

EEE210 : Electronic Circuits and Devices

Lab #5 : MOSFET Static Characteristic and Biasing

Experimental work : Use the N-channel enhancement type MOSFET 2N7000 or an equivalent.

1. Start *Multisim* and set the simulation temperature to that which has been assigned to you. To do so, click on the tab **Simulate > Analyses and Simulation** to open the window shown in figure 1. Proceed as in the figure to set the operating temperature parameter **TEMP**.
2. Build the circuit of figure 2.
3. Measure I_D by varying V_{GS} from 0 V to about 4.5 V; V_{GS} is set by the **Offset** of the function generator (make sure its amplitude is almost 0). Record the values in the spreadsheet `MOSFET-parametersEstimation.ods` (*Libre Office*) or `MOSFET-parametersEstimation.xlsx` (*Excel*) available from the web page (I_D in mA and V_{GS} in V). Only 5 to 10 measurements are required.
4. Using the *spin buttons* in the spreadsheet, estimate the values of K and V_t for which the theoretical curve best matches the experimental measurements.
5. Build the circuit of figure 3. Measure I_D , V_{GS} and V_{DS} .
6. The pin out of the 2N7000 is presented in figure 4. Build the circuit of figure 5. Measure V_{GS} and V_{DS} with a voltmeter. Calculate I_D from those noting that :

$$I_D = \frac{V_{DD} - V_{DS}}{R_S + R_D}$$

Report : Using your estimated values of K , V_t and the component values in the circuit of figures 3, 5, calculate theoretically the Q -point of the MOSFET. Compare the calculated theoretical Q -point with the Q -point measured in parts 5 and 6.

