

# How Transistor works, symbol, types , structure, Applications

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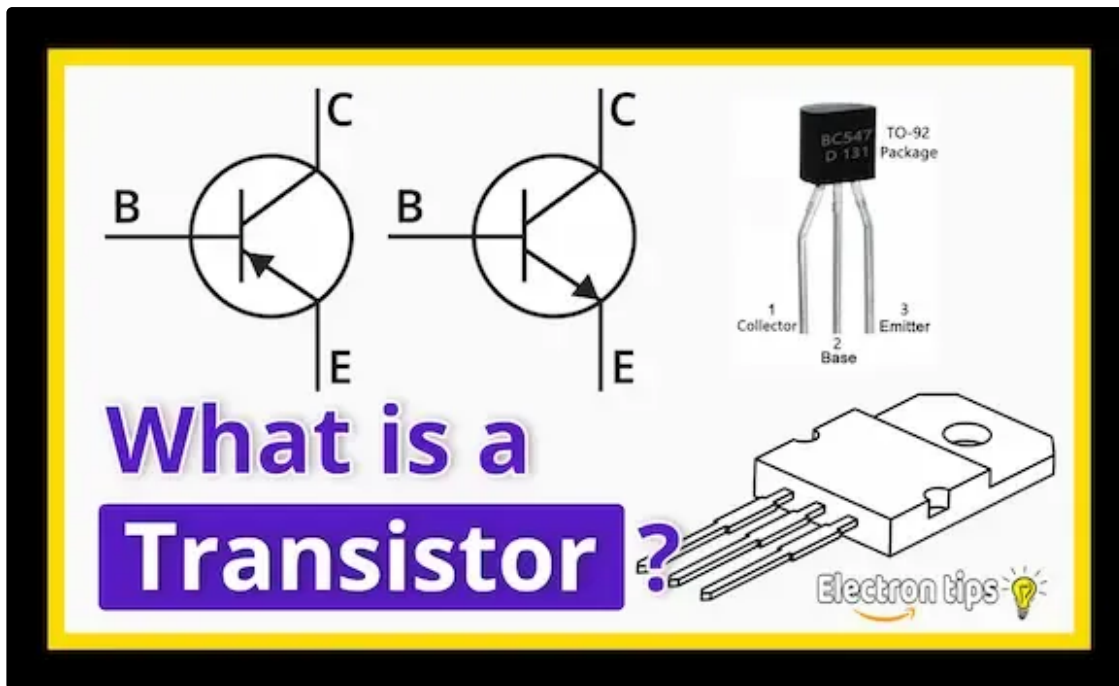
## How Transistor works, symbol, types , structure, Applications

The invention of the transistor in the last century was a great revolution in the field of electronics and it is considered one of the most important inventions that contributed greatly to the development of electronics and technical devices in general.

Without the presence of a transistor it would not enable humans to manufacture computers and mobile devices and specifically processors because the processors consist mainly of a huge

number of very accurate transistors, as hardly any device is currently devoid of the transistor either in one way or another, so What are the basic components of the transistor ? Transistor symbol ? Transistor terminals? and the transistor types ?

## Transistor definition:



Transistor is an electronic element that belongs to the semiconductors and allows us to control the other electronic components through the so-called base, as it consists of three terminals:

Base .

