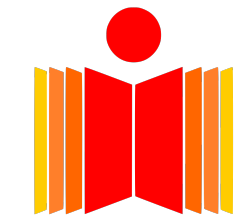
Experiment 1



Bachelor of Technology

Department of Electrical Engineering

Arjun Pavanje (EE24BTECH11005)

August 11, 2025

0.1 Aim

To characterize the electrical behavior of diodes, BJTs, and MOSFETs by plotting their I-V characteristics through simulations (LTspice).

0.2 Apparatus

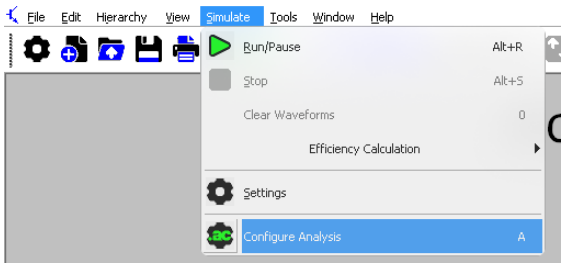
Laptop

0.2.1 Basic Procedure

,

1. Opening components menu,

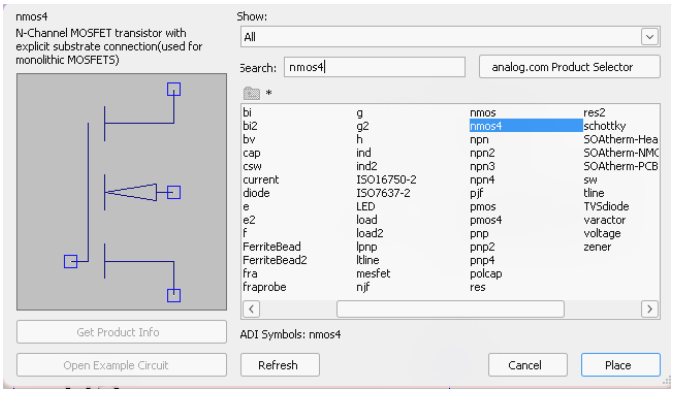
2. Modifying DC-Sweep settings,



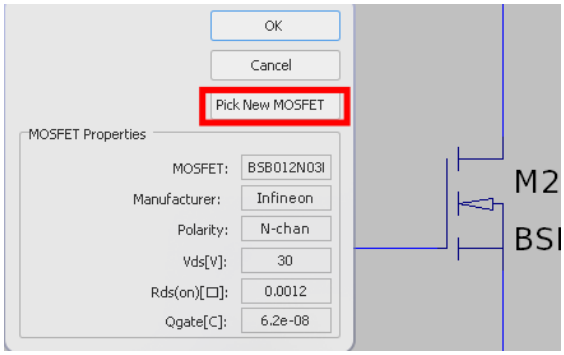
3. Running simulation,

0.2.2 MOSFET

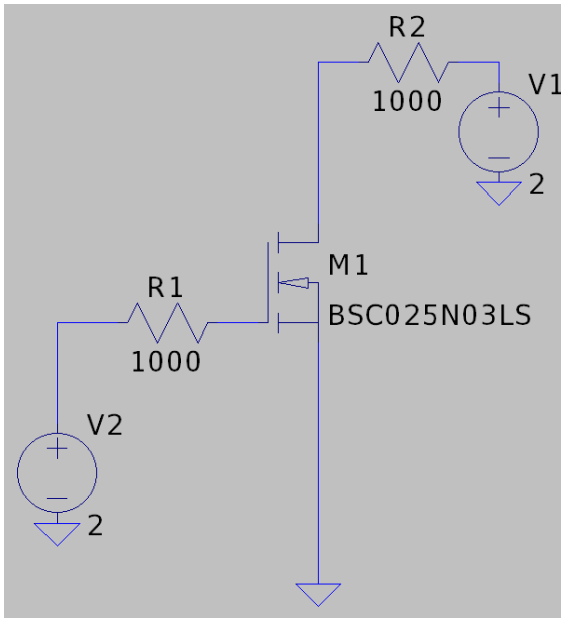
1. Select the MOSFET (shown in the figure), 2 resistors, 2 voltage sources.



