R&S®ZNB
Vector Network Analyzer
Specifications

ROHDE&SCHWARZ

Test&Measurement

Data Sheet | 07.04

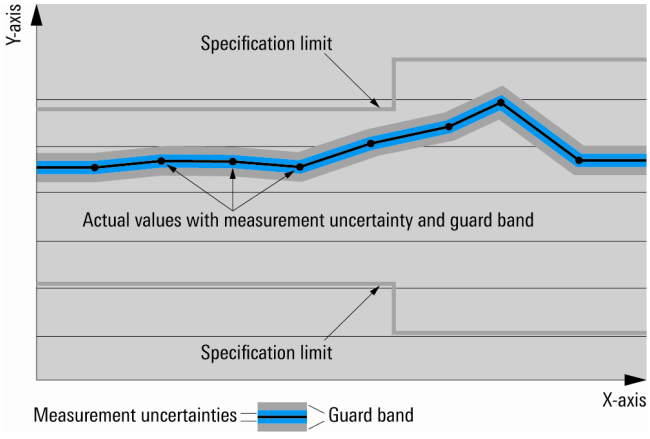
CONTENTS

Definitions

General
Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 60 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable
- Unless stated otherwise, specifications apply to test ports and a nominal source power of –10 dBm

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



Specifications without limits
Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)
Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)
Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)
Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties
Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: “parameter: value”.

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

Measurement range

Impedance		50 Ω
Test port connector	R&S®ZNB4	N female
	R&S®ZNB8	N female
	R&S®ZNB20	3.5 mm, male, ruggedized
	R&S®ZNB40	2.92 mm, male, ruggedized
Number of test ports	R&S®ZNB4	2 or 4
	R&S®ZNB8	2 or 4
	R&S®ZNB20	2 or 4
	R&S®ZNB40	2
Frequency range [1]	R&S®ZNB4	9 kHz to 4.5 GHz
	R&S®ZNB8	9 kHz to 8.5 GHz
	R&S®ZNB20	100 kHz to 20 GHz
	R&S®ZNB40	10 MHz to 40 GHz

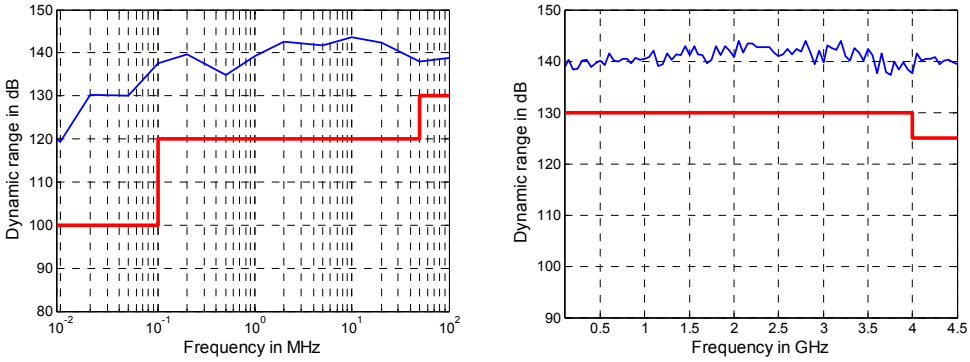
Static frequency accuracy		(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year	standard	$\pm 1 \times 10^{-6}$
	with R&S®ZNB-B4 precision frequency reference option	$\pm 1 \times 10^{-7}$
Temperature drift (0 °C to +50 °C)	standard	$\pm 1 \times 10^{-6}$
	with R&S®ZNB-B4 precision frequency reference option	$\pm 1 \times 10^{-8}$
Achievable initial calibration accuracy	standard	$\pm 5 \times 10^{-7}$
	with R&S®ZNB-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 steps	
	without optional increased bandwidth	1 Hz to 1 MHz
	with optional increased bandwidth	1 Hz to 10 MHz

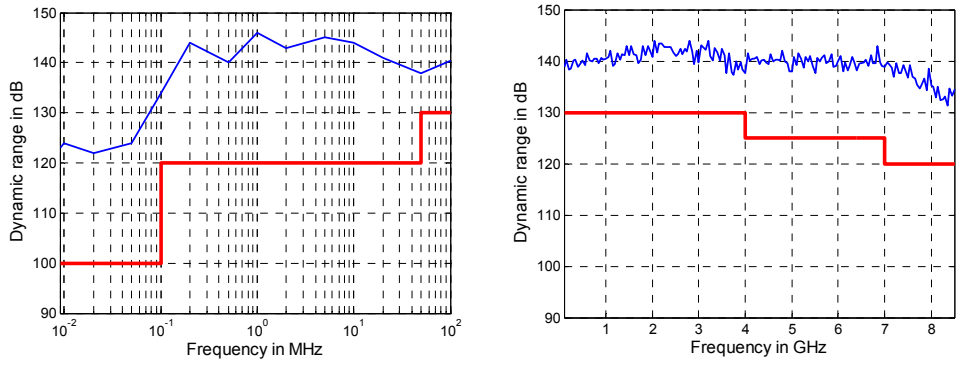
		specification	**typical**
Dynamic range [2] of the R&S®ZNB4 and the R&S®ZNB8 (without optional step attenuators)	9 kHz to 100 kHz	≥ 100 dB	122 dB
	100 kHz to 50 MHz	≥ 120 dB	138 dB
	50 MHz to 4 GHz	≥ 130 dB	140 dB
	4 GHz to 7 GHz	≥ 125 dB	138 dB
	7 GHz to 8.5 GHz	≥ 120 dB	130 dB
Dynamic range [2] of the R&S®ZNB20	100 kHz to 1 MHz	≥ 100 dB	110 dB
	1 MHz to 10 MHz	≥ 110 dB	120 dB
	10 MHz to 100 MHz	≥ 115 dB	125 dB
	100 MHz to 6 GHz	≥ 125 dB	135 dB
	6 GHz to 20 GHz	≥ 120 dB	130 dB
Dynamic range [2] of the R&S®ZNB40	10 MHz to 50 MHz	≥ 90 dB	105 dB
	50 MHz to 100 MHz	≥ 115 dB	125 dB
	100 MHz to 500 MHz	≥ 120 dB	130 dB
	500 MHz to 20 GHz	≥ 125 dB	135 dB
	20 GHz to 30 GHz	≥ 115 dB	125 dB
	30 GHz to 40 GHz	≥ 110 dB	120 dB

[1] Specified and typical data given in this data sheet applies to the R&S®ZNB4, the R&S®ZNB8, the R&S®ZNB20 and the R&S®ZNB40; please note their respective frequency ranges.

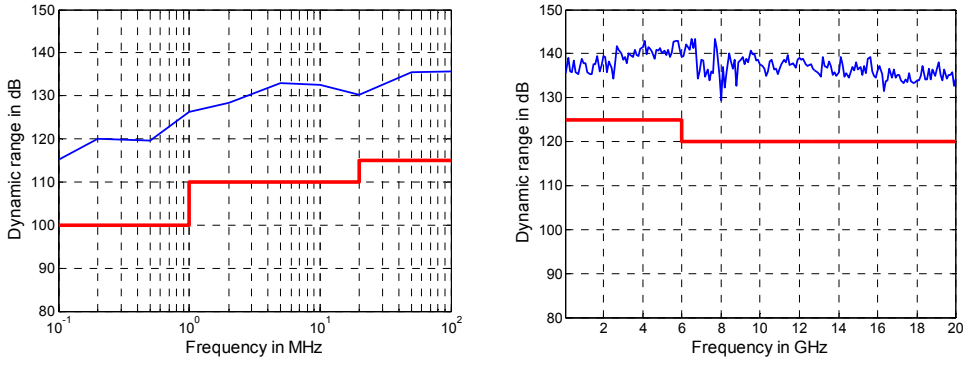
[2] The dynamic range is defined as the difference between the actual maximum source power and the RMS value of the data trace of the transmission magnitude, which is produced by noise and crosstalk with the test ports short-circuited. The specification applies at 10 Hz measurement bandwidth, without system error correction. The dynamic range can be increased by using a measurement bandwidth of 1 Hz. Crosstalk does not limit the dynamic range. Dynamic range between port 1 and port 2 and between port 3 and port 4 (4-port model). Otherwise the dynamic range performance is typical.



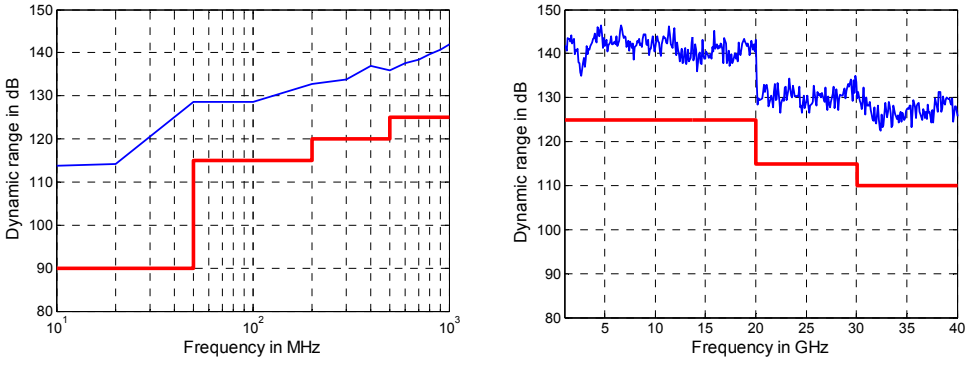
Dynamic range in dB versus frequency for the R&S®ZNB4.



Dynamic range in dB versus frequency for the R&S®ZNB8.



Dynamic range in dB versus frequency for the R&S®ZNB20.

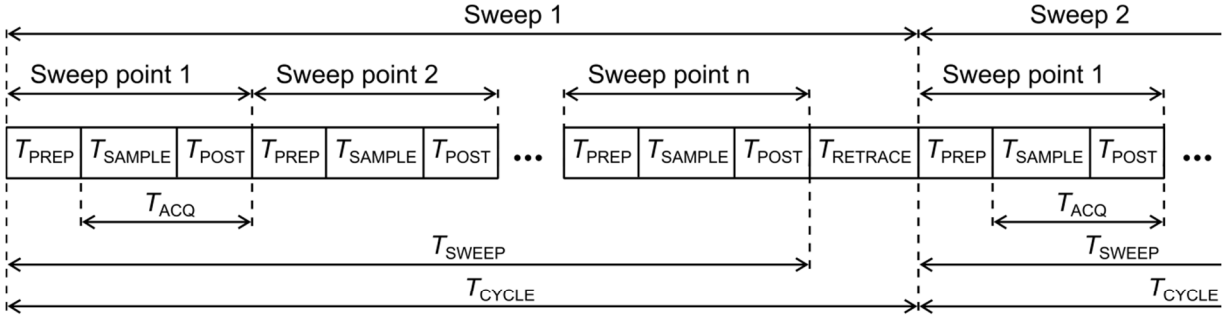


Dynamic range in dB versus frequency for the R&S®ZNB40.

Measurement speed

Measured with firmware version 2.20 and Windows 7/64 bit.

Measurement time	for 201 measurements points, with 200 MHz span, 1 MHz measurement bandwidth			
		T_{SWEEP}	T_{CYCLE}	
	with 900 MHz center frequency	< 2.5 ms	< 5 ms	
	with 5.1 GHz center frequency	< 2.0 ms	< 4 ms	
Acquisition time per point (T_{ACQ})	1 MHz measurement bandwidth, CW mode	2.5 µs		
Sampling time per point (T_{SAMPLE})	at 1 MHz measurement bandwidth	860 ns		
IF filter: normal	at 10 MHz measurement bandwidth	312 ns		
Time for measurement and data transfer	for 201 measurements points, with 800 MHz start frequency, 1 GHz stop frequency, 1 MHz measurement bandwidth [3]	IEC/IEEE	VXI11	RSIB
			over 1 Gbit/s LAN	
		typ. 3.8 ms	typ. 2.9 ms	typ. 2.8 ms
Data transfer time	for 201 measurements points (magnitude)	typ. 2.5 ms	typ. 1.6 ms	typ. 1.0 ms
Switching time between channels	with a maximum of 2001 points	< 5 ms		
Switching time between two preloaded instrument settings	with a maximum of 2001 points	< 5 ms		



T_{PREP} Preparation time required to set up the internal hardware components
T_{SAMPLE} Sampling time (approximately equal to the settling time of the digital filters)
T_{POST} Time required for hardware postprocessing
T_{ACQ} Aquisition time (T_{SAMPLE} + T_{POST})
T_{SWEEP} Time required for one sweep
$T_{RETRACE}$ Time between two sweeps
T_{CYCLE} Sweep cycle time (T_{SWEEP} + $T_{RETRACE}$)

Measurement sequence.

