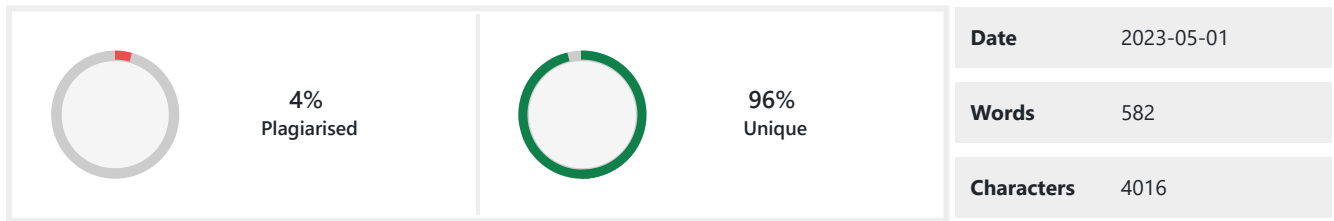


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MOSFET(Metal Oxide Silicon Field Effect Transistor)

What is a MOSFET?

Metal oxide silicon field effect transistor commonly known as MOSFET are electronic devices used to switch or amplify voltages in circuits .if is a voltage controlled device and is constructed by three terminals .the terminals of MOSFET are named as follows:

- 1.source
- 2.gate
- 3.Drain
- 4.Body

The figure shows a practical MOSFET.

MOSFET Construction

The circuit of MOSFET is typically represented as follows:

- 1.the p type semiconductor forms the base of the mosfet
- 2.thetwo typesof the base are highly doped with an n-type impurity which is marked as n+ .
- 3.from the heavily doped regions of the base ,the terminals source and drain originate.
- 4.the layer of the substrate is coated with alayer of silicon dioxide for insulation .
- 5.a thin insulated metallic plate is kept on top of the silicion dioxide for insulation .
- 6.a thin insulated metallic plate is kept on top of the silicion dioxide and it acts as a capicitor.

Working Principle of MOSFET

When voltage is applied to the gate an electrical field is generated that the width of the channel region ,where the electrons flow .the wider the channel region ,where the electrons flow .the wider the channel region ,the better conductivity of a device will be..

MOSFET Types

The classification of MOSFET based on the construction and the material used is given below in the flowchart

Depletion Mode-when there is no voltage across the gate terminals ,the channel shows maximum conductances .when the voltage across the gate terminal is either positive or negative .Then THE CHANnel conductivity decreases.

Enhancement Mode

When there is no voltage across the gate terminal ,then the devices does not conduct .when there is the maximum voltage across the gate terminal then the device shows enhanced conductivity.

Operating REGIONS Of MOSFET.

A MOSFET is seen to exhibit three operating regions. here we will discuss those regions

CUTT OFF REGION

The cut off region is a region in which there will be no conduction and as a result, the MOSFET will be off. In this condition, MOSFET behaves like an open switch.

OHMIC REGION

The ohmic region is a region where the current increases with an increase in the value. When MOSFETs are made to operate in this region, they are used as amplifiers.

SATURATION REGION

In this saturation region, the MOSFET has a constant current in spite of an increase in V_{DS} and occurs once V_{DS} exceeds the value of pinch-off voltage. Under this condition, the device will act like a closed switch through which a saturation value of current flows. As a result, this operating region is chosen whenever MOSFETs are required to perform switching operations.

MOSFET AS A SWITCH

MOSFETs are commonly used as switches. The circuit below shows the configuration of MOSFET when it is used.

In the circuit arrangement an enhancement mode n-channel MOSFET is used to switch a simple lamp ON. The device and the voltage level is set to a negative value or zero to turn it off.

MOSFET application

1. RADIO FREQUENCY applications use MOSFET amplifiers extensively.
2. MOSFET behaves as a passive circuit element.
3. Power MOSFET can be used to regulate DC motors.
4. MOSFETs are used in the design of the chopper circuit.

ADVANTAGES OF MOSFET

- 1.mosfet operate at greater efficiency at lower voltages .
2. absence of gate current result in high input impedance producing high switching speed .

DISADVANTAGES OF MOSFET

- 1.mosfet are vulnerable to damage by electrostatic charges due to thin oxide layer .
- 2.overload voltage make MOSFET unstable.

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