

# R&S® CABLE RIDER ZPH CABLE AND ANTENNA ANALYZER

## Specifications



Specifications  
Version 08.00

**ROHDE & SCHWARZ**

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# 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 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit 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, kbps, kSPS and Msample/s are not SI units.

# Specifications

## Frequency

Frequency range		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 ( $S_{11}$ )
		one-port cable loss
		distance-to-fault
	model .12	transmission ( $S_{21}$ )
<b>Measurement wizard</b>		
Guides the user through a sequence of individual measurements. Uses the R&S®InstrumentView PC software to configure the measurement sequence including hints displayed on the screen. R&S®InstrumentView is also used to combine the measurement results into user-configurable reports.		

<b>Measurement setup</b>		
Port output power	model .02	-10 dBm (nom.)
	model .12	-3 dBm to -30 dBm step 1 dB (nom.)
Data points	selectable	101 to 2501
Measurement bandwidth	reflection measurement ( $S_{11}$ )	10 kHz
	transmission measurement ( $S_{21}$ )	10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz
Trace modes		clear/write, average

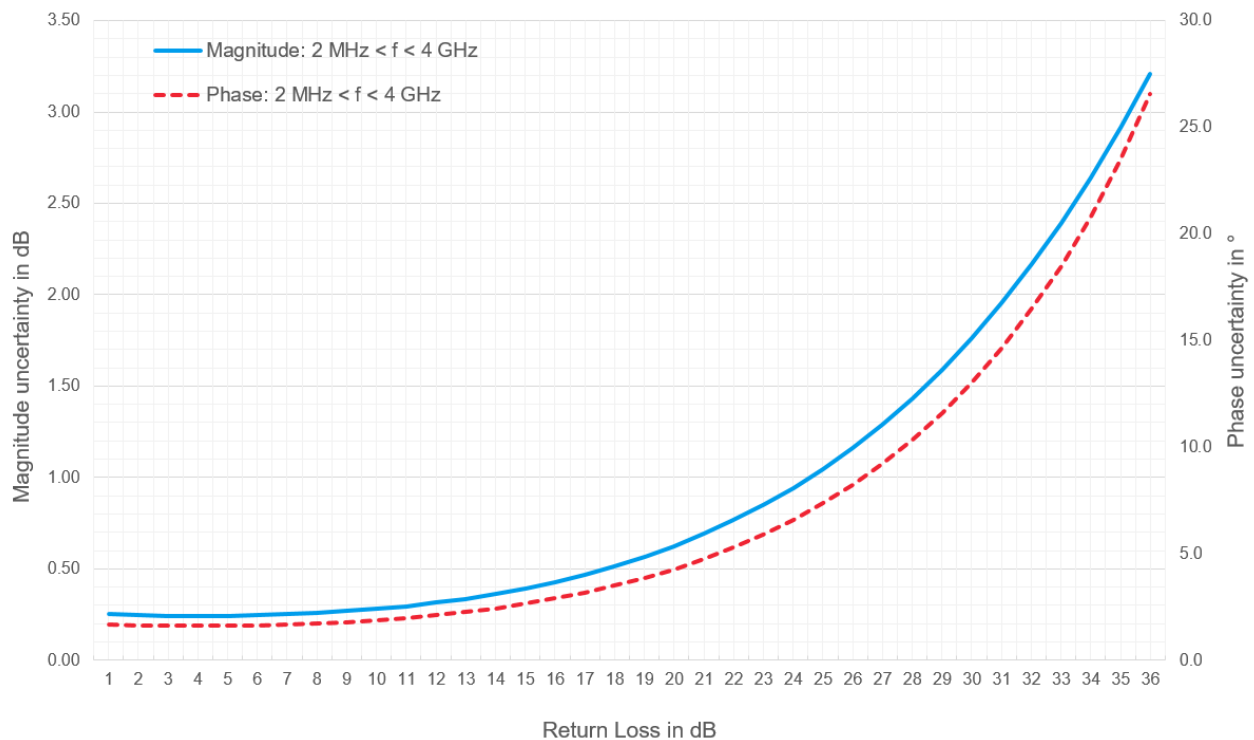
<b>Reflection measurement <math>S_{11}</math></b>		
Result formats		magnitude, SWR, magnitude and distance-to-fault, SWR and distance-to-fault, smith chart, phase
Magnitude		
Range		1/2/3/5/10/20/30/50/100/120/130/150 dB, linear 100 %
Resolution		0.1 dB
SWR		
Range	selectable	1 to 1.1/1.5/2/3/6/11/21/71
Measurement speed		0.3 ms per point
Corrected directivity with R&S®ZN-Z103	2 MHz $\leq$ 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>One-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		0.01 dB
SWR		
Range	selectable	1 to 1.1/1.5/2/3/6/11/21/71
Fault resolution		$(1.5 \times 10^8 \times \text{velocity factor} / \text{span}) \text{ m}$
Maximum cable length	depending on cable loss	1500 m (nom.)

