R&S®FPL1000
Signal and Spectrum Analyzer
Specifications

3 year warranty

ROHDE&SCHWARZ

Data Sheet | Version 05.01

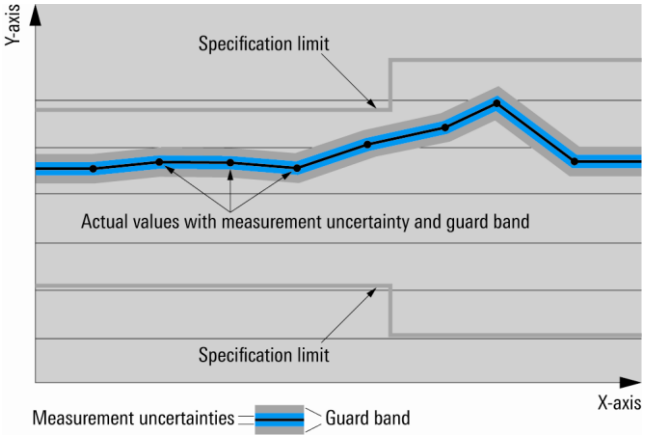
CONTENTS

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 <, ≤, >, ≥, ±, 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, Mbps, kbps, ksps and Msample/s are not SI units.

Specifications

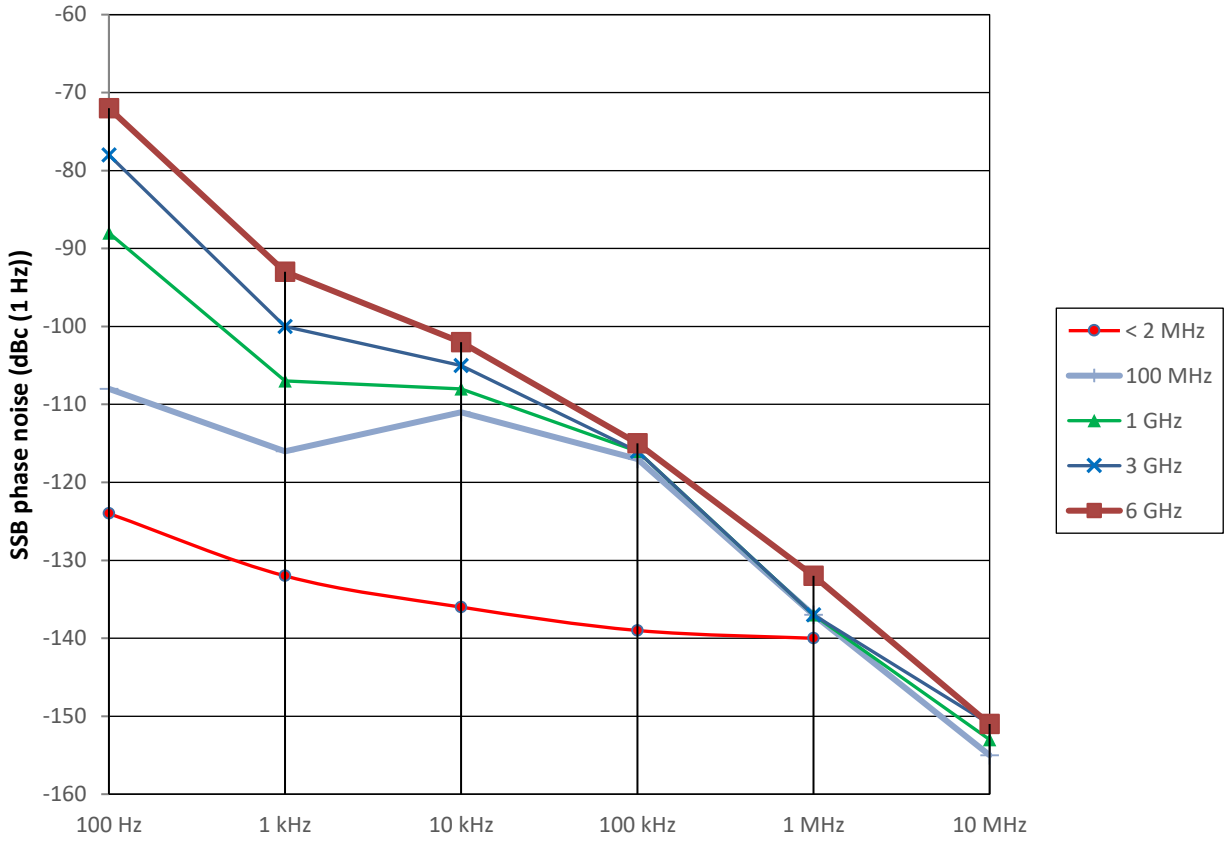
Frequency

Frequency range	R&S®FPL1003	5 kHz to 3 GHz
	R&S®FPL1007	5 kHz to 7.5 GHz
Frequency resolution		0.01 Hz
Scaling	standard	linear
	with R&S®FPL1-K54, RBW ≤ 1 MHz	linear, logarithmic

Reference frequency, internal, nominal		
Accuracy		(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year	standard	1×10^{-6}
	with R&S®FPL1-B4 OCXO reference frequency option	1×10^{-7}
Temperature drift (0 °C to +50 °C)	standard	1×10^{-6}
	with R&S®FPL1-B4 OCXO reference frequency option	1×10^{-7}
Achievable initial calibration accuracy	standard	5×10^{-7}
	with R&S®FPL1-B4 OCXO reference frequency option	5×10^{-8}

Frequency readout		
Marker resolution		0.01 Hz
Uncertainty		±(marker frequency × reference uncertainty + 10 % × resolution bandwidth + ½ (span/(sweep points – 1)) + 1 Hz)
Number of sweep (trace) points	default value	1001
	range	101 to 100001
Marker tuning frequency step size	marker step size = sweep points	span/(sweep points – 1)
	marker step size = standard	span/(default sweep points – 1)
Frequency counter resolution		1 Hz
Count accuracy		±(frequency × reference uncertainty + ½ (last digit))
Display range for frequency axis		0 Hz, 10 Hz to max. frequency
