

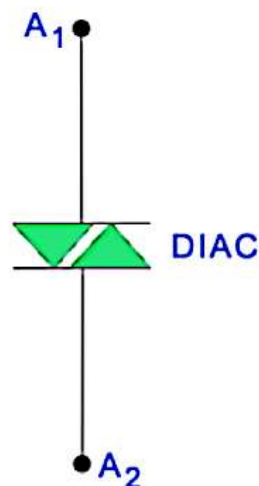


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Diac is a device which has two electrodes. It is a member of the **thyristor** family. It is mainly used in **triggering of thyristor**. The advantage of using this device is that it can be turned on or off simply by reducing the **voltage** level below its **avalanche breakdown** voltage.

Also, it can be either turned on or off for both the polarity of voltages. This device works when avalanche breakdown occurs.



Diac Symbol

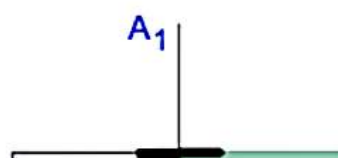
The figure shows a symbol of diac which resembles the connection of two diodes in series. Also it can be called as a **transistor** without base.

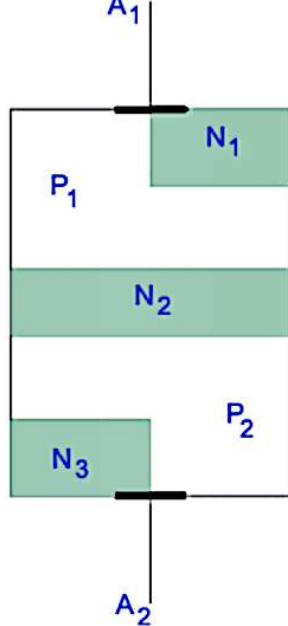


Construction of Diac

It is a device which consists of four layers and two terminals. The construction is almost same as that of the transistor. But there are certain points which deviate from the construction from the transistor. The differentiating points are-

1. There is no base terminal in the diac.
2. The three regions have almost the same level of doping.
3. It gives symmetrical switching characteristics for either polarity of voltages.





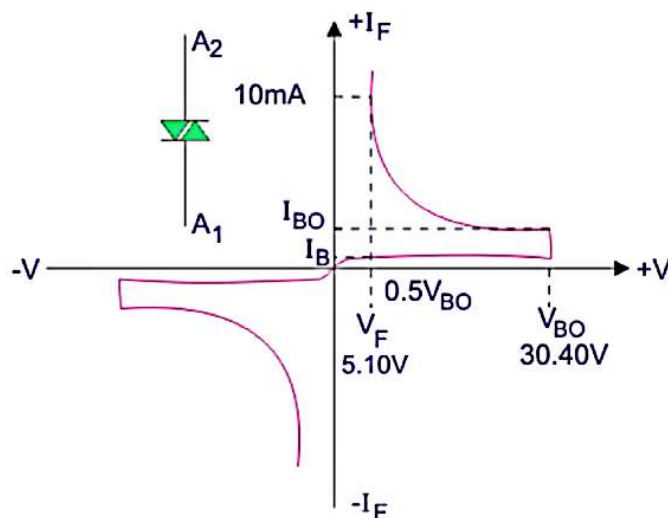
Construction of Diac

Operation of Diac

From the figure, we see that it has two p-type material and three n-type materials. Also it does not have any gate terminal in it.

The **diac** can be turned on for both the polarity of voltages. When A_2 is more positive with respect to A_1 then the current does not flows through the corresponding N-layer but flows from $P_2-N_2-P_1-N_1$. When A_1 is more positive A_2 then the **current** flows through $P_1-N_2-P_2-N_3$.

The construction resembles the **diode** connected in series. When applied voltage is small in either polarity, a very small current flows which is known as leakage current because of drift of electrons and holes in the depletion region. Although a small current flows, but it is not sufficient enough to produce avalanche breakdown so the device remains in the non conducting state. When the applied voltage in either polarity exceeds the breakdown voltage, diac current rises and the device conducts in accordance with its V-I characteristics.



V-I Characteristics of the Diac

The V-I characteristics resembles the english word Z. The diac acts as open circuit when the voltage is less than its avalanche breakdown voltage. When the device has to be turned off, the voltage must be reduced below its avalanche breakdown voltage.

Application of Diac

It can be used mainly in the triac triggering circuit. The **diac** is connected in the gate terminal of the triac. When the voltage across the gate decreases below a predetermined value, the gate voltage will be zero and hence the triac will be turned off. The main applications are-

1. It can be used in the lamp dimmer circuit.
2. It is used in the heat control circuit.
3. It is used in the speed control of a universal motor.

It is used with triac in series combination for triggering. The gate of triac is connected with a terminal of the diac. When applied voltage across diac increases above the avalanche breakdown, then only it can conduct. However, when the voltage across diac decreases below its avalanche breakdown voltage it will be turned off and hence the triac will also remain in the off state.

Conclusion of Diac

The **diac** is an important device in the thyristor family. The main advantage of using this device is-

1. It does not switch sharply to a low voltage condition at a low current level as done by SCR or triac.
2. It has low on state voltage drop until its current falls below the holding current level.
3. Voltage drop decreases with the increase in current.