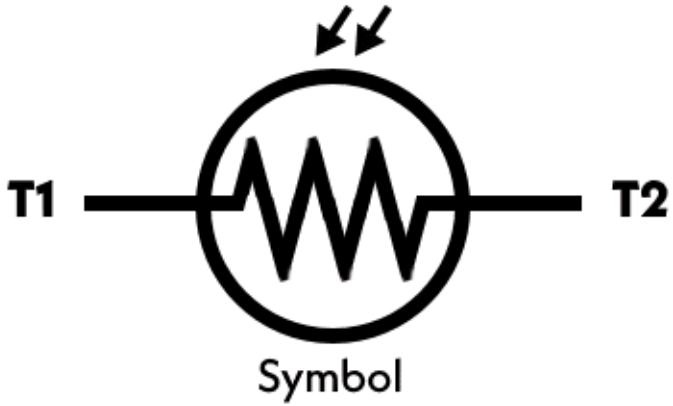
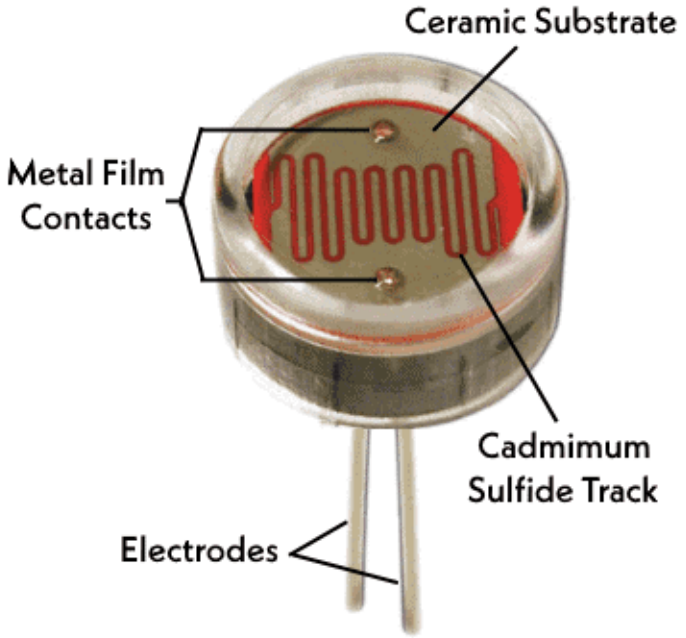
Photoresistors (LDR - Light Dependent Resistor)

LDR - Light Dependent Resistor

*LDR is also known as Photocell & Photoresistor





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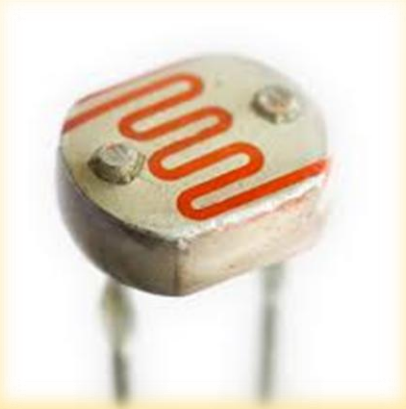
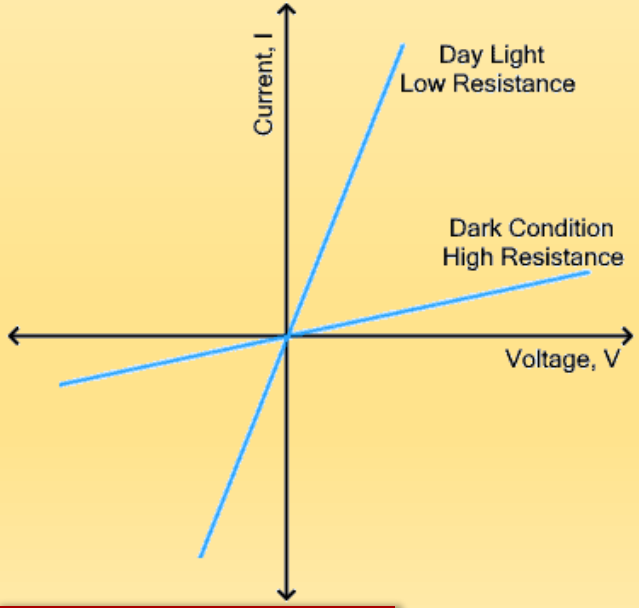


Working Principle:

Resistance decreases with increasing light intensity (photoconductivity).

