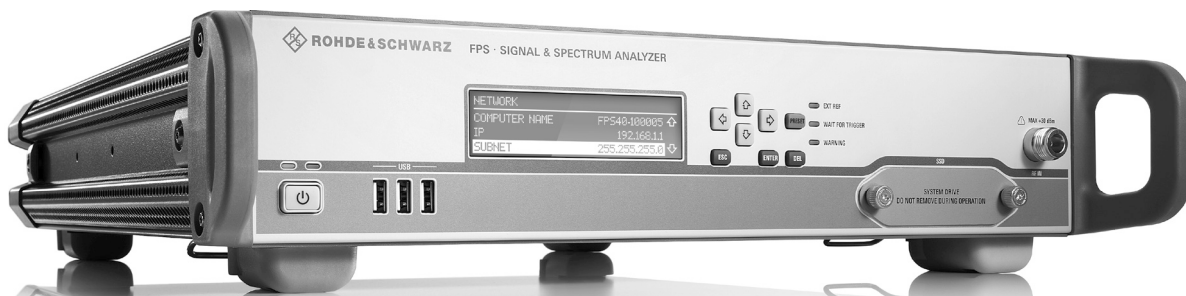


# R&S®FPS

## Signal and Spectrum Analyzer

### Specifications



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# Definitions

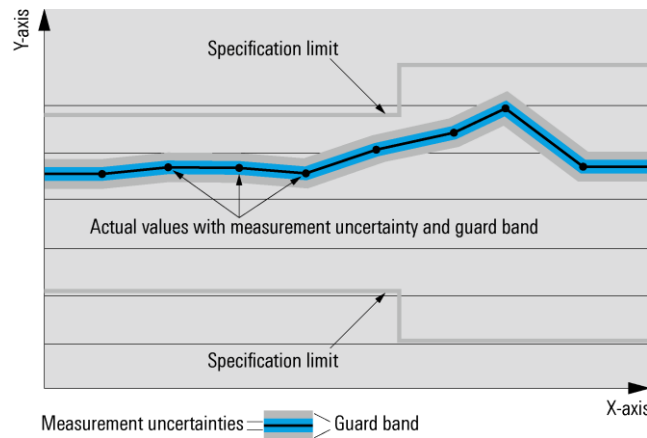
## General

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.

# Specifications

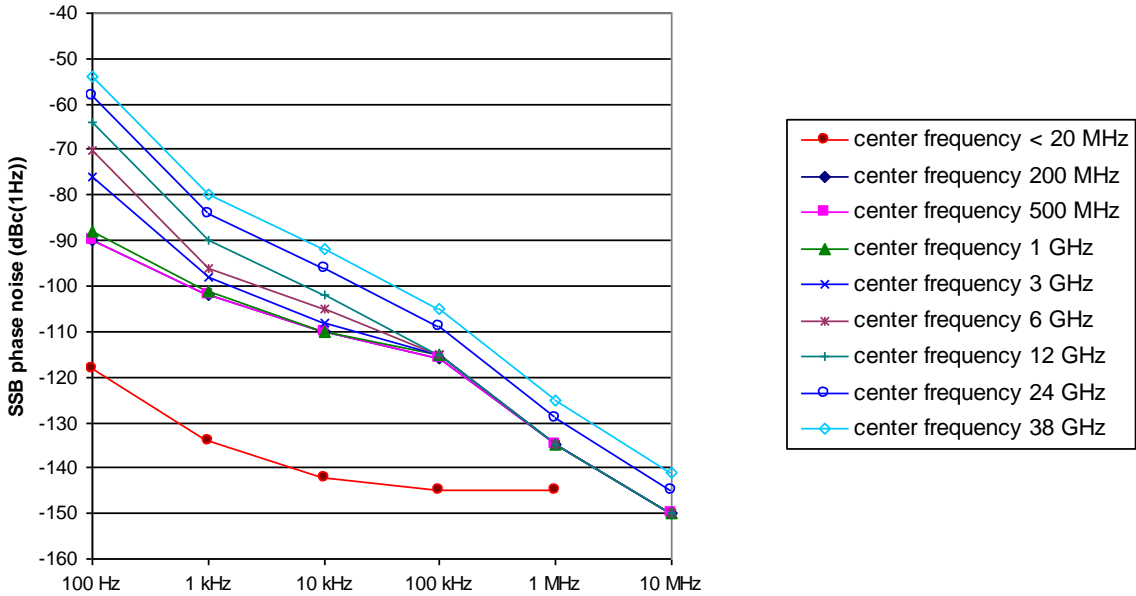
## Frequency

<b>Frequency range</b>	R&S®FPS4	
	DC-coupled	10 Hz to 4 GHz
	AC-coupled	1 MHz to 4 GHz
	R&S®FPS7	
	DC-coupled	10 Hz to 7 GHz
	AC-coupled	1 MHz to 7 GHz
	R&S®FPS13	
	DC-coupled	10 Hz to 13.6 GHz
	AC-coupled	10 MHz to 13.6 GHz
	R&S®FPS30	
	DC-coupled	10 Hz to 30 GHz
	AC-coupled	10 MHz to 30 GHz
	R&S®FPS40	
	DC-coupled	10 Hz to 40 GHz
AC-coupled	10 MHz to 40 GHz	
<b>Frequency resolution</b>	0.01 Hz	

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

<b>Frequency readout</b>		
Marker resolution		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	default value	1001
	range	101 to 32001
Marker tuning frequency step size	marker step size = sweep points	$\text{span} / (\text{sweep points} - 1)$
	marker step size = standard	$\text{span} / (\text{default sweep size} - 1)$
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
Max. span deviation		$\pm 0.1 \%$

<b>Spectral purity</b>		
SSB phase noise	frequency = 500 MHz, carrier offset	
	100 Hz	< -84 dBc (1 Hz)
	1 kHz	< -101 dBc (1 Hz)
	10 kHz	< -106 dBc (1 Hz)
	100 kHz	< -115 dBc (1 Hz)
	1 MHz	< -134 dBc (1 Hz)
	10 MHz	-150 dBc (1 Hz) (nom.)
Residual FM	frequency = 500 MHz, RBW = 1 kHz, sweep time = 100 ms	< 3 Hz (nom.)



Typical phase noise at different center frequencies.

**Sweep time**

Range	span = 0 Hz	1 $\mu$ s to 16000 s
	span $\geq$ 10 Hz, swept	1 ms to 16000 s <sup>1</sup>
	span $\geq$ 10 Hz, FFT	7 $\mu$ s to 16000 s <sup>2</sup>
Sweep time accuracy	span = 0 Hz	$\pm$ 0.1 % (nom.)
	span $\geq$ 10 Hz, swept	$\pm$ 3 % (nom.)

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

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

## Resolution bandwidths

<b>Sweep filters and FFT filters</b>		
Resolution bandwidths (–3 dB)	span $\geq$ 10 Hz, sweep filters	1 Hz to 10 MHz in 1/2/3/5 sequence
	span $\geq$ 10 Hz, FFT filters	1 Hz to 3 MHz in 1/2/3/5 sequence
	all models except R&S®FPS40, span = 0 Hz	20 MHz, 28 MHz additionally
	all models except R&S®FPS40, with R&S®FPS-B40 option, span = 0 Hz, $f \leq$ 7 GHz	40 MHz additionally
Bandwidth uncertainty		< 3 % (nom.)
Shape factor 60 dB:3 dB		< 5 (nom.)
<b>Channel filters</b>		
Bandwidths (–3 dB)	standard (RRC = root raised cosine)	100 Hz, 200 Hz, 300 Hz, 500 Hz
		1/1.5/2/2.4/2.7/3/3.4/4/4.5/5/6/8.5/9/10/ 12.5/14/15/16/18 (RRC)/20/21/ 24.3 (RRC)/25/30/50/100/150/192/200/ 300/500 kHz
	all models except R&S®FPS40 all models except R&S®FPS40, with R&S®FPS-B40 option, $f \leq$ 7 GHz	1/1.228/1.28 (RRC)/1.5/2/3/ 3.84 (RRC)/4.096 (RRC)/5/10 MHz
		20 MHz, 28 MHz additionally 40 MHz additionally
Bandwidth accuracy		< 2 % (nom.)
Shape factor 60 dB:3 dB		< 2 (nom.)
<b>Video bandwidths</b>		
	standard	1 Hz to 10 MHz in 1/2/3/5 sequence
	all models except R&S®FPS40	20 MHz, 28 MHz additionally
	all models except R&S®FPS40, with R&S®FPS-B40 option, $f \leq$ 7 GHz	40 MHz additionally
<b>Signal analysis bandwidth (equalized)</b>		
	$f \leq$ 7 GHz	
	all models	28 MHz (nom.)
	with R&S®FPS-B40 option	40 MHz (nom.)
	with R&S®FPS-B160 option	160 MHz (nom.)
	$f >$ 7 GHz, with R&S®FPS-B11 installed, YIG preselector = off	
	all models	28 MHz
	with R&S®FPS-B40 option	40 MHz
	with R&S®FPS-B160 option	160 MHz

