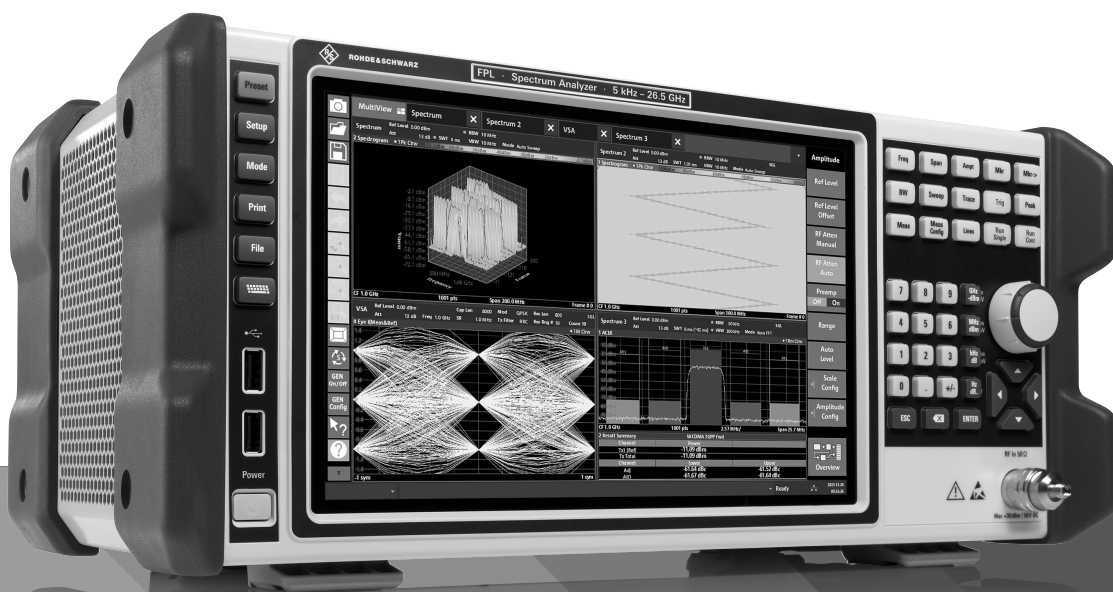


# FPL SPECTRUM ANALYZER

## Specifications



Specifications  
Version 17.00

**ROHDE & SCHWARZ**  
Make ideas real



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# Definitions

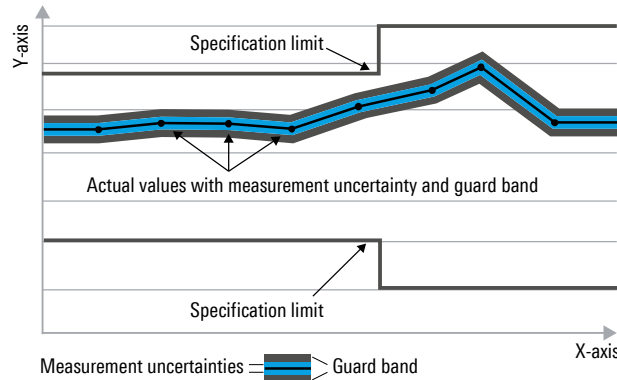
## General

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



## 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.

# Specifications

## Frequency

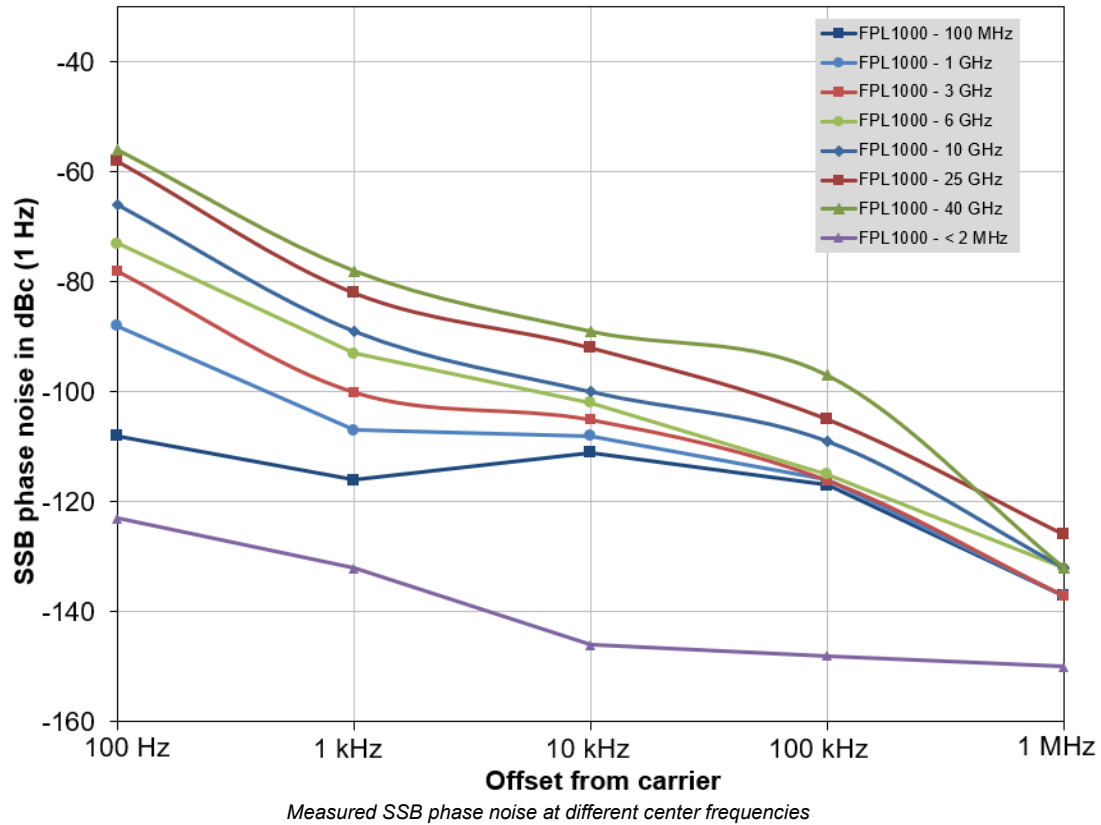
<b>Frequency range</b>	R&S®FPL1003	
	AC coupled	5 kHz to 3 GHz
	R&S®FPL1007	
	AC coupled	5 kHz to 7.5 GHz
	R&S®FPL1014	
	AC coupled	5 kHz to 14 GHz
	R&S®FPL1026	
	AC coupled	5 kHz to 26.5 GHz
	R&S®FPL1044	
	DC coupled	10 Hz to 44 GHz
	AC coupled	5 kHz to 44 GHz
<b>Frequency resolution</b>		0.01 Hz
<b>Scaling</b>	standard	linear
	with R&S®FPL1-K54 option, RBW ≤ 1 MHz	linear, logarithmic

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

<b>Frequency readout</b>		
Marker resolution		0.01 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	default value	1001
	range	101 to 100001
Number of measurement points	with R&S®FPL1-K54, active EMI measurement	101 to 200001
Marker tuning frequency step size	marker step size = sweep points	$\text{span} / (\text{sweep points} - 1)$
	marker step size = standard	$\text{span} / (\text{default sweep points} - 1)$
Frequency counter resolution		0.001 Hz
Count accuracy		$\pm(\text{frequency} \times \text{reference uncertainty} + \frac{1}{2} (\text{last digit}))$
Display range for frequency axis		0 Hz, 10 Hz to max. frequency
Resolution		0.1 Hz
Maximum span deviation		0.1 %

**Frequency spectral purity**

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

**Sweep time**

Range	span = 0 Hz	1 $\mu$ s to 8000 s
	span $\geq$ 10 Hz, RBW $\geq$ 100 kHz	1 ms to 8000 s <sup>1</sup>
	span $\geq$ 10 Hz, RBW < 100 kHz	75 $\mu$ s to 8000 s <sup>2</sup>
Sweep time accuracy	span = 0 Hz	0.1 % (nom.)
	span $\geq$ 10 Hz, RBW $\geq$ 100 kHz	3 % (nom.)

