Pre-Lab 10:
Characterization of the MOSFET

Name: Wan-Yu Liao

ECEN 325 Section 514

TA: Mandela

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Simulations

(1) NMOS using 2N7000G

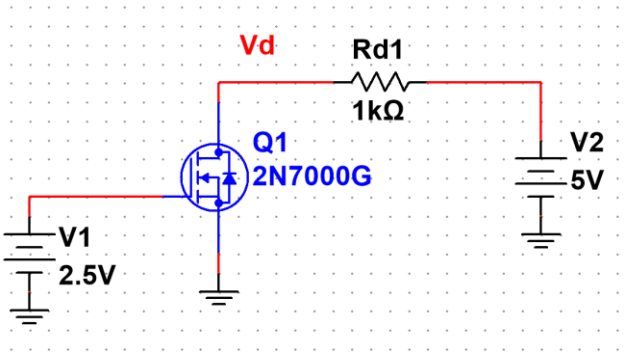

Figure 1: Schematic for NMOS using 2N7000G ▲

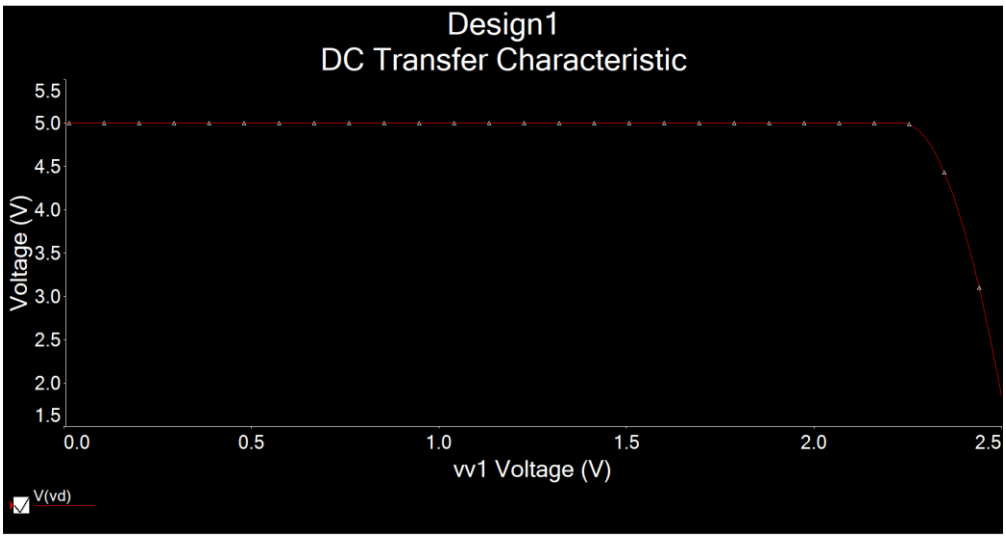

Figure 2: Simulation of NMOS characterization circuit using DC sweep of V1 from 0 to 2.5V, while V2 = 5V ▲

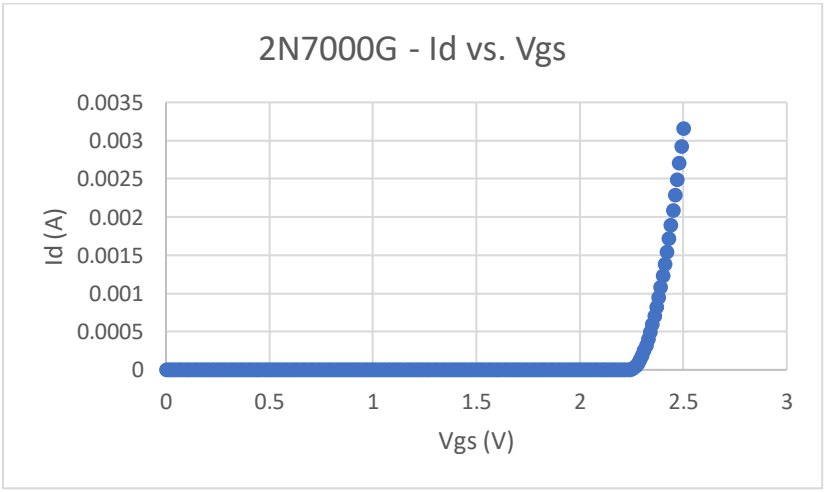

Figure 3: Excel plot of NMOS characterization circuit using DC sweep of V1 from 0 to 2.5V, while V2 = 5V, where Id = (5-Vd)/1000 ▲

