ECEN 474/704: Lab 08

Transconductance Amplifier

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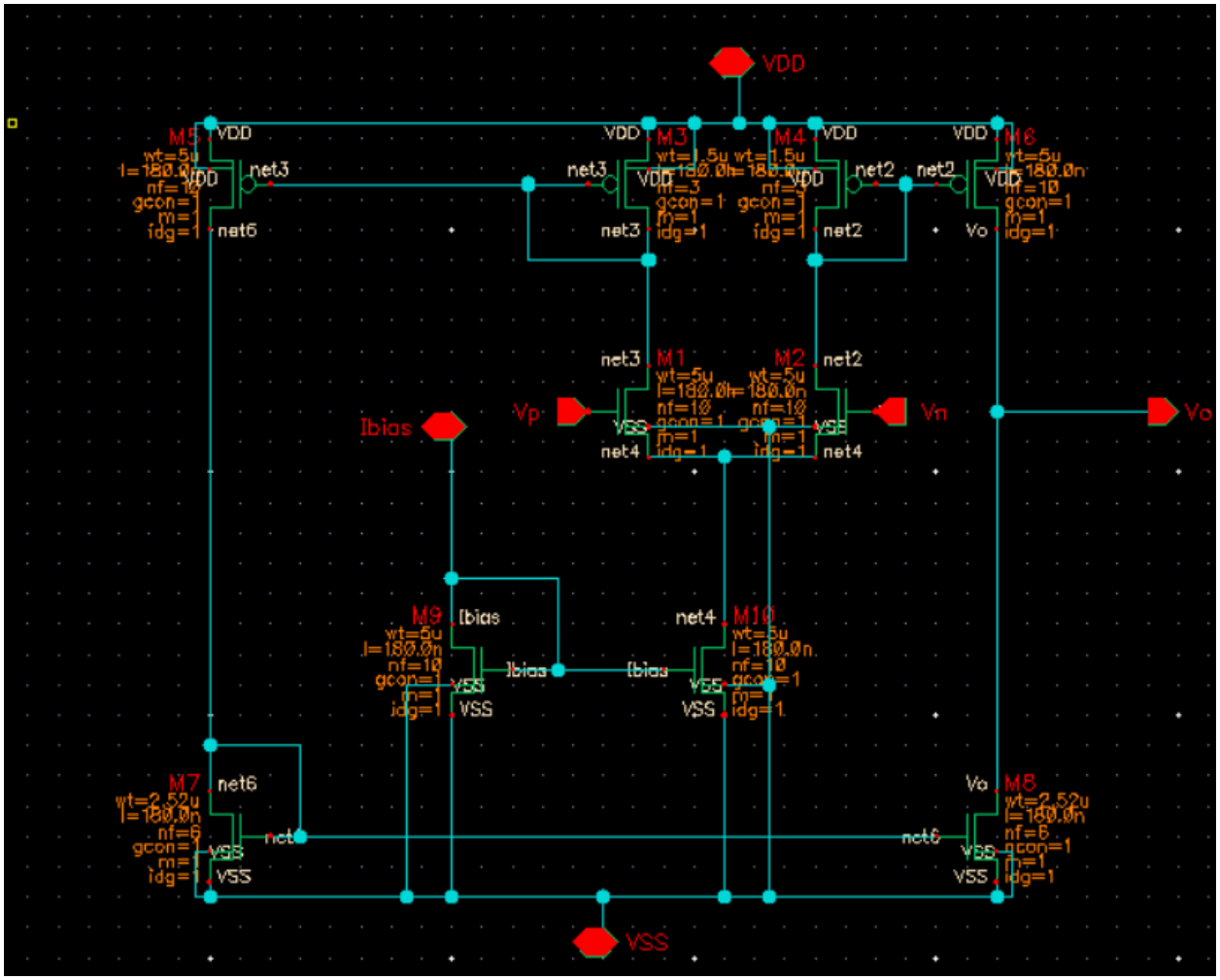
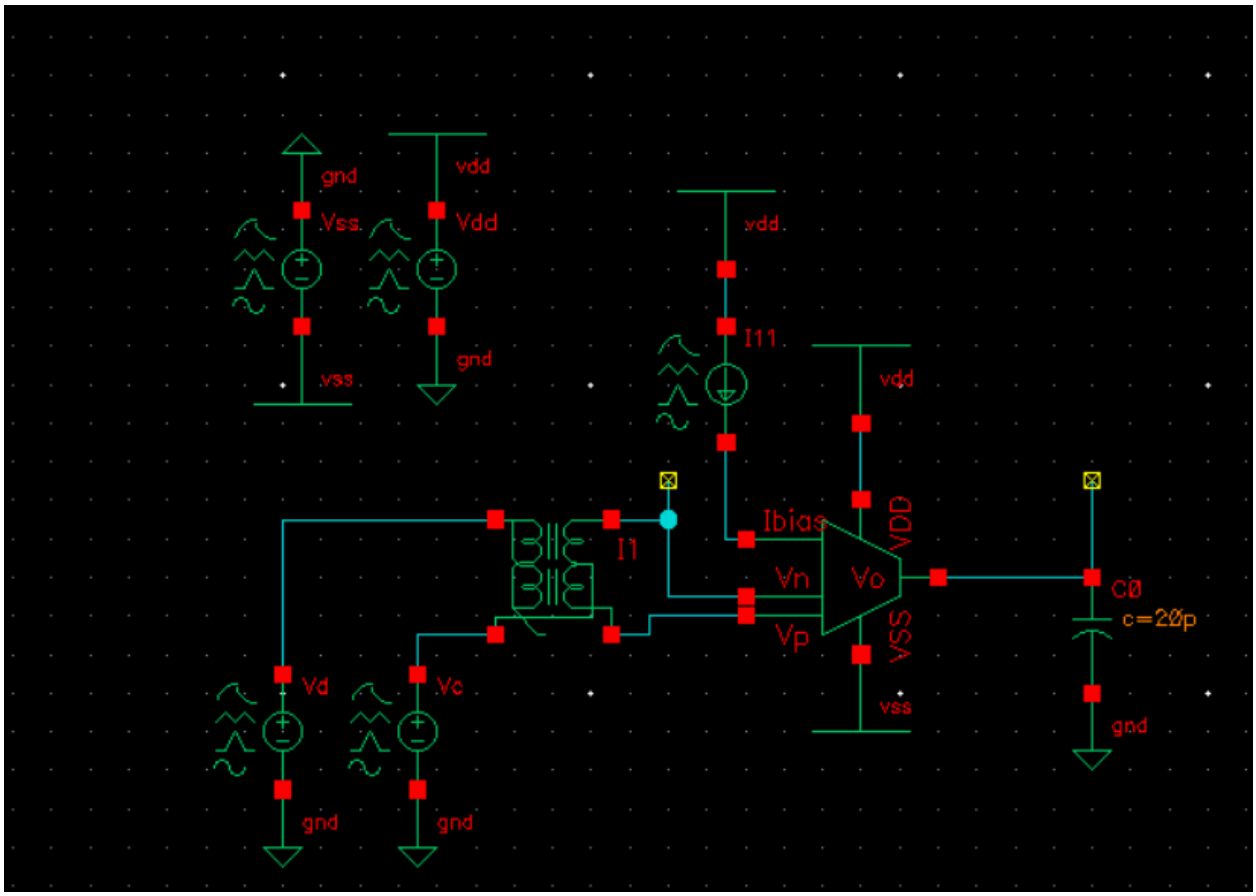
Due date: 11/21/25

