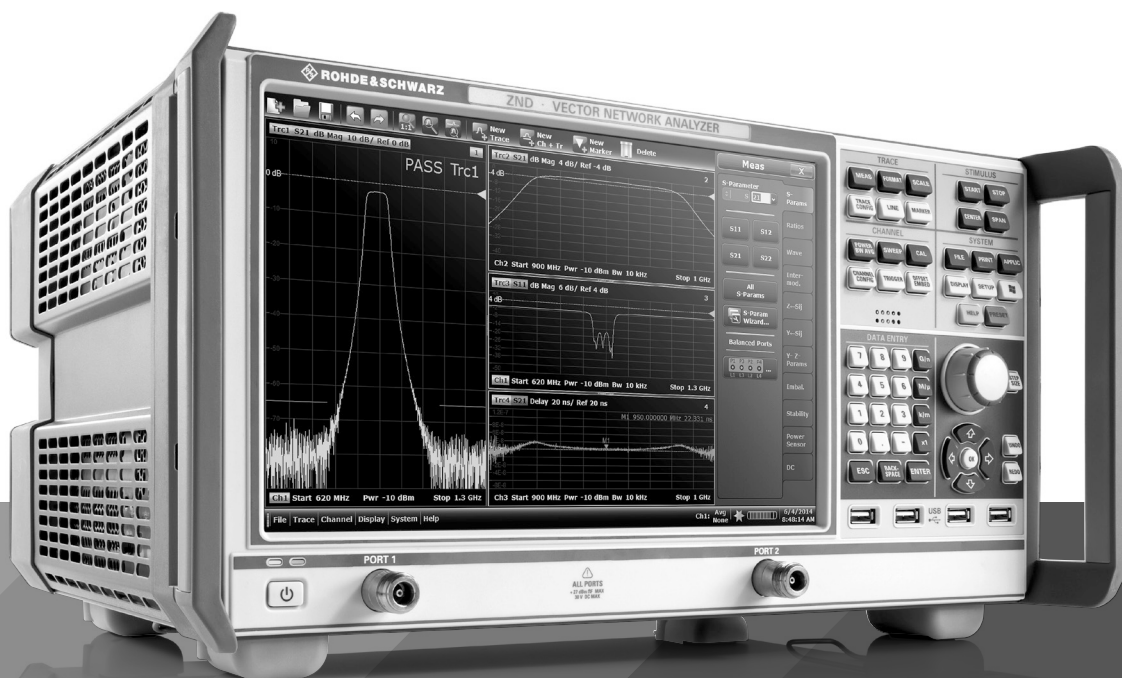


# R&S® ZND VECTOR NETWORK ANALYZER

## Specifications

3  
year  
warranty



Data Sheet  
Version 06.00

**ROHDE & SCHWARZ**

Make ideas real



# CONTENTS

|   |           |
|---|-----------|
| <b>Definitions</b> .....                | <b>3</b>  |
| <b>Base unit</b> .....                  | <b>4</b>  |
| Measurement range .....                 | 4         |
| Measurement speed.....                  | 5         |
| Measurement accuracy .....              | 7         |
| Effective system data .....             | 9         |
| Factory-calibrated system data .....    | 9         |
| Test port output .....                  | 10        |
| Test port input.....                    | 10        |
| Additional front panel connectors ..... | 10        |
| Display .....                           | 10        |
| Rear panel connectors .....             | 11        |
| <b>Options</b> .....                    | <b>12</b> |
| R&S®ZND-K1.....                         | 12        |
| R&S®ZND-K5.....                         | 12        |
| R&S®ZND-K6.....                         | 12        |
| R&S®ZND-K7.....                         | 12        |
| R&S®ZND-K8.....                         | 12        |
| R&S®ZND-B7.....                         | 13        |
| R&S®ZND-B10.....                        | 13        |
| R&S®ZND-B14 .....                       | 13        |
| R&S®ZND-K980 .....                      | 14        |
| <b>General data</b> .....               | <b>15</b> |
| Dimensions (in mm) .....                | 16        |
| <b>Ordering information</b> .....       | <b>18</b> |

# Definitions

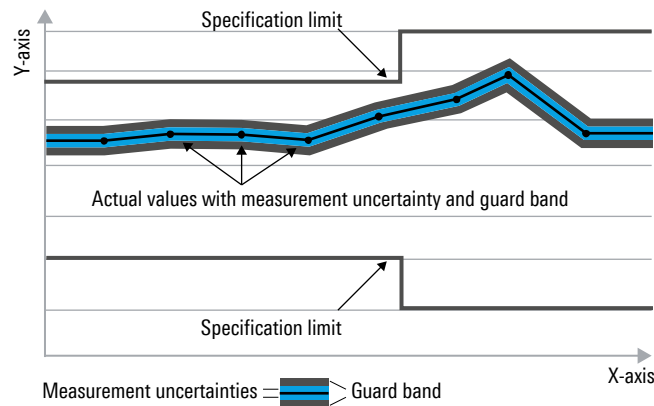
## General

Product data applies under the following conditions:

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

## Specifications with limits

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



## Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

## Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

## Typical data (typ.)

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

## Nominal values (nom.)

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

## Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

## Uncertainties

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

Device settings and GUI parameters are designated with the format “parameter: value”.

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP/3GPP2 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bits per second (Gbps), million bits per second (Mbps), thousand bits per second (kbps), million symbols per second (MSPS) or thousand symbols per second (kSPS), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, MSPS, kSPS and Msample/s are not SI units.

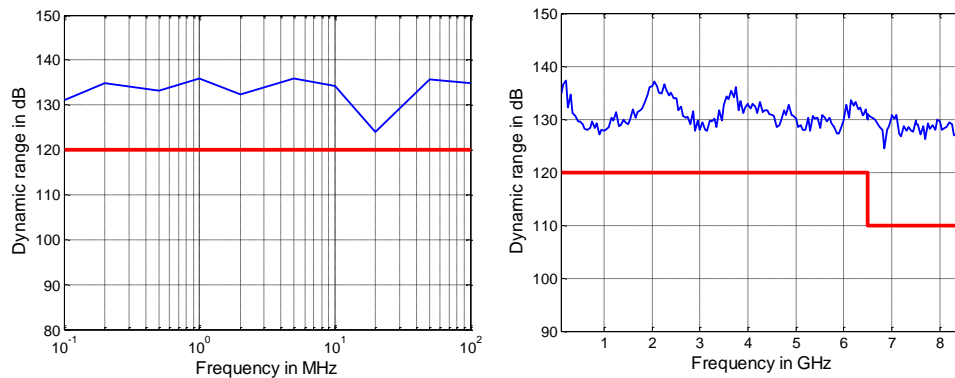
# Base unit

## Measurement range

|                              |   |  |
|------------------------------|---|--|
| Impedance                    |   | 50 $\Omega$                              |
| Test port connector          |   | N female                                 |
| Number of test ports         |   | 2  |
| Test set configuration       | base unit<br>R&S <sup>®</sup> ZND with optional R&S <sup>®</sup> ZND-K5 or<br>R&S <sup>®</sup> ZND-K6 | unidirectional<br>bidirectional          |
| Frequency range <sup>1</sup> | base unit<br>R&S <sup>®</sup> ZND with optional R&S <sup>®</sup> ZND-K1 or<br>R&S <sup>®</sup> ZND-K8 | 100 kHz to 4.5 GHz<br>100 kHz to 8.5 GHz |

