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Technical Information

Power Sensors R&S NRP-Z22, -Z23, -Z24

The right choice for medium-power applications

These power sensors with nominal powers of 2 W (R&S NRP-Z22), 15 W (R&S NRP-Z23) and 30 W (R&S NRP-Z24) expand the measurement capabilities of the R&S NRP family in the frequency range from 10 MHz to 18 GHz. They allow direct power measurement at the output of power amplifiers, radio equipment or digital mobile radio base stations. Tried-and-tested precision attenuators ahead of the power sensor ensure high measurement accuracy and excellent stability of the electrical characteristics. The new products are of great

benefit, since they provide full accuracy even if they are used without an attenuator being connected. In this case, they behave like a standard R&S NRP-Z21 sensor with a nominal power of 200 mW and a lower measurement threshold of 200 pW (-67 dBm). The full functionality of this sensor type – including 90 dB dynamic range, suitability for modulated signals, time gating, etc – is available in every operating mode, i.e. also with adapted attenuator.

Specifications

Specifications apply when the power sensor is operated together with the supplied power attenuator (pad). Please refer to the specifications of the R&S NRP-Z21 in the R&S NRP data sheet (PD 0757.7023.21) when operating the power sensor alone.

Bold: Parameter 100% tested

Italics: Uncertainties calculated from the test assembly specifications and the modelled behaviour of the sensor.

Normal: Compliance with specifications is ensured by the design or derived from the measurement of related parameters

Power Sensor R&S NRP-Z22

Frequency range		10 MHz to 18 GHz
Matching (SWR)	10 MHz to 2.4 GHz > 2.4 GHz to 8.0 GHz > 8.0 GHz to 12.4 GHz > 12.4 GHz to 18 GHz	< 1.14 < 1.20 < 1.25 < 1.30
Power measurement range	Continuous Average Burst Average Timeslot Scope	2 nW to 2 W (-57 dBm to +33 dBm) 2 µW to 2 W (-27 dBm to +33 dBm) 7 nW to 2 W (-52 dBm to +33 dBm) ³⁾ 100 nW to 2 W (-40 dBm to +33 dBm) ⁴⁾
Max. power	Average Peak envelope power	3 W (+35 dBm) continuous (see diagram) 10 W (+40 dBm) for max. 10 µs
Measurement subranges	Path 1 Path 2 Path 3	-57 dBm to - 4 dBm -37 dBm to +16 dBm -17 dBm to +33 dBm
Transition ranges	With automatic path selection, user def'd crossover ⁵⁾ set to 0 dB	(- 9±1.5) dBm to (- 3±1.5) dBm (+11±1.5) dBm to (+17±1.5) dBm
Display noise¹⁴⁾	Path 1 Path 2 Path 3	< 0.8 nW (0.4 nW typ.) < 80 nW (40 nW typ.) < 8 µW (4 µW typ.)
Display noise, relative¹⁵⁾	Measurement window 2 × 100 µs, without averaging Measurement window 2 × 20 ms, averaging factor 32 (measure- ment time approx. 1 s)	< 0.160 dB (0.1 dB typ.) < 0.002 dB (0.001 dB typ.)
Zero offset¹⁷⁾	Path 1 Path 2 Path 3	< 1.3 nW (0.7 nW typ.) < 0.12 µW (60 nW typ.) < 12 µW (6 µW typ.)
Zero drift¹⁸⁾	Path 1 Path 2 Path 3	< 0.4 nW < 40 nW < 4 µW
Triggering	Source Slope (external, internal) Level Internal External Delay Holdoff Hysteresis	Bus, External, Hold, Immediate, Internal pos./neg. -30 dBm to +33 dBm See specs for R&S NRP and USB Adapter R&S NRP-Z3 -5 ms to +100 s 0 s to 10 s 0 dB to 10 dB

Power Sensor R&S NRP-Z22 (continued)

