

Ideal Diode and Characteristics of Ideal Diode



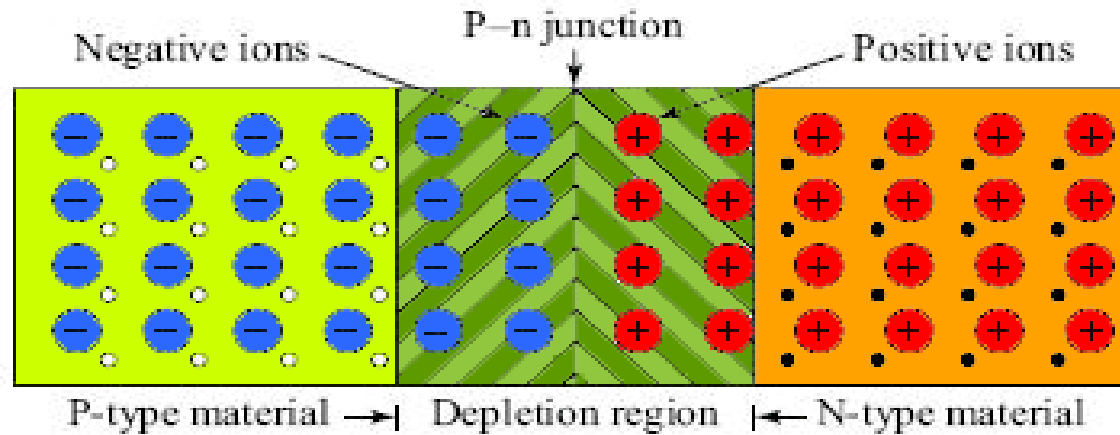
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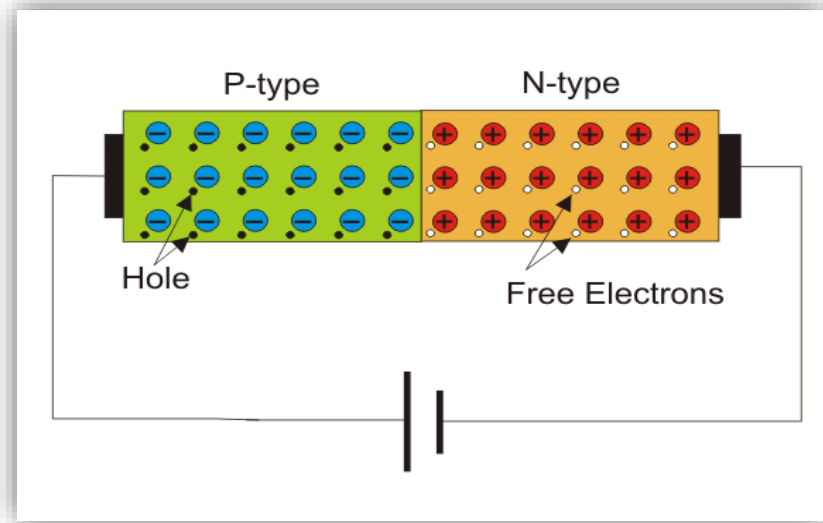
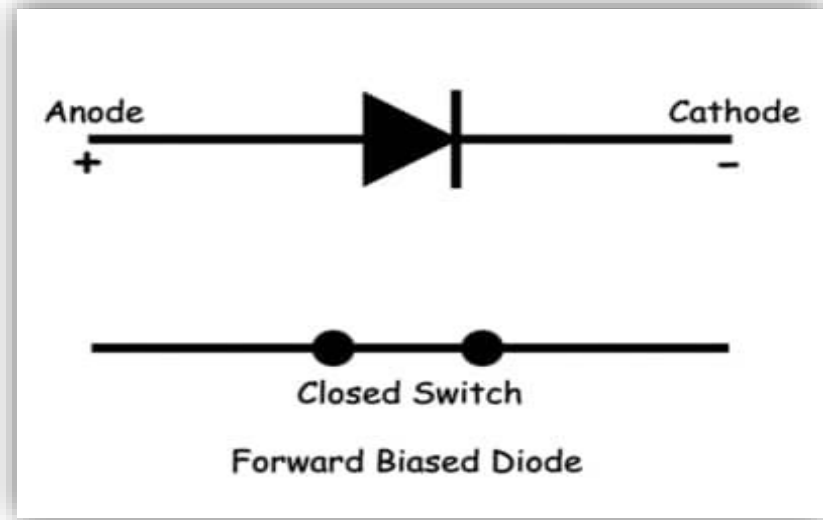


An ideal diode means a perfect diode which has all properties in their perfect sense.

