R&S®ZNB
Vector Network Analyzer
Specifications

ROHDE&SCHWARZ

Test & Measurement

Data Sheet | 07.03

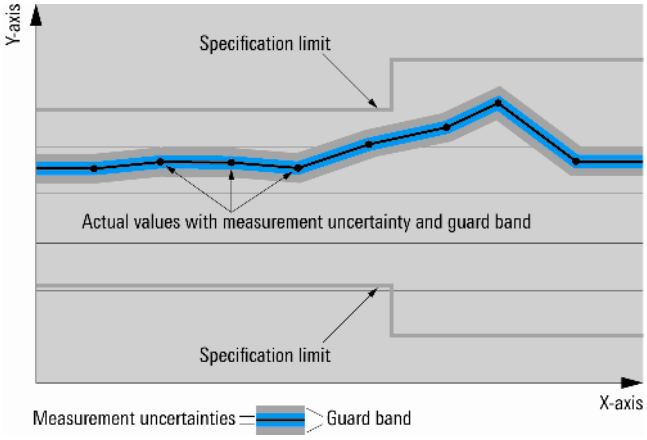
CONTENTS

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

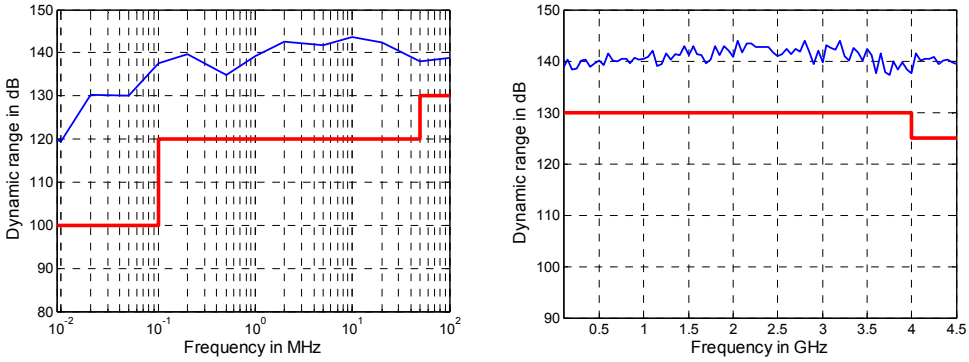
Impedance		50 Ω
Test port connector	R&S®ZNB4	N female
	R&S®ZNB8	N female
	R&S®ZNB20	3.5 mm, male, ruggedized
	R&S®ZNB40	2.92 mm, male, ruggedized
Number of test ports	R&S®ZNB4	2 or 4
	R&S®ZNB8	2 or 4
	R&S®ZNB20	2 or 4
	R&S®ZNB40	2
Frequency range [1]	R&S®ZNB4	9 kHz to 4.5 GHz
	R&S®ZNB8	9 kHz to 8.5 GHz
	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	$\pm 5 \times 10^{-8}$

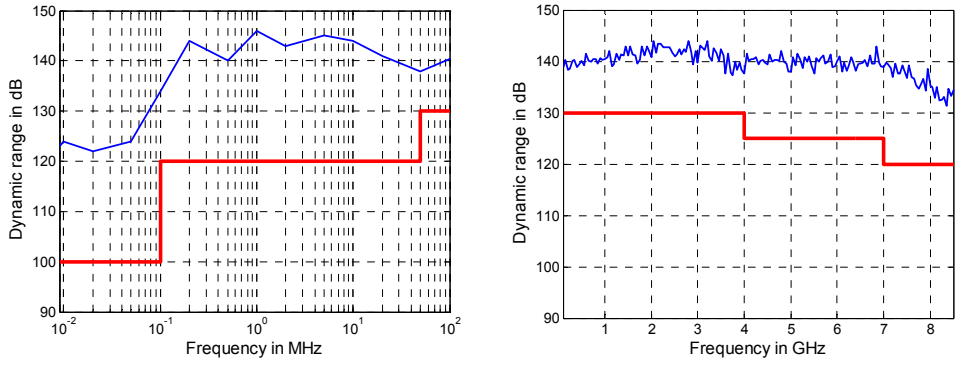
Frequency resolution		1 Hz
Number of measurement points	per trace	2 to 100 001
Measurement bandwidth	1/1.5/2/3/5/7 steps	
	without optional increased bandwidth	1 Hz to 1 MHz
	with optional increased bandwidth	1 Hz to 10 MHz
Dynamic range [2] of the R&S®ZNB4 and the R&S®ZNB8 (without optional step attenuators)	9 kHz to 100 kHz	> 100 dB, typ. 122 dB
	100 kHz to 50 MHz	> 120 dB, typ. 138 dB
	50 MHz to 4 GHz	> 130 dB, typ. 140 dB
	4 GHz to 7 GHz	> 125 dB, typ. 138 dB
	7 GHz to 8.5 GHz	> 120 dB, typ. 130 dB
Dynamic range [2] of the R&S®ZNB20	100 kHz to 1 MHz	> 100 dB, typ. 110 dB
	1 MHz to 10 MHz	> 110 dB, typ. 120 dB
	10 MHz to 100 MHz	> 115 dB, typ. 125 dB
	100 MHz to 6 GHz	> 125 dB, typ. 135 dB
	6 GHz to 20 GHz	> 120 dB, typ. 130 dB
Dynamic range [2] of the R&S®ZNB40	10 MHz to 50 MHz	> 90 dB, typ. 105 dB
	50 MHz to 100 MHz	> 115 dB, typ. 125 dB
	100 MHz to 500 MHz	> 120 dB, typ. 130 dB
	500 MHz to 20 GHz	> 125 dB, typ. 135 dB
	20 GHz to 30 GHz	> 115 dB, typ. 125 dB
	30 GHz to 40 GHz	> 110 dB, typ. 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.

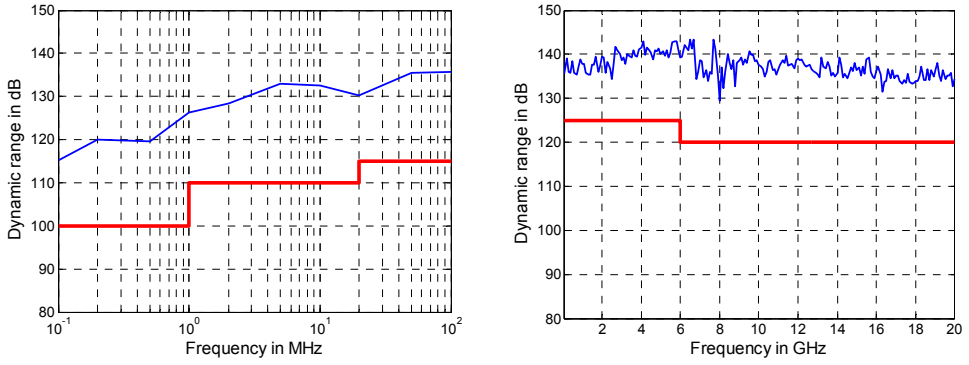
[2] The dynamic range is defined as the difference between the actual maximum source power and the RMS value of the data trace of the transmission magnitude, which is produced by noise and crosstalk with the test ports short-circuited. The specification applies at 10 Hz measurement bandwidth, without 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.



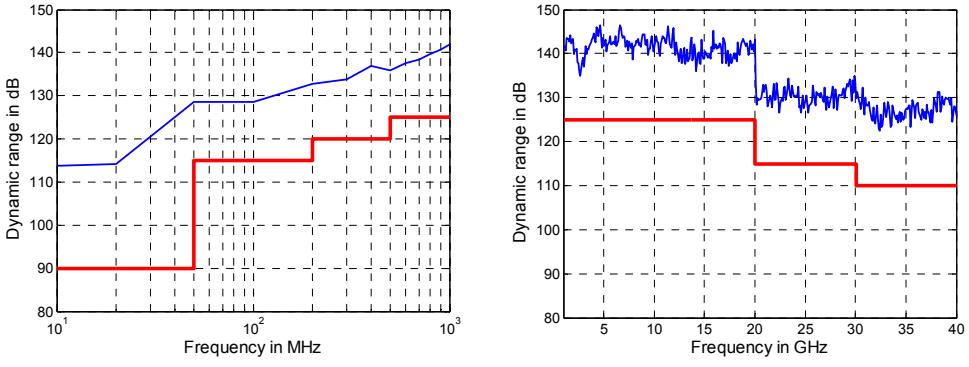
Dynamic range in dB versus frequency for the R&S®ZNB4.



