Lab 10: Characterization of the MOSFET

ECEN 325 - 511

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Date Performed: November 16, 2021

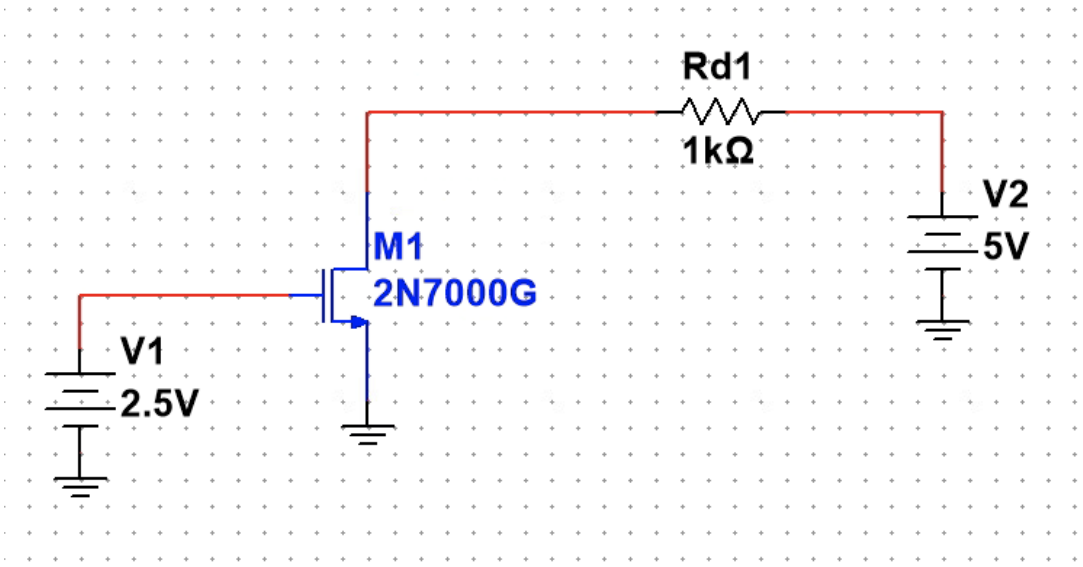
Due Date: November 23, 2021

Purpose

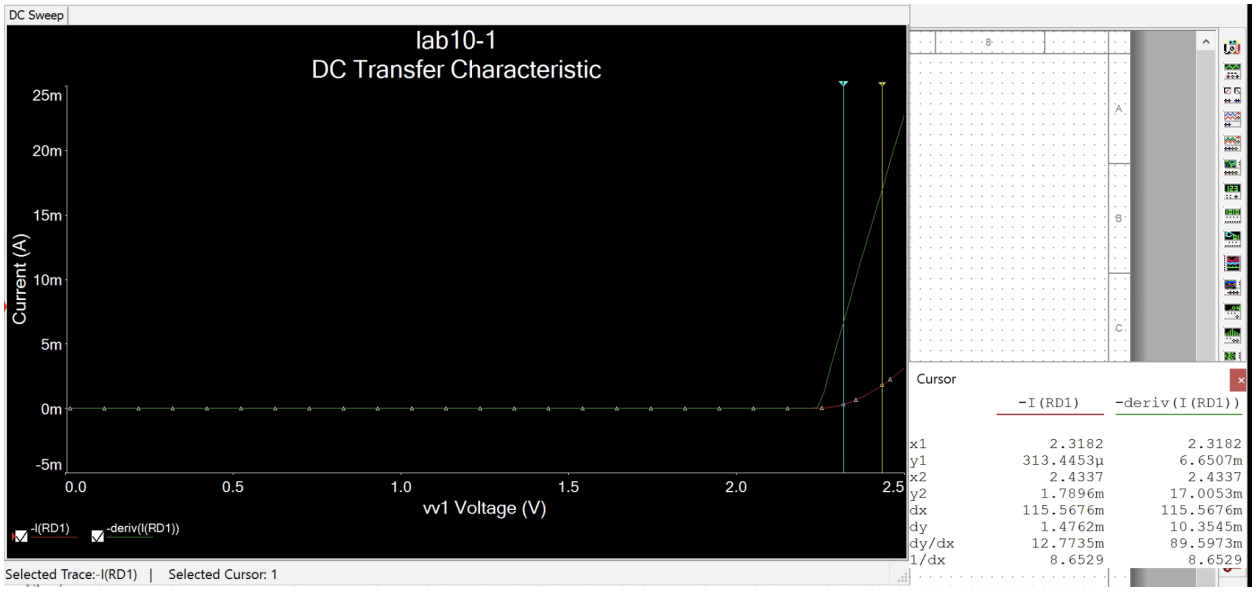
The objective of this lab was to be able to characterize a N and P type metal-oxide-semiconductor field-effect transistors, also known as PMOS and NMOS.

Simulations (on Multisim)

