

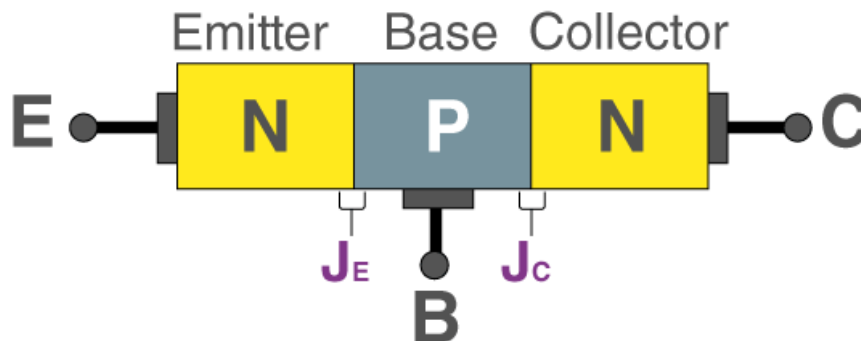
# BJT

## OVERVIEW

A bipolar junction transistor is a 3-pole semiconductor device consisting of two p-n junctions that amplify the signal input. It is a current controlled device. BJT 3 terminals are base, collector and emitter. The signal in an amplified form appears in the collector of a small-amplitude transistor applied to the base. This is a BJT mount. It requires external DC power to carry out the amplification process.

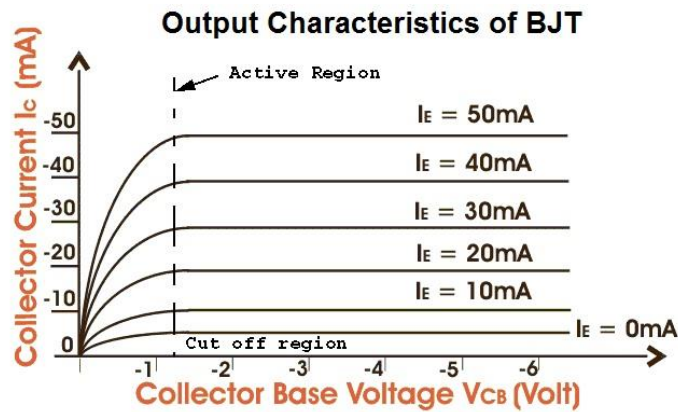
SYMBOL:

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CHARACTERISTICS CURVE OF BJT:



#### WORKING OF A BJT:

An NPN transistor is a biased active region. The base-emitter junction is forward-biased and the collector-base junction is reverse-biased. Thus, the width of the drain region of the base-emitter junction becomes small compared to the width of the collector-base junction. The forward junction reduces the barrier potential and helps current flow from the emitter to the base. Generally, the base of NPN transistors is thin and lightly doped, so it has fewer holes compared to electrons in the emitter. Recombination of holes in the base with electrons in the emitter region results in a flow of base current.

Then the remaining large number of electrons in the emitter pass through the reverse-biased collector junction in the form of collector current.

According to Kirchhoff's current law, or KCL, the emitter current is equal to the sum of the collector current and the base current. In general, the base current  $I_B$  remains small compared to the emitter current  $I_E$  and the collector current  $I_C$

$$I_E = I_C + I_B$$

The only significant difference between NPN and PNP transistors is their majority charge carriers. Most charge carriers in NPN transistors are

electrons and most charge carriers in PNP transistors are holes. For both NPN and PNP transistors, other operating principles and doping ratios remain the same

In a transistor, as the collector current increases, the temperature of the collector junction increases. Thus, the resistance given by the collector decreases. As a result, the collection flow increases. This phenomenon is called thermal flywheel in BJT transistors.

## TYPES OF BJT:

**There are two types of bipolar junction transistors:**

- PNP bipolar junction transistor.
- NPN bipolar junction transistor.

## APPLICATIONS:

THE APPLICATIONS OF BJT ARE:

- Switching
- Amplification
- Converters
- Automatic switch
- Temperature sensors
- Electronic switches
- Amplifiers
- High driving capability
- Detection circuits
- High-frequency operation
- Demodulator and modulator
- Digital switch
- Clippers
- Oscillation circuit