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



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

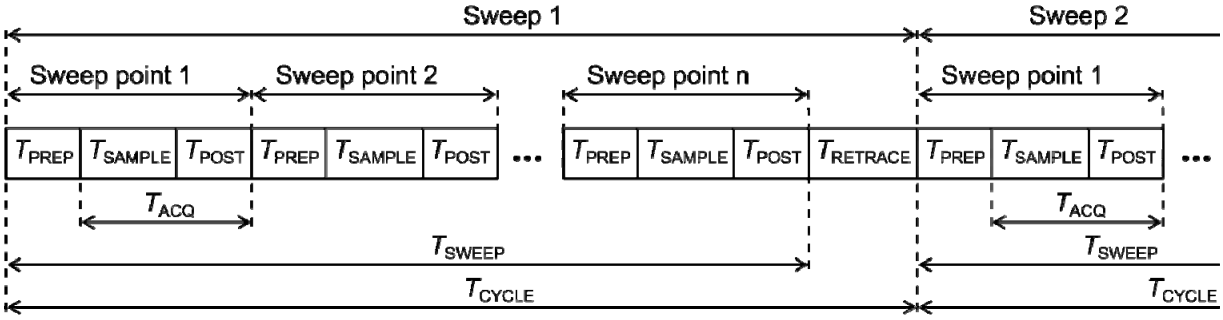


Dynamic range in dB versus frequency for the R&S®ZNB40.

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}) IF filter: normal	at 1 MHz measurement bandwidth	860 ns		
	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 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**
800 MHz start frequency, 1 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth					
With correction switched off	49 ms	185 ms	370 ms	1385 ms	4320 ms
With 2-port TOSM calibration	98 ms	370 ms	740 ms	2770 ms	8640 ms
With 4-port TOSM calibration	190 ms	735 ms	1460 ms	5530 ms	17200 ms
800 MHz start frequency, 1 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	2.0 ms	5 ms	8 ms	20 ms	57 ms
With 2-port TOSM calibration	3.5 ms	9 ms	13 ms	40 ms	113 ms
With 4-port TOSM calibration	6.5 ms	17 ms	25 ms	81 ms	246 ms
800 MHz start frequency, 1 GHz stop frequency, AGC AUTO, 1 MHz measurement bandwidth					
With correction switched off	1.5 ms	2.5 ms	3.5 ms	9 ms	23 ms
With 2-port TOSM calibration	2.5 ms	4 ms	6 ms	17 ms	48 ms
With 4-port TOSM calibration	4.6 ms	9 ms	13 ms	41 ms	117 ms
100 kHz start frequency, 4.5 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth					
With correction switched off	52 ms	185 ms	365 ms	1435 ms	4480 ms
With 2-port TOSM calibration	103 ms	370 ms	730 ms	2870 ms	8960 ms
With 4-port TOSM calibration	200 ms	735 ms	1450 ms	5750 ms	17800 ms
100 kHz start frequency, 4.5 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	4.0 ms	8 ms	12 ms	33 ms	90 ms
With 2-port TOSM calibration	7.5 ms	14 ms	22 ms	65 ms	180 ms
With 4-port TOSM calibration	14 ms	27 ms	42 ms	130 ms	355 ms
100 kHz start frequency, 4.5 GHz stop frequency, AGC AUTO, 1 MHz measurement bandwidth					
With correction switched off	3.5 ms	6.0 ms	8 ms	21 ms	45 ms
With 2-port TOSM calibration	7.0 ms	11.0 ms	16 ms	42 ms	90 ms
With 4-port TOSM calibration	12 ms	20 ms	30 ms	84 ms	180 ms
100 kHz start frequency, 8.5 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth					
With correction switched off	53 ms	188 ms	368 ms	1435 ms	4450 ms
With 2-port TOSM calibration	105 ms	376 ms	736 ms	2870 ms	8900 ms
With 4-port TOSM calibration	208 ms	745 ms	1470 ms	5750 ms	17750 ms
100 kHz start frequency, 8.5 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	4.5 ms	9 ms	13 ms	34 ms	90 ms
With 2-port TOSM calibration	8.5 ms	17 ms	25 ms	67 ms	180 ms
With 4-port TOSM calibration	16 ms	32 ms	47 ms	131 ms	359 ms
100 kHz start frequency, 8.5 GHz stop frequency, AGC AUTO, 1 MHz measurement bandwidth					
With correction switched off	3.9 ms	7 ms	10 ms	22 ms	55 ms
With 2-port TOSM calibration	8.0 ms	14 ms	20 ms	43 ms	110 ms
With 4-port TOSM calibration	15 ms	25 ms	35 ms	86 ms	214 ms

[4] Sweep time is to be understood as cycle time; static frequency accuracy of the instrument applies; measured with firmware version 1.81, Windows 7.