[3] In continuous mode, no additional time is needed for data transfer as this occurs simultaneously during the measurement.

Typical sweep times in ms versus number of measurement points [4] of the R&S®ZNB4 and the R&S®ZNB8										
Number of measurement points	**51**		**201**		**401**		**1601**		**5001**	
Sweep mode (stepped, swept)	**swept**	**step**	**swept**	**step**	**swept**	**step**	**swept**	**step**	**swept**	**step**
800 MHz start frequency, 1 GHz stop frequency, AGC AUTO, 500 kHz measurement bandwidth										
With correction switched off	0.6	1.0	1.1	2.9	1.8	3.6	4.8	7.1	13.7	19.3
With 2-port TOSM calibration	0.9	1.8	2.1	5.4	3.7	6.9	10.2	14.1	27.2	41.5
With 4-port TOSM calibration	1.8	3.6	5.3	10.9	8.1	14.8	25.5	38.1	68.6	110
800 MHz start frequency, 1 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth										
With correction switched off	46.1	46.1	180	180	358	358	1377	1377	4299	4298
With 2-port TOSM calibration	91.9	91.9	359	359	716	716	2753	2753	8597	8597
With 4-port TOSM calibration	184	184	719	719	1431	1431	5507	5507	17194	17194
1 MHz start frequency, 4.5 GHz stop frequency, AGC AUTO, 500 kHz measurement bandwidth										
With correction switched off	2.2	2.6	4.1	4.6	3.7	6.9	7.2	19.6	16.4	51.7
With 2-port TOSM calibration	4.1	5.3	8.1	9.6	7.1	13.9	14.1	39.6	32.6	103
With 4-port TOSM calibration	8.4	10.8	16.8	19.6	15.0	29.0	31.9	80.4	75.7	209
1 MHz start frequency, 4.5 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth										
With correction switched off	49.1	49.2	181	182	358	358	1414	1414	4407	4407
With 2-port TOSM calibration	97.9	98.1	362	363	715	716	2829	2830	8813	8813
With 4-port TOSM calibration	196	196	724	726	1430	1431	5658	5658	17626	17626
1 MHz start frequency, 8.5 GHz stop frequency, AGC AUTO, 500 kHz measurement bandwidth										
With correction switched off	2.5	3.4	4.5	5.9	6.7	8.3	7.9	20.5	16.7	53.0
With 2-port TOSM calibration	4.8	7.0	8.9	12.0	13.4	16.8	16.0	41.3	33.8	106
With 4-port TOSM calibration	9.7	14.3	17.8	23.8	27.4	34.1	35.3	83.6	78.7	214
1 MHz start frequency, 8.5 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth										
With correction switched off	50.5	50.6	183	183	359	359	1414	1415	4399	4402
With 2-port TOSM calibration	101	101	365	367	717	719	2828	2830	8799	8802
With 4-port TOSM calibration	201	202	730	733	1434	1438	5654	5659	17598	17604

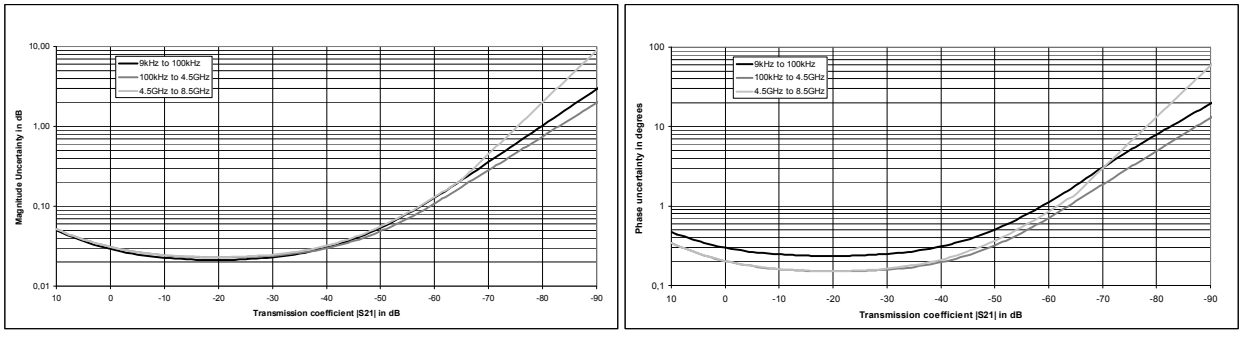
Typical sweep times in ms versus number of measurement points [4] of the R&S®ZNB20 and the R&S®ZNB40										
9 GHz start frequency, 10 GHz stop frequency, AGC AUTO, 500 kHz measurement bandwidth										
With correction switched off	0.9	0.9	1.2	2.3	1.9	3.8	5.0	10.4	13.6	22.5
With 2-port TOSM calibration	2.5	2.5	3.3	5.2	4.3	8.6	11.4	22.2	29.1	54.9
With 4-port TOSM calibration	6.0	6.0	8.2	11.4	11.3	18.9	28.7	54.7	74.3	157
9 GHz start frequency, 10 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth										
With correction switched off	45.1	45.3	176	176	350	352	1396	1396	4310	4310
With 2-port TOSM calibration	90.7	90.9	352	352	701	701	2793	2793	8619	8620
With 4-port TOSM calibration	182	182	704	706	1405	1405	5580	5580	17240	17240
1 MHz start frequency, 20 GHz stop frequency, AGC AUTO, 500 kHz measurement bandwidth										
With correction switched off	11.7	11.7	16.1	16.1	18.4	18.4	29.8	29.8	33.0	59.1
With 2-port TOSM calibration	23.9	23.9	32.8	32.8	37.0	37.0	60.0	60.0	66.0	119
With 4-port TOSM calibration	49.4	49.4	68.1	68.1	78.2	78.4	129	130	141	263
1 MHz start frequency, 20 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth										
With correction switched off	55.7	55.8	190	190	365	365	1410	1415	4380	4380
With 2-port TOSM calibration	111	112	380	381	730	732	2830	2830	8750	8760
With 4-port TOSM calibration	224	225	760	766	1460	1470	5660	5650	17500	17510
10 MHz start frequency, 40 GHz stop frequency, AGC AUTO, 500 kHz measurement bandwidth										
With correction switched off	13.6	13.6	18.6	18.6	21.4	21.5	33.1	33.1	39.6	62.2
With 2-port TOSM calibration	28.0	28.0	37.9	37.9	43.5	43.5	66.8	66.8	79.8	125
10 MHz start frequency, 40 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth										
With correction switched off	57.5	57.5	191	193	367	369	1415	1415	4370	4380
With 2-port TOSM calibration	115	115	384	386	734	736	2830	2830	8759	8760

[4] Sweep time is to be understood as cycle time; static frequency accuracy of the instrument applies; measured with firmware version 2.60, Windows 7.

Measurement accuracy of the R&S®ZNB4 and the R&S®ZNB8

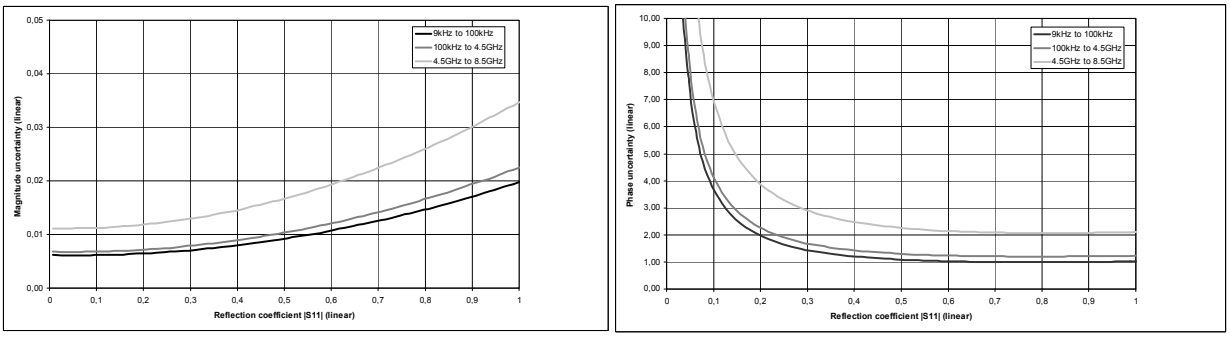
This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C since calibration. Validity of the data is conditional on the use of an R&S®ZV-Z270 calibration kit. This calibration kit is used to achieve the effective system data specified below. Frequency points,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

Accuracy of transmission measurements		
Above 9 kHz	+5 dB to –35 dB	< 0.05 dB or < 0.5°
	–35 dB to –50 dB	< 0.1 dB or < 1°
	–50 dB to –65 dB	< 0.2 dB or < 2°
Specifications are based on a matched DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.		



Typical accuracy of transmission magnitude and transmission phase measurements for the R&S®ZNB4 in the frequency range from 9 kHz to 4.5 GHz, for the R&S®ZNB8 in the frequency range from 9 kHz to 8.5 GHz.
Analysis conditions: $S_{11} = S_{22} = 0$, cal. power –10 dBm, meas. power –10 dBm.

Accuracy of reflection measurements		
9 kHz to 50 MHz	0 dB to –15 dB	< 0.3 dB or < 2°
	–15 dB to –25 dB	< 0.8 dB or < 6°
	–25 dB to –35 dB	< 3.0 dB or < 17°
50 MHz to 4 GHz	0 dB to –15 dB	< 0.2 dB or < 2°
	–15 dB to –25 dB	< 0.6 dB or < 4°
	–25 dB to –35 dB	< 2.0 dB or < 12°
4 GHz to 8.5 GHz	0 dB to –15 dB	< 0.3 dB or < 2°
	–15 dB to –25 dB	< 0.8 dB or < 6°
	–25 dB to –35 dB	< 3.0 dB or < 17°
Specifications are based on an isolating DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.		

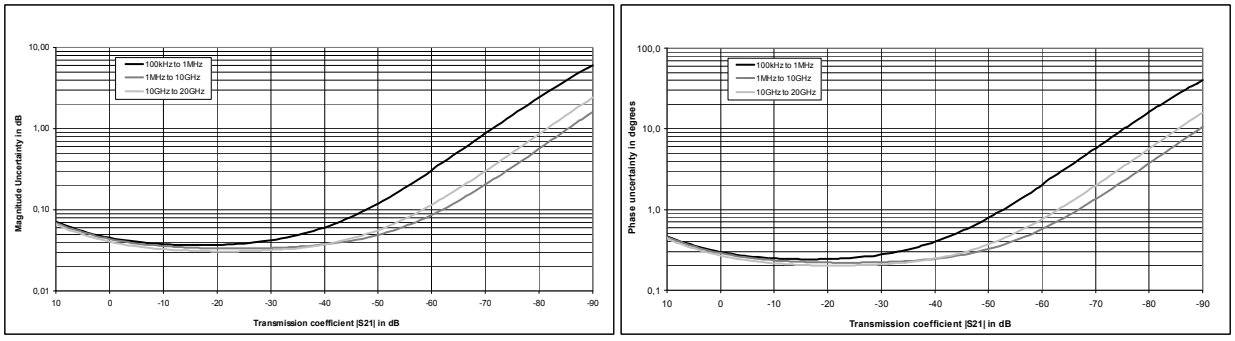


Typical accuracy of reflection magnitude and reflection phase measurements for the R&S®ZNB4 in the frequency range from 9 kHz to 4.5 GHz, for the R&S®ZNB8 in the frequency range from 9 kHz to 8.5 GHz.
Analysis conditions: $S_{12} = S_{21} = 0$, cal. power –10 dBm, meas. power –10 dBm.

