

Lab 2 Field Effect Transistor Applications

Analog Switch

1. Measure the value of R_{DS} as in Fig. 1. Notice that the gate and source are shorted together.

$$R_{DS} = \underline{\hspace{2cm}}$$

2. Assemble the circuit in Fig. 2
3. Measure the output with the switch open:

$$V_{out} = \underline{\hspace{2cm}}$$

Measure the output with the switch closed:

$$V_{out} = \underline{\hspace{2cm}}$$

4. Explain the operation of this circuit.

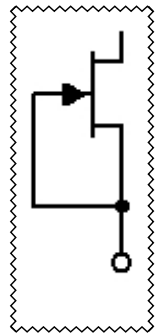


Fig. 1

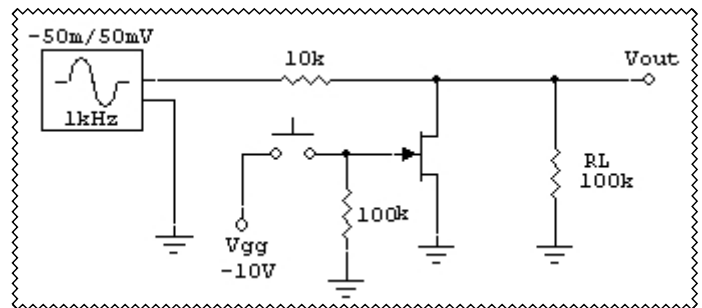


Fig. 2

Voltage Variable Resistance

5. Assemble the circuit in Fig. 3
Note that V_{GG} will be 0V or a negative voltage.

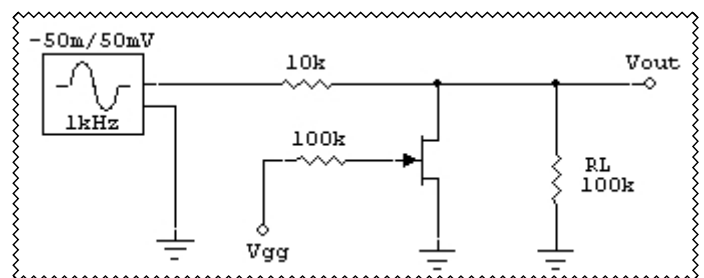


Fig. 3

6. Let $V_{IN} = 100 \text{ mV}_{PP}$; apply the values of V_{GG} and measure V_{OUT} as shown in Table 1.

V_{GG}	V_{OUT}	r_{ds}

Table 1

7. Calculate r_{ds} for each row in Table 1: $r_{ds} = \frac{10k\Omega(V_{OUT})}{V_{IN} - V_{OUT}}$

8. What is the effect on r_{ds} and V_{OUT} as V_{GG} is changed?

Automatic Gain Control (AGC)

9. Assemble the circuit in Fig. 4.

10. Adjust V_{GG} for a maximum output, recall that V_{GG} is 0V or some negative voltage.

$V_{GG} = \underline{\hspace{2cm}}$ $V_{OUT} = \underline{\hspace{2cm}}$

11. Adjust V_{GG} until V_{OUT} drop to half of the value from step 10.

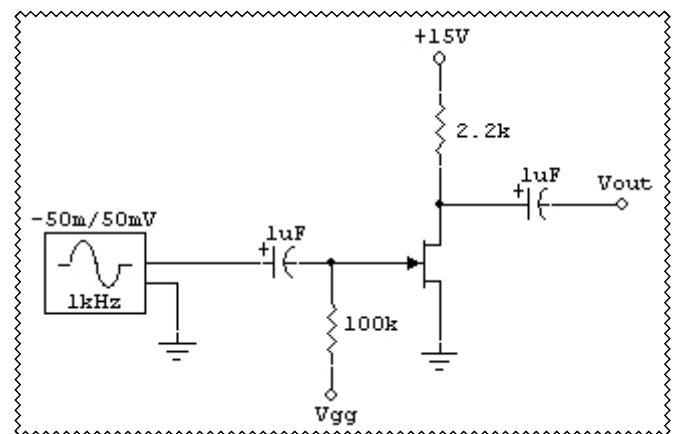


Fig. 4

$V_{GG} = \underline{\hspace{2cm}}$ $V_{OUT} = \underline{\hspace{2cm}}$

12. What effect does changing V_{GG} have on the output voltage V_{OUT} ?

13. Does the shape of the waveform change as V_{GG} is changed?

JFET Chopper

14. Assemble the circuit in Fig. 5:

Notice that this circuit uses two signal generators: V1 is a square wave, 20kHz at 10 Vpp, while V2 is a sine wave, 1kHz at 1Vpp.

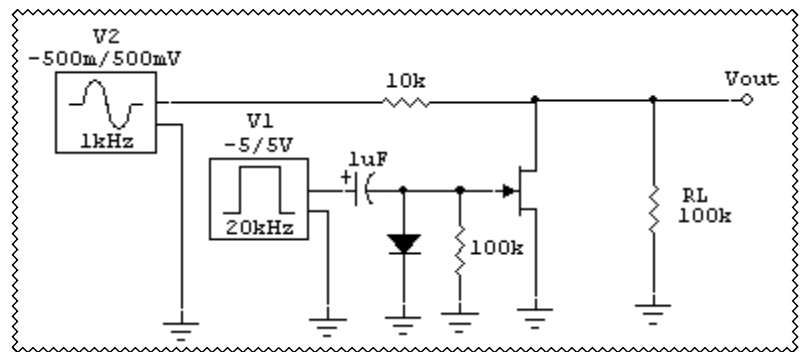


Fig. 5

15. Adjust the oscilloscope trigger and time base until a steady signal is observed at the output.

16. What is the function of the field effect transistor on the sine wave output?

17. Sketch the wave observed at V_{OUT} .

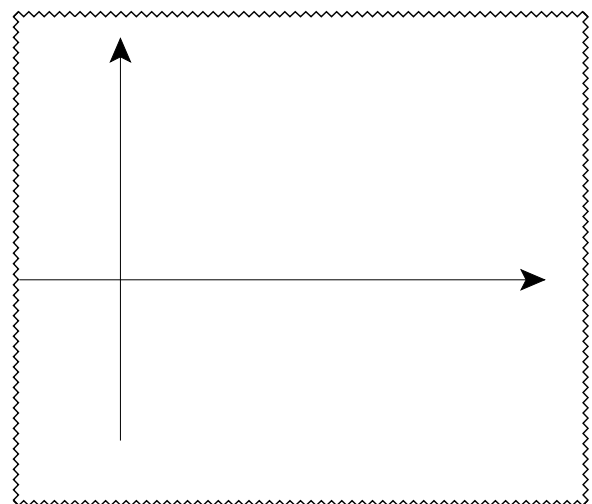


Fig. 6