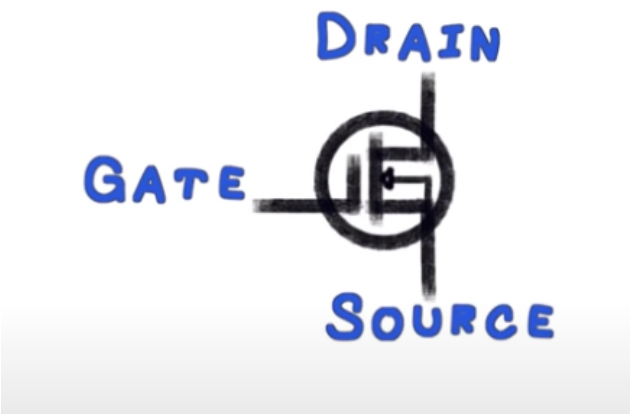
Mosfet Transistors

Overview

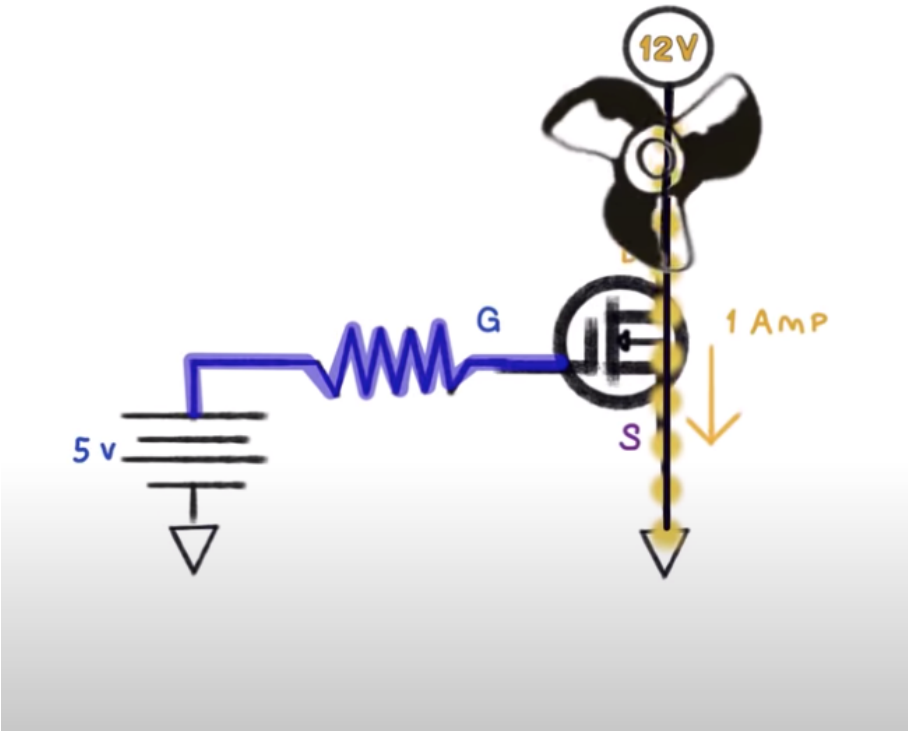
Metal Oxide Semiconductor Field Effect Transistor

"variable resistors controlled by voltage"



How they Work

MOSFETs work like BJT Transistors but trigger based on voltage instead of current.



When voltage is applied between Gate and Source, current is allowed to flow between DRAIN and SOURCE.

MOSFETs are variable resistors controlled by voltage. Depending on the voltage applied at the GATE, the resistance between the DRAIN and SOURCE will vary (known as RDS_{on}).

Do I Need a Heat Sink?

Calculate the power you are going to need to dissipate.

Where I is the current your application is going to pull.

Let's assume our little motor will pull 1A and $R_{DS=0.035Omhs\ I}$

$P=R \times I^2$

$=R_{DS} \times I2$

$= 0.035 * 1^2$

= 35 mWatts

The formula to compute the amount of power our MOSFET can dissipate without a heat sink is as follows:

$$\mathbf{P_D = ((MAX(T_J) - (T_A))/ R_{0JA}}$$

We will need a few more items from the data sheet.

$MAX(T_J)$ - Maximum Junction Temperature

T_A - Ambiant Temperature (25C)

R_{0JA} - Thermal Resistance, Junction-to-Ambient, Max

How many watts can we dissipate without a heat sink?

$P_D = ((MAX(T_J) - (T_A))/ R_{0JA}$

= (175C - 25C)/ 62.5

= 2.4 Watts

NOTE:

The spec sheet will refer to a $\mathbf{P_D}$ which is higher than our calculation. This is because it assumes that you can keep the MOSFET at 25C while operating which would mean you would need a heatsink.

Reference

Reference	URL
MOSFET Transistor	https://www.electronics-tutorials.ws/transistor/tran_6.html
MOSFETs Video	https://www.youtube.com/watch?v=GrvvkYTW_0k
Real vs Fake MOSFET | How to identify a Fake Transistor? | MOSFET Test	https://www.youtube.com/watch?v=XXcEgddzjnI