Immunity to interference		
Maximum permissible spurious signal	measurement = reflection ( $S_{11}$ ) / one-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, RBW: 10 Hz, Power: -10dBm



*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°

Dynamic of transmission measurements (model .12 only)		
RF attenuation = 5 dB, tracking generator level = -3 dBm, RBW = 10 kHz	$100 \text{ kHz} \leq f < 20 \text{ MHz}$	> 60 dB (nom.)
	$20 \text{ MHz} \leq f < 1.5 \text{ GHz}$	> 90 dB (nom.)
	$1.5 \text{ GHz} \leq f < 2.5 \text{ GHz}$	> 70 dB (nom.)
	$2.5 \text{ GHz} \leq f < 4 \text{ GHz}$	> 60 dB (nom.)

## Sweep time

Sweep time	span = 0 Hz	56.8 $\mu$ s to 1000 s
	10 Hz $\leq$ span $\leq$ 600 MHz	20 ms to 1000 s
	span > 600 MHz	(20 ms $\times$ span / 1600 MHz) to 1000 s
Uncertainty	span = 0 Hz	1 % (nom.)
	span $\geq$ 10 Hz	3 % (nom.)

## Bandwidths

<b>Resolution bandwidths</b>		
Range	-3 dB bandwidths	1 Hz to 3 MHz in 1/3 sequence
Bandwidth accuracy	1 Hz $\leq$ RBW $\leq$ 300 kHz	< 5 % (nom.)
	300 kHz < RBW $\leq$ 1 MHz	< 10 % (nom.)
Selectivity 60 dB:3 dB	Gaussian type filters	< 5 (nom.)
Video filters		
Range	-3 dB bandwidths	1 Hz to 3 MHz in 1/3 sequence

## Level

Display range		displayed noise floor to +30 dBm
<b>Maximum rated input level</b>		
DC voltage		50 V
CW RF power		33 dBm (= 2 W)
Peak RF power	duration < 3 s	36 dBm (= 4 W)
Maximum pulse voltage		150 V
Maximum pulse energy	pulse width 10 $\mu$ s	10 mWs
<b>Intermodulation</b>		
Third-order intercept (TOI)	intermodulation-free dynamic range, signal level = -20 dBm (both), RF attenuation = 0 dB, RF preamplifier = off	
	f = 1 GHz	+7 dBm (meas.)
	f = 2.4 GHz	+10 dBm (meas.)
Second-harmonic intercept (SHI)	RF attenuation = 0 dB, RF preamplifier = off, signal level = -40 dBm	
	$f_{in}$ = 20 MHz to 1.5 GHz	-60 dBc (nom.)
	$f_{in}$ = 1.5 GHz to 2 GHz	-80 dBc (nom.)
<b>Displayed average noise level</b>	0 dB RF attenuation, termination 50 $\Omega$ , RBW = 1 kHz, VBW = 10 Hz, sample detector, logarithmic scaling, normalized to 1 Hz	
	preamplifier = off	
	1 MHz to 10 MHz	< -130 dBm, -135 dBm (typ.)
	10 MHz to 1 GHz	< -142 dBm, -146 dBm (typ.)
	1 GHz to 4 GHz	< -140 dBm, -144 dBm (typ.)
	preamplifier = on	
	1 MHz to 10 MHz	< -150 dBm, -160 dBm (typ.)
	10 MHz to 3 GHz	< -158 dBm, -163 dBm (typ.)
3 GHz to 4 GHz	< -156 dBm, -161 dBm (typ.)	

