

# R&S® FPC1000 Spectrum Analyzer Specifications



**3** year  
warranty

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# Definitions

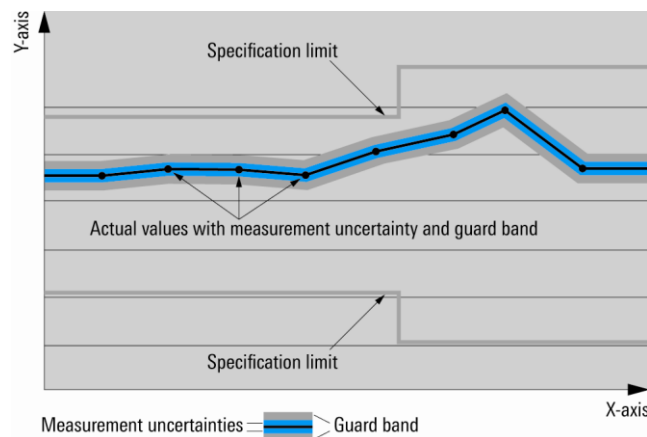
## General

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  $<$ ,  $\leq$ ,  $>$ ,  $\geq$ ,  $\pm$ , 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.



## 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 indicated as follows: "parameter: value".

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP/3GPP2 standard, chip rates are specified in Mcps (million chips per second), whereas bit rates and symbol rates are specified in Mbps (million bits per second), kbps (thousand bits per second) or ksps (thousand symbols per second), and sample rates are specified in Msample/s (million samples per second). Mcps, kbps, ksps and Msample/s are not SI units.

## Specifications

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. Data without tolerance limits is not binding.

### Frequency

Frequency range	R&S®FPC1000	5 kHz to 1 GHz
	with R&S®FPC-B2 option	5 kHz to 2 GHz
	with R&S®FPC-B3 option	5 kHz to 3 GHz
Frequency resolution		1 Hz

<b>Reference frequency, internal</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 calibration 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		1183
Marker tuning frequency step size		span/1182
Frequency counter resolution		0.1 Hz
Count uncertainty	SNR > 25 dB	$\pm(\text{frequency} \times \text{reference uncertainty} + \frac{1}{2}(\text{last digit}))$
Frequency span		0 Hz, 10 Hz to 1 GHz
	with R&S®FPC-B2 option	0 Hz, 10 Hz to 2 GHz
	with R&S®FPC-B3 option	0 Hz, 10 Hz to 3 GHz
Span uncertainty		nominal 1 %

<b>Spectral purity SSB phase noise</b>		
Carrier offset		f = 500 MHz
Carrier offset	30 kHz	< -88 dBc (1 Hz), -92 dBc (1 Hz) (typ.)
	100 kHz	< -98 dBc (1 Hz), -103 dBc (1 Hz) (typ.)
	1 MHz	< -120 dBc (1 Hz), -125 dBc (1 Hz) (typ.)

### Sweep time

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

### Bandwidth

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

## Level

Display range		displayed noise floor to +30 dBm
<b>Maximum rated input level</b>		
DC voltage		50 V
CW RF power		33 dBm (= 2 W)
Peak RF power	duration < 3 s	36 dBm (= 4 W)
Max. pulse voltage		150 V
Max. pulse energy	pulse width 10 $\mu$ s	10 mWs
<b>Intermodulation</b>		
Third-order intercept (TOI),	intermodulation-free dynamic range, signal level 2 $\times$ -20 dBm, RF attenuation = 0 dB, RF preamplifier = off	
	$f_{in} = 1$ GHz	+7 dBm (meas.)
	$f_{in} = 2.4$ GHz	+10 dBm (meas.)
Second harmonic intercept (SHI)	RF attenuation = 0 dB, RF preamplifier = off, signal level = -40dBm	
	$f_{in} = 20$ MHz to 1.5 GHz	-60 dBc (nom.)
<b>Displayed average noise level</b>		
	0 dB RF attenuation, termination 50 $\Omega$ , RBW = 100 Hz, VBW = 10 Hz, sample detector, log scaling, normalized to 1 Hz	
	frequency	preamplifier R&S®FPC1000 = off
	1 MHz to 10 MHz	< -127 dBm, -135 dBm (typ.)
	10 MHz to 1 GHz	< -142 dBm, -146 dBm (typ.)
	1 GHz to 3 GHz	< -140 dBm, -144 dBm (typ.)
	frequency	preamplifier R&S®FPC1000 = on (requires R&S®FPC-B22 option)
	1 MHz to 10 MHz	< -147 dBm, -157 dBm (typ.)
	10 MHz to 3 GHz	< -158 dBm, -163 dBm (typ.)