## Level

Display range		displayed noise floor up to +30 dBm
<b>Max. input level</b>		
DC voltage	AC-coupled	50 V
	DC-coupled	0 V
CW RF power	RF attenuation 0 dB	
	RF preamplifier = off	20 dBm (= 0.1 W)
	with R&S®FPS-B22 option, RF preamplifier = on	13 dBm (= 0.02 W)
	RF attenuation ≥ 10 dB	
	RF preamplifier = off	30 dBm (= 1 W)
	with R&S®FPS-B22 option, RF preamplifier = on	23 dBm (= 0.2 W)
Pulse spectral density	RF attenuation 0 dB, RF preamplifier = off	97 dBμV/MHz
Max. pulse voltage	RF attenuation ≥ 10 dB	150 V
Max. pulse energy	RF attenuation ≥ 10 dB, 10 μs	1 mWs
<b>Intermodulation</b>		
1 dB compression of input mixer	RF attenuation 0 dB, RF preamplifier = off	
	f ≤ 7 GHz	+3 dBm (nom.)
	f > 7 GHz	+5 dBm (nom.)
	with R&S®FPS-B22 or R&S®FPS-B24 option, RF preamplifier = on, RF attenuation 0 dB	
	f ≤ 7 GHz	-12 dBm (nom.)
	f > 7 GHz	-25 dBm (nom.)
Third-order intercept point (TOI)	RF attenuation 0 dB, level 2 × -15 dBm, Δf > 5 × RBW or 10 kHz, whichever is larger, RF preamplifier = off	
	10 MHz ≤ f <sub>in</sub> < 100 MHz	> 12 dBm, 15 dBm (typ.)
	100 MHz ≤ f <sub>in</sub> < 3.6 GHz	> 13 dBm, 16 dBm (typ.)
	3.6 GHz ≤ f <sub>in</sub> ≤ 40 GHz	> 15 dBm, 18 dBm (typ.)
	with R&S®FPS-B22 or R&S®FPS-B24 option, RF preamplifier = on, RF attenuation 0 dB, level 2 × -45 dBm, Δf > 5 × RBW or 10 kHz, whichever is larger	
	10 MHz ≤ f <sub>in</sub> < 100 MHz	-3 dBm (nom.)
	100 MHz ≤ f <sub>in</sub> < 3.6 GHz	-2 dBm (nom.)
	3.6 GHz ≤ f <sub>in</sub> < 7 GHz	0 dBm (nom.)
	7 GHz ≤ f <sub>in</sub> ≤ 40 GHz	-10 dBm (nom.)
Second harmonic intercept (SHI)	RF attenuation 0 dB, level -10 dBm, RF preamplifier = off	
	100 MHz < f <sub>in</sub> ≤ 3.5 GHz	45 dBm (typ.)
	3.5 GHz < f <sub>in</sub> ≤ 20 GHz	
	standard	80 dBm (typ.)
	with R&S®FPS-B24 option	75 dBm (typ.)
	with R&S®FPS-B22 or R&S®FPS-B24 option, RF preamplifier = on, RF attenuation 0 dB, level -40 dBm	
100 MHz < f <sub>in</sub> ≤ 3.5 GHz	25 dBm (nom.)	
3.5 GHz < f <sub>in</sub> ≤ 20 GHz	10 dBm (nom.)	

<b>Displayed average noise level without preamplifier options, without R&amp;S®FPS-B11 YIG preselector bypass option</b>	
0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 5 Hz, VBW = 5 Hz, zero span, sweep time 500 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed	
10 Hz	< -90 dBm (nom.)
20 Hz	< -100 dBm, -110 dBm (typ.)
100 Hz	< -110 dBm, -120 dBm (typ.)
1 kHz	< -120 dBm, -130 dBm (typ.)
with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	
0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed	
<b>R&amp;S®FPS4, R&amp;S®FPS7</b>	
9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -152 dBm, -155 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -150 dBm, -153 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -148 dBm, -151 dBm (typ.)
6 GHz ≤ f ≤ 7 GHz	< -146 dBm, -149 dBm (typ.)
<b>R&amp;S®FPS13, R&amp;S®FPS30</b>	
9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -151 dBm, -154 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -149 dBm, -152 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -146 dBm, -149 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -144 dBm, -147 dBm (typ.)
7.4 GHz ≤ f < 15 GHz	< -148 dBm, -151 dBm (typ.)
15 GHz ≤ f ≤ 30 GHz	< -144 dBm, -147 dBm (typ.)
<b>R&amp;S®FPS40</b>	
9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -151 dBm, -154 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -149 dBm, -152 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -146 dBm, -149 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -144 dBm, -147 dBm (typ.)
7.4 GHz ≤ f < 15 GHz	< -145 dBm, -148 dBm (typ.)
15 GHz ≤ f < 34 GHz	< -142 dBm, -145 dBm (typ.)
34 GHz ≤ f ≤ 40 GHz	< -136 dBm, -139 dBm (typ.)
with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	



<b>Displayed average noise level without preamplifier options, with R&amp;S®FPS-B11 YIG preselector bypass option</b>	
	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 5 Hz, VBW = 5 Hz, zero span, sweep time 500 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed, YIG preselector = off
10 Hz	< -90 dBm (nom.)
20 Hz	< -100 dBm, -110 dBm (typ.)
100 Hz	< -110 dBm, -120 dBm (typ.)
1 kHz	< -120 dBm, -130 dBm (typ.)
with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	
	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed, YIG preselector = off
<b>R&amp;S®FPS30</b>	
9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -151 dBm, -154 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -149 dBm, -152 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -146 dBm, -149 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -144 dBm, -147 dBm (typ.)
7.4 GHz ≤ f < 15 GHz	< -147 dBm, -150 dBm (typ.)
15 GHz ≤ f ≤ 30 GHz	< -142 dBm, -145 dBm (typ.)
<b>R&amp;S®FPS40</b>	
9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -151 dBm, -154 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -149 dBm, -152 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -146 dBm, -149 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -144 dBm, -147 dBm (typ.)
7.4 GHz ≤ f < 15 GHz	< -144 dBm, -147 dBm (typ.)
15 GHz ≤ f < 34 GHz	< -140 dBm, -143 dBm (typ.)
34 GHz ≤ f ≤ 40 GHz	< -133 dBm, -136 dBm (typ.)
with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	
<b>Displayed average noise level with R&amp;S®FPS-B22 preamplifier option</b>	
RF preamplifier = off	without R&S®FPS-B11 YIG preselector bypass option, see section Displayed average noise level without preamplifier options, without R&S®FPS-B11 YIG preselector bypass option; with R&S®FPS-B11 YIG preselector bypass option, see section Displayed average noise level without preamplifier options, with R&S®FPS-B11 YIG preselector bypass option
RF preamplifier = on	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed, with or without R&S®FPS-B11 YIG preselector bypass option
<b>R&amp;S®FPS4, R&amp;S®FPS7</b>	
100 kHz ≤ f < 1 MHz	< -150 dBm, -155 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -162 dBm, -165 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -160 dBm, -163 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -158 dBm, -161 dBm (typ.)
6 GHz ≤ f ≤ 7 GHz	< -156 dBm, -159 dBm (typ.)
<b>R&amp;S®FPS13, R&amp;S®FPS30, R&amp;S®FPS40</b>	
100 kHz ≤ f < 1 MHz	< -145 dBm, -148 dBm (typ.)
1 MHz ≤ f < 20 MHz	< -155 dBm, -158 dBm (typ.)
20 MHz ≤ f < 1 GHz	< -161 dBm, -164 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -159 dBm, -162 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -156 dBm, -159 dBm (typ.)
6 GHz ≤ f ≤ 7 GHz	< -154 dBm, -157 dBm (typ.)
with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	

