

Concepts

| | | |
|-----------------|------------------------------|----------|
| Charge | $Q = C V$ | Coulombs |
| Current | $I = dQ/dt$ | Amperes |
| Ohm's Law | $V = I R$ | Volts |
| Joule's Law | $P = V I = I^2 R$ | Watts |
| Kirchhoff's Law | | |
| | Sum of the Loop Voltages = 0 | |
| | Sum of the Node Currents = 0 | |

Engineering Notation

Decibel Calculations

$$P_2 / P_1 \text{ in dB} = 10 \log (P_2 / P_1)$$

$$V_2 / V_1 \text{ in dB} = 20 \log (V_2 / V_1)$$

$$0 \text{ dB implies } P_2 = P_1$$

$$\text{Half Power Point} = -3\text{dB (Same as RMS voltage } 0.707 V_{\text{peak}})$$

$$\text{Power expressed in dBm} = 10 \log (\text{Power in milliwatts})$$

Examples:

Use decibels to calculate the following:

- Given the ratio of two voltages $V_2 / V_1 = 25$; express the voltage ratio in dB. (+28 dB)
- Given the power ratio of $P_2 / P_1 = 50$; express the power ratio in dB. (+17 dB)
- Express 400 milliwatts in dBm. (+26 dBm)
- Express 400 microwatts (0.400 milliwatts) in dBm. (-4 dBm)
- For additional examples - See Course Handouts

DMM Accuracy and Resolution

Electrical Concepts (PowerPoint)

Handy References: Schaum's Outline of Basic Electricity, 2ed

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