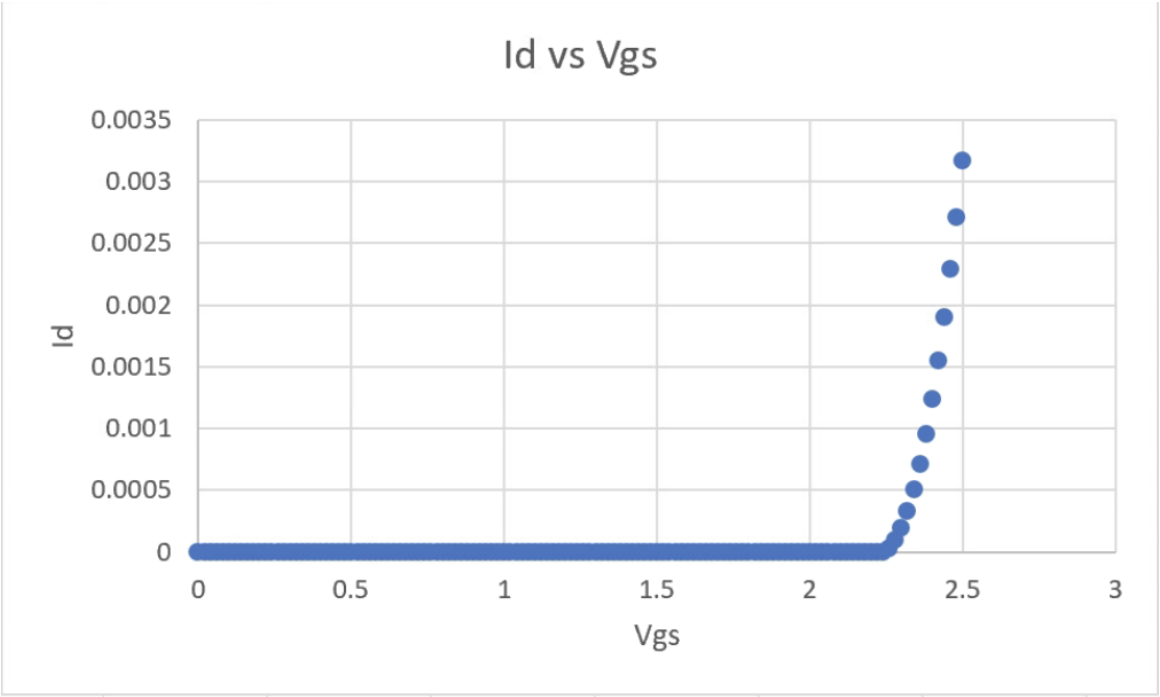
2N7000G Schematic



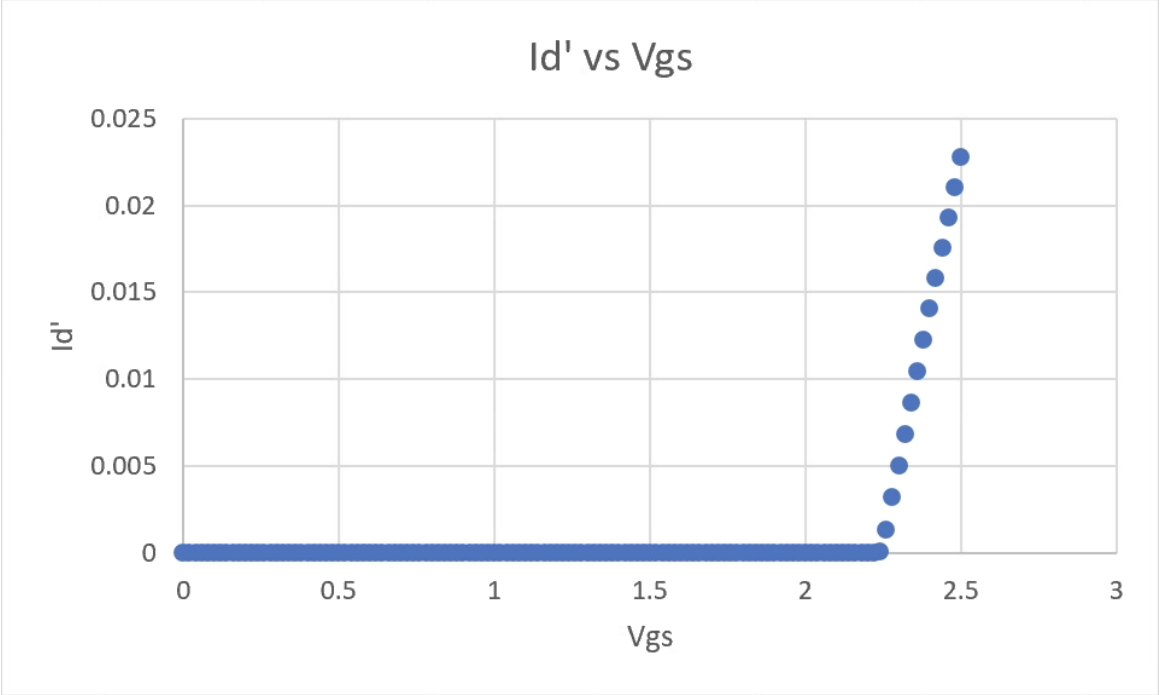
2N7000G transistor DC Sweep



2N7000G transistor DC Sweep Id vs Vgs

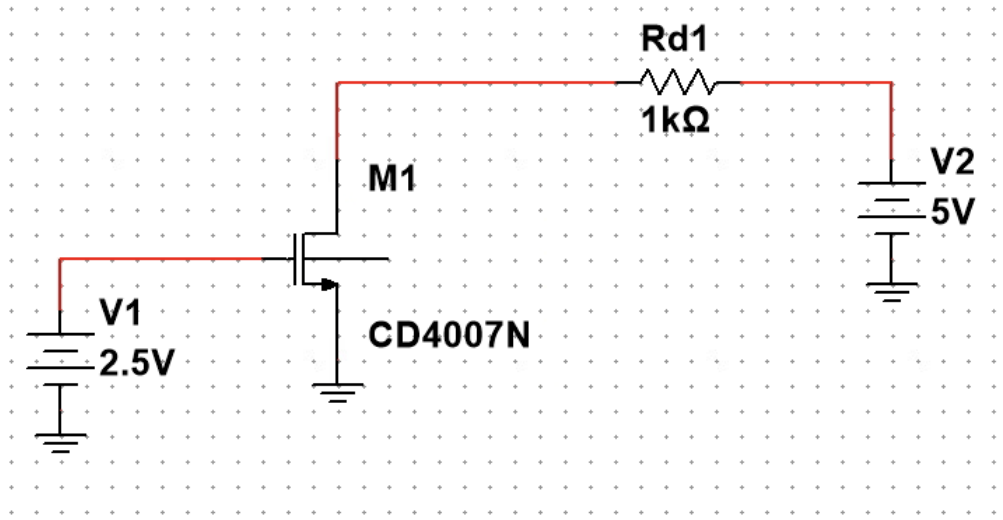


2N7000G transistor DC Sweep Id' vs Vgs