<b>Displayed average noise level with R&amp;S®FPS-B24 preamplifier option, without R&amp;S®FPS-B11 YIG preselector bypass option</b>																																															
RF preamplifier = off	<p>0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 5 Hz, VBW = 5 Hz, zero span, sweep time 500 ms, sample detector, trace average, sweep count = 20, mean marker, R&amp;S®FPS-B160 option not installed</p> <table border="1"> <tr><td>10 Hz</td><td>&lt; -90 dBm (nom.)</td></tr> <tr><td>20 Hz</td><td>&lt; -100 dBm, -110 dBm (typ.)</td></tr> <tr><td>100 Hz</td><td>&lt; -110 dBm, -120 dBm (typ.)</td></tr> <tr><td>1 kHz</td><td>&lt; -120 dBm, -130 dBm (typ.)</td></tr> </table> <p>with R&amp;S®FPS-B160 option installed, add 1.5 dB to the above specifications for f &gt; 7 GHz</p> <p>0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&amp;S®FPS-B160 option not installed</p> <p>R&amp;S®FPS13, R&amp;S®FPS30</p> <table border="1"> <tr><td>9 kHz ≤ f &lt; 100 kHz</td><td>&lt; -130 dBm, -140 dBm (typ.)</td></tr> <tr><td>100 kHz ≤ f &lt; 1 MHz</td><td>&lt; -145 dBm, -150 dBm (typ.)</td></tr> <tr><td>1 MHz ≤ f &lt; 1 GHz</td><td>&lt; -150 dBm, -153 dBm (typ.)</td></tr> <tr><td>1 GHz ≤ f &lt; 3.6 GHz</td><td>&lt; -147 dBm, -150 dBm (typ.)</td></tr> <tr><td>3.6 GHz ≤ f &lt; 6 GHz</td><td>&lt; -144 dBm, -147 dBm (typ.)</td></tr> <tr><td>6 GHz ≤ f &lt; 7.4 GHz</td><td>&lt; -141 dBm, -144 dBm (typ.)</td></tr> <tr><td>7.4 GHz ≤ f &lt; 13.6 GHz</td><td>&lt; -145 dBm, -148 dBm (typ.)</td></tr> <tr><td>13.6 GHz ≤ f &lt; 15 GHz</td><td>&lt; -143 dBm, -146 dBm (typ.)</td></tr> <tr><td>15 GHz ≤ f ≤ 30 GHz</td><td>&lt; -141 dBm, -144 dBm (typ.)</td></tr> </table> <p>R&amp;S®FPS40</p> <table border="1"> <tr><td>9 kHz ≤ f &lt; 100 kHz</td><td>&lt; -130 dBm, -140 dBm (typ.)</td></tr> <tr><td>100 kHz ≤ f &lt; 1 MHz</td><td>&lt; -145 dBm, -150 dBm (typ.)</td></tr> <tr><td>1 MHz ≤ f &lt; 1 GHz</td><td>&lt; -150 dBm, -153 dBm (typ.)</td></tr> <tr><td>1 GHz ≤ f &lt; 3.6 GHz</td><td>&lt; -147 dBm, -150 dBm (typ.)</td></tr> <tr><td>3.6 GHz ≤ f &lt; 6 GHz</td><td>&lt; -144 dBm, -147 dBm (typ.)</td></tr> <tr><td>6 GHz ≤ f &lt; 7.4 GHz</td><td>&lt; -141 dBm, -144 dBm (typ.)</td></tr> <tr><td>7.4 GHz ≤ f &lt; 13.6 GHz</td><td>&lt; -143 dBm, -146 dBm (typ.)</td></tr> <tr><td>13.6 GHz ≤ f &lt; 15 GHz</td><td>&lt; -141 dBm, -144 dBm (typ.)</td></tr> <tr><td>15 GHz ≤ f &lt; 34 GHz</td><td>&lt; -139 dBm, -142 dBm (typ.)</td></tr> <tr><td>34 GHz ≤ f ≤ 40 GHz</td><td>&lt; -132 dBm, -135 dBm (typ.)</td></tr> </table> <p>with R&amp;S®FPS-B160 option installed, add 1.5 dB to the above specifications for f &gt; 7 GHz</p>	10 Hz	< -90 dBm (nom.)	20 Hz	< -100 dBm, -110 dBm (typ.)	100 Hz	< -110 dBm, -120 dBm (typ.)	1 kHz	< -120 dBm, -130 dBm (typ.)	9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)	100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)	1 MHz ≤ f < 1 GHz	< -150 dBm, -153 dBm (typ.)	1 GHz ≤ f < 3.6 GHz	< -147 dBm, -150 dBm (typ.)	3.6 GHz ≤ f < 6 GHz	< -144 dBm, -147 dBm (typ.)	6 GHz ≤ f < 7.4 GHz	< -141 dBm, -144 dBm (typ.)	7.4 GHz ≤ f < 13.6 GHz	< -145 dBm, -148 dBm (typ.)	13.6 GHz ≤ f < 15 GHz	< -143 dBm, -146 dBm (typ.)	15 GHz ≤ f ≤ 30 GHz	< -141 dBm, -144 dBm (typ.)	9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)	100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)	1 MHz ≤ f < 1 GHz	< -150 dBm, -153 dBm (typ.)	1 GHz ≤ f < 3.6 GHz	< -147 dBm, -150 dBm (typ.)	3.6 GHz ≤ f < 6 GHz	< -144 dBm, -147 dBm (typ.)	6 GHz ≤ f < 7.4 GHz	< -141 dBm, -144 dBm (typ.)	7.4 GHz ≤ f < 13.6 GHz	< -143 dBm, -146 dBm (typ.)	13.6 GHz ≤ f < 15 GHz	< -141 dBm, -144 dBm (typ.)	15 GHz ≤ f < 34 GHz	< -139 dBm, -142 dBm (typ.)	34 GHz ≤ f ≤ 40 GHz	< -132 dBm, -135 dBm (typ.)
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15 GHz ≤ f < 34 GHz	< -139 dBm, -142 dBm (typ.)																																														
34 GHz ≤ f ≤ 40 GHz	< -132 dBm, -135 dBm (typ.)																																														
RF preamplifier = on	<p>0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&amp;S®FPS-B160 option not installed</p> <p>R&amp;S®FPS13, R&amp;S®FPS30, R&amp;S®FPS40</p> <table border="1"> <tr><td>100 kHz ≤ f &lt; 1 MHz</td><td>&lt; -145 dBm, -148 dBm (typ.)</td></tr> <tr><td>1 MHz ≤ f &lt; 20 MHz</td><td>&lt; -155 dBm, -158 dBm (typ.)</td></tr> <tr><td>20 MHz ≤ f &lt; 1 GHz</td><td>&lt; -160 dBm, -163 dBm (typ.)</td></tr> <tr><td>1 GHz ≤ f &lt; 3.6 GHz</td><td>&lt; -157 dBm, -160 dBm (typ.)</td></tr> <tr><td>3.6 GHz ≤ f &lt; 6 GHz</td><td>&lt; -153 dBm, -156 dBm (typ.)</td></tr> <tr><td>6 GHz ≤ f &lt; 7.4 GHz</td><td>&lt; -150 dBm, -153 dBm (typ.)</td></tr> <tr><td>7.4 GHz ≤ f &lt; 15 GHz</td><td>&lt; -164 dBm, -167 dBm (typ.)</td></tr> <tr><td>15 GHz ≤ f &lt; 34 GHz</td><td>&lt; -159 dBm, -162 dBm (typ.)</td></tr> <tr><td>34 GHz ≤ f ≤ 40 GHz</td><td>&lt; -154 dBm, -156 dBm (typ.)</td></tr> </table> <p>with R&amp;S®FPS-B160 option installed, add 1.5 dB to the above specifications for f &gt; 7 GHz</p>	100 kHz ≤ f < 1 MHz	< -145 dBm, -148 dBm (typ.)	1 MHz ≤ f < 20 MHz	< -155 dBm, -158 dBm (typ.)	20 MHz ≤ f < 1 GHz	< -160 dBm, -163 dBm (typ.)	1 GHz ≤ f < 3.6 GHz	< -157 dBm, -160 dBm (typ.)	3.6 GHz ≤ f < 6 GHz	< -153 dBm, -156 dBm (typ.)	6 GHz ≤ f < 7.4 GHz	< -150 dBm, -153 dBm (typ.)	7.4 GHz ≤ f < 15 GHz	< -164 dBm, -167 dBm (typ.)	15 GHz ≤ f < 34 GHz	< -159 dBm, -162 dBm (typ.)	34 GHz ≤ f ≤ 40 GHz	< -154 dBm, -156 dBm (typ.)																												
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7.4 GHz ≤ f < 15 GHz	< -164 dBm, -167 dBm (typ.)																																														
15 GHz ≤ f < 34 GHz	< -159 dBm, -162 dBm (typ.)																																														
34 GHz ≤ f ≤ 40 GHz	< -154 dBm, -156 dBm (typ.)																																														