|   |                   |  |
|---|-------------------|--|
| Static frequency accuracy               |                   | (time since last adjustment $\times$ aging rate) +<br>temperature drift + calibration accuracy |
| Aging per year                          |                   | $\pm 1 \times 10^{-6}$   |
| Temperature drift                       | (+5 °C to +40 °C) | $\pm 1 \times 10^{-6}$   |
| Achievable initial calibration accuracy |                   | $\pm 5 \times 10^{-7}$   |

|                              |  |  |
|------------------------------|--|--|
| Frequency resolution         |  | 1 Hz   |
| Number of measurement points | per trace                                | 2 to 5001                                      |
| Measurement bandwidth        | 1/1.5/2/3/5/7 steps                      | 1 Hz to 300 kHz                                |
| Dynamic range <sup>2</sup>   | 100 kHz to 6.5 GHz<br>6.5 GHz to 8.5 GHz | > 120 dB, typ. 130 dB<br>> 110 dB, typ. 125 dB |



Dynamic range in dB versus frequency for the R&S<sup>®</sup>ZND base unit

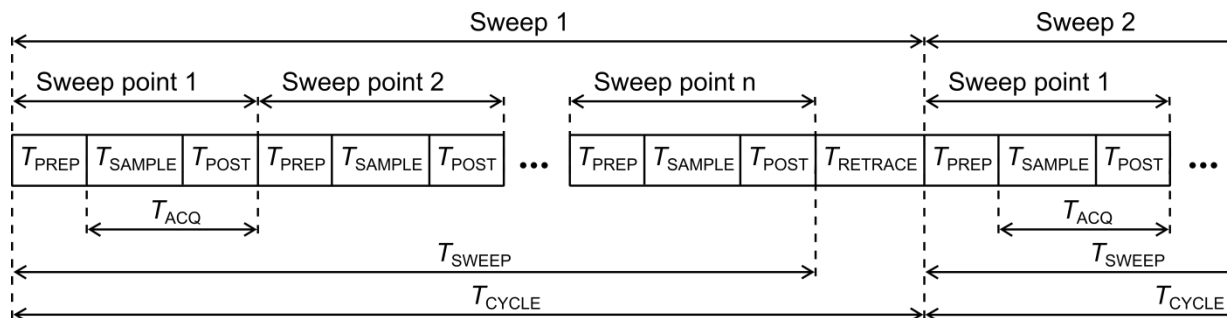
<sup>1</sup> Specified and typical data given in this data sheet applies to any model of the R&S<sup>®</sup>ZND; please note its respective frequency and power range as well as the test set configuration.

<sup>2</sup> 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.

## Measurement speed

Measured with firmware version 3.10 and Windows 10.

|  |   |                      |                    |             |
|--|---|----------------------|--------------------|-------------|
| Measurement time   | for 201 measurements points, with 200 MHz span, 300 kHz measurement bandwidth   | $T_{\text{SWEEP}}$   | $T_{\text{CYCLE}}$ |             |
|  | with 900 MHz center frequency   | < 4.0 ms             | < 5.0 ms           |             |
|  | with 5.1 GHz center frequency   | < 3.0 ms             | < 5.0 ms           |             |
| Acquisition time per point ( $T_{\text{ACQ}}$ )          | 300 kHz measurement bandwidth, CW mode  | < 10.0 $\mu\text{s}$ |                    |             |
| Sampling time per point ( $T_{\text{SAMPLE}}$ )          | at 300 kHz measurement bandwidth;<br>IF filter: normal  | 2.91 $\mu\text{s}$   |                    |             |
| Time for measurement and data transfer                   | for 201 measurements points, with 800 MHz start frequency, 1 GHz stop frequency, 1 MHz measurement bandwidth <sup>3</sup> | IEC/IEEE             | VXI11              | RSIB        |
|  |   | over 1 Gbit/s LAN    |                    |             |
| Data transfer time                                       | for 201 measurements points (magnitude)   | typ. 5.7 ms          | typ. 6.0 ms        | typ. 6.0 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               |                    |             |



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

Measurement sequence

<sup>3</sup> In continuous mode, no additional time for data transfer is required as this occurs simultaneously during the measurement.

