R&S®ZNL
VECTOR NETWORK ANALYZER

Specifications

Data Sheet
Version 08.00

ROHDE&SCHWARZ
Make ideas real

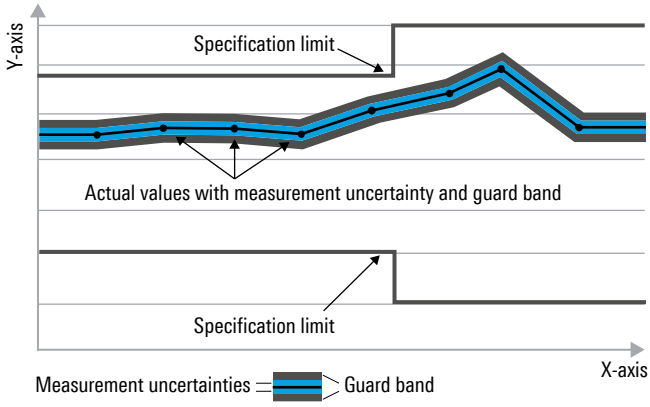
CONTENTS

Definitions

General
Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits
Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as <, ≤, >, ≥, ±, or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



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

Measurement range

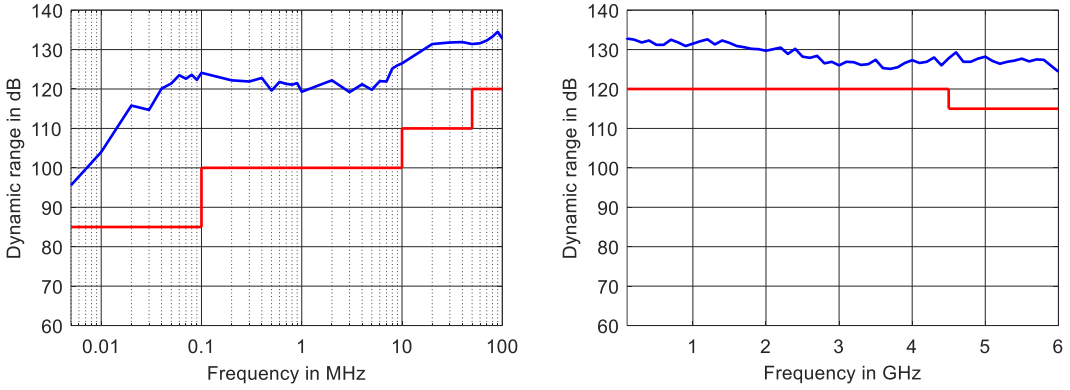
Impedance		50 Ω
Test port connector	R&S®ZNL3, R&S®ZNL4, R&S®ZNL6 and R&S®ZNL14	N, female
	R&S®ZNL20	3.5 mm, male
Number of test ports		2
Frequency range [1]	R&S®ZNL3	5 kHz to 3 GHz
	R&S®ZNL4	5 kHz to 4.5 GHz
	R&S®ZNL6	5 kHz to 6 GHz
	R&S®ZNL14	5 kHz to 14 GHz
	R&S®ZNL20	5 kHz to 20 GHz

Static frequency accuracy		(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year	standard	$\pm 1 \times 10^{-6}$
	with R&S®FPL-B4 precision frequency reference option	$\pm 1 \times 10^{-7}$
Temperature drift (+5 °C to +40 °C)	standard	$\pm 1 \times 10^{-6}$
	with R&S®FPL-B4 precision frequency reference option	$\pm 1 \times 10^{-8}$
Achievable initial calibration accuracy	standard	$\pm 5 \times 10^{-7}$
	with R&S®FPL-B4 precision frequency reference option	$\pm 5 \times 10^{-8}$

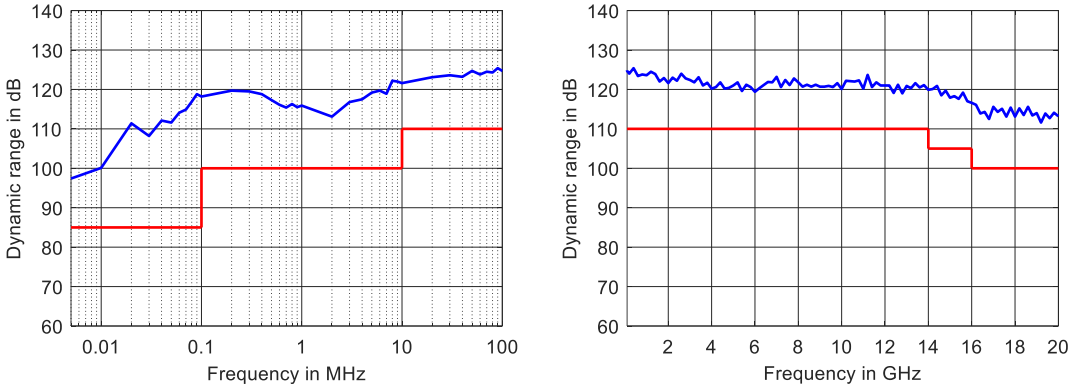
Frequency resolution		1 Hz
Number of measurement points	per trace	1 to 100 001
Measurement bandwidth	1/1.5/2/3/5/7 sequence	1 Hz to 500 kHz

[1] Specified and typical data given in this data sheet applies to the R&S®ZNL3, R&S®ZNL4, R&S®ZNL6, R&S®ZNL14 and R&S®ZNL20; note their respective frequency ranges.

Dynamic range [2]		Specification	Typical
	R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6		
	5 kHz to 100 kHz	> 85 dB	110 dB
	100 kHz to 10 MHz	> 100 dB	120 dB
	10 MHz to 50 MHz	> 110 dB	120 dB
	50 MHz to 4.5 GHz	> 120 dB	130 dB
	4.5 GHz to 6 GHz	> 115 dB	125 dB
	R&S®ZNL14 and R&S®ZNL20		
	5 kHz to 100 kHz	> 85 dB	110 dB
	100 kHz to 10 MHz	> 100 dB	120 dB
	10 MHz to 14 GHz	> 110 dB	120 dB
	14 GHz to 16 GHz	> 105 dB	120 dB
	16 GHz to 20 GHz	> 100 dB	117 dB



Measured dynamic range in dB versus frequency for the R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6



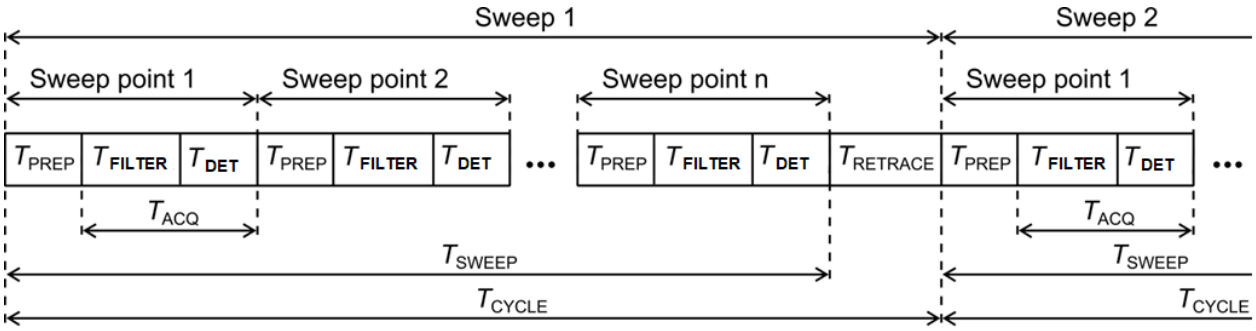
Measured dynamic range in dB versus frequency for the R&S®ZNL14 and R&S®ZNL20

[2] The dynamic range is defined as the difference between 0 dBm source power and the RMS value of the data trace of the transmission magnitude, which is produced by noise and crosstalk with the test ports short-circuited. The specification applies at 10 Hz measurement bandwidth, without system error correction. The dynamic range can be increased by using a measurement bandwidth of 1 Hz.