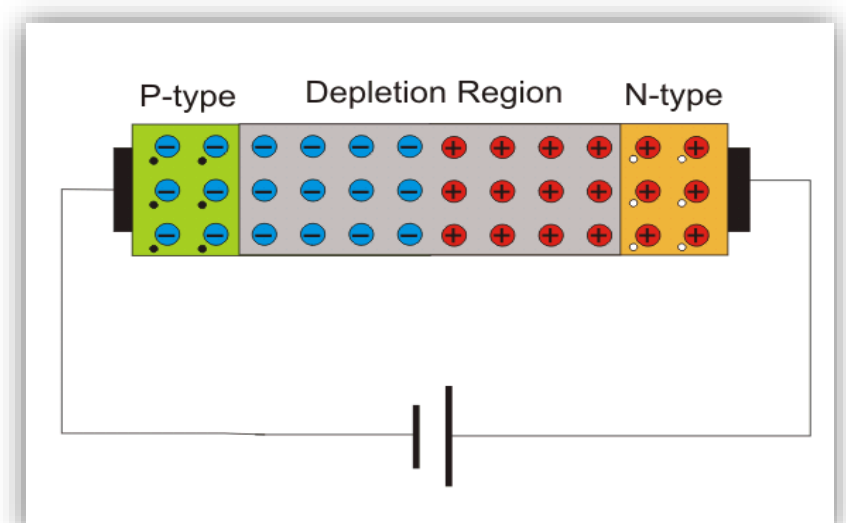
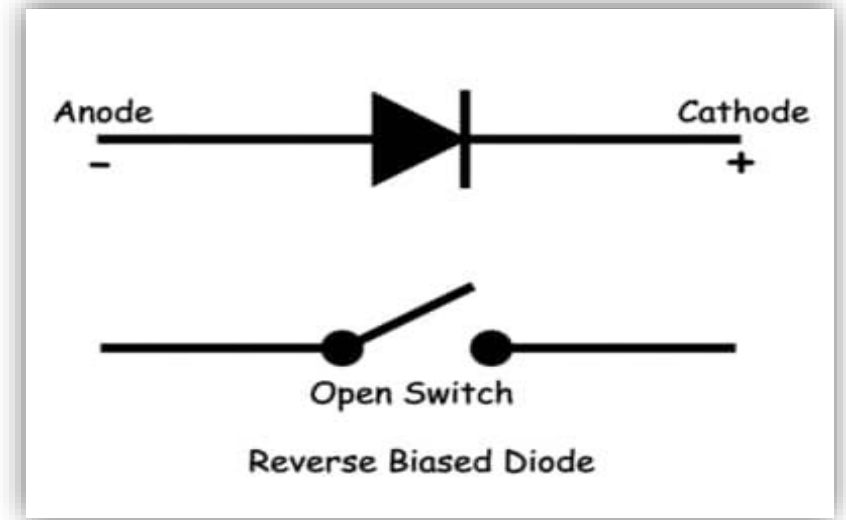


Usually, a diode operates either in **FORWARD** or **REVERSE** biased condition.

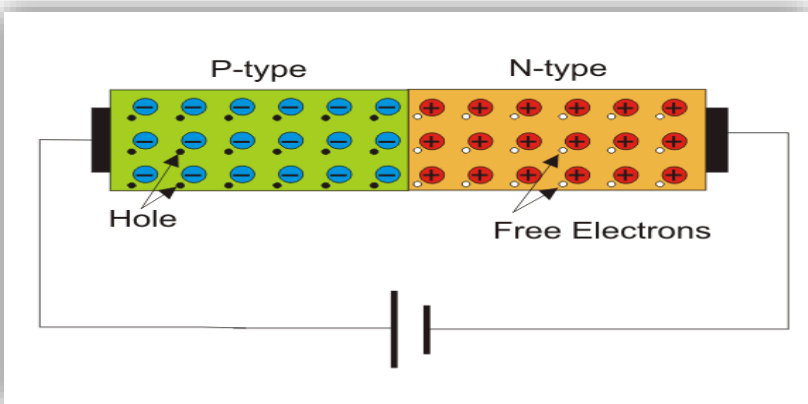
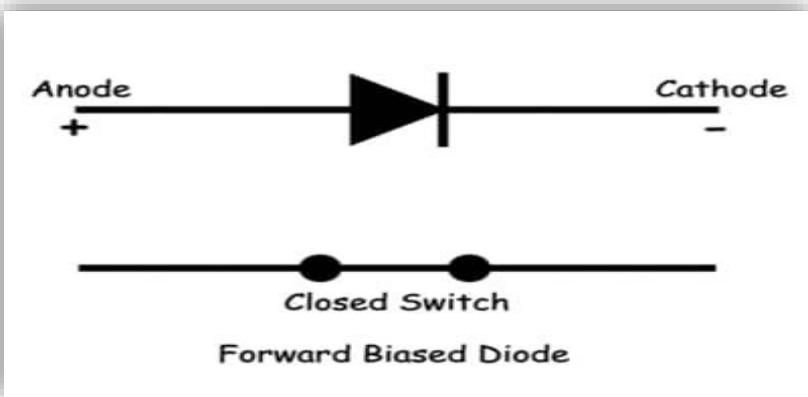
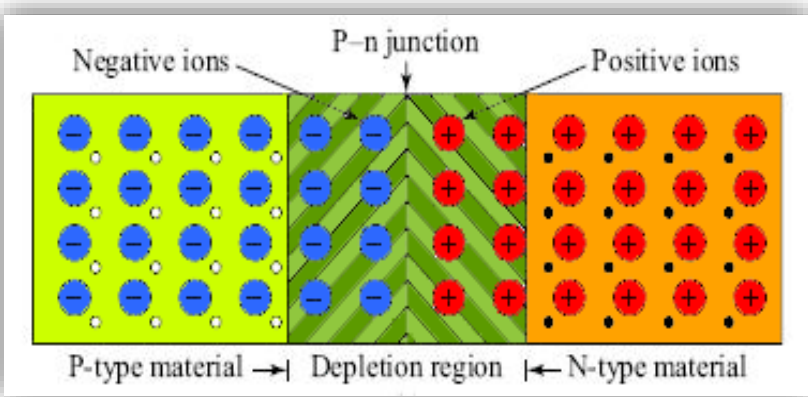
FORWARD BIASED CONDITION



