

# R&S® FSC Spectrum Analyzer Specifications



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Specifications apply under the following conditions:

15 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to.

Data without tolerances: typical values only. Data designated as “nominal” applies to design parameters and is not tested.

## Base unit

### Frequency

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

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

<b>Frequency readout</b>		
Marker resolution		0.1 Hz
Uncertainty		$\pm(\text{marker frequency} \times \text{reference uncertainty} + 10 \% \times \text{resolution bandwidth} + \frac{1}{2} (\text{span}/(\text{sweep points} - 1)) + 1 \text{ Hz})$
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	$\pm(\text{frequency} \times \text{reference uncertainty} + \frac{1}{2} (\text{last digit}))$
<b>Frequency span</b>		
Span setting uncertainty		$\pm\text{span}/630$

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

### Sweep time

Sweep time	span = 0 Hz	200 $\mu$ s to 100 s
	$10 \text{ Hz} \leq \text{span} \leq 600 \text{ MHz}$	20 ms to 1000 s
	span > 600 MHz	$20 \text{ ms} \times \text{span}/600 \text{ MHz}$ to 1000 s
Uncertainty	span = 0 Hz	1 %, nominal
	span $\geq 10 \text{ Hz}$	3 %, nominal

### Bandwidths

<b>Resolution bandwidths</b>		
Range	-3 dB bandwidth	10 Hz to 3 MHz in 1/3 sequence
Bandwidth accuracy	$10 \text{ Hz} \leq \text{RBW} \leq 300 \text{ kHz}$	< 5 %, nominal
	RBW > 300 kHz	< 10 %, nominal
Selectivity	60 dB:3 dB	< 5 (Gaussian type filters), nominal
<b>Video filters</b>		
Range	-3 dB bandwidth	10 Hz to 3 MHz in 1/3 sequence

## Level

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

<b>Immunity to interference, nominal values</b>		
Image frequencies	$f_{in} - 2 \times 21.4$ MHz	< -70 dBc, typ. -80 dBc
	$f_{in} - 2 \times 831.4$ MHz	< -70 dBc, typ. -90 dBc
	$f_{in} - 2 \times 4881$ MHz	-60 dBc
Intermediate frequencies	21.4 MHz, 831.4 MHz, 4881.4 MHz	-60 dBc, typ. -80 dBc
	8931.4 MHz	-50 dBc
Other interfering signals, signal level – RF attenuation < -20 dBm	$f \leq 3.6$ GHz spurious at $f_{in} - 2440.7$ MHz	< -60 dBc
	$3.6$ GHz < $f \leq 6$ GHz spurious at $f_{in} - 4465.7$ MHz	< -60 dBc
	$f \leq 3.6$ GHz	
Other interfering signals, related to local oscillators	$\Delta f < 300$ kHz	-60 dBc
	$\Delta f \geq 300$ kHz	< -60 dBc
	$f > 3.6$ GHz	
	$\Delta f < 300$ kHz	-54 dBc
	$\Delta f \geq 300$ kHz	< -54 dBc
	$f =$ receive frequency	
Residual spurious response	input matched with 50 $\Omega$ , without input signal, RBW $\leq 30$ kHz, RF attenuation = 0 dB, tracking generator = OFF	< -90 dBm

<b>Level display</b>		
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, dB $\mu$ V, V, W

<b>Level measurement uncertainty</b>		
Absolute level uncertainty at 100 MHz	+20 °C to +30 °C	$\pm 0.3$ dB ( $\sigma = 0.1$ dB)
Frequency response (+20 °C to +30 °C)	$9$ kHz $\leq f < 10$ MHz	$\pm 1.5$ dB, nominal
	$10$ MHz $\leq f \leq 3.6$ GHz	$\pm 1$ dB ( $\sigma = 0.33$ dB)
	$3.6$ GHz < $f \leq 6$ GHz	$\pm 1.5$ dB ( $\sigma = 0.5$ dB)
Attenuator uncertainty		$\pm 0.3$ dB ( $\sigma = 0.1$ dB)
Uncertainty of reference level setting		$\pm 0.1$ dB, nominal
Display nonlinearity	S/N > 16 dB, 0 dB to -50 dB, logarithmic level display	$\pm 0.2$ dB ( $\sigma = 0.067$ dB)
Bandwidth switching uncertainty	reference: RBW = 10 kHz	$\pm 0.1$ dB, nominal
<b>Total measurement uncertainty</b>	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 < $f \leq 3.6$ GHz	$\pm 1$ dB, typ. $\pm 0.5$ dB
	$3.6$ GHz < $f \leq 6$ GHz	$\pm 1.5$ dB, typ. $\pm 1$ dB