**Resolution bandwidths**

Sweep filters and FFT filters <sup>3</sup>		
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		< 3 % (nom.)
Shape factor 60 dB:3 dB		< 5 (nom.)

<sup>1</sup> Net sweep time without additional hardware settling time.

<sup>2</sup> Time for data acquisition for FFT calculation.

<sup>3</sup> At a filter bandwidth of  $\leq$  50 kHz the device automatically switches to FFT sweep mode.

<b>Channel filters</b> <sup>3</sup>		
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		< 2 % (nom.)
Shape factor 60 dB:3 dB		< 2 (nom.)

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

<b>Video bandwidths</b>		
		1 Hz to 10 MHz, in 1/2/3/5 sequence

## Signal analysis bandwidth

<b>Maximum signal analysis bandwidth (equalized)</b>		
R&S®FPL1003, R&S®FPL1007 ≤ 7.5 GHz; R&S®FPL1014, R&S®FPL1026 < 6 GHz; R&S®FPL1044 < 7 GHz	standard	12.8 MHz (nom.)
	with R&S®FPL1-B40 option	40 MHz (nom.)
R&S®FPL1014, R&S®FPL1026 ≥ 6 GHz; R&S®FPL1044 ≥ 7 GHz	standard	12.8 MHz (nom.)
	with R&S®FPL1-B40 and R&S®FPL1-B11 options, YIG preselector: off	40 MHz (nom.)

## Level measurement uncertainty and range

Display range		displayed noise floor up to +30 dBm
---------------	--	-------------------------------------

<b>Maximum input level</b>		
DC voltage		50 V
CW RF power	RF preamplifier: off	
	RF attenuation: 0 dB	20 dBm (= 0.1 W)
	RF attenuation ≥ 10 dB	30 dBm (= 1 W)
	with R&S®FPL1-B22 option, RF preamplifier: on	
Pulse spectral density	RF attenuation: 0 dB, RF preamplifier: off	97 dB $\mu$ V/MHz
	RF attenuation ≥ 10 dB	23 dBm (= 200 mW)
Maximum pulse voltage	RF attenuation ≥ 10 dB, RF preamplifier: off	150 V
Maximum pulse energy	RF attenuation ≥ 10 dB, pulse duration: 10 $\mu$ s, RF preamplifier: off	1 mWs

<b>Level display</b>		
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 option	quasi-peak, RMS-average, CISPR-average
Measurement marker detector	with R&S®FPL1-K54 option	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, dB $\mu$ V, dBmV, dB $\mu$ A, 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 ( $\sigma = 0.1$ dB)
	0 °C to +50 °C	< 0.5 dB ( $\sigma = 0.17$ dB)
Frequency response referenced to 50 MHz	RF attenuation: 10/20/30/40 dB, RF preamplifier: off, +20 °C to +30 °C	
	R&S®FPL1003, R&S®FPL1007	
	5 kHz $\leq$ f < 3 MHz	< 1 dB (nom.)
	3 MHz $\leq$ f < 3 GHz	< 0.3 dB ( $\sigma = 0.1$ dB)
	3 GHz $\leq$ f < 7.5 GHz	< 0.6 dB ( $\sigma = 0.2$ dB)
	R&S®FPL1014, R&S®FPL1026	
	5 kHz $\leq$ f < 3 MHz	< 1 dB (nom.)
	3 MHz $\leq$ f < 3 GHz	< 0.3 dB ( $\sigma = 0.1$ dB)
	3 GHz $\leq$ f < 7.5 GHz	< 0.6 dB ( $\sigma = 0.2$ dB)
	7.5 GHz $\leq$ f < 14 GHz	< 1.5 dB ( $\sigma = 0.5$ dB)
	14 GHz $\leq$ f < 26.5 GHz	< 2.0 dB ( $\sigma = 0.66$ dB)
	R&S®FPL1044	
	10 Hz $\leq$ f < 9 kHz <sup>6</sup>	< 1.5 dB (nom.)
	9 kHz $\leq$ f < 50 kHz	< 1.0 dB ( $\sigma = 0.33$ dB)
	50 kHz $\leq$ f < 3 GHz	< 0.6 dB ( $\sigma = 0.2$ dB)
	3 GHz $\leq$ f < 6 GHz	< 0.6 dB ( $\sigma = 0.2$ dB)
	6 GHz $\leq$ f < 14 GHz	< 1.5 dB ( $\sigma = 0.5$ dB)
	14 GHz $\leq$ f < 26.5 GHz	< 2.0 dB ( $\sigma = 0.66$ dB)
	26.5 GHz $\leq$ f < 36 GHz	< 2.5 dB ( $\sigma = 0.83$ dB)
	36 GHz $\leq$ f $\leq$ 44 GHz	< 3.0 dB ( $\sigma = 1.0$ dB)
	any setting of RF attenuation, RF preamplifier: off, 0 °C to +50 °C	
	R&S®FPL1003, R&S®FPL1007	
	5 kHz $\leq$ f < 3 GHz	< 1 dB (nom.)
	3 GHz $\leq$ f < 7.5 GHz	< 1.5 dB (nom.)
	R&S®FPL1014, R&S®FPL1026	
	5 kHz $\leq$ f < 3 GHz	< 1 dB (nom.)
	3 GHz $\leq$ f < 7.5 GHz	< 1.5 dB (nom.)
	7.5 GHz $\leq$ f < 14 GHz	< 2.5 dB (nom.)
	14 GHz $\leq$ f < 26.5 GHz	< 3.0 dB (nom.)
	R&S®FPL1044	
	10 Hz $\leq$ f < 9 kHz <sup>6</sup>	< 1.5 dB (nom.)
	9 kHz $\leq$ f < 3 GHz	< 1 dB (nom.)
	3 GHz $\leq$ f < 6 GHz	< 1.5 dB (nom.)
	6 GHz $\leq$ f < 14 GHz	< 2.5 dB (nom.)
	14 GHz $\leq$ f < 26.5 GHz	< 3.0 dB (nom.)
	26.5 GHz $\leq$ f $\leq$ 44 GHz	< 3.5 dB (nom.)
	RF attenuation $\leq$ 20 dB, RF preamplifier: on, +20 °C to +30 °C	
	R&S®FPL1003, R&S®FPL1007	
	3 MHz $\leq$ f < 3 GHz	< 0.6 dB ( $\sigma = 0.2$ dB)
	3 GHz $\leq$ f < 7.5 GHz	< 1.0 dB ( $\sigma = 0.33$ dB)
	R&S®FPL1014, R&S®FPL1026	
	3 MHz $\leq$ f < 3 GHz	< 0.6 dB ( $\sigma = 0.2$ dB)
	3 GHz $\leq$ f < 7.5 GHz	< 1.0 dB ( $\sigma = 0.33$ dB)
	7.5 GHz $\leq$ f < 14 GHz	< 2.5 dB ( $\sigma = 0.83$ dB)
	14 GHz $\leq$ f < 26.5 GHz	< 3.0 dB ( $\sigma = 1.0$ dB)
	R&S®FPL1044	
	10 Hz $\leq$ f < 9 kHz <sup>6</sup>	< 1.5 dB (nom.)
	9 kHz $\leq$ f < 3 GHz	< 0.6 dB ( $\sigma = 0.2$ dB)
	3 GHz $\leq$ f < 6 GHz	< 1.0 dB ( $\sigma = 0.33$ dB)
	6 GHz $\leq$ f < 14 GHz	< 2.5 dB ( $\sigma = 0.83$ dB)
	14 GHz $\leq$ f < 26.5 GHz	< 3.0 dB ( $\sigma = 1.0$ dB)
	26.5 GHz $\leq$ f $\leq$ 44 GHz	< 3.5 dB ( $\sigma = 1.08$ dB)

