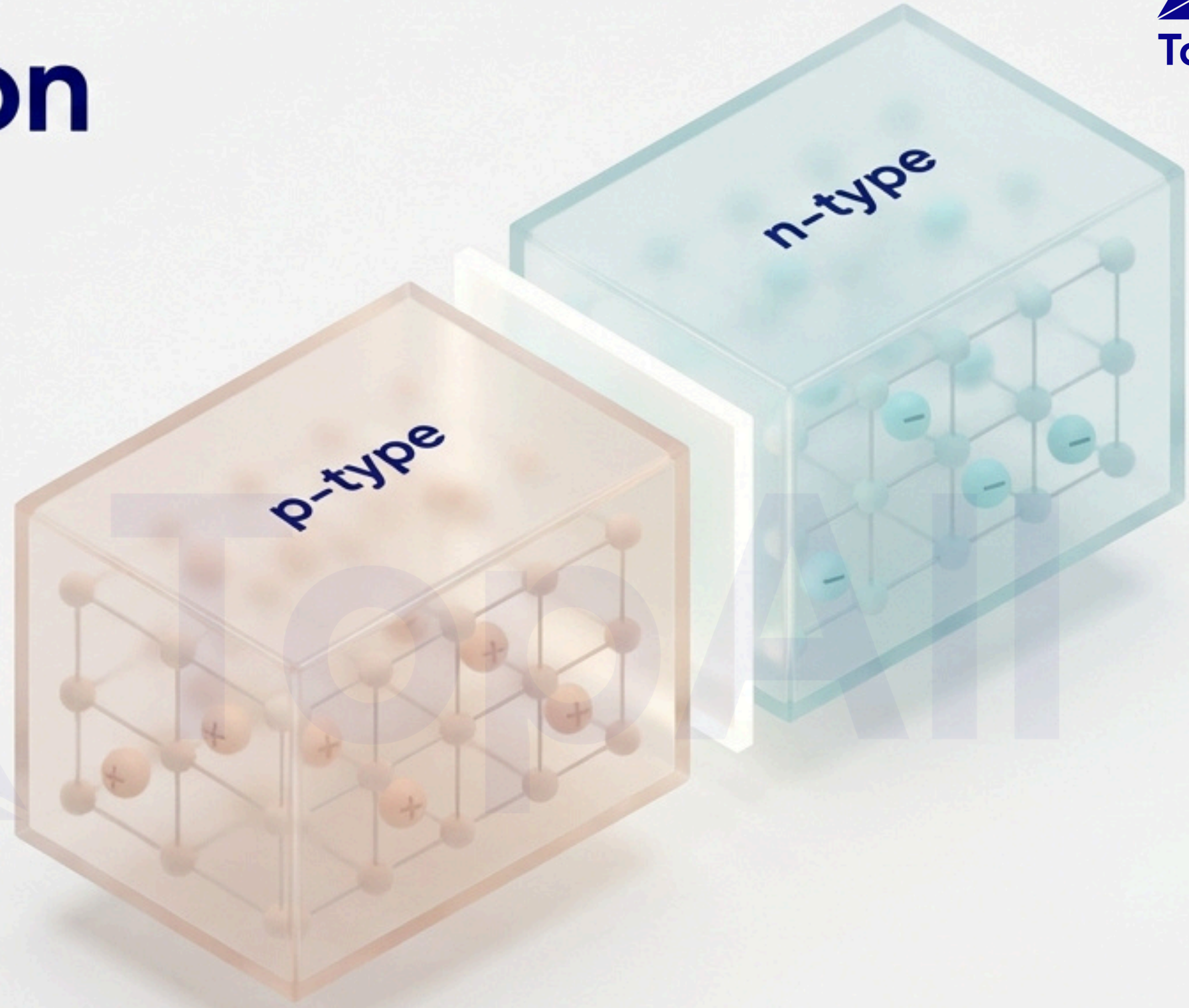
