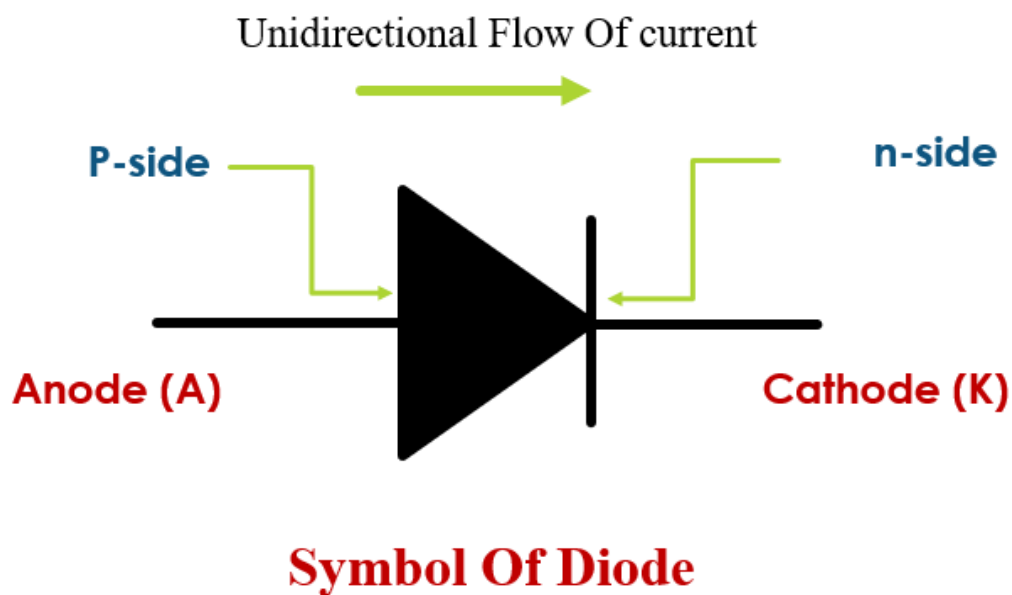


DIODE

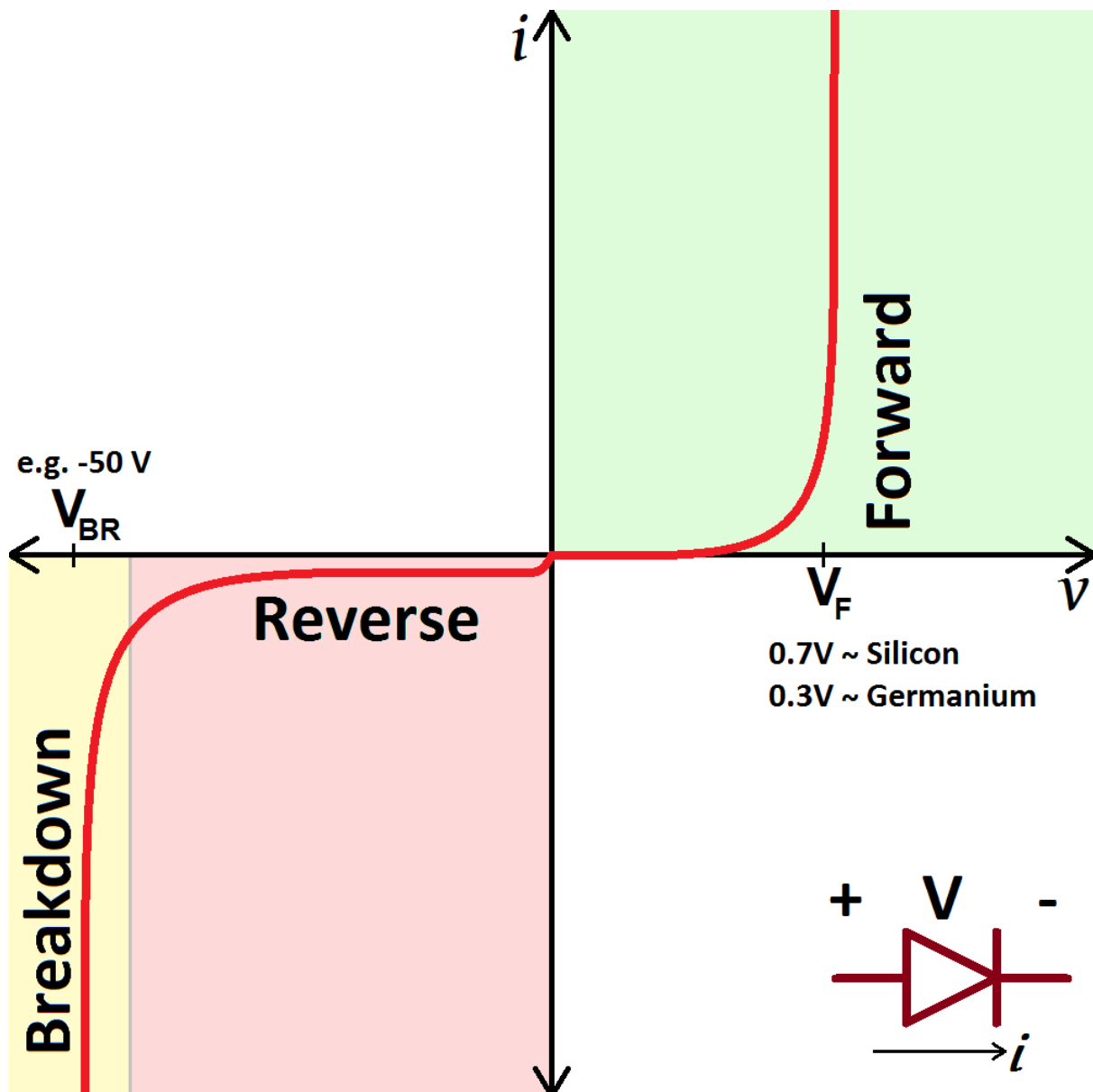
OVERVIEW

SUPERVISION A diode is a **bipolar** electrical component that **acts** as a one-way **switch for current**. It is **called** a diode because it has two electrodes as its terminal. Because they convert alternating current (**AC**) into pulsating direct **current**, diodes are also **called** rectifiers. Type, **voltage** and **amperage** are used to rate diodes. Anode (positive **e-wire**) and cathode (negative **wire**) **provide polarity to the diode**. **Most** diodes only **allow** current to flow when a **positive voltage** is applied to the **anode**.

SYMBOL



CHARACTERISTICS GRAPH OF A DIODE



WORKING:

In the N-type region, the majority charge carriers **are electrons** and the minority charge **carriers are holes**. In the **p-type** region, the **majority of charge carriers are holes** and the negative charge **carriers are electrons**. **Most of the** charge carriers **separate** and recombine with the opposite charge as a result of the concentration difference. A positive or negative ion is **formed**. The junction is where these ions are **collected**. The **clearance area** is another name for **that** area. A diode is **considered inverted** when the cathode of the diode is connected to the positive terminal of **the** battery and the anode is connected to the negative terminal. A diode is said to be forward **biased** when the anode terminal is connected to **the** positive

terminal of the battery and the cathode is connected to the negative terminal of the battery. **Diode operation in reverse voltage mode** A reverse voltage is used when switching the diode. Under these conditions, free electrons diffuse into the P-type regions and recombine with holes. It produces unfavorable ions. Just as electrons diffuse into the N-type region, so do holes. Positive ions are produced. The stationary ions form a depletion region when a voltage is applied to the circuit as shown in the previous figure. The outlet is wide. Therefore, neither hole nor electron can cross the junction. Even if it is supplied with the required voltage, it cannot generate a flow of electrons or holes. Since current cannot flow through the diode, it acts as an open switch. In this case, a small amount of electricity passes through the circuit. Reverse leakage current or reverse saturation current are two names for this current. The minority reservation holders are to blame for this current trend. The diode cannot be driven with