Attenuator switching uncertainty	f = 50 MHz, 0 dB to 45 dB, referenced to 10 dB attenuation	< 0.2 dB ( $\sigma = 0.07$ dB)
Uncertainty of reference level setting		0 dB <sup>4</sup>
Bandwidth switching uncertainty	referenced to RBW = 10 kHz and sweep type: FFT	
	sweep type: FFT, RBW < 100 kHz	< 0.1 dB (nom.)
	sweep type: sweep, RBW $\geq$ 100 kHz	< 0.2 dB (nom.)

**Nonlinearity of displayed level**

Logarithmic level display	S/N > 16 dB, 0 dB to -50 dB	< 0.1 dB ( $\sigma = 0.07$ dB)
	R&S®FPL1044	
	S/N > 16 dB, -50 dB to -70 dB	< 0.5 dB ( $\sigma = 0.16$ dB)
Linear level display	S/N > 16 dB, 0 dB to -70 dB	5 % of reference level (nom.)

**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: 10/20/30/40 dB, RF preamplifier: off, span / RBW < 100, confidence level: 95 %, +20 °C to +30 °C		
R&S®FPL1003, R&S®FPL1007		
	1 MHz $\leq$ f < 3 GHz	0.5 dB
	3 GHz $\leq$ f < 7.5 GHz	0.8 dB
	7.5 GHz $\leq$ f < 14 GHz	1.2 dB
	14 GHz $\leq$ f < 26.5 GHz	1.8 dB
R&S®FPL1014, R&S®FPL1026		
	1 MHz $\leq$ f < 3 GHz	0.5 dB
	3 GHz $\leq$ f < 7.5 GHz	0.8 dB
	7.5 GHz $\leq$ f < 14 GHz	1.2 dB
	14 GHz $\leq$ f < 26.5 GHz	1.8 dB
R&S®FPL1044		
	9 kHz $\leq$ f < 50 kHz	0.7 dB
	50 kHz $\leq$ f < 3 GHz	0.5 dB
	3 GHz $\leq$ f < 6 GHz	0.8 dB
	6 GHz $\leq$ f < 14 GHz	1.2 dB
	14 GHz $\leq$ f < 26.5 GHz	1.8 dB
	26.5 GHz $\leq$ f < 36 GHz	1.8 dB
	36 GHz $\leq$ f $\leq$ 44 GHz	2.0 dB

**Intermodulation, sensitivity and spurious response**

<b>Intermodulation</b>		
1 dB compression of input mixer (two tone)	RF attenuation: 0 dB, RF preamplifier: off	+7 dBm (nom.)
Third-order intercept point (TOI) <sup>5</sup>	RF attenuation: 0 dB, level = -20 dBm (both), $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger, RF preamplifier: off	
	10 MHz $\leq$ $f_{in}$ < 300 MHz	> 13 dBm, 16 dBm (typ.)
	300 MHz $\leq$ $f_{in}$ < 3 GHz	> 17 dBm, 20 dBm (typ.)
	3 GHz $\leq$ $f_{in}$ < 6 GHz	> 15 dBm, 18 dBm (typ.)
	6 GHz $\leq$ $f_{in}$ < 20 GHz	> 13 dBm, 18 dBm (typ.)
	20 GHz $\leq$ $f_{in}$ $\leq$ 44 GHz	> 15 dBm, 18 dBm (typ.)
	with R&S®FPL1-B22 option, RF attenuation: 0 dB, level = -40 dBm (both), $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger, RF preamplifier: on	
5 MHz $\leq$ $f_{in}$ < 6 GHz	0 dBm (nom.)	
6 GHz $\leq$ $f_{in}$ < 26.5 GHz	-6 dBm (nom.)	
26.5 GHz $\leq$ $f_{in}$ $\leq$ 44 GHz	-6 dBm (nom.)	
Second-harmonic intercept (SHI)	RF attenuation: 0 dB, level = -13 dBm, RF preamplifier: off	
	1 MHz < $f_{in}$ < 900 MHz	45 dBm (nom.)
	900 MHz $\leq$ $f_{in}$ $\leq$ 13.25 GHz	70 dBm (nom.)
	13.25 GHz < $f_{in}$ $\leq$ 22 GHz	73 dBm (nom.)

<sup>4</sup> 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.

<sup>5</sup> TOI specifications at frequencies > 20 GHz are nominal for R&S®FPL1026.