Measurement accuracy of the R&S®ZNB20

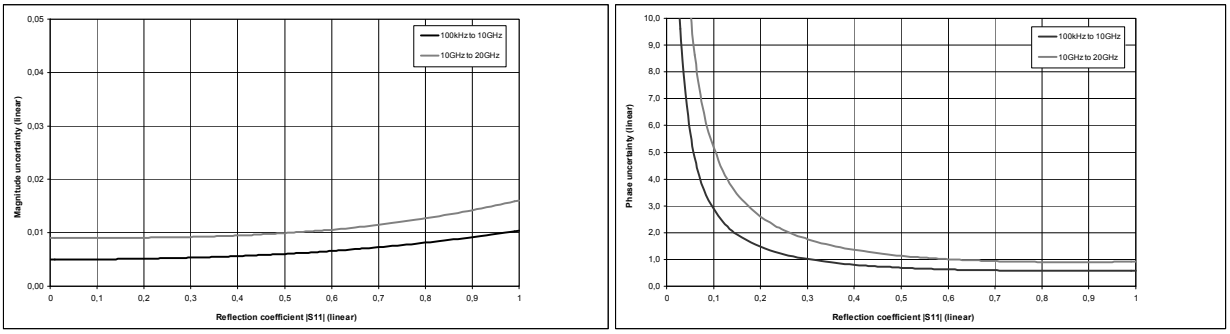
This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C since calibration. Validity of the data is conditional on the use of an R&S®ZV-Z235 calibration kit. This calibration kit is used to achieve the effective system data specified below. Frequency points,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

Accuracy of transmission measurements		**magnitude**	**phase**
100 kHz to 1 MHz	+5 dB to –35 dB	≤ 0.05 dB	≤ 0.5°
	–35 dB to –50 dB	≤ 0.10 dB	≤ 1.0°
	–50 dB to –60 dB	≤ 0.30 dB	≤ 5.0°
1 MHz to 10 GHz	+5 dB to –35 dB	≤ 0.05 dB	≤ 0.5°
	–35 dB to –50 dB	≤ 0.06 dB	≤ 0.6°
	–50 dB to –60 dB	≤ 0.10 dB	≤ 1.0°
10 GHz to 20 GHz	+5 dB to –35 dB	≤ 0.05 dB	≤ 0.5°
	–35 dB to –50 dB	≤ 0.08 dB	≤ 0.8°
	–50 dB to –60 dB	≤ 0.15 dB	≤ 1.5°
Specifications are based on a matched DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.			



Typical accuracy of transmission magnitude and transmission phase measurements for the R&S®ZNB20 in the frequency range from 100 kHz to 20 GHz. Analysis conditions: $S_{11} = S_{22} = 0$, cal. power –10 dBm, meas. power –10 dBm.

Accuracy of reflection measurements	**logarithmic**			**linear**	
		magnitude	**phase**		**magnitude**
100 kHz to 10 GHz	0 dB	≤ 0.12 dB	≤ 1.1°	0 dB to –3 dB	0.018
	–3 dB	≤ 0.13 dB	≤ 1.1°	< –3 dB to –6 dB	0.013
	–6 dB	≤ 0.15 dB	≤ 1.2°	< –6 dB to –15 dB	0.010
	–15 dB	≤ 0.30 dB	≤ 2.1°	< –15 dB to –25 dB	0.007
	–25 dB	≤ 1.00 dB	≤ 5.5°	< –25 dB to –35 dB	0.006
	–35 dB	≤ 2.80 dB	≤ 17°		
10 GHz to 20 GHz	0 dB	≤ 0.12 dB	≤ 1.6°	0 dB to –3 dB	0.028
	–3 dB	≤ 0.25 dB	≤ 1.6°	< –3 dB to –6 dB	0.020
	–6 dB	≤ 0.30 dB	≤ 1.8°	< –6 dB to –15 dB	0.015
	–15 dB	≤ 0.60 dB	≤ 3.4°	< –15 dB to –25 dB	0.011
	–25 dB	≤ 1.60 dB	≤ 9.5°	< –25 dB to –35 dB	0.010
	–35 dB	≤ 4.50 dB	≤ 31°		
Specifications are based on an isolating DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.					

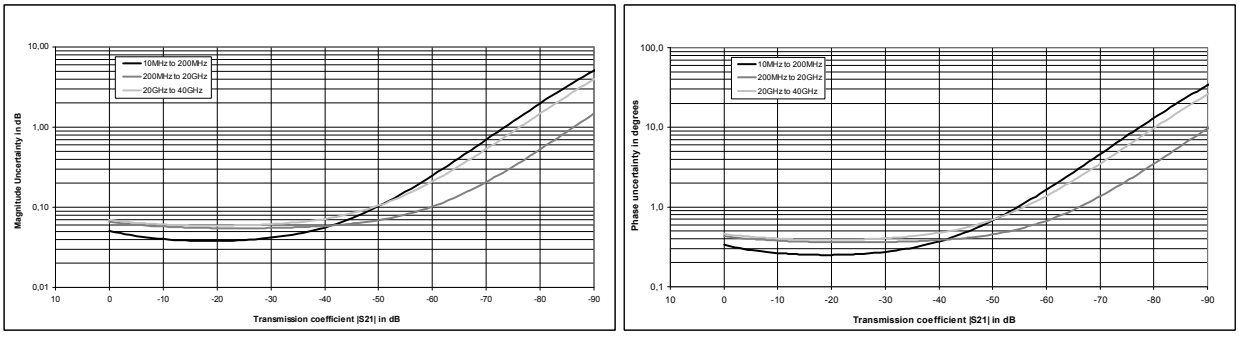


Typical accuracy of reflection magnitude and reflection phase measurements for the R&S®ZNB20 in the frequency range from 100 kHz to 20 GHz. Analysis conditions: $S_{12} = S_{21} = 0$, cal. power –10 dBm, meas. power –10 dBm.

Measurement accuracy of the R&S®ZNB40

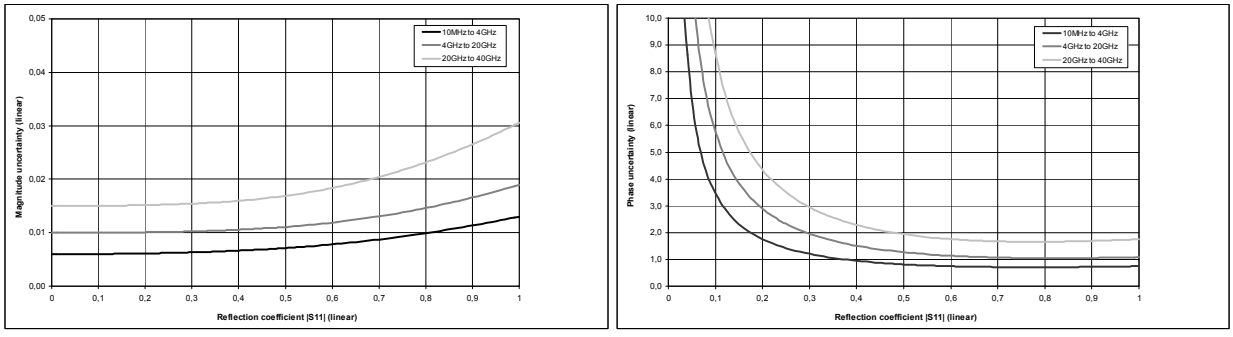
This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C since calibration. Validity of the data is conditional on the use of an R&S®ZV-Z229 calibration kit. This calibration kit is used to achieve the effective system data specified below. Frequency points, measurement bandwidth and sweep time have to be identical for measurement and calibration (no interpolation allowed).

Accuracy of transmission measurements		
10 MHz to 200 MHz	0 dB to –35 dB	< 0.07 dB or < 1°
	–35 dB to –50 dB	< 0.1 dB or < 1°
	–50 dB to –60 dB	< 0.2 dB or < 2°
200 MHz to 20 GHz	0 dB to –35 dB	< 0.07 dB or < 1°
	–35 dB to –50 dB	< 0.1 dB or < 1°
	–50 dB to –60 dB	< 0.1 dB or < 2°
20 GHz to 40 GHz	0 dB to –35 dB	< 0.1 dB or < 1°
	–35 dB to –50 dB	< 0.1 dB or < 1°
	–50 dB to –60 dB	< 0.2 dB or < 2°
Specifications are based on a matched DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.		



Typical accuracy of transmission magnitude and transmission phase measurements for the R&S®ZNB40 in the frequency range from 10 MHz to 40 GHz. Analysis conditions: $S_{11} = S_{22} = 0$, cal. power –10 dBm, meas. power –10 dBm.

Accuracy of reflection measurements		
10 MHz to 4 GHz	0 dB to –15 dB	< 0.5 dB or < 2.5°
	–15 dB to –25 dB	< 1.0 dB or < 6.5°
	–25 dB to –35 dB	< 3.8 dB or < 20°
4 GHz to 20 GHz	0 dB to –15 dB	< 0.7 dB or < 4°
	–15 dB to –25 dB	< 1.8 dB or < 11°
	–25 dB to –35 dB	< 7.5 dB or < 35°
20 GHz to 40 GHz	0 dB to –15 dB	< 1.0 dB or < 6°
	–15 dB to –25 dB	< 3.0 dB or < 17°
	–25 dB to –35 dB	< 17 dB or < 60°
Specifications are based on an isolating DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.		



Typical accuracy of reflection magnitude and reflection phase measurements for the R&S®ZNB40 in the frequency range from 10 MHz to 40 GHz. Analysis conditions: $S_{12} = S_{21} = 0$, cal. power –10 dBm, meas. 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. Frequency points, measurement bandwidth and sweep time have to be identical for measurement and calibration (no interpolation allowed). The data is based on a measurement bandwidth of 10 Hz.

R&S®ZNB4 and R&S®ZNB8 calibrated using R&S®ZV-Z270	**9 kHz to 100 kHz**	**100 kHz to 4.5 GHz**	**4.5 GHz to 8.5 GHz**
Directivity	≥ 46 dB	≥ 45 dB	≥ 40 dB
Source match	≥ 41 dB	≥ 40 dB	≥ 36 dB
Load match	≥ 44 dB	≥ 45 dB	≥ 40 dB
Reflection tracking	≤ 0.02 dB	≤ 0.02 dB	≤ 0.05 dB
Transmission tracking	≤ 0.028 dB	≤ 0.018 dB	≤ 0.09 dB

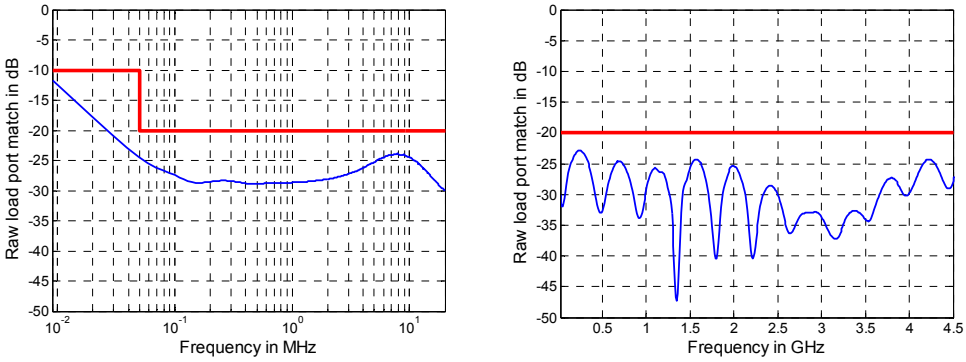
R&S®ZNB20 calibrated using R&S®ZV-Z235	**100 kHz to 10 GHz**	**10 GHz to 20 GHz**
Directivity	≥ 46 dB	≥ 41 dB
Source match	≥ 43 dB	≥ 38 dB
Load match	≥ 44 dB	≥ 40 dB
Reflection tracking	≤ 0.05 dB	≤ 0.05 dB
Transmission tracking	≤ 0.025 dB	≤ 0.035 dB

R&S®ZNB40 calibrated using R&S®ZV-Z229	**10 MHz to 4 GHz**	**4 GHz to 20 GHz**	**20 GHz to 40 GHz**
Directivity	≥ 42 dB	≥ 38 dB	≥ 34 dB
Source match	≥ 38 dB	≥ 36 dB	≥ 32 dB
Load match	≥ 40 dB	≥ 38 dB	≥ 35 dB
Reflection tracking	≤ 0.05 dB	≤ 0.05 dB	≤ 0.08 dB
Transmission tracking	≤ 0.02 dB	≤ 0.03 dB	≤ 0.06 dB

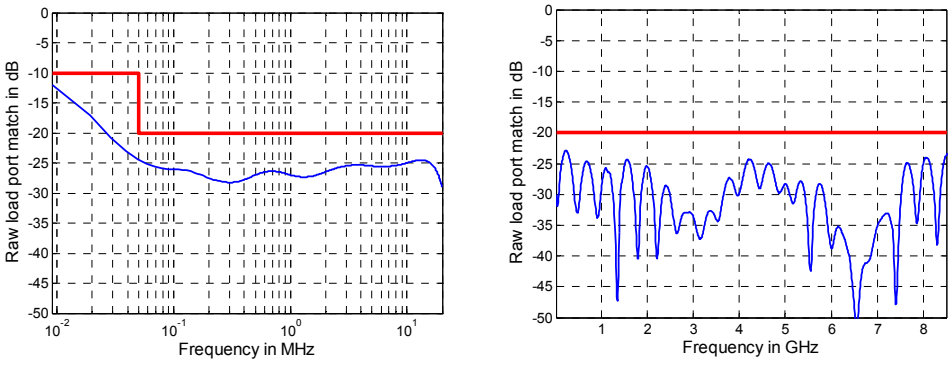
Factory-calibrated system data

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.

