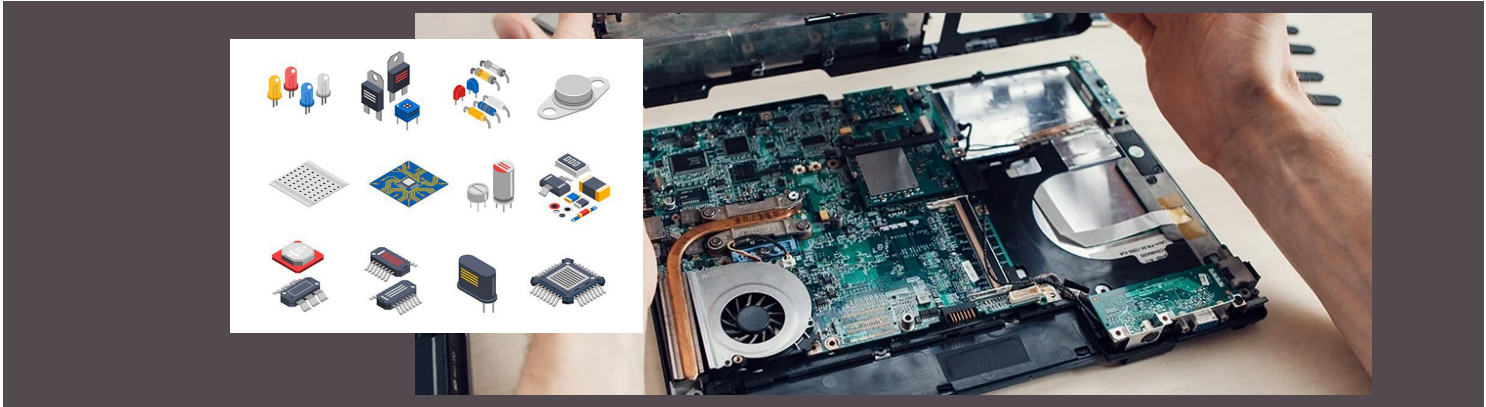


How Electronic Components Work



Electronic gadgets have become an integral part of our lives. They have made our lives more comfortable and convenient. From aviation to medical and healthcare industries, electronic gadgets have a wide range of applications in the modern world. In fact, the electronics revolution and the computer revolution go hand in hand.

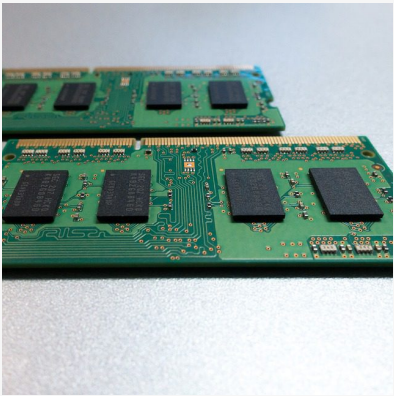
Most gadgets have tiny electronic circuits that can control machines and process information. Simply put, electronic circuits are the lifelines of various electrical appliances. This guide explains in detail about common electronic components used in electronic circuits and how they work.

Firstly, I will provide an overview on electronic circuits. Then I will provide more information on 3 different types of components. For each type , how it works, and the function & significance of the component.

1-capacitor

2-Resistor

3-Transistor

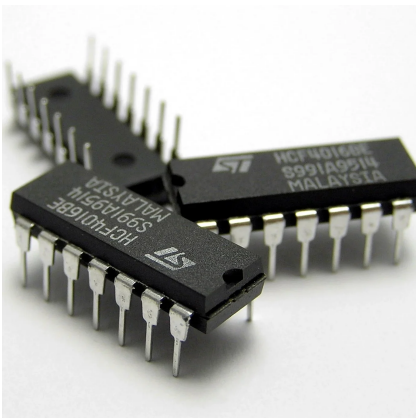


Printed Circuit Boards (PCBs)

Most electronic appliances require complex electronic circuits. That's why designers have to arrange tiny electronic components on a circuit board. It comprises a plastic board with connecting copper tracks on one side and lots of holes to affix the components. When the layout of a circuit board is printed chemically onto a plastic board, it is called a printed circuit board or PCB.

Integrated Circuits (ICs)

Though PCBs can offer a lot of advantages, most modern instruments such as computers and mobiles require complex circuits, having thousands and even millions of components. That's where integrated circuits come in. They are the tiny electronic circuits that can fit inside a small silicon chip. Jack Kilby invented the first **integrated Circuit** in 1958 at Texas Instruments. The sole purpose of ICs is to increase the efficiency of the electronic devices, while reducing their size and manufacturing cost. Over the years, integrated circuits have become increasingly sophisticated as technology continues to evolve. That's why personal computers, laptops, mobiles phones, and other consumer electronics are getting cheaper and better by the day.



COMPONENT 1: CAPACITOR

Capacitors are widely used to build different types of electronic circuits. A **capacitor** is a passive two-terminal electrical component that can store energy in an electric field electrostatically. In simple terms, it works as a small rechargeable battery that stores electricity. However, unlike a battery, it can charge and discharge in the split of a second.

HOW DOES IT WORK?

