Experiment 3: CMOS Inverter and Characterization

3 Lab

3.1 PMOS Characterization

Plot $I_{DS}\text{ vs. } V_{DS}$ curves with different $V_{GS}$. Label the cutoff, triode and saturation regions on the plot.

What is the channel length modulation $\lambda$: ____________.

Plot $I_{D}^1\text{ vs. } V_{GS}$, extract $V_{TP}$: ____________ and $K_n$: ____________.

Plot $C_{GS}\text{ vs. } V_{GS}$ curve.

What zero bias drain gate capacitance $C_{GD}$: ____________.

3.2 CMOS Inverter

Plot $V_{out}\text{ vs. } V_{in}$ curves.

What is $V_{IL}$ ____________ and $V_{IH}$ ____________

Plot out the output signal $v_{out}(t)$ without load.

What is fall time $t_f$ ____________ and fall time $t_r$ ____________

Plot out the output signal $v_{out}(t)$ with 10nF load capacitor.

What is fall time $t_f$ ____________ and fall time $t_r$ ____________