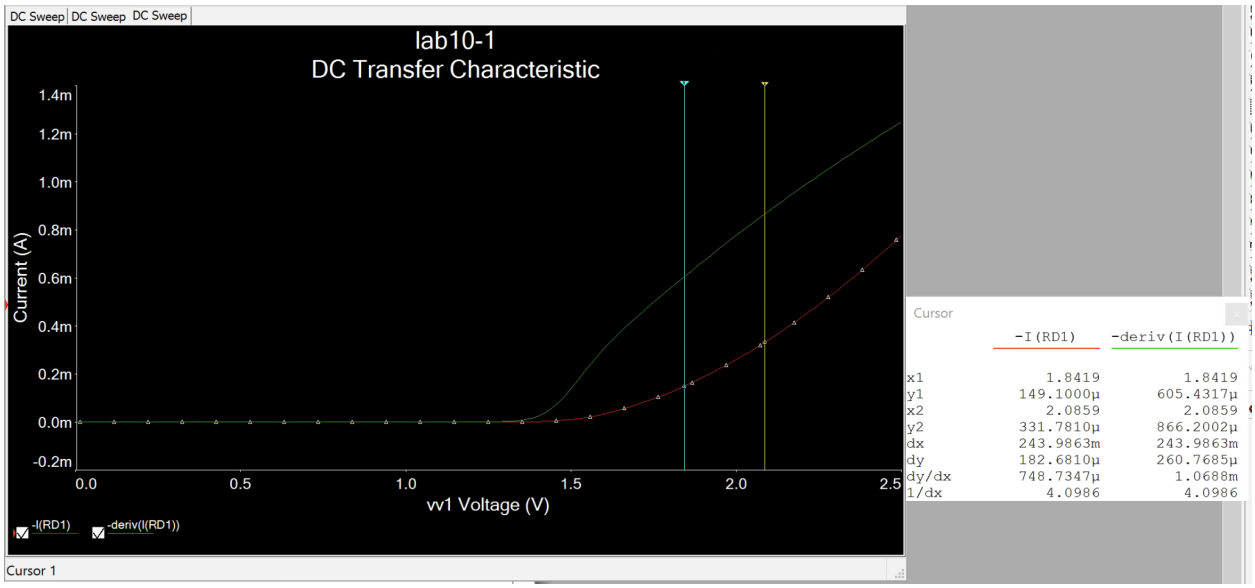


Threshold Voltage - 2.24 V
Transconductance- 89.5973 mA

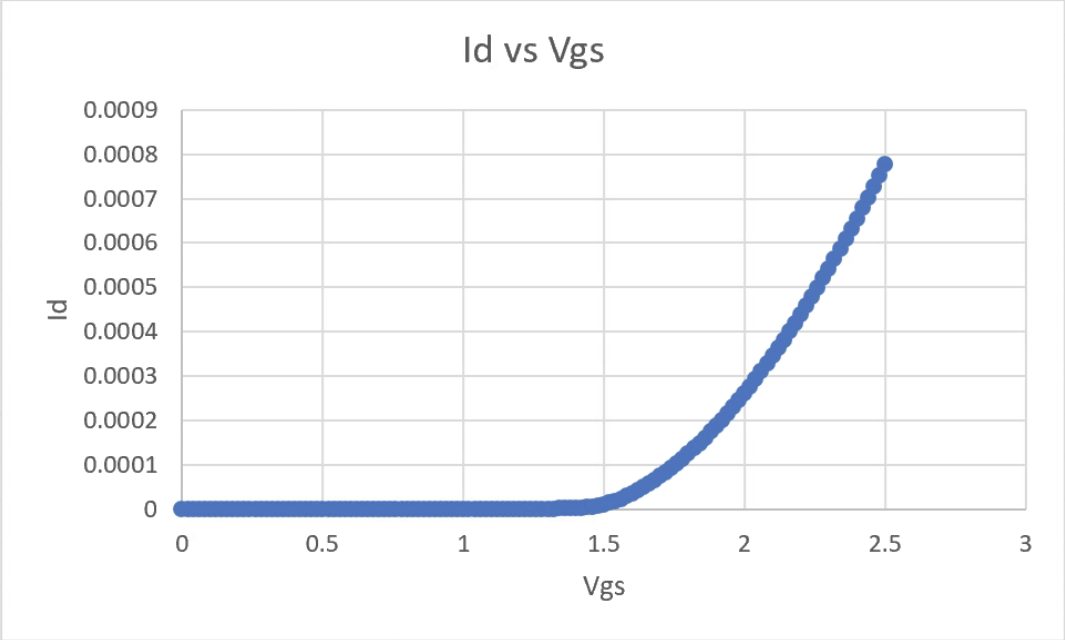
CD4007N Schematic



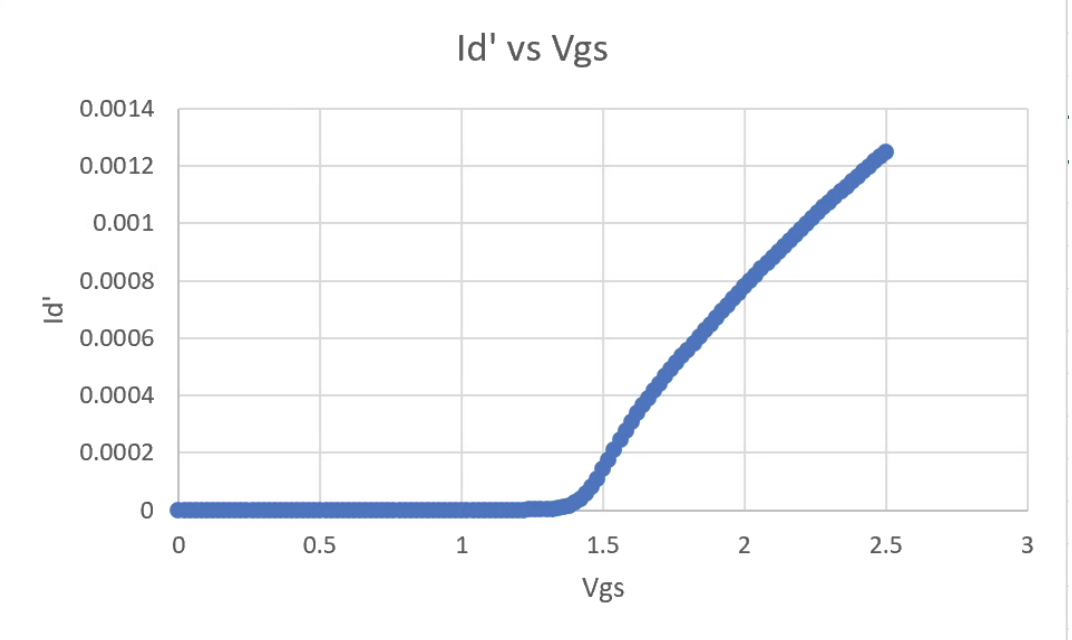
CD4007N transistor DC Sweep



CD4007N transistor DC Sweep Id vs Vgs