Uncertainty for absolute power measurements³¹⁾ in dB

10 MHz to < 100 MHz					100 MHz to < 4 GHz					(0 to 35/40/50) °C (15 to 35) °C (20 to 25) °C
0.180	0.237	0.281	0.316		0.186	0.242	0.285	0.320		
0.096	0.124	0.149	0.170		0.106	0.133	0.157	0.176		
0.079	0.088	0.104	0.119		0.085	0.098	0.113	0.128		
-30 ³⁷⁾	to +20	to +30	to +32	to +33	-30 ³⁷⁾	to +20	to +30	to +32	to +33	dBm

4 GHz to < 12.4 GHz					12.4 GHz to 18 GHz					(0 to 35/40/50) °C (15 to 35) °C (20 to 25) °C
0.203	0.255	0.296	0.330		0.223	0.271	0.310	0.343		
0.133	0.156	0.176	0.194		0.163	0.182	0.199	0.215		
0.116	0.125	0.137	0.151		0.147	0.155	0.165	0.178		
-30 ³⁷⁾	to +20	to +30	to +32	to +33	-30 ³⁷⁾	to +20	to +30	to +32	to +33	dBm

Uncertainty for relative power measurements^{32), 33), 36)} in dB

10 MHz to < 100 MHz					100 MHz to 4 GHz					(0 to 50) °C (15 to 35) °C (20 to 25) °C
+33	0.286	0.298	0.031		+33	0.272	0.289	0.041		
	0.108	0.109	0.022			0.112	0.113	0.032		
+18	0.052	0.045	0.022		+18	0.060	0.053	0.031		
+10	0.283	0.031	0.298		+10	0.268	0.032	0.289		(0 to 50) °C (15 to 35) °C (20 to 25) °C
	0.108	0.022	0.109			0.108	0.022	0.113		
-2	0.051	0.022	0.045		-2	0.054	0.022	0.053		
-10	0.023	0.283	0.286		-10	0.024	0.268	0.272		(0 to 50) °C (15 to 35) °C (20 to 25) °C
	0.022	0.108	0.108			0.022	0.108	0.112		
-30 ³⁷⁾	0.022	0.051	0.052		-30 ³⁷⁾	0.022	0.054	0.060		
dBm	-30 ³⁷⁾	-10 / -2	+10 / +18	+33	dBm	-30 ³⁷⁾	-10 / -2	+10 / +18	+33	

> 4 GHz to 12.4 GHz					>12.4 GHz to 18 GHz					(0 to 50) °C (15 to 35) °C (20 to 25) °C
+33	0.284	0.299	0.066		+33	0.300	0.310	0.088		
	0.131	0.130	0.061			0.152	0.148	0.084		
+18	0.087	0.081	0.060		+18	0.112	0.106	0.083		
+10	0.277	0.037	0.299		+10	0.288	0.043	0.310		(0 to 50) °C (15 to 35) °C (20 to 25) °C
	0.118	0.027	0.130			0.131	0.035	0.148		
-2	0.068	0.025	0.081		-2	0.082	0.033	0.106		
-10	0.024	0.277	0.284		-10	0.024	0.288	0.300		(0 to 50) °C (15 to 35) °C (20 to 25) °C
	0.022	0.118	0.131			0.022	0.131	0.152		
-30 ³⁷⁾	0.022	0.068	0.087		-30 ³⁷⁾	0.022	0.082	0.112		
dBm	-30 ³⁷⁾	-10 / -2	+10 / +18	+33	dBm	-30 ³⁷⁾	-10 / -2	+10 / +18	+33	

