R&S®NRPV
Virtual Power Meter
Specifications

ROHDE & SCHWARZ

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.
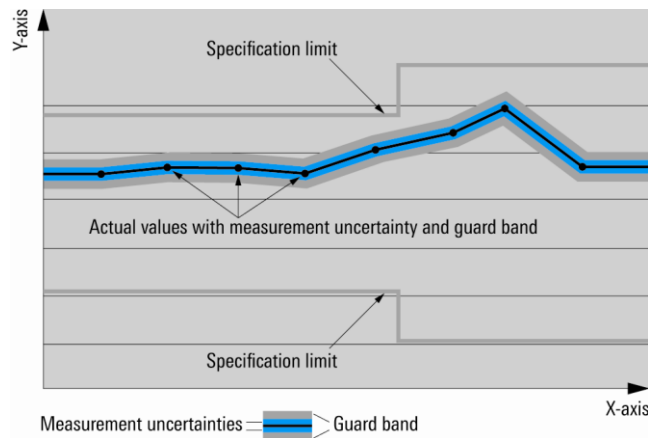
Specifications without limits

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.

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

Introduction

R&S®NRPV is a PC software package for 32-bit Windows operating systems. It has been especially developed for easy RF power measurements using the R&S® NRP family power sensors. Both R&S® NRP-Zxx series as well as R&S® NRPxS[N], R&S® NRPxT[N], R&S® NRPxA[N] series are supported.

Key features

Large variety of measurements
- Simultaneous operation of up to 4 R&S®NRP family power sensors per measurement mode
- Several different measurement modes, including
  - Trace (up to 8 traces with math functions)
  - Statistics (CCDF, CDF and PDF)
  - Pulse measurements (up to 17 parameters simultaneously)
  - Numeric measurements (continuous, burst average and gated)
  - Timeslot measurements
- User-configurable measurements and screen setup (e.g. number of windows, size, colors, grid, axis, units)
- R&S® NRPxS[N], R&S® NRPxT[N], R&S® NRPxA[N] series power sensors by default contain a license for operating them with R&S®NRPV
- Licensed on a "per power sensor" basis with cost-free "try before buy" capability for any R&S®NRP-Zxx power sensor (see R&S®NRPZ-K1 option key for enabling an R&S®NRP-Zxx power sensor for unlimited use with R&S®NRPV)

Enhanced features
- Task management : load and save tasks containing multiple measurements
- Snapshot
- Recording of numerical measurement results over time (unlimitied time period)

Specifications

Measurement modes		continuous (numeric)
		timegate (numeric)
		timeslot (bar graph)
		burst average (numeric)
		trace (graphical)
		statistics (graphical)
General settings	maximum number of power sensors to be used simultaneously (= number of channels)	4
	maximum number of measurement windows containing one of the above listed measurement modes	4
	frequency range	depends on sensor, see ordering information
	power range	depends on sensor, see ordering information
	uncertainty of measured power	determined by power sensor used
	video bandwidth	FULL, 5 MHz, 1.5 MHz, 300 kHz
Gates (to be used with timegate and trace measurement modes)	maximum number of gates	4
	gate length	0 s to 999.999 s
	fences	1 per gate, length 0 to gate length
Channel-specific settings	power offset	−99.999 dB to +99.999 dB
	correction (sensor-specific)	gamma, S-parameter
	ranging (sensor-specific)	auto, path1, path2, path3
	averaging	normal, fixed noise
	trigger source	internal, external
	trigger slope	positive, negative
	trigger level	−30 dBm to +20 dBm
	additional trigger parameters	delay, dropout, hysteresis, holdoff

