

BIPOLAR TRANSISTORS

Before transistor, the amplification was achieved by using vacuum tubes as an amplifier. Now-a-days vacuum tubes are replaced by transistors because of following: advantages of transistors.

1. Low operating voltage
 2. Higher efficiency
 3. Small size and ruggedness and
 4. Does not require any filament power
- A Bipolar Junction Transistor is a three terminal semiconductor device in which the operation depends on the interaction of both majority and minority carriers and hence the name bipolar.
 - The BJT is analogous to vacuum triode and is comparatively smaller in size. It is used in amplifiers and oscillator circuits and as a switch in digital circuits.
 - It has wide applications in computer, satellites and other modern communication systems.
 - There are two basic types of transistors unipolar junction transistor and bipolar junction transistor.
 - In Unipolar transistor the current conduction is only due to one type carriers, majority carriers.

- The current conduction in bipolar transistor is because of both the types of charge carriers, holes and electrons. Hence this is called bipolar junction transistor, hereafter referred to as BJT.

The BJTs are of two basic types

1.n-p-n type

2.p-n-p type

JUNCTION TRANSISTOR

The BJT consists of a Silicon or Germanium crystals in which a thin layer of N type silicon is sandwiched between two layers of P type silicon.

This transistor is referred to as PNP. Alternatively, in a NPN transistor, a layer of P type material is sandwiched between two layers of N type material.



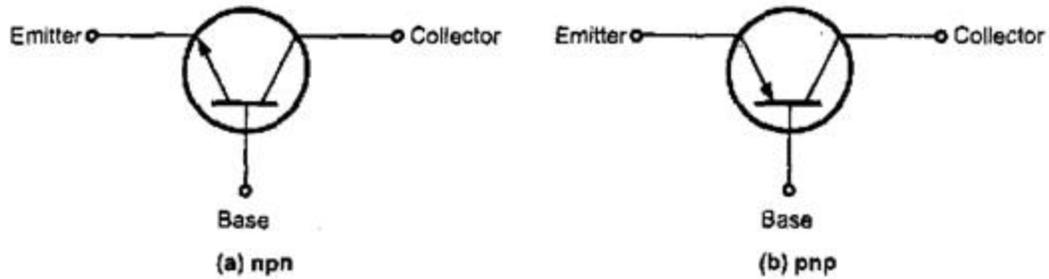
Figure: Structure of NPN and PNP Transistor

Emitter is heavily doped so that it can inject a large number of charge carriers into the base.

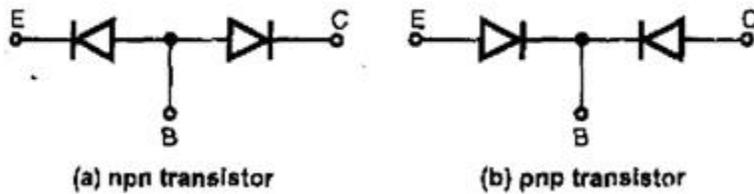
Base is lightly doped and very thin. It passes most of the injected charge carriers from the emitter to the collector.

Collector is moderately doped.

STANDARD TRANSISTOR SYMBOLS



TWO-DIODE TRANSISTOR ANALOGY



A transistor has two p-n junctions. One junction is between the emitter and the base, and is called the emitter base junction, or simply the emitter junction JE.

The other junction is between the base and the collector, and is called collector-base junction, or simply junction diodes connected back-to-back

Another important point is that, the emitter area in the transistor is considerably smaller than the collector area. This is because the collector region has to handle more power than the emitter and more surface area is required for heat dissipation.

Source : <http://mediatoget.blogspot.in/2011/09/bipolar-transistors.html>