

# R&S® Cable Rider ZPH

## Cable and Antenna Analyzer

### Specifications



## CONTENTS

<b>Definitions .....</b>	<b>3</b>
<b>Specifications.....</b>	<b>4</b>
Frequency .....	4
Measurements.....	4
Channel power meter (R&S®ZPH-K19 option) .....	6
Maximum rated input levels .....	6
Inputs and outputs .....	6
Built-In GPS receiver (R&S®ZPH-B10 option) .....	6
General data.....	6
<b>Ordering information .....</b>	<b>8</b>
Options.....	8
Accessories .....	8
R&S®NRP-Zxx power sensors supported by the R&S®Cable Rider ZPH .....	9
Service options .....	10

# Definitions

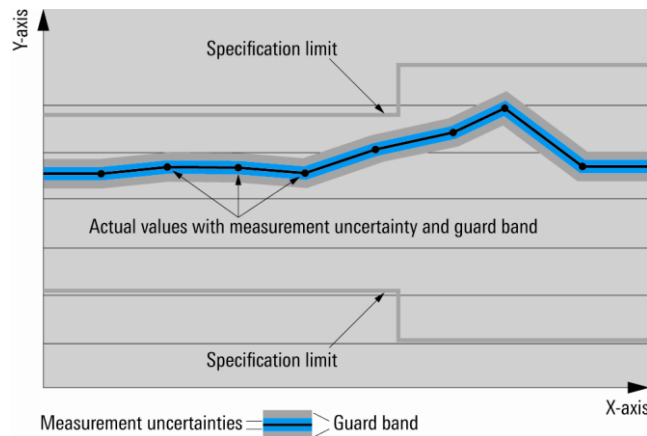
## General

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.



## 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

<b>Reference frequency, internal</b>		
Total reference accuracy		$\pm(\text{time since last adjustment} \times \text{aging rate})$ + 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

<b>Individual</b>		reflection ( $S_{11}$ )
		1-port cable loss
		distance-to-fault
<b>Measurement wizard</b>		
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.		

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

<b>Reflection measurement <math>S_{11}</math></b>		
Result formats		magnitude, SWR, magnitude and distance-to-fault, SWR and distance-to-fault, smith chart, phase
<b>Magnitude</b>		
Range		1/2/3/5/10/20/30/50/100/120/130/150 dB, linear 100 %
Resolution		0.1 dB
<b>SWR</b>		
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 $\leq$ f $\leq$ 4 GHz	> 42 dB (nom.)
Corrected test port match with R&S®ZN-Z103	2 MHz $\leq$ f $\leq$ 4 GHz	> 36 dB (nom.)
Measurement uncertainty with R&S®ZN-Z103		see figure Uncertainty of reflection measurement

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

**Distance-to-fault analysis**

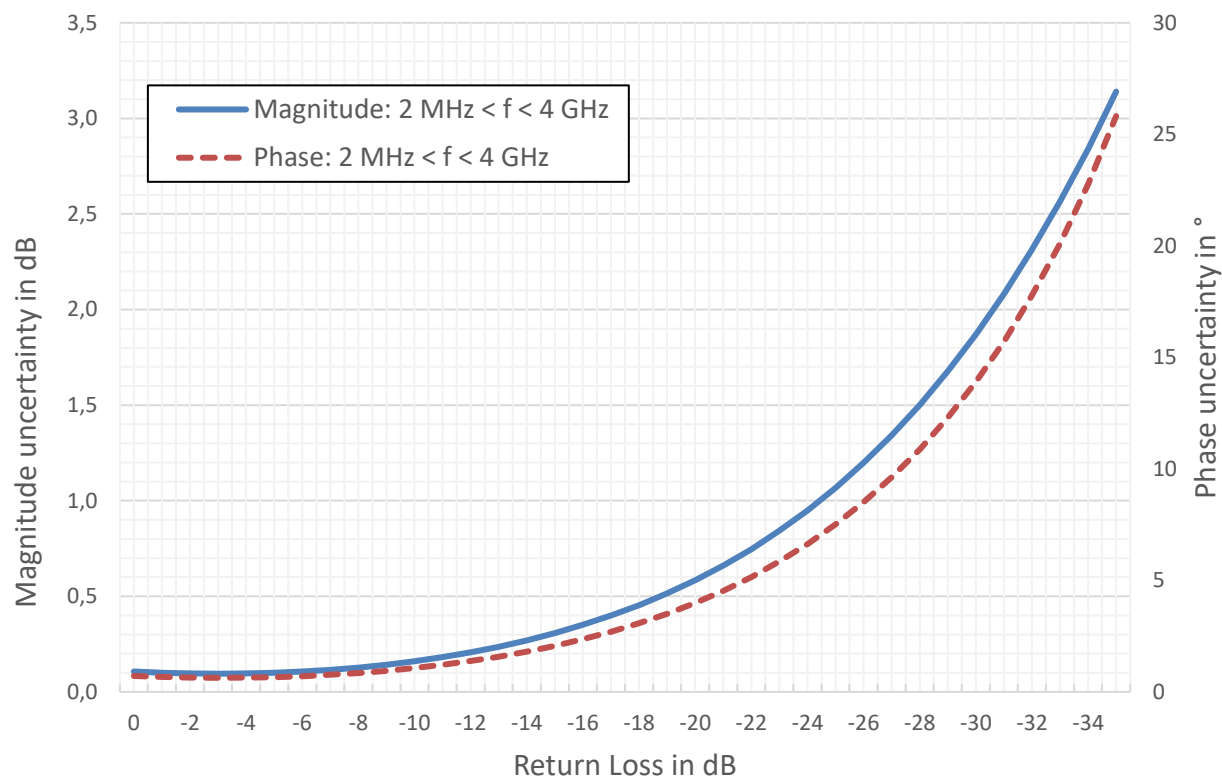
Result formats		return loss, SWR, split screen DTF and SWR, split screen DTF and return loss
Return loss		
Range		1/2/3/5/10/20/30/50/100/120/130/150 dB, linear 100 %
Resolution		0.1 dB
SWR		
Range	selectable	1 to 1.1/1.5/2/3/6/11/21/71
Fault resolution		$(1.5 \times 10^8 \times \text{velocity factor}/\text{span})$ 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 measurements with R&S®ZN-Z103**

