R&S[®]FSC SPECTRUM ANALYZER

Specifications



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Data Sheet Version 04.00



ROHDE&SCHWARZ

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Definitions

General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes 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 $\langle, \leq, \rangle, \geq, \pm$, 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 x aging rate) +
		temperature drift + calibration accuracy

Frequency readout		
Marker resolution		0.1 Hz
Uncertainty		±(marker frequency × reference
		uncertainty + 10 % × resolution bandwidth
		+ 1/2 (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), typ105 dBc (1 Hz)
	100 kHz	< -100 dBc (1 Hz), typ110 dBc (1 Hz)
	1 MHz	< -120 dBc (1 Hz), typ127 dBc (1 Hz)

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 %, nominal
	span ≥ 10 Hz	3 %, nominal

Bandwidths

Resolution bandwidths		
Range	–3 dB bandwidth	10 Hz to 3 MHz in 1/3 sequence
Bandwidth accuracy	10 Hz ≤ RBW ≤ 300 kHz	< 5 %, nominal
	RBW > 300 kHz	< 10 %, nominal
Selectivity	60 dB:3 dB	< 5 (Gaussian type filters), nominal
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 us	10 mWs
Maximum rated input level with RF atten	uation < 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 us	1 mWs
Intermodulation		
Third-order intermodulation (TOI).	intermodulation-free dynamic range.	
nominal values	signal level: 2×-20 dBm. RF attenuation =	0 dB.
	without RF preamplifier (R&S [®] FSC-B22 opt	ion) or RF preamplifier: off
	f _{in} < 300 MHz	> 54 dBc (TOI $> +7 dBm$, typ. +11 dBm)
	$300 \text{ MHz} \le f_{in} < 3.6 \text{ GHz}$	> 60 dBc (TOI $> +10 dBm$, typ. +15 dBm)
	$3.6 \text{ GHz} \le f_{\text{in}} \le 6 \text{ GHz}$	> 46 dBc (TOI > +3 dBm typ +10 dBm)
	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)
	$300 \text{ MHz} \le 6 \text{ GHz}$	> 56 dBc (TOI = -12 dBm)
Second harmonic intercept (SHI).	RF attenuation = 0 dB .	
nominal values	without RE preamplifier (R&S [®] ESC-B22 option) or RE preamplifier: off	
	$f_{in} = 20 \text{ MHz to } 1.5 \text{ GHz}$	+40 dBm
	$f_{in} = 1.5 \text{ GHz to 3 GHz}$	+30 dBm
	RF attenuation 0 dB, RF preamplifier (R&S®	FSC-B22 option): on
	$f_{in} = 100 \text{ MHz to 3 GHz}$	0 dBm
Displayed average noise level	RF attenuation 0 dB. termination 50 Ω . RBV	V = 100 Hz. VBW = 10 Hz.
	sample detector, log scaling, tracking generator; off, normalized to 1 Hz	
	without RF preamplifier (R&S [®] FSC-B22 opt	ion) or RF preamplifier: off
	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, typ146 dBm
	5 GHz to 6 GHz	< –140 dBm, typ. –144 dBm
	RF attenuation 0 dB, termination 50 Ω, RBV	V = 100 Hz, VBW = 10 Hz,
	sample detector, log scaling, tracking gener	ator: off, normalized to 1 Hz,
	RF preamplifier (R&S [®] FSC-B22 option): on	
	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, typ163 dBm
	2 GHz to 5 GHz	< –155 dBm, typ. –159 dBm
	5 GHz to 6 GHz	< –151 dBm, typ. –155 dBm

Immunity to interference, nominal values		
Image frequencies	f _{in} – 2 × 21.4 MHz	< -70 dBc, typ80 dBc
	f _{in} – 2 × 831.4 MHz	< -70 dBc, typ90 dBc
	f _{in} – 2 × 4881 MHz	–60 dBc
Intermediate frequencies	21.4 MHz, 831.4 MHz, 4881.4 MHz	-60 dBc, typ80 dBc
	8931.4 MHz	–50 dBc
Other interfering signals,	f ≤ 3.6 GHz,	<-60 dBc
signal level – RF attenuation < –20 dBm	spurious at f _{in} – 2440.7 MHz	
	3.6 GHz < f ≤ 6 GHz,	< -60 dBc
	spurious at f _{in} – 4465.7 MHz	
Other interfering signals,	f ≤ 3.6 GHz	
related to local oscillators	∆f < 300 kHz	-60 dBc
	∆f ≥ 300 kHz	<-60 dBc
	f > 3.6 GHz	
	∆f < 300 kHz	-54 dBc
	∆f ≥ 300 kHz	<-54 dBc
	f = receive frequency	
Residual spurious response	input matched with 50 Ω ,	<-90 dBm
	without input signal, RBW ≤ 30 kHz,	
	$f \ge 3 MHz$, RF attenuation = 0 dB,	
	tracking generator: off	