<b>Displayed average noise level with R&amp;S®FPS-B24 preamplifier option, with R&amp;S®FPS-B11 YIG preselector bypass option</b>	
RF preamplifier = off	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 5 Hz, VBW = 5 Hz, zero span, sweep time 500 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed, YIG preselector = on or off
	10 Hz < -90 dBm (nom.)
	20 Hz < -100 dBm, -110 dBm (typ.)
	100 Hz < -110 dBm, -120 dBm (typ.)
	1 kHz < -120 dBm, -130 dBm (typ.)
	with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz
	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed, YIG preselector = on or off
	R&S®FPS30
	9 kHz ≤ f < 100 kHz < -130 dBm, -140 dBm (typ.)
	100 kHz ≤ f < 1 MHz < -145 dBm, -150 dBm (typ.)
	1 MHz ≤ f < 1 GHz < -150 dBm, -153 dBm (typ.)
	1 GHz ≤ f < 3.6 GHz < -147 dBm, -150 dBm (typ.)
	3.6 GHz ≤ f < 6 GHz < -144 dBm, -147 dBm (typ.)
	6 GHz ≤ f < 7.4 GHz < -141 dBm, -144 dBm (typ.)
	7.4 GHz ≤ f < 13.6 GHz < -144 dBm, -147 dBm (typ.)
	13.6 GHz ≤ f < 15 GHz < -142 dBm, -145 dBm (typ.)
	15 GHz ≤ f ≤ 30 GHz < -139 dBm, -142 dBm (typ.)
	R&S®FPS40
	9 kHz ≤ f < 100 kHz < -130 dBm, -140 dBm (typ.)
	100 kHz ≤ f < 1 MHz < -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz < -150 dBm, -153 dBm (typ.)	
1 GHz ≤ f < 3.6 GHz < -147 dBm, -150 dBm (typ.)	
3.6 GHz ≤ f < 6 GHz < -144 dBm, -147 dBm (typ.)	
6 GHz ≤ f < 7.4 GHz < -141 dBm, -144 dBm (typ.)	
7.4 GHz ≤ f < 13.6 GHz < -142 dBm, -145 dBm (typ.)	
13.6 GHz ≤ f < 15 GHz < -140 dBm, -143 dBm (typ.)	
15 GHz ≤ f < 34 GHz < -137 dBm, -140 dBm (typ.)	
34 GHz ≤ f ≤ 40 GHz < -129 dBm, -132 dBm (typ.)	
with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	
RF preamplifier = on	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed, YIG preselector = on
	R&S®FPS30, R&S®FPS40
	100 kHz ≤ f < 1 MHz < -145 dBm, -148 dBm (typ.)
	1 MHz ≤ f < 20 MHz < -155 dBm, -158 dBm (typ.)
	20 MHz ≤ f < 1 GHz < -160 dBm, -163 dBm (typ.)
	1 GHz ≤ f < 3.6 GHz < -157 dBm, -160 dBm (typ.)
	3.6 GHz ≤ f < 6 GHz < -153 dBm, -156 dBm (typ.)
	6 GHz ≤ f < 7.4 GHz < -150 dBm, -153 dBm (typ.)
	7.4 GHz ≤ f < 15 GHz < -164 dBm, -167 dBm (typ.)
	15 GHz ≤ f < 34 GHz < -159 dBm, -162 dBm (typ.)
	34 GHz ≤ f ≤ 40 GHz < -153 dBm, -155 dBm (typ.)
	with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz

RF preamplifier = on	0 dB RF attenuation, termination 50 $\Omega$ , log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FPS-B160 option not installed, YIG preselector = off	
	R&S®FPS30, R&S®FPS40	
	100 kHz $\leq f < 1$ MHz	< -145 dBm, -148 dBm (typ.)
	1 MHz $\leq f < 20$ MHz	< -155 dBm, -158 dBm (typ.)
	20 MHz $\leq f < 1$ GHz	< -160 dBm, -163 dBm (typ.)
	1 GHz $\leq f < 3.6$ GHz	< -157 dBm, -160 dBm (typ.)
	3.6 GHz $\leq f < 6$ GHz	< -153 dBm, -156 dBm (typ.)
	6 GHz $\leq f < 7$ GHz	< -150 dBm, -153 dBm (typ.)
	7 GHz $\leq f < 7.4$ GHz	< -146 dBm, -149 dBm (typ.)
	7.4 GHz $\leq f < 15$ GHz	< -160 dBm, -163 dBm (typ.)
	15 GHz $\leq f < 34$ GHz	< -155 dBm, -158 dBm (typ.)
	34 GHz $\leq f \leq 40$ GHz	< -148 dBm, -150 dBm (typ.)
	with R&S®FPS-B160 option installed, add 1.5 dB to the above specifications for $f > 7$ GHz	
<b>Spurious responses</b> <sup>3</sup>		
Image response	20 MHz $\leq f \leq 7$ GHz	
	$f_{in} - 2 \times 8409.9$ MHz (1st IF)	< -80 dBc (typ.)
	$f_{in} - 2 \times 729.9$ MHz (2nd IF)	< -80 dBc
	$f_{in} - 2 \times 89.9$ MHz (3rd IF)	< -80 dBc
	7 GHz $< f \leq 30$ GHz	
	$f_{in} \pm 2 \times 729.9$ MHz (1st IF)	< -80 dBc
	$f_{in} - 2 \times 89.9$ MHz (2nd IF)	< -80 dBc
	30 GHz $< f \leq 40$ GHz	
	$f_{in} \pm 2 \times 729.9$ MHz (1st IF)	< -70 dBc
	$f_{in} - 2 \times 89.9$ MHz (2nd IF)	< -80 dBc
Intermediate frequency response	20 MHz $\leq f \leq 7$ GHz	
	1st IF (8409.9 MHz)	< -70 dBc (typ.)
	2nd IF (729.9 MHz)	< -80 dBc
	3rd IF (89.9 MHz)	< -80 dBc
	7 GHz $< f \leq 40$ GHz	
	1st IF (729.9 MHz)	< -80 dBc
	2nd IF (89.9 MHz)	< -80 dBc
Residual spurious response	0 dB RF attenuation	
	$f \leq 1$ MHz	< -90 dBm
	$f > 1$ MHz	< -103 dBm
Local oscillator related spurious	$f < 15$ GHz	
	1 kHz $\leq$ carrier offset $\leq 10$ MHz	< -70 dBc
	carrier offset $> 10$ MHz	< -80 dBc
	15 GHz $\leq f < 30$ GHz	
	1 kHz $\leq$ carrier offset $\leq 10$ MHz	< -64 dBc
	carrier offset $> 10$ MHz	< -74 dBc
	30 GHz $\leq f \leq 40$ GHz	
	1 kHz $\leq$ carrier offset $\leq 10$ MHz	< -58 dBc
	carrier offset $> 10$ MHz	< -68 dBc
Other interfering signals		
Subharmonic of 1st LO	20 MHz $\leq f < 7$ GHz, spurious at 8410 MHz $- 2 \times f_{in}$	< -70 dBc
Harmonic of 1st LO	mixer level $< -25$ dBm, spurious at $f_{in} - 4205$ MHz	< -70 dBc

<sup>3</sup> YIG preselector = on for frequencies  $> 7$  GHz.

