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Silicon Controlled Rectifier

(SCR)



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Presentation Outline

1. What is SCR?
2. Meaning of the word SCR
3. Symbol of SCR
4. Uses of SVR
5. Working of SCR
6. V-I Characteristics of SCR
7. Mode of Operations
8. Applications

TOPIC HIGHLIGHTS

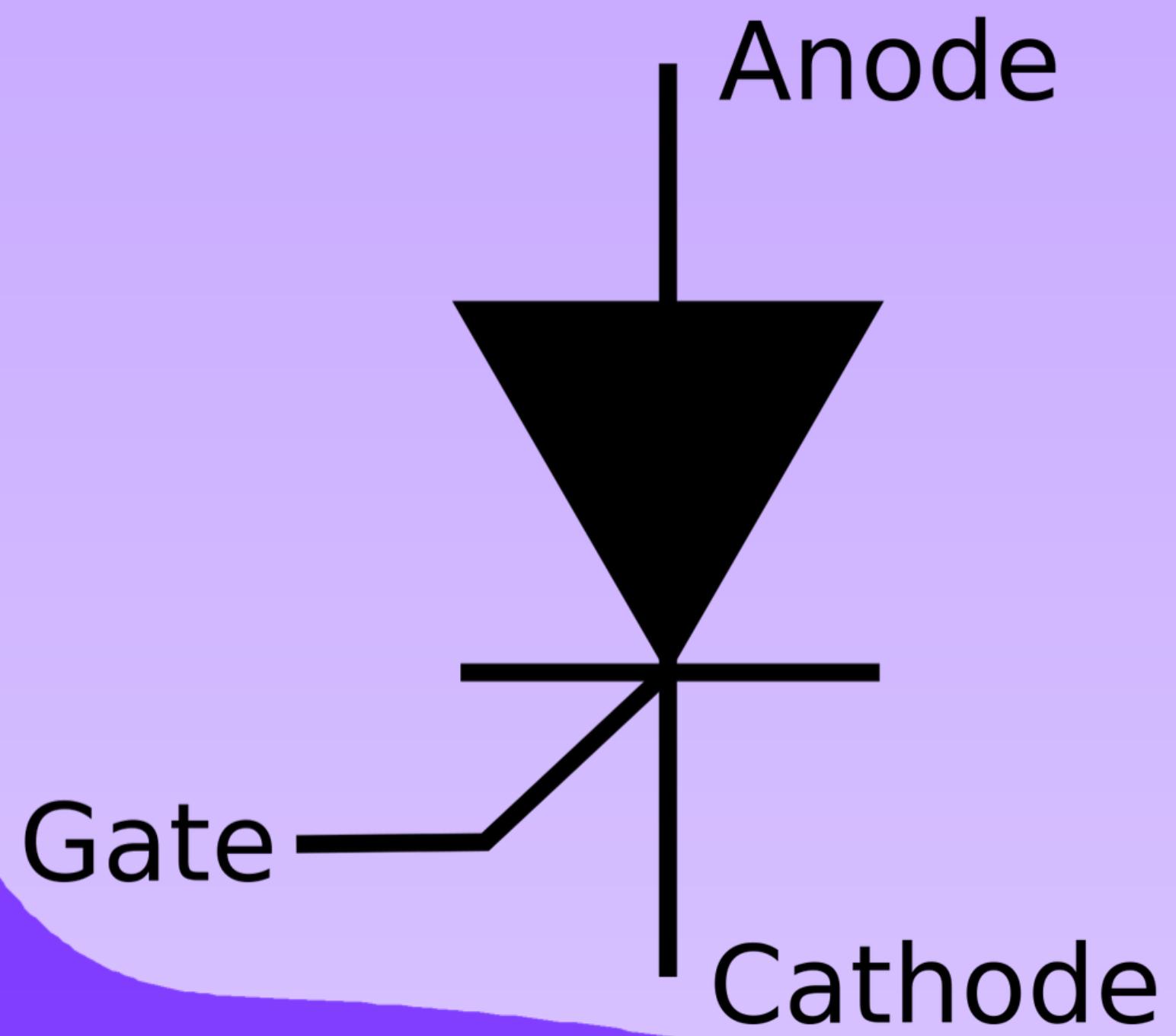




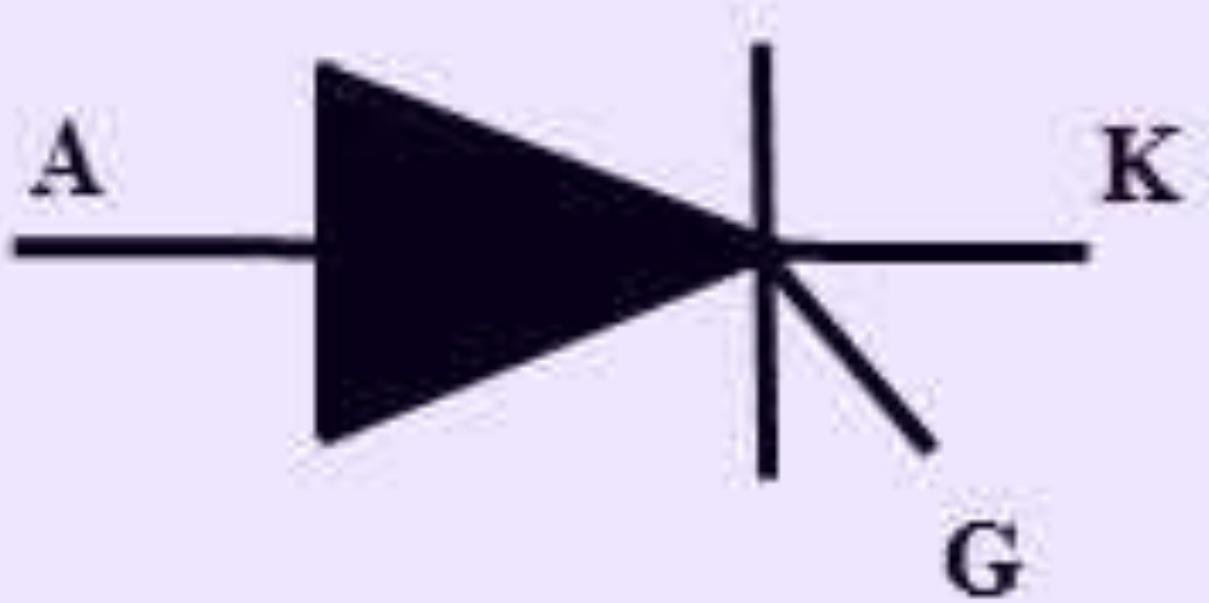
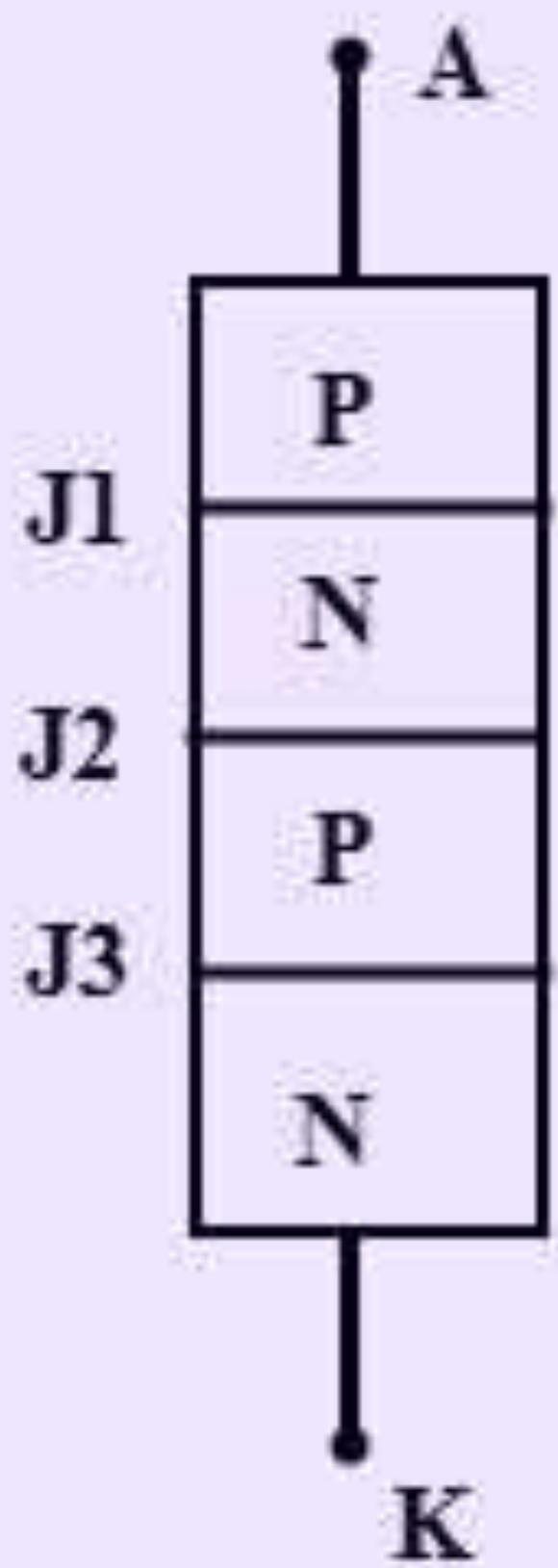
WHAT IS SCR?

