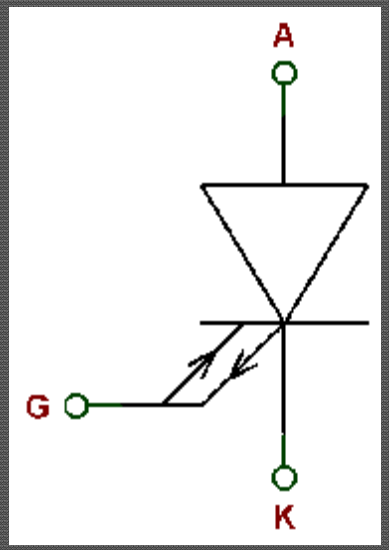
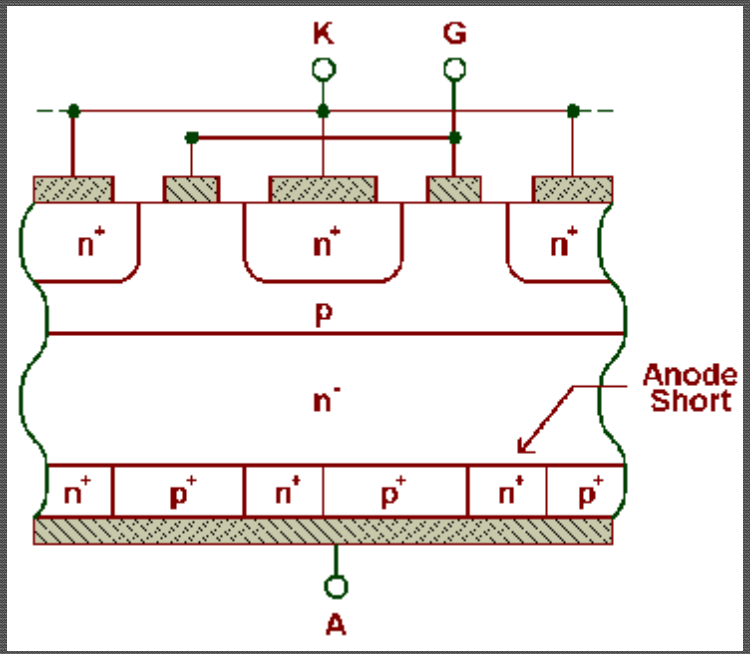
GTO

The Gate Turn Off Thyristor

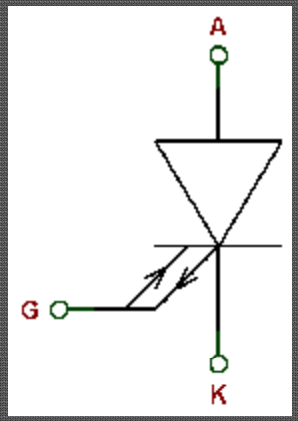
- GTO, is one of the new power semiconductor device.
- Introduced in the 1970's but was not established until the 1980's.
- Research and development has led to the present day range of devices, with peak turn-off current in the range of 300A to 4000A and rated forward blocking voltages of between 1300V and 6000V.