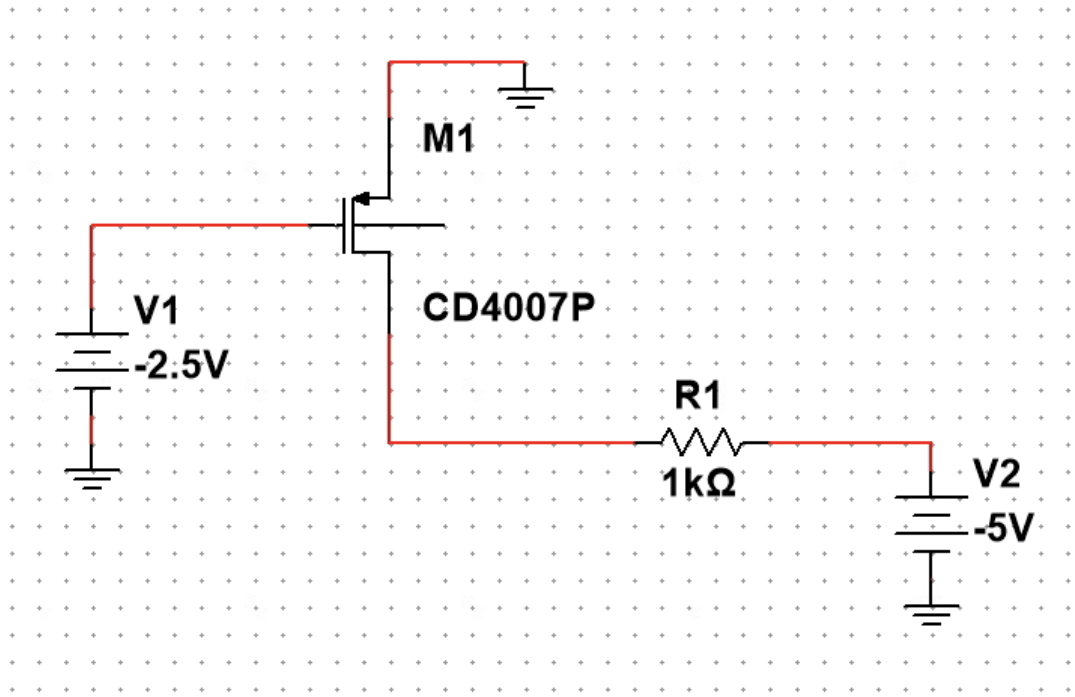


CD4007N transistor DC Sweep Id' vs Vgs

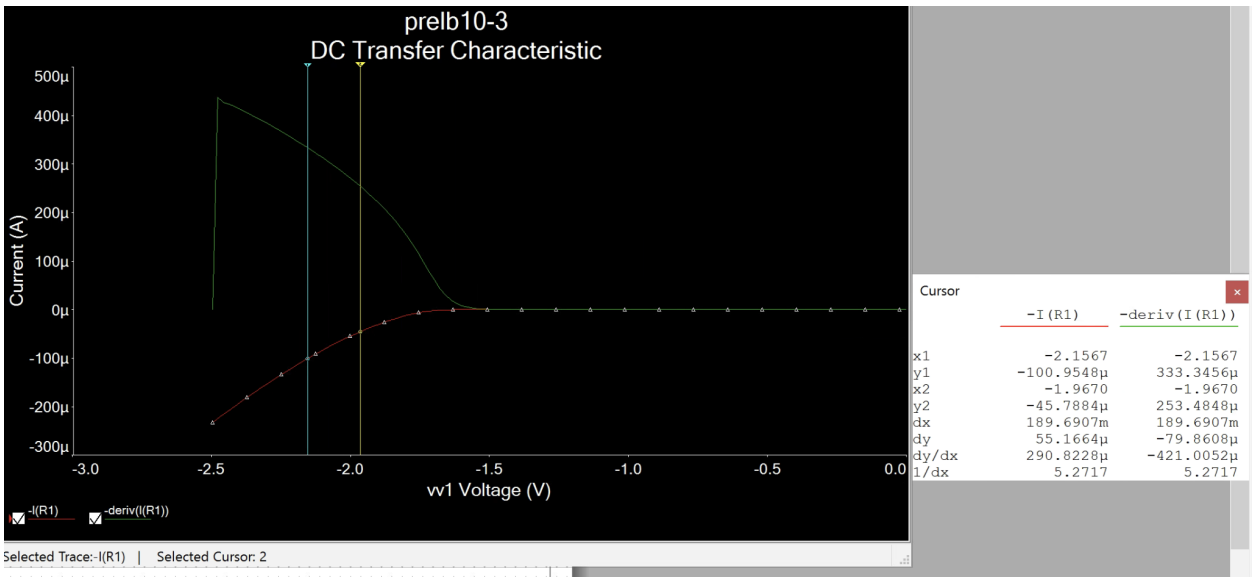


Threshold Voltage - 1.354 V
Transconductance - 1.0688 mA

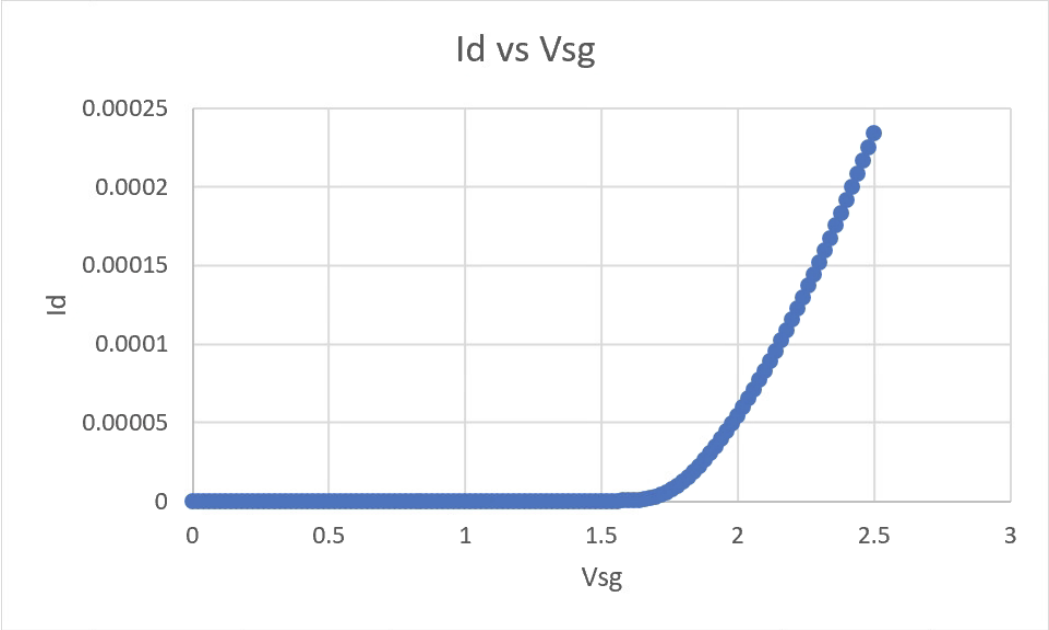
CD4007P Schematic



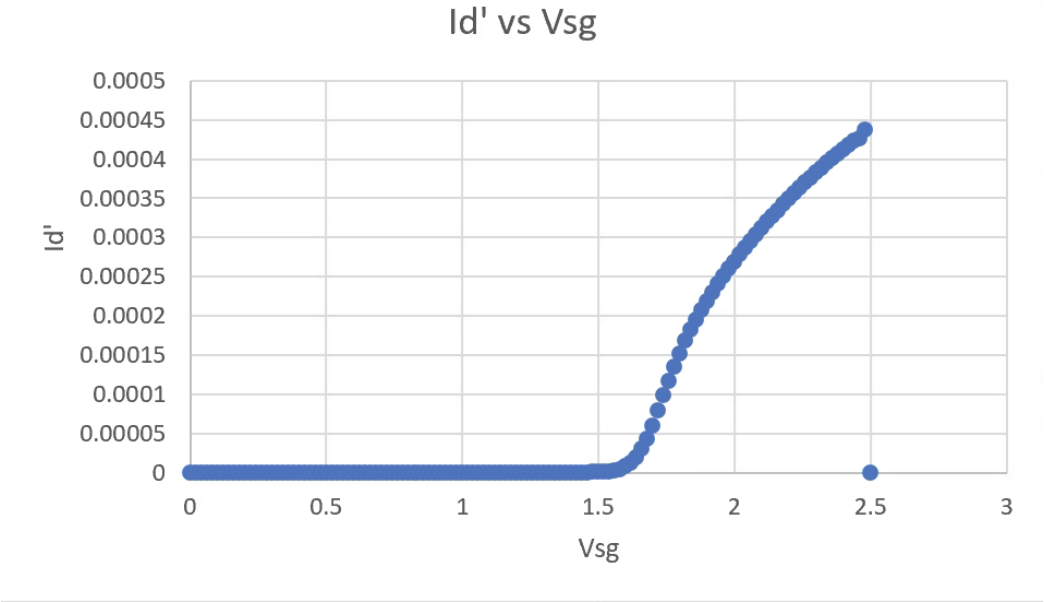
