IIT BOMBAY

EE619
COURSE PROJECT

CASCODE CS-LNA DESIGN

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Contents

1   Preliminaries

- Output Load Capacitance $C_L = 200$ fF

- Frequency of Operation - 2.3 to 2.4 GHz

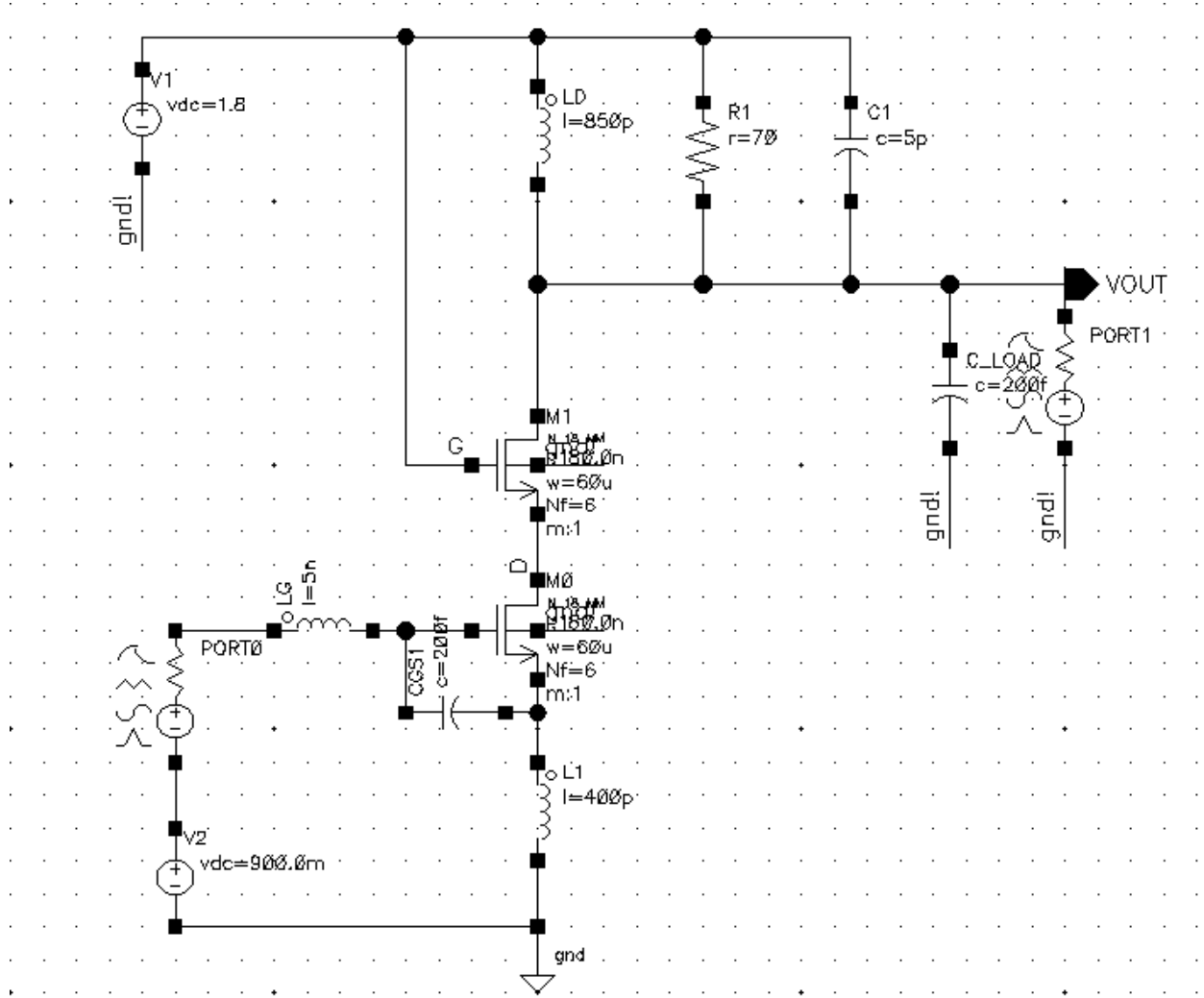- $V_{DD} = 1.8$ V and input and output impedances matched to 50 Ω
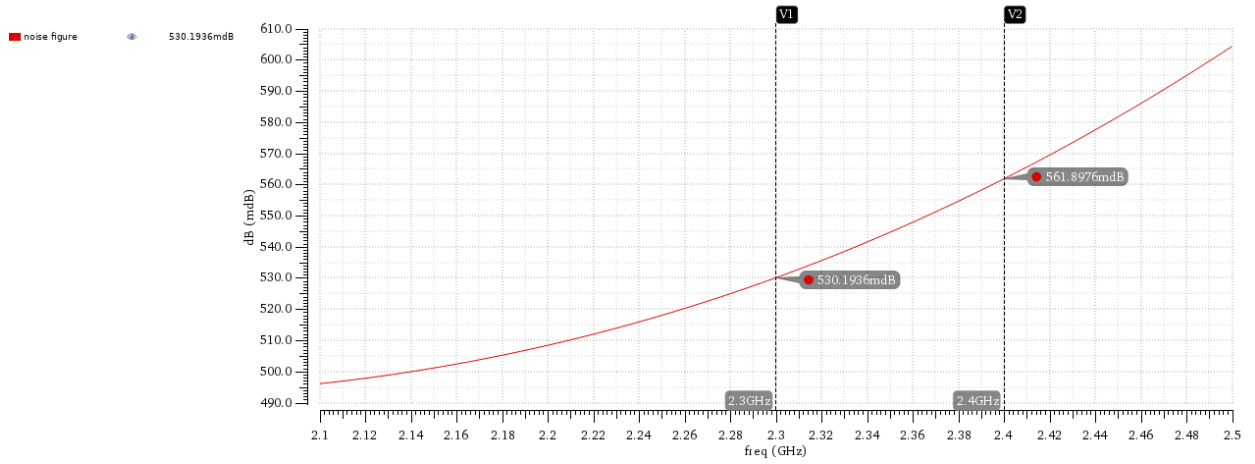

