LED Basics

LEDs are semiconductor devices that emit light when an electric current passes through them. Unlike traditional incandescent bulbs, LEDs produce light without generating significant heat, making them more energy-efficient.

Types and Characteristics

- Through-hole LEDs: Common 5mm, 3mm, and 10mm sizes, typically dome-shaped
- Surface Mount Device (SMD) LEDs: Smaller, used in compact designs
- High-powered LEDs: Multiple LEDs packed together, used in torches and floodlights

LEDs come in various colors, determined by the semiconductor material used, not the color of the casing.

LED Structure and Polarity

- Longer lead: Anode (positive)
- Flat edge on the casing: Cathode (negative)
- Internal structure: Two metal plates, with the larger one being the cathode

Specialized LED Types

- Blinking LEDs: Automatically turn on and off at a set frequency
- Color-changing LEDs: Transition between colors using an internal controller
- Bi-directional LEDs: Can switch between two colors
- RGB LEDs: Contain separate red, green, and blue LEDs for color mixing

LED Circuit Design

LEDs require a resistor in series to limit current and prevent damage. LED drivers are used in light bulbs and strip lighting to provide constant current.

LED Applications

LEDs are used in various applications, including:

- TV remotes (infrared LEDs)
- Light bulbs

- Display screens
- Indicator lights
- Automotive lighting