Continuous (numeric)	maximum measurements per measurement window (physical plus math)	4
	aperture	10 ns to 1 s
	measurand	average, peak [1]
	averaging	auto, 2^n, for n = 1 to 16
	units	W, dBm, dBµV and relative (%, dB, 1)
	number of displayed auxiliary values per measurement	3
	possible auxiliaries	min, max, mean, standard deviation, measurement frequency, average count, number of measurements
	math functions	ratio, difference, SWR
	duty cycle	0 % to 99.999 % or OFF
	limits	upper, lower (with optional audible signal)
Timegate (numeric)	all parameters as for continuous mode but using up to 4 gates	
Timeslot (bar graph)	maximum number of slots	16
	nominal width	0 s to 999.999 s
	exclude areas at start and end of slot	0 to nominal width
	fences	1 (valid for all slots), length: 0 to nominal width
	measurand	average, peak
	averaging	auto, 2^n, for n = 1 to 16
	units	W, dBm, dBµV and relative
Trace (graphical)	maximum traces per measurement window	8 (4 physical plus 4 math)
	units	W, dBm, dBµV and relative (%, dB, 1)
	power/division	lin : 250 pW to 150 MW log : 0.01 dB to 20 dB
	time/division	10 ns to 100 ms
	mouse moving/zooming modes	move freely, move horizontal only, move vertical only, zoom in, fixed trace
	trigger modes	free run, continuous, single
	measurand	average, peak [1], random [1]
	max hold and averaging	yes
	math functions	ratio, difference, SWR
	supported measurements	pulse, marker, gate average, gate peak, gate peak/average, timeslot average
	markers	highly configurable, including time-absolute, level-absolute and delta markers; peak search markers
	pulse parameters	duration, period, duty cycle, rise time, start time, overshoot, fall time, stop time, top power, base power, distal power, mesial power, proximal power, peak power, average power, minimum power
	pulse algorithm	histogram, integration
	pulse thresholds	voltage-related, power-related
	pulse reference levels	distal, mesial and proximal
Statistics (graphical)	maximum traces per measurement window	5 (4 physical plus AWGN reference trace)
	aperture	10 ns to 1 s
	distribution function	CCDF (lin), CCDF (log), CDF (lin), CDF (log), PDF (lin)
	power/division (x-axis)	0.15 dB to 10 dB
	mouse moving/zooming modes	move vertically only, zoom in, fixed trace
	acquisition mode	free run, during gate
	acquisition buffer	5×10^5 sample to 5×10^{10} sample

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[1]   If supported by the power sensor.

Supported R&S®NRP-Zxx power sensors

Sensor	Supported measurements					
	Continuous	Timegate	Burst average	Timeslot	Trace	Statistics
Universal Power Sensors						
R&S®NRP8S	●	●	●	●	●	
R&S®NRP8SN	●	●	●	●	●	
R&S®NRP18S	●	●	●	●	●	
R&S®NRP18SN	●	●	●	●	●	
R&S®NRP33S	●	●	●	●	●	
R&S®NRP33SN	●	●	●	●	●	
R&S®NRP33SN-V	●	●	●	●	●	
R&S®NRP40S	●	●	●	●	●	
R&S®NRP40SN	●	●	●	●	●	
R&S®NRP50S	●	●	●	●	●	
R&S®NRP50SN	●	●	●	●	●	
R&S®NRP18S-10	●	●	●	●	●	
R&S®NRP18S-20	●	●	●	●	●	
R&S®NRP18S-25	●	●	●	●	●	
R&S®NRP-Z11	●	●	●	●	●	
R&S®NRP-Z21	●	●	●	●	●	
R&S®NRP-Z22	●	●	●	●	●	
R&S®NRP-Z23	●	●	●	●	●	
R&S®NRP-Z24	●	●	●	●	●	
R&S®NRP-Z31	●	●	●	●	●	
Thermal Power Sensors						
R&S®NRP18T	●					
R&S®NRP18TN	●					
R&S®NRP33T	●					
R&S®NRP33TN	●					
R&S®NRP40T	●					
R&S®NRP40TN	●					
R&S®NRP50T	●					
R&S®NRP50TN	●					
R&S®NRP67T	●					
R&S®NRP67TN	●					
R&S®NRP110T	●					
R&S®NRP-Z51	●					
R&S®NRP-Z52	●					
R&S®NRP-Z55	●					
R&S®NRP-Z56	●					
R&S®NRP-Z57	●					
Wideband Power Sensors						
R&S®NRP-Z81	●	●	●	●	●	●
R&S®NRP-Z85	●	●	●	●	●	●
R&S®NRP-Z86	●	●	●	●	●	●
Average Power Sensors						
R&S®NRP6A	●					
R&S®NRP6AN	●					
R&S®NRP18A	●					
R&S®NRP18AN	●					
R&S®NRP-Z91	●					
R&S®NRP-Z92	●					
Level Control Sensors						
R&S®NRP-Z28	●	●	●	●	●	
R&S®NRP-Z98	●					
Power Sensor Modules (for use with R&S®FSMR)						
R&S®NRP-Z27	●					
R&S®NRP-Z37	●					