Measurement speed

Measurement time	sweep type: CW, center frequency: 1 GHz, measurement: S_{11}, bandwidth: selectivity normal, number of points: 201	
Time per sweep (T_{SWEEP})	bandwidth: 500 kHz	920 µs
	bandwidth: 100 kHz	2.65 ms
Sweep cycle time (T_{CYCLE})	bandwidth: 500 kHz	1.6 ms (meas.)
	bandwidth: 100 kHz	3.6 ms (meas.)
Preparation time per sweep point (T_{PREP})		0.6 µs [3]
Acquisition time per point (T_{ACQ})	bandwidth: 500 kHz	4.0 µs
	bandwidth: 100 kHz	12.7 µs
Total time per point (T_{POINT})	bandwidth: 500 kHz	4.6 µs
	bandwidth: 100 kHz	13.2 µs

Data transfer time	sweep type: CW, center frequency: 1 GHz, measurement: S_{11}, bandwidth: 500 kHz selectivity normal			
		IEC/IEEE	VXI11	HiSLIP
			over 1 Gbit/s LAN	
Time for measurement and data transfer (magnitude, REAL32) [4], includes all necessary remote commands	for 201 measurements points	10 ms (meas.)	8 ms (meas.)	8 ms (meas.)
	for 5001 measurements points	46 ms (meas.)	31 ms (meas.)	31 ms (meas.)
Data transfer time (magnitude, REAL32), includes all necessary remote commands	for 201 measurements points	4 ms (meas.)	2.5 ms (meas.)	2.5 ms (meas.)
	for 5001 measurements points	18 ms (meas.)	3.5 ms (meas.)	3.5 ms (meas.)



Measurement sequence

T_{PREP} Preparation time required to set up the internal hardware components
T_{FILTER} Filter settling time (settling time of the digital filters)
T_{DET} Detector time (additional time for averaging of detector sample, normally 0)
T_{ACQ} Data acquisition time ($T_{ACQ} = T_{FILTER} + T_{DET}$)
T_{POINT} Total time for one sweep point
T_{SWEEP} Time required for one sweep
$T_{RETRACE}$ Time between two sweeps
T_{CYCLE} Sweep cycle time ($T_{CYCLE} = T_{SWEEP} + T_{RETRACE}$)

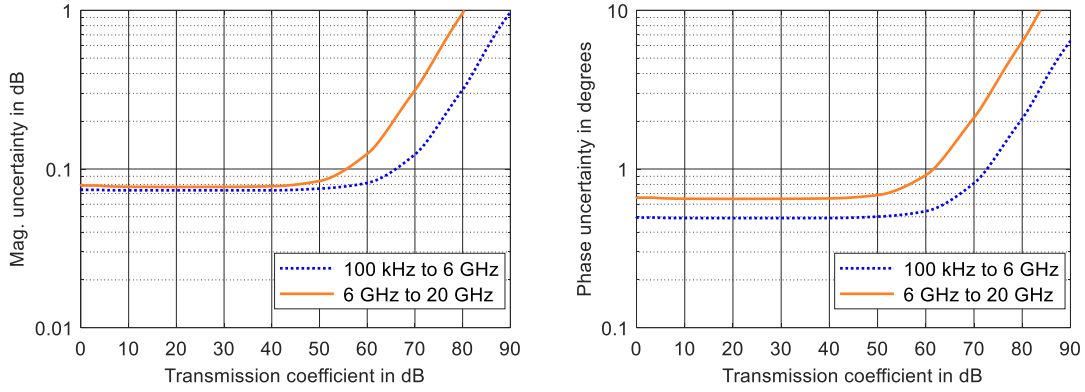
[3] Only sweep type “CW”. When sweep type “Lin Freq” or “Log Freq” preparation time increases.
[4] In continuous mode, no additional time for data transfer is needed, as data transfer takes place simultaneously with the measurement.

Nominal sweep times in ms versus number of measurements					
Number of measurement points	**51**	**201**	**401**	**1601**	**5001**
R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6					
800 MHz start frequency, 1 GHz stop frequency, 100 kHz measurement bandwidth					
With correction switched off	2.4	4.9	8.7	31.2	94
With 2-port TOSM calibration	3.9	9.6	16.7	61.7	189
800 MHz start frequency, 1 GHz stop frequency, 1 kHz measurement bandwidth					
With correction switched off	66	258	515	2055	6400
With 2-port TOSM calibration	132	515	1028	4100	12780
100 MHz start frequency, 3 GHz stop frequency, 100 kHz measurement bandwidth					
With correction switched off	3.9	9.1	14.5	36.7	102
With 2-port TOSM calibration	7.3	17.7	28.8	73.3	206
100 MHz start frequency, 3 GHz stop frequency, 1 kHz measurement bandwidth					
With correction switched off	68	262	519	2055	6390
With 2-port TOSM calibration	136	524	1040	4110	12800
100 MHz start frequency, 6 GHz stop frequency, 100 kHz measurement bandwidth					
With correction switched off	3.9	9.5	15.4	47	104
With 2-port TOSM calibration	7.3	18.8	30.5	95	209
100 MHz start frequency, 6 GHz stop frequency, 1 kHz measurement bandwidth					
With correction switched off	68	263	521	2070	6400
With 2-port TOSM calibration	136	525	1042	4120	12800
R&S®ZNL14 and R&S®ZNL20					
9 GHz start frequency, 10 GHz stop frequency, 100 kHz measurement bandwidth					
With correction switched off	5.3	11.8	18.8	59	174
With 2-port TOSM calibration	9.9	22.7	36.5	117	347
9 GHz start frequency, 10 GHz stop frequency, 1 kHz measurement bandwidth					
With correction switched off	69.4	265	524	2077	6491
With 2-port TOSM calibration	138	529	1047	4159	13524
100 MHz start frequency, 14 GHz stop frequency, 100 kHz measurement bandwidth					
With correction switched off	12.7	31.1	52.4	140	287
With 2-port TOSM calibration	24.7	61.4	104	281	577
100 MHz start frequency, 14 GHz stop frequency, 1 kHz measurement bandwidth					
With correction switched off	76.9	284	558	2160	6614
With 2-port TOSM calibration	153	568	1115	4326	13800
100 MHz start frequency, 20 GHz stop frequency, 100 kHz measurement bandwidth					
With correction switched off	12.7	31.4	51.4	134	294
With 2-port TOSM calibration	24.8	62.2	102	269	589
100 MHz start frequency, 20 GHz stop frequency, 1 kHz measurement bandwidth					
With correction switched off	76.9	285	556	2154	6622
With 2-port TOSM calibration	153	569	1113	4314	13819

Measurement accuracy

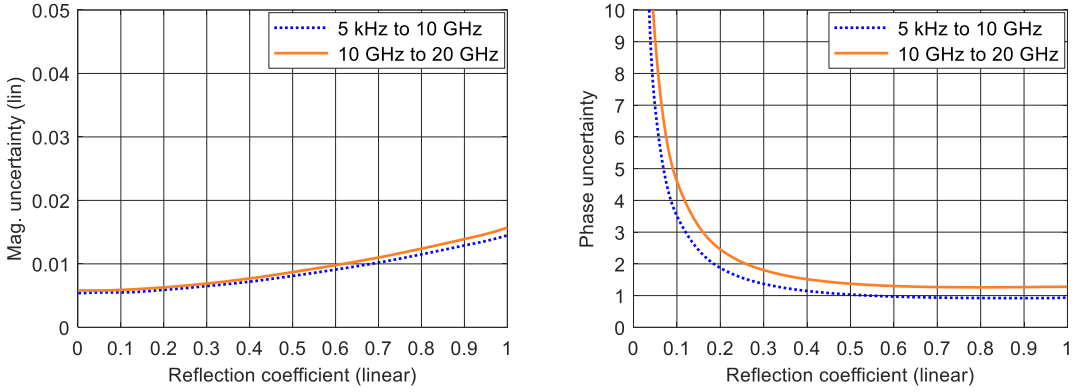
This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C since calibration. Validity of the data is conditional on the use of an R&S®ZV-Z270 or R&S®ZN-Z235 calibration kit, depending on port connector. Calibration method is TOSM/SOLT. This calibration kit is used to achieve the effective system data specified below. Frequency points, measurement bandwidth and sweep time have to be identical for measurement and calibration (no interpolation allowed).