Material:

Cadmium Sulfide (CdS) or other semiconductors.



Photoconductivity Effect:

- When **light photons** hit the LDR, electrons gain energy and jump to the conduction band.
- This **reduces resistance** (higher light = lower resistance).

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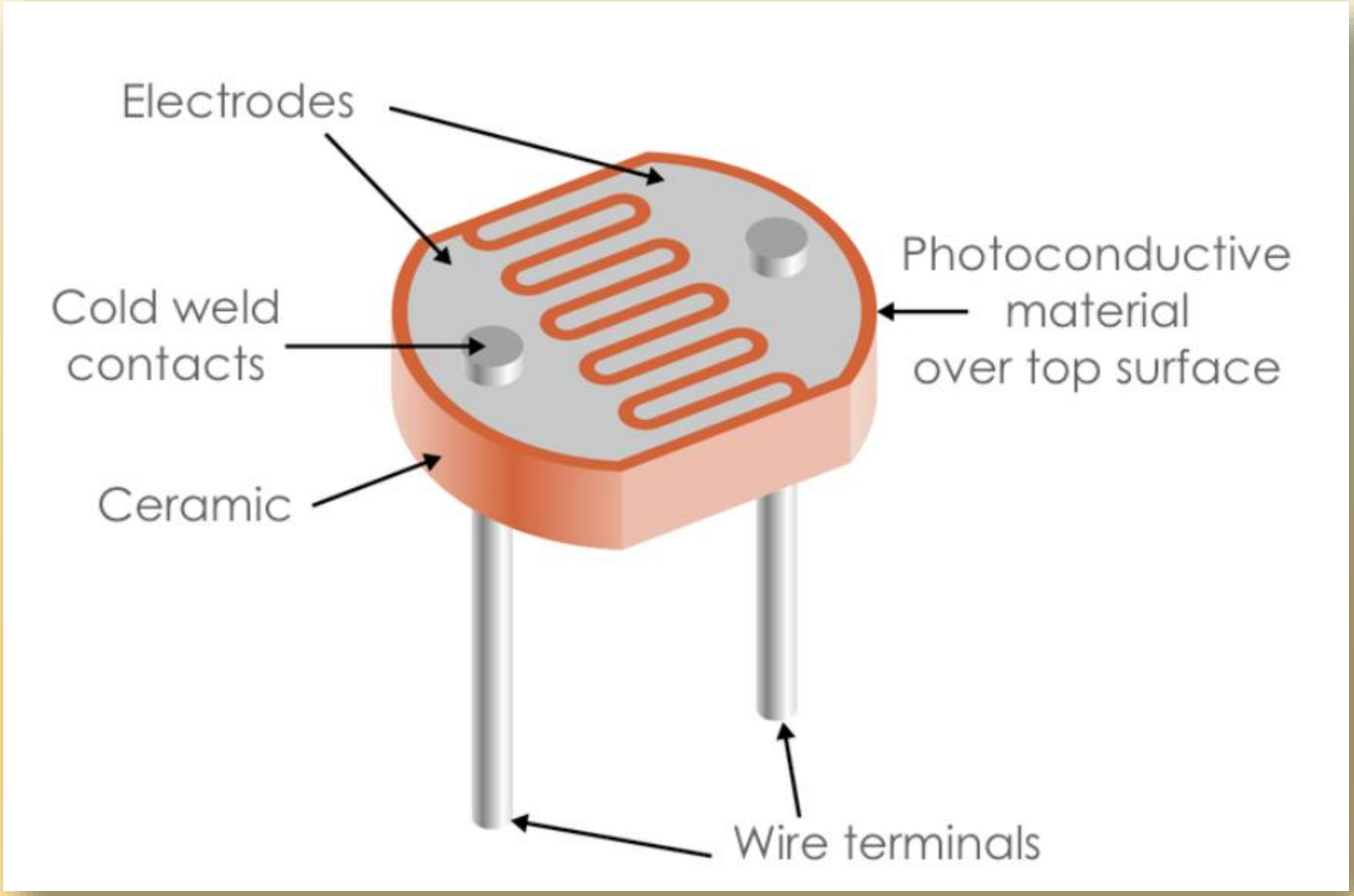