Power Sensor R&S NRP-Z23

Frequency range		10 MHz to 18 GHz
Matching (SWR)	10 MHz to 2.4 GHz >2.4 GHz to 8.0 GHz >8.0 GHz to 12.4 GHz >12.4 GHz to 18 GHz	< 1.14 < 1.25 < 1.30 < 1.41
Power measurement range	Continuous Average Burst Average Timeslot Scope	20 nW to 15 W (-47 dBm to +42 dBm) 20 µW to 15 W (-17 dBm to +42 dBm) 70 nW to 15 W (-42 dBm to +42 dBm) ³⁾ 1 µW to 15 W (-30 dBm to +42 dBm) ⁴⁾
Max. power	Average Peak envelope power	18 W (+42.5 dBm) continuous (see diagram) 100 W (+50 dBm) for max. 10 µs
Measurement subranges	Path 1 Path 2 Path 3	-47 dBm to + 6 dBm -27 dBm to + 26 dBm - 7 dBm to + 42 dBm
Transition ranges	With automatic path selection, user def'd crossover ⁵⁾ set to 0 dB	(+ 1±1.75) dBm to (+ 7±1.75) dBm (+21±1.75) dBm to (+27±1.75) dBm
Display noise ¹⁴⁾	Path 1 Path 2 Path 3	< 8 nW (4 nW typ.) < 0.8 µW (0.4 µW typ.) < 80 µW (40 µW typ.)
Display noise, relative ¹⁵⁾	Measurement window 2 × 100 µs, without averaging Measurement window 2 × 20 ms, averaging factor 32 (measure- ment time approx. 1 s)	< 0.160 dB (0.1 dB typ.) < 0.002 dB (0.001 dB typ.)
Zero offset ¹⁷⁾	Path 1 Path 2 Path 3	< 13 nW (7 nW typ.) < 1.3 µW (0.6 µW typ.) < 0.13 mW (60 µW typ.)
Zero drift ¹⁸⁾	Path 1 Path 2 Path 3	< 5 nW < 0.4 µW < 40 µW
Triggering	Source Slope (external, internal) Level Internal External Delay Holdoff Hysteresis	Bus, External, Hold, Immediate, Internal pos./neg. -19 dBm to +42 dBm See specs for R&S NRP and USB Adapter R&S NRP-Z3 -5 ms to +100 s 0 s to 10 s 0 dB to 10 dB

Power Sensor R&S NRP-Z23 (continued)

Uncertainty for absolute power measurements³¹⁾ in dB

10 MHz to < 100 MHz					100 MHz to < 4 GHz					
0.194	0.203	0.227	0.257		0.187	0.197	0.222	0.253	(0 to 50) °C	
0.096	0.106	0.137	0.175		0.105	0.115	0.144	0.181	(15 to 35) °C	
0.078	0.081	0.111	0.149		0.087	0.094	0.120	0.156	(20 to 25) °C	
-20 ³⁷⁾	to +30	to +36	to +40	to +42	-20 ³⁷⁾	to +30	to +36	to +40	to +42	dBm

4 GHz to < 12.4 GHz					12.4 GHz to 18 GHz					
0.209	0.217	0.240	0.269		0.238	0.245	0.266	0.292	(0 to 50) °C	
0.133	0.140	0.165	0.198		0.166	0.172	0.193	0.221	(15 to 35) °C	
0.117	0.122	0.144	0.175		0.151	0.155	0.172	0.199	(20 to 25) °C	
-20 ³⁷⁾	to +30	to +36	to +40	to +42	-20 ³⁷⁾	to +30	to +36	to +40	to +42	dBm

Uncertainty for relative power measurements^{32), 33), 36)} in dB

10 MHz to < 100 MHz					100 MHz to 4 GHz					
+42	0.226	0.229	0.027		+42	0.209	0.218	0.038	(0 to 50) °C	
	0.084	0.080	0.022			0.088	0.085	0.032	(15 to 35) °C	
+28	0.046	0.044	0.022		+28	0.055	0.047	0.031	(20 to 25) °C	
+20	0.226	0.027	0.229		+20	0.206	0.028	0.218	(0 to 50) °C	
	0.083	0.022	0.080			0.083	0.022	0.085	(15 to 35) °C	
+8	0.045	0.022	0.044		+8	0.048	0.022	0.047	(20 to 25) °C	
±0	0.023	0.226	0.226		±0	0.023	0.206	0.209	(0 to 50) °C	
	0.022	0.083	0.084			0.022	0.083	0.088	(15 to 35) °C	
-20 ³⁷⁾	0.022	0.045	0.046		-20 ³⁷⁾	0.022	0.048	0.055	(20 to 25) °C	
dBm	-20 ³⁷⁾	±0 / +8	+20 / +28	+42	dBm	-20 ³⁷⁾	±0 / +8	+20 / +28	+42	