REVERSE BIASED CONDITION

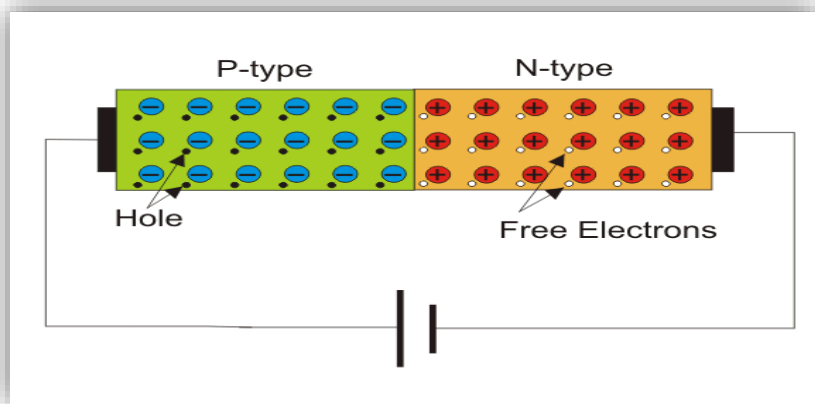
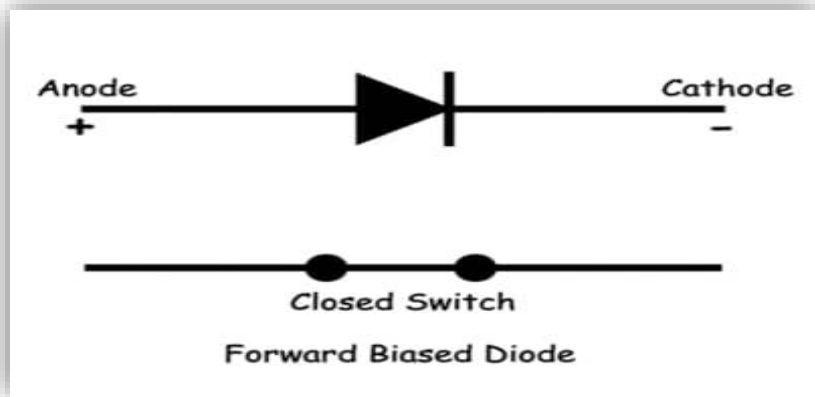
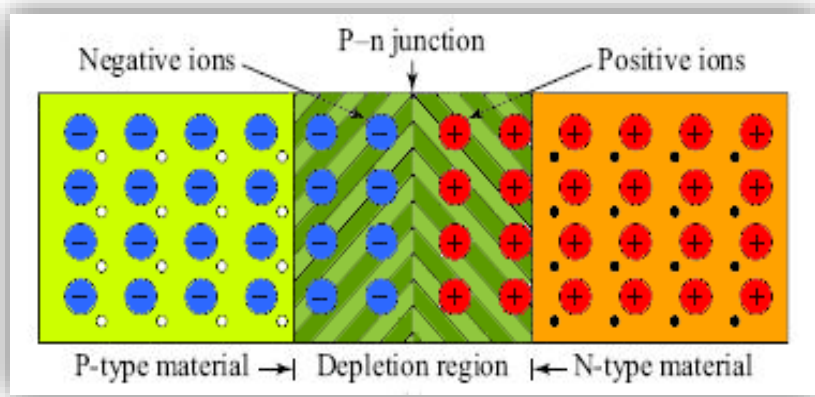


Zero Resistance, $R=0$



- **Resistance** offered is *due to the presence of immobile charges dwells in depletion region*
- Infer that the ideal diode *does not have any barrier potential*
- **Absence of depletion region**
- **Does not offer any resistance** to the flow of current through it.





Infinite Amount of Current, $I = \infty$

- **Implied property** which states that **of zero resistance** when forward biased
- *Electronics governed by Ohms Law*
- Relationship between the current (I), voltage (V) and resistance (R) is expressed as

$$I = \frac{v}{R} \text{ if } R = 0, \text{ then } I = \infty.$$
- **No higher limit** for the current in forward bias state

