

EE100B  
Experiment 2

**The Design of a Multistage MOSFET Amplifier**

College of Engineering  
University of California, Riverside

**Objective**

To design and implement the design of a multistage MOSFET amplifier using the knowledge you learned from class.

**Equipment**

2 MOSFET Arrays (MC14007UB), a variety of resistors and capacitors, function generator, oscilloscope, digital multimeter, DC power supply, breadboard

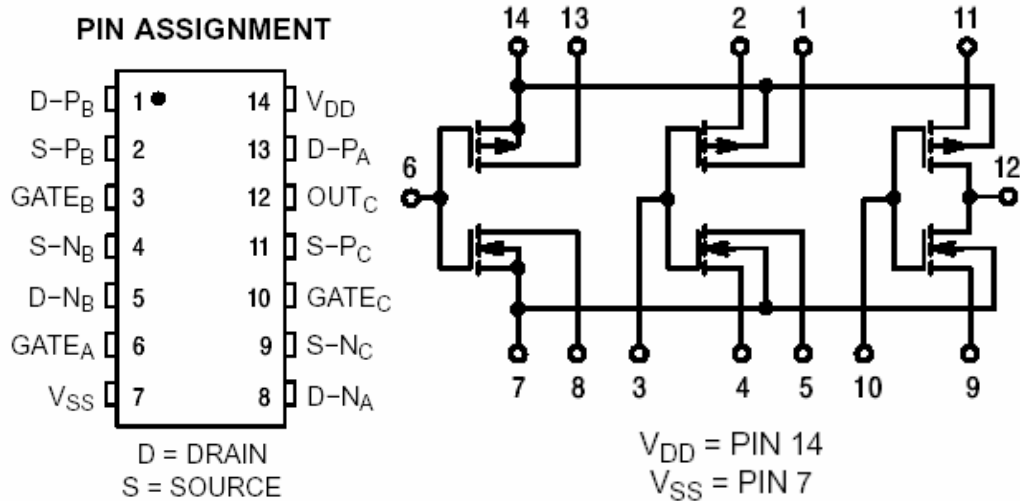
**Prelab**

Read the sections of your textbook relevant to this laboratory session.

Design a 3-stage MOSFET amplifier that provides a differential gain  $|v_o/v_d| > 20$  V/V, a small common-mode gain, and an output resistance  $R_o > 1\text{k}\Omega$ . The amplifier is to drive a load  $R_L = 10\text{k}\Omega$ . The frequency of the signal source is 10 kHz. Power supplies with  $\pm 8$  V are available. Assume that the output resistance  $r_o$  of all MOSFETs are very large and can be neglected. Also, assume that  $K=0.5$  mA/V<sup>2</sup> and  $V_t = 1.5$  V for all MOSFETs. Note that the designs will vary between individuals and there is not a single correct design. It is important that all the requirements listed above are satisfied.

**Laboratory Procedure**

Pin 14 of the MC14007UB must be connected to the most positive supply in use, and pin 7 to the most negative, no matter what is made of any device.



**Figure L2.1** The MC14007UB MOS Array

Assemble the circuit as per your design in the prelab. Confirm that the design requirements are satisfied by measuring the differential gain of the whole circuit, differential gain of each stage, common-mode gain and output resistance achieved by the actual circuit. If the design requirements are not satisfied, adjust the circuit parameters accordingly. State any differences or modifications between the original design and the one assembled on your breadboard. Compare the theoretical results to those obtained experimentally (by calculating the percentage of error).