R&S®Cable Rider ZPH
Cable and Antenna Analyzer
Specifications

ROHDE&SCHWARZ

Data Sheet | Version 02.02

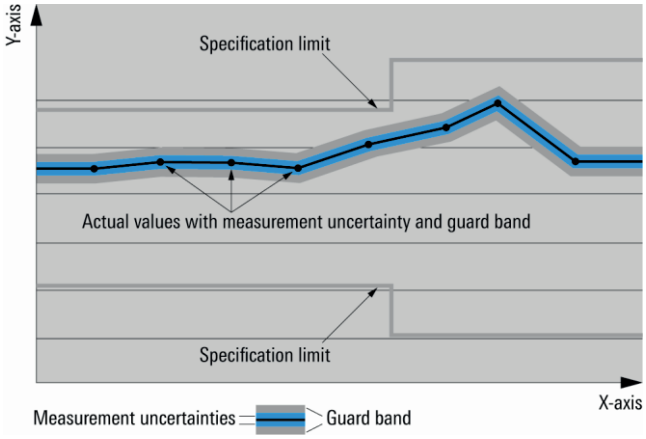
CONTENTS

Definitions

General
Product data applies under the following conditions:

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

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



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.

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

Specifications

Frequency

Frequency range	R&S®Cable Rider ZPH	2 MHz to 3 GHz
	with R&S®ZPH-B4 option installed	2 MHz to 4 GHz
Frequency resolution		1 Hz

Reference frequency, internal		
Total reference accuracy		±(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year		$\pm 1 \times 10^{-6}$
Temperature drift	0 °C to +30 °C	$\pm 1 \times 10^{-6}$
	+30 °C to +50 °C	$\pm 3 \times 10^{-6}$
Achievable initial calibration accuracy		$\pm 5 \times 10^{-7}$

Measurements

Individual		reflection (S_{11})
		1-port cable loss
		distance-to-fault
Measurement wizard		
Guides the user through a sequence of individual measurements. Uses the R&S®Instrument View PC software to configure the measurement sequence including hints displayed on the screen. R&S®Instrument View is also used to combine the measurement results into user-configurable reports.		

