MOSFET Configurations

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Todays topic:
MOSFET Configuration

* MOSFET configurations:

① There are three basic configurations for MOSFETs (for connecting the MOSFET as an amplifier)

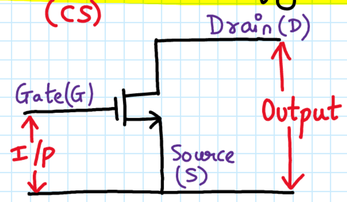
a) Common source (CS)
b) Common drain (CD) or source follower
c) Common gate (CG)

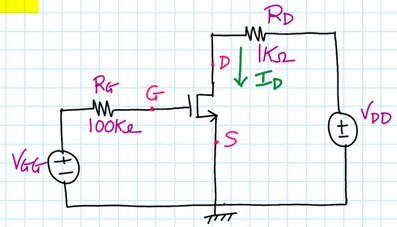
② Each configuration have its own characteristics of voltage and current gain as well as input and output impedance

③ Each of these configurations is obtained by connecting one of the three terminals of MOSFET to ground → thus creating a two-port network with the grounded terminal being common to the input and output ports

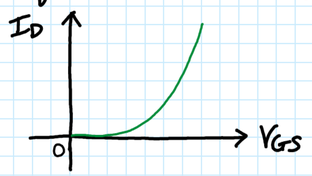
I Common source configuration (CS)

MOSFET: NMOS-E

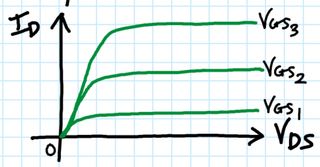




1) Transfer characteristics (I_D-V_{GS}) at constant V_{DS}



2) Output characteristics (I_D-V_{DS}) at constant V_{GS}

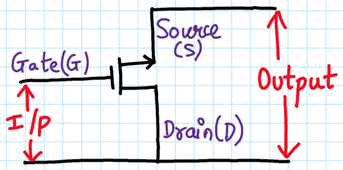


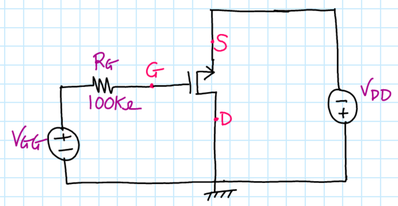
$V_{GS_3} > V_{GS_2} > V_{GS_3}$

3) CS configuration has
i) very high input impedance
ii) moderately high output impedance
iii) high voltage gain
iv) have 180° input/output phase relationship

II Common drain configuration (CD)

MOSFET: NMOS-E

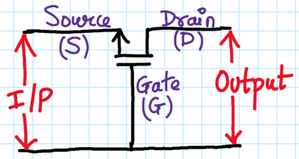


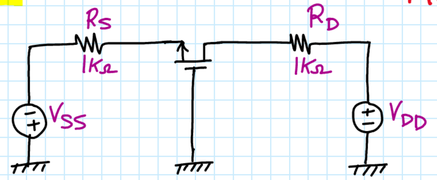


i) CD configuration has
i) very high input impedance
ii) very low output impedance
iii) unity voltage gain
iv) have 0° input/output phase relationship

III Common gate configuration (CG)

MOSFET: NMOS-E





i) CG configuration has
i) very low input impedance
ii) very high output impedance
iii) high voltage gain
iv) have 0° input/output phase relationship