

# Signal Power

## 1. Signal Power

- Power is defined as time average of energy, energy per unit time, mean value of squared time domain signal [1].
- For periodic signals power can therefore be calculated by dividing energy of single period with period T:

$$E_y = \frac{1}{T} \int_0^T y^2(t) dt \quad (1.1)$$

- An example will be shown for sinusoid:

$$y(t) = 2 \sin(\omega t) \quad , \quad T=4s \quad (1.2)$$

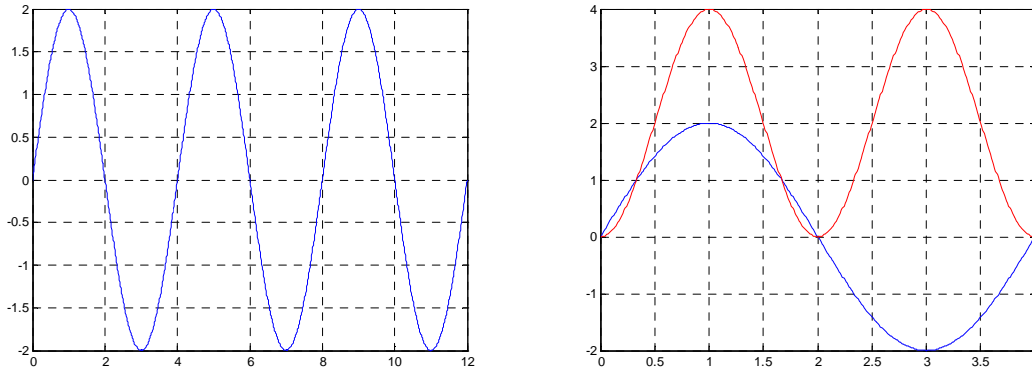


Figure 1.1. Power of sinusoid signal.

- Inserting (1.2) into (1.1) we get

$$E_y = \frac{1}{T} \int_0^T [2 \sin(\omega t)]^2 dt \quad (1.3)$$
$$E_y = \frac{1}{T} \int_0^T 4 \sin^2(\omega t) dt = \frac{4}{T} \int_0^T \sin^2(\omega t) dt$$

- For discrete period signals power is calculated like this:

$$E_y = \frac{1}{N} \sum_1^N y^2(n) \quad (1.4)$$

## 1.1. References

- [1] <http://cnx.org/content/m10055/latest/>