

ECE6420 Wireless IC Design Fall 2012

Instructor: Professor Hua Wang

Low Noise Amplifier Design Project

Electronic Submission Due Time: 5:00pm on November 27th 2012

Report Submission Due Time: 5:00pm on November 27th 2012

Project description:

In this design project, you will be asked to design a low noise amplifier (LNA) in Agilent Advanced Design System (ADS) environment. The target standard of this LNA design will be the IEEE 802.11 ac WLAN standard at a center tone of 5GHz, which has key applications in implementing broadband WIFI networks.

Teamwork (two students per team) is highly encouraged for this project. Please send our TA (Song Hu at husong@gatech.edu) an email about your team (your name and your teammate's name) by November 7th.

Upon completion of the project, each team needs to submit the electronic design file (ADS design file) and a project report.

Project grading policy:

The project is weighted as 16 points out of 100 points in your final score of this class. Your project grading will be based on both the performance of your designed LNA (10 points) and your project report (6 points).

a) Design Performance

We will announce a detailed performance specification table which shows the target performance of your designed LNA. **The specifications will include noise figure, input matching, gain, bandwidth, IIP3, 1dB compression point, and total power consumption, etc.**

If your design meets all the design specifications, your team will get the full score on the design performance (10 points).

b) Project Report

Each team needs to submit a project report which clearly documents the LNA design implemented in the project (6 points). The following technical contents should be included in the report:

- 1) A brief summary (2-3 sentences) of your LNA design to describe the LNA topology and the number of stages.

- 2) A performance table to summarize your simulated LNA performance specifications and benchmark them with the target specifications.
 - 3) The complete schematic of the designed LNA, including transistor sizing, passive element values, and the biasing networks.
 - 4) Theoretical analysis of the designed LNA, including hand-calculated noise figure, input matching, and gain.
 - 5) Simulation results of your designed LNA to demonstrate all the achieved performance.
 - 6) Comparison between your calculated and your simulated LNA performance. You also need to explain the performance difference, if there is any.
- c) Design Competition
- If your design meets all the target performance specifications, your team will automatically enter the design competition.

We will announce a Figure-of-Merit (FoM) to evaluate your designed LNA considering all the performance specifications.

The TOP FIVE teams will be invited to showcase your design in the class!

The TOP THREE teams will receive design competition awards!