Resolution		0.1 Hz
Max. span deviation		0.1 %

Spectral purity		
SSB phase noise	frequency = 1000 MHz, carrier offset	
	100 Hz	nom. –88 dBc (1 Hz)
	1 kHz	< –99 dBc (1 Hz)
	10 kHz	< –105 dBc (1 Hz), typ. –108 dBc (1 Hz)
	100 kHz	< –110 dBc (1 Hz), typ. –115 dBc (1 Hz)
	1 MHz	< –130 dBc (1 Hz), typ. –135 dBc (1 Hz)
	10 MHz	nom. –152 dBc (1 Hz)



Measured phase noise at different center frequencies

Sweep time

Range	span = 0 Hz	1 µs to 8000 s
	span ≥ 10 Hz, RBW ≥ 100 kHz	1 ms to 8000 s [1]
	span ≥ 10 Hz, RBW < 100 kHz	75 µs to 8000 s [2]
Sweep time accuracy	span = 0 Hz	nom. 0.1 %
	span ≥ 10 Hz, RBW ≥ 100 kHz	nom. 3 %

Resolution bandwidths

Sweep filters and FFT filters		
Resolution bandwidths (–3 dB)	sweep filters	100 kHz to 10 MHz in 1/2/3/5 sequence
	FFT filters	1 Hz to 50 kHz in 1/2/3/5 sequence
Bandwidth uncertainty		nom. < 3 %
Shape factor 60 dB:3 dB		nom. < 5

[1] Net sweep time without additional hardware settling time.

[2] Time for data acquisition for FFT calculation.

Channel filters		
Bandwidths (–3 dB)		100/200/300/500 Hz
		1/1.5/2/2.4/2.7/3/3.4/4/4.5/5/6/7.5/8.5/9/10/12.5/14/15/16/20/21/25/30/50/100/150/192/200/300/500 kHz
		1/1.228/1.5/2/3/3.75/5/10 MHz
Bandwidth uncertainty		nom. < 2 %
Shape factor 60 dB:3 dB		nom. < 2

EMI filters (with R&S®FPL1-K54 option)		
Bandwidths (–6 dB)		10/100/200 Hz
		1/9/10/100/120 kHz
		1 MHz
Bandwidth uncertainty		nom. < 3 %
Shape factor 60 dB:6 dB		nom. < 4

Video bandwidths	standard	1 Hz to 10 MHz in 1/2/3/5 sequence

Signal analysis bandwidth (equalized)	standard	nom. 10 MHz
	with R&S®FPL1-B40 option	nom. 40 MHz