| Typical sweep times in ms versus number of measurement points <sup>4</sup> of the R&S®ZND |      |      |      |      |      |
|---|------|------|------|------|------|
| Number of measurement points  | 51   | 201  | 401  | 1601 | 5001 |
| 800 MHz start frequency, 1 GHz stop frequency, 1 kHz measurement bandwidth                |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction <sup>5</sup>                    | 52.6 | 202  | 402  | 1548 | 4831 |
| With 2-port TOSM calibration  | 104  | 403  | 802  | 3094 | 9661 |
| 800 MHz start frequency, 1 GHz stop frequency, 100 kHz measurement bandwidth              |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction                                 | 2.7  | 6.3  | 9.1  | 26.7 | 80   |
| With 2-port TOSM calibration  | 4.4  | 11.2 | 17   | 52.1 | 158  |
| 800 MHz start frequency, 1 GHz stop frequency, 300 kHz measurement bandwidth              |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction                                 | 2.3  | 5    | 6.3  | 15.4 | 44.5 |
| With 2-port TOSM calibration  | 3.6  | 8.4  | 11.6 | 30.1 | 87   |
| 100 kHz start frequency, 4.5 GHz stop frequency, 1 kHz measurement bandwidth              |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction                                 | 55.6 | 203  | 400  | 1580 | 4921 |
| With 2-port TOSM calibration  | 110  | 406  | 799  | 3159 | 9842 |
| 100 kHz start frequency, 4.5 GHz stop frequency, 100 kHz measurement bandwidth            |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction                                 | 4.9  | 8.9  | 13.8 | 40.2 | 110  |
| With 2-port TOSM calibration  | 8.6  | 16.8 | 25.9 | 78.6 | 218  |
| 100 kHz start frequency, 4.5 GHz stop frequency, 300 kHz measurement bandwidth            |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction                                 | 4.6  | 7.4  | 10.5 | 28.1 | 73.8 |
| With 2-port TOSM calibration  | 7.8  | 13.2 | 19.5 | 54.2 | 145  |
| 100 kHz start frequency, 8.5 GHz stop frequency, 1 kHz measurement bandwidth              |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction                                 | 57   | 205  | 402  | 1580 | 4915 |
| With 2-port TOSM calibration  | 113  | 409  | 802  | 3159 | 9830 |
| 100 kHz start frequency, 8.5 GHz stop frequency, 100 kHz measurement bandwidth            |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction                                 | 5.5  | 10.1 | 14.9 | 40.9 | 112  |
| With 2-port TOSM calibration  | 10.1 | 18.9 | 28.8 | 80.5 | 221  |
| 100 kHz start frequency, 8.5 GHz stop frequency, 300 kHz measurement bandwidth            |      |      |      |      |      |
| With correction switched off or 1-path, 2-port correction                                 | 5    | 8.3  | 11.6 | 29   | 74.9 |
| With 2-port TOSM calibration  | 9.1  | 15.5 | 22.1 | 56.5 | 148  |

<sup>4</sup> Sweep time is to be understood as cycle time; static frequency accuracy of the instrument applies; measured with firmware version 3.10, Windows 10.

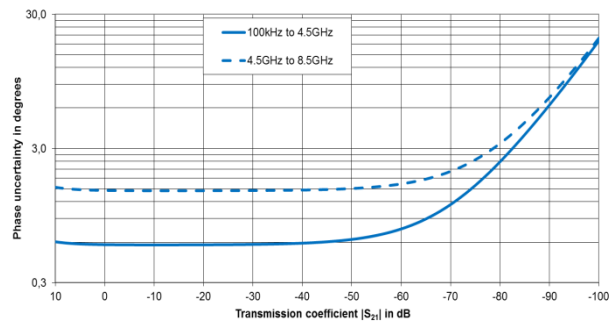
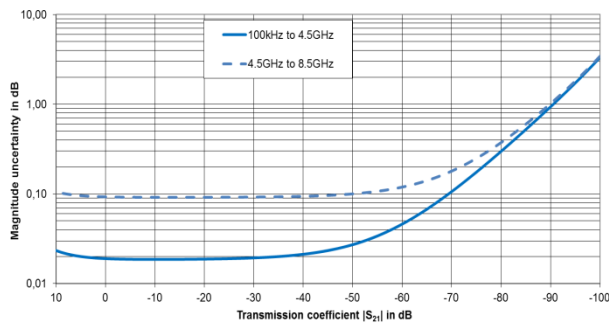
<sup>5</sup> Enhanced response calibration.

## Measurement accuracy

This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C after 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).

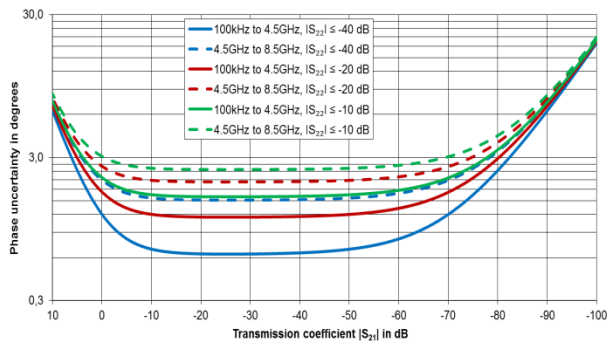
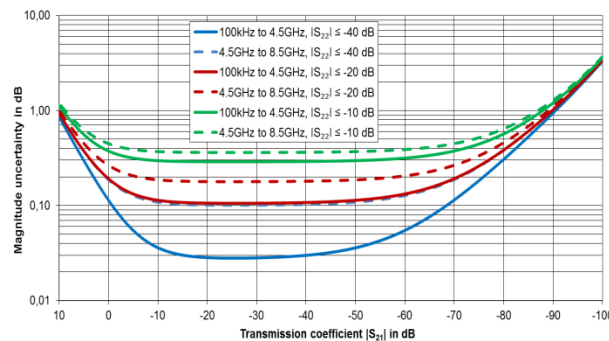
| Accuracy of transmission measurements |                  |                          |                                       |
|---------------------------------------|------------------|--------------------------|---------------------------------------|
| Above 100 kHz                         |                  | Base unit and R&S®ZND-K1 | Base unit and R&S®ZND-K5, -K6 and -K8 |
|                                       | +5 dB to -35 dB  | < 0.65 dB or < 6°        | < 0.095 dB or < 1.5°                  |
|                                       | -35 dB to -50 dB | < 0.40 dB or < 3°        | < 0.1 dB or < 2°                      |
|                                       | -50 dB to -65 dB | < 0.45 dB or < 3°        | < 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®ZND; analysis conditions:  $S_{11} = S_{22} = 0$ , cal. power -10 dBm, meas. power -10 dBm, R&S®ZND-K5, R&S®ZND-K6 or R&S®ZND-K8 installed

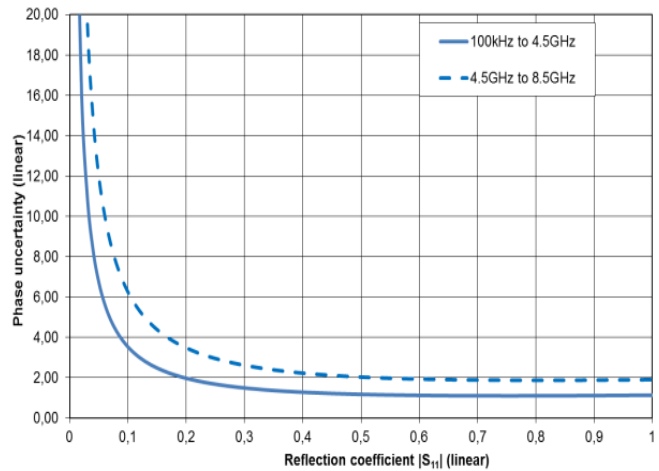
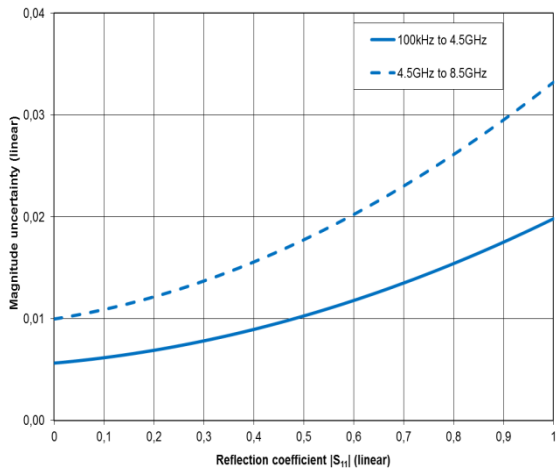
The accuracy of transmission measurements is reduced for DUTs with non-zero output reflection, i.e.  $|S_{22}| > 0$  using a unidirectional test set.



