

Resistors and Resistor Networks

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1. Introduction

- A resistor is a component that opposes the flow of electric current.
- Resistors control current, divide voltage, and protect circuit elements.

2. Resistor Basics

- **Resistance:** measured in ohms, it limits current per Ohm's Law.
- Power rating indicates how much heat a resistor can safely dissipate.
- Color bands or printed codes specify a resistor's value and tolerance.

3. Series Networks

- Resistors in series carry the same current.
- **Series resistance:** total resistance equals the sum of individual resistances.
- Voltage divides across each resistor in proportion to its value.

4. Parallel Networks

- Resistors in parallel share the same voltage.
- **Parallel resistance:** the reciprocal of total equals the sum of reciprocals.
- Total resistance is always less than the smallest branch resistance.

5. Applications

- **Voltage divider:** uses series resistors to obtain a fraction of supply voltage.
- Current limiting protects components such as LEDs.
- Combined networks mix series and parallel arrangements.