<b>Immunity to interference, nominal values</b>		
Image frequencies	$f_{in} - 2 \times 30.15$ MHz	< -70 dBc (nom.)
	$f_{in} - 2 \times 830.15$ MHz	< -70 dBc (nom.)
	f < 3 GHz, $f_{in} - 2 \times 830.15$ MHz	< -70 dBc (nom.)
	f < 3 GHz, $f_{in} - 2 \times 4042.65$ MHz	-60 dBc (nom.)
	f $\geq$ 3 GHz, $f_{in} + 2 \times 830.15$ MHz	-60 dBc (nom.)
Intermediate frequencies	30.15 MHz, 830.15 MHz, 4042.65 MHz	< -60 dBc (nom.)
Other interfering signals, signal level - RF attenuation < -30 dBm	f $\leq$ 3 GHz, spurious at $f_{in} - 2021.325$ MHz	< -60 dBc (nom.)
Other interfering signals, related to local oscillators	$\Delta f \geq 300$ kHz f: receive frequency	< -60 dBc (nom.)
Residual spurious response	input matched with 50 $\Omega$ , without input signal, RBW $\leq$ 30 kHz, f $\geq$ 3 MHz, RF attenuation = 0 dB	< -90 dBm (nom.)
<b>Level display</b>		
Logarithmic level axis		1/2/3/5/10/20/30/50/100/120/150 dB, 10 divisions
Linear level axis		0 % to 100 %, 10 divisions
Number of traces		2

Trace detectors		max. peak, min. peak, auto peak, sample, RMS
Trace functions		clear/write, max. hold, min. hold, average, view
Setting range of reference level		-130 dBm to +30 dBm
Units of level axis		dBm, dBmV, dBμV, V, W
<b>Level measurement uncertainty</b>		
Absolute level uncertainty at 100 MHz	+20 °C to +30 °C	< 0.3 dB
Frequency response (+20 °C to +30 °C)	5 kHz ≤ f < 10 MHz	< 1.5 dB (nom.)
	10 MHz ≤ f ≤ 4 GHz	< 1 dB
Attenuator uncertainty		< 0.3 dB
Uncertainty of reference level setting		< 0.1 dB (nom.)
Display nonlinearity	SNR > 16 dB, 0 dB to -50 dB, logarithmic level display	< 0.3 dB
Bandwidth switching uncertainty	reference: RBW = 10 kHz	< 0.1 dB (nom.)
Total measurement uncertainty	95 % confidence level, +20 °C to +30 °C, SNR > 16 dB, 0 dB to -50 dB below reference level, RF attenuation auto	
	10 MHz ≤ f ≤ 4 GHz	0.74 dB

## Trigger functions

<b>Trigger</b>		
Trigger source		free run, video, external
External trigger level threshold	low → high transition	2.4 V
	high → low transition	0.7 V
	maximum	3.0 V
<b>Gated trigger (model .12 only)</b>		
Gate delay		1 μs to 100 s, resolution min. 1 μs (or 1 % of delay)
Gate length		1 μs to 100 s, resolution min. 1 μs (or 1 % of gate length)

## 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 flash drive/microSD card (not supplied), size ≤ 32 Gbyte, USB version 1.1 or 2.0
Data storage	internal	> 160 instrument settings and traces
	on USB flash drive 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 °C/+55 °C at 95 % relative humidity, in line with 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	100 V to 240 V AC, 50 Hz to 60 Hz, 1.0 A to 0.5 A
	output	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 marks	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	model .02	9 h
	model .12 (default mode)	6.5 h
	model .12 (spectrum analyzer mode)	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 its initial capacity after 300 charge/discharge cycles
<b>Power consumption</b>	model .02	8 W (meas.)
	model .12 (default mode)	11 W (meas.)
	model .12 (spectrum analyzer mode)	8 W (meas.)
<b>Safety</b>		IEC 61010-1, EN 61010-1, UL 61010-1 (third edition), CAN/CSA-C22.2 No. 61010.1-12
<b>Test marks</b>		VDE, CSA, CSA-NRTL
<b>Electromagnetic compatibility</b>	in line with European EMC Directive 2014/30/EU including	EN 61326-1 class B (emission) <ul style="list-style-type: none"> <li>CISPR 11/EN 55011/group 1 class B (emission)</li> <li>EN 61326-1 table 2 (immunity, industrial)</li> </ul>

