

ECE 332 Lab 1

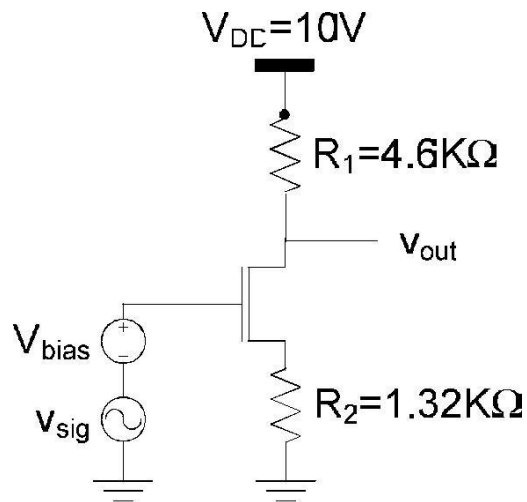
Experiment with Common Source Amplifier with Degeneration

Objective:

1. Design, build, and measure a MOS common source amplifier with source degeneration
2. Reinforce the concept and procedure of performing basic measurement tasks for electronic circuits. The tools and instrument used in this lab include:
 - a. Labview
 - b. Scope
 - c. Function generator
 - d. Multi-meter

Common Source Amplifier Circuit:

The circuit to be experimented in this lab is shown in Figure 1. The circuit bias is set in such a way that output DC voltage is half of V_{DD} . The required input DC bias is 4V ish. You need to build the circuit on a breadboard and perform the required measurement tasks described below.



Devices needed for Experiment:

ALD 1106 for NFET

Download the SPEC sheet from your course website.

Lab Measurements and Questions:

1. Use Labview to measure the MOSFET characteristics. You will need to plot I_D vs V_{DS} and I_D vs V_{GS} . Use a rail to rail voltage of 10V.
2. Build the circuit, making sure you measure the resistor values. Evaluate the DC values for V_G , V_S and V_D to ensure that the DC operating point is what's expected.
3. Measure the small signal voltage gain with a sinusoidal input at a frequency of 10 KHz.
4. Now sweep the input signal frequency from 10Hz to 10MHz.
5. Use Labview to measure the voltage gain as a function of frequency, and determine the -3dB point (70% of the low frequency gain).
6. Record phase shift of all the frequency points during the sweep and generate a phase shift plot aligned with the gain-frequency plot (Bandwidth plot) from Labview.

Lab Report Requirement:

1. Briefly describe the role each component in the circuit plays.
2. Present the small signal input/output waveforms and illustrate the relationships between the input and the output (gain and phase relationships).
3. Present the frequency response of the circuit with a plot for gain and phase shift as a function of input frequency.
4. Discuss the measurement results related to the characteristics of a common source amplifier. Provide your observations of the experiment.