MOSFET Parameters

Key parameters & operating regoins:

(1) Gate Threshold Voltage VGS(th):

This parameter identifies the minimum voltage needed to be applied on the gate source terminal in order to the mosfet to conduct and be turned on

If any voltage under this rating is applied to the gate source terminals the mosfet would not be turned on

(2) Maximum VGS Rating:

On the other hand, this parameter indicates the maximum voltages that can be applied to the gate source terminals without damaging the mosfet or change its characteristic

This rating usually varies around +20 and -20 volts for most mosfets

If the voltage applied exceded this rating, it will cause a permanent short circuit between the gate and source and the mosfet will not be functional

(3) Drain-Source Breakdown Voltage VDS(max):

This parameter indicates the maximum voltage that can be applied between the drain and source before the MOSFET breaks down and that useful in the high voltage applications to know the maximum voltage the mosfet can handle

(4) Maximum Drain Current ID(max):

Similar to the voltage mosfet also have a current limitation so the maximum ID indicates the maximum current passing through the mosfet can handle before breaking down and it's very critical for high power applications

(5) Power Dissipation (PD):

This parameter indicates the maximum power mosfet can dissipate if form of heat without exceeding it's limits

This determines the thermal management needed for the design

(6) Body Diode Forward Voltage (VF):

Indicates the forward voltage drop across the body diode when the MOSFET conducts in reverse mode and it's important for applications like switching power supplies

(7) On-state resistance RDS(on):

the resistance between the drain and source terminals when the MOSFET is in on state. The conduction loss depends on it

the lower the value of the RDS(on), lower is the conduction loss.

Guidelines on selecting the right mosfet for different applications:

Mosfet applications can be classified into four main categories

(1) General Power Switching Applications

(2) Low-Voltage Logic-Level Switching

(3) High-Speed Switching

(4) Linear Applications

(5) Reverse Polarity Protection and Rectification

In each categories there is some main parameters in need to be considered to select the suitable mosfet like max and min voltage and current applied , operating temperature , total load of the circuit and the circuit efficiency required