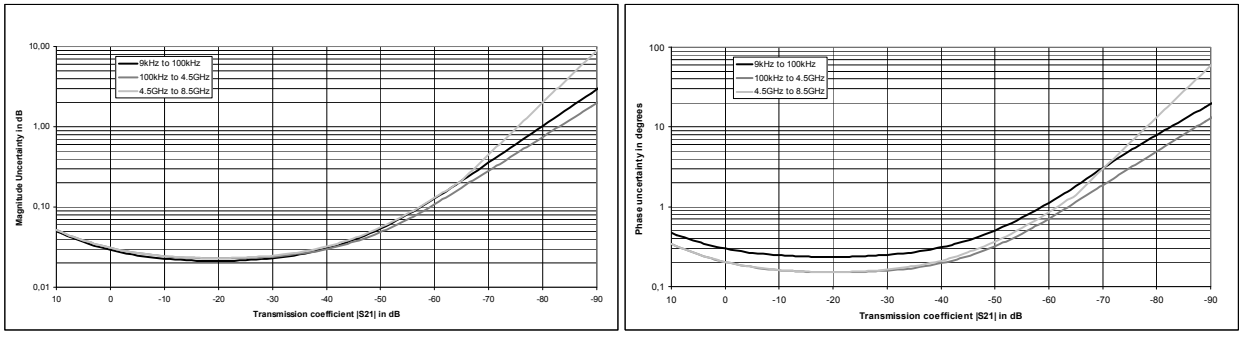
Typical sweep times versus number of measurement points [5] of the R&S®ZNB20 and the R&S®ZNB40					
Number of measurement points	**51**	**201**	**401**	**1601**	**5001**
9 GHz start frequency, 10 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth					
With correction switched off	50 ms	200 ms	370 ms	1450 ms	4500 ms
With 2-port TOSM calibration	100 ms	400 ms	740 ms	2900 ms	9000 ms
With 4-port TOSM calibration	200 ms	800 ms	1480 ms	5800 ms	18000 ms
9 GHz start frequency, 10 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	2 ms	4.5 ms	8 ms	25 ms	75 ms
With 2-port TOSM calibration	4 ms	9 ms	16 ms	50 ms	150 ms
With 4-port TOSM calibration	8 ms	18 ms	32 ms	100 ms	300 ms
9 GHz start frequency, 10 GHz stop frequency, AGC AUTO, 1 MHz measurement bandwidth					
With correction switched off	1.5 ms	3.2 ms	5 ms	10 ms	25 ms
With 2-port TOSM calibration	3 ms	6.5 ms	10 ms	22 ms	63 ms
With 4-port TOSM calibration	7 ms	13 ms	20 ms	56 ms	165 ms
10 GHz start frequency, 20 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth					
With correction switched off	51 ms	190 ms	370 ms	1500 ms	4600 ms
With 2-port TOSM calibration	102 ms	380 ms	740 ms	3000 ms	9100 ms
With 4-port TOSM calibration	205 ms	760 ms	1470 ms	6000 ms	18500 ms
10 GHz start frequency, 20 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	6 ms	10 ms	15 ms	32 ms	100 ms
With 2-port TOSM calibration	12 ms	20 ms	30 ms	65 ms	200 ms
With 4-port TOSM calibration	24 ms	40 ms	60 ms	130 ms	400 ms
10 GHz start frequency, 20 GHz stop frequency, AGC AUTO, 1 MHz measurement bandwidth					
With correction switched off	5 ms	8 ms	10 ms	20 ms	45 ms
With 2-port TOSM calibration	10 ms	16 ms	20 ms	40 ms	90 ms
With 4-port TOSM calibration	21 ms	32 ms	40 ms	85 ms	220 ms
100 kHz start frequency, 20 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth					
With correction switched off	55 ms	200 ms	380 ms	1500 ms	4600 ms
With 2-port TOSM calibration	115 ms	400 ms	760 ms	3000 ms	9100 ms
With 4-port TOSM calibration	230 ms	800 ms	1520 ms	6000 ms	18500 ms
100 kHz start frequency, 20 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	10 ms	15 ms	19 ms	40 ms	100 ms
With 2-port TOSM calibration	20 ms	30 ms	38 ms	80 ms	200 ms
With 4-port TOSM calibration	40 ms	60 ms	75 ms	160 ms	400 ms
100 kHz start frequency, 20 GHz stop frequency, AGC AUTO, 1 MHz measurement bandwidth					
With correction switched off	9 ms	14 ms	16 ms	30 ms	60 ms
With 2-port TOSM calibration	18 ms	28 ms	32 ms	60 ms	120 ms
With 4-port TOSM calibration	38 ms	56 ms	64 ms	120 ms	250 ms
10 MHz start frequency, 40 GHz stop frequency, AGC LOW DIST, 1 kHz measurement bandwidth					
With correction switched off	60 ms	200 ms	380 ms	1500 ms	4600 ms
With 2-port TOSM calibration	120 ms	400 ms	760 ms	3000 ms	9100 ms
10 MHz start frequency, 40 GHz stop frequency, AGC AUTO, 100 kHz measurement bandwidth					
With correction switched off	12 ms	20 ms	25 ms	45 ms	100 ms
With 2-port TOSM calibration	24 ms	40 ms	50 ms	90 ms	200 ms
10 MHz start frequency, 40 GHz stop frequency, AGC AUTO, 1 MHz measurement bandwidth					
With correction switched off	11 ms	18 ms	20 ms	35 ms	65 ms
With 2-port TOSM calibration	22 ms	36 ms	40 ms	70 ms	130 ms

[5] Sweep time is to be understood as cycle time; static frequency accuracy of the instrument applies; measured with firmware version 1.90, Windows 7.

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

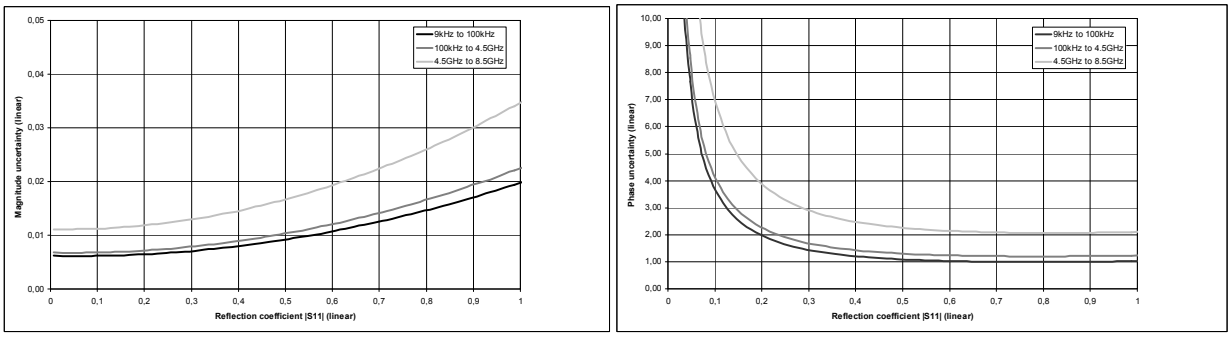
This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C since calibration. Validity of the data is conditional on the use of an R&S®ZV-Z270 calibration kit. This calibration kit is used to achieve the effective system data specified below. Frequency points, 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.		

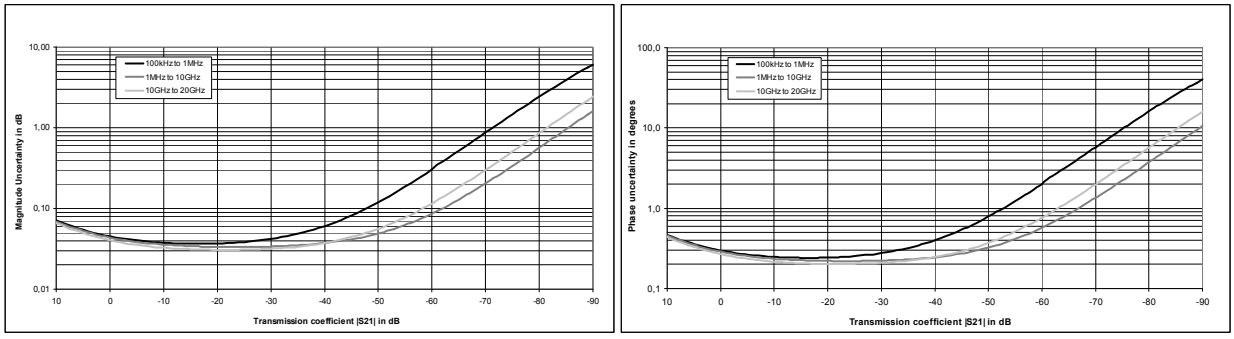


Typical accuracy of reflection magnitude and reflection phase measurements for the R&S®ZNB4 in the frequency range from 9 kHz to 4.5 GHz, for the R&S®ZNB8 in the frequency range from 9 kHz to 8.5 GHz.
Analysis conditions: $S_{12} = S_{21} = 0$, cal. power –10 dBm, meas. power –10 dBm.

Measurement accuracy of the R&S®ZNB20

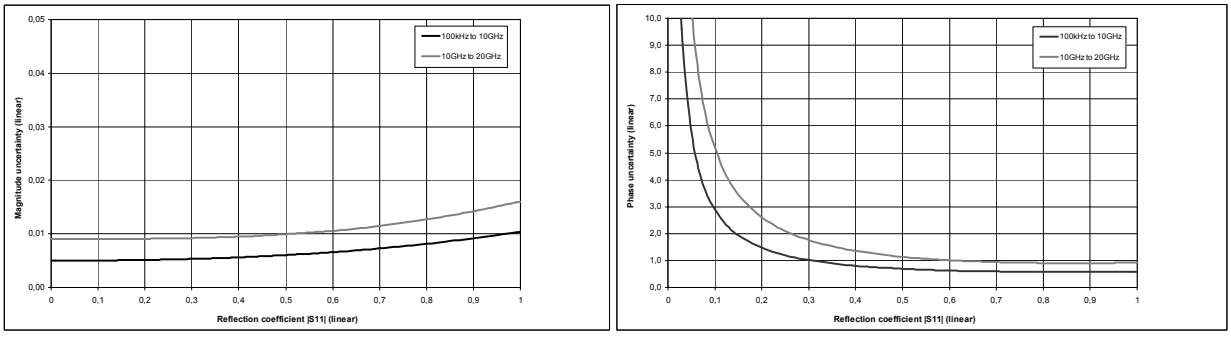
This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C since calibration. Validity of the data is conditional on the use of an R&S®ZV-Z235 calibration kit. This calibration kit is used to achieve the effective system data specified below. Frequency points,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