Uncertainty of transmission measurements		**Magnitude**	**Phase**
100 kHz to 6 GHz	0 dB to –20 dB	0.08 dB	0.5°
	–20 dB to –30 dB	0.08 dB	0.5°
	–30 dB to –40 dB	0.08 dB	0.5°
	–40 dB to –50 dB	0.09 dB	0.6°
	–50 dB to –60 dB	0.19 dB	1.2°
6 GHz to 20 GHz	0 dB to –20 dB	0.08 dB	0.7°
	–20 dB to –30 dB	0.08 dB	0.7°
	–30 dB to –40 dB	0.09 dB	0.7°
	–40 dB to –50 dB	0.12 dB	0.9°
	–50 dB to –60 dB	0.31 dB	2.1°
Specifications are based on a matched DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.			



Measured uncertainty of transmission magnitude and transmission phase measurements for the R&S®ZNL [1]; analysis conditions: S_{11} = S_{22} = 0, calibrated power –10 dBm, measured power –10 dBm

Uncertainty of reflection measurements	Logarithmic			Linear	
	Reflection level	Magnitude	Phase	Reflection range	Magnitude
5 kHz to 10 GHz	0 dB	0.14 dB	0.9°	0 dB to –3 dB	0.016
	–3 dB	0.14 dB	0.9°	–3 dB to –6 dB	0.011
	–6 dB	0.15 dB	1.0°	–6 dB to –15 dB	0.009
	–15 dB	0.31 dB	1.9°	–15 dB to –25 dB	0.006
	–25 dB	0.89 dB	6.9°	–25 dB to –35 dB	0.006
	–35 dB	2.53 dB	34.3°	–35 dB	0.006
10 GHz to 20 GHz	0 dB	0.18 dB	1.3°	0 dB to –3 dB	0.021
	–3 dB	0.18 dB	1.3°	–3 dB to –6 dB	0.015
	–6 dB	0.20 dB	1.4°	–6 dB to –15 dB	0.012
	–15 dB	0.41 dB	2.5°	–15 dB to –25 dB	0.009
	–25 dB	1.14 dB	9.0°	–25 dB to –35 dB	0.008
	–35 dB	3.19 dB	45.0°	–35 dB	0.008
Specifications are based on an isolating DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.					



Measured uncertainty of reflection magnitude and reflection phase measurements for the R&S® ZNL [1]; analysis conditions: $S_{12} = S_{21} = 0$, calibrated power –10 dBm, measured power –10 dBm

Effective system data

This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C since calibration. Validity of the data is conditional on the use of a calibration kit R&S®ZV-Z270 or R&S®ZN-Z235, depending on port connector. Calibration method is TOSM/SOLT. This calibration kit is used to achieve the effective system data specified below. Frequency points, measurement bandwidth and sweep time have to be identical for measurement and calibration (no interpolation allowed). The data is based on a source power of –10 dBm and a measurement bandwidth of 10 Hz.

	5 kHz to 10 GHz	**10 GHz to 20 GHz**
Directivity	≥ 46 dB	≥ 42 dB
Source match	≥ 40 dB	≥ 37 dB
Load match	≥ 42 dB	≥ 38 dB
Reflection tracking	≤ 0.07 dB	≤ 0.09 dB
Transmission tracking	≤ 0.06 dB	≤ 0.06 dB

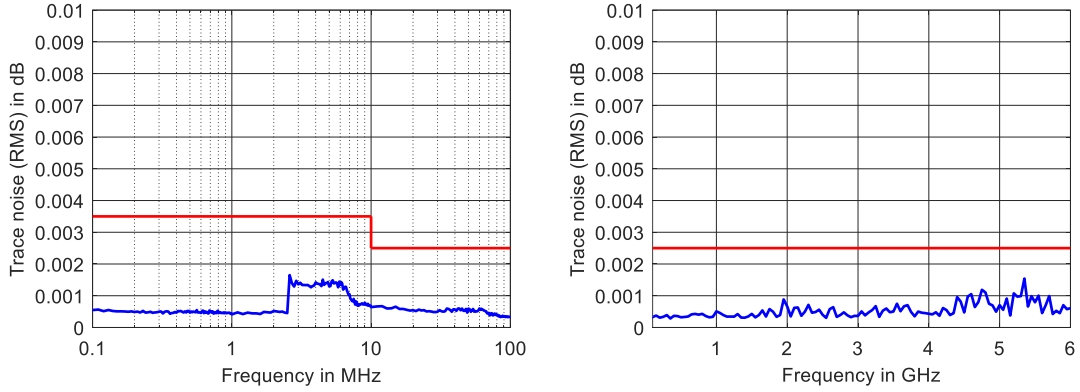
Factory-calibrated system data

This data is valid between +18 °C and +28 °C. It is based on a source power of –10 dBm and a measurement bandwidth of 1 kHz.

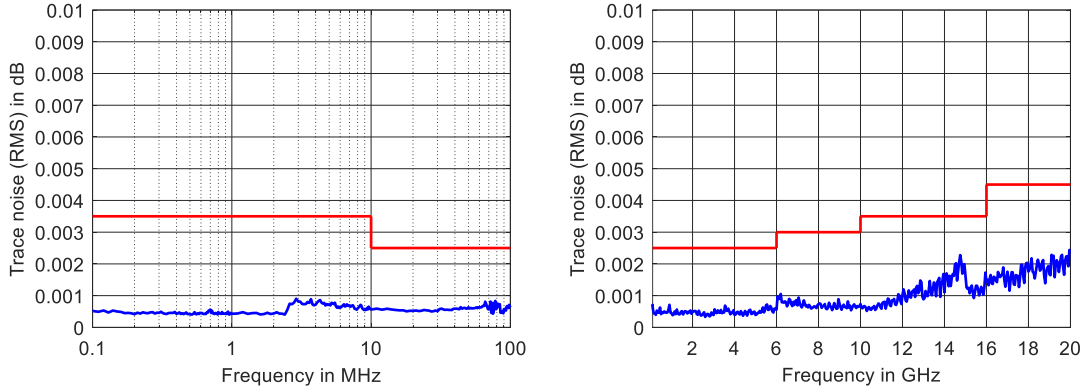
		Specification	**Typical**
Directivity	100 kHz to 20 GHz	≥ 20 dB	35 dB
Source match	100 kHz to 20 GHz	≥ 20 dB	35 dB
Reflection tracking	100 kHz to 6 GHz	≤ 1 dB	0.1 dB
	6 GHz to 20 GHz	≤ 1.5 dB	0.1 dB
Transmission tracking	100 kHz to 3 GHz	≤ 1 dB	0.1 dB
	3 GHz to 20 GHz	≤ 1.5 dB	0.2 dB
Load match (raw test port match)	R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6		
	100 kHz to 3 GHz	≥ 14 dB	20 dB
	3 GHz to 6 GHz	≥ 12 dB	16 dB
	R&S®ZNL14 and R&S®ZNL20		
	100 kHz to 1 GHz	≥ 17 dB	24 dB
	1 GHz to 3 GHz	≥ 13 dB	20 dB
	3 GHz to 10 GHz	≥ 10 dB	16 dB
	10 GHz to 20 GHz	≥ 7 dB	15 dB

Trace stability

		Specification	Typical
Trace noise magnitude (RMS) [5]	source power: 0 dBm, reflection: 0 dB, bandwidth: 10 kHz		
	100 kHz to 10 MHz	< 0.0035 dB	0.0005 dB
	10 MHz to 6 GHz	< 0.0025 dB	0.0005 dB
	6 GHz to 10 GHz	< 0.0030 dB	0.0010 dB
	10 GHz to 16 GHz	< 0.0035 dB	0.0015 dB
	16 GHz to 20 GHz	< 0.0045 dB	0.0025 dB
Trace noise phase (RMS) [5]	source power: 0 dBm, reflection: 0 dB, bandwidth: 10 kHz		
	100 kHz to 10 MHz	< 0.05°	0.005°
	10 MHz to 10 GHz	< 0.03°	0.005°
	10 GHz to 16 GHz	< 0.035°	0.01°
	16 GHz to 20 GHz	< 0.045°	0.02°



Measured trace noise (RMS) in dB versus frequency of the R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6