I. DISCUSSION OF THE LAB AND RESULTS

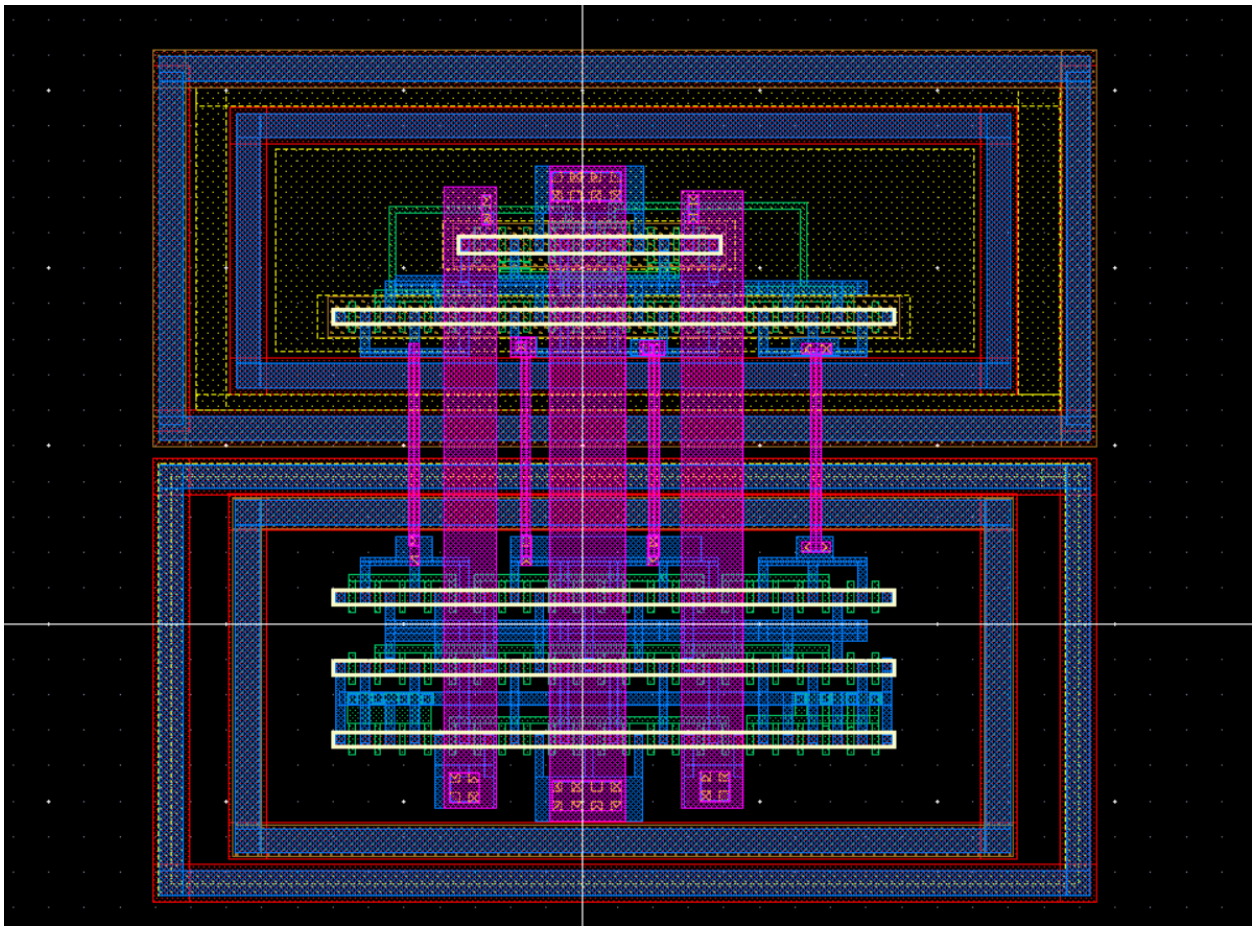
The purpose of this lab was to attain familiarity with OTA circuits. These are powerful since they can allow us to manipulate our transconductance of circuits and are very similar to gain amplifiers. The main design choices will the ratio of a couple transistors and the desired output current.