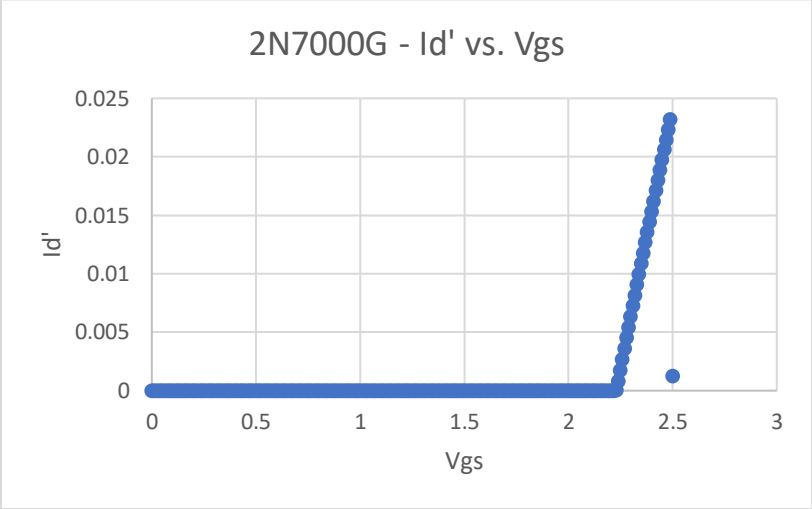

Figure 4: Excel plot of NMOS characterization of derivative of Id' vs. Vgs▲

Threshold Voltage Vt = **2.23V**

Transconductance parameter = (0.023218-0)/(2.5-2.23) = **0.086**

(2) NMOS using CD4007N

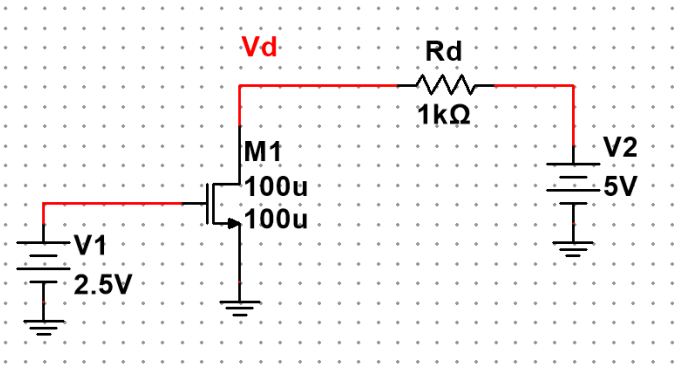

Figure 5: Schematic for NMOS using CD4007N (β=102mA/V2, V_{TN}=2.0V) ▲