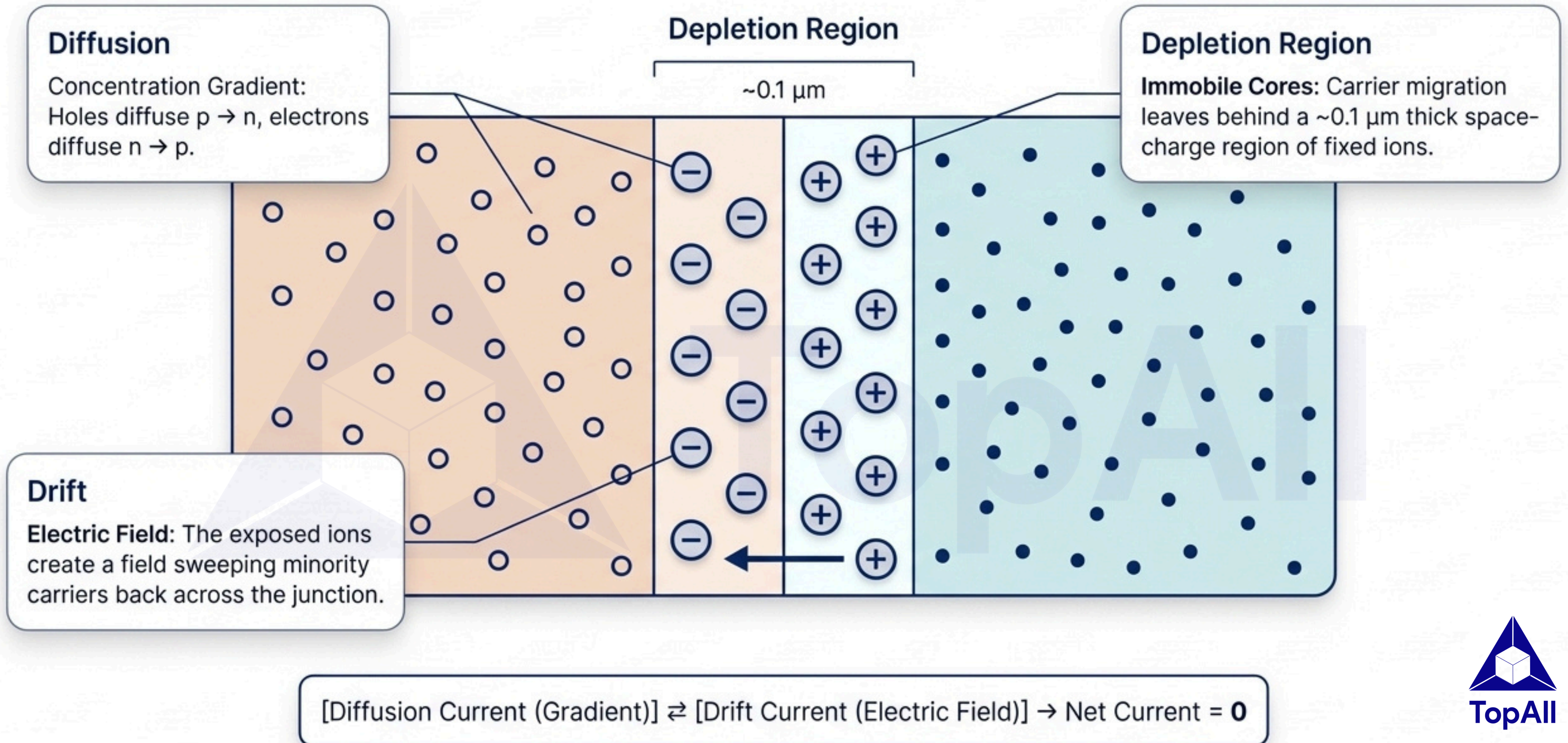