Level

Display range		displayed noise floor up to +30 dBm

Max. input level		
DC voltage		50 V
CW RF power	RF attenuation 0 dB	
	RF preamplifier = off	20 dBm (= 0.1 W)
	with R&S®FPL1-B22 option, RF preamplifier = on	13 dBm (= 0.02 W)
	RF attenuation ≥ 10 dB	
	RF preamplifier = off	30 dBm (= 1 W)
	with R&S®FPL1-B22 option, RF preamplifier = on	23 dBm (= 0.2 W)
Pulse spectral density	RF attenuation 0 dB, RF preamplifier = off	97 dB µV/MHz
Max. pulse voltage	RF attenuation ≥ 10 dB	150 V
Max. pulse energy	RF attenuation ≥ 10 dB, 10 µs	1 mWs

Intermodulation		
1 dB compression of input mixer (two-tone)	RF attenuation 0 dB, RF preamplifier = off	nom. +7 dBm
Third-order intercept point (TOI)	RF attenuation 0 dB, level 2 × –20 dBm, ∆f > 5 × RBW or 10 kHz, whichever is larger, RF preamplifier = off	
	10 MHz ≤ f_{in} < 300 MHz	> 13 dBm, typ. 16 dBm
	300 MHz ≤ f_{in} < 3 GHz	> 17 dBm, typ. 20 dBm
	3 GHz ≤ f_{in} ≤ 7.5 GHz	> 15 dBm, typ. 18 dBm
	with R&S®FPL1-B22 option, RF attenuation 0 dB, level 2 × –40 dBm, ∆f > 5 × RBW or 10 kHz, whichever is larger, RF preamplifier = on	
	5 MHz ≤ f_{in} < 7,5 GHz	nom. 0 dBm
Second-harmonic intercept (SHI)	RF attenuation 0 dB, level –13 dBm, RF preamplifier = off	
	1 MHz < f_{in} ≤ 900 MHz	nom. 45 dBm
	900 MHz < f_{in} ≤ 3.75 GHz	nom. 70 dBm

Displayed average noise level (DANL)	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, sample detector, +20 °C to +30 °C	
RF preamplifier off	5 kHz ≤ f < 100 kHz	typ. –143 dBm
	100 kHz ≤ f < 5 MHz	< –140 dBm, typ. –143 dBm
	5 MHz ≤ f < 3 GHz	< –149 dBm, typ. –152 dBm
	3 GHz ≤ f < 5 GHz	< –143 dBm, typ. –146 dBm
	5 GHz ≤ f ≤ 7.5 GHz	< –140 dBm, typ. –143 dBm

RF preamplifier on (gain nom. 20 dB)	3 MHz ≤ f < 10 MHz	< –155 dBm, typ. –158 dBm
	10 MHz ≤ f < 2 GHz	< –163 dBm, typ. –166 dBm
	2 GHz ≤ f < 3 GHz	< –162 dBm, typ. –165 dBm
	3 GHz ≤ f < 5 GHz	< –158 dBm, typ. –161 dBm
	5 GHz ≤ f < 7 GHz	< –156 dBm, typ. –159 dBm
	7 GHz ≤ f < 7.5 GHz	< –155 dBm, typ. –158 dBm

Spurious responses	mixer level ≤ –13 dBm, sweep optimization: auto or dynamic, scaling linear	
Image response	10 MHz ≤ f ≤ 3 GHz	
	f_{in} – 2 × 4020.4 MHz (1st IF)	typ. < –90 dBc
	f_{in} – 2 × 820.4 MHz (2nd IF)	< –90 dBc
	f_{in} – 2 × 20.4 MHz (3rd IF), RBW ≤ 3 MHz	< –80 dBc
	3 GHz < f ≤ 7.5 GHz, RBW ≤ 3 MHz	typ. < –70 dBc
Intermediate frequency response	2 MHz ≤ f ≤ 3 GHz	
	1st IF (4020.4 MHz)	typ. < –80 dBc
	2nd IF (820.4 MHz)	< –80 dBc
	3rd IF (20.4 MHz)	< –80 dBc
	3 GHz < f ≤ 7.5 GHz	< –70 dBc
Residual spurious response	0 dB RF attenuation	
	f ≤ 1 MHz	nom. < –90 dBm
	f > 1 MHz	< –90 dBm
Local oscillator related spurious	f < 3 GHz	
	1 kHz ≤ carrier offset ≤ 10 MHz	< –70 dBc
	carrier offset > 10 MHz	< –80 dBc
	3 GHz ≤ f < 7.5 GHz	typ. < –70 dBc
Other interfering signals		
Subharmonic of 1st LO	20 MHz ≤ f < 3 GHz, spurious at 4020.4 MHz – 2 × f_{in}	nom. < –80 dBc
Harmonic of 1st LO	20 MHz ≤ f < 3 GHz, mixer level < –25 dBm, spurious at f_{in} –2010.2 MHz	nom. < –80 dBc