<b>Level display</b>		
Logarithmic level axis		1 dB to 200 dB, in steps of 1/2/5
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
Setting range of reference level		-130 dBm to (-10 dBm + RF attenuation - RF preamplifier gain), in steps of 0.01 dB
Units of level axis	logarithmic level display	dBm, dB $\mu$ V, dBmV, dB $\mu$ A, dBpW
	linear level display	$\mu$ V, mV, $\mu$ A, mA, pW, nW
<b>Level measurement uncertainty</b>		
Absolute level uncertainty at 64 MHz	RBW = 10 kHz, level -10 dBm, reference level -10 dBm, RF attenuation 10 dB	
	+20 °C to +30 °C	< 0.2 dB ( $\sigma$ = 0.07 dB)
	0 °C to +50 °C	< 0.35 dB ( $\sigma$ = 0.12 dB) (nom.)
Frequency response referenced to 64 MHz	DC coupling, RF attenuation 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier = off, +20 °C to +30 °C	
	9 kHz $\leq$ f < 10 MHz	< 0.5 dB ( $\sigma$ = 0.17 dB)
	10 MHz $\leq$ f < 3.6 GHz	< 0.3 dB ( $\sigma$ = 0.1 dB)
	3.6 GHz $\leq$ f < 7 GHz	< 0.5 dB ( $\sigma$ = 0.17 dB)
	7 GHz $\leq$ f < 13.6 GHz, span < 1 GHz	< 1.5 dB ( $\sigma$ = 0.5 dB)
	13.6 GHz $\leq$ f < 30 GHz, span < 1 GHz	< 2 dB ( $\sigma$ = 0.66 dB)
	30 GHz $\leq$ f $\leq$ 40 GHz, span < 1 GHz	< 2.5 dB ( $\sigma$ = 0.83 dB)
	any setting of RF attenuation, RF preamplifier = off, +5 °C to +40 °C	
	9 kHz $\leq$ f < 3.6 GHz	< 1 dB ( $\sigma$ = 0.33 dB)
	3.6 GHz $\leq$ f < 7 GHz	< 1.5 dB ( $\sigma$ = 0.5 dB)
	7 GHz $\leq$ f < 13.6 GHz	< 2.5 dB ( $\sigma$ = 0.83 dB)
	13.6 GHz $\leq$ f < 30 GHz	< 3 dB ( $\sigma$ = 1 dB)
	30 GHz $\leq$ f $\leq$ 40 GHz	< 3.5 dB ( $\sigma$ = 1.33 dB)
	any setting of RF attenuation, RF preamplifier = on, +5 °C to +40 °C	
	9 kHz $\leq$ f < 3.6 GHz	< 1 dB ( $\sigma$ = 0.33 dB)
	3.6 GHz $\leq$ f < 7 GHz	< 1.5 dB ( $\sigma$ = 0.5 dB)
	7 GHz $\leq$ f < 13.6 GHz	< 3 dB ( $\sigma$ = 1 dB)
	13.6 GHz $\leq$ f < 30 GHz	< 3.5 dB ( $\sigma$ = 1.17 dB)
	30 GHz $\leq$ f $\leq$ 40 GHz	< 4 dB ( $\sigma$ = 1.33 dB)
	DC coupling, RF preamplifier = off, 5 °C to +40 °C	
10 Hz $\leq$ f < 20 Hz	< 1.5 dB (nom.)	
20 Hz $\leq$ f < 9 kHz	< 1 dB ( $\sigma$ = 0.33 dB)	
Attenuator switching uncertainty	f = 64 MHz, 0 dB to 70 dB, referenced to 10 dB attenuation	< 0.2 dB ( $\sigma$ = 0.07 dB)
Uncertainty of reference level setting		0 dB <sup>4</sup> (nom.)
Bandwidth switching uncertainty	referenced to RBW = 10 kHz	
	sweep filters	< 0.1 dB ( $\sigma$ = 0.04 dB)
	FFT filters	< 0.2 dB ( $\sigma$ = 0.07 dB)
<b>Nonlinearity of displayed level</b>		
Logarithmic level display	+5 °C to +40 °C, S/N > 16 dB	
	0 dB to -70 dB	< 0.1 dB ( $\sigma$ = 0.04 dB)
Linear level display	S/N > 16 dB, 0 dB to -70 dB	5 % of reference level

<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.

Total measurement uncertainty		
	signal level 0 dB to -70 dB below reference level, S/N > 20 dB, sweep time auto, sweep type = sweep, RF attenuation 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier = off, YIG preselector = on, span/RBW < 100, 95 % confidence level, +20 °C to +30 °C	
	9 kHz ≤ f < 10 MHz	0.39 dB
	10 MHz ≤ f < 3.6 GHz	0.28 dB
	3.6 GHz ≤ f < 7 GHz	0.39 dB
	7 GHz ≤ f < 13.6 GHz	1 dB
	13.6 GHz ≤ f < 30 GHz	1.32 dB
	30 GHz ≤ f ≤ 40 GHz	1.65 dB

## Trigger functions

Trigger		
Trigger source		free run, video, external, IF power
	signal analysis bandwidth > 40 MHz	free run, external
Trigger offset	span ≥ 10 Hz	31.25 ns to 30 s, min. resolution 31.25 ns (or 1 % of offset)
	span = 0 Hz	(-sweep time) to 30 s, min. resolution 31.25 ns (or 1 % of offset)
Max. deviation of trigger offset		±(7.8125 ns + (0.1 % × trigger offset))
IF power trigger		
Sensitivity	min. signal power	-60 dBm + RF attenuation – RF preamplifier gain
	max. signal power	-10 dBm + RF attenuation – RF preamplifier gain
IF power trigger bandwidth	RBW > 500 kHz, swept	40 MHz (nom.)
	RBW > 20 kHz, FFT	
	RBW ≤ 500 kHz, swept	6 MHz (nom.)
	RBW ≤ 20 kHz, FFT	

Gated sweep		
Gate source		video, external, IF power
Gate delay		31.25 ns to 30 s, min. resolution 31.25 ns (or 1 % of delay)
Gate length		31.25 ns to 30 s, min. resolution 31.25 ns (or 1 % of gate length)
Max. deviation of gate length		±(7.8125 ns + (0.1 % × gate length))

## Measurement speed <sup>5</sup>

Power amplifier measurements, performed using R&S®FPS-K18 option, remote control via LAN		
Power servo loop + ACLR measurement	requires R&S®SGT100A	2.7 ms (meas.)
Power servo loop + ACLR measurement + Harmonic measurement	requires R&S®SGT100A , carrier frequency 3.8 GHz, time to measure carrier frequency, 2 <sup>nd</sup> harmonic (7.6 GHz) and 3 <sup>rd</sup> harmonic (11.4 GHz)	13.7 ms (meas.)

<sup>5</sup> Measured with PC equipped with Intel® Core™ i7 CPU 2.8 GHz and Gbit LAN interface.