III. SUB-CIRCUIT AND TEST BENCH SCHEMATICS

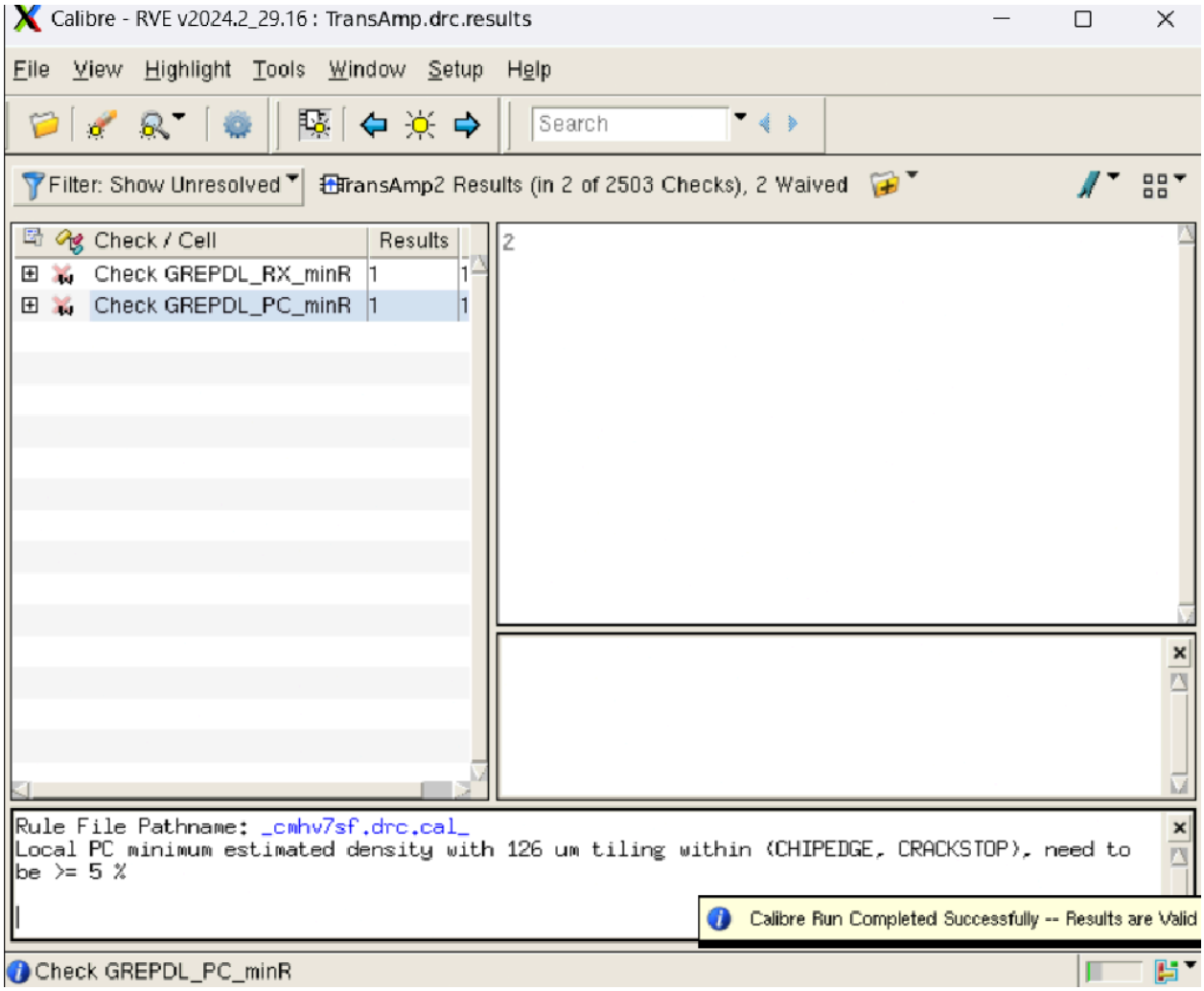




IV. LAYOUT(S) AND FLOOR PLAN(S)



V. DRC AND LVS RESULTS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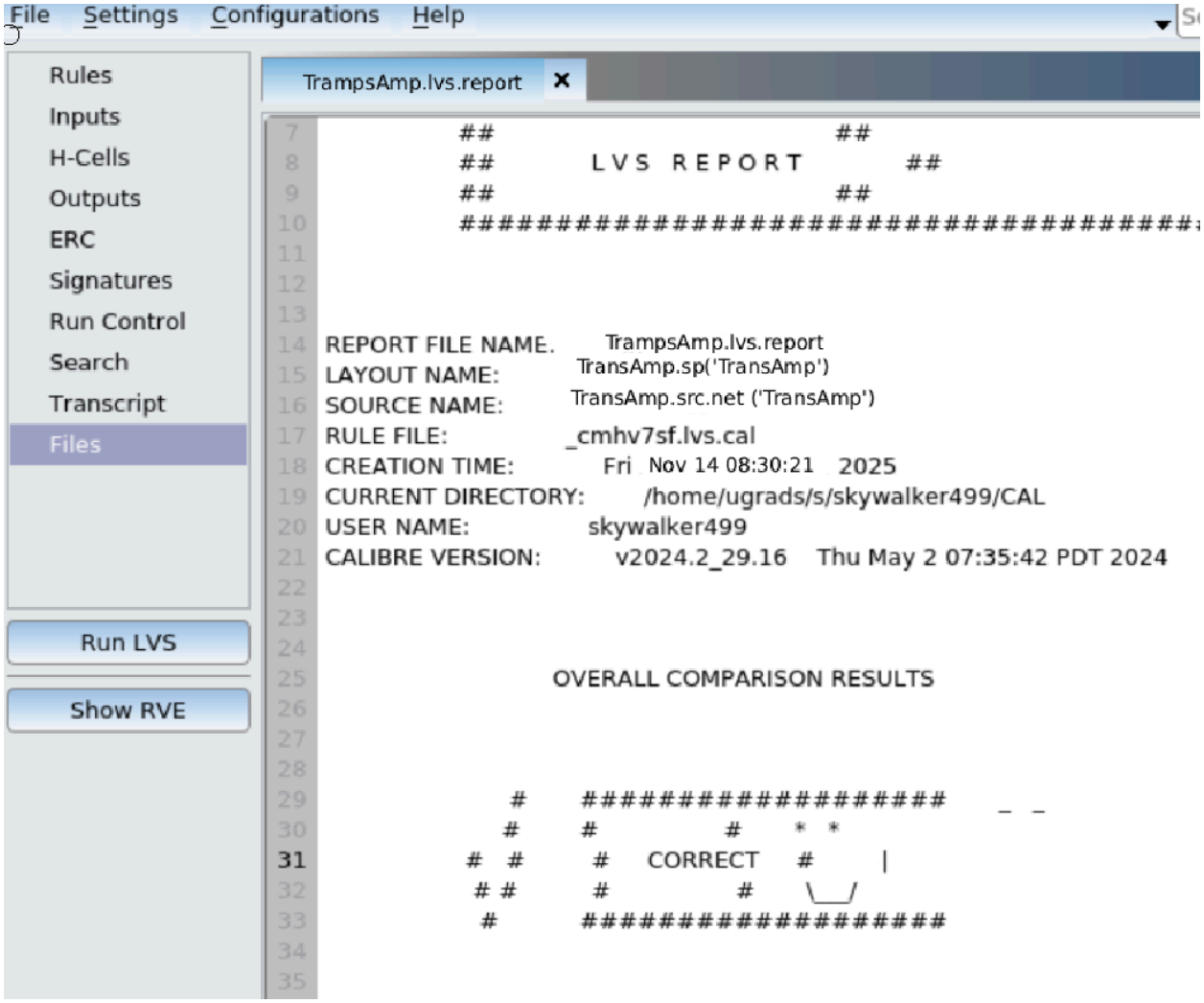
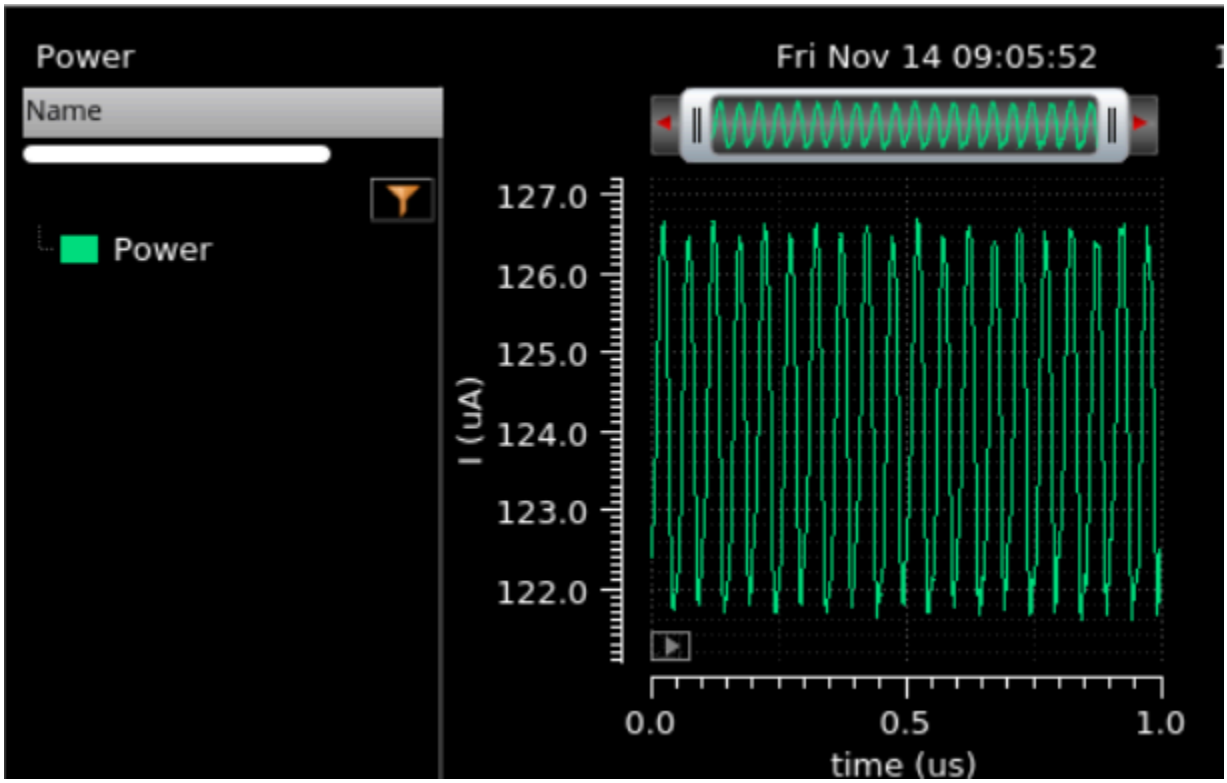
File View Highlight Tools Window Setup Help
Search
Filter: Show Unresolved
TransAmp2 Results (in 2 of 2503 Checks), 2 Waived
Check / Cell
Results
Check GREPDL_RX_minR 1 1
Check GREPDL_PC_minR 1 1
2
Rule File Pathname: _cmhv7sf.drc.cal_
Local PC minimum estimated density with 126 um tiling within (CHIPEDGE, CRACKSTOP), need to be >= 5 %
Calibre Run Completed Successfully -- Results are Valid
Check GREPDL_PC_minR