Level display		
Logarithmic level axis		1 dB to 200 dB, in 1 dB steps
Linear level axis		10 % of reference level per level division, 10 divisions or logarithmic scaling
Number of traces		6
Trace detector		max. peak, min. peak, auto peak (normal), sample, RMS, average
Trace functions		clear/write, max. hold, min. hold, average, view
EMI detectors (with R&S®FPL1-K54)		quasi-peak, RMS-average, CISPR-average
Measurement marker detector (with R&S®FPL1-K54)		max. peak, average, quasi-peak, RMS-average, CISPR-average
Setting range of reference level		–130 dBm to (–13 dBm + RF attenuation – RF preamplifier gain), in steps of 0.01 dB
Units of level axis		dBm, dBµV, dBmV, dBµA, dBpW, V, A, W

Level measurement uncertainty		
Absolute level uncertainty at 50 MHz	RBW = 10 kHz, level –10 dBm, reference level –10 dBm, RF attenuation 10 dB	
	+20 °C to +30 °C	< 0.3 dB (σ = 0.1 dB)
	0 °C to +50 °C	< 0.5 dB (σ = 0.17 dB)
Frequency response referenced to 50 MHz	RF attenuation 10/20/30/40 dB, RF preamplifier = off, +20 °C to +30 °C	
	5 kHz ≤ f < 3 MHz	nom. < 1 dB
	3 MHz ≤ f < 3 GHz	< 0.3 dB (σ = 0.1 dB)
	3 GHz ≤ f < 7.5 GHz	< 0.6 dB (σ = 0.2 dB)
	any setting of RF attenuation, RF preamplifier = off, 0 °C to +50 °C	
	5 kHz ≤ f < 3 GHz	nom. < 1 dB
	3 GHz ≤ f < 7.5 GHz	nom. < 1.5 dB
	RF attenuation ≤ 20 dB,RF preamplifier = on, +20 °C to +30 °C	
	3 MHz ≤ f < 3 GHz	nom. < 0.6 dB
	3 GHz ≤ f < 7.5 GHz	nom. < 1 dB

Attenuator switching uncertainty	f = 50 MHz, 0 dB to 45 dB, referenced to 10 dB attenuation	< 0.2 dB (σ = 0.07 dB)
Uncertainty of reference level setting		0 dB [3]
Bandwidth switching uncertainty	referenced to RBW = 10 kHz and sweep type FFT	
	sweep type = FFT (RBW < 100 kHz)	nom. < 0.1 dB
	sweep type = sweep (RBW ≥ 100 kHz)	nom. < 0.2 dB

Nonlinearity of displayed level		
Logarithmic level display	S/N > 16 dB, 0 dB to –50 dB	< 0.1 dB (σ = 0.07 dB)
Linear level display	S/N > 16 dB, 0 dB to –70 dB	nom. 5 % of reference level

Total measurement uncertainty	signal level 0 dB to –50 dB below reference level, S/N > 20 dB, sweep time auto, sweep type = FFT, RF attenuation 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier = off, span/RBW < 100, confidence level 95 %, +20 °C to +30 °C	
	1 MHz ≤ f < 3 GHz	0.5 dB
	3 GHz ≤ f < 7.5 GHz	0.8 dB

Measurement speed

Local measurement and display update rate	1001 sweep points, sweep optimization set to “speed”	nom. 1 ms (1000/s)
Max. sweep rate, remote operation [4, 5]	trace average = on	nom. 0.9 ms (1100/s)
Remote measurement and LAN transfer [4]		nom. 3.2 ms (357/s)
Marker peak search [4]		nom. 1.9 ms
Center frequency tune + sweep + sweep data transfer [4]		nom. 16 ms

