Thermal Noise Level vs. Bandwidth

in 50 ohms, rms					
BW, Hz	P, uW	V, uV	I, nA	dBm	dBuV (rms)
1	0.0000	0.0009	0.0182	-167.8	-61
2	0.0000	0.0013	0.0257	-164.8	-58
3	0.0000	0.0016	0.0315	-163.0	-56
5	0.0000	0.0020	0.0407	-160.8	-54
10	0.0000	0.0029	0.0575	-157.8	-51
20	0.0000	0.0041	0.0814	-154.8	-48
30	0.0000	0.0050	0.0997	-153.0	-46
50	0.0000	0.0064	0.1287	-150.8	-44
100	0.0000	0.0091	0.1820	-147.8	-41
200	0.0000	0.0129	0.2574	-144.8	-38
300	0.0000	0.0158	0.3152	-143.0	-36
500	0.0000	0.0203	0.4069	-140.8	-34
1000	0.0000	0.0288	0.5755	-137.8	-31
2000	0.0000	0.0407	0.8139	-134.8	-28
3000	0.0000	0.0498	0.9968	-133.0	-26
5000	0.0000	0.0643	1.2869	-130.8	-24
10000	0.0000	0.0910	1.8199	-127.8	-21
20000	0.0000	0.1287	2.5737	-124.8	-18
30000	0.0000	0.1576	3.1521	-123.0	-16
50000	0.0000	0.2035	4.0694	-120.8	-14
100000	0.0000	0.2877	5.7550	-117.8	-11
200000	0.0000	0.4069	8.1388	-114.8	-8
300000	0.0000	0.4984	9.9679	-113.0	-6
500000	0.0000	0.6434	12.8686	-110.8	-4
1000000	0.0000	0.9099	18.1989	-107.8	-1
2000000	0.0000	1.2869	25.7371	-104.8	2
3000000	0.0000	1.5761	31.5214	-103.0	4
5000000	0.0000	2.0347	40.6940	-100.8	6
10000000	0.0000	2.8775	57.5500	-97.8	9
20000000	0.0000	4.0694	81.3880	-94.8	12
30000000	0.0000	4.9840	99.6795	-93.0	14
50000000	0.0000	6.4343	128.6857	-90.8	16

Thermal Noise Power, N = 4 k T B (independent of impedance)

where:

- k = 1.38 x 10-23 J/K (Boltzmann constant)
- T = temp, Kelvin
- B = bandwidth, Hz
- N = power, watts

Room temperature is usually taken as 290K (17C/63F) or 300K (27C/80F) for convenience

Table above uses:

- 300 K
- 4*k*T = 1.66E-20 watts/Hz

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