

TYPES OF DIODE



Types of Diodes

There Are Following Major Types Of Diodes.

1. Zener Diode
2. Varactor Diode
3. Light-emitting Diode
4. Photodiode
5. Laser Diode
6. Schottky Diode
7. PIN Diode
8. Tunnel Diode
9. Small Signal Diode
10. Large Signal Diode
11. Shockley Diode

LED

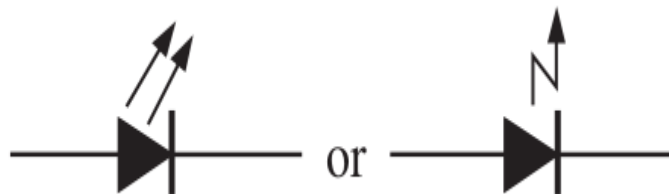
Light Emitting Diode



Light-Emitting Diode (LED)

1. An LED emits light when forward- biased.
2. LEDs are available for either infrared or visible light.
3. High-intensity LEDs are used in large- screendisplays ,traffic lights, automotive lighting, and home lighting etc.

Symbol:

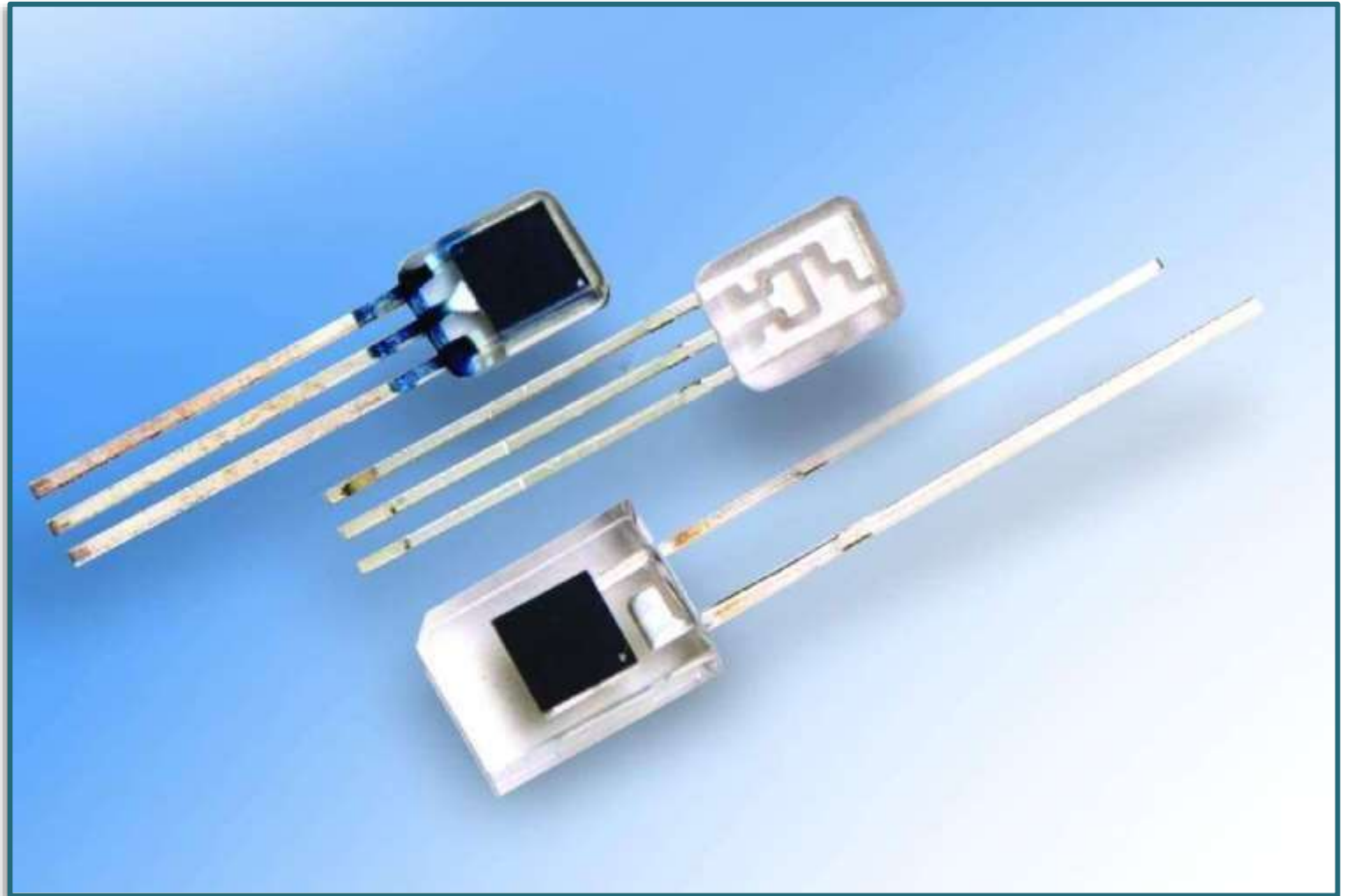




Explanation:

1. When the device is forward-biased, electrons cross the pn junction from the n-type material and recombine with holes in the p-type material.
2. The difference in energy between the electrons and the holes corresponds to the energy of visible light.
3. When recombination takes place, the recombining electrons release energy in the form of photons
4. The light output (both intensity and color) is also dependent on temperature. Light intensity goes down with higher temperature

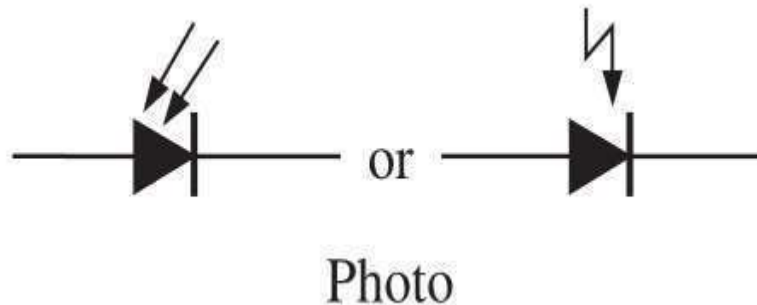
The photo Diode



The Photo Diode:

1. The photodiode is a device that operates in reverse bias.
2. The photodiode exhibits an increase in reverse current with light intensity.
3. A diode in which the reverse current varies directly with the amount of light.

Symbol



Explanation:

1. The photodiode has a small transparent window that allows light to strike the pn junction.
2. when its pn junction is exposed to light, the reverse current increases with the light intensity. When there is no incident light the reverse current, is almost negligible and is called the dark current.
3. Some typical photodiodes are shown in Figure

Photo diode



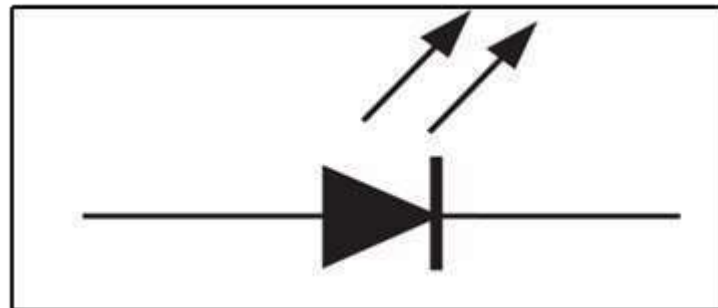


The laser diode

The Laser Diode:

1. The term Laser stands for Light Amplification by Stimulated Emission of Radiation.
2. Laser light is Monochromatic, which means that it consists of a single color and not a mixture of colors.
3. Laser light is also called Coherent light, which means a single wavelength

Symbol:





Applications:

1. Laser diodes are used in the pick-up system of compact disk (CD) players.
2. Laser diodes are also used in laser printers.
3. Laser diodes are also used in fiber - optic systems.
4. Laser diodes are used for the treatment of cancer.