General data

Supported operating systems

Windows 7	Service Pack 1 and later
Windows 8	8.1 Update and later
Windows 10	Creators Update (1703) and later

Ordering information

Designation	Type	Order No.
Virtual Power Meter, PC software for RF power measurements	R&S®NRPV	1417.0009.02
Option Key, for enabling an R&S®NRP-Zxx power sensor for use with R&S®NRPV (each R&S®NRP-Zxx power sensor requires its own option key) Power sensors of R&S®NRPxS[N], R&S®NRPxT[N] and R&S®NRPxA[N] are by default enabled for use with R&S®NRPV.	R&S®NRPZ-K1	1418.9800.03
Recommended R&S®NRP power sensors		
Universal 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 8 GHz	R&S®NRP8SN	1419.0012.02
100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18S	1419.0029.02
100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18SN	1419.0035.02
100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33S	1419.0064.02
100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33SN	1419.0070.02
100 pW to 200 mW, 10 MHz to 33 GHz, TVAC compliant	R&S®NRP33SN-V	1419.0129.02
100 pW to 100 mW, 50 MHz to 40 GHz	R&S®NRP40S	1419.0041.02
100 pW to 100 mW, 50 MHz to 40 GHz	R&S®NRP40SN	1419.0058.02
100 pW to 100 mW, 50 MHz to 50 GHz	R&S®NRP50S	1419.0087.02
100 pW to 100 mW, 50 MHz to 50 GHz	R&S®NRP50SN	1419.0093.02
1 nW to 2 W, 10 MHz to 18 GHz	R&S®NRP18S-10	1424.6721.02
10 nW to 15 W, 10 MHz to 18 GHz	R&S®NRP18S-20	1424.6738.02
30 nW to 30 W, 10 MHz to 18 GHz	R&S®NRP18S-25	1424.6744.02
200 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP-Z11	1138.3004.02
200 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP-Z21	1137.6000.02
2 nW to 2 W, 10 MHz to 18 GHz	R&S®NRP-Z22	1137.7506.02
20 nW to 15 W, 10 MHz to 18 GHz	R&S®NRP-Z23	1137.8002.02
60 nW to 30 W, 10 MHz to 18 GHz	R&S®NRP-Z24	1137.8502.02
200 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP-Z31	1169.2400.02
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 18 GHz	R&S®NRP18TN	1424.6121.02
300 nW to 100 mW, DC to 33 GHz	R&S®NRP33T	1424.6138.02
300 nW to 100 mW, DC to 33 GHz	R&S®NRP33TN	1424.6144.02
300 nW to 100 mW, DC to 40 GHz	R&S®NRP40T	1424.6150.02
300 nW to 100 mW, DC to 40 GHz	R&S®NRP40TN	1424.6167.02
300 nW to 100 mW, DC to 50 GHz	R&S®NRP50T	1424.6173.02
300 nW to 100 mW, DC to 50 GHz	R&S®NRP50TN	1424.6180.02
300 nW to 100 mW, DC to 67 GHz	R&S®NRP67T	1424.6196.02
300 nW to 100 mW, DC to 67 GHz	R&S®NRP67TN	1424.6209.02
300 nW to 100 mW, DC to 110 GHz	R&S®NRP110T	1424.6215.02
1 µW to 100 mW, DC to 18 GHz	R&S®NRP-Z51	1138.0005.02
300 nW to 100 mW, DC to 33 GHz	R&S®NRP-Z52	1138.0505.02
300 nW to 100 mW, DC to 40 GHz	R&S®NRP-Z55	1138.2008.03
300 nW to 100 mW, DC to 50 GHz	R&S®NRP-Z56	1171.8201.02
300 nW to 100 mW, DC to 67 GHz	R&S®NRP-Z57	1171.8401.02
Wideband Power Sensors		
1 nW to 100 mW, 50 MHz to 18 GHz	R&S®NRP-Z81	1137.9009.02
1 nW to 100 mW, 50 MHz to 40 GHz	R&S®NRP-Z85	1411.7501.02
1 nW to 100 mW, 50 MHz to 40 GHz	R&S®NRP-Z86	1417.0109.40
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 6 GHz	R&S®NRP6AN	1424.6809.02
100 pW to 200 mW, 8 kHz to 18 GHz	R&S®NRP18A	1424.6815.02
100 pW to 200 mW, 8 kHz to 18 GHz	R&S®NRP18AN	1424.6821.02
200 pW to 200 mW, 9 kHz to 6 GHz	R&S®NRP-Z91	1168.8004.02
2 nW to 2 W, 9 kHz to 6 GHz	R&S®NRP-Z92	1171.7005.02
Level Control Sensors		
200 pW to 100 mW, 10 MHz to 18 GHz	R&S®NRP-Z28	1170.8008.02
200 pW to 100 mW, 9 kHz to 6 GHz	R&S®NRP-Z98	1170.8508.02
Power Sensor Modules (for use with R&S®FSMR)		
4 µW to 400 mW, DC to 18 GHz	R&S®NRP-Z27	1169.4102.02
4 µW to 400 mW, DC to 26.5 GHz	R&S®NRP-Z37	1169.3206.02