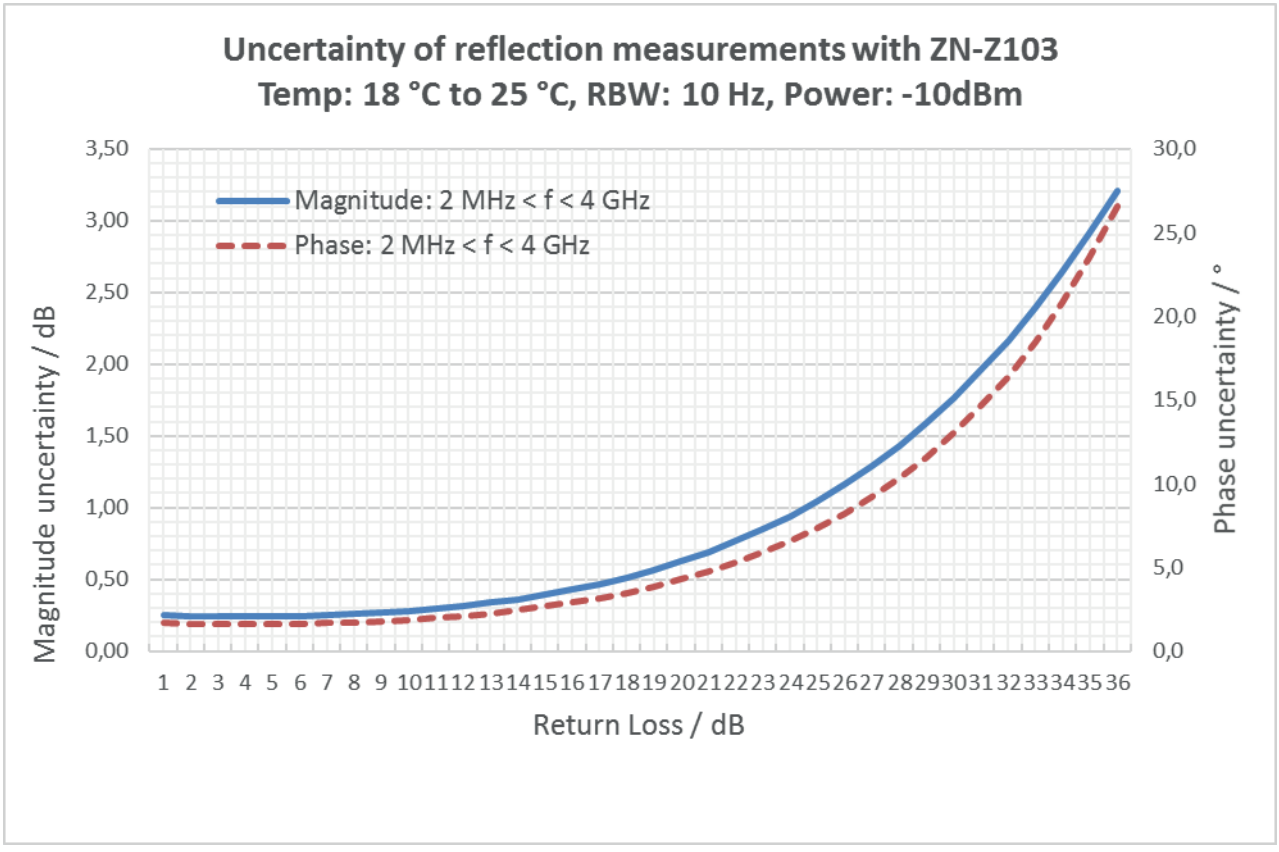
Measurement setup		
Port output power		–10 dBm (nom.)
Data points	selectable	101 to 2501
Measurement bandwidth		10 kHz
Trace modes		clear/write, average, interference suppression

Reflection measurement S_{11}		
Result formats		magnitude, SWR, magnitude and distance-to-fault, SWR and distance-to-fault, smith chart, phase
Magnitude		
Range		1/2/3/5/10/20/30/50/100/120/130/150 dB, linear 100 %
Resolution		0.1 dB
SWR		
Range	selectable	1 to 1.1/1.5/2/3/6/11/21/71
Measurement speed		0.3 ms per point
Corrected directivity with R&S®ZN-Z103	2 MHz ≤ f ≤ 4 GHz	> 42 dB (nom.)
Corrected test port match with R&S®ZN-Z103	2 MHz ≤ f ≤ 4 GHz	> 36 dB (nom.)
Measurement uncertainty with R&S®ZN-Z103		see figure Uncertainty of reflection measurement

1-port cable loss measurement		
Result format		magnitude
Range	selectable	1/2/5/10/20/50/100 dB
Resolution		0.1 dB

Distance-to-fault analysis		
Result formats		return loss, SWR, split screen DTF and SWR, split screen DTF and return loss
Return loss		
Range		1/2/3/5/10/20/30/50/100/120/130/150 dB, linear 100 %
Resolution		0.1 dB
SWR		
Range	selectable	1 to 1.1/1.5/2/3/6/11/21/71
Fault resolution		(1.5 × 10^8 × velocity factor/span) m
Maximum cable length	depending on cable loss	1500 m (nom.)

Immunity to interference		
Maximum permissible spurious signal	measurement = reflection (S_{11})/1-port cable loss/distance-to-fault analysis	
		+17 dBm (nom.)



Uncertainty of reflection measurement with R&S®ZN-Z103 calibration unit.