<b>Dimensions and weight</b>		
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)
<b>Recommended calibration interval</b>		1 year

## Inputs and outputs

<b>Port 1</b>		
Impedance		50 Ω
Connector		type N, female
VSWR	2 MHz ≤ f ≤ 4 GHz (model .02)	< 1.2 (nom.)
	100 kHz ≤ f ≤ 1 GHz (model .12)	< 1.5 (nom.)
	1 GHz < f ≤ 4 GHz (model .12)	< 2 (nom.)
<b>Port 2</b>		
Impedance		50 Ω
Connector		type N, female
VSWR	2 MHz ≤ f ≤ 4 GHz (model .02)	< 1.5 (nom.)
	2 MHz ≤ f < 100 MHz (model .12)	< 2.0 (nom.)
	100 MHz ≤ f ≤ 4 GHz (model .12)	< 1.5 (nom.)
<b>DC bias (model .12 only)</b>		
Mode		type N or BNC
Output port		port 2
Output voltage	mode: internal	+2 V to +32 V in 0.1 V steps (nom.)
Accuracy	< +3 V	< 1 V (nom)
	≥ +3 V	< 0.5 V (nom)



Maximum output power	mode: internal	
	operated with battery	7 W
	operated with AC mains	7 W
Maximum continuous output current	mode: internal	650 mA

## 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)
Maximum pulse voltage		150 V
Maximum pulse energy	pulse width 10 $\mu$ s	10 mWs

## R&S®ZPH-B10 built-in GPS receiver (model .02 only)

GPS location indication		latitude, longitude, height
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## R&S®ZPH-K1 spectrum analyzer (model .12 only)

Frequency range		5 kHz to 3 GHz
	with R&S®ZPH-B4 option installed	5 kHz to 4 GHz
Frequency resolution		1 Hz

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

<b>Frequency readout</b>		
Marker resolution		0.1 Hz
Uncertainty		$\pm$ (marker frequency $\times$ reference uncertainty + 10 % $\times$ resolution bandwidth + $\frac{1}{2}$ (span / (sweep points - 1) + 1 Hz)
Number of sweep (trace) points		711
Marker tuning frequency step size		span / 710
Frequency counter resolution	selectable	0.1 Hz (low), 0.1 mHz (high)
Count uncertainty	SNR > 25 dB	$\pm$ (frequency $\times$ reference uncertainty + $\frac{1}{2}$ (last digit))
Frequency span		0 Hz, 10 Hz to 3 GHz
	with R&S®ZPH-B4 option installed	0 Hz, 10 Hz to 4 GHz
Span uncertainty		1 % (nom.)

<b>Spectral purity SSB phase noise</b>		
Carrier offset	30 kHz	f = 500 MHz < -88 dBc (1 Hz), -95 dBc (1 Hz) (typ.)
	100 kHz	< -98 dBc (1 Hz), -105 dBc (1 Hz) (typ.)
	1 MHz	< -118 dBc (1 Hz), -125 dBc (1 Hz) (typ.)

## R&S® ZPH-K7 analog modulation analysis AM/FM (model .12 only)

Measurement of analog modulation signals		
Center frequency		500 kHz to 4 GHz
Demodulation bandwidth		2 MHz, 1 MHz, 500 kHz, 300 kHz, 200 kHz, 100 kHz, 50 kHz, 30 kHz, 20 kHz, 10 kHz (nom.)
Bandwidth accuracy		< ±5 % (nom.)
Display	AM	carrier power, carrier frequency offset, AM modulation depth, modulation frequency, THD, SINAD
	FM	carrier power, carrier frequency offset, FM deviation, modulation frequency, THD, SINAD

Carrier power		
Carrier power measurement accuracy		add 0.2 dB, see Level measurement uncertainty
Display resolution		0.1 dB

AF modulation frequency <sup>1</sup>		
Measurement range	AM	20 Hz to 100 kHz (nom.)
	FM	20 Hz to 200 kHz (nom.)
Resolution		1 Hz
Measurement uncertainty	1 kHz ≤ AF ≤ 200 kHz	±(1 % of measured value) (nom.)
	20 Hz ≤ AF < 1 kHz	±1 Hz (nom.)
AF filters		
Lowpass	audio decimation	bypass, 1/10, 1/30, 1/100 (nom.)
Deemphasis	FM demodulation, demodulation bandwidth 200 kHz and 300 kHz	off, 50 μs, 75 μs (nom.)