CD4007P transistor DC Sweep



CD4007P transistor DC Sweep Id vs Vsg



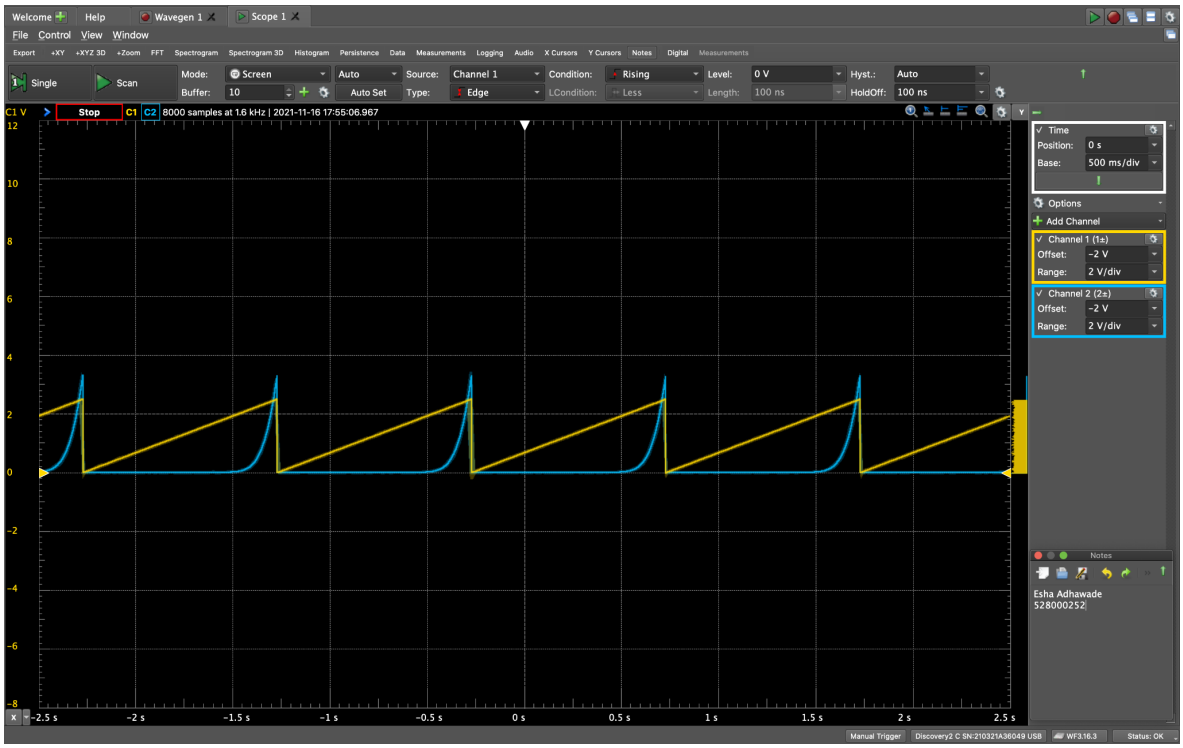
CD4007P transistor DC Sweep Id' vs Vsg



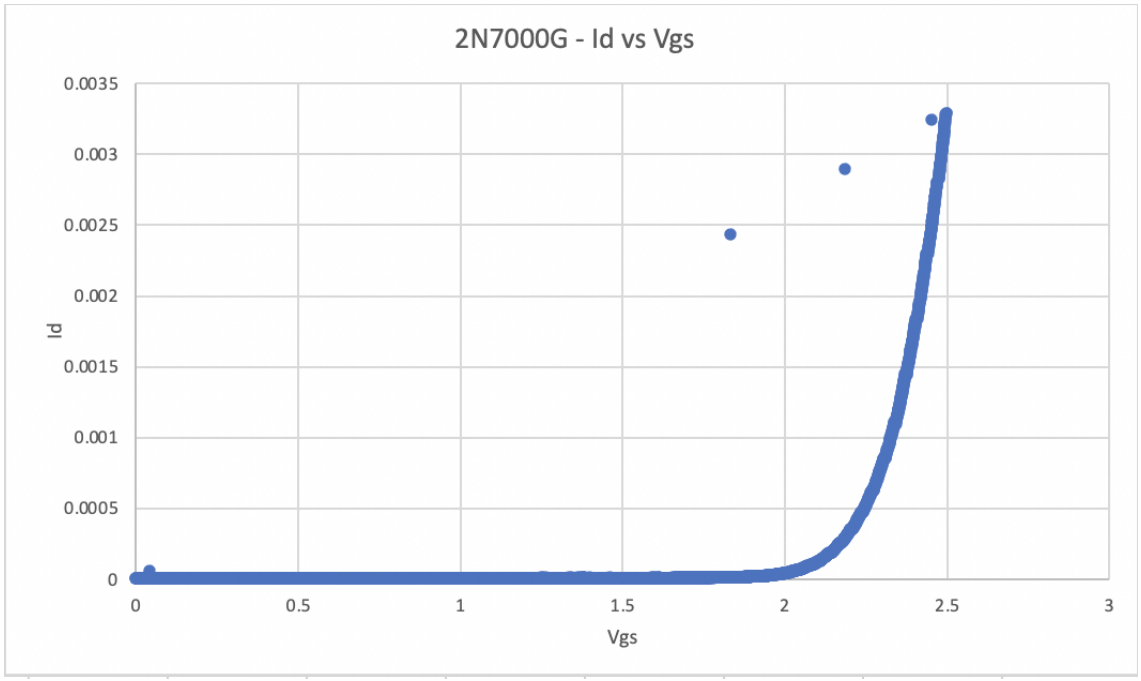
Threshold Voltage - 1.567 V
Transconductance - -421.0052 uA