## I/Q data

Interface		GPIB or LAN interface
Memory length		max. 200 Msample I and Q
Word length of I/Q samples	sampling rate > 64 MHz or number of samples > 100 Msample otherwise	18 bit 24 bit
Sampling rate	all models with R&S®FPS-B40 option with R&S®FPS-B160 option	100 Hz to 45 MHz 100 Hz to 128 MHz 100 Hz to 400 MHz
Max. signal analysis bandwidth (equalized)	$f \leq 7$ GHz all models with R&S®FPS-B40 option with R&S®FPS-B160 option $f > 7$ GHz, with R&S®FPS-B11 installed, YIG preselector = off all models with R&S®FPS-B40 option with R&S®FPS-B160 option	28 MHz 40 MHz 160 MHz 28 MHz 40 MHz 160 MHz
IF power trigger bandwidth	$f \leq 7$ GHz all models with R&S®FPS-B160 option set analysis bandwidth $\leq 40$ MHz set analysis bandwidth $> 40$ MHz $f > 7$ GHz, with R&S®FPS-B11 installed, YIG preselector = off all models with R&S®FPS-B160 option set analysis bandwidth $\leq 40$ MHz set analysis bandwidth $> 40$ MHz	40 MHz 40 MHz 160 MHz 40 MHz 40 MHz 160 MHz

**Signal analysis bandwidth  $\leq 40$  MHz<sup>6</sup>,  $f \leq 7$  GHz**

Amplitude flatness		$\pm 0.3$ dB (nom.)
Deviation from linear phase		$\pm 1^\circ$ (nom.)
Nonlinearity of displayed level		see section Nonlinearity of displayed level
Level measurement uncertainty	at center frequency	see section Total measurement uncertainty
Displayed average noise level	at center frequency	see section Displayed average noise level
ADC related third-order intermodulation distortion	$f \geq 100$ MHz two $-30$ dBm tones at input mixer within analysis bandwidth	$-80$ dBc (nom.)
Residual spurious response	RF attenuation 0 dB, $f \geq 100$ MHz	$-90$ dBm (nom.)
Other spurious responses		see section Spurious responses

**Signal analysis bandwidth  $\leq 40$  MHz<sup>6</sup>,  $f > 7$  GHz, R&S®FPS-B11 option installed, YIG preselector = off**

Amplitude flatness	RF attenuation $\geq 10$ dB, RF preamplifier = off $7 \text{ GHz} \leq f < 13 \text{ GHz}$ $13 \text{ GHz} \leq f < 30 \text{ GHz}$ $30 \text{ GHz} \leq f \leq 40 \text{ GHz}$	$\pm 0.85$ (nom.) <sup>7</sup> $\pm 0.85$ (nom.) <sup>7</sup> $\pm 0.85$ (nom.) <sup>7</sup>
Deviation from linear phase	RF attenuation $\geq 10$ dB, RF preamplifier = off $7 \text{ GHz} \leq f < 13 \text{ GHz}$ $13 \text{ GHz} \leq f < 30 \text{ GHz}$ $30 \text{ GHz} \leq f \leq 40 \text{ GHz}$	$\pm 2^\circ$ (nom.) <sup>8</sup> $\pm 2^\circ$ (nom.) <sup>8</sup> $\pm 2^\circ$ (nom.) <sup>8</sup>
Nonlinearity of displayed level		see section Nonlinearity of displayed level
Level measurement uncertainty	at center frequency	see section Total measurement uncertainty
Displayed average noise level	at center frequency	see section Displayed average noise level
ADC related third-order intermodulation distortion	$f \geq 7$ GHz two $-30$ dBm tones at input mixer within analysis bandwidth	$-80$ dBc (nom.)
Residual spurious response	RF attenuation 0 dB, $f \geq 7$ GHz	$-90$ dBm (nom.)
Other spurious responses		see section Spurious responses

<sup>6</sup> Requires R&S®FPS-B40 or R&S®FPS-B160 option.<sup>7</sup> With R&S®FPS-B24 option installed, add 0.2 dB to the specifications.<sup>8</sup> With R&S®FPS-B24 option installed, add 1° to the specifications.

<b>Signal analysis bandwidth 40 MHz to 160 MHz<sup>9</sup>, <math>f \leq 7</math> GHz</b>		
The specifications in this section apply to a maximum frequency of 7 GHz.		
Amplitude flatness	RF attenuation $\geq 10$ dB, RF preamplifier = off	
	100 MHz $\leq f < 4$ GHz	$\pm 0.7$ dB (nom.) <sup>10</sup>
	4 GHz $\leq f < 6$ GHz	$\pm 1.0$ dB (nom.) <sup>10</sup>
	6 GHz $\leq f \leq 7$ GHz	$\pm 1.5$ dB (nom.) <sup>10</sup>
Deviation from linear phase	RF attenuation $\geq 10$ dB, RF preamplifier = off	
	100 MHz $\leq f < 4$ GHz	$\pm 2^\circ$ (nom.) <sup>11</sup>
	4 GHz $\leq f < 6$ GHz	$\pm 2.5^\circ$ (nom.) <sup>11</sup>
	6 GHz $\leq f \leq 7$ GHz	$\pm 3^\circ$ (nom.) <sup>11</sup>
Nonlinearity of displayed level	0 dB to $-70$ dB	$< 0.15$ dB (nom.)
Level measurement uncertainty	at center frequency	add 0.2 dB (nom.) to the values in section Total measurement uncertainty
Displayed average noise level	at center frequency	add 5 dB (nom.) to the values in section Displayed average noise level
ADC related third-order intermodulation distortion	$f \geq 100$ MHz two $-30$ dBm tones at input mixer within analysis bandwidth	$-65$ dBc (nom.)
Residual spurious response	RF attenuation 0 dB, $f \geq 100$ MHz	$-90$ dBm (nom.)
Image response	$f \geq 100$ MHz	$-65$ dBc (nom.)
ADC related spurious response	$f \geq 100$ MHz mixer level = $-20$ dBm reference level = signal level single tone within analysis bandwidth	$-65$ dBc (nom.)
Other spurious responses		see section Spurious responses

<b>Signal analysis bandwidth 40 MHz to 160 MHz<sup>9</sup>, <math>f &gt; 7</math> GHz, R&amp;S®FPS-B11 option installed, YIG preselector = off</b>		
The specifications in this section apply to frequencies above 7 GHz and YIG preselector off.		
Amplitude flatness	RF attenuation $\geq 10$ dB, RF preamplifier = off	
	7 GHz $\leq f < 13$ GHz	$\pm 1.5$ dB (nom.) <sup>10</sup>
	13 GHz $\leq f < 30$ GHz	$\pm 1.5$ dB (nom.) <sup>10</sup>
	30 GHz $\leq f \leq 40$ GHz	$\pm 1.5$ dB (nom.) <sup>10</sup>
Deviation from linear phase	RF attenuation $\geq 10$ dB, RF preamplifier = off	
	7 GHz $\leq f < 13$ GHz	$\pm 3^\circ$ (nom.) <sup>11</sup>
	13 GHz $\leq f < 30$ GHz	$\pm 3^\circ$ (nom.) <sup>11</sup>
	30 GHz $\leq f \leq 40$ GHz	$\pm 3^\circ$ (nom.) <sup>11</sup>
Nonlinearity of displayed level	0 dB to $-70$ dB	$< 0.15$ dB (nom.)
Level measurement uncertainty	at center frequency	add 0.2 dB (nom.) to the values in section Total measurement uncertainty
Displayed average noise level	at center frequency	add 5 dB (nom.) to the values in section Displayed average noise level
ADC related third-order intermodulation distortion	two $-30$ dBm tones at input mixer within analysis bandwidth	$-65$ dBc (nom.)
Residual spurious response	RF attenuation 0 dB, $f \geq 7$ GHz	$-90$ dBm (nom.)
Image response		$-65$ dBc (nom.)
ADC related spurious response	mixer level = $-20$ dBm reference level = signal level single tone within analysis bandwidth	$-65$ dBc (nom.)
Other spurious responses		see section Spurious responses

<sup>9</sup> Requires R&S®FPS-B160 option.

<sup>10</sup> With R&S®FPS-B24 option installed, add 0.2 dB to the specifications.

<sup>11</sup> With R&S®FPS-B24 option installed, add 1° to the specifications.