A silicon controlled rectifier or semiconductor controlled rectifier is a four-layer solid-state current-controlling device

SYMBOL OF SCR?



HOW THE SYMBOL OF SCR IS USED?



WHAT IS THE OTHER NAME OF SCR?

In many ways the Silicon Controlled Rectifier, SCR or just Thyristor as it is more commonly known, is similar in construction to the transistor.

It is a multi-layer semiconductor device, hence the “silicon” part of its name.



Why SCR is Used?

SCRs are mainly used in electronic devices that require control of high voltage and power. This makes them applicable in medium and high AC power operations such as motor control function.

An SCR conducts when a gate pulse is applied to it, just like a diode.



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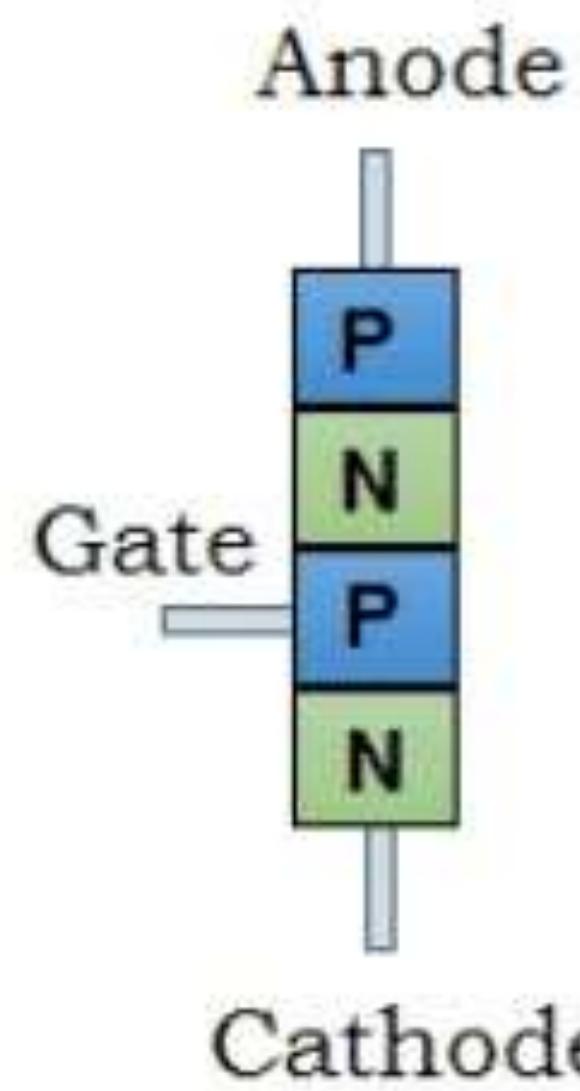
SCR OPERATIONS OR WORKING

The Silicon Control Rectifier SCR starts conduction when it is forward biased. For this purpose the cathode is kept at negative and anode at positive. When positive clock pulse is applied at the gate the SCR turns ON.