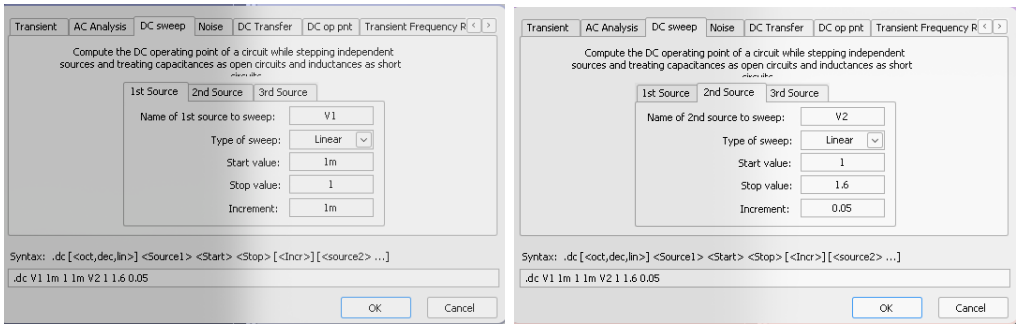
2. Select an appropriate commercially available model of the nmos,



3. Connect the circuit as shown,



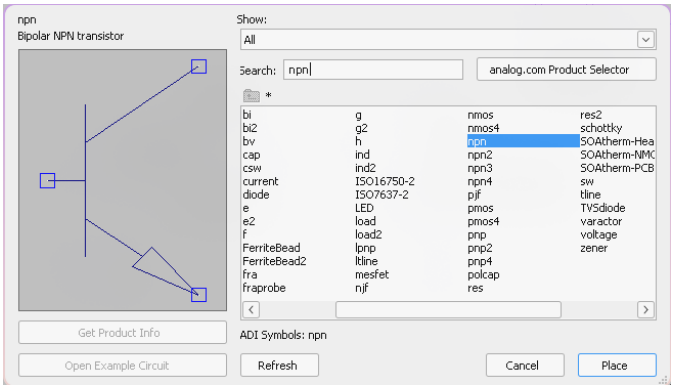
4. Configure DC sweep settings from the *Simulate* bar. These were the settings used in this case,



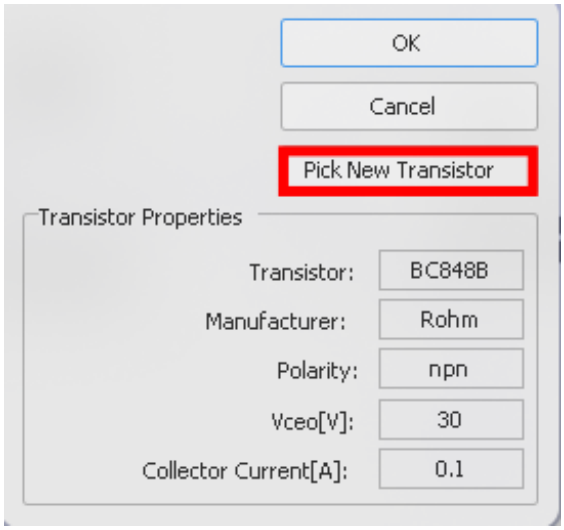
5. Run the simulation

0.2.3 BJT

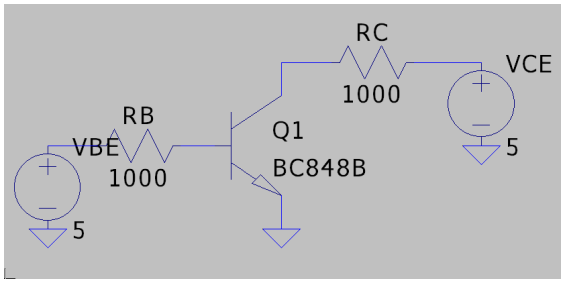
1. Select the BJT (shown in the figure), 2 resistors, 2 voltage sources.



