Fundamentals of Electrical Engineering

Decibels

RICE

Definitions

- The decibel scale expresses a value *logarithmically* relative to a reference value

$$\text{power}(s,\ \text{in decibels}) \equiv 10 \log_{10} \frac{\text{power}(s)}{\text{power}(s_0)}$$

$$\text{amplitude}(s,\ \text{in decibels}) \equiv 20 \log_{10} \frac{\text{amplitude}(s)}{\text{amplitude}(s_0)}$$

$$\text{Note that, usually, power}(s) \propto \text{amplitude}^2(s)$$

- Adding decibel values corresponds to multiplying amplitude/power values

Important Values

Power Ratio	dB
1	0
10	10
0.1	-10
100 (=10*10)	20
2	3
5	7
2^{10}=1024	30.1