Trigger functions

Trigger		
Trigger source		free run, video, external, IF power, I/Q power
Trigger offset	span ≥ 10 Hz	0 s to 20 s
	span = 0 Hz	(–sweep time) to 20 s
Max. deviation of trigger offset		±10 ns
IF power trigger		
Sensitivity	min. signal power	–60 dBm + RF attenuation – RF preamplifier gain
	max. signal power	–15 dBm + RF attenuation – RF preamplifier gain
IF power trigger bandwidth	RBW > 5 MHz	nom. 40 MHz
	RBW ≤ 5 MHz	nom. 6 MHz
Gated sweep		
Gate source		video, external, IF power, I/Q power
Gate delay		0 s to 20 s, min. resolution 10 ns
Gate length		10 ns to 20 s, min. resolution 10 ns
Max. deviation of gate length		±10 ns

I/Q data

Interface		GPIB or LAN interface
Memory length		max. 25 Msample I and Q
Word length of I/Q samples		14 bit
Sampling rate	standard	100 Hz to 16 MHz
	with R&S®FPL1-B40 option	100 Hz to 100 MHz
Max. signal analysis bandwidth (equalized)	standard	12.8 MHz
	with R&S®FPL1-B40 option	40 MHz

[3] The setting of the reference level affects only the graphical representation of the measurement result on the display, not the measurement itself. Therefore, the reference level setting causes no additional uncertainty in measurement results.

[4] Measured with a PC equipped with Intel® Core™ i7 2.8 GHz and Gbit LAN interface.

[5] Measurement is performed with a sweep count of 1000. The indicated speed is the average speed of 1 sweep.

Signal analysis bandwidth ≤ 10 MHz		
Amplitude flatness	f_{center} ≥ 12 MHz and (1.25 × signal analysis bandwidth)	nom. ±0.3 dB
Deviation from linear phase	f_{center} ≥ 12 MHz and (1.25 × signal analysis bandwidth)	nom. ±1°
Signal analysis bandwidth ≤ 40 MHz		
Amplitude flatness	f_{center} ≥ 12 MHz and (1.25 × signal analysis bandwidth)	nom. ±0.5 dB
Deviation from linear phase	f_{center} ≥ 12 MHz and (1.25 × signal analysis bandwidth)	nom. ±1.5°

Inputs and outputs

RF input		
Impedance		50 Ω
Connector		N female
VSWR	RF attenuation ≥ 10 dB	
	10 MHz ≤ f < 3 GHz	nom. < 1.5
	3 GHz ≤ f < 7.5 GHz	nom. < 2
Setting range of attenuator	standard	0 dB to 45 dB, in 5 dB steps
	with R&S®FPL1-B25 option	0 dB to 45 dB, in 1 dB steps
RF preamplifier gain	with R&S®FPL1-B22 option	nom. 20 dB

USB interface		4 ports, type A plug, version 2.0

Reference output		
Connector		BNC female
Impedance		50 Ω
Output frequency	internal reference	10 MHz
	external reference	same as reference input signal
Level		nom. > 0 dBm

Reference input		
Connector		BNC female
Impedance		50 Ω
Input frequency range		10 MHz ± 5 ppm
Required level		> 0 dBm into 50 Ω

External trigger/gate input		
Connector		BNC female
Trigger voltage		0.5 V to 3.5 V
Input impedance		10 kΩ

IEC/IEEE bus control		interface in line with IEC 625-2 (IEEE 488.2)
Command set		SCPI 1997.0
Connector		24-pin Amphenol female
Interface functions		SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0

LAN interface		10/100/1000BASE-T
Connector		RJ-45

External monitor		
Connector		DVI-D

General data

Display		21 cm LC TFT color display (10.1")
Resolution		1280 × 800 pixel (WXGA resolution)
Pixel failure rate		< 1 × 10^{-5}

Data storage		
Internal	standard	solid-state drive (SSD) 32 Gbyte
External		supports USB 2.0 compatible memory devices

Environmental conditions		
Temperature	operating temperature range	+0 °C to +50 °C
	storage temperature range	–20 °C to +70 °C
Climatic loading	without condensation	+40 °C at 85 % rel. humidity, in line with EN 60068-2-30,

Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz 0.15 mm constant amplitude (1.8 g at 55 Hz); 55 Hz to 150 Hz acceleration: 0.5 g constant; in line with EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E method no. 516.4 procedure I, MIL-PRF-28800F