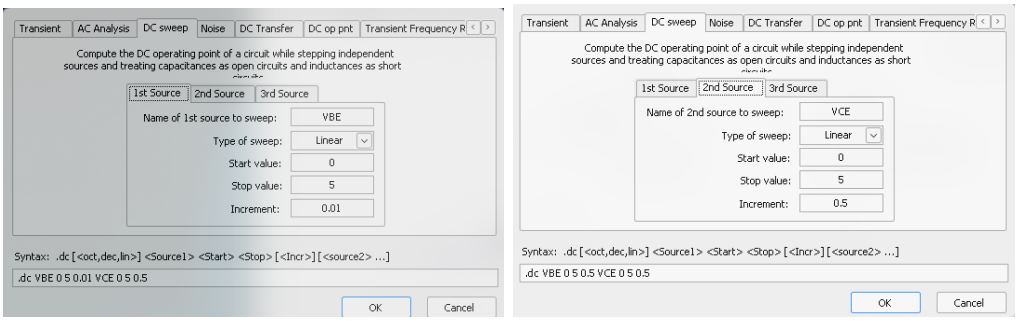
2. Select an appropriate commercially available model of the npn transistor,



3. Connect the circuit as shown,



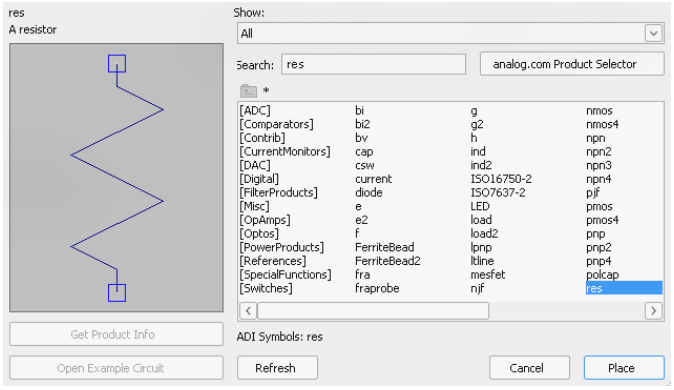
4. Configure DC sweep settings from the *Simulate* bar. These were the settings used in this case,



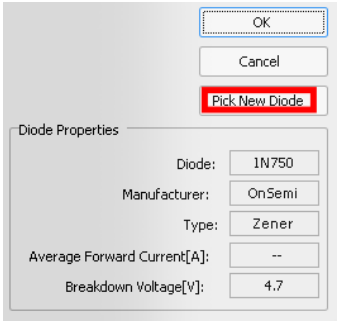
5. Run the simulationi

0.2.4 Diode

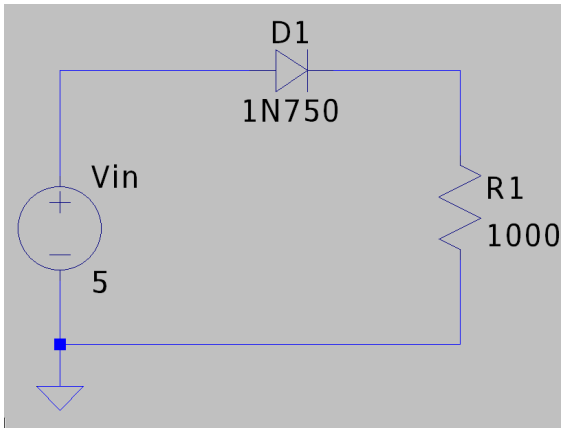
1. Select the diode (shown in the figure), a resistor, a voltage source.



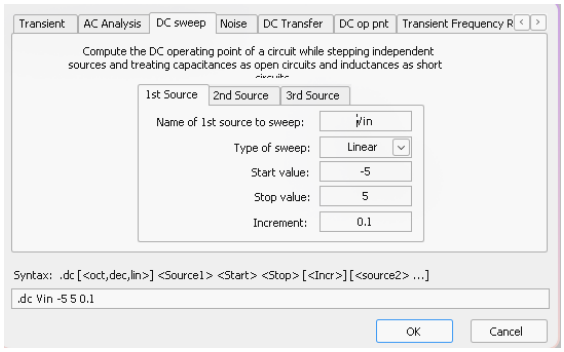
2. Select an appropriate commercially available model of the npn transistor,



