# HISTORY OF DIODE

In electronics, a **diode** is a two-terminal electronic component that conducts electric current in only one direction. The term usually refers to a semiconductor diode, the most common type today, which is a crystal of semiconductor connected to two electrical terminals, a P-N junction. A vacuum tube diode, now little used, is a vacuum tube with two electrodes; a plate and a cathode.

The most common function of a diode is to allow an electric current in one direction (called the diode's forward direction) while blocking current in the opposite direction (the reverse direction). Thus, the diode can be thought of as an electronic version of a check valve. This unidirectional behavior is called rectification, and is used to convert alternating current to direct current, and extract modulation from radio signals in radio receivers.

However, diodes can have more complicated behavior than this simple on-off action, due to their complex non-linear electrical characteristics, which can be tailored by varying the construction of their P-N junction. These are exploited in special purpose diodes that perform many different functions.

Diodes are used to regulate voltage (Zener diodes), electronically tune radio and TV receivers (varactor diodes), generate radio frequency oscillations (tunnel diodes), and produce light (light emitting diodes).

Diodes were the first semiconductor electronic devices. The discovery of crystals' rectifying abilities was made by German physicist Ferdinand Braun in 1874. The first semiconductor diodes, called cat's whisker diodes were made of crystals of minerals such as galena. Today most diodes are made of silicon, but other semiconductors such as germanium are sometimes used.

**History**

Although the crystal semiconductor diode was popular before the thermionic diode (also known as vacuum tubes, tubes, or valves), thermionic and solid state diodes were developed in parallel.

The basic principle of operation of thermionic diodes was discovered by Frederick Guthrie in 1873. Guthrie discovered that a positively-charged electroscope could be discharged by bringing a grounded piece of white-hot metal close to it (but not actually touching it). The same did not apply to a negatively charged electroscope, indicating that the current flow was only possible in one direction.

The principle was independently rediscovered by Thomas Edison on February 13, 1880. At the time Edison was carrying out research into why the filaments of his carbon-filament light bulbs nearly always burned out at the positive-connected end. He had a special bulb made with a metal plate sealed into the glass envelope, and he was able to confirm that an invisible current could be drawn from the glowing filament through the vacuum to the metal plate, but only when the plate was connected to the positive supply.

Edison devised a circuit where his modified light bulb more or less replaced the resistor in a DC voltmeter and on this basis was awarded a patent for it in 1883. There was no apparent practical use for such device at the time, and the patent application was most likely simply a precaution in case someone else did find a use for the so-called “Edison Effect”.

About 20 years later, John Ambrose Fleming (scientific adviser to the Marconi Company and former Edison employee) realized that the Edison effect could be used as a precision radio detector. Fleming patented the first true thermionic diode in Britain on November 16, 1904 (followed by U.S. Patent 803,684 in November 1905).

The principle of operation of crystal diodes was discovered in 1874 by the German scientist Karl Ferdinand Braun. Braun patented the crystal rectifier in 1899. Braun's discovery was further developed by Jagdish Chandra Bose into a useful device for radio detection.

The first actual radio receiver using a crystal diode was built by Greenleaf Whittier Pickard. Pickard received a patent for a silicon crystal detector on November 20, 1906.

Other experimenters tried a variety of minerals and other substances, although by far the most popular was the lead sulfide mineral Galena. Although other substances offered slightly better performance, galena had the advantage of being cheap and easy to obtain, and was used almost exclusively in home-built "crystal sets", until the advent of inexpensive fixed-germanium diodes in the 1950s.

At the time of their invention, such devices were known as rectifiers. In 1919, William Henry Eccles coined the term diode from the Greek roots dia, meaning "through", and ode, meaning "path".

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