Figure 1: LNA Schematic

2   Noise Figure

Figure 2: Noise Figure

3   Transmission and Reflection Coefficients
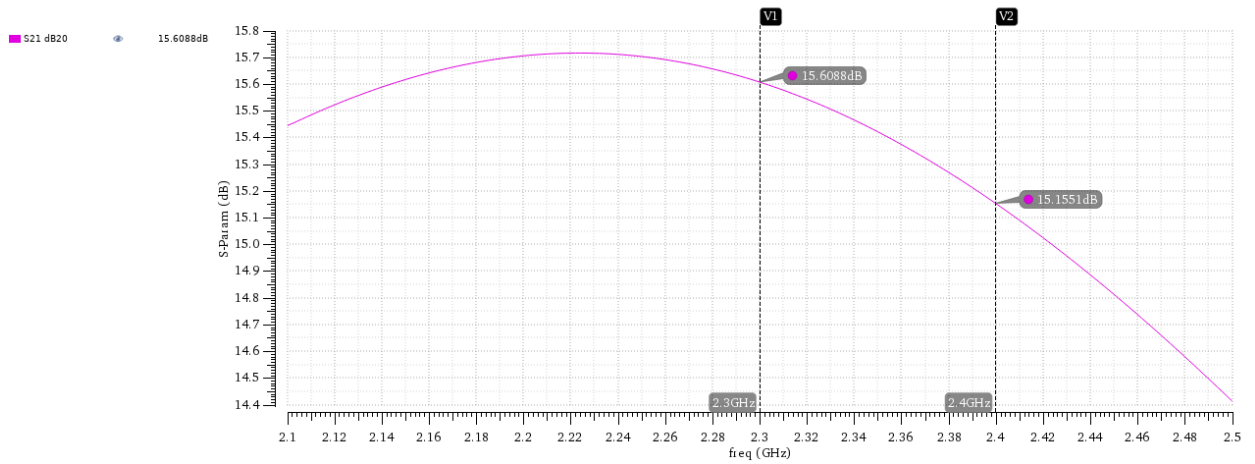
Figure 3: Forward Voltage Gain S_{21}