> 4 GHz to 12.4 GHz					>12.4 GHz to 18 GHz					
+42	0.224	0.231	0.064		+42	0.244	0.245	0.086	(0 to 50) °C	
	0.111	0.106	0.061			0.135	0.128	0.084	(15 to 35) °C	
+28	0.084	0.077	0.060		+28	0.110	0.102	0.083	(20 to 25) °C	
+20	0.216	0.034	0.231		+20	0.230	0.040	0.245	(0 to 50) °C	
	0.096	0.027	0.106			0.112	0.034	0.128	(15 to 35) °C	
+8	0.063	0.025	0.077		+8	0.079	0.033	0.102	(20 to 25) °C	
±0	0.024	0.216	0.224		±0	0.024	0.230	0.244	(0 to 50) °C	
	0.022	0.096	0.111			0.022	0.112	0.135	(15 to 35) °C	
-20 ³⁷⁾	0.022	0.063	0.084		-20 ³⁷⁾	0.022	0.079	0.110	(20 to 25) °C	
dBm	-20 ³⁷⁾	±0 / +8	+20 / +28	+42	dBm	-20 ³⁷⁾	±0 / +8	+20 / +28	+42	

Power Sensor R&S NRP-Z24

Frequency range		10 MHz to 18 GHz
Matching (SWR)	10 MHz to 2.4 GHz >2.4 GHz to 8.0 GHz >8.0 GHz to 12.4 GHz >12.4 GHz to 18 GHz	< 1.14 < 1.25 < 1.30 < 1.41
Power measurement range	Continuous Average Burst Average Timeslot Scope	60 nW to 30 W (-42 dBm to +45 dBm) 60 µW to 30 W (-12 dBm to +45 dBm) 0.2 µW to 30 W (-37 dBm to +45 dBm) ³⁾ 3 µW to 30 W (-25 dBm to +45 dBm) ⁴⁾
Max. power	Average Peak envelope power	36 W (+45.5 dBm) continuous (see diagram) 300 W (+55 dBm) for max. 10 µs
Measurement subranges	Path 1 Path 2 Path 3	-42 dBm to +11 dBm -22 dBm to +31 dBm - 2 dBm to +45 dBm
Transition ranges	With automatic path selection, user def'd crossover ⁵⁾ set to 0 dB	(+ 6±2) dBm to (+12±2) dBm (+26±2) dBm to (+32±2) dBm
Display noise¹⁴⁾	Path 1 Path 2 Path 3	< 27 nW (13 nW typ.) < 2.6 µW (1.2 µW typ.) < 0.26 mW (0.12 mW typ.)
Display noise, relative¹⁵⁾	Measurement window 2 × 100 µs, without averaging Measurement window 2 × 20 ms, averaging factor 32 (measure- ment time approx. 1 s)	< 0.160 dB (0.1 dB typ.) < 0.002 dB (0.001 dB typ.)
Zero offset¹⁷⁾	Path 1 Path 2 Path 3	< 44 nW (20 nW typ.) < 4.2 µW (2 µW typ.) <0.42 mW (0.2 mW typ.)
Zero drift¹⁸⁾	Path 1 Path 2 Path 3	< 15 nW < 1.3 µW < 0.13 mW
Triggering	Source Slope (external, internal) Level Internal External Delay Holdoff Hysteresis	Bus, External, Hold, Immediate, Internal pos./neg. -14 dBm to +45 dBm See specs for R&S NRP and USB Adapter R&S NRP-Z3 -5 ms to +100 s 0 s to 10 s 0 dB to 10 dB