Accuracy of transmission measurements		
100 kHz to 1 MHz	+5 dB to –35 dB	< 0.05 dB or < 0.5°
	–35 dB to –50 dB	< 0.1 dB or < 1°
	–50 dB to –60 dB	< 0.3 dB or < 5°
1 MHz to 10 GHz	+5 dB to –35 dB	< 0.05 dB or < 0.5°
	–35 dB to –50 dB	< 0.06 dB or < 0.6°
	–50 dB to –60 dB	< 0.1 dB or < 1°
10 GHz to 20 GHz	+5 dB to –35 dB	< 0.05 dB or < 0.5°
	–35 dB to –50 dB	< 0.08 dB or < 0.8°
	–50 dB to –60 dB	< 0.15 dB or < 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		
100 kHz to 10 GHz	0 dB to –15 dB	< 0.3 dB or < 2°
	–15 dB to –25 dB	< 1.0 dB or < 6°
	–25 dB to –35 dB	< 3.0 dB or < 20°
10 GHz to 20 GHz	0 dB to –15 dB	< 0.5 dB or < 4°
	–15 dB to –25 dB	< 1.6 dB or < 10°
	–25 dB to –35 dB	< 7.5 dB or < 35°
Specifications are based on an isolating DUT, a measurement bandwidth of 10 Hz and a nominal source power of –10 dBm.		

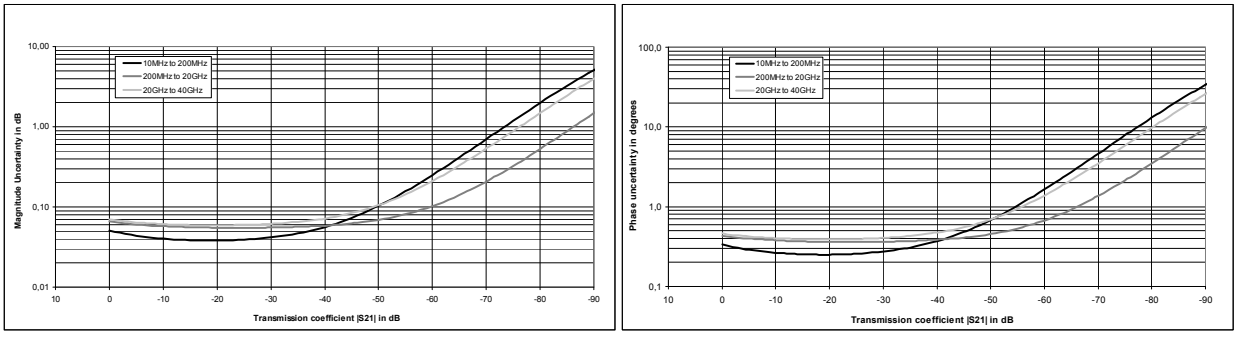


Typical accuracy of reflection magnitude and reflection phase measurements for the R&S®ZNB20 in the frequency range from 100 kHz to 20 GHz. Analysis conditions: $S_{12} = S_{21} = 0$, cal. power –10 dBm, meas. power –10 dBm.

Measurement accuracy of the R&S®ZNB40

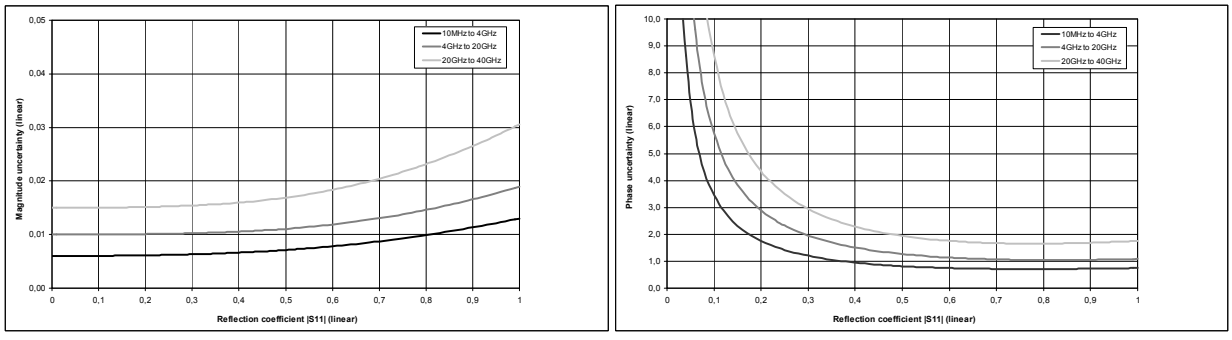
This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C since calibration. Validity of the data is conditional on the use of an R&S®ZV-Z229 calibration kit. This calibration kit is used to achieve the effective system data specified below. Frequency points, 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 and system error calibration with an R&S®ZV-Z270 calibration kit.

R&S®ZNB4 and R&S®ZNB8	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

The data is based on a measurement bandwidth of 10 Hz and system error calibration with an R&S®ZV-Z235 calibration kit.

R&S®ZNB20	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

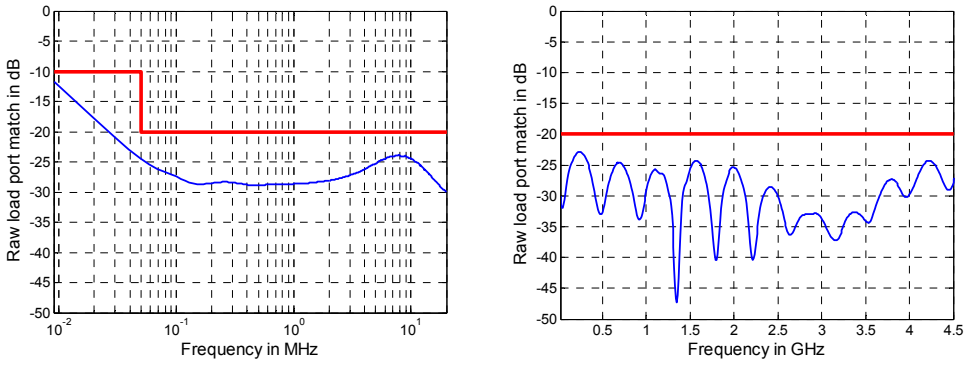
The data is based on a measurement bandwidth of 10 Hz and system error calibration with an R&S®ZV-Z229 calibration kit.

R&S®ZNB40	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

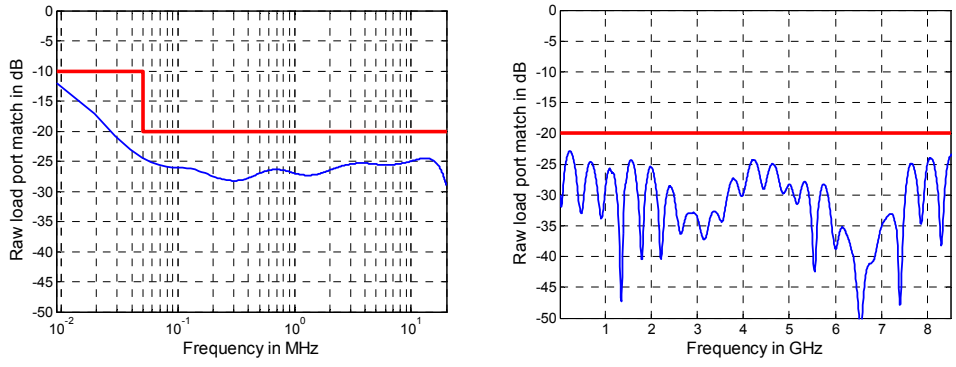
Factory-calibrated system data

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.