EMC		in line with EMC Directive 2014/30/EU including IEC/EN 61326-1 [6, 7], IEC/EN 61326-2-1, CISPR 11/EN 55011 [6], IEC/EN 61000-3-2, IEC/EN 61000-3-3

Recommended calibration interval		2 years

Power supply		
AC supply	without battery option	100 V to 240 V ± 10 %, 50 Hz to 60 Hz ± 5 %, 400 Hz ± 5 % class of protection I in line with VDE 411
	with battery option	100 V to 240 V ± 10%, 50 Hz to 60 Hz ± 5%
Current consumption	without options	nom. 1.7 A to 0.8 A
	with internal battery (option R&S®FPL1-B31) in charge mode	nom. 3 A to 1.5 A
Safety		in line with EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1
Test mark		CSA, CSA-NRTL

Dimensions and weight		
Dimensions	W × H × D	408 mm × 186 mm × 235 mm (16.06 in × 7.32 in × 9.25 in)
Net weight, nominal	without options	6 kg (13.22 lb)
	with internal battery	7.3 kg (16 lb)

[6] Emission limits for class A equipment.

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

Options

R&S®FPL1-B5 additional interfaces

User port		
Connector		25-pin D-Sub female
Output		TTL-compatible, 0 V/5 V, max. 15 mA
Input		TTL-compatible, max. 5 V

Noise source control and power sensor		
Connectors	for R&S®NRP-Zxx power sensors	6-pin LEMOSA female
	for noise source control	BNC female
Noise source control output voltage		0 V/28 V, switchable, max. 100 mA (nom.)

IF/video/demod out		
Connector		BNC female, 50 Ω
IF out		
Bandwidth		equal to RBW setting
IF frequency		25 MHz
Output level	center frequency > 10 MHz, span = 0 Hz, signal at reference level and center frequency	nom. 0 dBm
Video out		
Bandwidth		equal to VBW setting
Output scaling	log. display scale	logarithmic
	lin. display scale	linear
Output level	center frequency > 10 MHz, span = 0 Hz, signal at reference level and center frequency	nom. 1 V, open circuit

Audio output		
Loudspeaker		built-in, adjustable
AF out		
Connector		3.5 mm mini jack
Output impedance		10 Ω
Open-circuit voltage		up to 1.5 V, adjustable

R&S®FPL1-B30 DC power input 12 V/24 V

Input voltage range	DC	12 V to 24 V (nom.) 10.4 V to 28 V, switch-on voltage > 11 V (meas.)
Input current	V_{in} = 12 V/24 V	13 A/6.5 A (nom.)
	V_{in} = 12 V/24 V, operating mode, without internal batteries (R&S®FPL1-B31)	5.5 A/2.7 A (meas.)
	V_{in} = 12 V/24 V, operating mode, internal batteries in charge mode	11 A/5 A (meas.)
	V_{in} = 12 V/24 V, instrument standby mode, internal batteries in charge mode	6.5 A/3 A (meas.)
Temperature	operating temperature range	0 °C to +40 °C
	storage temperature range	–20 °C to +70 °C

R&S®FPL1-B31 internal lithium-ion battery

Operating time		nom. 3.5 h
Charge time	standby mode, AC supply	nom. < 2 h
	standby mode, external DC supply (R&S®FPL1-B30)	nom. < 2 h
	operating mode	nom. < 4 h
Temperature	operating temperature range, discharge	0 °C to +50 °C
	operating temperature range, charge	0 °C to + 45 °C
	storage temperature range	–20 °C to +60 °C [8]

R&S®FSV-B34 charger (only needed for charging spare batteries)

AC input voltage range		100 V to 240 V, ±10 % (nom.)
AC supply frequency		50 Hz to 60 Hz (nom.)
Power consumption		max. 300 W (nom.)
Number of charger bays		4
Dimensions	W × H × D	400 mm × 127 mm × 203 mm (15.75 in × 5 in × 8 in)
Net weight		3.1 kg (6.9 lb)

[8] The battery packs should be stored in an environment with low humidity, free from corrosive gas at a recommended temperature range < +21 °C. Extended exposure to temperatures above +45°C could degrade battery performance and life.