Power Sensor R&S NRP-Z24 (continued)

Uncertainty for absolute power measurements³¹⁾ in dB

10 MHz to < 100 MHz					100 MHz to < 4 GHz				
0.199	0.218	0.249	0.291		0.193	0.212	0.244	0.287	(0 to 50) °C
0.098	0.120	0.158	0.208		0.108	0.128	0.164	0.213	(15 to 35) °C
0.078	0.091	0.128	0.178		0.088	0.102	0.136	0.184	(20 to 25) °C
-15 ³⁷⁾	to +33	to +40	to +43	to +45	-15 ³⁷⁾	to +33	to +40	to +43	to +45 dBm

4 GHz to < 12.4 GHz					12.4 GHz to 18 GHz				
0.214	0.231	0.260	0.301		0.242	0.258	0.284	0.322	(0 to 50) °C
0.135	0.151	0.183	0.228		0.167	0.181	0.208	0.248	(15 to 35) °C
0.118	0.129	0.157	0.201		0.151	0.160	0.183	0.222	(20 to 25) °C
-15 ³⁷⁾	to +33	to +40	to +43	to +45	-15 ³⁷⁾	to +33	to +40	to +43	to +45 dBm

Uncertainty for relative power measurements^{32), 33), 36)} in dB

10 MHz to < 100 MHz					100 MHz to 4 GHz				
+45	0.226	0.229	0.027		+45	0.209	0.218	0.038	(0 to 50) °C
	0.084	0.080	0.022			0.088	0.085	0.032	(15 to 35) °C
+33	0.046	0.044	0.022		+33	0.055	0.047	0.031	(20 to 25) °C
+25	0.226	0.027	0.229		+25	0.206	0.028	0.218	(0 to 50) °C
	0.083	0.022	0.080			0.083	0.022	0.085	(15 to 35) °C
+13	0.045	0.022	0.044		+13	0.048	0.022	0.047	(20 to 25) °C
+5	0.023	0.226	0.226		+5	0.023	0.206	0.209	(0 to 50) °C
-15 ³⁷⁾	0.022	0.083	0.084		-15 ³⁷⁾	0.022	0.083	0.088	(15 to 35) °C
	0.022	0.045	0.046			0.022	0.048	0.055	(20 to 25) °C
dBm	-15 ³⁷⁾	+5 / +13	+25 / +33	+45	dBm	-15 ³⁷⁾	+5 / +13	+25 / +33	+45

> 4 GHz to 12.4 GHz					>12.4 GHz to 18 GHz				
+45	0.224	0.231	0.064		+45	0.244	0.245	0.086	(0 to 50) °C
	0.111	0.106	0.061			0.135	0.128	0.084	(15 to 35) °C
+33	0.084	0.077	0.060		+33	0.110	0.102	0.083	(20 to 25) °C
+25	0.216	0.034	0.231		+25	0.230	0.040	0.245	(0 to 50) °C
	0.096	0.027	0.106			0.112	0.034	0.128	(15 to 35) °C
+13	0.063	0.025	0.077		+13	0.079	0.033	0.102	(20 to 25) °C
+5	0.024	0.216	0.224		+5	0.024	0.230	0.244	(0 to 50) °C
-15 ³⁷⁾	0.022	0.096	0.111		-15 ³⁷⁾	0.022	0.112	0.135	(15 to 35) °C
	0.022	0.063	0.084			0.022	0.079	0.110	(20 to 25) °C
dBm	-15 ³⁷⁾	+5 / +13	+25 / +33	+45	dBm	-15 ³⁷⁾	+5 / +13	+25 / +33	+45