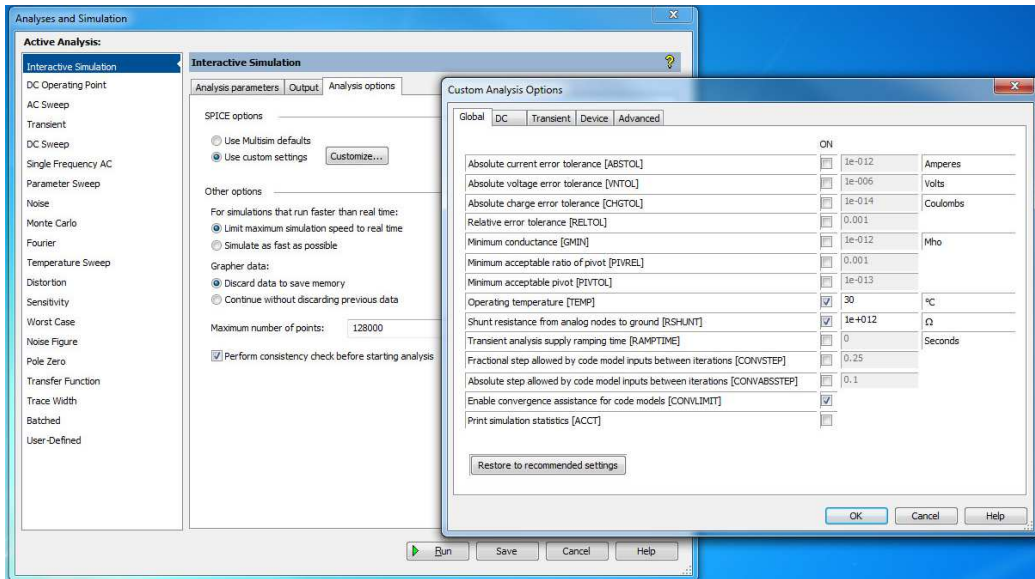


FIGURE 1 –

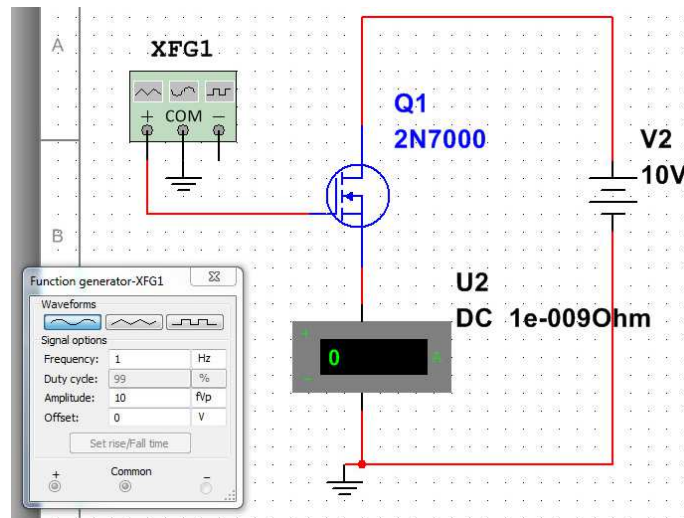


FIGURE 2 –

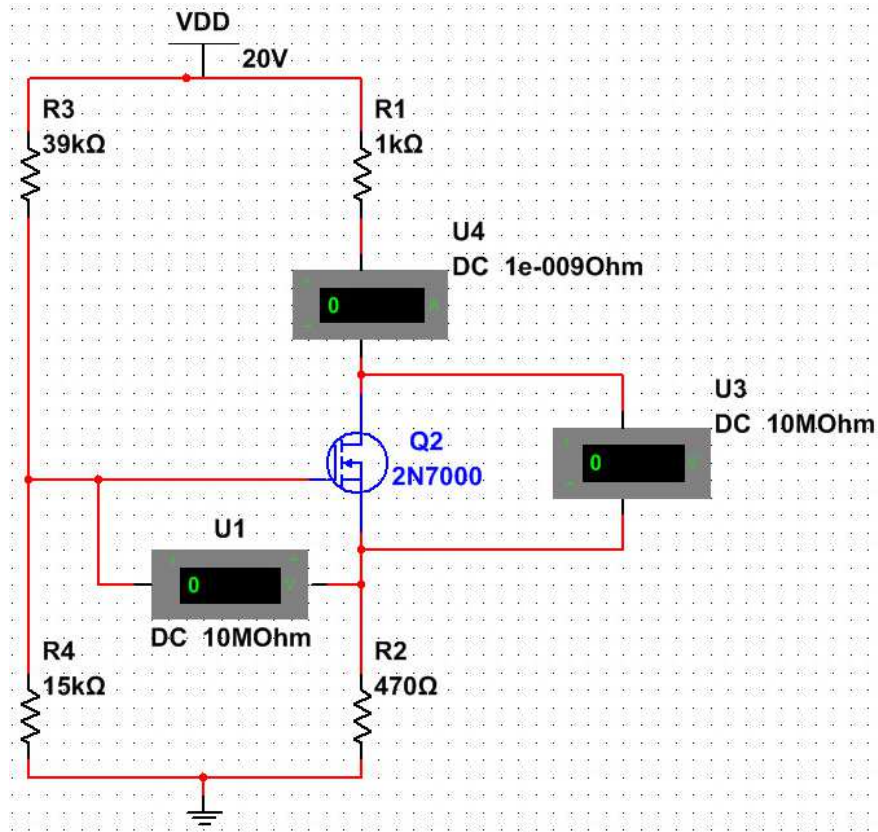


FIGURE 3 –

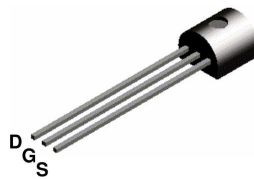


FIGURE 4 –

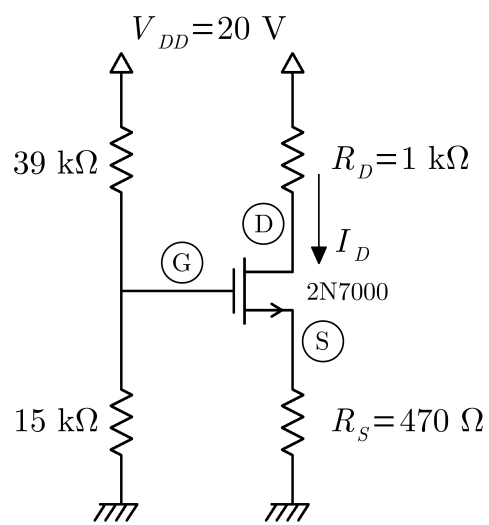


FIGURE 5 -