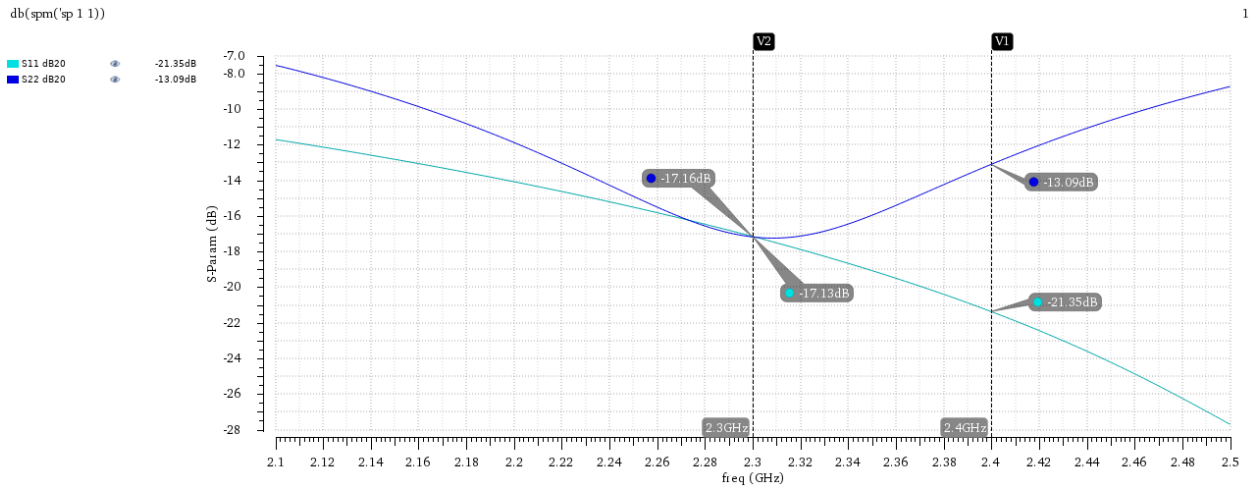
db(spm('sp 1 1))

Figure 4: Input and Output port Voltage Reflection Coefficients S_{11} and S_{22}
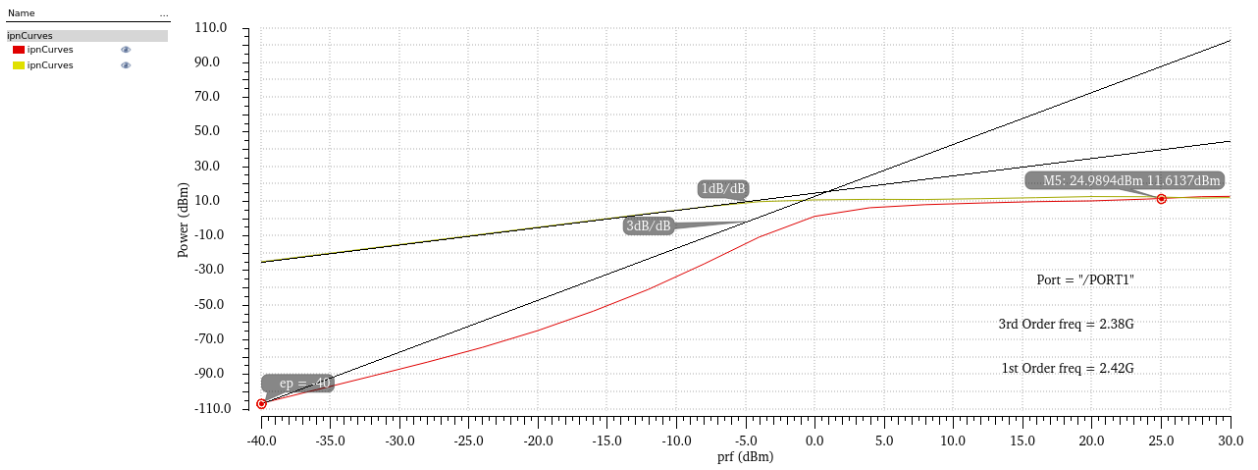
4   Non-Linearity

