5.5 POWER TRANSISTOR

The symbol of the Power BJT is same as signal level transistor.

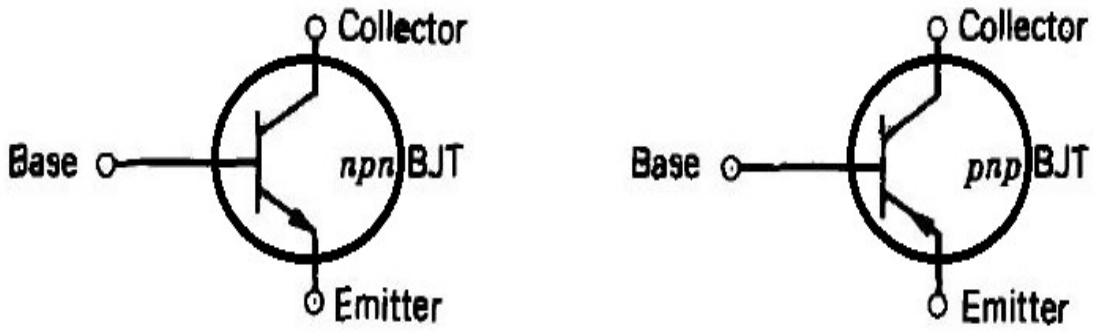

Fig:5.5.1 Symbol of Power Transistor NPN and PNP

Power BJT Structure:

The construction of the Power Transistor is different from the signal transistor as shown in the following figure.

The n- layer is added in the power BJT which is known as drift region.

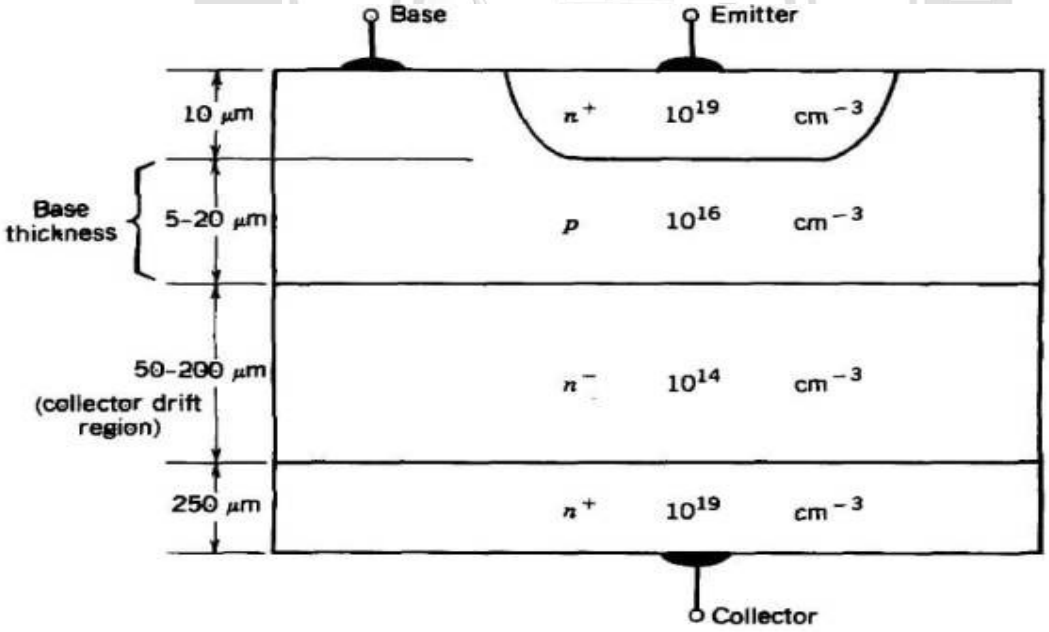

Fig:5.5.2 Construction of Power Transistor

- A Power BJT has a four layer structure of alternating P and N type doping as shown in above NPN transistor.
- It has three terminals labeled as Collector, Base, Emitter.
- In most of Power Electronic applications, the Power Transistor works in Common Emitter configuration.

- ie, Base is the input terminal, the Collector is the output terminal and the Emitter is common between input and output.
- In power switches NPN transistors are most widely used than PNP transistors.
- The characteristics of the device is determined by the doping level in each of the layers and the thickness of the layers.
- The thickness of the dirft region determines the breakdown voltage of the Power transistor.

Power BJT - VI Characteristics:

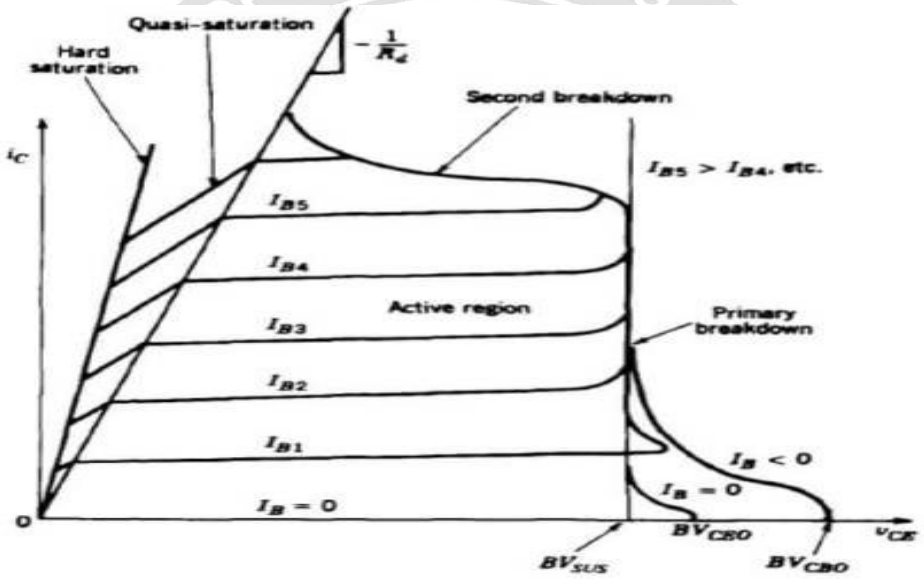

Fig:5.5.3 Characteristics of Power Transistor

- The VI characteristics of the Power BJT is different from signal level transistor.
- The major differences are Quasi saturation region & secondary breakdown region.
- The Quasi saturation region is available only in Power transistor characteristic not in signal transistors.
- It is because of the lightly doped collector drift region present in Power BJT.
- The primary breakdown is similar to the signal transistor's avalanche breakdown.
- Operation of device at primary and secondary breakdown regions should be avoided as it will lead to the catastrophic failure of the device.