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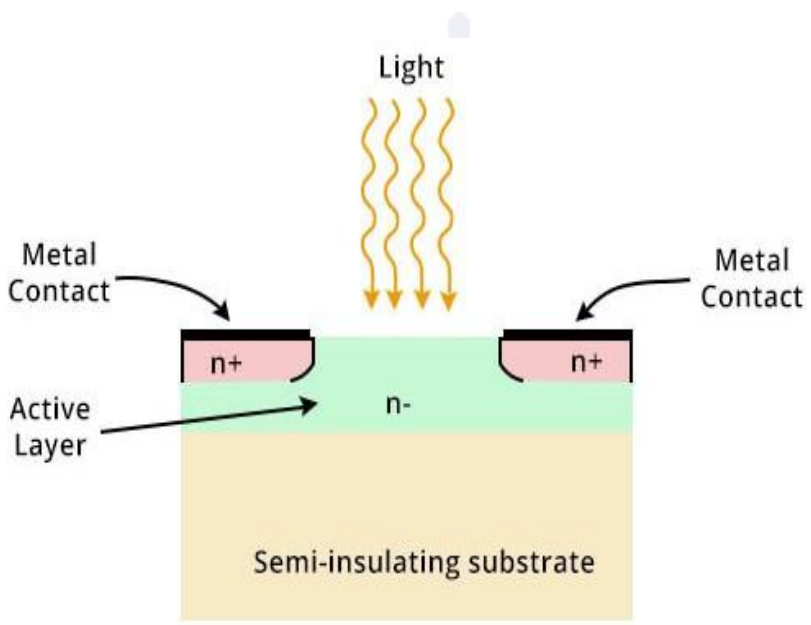
