

Ohm's Law & Power

Electrical Engineering

The three power forms alongside $V = IR$, and why the power rating decides the part.

Voltage across a linear resistor is proportional to the current through it.

$$V = IR \cdot P = VI = I^2R = V^2/R$$

12 V across 470 Ω

V/R .

25.5 mA

0.2 A in 100 Ω

I^2R .

4 W

5 V across 1 k Ω

V^2/R .

25 mW

THE COMMON MISTAKE

✗ **Choosing a resistor by its value alone**

✓ **Checking the dissipation as well**

A quarter-watt part carrying 25 mA at 12 V dissipates 0.3 W and cooks.
Resistors fail on power, not on voltage.

Ohm's law describes resistors, not diodes or filament lamps. A lamp's resistance climbs steeply with temperature.