

6.002 Demo# 09GS (Load Set up demo#09GS.set)

MOSFET Inverting Amplifier

Small signal

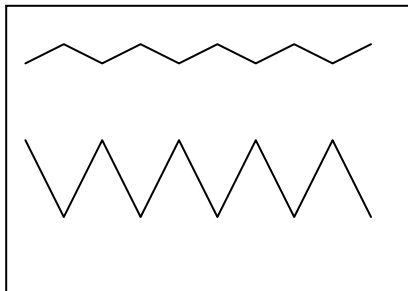
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Lectures 9 and 10

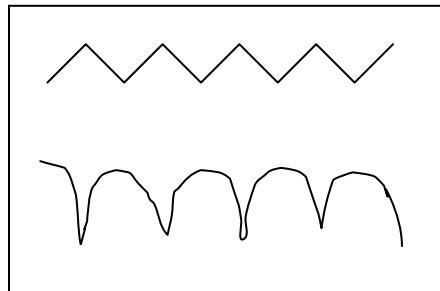
Purpose: This demo shows the amplification of small waveforms using a MOSFET, along with the limitations of such an amplifier. Using a biased sine wave as input, the output is seen as an inverted triangle wave. By increasing the amplitude or changing the bias, the output is shown to become distorted. This corresponds to amplifier operation outside the saturation region.

Steps:

1. Show a small sine wave and the inverted and amplified output on the scope.
2. Increase the amplitude of the input until the output becomes distorted. (Alternatively, it is more instructive to show distorted output (since amp is nonlinear), and then reduce amplitude to show more or less linear behavior.)



Small input signal & output



Large input signal & output

Description: Small signal, cut off/linear region distortion

- 1) To show the distortion you should increase the amplitude of FG1 from 50 mV to 500 mV and see how the output of the sine wave will be distorted ; see the picture on the next page Fig 1.
- 2) When the input signal is decreased to ~ 100 mV the output should be without distortion; see the picture on the next page Fig2.

Note: for circuit connections and pins out please check next page for more detail

Oscilloscope Setup

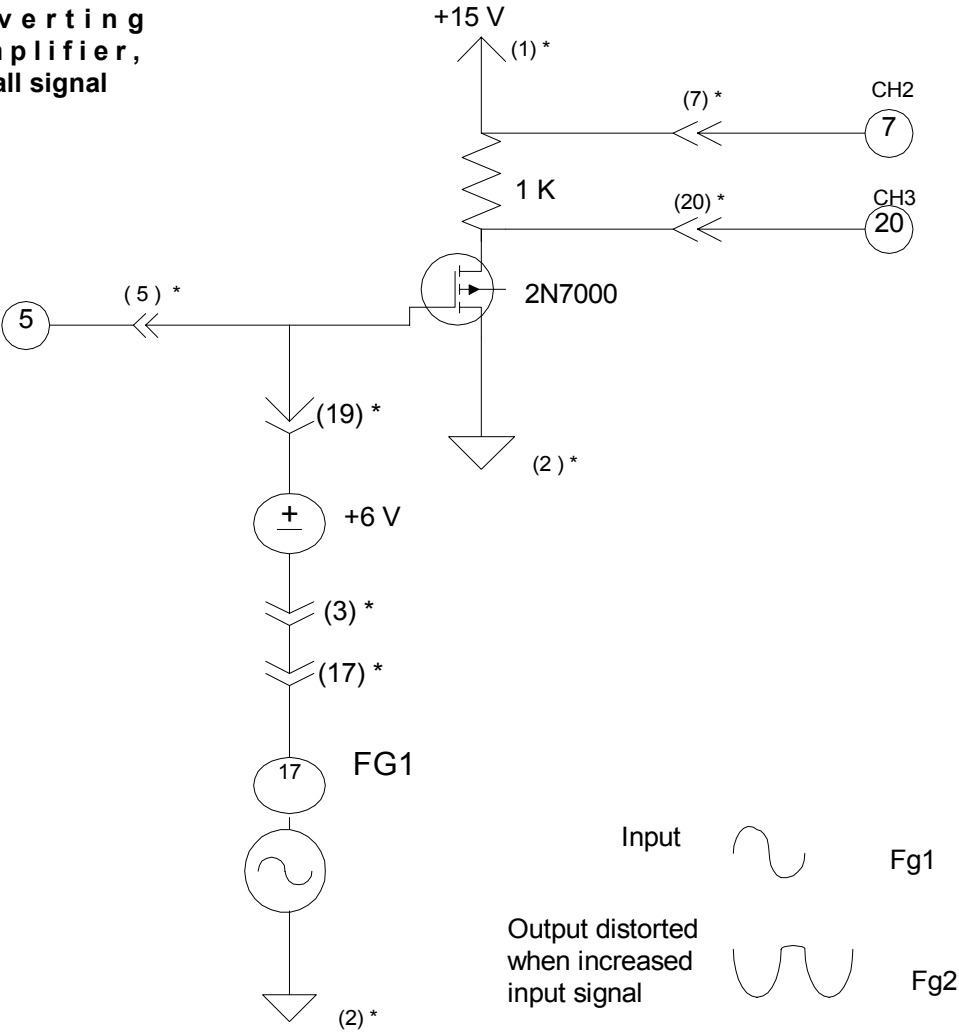
| CH | V/DIV | OFFSET | MODE | FUNC | MATH | VERTICAL | HORIZONTAL |
|--------------------|--------|--------------------------|------|------|------|----------|------------|
| 1 on | 500 mV | 1.382 | DC | off | | | |
| 2 on | 1 | 4.130 | DC | off | | | |
| Horizontal: 200 uS | | Acquisition: AUTO AUTO 4 | | | | Trigger: | CH2 |

Waveform Generator Setup**Power Supply Setup**

| UNIT | WAVE | AMP | OFFSET | FREQ | | +6 | +25 | -25 | OUTPUT |
|--------------|------|-------|--------|-------|------|------|-----|-----|--------|
| FG1 | Sine | 50 mV | 0 | 3 KHZ | Hi Z | 2.6V | 5 V | | |
| Trigger: INT | | | | | | | | | |

Note: Prof Sussman prefers to have pin #20 (Blue coax cable) plugged into channel 2 on the oscilooscope, because the green trace is easier to see than the purple trace. Prof Sussman prefers to change FG1 same as prof. Agarwal.

M O S F E T
Inverting
Amplifier,
small signal



* Note: # of pins on the PC
board and BNC connectors



() Pins