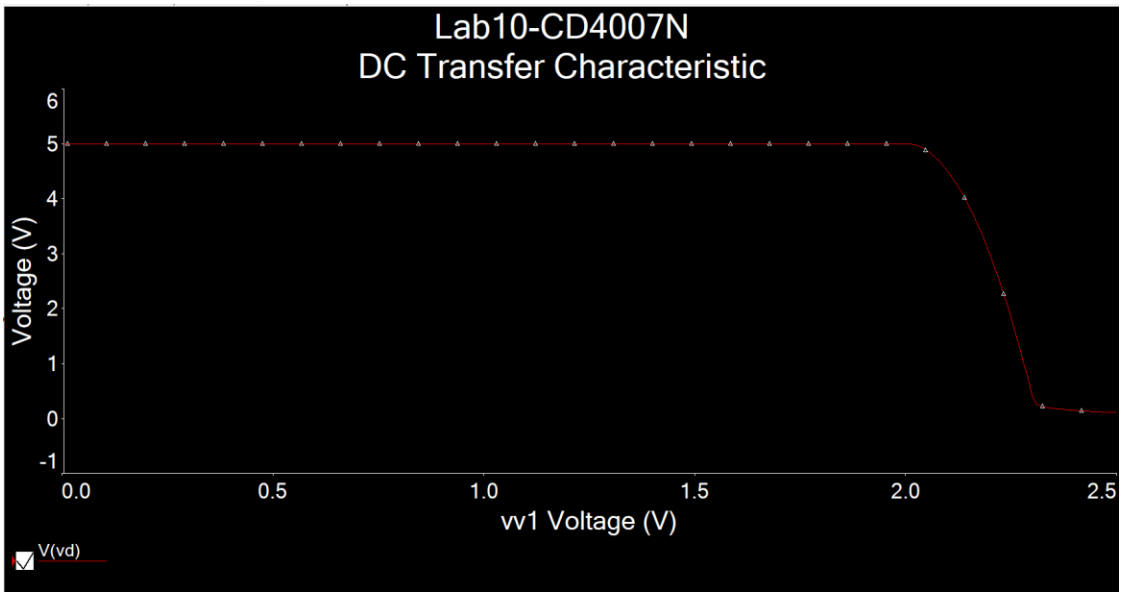

Figure 6: Simulation of NMOS characterization circuit using DC sweep of V1 from 0 to 2.5V, while V2 = 5V ▲

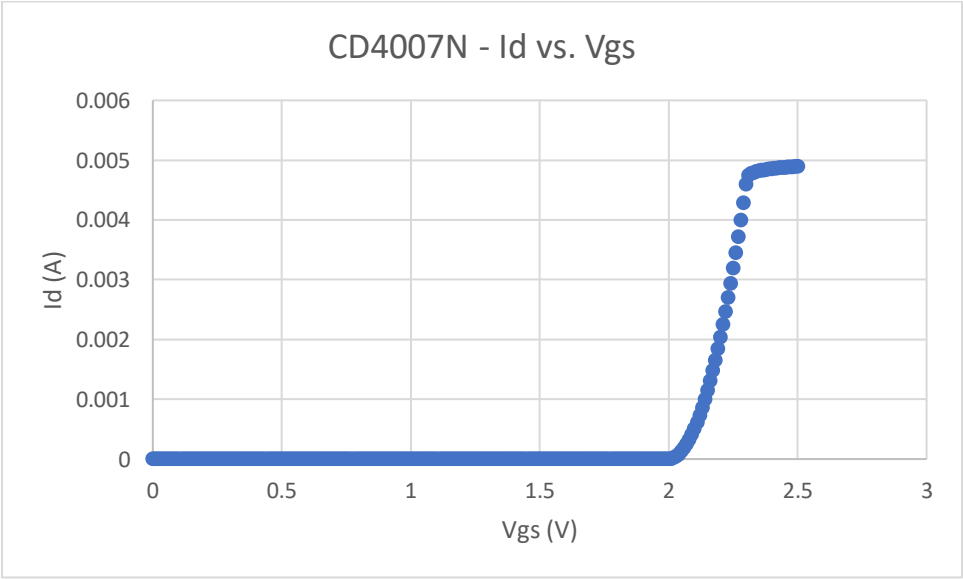

Figure 7: Excel plot of NMOS characterization circuit using DC sweep of V1 from 0 to 2.5V, while V2 = 5V, where Id = (5-Vd)/1000 ▲