AM demodulation <sup>2</sup>		
Measurement range	modulation depth	5 % to 95 % (nom.)
Modulation depth uncertainty		±4 % (nom.)

FM demodulation <sup>3</sup>		
Measurement range	frequency deviation	10 kHz to 400 kHz (nom.), max. 0.4 × demodulation bandwidth
Deviation uncertainty		±(0.04 × (AF + deviation)) (nom.)

Modulation distortion <sup>1, 2, 3</sup>		
Measurement functions		THD, SINAD
Measurement range	THD	-50 dB to 0 dB
	SINAD, AM	0 dB to 50 dB
	SINAD, FM	0 dB to 40 dB
Display resolution		0.1 dB
Measurement uncertainty		1 dB (nom.)
AF frequency range		20 Hz to 100 kHz (nom.)

<sup>1</sup> Minimum and maximum detectable audio frequency and harmonics depend on the demodulation bandwidth and audio filter settings.

<sup>2</sup> Modulation frequency = 1 kHz sine, AM modulation depth: 50 %, carrier level = 0 dBm, center frequency = 499 MHz, reference level = 6 dBm, demodulation bandwidth = 20 kHz, SNR > 60 dB, audio filter = bypass.

<sup>3</sup> Modulation frequency = 1 kHz sine, FM deviation = 75 kHz, carrier level = 0 dBm, center frequency = 499 MHz, reference level = 6 dBm, demodulation bandwidth = 300 kHz, SNR > 60 dB, audio filter = 1/10, deemphasis = off.

## R&S®ZPH-K19 channel power meter (model .02 only)

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

## R&S®ZPH-K19 channel power meter (model .12 only)

Frequency range		5 kHz to 3 GHz
	with R&S®ZPH-B4 option installed	5 kHz to 4 GHz
Channel bandwidth		100 kHz to 1 GHz
Amplitude		offset, dB relative, zeroing
Unit		dBm, W
Limits		on/off, upper limit, lower limit, beep on fail
Measurement range		-120 dBm to +30 dBm
<b>Level measurement uncertainty</b>		
Absolute level uncertainty at 100 MHz	+20 °C to +30 °C	< 0.3 dB
Frequency response	+20 °C to +30 °C	
	100 kHz ≤ f < 10 MHz	< 1.5 dB (nom.)
	10 MHz ≤ f ≤ 4 GHz	< 1.25 dB

## R&S®ZPH-K105 EMF measurement application (model .12 only)

The R&S®ZPH-K105 requires R&S®ZPH-K1 option.

EMF measurements	R&S®ZPH-K105
Mode	<ul style="list-style-type: none"> <li>• spectrum</li> <li>• channel power (10 MHz)</li> </ul>
Sequence of measurements	•
Fixed frequency	•
Set of frequencies	•
<b>Results</b>	
Table of field strengths	•
Total field strength	•
Calculation of exposition	•
EMF limit check	•
ISO antenna measurement	•

The setup of the EMF measurement sequence and the detailed result evaluation is done via the R&S®InstrumentView software.

## R&S®ZPH-K57 advanced gated trigger measurement (model .12 only)

The specifications have not been checked separately and are not verified during instrument calibration. Advanced gated trigger measurements are used for analysis of periodic time domain signal measurements and applicable only to the below mentioned measurement modes.

Measurements	R&S®ZPH-K57
Occupied bandwidth (OBW)	•
Spectrum emission mask (SEM)	•
Adjacent channel leakage ratio (ACLR)	•

Frequency range		see basic instrument
Resolution bandwidths	-3 dB bandwidths	30 kHz to 3 MHz in 1/3 sequence
Video bandwidths		30 kHz to 3 MHz in 1/3 sequence
Detectors		see basic instrument
Auto gate detection	minimum distance, high level to low level	10 dB

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

The specifications for part number 1321.1211.02 are equivalent to part number 1321.1211.52 and 1321.1211P01.

