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RLC Circuit Formulas

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List of 13 RLC Circuit Formulas

RLC Circuit

1) Capacitance for Parallel RLC Circuit using Q Factor

Open Calculator

fx $$C = \frac{L \cdot Q_{||}^2}{R^2}$$

ex $$349.3578\mu F = \frac{0.79mH \cdot (39.9)^2}{(60\Omega)^2}$$

2) Capacitance for Series RLC Circuit given Q Factor

Open Calculator

fx $$C = \frac{L}{Q_{se}^2 \cdot R^2}$$

ex $$351.1111\mu F = \frac{0.79mH}{(0.025)^2 \cdot (60\Omega)^2}$$

3) Inductance for Parallel RLC Circuit using Q Factor

Open Calculator

fx $$L = \frac{C \cdot R^2}{Q_{||}^2}$$

ex $$0.791452mH = \frac{350\mu F \cdot (60\Omega)^2}{(39.9)^2}$$

4) Inductance for Series RLC Circuit given Q Factor

Open Calculator

fx $$L = C \cdot Q_{se}^2 \cdot R^2$$

ex $$0.7875\text{mH} = 350\mu\text{F} \cdot (0.025)^2 \cdot (60\Omega)^2$$

5) Line to Neutral Voltage using Reactive Power

Open Calculator

fx $$V_{ln} = \frac{Q}{3 \cdot \sin(\Phi) \cdot I_{ln}}$$

ex $$68.71795\text{V} = \frac{134\text{VAR}}{3 \cdot \sin(30^\circ) \cdot 1.3\text{A}}$$

6) Q Factor for Parallel RLC Circuit

Open Calculator

fx $$Q_{||} = R \cdot \left(\sqrt{\frac{C}{L}}\right)$$

ex $$39.93666 = 60\Omega \cdot \left(\sqrt{\frac{350\mu\text{F}}{0.79\text{mH}}}\right)$$

7) Q Factor for Series RLC Circuit

Open Calculator

fx $$Q_{se} = \frac{1}{R} \cdot \left(\sqrt{\frac{L}{C}}\right)$$

ex $$0.02504 = \frac{1}{60\Omega} \cdot \left(\sqrt{\frac{0.79\text{mH}}{350\mu\text{F}}}\right)$$

8) Resistance for Parallel RLC Circuit using Q Factor

Open Calculator

fx $$R = \frac{Q_{||}}{\sqrt{\frac{C}{L}}}$$

ex $$59.94492\Omega = \frac{39.9}{\sqrt{\frac{350\mu F}{0.79mH}}}$$

9) Resistance for Series RLC Circuit given Q Factor

Open Calculator

fx $$R = \frac{\sqrt{L}}{Q_{se} \cdot \sqrt{C}}$$

ex $$60.09516\Omega = \frac{\sqrt{0.79mH}}{0.025 \cdot \sqrt{350\mu F}}$$

10) Resonant Frequency for RLC circuit

Open Calculator

fx $$f_o = \frac{1}{2 \cdot \pi \cdot \sqrt{L \cdot C}}$$

ex $$302.6722Hz = \frac{1}{2 \cdot \pi \cdot \sqrt{0.79mH \cdot 350\mu F}}$$

11) RMS Voltage using Reactive Power

Open Calculator

fx $$V_{rms} = \frac{Q}{I_{rms} \cdot \sin(\Phi)}$$

ex $$57.02128V = \frac{134VAR}{4.7A \cdot \sin(30^\circ)}$$

12) Voltage using Complex Power

Open Calculator

fx $$V = \sqrt{S \cdot Z}$$

ex $$128.9796V = \sqrt{270.5VA \cdot 61.5\Omega}$$

13) Voltage using Reactive Power

Open Calculator

fx $$V = \frac{Q}{I \cdot \sin(\Phi)}$$

ex $$127.619V = \frac{134VAR}{2.1A \cdot \sin(30^\circ)}$$

Variables Used

- **C** Capacitance *(Microfarad)*
- **f_o** Resonant Frequency *(Hertz)*
- **I** Current *(Ampere)*
- **I_{ln}** Line to Neutral Current *(Ampere)*
- **I_{rms}** Root Mean Square Current *(Ampere)*
- **L** Inductance *(Millihenry)*
- **Q** Reactive Power *(Volt Ampere Reactive)*
- **$Q_{||}$** Parallel RLC Quality Factor
- **Q_{se}** Series RLC Quality Factor
- **R** Resistance *(Ohm)*
- **S** Complex Power *(Volt Ampere)*
- **V** Voltage *(Volt)*
- **V_{ln}** Line to Neutral Voltage *(Volt)*
- **V_{rms}** Root Mean Square Voltage *(Volt)*
- **Z** Impedance *(Ohm)*
- **Φ** Phase Difference *(Degree)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **sin**, sin(Angle)
  Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- Function: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Electric Current** in Ampere (A)
  Electric Current Unit Conversion
- Measurement: **Power** in Volt Ampere Reactive (VAR), Volt Ampere (VA)
  Power Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion
- Measurement: **Frequency** in Hertz (Hz)
  Frequency Unit Conversion
- Measurement: **Capacitance** in Microfarad (µF)
  Capacitance Unit Conversion
- Measurement: **Electric Resistance** in Ohm (Ω)
  Electric Resistance Unit Conversion
- Measurement: **Inductance** in Millihenry (mH)
  Inductance Unit Conversion
- Measurement: **Electric Potential** in Volt (V)
  Electric Potential Unit Conversion

Check other formula lists

- **AC Circuit Design Formulas**
- **RLC Circuit Formulas**
- **AC Power Formulas**

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