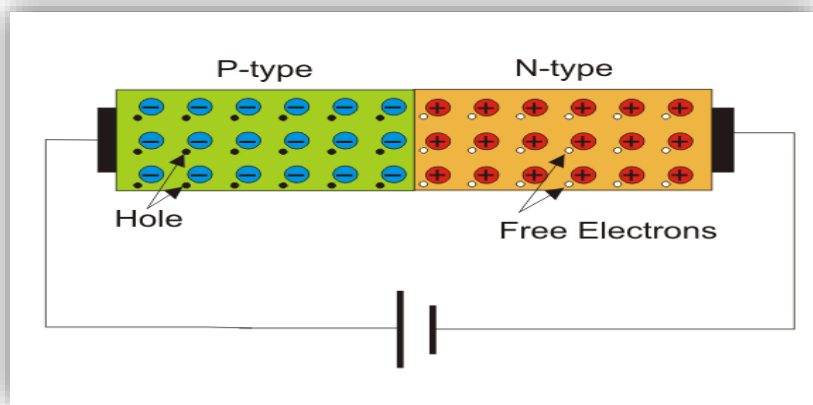
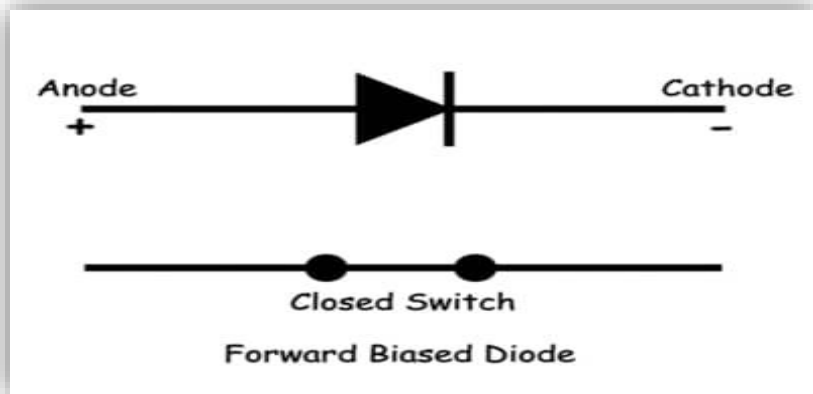
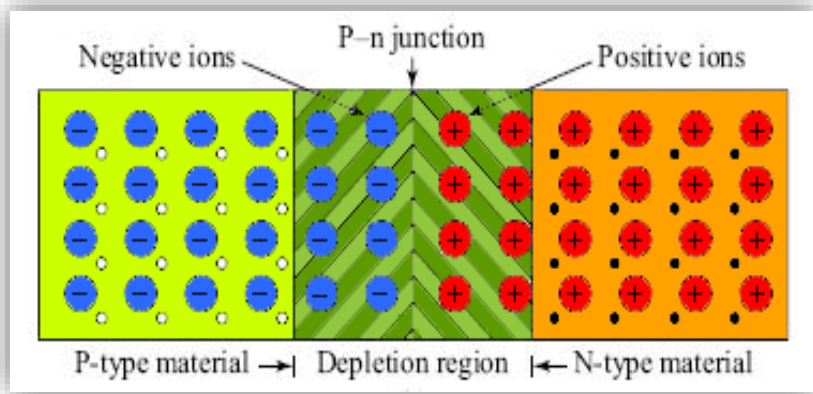


Zero Threshold Voltage

➤ *Referred* from its first property of possessing **zero resistance**.

➤ *Threshold voltage* is the **minimum voltage** which is required **to be provided** to the diode **to overcome its barrier potential** and **to start conducting**

➤ Ideal diode is **void of depletion region and zero minimum or threshold voltage required**