## Trigger functions

<b>Trigger</b>		
Trigger source		free run, video, external
External trigger level	low $\rightarrow$ high transition	2.4 V, nominal
	high $\rightarrow$ low transition	0.7 V, nominal

**Tracking generator (model .13/.16 only)**

Frequency range	model .13	100 kHz to 3 GHz
	model .16	100 kHz to 6 GHz
Connector		N female, 50 $\Omega$
VSWR	$100 \text{ kHz} \leq f \leq 1 \text{ GHz}$	< 1.5, nominal
	$1 \text{ GHz} < f \leq 3 \text{ GHz}$	< 2, nominal
	$3 \text{ GHz} < f \leq 6 \text{ GHz}$ (model .16 only)	< 2, nominal
Output level	tracking generator attenuation = 0 dB	0 dBm, nominal
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	
	$100 \text{ kHz} \leq f < 300 \text{ kHz}$	> 60 dB, typ. 80 dB
	$300 \text{ kHz} \leq f < 3 \text{ GHz}$	> 70 dB, typ. 90 dB
	$3 \text{ GHz} \leq f < 6 \text{ GHz}$ (model .16 only)	> 70 dB, typ. 90 dB
Reverse power		
DC voltage		50 V
CW RF power		+20 dBm (= 0.1 W)
Max. pulse voltage		50 V
Max. pulse energy (10 $\mu$ s)		1 mWs

## Inputs and outputs

<b>RF input</b>		
Impedance		50 $\Omega$
Connector		N female
VSWR	$100 \text{ kHz} \leq f \leq 1 \text{ GHz}$	< 1.5, nominal
	$1 \text{ GHz} < f \leq 6 \text{ GHz}$	< 2, nominal
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, nominal
<b>AF output</b>		
AF demodulation types		AM and FM
Connector		3.5 mm mini jack
Output impedance		32 $\Omega$ , nominal
Voltage (open circuit)		$V_{\text{RMS}}$ adjustable from 0 V to > 100 mV
<b>USB interface</b>		
Front panel		USB host interface, version 1.1
Connector		USB type A plug, version 1.1
Memory sticks supported		$\leq 4$ Gbyte, USB version 1.1 or 2.0
Rear panel		USB device interface, version 1.1
Connector		USB type B plug, version 1.1
<b>External reference, external trigger</b>		
Connector		BNC female, 50 $\Omega$
Mode	selectable	external reference, external trigger
External reference input	required level	0 dBm
	frequency	10 MHz
External trigger threshold	low $\rightarrow$ high transition	2.4 V, nominal
	high $\rightarrow$ low transition	0.7 V, nominal
<b>IF out</b>		
Connector		BNC female, 50 $\Omega$
Frequency		21.4 MHz
<b>DC supply input</b>		
Connector		5 mm DIN 45323 female
Input voltage range		14 V to 16 V, nominal
Input current		0.9 A to 0.7 A

## General data

<b>Power supply</b>		
AC supply	input specifications	100 V AC 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, nominal
Power consumption		12 W, nominal
Safety		in line with IEC 61010-1, EN 61010-1, CAN/CSA C22.2 No. 61010-1-04, UL61010-1
Test mark		VDE - GS, cCSA <sub>US</sub> ,

