Silicon Controlled Rectifier (SCR)

Lecture – 4

TDC PART – I
Paper - II (Group - B)
Chapter - 5

by:

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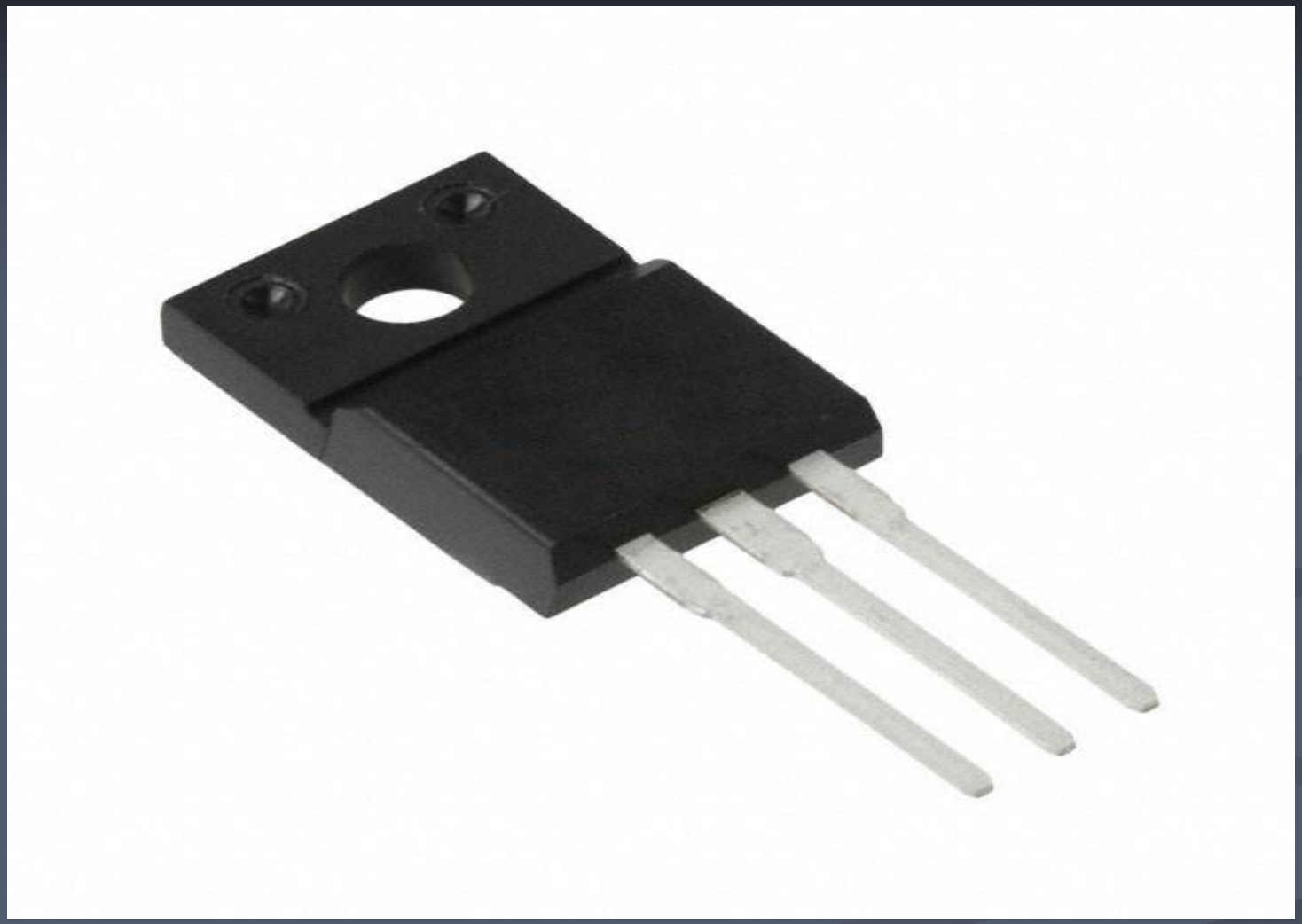
SCR (Thyristor) Classification Based on Packaging

- Based on the packages/shapes available in the market, SCR (thyristors) are classified as :-

- **(1)** Discrete Plastic Type
- **(2)** Plastic Module Type
- **(3)** Stud Mounts type
- **(4)** Press Pack Type.
- **(5)** Capsule (or Disc) Type

(1) Discrete Plastic Type

- The discrete Plastic type package is a commonly known type of SCRs that has three pins attached to a plastic-covered semiconductor material. These SCRs are of planar type construction and they are the cheapest type of SCR when compared to other packages. They are available up to 25A and 1000V applications, they can be easily mounted on any type of circuit with a large number of other components. Discrete Plastic type SCR (thyristor) shown in **Fig (17)** below.



- **Fig (17)** Shown Discrete Plastic Type SCR (thyristor).