Figure 5: IIP_3 (represented by M3)
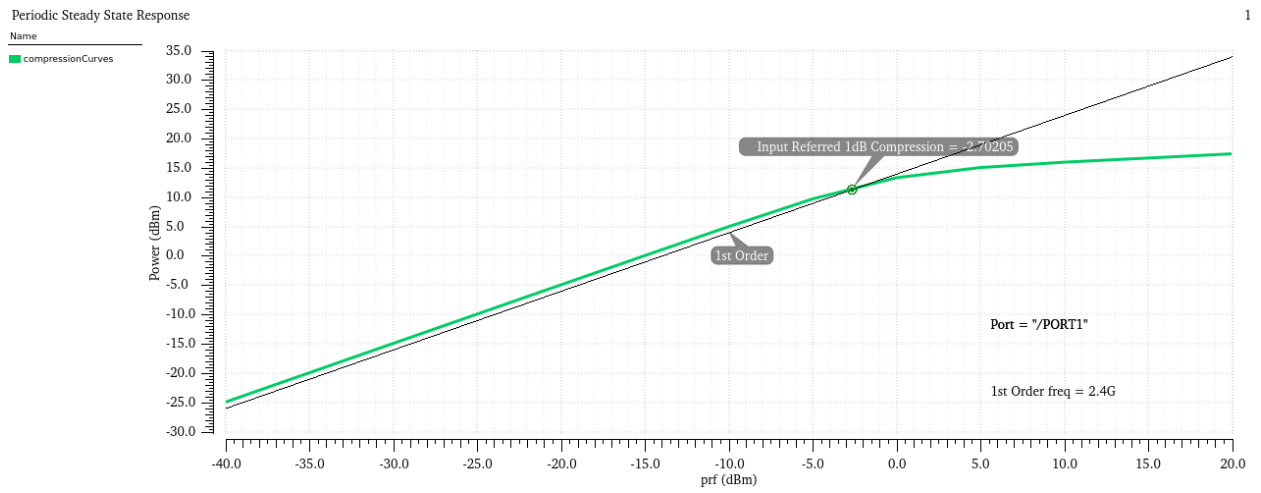
4

Figure 6: 1 dB compression point
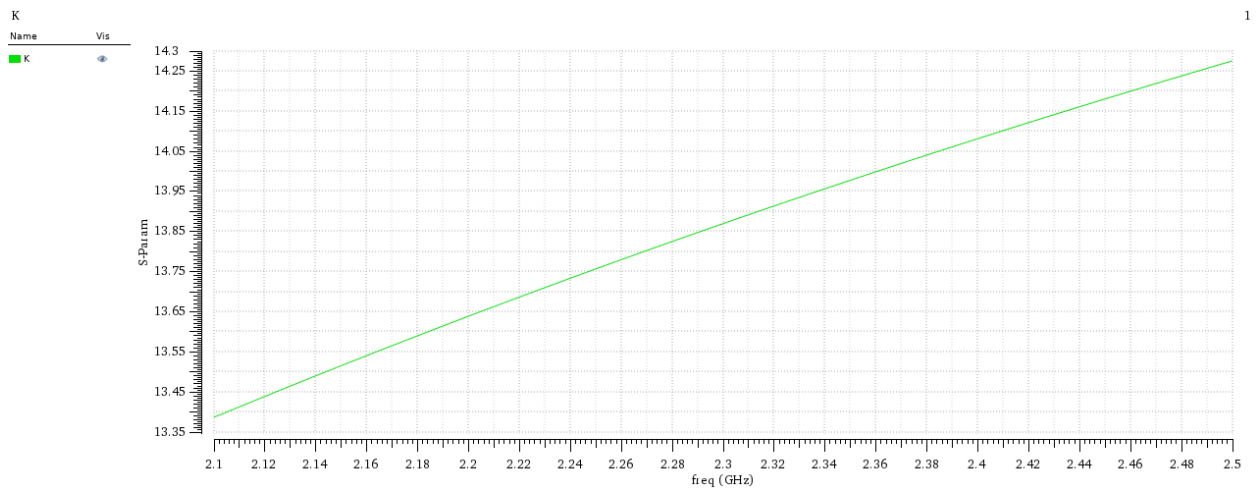
5 Stability

