Semiconductor Devices - Diodes

Diodes are the simplest semiconductor device. They essentially form a one-way gate for current flow. In other words, current will flow in one direction but not in the other. The symbol for a silicon diode and its V-I characteristic curve is shown below.



Silicon diodes exhibit a turn-on voltage of approximately 0.7 volts. Before reaching the turnon voltage, no significant current flows.

A typical usage for this type of diode is in converting ac voltages to dc such as in a small appliance "wall wart". When the diodes are used in this way, they are referred to as rectifier diodes. They only pass the positive portion of the sine wave giving an output that is uni-polar put has considerable "ripple". The ripple is removed with capacitors to give a fairly constant DC voltage.



Zener diodes have a different characteristic in the reverse bias region. At a specific point in the off state the zener diode will begin to conduct current. This point is called the *zener voltage*.



The characteristic of the zener diode in the reverse bias region is useful to create a voltage reference voltage for power supplies. The point at which the reverse current rapidly increases is called the zener "knee".