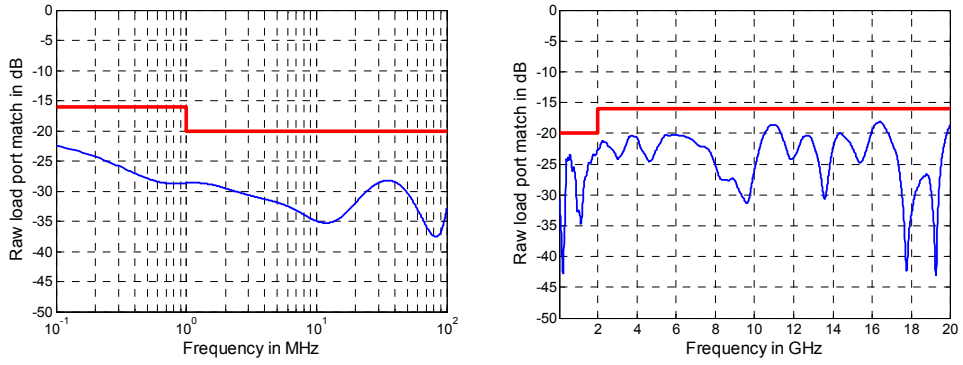
Directivity	9 kHz to 50 kHz	> 20 dB, typ. 35 dB
	50 kHz to 4.5 GHz	> 30 dB, typ. 50 dB
	4.5 GHz to 10 GHz	> 30 dB, typ. 50 dB
	10 GHz to 20 GHz	> 25 dB, typ. 35 dB
	20 GHz to 35 GHz	> 20 dB, typ. 20 dB
	35 GHz to 40 GHz	> 15 dB, typ. 20 dB
Source match	9 kHz to 50 kHz	> 20 dB, typ. 35 dB
	50 kHz to 4.5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



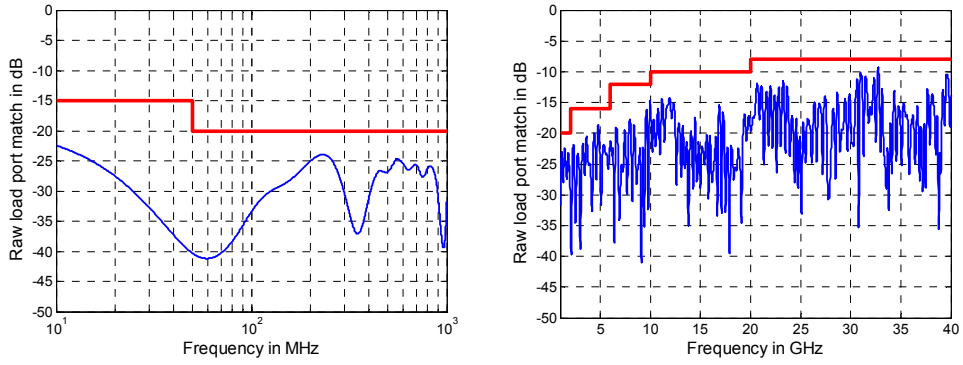
Raw load port match versus frequency for the R&S®ZNB4.



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.

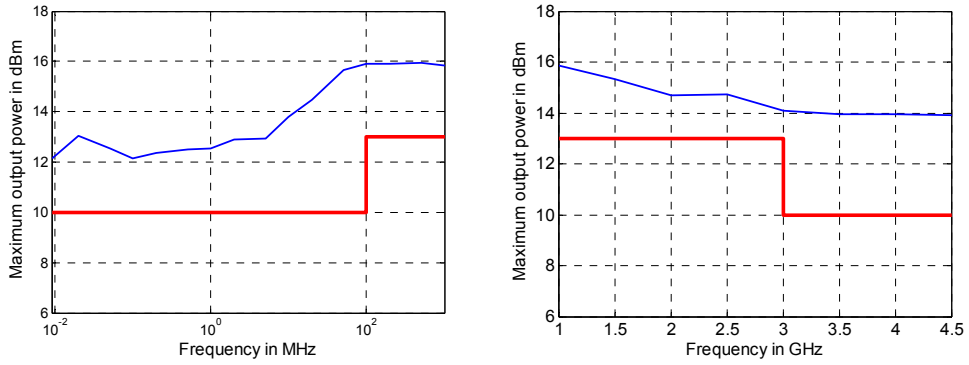
Trace stability			
Trace noise magnitude (RMS) of the R&S®ZNB4 and the R&S®ZNB8	at 0 dBm source power, 0 dB reflection	IF bandwidth	
	9 kHz to 20 kHz	1 kHz	< 0.008 dB, typ. 0.004 dB
	20 kHz to 100 kHz	1 kHz	< 0.004 dB, typ. 0.001 dB
	100 kHz to 100 MHz	10 kHz	< 0.004 dB, typ. 0.001 dB
	100 MHz to 8.5 GHz	10 kHz	< 0.004 dB, typ. 0.002 dB
Trace noise magnitude (RMS) of the R&S®ZNB20	at 0 dBm source power, 0 dB reflection	IF bandwidth	
	100 kHz to 300 kHz	10 kHz	< 0.008 dB, typ. 0.002 dB
	300 kHz to 20 GHz	10 kHz	< 0.004 dB, typ. 0.001 dB
Trace noise magnitude (RMS) of the R&S®ZNB40	at 0 dBm source power, 0 dB reflection	IF bandwidth	
	10 MHz to 50 MHz	10 kHz	< 0.04 dB, typ. 0.02 dB
	50 MHz to 500 MHz	10 kHz	< 0.015 dB, typ. 0.006 dB
	500 MHz to 20 GHz	10 kHz	< 0.004 dB, typ. 0.002 dB
	20 GHz to 30 GHz	10 kHz	< 0.015 dB, typ. 0.006 dB
	30 GHz to 40 GHz	10 kHz	< 0.02 dB, typ. 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	IF bandwidth	
	9 kHz to 20 kHz	1 kHz	< 0.07°, typ. 0.04°
	20 kHz to 100 kHz	1 kHz	< 0.035°, typ. 0.01°
	100 kHz to 100 MHz	10 kHz	< 0.035°, typ. 0.005°
	100 MHz to 8.5 GHz	10 kHz	< 0.035°, typ. 0.02°
Trace noise phase (RMS) of the R&S®ZNB20	at 0 dBm source power, 0 dB reflection	IF bandwidth	
	100 kHz to 300 kHz	10 kHz	< 0.07°, typ. 0.02°
	300 kHz to 20 GHz	10 kHz	< 0.035°, typ. 0.01°
Trace noise phase (RMS) of the R&S®ZNB40	at 0 dBm source power, 0 dB reflection	IF bandwidth	
	10 MHz to 50 MHz	10 kHz	< 0.4°, typ. 0.2°
	50 MHz to 500 MHz	10 kHz	< 0.12°, typ. 0.06°
	500 MHz to 20 GHz	10 kHz	< 0.035°, typ. 0.02°
	20 GHz to 30 GHz	10 kHz	< 0.12°, typ. 0.06°
	30 GHz to 40 GHz	10 kHz	< 0.2°, typ. 0.12°
Temperature dependence	at 0 dB transmission or reflection		
	9 kHz to 4.5 GHz	magnitude	typ. 0.01 dB/K
		phase	typ. 0.15°/K
	4.5 GHz to 40 GHz	magnitude	typ. 0.04 dB/K
		phase	typ. 0.8°/K

Test port output

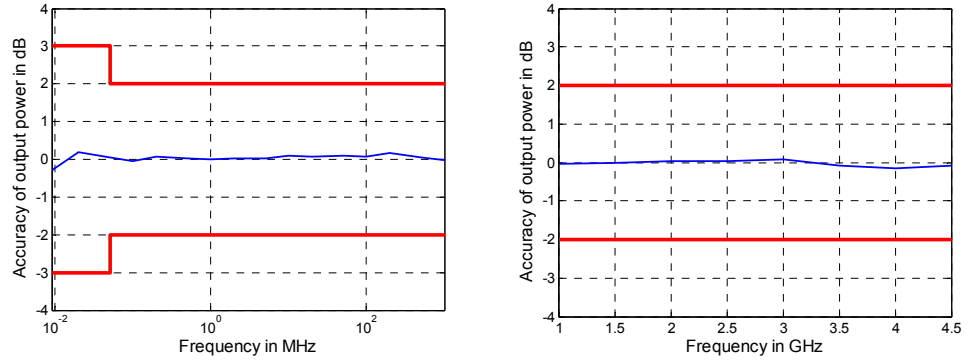
This data is valid from +18 °C to +28 °C.

