70 dB, 90 dB (typ.)
Reverse power		
DC voltage		50 V
CW RF power		+20 dBm (= 0.1 W)
Maximum pulse voltage		50 V
Maximum pulse energy (10 µs)		1 mWs

Inputs and outputs

RF input		
Impedance		50 Ω
Connector		N female
VSWR	100 kHz ≤ f ≤ 1 GHz	< 1.5 (nom.)
	1 GHz < f ≤ 6 GHz	< 2 (nom.)
Setting range of input attenuator		0 dB to 40 dB in 5 dB steps
RF preamplifier gain	with R&S®FSC-B22 option	20 dB (nom.)
AF output		
AF demodulation types		AM and FM
Connector		3.5 mm mini jack
Output impedance		32 Ω (nom.)
Voltage (open circuit)		V (RMS) adjustable from 0 V to > 100 mV
USB interface		
Front panel		USB host interface, version 1.1
Connector		USB type A plug, version 1.1
Memory sticks supported		≤ 4 Gbyte, USB version 1.1 or 2.0
Rear panel		USB device interface, version 1.1
Connector		USB type B plug, version 1.1
External reference, external trigger		
Connector		BNC female, 50 Ω
Mode	selectable	external reference, external trigger
External reference input	required level	0 dBm
	frequency	10 MHz
External trigger threshold	low → high transition	2.4 V (nom.)
	high → low transition	0.7 V (nom.)
IF out		
Connector		BNC female, 50 Ω
Frequency		21.4 MHz
DC supply input		
Connector		5 mm DIN 45323 female
Input voltage range		14 V to 16 V (nom.)
Input current		0.9 A to 0.7 A

General data

Power supply		
AC supply	input specifications	100 V to 240 V AC, 50 Hz to 60 Hz, 400 Hz, 130 VA
DC supply	input specifications	14 V to 16 V, 0.9 A to 0.7 A (nom.)
Power consumption		12 W (nom.)
Safety		in line with IEC 61010-1, EN 61010-1, CAN/CSA C22.2 No. 61010-1-04, UL61010-1
Test marks		VDE, $_{C}$CSA$_{US}$
EU legislation	for details, see user documentation	EU: in line with Data Act – Regulation (EU) 2023/2854

Manual operation		
Languages		Chinese, English, French, German, Italian, Hungarian, Japanese, Korean, Portuguese, Russian, Spanish
Remote control		
Command set		SCPI 1997.0
LAN interface		10BASE-T/100BASE-T, RJ-45
USB interface	rear panel	USB device, type B
Display		
Type		14.5 cm (5,7") LCD TFT color
Resolution		640 × 480 pixel
Audio		
Speaker		internal
Mass memory		
Mass memory		flash memory (internal) USB flash drive (not supplied)
Data storage	internal	> 256 instrument settings and traces
	external, on 1 Gbyte USB flash drive	> 5000 instrument settings and traces
Temperature	operating temperature range	+0 °C to +50 °C
	permissible temperature range	+0 °C to +55 °C
	storage temperature range	–40 °C to +70 °C
Climatic loading	relative humidity	+25 °C/+40 °C at 85 % relative humidity (IEC 60068-2-30)
Mechanical resistance		
Vibration	sinusoidal	IEC 60068-2-6
	random	IEC 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E, method 516.4, procedure 1, IEC 60068-2-27
EMC		in line with EMC Directive 2014/30/EU including: • IEC/EN 61326-1 [1, 2] • IEC/EN 61326-2-1 • CISPR 11/EN 55011 [1] • IEC/EN 61000-3-2 • IEC/EN 61000-3-3

Dimensions and weight		
Dimensions	W × H × D	233 mm × 158.1 mm × 350 mm (9.2 in × 6.2 in × 13.8 in)
Weight		4.5 kg (9.9 lb)

Recommended calibration interval		1 year

[1] RF emission in line with EN 55011 class A, operation in residential, commercial and business areas or in small-size companies is not covered. Thus, the instrument may not be operated in residential, commercial and business areas or in small-size companies, unless additional measures are taken to ensure that EN 55011 class B is complied with.

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

Ordering information

Designation	Type	Order No.
Spectrum analyzer, 9 kHz to 3 GHz	R&S®FSC3	1314.3006.03
Spectrum analyzer, 9 kHz to 3 GHz, with tracking generator	R&S®FSC3	1314.3006.13
Spectrum analyzer, 9 kHz to 6 GHz	R&S®FSC6	1314.3006.06
Spectrum analyzer, 9 kHz to 6 GHz, with tracking generator	R&S®FSC6	1314.3006.16
Accessories supplied		
Power cable, USB cable for connection to PC, quick start guide and CD-ROM (with operating manual and service manual)		

Options

Designation	Type	Order No.
Preamplifier, 100 kHz to 3 GHz/6 GHz (for the R&S®FSC3/6)	R&S®FSC-B22	1314.3535.02

Recommended extras

Designation	Type	Order No.
Ethernet cable	R&S®HA-Z210	1309.6152.00
Headphones	R&S®FSH-Z36	1145.5838.02
19" rack adapter, for installing two R&S®FSC	R&S®ZZA-T33	1109.4458.00
19" rack adapter, for installing one R&S®FSC	R&S®ZZA-T34	1109.4464.00
Matching pad 50 Ω/75 Ω, 0 Hz to 2700 MHz, matching at both ends, N connectors	R&S®RAM	0358.5414.02
Matching pad 50 Ω/75 Ω, 0 Hz to 2700 MHz, matching at one end, N connectors	R&S®RAZ	0358.5714.02
75 Ω matching pad, N to BNC (female)	R&S®FSH-Z38	1300.7740.02
Near-field probe set	R&S®HZ-15	1147.2736.02
Preamplifier, for R&S®HZ-15	R&S®HZ-16	1147.2720.02

Supported power sensors

Designation	Type	Order No.
Universal power sensor [3], 10 MHz to 8 GHz, 100 mW, 2-path	R&S®NRP-Z211	1417.0409.02
Universal power sensor [3], 10 MHz to 18 GHz, 100 mW, 2-path	R&S®NRP-Z221	1417.0309.02
R&S®NRP-Zxx power sensors require the following adapter cable for operation on the R&S®FSC		
USB adapter cable (passive), length: 2 m, to connect R&S®NRP-Zxx S/SN power sensors to the R&S®FSC	R&S®NRP-Z4	1146.8001.02

Warranty and service

Warranty		
Base unit		3 years
All other items [4]		1 year
Service options		
	Service plans	**On demand**
Calibration	up to five years [5]	pay per calibration
Warranty and repair	up to five years [5]	standard price repair
Contact your Rohde & Schwarz sales office for further details.		

For product brochure, see PD 5214.3830.12.

[3] For average power measurement only.

[4] For options installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

[5] For extended periods, contact your Rohde & Schwarz sales office.

Service at Rohde&Schwarz
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- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

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Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

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