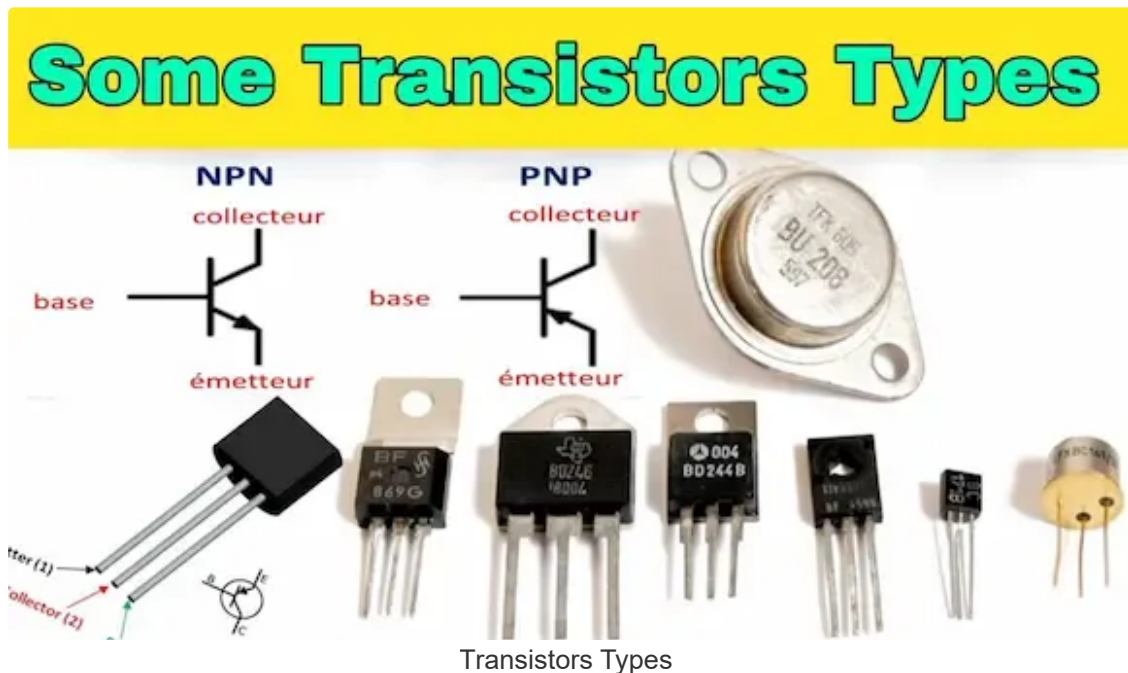
Emitter .

Collector.

It is mostly made of silicone or germanium, and it is often used in signal enlargement circuits ( amplifier ..) and many other electronic circuits.

## The components of the transistor :

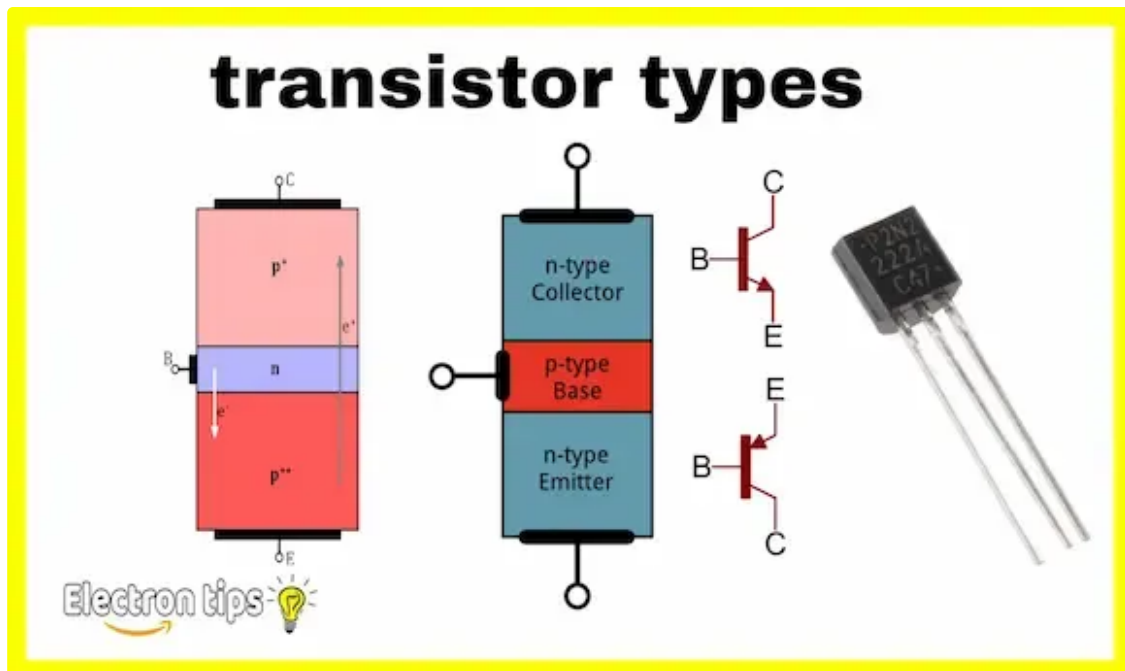
The transistor consists of three main terminals, the base, the collector and the emitter, and allows us to control the electric current through another electrical current, meaning we pass a very little electric current in the base to allow the electrical current to pass or the operation of any electrical device through the complex and The impulse, in other words, the base controls the amount of electric current in "Emitter" and "collector", where the work of the transistor is very similar to the principle of the work of the water tampon, and these are pictures of some common transistors :