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, typ. +12 dBm
	100 MHz to 2.5 GHz	–55 dBm to +13 dBm, typ. +15 dBm
	2.5 GHz to 7.5 GHz	–55 dBm to +10 dBm, typ. +13 dBm
	7.5 GHz to 8.5 GHz	–55 dBm to +8 dBm, typ. +12 dBm
	with R&S®ZNB-B22/-B24 extended power range option	
	9 kHz to 100 MHz	–85 dBm to +10 dBm, typ. +12 dBm
	100 MHz to 2.5 GHz	–85 dBm to +13 dBm, typ. +15 dBm
	2.5 GHz to 7.5 GHz	–85 dBm to +10 dBm, typ. +13 dBm
	7.5 GHz to 8.5 GHz	–85 dBm to +8 dBm, typ. +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, typ. +10 dBm
	1 MHz to 10 MHz	–30 dBm to +10 dBm, typ. +12 dBm
	10 MHz to 10 GHz	–30 dBm to +12 dBm, typ. +14 dBm
	10 GHz to 15 GHz	–30 dBm to +10 dBm, typ. +12 dBm
	15 GHz to 20 GHz	–30 dBm to +8 dBm, typ. +10 dBm
	with R&S®ZNB20-B22/-B24 extended power range option	
	100 kHz to 1 MHz	–60 dBm to +8 dBm, typ. +10 dBm
	1 MHz to 10 MHz	–60 dBm to +10 dBm, typ. +12 dBm
	10 MHz to 10 GHz	–60 dBm to +12 dBm, typ. +14 dBm
	10 GHz to 15 GHz	–60 dBm to +10 dBm, typ. +12 dBm
	15 GHz to 20 GHz	–60 dBm to +8 dBm, typ. +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, typ. +15 dBm
	30 GHz to 40 GHz	–30 dBm to +8 dBm, typ. +13 dBm
	with R&S®ZNB40-B22 extended power range option	
	10 MHz to 30 GHz	–60 dBm to +10 dBm, typ. +15 dBm
	30 GHz to 40 GHz	–60 dBm to +8 dBm, typ. +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, typ. 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

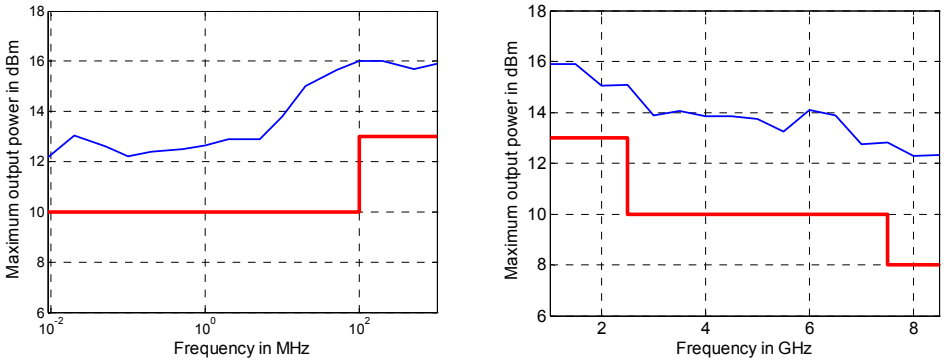
Harmonics of the R&S®ZNB4 and the R&S®ZNB8	at 0 dBm	
	20 kHz to 100 MHz	< –20 dBc, typ. < –30 dBc
	100 MHz to 8.5 GHz	< –25 dBc, typ. < –35 dBc
Harmonics of the R&S®ZNB20	at 0 dBm	
	100 kHz to 10 MHz	< –15 dBc, typ. < –20 dBc
	10 MHz to 100 MHz	< –20 dBc, typ. < –30 dBc
	100 MHz to 15 GHz	< –25 dBc,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



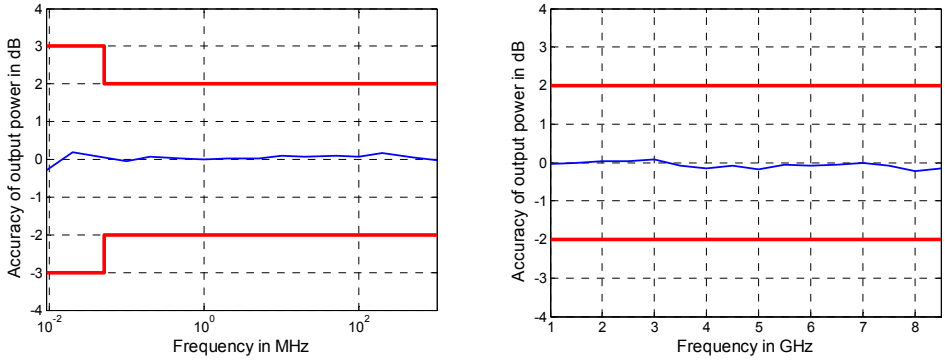
Maximum output power in dBm versus frequency for the R&S®ZNB4.



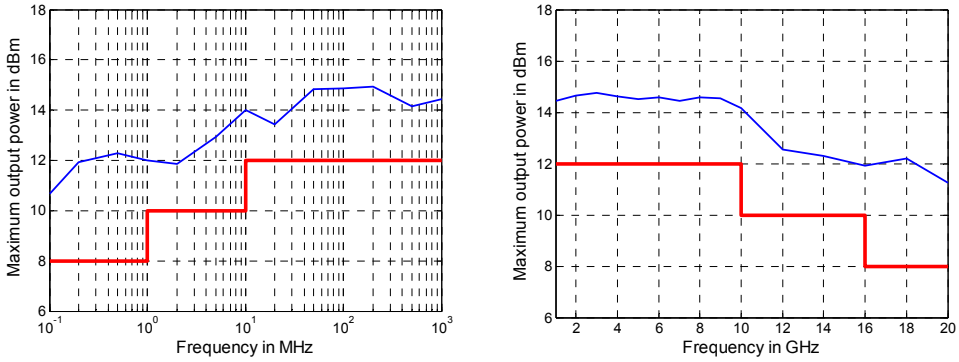
Output power accuracy in dB versus frequency for the R&S®ZNB4.



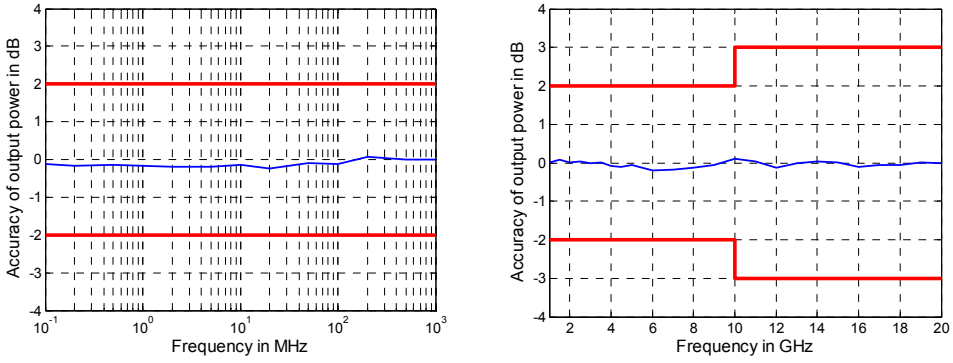
Maximum output power in dBm versus frequency for the R&S®ZNB8.



