

R&S® CABLE RIDER ZPH CABLE AND ANTENNA ANALYZER

Specifications



Specifications
Version 09.00

ROHDE & SCHWARZ

Make ideas real



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Definitions

General

Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of 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

Reference frequency, internal		
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

Individual		reflection (S_{11})
		one-port cable loss
		distance-to-fault
	model .12	transmission (S_{21})

Measurement wizard

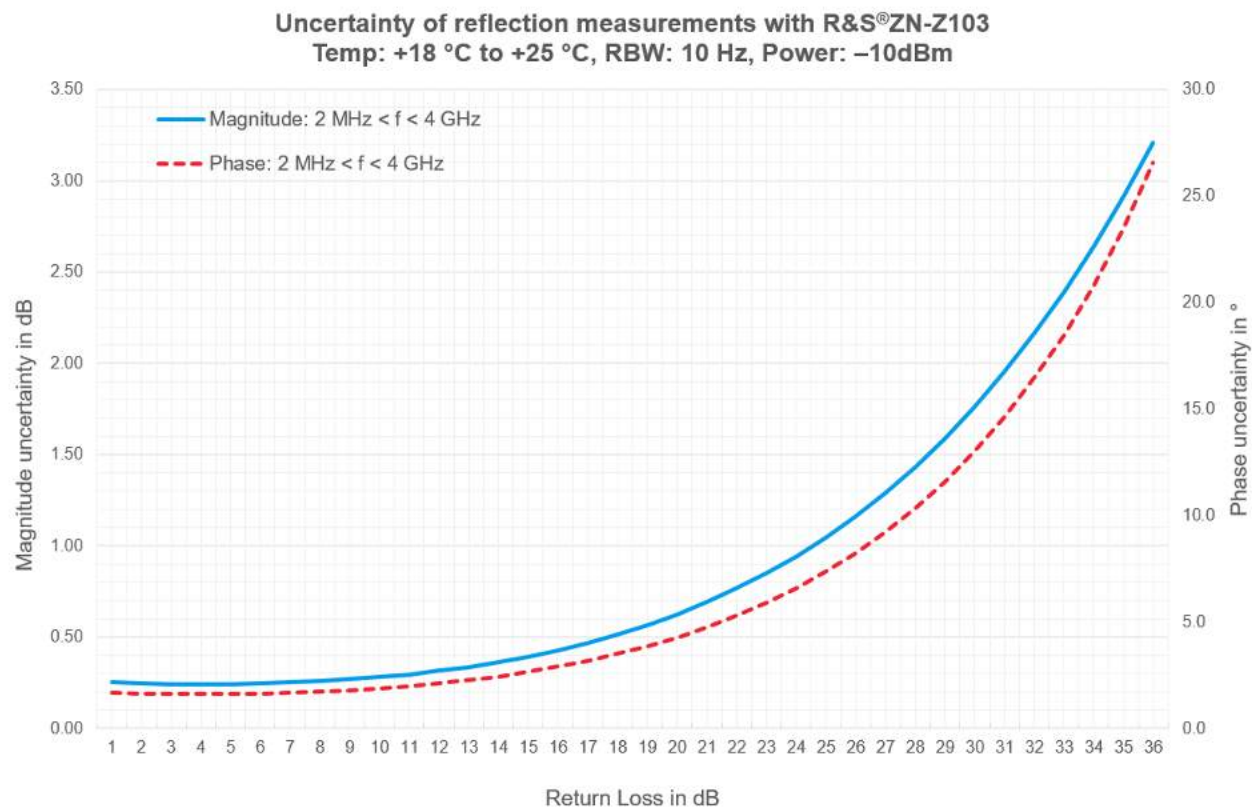
Guides the user through a sequence of individual measurements. Uses the R&S®InstrumentView PC software to configure the measurement sequence including hints displayed on the screen. R&S®InstrumentView is also used to combine the measurement results into user-configurable reports.

