Analog Electronics

Laboratory work

FET Amplifiers

Key objective

1. Calculate and measure dc and ac parameter for a common-source amplifier.
2. Calculate and measure dc and ac parameter for a common-drain amplifier.

Components needed

1. Resistors (one of each): 560 Ω,1 kΩ, 3.3 kΩ, 10.0 kΩ, two 470 kΩ
   One BF244 n-channel JFET
   Capacitors (one of each): 0.1 uF, 1.0 uF, 10 uF
2. Resistors (one of each): 1 kΩ, 10.0 kΩ, two 470 kΩ
   One BF244 n-channel JFET
   Capacitors (one of each): 0.1 uF, 10 uF

The Common-Source JFET Amplifier

1. Construct the common-source(CS) amplifier shown in Figure 1. Set the signal generator for a 500 mV_{PP} sine wave at 1.0 kHz. Check the amplitude and frequency with your oscilloscope.

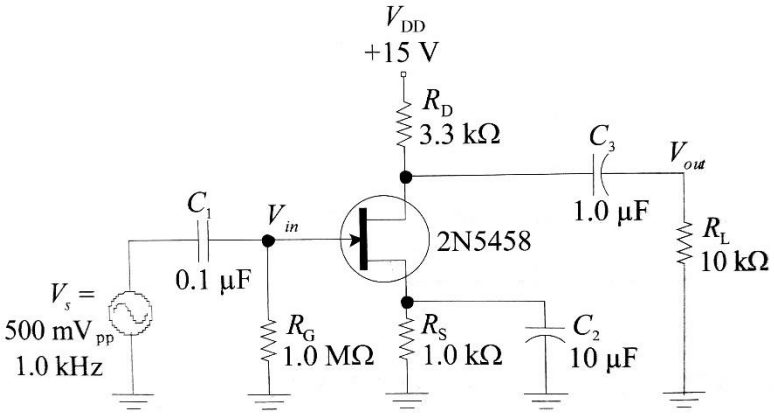

Figure 1

2. Measure the dc voltages listed in Table 1 and compute I_D. Set the function generator for a 500 mV_{PP} sine wave and measure the ac quantities listed. Compare the input and output ac voltage by viewing V_{in} and V_{out} simultaneously. Measure the voltage gain and note the phase difference between the input and output signal. Enter all data from this step in Table 1.

Table 1

Quantity	DC values	AC values
Gate voltage, V_G	0 V	
Source voltage, V_S	0 V	
Drain voltage, V_D	15 V	
Drain current, I_D		
Input voltage, V_{in}		176.8 mV
Output voltage, V_{out}		
Voltage gain, A_V		
Phase difference		

3. Change the load resistor from 10 kΩ to 100 kΩ. Does the gain change?

The Common-Drain JFET amplifier

1. A self-biased common-drain (CD) circuit is shown in Figure 2. Connect the circuit and measure the dc voltage at the drain, source, and gate and compute drain current. Observe the input and output ac voltage with the oscilloscope. Measure the voltage gain and note the phase. Enter the data in Table 2.

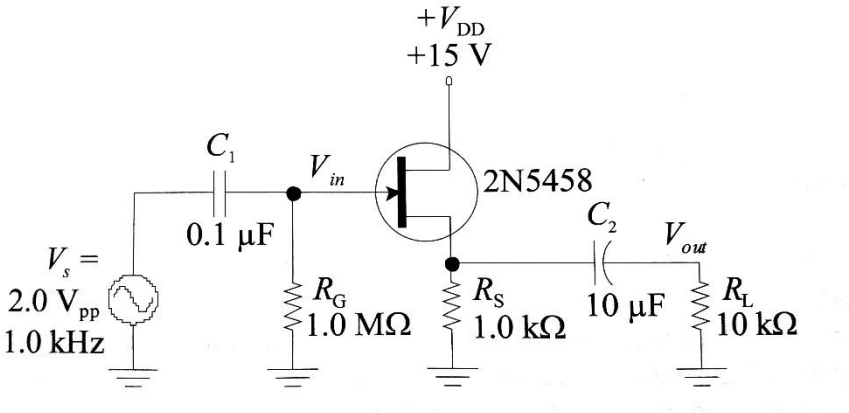

Figure 2

Table 2

Quantity	DC values	AC values
Gate voltage, V_G	0 V	
Source voltage, V_S	1.189 V	
Drain voltage, V_D	15 V	
Drain current, I_D		
Input voltage, V_{in}		707.1 mV
Output voltage, V_{out}		
Voltage gain, A_V		1
Phase difference		0

2. Compare common-drain amplifier with common-source amplifier. Explain your answer.