

The Really Important Formulas

P = Power (Watts)
 E = Potential Difference (Volts)
 I = Current (Amps)
 R = Resistance (Ohms)

Ohm's Law

$300 / \text{Frequency (MHz)} = \text{Wavelength (M)}$
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Frequency & Wavelength

$\text{dB} = 10\text{Log}(P_2/P_1)$ where 'P' is power $\text{dB} = 20\text{Log}(E_2/E_1)$ where 'E' is voltage
 On your calculator: $(P_2 \div P_1) \{\text{Log}\} * 10 =$ or $(E_2 \div E_1) \{\text{Log}\} * 20 =$
 dB to Power Ratio on your calculator: $(\text{dB} \div 10) \{2\text{ndF}\} \{10^x\} =$

Decibels

Series Resistance = $R_1 + R_2 + R_3 \dots$

Parallel Resistance = $\frac{R_1 \times R_2}{R_1 + R_2}$

Inductance is calculated like Resistance
 Capacitance is calculated in reverse

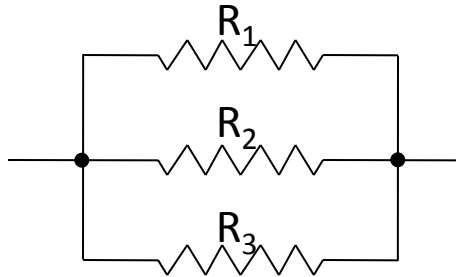
Series & Parallel

Other Important Formulas

Series & Parallel (Resistance)



- $R_T = R_1 + R_2 + R_3$
- $I = E / R_T$ → Current is the same, wherever you measure it.
- $E \text{ at } R_x = I_T * R_x$ → Voltage drop is different at each resistor.
→ Total voltage drop is the sum of $E_1 + E_2 + E_3$



$$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

- $I_x = E / R_x$ → Current is different at each resistor.
- $E_x = E_T$ → Voltage drop is the same, wherever you measure it.

Frequency and period

$F = 1 / T$ and $T = 1 / F$ where 'T' = 1 cycle

Ohm's Law

- $P = E * I$
- $E = R * I$
- Therefore $P = (R * I) * I$, or $P = R^2 * I$

Reactance and Resonant Frequencies

Capacitive and Inductive Reactance

- Capacitive reactance (X_C) is the opposition to AC current flow by a capacitor.
 - It is inversely proportional to frequency.
- Inductive reactance (X_L) is the opposition to AC current flow by an inductor.
 - It is directly proportional to frequency.
- Reactance is measured in ohms.
- Impedance (AC resistance) is pure resistance + reactance.

$$X_C = \frac{1}{2 \pi f C}$$

$$X_L = 2 \pi f L$$

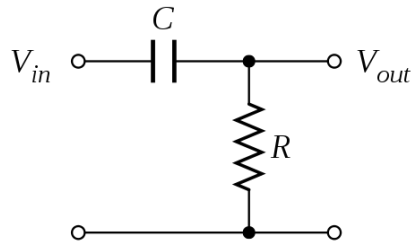
Resonant Frequency

- Current lags behind voltage in an inductor.
- Current leads voltage in a capacitor.
- At the resonant frequency in an RLC circuit, the inductor and capacitor are in-phase.
- In an RLC series circuit, at resonance, current is maximum.
- In a parallel LC circuit, at resonance current is minimum.

Resonance $f_r = \frac{1}{2 \pi \sqrt{L C}}$

Cut-off Frequencies

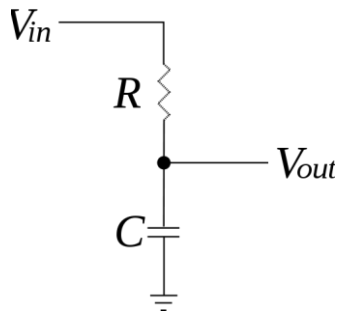
High-Pass Filters



$$f_c = \frac{1}{2\pi\tau} = \frac{1}{2\pi RC},$$

- High-pass filters pass high frequencies and reject signals at frequencies below the cut-off point.
- At the cut-off point, output power is $\frac{1}{2}$ input power.
- R represents the impedance of the circuit in question.
- Higher value capacitors lower the cut-off frequency (frequencies below the cut-off are attenuated).

Low-Pass Filters



$$f_c = \frac{1}{2\pi\tau} = \frac{1}{2\pi RC},$$

- Low-pass filters pass low frequencies and shunt higher frequencies to ground.
- At the cut-off point, output power is $\frac{1}{2}$ input power.
- R represents the impedance of the circuit in question.
- Lower value capacitors lower the cut-off frequency (frequencies above the cut-off are attenuated).

All Possible Ohm's Law Calculations