## Ordering information

Designation	Type	Order No.
Cable and antenna analyzer, 2 MHz to 3 GHz	R&S®Cable Rider ZPH	1321.1211.02
Cable and antenna analyzer, combi model, 2 MHz to 3 GHz	R&S®Cable Rider ZPH	1321.1211.12
<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.
Frequency upgrade from 3 GHz to 4 GHz	R&S®ZPH-B4	1321.0380.02
Spectrum analyzer (model .12 only)	R&S®ZPH-K1	1334.5604.02
GPS support (model .02 only)	R&S®ZPH-B10	1321.0396.02
Spectrum analyzer preamplifier (model .12 only)	R&S®ZPH-B22 <sup>4</sup>	1334.5627.02
Analog modulation analysis AM/FM (model .12 only)	R&S®ZPH-K7 <sup>4</sup>	1334.5633.02
Power sensor support	R&S®ZPH-K9	1321.0415.02
Interference analysis (model .12 only)	R&S®ZPH-K15 <sup>4</sup>	1334.5640.02
Signal strength mapping (model .12 only)	R&S®ZPH-K16 <sup>4</sup>	1334.5656.02
Channel power meter	R&S®ZPH-K19	1321.0409.02
Pulse measurements with power sensor	R&S®ZPH-K29	1321.0421.02
Advanced gated trigger measurements	R&S®ZPH-K57 <sup>4</sup>	1334.5685.02
EMF measurement	R&S®ZPH-K105 <sup>4</sup>	1334.7207.02

## Accessories

Designation	Type	Order No.
Calibration unit	R&S®ZN-Z103	1321.1828.02
Combined open/short/50 Ω load calibration standard, for calibrating the VSWR and DTF measurements, DC to 3.6 GHz	R&S®FSH-Z29	1300.7510.03
Battery charger for R&S®HA-Z306 <sup>5</sup>	R&S®HA-Z303	1321.1328.02
Lithium-ion battery pack, 6.4 Ah	R&S®HA-Z306	1321.1334.02
Spare power supply, incl. mains plug for EU, GB, US, AUS, CH	R&S®HA-Z301	1321.1386.02
Car adapter	R&S®HA-Z302	1321.1340.02
Headphones	R&S®FSH-Z36	1145.5838.02
Spare USB cable	R&S®HA-Z211	1309.6169.00
Spare Ethernet cable	R&S®HA-Z210	1309.6152.00
Soft carrying bag	R&S®HA-Z220	1309.6175.00
Hard case	R&S®HA-Z321	1321.1357.02
Hard shell protective carrying case	R&S®RTH-Z4	1326.2774.02
Carrying holster	R&S®HA-Z322	1321.1370.02
Rainproof carrying holster	R&S®HA-Z322	1321.1370.03

## Antennas and antenna accessories

Designation	Type	Order No.
Handheld directional antenna (with antenna handle)	R&S®HE400BC	4104.6000.04
Cable set for R&S®HE400BC (R&S®HE300USB required)	R&S®HE400-KB	4104.7770.04
Handheld directional antenna (with antenna handle)	R&S®HE400	4104.6000.02
Cable set for R&S®HE400 (R&S®HE300USB required)	R&S®HE400-K	4104.7770.02
HF antenna module, 8.3 kHz to 30 MHz	R&S®HE400HF	4104.8002.02
VHF antenna module, 20 MHz to 200 MHz	R&S®HE400VHF	4104.8202.02
UWB antenna module, 30 MHz to 6 GHz	R&S®HE400UWB	4104.6900.02
Log-periodic antenna module, 450 MHz to 8 GHz	R&S®HE400LP	4104.8402.02
Cellular antenna module, 700 MHz to 2500 MHz	R&S®HE400CEL	4104.7306.02
USB adapter	R&S®HE300USB	4080.9440.02
Log-periodic OEM antenna, 700 MHz to 4 GHz	R&S®HA-Z350	1321.1405.02
Yagi antenna, 1710 MHz to 1990 MHz	R&S®HA-Z1900	1328.6825.02
Yagi antenna, 824 MHz to 960 MHz	R&S®HA-Z900	1328.6283.02
Portable EMF measurement system, hard case	R&S®TS-EMF	1158.9295.05

<sup>4</sup> Additional R&S®ZPH-K1 option is required to activate this option.