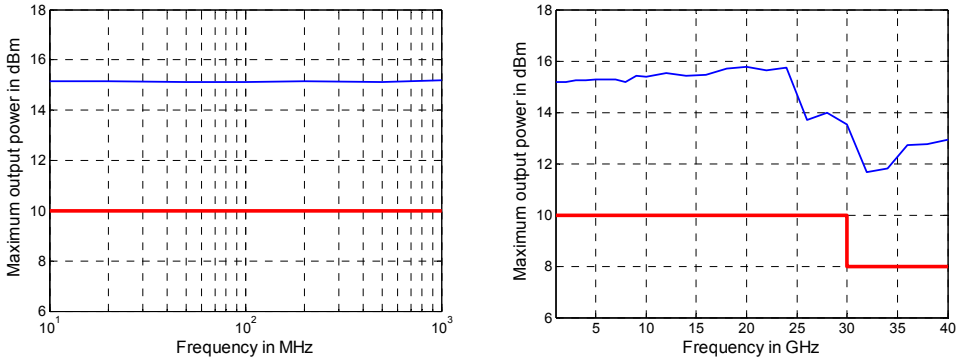
Output power accuracy in dB versus frequency for the R&S®ZNB8.



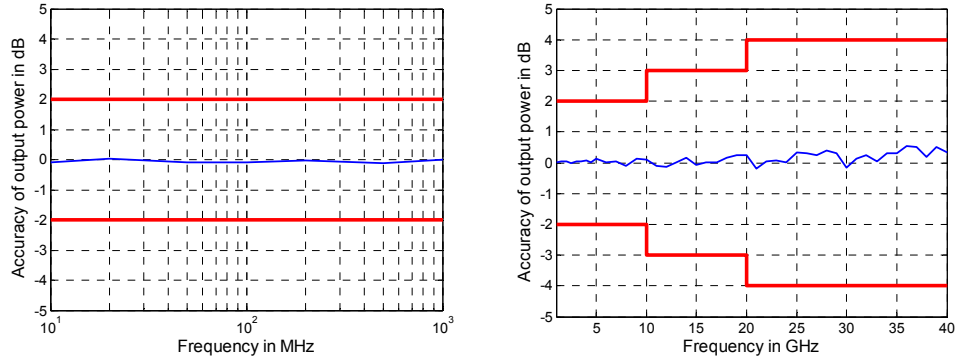
Maximum output power in dBm versus frequency for the R&S®ZNB20.



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 [6] 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)

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

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 frequency accuracy		80 Hz
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)

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.

Directivity	100 kHz to 4.5 GHz	> 30 dB, typ. 50 dB
	4.5 GHz to 8.5 GHz	> 30 dB, typ. 50 dB
Source match	100 kHz to 500 kHz	> 20 dB, typ. 30 dB
	500 kHz to 4.5 GHz	> 30 dB, typ. 50 dB
	4.5 GHz to 8.5 GHz	> 30 dB, typ. 50 dB
Reflection tracking	100 kHz to 8.5 GHz	< 0.5 dB, typ. 0.1 dB
Load match	100 kHz to 500 kHz	> 10 dB, typ. 15 dB
	500 kHz to 8.5 GHz	> 20 dB, typ. 25 dB
Transmission tracking	100 kHz to 8.5 GHz	< 0.5 dB, typ. 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, 3.3 V TTL, for controlling external devices, limit checks, sweep signals, etc.	
Agilent handler interface compatibility	type 3	
Input signals	pin 2, pin 18	3.3 V TTL, 5 V tolerant
Output signals	pin 3 to pin 17, pin 19 to pin 21, pin 30 to pin 34, pin 36	3.3 V TTL, 5 V tolerant
Input/output signals	pin 22 to pin 29	3.3 V TTL, 5 V tolerant
+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	RFFE: controls up to two independent MIPI RFFE devices, GPIO: ten output lanes with different power capability	
Connector type	25-pin D-Sub female	
Ground	pin 1/3/5/11/22	
RFFE port 1 VIO (output)	pin 2	0 V to +2 V; 1 mV step size, max. 20 mA
RFFE port 1 DATA (output)	pin 15	0 V to +2 V; 1 mV step size, max. 20 mA
RFFE port 1 CLK (output)	pin 14	0 V to +2 V; 1 mV step size, max. 20 mA 31.25 kHz to 26 MHz
RFFE port 2 VIO (output)	pin 4	0 V to +2 V; 1 mV step size, max. 20 mA
RFFE port 2 DATA (output)	pin 17	0 V to +2 V; 1 mV step size, max. 20 mA
RFFE port 2 CLK (output)	pin 16	0 V to +2 V; 1 mV step size, max. 20 mA 31.25 kHz to 26 MHz
GPIO 1 to GPIO 8 (output)	pin 6 to pin 9, pin 18 to pin 21	–5 V to +10 V; 5 mV step size, max. 20 mA, typ. –6 V to +12 V
GPIO 9/10 (output)	pin 10/23	–5 V to +10 V; 5 mV step size, max. 100 mA, typ. –6 V to +12 V

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

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, typ. +12 dBm
	100 MHz to 2.5 GHz	–85 dBm to +13 dBm, typ. +15 dBm
	2.5 GHz to 7.5 GHz	–85 dBm to +10 dBm, typ. +13 dBm
	7.5 GHz to 8.5 GHz	–85 dBm to +8 dBm, typ. +12 dBm
Power range for the R&S®ZNB20	100 kHz to 1 MHz	–60 dBm to +8 dBm, typ. +10 dBm
	1 MHz to 10 MHz	–60 dBm to +10 dBm, typ. +12 dBm
	10 MHz to 10 GHz	–60 dBm to +12 dBm, typ. +14 dBm
	10 GHz to 15 GHz	–60 dBm to +10 dBm, typ. +12 dBm
	15 GHz to 20 GHz	–60 dBm to +8 dBm, typ. +10 dBm
Power range for the R&S®ZNB40	10 MHz to 30 GHz	–60 dBm to +10 dBm, typ. +15 dBm
	30 GHz to 40 GHz	–60 dBm to +8 dBm, typ. +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		
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, typ. 130 dB
	100 kHz to 50 MHz	> 125 dB, typ. 140 dB
	50 MHz to 6.5 GHz	> 140 dB, typ. 150 dB
	6.5 GHz to 8.5 GHz	> 130 dB, typ. 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			
Trace noise magnitude (RMS)	at 0 dBm source power, 0 dB reflection	IF bandwidth	
	9 kHz to 20 kHz	1 kHz	< 0.008 dB, typ. 0.004 dB
	20 kHz to 100 kHz	1 kHz	< 0.005 dB, typ. 0.001 dB
	100 kHz to 100 MHz	10 kHz	< 0.005 dB, typ. 0.001 dB
	100 MHz to 8.5 GHz	10 kHz	< 0.005 dB, typ. 0.002 dB

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

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

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.