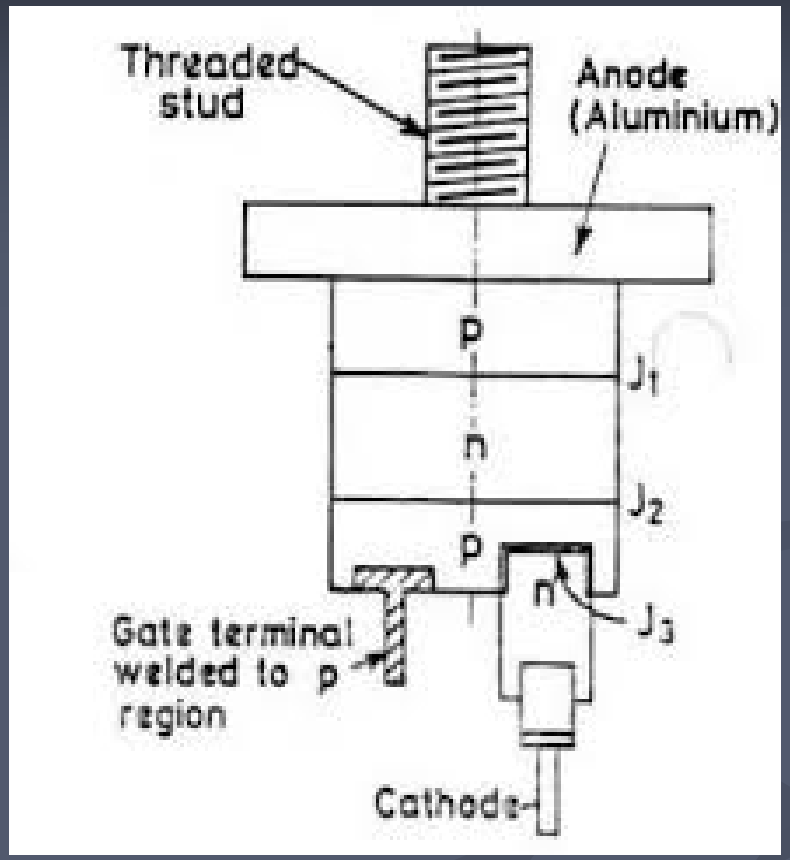
(2) Plastic Module Type

- The Plastic module shares the similar features of the Discrete Plastic type package, it also contains more than one device same package. Here the silicon wafers are placed on an electrically isolated metallic base plate and then covered using a plastic enclosure as shown in **Fig (18).** The heat transfer will be taken place through the metallic base plate which will be mounted on a heat sink. Using these modules will give a circuit a better finishing because they can be mounted to the boards with bolting the heatsink to the circuit board. They are available in the current range up to 100A. Plastic Module type SCR (thyristor) shown in **Fig (18)** below.

- **Fig (18)** Shown Plastic Module Type SCR (thyristor).

(3) Stud Mounts Type

- Here the anode will be of threaded bolt used to mount on a heat sink and the cathode is of thick metal cable, shown in **Fig. (19),** used to connect thyristor to the remaining circuit. The stud base device will be having a screwed base; it shares the dual advantage of low thermal resistance and ease of mounting. Here heat transfer takes place primarily through the threaded bolt side of the thyristor. The only disadvantage it posses is that it cannot be easily isolated from the heat sink. They are available between the current range of 5 to 150 A and a full range of voltage. Stud mounts type SCR (thyristor) shown in **Fig (19)** below.



- **Fig (19)** Shown Physical Appearance and its Internal Structure of Stud Type SCR (thyristor)

(4) Press Pack Type

- This package is also known by different names such as hockey puck, flat pack, disc and capsule shown in **Fig. (20).** The SCR structure and the electrodes are packed within a ceramic envelop that provides the required isolation between the anode and cathode. Both the surface is clamped to the heat sink; hence they offer better electrical contact resistance and minimum thermal resistance. Here both anode and cathode have a flat circular metallic plate, called pole faces, allowing the passage of current and provides double side cooling by mounting heat sink on both sides. Hence these type of thyristor gives excellent cooling and can handle higher power. The press pack SCRs are used for high current applications of 200A or above and applications with higher voltage exceeding 1200V. Availability of this package at higher voltage and current rating along with higher surge current capability suits its use in high pulse power applications. Press Pack type SCR (thyristor) shown in **Fig (20)** below.

- **Fig (20)** Shown Press Pack Type SCR (thyristor).

(5) Capsule (or Disc) Type

- Capsule types (or Disc type) SCR's (thyristors) are constructed with glass passivated chips and are assembled in high reliable, robust hermetic sealed housing structures. They are mechanically strong and are stable under negative environmental conditions.

- SCR (thyristors) in capsule type have high reliability and exceptional stability at high temperatures. They have superior surge capabilities. Capsule type (or Disc type) SCR's are used in applications such as industrial power supplies, induction heating, motor controls, UPS welding, battery chargers, soft starters, etc. The current range starts from 400A upto 1200A, with voltages upto 2200V. Capsule (or Disc) type SCR (thyristor) shown in **Fig (21)** below.

- **Fig (21)** Shown Capsule (or Disc) Type SCR (thyristor).

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