<sup>5</sup> The battery charger is dedicated for charging an additional battery outside the instrument. The battery can be charged via the instrument as well.

Designation	Type	Order No.
Isotropic antenna, 30 MHz to 3 GHz, for R&S <sup>®</sup> TS-EMF	R&S <sup>®</sup> TSEMF-B1	1074.5719.02
Isotropic antenna, 700 MHz to 6 GHz, for R&S <sup>®</sup> TS-EMF	R&S <sup>®</sup> TSEMF-B2	1074.5702.02
Isotropic antenna, 700 MHz to 8 GHz, for R&S <sup>®</sup> TS-EMF	R&S <sup>®</sup> TSEMF-B2E	1074.5702.03
Isotropic antenna, 9 kHz to 200 MHz, for R&S <sup>®</sup> TS-EMF	R&S <sup>®</sup> TSEMF-B3	1074.5690.02
Converter cable	R&S <sup>®</sup> TSEMF-CV	1158.9250.02
RF cable (length: 1 m), DC to 6 GHz, type N (m) to type N (m) connectors	R&S <sup>®</sup> HA-Z901	3626.2757.02
Carrying bag, for R&S <sup>®</sup> HA-Z900 or R&S <sup>®</sup> HA-Z1900 Yagi antenna	R&S <sup>®</sup> HA-Z902	1328.6883.02
Compact probe set for E and H near-field measurements, 30 MHz to 3 GHz	R&S <sup>®</sup> HZ-15	1147.2736.02
Near-field probe set H field	R&S <sup>®</sup> HZ-17	1339.4141.02
Preamplifier (3 GHz, 20 dB), power adapter (100 V to 230 V), for R&S <sup>®</sup> HZ-15	R&S <sup>®</sup> HZ-16	1147.2720.02
RF cable (length: 1 m), DC to 8 GHz, armored, type N (m) to type N (f) connectors	R&S <sup>®</sup> FSH-Z320	1309.6600.00
RF cable (length: 3 m), DC to 8 GHz, armored, type N (m) to type N (f) connectors	R&S <sup>®</sup> FSH-Z321	1309.6617.00
Matching pad, 50/75 Ω, L section	R&S <sup>®</sup> RAM	0358.5414.02
Matching pad, 50/75 Ω, series resistor 25 Ω	R&S <sup>®</sup> RAZ	0358.5714.02
Matching pad, 50/75 Ω, L section, type N to BNC	R&S <sup>®</sup> FSH-Z38	1300.7740.02
Adapter, type N (m) to BNC (f)		0118.2812.00
Adapter, type N (m) to type N (m)		0092.6581.00
Adapter, type N (m) to SMA (f)		4012.5837.00
Adapter, type N (m) to 7/16 (f)		3530.6646.00
Adapter, type N (m) to 7/16 (m)		3530.6630.00
Adapter, type N (m) to FME (f)		4048.9790.00
Adapter, BNC (m) to banana (f)		0017.6742.00
Attenuator, 50 W, 20 dB, 50 Ω, DC to 6 GHz, type N (f) to type N (m)	R&S <sup>®</sup> RDL50	1035.1700.52
Attenuator, 100 W, 20 dB, 50 Ω, DC to 2 GHz, type N (f) to type N (m)	R&S <sup>®</sup> RBU100	1073.8495.20
Attenuator, 100 W, 30 dB, 50 Ω, DC to 2 GHz, type N (f) to type N (m)	R&S <sup>®</sup> RBU100	1073.8495.30