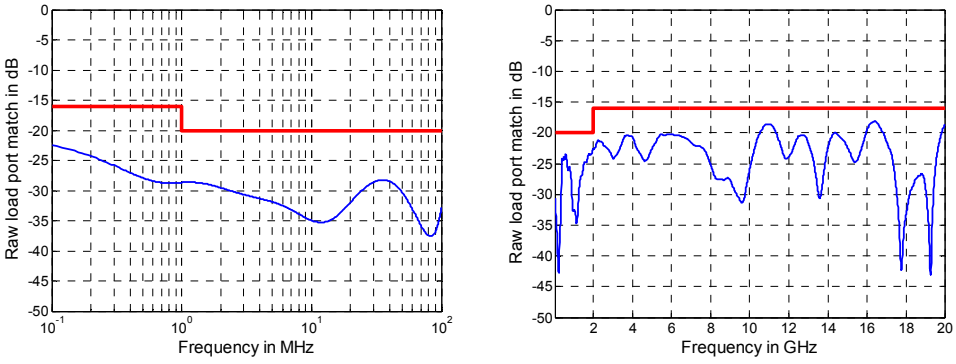
		specification	**typical**
Directivity	9 kHz to 50 kHz	≥ 20 dB	35 dB
	50 kHz to 4.5 GHz	≥ 30 dB	50 dB
	4.5 GHz to 10 GHz	≥ 30 dB	50 dB
	10 GHz to 20 GHz	≥ 25 dB	35 dB
	20 GHz to 35 GHz	≥ 20 dB	20 dB
	35 GHz to 40 GHz	≥ 15 dB	20 dB
Source match	9 kHz to 50 kHz	≥ 20 dB	35 dB
	50 kHz to 4.5 GHz	≥ 30 dB	50 dB
	4.5 GHz to 10 GHz	≥ 30 dB	50 dB
	10 GHz to 20 GHz	≥ 25 dB	35 dB
	20 GHz to 35 GHz	≥ 20 dB	20 dB
	35 GHz to 40 GHz	≥ 15 dB	20 dB
Reflection tracking	9 kHz to 20 GHz	≤ 0.5 dB	0.1 dB
	20 GHz to 40 GHz	≤ 0.5 dB	0.1 dB
Transmission tracking	9 kHz to 20 GHz	≤ 0.5 dB	0.1 dB
	20 GHz to 40 GHz	≤ 0.5 dB	0.1 dB
Load match of the R&S®ZNB4 and the R&S®ZNB8	9 kHz to 50 kHz	≥ 10 dB	15 dB
	50 kHz to 8.5 GHz	≥ 20 dB	25 dB
Load match of the R&S®ZNB20	100 kHz to 1 MHz	≥ 16 dB	20 dB
	1 MHz to 2 GHz	≥ 20 dB	23 dB
	2 GHz to 20 GHz	≥ 16 dB	19 dB
Load match of the R&S®ZNB40	10 MHz to 50 MHz	≥ 15 dB	18 dB
	50 MHz to 2 GHz	≥ 20 dB	22 dB
	2 GHz to 6 GHz	≥ 16 dB	18 dB
	6 GHz to 10 GHz	≥ 12 dB	14 dB
	10 GHz to 20 GHz	≥ 10 dB	12 dB
	20 GHz to 40 GHz	≥ 8 dB	10 dB



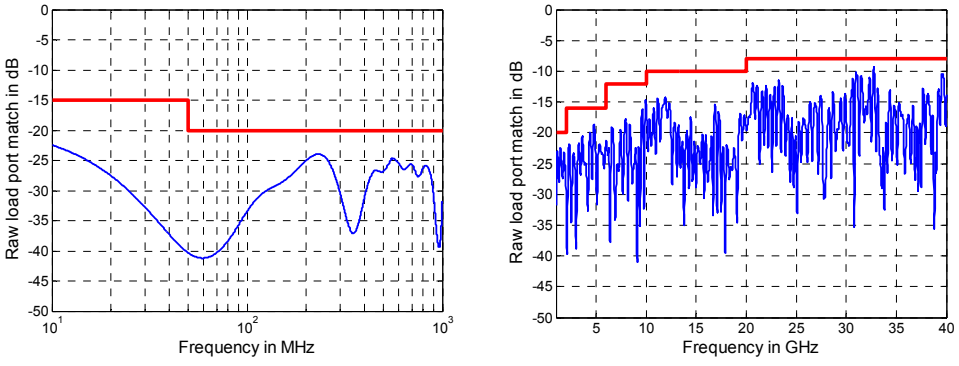
Raw load port match versus frequency for the R&S®ZNB4.



Raw load port match versus frequency for the R&S®ZNB8.



Raw load port match versus frequency for the R&S®ZNB20.



Raw load port match versus frequency for the R&S®ZNB40.

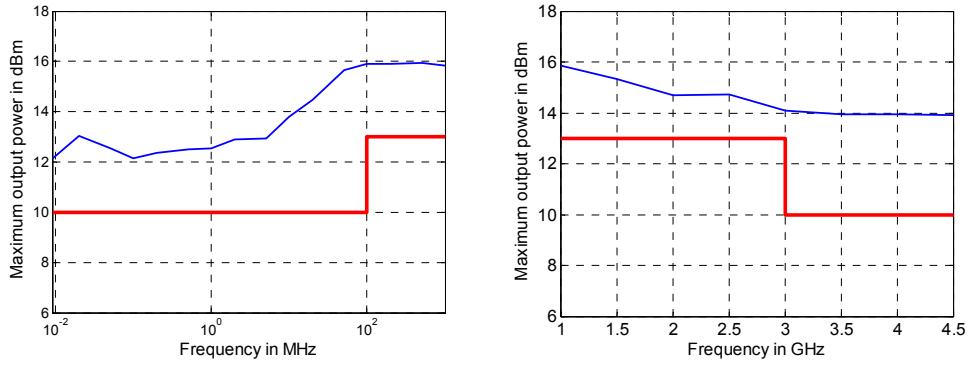
Trace stability				
Trace noise magnitude (RMS) of the R&S®ZNB4 and the R&S®ZNB8	at 0 dBm source power, 0 dB reflection	IF bandwidth	**specification**	**typical**
	9 kHz to 20 kHz	1 kHz	≤ 0.008 dB	0.004 dB
	20 kHz to 100 kHz	1 kHz	≤ 0.004 dB	0.001 dB
	100 kHz to 100 MHz	10 kHz	≤ 0.004 dB	0.001 dB
	100 MHz to 8.5 GHz	10 kHz	≤ 0.004 dB	0.002 dB
Trace noise magnitude (RMS) of the R&S®ZNB20	at 0 dBm source power, 0 dB reflection			
	100 kHz to 300 kHz	10 kHz	≤ 0.008 dB	0.002 dB
	300 kHz to 20 GHz	10 kHz	≤ 0.004 dB	0.001 dB
Trace noise magnitude (RMS) of the R&S®ZNB40	at 0 dBm source power, 0 dB reflection			
	10 MHz to 50 MHz	10 kHz	≤ 0.040 dB	0.020 dB
	50 MHz to 500 MHz	10 kHz	≤ 0.015 dB	0.006 dB
	500 MHz to 20 GHz	10 kHz	≤ 0.004 dB	0.002 dB
	20 GHz to 30 GHz	10 kHz	≤ 0.015 dB	0.006 dB
	30 GHz to 40 GHz	10 kHz	≤ 0.020 dB	0.012 dB
Trace noise phase (RMS) of the R&S®ZNB4 and the R&S®ZNB8	at 0 dBm source power, 0 dB reflection			
	9 kHz to 20 kHz	1 kHz	≤ 0.070°	0.040°
	20 kHz to 100 kHz	1 kHz	≤ 0.035°	0.010°
	100 kHz to 100 MHz	10 kHz	≤ 0.035°	0.005°
	100 MHz to 8.5 GHz	10 kHz	≤ 0.035°	0.020°
Trace noise phase (RMS) of the R&S®ZNB20	at 0 dBm source power, 0 dB reflection			
	100 kHz to 300 kHz	10 kHz	≤ 0.070°	0.02°
	300 kHz to 20 GHz	10 kHz	≤ 0.035°	0.01°
Trace noise phase (RMS) of the R&S®ZNB40	at 0 dBm source power, 0 dB reflection			
	10 MHz to 50 MHz	10 kHz	≤ 0.400°	0.2°
	50 MHz to 500 MHz	10 kHz	≤ 0.120°	0.06°
	500 MHz to 20 GHz	10 kHz	≤ 0.035°	0.02°
	20 GHz to 30 GHz	10 kHz	≤ 0.120°	0.06°
	30 GHz to 40 GHz	10 kHz	≤ 0.200°	0.12°
Temperature dependence	at 0 dB transmission or reflection			
	9 kHz to 4.5 GHz	magnitude		0.01 dB/K
		phase		0.15 °/K
	4.5 GHz to 40 GHz	magnitude		0.04 dB/K
		phase		0.80 °/K

Test port output

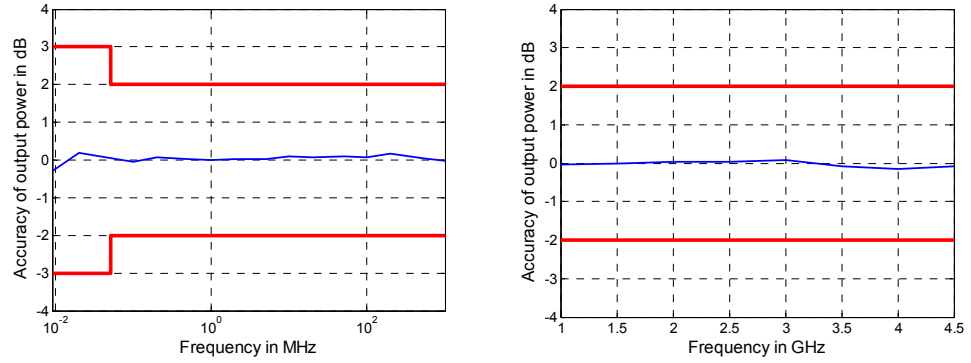
This data is valid from +18 °C to +28 °C.