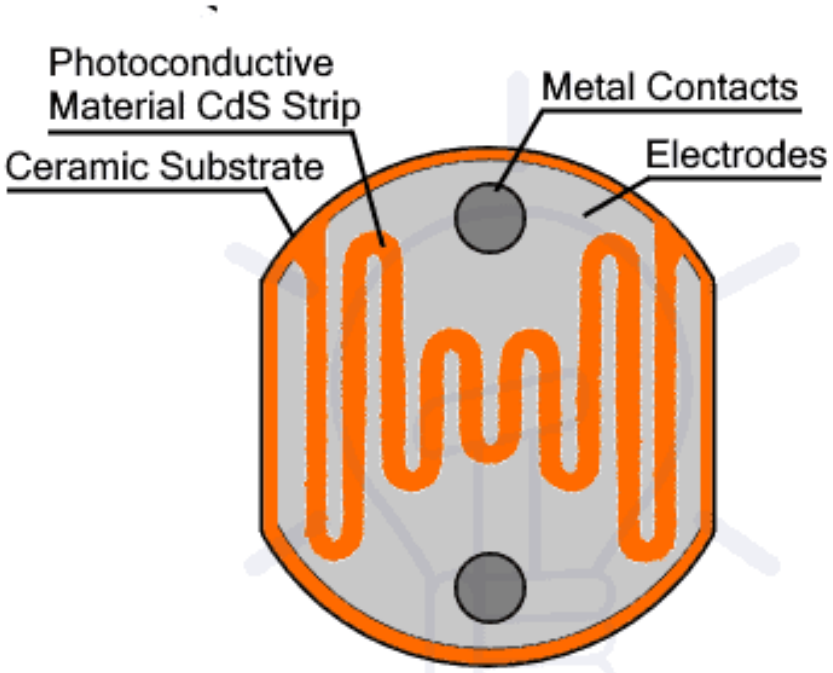
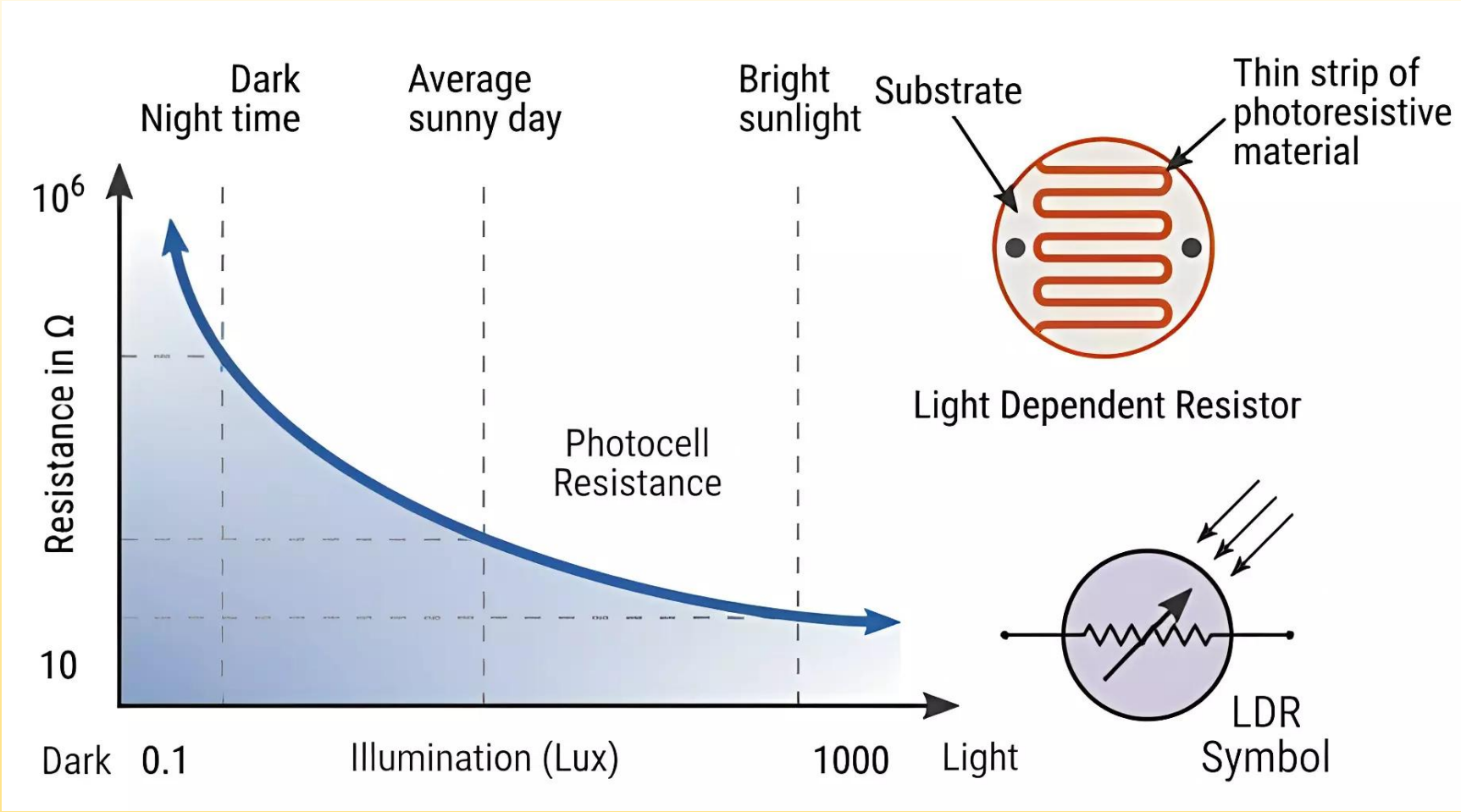


