

## Tunneling barrier

The width of depletion region depends upon the concentration of the donor atoms. In a rectifying metal semiconductor contacts (junction), the width is the square root of the donor concentration.

Since, the width of the metal semiconductor depletion region decreases with increase in donor concentration, it enhances the probability of tunneling of charge carriers through barrier. The fig (b) shows the variation of potential barrier with donor concentration.

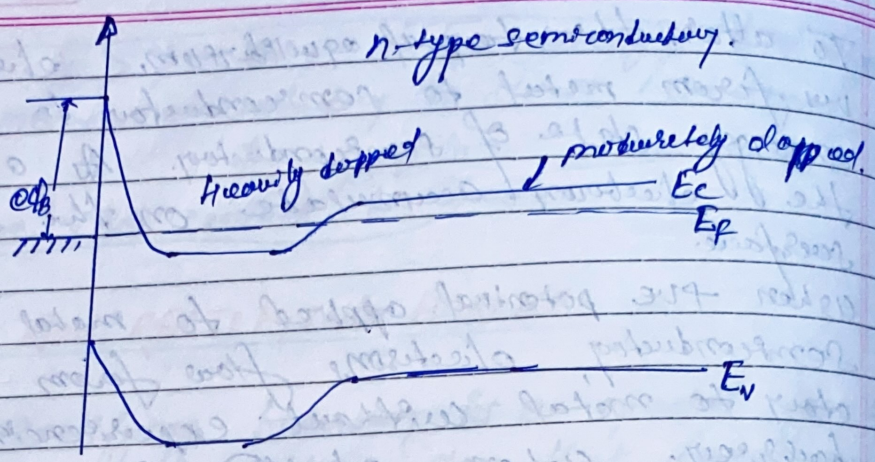


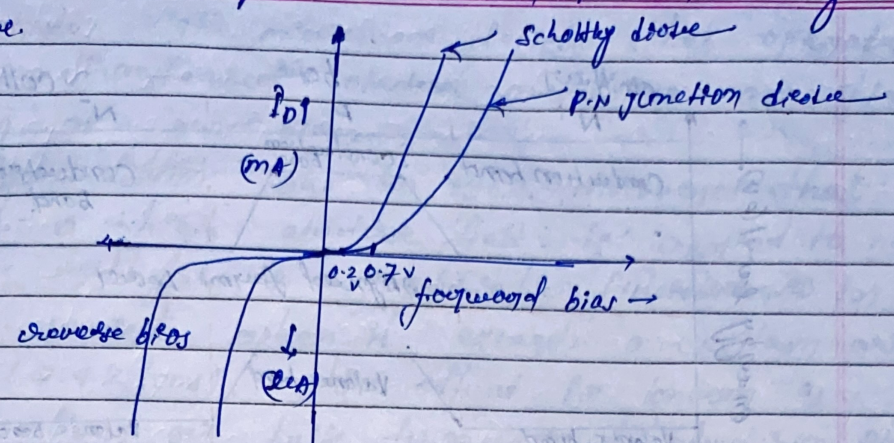
Fig: Energy band diagram of metal and heavily doped n-type semiconductor.

Comparison between Schottky diode and P-N junction diode.

Schottky diode.	P-N junction.
I, It has electron as majority charge carrier.	I, It has both electron and hole as majority charge carrier.
II, It is a unipolar device.	II, It is a bi-polar device.
III, Reverse recovery time and reverse recovery loss is very-very less.	III, The reverse recovery time and reverse recovery loss is high.
IV, It has very low forward voltage drop approx 0.2V.	IV, It has very high forward voltage drop approx 0.7V.
V, The junction is formed between n-type and semiconductor which has very small width.	V, The junction is formed between p-type and n-type semiconductor.

III) It is used at low power and high frequency application. | IV) It is used at higher power and low frequency application.

characteristics comparison between p-n and schottky diode.



characteristics comparison of schottky and p-n junction

### Applications

- I) Schottky diodes are used for voltage clamping application and prevention of transistor saturation.
- II) Schottky diodes used in logic circuits.
- III) It is used to detect signals in radar systems.
- IV) Used in power supply. (SMPS)
- V) It is used as a switch at higher frequency exceeding 300MHz.