Forward Bias Summary

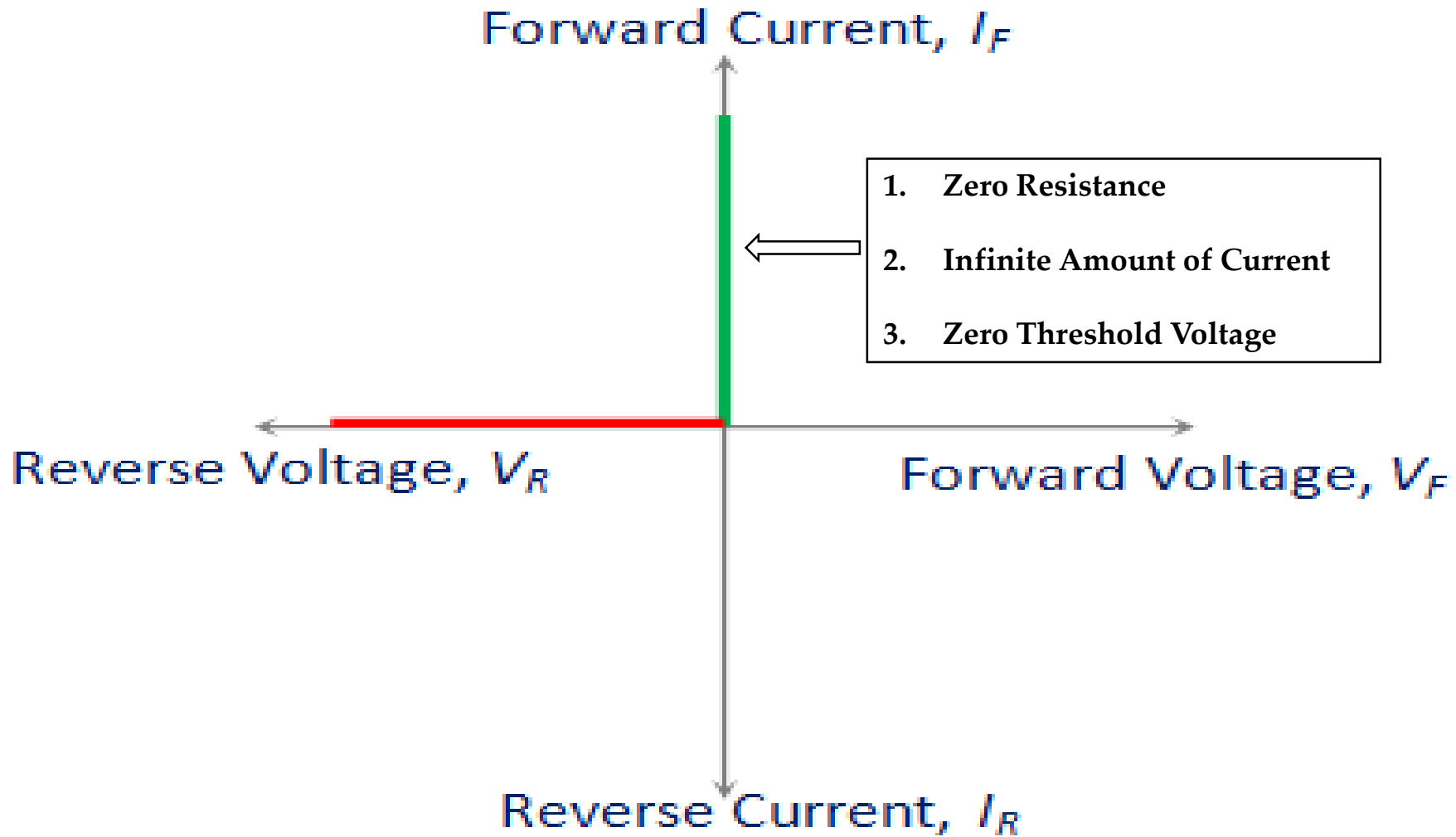
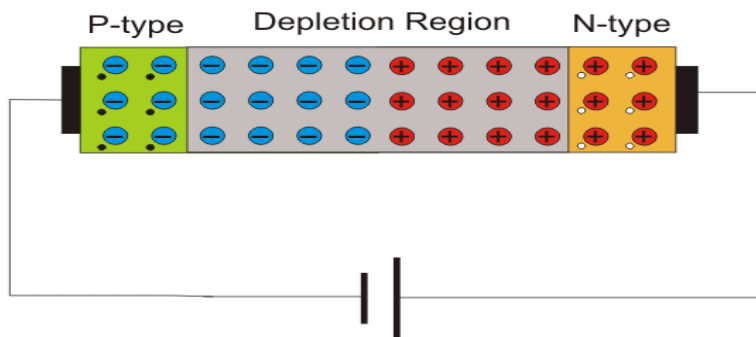
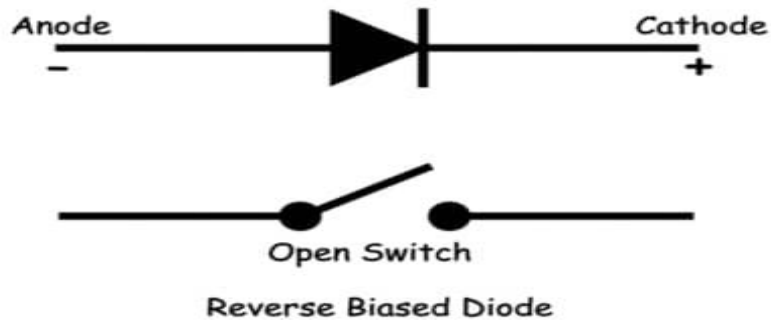
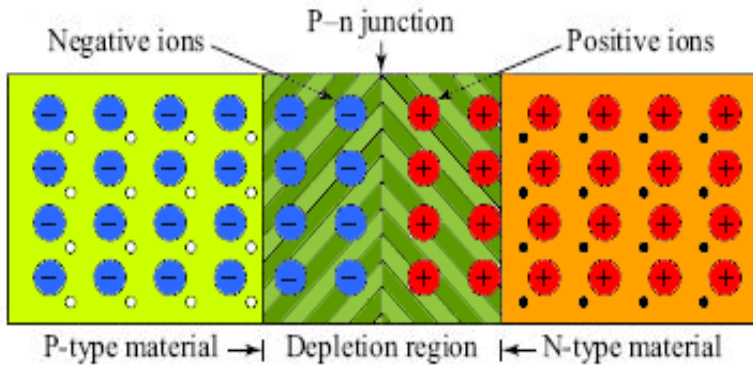