Measured trace noise (RMS) in dB versus frequency of the R&S®ZNL14 and R&S®ZNL20

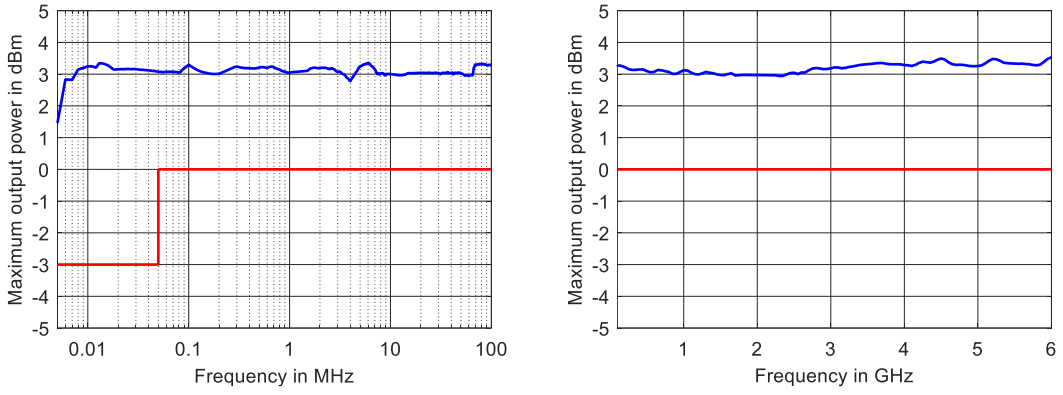
		Magnitude	Phase
Measured temperature stability	source power: –10 dBm, 0 dB transmission or reflection		
	R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6		
	5 kHz to 6 GHz	0.03 dB/K	0.8°/K
	R&S®ZNL14 and R&S®ZNL20		
	5 kHz to 100 kHz	0.024 dB/K	0.24°/K
	100 kHz to 10 GHz	0.016 dB/K	0.15°/GHz/K
	10 GHz to 20 GHz	0.024 dB/K	0.15°/GHz/K

[5] The RMS value describes trace noise, which is produced by noise.

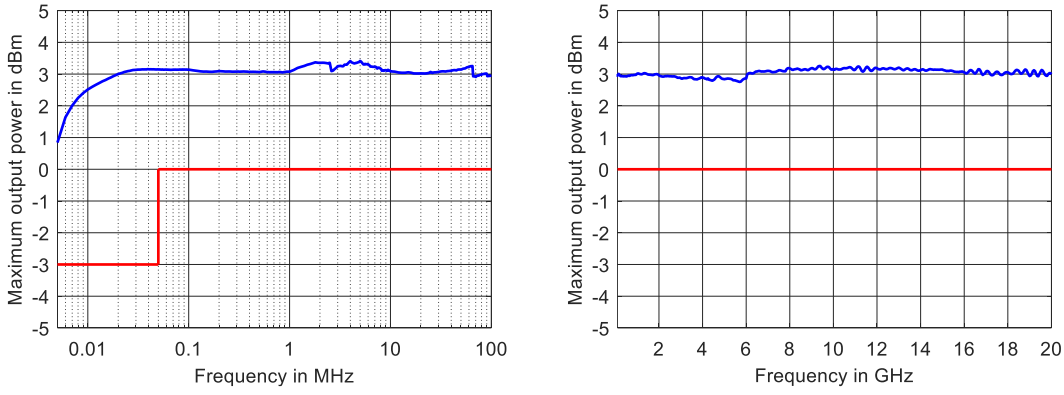
Test port output

This data is valid from +18 °C to +28 °C.

		Specification	Typical
Power range	without R&S®ZNL-B22 extended power range option [1]		
	5 kHz to 50 kHz	–10 dBm to –3 dBm	up to +3 dBm
	50 kHz to 20 GHz	–10 dBm to 0 dBm	up to +3 dBm
	with R&S®ZNL-B22 extended power range option [1]		
	5 kHz to 50 kHz	–40 dBm to –3 dBm	up to +3 dBm
	50 kHz to 20 GHz	–40 dBm to 0 dBm	up to +3 dBm
Power accuracy	source power: –10 dBm		
	5 kHz to 50 kHz	≤ 3 dB	
	50 kHz to 20 GHz	≤ 2 dB	0.5 dB
Power linearity	referenced to –10 dBm		
	100 kHz to 6 GHz	≤ 1 dB	
	6 GHz to 20 GHz	≤ 1.5 dB	
Power resolution		0.01 dB	
Second harmonics	source power: –10 dBm		
	R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6		
	100 kHz to 6 GHz	≤ –25 dBc	–40 dBc
	R&S®ZNL14		
	10 MHz to 9 GHz	≤ –20 dBc	–35 dBc
	R&S®ZNL20		
	10 MHz to 13 GHz	≤ –20 dBc	–35 dBc
Third harmonics	source power: –10 dBm		
	R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6		
	100 kHz to 6 GHz	≤ –25 dBc	–40 dBc
	R&S®ZNL14		
	10 MHz to 6 GHz	≤ –25 dBc	–40 dBc
	R&S®ZNL20		
	10 MHz to 8.5 GHz	≤ –25 dBc	–40 dBc



Measured maximum output power in dBm versus frequency for the R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6



Measured maximum output power in dBm versus frequency for the R&S®ZNL14 and R&S®ZNL20

Test port input

		Specification	Typical
Maximum nominal input level		0 dBm	
Power measurement accuracy	at –10 dBm without power calibration		
	9 kHz to 100 kHz	≤ 2 dB	0.3 dB
	100 kHz to 20 GHz	≤ 1.5 dB	0.3 dB
Receiver linearity	referenced to –10 dBm		
	+10 dB to +5 dB	≤ 0.25 dB	0.1 dB
	+5 dB to –40 dB	≤ 0.15 dB	0.05 dB
Damage level		+27 dBm	
Damage DC voltage		30 V	
Noise level [6]	measurement bandwidth: 1 kHz, normalized to 1 Hz		
	R&S®ZNL3, R&S®ZNL4 and R&S®ZNL6		
	5 kHz to 100 kHz	< –95 dBm (1 Hz)	–120 dBm (1 Hz)
	100 kHz to 50 MHz	< –120 dBm (1 Hz)	–130 dBm (1 Hz)
	50 MHz to 4.5 GHz	< –130 dBm (1 Hz)	–140 dBm (1 Hz)
	4.5 GHz to 6 GHz	< –125 dBm (1 Hz)	–135 dBm (1 Hz)
	R&S®ZNL14 and R&S®ZNL20		
	5 kHz to 100 kHz	< –95 dBm (1 Hz)	–120 dBm (1 Hz)
	100 kHz to 50 MHz	< –120 dBm (1 Hz)	–135 dBm (1 Hz)
	50 MHz to 6 GHz	< –125 dBm (1 Hz)	–135 dBm (1 Hz)
	6 GHz to 16 GHz	< –120 dBm (1 Hz)	–132 dBm (1 Hz)
	16 GHz to 20 GHz	< –115 dBm (1 Hz)	–125 dBm (1 Hz)

[6] The noise level is defined as the RMS value of the specified noise floor.

Display

Screen	26.4 cm (10.1") diagonal WXGA color LCD with touchscreen
Resolution	1280 × 800 × 262144 (high color, 125 dpi)
Pixel failure rate	$< 1 \times 10^{-5}$

Front panel connectors

USB	two universal serial bus connectors, for connecting USB devices (USB 2.0); two additional USB 3.0 connectors on rear panel

Rear panel connectors

LAN	local area network connector, 10/100/1000BASE-T, 8-pin, RJ-45

USB	two universal serial bus connectors, for connecting USB devices (USB 3.0); two additional USB 2.0 connectors on front panel

MONITOR	DVI-D connector (for external monitor)

REF IN	input for external frequency reference signal	
Connector type		BNC, female
Input frequency		10 MHz
Maximum permissible deviation		1 kHz
Input power		–10 dBm to +15 dBm at 50 Ω
Input impedance		> 10 kΩ

REF OUT	output for external frequency reference signal	
Connector type		BNC, female
Output frequency		10 MHz
Output frequency accuracy		80 Hz
Output power		+6 dBm ± 4 dB at 50 Ω

EXT TRIG IN	trigger input for analyzer	
Connector type		BNC, female
TTL signal (edge-triggered or level-triggered)		3 V, 5 V tolerant
Polarity (selectable)		positive or negative
Minimum pulse width		1 µs
Input impedance		> 10 kΩ

Options

R&S®ZNL3-B1, R&S®ZNL4-B1, R&S®ZNL6-B1, R&S®ZNL14-B1 and R&S®ZNL20-B1 spectrum analysis