3. Connect the circuit as shown,



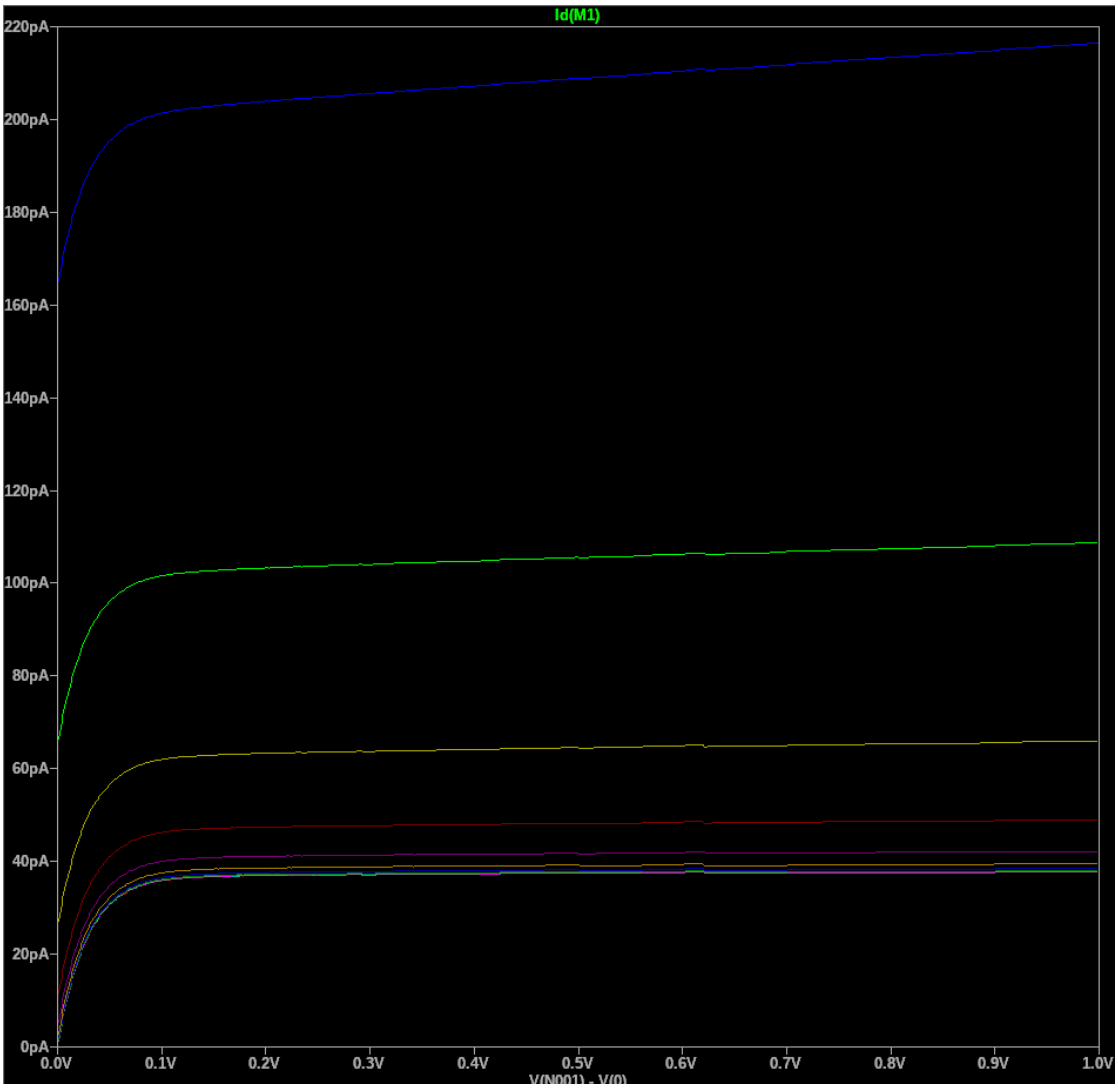
4. Configure DC sweep settings from the *Simulate* bar. These were the settings used in this case,