Displayed average noise level (DANL)			
RF preamplifier off	RF attenuation: 0 dB, termination: 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, sample detector, +20 °C to +30 °C		
	R&S®FPL1003, R&S®FPL1007		
	5 kHz ≤ f < 100 kHz	-143 dBm (typ.)	
	100 kHz ≤ f < 5 MHz	< -140 dBm, -143 dBm (typ.)	
	5 MHz ≤ f < 3 GHz	< -149 dBm, -152 dBm (typ.)	
	3 GHz ≤ f < 5 GHz	< -143 dBm, -146 dBm (typ.)	
	5 GHz ≤ f ≤ 7.5 GHz	< -140 dBm, -143 dBm (typ.)	
	R&S®FPL1014, R&S®FPL1026		
	5 kHz ≤ f < 100 kHz	-143 dBm (typ.)	
	100 kHz ≤ f < 5 MHz	< -140 dBm, -143 dBm (typ.)	
	5 MHz ≤ f < 3 GHz	< -147 dBm, -150 dBm (typ.)	
	3 GHz ≤ f < 6 GHz	< -143 dBm, -146 dBm (typ.)	
	6 GHz ≤ f < 14 GHz	< -141 dBm, -144 dBm (typ.)	
	14 GHz ≤ f < 20 GHz	< -135 dBm, -140 dBm (typ.)	
	20 GHz ≤ f ≤ 26.5 GHz	< -132 dBm, -135 dBm (typ.)	
	R&S®FPL1044		
	10 Hz ≤ f < 5 kHz	-100 dBm (nom.)	
	5 kHz ≤ f < 100 kHz	< -140 dBm, -143 dBm (typ.)	
	100 kHz ≤ f < 5 MHz	< -141 dBm, -147 dBm (typ.)	
	5 MHz ≤ f < 3 GHz	< -147 dBm, -150 dBm (typ.)	
	3 GHz ≤ f < 6 GHz	< -143 dBm, -146 dBm (typ.)	
	6 GHz ≤ f < 14 GHz	< -141 dBm, -144 dBm (typ.)	
	14 GHz ≤ f < 20 GHz	< -135 dBm, -140 dBm (typ.)	
	20 GHz ≤ f < 26.5 GHz	< -132 dBm, -140 dBm (typ.)	
	26.5 GHz ≤ f ≤ 44 GHz	< -133 dBm, -135 dBm (typ.)	
	RF preamplifier on (gain: nom. 20 dB)	RF attenuation: 0 dB, termination: 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, sample detector, +20 °C to +30 °C	
		R&S®FPL1003, R&S®FPL1007	
		3 MHz ≤ f < 10 MHz	< -155 dBm, -158 dBm (typ.)
		10 MHz ≤ f < 2 GHz	< -163 dBm, -166 dBm (typ.)
		2 GHz ≤ f < 3 GHz	< -162 dBm, -165 dBm (typ.)
		3 GHz ≤ f < 5 GHz	< -158 dBm, -161 dBm (typ.)
		5 GHz ≤ f < 7 GHz	< -156 dBm, -159 dBm (typ.)
		7 GHz ≤ f < 7.5 GHz	< -155 dBm, -158 dBm (typ.)
R&S®FPL1014, R&S®FPL1026			
10 MHz ≤ f < 2 GHz		< -160 dBm, -163 dBm (typ.)	
2 GHz ≤ f < 6 GHz		< -158 dBm, -161 dBm (typ.)	
6 GHz ≤ f < 14 GHz		< -158 dBm, -163 dBm (typ.)	
14 GHz ≤ f < 18 GHz		< -158 dBm, -161 dBm (typ.)	
18 GHz ≤ f ≤ 26.5 GHz		< -156 dBm, -158 dBm (typ.)	
R&S®FPL1044			
5 kHz ≤ f < 30 MHz <sup>6</sup>		< -155 dBm, -160 dBm (typ.)	
30 MHz ≤ f < 2 GHz		< -160 dBm, -163 dBm (typ.)	
2 GHz ≤ f < 6 GHz		< -158 dBm, -165 dBm (typ.)	
6 GHz ≤ f < 14 GHz		< -158 dBm, -163 dBm (typ.)	
14 GHz ≤ f < 18 GHz		< -158 dBm, -161 dBm (typ.)	
18 GHz ≤ f < 26.5 GHz		< -156 dBm, -160 dBm (typ.)	
26.5 GHz ≤ f ≤ 44 GHz	< -152 dBm, -157 dBm (typ.)		
<b>Spurious responses</b>	mixer level ≤ -13 dBm, sweep optimization: auto or dynamic, scaling linear		
Image response	10 MHz ≤ f ≤ 3 GHz		
	$f_{in} - 2 \times 4020.4 \text{ MHz}$ (1st IF)	< -90 dBc (typ.)	
	$f_{in} - 2 \times 820.4 \text{ MHz}$ (2nd IF)	< -80 dBc	
	$f_{in} - 2 \times 20.4 \text{ MHz}$ (3rd IF), RBW ≤ 3 MHz	< -80 dBc	
	3 GHz < f ≤ 14 GHz, RBW ≤ 3 MHz	< -70 dBc (typ.)	
	14 GHz < f ≤ 44 GHz, RBW ≤ 3 MHz	< -65 dBc (typ.)	

<sup>6</sup> Input coupling: DC.

Intermediate frequency response	2 MHz ≤ f ≤ 3 GHz	
	4020.4 MHz (1st IF)	< -80 dBc (typ.)
	820.4 MHz (2nd IF)	< -80 dBc
	20.4 MHz (3rd IF)	< -80 dBc
	3 GHz < f ≤ 44 GHz	< -70 dBc
Residual spurious response	RF attenuation: 0 dB	
	f ≤ 1 MHz	< -90 dBm (nom.)
	f > 1 MHz	< -90 dBm, -100 dBm (typ.)
Local oscillator related spurious	f < 3 GHz	
	1 kHz ≤ carrier offset ≤ 10 MHz	< -70 dBc
	carrier offset > 10 MHz	< -80 dBc
	3 GHz ≤ f < 14 GHz	
	R&S®FPL1014, R&S®FPL1026	
	14 GHz ≤ f ≤ 26.5 GHz	< -67 dBc
	R&S®FPL1044	
	14 GHz ≤ f ≤ 44 GHz	
	1 kHz ≤ carrier offset ≤ 10 MHz	< -90 dBc + 20log(f <sub>in</sub> /GHz)
	carrier offset > 10 MHz	< -110 dBc + 20log(f <sub>in</sub> /GHz)
Other interfering signals		
Subharmonic of 1st LO	20 MHz ≤ f < 3 GHz, spurious at 4020.4 MHz - 2 × f <sub>in</sub>	< -80 dBc (nom.)
Harmonic of 1st LO	20 MHz ≤ f < 3 GHz, mixer level < -25 dBm, spurious at f <sub>in</sub> - 2010.2 MHz	< -80 dBc (nom.)

## Measurement speed

Local measurement and display update rate	1001 sweep points, sweep optimization set to "speed"	1 ms (1000/s) (nom.)
Maximum sweep rate, remote operation <sup>7,8</sup>	trace average: on	0.9 ms (1100/s) (nom.)
Remote measurement and LAN transfer <sup>7</sup>		3.2 ms (357/s) (nom.)
Marker peak search <sup>7</sup>		1.9 ms (nom.)
Center frequency tune + sweep + sweep data transfer <sup>7</sup>		16 ms (nom.)

## Trigger functions

<b>Trigger</b>		
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
Maximum deviation of trigger offset		±10 ns
<b>IF power trigger</b>		
Sensitivity	minimum signal power	-60 dBm + RF attenuation - RF preamplifier gain
	maximum signal power	-15 dBm + RF attenuation - RF preamplifier gain
IF power trigger bandwidth	RBW > 5 MHz	40 MHz (nom.)
	RBW ≤ 5 MHz	6 MHz (nom.)
<b>Gated sweep</b>		
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
Maximum deviation of gate length		±10 ns

## I/Q data

Interface		GPIO 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

<sup>7</sup> Measured with a PC equipped with Intel Core i7 2.8 GHz and 1 Gigabit LAN interface.

<sup>8</sup> Measurement is performed with a sweep count of 1000. The indicated speed is the average speed of 1 sweep.