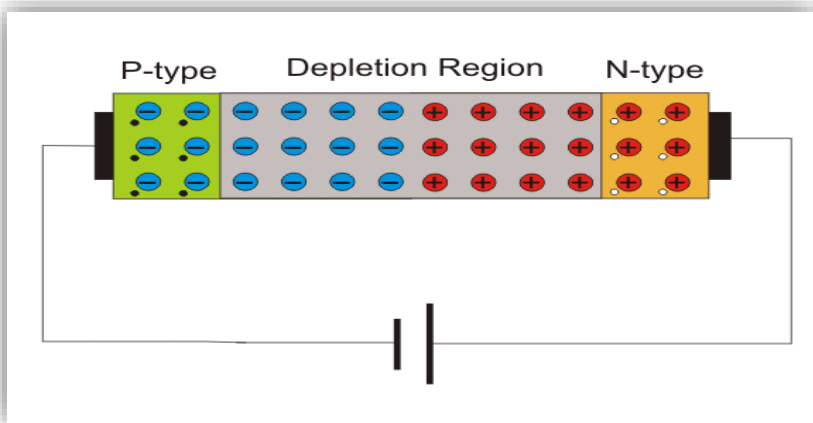
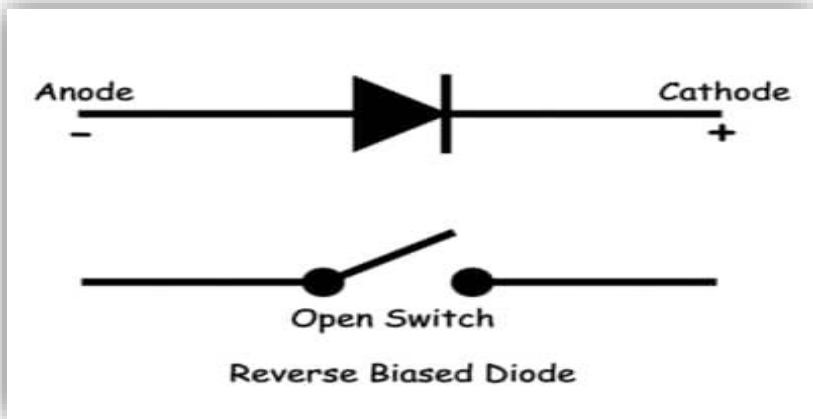
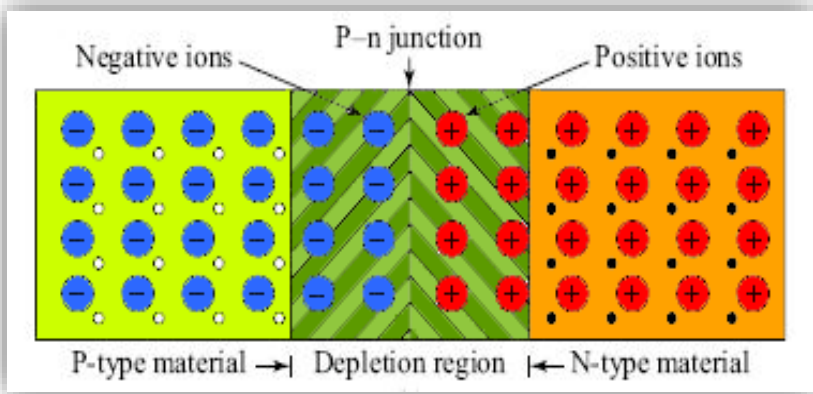
Figure 1 I-V Characteristics of an Ideal Diode



Infinite Resistance, $R = \alpha$

- Fully *inhibit the flow of current* through it under reverse biased condition
- Expected to *mimic the behavior of a perfect insulator*





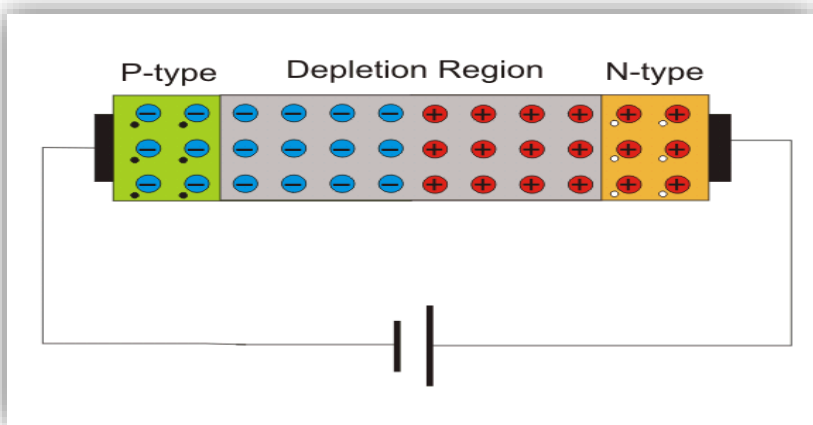
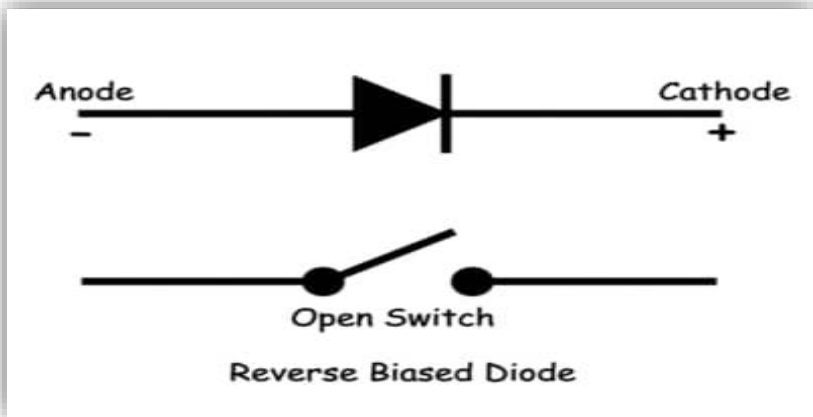
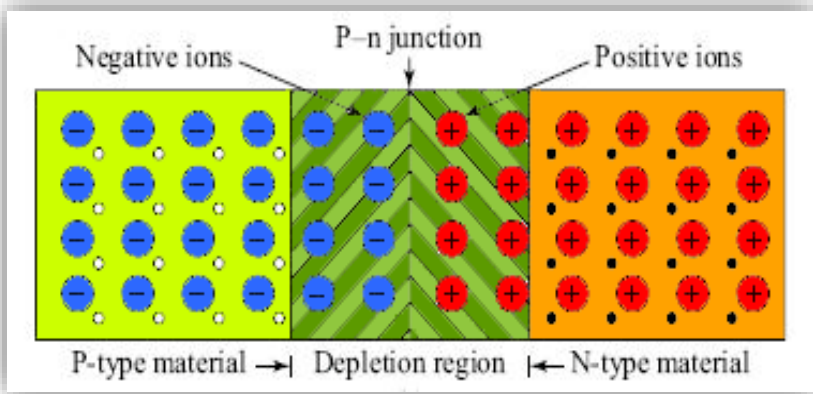
Zero Reverse Leakage Current