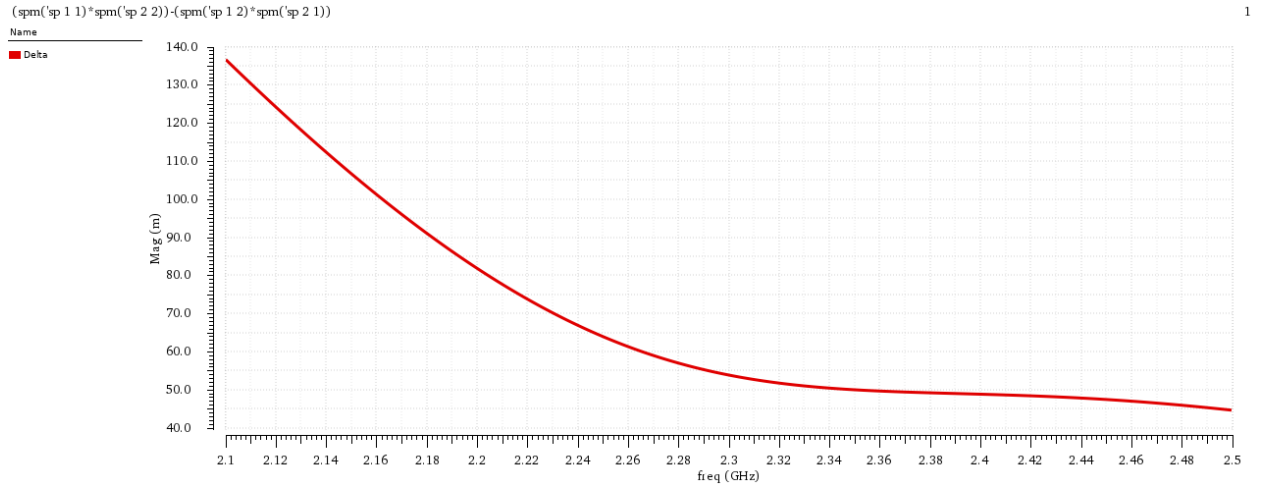Figure 7: Stability Analysis - $K > 1$

Figure 8: Stability Analysis - $\Delta < 1$

Since $K > 1$ and $\Delta < 1$, we can see that the system will be unconditionally stable for all passive sources and loads.

6 Final Results

Parameters	Specifications	Results
Noise Figure	$\leq$ 2 dB	$\leq$ 0.562 dB
Forward Voltage Gain (S_{21})	> 15 dB	> 15.15 dB
Input port voltage reflection coefficient S_{11}	< -10 dB	< -17.13 dB
Output port voltage reflection coefficient S_{22}	< -10 dB	< -13.09 dB
IIP_3	> -8 dBm	11.61 dBm

Table 1: Final Results

7   References

References

[1] Behzad Razavi. 2011. RF Microelectronics (2nd Edition) (Prentice Hall Communications Engineering and Emerging Technologies Series) (2nd. ed.). Prentice Hall Press, USA.