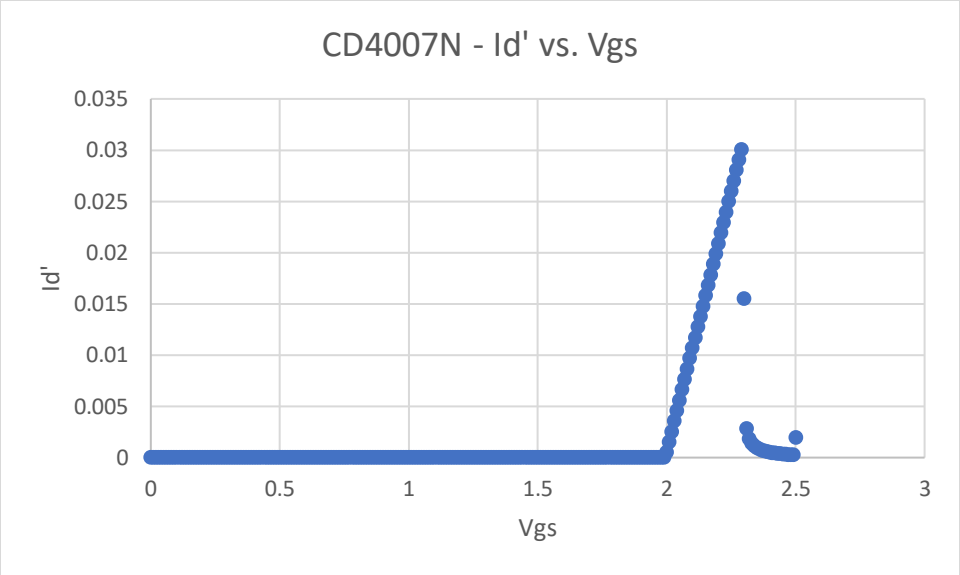

Figure 8: Excel plot of NMOS characterization of derivative of Id' vs. Vgs▲

Threshold Voltage Vt = **2V**

Transconductance parameter = (0.03009-0)/(2.3-2) = **0.1003**

(3) PMOS using CD4007P

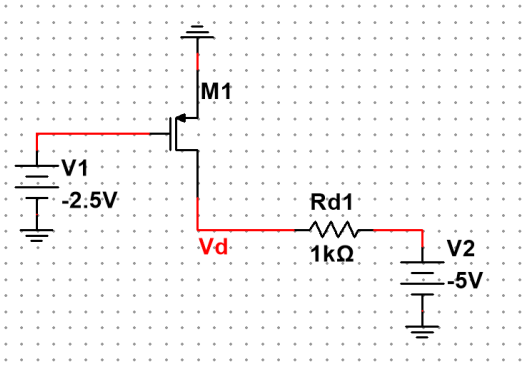

Figure 9: Schematic for PMOS using CD4007P (β=102mA/V2, V_{TN}=2.0V) ▲

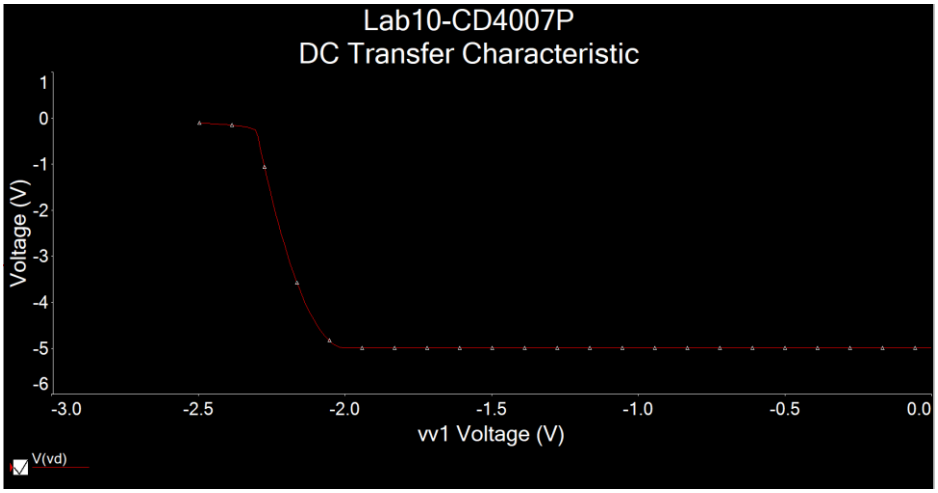

Figure 10: Simulation of PMOS characterization circuit using DC sweep of V1 from -2.5 to 0V, while V2 = -5V ▲