LDR Structure



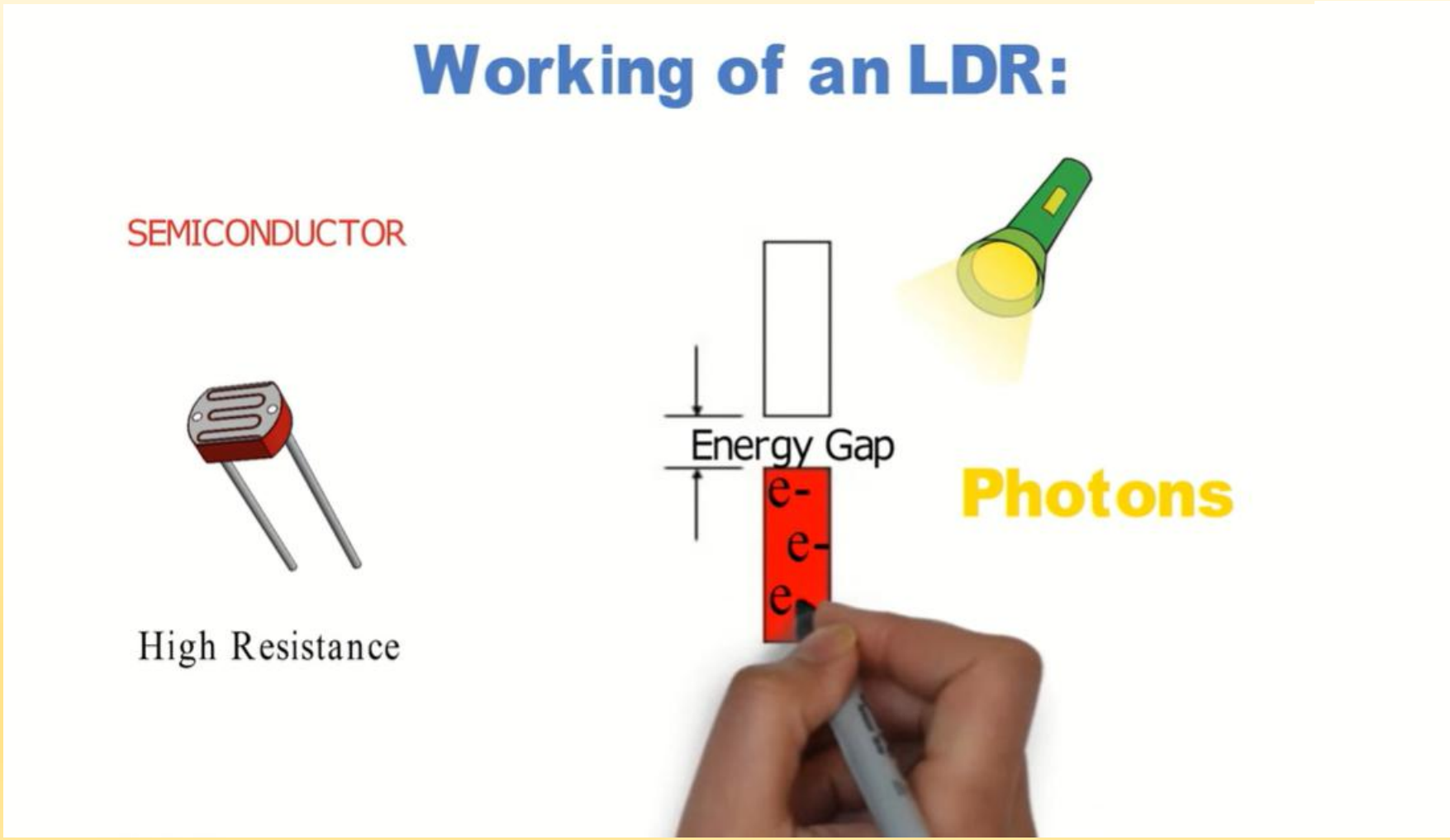
LDR - Light Dependent Resistor
Top View

Photoresistors (LDR - Light Dependent Resistor)



- **Dark Resistance:**
  - In darkness, resistance is **very high (MΩ range)**.
  - Under light, resistance **drops significantly (few kΩ or less)**.

Photoresistors (LDR - Light Dependent Resistor)



Photoresistors (LDR - Light Dependent Resistor)

Applications :

- **Automatic Night Lights** (street lights, garden lights).
- **Camera Light Meters** (older film cameras).
- **Light/Dark Activated Switches** (burglar alarms, DIY projects).
- **Solar Trackers** (adjusts panel angle based on sunlight).

Parameter	Typical Value	Notes
Resistance Range	~1 MΩ (dark) to ~100 Ω (bright)	Depends on LDR model
Response Time	~10–100 ms	Slower than photodiodes
Spectral Range	~400–700 nm (visible light)	Best sensitivity in **green-yellow** range
Power Rating	~100–200 mW	Avoid exceeding to prevent damage

Photoresistors (LDR - Light Dependent Resistor)

Advantages & Disadvantages

✅ **Pros:**

- Simple, low-cost.
- No need for external power (passive device).
- Good for basic light-sensing applications.

❌ **Cons:**

- **Slow response time** (not suitable for fast signals).
- **Non-linear response** (logarithmic resistance change).
- **Wears out over time** (degradation with prolonged use).