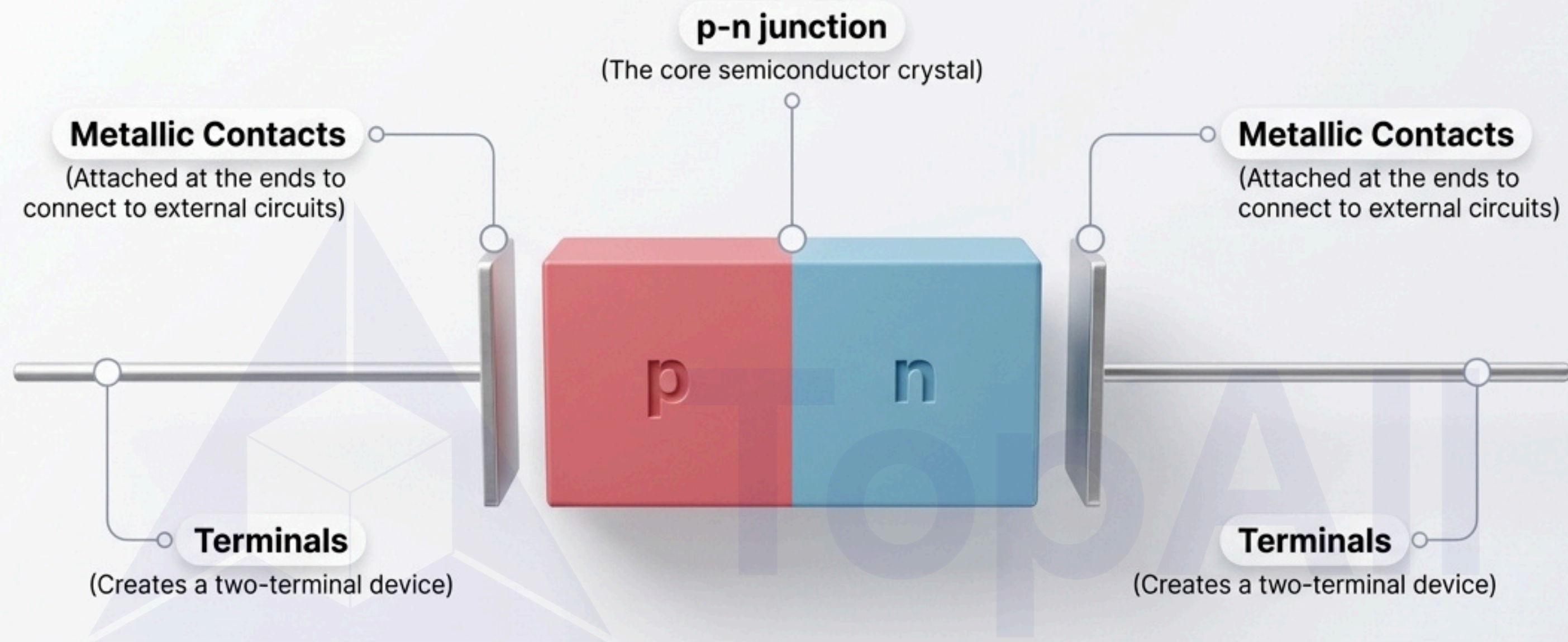




CHAPTER 14.6 | SEMICONDUCTOR ELECTRONICS

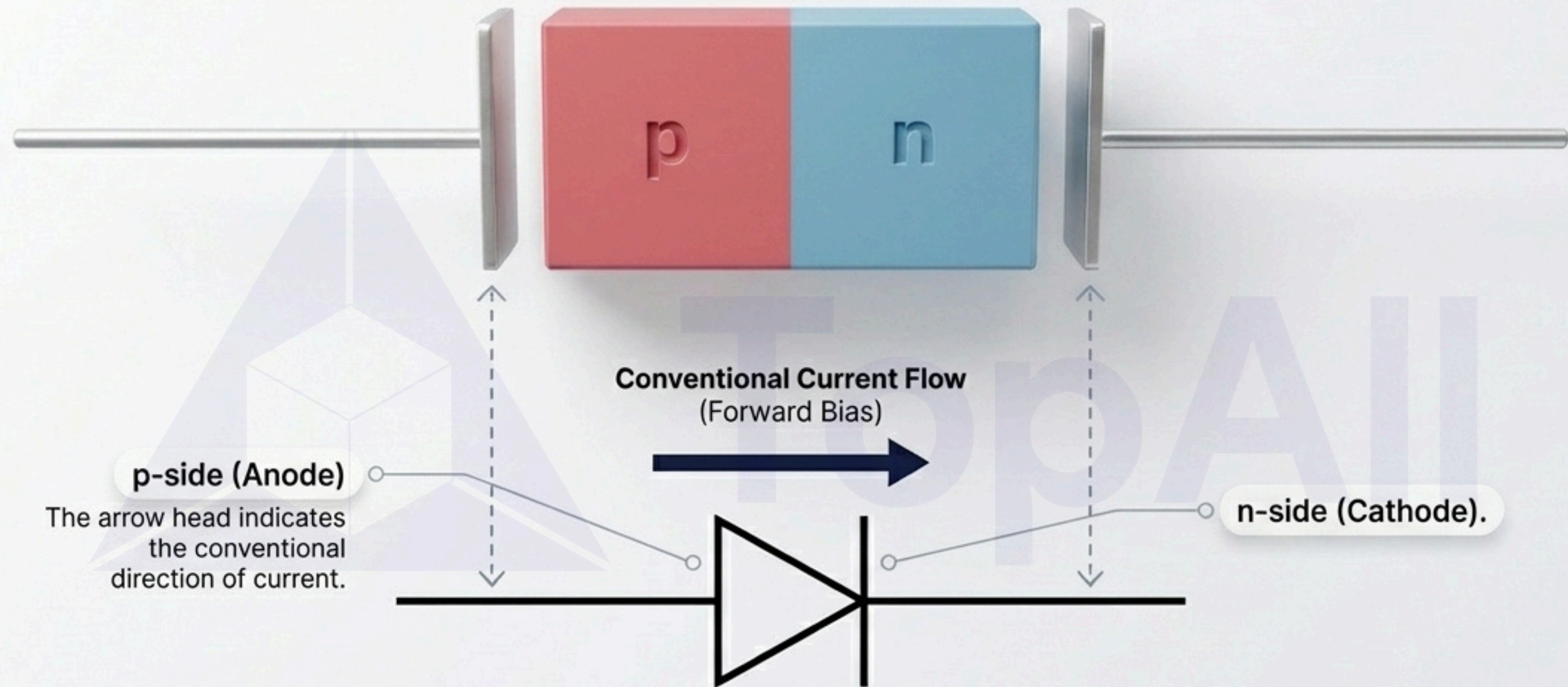
Semiconductor Diode

The fundamental two-terminal device that controls the flow of current.



By adding metallic contacts to a p-n junction, we create a discrete component capable of interfacing with an external voltage.