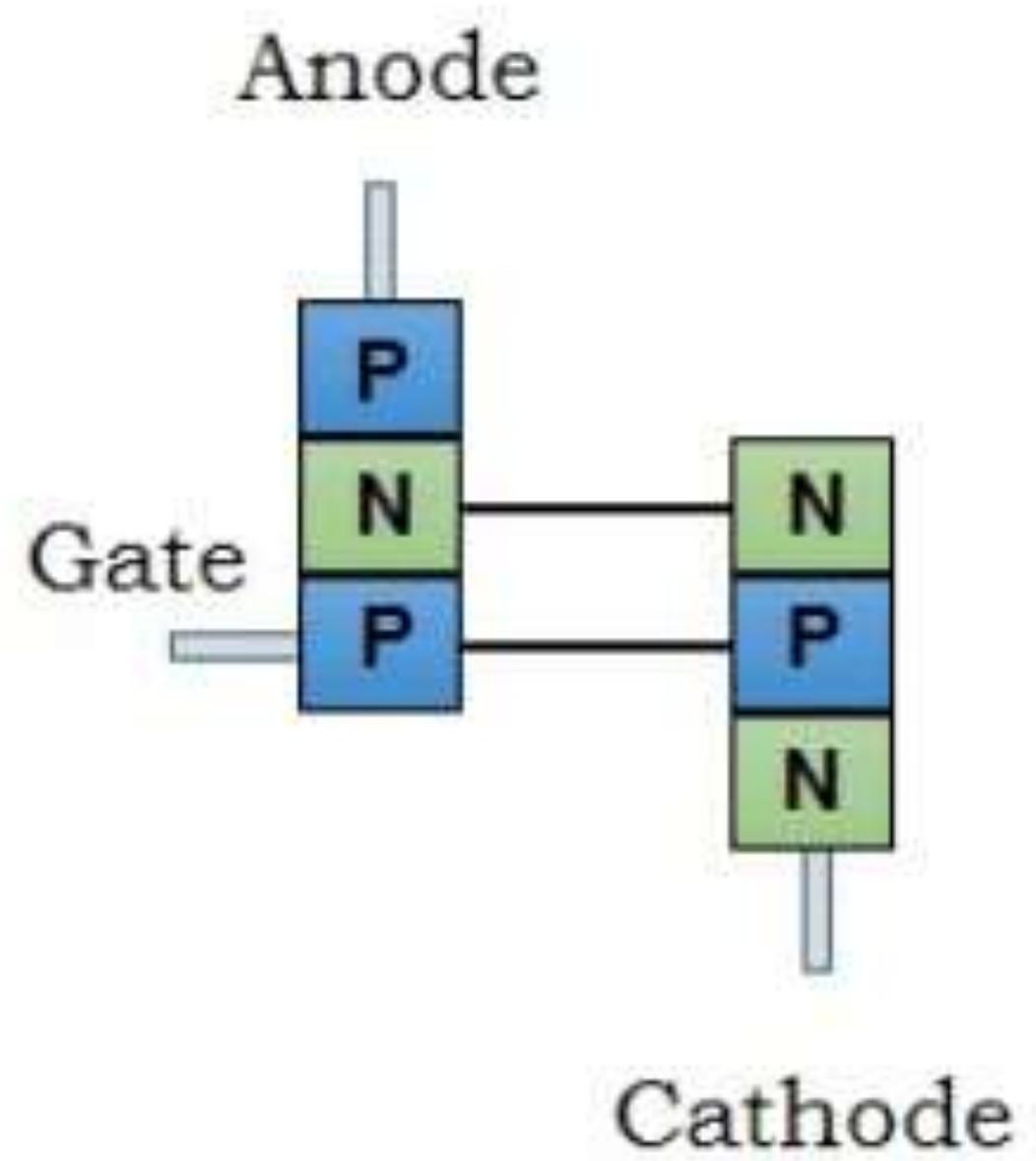


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