that current because it is too small. Minority charge carriers collide with atoms when the voltage is increased to the reverse breakdown voltage due to their high kinetic energy. In this situation, the number of broken covalent bonds and the significant number of electron-hole pairs produce a significant amount of current. This high current level can damage the diode. As a result, the diode is not reverse connected under normal conditions. **Diode operation in bias mode** If the anode is connected to the positive terminal of the battery and the cathode is connected to the negative terminal of the battery, the anode is positive with respect to the cathode. And the diode is said to be forward biased. Now we gradually increase the voltage supply. If we add a small voltage, the majority charge carrier does not have enough energy to dissipate in the depletion region. Under forward bias conditions, the width of the depletion region is very small. If we increase the voltage more than the previous cutoff voltage, the majority charge carrier gains enough energy to flow across the depletion region. Silicon has a cut-off voltage of 0.7 V and germanium has a cut-off voltage of 0.3 V. If the supply voltage rises above this voltage, most of the charge carriers have flowed through the circuit and caused the diode to conduct.

TYPES:

Light emitting diodes

Laser diodes

Avalanche diode

Zener diode

Schottkey diode

Photodiode

PN junction diode

APPS:

Diodes help **perform** digital logic. Millions of diodes are used **in the same way as** logic gates and **are** used in modern processors.

- They are used **to isolate** signals from **the power** supply. For example, one of the **most important** uses of diodes is to remove negative signals from **alternating** current. This is **called** signal demodulation. This function is **mainly** used in radios as a **filter** system to **separate the** radio signals from **the** carrier wave.
- They are also used **to create** power supplies and voltage doublers. Using a **full-wave** rectifier **helps provide** a more stable voltage. **Combining** a diode **and** a capacitor **helps to multiply a** small **alternating** voltage to **produce** a very high voltage.
- **Light** emitting diodes or LEDs are used in sensors and also in laser devices **in** many other **lighting** devices.
- Zener diodes are used as voltage regulators and varactors in electronic tuning and varistors are used **to suppress AC lines**.
- Diodes are the basis of **operational amplifiers** and transistors.