Typical accuracy of transmission magnitude and transmission phase measurements for the R&S®ZND; analysis conditions:  $S_{11} = 0$ , cal. power -10 dBm, meas. power -10 dBm, base unit or R&S®ZND-K1 installed

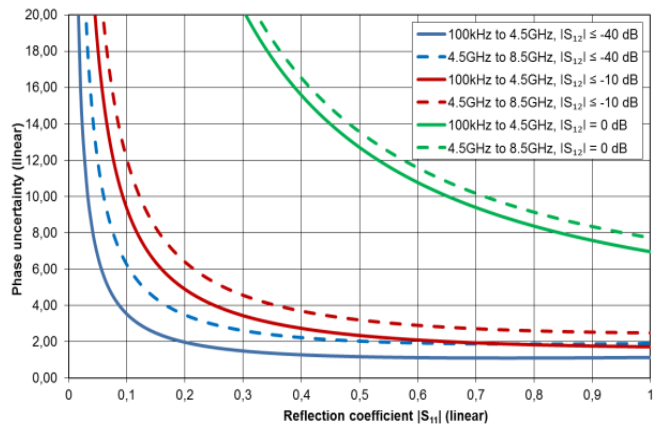
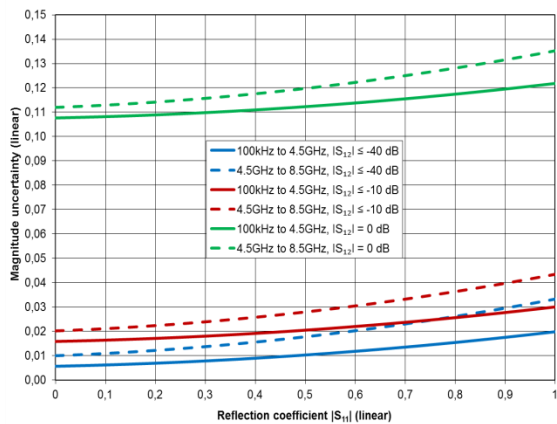
| Accuracy of reflection measurements |                  |                          |                             |                                       |
|-------------------------------------|------------------|--------------------------|-----------------------------|---------------------------------------|
| Configuration                       |                  | Base unit and R&S®ZND-K1 |                             | Base unit and R&S®ZND-K5, -K6 and -K8 |
| Type of DUT                         |                  | 1-port DUT               | 2-port DUT                  | 1 or 2-port DUT                       |
| 100 kHz to 50 MHz                   | 0 dB to -15 dB   | < 0.3 dB or < 2.5°       | typ. < 1.0 dB or typ. < 8°  | < 0.3 dB or < 2.5°                    |
|                                     | -15 dB to -25 dB | < 0.9 dB or < 6°         | typ. < 1.0 dB or typ. < 12° | < 0.9 dB or < 6°                      |
|                                     | -25 dB to -35 dB | < 3.0 dB or < 30°        | typ. < 3.0 dB or typ. < 30° | < 3.0 dB or < 30°                     |
| 50 MHz to 4 GHz                     | 0 dB to -15 dB   | < 0.2 dB or < 1.5°       | typ. < 1.0 dB or typ. < 8°  | < 0.2 dB or < 1.5°                    |
|                                     | -15 dB to -25 dB | < 0.5 dB or < 3.5°       | typ. < 1.0 dB or typ. < 12° | < 0.5 dB or < 3.5°                    |
|                                     | -25 dB to -35 dB | < 2.0 dB or < 16°        | typ. < 2.0 dB or typ. < 30° | < 2.0 dB or < 16°                     |
| 4 GHz to 8.5 GHz                    | 0 dB to -15 dB   | < 0.6 dB or < 4.5°       | typ. < 0.6 dB or typ. < 5°  | < 0.6 dB or < 4.5°                    |
|                                     | -15 dB to -25 dB | < 1.4 dB or < 10°        | typ. < 1.5 dB or typ. < 12° | < 1.4 dB or < 10°                     |
|                                     | -25 dB to -35 dB | < 4.0 dB or < 30°        | typ. < 4.0 dB or typ. < 30° | < 4.0 dB or < 30°                     |

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®ZND;  
analysis conditions:  $S_{12} = S_{21} = 0$ , cal. power -10 dBm, meas. power -10 dBm,  
R&S®ZND-K5, R&S®ZND-K6 or R&S®ZND-K8 installed

The accuracy of reflection measurements is reduced for non-isolating DUTs, i.e.  $|S_{12}| > 0$  using a unidirectional test set.



Typical accuracy of reflection magnitude and reflection phase measurements for the R&S®ZND;  
analysis conditions:  $S_{21} = 0$ , cal. power -10 dBm, meas. power -10 dBm, base unit or R&S®ZND-K1 installed



## Effective system data

This data is valid between +18 °C and +28 °C, provided the temperature has not varied by more than 1 °C after calibration. Frequency points, measurement bandwidth and sweep time have to be identical for measurement and calibration (no interpolation allowed). For unidirectional test set applicable specified values are related to port 1 only.