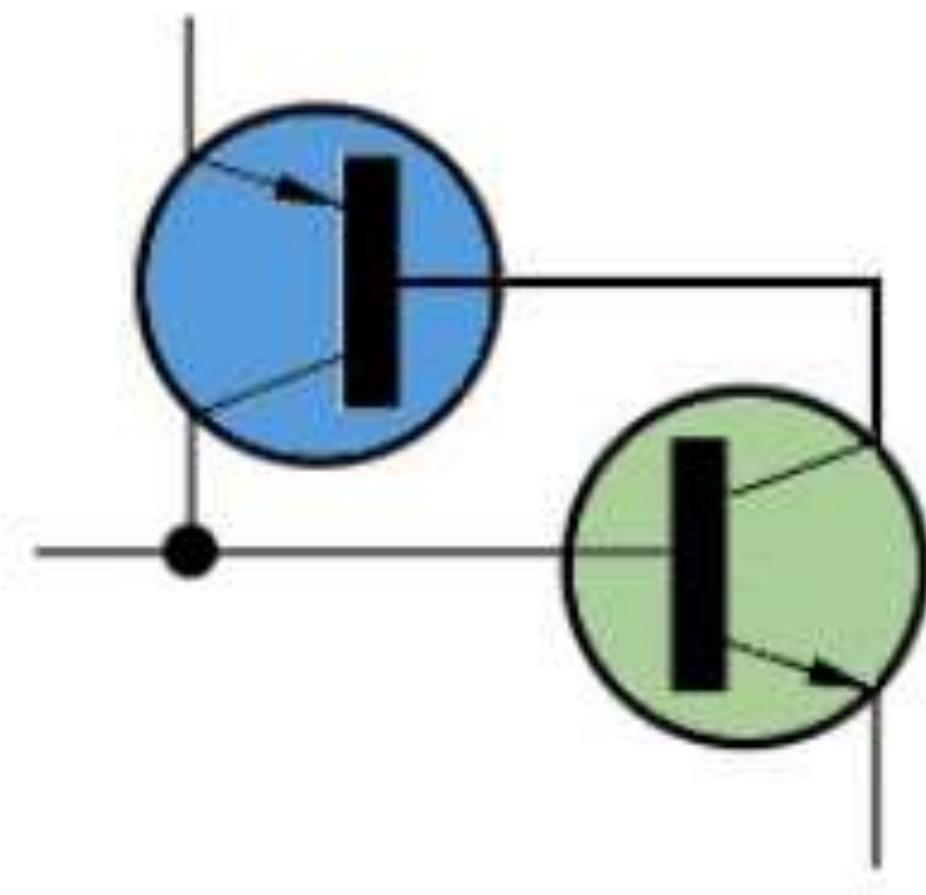
TWO TRANSISTOR ANALOGY OF SCR