		specification	typical
Power range of the R&S®ZNB4 and the R&S®ZNB8	without R&S®ZNB-B22/-B24 extended power range option		
	9 kHz to 100 MHz	–55 dBm to +10 dBm	up to +12 dBm
	100 MHz to 2.5 GHz	–55 dBm to +13 dBm	up to +15 dBm
	2.5 GHz to 7.5 GHz	–55 dBm to +10 dBm	up to +13 dBm
	7.5 GHz to 8.5 GHz	–55 dBm to +8 dBm	up to +12 dBm
	with R&S®ZNB-B22/-B24 extended power range option		
	9 kHz to 100 MHz	–85 dBm to +10 dBm	up to +12 dBm
	100 MHz to 2.5 GHz	–85 dBm to +13 dBm	up to +15 dBm
	2.5 GHz to 7.5 GHz	–85 dBm to +10 dBm	up to +13 dBm
	7.5 GHz to 8.5 GHz	–85 dBm to +8 dBm	up to +12 dBm
Power range of the R&S®ZNB20	without R&S®ZNB20-B22/-B24 extended power range option		
	100 kHz to 1 MHz	–30 dBm to +8 dBm	up to +10 dBm
	1 MHz to 10 MHz	–30 dBm to +10 dBm	up to +12 dBm
	10 MHz to 10 GHz	–30 dBm to +12 dBm	up to +14 dBm
	10 GHz to 15 GHz	–30 dBm to +10 dBm	up to +12 dBm
	15 GHz to 20 GHz	–30 dBm to +8 dBm	up to +10 dBm
	with R&S®ZNB20-B22/-B24 extended power range option		
	100 kHz to 1 MHz	–60 dBm to +8 dBm	up to +10 dBm
	1 MHz to 10 MHz	–60 dBm to +10 dBm	up to +12 dBm
	10 MHz to 10 GHz	–60 dBm to +12 dBm	up to +14 dBm
	10 GHz to 15 GHz	–60 dBm to +10 dBm	up to +12 dBm
	15 GHz to 20 GHz	–60 dBm to +8 dBm	up to +10 dBm
Power range of the R&S®ZNB40	without R&S®ZNB40-B22 extended power range option		
	10 MHz to 30 GHz	–30 dBm to +10 dBm	up to +15 dBm
	30 GHz to 40 GHz	–30 dBm to +8 dBm	up to +13 dBm
	with R&S®ZNB40-B22 extended power range option		
	10 MHz to 30 GHz	–60 dBm to +10 dBm	up to +15 dBm
	30 GHz to 40 GHz	–60 dBm to +8 dBm	up to +13 dBm
Power accuracy of the R&S®ZNB4 and the R&S®ZNB8	source power –10 dBm		
	9 kHz to 50 kHz	≤ 3 dB	
	50 kHz to 8.5 GHz	≤ 2 dB	0.5 dB
Power accuracy of the R&S®ZNB20	source power –10 dBm		
	100 kHz to 10 GHz	≤ 2 dB	
	10 GHz to 20 GHz	≤ 3 dB	
Power accuracy of the R&S®ZNB40	source power –10 dBm		
	10 MHz to 10 GHz	≤ 2 dB	
	10 GHz to 20 GHz	≤ 3 dB	
	20 GHz to 40 GHz	≤ 4 dB	
Power linearity of the R&S®ZNB4 and the R&S®ZNB8	referenced to –10 dBm		
	source power ≥ –55 dBm	≤ 1 dB	
	source power < –55 dBm	≤ 2 dB	
Power linearity of the R&S®ZNB20	referenced to –10 dBm		
	source power ≥ –30 dBm	≤ 1 dB	
	source power < –30 dBm	≤ 2 dB	
Power linearity of the R&S®ZNB40	referenced to –10 dBm		
	source power ≥ –30 dBm		
	10 MHz to 20 GHz	≤ 1 dB	
	20 GHz to 40 GHz	≤ 2 dB	
	source power < –30 dBm		
	10 MHz to 20 GHz	≤ 2 dB	
	20 GHz to 40 GHz	≤ 4 dB	
Power resolution		0.01 dB	

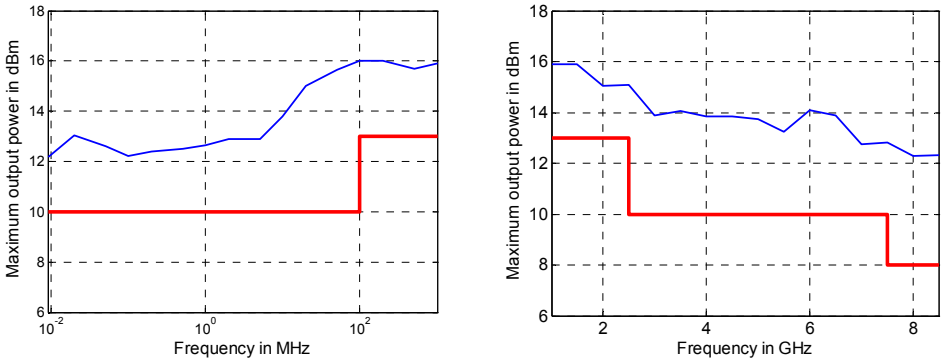
		specification	typical
Harmonics of the R&S®ZNB4 and the R&S®ZNB8	at 0 dBm		
	20 kHz to 100 MHz	≤ –20 dBc	–30 dBc
	100 MHz to 8.5 GHz	≤ –25 dBc	–35 dBc
Harmonics of the R&S®ZNB20	at 0 dBm		
	100 kHz to 10 MHz	≤ –15 dBc	–20 dBc
	10 MHz to 100 MHz	≤ –20 dBc	–30 dBc
	100 MHz to 15 GHz	< –25 dBc	–35 dBc
	15 GHz to 20 GHz	≤ –20 dBc	–35 dBc
Harmonics of the R&S®ZNB40	at 0 dBm		
	10 MHz to 100 MHz	≤ –20 dBc	–30 dBc
	100 MHz to 14 GHz	≤ –25 dBc	–35 dBc
	14 GHz to 40 GHz	≤ –15 dBc	–30 dBc



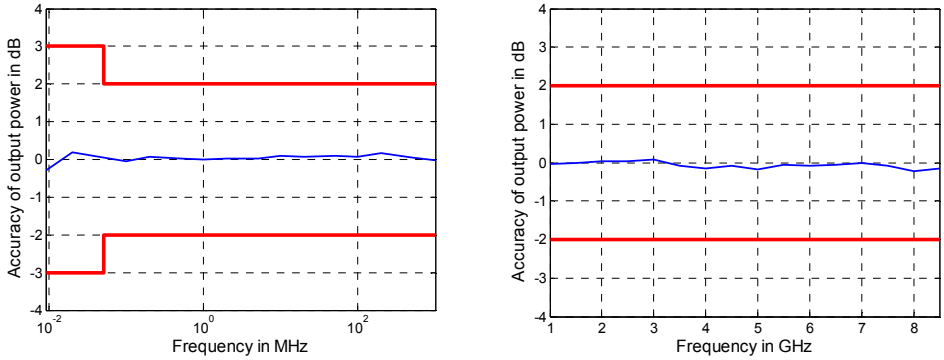
Maximum output power in dBm versus frequency for the R&S®ZNB4.



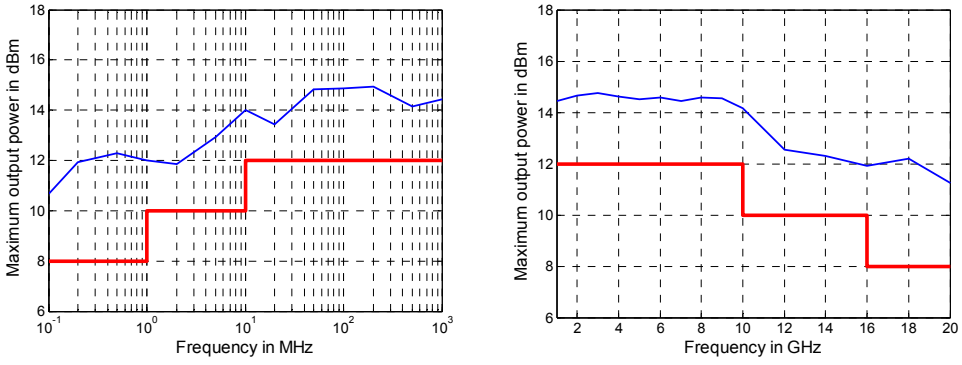
Output power accuracy in dB versus frequency for the R&S®ZNB4.



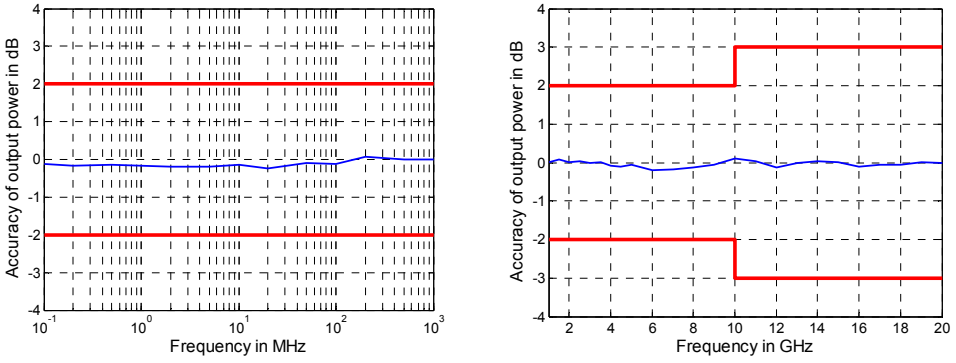
Maximum output power in dBm versus frequency for the R&S®ZNB8.



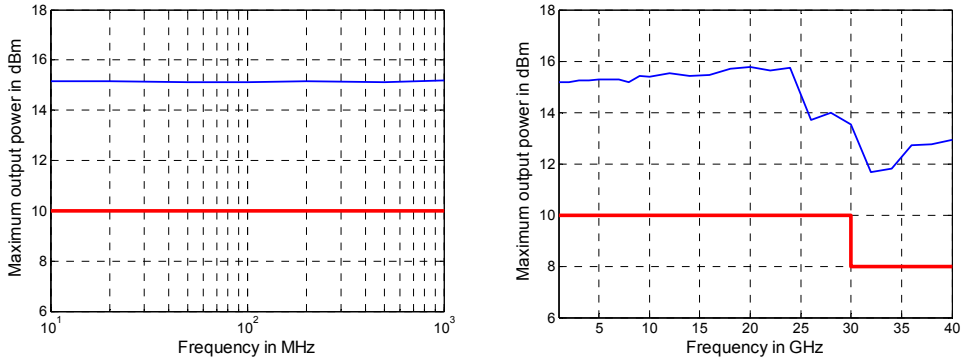
Output power accuracy in dB versus frequency for the R&S®ZNB8.



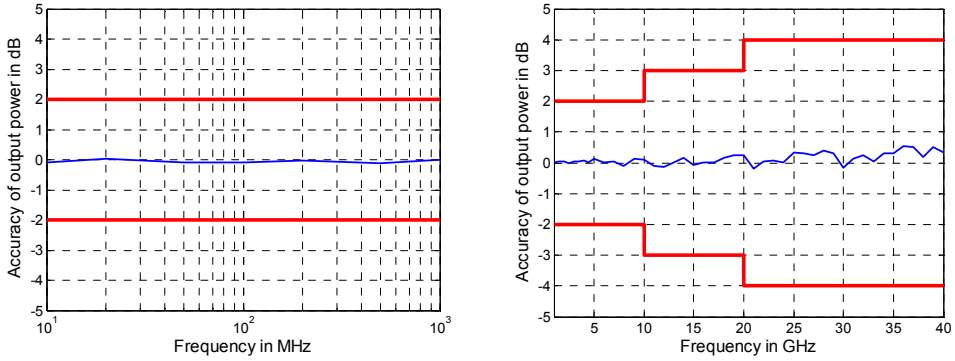
Maximum output power in dBm versus frequency for the R&S®ZNB20.



Output power accuracy in dB versus frequency for the R&S®ZNB20.



Maximum output power in dBm versus frequency for the R&S®ZNB40.



Output power accuracy in dB versus frequency for the R&S®ZNB40.