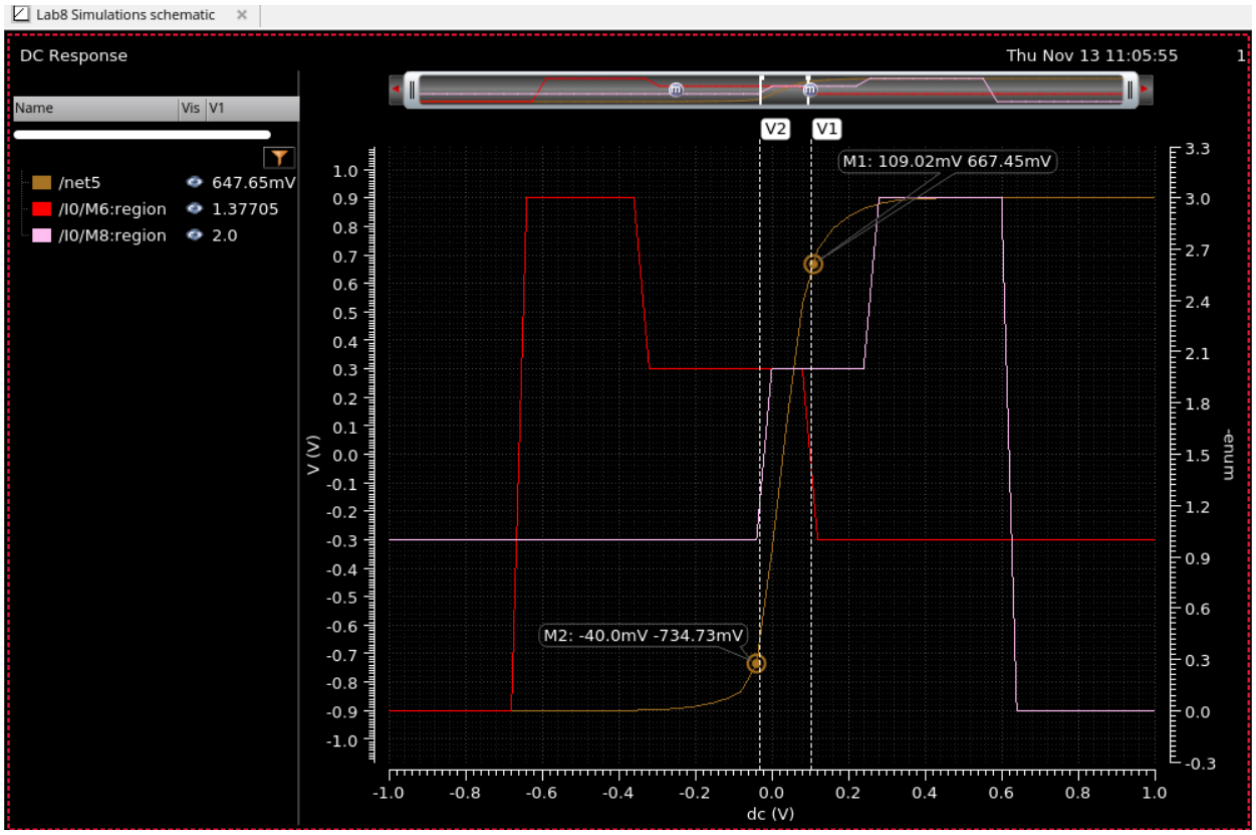
VI. SIMULATION RESULTS

Power Consumption:

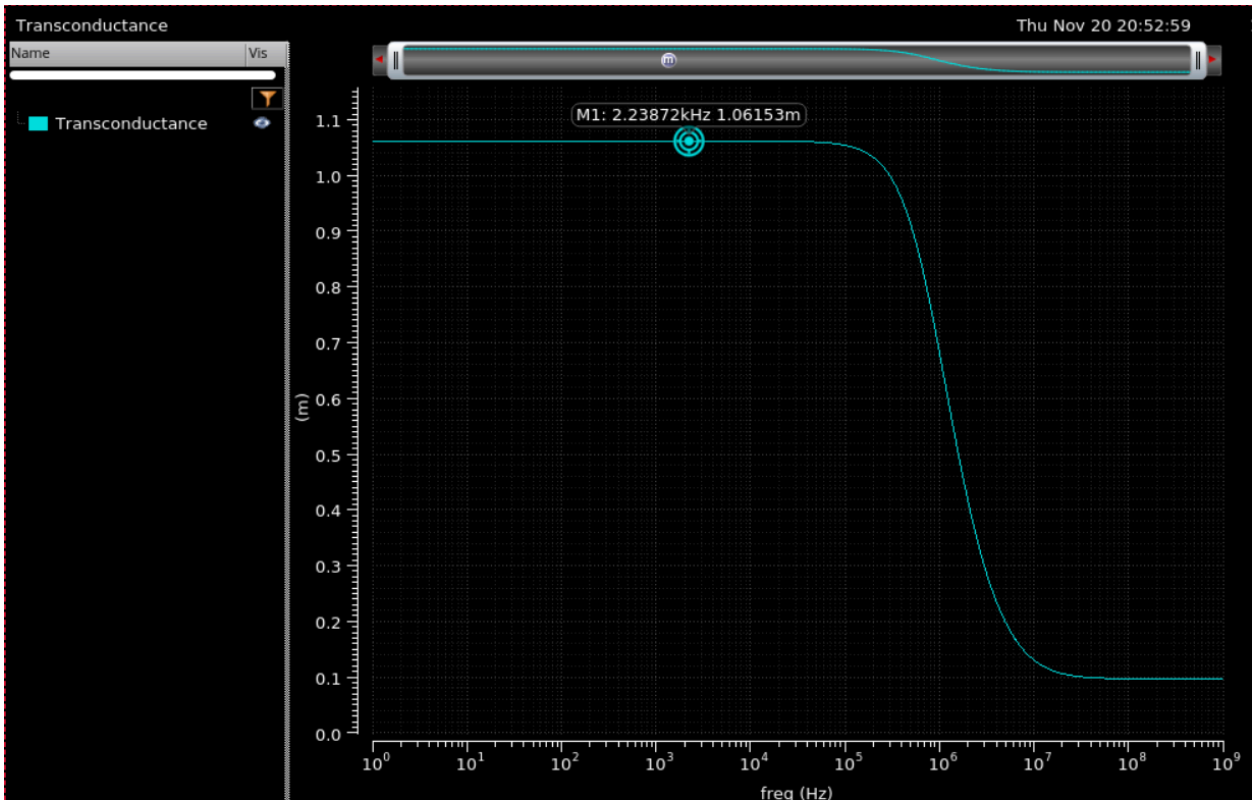


Note: Power stays within 127 - 122 uW, well under the 500uW limit.

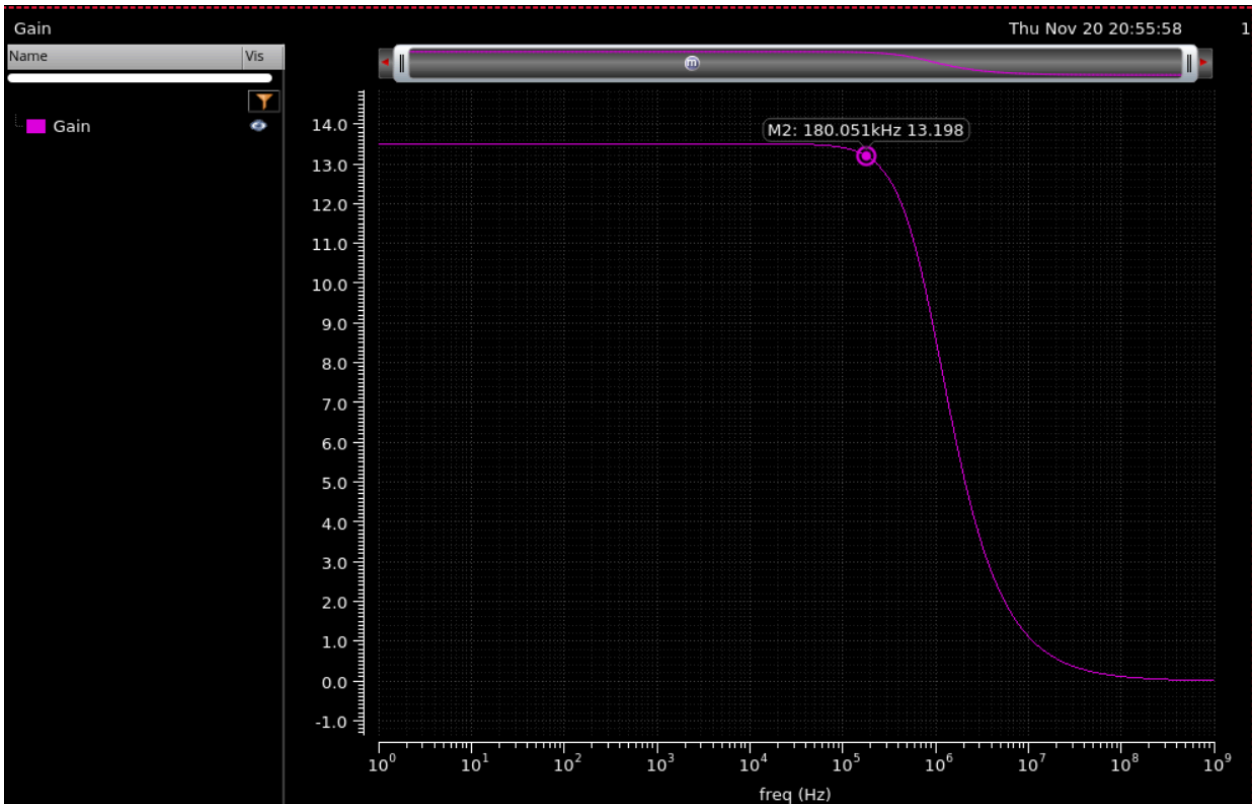
Output swing:



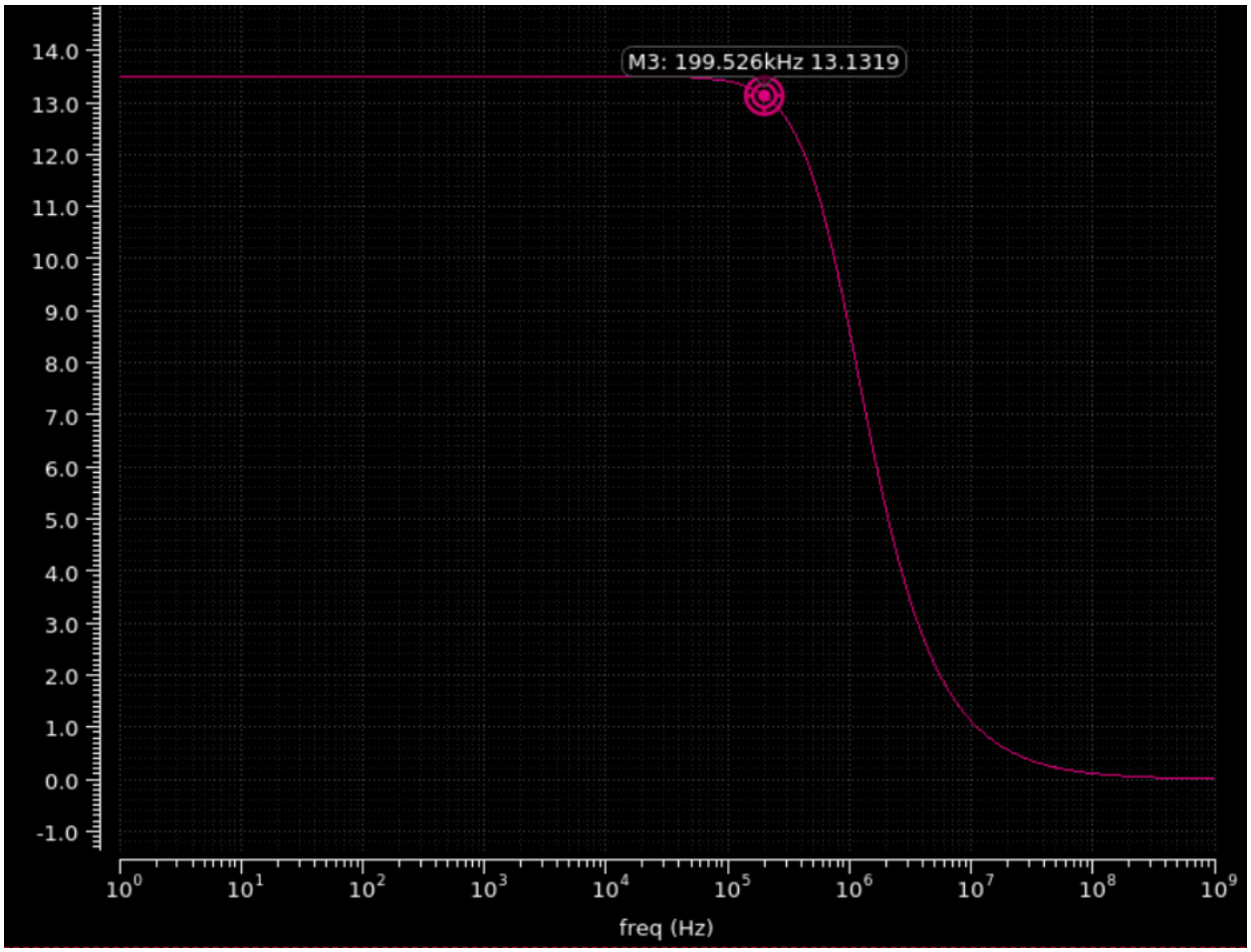
Open loop Transconductance vs Frequency



Open Loop Voltage gain vs Frequency

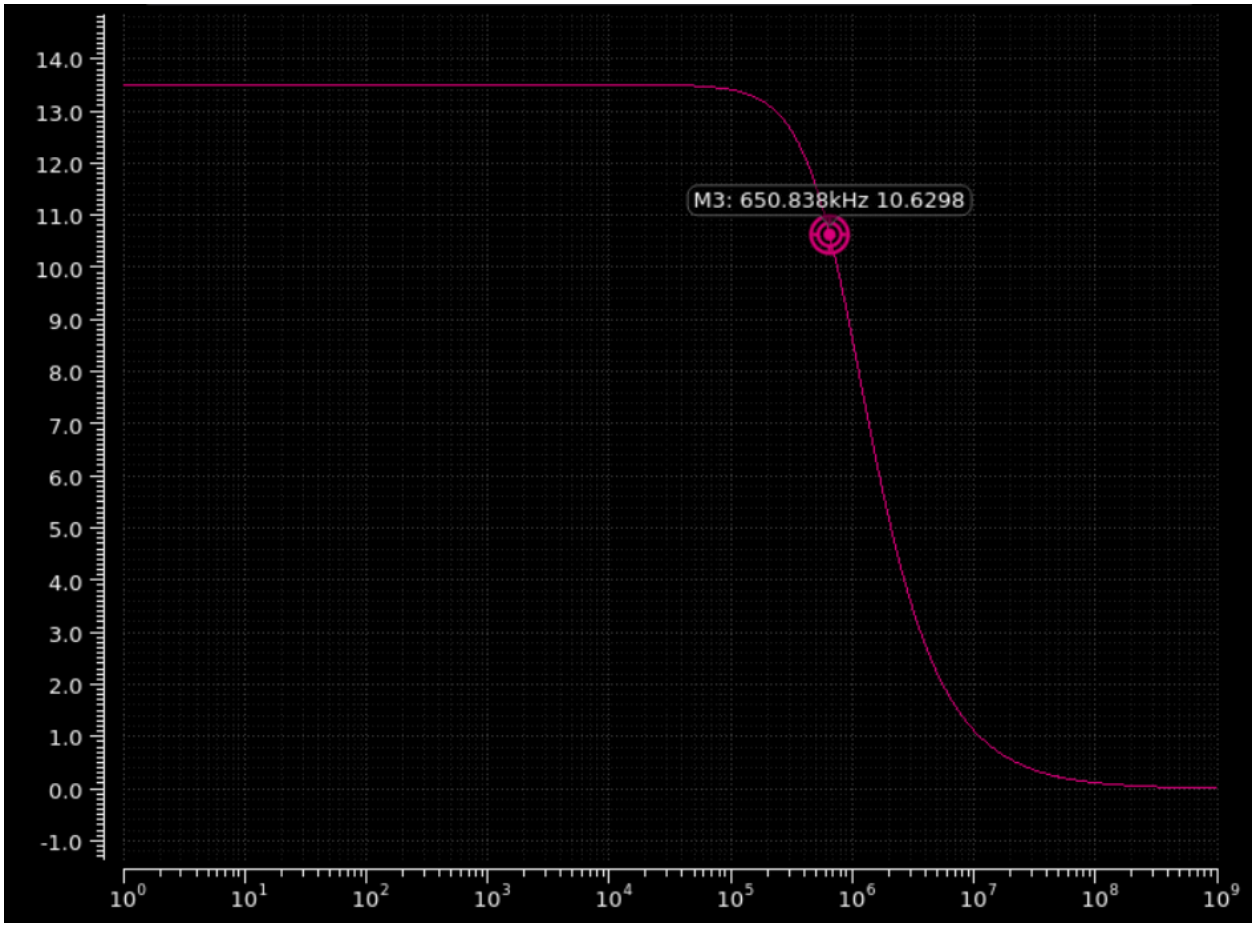


Dominant Pole Frequency =~200kHz



GBW product

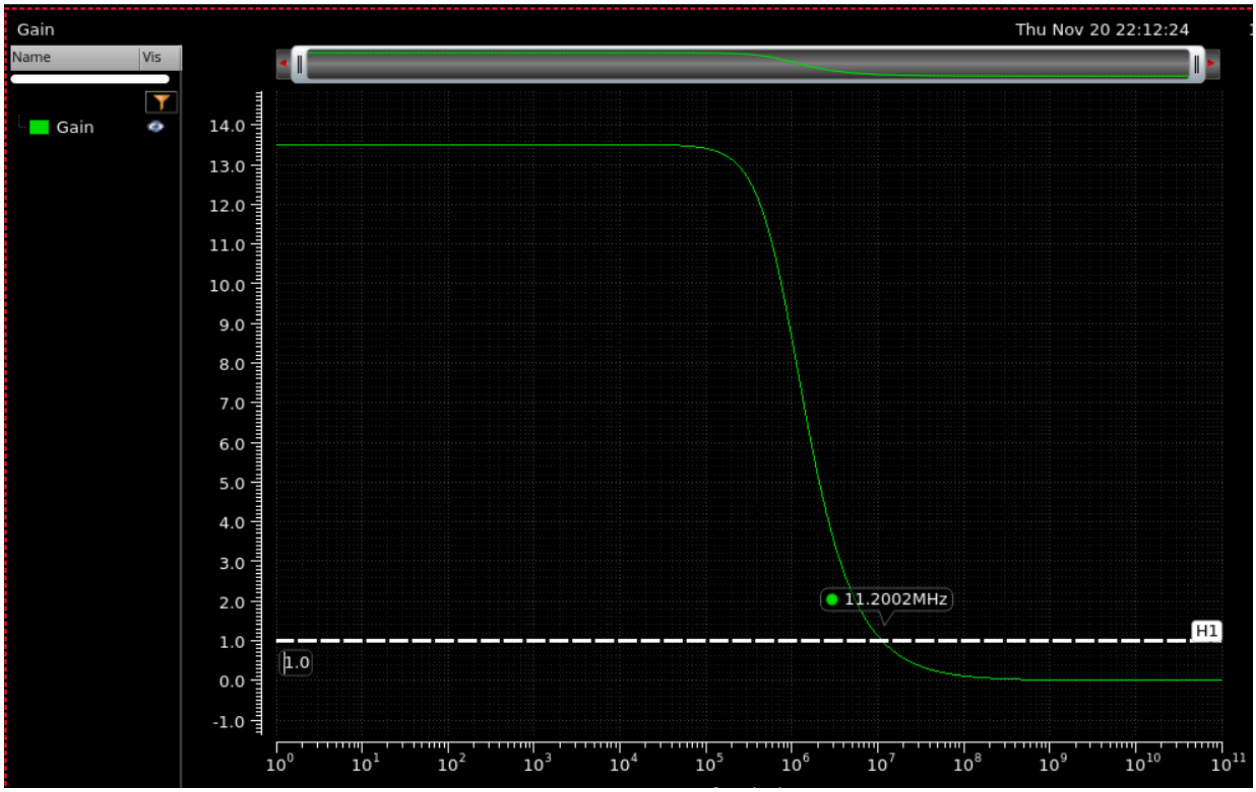
650kHz *10 = 6.50 GHz



Slew-Rate

$$SR = N\frac{I_{tail}}{C_L} = 3\frac{100uA}{20p\ F} = 15\ V/\mu s$$

Phase Margin


Gain
Thu Nov 20 22:12:24
Name
Vis
Gain
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13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
11.2002MHz
H1
1.0
10^0
10^1
10^2
10^3
10^4
10^5
10^6
10^7
10^8
10^9
10^{10}
10^{11}