The p-n Junction

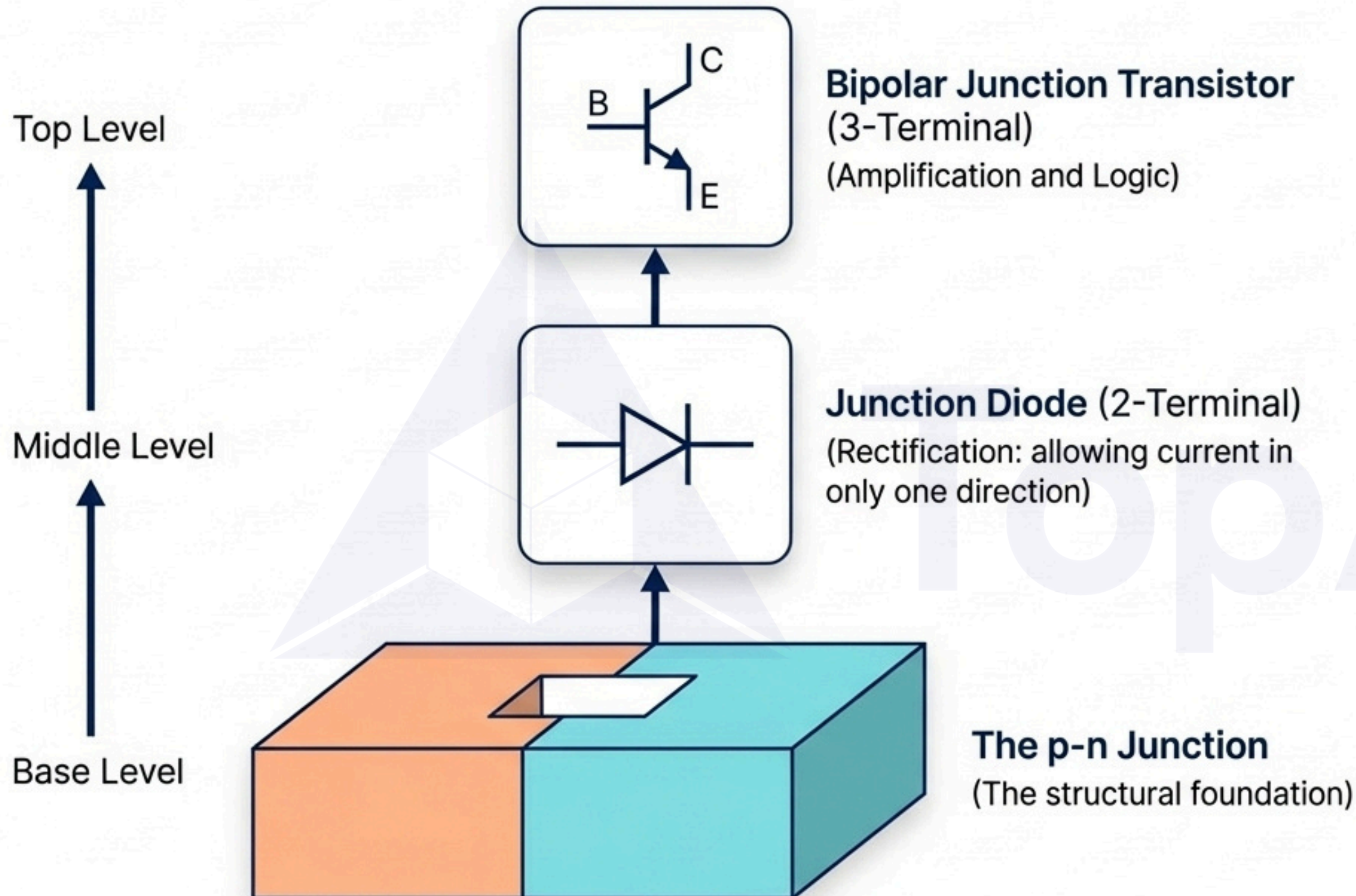
The fundamental architectural block of modern semiconductor electronics.



H1: Anatomy of the Interface



H1: The Universal Building Block



The Solid-State Revolution

Replaced legacy vacuum tubes. Vacuum valves were bulky, required high power/heat, and operated at high voltages (~100V).

The p-n junction internalized the flow of charge carriers within the solid itself, requiring no external heat or evacuated space.