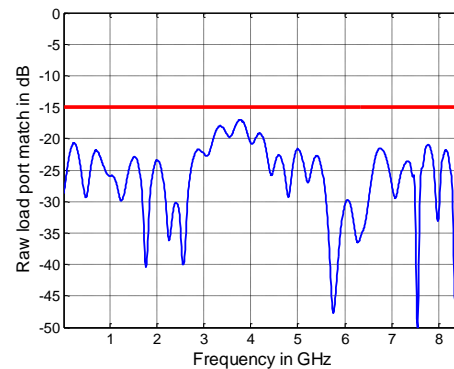
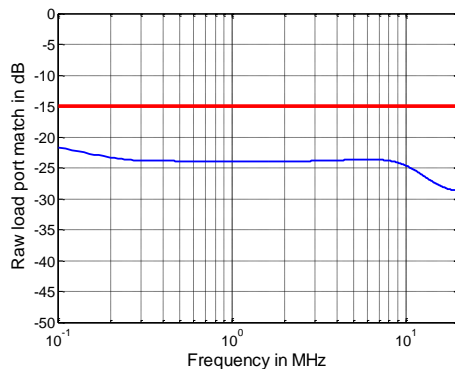
The data is based on a measurement bandwidth of 10 Hz and system error calibration with an R&S®ZV-Z270 calibration kit.

| R&S®ZND               | 100 kHz to 4.5 GHz | 4.5 GHz to 8.5 GHz |
|-----------------------|--------------------|--------------------|
| Directivity           | ≥ 45 dB            | ≥ 40 dB            |
| Source match          | ≥ 40 dB            | ≥ 36 dB            |
| Load match            | ≥ 45 dB            | ≥ 40 dB            |
| Reflection tracking   | ≤ 0.02 dB          | ≤ 0.05 dB          |
| Transmission tracking | ≤ 0.018 dB         | ≤ 0.09 dB          |

## 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. For unidirectional test set, applicable specified values are related to port 1 only.

|                       |                    |  |                                      |
|-----------------------|--------------------|--|--------------------------------------|
| Directivity           | 100 kHz to 8.5 GHz | none or R&S®ZND-K1<br>R&S®ZND-K5, R&S®ZND-K6 or R&S®ZND-K8 | > 30 dB, typ. 50 dB                  |
| Source match          | 100 kHz to 8.5 GHz | none or R&S®ZND-K1<br>R&S®ZND-K5, R&S®ZND-K6 or R&S®ZND-K8 | > 30 dB, typ. 50 dB                  |
| Reflection tracking   | 100 kHz to 8.5 GHz | none or R&S®ZND-K1<br>R&S®ZND-K5, R&S®ZND-K6 or R&S®ZND-K8 | < 0.5 dB, typ. 0.1 dB                |
| Transmission tracking | 100 kHz to 8.5 GHz | none or R&S®ZND-K1<br>R&S®ZND-K5, R&S®ZND-K6 or R&S®ZND-K8 | typ. 0.2 dB<br>< 0.5 dB, typ. 0.1 dB |
| Load match            | 100 kHz to 8.5 GHz | none or R&S®ZND-K1<br>R&S®ZND-K5, R&S®ZND-K6 or R&S®ZND-K8 | typ. 20 dB<br>> 15 dB, typ. 20 dB    |



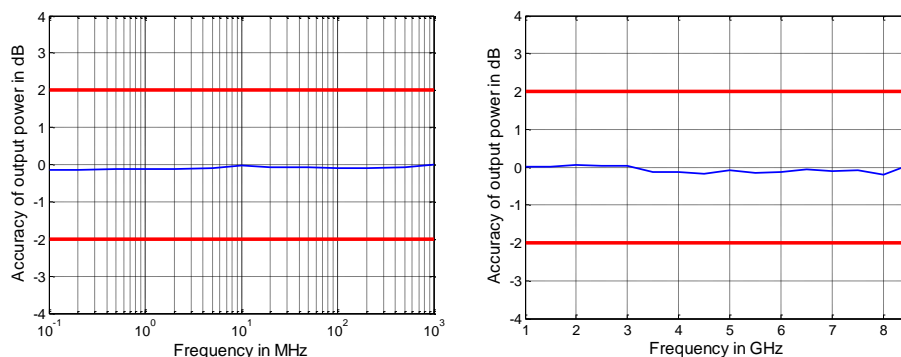
Raw load port match versus frequency for the R&S®ZND

| Trace stability             |   |              |                           |
|-----------------------------|---|--------------|---------------------------|
| Trace noise magnitude (RMS) | at 0 dBm source power,<br>0 dB reflection | IF bandwidth |                           |
|                             | 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 |
| Trace noise phase (RMS)     | at 0 dBm source power,<br>0 dB reflection | IF bandwidth |                           |
|                             | 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°      |
| Temperature dependence      | at 0 dB transmission or reflection        |              |                           |
|                             | 100 kHz to 4.5 GHz                        | magnitude    | typ. 0.01 dB/K            |
|                             |   | phase        | typ. 0.15°/K              |
|                             | 4.5 GHz to 8.5 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      | bare instrument without power extending options R&S®ZND-B7, R&S®ZND-K7 | -20 dBm to +3 dBm       |
| Power accuracy   | source power -10 dBm   | < 2 dB, typ. 0.5 dB     |
| Power linearity  | referenced to -10 dBm  | < 1 dB                  |
| Power resolution |  | 0.01 dB                 |
| Harmonics        | at 0 dBm   |                         |
|                  | 100 kHz to 100 MHz   | typ. -30 dBc            |
|                  | 100 MHz to 8.5 GHz   | < -25 dBc, typ. -35 dBc |



Output power accuracy in dB versus frequency for the R&S®ZND base unit

## Test port input

|  |                                      |                           |
|--|--------------------------------------|---------------------------|
| Match  | without system error correction      | > 15 dB                   |
| Maximum nominal input level                                    |                                      | +3 dBm                    |
| Power measurement accuracy                                     | at -10 dBm without power calibration | < 1 dB                    |
| Receiver linearity, referenced to -10 dBm                      | +13 dB to -35 dB                     | < 0.2 dB                  |
| Damage level   |                                      | +27 dBm                   |
| Damage DC voltage  |                                      | 30 V                      |
| Noise level at 1 kHz measurement bandwidth, normalized to 1 Hz | 100 kHz to 50 MHz                    | < -118 dBm, typ. -125 dBm |
|  | 50 MHz to 6.5 GHz                    | < -120 dBm, typ. -125 dBm |
|  | 6.5 GHz to 8.5 GHz                   | < -110 dBm, typ. -120 dBm |

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

## Additional front panel connectors

|            |             |                                   |
|------------|-------------|-----------------------------------|
| USB device | front panel | 4 ports, type A plug, version 2.0 |
|------------|-------------|-----------------------------------|

## Display

|                    |  |   |
|--------------------|--|---|
| Screen             |  | 30.7 cm (12.1") WXGA, 18-bit color LCD with touchscreen |
| Resolution         |  | 1280 × 800 pixel, 125 dpi)                              |
| Pixel failure rate |  | < 1 × 10 <sup>-5</sup>                                  |

