



DECIBELS AND POWER, VOLTAGE AND CURRENT RATIOS

The decibel, abbreviated db, is a unit used to express the ratio between two amounts of power, P_1 and P_2 , existing at two points. By definition,

$$\text{number of db} = 10 \log_{10} \frac{P_1}{P_2}$$

It is also used to express voltage and current ratios;

$$\text{number of db} = 20 \log_{10} \frac{V_1}{V_2} = 20 \log_{10} \frac{I_1}{I_2}$$

Strictly, it can be used to express voltage and current ratios only when the voltages or currents in question are measured at places having identical impedances.

Decibels	Power Ratio	Voltage and Current Ratio	Decibels	Power Ratio	Voltage and Current Ratio
0.1	1.0233	1.0116	13.0	19.953	4.4668
0.2	1.0471	1.0233	14.0	25.119	5.0119
0.3	1.0715	1.0351	15.0	31.623	5.6234
0.4	1.0965	1.0471	16.0	39.811	6.3096
0.5	1.1220	1.0593	17.0	50.119	7.0795
0.6	1.1482	1.0715	18.0	63.096	7.9433
0.7	1.1749	1.0839	19.0	79.433	8.9125
0.8	1.2023	1.0965	20.0	100.00	10.000
0.9	1.2303	1.1092	22.0	158.49	12.589
1.0	1.2589	1.1220	24.0	251.19	15.849
1.2	1.3183	1.1482	26.0	398.11	19.953
1.4	1.3804	1.1749	28.0	630.96	25.119
1.6	1.4454	1.2023	30.0	1000.0	31.623
1.8	1.5136	1.2303	32.0	1584.9	39.811
2.0	1.5849	1.2589	34.0	2511.9	50.119
2.2	1.6595	1.2882	36.0	3981.1	63.096
2.4	1.7378	1.3183	38.0	6309.6	79.433
2.6	1.8197	1.3490	40.0	10 ⁴	100.00
2.8	1.9055	1.3804	42.0	10 ⁴ × 1.5849	125.89
3.0	1.9953	1.4125	44.0	10 ⁴ × 2.5119	158.49
3.5	2.2387	1.4962	46.0	10 ⁴ × 3.9811	199.53
4.0	2.5119	1.5849	48.0	10 ⁴ × 6.3096	251.19
4.5	2.8184	1.6788	50.0	10 ⁵	316.23
5.0	3.1623	1.7783	52.0	10 ⁵ × 1.5849	398.11
5.5	3.5481	1.8836	54.0	10 ⁵ × 2.5119	501.19
6.0	3.9811	1.9953	56.0	10 ⁵ × 3.9811	630.96
7.0	5.0119	2.2387	58.0	10 ⁵ × 6.3096	794.33
8.0	6.3096	2.5119	60.0	10 ⁶	1000.00
9.0	7.9433	2.8184	70.0	10 ⁷	3162.3
10.0	10.0000	3.1623	80.0	10 ⁸	10000
11.0	12.589	3.5481	90.0	10 ⁹	31623
12.0	15.849	3.9811	100.0	10 ¹⁰	100000

To convert

Decibels to nepers multiply by 0.1151.

Nepers to decibels multiply by 8.686.

Where the power ratio is less than unity, it is usual to invert the fraction and express the answer as a decibel loss.

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