Measurement setup		
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

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 $\leq f \leq$ 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

One-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		0.01 dB
SWR		
Range	selectable	1 to 1.1/1.5/2/3/6/11/21/71
Fault resolution		$(1.5 \times 10^8 \times \text{velocity factor} / \text{span})$ 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 and 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°
Dynamic of transmission measurements (model .12 only)		
RF attenuation = 5 dB, tracking generator level = -3 dBm, RBW = 10 kHz	100 kHz ≤ f < 20 MHz	> 60 dB (nom.)
	20 MHz ≤ f < 1.5 GHz	> 90 dB (nom.)
	1.5 GHz ≤ f < 2.5 GHz	> 70 dB (nom.)
	2.5 GHz ≤ f < 4 GHz	> 60 dB (nom.)

Sweep time

Sweep time	span = 0 Hz	56.8 μ 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

Resolution bandwidths		
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
Maximum rated input level		
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 μ s	10 mWs
Intermodulation		
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.)
Displayed average noise level	0 dB RF attenuation, termination 50 Ω , 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.)

Immunity to interference, nominal values		
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 Ω , without input signal, RBW ≤ 30 kHz, $f \geq 3$ MHz, RF attenuation = 0 dB	< –90 dBm (nom.)
Level display		
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
Level measurement uncertainty		
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

Trigger		
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
Gated trigger (model .12 only)		
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

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 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
Temperature range	operating temperature	–10 °C to +55 °C
	storage temperature	–20 °C to +50 °C
	battery charging mode	0 °C to +40 °C
Climatic loading	relative humidity	+25 °C/+55 °C at 95 % relative humidity, in line with EN 60068-2-30
	class of protection	IP51
Altitude	operating with battery	15000 m (49210 ft)
	operating with AC to DC adapter	3000 m (9840 ft)

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	100 V to 240 V AC $\pm$ 10 %, 50 Hz to 60 Hz, 1.0 A to 0.5 A
	output	15 V, 2.67 A, max. 40 W
	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
Power consumption	model .02	8 W (meas.)
	model .12 (default mode)	11 W (meas.)
	model .12 (spectrum analyzer mode)	8 W (meas.)
Safety		IEC 61010-1, EN 61010-1, UL 61010-1 (third edition), CAN/CSA-C22.2 No. 61010.1-12
Test marks		VDE, CSA, CSA-NRTL
Electromagnetic compatibility	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 and weight		
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

Inputs and outputs

Port 1		
Impedance		50 Ω
Connector		type N, female
VSWR	$2 \text{ MHz} \leq f \leq 4 \text{ GHz}$ (model .02)	< 1.2 (nom.)
	$100 \text{ kHz} \leq f \leq 1 \text{ GHz}$ (model .12)	< 1.5 (nom.)
	$1 \text{ GHz} < f \leq 4 \text{ GHz}$ (model .12)	< 2 (nom.)
Port 2		
Impedance		50 Ω
Connector		type N, female
VSWR	$2 \text{ MHz} \leq f \leq 4 \text{ GHz}$ (model .02)	< 1.5 (nom.)
	$2 \text{ MHz} \leq f < 100 \text{ MHz}$ (model .12)	< 2.0 (nom.)
	$100 \text{ MHz} \leq f \leq 4 \text{ GHz}$ (model .12)	< 1.5 (nom.)

DC bias (model .12 only)		
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

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)
Maximum pulse voltage		150 V
Maximum pulse energy	pulse width 10 μs	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

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

Frequency readout		
Marker resolution		0.1 Hz
Uncertainty		$\pm(\text{marker frequency} \times \text{reference uncertainty} + 10 \% \times \text{resolution bandwidth} + \frac{1}{2} (\text{span} / (\text{sweep points} - 1) + 1 \text{ Hz}))$
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	$\pm(\text{frequency} \times \text{reference uncertainty} + \frac{1}{2} (\text{last digit}))$
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.)

Spectral purity SSB phase noise		
Carrier offset	30 kHz	< -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 ¹		
Measurement range	AM	20 Hz to 100 kHz (nom.)
	FM	20 Hz to 200 kHz (nom.)
Resolution		1 Hz
Measurement uncertainty	$1 \text{ kHz} \leq \text{AF} \leq 200 \text{ kHz}$	±(1 % of measured value) (nom.)
	$20 \text{ Hz} \leq \text{AF} < 1 \text{ kHz}$	±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 ²		
Measurement range	modulation depth	5 % to 95 % (nom.)
Modulation depth uncertainty		±4 % (nom.)