Input

RF input		
Impedance		50 Ω
Connector		see section: Measurement range, test port connector
VSWR	10 MHz ≤ f ≤ 3 GHz	< 1.5 (nom.)
	3 GHz < f ≤ 6 GHz	< 1.7 (nom.)
	6 GHz < f ≤ 20 GHz	< 2.0 (nom.)
	20 GHz < f ≤ 26.5 GHz	< 2.5 (nom.)
Setting range of attenuator		0 dB to 30 dB, in 10 dB steps

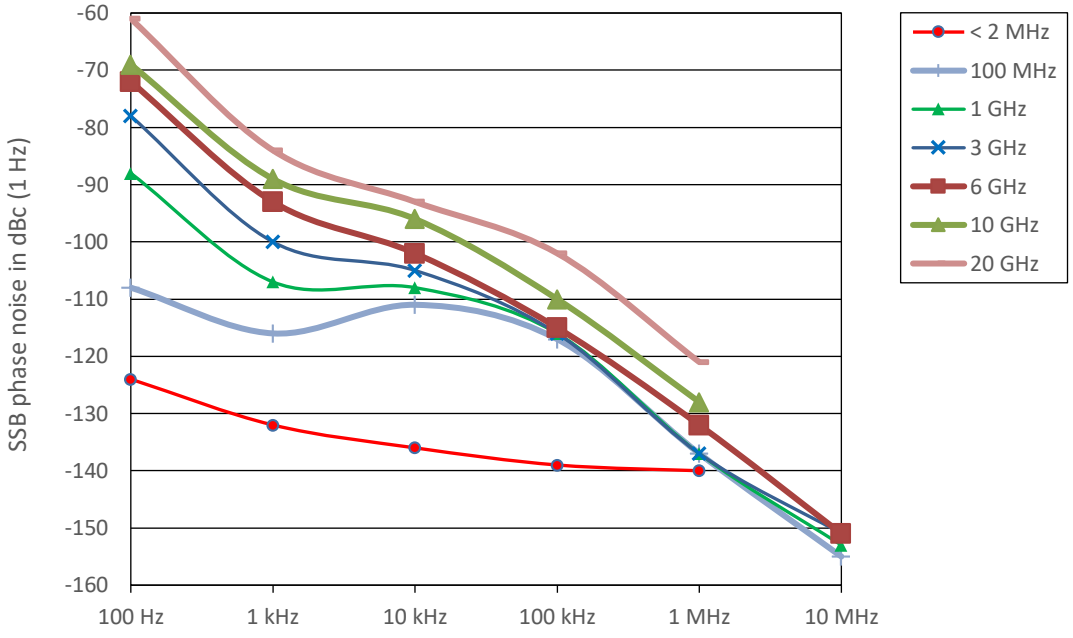
Frequency

Frequency range	R&S®ZNL3-B1	5 kHz to 3 GHz
	R&S®ZNL4-B1	5 kHz to 4.5 GHz
	R&S®ZNL6-B1	5 kHz to 6 GHz
	R&S®ZNL14-B1	5 kHz to 14 GHz
	R&S®ZNL20-B1	5 kHz to 26.5 GHz
Frequency resolution		0.01 Hz

Reference frequency, internal		see section: Measurement range

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

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



Measured SSB phase noise at different center frequencies

Sweep time

Range	span = 0 Hz	1 µs to 8000 s
	span ≥ 10 Hz, RBW ≥ 100 kHz	1 ms to 8000 s [7]
	span ≥ 10 Hz, RBW < 100 kHz	75 µs to 8000 s [8]
Sweep time accuracy	span = 0 Hz	0.1 % (nom.)
	span ≥ 10 Hz, RBW ≥ 100 kHz	3 % (nom.)

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

[8] Time for data acquisition for FFT calculation.

Resolution bandwidths

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

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

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

Signal analysis bandwidth (equalized)	standard	10 MHz (nom.)
	f < 6 GHz with R&S®FPL1-B40 option	40 MHz (nom.)
	f ≥ 6 GHz with R&S®FPL1-B40 and R&S®FPL1-B11 options, YIG preselector: off	40 MHz (nom.)

Level

Display range		displayed noise floor up to +30 dBm

Intermodulation		
Third order intercept point (TOI)	RF attenuation: 0 dB, level: 2 × –20 dBm, Δf > 5 × RBW or 10 kHz, whichever is larger	
	10 MHz ≤ f_{in} < 300 MHz	> 13 dBm, 20 dBm (typ.)
	300 MHz ≤ f_{in} < 3 GHz	> 16 dBm, 22 dBm (typ.)
	3 GHz ≤ f_{in} < 6 GHz	> 13 dBm, 18 dBm (typ.)
	6 GHz ≤ f_{in} < 20 GHz	> 11 dBm, 17 dBm (typ.)
	20 GHz ≤ f_{in} < 26.5 GHz	11 dBm (nom.)
Second harmonic intercept (SHI)	RF attenuation: 0 dB, level: –13 dBm	
	1 MHz < f_{in} ≤ 900 MHz	45 dBm (nom.)
	900 MHz < f_{in} ≤ 13.25 GHz	70 dBm (nom.)

Displayed average noise level (DANL)	termination: 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, sample detector, +18 °C to +28 °C	
RF attenuation 0 dB	5 kHz ≤ f < 100 kHz	–130 dBm (typ.)
	100 kHz ≤ f < 5 MHz	< –135 dBm, –145 dBm (typ.)
	5 MHz ≤ f < 4.5 GHz	< –140 dBm, –150 dBm (typ.)
	4.5 GHz ≤ f < 6 GHz	< –137 dBm, –147 dBm (typ.)
	6 GHz ≤ f ≤ 14 GHz	< –135 dBm, –143 dBm (typ.)
	14 GHz < f < 20 GHz	< –124 dBm, –133 dBm (typ.)
	20 GHz ≤ f ≤ 26.5 GHz	< –112 dBm, –120 dBm (typ.)

Spurious responses	RF attenuation: 0 dB, mixer level ≤ –13 dBm, sweep optimization: auto or dynamic	
Image response	10 MHz ≤ f ≤ 3 GHz	
	f_{in} – 2 × 4020.4 MHz (first IF)	< –90 dBc (nom.)
	f_{in} – 2 × 820.4 MHz (second IF)	< –80 dBc
	f_{in} – 2 × 20.4 MHz (third IF), RBW ≤ 3 MHz	< –80 dBc
	3 GHz < f ≤ 14 GHz, RBW ≤ 3 MHz	< –70 dBc (nom.)
	14 GHz < f ≤ 26.5 GHz, RBW ≤ 3 MHz	< –60 dBc (nom.)
Intermediate frequency response	2 MHz ≤ f ≤ 3 GHz	
	first IF (4020.4 MHz)	< –80 dBc (nom.)
	second IF (820.4 MHz)	< –80 dBc
	third IF (20.4 MHz)	< –80 dBc
	3 GHz < f ≤ 26.5 GHz	< –70 dBc (nom.)
Residual spurious response	f < 1 MHz	< –90 dBm (nom.)
	1 MHz ≤ f ≤ 18 GHz	< –90 dBm
	f > 18 GHz	< –90 dBm (nom.)
Local oscillator related spurious	f < 3 GHz	
	1 kHz ≤ carrier offset ≤ 10 MHz	< –70 dBc (nom.)
	carrier offset > 10 MHz	< –80 dBc (nom.)
	3 GHz < f < 14 GHz	< –70 dBc (nom.)
	14 GHz ≤ f < 26.5 GHz	< –67 dBc (nom.)
Other interfering signals		
Subharmonic of first local oscillator	20 MHz ≤ f < 3 GHz, spurious at 4020.4 MHz – 2 × f_{in}	< –80 dBc (nom.)
Harmonic of first local oscillator	mixer level < –25 dBm, spurious at f_{in} –2010.2 MHz	< –80 dBc (nom.)