Maximum signal analysis bandwidth (equalized)	standard	12.8 MHz
	with R&S®FPL1-B40 option	40 MHz
Signal analysis bandwidth ≤ 10 MHz, R&S®FPL1003 and R&S®FPL1007		
Amplitude flatness	$f_{\text{center}} \geq 12 \text{ MHz}$ and $(1.25 \times \text{signal analysis bandwidth})$	±0.3 dB (nom.)
Deviation from linear phase	$f_{\text{center}} \geq 12 \text{ MHz}$ and $(1.25 \times \text{signal analysis bandwidth})$	±1° (nom.)
Signal analysis bandwidth ≤ 10 MHz, R&S®FPL1014 and R&S®FPL1026		
Amplitude flatness	$f_{\text{center}} \geq 30 \text{ MHz}$ and $(1.25 \times \text{signal analysis bandwidth})$	±1.0 dB (nom.)
Deviation from linear phase	$f_{\text{center}} \geq 30 \text{ MHz}$ and $(1.25 \times \text{signal analysis bandwidth})$	±2° (nom.)
Signal analysis bandwidth ≤ 40 MHz, R&S®FPL1003 and R&S®FPL1007		
Amplitude flatness	$f_{\text{center}} \geq 12 \text{ MHz}$ and $(1.25 \times \text{signal analysis bandwidth})$	±0.5 dB (nom.)
Deviation from linear phase	$f_{\text{center}} \geq 12 \text{ MHz}$ and $(1.25 \times \text{signal analysis bandwidth})$	±1.5° (nom.)
Signal analysis bandwidth ≤ 40 MHz, R&S®FPL1014 and R&S®FPL1026, $f_{\text{center}} \leq 6 \text{ GHz}$		
Amplitude flatness	$f_{\text{center}} \geq 30 \text{ MHz}$ and $(1.25 \times \text{signal analysis bandwidth})$	±0.5 dB (nom.)
Deviation from linear phase	$f_{\text{center}} \geq 30 \text{ MHz}$ and $(1.25 \times \text{signal analysis bandwidth})$	±1.5° (nom.)
Signal analysis bandwidth ≤ 40 MHz, R&S®FPL1014 and R&S®FPL1026, $f_{\text{center}} > 6 \text{ GHz}$ , YIG preselector: off <sup>9</sup>		
Amplitude flatness		±1.5 dB (nom.)
Deviation from linear phase		±3° (nom.)

## Inputs and outputs

<b>RF input</b>		
Impedance		50 Ω
Connector	R&S®FPL1003, R&S®FPL1007, R&S®FPL1014	type N female
	R&S®FPL1026	test port adapter, PC 2.92 mm female (interchangeable port connector system)
	R&S®FPL1044	2.92 mm male (compatible with SMA, and 3.5 mm)
VSWR	R&S®FPL1003, R&S®FPL1007, R&S®FPL1014, R&S®FPL1026	
	RF attenuation ≥ 10 dB	
	10 MHz ≤ f < 3 GHz	< 1.5 (nom.)
	3 GHz ≤ f < 7.5 GHz	< 2 (nom.)
	7.5 GHz ≤ f < 26.5 GHz	< 2 (nom.)
	R&S®FPL1044	
	RF attenuation ≥ 10 dB	
	5 kHz ≤ f < 10 MHz	< 2.3 (nom.)
	10 MHz ≤ f < 100 MHz	< 2.3 (meas.)
	100 MHz ≤ f < 7.5 GHz	< 1.8 (meas.)
	7.5 GHz ≤ f < 26.5 GHz	< 2.0 (meas.)
	26.5 GHz ≤ f ≤ 43.5 GHz	< 2.3 (meas.)
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	20 dB (nom.)

<b>USB interfaces</b>	front	2 ports, type A plug, version 2.0
	Rear	2 ports, type A plug, version 3.1

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

<sup>9</sup> R&S®FPL1-B11 option required.

Reference input		
Connector		BNC female
Impedance		50 $\Omega$
Input frequency range		10 MHz $\pm$ 5 ppm
Required level		> 0 dBm into 50 $\Omega$

External trigger/gate input		
Connector		BNC female
Trigger voltage		0.5 V to 3.5 V
Input impedance		10 k $\Omega$

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

External monitor		
Connector <sup>10</sup>		DisplayPort Rev. 1.3

## General data

Display		
Resolution		21 cm LC TFT color display (10.1") 1280 $\times$ 800 pixel (WXGA resolution)
Pixel failure rate		< 1 $\times$ 10 <sup>-5</sup>

Data storage		
Internal <sup>11</sup>	standard	solid-state drive (SSD), 128 Gbyte
External		supports USB 2.0/3.1 compatible memory devices

Environmental conditions		
Temperature	operating temperature range	0 $^{\circ}$ C to +50 $^{\circ}$ C
	storage temperature range	-20 $^{\circ}$ C to +70 $^{\circ}$ C
Damp heat	without condensation	+40 $^{\circ}$ 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	5 Hz to 500 Hz, acceleration: 1.2 g (RMS), in line with EN 60068-2-64, MIL-PRF-28800F
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 <ul style="list-style-type: none"> <li>• IEC/EN 61326-1 <sup>12, 13</sup></li> <li>• IEC/EN 61326-2-1</li> <li>• CISPR 11/EN 55011 <sup>12</sup></li> <li>• IEC/EN 61000-3-2</li> <li>• IEC/EN 61000-3-3</li> </ul>

EU legislation		
	for details, see user documentation	EU: in line with Data Act – Regulation (EU) 2023/2854

Recommended calibration interval		
		1 year

<sup>10</sup> Instruments with SN < 300000 are equipped with IPS2 PC module and only provide a DVI-D connector.

<sup>11</sup> Instruments with SN < 300000 are equipped with IPS2 PC module and only provide 32 Gbyte of internal data storage.

<sup>12</sup> Emission limits for class A equipment.

<sup>13</sup> Immunity test requirement for industrial environment (EN 61326, table 2).

<b>Power supply</b>		
AC supply		100 V to 240 V $\pm$ 10 %, 50 Hz to 60 Hz $\pm$ 5 %
Safety		in line with <ul style="list-style-type: none"> <li>• EN 61010-1</li> <li>• IEC 61010-1</li> <li>• UL 61010-1</li> <li>• CAN/CSA-C22.2 No. 61010-1</li> </ul>
Test marks <sup>14</sup>		CE, cCSA <sub>US</sub> , KCC

<b>Power consumption</b>		
Operating	R&S®FPL1003, R&S®FPL1007	65 W (nom.), max. 115 W with all options <sup>15</sup>
	R&S®FPL1014	80 W (nom.), max. 130 W with all options <sup>15</sup>
	R&S®FPL1026	85 W (nom.), max. 140 W with all options <sup>15</sup>
	R&S®FPL1044	110 W (nom.), max. 160 W with all options <sup>15</sup>
Non-operating	standby (all models)	
	without R&S®FPL1-B4 option	5 W (nom.)
	with R&S®FPL1-B4 option	8 W (nom.)
	internal battery (R&S®FPL1-B31 option) in charge mode	85 W (nom.)
	power off (all models)	0 W (nom.)

<b>Dimensions and weight</b>		
Dimensions	W × H × D	408 mm × 186 mm × 235 mm (16.06 in × 7.32 in × 9.25 in)
Net weight without options, nominal	R&S®FPL1003, R&S®FPL1007	6 kg (13.22 lb)
	R&S®FPL1014, R&S®FPL1026	7 kg (15.43 lb)
	R&S®FPL1044	7.7 kg (17 lb)
Net weight with internal battery, nominal	R&S®FPL1003, R&S®FPL1007	7.3 kg (16 lb)
	R&S®FPL1014, R&S®FPL1026	8.3 kg (17.64 lb)
	R&S®FPL1044	9 kg (19.84 lb)

<sup>14</sup> cCSA<sub>US</sub> certification for R&S®FPL1044 is in preparation and pending.

<sup>15</sup> Power consumption varies depending on mode of operation and options installed. The specified maximum power consumption includes R&S®FPL1-B31 option with both batteries in charge mode.