- *Implied from* its previous property which states that the ideal diodes possess *infinite resistance*
- Can be understood by considering the Ohm's law again which now takes the form

$$I = \frac{v}{\alpha} = 0$$

- **No current** flowing through the ideal diode *when* it is *reverse biased*, *no matter how* high the *reverse voltage applied* be.





No Reverse Breakdown Voltage

- The voltage at which the reverse biased diode fails and starts to conduct heavy current

- Last two properties :
offer infinite resistance
inhibits the current flow



Reverse Bias Summary

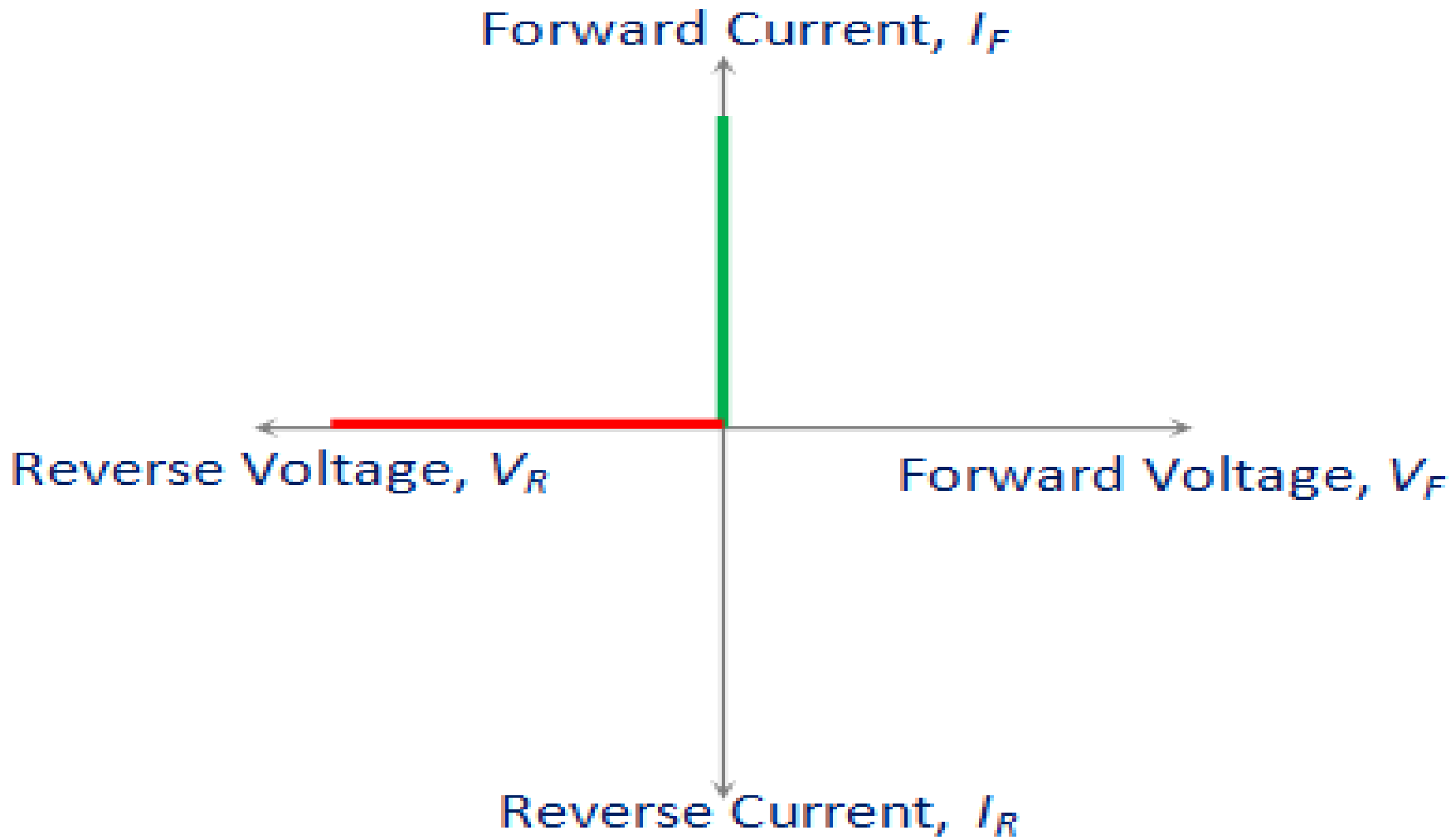
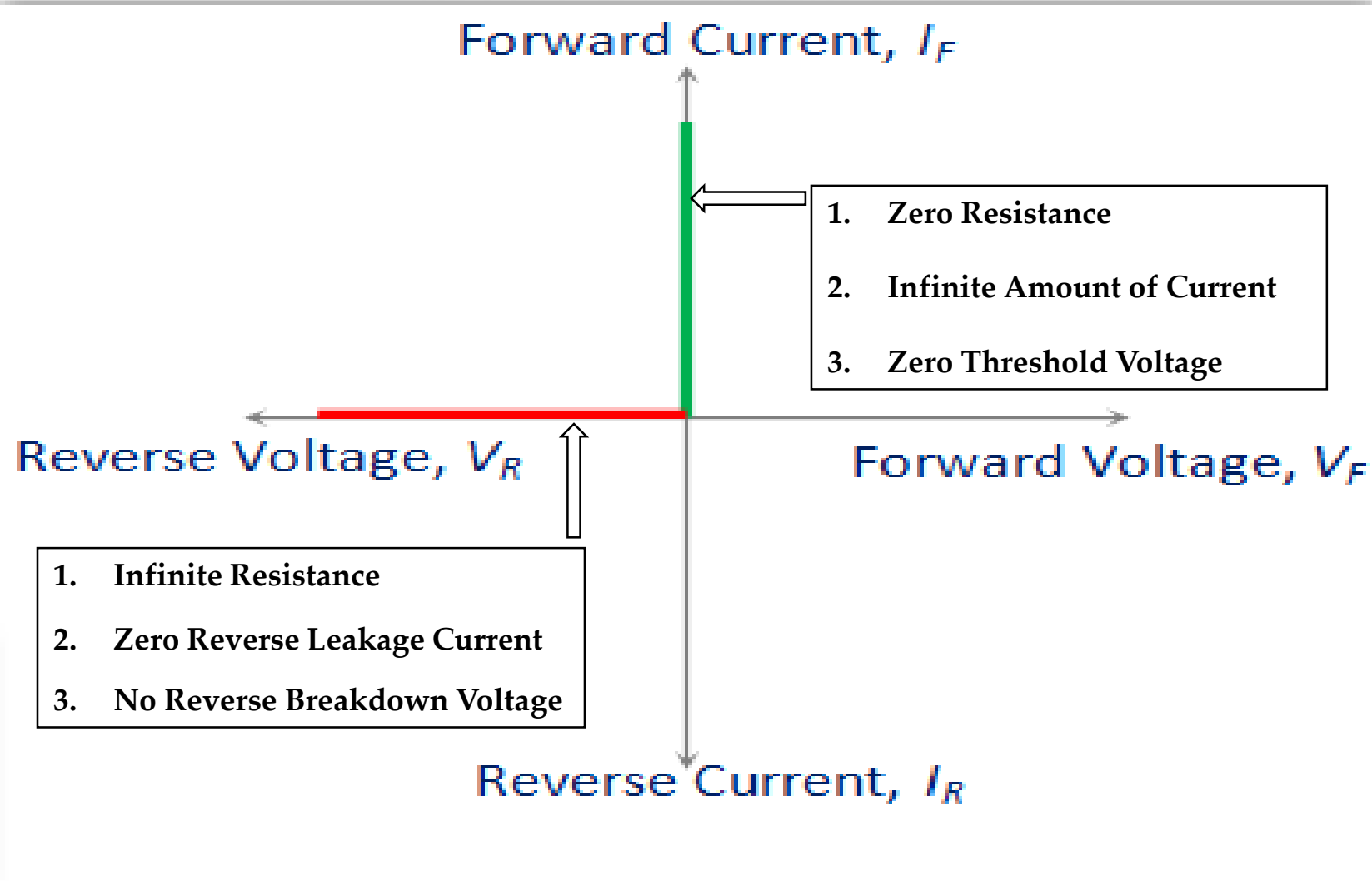


Figure 1 I-V Characteristics of an Ideal Diode

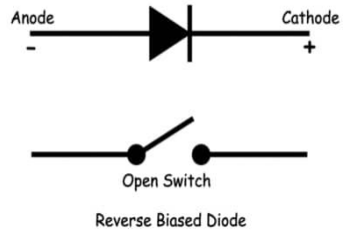
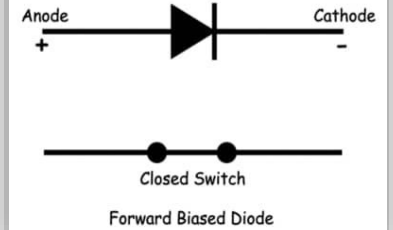


SUMMARY

Ideal Diode and Characteristics of Ideal Diode



Forward Bias



Reverse Bias

Figure 1 I-V Characteristics of an Ideal Diode





[To access notes for this session on Ideal diode and its characteristics](#)