Level display		
Logarithmic level axis		1 dB to 200 dB, in 1 dB steps
Linear level axis		10 % of reference level per level division, 10 divisions or logarithmic scaling
Number of traces		6
Trace detector		max. peak, min. peak, auto peak (normal), sample, RMS, average
Trace functions		clear/write, max. hold, min. hold, average, view
Setting range of reference level		–130 dBm to (–10 dBm + RF attenuation) in steps of 0.01 dB
Units of level axis		dBm, dBµV, dBmV, dBµA, dBpW, V, A, W

Level measurement uncertainty		
Absolute level uncertainty at 50 MHz	RBW = 10 kHz, level: –10 dBm, reference level: –10 dBm, RF attenuation: 10 dB	
	+18 °C to +28 °C	< 0.5 dB (σ = 0.1 dB)
	+5 °C to +40 °C	< 1 dB (σ = 0.17 dB)
R&S®ZNL3, frequency response referenced to 50 MHz	RF attenuation: 0 dB, 10 dB, 20 dB, 30 dB, +18 °C to +28 °C	
	5 kHz ≤ f ≤ 3 MHz	< 1 dB (nom.)
	3 MHz < f ≤ 10 MHz	< 0.8 dB (nom.)
	10 MHz < f ≤ 3 GHz	< 0.8 dB (σ = 0.1 dB)
R&S®ZNL4, R&S®ZNL6, R&S®ZNL14 and R&S®ZNL20, frequency response referenced to 50 MHz	RF attenuation: 0 dB, 10 dB, 20 dB, 30 dB, +18 °C to +28 °C	
	5 kHz ≤ f ≤ 3 MHz	< 1 dB (nom.)
	3 MHz < f ≤ 10 MHz	< 0.8 dB (nom.)
	10 MHz < f ≤ 2.9 GHz	< 0.8 dB (σ = 0.1 dB)
	2.9 GHz < f ≤ 6 GHz	< 1.3 dB (σ = 0.2 dB)
	6 GHz < f ≤ 14 GHz	< 2.0 dB (σ = 0.5 dB)
	14 GHz < f ≤ 20 GHz	< 2.5 dB (σ = 0.66 dB)
	20 GHz < f ≤ 26.5 GHz	< 3.0 dB (σ = 0.66 dB)
Attenuator switching uncertainty	f = 50 MHz, 0 dB to 30 dB, referenced to 10 dB attenuation	< 0.3 dB (σ = 0.07 dB)
Uncertainty of reference level setting		0 dB [9]
Bandwidth switching uncertainty	referenced to RBW = 10 kHz	
	RBW ≥ 1 MHz	< 0.3 dB (nom.)
	100 kHz ≤ RBW < 1 MHz	< 0.2 dB (nom.)
	RBW < 100 kHz	< 0.1 dB (nom.)

Nonlinearity of displayed level		
Logarithmic level display	S/N > 16 dB, 0 dB to –50 dB	< 0.2 dB (σ = 0.07 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: sweep, RF attenuation: 10 dB, 20 dB, 30 dB, span/RBW < 100, 95 % confidence level, +18 °C to +28 °C	
R&S®ZNL3	3 MHz < f ≤ 3 GHz	1 dB
R&S®ZNL4, R&S®ZNL6, R&S®ZNL14 and R&S®ZNL20	3 MHz < f ≤ 2.9 GHz	1 dB
	2.9 GHz < f ≤ 6 GHz	1.5 dB
	6 GHz < f ≤ 14 GHz	2.2 dB
	14 GHz < f ≤ 20 GHz	2.7 dB
	20 GHz < f ≤ 26.5 GHz	3.2 dB

[9] 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.

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 [10, 11]	trace average = on	0.9 ms (1100/s) (nom.)
Remote measurement and LAN transfer [10]		2.8 ms (357/s) (nom.)
Marker peak search [10]		1.3 ms (nom.)
Center frequency tune + sweep + sweep data transfer [10]		15 ms (nom.)

Trigger functions

Trigger		
Trigger source		free run, video, external, IF power
Trigger offset	span ≥ 10 Hz	50 ns to 40 s, min. resolution: 50 ns (or 0.5 % of offset)
	span = 0 Hz	(–sweep time) to 40 s, min. resolution: 50 ns (or 0.5 % of offset)
Maximum deviation of trigger offset		±(7.8125 ns + (0.1 % × trigger offset))
IF power trigger		
Sensitivity	minimum signal power	–60 dBm + RF attenuation
	maximum signal power	–15 dBm + RF attenuation
IF power trigger bandwidth	RBW > 5 MHz	40 MHz (nom.)
	RBW ≤ 5 MHz	6 MHz (nom.)
Gated sweep		
Gate source		video, external, IF power
Gate delay		50 ns to 30 s, min. resolution: 50 ns (or 0.5 % of delay)
Gate length		125 ns to 30 s, min. resolution: 50 ns (or 0.5 % of gate length)
Maximum deviation of gate length		±(7.8125 ns + (0.1 % × gate length))

I/Q data

Interface		GPIB or LAN interface
Memory length		max. 25 Msample I and Q
Word length of I/Q samples		14 bit
Sampling rate	standard	100 Hz to 45 MHz
	with R&S®FPL-B40 option	100 Hz to 100 MHz
Maximum signal analysis bandwidth (equalized)	standard	10 MHz
	with R&S®FPL-B40 option	40 MHz
Signal analysis bandwidth ≤ 10 MHz		
Amplitude flatness		±0.3 dB (nom.)
Deviation from linear phase		±1° (nom.)
Signal analysis bandwidth ≤ 40 MHz		
Amplitude flatness		±0.5 dB (nom.)
Deviation from linear phase		±1.5° (nom.)

[10] Measured with personal computer equipped with Intel® Core™ i7 2.8 GHz and Gbit LAN interface.

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

R&S®ZNL3-B22, R&S®ZNL4-B22, R&S®ZNL6-B22, R&S®ZNL14-B22 and R&S®ZNL20-B22 extended power range

Extended power range		specification	typical
Frequency range	R&S®ZNL3-B22	5 kHz to 3 GHz	
	R&S®ZNL4-B22	5 kHz to 4.5 GHz	
	R&S®ZNL6-B22	5 kHz to 6 GHz	
	R&S®ZNL14-B22	5 kHz to 14 GHz	
	R&S®ZNL20-B22	5 kHz to 20 GHz	
Power range for the R&S®ZNL [1]	5 kHz to 50 kHz	–40 dBm to –3 dBm	up to +3 dBm
	50 kHz to 18 GHz	–40 dBm to +0 dBm	up to +3 dBm
	18 GHz to 20 GHz	–40 dBm to –3 dBm	up to +3 dBm

R&S®ZNL3-B31/-B32, R&S®ZNL4-B31/-B32, R&S®ZNL6-B31/-B32, R&S®ZNL14-B31/-B32 and R&S®ZNL20-B31/-B32 receiver step attenuators

Receiver step attenuators		
Frequency range	R&S®ZNL3-B31/R&S®ZNL3-B32	5 kHz to 3 GHz
	R&S®ZNL4-B31/R&S®ZNL4-B32	5 kHz to 4.5 GHz
	R&S®ZNL6-B31/R&S®ZNL6-B32	5 kHz to 6 GHz
	R&S®ZNL14-B31/R&S®ZNL14-B32	5 kHz to 14 GHz
	R&S®ZNL20-B31/R&S®ZNL20-B32	5 kHz to 20 GHz
Attenuation		0 dB to 30 dB in 10 dB steps

R&S®FPL1-B5 additional interfaces

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

Noise source control		
Connector		BNC, female
Output		0 V/28 V, max. 100 mA, switchable, supply for noise source

Power sensor		
Connector	for supported R&S®NRP-Zxx power sensors	6-pin LEMOSA, female

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

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

R&S®FPL1-B4 precision frequency reference (OCXO)

Static frequency accuracy		(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year	with R&S®FPL-B4 precision frequency reference option	$\pm 1 \times 10^{-7}$
Temperature drift (+5 °C to +40 °C)	with R&S® FPL-B4 precision frequency reference option	$\pm 1 \times 10^{-8}$
Achievable initial calibration accuracy	with R&S® FPL-B4 precision frequency reference option	$\pm 5 \times 10^{-8}$

R&S®FPL1-B10 GPIB interface

GPIB interface	remote control interface, in line with IEEE 488, IEC 60625; 24-pin

R&S®FPL1-B30 DC power input 12 V/24 V

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

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

Operating time [12]		3.5 h (nom.)
Charge time	standby mode, AC supply	< 2 h (nom.)
	standby mode, external DC supply (R&S®FPL1-B30)	< 2 h (nom.)
	operating mode	< 4 h (nom.)
Temperature	operating temperature	+5 °C to +40 °C
	storage temperature range	–20 °C to +60 °C [13]

R&S®FSV-B34 charger (only necessary to charge 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)

[12] Depends on options installed.

[13] 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 +40 °C could degrade battery performance and life.