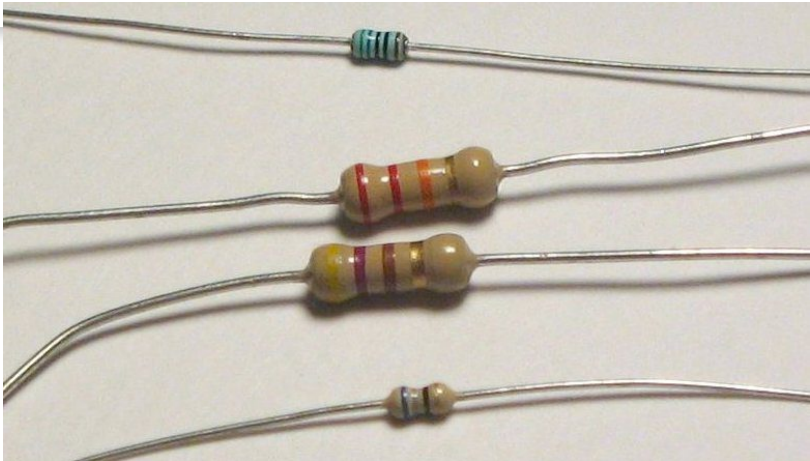
When you apply a voltage over the two plates or connect them to a source, an electric field develops across the insulator, causing one plate to accumulate positive charge while negative charge gets collected on the other. The capacitor continues to hold its charge even if you disconnect it from the source. The moment you connect it to a load, the stored energy will flow from the capacitor to the load.

Capacitance is the amount of energy stored in a capacitor. The higher the capacitance, the more energy it can store. You can increase the capacitance by moving the plates closer to each other or increasing their

FUNCTION AND SIGNIFICANCE

Though capacitors look like batteries, they can perform different types of functions in a circuit such as blocking direct current while allowing alternating current to pass or smooth the output from a power supply. They are also used in electric power transmission systems to stabilize voltage and power flow. One of the most significant functions of a capacitor in the AC systems is power factor correction, without which you can't provide sufficient amount of starting torque to single phase motors.

size. Alternatively, you can also enhance the insulation qualities to increase the capacitance.



**COMPONENT 2:
RESISTOR**

A resistor is a passive two-terminal electrical device that resists the flow of current. It is probably the simplest element in an electronic circuit. It is also one of the most common components as resistance is an inherent element of nearly all electronic circuits. They are usually color-coded.

HOW DOES IT WORK?

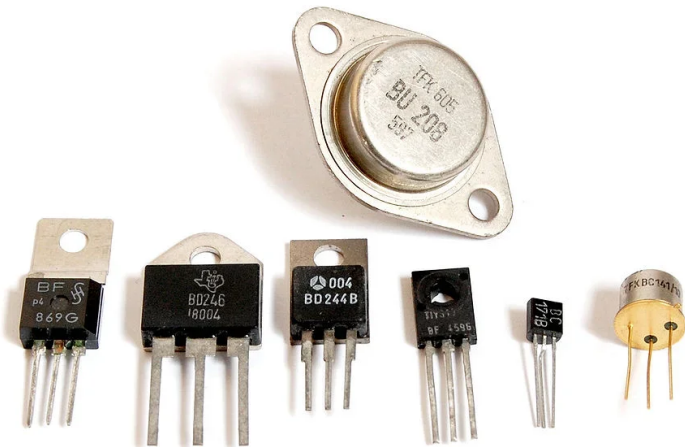
A resistor may not look like much. One may think it doesn't do anything except consume power. However, it performs a vital function: controlling the voltage and the current in your circuit. In other words, resistors give you control over the design of your circuit.

When electric current starts flowing through a wire, all the electrons start moving in the same direction. It's just like water flowing through a pipe. Less amount of water will flow through a thin pipe because there is less room for its movement.

Similarly, when the current passes through a thin wire in a resistor, it becomes progressively harder for the electrons to wiggle through it. In short, the number of electrons flowing through a resistor goes down as the length and thinness of the wire increases.

**FUNCTION AND
SIGNIFICANCE**

Resistors have plenty of applications, but the three most common ones are managing current flow, dividing voltage, and resistor-capacitor networks.



COMPONENT 3:
TRANSISTOR

One of the most crucial components of an electronic circuit, **transistors** have revolutionized the field of electronics. These tiny semiconductor devices with three terminals have been around for more than five decades now. They are often used as amplifiers and switching devices. You can think of them as relays without any moving parts because they can turn something ' on ' or ' off ' without any movement

HOW DOES IT WORK?

When you sandwich a p-type silicon slab between two n-type bars, you get an NPN transistor. The emitter is attached to one n-type, while the collector is attached to the other. The base is attached to the p-type. The surplus holes in the p-type silicon act as barriers, blocking the flow of the current. However, if you apply a positive voltage to the base and the collector and negatively charge the emitter, electrons start flowing from the emitter to the collector.

The arrangement and number of p-type and n-type blocks remain inverted in a PNP transistor. In this type of transistor, one n-type is sandwiched between two p-type blocks. As voltage allocation is different, a PNP transistor works differently. An NPN transistor requires a positive voltage to the base, while a PNP requires a negative voltage. In short, the current must flow away from the base to turn a PNP transistor on.

FUNCTION AND
SIGNIFICANCE

Transistors function as both, switches and amplifiers in most electronic circuits. Designers often use a transistor as a switch because unlike a simple switch, it can turn a small current into a much larger one. Though you can use a simple switch in an ordinary circuit, an advanced circuit may need varying amounts of currents at different stages.