<b>Manual operation</b>		
Languages		Chinese, English, French, German, Italian, Hungarian, Japanese, Korean, Portuguese, Russian, Spanish
<b>Remote control</b>		
Command set		SCPI 1997.0
LAN interface		10/100BaseT, RJ-45
USB interface	rear panel	USB device, type B
<b>Display</b>		
Type		14.5 cm (5,7") LCD TFT color
Resolution		640 x 480 pixel
<b>Audio</b>		
Speaker		internal
<b>Mass memory</b>		
Mass memory		flash memory (internal) USB memory stick (not supplied)
Data storage	internal	> 256 instrument settings and traces
	external, on 1 Gbyte USB memory stick	> 5000 instrument settings and traces
<b>Temperature</b>		
	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/+40 °C at 85 % relative humidity (IEC 60068-2-30)
<b>Mechanical resistance</b>		
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
<b>EMC</b>		
		in line with EMC Directive 2004/108/EC including: IEC/EN 61326-1 <sup>1, 2</sup> , IEC/EN 61326-2-1, CISPR 11/EN 55011 <sup>1</sup> IEC/EN 61000-3-2, IEC/EN 61000-3-3

<b>Weight and dimensions</b>		
Dimensions	W x H x D	233 mm x 158.1 mm x 350 mm (9.2 in x 6.2 in x 13.8 in)
Weight		4.5 kg (9.9 lb)

<b>Recommended calibration interval</b>		1 year
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<sup>1</sup> 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.

<sup>2</sup> 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
<b>Accessories supplied</b>		
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 50/75 Ω, 0 Hz to 2700 MHz, matching at both ends, N-connectors	R&S®RAM	0358.5414.02
Matching pad 50/75 Ω, 0 Hz to 2700 MHz, matching at one end, N-connectors	R&S®RAZ	0358.5714.02
75 ohm 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 <sup>3</sup>

Designation	Type	Order No.
Universal Power Sensor, 10 MHz to 8 GHz, 200 mW	R&S®NRP-Z11	1138.3004.02
Universal Power Sensor, 10 MHz to 18 GHz, 200 mW	R&S®NRP-Z21	1137.6000.02
Universal Power Sensor, 10 MHz to 18 GHz, 2 W	R&S®NRP-Z22	1137.7506.02
Universal Power Sensor, 10 MHz to 18 GHz, 15 W	R&S®NRP-Z23	1137.8002.02
Universal Power Sensor, 10 MHz to 18 GHz, 30 W	R&S®NRP-Z24	1137.8502.02
Universal Power Sensor, 10 MHz to 33GHz, 200mW	R&S®NRP-Z31	1169.2400.02
Thermal Power Sensor, 0 Hz to 18 GHz, 100 mW	R&S®NRP-Z51	1138.0005.02
Thermal Power Sensor, 0 Hz to 40 GHz, 100 mW	R&S®NRP-Z55	1138.2008.02
Thermal Power Sensor, 0 Hz to 50 GHz, 100 mW	R&S®NRP-Z56	1171.8201.02
Thermal Power Sensor, 0 Hz to 67 GHz, 100 mW	R&S®NRP-Z57	1171.8401.02
Wideband Power Sensor, 50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02
Average Power Sensor, 9 kHz to 6 GHz, 200 mW	R&S®NRP-Z91	1168.8004.02
Average Power Sensor, 9 kHz to 6 GHz, 2 W	R&S®NRP-Z92	1171.7005.02

All power sensors require the following adapter cable for operation on the FSC:

Passive USB adapter to connect NRP sensors on R&S®FSC	R&S®NRP-Z4	1146.8001.02
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For product brochure, see PD 5214.3330.12 and at [www.rohde-schwarz.com](http://www.rohde-schwarz.com).

<sup>3</sup> For average power measurement only.



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## Rohde & Schwarz GmbH & Co. KG

[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## Regional contact

- | Europe, Africa, Middle East  
+49 89 4129 137 74  
[customersupport@rohde-schwarz.com](mailto:customersupport@rohde-schwarz.com)
- | North America  
1 888 TEST RSA (1 888 837 87 72)  
[customer.support@rsa.rohde-schwarz.com](mailto:customer.support@rsa.rohde-schwarz.com)
- | Latin America  
+1 410 910 79 88  
[customersupport.la@rohde-schwarz.com](mailto:customersupport.la@rohde-schwarz.com)
- | Asia/Pacific  
+65 65 13 04 88  
[customersupport.asia@rohde-schwarz.com](mailto:customersupport.asia@rohde-schwarz.com)

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