# Lab 5.12 – A PMOS Source Follower

In this lab we are going to use a PMOS transistor (take care, the Multisim symbol for a PMOS device is confusing) and build a “Common Drain” amplifier (AKA a Source Follower). It is called a Source follower since that describes its behavior, the source (output) AC voltage is always approximately equal (there is a DC offset due to the Device threshold voltage) to the Gate AC voltage.



Notes:

* Rsig is the output impedance of the AC signal generator
which is 50 ohms for the function generator on our lab bench so do not put a physical source resistor in your actual circuit.
* The capacitors are there to block DC and at audio
frequencies should have a negligible reactance.
* V+ and V- (15 volts) are ideally at AC ground

As with any design, you first select the resistors to put the transistor at a reasonable operating point. Then draw the AC (small signal) version of the circuit (capacitors are short circuits and the power rails are AC grounds and replace the PMOS device by a small signal model (see your Text) to calculate the voltage gain (approximately 1), input impedance (approximately RG, and output impedance (very low – ignore RL).

The source follower is an effective “Buffer Amplifier” to isolate your signal source from the load.

* It will not “load” the signal source (high input impedance)
* The output “follows” the input (unity voltage gain)
* The output voltage is almost independent of the load resistance (low output impedance)

Most of these characteristics are due to a high degree of negative feedback in this circuit. Note that the input to the transistor is Vgs which is the input voltage minus the output voltage and the feedback gain is high due to the transistor gain.