# Options

## R&S® FPL1-B5 additional interfaces

<b>User port</b>		
Connector		25-pin D-Sub female
Output		TTL-compatible, 0 V/5 V, max. 15 mA
Input		TTL-compatible, max. 5 V
<b>Noise source control and power sensor</b>		
Connectors	for R&S®FS-SNSxx smart noise sources and R&S®NRP-Zxx power sensors	7-pin LEMOSA female
	for noise source control	BNC female
Noise source control output voltage		0 V/28 V, switchable, max. 100 mA (nom.)
<b>IF/Video</b>		
Connector		BNC female, 50 Ω
<b>IF Out</b>		
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	0 dBm (nom.)
<b>Video Out</b>		
Bandwidth		equal to VBW setting
Output scaling	log. display scale lin. display scale	logarithmic linear
Output level	center frequency > 10 MHz, span = 0 Hz, signal at reference level and center frequency	1 V, open-circuit (nom.)
<b>Audio output</b>		
Loudspeaker		built-in, adjustable
<b>AF out</b>		
Connector		3.5 mm mini jack
Output impedance		10 Ω
Open-circuit voltage		up to 1.5 V, adjustable

## R&S®FPL1-B9 internal generator <sup>16</sup>

<b>Frequency</b>		
Frequency range	R&S®FPL1003	5 kHz to 3 GHz
	R&S®FPL1007, R&S®FPL1014, R&S®FPL1026	5 kHz to 7.5 GHz
Setting resolution	independent CW source	0.01 Hz

<b>Frequency offset</b>		
Setting range		0 Hz to $f_{\max}$ <sup>17</sup>
Setting resolution		0.01 Hz

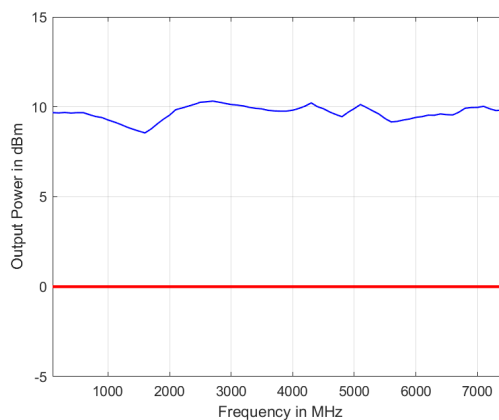
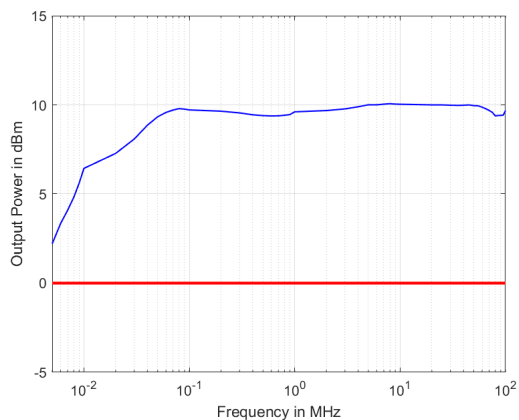
<b>Spectral purity</b>		
SSB phase noise	frequency = 1 GHz, output level = 0 dBm	
	carrier offset = 10 kHz	< -102 dBc (1 Hz), -108 dBc (1 Hz) (typ.)
	carrier offset = 100 kHz	< -105 dBc (1 Hz), -111 dBc (1 Hz) (typ.)
	carrier offset = 1 MHz	< -117 dB (1 Hz), -130 dBc (1 Hz) (typ.)
Harmonics	output level = 0 dBm, +20 °C to +30 °C	
	5 kHz ≤ f < 100 kHz	< -30 dBc (nom.)
	100 kHz ≤ f ≤ 7.5 GHz <sup>18</sup>	< -30 dBc
Non-harmonic spurious	output level = 0 dBm	
	1 kHz < offset from carrier ≤ 4 MHz	-35 dBc (nom.)
	offset from carrier > 4 MHz	< -35 dBc, -45 dBc (typ.)

<b>Level</b>		
Specified level range		-50 dBm to 0 dBm
Setting resolution		0.1 dB
Setting range		-60 dBm to +10 dBm
Absolute level uncertainty	frequency = 50 MHz, +20 °C to +30 °C, output level = -10 dBm, frequency offset = 0 Hz	< 0.5 dB
Frequency response	output level = -10 dBm, referenced to level at 50 MHz, +20 °C to +30 °C, frequency offset = 0 Hz	
	100 kHz ≤ f ≤ 3 GHz	< 1 dB,
	3 GHz < f ≤ 7.5 GHz	< 1.5 dB, < 1 dB (typ.)
Level nonlinearity	for specified level range, referenced to -10 dBm output level, +20 °C to +30 °C, f ≥ 100 kHz	≤ 2 dB, < 0.5 dB (typ.)

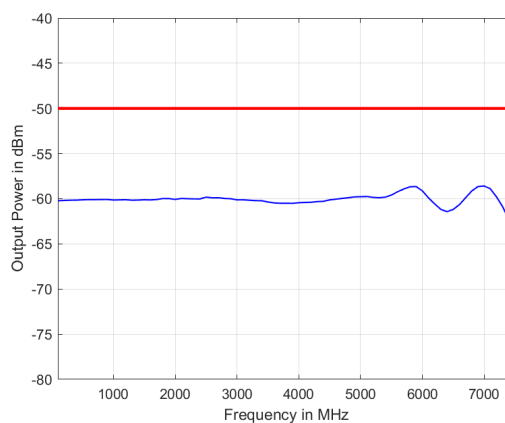
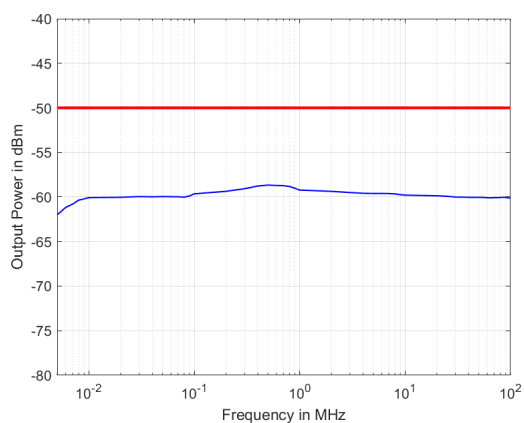
<sup>16</sup> Option R&S®FPL1-B9 is not available for R&S®FPL1044.

<sup>17</sup>  $f_{\max}$  depends on frequency range.

<sup>18</sup> Limit is nominal for harmonics at frequencies > 20 GHz.



Maximum output power versus frequency, level in dBm (meas.)



Minimum output power versus frequency, level in dBm (meas.)