Ordering information

Designation	Type	Order No.
Signal and spectrum analyzer	R&S®FPL1003	1304.0004.03
Signal and spectrum analyzer	R&S®FPL1007	1304.0004.07
Accessories supplied		
Power cable and quick start guide		

Options

Designation	Type	Order No.	Retrofittable	Remarks
OCXO reference frequency	R&S®FPL1-B4	1323.1902.02	yes	retrofit in service center
Additional interfaces	R&S®FPL1-B5	1323.1883.02	yes	user-retrofittable IF/video/demod out, user port, noise source control, power sensor, AF output, loudspeaker
GPIB interface	R&S®FPL1-B10	1323.1890.02	yes	user-retrofittable
Second hard disk (SSD)	R&S®FPL1-B19	1304.0427.02	yes	user-retrofittable mounted on PC board, including analyzer firmware
RF preamplifier (3 GHz/7.5 GHz)	R&S®FPL1-B22	1323.1719.02	yes	user-retrofittable
1 dB steps for electronic attenuator	R&S®FPL1-B25	1323.1990.02	yes	user-retrofittable
DC power supply 12 V/24 V	R&S®FPL1-B30	1323.1877.02	yes	user-retrofittable
Internal lithium-ion battery	R&S®FPL1-B31	1323.1725.02	yes	retrofit in service center; including 2 battery packs and internal charging unit
40 MHz analysis bandwidth	R&S®FPL1-B40	1323.1931.02	yes	user-retrofittable
Firmware				
AM/FM/φM measurement demodulator	R&S®FPL1-K7	1323.1731.02		
Power sensor measurement with R&S®NRPxx power sensors	R&S®FPL1-K9	1323.1754.02		supports R&S®NRPxx power sensors
Noise figure and gain measurements	R&S®FPL1-K30	1323.1760.02		requires R&S®FPL1-B5
EMI measurement application	R&S®FPL1-K54	1323.1783.02		
Vector signal analysis	R&S®FPL1-K70	1323.1748.02		
Multi-modulation analysis	R&S®FPL1-K70M	1323.1625.02		requires R&S®FPL1-K70
BER measurements with PRBS data	R&S®FPL1-K70P	1323.1631.02		requires R&S®FPL1-K70
Software				
License dongle	R&S®FSPC	1310.0002.03		
Vector signal explorer base software	R&S®VSE	1320.7500.06		
Vector signal analysis	R&S®VSE-K70	1320.7522.06		
EUTRA/LTE NB-IoT	R&S®VSE-K106	1320.7900.06		

Recommended extras

Designation	Type	Order No.
Protective hard cover	R&S®FPL1-Z1	1323.1960.02
Soft carrying bag for transport and outdoor operation	R&S®FPL1-Z2	1323.1977.02
H-style shoulder harness (requires R&S®FPL1-Z2 option)	R&S®FPL1-Z3	1323.1683.02
Spare lithium-ion battery pack	R&S®FPL1-Z4	1323.1677.02
Anti-glare display film for outdoor operation	R&S®FPL1-Z5	1323.1690.02
Lithium-ion battery charger for charging spare batteries	R&S®FSV-B34	1321.3950.02
19" rackmount kit	R&S®FPL1-Z6	1323.1954.02
Headphones		0708.9010.00
UWB antenna module (30 MHz to 6 GHz)	R&S®HE400UWB	4104.6900.02
Matching pads, 50 Ω/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
High-power attenuators		
Attenuator 100 W, 3/6/10/20/30 dB, 1 GHz	R&S®RBU100	1073.8495.xx (xx = 03/06/10/20/30)
Attenuator 50 W, 3/6/10/20/30 dB, 2 GHz	R&S®RBU50	1073.8695.xx (xx = 03/06/10/20/30)
Attenuator 50 W, 20 dB, 6 GHz	R&S®RDL50	1035.1700.52

Designation	Type	Order No.
Connectors and cables		
IEC/IEEE bus cable, length: 1 m	R&S®PCK	0292.2013.10
IEC/IEEE bus cable, length: 2 m	R&S®PCK	0292.2013.20
DC block		
DC block, 10 kHz to 18 GHz (type N)	R&S®FSE-Z4	1084.7443.02

Power sensors supported by the R&S®FPL1-K9 option [9]