## Inputs and outputs

<b>RF input</b>		
Impedance		50 $\Omega$
Connector	R&S®FPS4, R&S®FPS7, R&S®FPS13	N female
	R&S®FPS30	APC 3.5 mm male (compatible with SMA)
	R&S®FPS40	2.92 mm male (compatible with SMA)
VSWR	RF attenuation $\geq 10$ dB	
	10 MHz $\leq f < 3.6$ GHz	< 1.5, 1.3 (typ.)
	3.6 GHz $\leq f < 20$ GHz	< 2, 1.8 (typ.)
	20 GHz $\leq f < 27$ GHz	< 2.2, 2 (typ.)
	27 GHz $\leq f < 30$ GHz	
	DC-coupled	< 2.2, 2 (typ.)
	AC-coupled	2.5 (typ.)
	30 GHz $\leq f \leq 40$ GHz	
	DC-coupled	< 2.5, 2.2 (typ.)
	AC-coupled	3 (typ.)
	RF attenuation < 10 dB, DC-coupled	
	10 MHz $\leq f < 7$ GHz	2 (meas.)
7 GHz $\leq f < 30$ GHz	2.5 (typ.)	
30 GHz $\leq f \leq 40$ GHz	3 (typ.)	
Setting range of attenuator	standard	0 dB to 75 dB, in 5 dB steps
	with R&S®FPS-B25 option	0 dB to 75 dB, in 1 dB steps
Setting range of electronic attenuator	with R&S®FPS-B25 option, $f \leq 7$ GHz	0 dB to 25 dB, in 1 dB steps
	with R&S®FPS-B25 option, $f > 7$ GHz	0 dB to 9 dB, in 1 dB steps
	with R&S®FPS-B22 option	20 dB (nom.)
RF preamplifier gain	with R&S®FPS-B24 option	
	$f \leq 7$ GHz	20 dB (nom.)
	$f > 7$ GHz	30 dB (nom.)

### Noise source control (R&S®FPS-B28V option)

Connector		BNC female
Output voltage		0 V/28 V, max. 100 mA, switchable (nom.)

### USB interface

	front	3 ports, type A plug, version 2.0
	rear	4 ports, type A plug, version 2.0
		1 port, type B plug, version 2.0

### Reference output

Connector		BNC female
Impedance		50 $\Omega$ (nom.)
Output frequency	internal reference	10 MHz
	external reference	same as reference input signal
Level		> 0 dBm (nom.)

### Reference input

Connector		BNC female
Impedance		50 $\Omega$ (nom.)
Input frequency range		1 MHz $\leq f_{in} \leq 20$ MHz, in 100 kHz steps
Required level		> 0 dBm into 50 $\Omega$ (nom.)

### External trigger/gate input

Connector		BNC female
Trigger voltage		0.5 V to 3.5 V (nom.)
Input impedance		10 k $\Omega$ (nom.)

### External Trigger2 (switchable trigger input/ trigger output)

Connector		BNC female
<b>Trigger input</b>		
Trigger voltage		0.5 V to 3.3 V (nom.), min. 0 V, max. 5 V
Input impedance		10 k $\Omega$ (nom.)
<b>Trigger output</b>		
Trigger voltage	waiting for trigger/triggered state	TTL-compatible, 0 V/3.3 V (nom.)

<b>IF/video output</b>		
Connector		BNC female
<b>IF out</b>		
Impedance		50 $\Omega$ (nom.)
Bandwidth		equal to RBW setting
IF frequency		32 MHz (nom.)
Output level (gain versus RF input)	RF attenuation 0 dB, RF preamplifier off, span 0 Hz	0 dB (nom.)
<b>Video out</b>		
Impedance		50 $\Omega$ (nom.)
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	1 V (nom.) open circuit
<b>IEC/IEEE bus control</b>		
Command set		interface in line with IEC 625-2 (IEEE 488.2)
Connector		SCPI 1997.0
Interface functions		24-pin Amphenol female SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0
<b>LAN interface</b>		
Connector		10/100/1000BASE-T RJ-45
<b>External monitor</b>		
Connector		DisplayPort DVI (digital outputs only)
<b>External generator control</b>		
Interface		LAN
Supported signal generators		R&S®SGS100A, R&S®SGT100A, R&S®SMA100A, R&S®SMB100A, R&S®SMBV100A, R&S®SMC100A, R&S®SMF100A, R&S®SMJ100A, R&S®SMU200A, R&S®SMW200A

## General data

<b>Data storage</b>		
Internal		solid state module $\geq$ 30 Gbyte (nom.) removable
External		supports USB-2.0-compatible memory devices
<b>Environmental conditions</b>		
Temperature	operating temperature range	+5 °C to +40 °C
	permissible temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+40 °C at 90 % rel. humidity, in line with EN 60068-2-30
<b>Mechanical resistance</b>		
Vibration	sinusoidal	5 Hz to 55 Hz, 0.15 mm constant amplitude (1.8 g at 55 Hz), in line with EN 60068-2-6
		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
<b>EMC</b>		
		in line with EMC Directive 2004/108/EC including:
		IEC/EN 61326-1 <sup>12, 13</sup>
		IEC/EN 61326-2-1
		CISPR 11/EN 55011 <sup>12</sup>
		IEC/EN 61000-3-2
		IEC/EN 61000-3-3
<b>Recommended calibration interval</b>		
		2 years <sup>14</sup>
<b>Power supply</b>		
AC supply		100 V to 240 V, max. 3.5 A 50 Hz to 60 Hz/400 Hz, class of protection I in line with VDE 411
Power consumption	R&S®FPS4, R&S®FPS7	125 W (nom.), max.160 W with all options (meas.)
	R&S®FPS13, R&S®FPS30, R&S®FPS40	165 W (nom.), max.210 W with all options (meas.)
Safety		in line with EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1
Test mark		VDE, GS, CSA, CSA-NRTL
<b>Dimensions and weight</b>		
Dimensions (nom.)	W x H x D	461 mm x 107 mm x 551 mm (18.15 in x 4.21 in x 21.69 in)
Net weight without options (nom.)	R&S®FPS4, R&S®FPS7	10.1 kg (22.27 lb)
	R&S®FPS13	10.9 kg (24.03 lb)
	R&S®FPS30	11.3 kg (24.92 lb)
	R&S®FPS40	11.7 kg (25.80 lb)

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

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

<sup>14</sup> 2 years apply to instruments with serial numbers starting from:

R&S®FPS4: 100817, R&S®FPS7: 101191, R&S®FPS13: 101426, R&S®FPS30: 100961, R&S®FPS40: 100928.

To extend earlier instruments to a recommended calibration interval of 2 years please contact a Rohde & Schwarz service center.

## Ordering information

Designation	Type	Order No.
Signal and Spectrum Analyzer, 10 Hz to 4 GHz	R&S®FPS4	1319.2008.04
Signal and Spectrum Analyzer, 10 Hz to 7 GHz	R&S®FPS7	1319.2008.07
Signal and Spectrum Analyzer, 10 Hz to 13.6 GHz	R&S®FPS13	1319.2008.13
Signal and Spectrum Analyzer, 10 Hz to 30 GHz	R&S®FPS30	1319.2008.30
Signal and Spectrum Analyzer, 10 Hz to 40 GHz	R&S®FPS40	1319.2008.40
<b>Accessories supplied</b>		
Power cable, quick start guide		
R&S®FPS30: adapter 3.5 mm (APC3.5-compatible) female/female, R&S®FPS40: adapter 2.92 mm female/female		

## Options

Designation	Type	Order No.	Retrofittable	Remarks
<b>Hardware</b>				
Rear RF Input	R&S®FPS-B0	1321.4310.02	no	for R&S®FPS4 and R&S®FPS7
OCXO Reference Frequency	R&S®FPS-B4	1321.4291.02	yes	retrofit in service center
External Generator Control	R&S®FPS-B10	1321.4256.02	yes	pre-installed in factory
Spare Solid-State-Drive	R&S®FPS-B18	1321.4304.02	yes	
YIG Preselector Bypass	R&S®FPS-B11	1326.5467.30	no	for R&S®FPS30
YIG Preselector Bypass	R&S®FPS-B11	1326.5467.40	no	for R&S®FPS40
RF Preamplifier, 9 kHz to 7 GHz	R&S®FPS-B22	1321.4027.02	yes	user-retrofittable
Electronic Attenuator, 1 dB steps	R&S®FPS-B25	1321.4033.02	yes	user-retrofittable
RF Preamplifier, 9 kHz to 13.6 GHz	R&S®FPS-B24	1321.4279.13	no	
RF Preamplifier, 9 kHz to 30 GHz	R&S®FPS-B24	1321.4279.30	no	
RF Preamplifier, 9 kHz to 40 GHz	R&S®FPS-B24	1321.4279.40	no	
Noise Source Control 0/28 V	R&S®FPS-B28V	1326.5996.02	no	
40 MHz Analysis Bandwidth	R&S®FPS-B40	1321.4040.02	yes	user-retrofittable, for frequencies $\leq 7$ GHz
160 MHz Analysis Bandwidth	R&S®FPS-B160	1321.4285.02	yes	for R&S®FPS4 and R&S®FPS7 retrofit in service center
160 MHz Analysis Bandwidth	R&S®FPS-B160	1321.4285.13	no	for R&S®FPS13 for frequencies $\leq 7$ GHz
160 MHz Analysis Bandwidth	R&S®FPS-B160	1321.4285.40	no	for R&S®FPS30 and R&S®FPS40; for $f > 7$ GHz: R&S®FPS-B11 option required