<b>Dynamic range</b>	RBW = 1 kHz, f = 1 GHz	115 dB (nom.)
<b>Power sweep</b>		
Specified level range		-50 dBm to 0 dBm
Setting resolution		0.1 dB
Setting range		-60 dBm to +10 dBm
<b>GEN output</b>		
Connector		type N female, 50 Ω
VSWR		1.5 (nom.)
<b>Reverse power</b>		
DC voltage		50 V
CW RF power		30 dBm (= 1 W)
Maximum pulse voltage		150 V
Maximum pulse energy	pulse duration: 10 μs	1 mWs

## R&S® FPL1-B10 GPIB interface

IEC/IEEE bus control		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

## 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	$V_{in} = 12\text{ V}/24\text{ V}$	15 A/7.5 A (nom.)
	$V_{in} = 12\text{ V}/24\text{ V}$ , operating mode, without internal batteries (R&S®FPL1-B31); R&S®FPL1003, R&S®FPL1007	5.5 A/2.7 A (meas.)
	$V_{in} = 12\text{ V}/24\text{ V}$ , operating mode, without internal batteries (R&S®FPL1-B31); R&S®FPL1014, R&S®FPL1026	6.8 A/3.5 A (meas.)
	$V_{in} = 12\text{ V}/24\text{ V}$ , operating mode, without internal batteries (R&S®FPL1-B31); R&S®FPL1044	7.9 A/3.8 A (meas.)
	$V_{in} = 12\text{ V}/24\text{ V}$ , operating mode, internal batteries in charge mode; R&S®FPL1003, R&S®FPL1007	11 A/5 A (meas.)
	$V_{in} = 12\text{ V}/24\text{ V}$ , operating mode, internal batteries in charge mode; R&S®FPL1014, R&S®FPL1026	11.8 A/5.4 A (meas.)
	$V_{in} = 12\text{ V}/24\text{ V}$ , operating mode, internal batteries in charge mode; R&S®FPL1044	11.0 A/ 5.2 A (meas.)
	$V_{in} = 12\text{ V}/24\text{ V}$ , standby mode, internal batteries in charge mode, R&S®FPL1-B31 model .02	6.5 A/3 A (meas.)
	$V_{in} = 12\text{ V}/24\text{ V}$ , standby mode, internal batteries in charge mode, R&S®FPL1-B31 model .03	3.1 A/1.5 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	R&S®FPL1003, R&S®FPL1007	3.5 h (nom.)
	R&S®FPL1014, R&S®FPL1026	2.0 h (nom.)
	R&S®FPL1044	
	Preset, cont. sweep full span	2.0 h (nom.)
	Zero span at $f_{max}$	1.5 h (nom.)
Charge time	standby mode, AC supply	
	R&S®FPL1003, R&S®FPL1007, R&S®FPL1014, R&S®FPL1026	< 2 h (nom.)
	R&S®FPL1044	< 4 h (nom.)
	standby mode, external DC supply (R&S®FPL1-B30)	
	R&S®FPL1003, R&S®FPL1007, R&S®FPL1014, R&S®FPL1026	< 2 h (nom.)
	R&S®FPL1044	< 4 h (nom.)
	operating mode	
	R&S®FPL1003, R&S®FPL1007, R&S®FPL1014, R&S®FPL1026	< 4 h (nom.)
R&S®FPL1044	< 6 h (nom.)	
Temperature	operating temperature range, discharge	0 °C to +50 °C
	operating temperature range, charge	0 °C to +40 °C
	storage temperature range	-20 °C to +60 °C <sup>19</sup>

<sup>19</sup> 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.

**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)

## Ordering information

Designation	Type	Order No.
Spectrum analyzer, 5 kHz to 3 GHz	R&S®FPL1003	1304.0004.03
Spectrum analyzer, 5 kHz to 7.5 GHz	R&S®FPL1007	1304.0004.07
Spectrum analyzer, 5 kHz to 14 GHz	R&S®FPL1014	1304.0004.14
Spectrum analyzer, 5 kHz to 26.5 GHz	R&S®FPL1026	1304.0004.26
Spectrum analyzer, 10 Hz to 44 GHz	R&S®FPL1044	1304.0004.44
<b>Accessories supplied</b>		
Power cable and quick start guide		

## Options

Designation	Type R&S®...	Order No.	Retrofit	Remarks	Available for R&S®FPL...				
					1003	1007	1014	1026	1044
OCXO reference frequency	FPL1-B4	1323.1902.02	yes	retrofit in service center	•	•	•	•	•
Additional interfaces	FPL1-B5	1323.1883.02	yes	user-retrofittable	•	•	•	•	•
Internal generator	FPL1-B9	1323.1925.03	no		•	–	–	–	–
Internal generator	FPL1-B9	1323.1925.07	no		–	•	•	•	–
GPIB interface	FPL1-B10	1323.1890.02	yes	user-retrofittable	•	•	•	•	•
YIG preselector bypass	FPL1-B11	1323.1619.02	yes	user-retrofittable	–	–	•	•	•
External generator control	FPL1-B12	1353.6660.02	yes	user-retrofittable	•	•	•	•	•
Second solid-state drive (SSD)	FPL1-B19	1304.0427.02	yes	user-retrofittable mounted on PC board, including analyzer firmware	•	•	•	•	–
Second solid-state drive (SSD)	FPL1-B19	1304.0427.03	yes	user-retrofittable mounted on PC board, including analyzer firmware; only available for devices with SN ≥ 300000	•	•	•	•	•
RF preamplifier (3 GHz/7.5 GHz)	FPL1-B22	1323.1719.02	yes	user-retrofittable	•	•	–	–	–
RF preamplifier (14 GHz)	FPL1-B22	1323.1702.02	yes	user-retrofittable	–	–	•	–	–
RF preamplifier (26.5 GHz)	FPL1-B22	1323.1777.02	yes	user-retrofittable;	–	–	–	•	–
RF preamplifier (44 GHz)	FPL1-B22	1353.6060.02	yes	user-retrofittable	–	–	–	–	•
1 dB steps for electronic attenuator	FPL1-B25	1323.1990.02	yes	user-retrofittable	•	•	•	•	•
DC power supply 12 V/24 V	FPL1-B30	1323.1877.02	yes	user-retrofittable	•	•	•	•	•
Internal lithium-ion battery	FPL1-B31	1323.1725.02	yes	retrofit in service center; including 2 battery packs and internal charging unit	•	•	•	•	–
Internal lithium-ion battery	FPL1-B31	1323.1725.03	yes	retrofit in service center; including 2 battery packs and internal charging unit	–	–	–	–	•
40 MHz analysis bandwidth	FPL1-B40	1323.1931.02	yes	user-retrofittable	•	•	•	•	•

Designation	Type R&S®...	Order No.	Retrofit	Remarks	Available for R&S®FPL...				
					1003	1007	1014	1026	1044
<b>Firmware</b>									
AM/FM/PM measurement demodulator	FPL1-K7	1323.1731.02			•	•	•	•	•
Power sensor measurement with R&S®NRPxx power sensors	FPL1-K9	1323.1754.02		supports R&S®NRPxx power sensors	•	•	•	•	•
Noise figure and gain measurements	FPL1-K30	1323.1760.02		requires R&S®FPL1-B5	•	•	•	•	•
Security write protection for SSD	FPL1-K33	1323.1290.02		requires Windows 10 IoT Enterprise LTSC 2021 operating system or R&S®FPL1-U10	•	•	•	•	•
Phase noise measurement application	FPL1-K40	1323.1831.02			•	•	•	•	•
40 MHz real-time spectrum measurements	FPL1-K41R	1353.6702.02		CPU board IPS5 required (given for devices with SN > 300000)	•	•	•	•	•
EMI measurement application	FPL1-K54	1323.1783.02			•	•	•	•	•
Vector signal analysis	FPL1-K70	1323.1748.02			•	•	•	•	•
Multi-modulation analysis	FPL1-K70M	1323.1625.02		requires R&S®FPL1-K70	•	•	•	•	•
BER measurements with PRBS data	FPL1-K70P	1323.1631.02		requires R&S®FPL1-K70	•	•	•	•	•
<b>Software</b>									
License dongle	FSPC	1310.0002.03			•	•	•	•	•
Vector signal explorer base software	VSE	1320.7500.06			•	•	•	•	•
Vector signal analysis	VSE-K70	1320.7522.06			•	•	•	•	•
EUTRA/LTE NB-IoT	VSE-K106	1320.7900.06			•	•	•	•	•