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

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

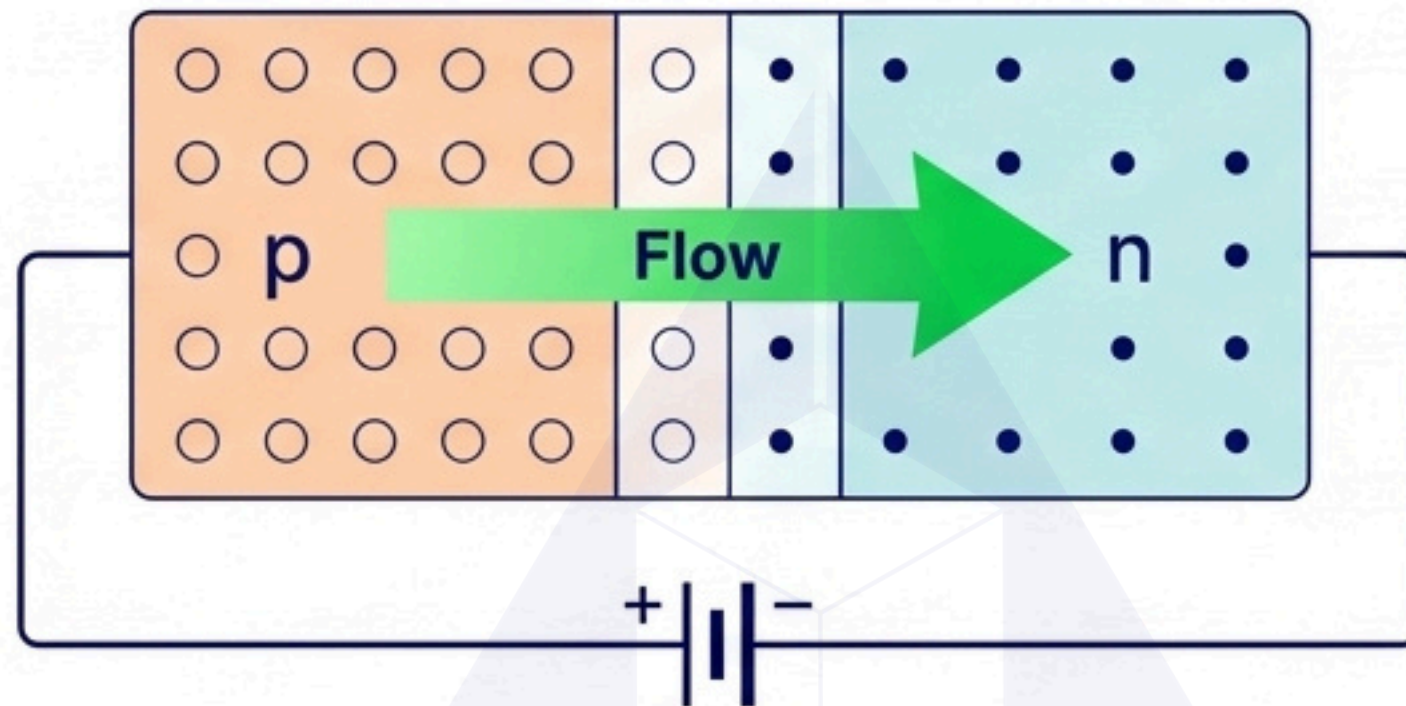
Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