Small Signal Diode

1. It is a small device with disproportional characteristics and whose applications are mainly involved at high frequency and very low currents devices such as radios and televisions etc.
2. The appearance of signal diode is very small when compared with the power diode. To indicate the cathode terminal one edge is marked with black or red in color.
3. For the applications at high frequencies the performance of the small signal diode is very effective.

- With respect to the functional frequencies of the signal diode the carrying capacity of the current and power are very low which are maximum nearly at 150mA and 500mW.

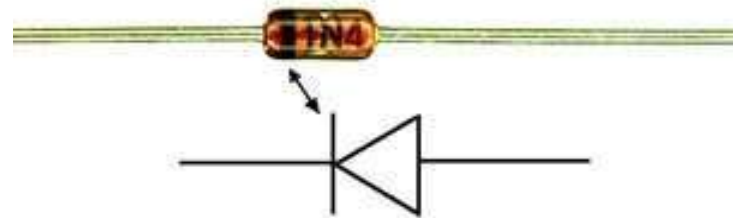




Large Signal Diode

1. These diodes have large PN junction layer. Thus the transformation of AC to DC voltages is unbounded.
2. This also increases the current forward capacity and reverse blocking voltage.
3. These large signals will disrupt the functional point also. Due to this it is not suitable for high frequency applications.

- The main applications of these diodes are in battery charging devices like inverters.
- In these diodes the range of forward resistance is in Ohms and the reverse blocking resistance is in mega Ohms.
- Since it has high current and voltage performance these can be used in electrical devices which are used to suppress high peak voltages.



The Zener diode



The Zener Diode:

1. A diode designed for limiting the voltage across its terminals in reverse bias.
2. A zener diode maintains a nearly constant voltage across its terminals over a specified range of zener currents.
3. The zener diode reverse breakdown.

Symbol:

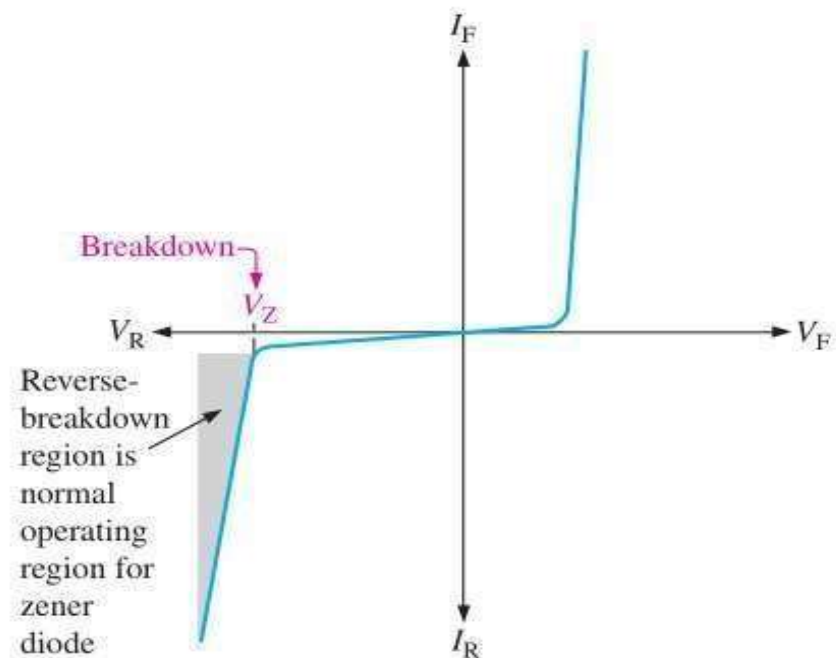


Explanation:

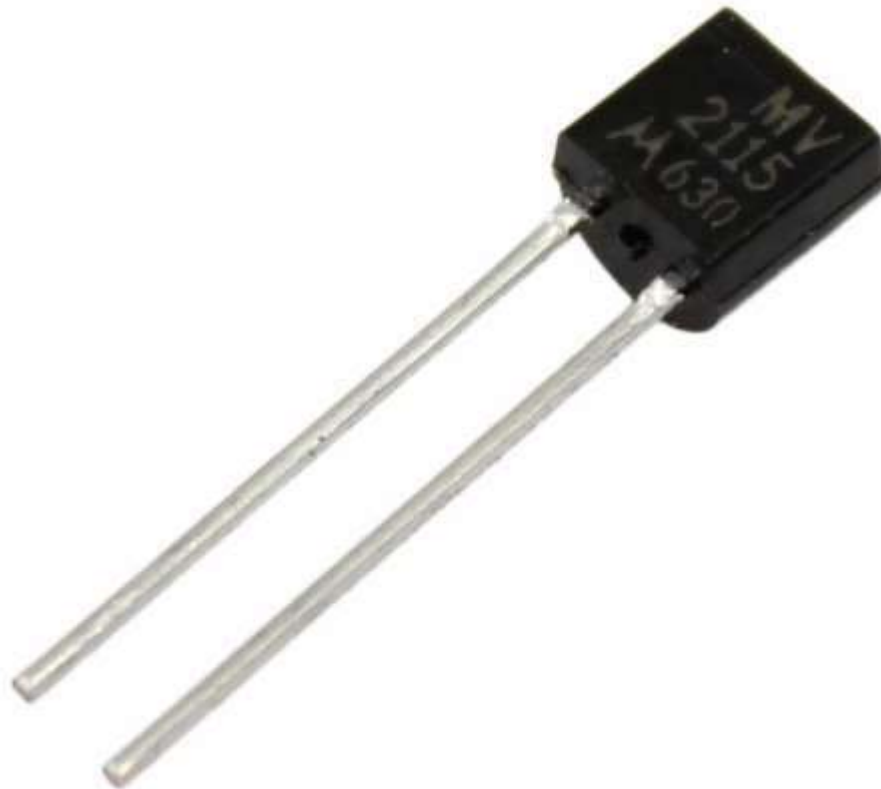
- A Zener diode is a silicon pn junction device that is designed for operation in the reverse-breakdown region.
- The breakdown voltage of a zener diode is set by carefully controlling the doping level during manufacture. when a diode reaches reverse breakdown, its voltage remains almost constant even though the current changes drastically, and this is the key to zener diode operation.

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- This volt-ampere characteristic is shown again in Figure with the normal operating region for zener diodes shown as a shaded area.



The Varactor Diode



The Varactor Diode:

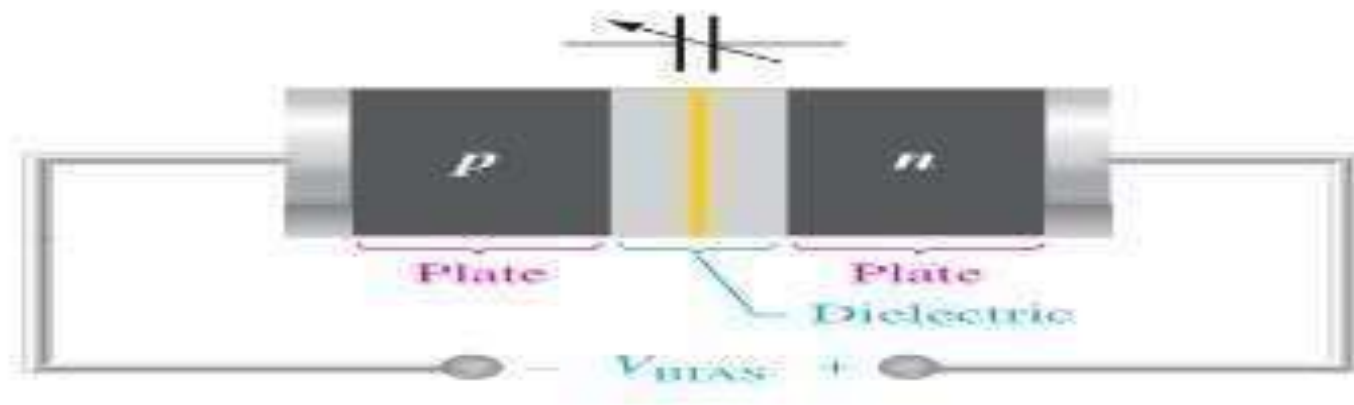
1. A variable capacitance diode.
2. The capacitance of a varactor ~~varies~~ varies inversely with reverse-bias voltage
3. The current regulator diode keeps its forward current at a constant specified value.