Designation	Type	Order No.	Retrofittable	Remarks
<b>Firmware/software</b>				
Pulse Measurements	R&S®FPS-K6	1331.3169.02		
Analog Modulation Analysis for AM, FM, φM	R&S®FPS-K7	1321.4079.02		
Noise Figure Measurements	R&S®FPS-K30	1321.4104.02		
Phase Noise Measurements	R&S®FPS-K40	1321.4110.02		
Security Write Protection of solid state drive	R&S®FPS-K33	1326.6092.02		
GSM/EDGE/EDGE Evolution/ VAMOS Measurements	R&S®FPS-K10	1321.4091.02		
Power Amplifier Measurements	R&S®FPS-K18	1321.4662.02		
Direct DPD Measurements	R&S®FPS-K18D	1321.4956.02		
Vector Signal Analysis	R&S®FPS-K70	1321.4127.02		
3GPP FDD (WCDMA) BS Measurements (incl. HSDPA and HSDPA+)	R&S®FPS-K72	1321.4133.02		
3GPP FDD (WCDMA) MS Measurements (incl. HSUPA and HSUPA+)	R&S®FPS-K73	1321.4140.02		
TD-SCDMA BS Measurements	R&S®FPS-K76	1321.4379.02		
TD-SCDMA UE Measurements	R&S®FPS-K77	1321.4385.02		
CDMA2000® BS Measurements	R&S®FPS-K82	1321.4156.02		
CDMA2000® MS Measurements	R&S®FPS-K83	1321.4162.02		
1xEV-DO BS Measurements	R&S®FPS-K84	1321.4179.02		
1xEV-DO MS Measurements	R&S®FPS-K85	1321.4185.02		
WLAN 802.11a/b/g Measurements	R&S®FPS-K91	1321.4191.02		
WLAN 802.11n Measurements	R&S®FPS-K91n	1321.4204.02		requires R&S®FPS-K91 and R&S®FPS-B40 or R&S®FPS-B160
WLAN 802.11p Measurements	R&S®FPS-K91p	1321.4391.02		requires R&S®FPS-K91
WLAN 802.11ac Measurements	R&S®FPS-K91ac	1321.4210.02		requires R&S®FPS-K91 and R&S®FPS-B160
EUTRA/LTE FDD Downlink Measurements	R&S®FPS-K100	1321.4227.02		
EUTRA/LTE FDD Uplink Measurements	R&S®FPS-K101	1321.4340.02		
EUTRA/LTE Downlink MIMO Measurements	R&S®FPS-K102	1321.4333.02		requires R&S®FPS-K100 or R&S®FPS-K104
EUTRA/LTE TDD Downlink Measurements	R&S®FPS-K104	1321.4233.02		
EUTRA/LTE TDD Uplink Measurements	R&S®FPS-K105	1321.4362.02		
EUTRA/LTE NB-IoT Downlink Measurements	R&S®FPS-K106	1331.3246.02		
VERIZON 5GTF	R&S®FPS-K118	1321.4962.02		requires R&S®FPS-B160

## Recommended extras

Designation	Type	Order No.
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
19" Rack Adapter	R&S®ZZA-KN2	1175.3010.00
19" Rack Adapter, pre-installed ex-factory	R&S®FPS-B478	1321.4262.02
<b>Matching pads, 50/75 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>SWR bridges, 50 Ω</b>		
SWR Bridge, 5 MHz to 3 GHz	R&S®ZRB2	0373.9017.5x
SWR Bridge, 40 kHz to 4 GHz	R&S®ZRC	1039.9492.5x
<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>Connectors and cables</b>		
N-type Adapter for R&S®RT-Zx oscilloscope probes	R&S®RT-ZA9	1417.0909.02
Probe Power Connector, 3-pin		1065.9480.00
LVDS Cable, for connecting digital baseband interfaces	R&S®SMU-Z6	1415.0201.02
<b>DC blocks</b>		
DC Block, 10 kHz to 18 GHz (type N)	R&S®FSE-Z4	1084.7443.02

## Power sensors supported <sup>15</sup>

Designation	Type	Order No.
<b>Universal power sensors</b>		
10 MHz to 8 GHz, 100 mW, two-path	R&S®NRP-Z211	1417.0409.02
10 MHz to 8 GHz, 200 mW	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	R&S®NRP-Z21	1137.6000.02
10 MHz to 18 GHz, 2 W	R&S®NRP-Z22	1137.7506.02
10 MHz to 18 GHz, 15 W	R&S®NRP-Z23	1137.8002.02
10 MHz to 18 GHz, 30 W	R&S®NRP-Z24	1137.8502.02
<b>Power sensor modules with power splitter</b>		
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
<b>Thermal power sensors</b>		
0 Hz to 18 GHz, 100 mW	R&S®NRP-Z51	1138.0005.02
0 Hz to 40 GHz, 100 mW	R&S®NRP-Z55	1138.2008.02
0 Hz to 50 GHz, 100 mW	R&S®NRP-Z56	1171.8201.02
0 Hz to 67 GHz, 100 mW	R&S®NRP-Z57	1171.8401.02
0 Hz to 110 GHz, 100 mW	R&S®NRP-Z58	1173.7031.02
<b>Average power sensor</b>		
9 kHz to 6 GHz, 200 mW	R&S®NRP-Z91	1168.8004.02
9 kHz to 6 GHz, 2 W	R&S®NRP-Z92	1171.7005.02
<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
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
<b>Wideband Power Sensor</b>		
50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02

## Power sensor USB adapter cable <sup>16</sup>

Designation	Type	Order No.
USB Adapter Cable (active), length: 2 m	R&S®NRP-Z3	1146.7005.02
USB Adapter Cable (passive), length: 2 m	R&S®NRP-Z4	1146.8001.02
USB Adapter Cable (passive), length: 0.5 m	R&S®NRP-Z4	1146.8001.04
USB Adapter Cable (passive), length: 0.15 m	R&S®NRP-Z4	1146.8001.06

<sup>15</sup> For average power measurement only.

<sup>16</sup> Required for connecting the power sensor to the R&S®FPS USB connector.

## Service options

Service 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 to four years (WE1 to WE2)

Repairs carried out during the contract term are free of charge <sup>17</sup>. 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 to 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>17</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

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<sup>17</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

## Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. 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**

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

## Rohde & Schwarz training

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

## Regional contact

- | Europe, Africa, Middle East | +49 89 4129 12345  
[customersupport@rohde-schwarz.com](mailto:customersupport@rohde-schwarz.com)
- | North America | 1 888 TEST RSA (1 888 837 87 72)  
[customer.support@rsa.rohde-schwarz.com](mailto:customer.support@rsa.rohde-schwarz.com)
- | Latin America | +1 410 910 79 88  
[customersupport.la@rohde-schwarz.com](mailto:customersupport.la@rohde-schwarz.com)
- | Asia Pacific | +65 65 13 04 88  
[customersupport.asia@rohde-schwarz.com](mailto:customersupport.asia@rohde-schwarz.com)
- | China | +86 800 810 82 28 | +86 400 650 58 96  
[customersupport.china@rohde-schwarz.com](mailto:customersupport.china@rohde-schwarz.com)

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R&S®FPS Signal and Spectrum Analyzer

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