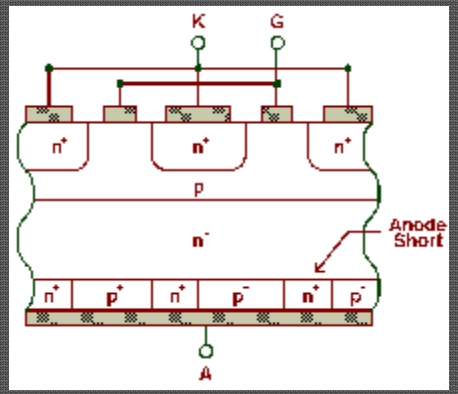




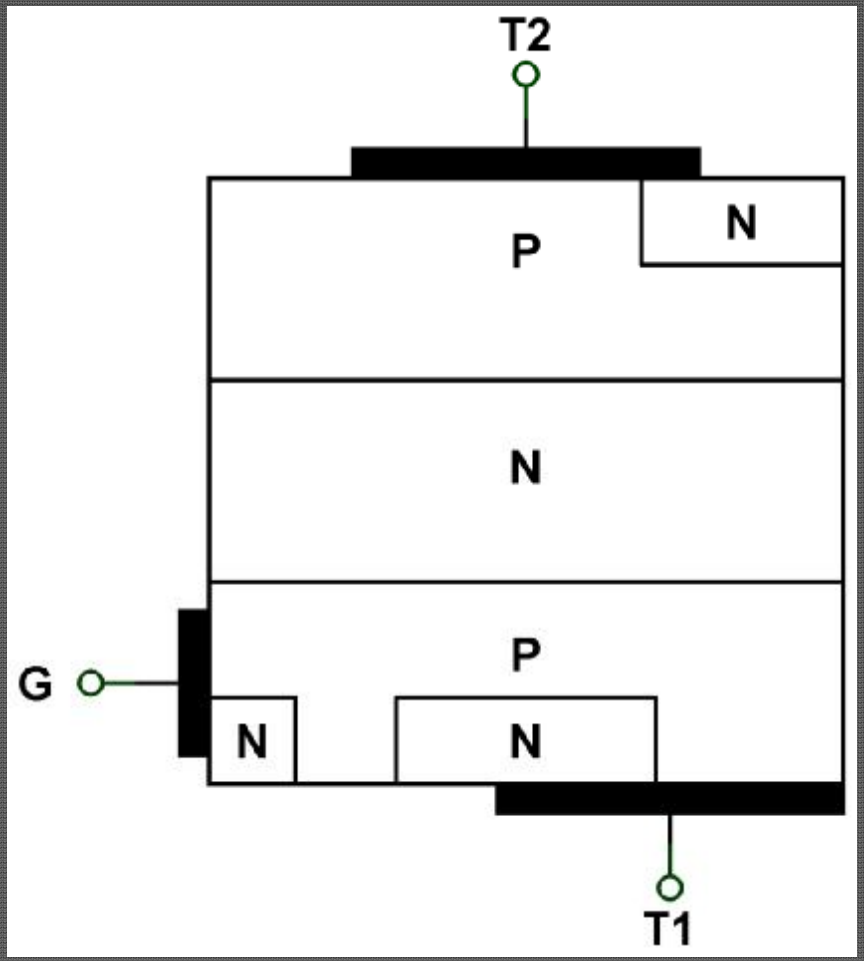
GTO

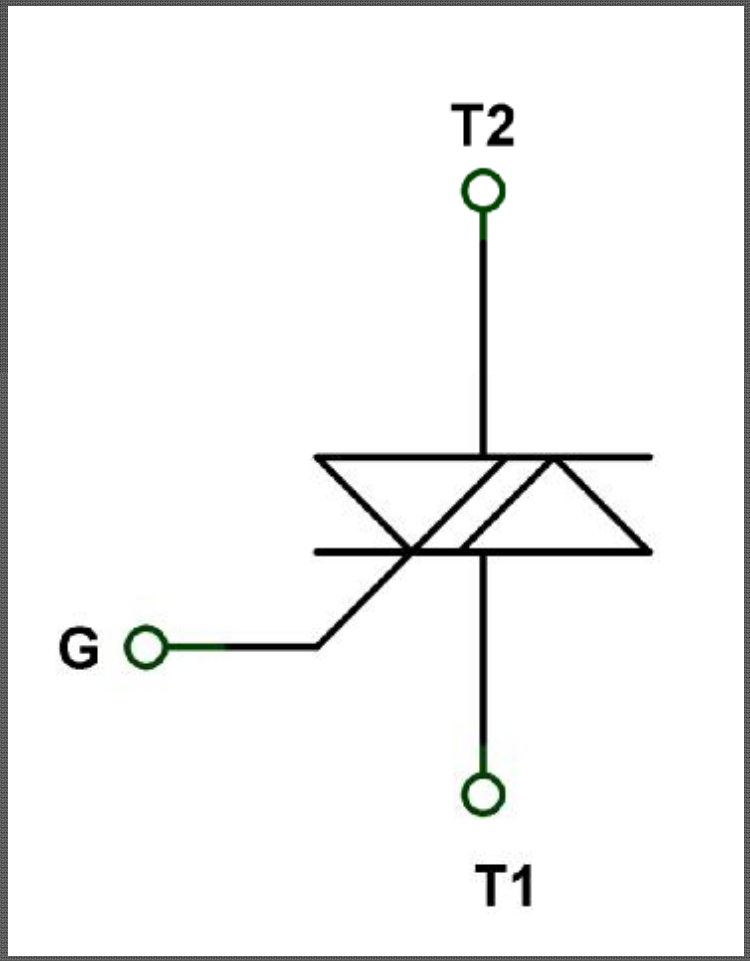
- The gate terminal has two arrowheads, on the circuit symbol of GTO indicating current flow in both directions, since the GTO can also be turned off with a negative gate current signal.
- The difference in the structure of GTO from the SCR is the Anode short which helps to stop the regeneration process with negative gate pulse.
- However, Anode short gives rise to an asymmetrical voltage blocking characteristics.





TRIAC





Thank you

For your attention

Power Electronics

Power Semiconductor Devices

Lecture-3

Power Diode

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Historical Background

- Mercury arc vacuum tube was invented in 1892 by a German researcher, L. Arons
- P.C. Hewitt, USA, patented the first mercury arc rectifier in 1902.
- In 1906, J. A. Fleming invented the first Vacuum Diode.
- During the first half of 20^{th} century, electronic equipment was mainly based on vacuum tubes.
- The era of semiconductor devices began in 1947 with the invention of germanium BJT.
- In 1952, GE manufactured the first germanium diode.
- In 1954, TI produced the first Silicon transistor.
- From mid 50s to early 60s, electronic circuit designs began to migrate from vacuum tubes to transistors.

Power Semiconductors

- SCR was developed in 1957
- Until 1970, conventional SCR has been exclusively used for power control in industrial applications.
- Since 1970, various types of power semiconductor devices were developed and become commercially available
- These power devices can be divided into following major types.

Power Devices

- Power Diodes
- Power BJTs
- Power MOSFETs
- IGBTs
- Thyristors:
  - ***SCR***
  - ***GTO***
  - ***DIAC***
  - ***TRIAC***

Power Diode

- Power semiconductor devices bear high current densities while they are ***'on'*** and withstand high voltage across them when ***'off'.***
- When ***'on'*** the drop across the diode is 2-3 volts and it is conducting large current, therefore the power dissipation of the power diode is large.
- The power diode are much bigger in size and encapsulated in metal body to be mounted on metal heat sink for proper thermal design.