## Rear panel connectors

|     |  |              |
|-----|--|--------------|
| LAN |  | 8-pin, RJ-45 |
|-----|--|--------------|

|            |  |                                   |
|------------|--|-----------------------------------|
| USB device |  | 2 ports, type A plug, version 3.0 |
|------------|--|-----------------------------------|

|                               |   |                                   |
|-------------------------------|---|-----------------------------------|
| <b>REF IN</b>                 | 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 $\Omega$                       |

|                  |  |                                  |
|------------------|--|----------------------------------|
| <b>REF OUT</b>   | output for external frequency reference signal |                                  |
| Connector type   |  | BNC, female                      |
| Output frequency |  | 10 MHz                           |
| Output power     |  | +9 dBm $\pm$ 4 dB at 50 $\Omega$ |

|                |                                      |  |
|----------------|--------------------------------------|--|
| <b>MONITOR</b> | DVI connector (for external monitor) |  |
|----------------|--------------------------------------|--|

|                                |  |   |
|--------------------------------|--|---|
| <b>USER CONTROL</b>            | 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                           |

|  |                            |                      |
|--|----------------------------|----------------------|
| <b>EXT TRIG IN</b>                             | 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 $\mu$ s            |
| Input impedance                                |                            | > 10 k $\Omega$      |

|                     |                            |             |
|---------------------|----------------------------|-------------|
| <b>EXT TRIG OUT</b> | trigger output of analyzer |             |
| Connector type      |                            | BNC, female |
| Logic high          |                            | typ. 3.3 V  |

## Options

For subsequently activated options, all data sheet parameters are typical values until a calibration is performed.

### R&S®ZND-K1

|  |  |
|--|--|
| <b>Extended frequency range, 8.5 GHz</b> | frequency range extension for unidirectional units |
| Frequency range                          | 100 kHz to 8.5 GHz                                 |
| Bidirectional measurements               | R&S®ZND-K6 option required                         |
| Prerequisites                            | R&S®ZND base unit                                  |

### R&S®ZND-K5

|  |  |
|--|--|
| <b>Full test set, base unit, 4.5 GHz</b> | bidirectional measurement capabilities for units with a frequency range of 4.5 GHz |
| Frequency range                          | 100 kHz to 4.5 GHz   |
| Bidirectional measurements               | yes  |
| Prerequisites                            | R&S®ZND base unit  |

### R&S®ZND-K6

|                               |  |
|-------------------------------|--|
| <b>Full test set, 8.5 GHz</b> | bidirectional measurement capabilities for units with a frequency range of 8.5 GHz |
| Frequency range               | 100 kHz to 8.5 GHz   |
| Bidirectional measurements    | yes  |
| Prerequisites                 | R&S®ZND base unit with R&S®ZND-K1  |

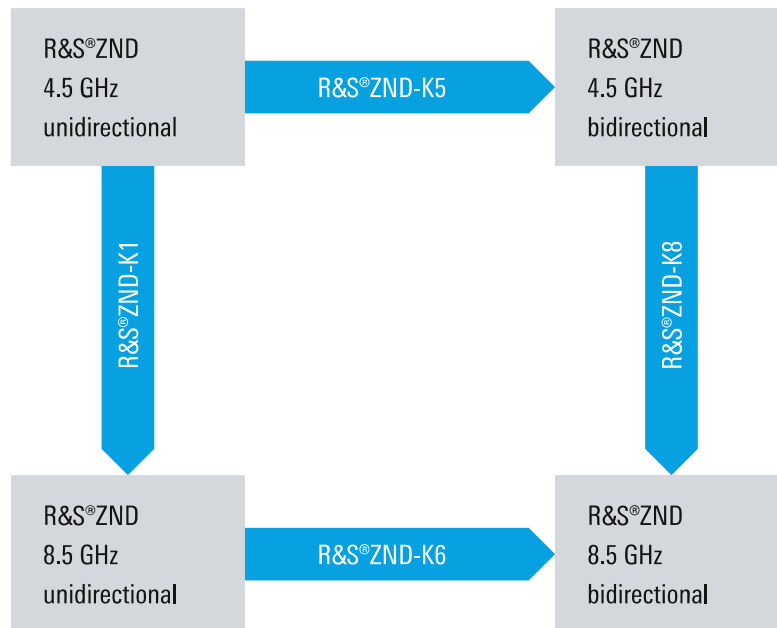
### R&S®ZND-K7

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

|                             |                                     |                    |
|-----------------------------|-------------------------------------|--------------------|
| <b>Extended power range</b> |                                     |                    |
| Power range                 | with R&S®ZND-K7, without R&S®ZND-B7 |                    |
|                             | 100 kHz to 8.5 GHz                  | -45 dBm to +3 dBm  |
|                             | with R&S®ZND-K7, with R&S®ZND-B7    |                    |
|                             | 100 kHz to 6.5 GHz                  | -45 dBm to +10 dBm |
|                             | 6.5 GHz to 7.5 GHz                  | -45 dBm to +8 dBm  |
|                             | 7.5 GHz to 8.5 GHz                  | -45 dBm to +6 dBm  |

### R&S®ZND-K8

|   |   |
|---|---|
| <b>Extended frequency range, 8.5 GHz, full test set</b> | frequency range extension for bidirectional units |
| Frequency range   | 100 kHz to 8.5 GHz                                |
| Bidirectional measurements                              | yes   |
| Prerequisites   | R&S®ZND base unit with R&S®ZND-K5                 |



Upgrade options for R&amp;S®ZND base unit

## R&S®ZND-B7

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

| High output power |  |                     |
|-------------------|--|---------------------|
| Power range       | without R&S®ZND-B7, without R&S®ZND-K7 |                     |
|                   | 100 kHz to 8.5 GHz                     | -20 dBm to +3.5 dBm |
|                   | with R&S®ZND-B7, without R&S®ZND-K7    |                     |
|                   | 100 kHz to 6.5 GHz                     | -20 dBm to +10 dBm  |
|                   | 6.5 GHz to 7.5 GHz                     | -20 dBm to +8 dBm   |
|                   | 7.5 GHz to 8.5 GHz                     | -20 dBm to +6 dBm   |