Measurements

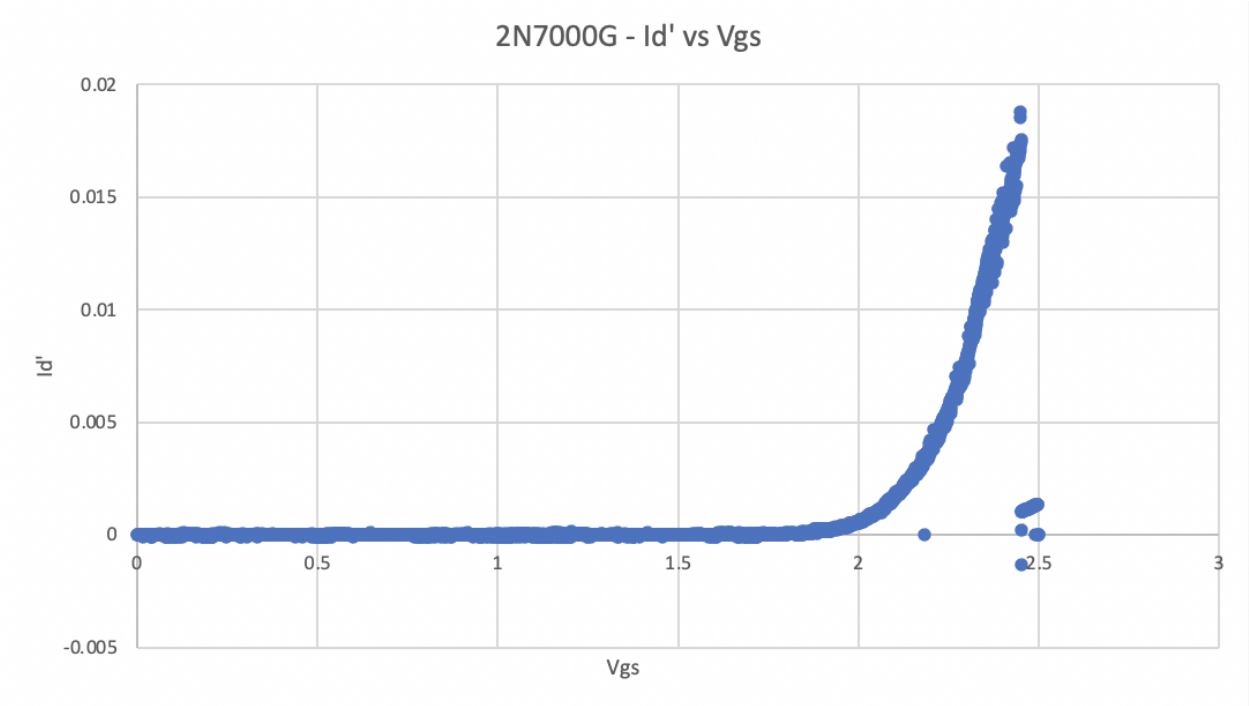
2N7000G transistor transient



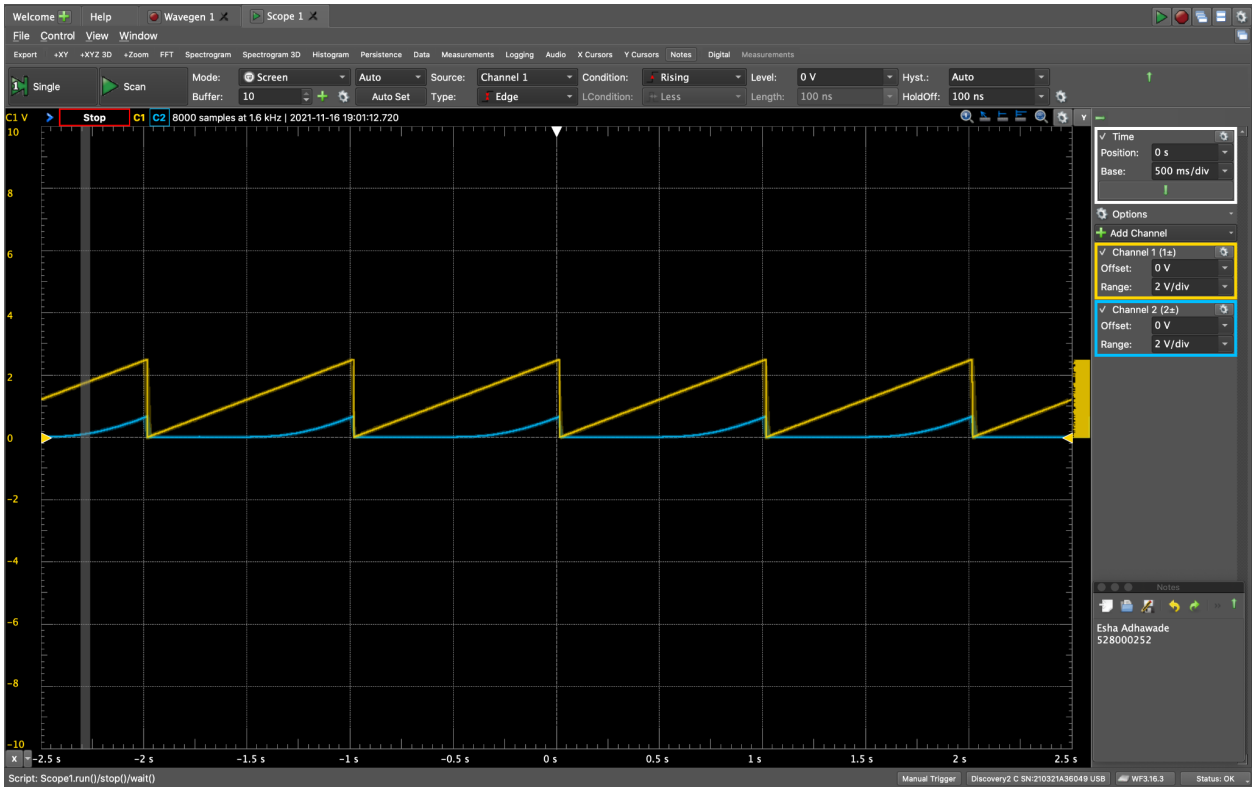
2N7000G transistor Id vs Vgs



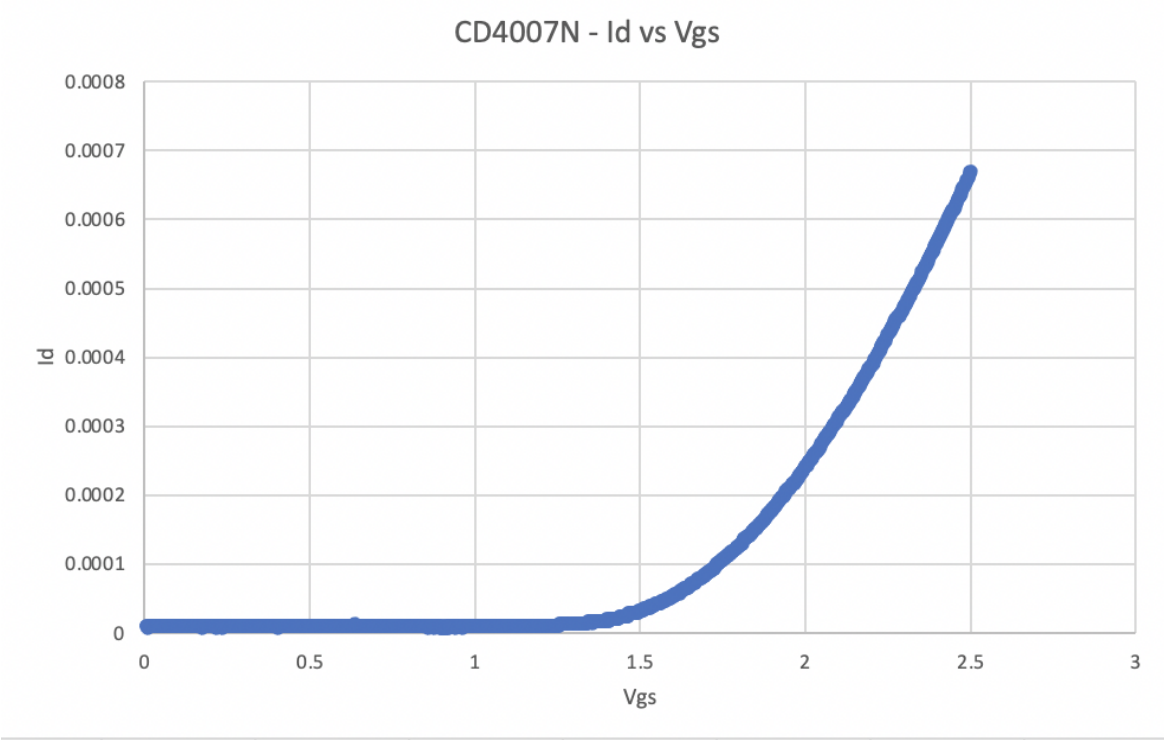
2N7000G transistor Id' vs Vgs



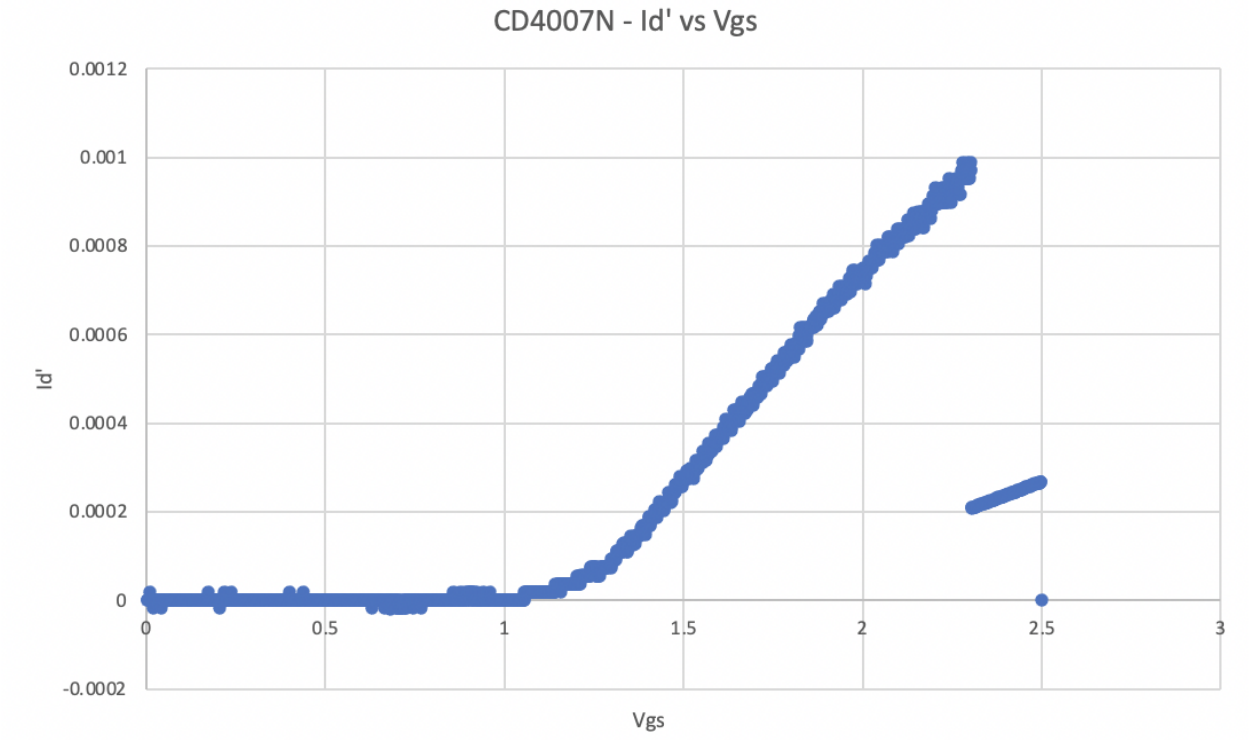
CD4007N transistor transient



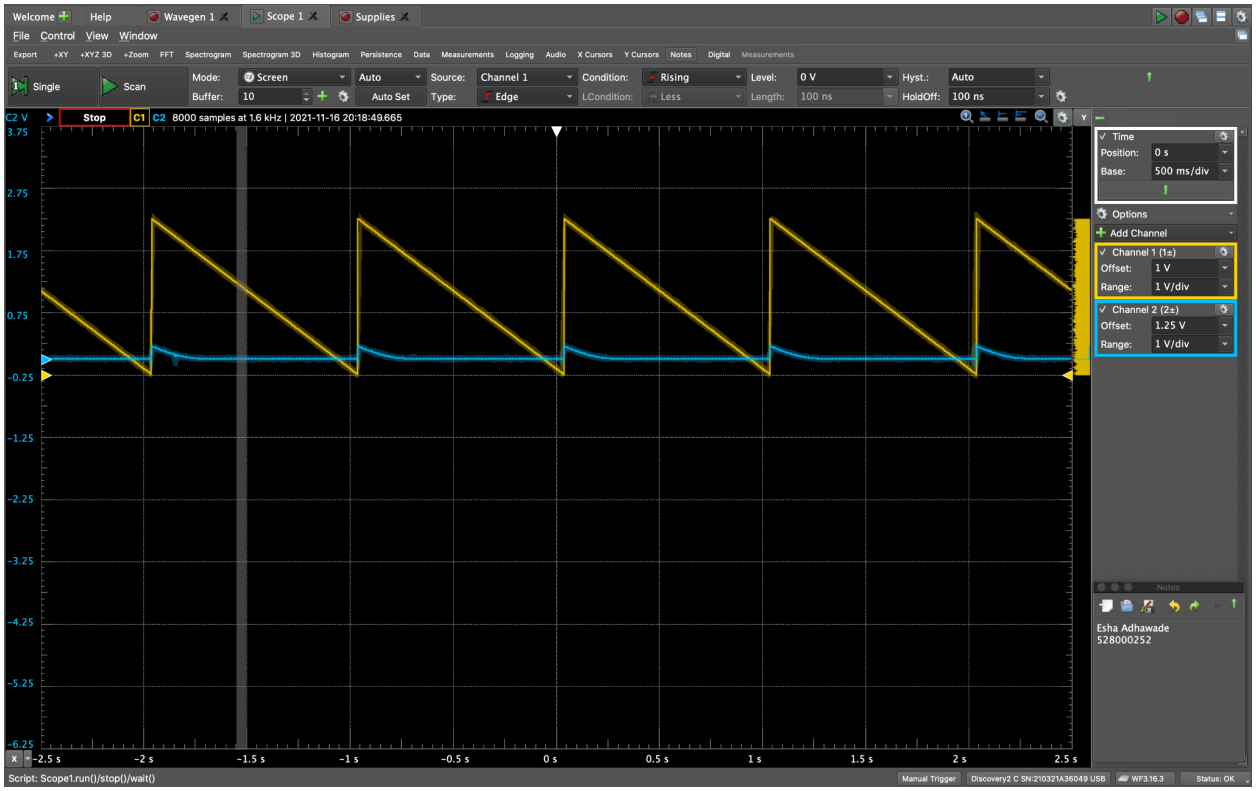
CD4007N transistor Id vs Vgs



