PROJECT
Design of an Amplifier

Instructor: Dr. Z. Chen

You have recently been hired by a small start-up company specializing in RF and microwave component design for the cellular industry as the lead RF design engineer. The company is young and has yet to attract the interest of any large clients, because of the state of the economy you fear that the company may soon go under.

Your friend, who works in the marketing department of a huge cellular company, tells you that night over dinner that his company is looking to replace their existing LNA (Low Noise Amplifier) in their PCS (Personal Communications Systems). After some discussion you learn that the company is leaning towards an amplifier designed by RFMD (RF micro devices), specifically the RF2364.

That night you do some research into the RF2364. You find it is a very attractive component, but it is for low power applications. Knowing that the amplifier is to be used in cellular basestations you realize that power might not be a considerable constraint. It is at this moment that you decide to save your struggling start-up company, by designing an amplifier that is as good or better than the RF2364 and submitting a report on your amplifier to the president of your friends cellular company.

You come up with the following specifications for your amplifier:

1) **Gain >= 10dB**
2) **Noise Figure <= 2.3 dB**
3) **Input and Output Return Loss >= 10 dB**
4) **Stable**
5) **Frequency Range of Operation: 1930 MHz to 1990 MHz**

Part I: Theoretical Design

1. Design both AC and DC parts of the amplifier (you need to report your design procedures, calculations, CAD files & results)
2. Give the performance specifications of your designed amplifier (e.g. variations of the gain within the bandwidth from your calculations)
3. Draw the complete schematic of the amplifier
4. Illustrate the layout of your amplifier

Part II: Physical Implementation

1. Build the amplifier
2. Measure and then record the performance of your amplifier and see if they meet your designed values. You need to ask the instructor or TA to be present during your final measurement.

Note:

1. The objective of this object is to expose you as close as possible to the real-world situation. Therefore, there is much information that may not be covered in classrooms. You need to ask around and be as much aggressive as possible in order to get the job done. The Instructor and our technicians are good sources of help.

2. Even if you have the knowledge in certain aspects, you still need to decide among different choices, for instance, the types of matching circuits. Whatever circuits you use, justify them. The design is not unique.

3. You need to form a group of three persons and only one report is required for each group.