Additional characteristics of the R&S NRP-Z22/-Z23/-Z24

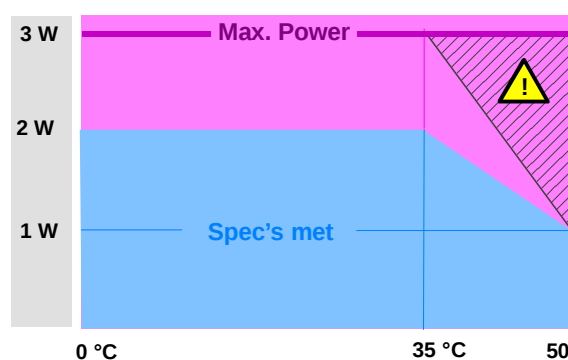
Sensor type		3-path diode sensor with preceding power attenuator		
Measurand		average power of incident wave average power of source into 50 Ω ¹⁾		
RF connector		N (male)		
Power attenuator	R&S NRP-Z22 R&S NRP-Z23 R&S NRP-Z24	10 dB 20 dB 25 dB		
Calibration uncertainty ³⁰⁾ in dB (20 to 25) °C	0.01 GHz to < 0.1 GHz 0.1 GHz to 4.0 GHz > 4 GHz to 12.4 GHz > 12.4 GHz to 18.0 GHz	Path 1 <i>0.078</i> <i>0.084</i> <i>0.110</i> <i>0.139</i>	Path 2 <i>0.072</i> <i>0.077</i> <i>0.095</i> <i>0.118</i>	Path 3 <i>0.073</i> <i>0.077</i> <i>0.095</i> <i>0.18</i>
Measurement functions	Stationary and periodically modulated signals Non-recurring waveforms	Continuous Average Burst Average Timeslot Scope Scope		
Continuous Average function Continuous measurement of average power	Measurement window ⁷⁾ Duty cycle correction ⁸⁾ Smoothing Capacity of measurement buffer ⁹⁾	2 × (10 μ s to 300 ms) 0.001% to 100.00% See under Measurement window 1 to 1024 results		
Burst Average function Measurement of average burst power with automatic detection of burst (trigger settings required)	Detectable burst width Minimum gap between bursts Dropout tolerance ¹⁰⁾ Exclusion periods ¹¹⁾ Exclude from Start Exclude from End Measurement window ⁷⁾	20 μ s to 100 ms 10 μ s 0 ms to 3 ms 0 ms to 100 ms 0 ms to 3 ms 2 × (burst width - Excl. from Start - Excl. from End)		
Timeslot function Measurement of average power in one or more equidistant, successive timeslots	Duration (nominal width) Number of timeslots Exclusion periods ¹¹⁾ Excluded from Start Excluded from End Measurement window (per timeslot) ⁷⁾	10 μ s to 100 ms 1 to 128 (26 in case of operation from R&S NRP basic unit) 0 ms to 100 ms 0 ms to 3 ms 2 × (nom. width - Excl. from Start - Excl. from End)		
Scope function Measurement of power versus time	Modes Measurement window Δ ¹²⁾ Recurring Non-recurring Number of measurement points M Resolution Δ / M Beginning of time window (referenced to trigger)	For recurring and non-recurring waveforms (single) 2 × (100 μ s to 300 ms) 100 μ s to 300 ms 1 to 1024 ≥ 10 μ s -5 ms to 100 s		