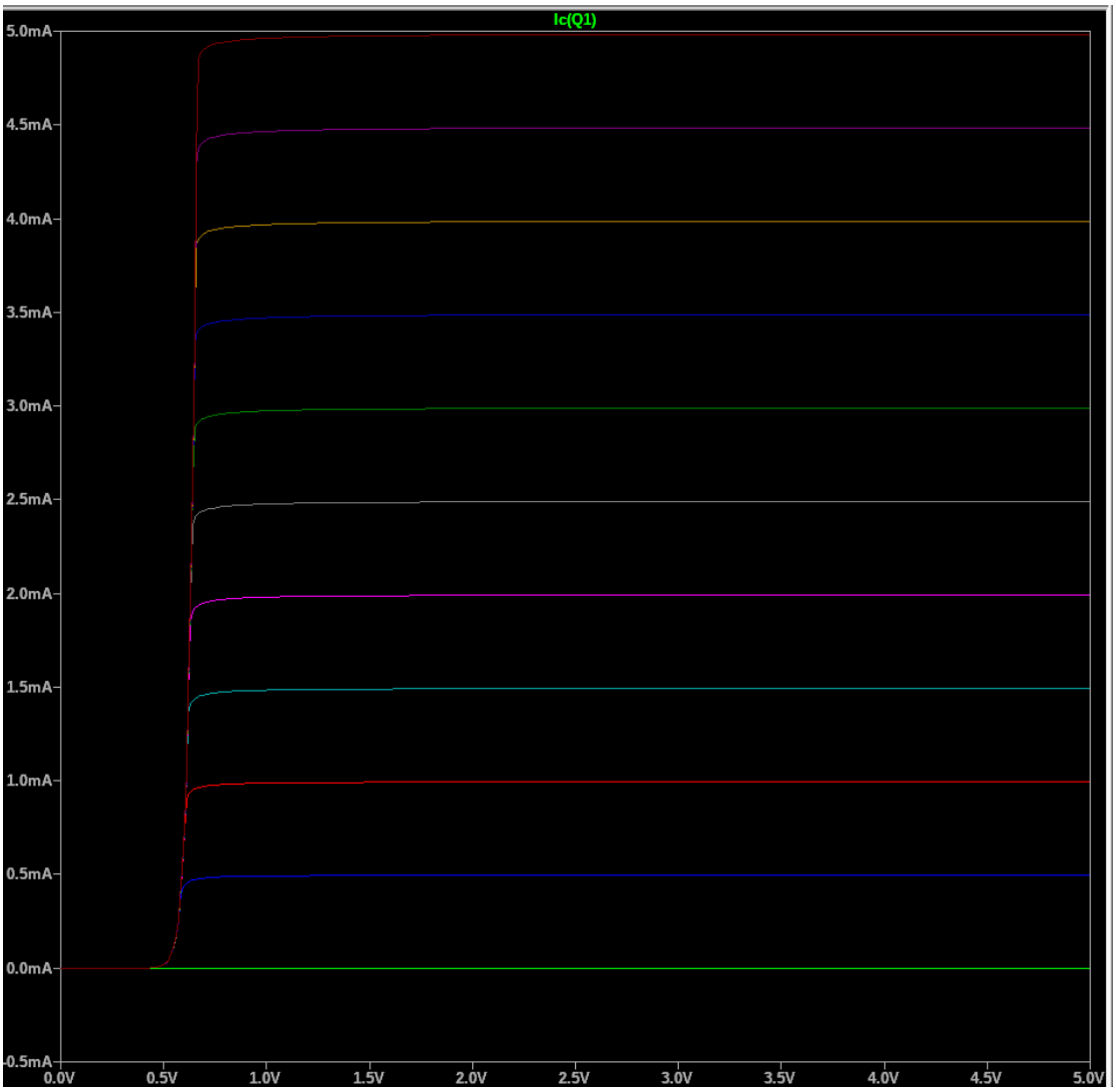
5. Run the simulation

0.3 Plots

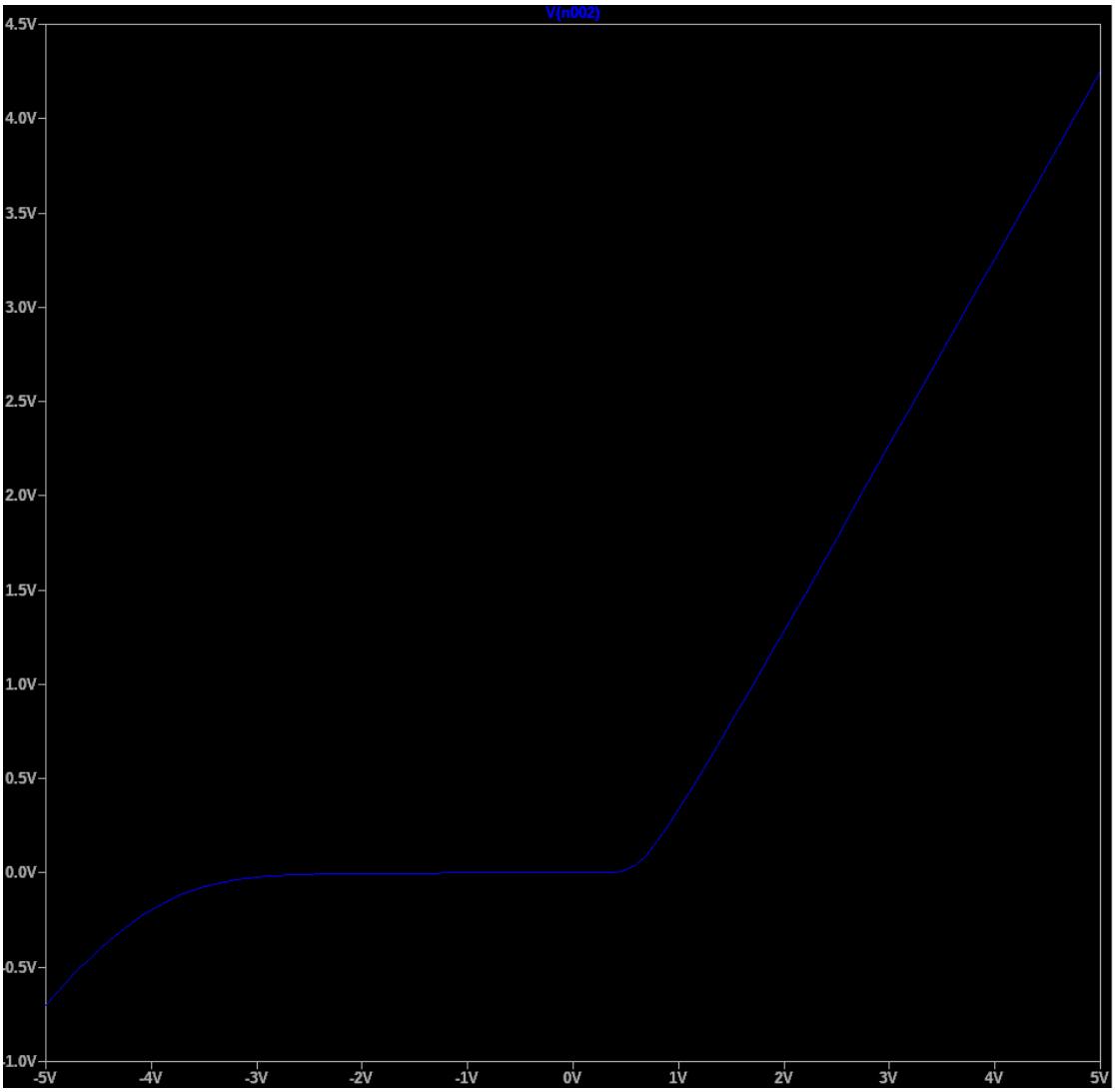
0.3.1 MOSFET



0.3.2 BJT


Ic(Q1)
5.0mA
4.5mA
4.0mA
3.5mA
3.0mA
2.5mA
2.0mA
1.5mA
1.0mA
0.5mA
0.0mA
-0.5mA
0.0V
0.5V
1.0V
1.5V
2.0V
2.5V
3.0V
3.5V
4.0V
4.5V
5.0V

0.3.3 Diode



0.4 Conclusion

VI characteristics of MOSFET, BJT, diode have been plotted using LTspice software.