Electrical and Computer Engineering Department

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ECE 2200L:

Experiment Number 9

Large Signal Characteristics of JFET

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Background Information:

A JFET is a Type of FET that we work with. A JFET is a short for junction field-effect transistor.

Objective:

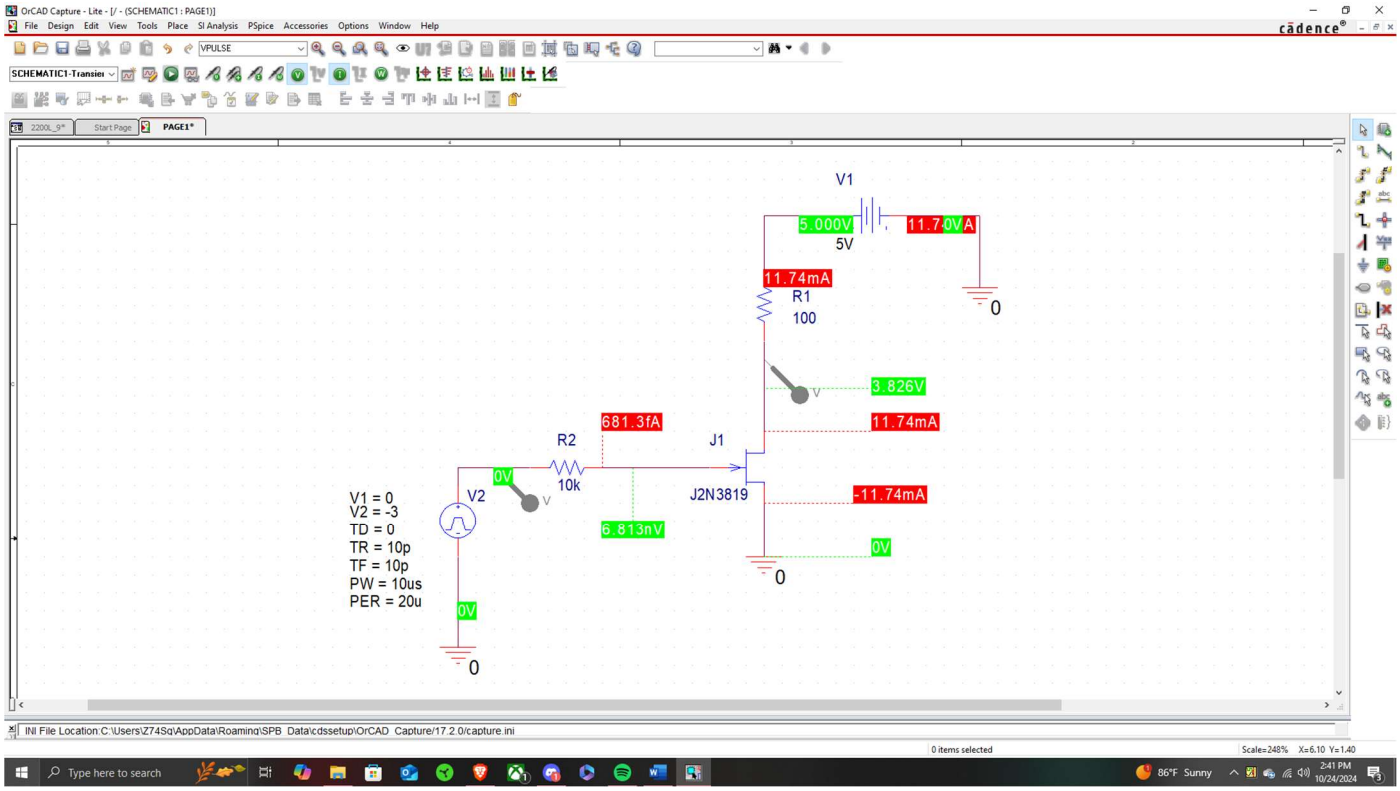
To study the large signal characteristics of a junction gate field-effect transistor though time domain characteristics.

