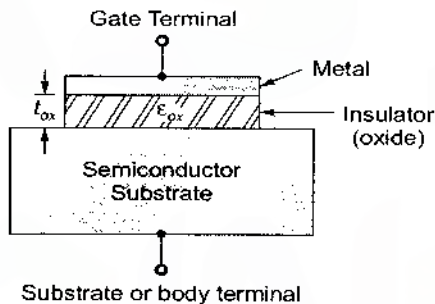


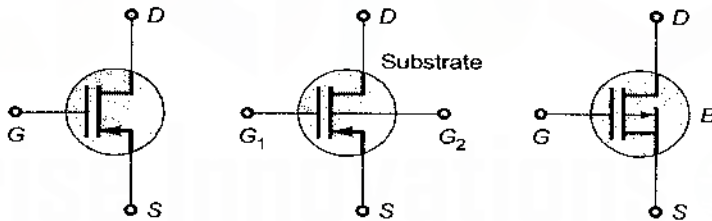
Metal Oxide Semiconductor Field Effect Transistor

- MOSFET is an integrated device, fabricated by VLSI using planar technology.
- It is a voltage controlled device.
- In the MOSFET the plate and semiconductor channel will be working as the plate of capacitor and SiO_2 as dielectric.
- The large input impedance of MOSFET is due to the SiO_2 .
- MOSFET is very sensitive to static electrical noise and static electrical disturbances.

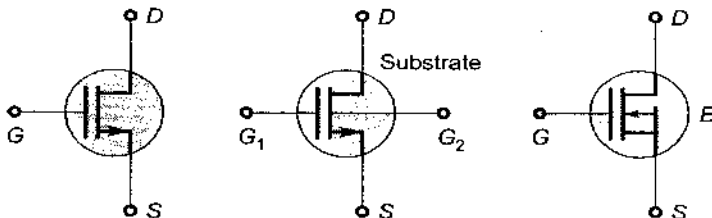
Schematic Symbol



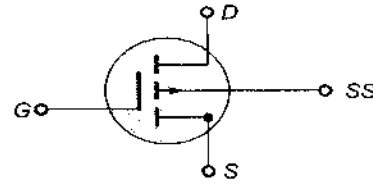
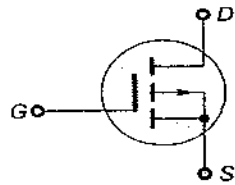
p-channel Depletion MOSFET



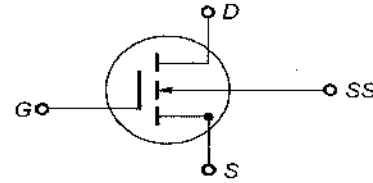
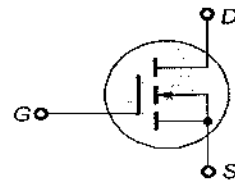
n-channel Depletion MOSFET



p-Channel Enhancement MOSFET

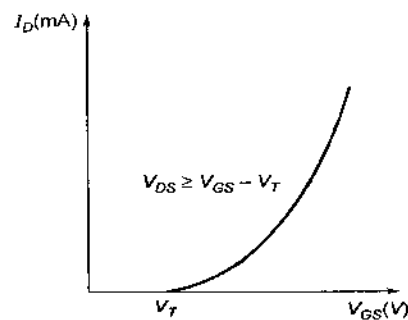


n-Channel Enhancement MOSFET

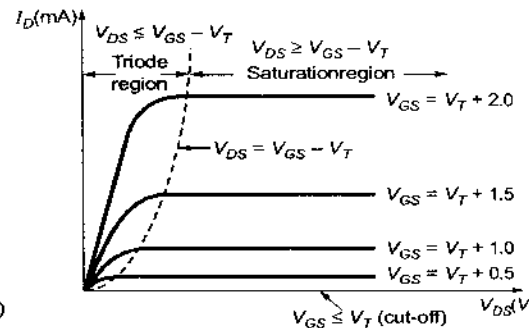


Characteristics of MOSFET

For depletion MOSFET characteristics are same as JFET characteristics.



Transfer characteristic of E-MOSFET



Drain characteristic of E-MOSFET

Remember:

- Threshold voltage (V_T) is defined as the "Minimum gate to source voltage required for MOSFET turn into ON state".
- For better performance of the MOSFET, threshold voltage must be as small as possible.
- The threshold voltage of MOSFET can be graphically obtained from the transfer characteristics.
- Threshold voltage V_T should be smaller.

Parameters

For depletion MOSFET

Drain current,

$$I_D = I_{DSS} \left(1 - \frac{V_{GS}}{V_P} \right)^2$$

where, $I_{DSS} = I_{Dmax}$

Note:

In depletion MOSFET channel is pre-existing.

For enhancement type n-channel MOSFET

- $V_{GS} > V_T$ for 'ON' or saturation region.
 $V_{GS} < V_T$ for 'OFF' or cut-off region.
where, V_T = Threshold voltage
- $V_{DS} < (V_{GS} - V_T) \rightarrow$ Triode region of operation.
 $V_{DS} \geq (V_{GS} - V_T) \rightarrow$ Saturation region of operation.
- For saturation region

$$I_D = K(V_{GS} - V_T)^2$$

- For p-channel MOSFET

$$I_D = K(V_{GS} + V_T)^2$$

Note:

In enhancement MOSFET channel is diffused channel.

Remember:

- MOSFET is less noisy as compared to JFET.
- MOSFET is faster than JFET but BJT is faster than MOSFET.
- When compare to BJT, MOSFET is more suitable for high frequency application.