## Upgrades

Designation	Type	Order No.	Retrofittable	Remarks
Upgrade to Windows IoT Enterprise LTSC 2021	R&S®FPL1-U10	1353.5393.21	yes	contact the Rohde & Schwarz service center

## 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
Lithium-ion battery charger for charging spare batteries	R&S®FSV-B34	1321.3950.02
19" rackmount kit (RAL 5014) <sup>20</sup>	R&S®FPL1-Z6	1323.1954.02
19" rackmount kit (RAL 5000) <sup>20</sup>	R&S®FPL1-Z6B	1323.1954.03
D-Sub cable for TTL synchronization <sup>21</sup>	R&S®FPL1-Z7	1353.6648.02
Headphone		0708.9010.00
<b>Adapters for instruments with test-port adapter (R&amp;S®FPL1026)</b>		
Test port adapter, 2.92 mm female		1036.4790.00
Test port adapter, 2.92 mm male		1036.4802.00
Test port adapter, 18 GHz, type N female <sup>22</sup>		1036.4777.00
<b>Matching pads, 50 Ω/75 Ω</b>		
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
<b>Smart noise sources for noise figure and gain measurements (R&amp;S®FPL1-K30 required)</b>		
Smart noise source, 10 MHz to 18 GHz	R&S®FS-SNS18	1338.8008.18
Smart noise source, 10 MHz to 26.5 GHz	R&S®FS-SNS26	1338.8008.26
<b>Probe adapters</b>		
Type N adapter, for R&S®RT-Zxx oscilloscope probes (recommended for R&S®FPL1003, R&S®FPL1007 and R&S®FPL1014)	R&S®RT-ZA9	1417.0909.02
Type 3.5 mm (f) adapter, for R&S®RT-Zxx oscilloscope probes (recommended for R&S®FPL1026)	R&S®RT-ZA51	1803.5365.02
<b>High-power attenuators</b>		
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
<b>Cables</b>		
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
<b>DC block</b>		
DC block, 10 kHz to 18 GHz, type N	R&S®FSE-Z4	1084.7443.03

<sup>20</sup> R&S®FPL1-Z6B is available for instruments in the current corporate design color RAL 5000 (violet blue), while R&S®FPL1-Z6 is available for the legacy color RAL 5014 (pigeon blue).

<sup>21</sup> R&S®FPL1-B5 option required.

<sup>22</sup> The type N connector is only specified for frequencies up to 18 GHz. Degradations in expected performance may occur when using this adapter at higher frequencies.

## Power sensors supported by the R&S®FPL1-K9 option <sup>23</sup>

Designation	Type	Order No.
<b>Universal power sensors</b>		
1 nW to 100 mW, 10 MHz to 8 GHz, two-path	R&S®NRP-Z211	1417.0409.02
200 pW to 200 mW, 10 MHz to 8 GHz <sup>24</sup>	R&S®NRP-Z11	1138.3004.02
1 nW to 100 mW, 10 MHz to 18 GHz, two-path	R&S®NRP-Z221	1417.0309.02
200 pW to 200 mW, 10 MHz to 18 GHz <sup>24</sup>	R&S®NRP-Z21	1137.6000.02
2 nW to 2 W, 10 MHz to 18 GHz <sup>24</sup>	R&S®NRP-Z22	1137.7506.02
20 nW to 15 W, 10 MHz to 18 GHz <sup>24</sup>	R&S®NRP-Z23	1137.8002.02
60 nW to 30 W, 10 MHz to 18 GHz <sup>24</sup>	R&S®NRP-Z24	1137.8502.02
<b>Power sensor modules with power splitter</b>		
4 µW to 400 mW, DC to 18 GHz	R&S®NRP-Z27	1169.4102.02
4 µW to 400 mW, DC to 26.5 GHz	R&S®NRP-Z37	1169.3206.02
<b>Thermal power sensors</b>		
300 nW to 100 mW, DC to 18 GHz	R&S®NRP18T	1424.6115.02
300 nW to 100 mW, DC to 18 GHz, LAN version	R&S®NRP18TN	1424.6121.02
300 nW to 100 mW, DC to 33 GHz	R&S®NRP33T	1424.6138.02
300 nW to 100 mW, DC to 33 GHz, LAN version	R&S®NRP33TN	1424.6144.02
300 nW to 100 mW, DC to 40 GHz	R&S®NRP40T	1424.6150.02
300 nW to 100 mW, DC to 40 GHz, LAN version	R&S®NRP40TN	1424.6167.02
300 nW to 100 mW, DC to 50 GHz	R&S®NRP50T	1424.6173.02
300 nW to 100 mW, DC to 50 GHz, LAN version	R&S®NRP50TN	1424.6180.02
300 nW to 100 mW, DC to 67 GHz	R&S®NRP67T	1424.6196.02
300 nW to 100 mW, DC to 67 GHz, LAN version	R&S®NRP67TN	1424.6209.02
300 nW to 100 mW, DC to 90 GHz	R&S®NRP90T	1424.6473.02
300 nW to 100 mW, DC to 90 GHz, LAN version	R&S®NRP90TN	1424.6480.02
300 nW to 100 mW, DC to 110 GHz	R&S®NRP110T	1424.6215.02
<b>Average power sensors</b>		
100 pW to 200 mW, 8 kHz to 6 GHz	R&S®NRP6A	1424.6796.02
100 pW to 200 mW, 8 kHz to 6 GHz, LAN version	R&S®NRP6AN	1424.6809.02
100 pW to 200 mW, 9 kHz to 6 GHz <sup>24</sup>	R&S®NRP-Z91	1168.8004.02
100 pW to 200 mW, 8 kHz to 18 GHz	R&S®NRP18A	1424.6815.02
100 pW to 200 mW, 8 kHz to 18 GHz, LAN version	R&S®NRP18AN	1424.6821.02
<b>Three-path diode power sensors</b>		
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
100 pW to 100 mW, 50 MHz to 67 GHz	R&S®NRP67S	1424.6396.02
100 pW to 100 mW, 50 MHz to 67 GHz, LAN version	R&S®NRP67SN	1424.6409.02
100 pW to 200 mW, 50 MHz to 67 GHz, LAN version, TVAC-compliant	R&S®NRP67SN-V	1424.6415.02
<b>Wideband power sensors</b>		
1 nW to 100 mW, 50 MHz to 18 GHz <sup>24</sup>	R&S®NRP-Z81	1137.9009.02
1 nW to 100 mW, 50 MHz to 40 GHz, 2.92 mm <sup>24</sup>	R&S®NRP-Z85	1411.7501.02
1 nW to 100 mW, 50 MHz to 40 GHz, 2.40 mm <sup>24</sup>	R&S®NRP-Z86	1417.0109.40
1 nW to 100 mW, 50 MHz to 44 GHz, 2.40 mm <sup>24</sup>	R&S®NRP-Z86	1417.0109.44

<sup>23</sup> For average power measurement only. LAN connection not supported.

<sup>24</sup> Product discontinued.

## Warranty and service

Warranty		
Base unit		1 year
All other items		1 year
Service options		
	Service plans	On demand
Calibration	up to five years <sup>25</sup>	pay per calibration
Warranty and repair	up to five years <sup>25</sup>	standard price repair
Contact your Rohde & Schwarz sales office for further details.		

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<sup>25</sup> For extended periods, contact your Rohde & Schwarz sales office.

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