Temp: +18 °C to +25 °C, BW: 10 Hz, power: -10 dBm

*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

<b>Maximum rated input level</b>		
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

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

<b>Manual operation</b>		
Languages		Chinese, Chinese Traditional, English, French, German, Italian, Hungarian, Japanese, Korean, Portuguese, Russian, Spanish
<b>Remote control</b>		
Command set		SCPI 1997.0
LAN interface		10/100BASE-T, RJ-45
USB		mini B plug, version 2.0
<b>Display</b>		
Resolution		WVGA, 800 × 480 pixel
<b>Audio</b>		
Speaker		internal
<b>USB interface</b>		type A plug, version 2.0
	number of interfaces	2
<b>Mass memory</b>		
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
<b>Temperature</b>	operating temperature range	–20 °C to +50 °C
	storage temperature range	–40 °C to +70 °C
	battery charging mode	0 °C to +40 °C
<b>Climatic loading</b>	relative humidity	+25 °/+55 °C at 95 % relative humidity (EN 60068-2-30)
	class of protection	IP51

<b>Mechanical resistance</b>		
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

<b>Power supply</b>		
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

## Ordering information

Designation	Type	Order No.
Handheld Cable and Antenna Analyzer, 2 MHz to 3 GHz	R&S®Cable Rider ZPH	1321.1211.02
<b>Accessories supplied</b>		
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 <sup>1</sup>	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

<sup>1</sup> 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 <sup>2</sup>

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
<b>R&amp;S®NRP-Zxx power sensors require the following adapter cable for operation on the R&amp;S®Cable Rider ZPH</b>		
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
<b>R&amp;S®NRP-Zxx power sensors require the following adapter cable for operation on the R&amp;S®Cable Rider ZPH</b>		
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
<b>R&amp;S®FSH-Z14 and R&amp;S®FSH-Z44 power sensors require the following adapter cable for operation on the R&amp;S®Cable Rider ZPH</b>		
USB Adapter Cable for R&S®FSH-Z14/R&S®FSH-Z44	R&S®FSH-Z144	1145.5909.02

<sup>2</sup> For average power measurements only.

## Service options

Warranty		
Base unit		3 years
All other items <sup>3</sup>		1 year
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 with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	

### 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>4</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>4</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

<sup>3</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>4</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 electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

## 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 GmbH & Co. KG

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

## Rohde & Schwarz training

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

## Regional contact

- ▮ Europe, Africa, Middle East | +49 89 4129 12345  
[customersupport@rohde-schwarz.com](mailto:customersupport@rohde-schwarz.com)
- ▮ North America | 1 888 TEST RSA (1 888 837 87 72)  
[customer.support@rsa.rohde-schwarz.com](mailto:customer.support@rsa.rohde-schwarz.com)
- ▮ Latin America | +1 410 910 79 88  
[customersupport.la@rohde-schwarz.com](mailto:customersupport.la@rohde-schwarz.com)
- ▮ Asia Pacific | +65 65 13 04 88  
[customersupport.asia@rohde-schwarz.com](mailto:customersupport.asia@rohde-schwarz.com)
- ▮ China | +86 800 810 82 28 | +86 400 650 58 96  
[customersupport.china@rohde-schwarz.com](mailto:customersupport.china@rohde-schwarz.com)

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG

Trade names are trademarks of the owners

PD 3607.6638.22 | Version 02.00 | March 2017 (as)

R&S®Cable Rider ZPH Cable and Antenna Analyzer

Data without tolerance limits is not binding | Subject to change

© 2017 Rohde & Schwarz GmbH & Co. KG | 81671 Munich, Germany



3607663822