Symbol:



Explanation:

A varactor is a diode that always operates in reverse bias and is doped to maximize the inherent capacitance of the depletion region. The depletion region acts as a capacitor dielectric because of its nonconductive characteristic. The p and n regions are conductive and act as the capacitor



The schottky diode



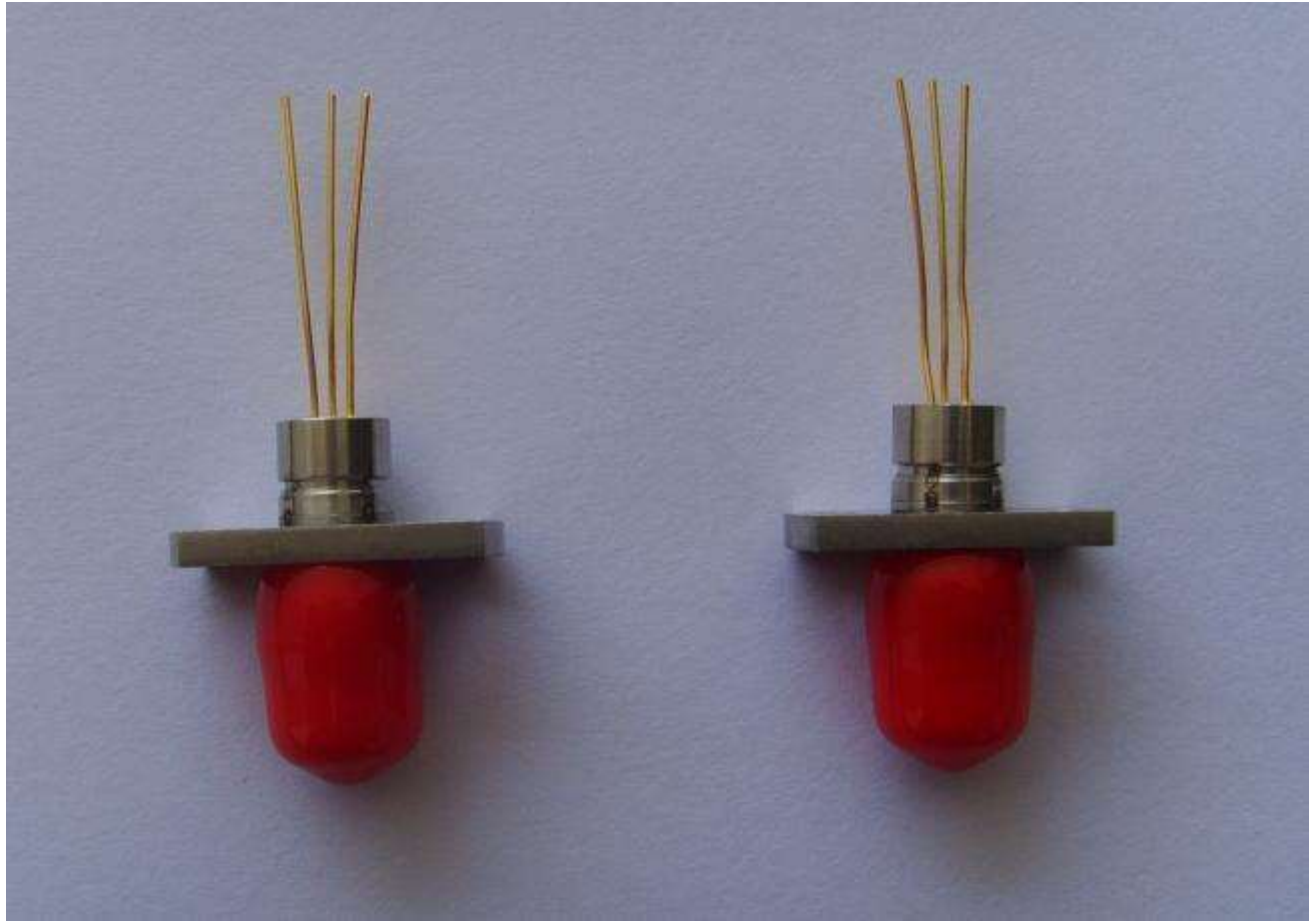
The Schottky Diode

1. Schottky diodes are high-current ~~diodes~~ used primarily in high-frequency and fast-switching applications.
2. They are also known as hot-carrier diodes
3. A Schottky diode is formed by joining a doped semiconductor region (usually n- type) with a metal such as gold, silver, or platinum.

Symbol:

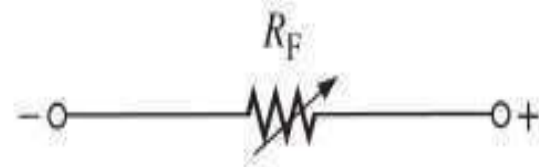
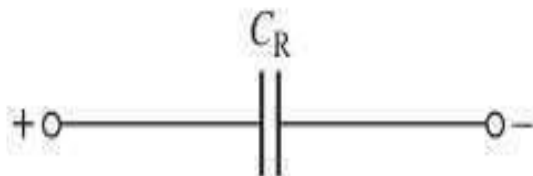