Accuracy of reflection measurements		
2 MHz to 4 GHz	0 dB to –15 dB	< 0.3 dB or < 2.1°
	–15 dB to –25 dB	< 1.0 dB or < 7.5°
	–25 dB to –35 dB	< 3.1 dB or < 26°

Channel power meter (R&S®ZPH-K19 option)

Frequency range		2 MHz to 3 GHz
	with R&S®ZPH-B4 option installed	2 MHz to 4 GHz
Measurement range		–20 dBm to +30 dBm
Measurement accuracy	+20 °C to +30 °C, 2 MHz ≤ f < 10 MHz	< 2 dB (nom.)
	+20 °C to +30 °C, 10 MHz ≤ f ≤ 4 GHz	< 0.8 dB
	–20 °C to +50 °C, 10 MHz ≤ f ≤ 4 GHz	< 1.2 dB

Maximum rated input levels

Maximum rated input level		
DC voltage		50 V
CW RF power	port 1 (power meter input)	30 dBm (= 1 W)
	port 2 (reflectometer input)	23 dBm (= 0.2 W)
Peak RF power	< 3 s duration, port 1	33 dBm (= 2 W)
	< 3 s duration, port 2	26 dBm (= 0.4 W)
Max. pulse voltage		150 V
Max. pulse energy	pulse width 10 µs	10 mWs

Inputs and outputs

Port 1: Power meter		
Impedance		50 Ω
Connector		N female
VSWR	2 MHz ≤ f ≤ 4 GHz	< 1.2 (nom.)
Port 2: Reflectometer		
Impedance		50 Ω
Connector		N female
VSWR	2 MHz ≤ f ≤ 4 GHz	< 1.5 (nom.)

Built-in GPS receiver (R&S®ZPH-B10 option)

GPS location indication		latitude, longitude, height

General data

Manual operation		
Languages		Chinese, Chinese Traditional, English, French, German, Italian, Hungarian, Japanese, Korean, Portuguese, Russian, Spanish
Remote control		
Command set		SCPI 1997.0
LAN interface		10/100BASE-T, RJ-45
USB		mini B plug, version 2.0
Display		
Resolution		WVGA, 800 × 480 pixel
Audio		
Speaker		internal
USB interface		type A plug, version 2.0
	number of interfaces	2
Mass memory		
Mass memory		USB stick/microSD card (not supplied) size ≤ 32 Gbyte, USB version 1.1 or 2.0
Data storage	internal	> 160 instrument settings and traces
	on USB stick or microSD Card, ≥ 1 Gbyte	> 10000 instrument settings and traces
Temperature	operating temperature range	–20 °C to +50 °C
	storage temperature range	–40 °C to +70 °C
	battery charging mode	0 °C to +40 °C
Climatic loading	relative humidity	+25 °/+55 °C at 95 % relative humidity (EN 60068-2-30)
	class of protection	IP51

Mechanical resistance		
Vibration	sinusoidal	EN 60068-2-6, MIL-PRF-28800F class 2
	random	EN 60068-2-64, MIL-PRF-28800F class 2
Shock		40 g shock spectrum, in line with MIL-STD-810F, method 516.4 procedure 1, MIL-PRF-28800F

Power supply		
R&S®HA-Z301 AC power supply	input specifications	100 V to 240 V AC, 50 Hz to 60 Hz, 1.0 A to 0.5 A
	output specifications	15 V, 2.67 A, max. 40 W
	operating temperature range	–30 °C to +60 °C
	storage temperature range	–40 °C to +85 °C
	test mark	CE, UL, PSE, TUV
External DC voltage		14.65 V to 15.45 V
Battery	R&S®HA-Z306	lithium-ion battery
Capacity		72 Wh
Voltage		11.25 V (nom.)
Operating time with new, fully charged battery		9 h
	instrument switched off or charge with R&S®HA-Z203 battery charger	3.5 h
	instrument switched on	4.5 h
Life time	charging cycles	> 80 % of more of its initial capacity after 300 charge/discharge cycles
Power consumption		8 W (meas.)
Safety		IEC 61010-1, EN 61010-1, UL 61010-1 (Third Edition), CAN/CSA-C22.2 No. 61010.1-12
Test mark		VDE, CSA, CSA-NRTL
EMC		in line with European EMC Directive 2014/30/EU including
		EN 61326-1 class B (emission) CISPR 11/EN 55011/group 1 class B (emission) EN 61326-1 table 2 (immunity, industrial)
Dimensions	W × H × D	202 mm × 294 mm × 76 mm (8.0 in × 11.6 in × 3 in)
Weight		2.5 kg (5.5 lb)
Recommended calibration interval		1 year

