

## Units

T	Tera	$10^{12}$	1,000,000,000,000
G	Giga	$10^9$	1,000,000,000
M	Mega	$10^6$	1,000,000
k	Kilo	$10^3$	1,000
m	Milli	$10^{-3}$	0.001
$\mu$	Micro	$10^{-6}$	0.000,001
n	Nano	$10^{-9}$	0.000,000,001
p	Pico	$10^{-12}$	0.000,000,000,001

## dBs

The decibel (dB) is widely used in electronics, signals and communication. It is a logarithmic unit used to describe a ratio. The ratio may be power, sound pressure, voltage or intensity or several other things.

When considering the ratio of powers (or intensity) it is used as a ratio of 10 times the logarithm (base 10) of the ratio. For example :

$$P_{dB} = 10 \log_{10} \left( \frac{P_1}{P_0} \right) \text{ dB}$$

We can see from this, that:

$$P_1 = P_0 \cdot 10^{\frac{P_{dB}}{10}}$$

When a measurement of amplitude, i.e. voltage or current, is used, then is the ratio of the squares. However, this can be defined in one of two ways.

$$P_{dB} = 10 \log_{10} \left( \frac{V_1^2}{V_0^2} \right) = 20 \log_{10} \left( \frac{V_1}{V_0} \right)$$

There are all ratios and therefore used for relative measurements such as gain or loss. A similar device can be used, by referencing the power to 1mW:

$$P_{dB} = 10 \log_{10} \left( \frac{P_1}{1 \text{ mW}} \right) \text{ dBm}$$