Basic Structure



Two Transistor Model

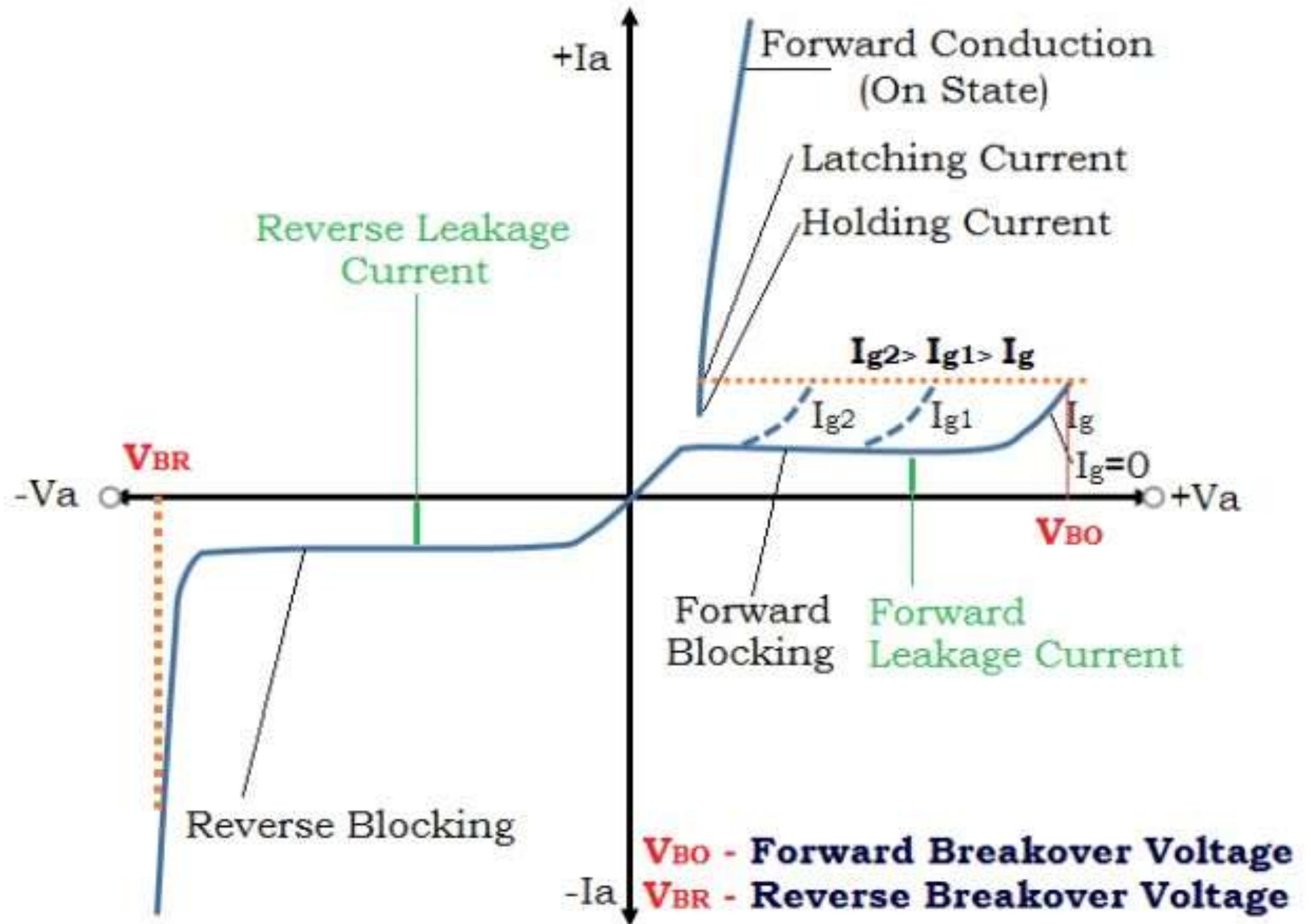


Two Transistor Circuit

V-I Characteristics of SCR

○ V-I: Curve between anode-cathode voltage(V) and anode current(I) of an SCR at constant Gate current.

Voltage drops at this point suddenly as shown by the dotted line. If proper gate current is made to flow, then SCR can close at smaller supply voltage.



V-I
Characteristics
of
SCR



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MODE OF OPERATIONS

1. Forward Blocking
2. Reverse Blocking
3. Forward
 - Conducting



Forward Blocking

In this state or mode, the forward current conduction is blocked .The upper diode and lower diode are forward biased and the junction in the center is reverse biased. Thus the Thyristor does not turn on as the gate is not fired and no current flows through it.

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Reverse Blocking

In this mode, the connection of anode and cathode is reversed and still no current flows through it. Thyristors can conduct current only in one direction and it blocks in the reverse direction and so the flow of current is blocked.



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Forward Conducting

When current is applied to the gate, the Thyristor is triggered and it will start conducting. This stays on until the forward current drops below the threshold value and that can be achieved by switching off the circuit.

APPLICATIONS

1. The silicon controlled rectifier (SCR) is used in AC voltage stabilizers.
2. The silicon controlled rectifier (SCR) is used as switch.
3. It is used in choppers.
4. The silicon controlled rectifier (SCR) is used in inverters.
5. The silicon controlled rectifier (SCR) is used for power control.
6. It is used for DC circuit breaker.