## R&S®ZND-B10

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

## 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. |                         |
| Keysight handler interface compatibility |  | type 3                  |
| Input signals                            | pin 2, pin 18  | 3.3 V TTL, 5 V tolerant |
| Output signals                           | pin 3 to 17, pin 19 to 21, pin 30 to 34, pin 36  | 3.3 V TTL, 5 V tolerant |
| Input/output signals                     | pin 22 to 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®ZND-K980**

| <b>Health and utilization monitoring service (HUMS) <sup>6, 7</sup></b> |   |   |
|---|---|---|
| Interfaces  | protocols and interfaces supported for data readout and display | <ul style="list-style-type: none"> <li>• SNMP (v1, v2c, v3)</li> <li>• REST (JSON)</li> <li>• SCPI</li> <li>• device web</li> </ul>   |
| Services  | information provided  | <ul style="list-style-type: none"> <li>• device information (model, serial number, BIOS, date, time, system, HUMS and software information)</li> <li>• user-defined information tags (e.g. for asset management)</li> <li>• equipment information (hardware, options, software, licenses)</li> <li>• system operating status</li> <li>• instrument security information</li> <li>• service related information (due dates etc.)</li> <li>• mass storage related information</li> <li>• instrument utilization data</li> <li>• device history (event log)</li> </ul> |

---

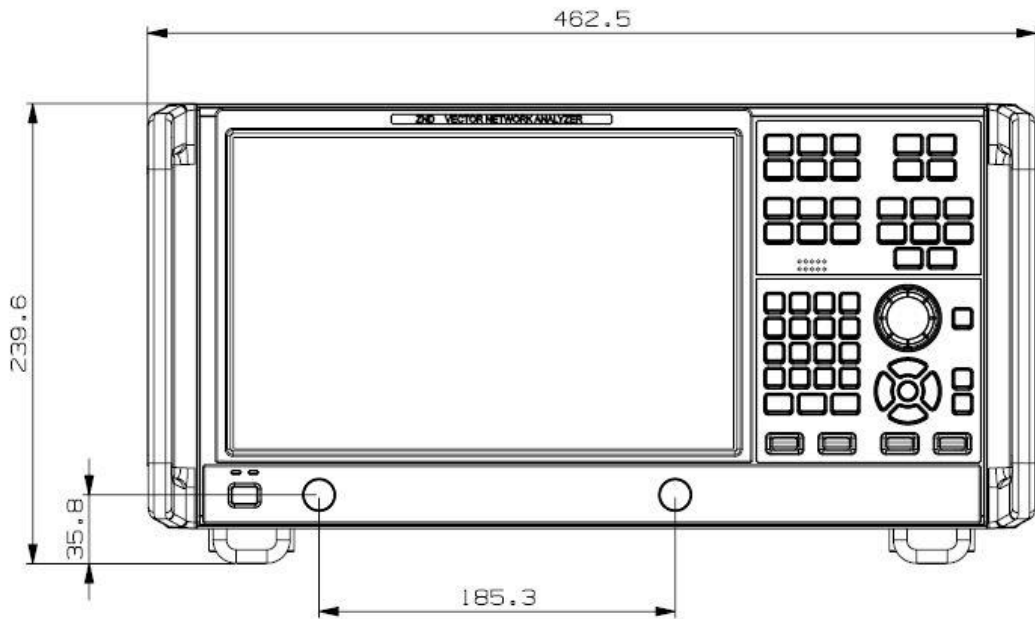
<sup>6</sup> For details, see application note under: [www.rohde-schwarz.com/appnote/GFM336](http://www.rohde-schwarz.com/appnote/GFM336)

<sup>7</sup> For use with common available asset management tools.

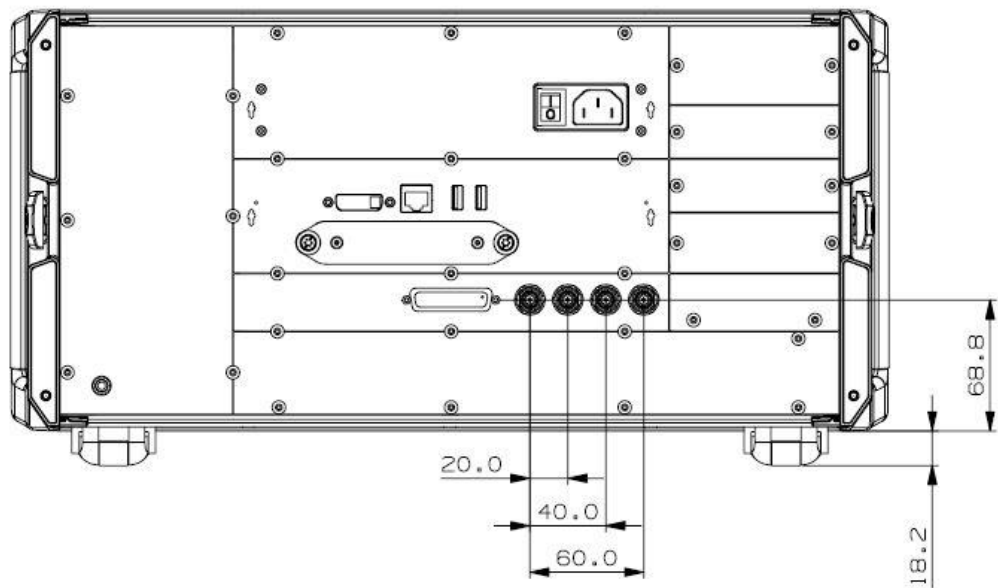
## General data

|                       |                             |   |
|-----------------------|-----------------------------|---|
| 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 2014/30/EU including: IEC/EN 61326-1 (immunity test requirement for industrial environment, EN 61326-1 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, CAN/CSA-C22.2 No.61010-1   |
| Power supply          |                             | 100 V to 240 V at 50 Hz to 60 Hz and 400 Hz, max. 3 A to 1.25 A respectively  |
| Power consumption     |                             | max. 300 W, typ. 120 W  |
| Test mark             |                             | VDE, cCSA <sub>US</sub> , CE conformity mark  |
| Dimensions            | W x H x D                   | 462.5 mm x 239.6 mm x 361.5 mm (18.2 in x 9.4 in x 14.23 in)  |
| Weight                |                             | 14 kg (30.9 lb)   |
| Shipping weight       |                             | 19 kg (41.9 lb)   |

