

ENGR-356
Lab # 10
Common-Emitter Amplifier with Emitter Follower

Goals

A principle goal is to understand the biasing and large signal operation of a two stage amplifier composed of a common-emitter stage followed by a common collector, i.e. emitter follower stage driving a low impedance load. A second goal is extending knowledge of SPICE simulation.

Design

Complete a design for the circuit in the figure that has the following performance: $R_{in} > 20k$, low distortion, driving a 500 ohm (or less) load, and low frequency amplification down to 20hz.

Approach

The given circuit topology with basic biasing already determined (you can use this biasing or use your biasing from lab 9). Use SPICE simulation to explore this circuit a piece at a time. First evaluate Q point and gain using the first stage only. Then add Q2 with a resistor from emitter to ground. Then complete the circuit as shown in the figure.

Measurements should include (where measurement may be by simulation or instrumentation):

1) Gain 2) Range of frequencies with the output is no less than 0.707 (-3db) of the maximum given a constant level input voltage 3) The maximum p-p output voltage without significant distortion (as seen visually looking at a sine wave).

Measure the distortion using FFT analysis with a 1mv input, 20mv input, and 200mv input voltage.

Documentation

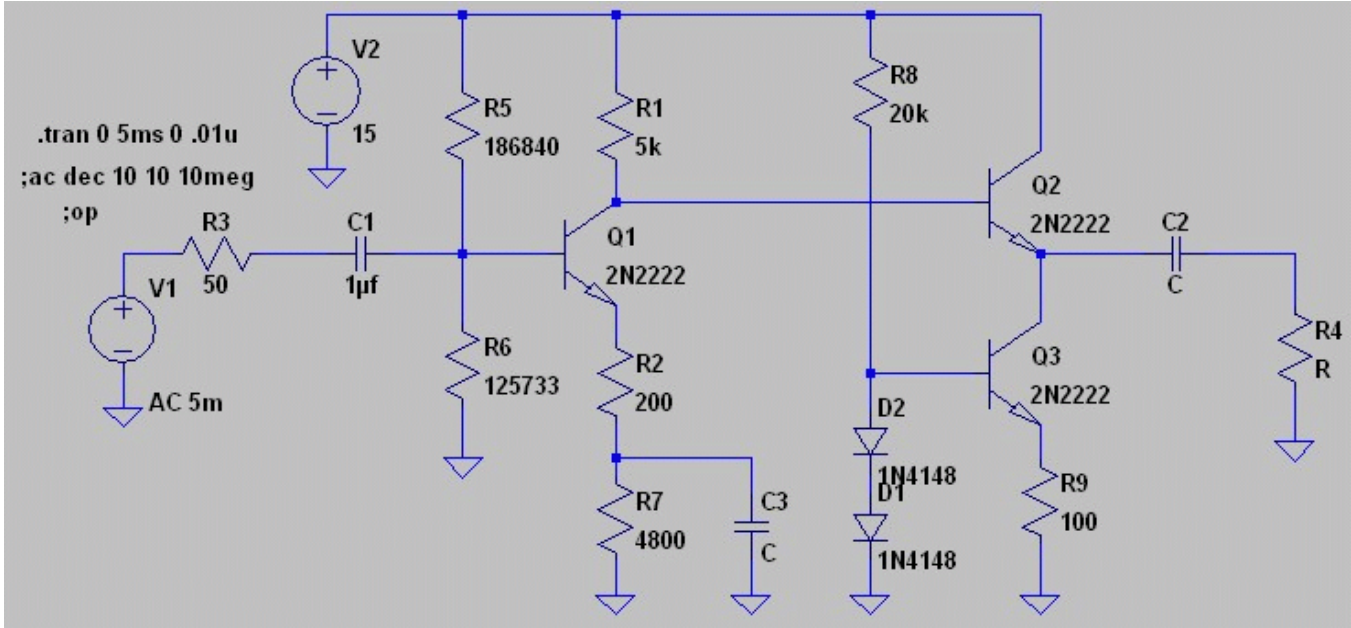
Take careful notes in your lab notebook.

Lab Report

The lab report will be one page on which you document the following:

Component values used (listed using the component designators in the given schematic)
Rin, Voltage gain maximum p-p output, frequency range, any other observations.

(See figures on next page)



The full circuit to work with.

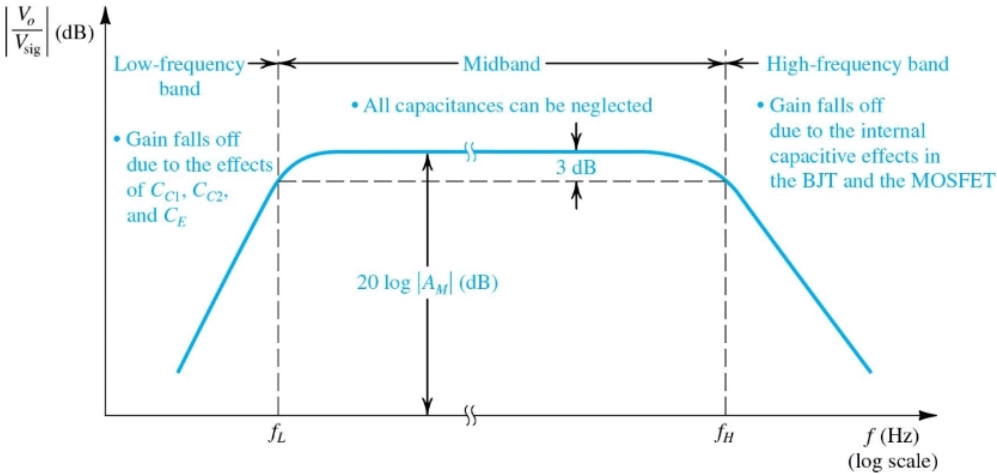


Figure to show how bandwidth is determined.