Dynamic behaviour of video path	Bandwidth Rise time 10% / 90%	> 50 kHz (100 kHz) < 8 μ s (4 μ s) Values in () for temp. range 15 °C to 35 °C
Sampling frequencies	Frequency 1 (default) Frequency 2 ¹³⁾	133.358 kHz 119.467 kHz
Zeroing (duration)	Depends on setting of averaging filter AUTO ON AUTO OFF Integration time ¹⁶⁾ < 4 s 4 s to 16 s >16 s	4 s 4 s Integration time ¹⁶⁾ 16 s
Measurement error due to harmonics $n \times f_0$ of carrier frequency ¹⁹⁾ values in []: typ. standard uncertainty	$N = 3, 5, 7, \dots$ ²⁰⁾ -30 dBc -20 dBc -10 dBc $N = 2, 4, 6, \dots$ ²⁰⁾ -30 dBc -20 dBc -10 dBc	<0.003 dB [0.0015 dB] <0.010 dB [0.005 dB] <0.040 dB [0.015 dB] <0.001 dB [0.0003 dB] <0.002 dB [0.001 dB] <0.010 dB [0.003 dB]
Modulation influence ²¹⁾ values in []: User def'd crossover <-6 dB	General WCDMA (3-GPP Test Model 1-64) Worst case Typical	measurement errors in subranges are proportional to power and depend on CCDF and modulation bandwidth of test signal -0.02 dB to +0.07 dB [-0.02 dB to +0.02 dB] -0.01 dB to +0.03 dB [-0.01 dB to +0.01 dB]
Averaging filter	Modes AUTO mode Reference power Continuous Average Burst Average Timeslot Scope ²²⁾ Normal operating mode ²³⁾ Resolution Fixed Noise operating mode Noise content Max. measurement time ²⁴⁾ Averaging factor N Result output Moving Average Repeat	AUTO OFF (fixed averaging factor) AUTO ON (continuously auto-adapted) AUTO ONCE (automatically fixed once) non-averaged result in measurement window non-averaged result in measurement window non-averaged result in reference timeslot ²⁵⁾ non-averaged result at reference point ²⁵⁾ setting of filter depends on power to be measured and resolution 1 (1 dB), 2 (0.1 dB), 3 (0.01 dB), 4 (0.001 dB) filter set to specified noise content 0.0001 dB to 1 dB 0.01 s to 999 s 1 to 2 ¹⁶⁾ (number of averaged measurement windows) continuous with every newly evaluated measurement window (e.g. in case of manual operation via R&S NRP) only final result (e.g. in case of remote control of R&S NRP)
Measurement window	Duration Shape	as specified for the individual measurement functions rectangular (integrating behaviour; available for all measurement functions) Von Hann (smoothing filter, for efficient suppression of result variations due to modulation ²⁶⁾ ; only for Continuous Average function)

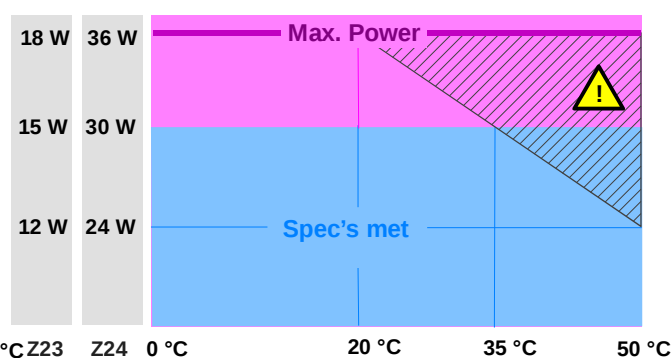
Measurement times ²⁷⁾	Continuous Average	$N \times (\text{duration of measurement window}^{7)} + 0.2\text{ms}) + t_z$
	Buffered, without averaging	$\text{buffer size} \times (\text{duration of measurement window}^{7)} + 0.5\text{ ms}) + t_z$
	Burst Average	$(2 \text{ to } 4) \times N \times \text{burst period} + t_z$
	Timeslot, Scope	$(2 \text{ to } 4) \times N \times \text{trigger period} + t_z^{28)}$ $t_z : < 1.6\text{ ms (0.9 ms on average)}$
Attenuation correction	Function	correcting the measurement result by means of a fixed factor (dB offset)
	Range	-100.000 dB to +100.000 dB
S-parameter correction Note: S-parameter correction is automatically switched on upon power-up of the sensor, taking into account the data of the supplied attenuator.	Function Number of frequencies Parameters Download	Taking into account a component connected to the sensor input by loading its s-parameter data set into the sensor 1 to 1000 s_{11} , s_{21} , s_{12} and s_{22} (in s2p format) With R&S NRP tool kit (supplied with sensor) via USB Adapter R&S NRP-Z3 or R&S NRP-Z4
Γ correction	Function	Reducing the influence of mismatched sources ²⁹⁾
	Parameters	Magnitude and phase of reflection coefficient of source
	Download	see under S-parameter correction
Frequency response correction	Function	taking into account the calibration factors relevant for the test frequency
	Parameter	carrier frequency (center frequency)
	Permissible deviation from actual value	50 MHz ($0.05 \times f$ below 1 GHz) for specified measurement uncertainty
Interface to host	Power supply	+5 V / 200 mA typ. (USB high-power device)
	Remote control	As a USB device (function) in full-speed mode, compatible with USB 1.0/1.1/2.0 specifications
	Trigger input	differential (0 / +3.3 V)
Dimensions	W x H x L	R&S NRP-Z22: 48 mm x 31 mm x 214 mm R&S NRP-Z23: 60 mm x 54 mm x 285 mm R&S NRP-Z24: 60 mm x 54 mm x 344 mm Length incl. connecting cable: approx. 1.6 m
Weight		R&S NRP-Z22: < 0.37 kg R&S NRP-Z23: < 0.48 kg R&S NRP-Z24: < 0.63 kg