General data

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

Environmental conditions		
Temperature	operating temperature range	+5 °C to +40 °C
	storage temperature range	–20 °C to +70 °C
Climatic loading		+40 °C at 85 % rel. humidity, in line with EN 60068-2-30, without condensation

Mechanical resistance		
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, MIL-PRF-28800F

EMC		in line with EMC Directive 2014/30/EU, including IEC/EN 61326-1 [14, 15], IEC/EN 61326-2-1, CISPR 11/EN 55011 [14], IEC/EN 61000-3-2, IEC/EN 61000-3-3

Recommended calibration interval		1 year

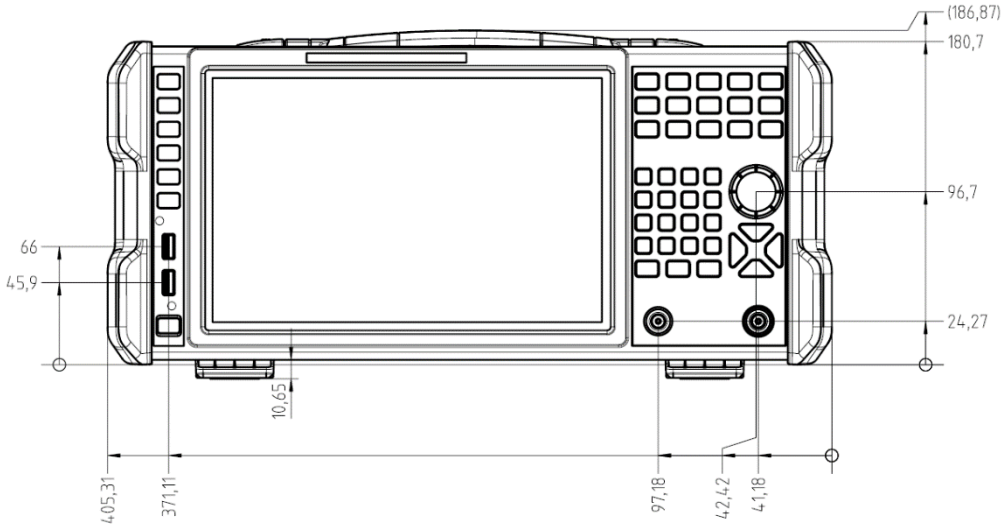
Power supply		
AC supply	without battery option	100 V to 240 V ± 10 %, 50 Hz to 60 Hz ± 5 %, 400 Hz ± 5% class of protection I, in line with VDE 411
	with battery option	100 V to 240 V ± 10 %, 50 Hz to 60 Hz ± 5 %
Current consumption	without options	1.7 A to 0.8 A
	with internal battery (R&S®FPL1-B31 option) in charge mode	3 A to 1.5 A
Power consumption	depends on options installed	max. 300 W, 90 W (nom.)
Safety		in line with EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1
Test marks	without battery option	CE, $_{C}$CSA$_{US}$, KCC
	with battery option	CE, $_{C}$CSA$_{US}$

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

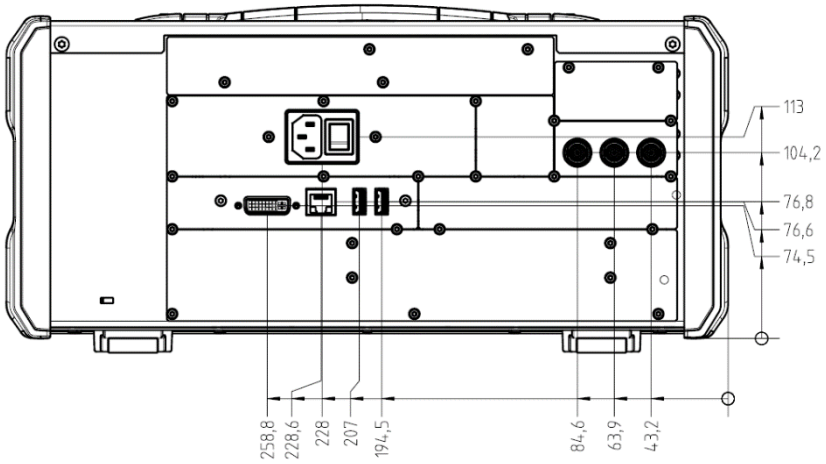
[14] Emission limits for class A equipment.

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

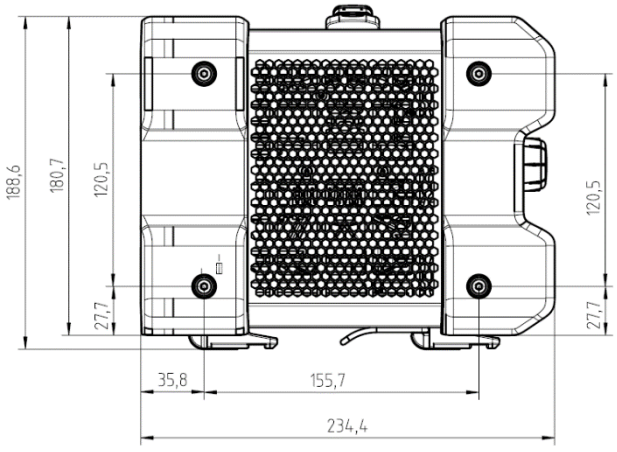
Dimensions (in mm)



Front view of the R&S®ZNL



Rear view of the R&S®ZNL



Side view of the R&S®ZNL

Ordering information

Designation	Type	Retrofit [16]	On Site [17]	Order No.
Base units				
Vector network analyzer, 3 GHz, N connectors	R&S®ZNL3			1323.0012.03
Vector network analyzer, 4.5 GHz, N connectors	R&S®ZNL4			1323.0012.04
Vector network analyzer, 6 GHz, N connectors	R&S®ZNL6			1323.0012.06
Vector network analyzer, 14 GHz, N connectors	R&S®ZNL14			1323.0012.14
Vector network analyzer, 20 GHz, 3.5 mm connectors	R&S®ZNL20			1323.0012.20
Options				
Spectrum analysis, for R&S®ZNL3	R&S®ZNL3-B1	•		1323.1802.02
Spectrum analysis, for R&S®ZNL4	R&S®ZNL4-B1	•		1303.8099.02
Spectrum analysis, for R&S®ZNL6	R&S®ZNL6-B1	•		1323.2067.02
Spectrum analysis, for R&S®ZNL14	R&S®ZNL14-B1	• [18]		1303.8082.02
Spectrum analysis, for R&S®ZNL20	R&S®ZNL20-B1	• [18]		1303.8101.02
Extended power range				
Extended power range, for R&S®ZNL3	R&S®ZNL3-B22	•		1323.1860.02
Extended power range, for R&S®ZNL4	R&S®ZNL4-B22	•		1303.8118.02
Extended power range, for R&S®ZNL6	R&S®ZNL6-B22	•		1323.2021.02
Extended power range, for R&S®ZNL14	R&S®ZNL14-B22	•		1303.8153.02
Extended power range, for R&S®ZNL20	R&S®ZNL20-B22	•		1303.9089.02
Receiver step attenuators				
Receiver step attenuator, port 1, for R&S®ZNL3	R&S®ZNL3-B31	•		1323.1848.02
Receiver step attenuator, port 2, for R&S®ZNL3	R&S®ZNL3-B32	•		1323.1854.02
Receiver step attenuator, port 1, for R&S®ZNL4	R&S®ZNL4-B31	•		1303.8124.02
Receiver step attenuator, port 2, for R&S®ZNL4	R&S®ZNL4-B32	•		1303.8130.02
Receiver step attenuator, port 1, for R&S®ZNL6	R&S®ZNL6-B31	•		1323.2038.02
Receiver step attenuator, port 2, for R&S®ZNL6	R&S®ZNL6-B32	•		1323.2044.02
Receiver step attenuator, port 1, for R&S®ZNL14	R&S®ZNL14-B31	•		1303.8160.02
Receiver step attenuator, port 2, for R&S®ZNL14	R&S®ZNL14-B32	•		1303.8176.02
Receiver step attenuator, port 1, for R&S®ZNL20	R&S®ZNL20-B31	•		1303.9095.02
Receiver step attenuator, port 2, for R&S®ZNL20	R&S®ZNL20-B32	•		1303.9108.02
Precision frequency reference (OCXO)	R&S®FPL1-B4	•		1323.1902.02
Additional interface	R&S®FPL1-B5	•	•	1323.1883.02
GPIB interface	R&S®FPL1-B10	•	•	1323.1890.02
YIG preselector bypass [19]	R&S®FPL1-B11	•	•	1323.1619.02
Second hard disk (SSD), mounted on PC board, including analyzer firmware	R&S®ZNL-B19	•	•	1323.2938.02
DC power supply 12 V/24 V	R&S®FPL1-B30	•		1323.1877.02
Internal lithium-ion battery	R&S®FPL1-B31	•		1323.1725.02
40 MHz analysis bandwidth [20]	R&S®FPL1-B40	•	•	1323.1931.02
Firmware/software				
Time domain analysis	R&S®ZNL-K2	•	•	1323.1819.02
Distance-to-fault measurement	R&S®ZNL-K3	•	•	1323.1825.02
Independent CW source [21]	R&S®ZNL-K14	•	•	1303.8182.02
AM/FM/PM measurement demodulator [20]	R&S®FPL1-K7	•	•	1323.1731.02
Power sensor measurement, with R&S®NRP power sensors [20]	R&S®FPL1-K9	•	•	1323.1754.02
Noise figure and gain measurements [22]	R&S®FPL1-K30	•	•	1323.1760.02