FM demodulation ³		
Measurement range	frequency deviation	10 kHz to 400 kHz (nom.), max. $0.4 \times$ demodulation bandwidth
Deviation uncertainty		±(0.04 × (AF + deviation)) (nom.)

Modulation distortion ^{1, 2, 3}		
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.)

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, $2 \text{ MHz} \leq f < 10 \text{ MHz}$	< 2 dB (nom.)
	+20 °C to +30 °C, $10 \text{ MHz} \leq f \leq 4 \text{ GHz}$	< 0.8 dB
	–20 °C to +50 °C, $10 \text{ MHz} \leq f \leq 4 \text{ GHz}$	< 1.2 dB

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

² 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.

³ 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 .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
Level measurement uncertainty		
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	- spectrum - channel power (10 MHz)
Sequence of measurements	•
Fixed frequency	•
Set of frequencies	•
Results	
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
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.
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 ⁴	1334.5627.02
Analog modulation analysis AM/FM (model .12 only)	R&S®ZPH-K7 ⁴	1334.5633.02
Power sensor support	R&S®ZPH-K9	1321.0415.02
Interference analysis (model .12 only)	R&S®ZPH-K15 ⁴	1334.5640.02
Signal strength mapping (model .12 only)	R&S®ZPH-K16 ⁴	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 ⁴	1334.5685.02
EMF measurement	R&S®ZPH-K105 ⁴	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 ⁵	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

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

⁵ 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®TS-EMF	R&S®TSEMF-B1	1074.5719.02
Isotropic antenna, 700 MHz to 6 GHz, for R&S®TS-EMF	R&S®TSEMF-B2	1074.5702.02
Isotropic antenna, 700 MHz to 8 GHz, for R&S®TS-EMF	R&S®TSEMF-B2E	1074.5702.03
Isotropic antenna, 9 kHz to 200 MHz, for R&S®TS-EMF	R&S®TSEMF-B3	1074.5690.02
Converter cable	R&S®TSEMF-CV	1158.9250.02
RF cable (length: 1 m), DC to 6 GHz, type N (m) to type N (m) connectors	R&S®HA-Z901	3626.2757.02
Carrying bag, for R&S®HA-Z900 or R&S®HA-Z1900 Yagi antenna	R&S®HA-Z902	1328.6883.02
Compact probe set for E and H near-field measurements, 30 MHz to 3 GHz	R&S®HZ-15	1147.2736.02
Near-field probe set for H field	R&S®HZ-17	1339.4141.02
Preamplifier (3 GHz, 20 dB), power adapter (100 V to 230 V), for R&S®HZ-15	R&S®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®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®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, type N to BNC	R&S®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 plug (f)		0017.6742.00
Attenuator, 50 W, 20 dB, 50 Ω, DC to 6 GHz, type N (f) to type N (m)	R&S®RDL50	1035.1700.52
Attenuator, 100 W, 20 dB, 50 Ω, DC to 2 GHz, type N (f) to type N (m)	R&S®RBU100	1073.8495.20
Attenuator, 100 W, 30 dB, 50 Ω, DC to 2 GHz, type N (f) to type N (m)	R&S®RBU100	1073.8495.30

Supported R&S®NRP-Zxx power sensors ⁶

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

⁶ For average power measurements only.

Wideband power sensors		
1 nW to 100 mW, 50 MHz to 18 GHz ⁷	R&S®NRP-Z81	1137.9009.02
1 nW to 100 mW, 50 MHz to 40 GHz, 2.92 mm ⁷	R&S®NRP-Z85	1411.7501.02
1 nW to 100 mW, 50 MHz to 40 GHz, 2.40 mm ⁷	R&S®NRP-Z86	1417.0109.40
1 nW to 100 mW, 50 MHz to 44 GHz, 2.40 mm ⁷	R&S®NRP-Z86	1417.0109.44
R&S®NRP-Zxx 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 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
R&S®NRP 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 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

Warranty and service

Warranty		
Base unit		3 years
All other items		1 year
Service options		
	Service plans	On demand
Calibration	up to five years ⁸	pay per calibration
Warranty and repair	up to five years ⁸	standard price repair
Find out more about our service portfolio under:		
www.rohde-schwarz.com/service-support/service/overview/service-overview_229461.html		

⁷ Product discontinued.

⁸ For extended periods, contact your Rohde & Schwarz sales office.

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