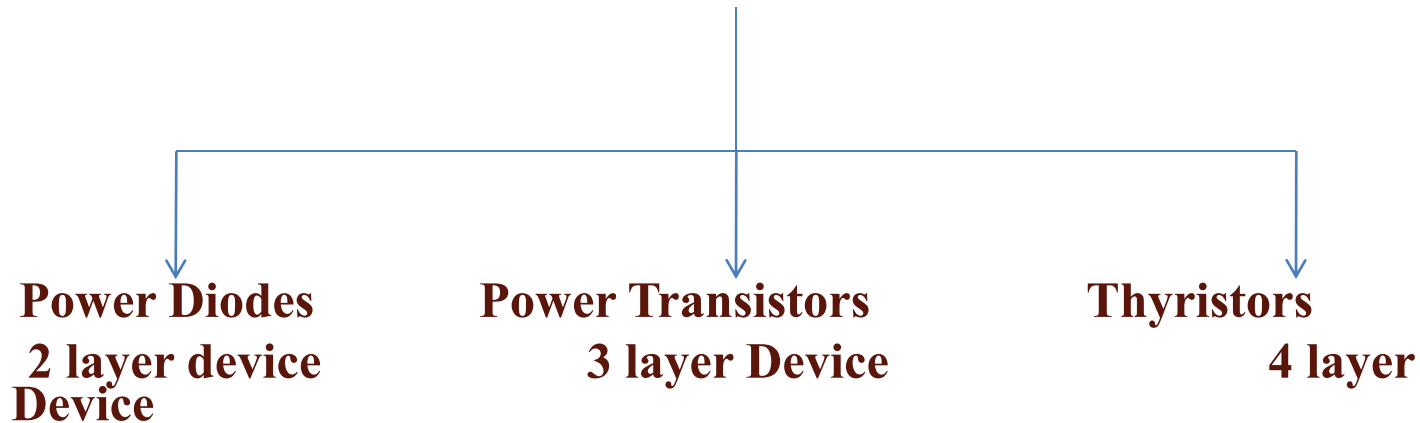


# Power Semiconductor Switches



- **Thyristor devices can convert and control large amounts of power in AC or DC systems while using very low power for control.**
- **Thyristor family includes**
  - 1- **Silicon controlled switch (SCR)**
  - 2- **Gate-turnoff thyristor (GTO)**
  - 3- **Triac**
  - 4- **Diac**
  - 5- **Silicon controlled switch (SCS)**
  - 6- **Mos-controlled switch (MCT)**

# Types of Power Electronic Circuits

The switching characteristics of power devices permit the control and conversion of electric power from one form to another. These converters are called static power converters and consist of a matrix of switches. Using a combination of these devices allows us to create circuit configurations that allow us to convert between a.c. and d.c. signals.

The resulting power electronic circuits are classified into six types:

- diode rectifiers
- ac-dc converters (controlled rectifiers)
- ac-ac converters (ac voltage controllers)
- dc-dc converters (dc choppers)
- dc-ac converters (inverters)
- static switches

- **Diode Rectifiers**

A diode rectifier circuit converts ac voltage into a fixed dc voltage. Since diodes have a much greater conductivity in one direction than the other, when connected in series with an alternating supply and load, they will produce a direct component of the current during one half cycle of the supply. This property is exploited in the main application of diodes - as rectifiers.

# AC-DC Converters

This is similar to the diode rectifier but with thyristors used in the place of diodes. Recall that thyristors need to be fired to turn on. If each thyristor is fired alternately the same effect would be obtained as with the diode rectifier. The average output voltage is controlled by varying the conduction time or firing delay angle  $\alpha$  of the thyristors. These converters are also called controlled rectifiers.

- **Dc-dc Converters**

A dc-dc converter is also known as a chopper or switching regulator. The average output voltage is obtained by controlling the conduction time  $t$  of transistor . If  $T$  is the chopping period, then  $t_1 = dT$ .  $d$  is called the duty cycle of the chopper.

- **Dc-ac Converters**

A dc-ac converter is also known as an inverter. It converts DC power supply into AC power supply in a single step at desired frequency. Scr, Power Mosfet or IGBT can be used as switch.

- **Static Switches**

Power devices can be used to operate as static switches or contactors, When the supply to these switches is an ac supply, they are called ac static switches and when the supply is dc, they are called dc static switches.