Circuit Representation





You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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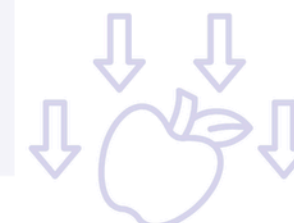
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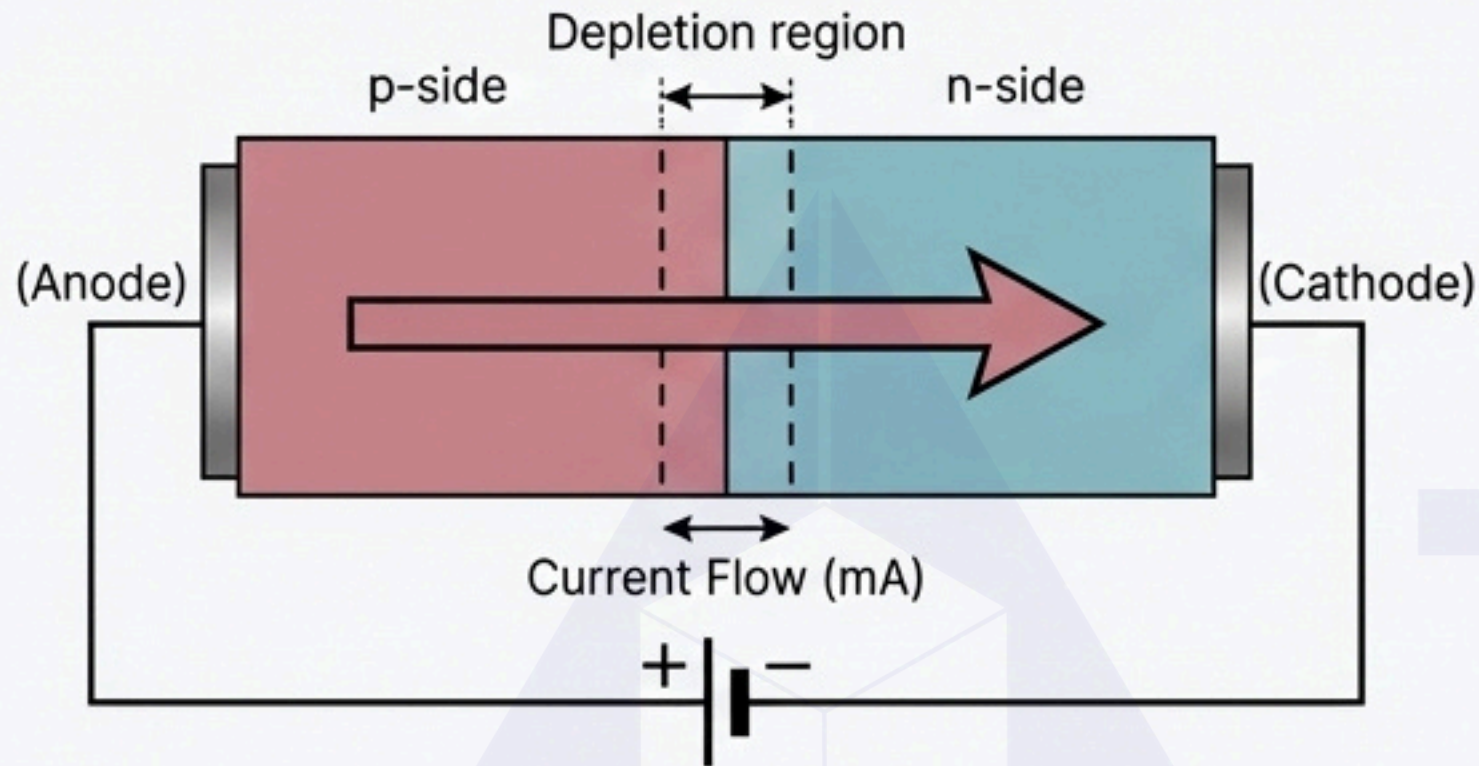
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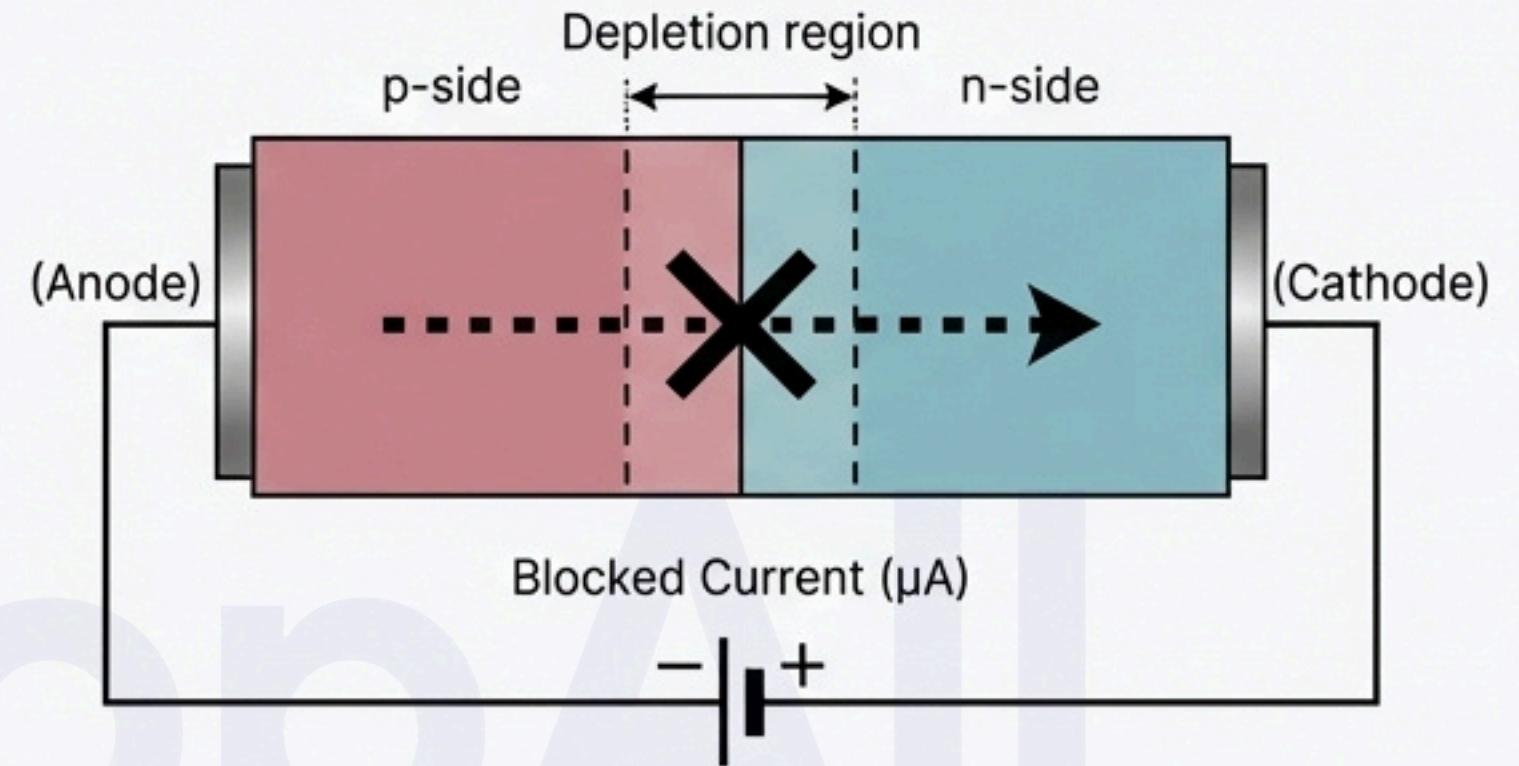
Barrier Control via Applied Voltage

Forward Bias



- External voltage opposes built-in potential.
- Effective barrier height reduces to $(V_0 - V)$.
- Current flows easily (measured in mA).

Reverse Bias



- External voltage adds to built-in potential.
- Effective barrier height increases to $(V_0 + V)$.
- Current is heavily suppressed (measured in μA).

Core Insight: The applied external voltage fundamentally alters the equilibrium barrier potential.

Key Takeaways

- 1 A diode is fundamentally a **p-n junction** equipped with **metallic contacts** for external circuit connections.
- 2 It functions as a **two-terminal device**: the **Anode** corresponds to the p-side, and the **Cathode** corresponds to the n-side.
- 3 Its primary behavior is dynamic barrier control: **Forward bias** reduces the barrier ($V_0 - V$) to allow current, while **Reverse bias** increases the barrier ($V_0 + V$) to block current.



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