Transistors Types

## Transistor Types:

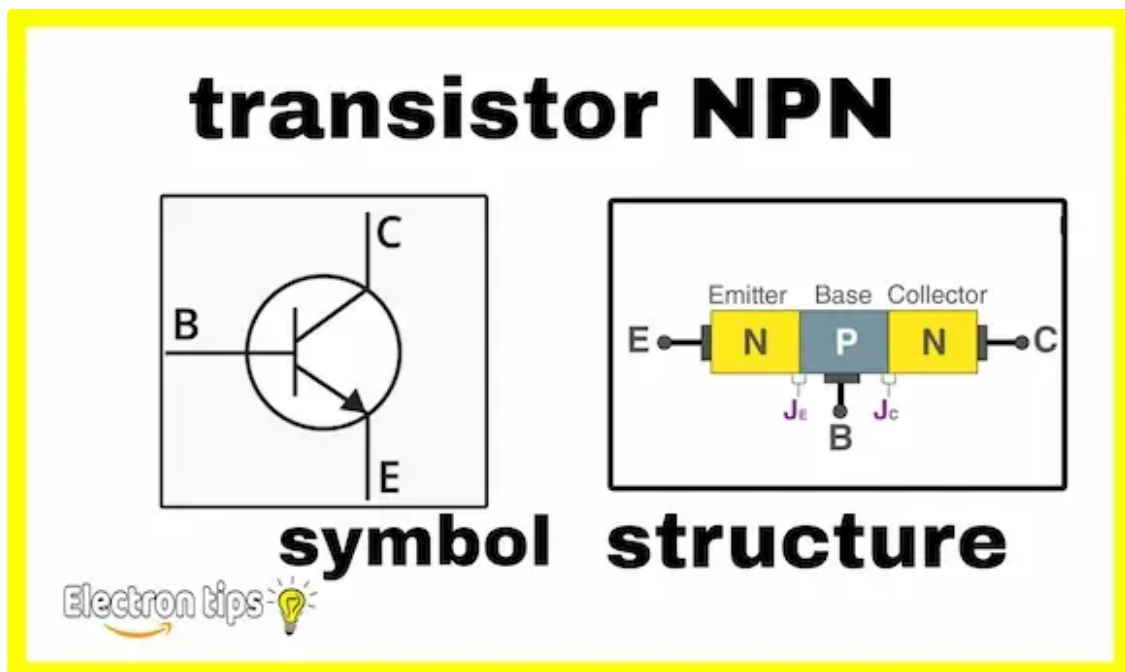
There are two main types of transistors, which are BJT and FET, and each type is divided into two other types, which are respectively MOSFET, J-FET, and NPN, PNP, but in this topic we will focus on the BJT type, which contains two types, NPN and PNP, and this type is exactly similar to the work of The diode element is also composed of a semi-conducting material, and this material is often silicon, Now we will explain the difference between the two types of NPN and PNP transistors:



Types of transistors

## NPN transistor :

This type of transistor is often made of silicon, but in this case it is inlaid with phosphorus, and since phosphorus is an electron-donating material that carries a negative charge, we call this type a type, N, and N means negative.