Test port input

Match	without system error correction	
	R&S®ZNB4	
	9 kHz to 50 kHz	> 10 dB
	50 kHz to 4.5 GHz	> 20 dB
	R&S®ZNB8	
	9 kHz to 50 kHz	> 10 dB
	50 kHz to 8.5 GHz	> 20 dB
	R&S®ZNB20	
	100 kHz to 1 MHz	> 16 dB
	1 MHz to 2 GHz	> 20 dB
	2 GHz to 20 GHz	> 16 dB
	R&S®ZNB40	
	10 MHz to 50 MHz	> 15 dB
	50 MHz to 2 GHz	> 20 dB
	2 GHz to 6 GHz	> 16 dB
	6 GHz to 10 GHz	> 12 dB
	10 GHz to 20 GHz	> 10 dB
	20 GHz to 40 GHz	> 8 dB
Maximum nominal input level		+13 dBm
Power measurement accuracy at –10 dBm without power calibration	R&S®ZNB4 and R&S®ZNB8	
	9 kHz to 100 kHz	< 2 dB
	100 kHz to 8.5 GHz	< 1 dB
	R&S®ZNB20	
	100 kHz to 20 GHz	< 1 dB
	R&S®ZNB40	
	10 MHz to 20 GHz	< 1 dB
	20 GHz to 40 GHz	< 2 dB
Receiver linearity referenced to –10 dBm	R&S®ZNB4 and R&S®ZNB8	
	for +20 dB to +10 dB	
	9 kHz to 7.5 GHz	< 0.2 dB
	for +18 dB to +10 dB	
	7.5 GHz to 8.5 GHz	< 0.2 dB
	for +10 dB to –40 dB	
	9 kHz to 8.5 GHz	< 0.1 dB
	R&S®ZNB20	
	for +18 dB to +10 dB	
	100 kHz to 1 MHz	< 0.3 dB
	for +20 dB to +10 dB	
	1 MHz to 15 GHz	< 0.3 dB
	for +18 dB to +10 dB	
	15 GHz to 20 GHz	< 0.3 dB
	for +10 dB to –40 dB	
	100 kHz to 20 GHz	< 0.1 dB
	R&S®ZNB40	
	for +15 dB to +10 dB	
	10 MHz to 40 GHz	typ. 0.4 dB
	for +10 dB to +5 dB	
	10 MHz to 40 GHz	< 0.2 dB
	for +5 dB to –40 dB	
	10 MHz to 40 GHz	< 0.1 dB
Damage level		+27 dBm
Damage DC voltage		30 V

Noise level [5] at 1 kHz measurement bandwidth, normalized to 1 Hz	R&S®ZNB4 and R&S®ZNB8	
	9 kHz to 50 kHz	< –115 dBm (1 Hz)
	50 kHz to 50 MHz	< –120 dBm (1 Hz)
	50 MHz to 4 GHz	< –130 dBm (1 Hz)
	4 GHz to 6.5 GHz	< –125 dBm (1 Hz)
	6.5 GHz to 8.5 GHz	< –120 dBm (1 Hz)
	R&S®ZNB20	
	100 kHz to 300 kHz	< –105 dBm (1 Hz)
	300 kHz to 1 MHz	< –110 dBm (1 Hz)
	1 MHz to 10 MHz	< –115 dBm (1 Hz)
	10 MHz to 100 MHz	< –120 dBm (1 Hz)
	100 MHz to 10 GHz	< –125 dBm (1 Hz)
	10 GHz to 20 GHz	< –120 dBm (1 Hz)
	R&S®ZNB40	
	10 MHz to 50 MHz	< –100 dBm (1 Hz)
	50 MHz to 100 MHz	< –110 dBm (1 Hz)
	100 MHz to 500 MHz	< –115 dBm (1 Hz)
	500 MHz to 20 GHz	< –125 dBm (1 Hz)
	20 GHz to 40 GHz	< –115 dBm (1 Hz)

Additional front panel connectors

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

Display

Screen	30.7 cm (12.1") diagonal WXGA color LCD with touchscreen
Resolution	1280 × 800 × 262144 (high color, 125 dpi)
Pixel failure rate	$< 1 \times 10^{-5}$

Rear panel connectors

LAN	local area network connector, 8-pin, RJ-45

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

REF IN	input for external frequency reference signal	
Connector type		BNC, female
Input frequency range		1 MHz to 20 MHz in steps of 1 MHz
Maximum permissible deviation		1 kHz
Input power		–10 dBm to +15 dBm
Input impedance		50 Ω

REF OUT	output for external frequency reference signal	
Connector type		BNC, female
Output frequency		10 MHz
Output power		+9 dBm ± 4 dB at 50 Ω

Bias tee for the R&S®ZNB20 and the R&S®ZNB40		
Connector type		BNC, female
Maximum nominal input voltage		30 V
Maximum nominal input current		250 mA
Damage voltage		30 V
Damage current		400 mA

MONITOR	DVI connector (for external monitor)

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

USER CONTROL	several control and trigger signals, 25-pin D-Sub, 3.3 V TTL, for controlling external generators, for limit checks, sweep signals, etc.	
CHANNEL BIT 0 to CHANNEL BIT 3	pin 8 to pin 11 (outputs)	channel-specific, user-configurable bits
CHANNEL BIT 4 to CHANNEL BIT 7	pin 16 to pin 19 (outputs)	channel-specific, user-configurable bits
DRIVE PORT 1 to DRIVE PORT 4	pin 16 to pin 19 (outputs)	indicates drive ports (can alternatively be used for channel bits 4 to 7)
PASS 1 and PASS 2	pin 13 and pin 14 (outputs)	pass/fail results of limit checks
BUSY	pin 4 (output)	measurements running
READY FOR TRIGGER	pin 6 (output)	ready for trigger
EXT GEN TRIGGER	pin 21 (output)	control signal for external generator
EXT GEN BLANK	pin 22 (input)	handshake signal from external generator
EXTERNAL TRIGGER	pin 2 (input)	first trigger input for analyzer, 5 V tolerant
EXTERNAL TRIGGER 2	pin 25 (input)	second trigger input for analyzer, 5 V tolerant

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

EXT TRIG OUT	trigger output of analyzer	
Connector type		BNC, female
Logic high		typ. 3.3 V

Options

R&S®ZNB-B1

Bias tee for the R&S®ZNB4 and the R&S®ZNB8		
Connector type		BNC, female
Maximum nominal input voltage		30 V
Maximum nominal input current		400 mA
Damage voltage		30 V
Damage current		420 mA
Frequency range	R&S®ZNB4 with R&S®ZNB-B1	100 kHz to 4.5 GHz
	R&S®ZNB8 with R&S®ZNB-B1	100 kHz to 8.5 GHz
Frequency response data		typical and specified data is valid for the limited frequency range given above

Factory-calibrated system data

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

		specification	**typical**
Directivity	100 kHz to 4.5 GHz	≥ 30 dB	50 dB
	4.5 GHz to 8.5 GHz	≥ 30 dB	50 dB
Source match	100 kHz to 500 kHz	≥ 20 dB	30 dB
	500 kHz to 4.5 GHz	≥ 30 dB	50 dB
	4.5 GHz to 8.5 GHz	≥ 30 dB	50 dB
Reflection tracking	100 kHz to 8.5 GHz	≤ 0.5 dB	0.1 dB
Load match	100 kHz to 500 kHz	≥ 10 dB	15 dB
	500 kHz to 8.5 GHz	≥ 20 dB	25 dB
Transmission tracking	100 kHz to 8.5 GHz	≤ 0.5 dB	0.1 dB

R&S®ZNB-B4

Static frequency accuracy		(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year	with R&S®ZNB-B4 precision frequency reference option	$\pm 1 \times 10^{-7}$
Temperature drift (0 °C to +50 °C)	with R&S®ZNB-B4 precision frequency reference option	$\pm 1 \times 10^{-8}$
Achievable initial calibration accuracy	with R&S®ZNB-B4 precision frequency reference option	$\pm 5 \times 10^{-8}$

R&S®ZNB-B10

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

R&S®ZNB-B12

Device control	
DIRECT CTRL interface	direct control bus output

R&S®ZN-B14

Handler I/O	several control and trigger signals, 36-pin Centronics connector, TTL compatible, for controlling external devices, limit checks, sweep signals, etc.	
Agilent handler interface compatibility	type 3	
Input signals	pin 2, pin 18	TTL compatible
Output signals	pin 3 to pin 17, pin 19 to pin 21, pin 30 to pin 34, pin 36	TTL compatible
Input/output signals	pin 22 to pin 29	TTL compatible
+5 V output	pin 35	+5 V, max. 100 mA
Response time of write strobe signal	pin 32	1 µs
Pulse width of write strobe signal	pin 32	1 µs
Pulse width of external trigger signal	pin 18	> 1 µs
Pulse width of sweep end signal	pin 34	> 10 µs

R&S®ZN-B15

RFFE GPIO interface 1323.9355.02 and 1323.9355.03	provides two independent MIPI RFFE busses, and ten individually configurable output lanes with different power handling capabilities
Connector type	25-pin D-Sub female
Ground (analog and digital)	pin 1, 3, 5, 11 and 22

Output voltage	output configuration selected	voltage range	voltage step size	max. current
RFFE port 1 VIO	pin 2	0 to +2 V	1 mV	20 mA
RFFE port 1 DATA	pin 15	0 to +2 V	1 mV	20 mA
RFFE port 1 CLK	pin 14	0 to +2 V	1 mV	20 mA
		configurable clockrate 31.25 kHz to 26 MHz		
RFFE port 2 VIO	pin 4	0 to +2 V	1 mV	20 mA
RFFE port 2 DATA	pin 17	0 to +2 V	1 mV	20 mA
RFFE port 2 CLK	pin 16	0 to +2 V	1 mV	20 mA
		configurable clockrate 31.25 kHz to 26 MHz		
GPIO 1 to GPIO 8	pin 6 to pin 9, pin 18 to pin 21	–5 V to +10 V, typ. –6 V to +12 V	5 mV	20 mA
GPIO 9 and 10	pin 10 and 23	–5 V to +10 V, typ. –6 V to +12 V	5 mV	100 mA

RFFE GPIO interface 1323.9355.03	including voltage/current measurement with switchable source resistance
	32 internal ADC channels are available on the RFFE-GPIO-Interface measuring voltage and current at each RFFE and GPIO pin simultaneously

Voltage measurement		voltage range	resolution	accuracy [6]
RFFE port 1 and 2, VIO, DATA and CLK	pin 2 and 4, pin 14 to pin 17	0 to +3 V	100 µV	2 % ± 20 mV
GPIO 1 to GPIO 10	pin 6 to pin 9, pin 18 to pin 21, pin 10, pin 23	–5 V to +10 V	100 µV	2 % ± 50 mV

Current measurement Current values are valid for GPIO voltages –5 V to +8 V		source shunt resistor	current range	resolution	accuracy [6]	repeatability
RFFE port 1 and 2, VIO, DATA and CLK, GPIO 1 to GPIO 8	pin 6 to pin 9, pin 18 to pin 21	10 Ω	–20 mA to +20 mA	10 uA	2 % ± 200 µA	< 100 µA
		100 Ω	–2 mA to +2 mA	1 µA	2 % ± 20 µA	< 10 µA
		1 kΩ	–200 µA to +200 µA	100 nA	3 % ± 3 µA	< 1 µA
		10 kΩ	–20 µA to +20 µA	10 nA	5 % ± 500 nA	< 100 nA
		100 kΩ	–2 µA to +2 µA	1 nA	5 % ± 50 nA	< 10 nA
GPIO 9 and 10	pin 10 and 23		–100 mA to +100 mA	10 µA	3 % ± 3 mA	< 100 µA

[6] x % ± y is to be understood as x % of reading ± y.