Equivalence of specifications for different R&S®ZPH part numbers

The specifications for part number 1321.1211.02 are equivalent to part number 1321.1211.52.

Ordering information

Designation	Type	Order No.
Handheld Cable and Antenna Analyzer, 2 MHz to 3 GHz	R&S®Cable Rider ZPH	1321.1211.02
Accessories supplied		
Lithium-ion battery pack, USB cable, AC power supply with country specific adapters for EU, GB, US, AUS, CH, getting started manual, side strap		

Options

Designation	Type	Order No.
Cable and Antenna Analyzer Frequency Upgrade from 3 GHz to 4 GHz	R&S®ZPH-B4	1321.0380.02
GPS Support	R&S®ZPH-B10	1321.0396.02
Power Sensor Support	R&S®ZPH-K9	1321.0415.02
Channel Power Meter	R&S®ZPH-K19	1321.0409.02
Pulse Measurements with Power Sensor	R&S®ZPH-K29	1321.0421.02

Accessories

Designation	Type	Order No.
1-Port Calibration Unit (male)	R&S®ZN-Z103	1321.1828.02
Combined Open/Short/50 Ω Load Calibration Standard, DC to 4 GHz	R&S®FSH-Z29	1300.7510.03
Soft Carrying Bag	R&S®HA-Z220	1309.6175.00
Battery Charger for R&S®HA-Z306 [1]	R&S®HA-Z303	1321.1328.02
Lithium-Ion Battery Pack, 6.4 Ah	R&S®HA-Z306	1321.1334.02
Spare USB Cable	R&S®HA-Z211	1309.6169.00
Spare Ethernet Cable	R&S®HA-Z210	1309.6152.00
Spare Power Supply, incl. mains plug for EU, GB,US, AUS, CH	R&S®HA-Z301	1321.1386.02
Hardcase	R&S®HA-Z321	1321.1357.02
Carrying Holster for R&S®FPH or R&S®ZPH	R&S®HA-Z322	1321.1370.02
RF Cable (length: 1 m), DC to 8 GHz, armored, N male/N female connectors	R&S®FSH-Z320	1309.6600.00
RF Cable (length: 3 m), DC to 8 GHz, armored, N male/N female connectors	R&S®FSH-Z321	1309.6617.00
Matching Pad, 50/75 Ω, L section	R&S®RAM	0358.5414.02
Matching Pad, 50/75 Ω, series resistor 25 Ω	R&S®RAZ	0358.5714.02
Matching Pad, 50/75 Ω, L section, N to BNC	R&S®FSH-Z38	1300.7740.02
Adapter N (m) – BNC (f)		0118.2812.00
Adapter N (m) – N (m)		0092.6581.00
Adapter N (m) – SMA (f)		4012.5837.00
Adapter N (m) – 7/16 (f)		3530.6646.00
Adapter N (m) – 7/16 (m)		3530.6630.00
Adapter N (m) – FME (f)		4048.9790.00
Adapter BNC (m) – Banana (f)		0017.6742.00
Attenuator, 50 W, 20 dB, 50 Ω, DC to 6 GHz, N (f) – N (m)	R&S®RDL50	1035.1700.52
Attenuator, 100 W, 20 dB, 50 Ω, DC to 2 GHz, N (f) – N (m)	R&S®RBU100	1073.8495.20
Attenuator, 100 W, 30 dB, 50 Ω, DC to 2 GHz, N (f) – N (m)	R&S®RBU100	1073.8495.30

[1] The battery charger is dedicated for charging an additional battery outside the instrument. The battery can be charged via the instrument as well.