## Supported R&S<sup>®</sup>NRP-Zxx power sensors <sup>6</sup>

Designation	Type	Order No.
<b>Directional power sensors</b>		
30 mW to 300 W, 25 MHz to 1 GHz	R&S <sup>®</sup> FSH-Z14	1444.0029.02
30 mW to 300 W, 200 MHz to 4 GHz	R&S <sup>®</sup> FSH-Z44	1444.0035.02
<b>Universal power sensors</b>		
1 nW to 100 mW, 10 MHz to 8 GHz, two-path	R&S <sup>®</sup> NRP-Z211	1417.0409.02
1 nW to 100 mW, 10 MHz to 18 GHz, two-path	R&S <sup>®</sup> NRP-Z221	1417.0309.02
<b>Thermal power sensors</b>		
300 nW to 100 mW, DC to 18 GHz	R&S <sup>®</sup> NRP18T	1424.6115.02
300 nW to 100 mW, DC to 33 GHz	R&S <sup>®</sup> NRP33T	1424.6138.02
300 nW to 100 mW, DC to 40 GHz	R&S <sup>®</sup> NRP40T	1424.6150.02
300 nW to 100 mW, DC to 50 GHz	R&S <sup>®</sup> NRP50T	1424.6173.02
300 nW to 100 mW, DC to 67 GHz	R&S <sup>®</sup> NRP67T	1424.6196.02
300 nW to 100 mW, DC to 110 GHz	R&S <sup>®</sup> NRP110T	1424.6215.02
<b>Average power sensors</b>		
100 pW to 200 mW, 8 kHz to 6 GHz	R&S <sup>®</sup> NRP6A	1424.6796.02
100 pW to 200 mW, 8 kHz to 18 GHz	R&S <sup>®</sup> NRP18A	1424.6815.02
<b>Three-path diode power sensors</b>		
100 pW to 200 mW, 10 MHz to 8 GHz	R&S <sup>®</sup> NRP8S	1419.0006.02
100 pW to 200 mW, 10 MHz to 18 GHz	R&S <sup>®</sup> NRP18S	1419.0029.02
100 pW to 200 mW, 10 MHz to 33 GHz	R&S <sup>®</sup> NRP33S	1419.0064.02
100 pW to 200 mW, 10 MHz to 40 GHz	R&S <sup>®</sup> NRP40S	1419.0041.02
100 pW to 200 mW, 10 MHz to 50 GHz	R&S <sup>®</sup> NRP50S	1419.0087.02
<b>Pulse power sensors</b>		
1 nW to 100 mW, 50 MHz to 18 GHz	R&S <sup>®</sup> NRP18P	1444.1190.02
1 nW to 100 mW, 50 MHz to 40 GHz, 2.92 mm	R&S <sup>®</sup> NRP40P	1444.1290.02
1 nW to 100 mW, 50 MHz to 50 GHz, 2.40 mm	R&S <sup>®</sup> NRP50P	1444.1390.02
<b>Wideband power sensors</b>		
1 nW to 100 mW, 50 MHz to 18 GHz	R&S <sup>®</sup> NRP-Z81	1137.9009.02
1 nW to 100 mW, 50 MHz to 40 GHz, 2.92 mm	R&S <sup>®</sup> NRP-Z85	1411.7501.02
1 nW to 100 mW, 50 MHz to 40 GHz, 2.40 mm	R&S <sup>®</sup> NRP-Z86	1417.0109.40
1 nW to 100 mW, 50 MHz to 44 GHz, 2.40 mm	R&S <sup>®</sup> NRP-Z86	1417.0109.44

<sup>6</sup> For average power measurements only.

<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, for R&S®FSH-Z14/R&S®FSH-Z44 power sensors	R&S®FSH-Z144	1145.5909.02
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 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 sensors to the R&S®Cable Rider ZPH	R&S®NRP-ZKU	1419.0658.03

## Optical power sensors and accessories

Designation	Type	Order No.
OEM USB optical power meter (Germanium)	R&S®HA-Z360	1334.5162.00
OEM USB optical power meter (filtered InGaAs)	R&S®HA-Z361	1334.5179.00
SC adapter for optical power meter	R&S®HA-Z362	1334.5185.00
LC adapter for optical power meter	R&S®HA-Z363	1334.5191.00
2.5 mm universal adapter for optical power meter	R&S®HA-Z364	1334.5204.00
1.25 mm universal adapter for optical power meter	R&S®HA-Z365	1334.5210.00
Patch cord SC-LC SM, SX, length: 1 m	R&S®HA-Z366	1334.5227.00
Patch cord SC-SC SM, SX, length: 1 m	R&S®HA-Z367	1334.5233.00

## Service options

<b>Warranty</b>		
Base unit		3 years
All other items <sup>7</sup>		1 year
<b>Service options</b>		
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 accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®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>8</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>8</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>8</sup> and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

<sup>7</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>8</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

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