The PIN Diode

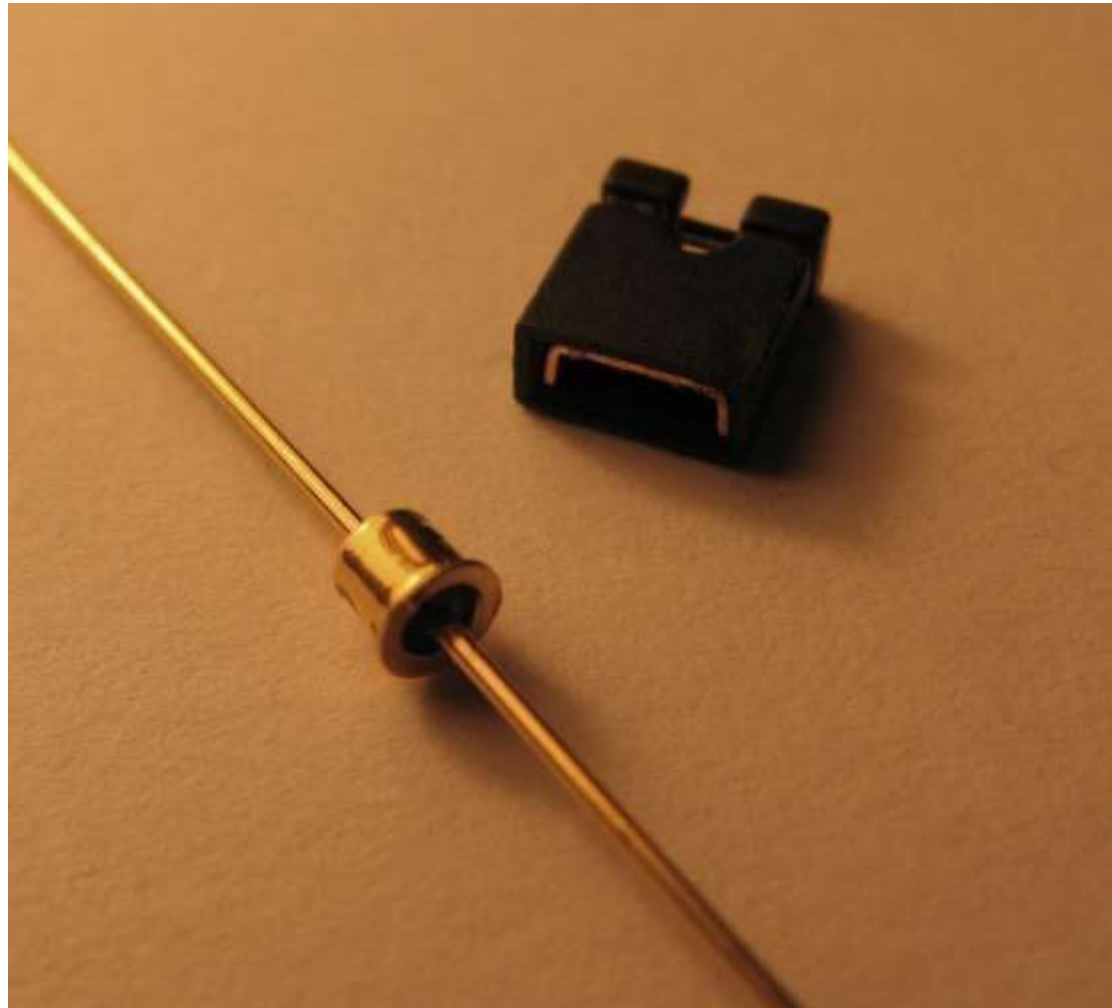


The PIN Diode:

1. The pin diode consists of heavily doped p and n regions separated by an intrinsic region.
2. When reverse-biased, the pin diode acts like a nearly constant capacitance.
3. When forward-biased, it acts like a current-controlled variable resistance.
4. The low forward resistance of the intrinsic region decreases with increasing current.

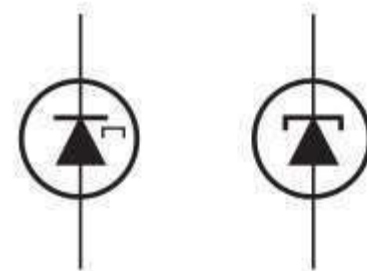


The Tunnel Diode

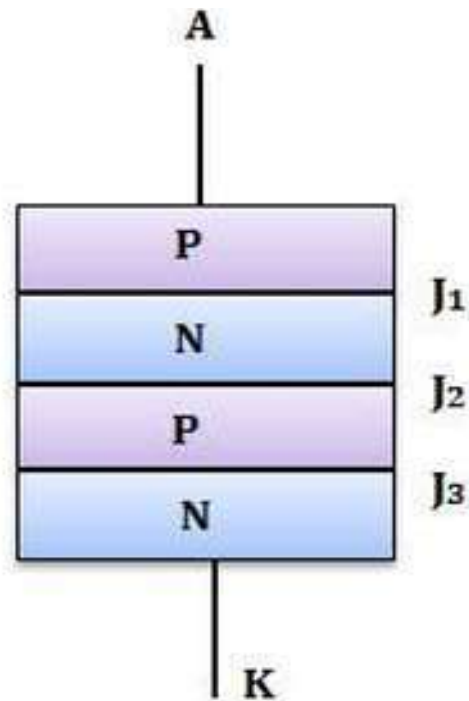


The Tunnel Diode:

1. The tunnel diode exhibits a special characteristic known as negative resistance.
2. This feature makes it useful in oscillator and microwave amplifier applications.
3. Tunnel diodes are constructed with germanium or gallium arsenide by doping the p and n regions much more heavily than in a conventional rectifier diode. This heavy doping results in an extremely narrow depletion region.



Shockley Diode



Explanation

1. It has four layers. It is also called as PNPN diode. It is equal to a thyristor without a gate terminal which means the gate terminal is disconnected. As there is no trigger inputs the only way the diode can conduct is by providing forward voltage.
2. It stays on once it turned "ON" and stays off once it turned "OFF". The diode has two operating states conducting and non-conducting. In non-conducting state the diode conducts with less voltage.