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	$\pm 0.3 \text{ dB} (\sigma = 0.1 \text{ dB})$
Frequency response (+20 °C to +30 °C)	9 kHz ≤ f < 10 MHz	±1.5 dB (nom.)
	10 MHz ≤ f ≤ 3.6 GHz	$\pm 1 \text{ dB} (\sigma = 0.33 \text{ dB})$
	3.6 GHz < f ≤ 6 GHz	$\pm 1.5 \text{ dB} (\sigma = 0.5 \text{ dB})$
Attenuator uncertainty		$\pm 0.3 \text{ dB} (\sigma = 0.1 \text{ dB})$
Uncertainty of reference level setting		±0.1 dB (nom.)
Display nonlinearity	S/N > 16 dB, 0 dB to –50 dB,	$\pm 0.2 \text{ dB} (\sigma = 0.067 \text{ dB})$
	logarithmic level display	
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, typ. ±0.5 dB
	3.6 GHz < f ≤ 6 GHz	±1.5 dB, typ. ±1 dB

Trigger functions

Trigger		
Trigger source		free run, video, external
External trigger level	low \rightarrow high transition	2.4 V (nom.)
	high \rightarrow 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 \leq 3 GHz	< 2 (nom.)	
	3 GHz < f \leq 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, typ. 80 dB	
	300 kHz ≤ f < 3 GHz	> 70 dB, typ. 90 dB	
	$3 \text{ GHz} \le f \le 6 \text{ GHz} \pmod{16 \text{ only}}$	> 70 dB, typ. 90 dB	
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 \rightarrow high transition	2.4 V (nom.)	
	high \rightarrow 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 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 (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}

Manual operation		
Languages		Chinese, English, French, German,
		Italian, Hungarian, Japanese, Korean,
		Portuguese, Russian, Spanish
Remote control		
Command set		SCPI 1997.0
LAN interface		10/100BaseT, RJ-45
USB interface	rear panel	USB device, type B
Display		
Туре		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/+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

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

Options

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

Recommended extras

Designation	Туре	Order No.
Ethernet cable	R&S [®] HA-Z210	1309.6152.00
Headphones	R&S [®] FSH-Z36	1145.5838.02
19" rack adapter,	R&S [®] ZZA-T33	1109.4458.00
for installing two R&S [®] FSC		
19" rack adapter,	R&S [®] ZZA-T34	1109.4464.00
for installing one R&S [®] FSC		
Matching pad 50 $\Omega/75 \Omega$,	R&S [®] RAM	0358.5414.02
0 Hz to 2700 MHz, matching at both ends, N-connectors		
Matching pad 50 $\Omega/75 \Omega$,	R&S [®] RAZ	0358.5714.02
0 Hz to 2700 MHz, matching at one end, N-connectors		
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 ³

Designation	Туре	Order No.
Universal power sensor, 10 MHz to 8 GHz, 100 mW, 2-path	R&S [®] NRP-Z211	1417.0409.02
Universal power sensor, 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 f	or operation on the R&S [®] FSC	
USB adapter cable (passive), length: 2 m (78.7 in),	R&S [®] NRP-Z4	1146.8001.02
to connect R&S®NRP-Zxx S/SN power sensors to the R&S®FSC		

³ For average power measurement only.

Warranty		
Base unit		3 years
All other items ⁴		1 year
Service options		
Extended warranty, one year	R&S [®] WE1	Contact your local
Extended warranty, two years	R&S [®] WE2	Rohde & Schwarz
Extended warranty with calibration coverage, one year	R&S [®] CW1	sales office.
Extended warranty with calibration coverage, two years	R&S [®] CW2	
Extended warranty with accredited calibration coverage, one year	R&S [®] AW1	
Extended warranty with accredited calibration coverage, two years	R&S [®] AW2	

Extended warranty with a term of one and two years (WE1 and WE2)

Repairs carried out during the contract term are free of charge ⁵. Necessary calibration and adjustments carried out during repairs are also covered.

Extended warranty with calibration coverage (CW1 and CW2)

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs ⁵ and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

Extended warranty with accredited calibration (AW1 and AW2)

Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs ⁵ and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

For product brochure, see PD 5214.3830.12 and at www.rohde-schwarz.com.

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

⁵ Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

Service at Rohde & Schwarz You're in great hands

- ► Worldwide
- 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 Environmental Management ISO 14001

Rohde & Schwarz training

www.training.rohde-schwarz.com

Rohde & Schwarz customer support

www.rohde-schwarz.com/support



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