R&S®ZNB4-B22/-B24, R&S®ZNB8-B22/-B24, R&S®ZNB20-B22/-B24 and R&S®ZNB40-B22

		specification	typical
Extended power range			
Frequency range	R&S®ZNB4-B22 and R&S®ZNB4-B24	9 kHz to 4.5 GHz	
	R&S®ZNB8-B22 and R&S®ZNB8-B24	9 kHz to 8.5 GHz	
	R&S®ZNB20-B22 and R&S®ZNB20-B24	100 kHz to 20 GHz	
	R&S®ZNB40-B22	10 MHz to 40 GHz	
Power range for the R&S®ZNB4 and the R&S®ZNB8	9 kHz to 100 MHz	–85 dBm to +10 dBm	up to +12 dBm
	100 MHz to 2.5 GHz	–85 dBm to +13 dBm	up to +15 dBm
	2.5 GHz to 7.5 GHz	–85 dBm to +10 dBm	up to +13 dBm
	7.5 GHz to 8.5 GHz	–85 dBm to +8 dBm	up to +12 dBm
Power range for the R&S®ZNB20	100 kHz to 1 MHz	–60 dBm to +8 dBm	up to +10 dBm
	1 MHz to 10 MHz	–60 dBm to +10 dBm	up to +12 dBm
	10 MHz to 10 GHz	–60 dBm to +12 dBm	up to +14 dBm
	10 GHz to 15 GHz	–60 dBm to +10 dBm	up to +12 dBm
	15 GHz to 20 GHz	–60 dBm to +8 dBm	up to +10 dBm
Power range for the R&S®ZNB40	10 MHz to 30 GHz	–60 dBm to +10 dBm	up to +15 dBm
	30 GHz to 40 GHz	–60 dBm to +8 dBm	up to +13 dBm

R&S®ZNB4-B31/-B32/-B33/-B34 and R&S®ZNB8-B31/-B32/-B33/-B34

Receiver step attenuators		
Frequency range	R&S®ZNB4-B31/R&S®ZNB4-B32/ R&S®ZNB4-B33/R&S®ZNB4-B34	9 kHz to 4.5 GHz
	R&S®ZNB8-B31/R&S®ZNB8-B32/ R&S®ZNB8-B33/R&S®ZNB8-B34	9 kHz to 8.5 GHz
Attenuation		0 dB to 30 dB in 10 dB steps

R&S®ZNB4-B52/-B54 and R&S®ZNB8-B52/-B54

Extended dynamic range		**specification**	**typical**
Power range	without R&S®ZNB4-B22/R&S®ZNB4-B24 or R&S®ZNB8-B22/R&S®ZNB8-B24 extended power range option		
	9 kHz to 100 kHz	–55 dBm to +8 dBm	
	100 kHz to 6.5 GHz	–55 dBm to +10 dBm	
	6.5 GHz to 7.5 GHz	–55 dBm to +8 dBm	
	7.5 GHz to 8.5 GHz	–55 dBm to +6 dBm	
	with R&S®ZNB4-B22/R&S®ZNB4-B24 or R&S®ZNB8-B22/R&S®ZNB8-B24 extended power range option		
	9 kHz to 100 kHz	–85 dBm to +8 dBm	
	100 kHz to 6.5 GHz	–85 dBm to +10 dBm	
	6.5 GHz to 7.5 GHz	–85 dBm to +8 dBm	
	7.5 GHz to 8.5 GHz	–85 dBm to +6 dBm	
Dynamic range	9 kHz to 100 kHz	≥ 120 dB	130 dB
	100 kHz to 50 MHz	≥ 125 dB	140 dB
	50 MHz to 6.5 GHz	≥ 140 dB	150 dB
	6.5 GHz to 8.5 GHz	≥ 130 dB	138 dB

Test port input		
Match	without system error correction	
	9 kHz to 20 kHz	≥ 10 dB
	20 kHz to 8.5 GHz	≥ 18 dB
Maximum nominal input level		+10 dBm
Receiver linearity referenced to –10 dBm	for 18 dB to +10 dB	
	9 kHz to 7.5 GHz	≤ 0.2 dB
	for +16 dB to +10 dB	
	7.5 GHz to 8.5 GHz	≤ 0.2 dB
	for +10 dB to –40 dB	
	9 kHz to 8.5 GHz	≤ 0.1 dB
Noise level [7] at 1 kHz measurement bandwidth, normalized to 1 Hz	9 kHz to 50 kHz	≤ –125 dBm (1 Hz)
	50 kHz to 50 MHz	≤ –130 dBm (1 Hz)
	50 MHz to 6.5 GHz	≤ –140 dBm (1 Hz)
	6.5 GHz to 8.5 GHz	≤ –130 dBm (1 Hz)

Trace stability			**specification**	**typical**
Trace noise magnitude (RMS)	at 0 dBm source power, 0 dB reflection	IF bandwidth		
	9 kHz to 20 kHz	1 kHz	≤ 0.008 dB	0.004 dB
	20 kHz to 100 kHz	1 kHz	≤ 0.005 dB	0.001 dB
	100 kHz to 100 MHz	10 kHz	≤ 0.005 dB	0.001 dB
	100 MHz to 8.5 GHz	10 kHz	≤ 0.005 dB	0.002 dB

Measurement speed in ms with option R&S®ZNB4-B52/-B54 or R&S®ZNB8-B52/-B54 installed Typical sweep times versus number of measurement points, sweep mode: stepped.					
Number of measurement points	51	201	401	1601	5001
800 MHz start frequency, 1 GHz stop frequency, AGC LOW DIST, 100 kHz measurement bandwidth					
With correction switched off	2.0	5	8	20	57
With 2-port TOSM calibration	3.5	9	13	40	113
With 4-port TOSM calibration	6.5	17	25	81	246
800 MHz start frequency, 1 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	3.5	10	16	55	170
With 2-port TOSM calibration	6	18	31	109	339
With 4-port TOSM calibration	10	35	61	225	701
100 kHz start frequency, 4.5 GHz stop frequency, AGC LOW DIST, 100 kHz measurement bandwidth					
With correction switched off	4.0	8	12	33	90
With 2-port TOSM calibration	7.5	14	22	65	180
With 4-port TOSM calibration	14	27	42	130	355
100 kHz start frequency, 4.5 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	6	12	21	69	205
With 2-port TOSM calibration	10	23	40	137	405
With 4-port TOSM calibration	19	45	79	273	810
100 kHz start frequency, 8.5 GHz stop frequency, AGC LOW DIST, 100 kHz measurement bandwidth					
With correction switched off	4.5	9	13	34	90
With 2-port TOSM calibration	8.5	17	25	67	180
With 4-port TOSM calibration	16	32	47	131	359
100 kHz start frequency, 8.5 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	6	13	22	70	205
With 2-port TOSM calibration	11	26	43	139	410
With 4-port TOSM calibration	21	50	84	280	815

Note: The R&S®ZNBx-B52/-B54 options cannot be combined with the R&S®ZNBx-B1 option and/or the R&S®ZNBx-B31/-B32/-B33/-B34 options.

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

R&S®ZNB-B81

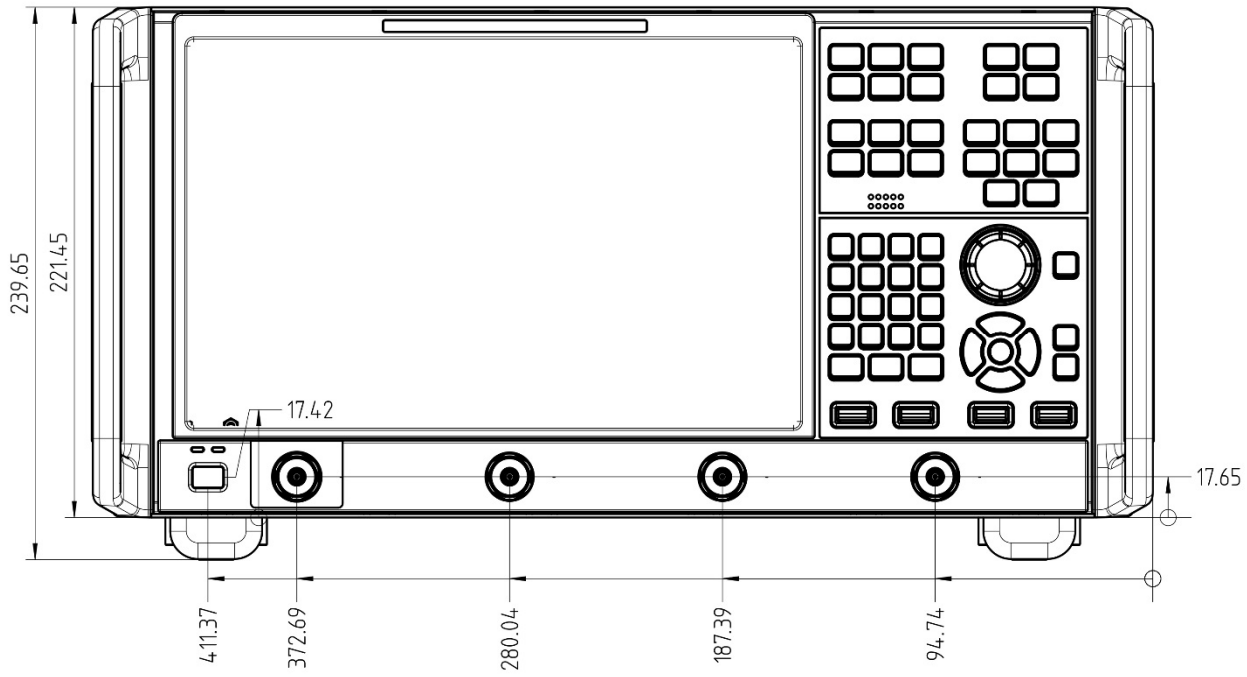
This data is valid from +18 °C to +28 °C and a measurement bandwidth at maximum 10 kHz.

DC inputs		
Number of ports		4
Connector type		BNC, female
Voltage range		±20 V, ±3 V, ±0.3 V
Measurement accuracy	±20 V	1 % of reading ± 0.01 V
	±3 V	1 % of reading ± 0.001 V
	±0.3 V	1 % of reading ± 0.001 V
Input impedance		≥ 1 MΩ
Damage voltage		30 V

