EE160 LAB 4: Broadband amplifier design.

Spring 2009

Summary
The purpose of this lab is the demonstration of the feedback effects on the 
S-parameters of BJT, design of broad band amplifier.

1 Feedback amplifier design.

1 Create a project with the transistor and the bias circuit design from the 
previous labs.

2 Estimate the value of the shunt feedback resistor and add the feedback 
resistor between collector and base. Use tuner to see the effects the feedback 
resistor has on the $S_{21}$ magnitude and phase. How the gain of the transistor 
changes with the addition of the feedback? At what frequency the angle of 
of the $S_{21}$ crosses the 90°? Why this point is significant?

3 Add reactive components to build a frequency selective feedback. What 
is the purpose of the reactive components in the feedback? What frequency 
range the resulting amplifier can achieve with a reasonably high gain (10dB)? 
Is the circuit stable across the entire frequency range?

4 Design matching circuits for the amplifier with $G = 10dB$ $BW = 50\%$ 
at 1GHz. Present plots with the resulting gain, VSWR, noise figure. Make 
sure your design is unconditionally stable.
5 Repeat the design with a combination of series and shunt feedback resis-
tors. Compare the characteristics and potential of the two circuits. Submit the final schematics, data window plots for each section of the lab. Include answers to questions in your report.