R&S®ZNB-B81

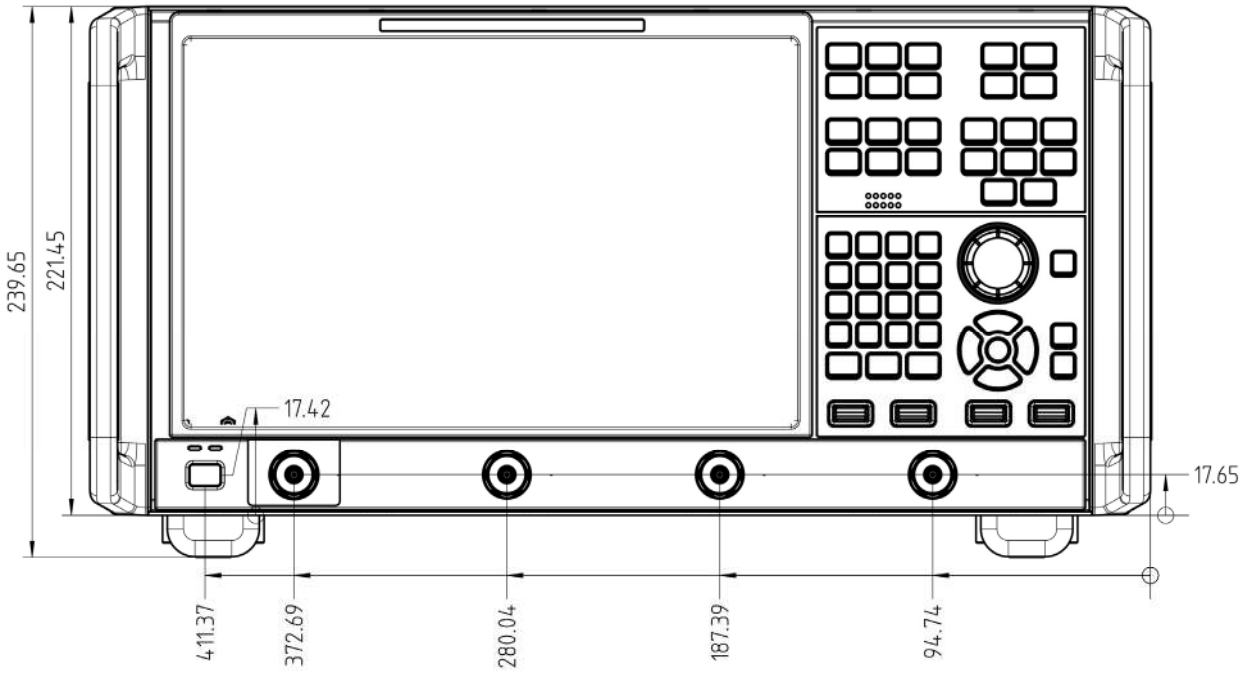
This data is valid from +18 °C to +28 °C and a measurement bandwidth at maximum 10 kHz.

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

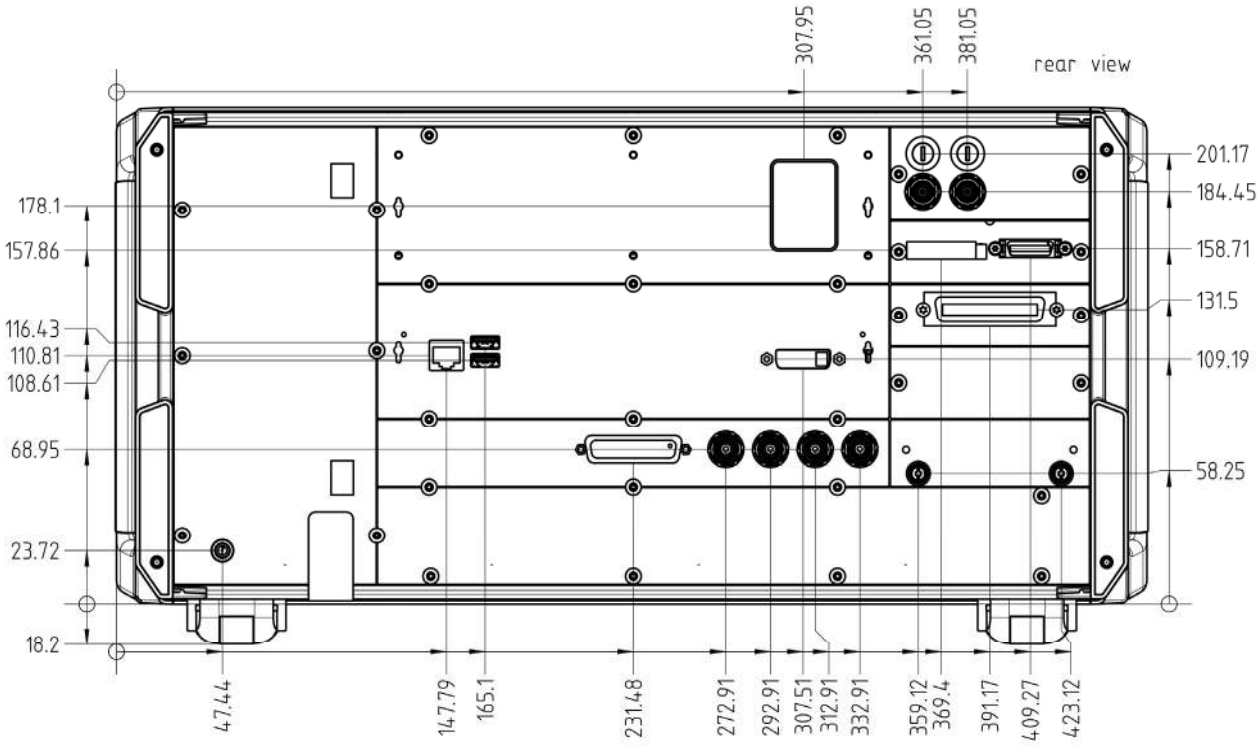
General data

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)

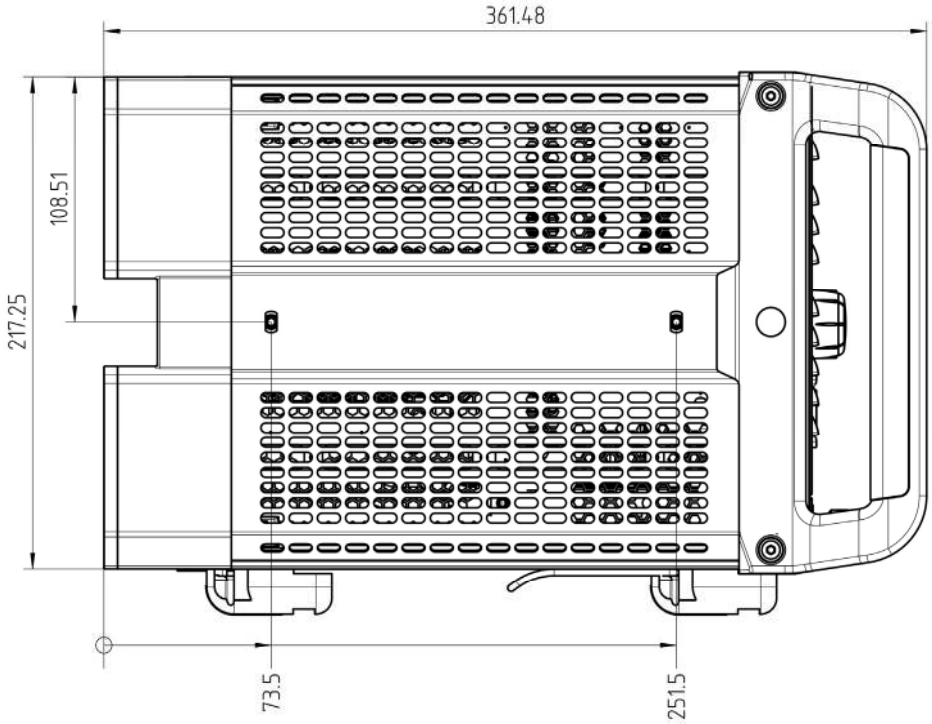
Dimensions (in mm)



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	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 [8]		
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	R&S®ZNB-B1	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	1316.2459.02
RFFE GPIO Interface [9]	R&S®ZN-B15	1323.9355.02
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	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

[8] 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.

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

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 [10]. 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 [10] 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

[10] 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

About Rohde&Schwarz

The Rohde&Schwarz electronics group is a leading supplier of solutions in the fields of test and measurement, broadcasting, secure communications, and radiomonitoring and radiolocation. Founded more than 80 years ago, this independent global company has an extensive sales network and is present in more than 70 countries.
The company is headquartered in Munich, Germany.

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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R&S®ZNB Vector Network Analyzer

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