### Immunity to interference, nominal values

Image frequencies	$f_{in} - 2 \times 30.15$ MHz	< -70 dBc (nom.)
	$f_{in} - 2 \times 830.15$ MHz	< -65 dBc (nom.)
	$f_{in} - 2 \times 4042.65$ MHz	-60 dBc (nom.)
Intermediate frequencies	30.25 MHz, 830.25 MHz, 4042.65 MHz	< -70 dBc (nom.)
Other interfering signals, signal level – RF attenuation < -30 dBm	spurious at $f_{in} - 2021.325$ MHz	< -60 dBc (nom.)
Other interfering signals, related to local oscillators	$\Delta f \geq 300$ kHz $f =$ receive frequency	< -60 dBc (nom.)
Residual spurious response	input matched with 50 $\Omega$ , without input signal, RBW $\leq 30$ kHz, $f \geq 3$ MHz, RF attenuation = 0 dB, Wifi function disabled	< -90 dBm (nom.)

### 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		clearWrite, max hold, min hold, average, view
Setting range of reference level		-130 dBm to +30 dBm
Units of level axis		dBm, dBmV, dB $\mu$ V, V, W

### Level measurement uncertainty

Absolute level uncertainty at 100 MHz	+20 $^{\circ}$ C to +30 $^{\circ}$ C	< 0.3 dB
Frequency response (+20 $^{\circ}$ C to +30 $^{\circ}$ C)	100 kHz $\leq f < 10$ MHz	< 1.5 dB (nom.)
	10 MHz $\leq f \leq 3$ GHz	< 1 dB
Attenuator uncertainty		< 0.3 dB
Uncertainty of reference level setting		< 0.1 dB (nom.)
Display nonlinearity	SNR > 16 dB, 0 dB to -50 dB, logarithmic level display	< 0.3 dB
Bandwidth switching uncertainty	reference: RBW = 10 kHz	< 0.1 dB (nom.)
Total measurement uncertainty	95 % confidence level, +20 $^{\circ}$ C to +30 $^{\circ}$ C, SNR > 16 dB, 0 dB to -50 dB below reference level, RF attenuation auto	
	10 MHz $\leq f \leq 3$ GHz	< 1.25 dB, typ. 0.5 dB

## Trigger functions

<b>Trigger</b>		
Trigger source		free run, video, external
External trigger level threshold	low → high transition	2.4 V
	high → low transition	0.7 V
	maximum	3.0 V

## Inputs and outputs

<b>RF input</b>		
Impedance		50 Ω (nom.)
Connector		N female
VSWR	5 kHz ≤ f ≤ 1 GHz	< 1.5 (nom.)
	1 GHz < f ≤ 3 GHz	< 2 (nom.)
Input attenuator	RF input only	0 dB to 40 dB in 5 dB steps
<b>AF output</b>		
AF demodulation types		AM and FM
Connector		3.5 mm mini jack
Output impedance		32 Ω (nom.)
Voltage (open circuit)		V <sub>RMS</sub> adjustable from 0 V to > 100 mV
<b>External reference, external trigger</b>		
Connector		BNC, 50 Ω
Mode		ext. reference, ext. trigger
External reference	required level	0 dBm
	frequency	10 MHz
External trigger threshold	low → high transition	2.4 V
	high → low transition	0.7 V