## Dimensions (in mm)

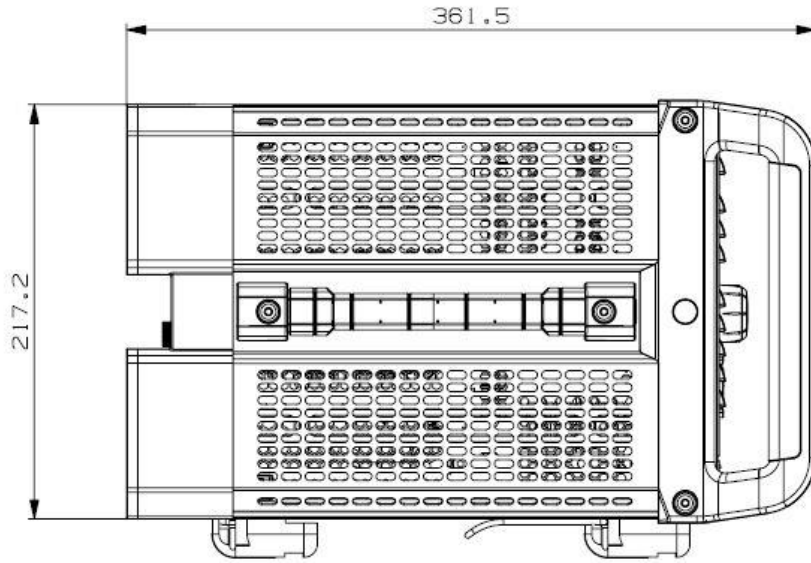


Front view of the R&S®ZND



Rear view of the R&S®ZND





Side view of the R&S®ZND

## Ordering information

| Designation   | Type                      | Retrofit <sup>8</sup> | On site <sup>9</sup> | Order No.    |
|---|---------------------------|-----------------------|----------------------|--------------|
| <b>Base unit</b>  |                           |                       |                      |              |
| Vector network analyzer, two ports, 4.5 GHz, N                          | R&S <sup>®</sup> ZND      |                       |                      | 1328.5170.92 |
| <b>Options</b>  |                           |                       |                      |              |
| Extended frequency range, unidirectional, 8.5 GHz                       | R&S <sup>®</sup> ZND-K1   |                       | •                    | 1328.5306.02 |
| Time domain analysis (TDR)  | R&S <sup>®</sup> ZND-K2   |                       | •                    | 1328.5393.02 |
| Distance-to-fault (DTF)   | R&S <sup>®</sup> ZND-K3   |                       | •                    | 1350.5070.02 |
| Full test set, base unit, bidirectional, 4.5 GHz                        | R&S <sup>®</sup> ZND-K5   |                       | •                    | 1328.5312.02 |
| Full test set, bidirectional, 8.5 GHz                                   | R&S <sup>®</sup> ZND-K6   |                       | •                    | 1328.5329.02 |
| Extended power range for R&S <sup>®</sup> ZND                           | R&S <sup>®</sup> ZND-K7   |                       | •                    | 1328.5335.02 |
| Extended frequency range, full test set, bidirectional, 8.5 GHz         | R&S <sup>®</sup> ZND-K8   |                       | •                    | 1328.5412.02 |
| 1 Millihertz frequency resolution                                       | R&S <sup>®</sup> ZND-K19  |                       | •                    | 1326.8089.02 |
| Easy deembedding  | R&S <sup>®</sup> ZND-K210 |                       | •                    | 1328.8670.02 |
| In-situ deembedding   | R&S <sup>®</sup> ZND-K220 |                       | •                    | 1328.8686.02 |
| Smart fixture deembedding   | R&S <sup>®</sup> ZND-K230 |                       | •                    | 1328.8692.02 |
| Delta-L PCB characterization  | R&S <sup>®</sup> ZND-K231 |                       | •                    | 1328.8705.02 |
| Health and utilization monitoring service                               | R&S <sup>®</sup> ZND-K980 | •                     | •                    | 1350.5311.02 |
| High output power   | R&S <sup>®</sup> ZND-B7   |                       | •                    | 1338.1578.02 |
| GPIB interface  | R&S <sup>®</sup> ZND-B10  | •                     | •                    | 1328.5358.02 |
| Additional removable hard disk, for R&S <sup>®</sup> ZND with Windows 7 | R&S <sup>®</sup> ZND-B19  | •                     | •                    | 1326.7760.02 |
| Additional removable SSD, for R&S <sup>®</sup> ZND with Windows 10      | R&S <sup>®</sup> ZND-B19  | •                     | •                    | 1338.1703.02 |
| Handler I/O   | R&S <sup>®</sup> ZN-B14   | •                     | •                    | 1316.2459.02 |
| 19" rackmount kit   | R&S <sup>®</sup> ZZA-KN5  | •                     | •                    | 1175.3040.00 |
| <b>Upgrade kit</b>  |                           |                       |                      |              |
| Upgrade kit from Windows 7 to Windows 10, for R&S <sup>®</sup> ZND      | R&S <sup>®</sup> ZND-U10  | •                     |                      | 1338.1690.02 |

| <b>Warranty</b>   |                      |  |  |   |
|---|----------------------|--|--|---|
| Base unit   |                      |  |  | 3 years   |
| All other items <sup>10</sup>                                     |                      |  |  | 1 year  |
| <b>Service options</b>  |                      |  |  |   |
| Extended warranty, one year                                       | R&S <sup>®</sup> WE1 |  |  | Please contact your local Rohde & Schwarz sales office. |
| Extended warranty, two years                                      | R&S <sup>®</sup> WE2 |  |  |   |
| Extended warranty with calibration coverage, one year             | R&S <sup>®</sup> CW1 |  |  |   |
| Extended warranty with calibration coverage, two years            | R&S <sup>®</sup> CW2 |  |  |   |
| Extended warranty with accredited calibration coverage, one year  | R&S <sup>®</sup> AW1 |  |  |   |
| Extended warranty with accredited calibration coverage, two years | R&S <sup>®</sup> AW2 |  |  |   |

### Extended warranty with a term of one and two years (WE1 and WE2)

Repairs carried out during the contract term are free of charge <sup>11</sup>. Necessary calibration and adjustments carried out during repairs are also covered.

### Extended warranty with calibration coverage (CW1 and CW2)

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs <sup>11</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

### Extended warranty with accredited calibration (AW1 and AW2)

Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs <sup>11</sup> and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

<sup>8</sup> Option may also be ordered at a later stage.

<sup>9</sup> Option may be installed by the customer on site.

<sup>10</sup> For options that are installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

<sup>11</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.



## Service that adds value

- ▶ Worldwide
- ▶ Local and personalized
- ▶ Customized and flexible
- ▶ Uncompromising quality
- ▶ Long-term dependability

## Rohde & Schwarz

The Rohde & Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test and measurement, technology systems, and networks and cybersecurity. Founded more than 85 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

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

## 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**

## Rohde & Schwarz training

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

## Rohde & Schwarz customer support

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

