

Conversion Factors:

$$\begin{aligned} \pi (\text{Pi}) &= 3.14 & 2\pi &= 6.28 \\ \pi^2 &= 9.87 & \log\pi &= 0.497 \\ 1 \text{ meter} &= 3.28 \text{ feet} \\ 1 \text{ inch} &= 2.54 \text{ centimeters} \\ 1 \text{ radian} &= 57.3^\circ \end{aligned}$$

Resonant frequency formulas

Where f is in kHz, L is in microhenries, C is in microfarads

$$\begin{aligned} f_{\text{kHz}} &= 159.2 \div \sqrt{LC} \\ f_{\text{resonant}} &= \frac{1}{2\pi \sqrt{LC}} \end{aligned}$$

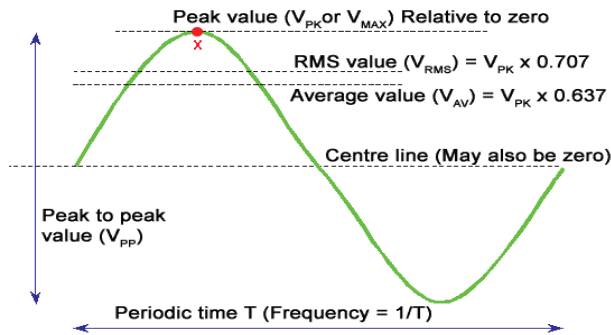
Frequency & Wavelength formulas $f = \text{frequency}$, $\lambda = \text{wavelength}$

$0.5\lambda = 180^\circ = \text{half wave}$ $0.25\lambda = 90^\circ = \text{quarter wave}$

$$\begin{aligned} f_{\text{kHz}} &= (3 \times 10^8) \div \lambda_{\text{meters}} \quad \text{or} \quad f_{\text{MHz}} = 984 \div \lambda_{\text{feet}} \\ \lambda_{\text{meters}} &= (3 \times 10^8) \div f_{\text{kHz}} \quad \text{or} \quad \lambda_{\text{feet}} = 984 \div f_{\text{MHz}} \end{aligned}$$

Sine wave conversion (RMS = root mean square).

Effective value (RMS) = 0.707 x Peak Value = 1.11 x Average Value
 Peak Value = 1.414 x Effective Value (RMS) = 1.57 x Average Value
 Average Value = 0.637 x Peak Value = 0.9 x Effective Value (RMS)
 Identify: Waveform, Peak (amplitude), RMS, 1 cycle over time period (frequency), Peak to peak, and practical average.



Voltage gain in decibels

$$\text{Gain dB} = 20 \log (V_{\text{out}} / V_{\text{in}})$$

Ratio of 2 power levels in decibels

$$\text{Gain dB} = 10 \log (P_2 \div P_1)$$

Resistors in series

$$R = R_1 + R_2 + R_3 \dots$$

Resistors in parallel

$$1/R = (1/R_1) + (1/R_2) + (1/R_3) \dots$$

Inductors connected in series

$$L = L_1 + L_2 + L_3 \dots$$

Inductors connected in parallel

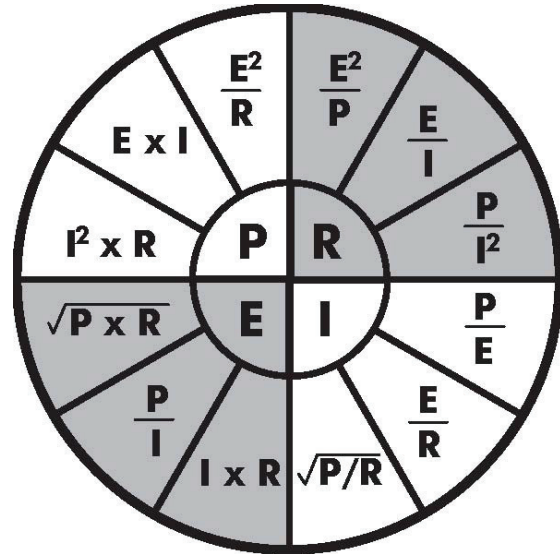
$$1 \div L = (1 \div L_1) + (1 \div L_2) \dots \quad \text{or} \quad L = 1 / (1 \div L_1) + (1 \div L_2) \dots$$

Reactance of inductors

where X_L is reactance, f is frequency, and L is inductance

$$X_L = 2 \times \pi \times f \times L$$

Ohm's Law



E=Voltage I=Current
P=Power R=Resistance

$P = I \times E$, the power being dissipated by the resistor is a product of the current and the applied voltage.

Time constants

T (Greek Tau), R (ohms), C (microfarads), L (microhenries)

$$\text{RL circuit: } 1 \text{ T (sec)} = L (\mu\text{H}) \div R (\Omega)$$

$$\text{RC circuit: } 1 \text{ T (sec)} = R (\Omega) \times C (\mu\text{f})$$

How to Compute Charge or Quantity of Electricity

where Q is the charge (in coulombs), C is the capacitance (in farads), and V is the potential difference (in volts).

$$Q = C \times V$$

Energy Storage in a Capacitor

where W is the energy (in Joules), C is the capacitance (in farads), and V is the potential difference (in volts).

$$W = \frac{1}{2} C \times V^2$$

Capacitors connected in parallel

$$C = C_1 + C_2 + C_3 \dots$$

Capacitors connected in series

$$1 \div C = (1 \div C_1) + (1 \div C_2) + (1 \div C_3) \dots$$

Reactance of capacitors

$$X_C = 1 \div (2 \times \pi \times f \times C)$$

Impedance Formulas for a Series Circuit

$$Z = \sqrt{R^2 + (X_L - X_C)^2} \quad \text{where } Z \text{ is impedance}$$

Impedance Formulas for R and X in Parallel

$$Z = \frac{RX}{\sqrt{R^2 + X^2}}$$

Battery internal resistance

$$V_{\text{out}} = \text{EMF} - V_{\text{terminal}}$$