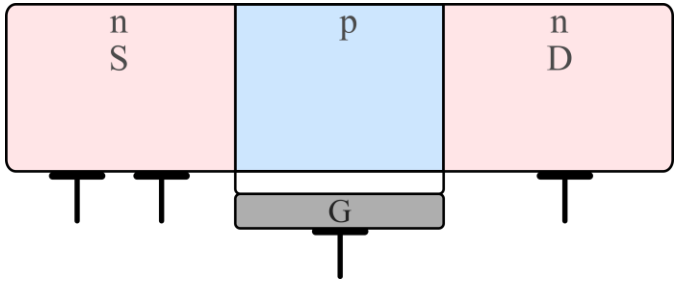
MOSFET

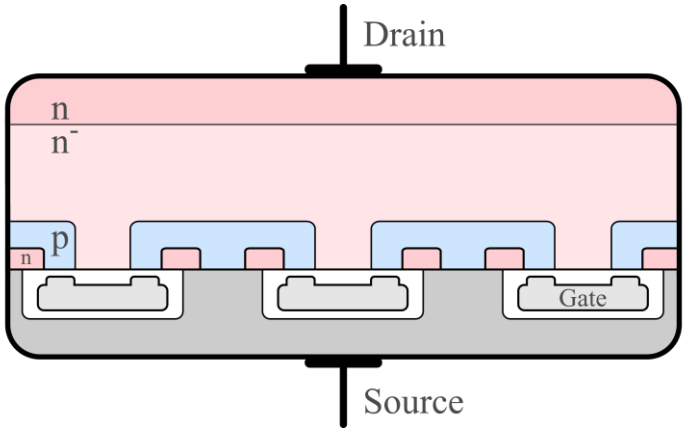
- What is a (power) MOSFET?
- How it operates?
- How do we address and use MOSFETS in circuits?

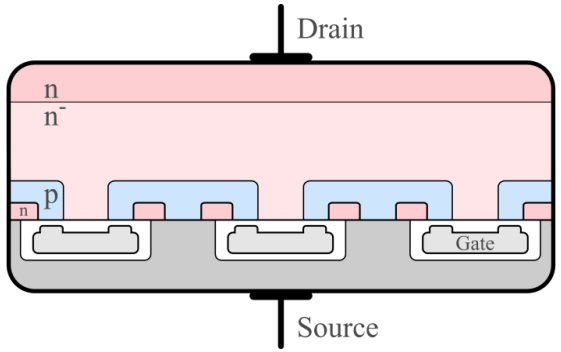
SEMICONDUCTOR DEVICES

MOSFET – Cross section

MOSFET =
metal-oxide-semiconductor + field effect transistor
Power MOSFET is a “vertical” component.
MOSFET is a majority carrier device.
R_{on} has positive temperature coefficient.