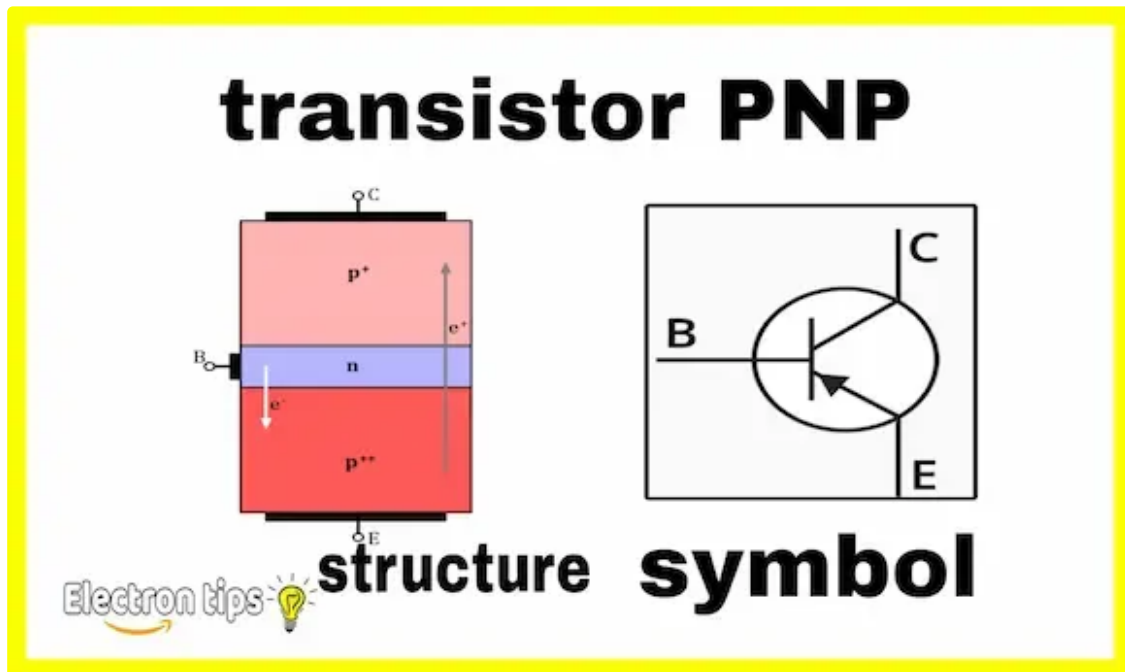
Npn transistor symbol

Whereas when the silicon material is grafted with a material that takes electrons, such as an aluminum atom, Al, for example, in this case the material will contain holes or holes, and we call

this type Type P, meaning positive. To obtain an NPN transistor, we combine two types of Type N and a type of P. With this we get an NPN transistor, see the image below:

## PNP transistor:

After explaining in detail how to make a transistor element in the previous paragraph and its basic components, to obtain a PNP transistor, we combine two types of Type P and one type of Type N.



PNP transistor symbol

## How does a transistor work:

The transistor works to pass electric current from the collector to the radiator or emitter, but it must meet a condition, which is that it must be energized with a weak current on its base, and the larger the current entering its base,  $i_b$ , the more it allows a high current to pass between the two terminals of the collector,  $i_c$ , and the emitter,  $i_e$  this is a working principle the transistor is very similar to the operation of a water tap.

## The importance of the transistor element :

The importance of the transistor is evident in the operation, management and control of many electronic circuits. It can be used in the form of an ON-OFF switch, but its function remains in amplifying electrical signals, such as audio amplifiers and many different projects that can be created with this wonderful electronic element.

## Some uses of transistors :

The transistor can perform many roles in the field of electronics and technology in general.

These are some of the uses of the transistor:

Using transistors to make amplifiers and speakers.

Manufacture of microprocessors consisting of millions of transistors.

The transistor is widely used in the field of making electronic and technical devices such as smart phones, laptops, and many electrical devices.

The transistor is widely used in electronic control circuits because it allows the circuits to be controlled through an electric current in its base.