Power sensors supported by the R&S®Cable Rider ZPH [2]

Designation	Type	Order No.
Directional Power Sensor, 25 MHz to 1 GHz	R&S®FSH-Z14	1120.6001.02
Directional Power Sensor, 200 MHz to 4 GHz	R&S®FSH-Z44	1165.2305.02
Universal Power Sensor, 10 MHz to 8 GHz, 100 mW, 2-path	R&S®NRP-Z211	1417.0409.02
Universal Power Sensor, 10 MHz to 18 GHz, 100 mW, 2-path	R&S®NRP-Z221	1417.0309.02
Wideband Power Sensor, 50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02
Wideband Power Sensor, 50 MHz to 40 GHz, 100 mW (2.92 mm)	R&S®NRP-Z85	1411.7501.02
Wideband Power Sensor, 50 MHz to 40 GHz, 100 mW (2.40 mm)	R&S®NRP-Z86	1417.0109.40
Wideband Power Sensor, 50 MHz to 44 GHz, 100 mW (2.40 mm)	R&S®NRP-Z86	1417.0109.44
Three-Path Diode Power Sensors, 100 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP8S	1419.0006.02
Three-Path Diode Power Sensors, 100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18S	1419.0029.02
Three-Path Diode Power Sensors, 100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33S	1419.0064.02
Three-Path Diode Power Sensors, 100 pW to 200 mW, 50 MHz to 40 GHz	R&S®NRP40S	1419.0041.02
Three-Path Diode Power Sensors, 100 pW to 200 mW, 50 MHz to 50 GHz	R&S®NRP50S	1419.0087.02
Thermal Power Sensor, 300 nW to 100 mW, DC to 18 GHz	R&S®NRP18T	1424.6115.02
Thermal Power Sensor, 300 nW to 100 mW, DC to 33 GHz	R&S®NRP33T	1424.6138.02
Thermal Power Sensor, 300 nW to 100 mW, DC to 40 GHz	R&S®NRP40T	1424.6150.02
Thermal Power Sensor, 300 nW to 100 mW, DC to 50 GHz	R&S®NRP50T	1424.6173.02
Thermal Power Sensor, 300 nW to 100 mW, DC to 67 GHz	R&S®NRP67T	1424.6196.02
Thermal Power Sensor, 300 nW to 100 mW, DC to 110 GHz	R&S®NRP110T	1424.6215.02
Average Power Sensor, 100 pW to 200 mW, 8 kHz to 6 GHz	R&S®NRP6A	1424.6796.02
Average Power Sensor, 100 pW to 200 mW, 8 kHz to 18 GHz	R&S®NRP18A	1424.6815.02
R&S®NRP-Zxx power sensors require the following adapter cable for operation on the R&S®Cable Rider ZPH		
USB Adapter Cable (passive), length: 2 m, to connect R&S®NRP-Zxx S/SN power sensors to the R&S®Cable Rider ZPH	R&S®NRP-Z4	1146.8001.02
R&S®NRP-Zxx power sensors require the following adapter cable for operation on the R&S®Cable Rider ZPH		
USB Interface Cable, length: 1.5 m, to connect R&S®NRP-Zxx sensors to the R&S®Cable Rider ZPH	R&S®NRP-ZKU	1419.0658.03
R&S®FSH-Z14 and R&S®FSH-Z44 power sensors require the following adapter cable for operation on the R&S®Cable Rider ZPH		
USB Adapter Cable for R&S®FSH-Z14/R&S®FSH-Z44	R&S®FSH-Z144	1145.5909.02

[2] For average power measurements only.