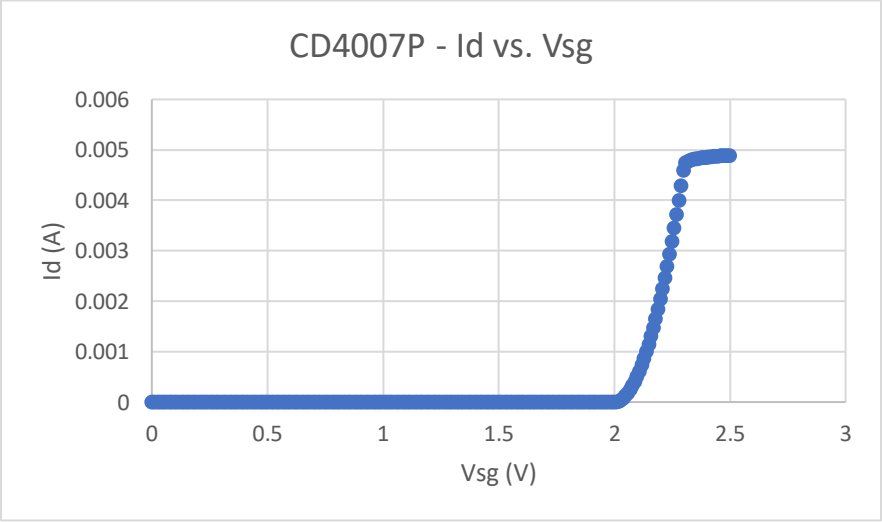

Figure 11: Excel plot of PMOS characterization circuit using DC sweep of V1 from -2.5 to 0V, while V2 = -5V, where Id = (Vd+5)/1000 ▲

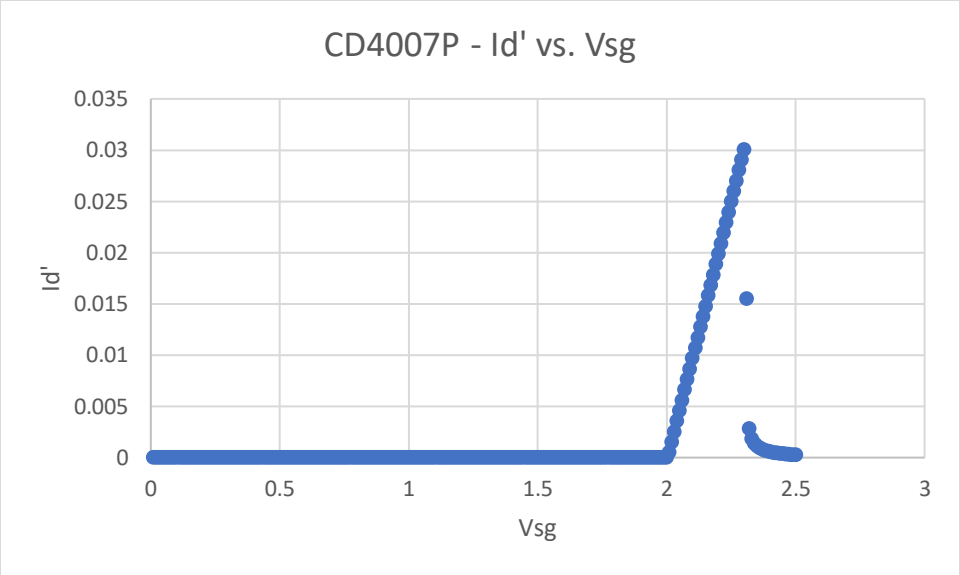

Figure 12: Excel plot of PMOS characterization of derivative of Id' vs. Vgs▲

Threshold Voltage Vt = **2.01V**

Transconductance parameter = (0.03009-0)/(2.3-2.01) = **0.1037**