

Lab 1, Asg. 1, Approximate Marking Scheme, Oct. 2005

Part 1 Tuned Amplifier Design, Simulation, 40 marks.

- Components R1,R2, C_{in}, CE, L, CL, RL calculations and values 15 points
- Compute and measure (simulate) the voltage gain at 12 MHz (or at f_0 which should be close to 12 MHz). (Expected for this part, and all other parts which have both computations and measurements (simulations) that you will compare theory to simulations) 5 marks
- Estimate and measure the phase shift at f_0 . 5 marks
- Estimate and measure frequency response clearly showing the -3 dB points. The theoretical calculation for the 3 dB points need only be an estimate. 5 marks
- Estimate the input impedance of the amplifier at f_0 . Measure the input impedance of the amplifier. 10 marks

Part 2 Frequency Multiplier 15 marks

- Observations, sketches of input, output demonstrating multiplying by 2,3,4. Explain operation as a frequency multiplier, include time domain and fft results 15 Marks

Part 3 Matching Effects on Noise Figure, gain 30 marks

Prior to matching:

- Simulation result of Frequency Response (marks above in part 1)
- simulations results of Noise Figure, 5 marks
- Determination of input impedance (marks above in part 1)
- Impedance matching calculations (one inductor, one capacitor), verification by simulation that matching is correct 15 Marks
- Gain after matching, comparison, 5 marks
- Noise Figure after matching, comparison, 5 marks

Discretionary marks, (lab is organized, logical and neat) 10 Marks

Demo Marks 20

Total 120 marks

Assignment 1 Marking: Double Tuned Amplifier, Transformers

- Calculate output transformer turns, to replace load resistor with 50 Ohm resistor, 5 marks
- Using impedance calculated in Lab 1, part 1 calculate components for transformer-based impedance matching, turns ratio, extra C, L value in transformer secondary, 25 marks
- Calculate voltage gain of complete double tuned amplifier, 10 marks
- Find 3 dB bandwidth of double-tuned circuit, 5 marks
- Discretionary marks, 5 marks

Total 50 Marks