Designation	Type	Order No.
Universal power sensors		
10 MHz to 8 GHz, 100 mW, two-path	R&S®NRP-Z211	1417.0409.02
10 MHz to 8 GHz, 200 mW [10]	R&S®NRP-Z11	1138.3004.02
10 MHz to 18 GHz, 100 mW, two-path	R&S®NRP-Z221	1417.0309.02
10 MHz to 18 GHz, 200 mW [10]	R&S®NRP-Z21	1137.6000.02
10 MHz to 18 GHz, 2 W [10]	R&S®NRP-Z22	1137.7506.02
10 MHz to 18 GHz, 15 W [10]	R&S®NRP-Z23	1137.8002.02
10 MHz to 18 GHz, 30 W [10]	R&S®NRP-Z24	1137.8502.02
Power sensor modules with power splitter		
DC to 18 GHz, 500 mW	R&S®NRP-Z27	1169.4102.02
DC to 26.5 GHz, 500 mW	R&S®NRP-Z37	1169.3206.02
Thermal power sensors		
0 Hz to 18 GHz, 100 mW	R&S®NRP18T	1424.6115.02
0 Hz to 18 GHz, 100 mW	R&S®NRP18TN	1424.6121.02
0 Hz to 33 GHz, 100 mW	R&S®NRP33T	1424.6138.02
0 Hz to 33 GHz, 100 mW	R&S®NRP33TN	1424.6144.02
0 Hz to 40 GHz, 100 mW	R&S®NRP40T	1424.6150.02
0 Hz to 40 GHz, 100 mW	R&S®NRP40TN	1424.6167.02
0 Hz to 50 GHz, 100 mW	R&S®NRP50T	1424.6173.02
0 Hz to 50 GHz, 100 mW	R&S®NRP50TN	1424.6180.02
0 Hz to 67 GHz, 100 mW	R&S®NRP67T	1424.6196.02
0 Hz to 67 GHz, 100 mW	R&S®NRP67TN	1424.6209.02
0 Hz to 110 GHz, 100 mW	R&S®NRP110T	1424.6215.02
Average power sensors		
8 kHz to 6 GHz, 200 mW	R&S®NRP6A	1424.6796.02
8 kHz to 6 GHz, 200 mW	R&S®NRP6AN	1424.6809.02
9 kHz to 6 GHz, 200 mW [10]	R&S®NRP-Z91	1168.8004.02
8 kHz to 18 GHz, 200 mW	R&S®NRP18A	1424.6815.02
8 kHz to 18 GHz, 200 mW	R&S®NRP18AN	1424.6821.02
Three-path diode power sensors		
100 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP8S	1419.0006.02
100 pW to 200 mW, 10 MHz to 8 GHz, LAN version	R&S®NRP8SN	1419.0012.02
100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18S	1419.0029.02
100 pW to 200 mW, 10 MHz to 18 GHz, LAN version	R&S®NRP18SN	1419.0035.02
1 nW to 2 W, 10 MHz to 18 GHz	R&S®NRP18S-10	1424.6721.02
10 nW to 15 W, 10 MHz to 18 GHz	R&S®NRP18S-20	1424.6738.02
30 nW to 30 W, 10 MHz to 18 GHz	R&S®NRP18S-25	1424.6744.02
100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33S	1419.0064.02
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version	R&S®NRP33SN	1419.0070.02
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version, TVAC-compliant	R&S®NRP33SN-V	1419.0129.02
100 pW to 100 mW, 50 MHz to 40 GHz	R&S®NRP40S	1419.0041.02
100 pW to 100 mW, 50 MHz to 40 GHz, LAN version	R&S®NRP40SN	1419.0058.02
100 pW to 100 mW, 50 MHz to 50 GHz	R&S®NRP50S	1419.0087.02
100 pW to 100 mW, 50 MHz to 50 GHz, LAN version	R&S®NRP50SN	1419.0093.02
Wideband power sensors		
50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02
50 MHz to 40 GHz, 100 mW (2.92 mm)	R&S®NRP-Z85	1411.7501.02
50 MHz to 40 GHz, 100 mW (2.40 mm)	R&S®NRP-Z86	1417.0109.40
50 MHz to 44 GHz, 100 mW (2.40 mm)	R&S®NRP-Z86	1417.0109.44

[9] For average power measurement only.

[10] Product discontinued.

Warranty		
Base unit		3 years
All other items [11]		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 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 to two years (WE1 and WE2)
Repairs carried out during the contract term are free of charge [12]. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

Extended warranty with calibration (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 [12] 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 [12] and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

[11] For options that are installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.
[12] Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

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