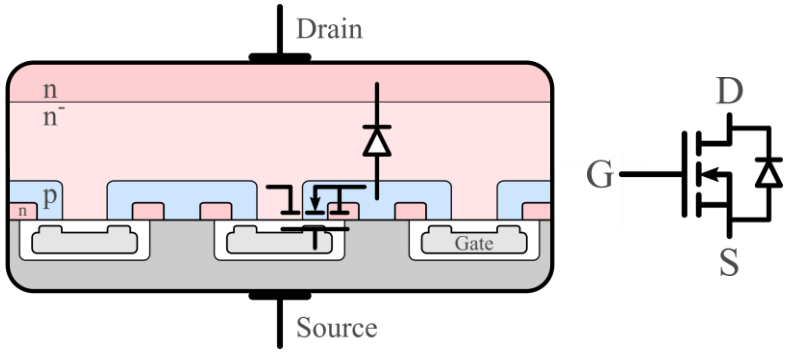


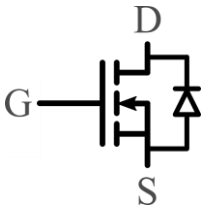


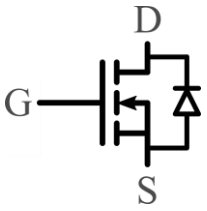


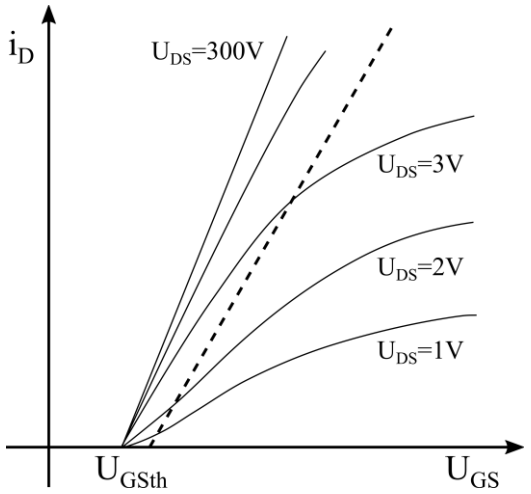
SEMICONDUCTOR DEVICES

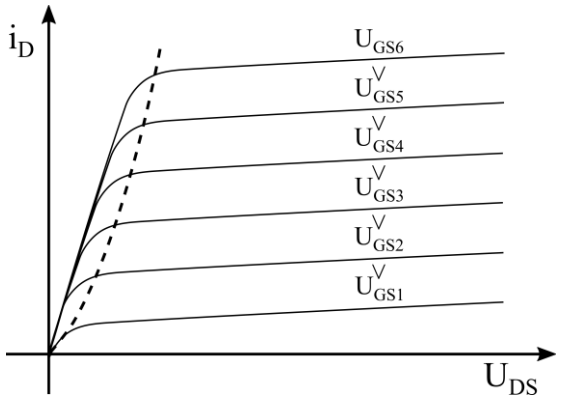
MOSFET – I-V curve (static)



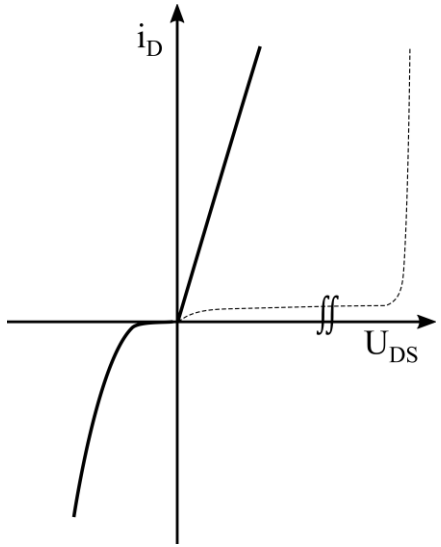






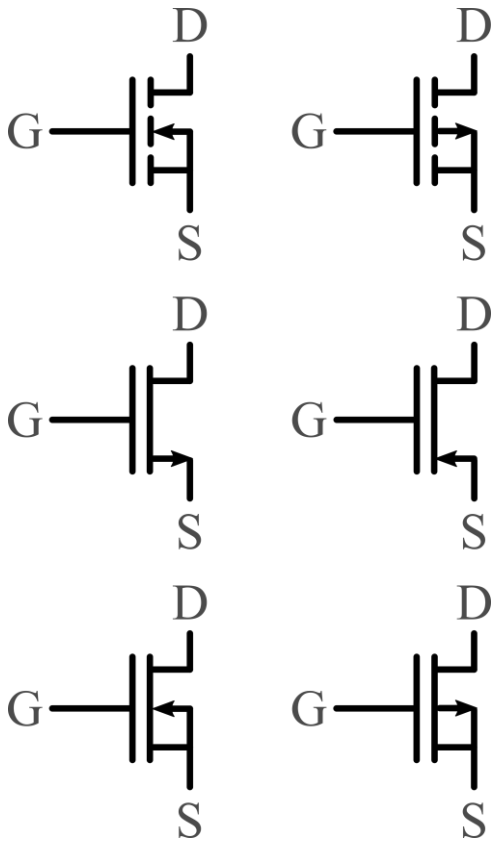


I-V curve approximation:



SEMICONDUCTOR DEVICES

MOSFET – symbols/types



MOSFET – packages

Figures taken from:
https://www.littelfuse.com/ and
https://www.infineon.com/ websites.

SEMICONDUCTOR DEVICES

MOSFET – important notes

Power MOSFETS:

- Are controllable semiconductor devices,
- Are turned ON and OFF by the dedicated driver circuitry,
- Are majority carrier devices (speed↑, R_{on}↑),
- Demonstrate positive temperature coefficient of the R_{on} (simple and reliable paralleling),
- Should be operated in the Ohmic region,