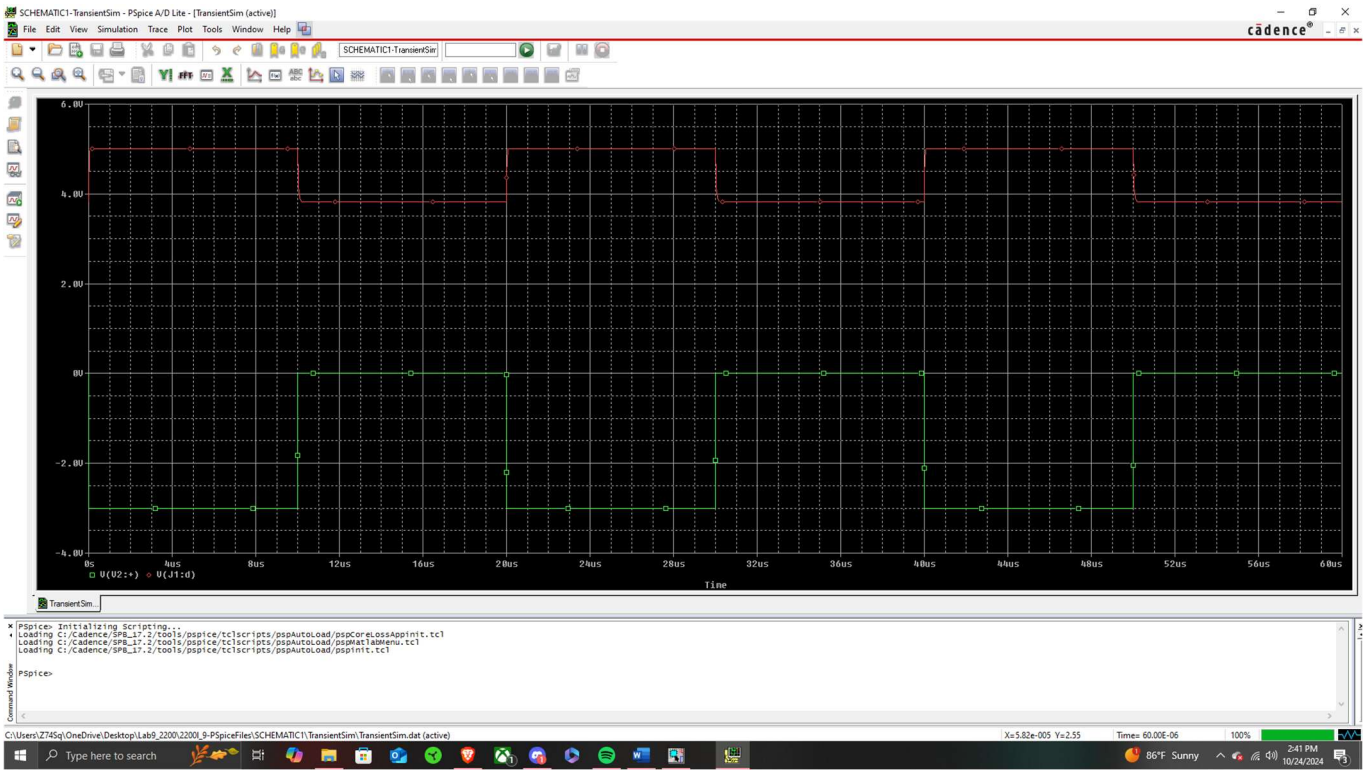
Pre-Lab:

1) Capture the circuit in Figure 2 in PSpice (R1=100 ohms, R2=10K).

   Set your supply (Vin) from 0V to -3V with a pulse width of 10µ.

2) Using Transient Simulation, record both the input waveform and output waveform at the same time.





3) From the input and output signals determine the rise time, fall time and delay parameters of the output voltage.

- The time taken to rise from 10% to 90% of output voltage
Rise Time (T_R) ≈ t(90%) - t(10%) ≈ 20.062 µs - 19.993 µs = 0.069 µs

- The time taken to fall from 90% to 10% of output voltage
Fall Time (T_F) ≈ t(90%) - t(10%) ≈ 30.066 µs - 30.008 µs = 0.058 µs

- The time taken for the output to reach 50% of the output voltage
t_Dr t(out 50%) - t(in 50%) ≈ 20.009 µs - 20.007 µs = 0.002 µs

- The time taken for the output to fall to 50% of the output voltage
t_Df t(out 50%) - t(in 50%) ≈ 30.038 µs - 30.006 µs = 0.032 µs

Lab Report:

1. ***Figure 1:***

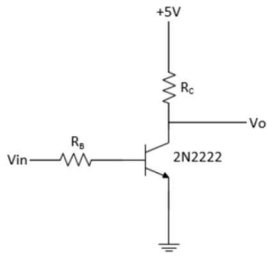


Figure 1

Tr

R2\R1	100	1k	10k
10k	X	X	2.08u
100k	440n	935n	2.2u

Ff

R2\R1	100	1k	10k
10k	X	X	535n
100k	5.6u	6.2us	4.54u

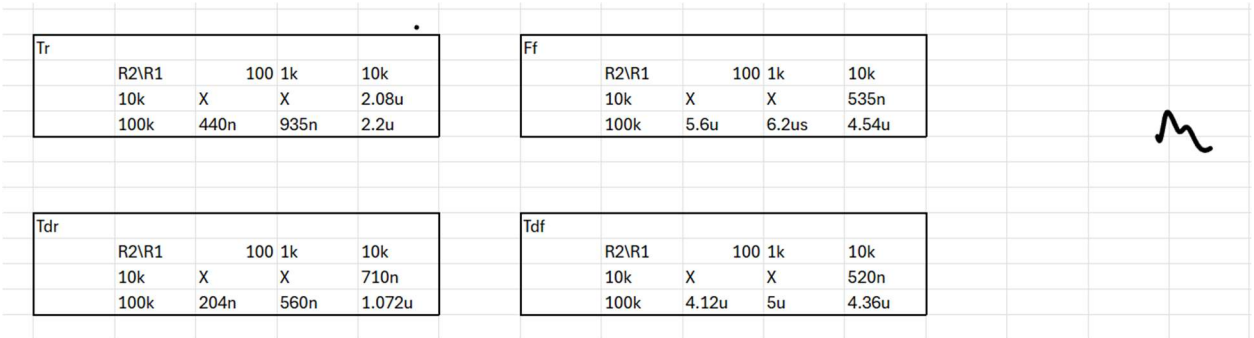
Tdr

R2\R1	100	1k	10k
10k	X	X	710n
100k	204n	560n	1.072u

Tdf

R2\R1	100	1k	10k
10k	X	X	520n
100k	4.12u	5u	4.36u

Signature proof



Scope Image Representing V_{in} and V_{out} vs $time$:

Conclusion:

In this experiment, we constructed a circuit with varying resistor values to analyze the behavior of a BJT. By adjusting the resistor values, we observed variations in the input and output signals over time. Although the signals remained similar in shape, there were noticeable differences in the rise and fall times, as well as in the time delay between the input and output signals.