Power rating

R&S NRP-Z22



R&S NRP-Z23, -Z24

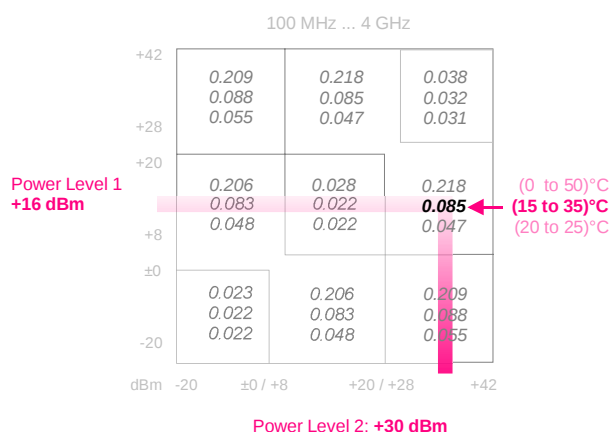


Hatched area: The maximum surface temperatures permitted to IEC 1010-1 are exceeded. Provide protection against inadvertent contacting or apply only short-term load to the sensor.

Footnotes

Please refer to the R&S NRP data sheet for footnotes not mentioned below. Please keep in mind that the power levels specified there are valid only for the power sensor section. Add +10 dB in the case of the R&S NRP-Z22, +20 dB in the case of the R&S NRP-Z23 or +25 dB in the case of the R&S NRP-Z24 to calculate the power incident on the pad preceding the sensor.

- ³³⁾ Reading the uncertainty for relative power measurements. The example shows a level step of approx. 14 dB (+16 dBm → +30 dBm) at 1.9 GHz and an ambient temperature of 28°C.



- ³⁶⁾ Specifications are based on the assumption that the measurements follow each other so fast (at intervals of not more than 10 s) that the temperature of the pad does not change significantly. With the R&S NRP-Z22, the average power shall not exceed 1 W to be compliant with accuracy specifications for relative power measurements.
- ³⁷⁾ For measurements at even lower levels the influence of zero offset and zero drift must be added to the specifications on an RSS basis. The same applies to noise exceeding a two-sigma value of 0.01 dB.

General specifications

See the R&S NRP data sheet (PD 0757.7023.21), sensors R&S NRP-Z11/-Z21.

Accessories

See the R&S NRP data sheet (PD 0757.7023.21).

Ordering information

Description	Type	Order No.
Power Sensors		
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

