Average power sensors in R&S®Smart Sensor Technology

R&S®NRP-Z91 average power sensor

Frequency range		9 kHz to 6 GHz	
Impedance matching (SWR)	9 kHz to 2.4 GHz	< 1.13 (**1.11**)	( ): +15 °C to +35 °C
	> 2.4 GHz to 6.0 GHz	< 1.20 (**1.18**)	
Power measurement range		200 pW to 200 mW (–67 dBm to +23 dBm)	
Max. power	average power	0.4 W (+26 dBm), continuous	
	peak envelope power	1.0 W (+30 dBm) for max. 10 µs	
Measurement subranges	path 1	–67 dBm to –14 dBm	
	path 2	–47 dBm to +6 dBm	
	path 3	–27 dBm to +23 dBm	
Transition regions	with automatic path selection [3]	(–19 ± 1) dBm to (–13 ± 1) dBm (+1 ± 1) dBm to (+7 ± 1) dBm	
Dynamic response	rise time 10 %/90 %	< 5 ms	
Acquisition	sample rate (continuous)	133.358 kHz	
Zero offset	initial, without zeroing		( ): typical at 1 GHz +15 °C to +35 °C
	path 1	< 470 (100) pW	
	path 2	< 47 (10) nW	
	path 3	< 4.7 (1) µW	
	after external zeroing [6, 7]		
	path 1	< 104 (64) pW	
	path 2	< 10.0 (6) nW	
	path 3	< 1.00 (0.6) µW	
Zero drift [8]	path 1	< 35 (0) pW	
	path 2	< 3.0 (0) nW	
	path 3	< 0.3 (0) µW	
Measurement noise [9]	path 1	< 65 (40) pW	
	path 2	< 6.3 (4) nW	
	path 3	< 0.63 (0.4) µW	

R&S®NRP-Z91 average power sensor (continued)

Uncertainty for absolute power measurements [10] in dB

9 kHz to < 20 kHz

	–67	–19	+1	+23
0 °C to +50 °C	0.174	0.175	0.175	
+15 °C to +35 °C	0.075	0.070	0.071	
+20 °C to +25 °C	0.056	0.047	0.048	

Power level in dBm

20 kHz to < 100 MHz

	–67	–19	+1	+23
0 °C to +50 °C	0.147	0.159	0.159	
+15 °C to +35 °C	0.072	0.069	0.069	
+20 °C to +25 °C	0.056	0.047	0.048	

Power level in dBm

100 MHz to 4 GHz

	–67	–19	+1	+23
0 °C to +50 °C	0.150	0.162	0.164	
+15 °C to +35 °C	0.081	0.077	0.081	
+20 °C to +25 °C	0.066	0.058	0.063	

Power level in dBm

> 4 GHz to 6 GHz

	–67	–19	+1	+23
0 °C to +50 °C	0.160	0.170	0.174	
+15 °C to +35 °C	0.096	0.089	0.097	
+20 °C to +25 °C	0.083	0.072	0.082	

Power level in dBm

Uncertainty for relative power measurements [11] in dB

9 kHz to < 20 kHz

	–67	–19/–13	+1/+7	+23
+23	0.226	0.229	0.027	
	0.084	0.080	0.022	
+7	0.046	0.044	0.022	
+1	0.226	0.027	0.229	
	0.083	0.022	0.080	
–13	0.045	0.022	0.044	
–19	0.023	0.226	0.226	
	0.022	0.083	0.084	
–67	0.022	0.045	0.046	

Power level in dBm

20 kHz to < 100 MHz

	–67	–19/–13	+1/+7	+23
+23	0.206	0.215	0.027	
	0.082	0.078	0.022	
+7	0.046	**0.044**	0.022	
+1	0.205	0.027	0.215	
	0.081	0.022	0.078	
–13	**0.044**	**0.022**	**0.044**	
–19	0.023	0.205	0.206	
	0.022	0.081	0.082	
–67	0.022	**0.044**	0.046	

Power level in dBm

100 MHz to 4 GHz

	–67	–19/–13	+1/+7	+23
+23	0.209	0.218	0.038	
	0.088	0.085	0.032	
+7	0.055	0.047	0.031	
+1	0.206	0.028	0.218	
	0.083	0.022	0.085	
–13	0.048	0.022	0.047	
–19	0.023	0.206	0.209	
	0.022	0.083	0.088	
–67	0.022	0.048	0.055	

Power level in dBm

> 4 GHz to 6 GHz

	–67	–19/–13	+1/+7	+23
+23	0.215	0.223	0.049	
	0.097	0.093	0.044	
+7	0.066	0.059	0.043	
+1	0.210	0.030	0.223	
	0.088	0.022	0.093	
–13	0.054	0.022	0.059	
–19	0.024	0.210	0.215	
	0.022	0.088	0.097	
–67	0.022	0.054	0.066	

Power level in dBm