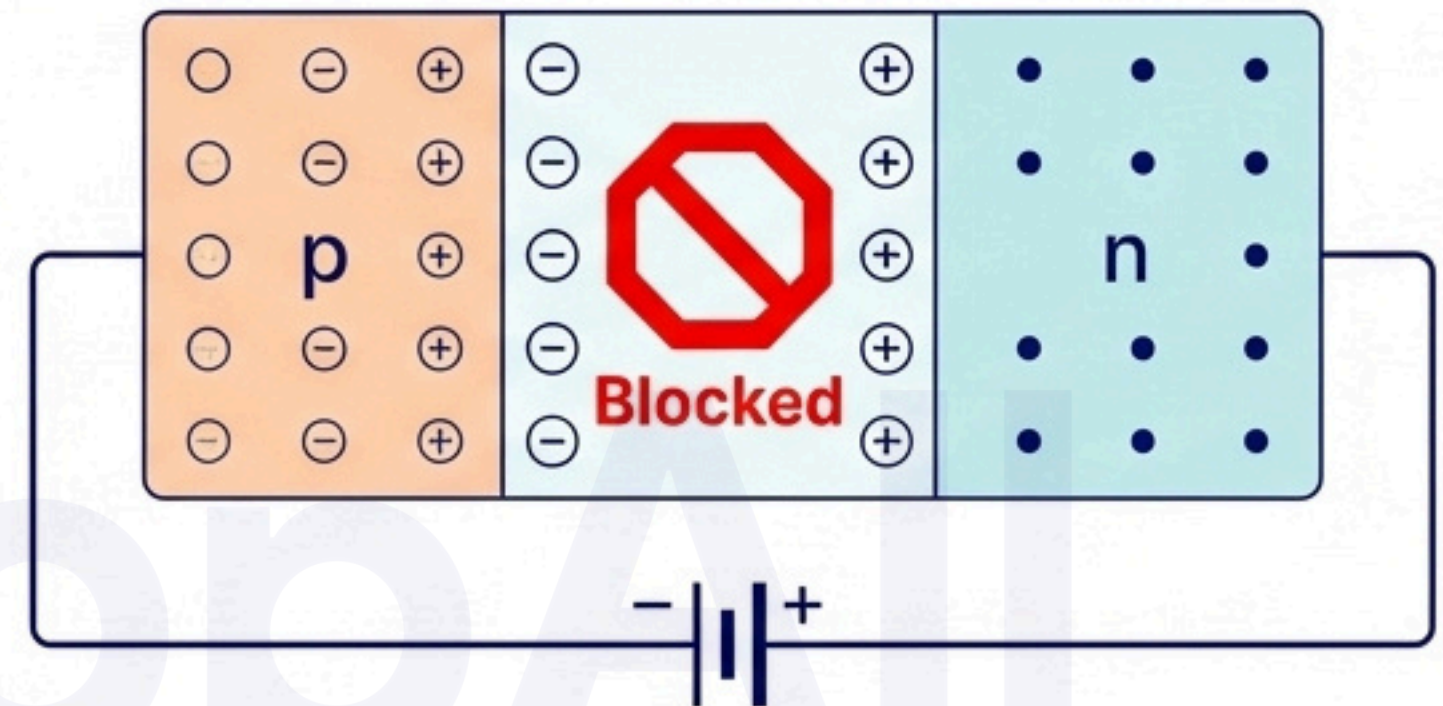
H1: Controlling the Barrier (External Bias)

Forward Bias



- **Connection:** $p \rightarrow (+) \mid n \rightarrow (-)$
- **Barrier Height:** Decreases to $(V_0 - V)$
- **Depletion Width:** Shrinks
- **Current Type:** Diffusion (Minority Carrier Injection)
- **Magnitude:** High ($\sim \text{mA}$)

Reverse Bias

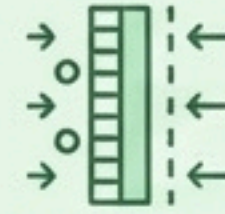


- **Connection:** $p \rightarrow (-) \mid n \rightarrow (+)$
- **Barrier Height:** Increases to $(V_0 + V)$
- **Depletion Width:** Widens
- **Current Type:** Drift (Sweeping minority carriers)
- **Magnitude:** Low ($\sim \mu\text{A}$)

H1: Key Takeaways



Dynamic Equilibrium: The junction forms through a balance of Diffusion (driven by concentration gradients) and Drift (driven by internal electric fields).



The Depletion Region: A $\sim 0.1 \mu\text{m}$ natural barrier of immobile ion cores devoid of free charge carriers, creating the built-in potential (V_0).



Solid-State Foundation: The fundamental interface that makes diodes (rectification) and transistors (amplification) possible.



Bias Dictates Flow: Forward bias lowers the barrier ($V_0 - V$) allowing milliamperes flow. Reverse bias raises the barrier ($V_0 + V$) restricting flow to microamperes.



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis