EE 619 Project Report
Cascode CS-LNA Design

Harsh Pal (18D070012)
Anurag Kumar (18D070006)
Shreya Laddha (180070054)
Shrey Singhai (180070055)

July 9, 2022

The Schematic of the LNA is given in Figure 1. The value of V in is 900mV.

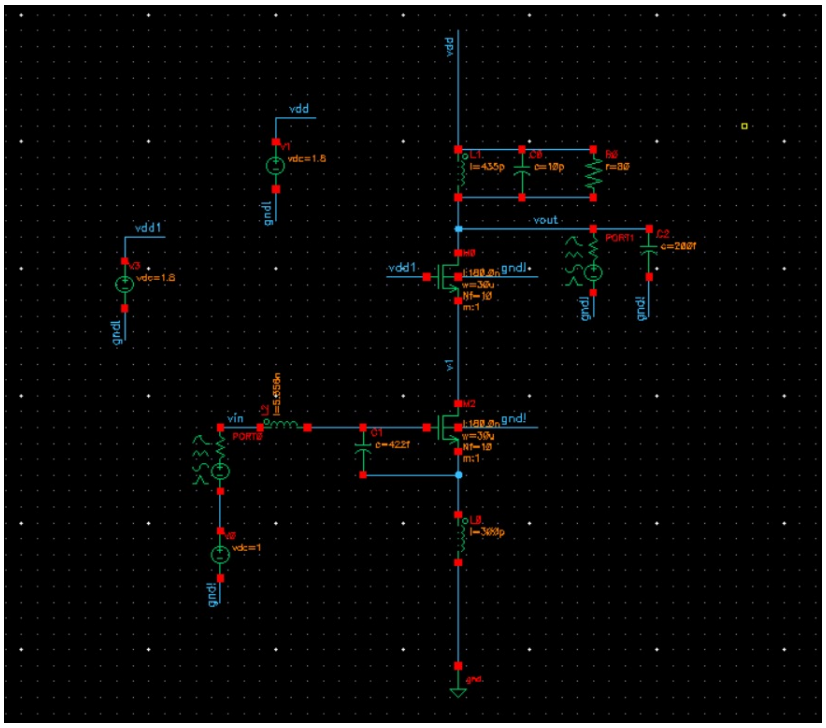

Figure 1: Schematics

Design Parameters	**Required range**	**Simulations result**
Noise Figure	$\leq$ 2dB	$\leq$ 0.74dB
S_{21}	$>$ 15dB	$>$ 15dB
S_{11}	$<$ -10dB	$<$ -11.4dB
S_{22}	$<$ -10dB	$<$ -10.7dB
IIP3	$>$ -8dBm	7.187dBm

Table 1: Table of simulation results over 2.3GHz to 2.4GHz.

The Noise figure vs frequency plot is given in Figure 2. For frequencies between 2.3GHz and 2.4GHz, the noise figure is below 2dB.

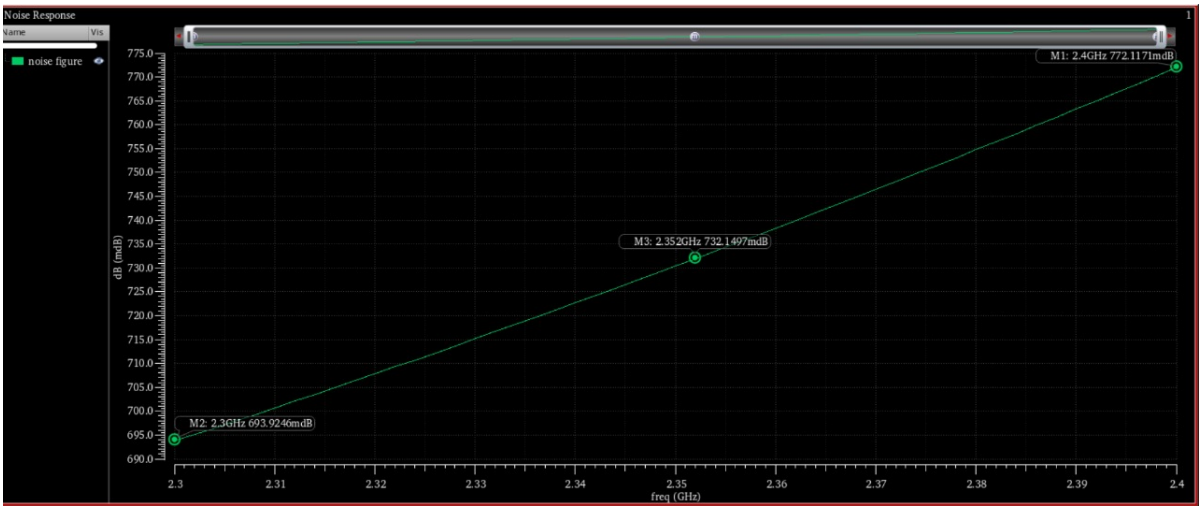

Figure 2: Noise figure vs frequency

The plot for S_{21} parameter is given in Figure 3. The forward voltage gain is above 15dB for the frequency of operation.

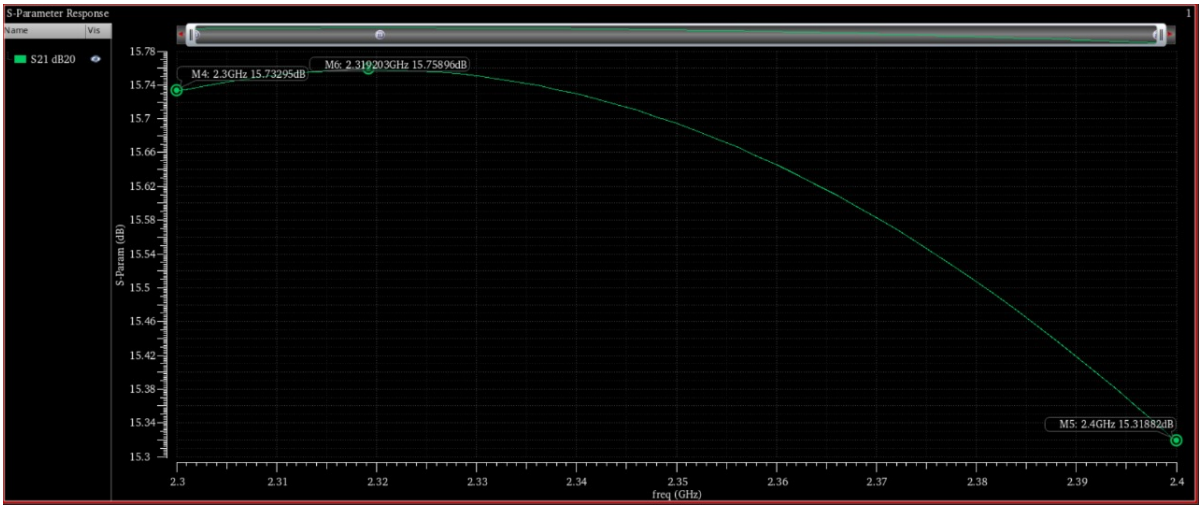

Figure 3: Forward Voltage gain

The Input port and Output port voltage reflection coefficients are plotted in Figure 4. The value of these reflection coefficients is below -10dB for frequencies between 2.3GHz and 2.4GHz

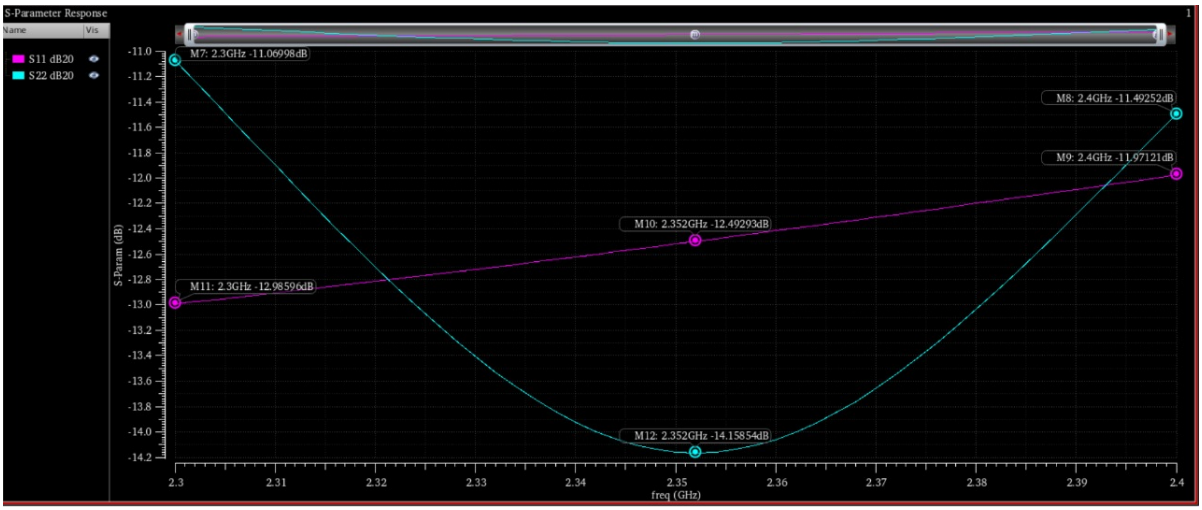

Figure 4: Input and Output Reflection Coefficients

The IIP3 for this LNA is 7.187dBm > 8dBm. This can be seen in Figure 5. The 1dB compression point is 3.011dBm as shown in Figure 6

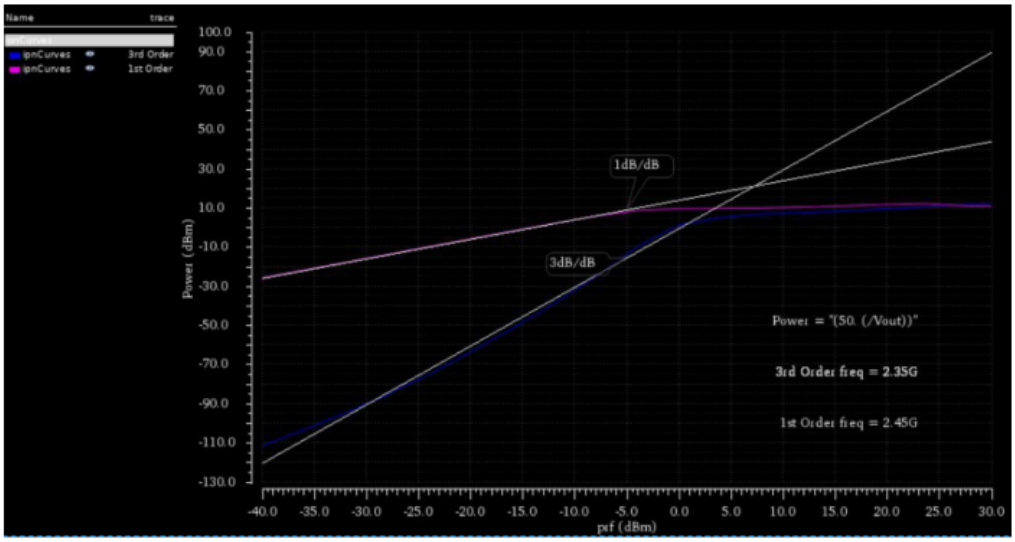

Figure 5: IIP3 calculation

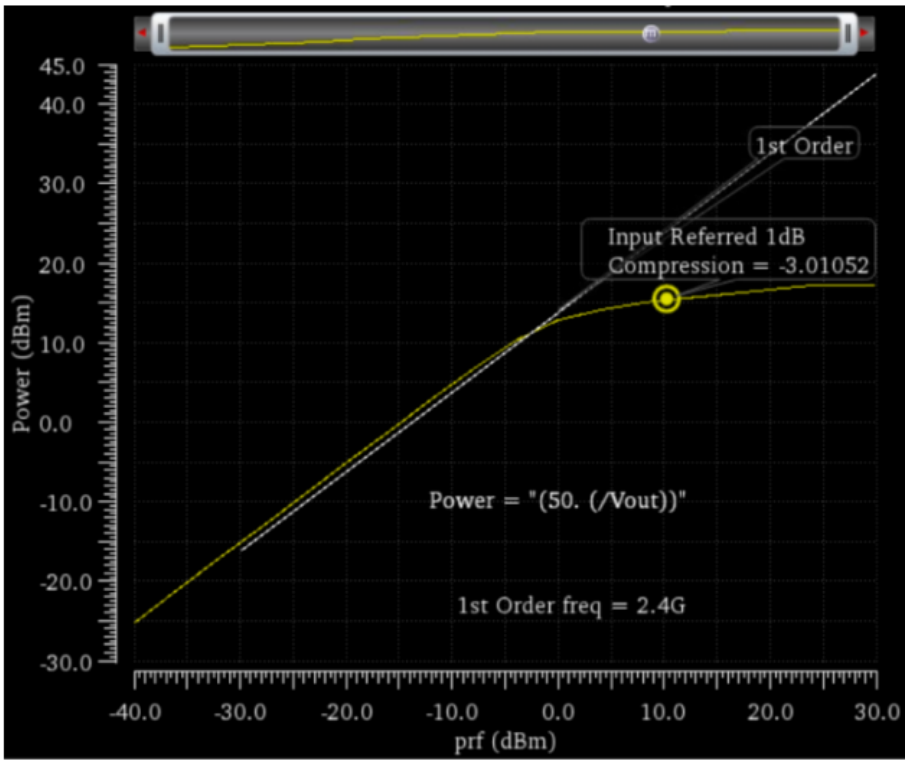

Figure 6: 1dB compression point

The stability factor is plotted against frequency in Figure 7. Kf $>$ 1 implies the circuit is stable for the desired frequency range

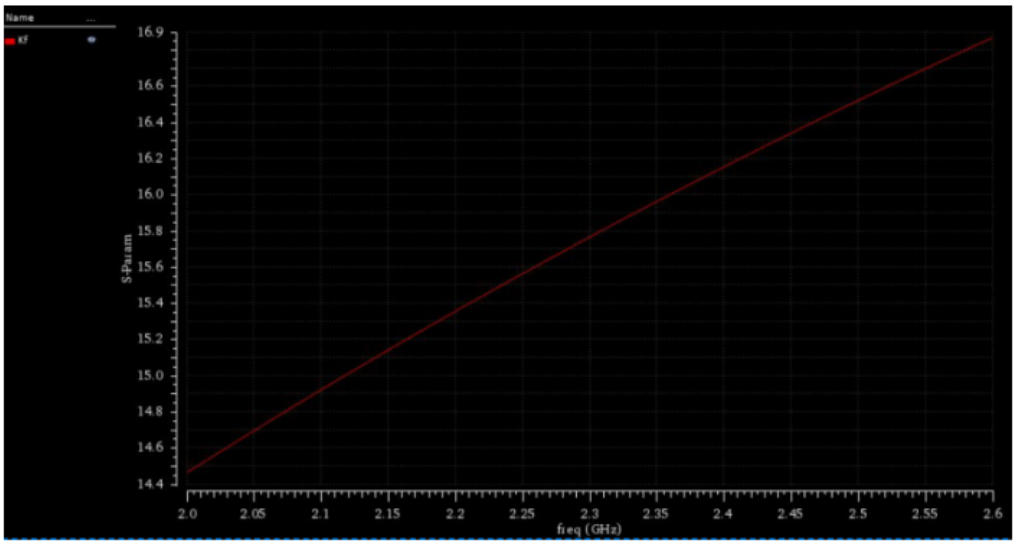

Figure 7: Stability Analysis