## General data

Power supply		
AC supply	input specifications	100 V AC to 240 V AC, 50 Hz to 60 Hz, 0.6 A to 0.4 A
Power consumption		
Safety		IEC 61010-1, EN 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010.1
Test mark		
		VDE, GS, CSA
Manual operation		
Languages		Chinese, English, French, German, Italian, Hungarian, Japanese, Korean, Portuguese, Russian, Spanish
Remote control		
Command set		SCPI 1997.0
LAN interface		10/100BASE-T, RJ-45
USB		type B plug, version 2.0
Display		
Size		10.1"
Resolution		1366 × 768 pixel
Pixel errors		< 2 pixel
Audio		
Speaker		internal
USB interface		type A plug, version 2.0
	number of interfaces	2
Mass memory		
Mass memory		memory stick (not supplied), size ≤ 4 Gbyte, USB version 1.1 or 2.0
Data storage	internal	> 256 instrument settings and traces
	on memory stick, ≥ 1 Gbyte	> 5000 instrument settings and traces
Environmental conditions		
Temperature	operating temperature range	+10 °C to +40 °C
	storage temperature range	-20 °C to +70 °C
Climatic loading	relative humidity	+25/+40 °C at 85 % relative humidity (EN 60068-2-30)
Mechanical resistance		
Vibration	sinusoidal	EN 60068-2-6
	random	EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810F, method 516.4 procedure 1, EN 60068-2-27
EMC		in line with European EMC Directive 2004/108/EC including CISPR 11/EN 55011/group 1 class A (emission) EN 61326 table 2 (immunity, industrial)
Dimensions (W × H × D)	without feet	396 mm × 178 mm × 147 mm (15.6 in × 7 in × 5.8 in)
	including feet	396 mm × 185 mm × 156 mm (15.6 in × 7.3 in × 6.1 in)
Weight		3 kg (6.61 lb)
Recommended calibration interval		1 year

## Ordering information

Designation	Type	Order No.
Spectrum Analyzer, 9 kHz to 1 GHz	R&S®FPC1000	1328.6660.02
<b>Accessories supplied</b>		
Power cable, USB cable for connection to PC		

## Options

Designation	Type	Order No.
Spectrum Analyzer Frequency Upgrade to 2 GHz	R&S®FPC-B2	1328.6677.02
Spectrum Analyzer Frequency Upgrade to 3 GHz	R&S®FPC-B3	1328.6683.02
Spectrum Analyzer Preamplifier	R&S®FPC-B22	1328.6690.02
Analog Modulation Analysis for AM, FM, ASK, FSK	R&S®FPC-K7	1328.6748.02
Receiver Mode	R&S®FPC-K43	1328.6754.02
Analog Modulation Analysis for ASK, FSK	R&S®FPC-K53	1328.6977.02
Advanced Measurements	R&S®FPC-K55	1328.6760.02
WiFi- Support	R&S®FPC-B200	1328.6990.02

## Accessories

Designation	Type	Order No.
19" Rack Mount Kit	R&S®ZZA-FPC1	1328.7080.02
Soft Carrying Bag	R&S®RTM-Z3	1305.0289.02
Carrying Case	R&S®RTB-Z3	1333.1734.02

## Service options

Warranty		
Base unit		3 years
All other items <sup>1</sup>		1 year
Options		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	

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

Repairs carried out during the contract term are free of charge <sup>2</sup>. 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 <sup>2</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

For product brochure, see PD 5214.7112.12 and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

<sup>1</sup> For options that are installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

<sup>2</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.









## Service that adds value

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

## About Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

## 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**

## Rohde & Schwarz GmbH & Co. KG

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R&S®FPC1000 Spectrum Analyzer

Data without tolerance limits is not binding | Subject to change

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