Recommended extras		
USB Interface Cable, length: 0.75 m	R&S®NRP-ZKU	1419.0658.02
USB Interface Cable, length: 1.5 m	R&S®NRP-ZKU	1419.0658.03
USB Interface Cable, length: 3 m	R&S®NRP-ZKU	1419.0658.04
USB Interface Cable, length: 5 m	R&S®NRP-ZKU	1419.0658.05
Six-Pole Interface Cable, length: 1.5 m	R&S®NRP-ZK6	1419.0664.02
Six-Pole Interface Cable, length: 3 m	R&S®NRP-ZK6	1419.0664.03
Six-Pole Interface Cable, length: 5 m	R&S®NRP-ZK6	1419.0664.04
Sensor Extension Cable to 3 m	R&S®NRP-Z2	1146.6750.03
Sensor Extension Cable to 5 m	R&S®NRP-Z2	1146.6750.05
Sensor Extension Cable to 5 m (with bulkhead jack)	R&S®NRP-Z2	1146.6750.15
Sensor Extension Cable to 10 m [2]	R&S®NRP-Z2	1146.6750.10
USB Adapter (active)	R&S®NRP-Z3	1146.7005.02
USB Adapter (passive) 1.8 m	R&S®NRP-Z4	1146.8001.02
USB Adapter (passive) 0.4 m	R&S®NRP-Z4	1146.8001.04
USB Sensor Hub, for direct connection of up to 4 R&S®NRP-Zxx or 4 R&S®NRPxS[N], R&S®NRPxT[N], R&S®NRPxA[N] power sensors; for a professional trigger solution	R&S®NRP-Z5	1146.7740.02
Power over Ethernet (PoE) Switch	R&S®NRP-ZAP1	1419.0829.00

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[2] Not in conjunction with R&S®NRP-Z81, R&S®NRP-Z85, R&S®NRP-Z86.

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