[16] Option may also be ordered at a later stage, upgrade in service.

[17] Option may be installed by the customer on site.

[18] Retrofit not possible for devices with serial number < 101200.

[19] Requires R&S®ZNL14-B1 or R&S®ZNL20-B1 spectrum analysis option.

[20] Requires R&S®ZNL3-B1, R&S®ZNL4-B1, R&S®ZNL6-B1, R&S®ZNL14-B1 or R&S®ZNL20-B1 spectrum analysis option.

[21] Available for the R&S®ZNL3, R&S®ZNL4, R&S®ZNL6, R&S®ZNL14 and R&S®ZNL20. Requires R&S®ZNL3-B1, R&S®ZNL4-B1, R&S®ZNL6-B1, R&S®ZNL14-B1 or R&S®ZNL20-B1 spectrum analysis option. Maximum output frequency for the R&S®ZNL20-K14 is 20 GHz.

[22] Requires R&S®ZNL3-B1, R&S®ZNL4-B1, R&S®ZNL6-B1, R&S®ZNL14-B1 or R&S®ZNL20-B1 spectrum analysis option and R&S®FPL1-B5 additional interface option.

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
Carrying vest holster (requires R&S®FPL1-Z2)	R&S®FPL1-Z3	1323.1683.02
Spare lithium-ion battery pack [23]	R&S®FPL1-Z4	1323.1677.02
Anti-glare display film for outdoor operation	R&S®FPL1-Z5	1323.1690.02
Lithium-ion battery charger, for charging spare batteries [14]	R&S®FSV-B34	1321.3950.02
19" rackmount kit	R&S®FPL1-Z6	1323.1954.02
Broadband limiter, N (m to f), 50 Ω, 50 MHz to 6 GHz	R&S®ZN-B13	1303.7840.02
Headphones		0708.9010.00
Matching pads, 50/75 Ω		
L section, matching at both ends	R&S®RAM	0358.5414.02
Series resistor, 25 Ω, matching at one end (taken into account in instrument function RF INPUT 75 Ω)	R&S®RAZ	0358.5714.02
Smart noise source		
Smart noise source, for noise figure and gain measurements (requires R&S®FPL1-K30)	R&S®FS-SNS26	1338.8008.26
High-power attenuators		
Attenuator 100 W, 3/6/10/20/30 dB, 1 GHz	R&S®RBU100	1073.8495.03, 1073.8495.06, 1073.8495.10, 1073.8495.20, 1073.8495.30
Attenuator 50 W, 3/6/10/20/30 dB, 2 GHz	R&S®RBU50	1073.8695.03, 1073.8695.06, 1073.8695.10, 1073.8695.20, 1073.8695.30
Attenuator 50 W, 20 dB, 6 GHz	R&S®RDL50	1035.1700.52
Connectors and cables		
N-type adapter, for R&S®RT-Zx probes	R&S®RT-ZA9	1417.0909.02
IEC/IEEE bus cable, length: 1 m	R&S®PCK	0292.2013.10
IEC/IEEE bus cable, length: 2 m	R&S®PCK	0292.2013.20
DC block		
DC block, 10 kHz to 18 GHz (type N)	R&S®FSE-Z4	1084.7443.02
Calibration kits		
Calibration kit, N (m), 50 Ω, 0 Hz to 18 GHz	R&S®ZN-Z170	1328.8163.02
Calibration kit, N (f), 50 Ω, 0 Hz to 18 GHz	R&S®ZN-Z170	1328.8163.03
Calibration kit, 3.5 mm (m), 50 Ω, 0 Hz to 26.5 GHz	R&S®ZN-Z135	1328.8157.02
Calibration kit, 3.5 (mm) (f), 50 Ω, 0 Hz to 26.5 GHz	R&S®ZN-Z135	1328.8157.03
Calibration units		
Calibration unit, 1 port, N (f), 2 MHz to 4 GHz	R&S®ZN-Z103	1321.1828.02
Calibration unit, 1 port, N (f), 1 MHz to 6 GHz	R&S®ZN-Z103	1321.1828.12
Calibration unit, 2 configurable ports, 5 kHz to 4.5 GHz	R&S®ZN-ZE104	1350.8040.04
Calibration unit, 2 configurable ports, 5 kHz to 9 GHz	R&S®ZN-ZE109	1350.8040.09
Calibration unit, 2 configurable ports, 5 kHz to 18 GHz	R&S®ZN-ZE118	1350.8040.18
Calibration unit, 2 configurable ports, 5 kHz to 26.5 GHz	R&S®ZN-ZE126	1350.8040.26

[23] Requires R&S®FPL1-B31 internal lithium-ion battery.

Designation	Type	Order No.
Recommended power sensors supported by the R&S®FPL1-K9 option [24]		
Universal power sensor, 10 MHz to 8 GHz, 200 mW	R&S®NRP-Z11	1138.3004.02
Universal power sensor, 10 MHz to 18 GHz, 200 mW	R&S®NRP-Z21	1137.6000.02
Universal power sensor, 10 MHz to 18 GHz, 2 W	R&S®NRP-Z22	1137.7506.02
Power sensor module with power splitter, DC to 18 GHz, 500 mW	R&S®NRP-Z27	1169.4102.02
Power sensor module with power splitter, DC to 26.5 GHz, 500 mW	R&S®NRP-Z37	1169.3206.02
Thermal power sensor, 0 Hz to 18 GHz, 100 mW	R&S®NRP18T	1424.6115.02
Thermal power sensor, 0 Hz to 33 GHz, 100 mW	R&S®NRP33T	1424.6138.02
Wideband power sensor, 50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02
Average power sensor, 9 kHz to 6 GHz, 200 mW	R&S®NRP-Z91	1168.8004.02
Average power sensor, 9 kHz to 6 GHz, 2 W	R&S®NRP-Z92	1171.7005.02
Two-path diode power sensor, 10 MHz to 8 GHz, 100 mW	R&S®NRP-Z211	1417.0409.02
Two-path diode power sensor, 10 MHz to 18 GHz, 100 mW	R&S®NRP-Z221	1417.0309.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP8S	1419.0006.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 8 GHz, LAN version	R&S®NRP8SN	1419.0012.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18S	1419.0029.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 18 GHz, LAN version	R&S®NRP18SN	1419.0035.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33S	1419.0064.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 33 GHz, LAN version	R&S®NRP33SN	1419.0070.02

[24] For average power measurement only. For a complete list of power sensors supported by the R&S®FPL1-K9 option refer to the R&S®NRP power meter family brochure (PD 5213.5539.12).

Warranty

Warranty		
Base unit		3 years
All other items [25]		1 year
Options		
Extended warranty, one year	R&S®WE1	Contact your local Rohde & Schwarz sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	

Extended warranty with a term of one and two years (WE1 and WE2)
Repairs carried out during the contract term are free of charge [26]. Necessary calibration and adjustments carried out during repairs are also covered.

Extended warranty with calibration coverage (CW1 and CW2)
Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs [26] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

Extended warranty with accredited calibration (AW1 and AW2)
Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs [26] and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

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

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

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