

V-I CHARACTERISTICS OF THYRISTORS

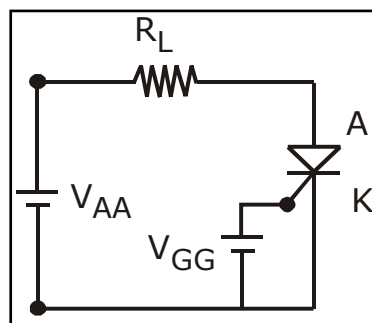


Fig.3.3 Circuit

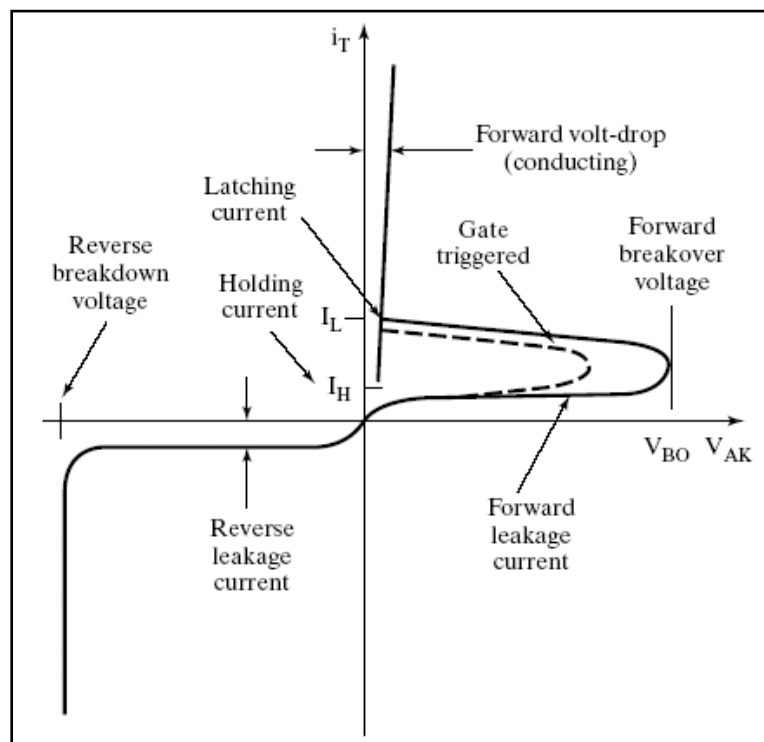


Fig 3.4: V-I Characteristics

A typical V-I characteristics of a thyristor is shown above. In the reverse direction the thyristor appears similar to a reverse biased diode which conducts very little current until avalanche breakdown occurs. In the forward direction the thyristor has two stable states or

modes of operation that are connected together by an unstable mode that appears as a negative resistance on the V-I characteristics. The low current high voltage region is the forward blocking state or the off state and the low voltage high current mode is the on state. For the forward blocking state the quantity of interest is the forward blocking voltage V_{BO} which is defined for zero gate current. If a positive gate current is applied to a thyristor then the transition or break over to the on state will occur at smaller values of anode to cathode voltage as shown. Although not indicated the gate current does not have to be a dc current but instead can be a pulse of current having some minimum time duration. This ability to switch the thyristor by means of a current pulse is the reason for wide spread applications of the device.

However once the thyristor is in the on state the gate cannot be used to turn the device off. The only way to turn off the thyristor is for the external circuit to force the current through the device to be less than the holding current for a minimum specified time period.

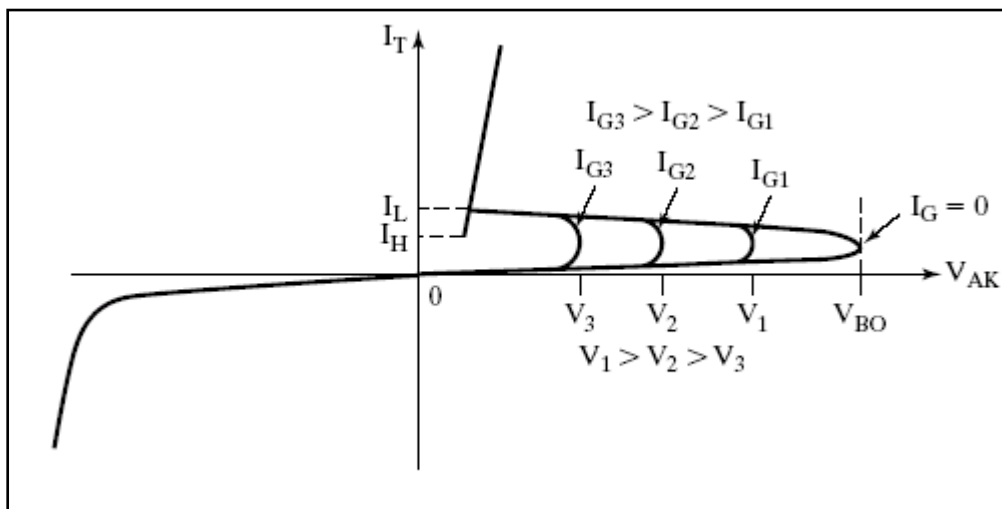


Fig.3.5: Effects on gate current on forward blocking voltage

Holding Current I_H

After an SCR has been switched to the on state a certain minimum value of anode current is required to maintain the thyristor in this low impedance state. If the anode current is reduced below the critical holding current value, the thyristor cannot maintain the current through it and reverts to its off state usually I_{μ} is associated with turn off the device.

Latching Current I_L

After the SCR has switched on, there is a minimum current required to sustain conduction. This current is called the latching current. I_L associated with turn on and is usually greater than holding current.