

# DIODE - BASICS

## Definition

A **diode** is a two-terminal electronic component that conducts electric current in only one direction.

## Basics

A **diode** is an electronic component with two electrodes which a signal can flow between (but thermionic diodes can have one or two more electrodes).

The most common function of a diode is to allow an electric current to flow in one direction and to block it in the opposite direction.

Today, the most common diodes are made from semiconductor materials such as silicon or germanium.

There are many kinds of diode. For example, Schottky Diode, LED(Light Emitting Diode), Photo Diode, Laser Diode, Varactor Diode, Current Regulator Diode, PIN Diode, Tunnel Diode, Step Recovery Diode, IMPATT Diode, etc.

## **Types of Diodes:**

- Silicon diode.
- Germanium diode
- Zener diode
- Photo diode
- Light emitting diode (LED)
- Tunnel diode

## **Diode Construction**

The first types of diodes were called Fleming valves. They worked inside a glass tube (much like a light bulb). Inside the glass bulb there was a small metal wire and a large metal plate. The small metal wire would heat up and emit electricity, which was captured by the plate. However, the large metal plate would not heat up enough to emit electricity because it was too big. So, electricity could go in one direction through the tube but not in the reverse direction. Fleming valves are mostly obsolete now, because they have been replaced by semiconductor diodes.

Semiconducting diodes are usually made of two types of semiconducting metals connected to each other.

One type of metal has atoms connected together with a few electrons to spare. The other metal has atoms connected together and needs a few electrons to be complete. Because one metal has too many electrons and the other metal has too few, the electricity will flow easily from the metal with too many electrons into the metal with too few. However, electricity will not flow easily in the reverse direction -- from the metal with too few electrons to the metal with too many. Silicon with arsenic dissolved in it makes a good metal with electrons to spare, while silicon with aluminum dissolved in it makes a good metal with too few electrons to be complete. There are actually many types of combinations of metals that will make p-type and n-type semiconductors.

## **Diode Operation**

### **Positive voltage at p-side**

If you give positive voltage to the p-side and negative voltage to the n-side, the electrons from the n-side want to go to the positive voltage at the p-side and the holes of the p-side want to go to the negative voltage at the n-side. In fact of this, current flow is able to exist. This is called breakdown. The breakdown voltage of a silicon Diode is at about 0.7V. A germanium Diode needs a breakdown voltage at about 0.3V.

## **Negative voltage at p-side**

If you give negative voltage to the p-side and positive voltage to the n-side, the electrons of the n-side go to the negative voltage at the n-side. The holes of the p-side do to the positive voltage at the p-side. So there won't be a current flow between p- and n-side. If you give too much voltage to the Diode in negative direction, the Diode will be destroyed.

When the temperature increases, the voltage, when the breakdown happens, will go down.

Source: <http://www.juliantrubin.com/encyclopedia/electronics/diode.html>