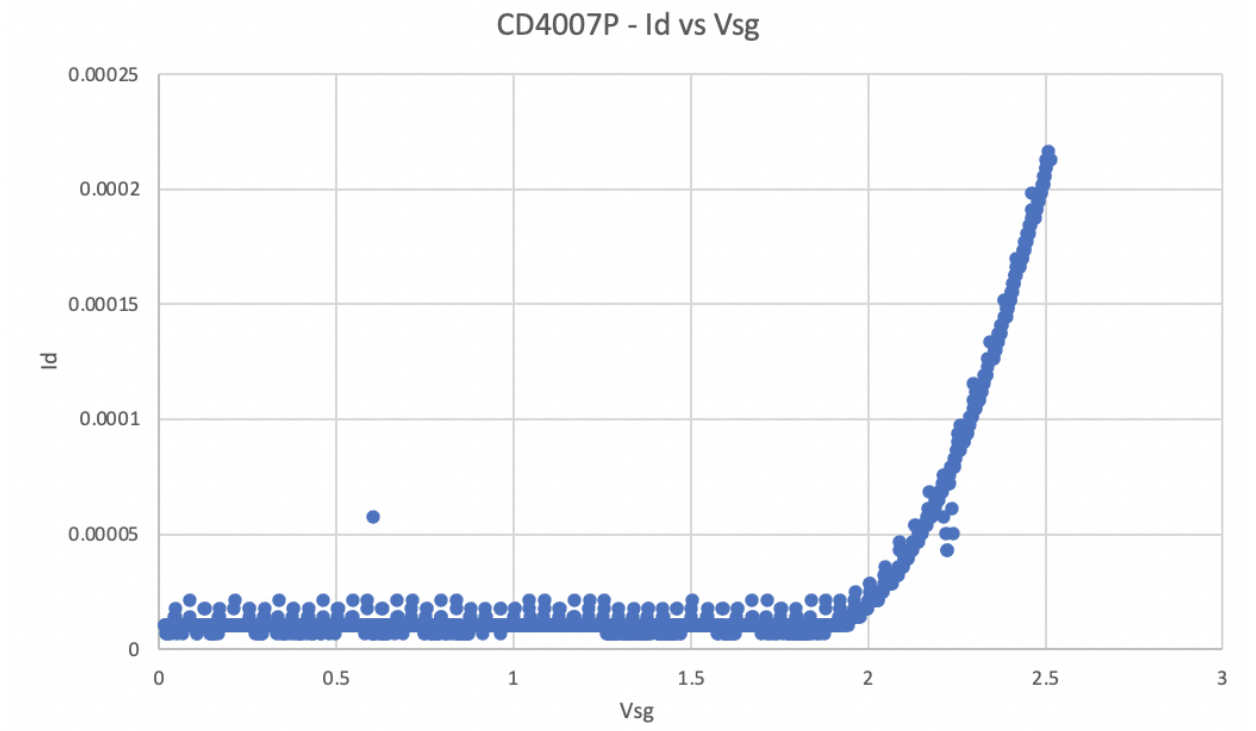
CD4007N transistor Id' vs Vgs



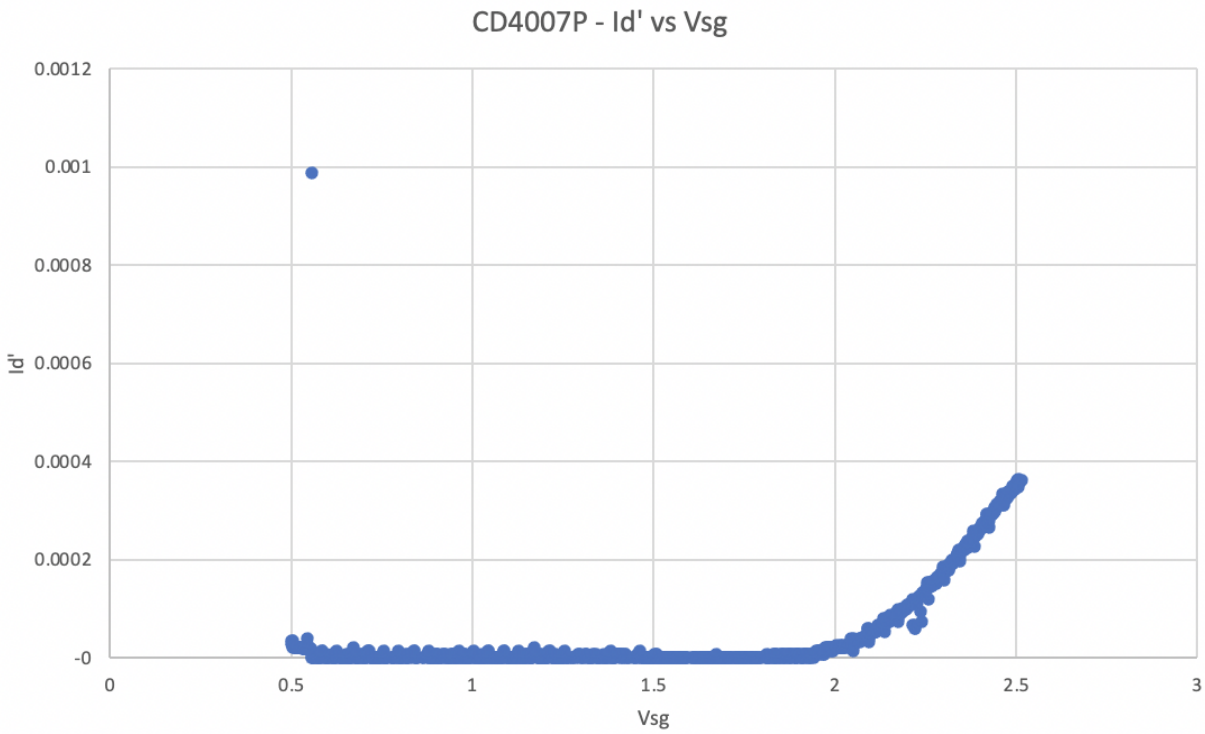
CD4007P transistor transient



CD4007P transistor Id vs Vsg



CD4007P transistor Id' vs Vs



Data Tables

Simulations

	Vt	**β**
2N7000G	2.24 V	89.5973 mA
CD4007N	1.354 V	1.0688 mA
CD4007P	1.567 V	-421.0052 uA

Measurements

	Vt	**β**
2N7000G	2.154 V	0.025 A
CD4007N	1.442 V	0.0019 A
CD4007P	1.941 V	0.00131 A

Discussion

For lab 10, students learned to characterize N and P type metal-oxide-semiconductor field-effect transistors. Most of the values between the simulations and measurements were pretty consistent for the circuits. If there were any minor differences, that's probably because of component differences, old breadboards, or loose wires.