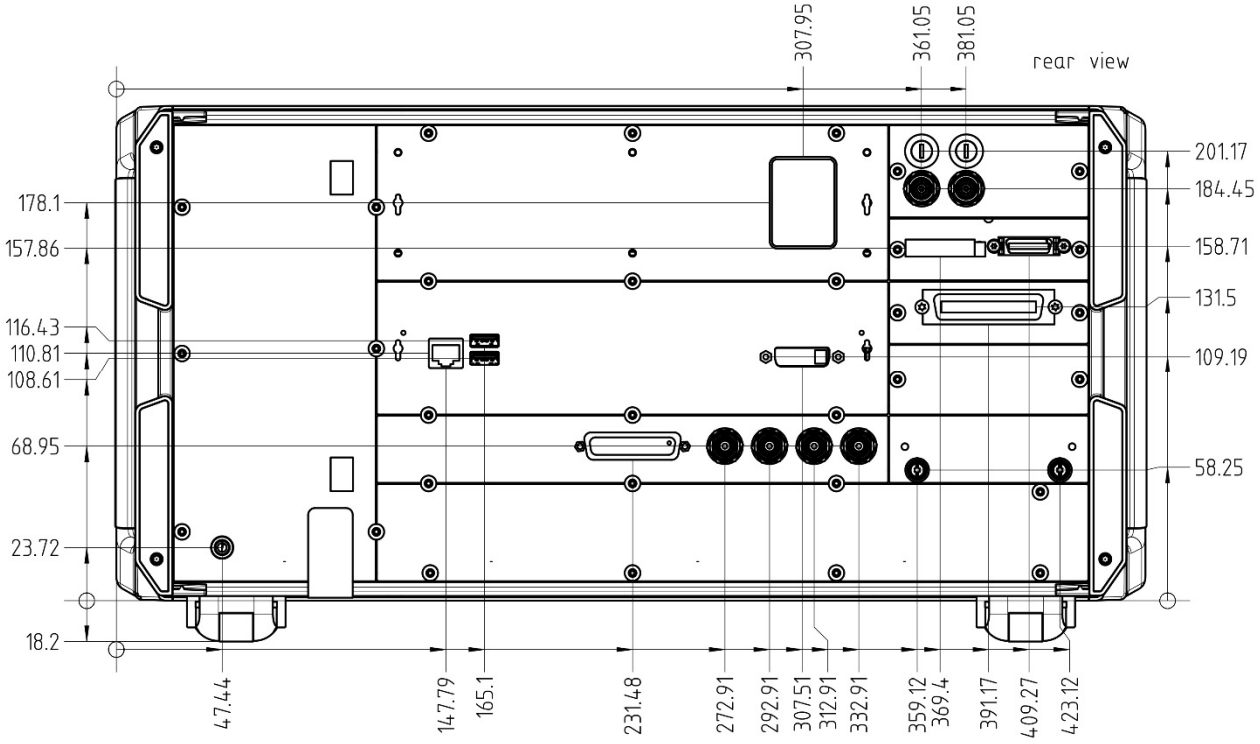
General data

Temperature loading		in line with IEC 60068-2-1 and IEC 60068-2-2
	operating temperature range	+5 °C to +40 °C
	storage temperature range	–20 °C to +60 °C
Damp heat		+40 °C at 85 % rel. humidity, in line with IEC 60068-2-30
Altitude	operating environment	max. 2000 m
	storage environment	max. 4500 m
Mechanical resistance	vibration, sinusoidal	5 Hz to 55 Hz, 0.15 mm amplitude constant, 55 Hz to 150 Hz, 0.5 g constant, in line with IEC 60068-2-6
	vibration, random	10 Hz to 300 Hz, acceleration 1.2 g (RMS) in line with IEC 60068-2-64
	shock	40 g shock spectrum, in line with MIL-STD-810E method no. 516.4 procedure I
Calibration interval		1 year
EMC	RF emission	in line with CISPR 11/EN 55011 group 1 class A (for a shielded test setup); instrument complies with the emission requirements stipulated by EN 55011 and EN 61326-1 class A; this means that the instrument is suitable for use in industrial environments
	immunity	in line with EMC Directive 2004/108/EC including: IEC/EN 61326-1 (immunity test requirement for industrial environment, EN 61326 table 2), IEC/EN 61326-2-1, IEC/EN 61000-3-2, IEC/EN 61000-3-3
Safety		in line with IEC 61010-1, EN 61010-1 and UL 61010-1
Power supply		100 V to 240 V at 50 Hz to 60 Hz and 400 Hz, max. 5.5 A to 2.3 A respectively
Power consumption	R&S®ZNB4 and R&S®ZNB8, with two ports	max. 450 W, typ. 120 W
	R&S®ZNB4 and R&S®ZNB8, with four ports	max. 450 W, typ. 170 W
	R&S®ZNB20 and R&S®ZNB40, with two ports	max. 450 W, typ. 130 W
	R&S®ZNB20 with four ports	max. 450 W, typ. 215 W
Test mark		VDE, GS, $_{c}$CSA$_{US}$, CE conformity mark
Dimensions (W × H × D)		461.1 mm × 239.9 mm × 351.0 mm (18.2 in × 9.6 in × 13.9 in)
Weight	R&S®ZNB4, R&S®ZNB8, R&S®ZNB20 and R&S®ZNB40, with two ports	14 kg (30.9 lb)
	R&S®ZNB4, R&S®ZNB8 and R&S®ZNB20, with four ports	16 kg (35.3 lb)
Shipping weight	R&S®ZNB4, R&S®ZNB8, R&S®ZNB20 and R&S®ZNB40, with two ports	19 kg (41.9 lb)
	R&S®ZNB4, R&S®ZNB8 and R&S®ZNB20, with four ports	21 kg (46.3 lb)

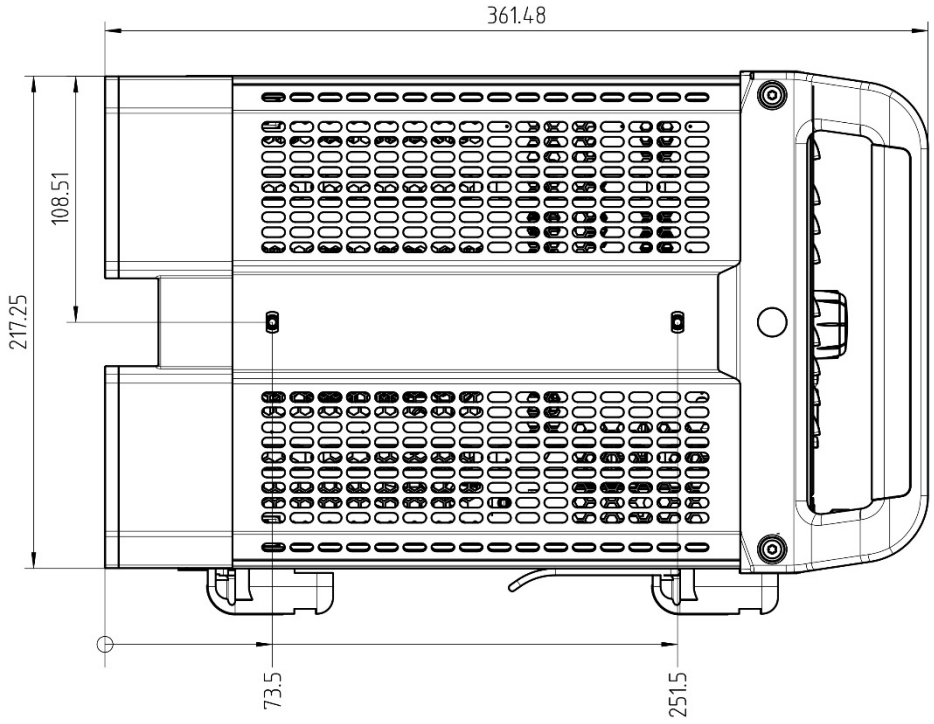
Dimensions (in mm)



Front view of the R&S®ZNB.



Rear view of the R&S®ZNB.



Side view of the R&S®ZNB.

Ordering information

Designation	Type	Retrofit [8]	On Site [9]	Order No.
Base unit				
Vector Network Analyzer, Two Ports, 4.5 GHz, N	R&S®ZNB4			1311.6010K22
Vector Network Analyzer, Four Ports, 4.5 GHz, N	R&S®ZNB4			1311.6010K24
Vector Network Analyzer, Two Ports, 8.5 GHz, N	R&S®ZNB8			1311.6010K42
Vector Network Analyzer, Four Ports, 8.5 GHz, N	R&S®ZNB8			1311.6010K44
Vector Network Analyzer, Two Ports, 20 GHz, 3.5 mm	R&S®ZNB20			1311.6010K62
Vector Network Analyzer, Four Ports, 20 GHz, 3.5 mm	R&S®ZNB20			1311.6010K64
Vector Network Analyzer, Two Ports, 40 GHz, 2.92 mm	R&S®ZNB40			1311.6010K72
Options				
Extended power range				
Extended Power Range for Two-Port R&S®ZNB4	R&S®ZNB4-B22	✓		1316.0210.02
Extended Power Range for Four-Port R&S®ZNB4	R&S®ZNB4-B24	✓		1316.0233.02
Extended Power Range for Two-Port R&S®ZNB8	R&S®ZNB8-B22	✓		1316.0227.02
Extended Power Range for Four-Port R&S®ZNB8	R&S®ZNB8-B24	✓		1316.0240.02
Extended Power Range for Two-Port R&S®ZNB20	R&S®ZNB20-B22	✓		1317.8950.02
Extended Power Range for Four-Port R&S®ZNB20	R&S®ZNB20-B24	✓		1317.8967.02
Extended Power Range for Two-Port R&S®ZNB40	R&S®ZNB40-B22	✓		1317.8973.02
Receiver step attenuators				
Receiver Step Attenuator, Port 1, for R&S®ZNB4	R&S®ZNB4-B31	✓		1316.0185.02
Receiver Step Attenuator, Port 2, for R&S®ZNB4	R&S®ZNB4-B32	✓		1316.0179.02
Receiver Step Attenuator, Port 3, for R&S®ZNB4	R&S®ZNB4-B33	✓		1316.0262.02
Receiver Step Attenuator, Port 4, for R&S®ZNB4	R&S®ZNB4-B34	✓		1316.0433.02
Receiver Step Attenuator, Port 1, for R&S®ZNB8	R&S®ZNB8-B31	✓		1316.0191.02
Receiver Step Attenuator, Port 2, for R&S®ZNB8	R&S®ZNB8-B32	✓		1316.0204.02
Receiver Step Attenuator, Port 3, for R&S®ZNB8	R&S®ZNB8-B33	✓		1316.0162.02
Receiver Step Attenuator, Port 4, for R&S®ZNB8	R&S®ZNB8-B34	✓		1316.0440.02
Extended Dynamic range [10]				
Extended Dynamic Range for Two-Port R&S®ZNB4	R&S®ZNB4-B52			1319.4975.02
Extended Dynamic Range for Four-Port R&S®ZNB4	R&S®ZNB4-B54			1319.4981.02
Extended Dynamic Range for Two-Port R&S®ZNB8	R&S®ZNB8-B52			1319.4998.02
Extended Dynamic Range for Four-Port R&S®ZNB8	R&S®ZNB8-B54			1319.5007.02
Bias Tees for R&S®ZNB4 and R&S®ZNB8 with two ports	R&S®ZNB-B1	✓		1316.1700.02
Bias Tees for R&S®ZNB4 and R&S®ZNB8 with four ports		✓		1316.1700.04
Second Internal Generator for Four-Port R&S®ZNB4 and Four-Port R&S®ZNB8	R&S®ZNB-B2	✓		1317.7954.02
Second Internal Generator for Four-Port R&S®ZNB20	R&S®ZNB20-B2	✓		1317.8980.02
Precision Frequency Reference (OCXO)	R&S®ZNB-B4	✓		1316.1769.02
GPIB Interface	R&S®ZNB-B10	✓	✓	1311.5995.02
Device Control	R&S®ZNB-B12	✓	✓	1319.5088.02
Handler I/O	R&S®ZN-B14	✓	✓	1316.2459.05
RFFE GPIO Interface [11]	R&S®ZN-B15	✓	✓	1323.9355.02
RFFE GPIO Interface [12] including voltage/current measurement	R&S®ZN-B15	✓	✓	1323.9355.03
Additional Removable Hard Disk, 32 bit	R&S®ZNB-B19	✓	✓	1323.9490.02
Additional Removable Hard Disk, 64 bit	R&S®ZNB-B19	✓	✓	1323.9490.07
DC Inputs	R&S®ZNB-B81	✓		1316.0004.02
Time Domain Analysis	R&S®ZNB-K2		✓	1316.0156.02
Frequency Conversion	R&S®ZNB-K4		✓	1316.2994.02
Intermodulation Measurements [12]	R&S®ZNB-K14		✓	1317.8373.02
10 MHz Receiver Bandwidth	R&S®ZNB-K17		✓	1316.1881.02
1 mHz Frequency Resolution	R&S®ZNB-K19		✓	1317.8573.02
19" Rackmount Kit	R&S®ZZA-KN5		✓	1175.3040.00
Direct Control Cable	R&S®ZN-B121		✓	1323.9290.00
Upgrade Kit, 64 bit [13]	R&S®ZNB-U64	✓		1326.8066.64

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

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

[10] The R&S®ZNBx-B52/-B54 options cannot be combined with the R&S®ZNBx-B1 option and/or the R&S®ZNBx-B31/-B32/-B33/-B34 options.

[11] The R&S®ZN-B15 option cannot be combined with the R&S®ZNBx-B1 option.

[12] The R&S®ZNB-K14 requires R&S®ZNB-K4.

[13] Upgrade from 32 bit to 64 bit, Windows 7 and 8 Gbyte RAM.

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, three years	R&S®WE3	
Extended warranty, four years	R&S®WE4	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with calibration coverage, three years	R&S®CW3	
Extended warranty with calibration coverage, four years	R&S®CW4	

Extended warranty with a term of one to four years (WE1 to WE4)
Repairs carried out during the contract term are free of charge [14]. 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 CW4)
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 [14] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

For product brochure, see PD 5214.5384.12 and www.rohde-schwarz.com

[14] 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

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The Rohde&Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. Founded more than 80 years ago, this independent company has an extensive sales and service network and is present in more than 70 countries. The electronics group is among the world market leaders in its established business fields. The company is headquartered in Munich, Germany. It also has regional headquarters in Singapore and Columbia, Maryland, USA, to manage its operations in these regions.

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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