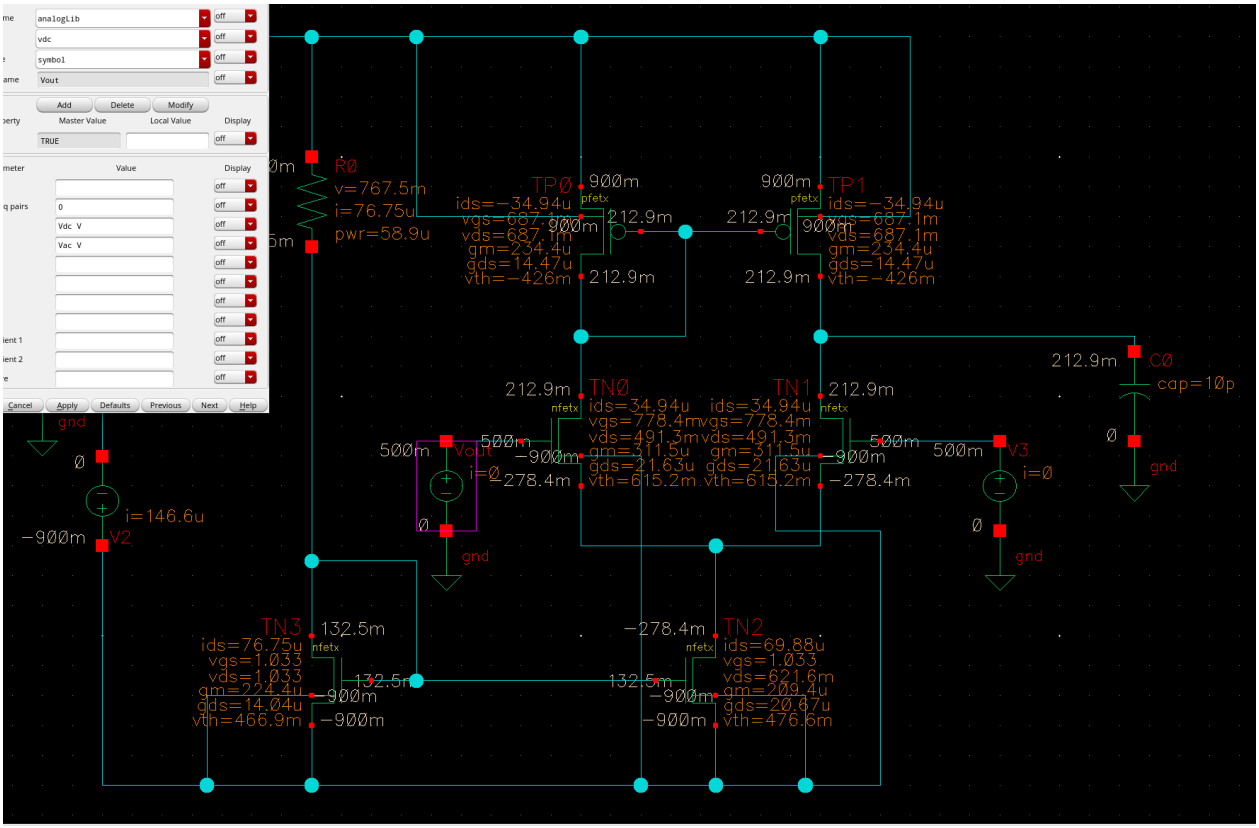
Matthew Loden

ECEN 474

Lab 06 Differential Amplifiers

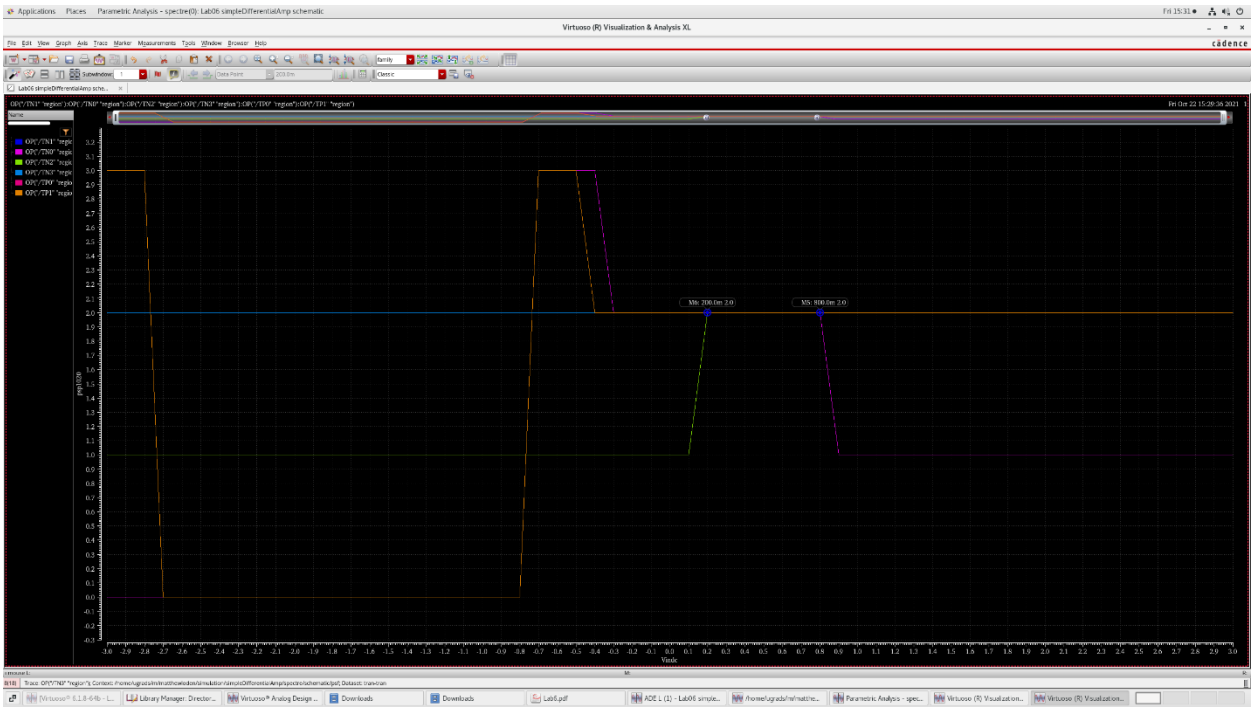
Simple Differential Amplifier:

Schematic & iTail:



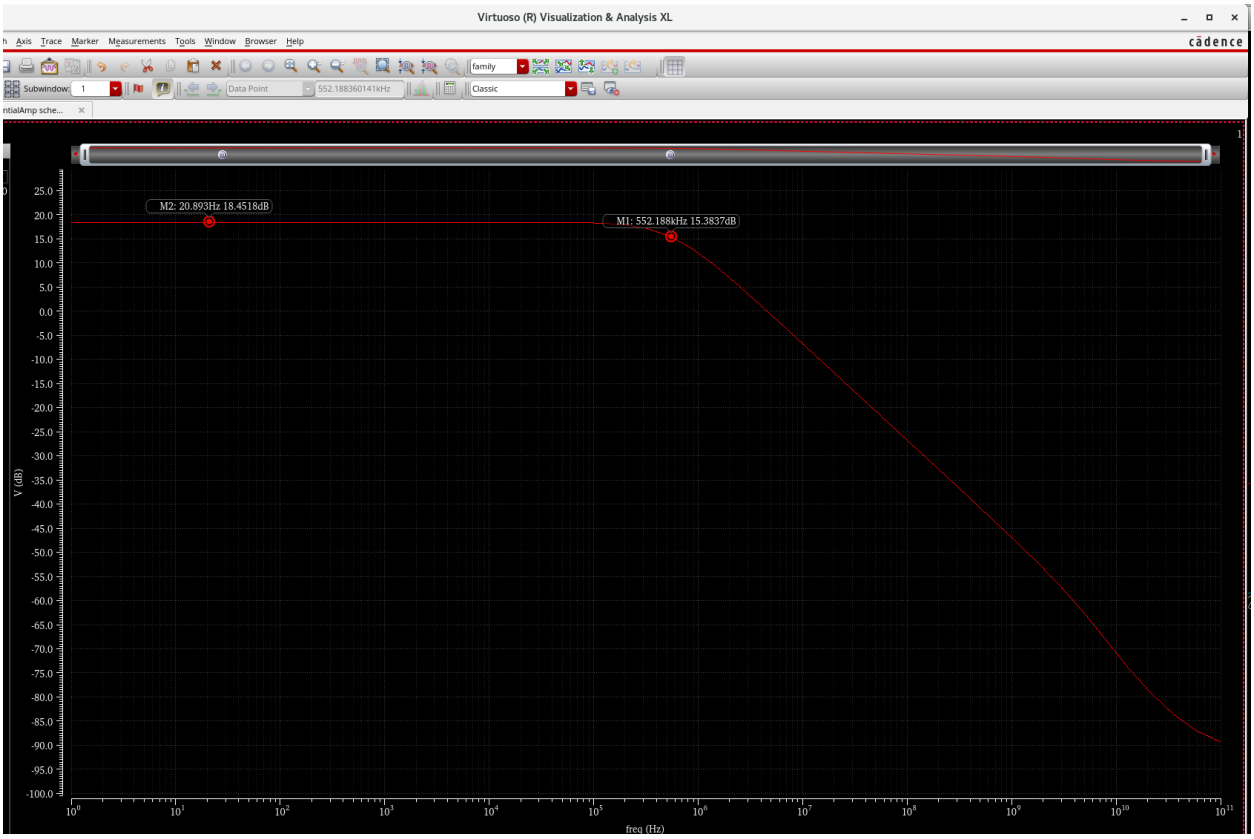
PreLayout Simulation Data:

CMVR:

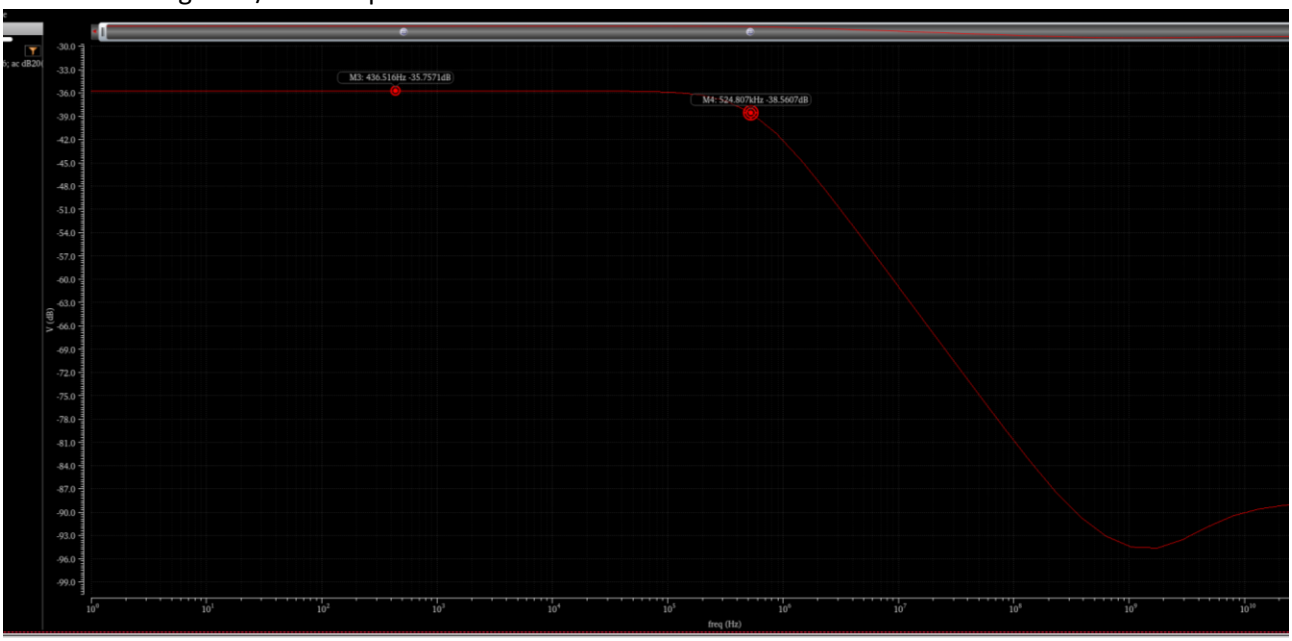


=800m-200m == 600mV CMVR

ADM and P1:

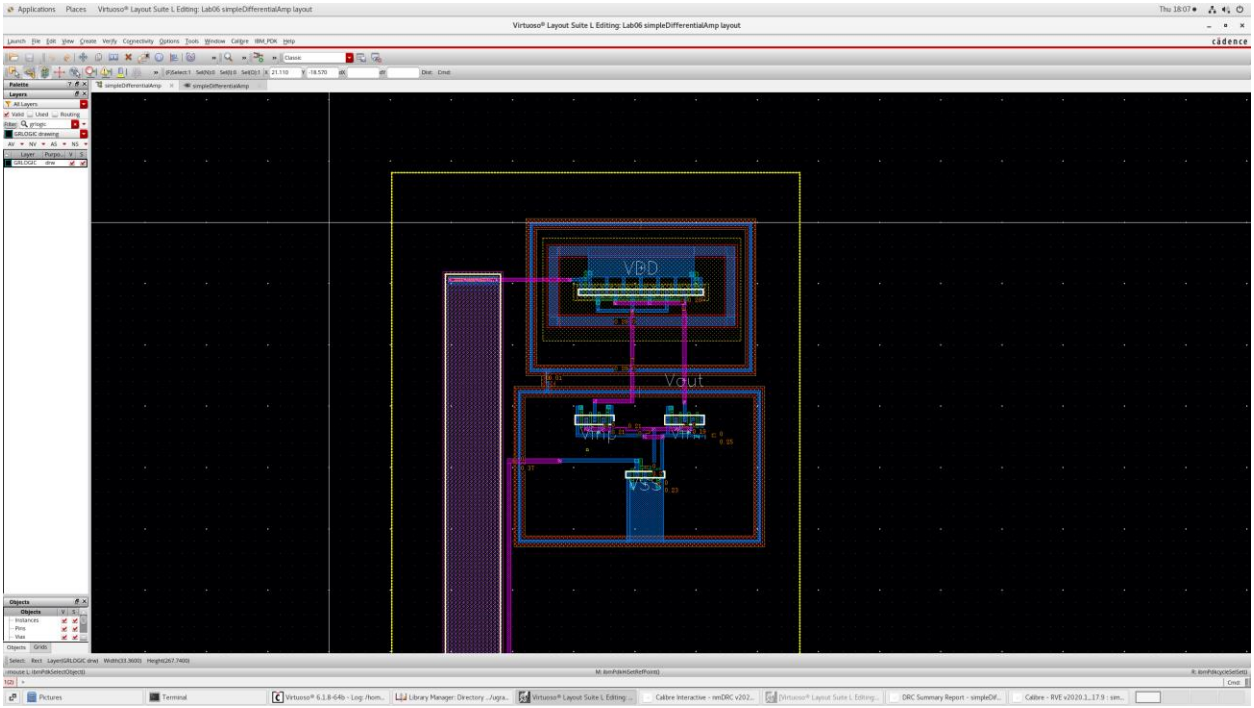


Adm=18.45dB gain w/ 552kHz pole 1

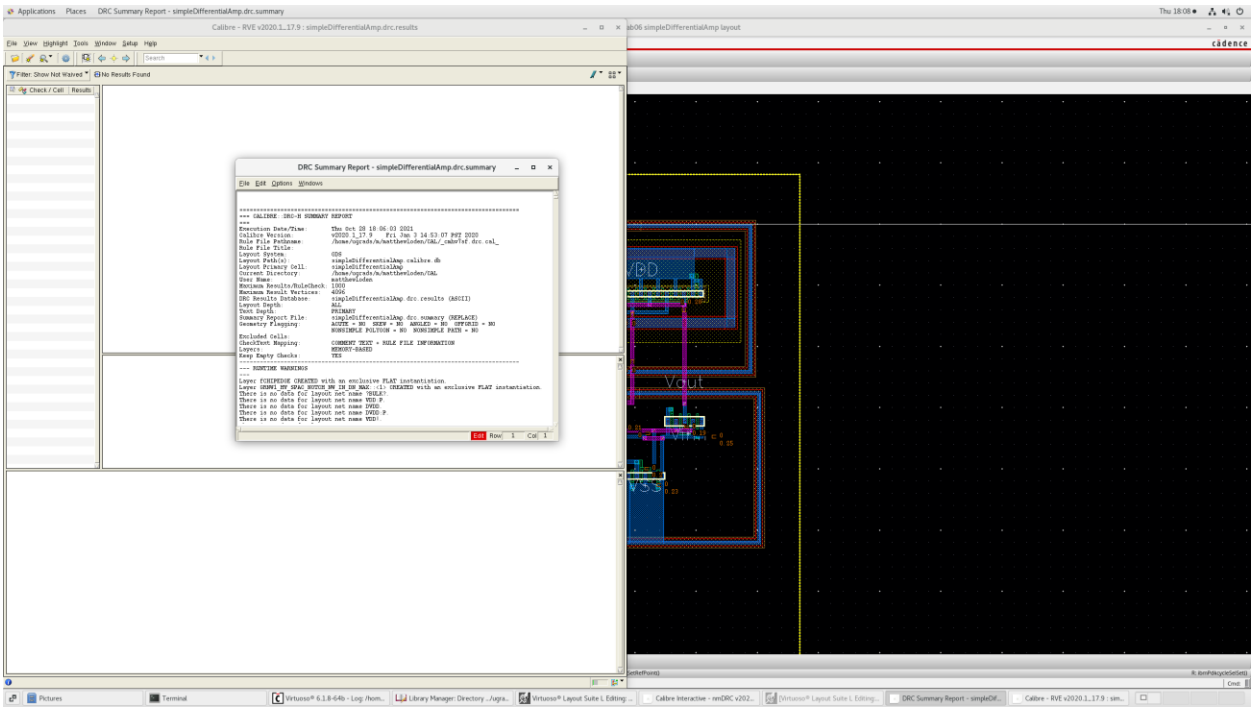


Acm = -35dB

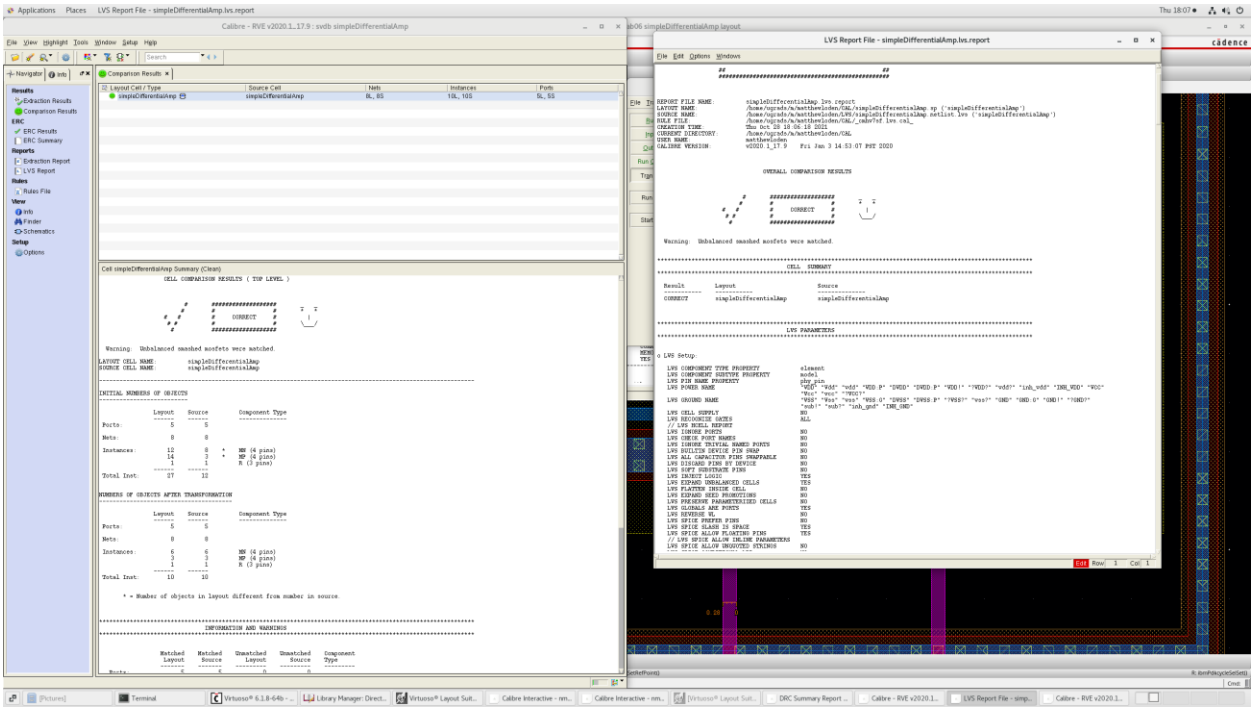
Layout:



DRC:

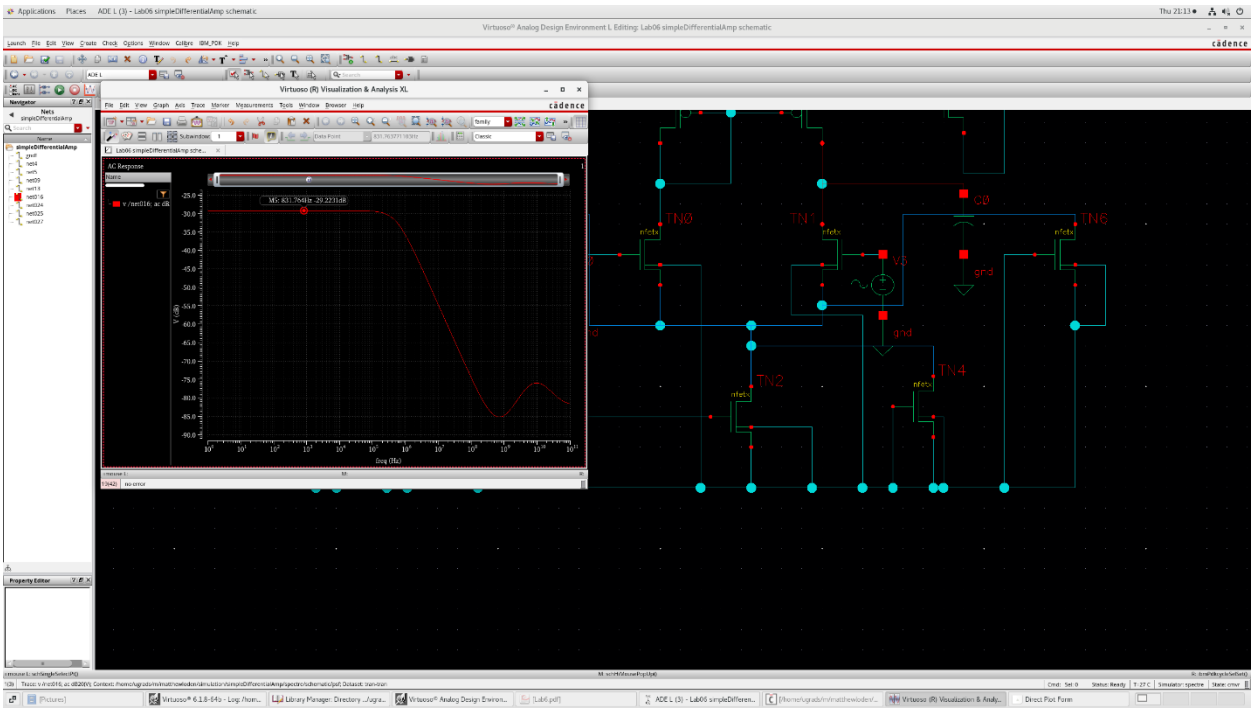


LVS:



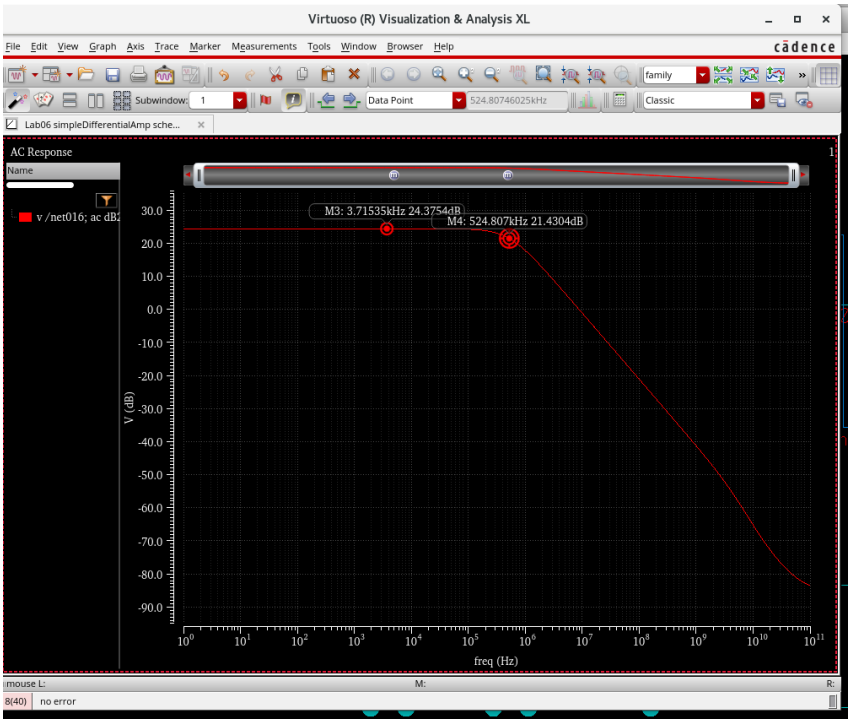
PostLab Simulations:

ACM:



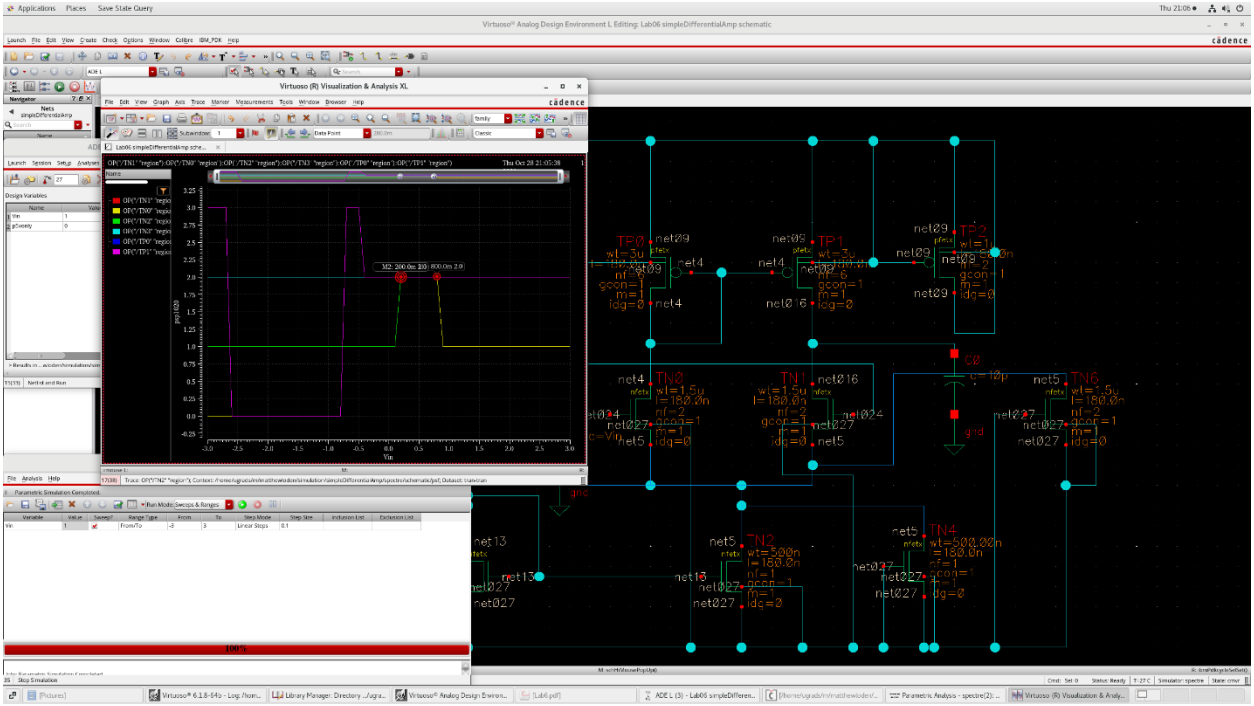
=-29dB

Adm:



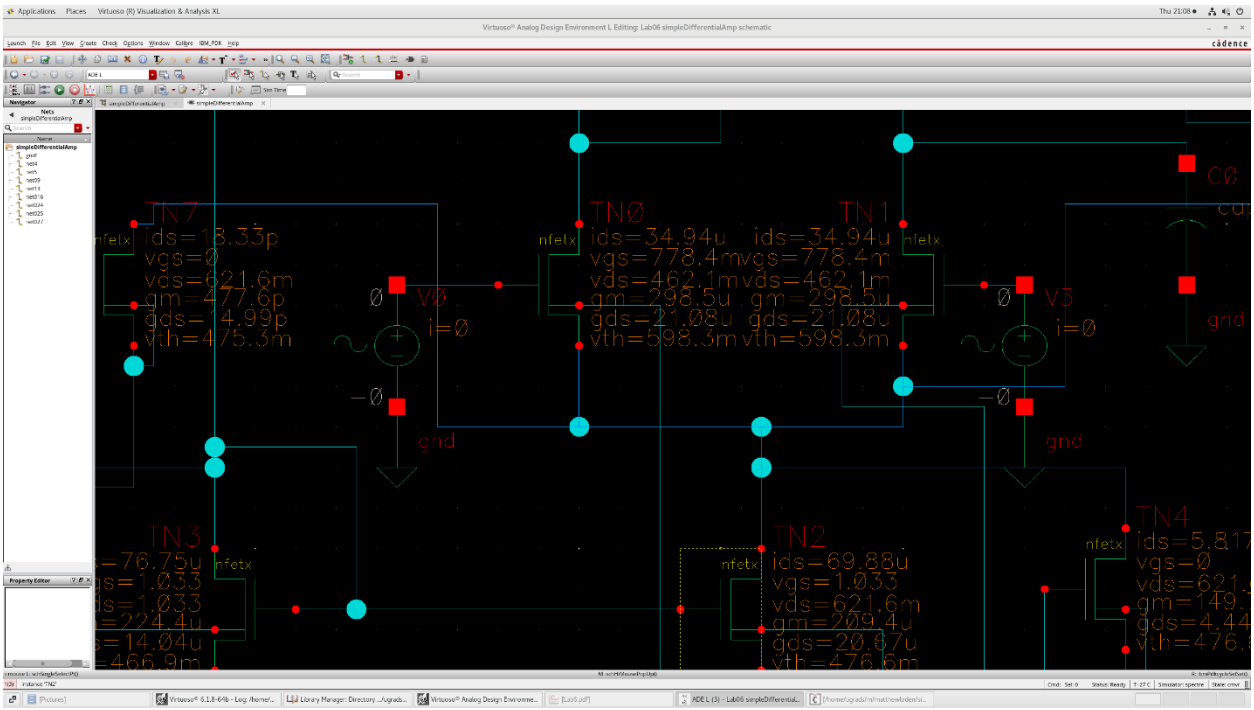
Adm = 24dB p1 = 524kHz

CMVR:



=800m – 200m == 600m

Itail:



=69.88uA

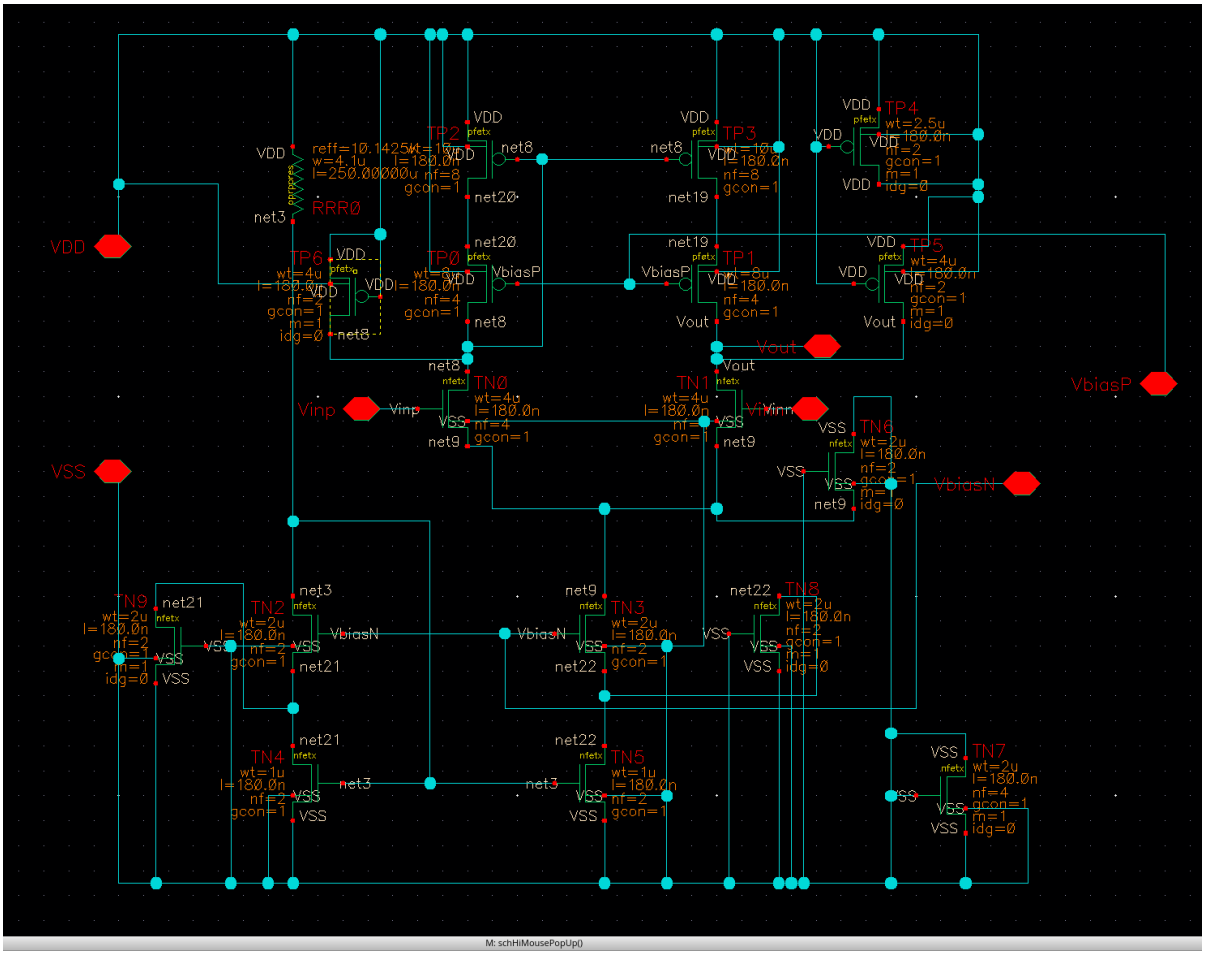
Data Analyzed:

Simple	PreLayout	linear Scale	PostLayout	linear Scale	Expected
ADM	18.45	8.365656	24.37	16.5386478	
ACM	-35.757	0.0162986	-29.233	0.0345422	
P1	552000		524000		
CMVR	600mV		600mV		500mV
CMRR	54.207		53.603		
Slew Rate	69000000		69000000		10000000
itail	6.9E-07		6.9E-07		100uA
GBW	4617842		8666251.5		5000000

There was slight error in the tail current that resulted in a lower slew rate than expected. The gain was slightly below using the prelayout data however the transition over to the layout information pushed the gain up and resulted in a higher gain bandwidth. The common mode voltage region of operation was nominal.

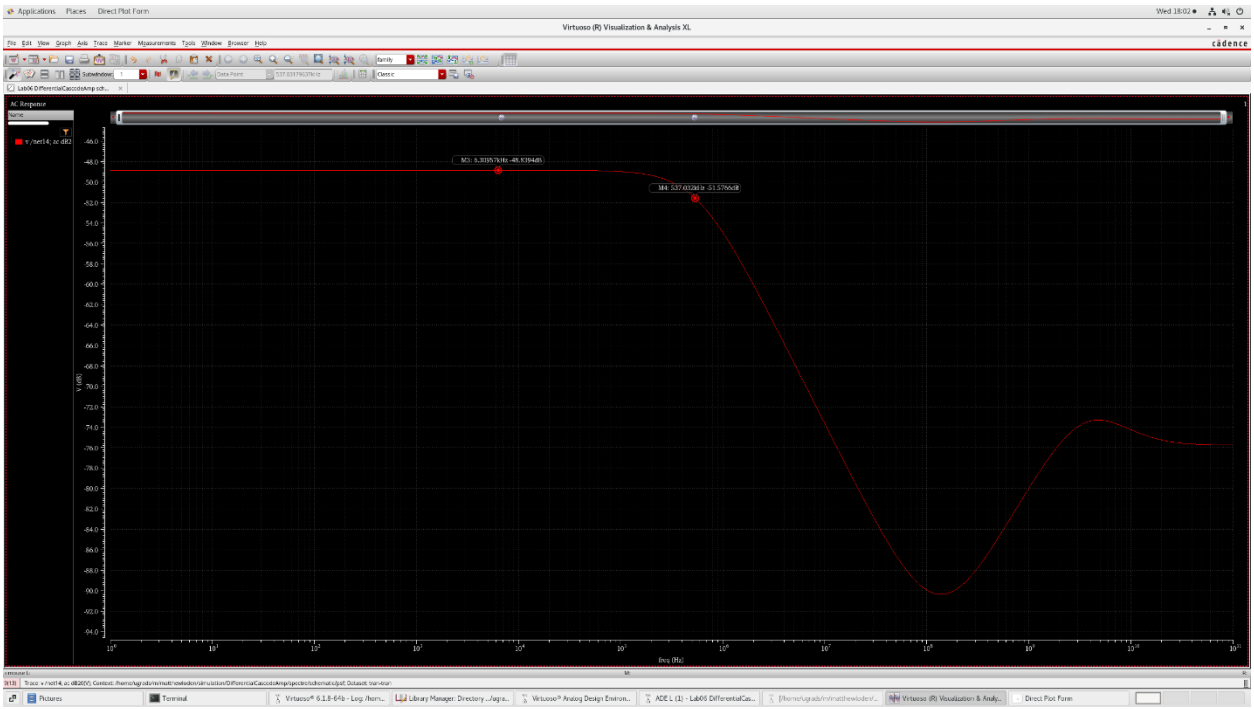
Differential Amp with Cascode Configuration

Schematic:

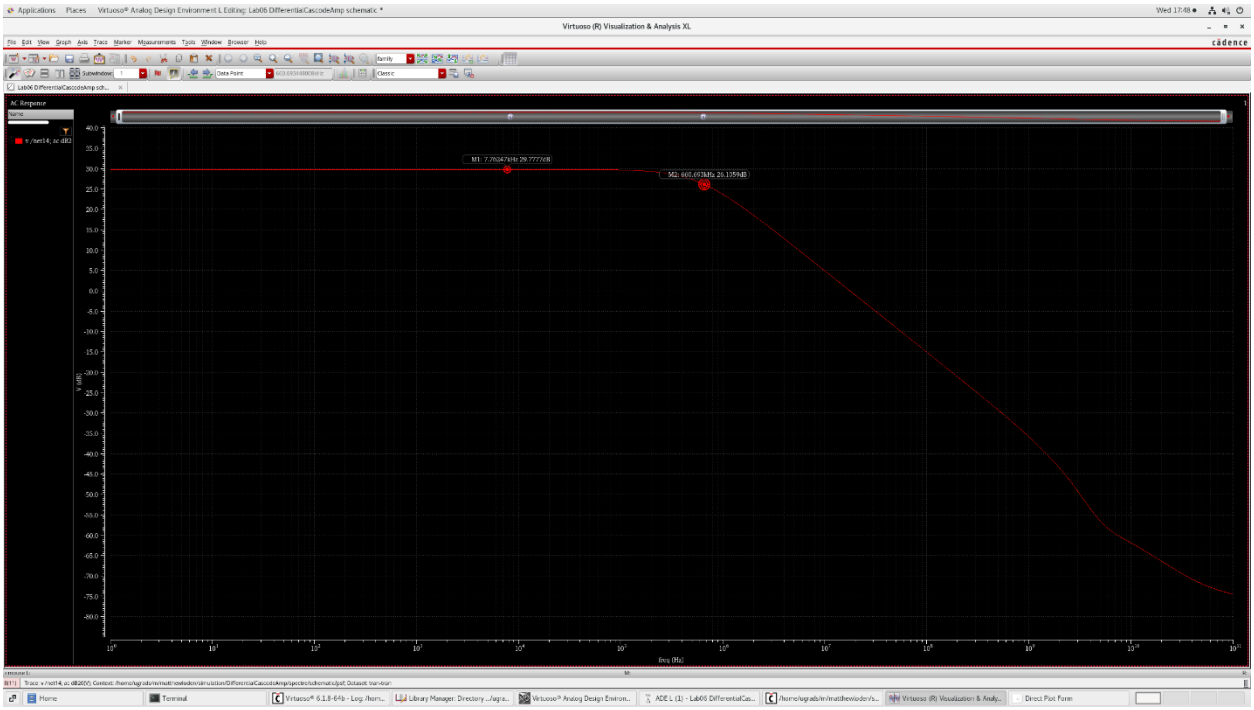


PreLab Simulations:

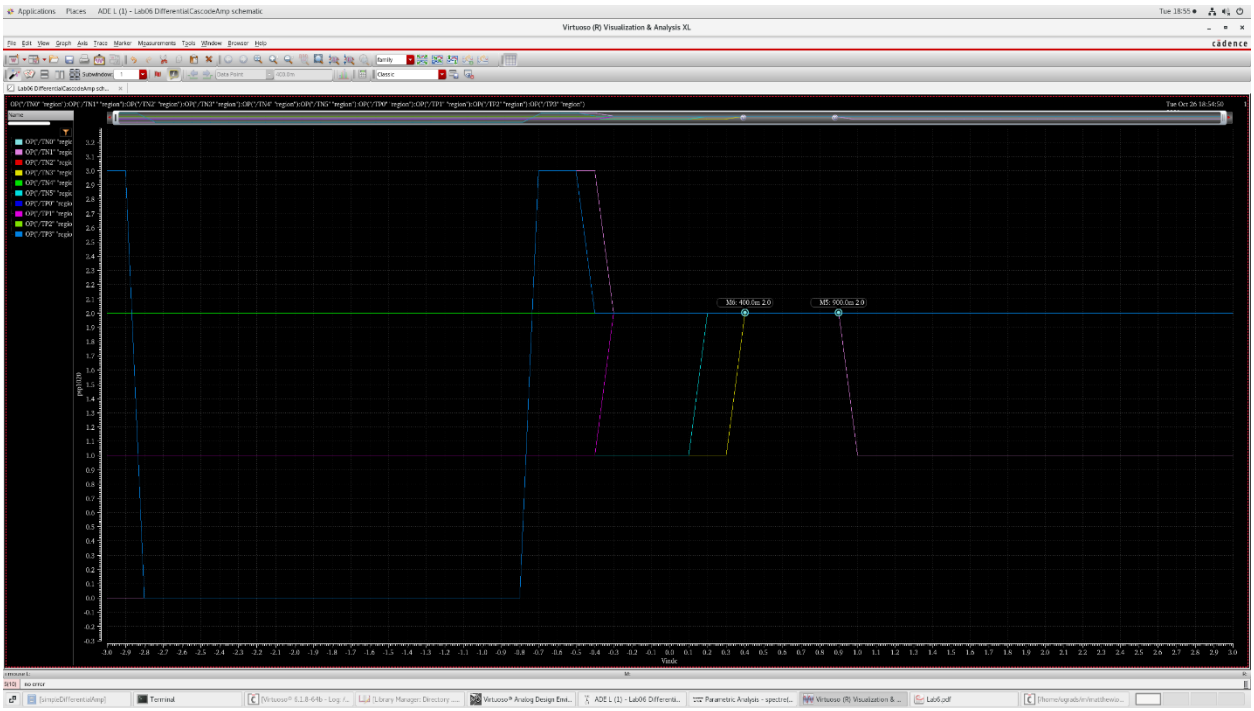
ACM:


Virtuoso (R) Visualization & Analysis XL
cadence
AC Response
M3: 8.30857kHz -48.9394dB
M4: 537.0328kHz -51.5796dB
Freq (Hz)

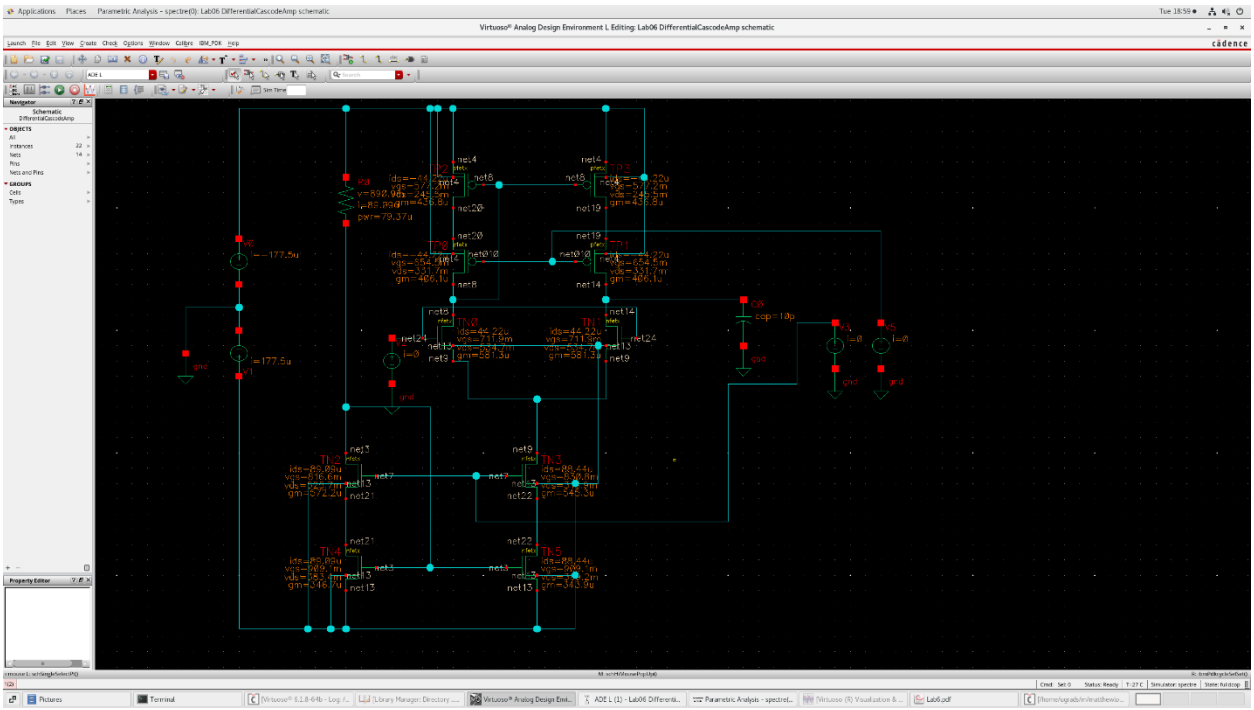
Adm and p1:


Virtuoso (R) Visualization & Analysis XL
cadence
AC Response
M1: 7.76047kHz 29.7777dB
M2: 660.6934kHz 26.195dB
Freq (Hz)

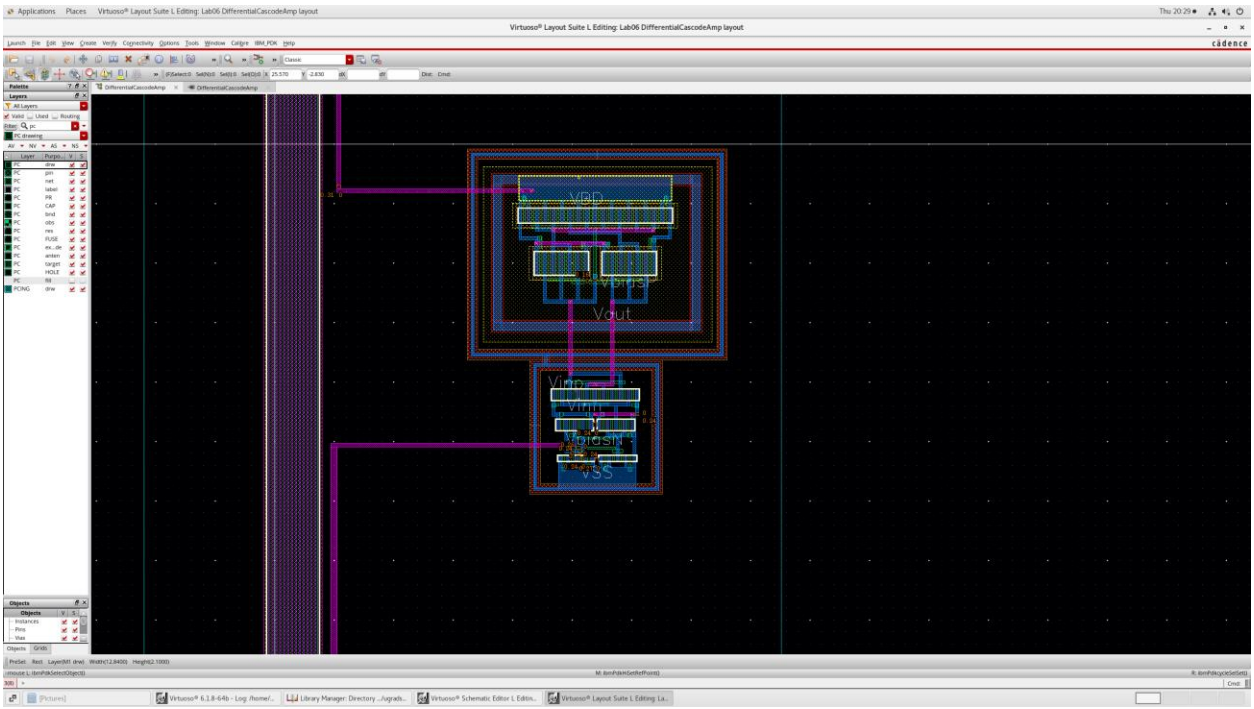
CMVR:



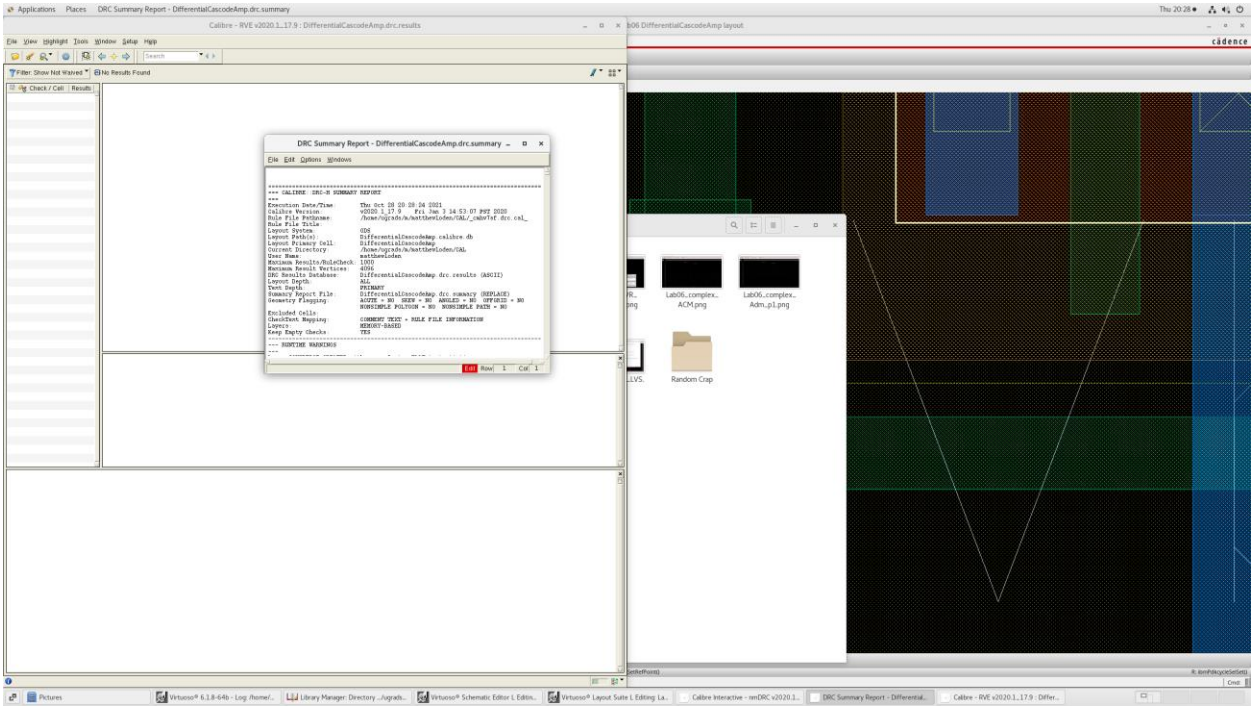
Itail:



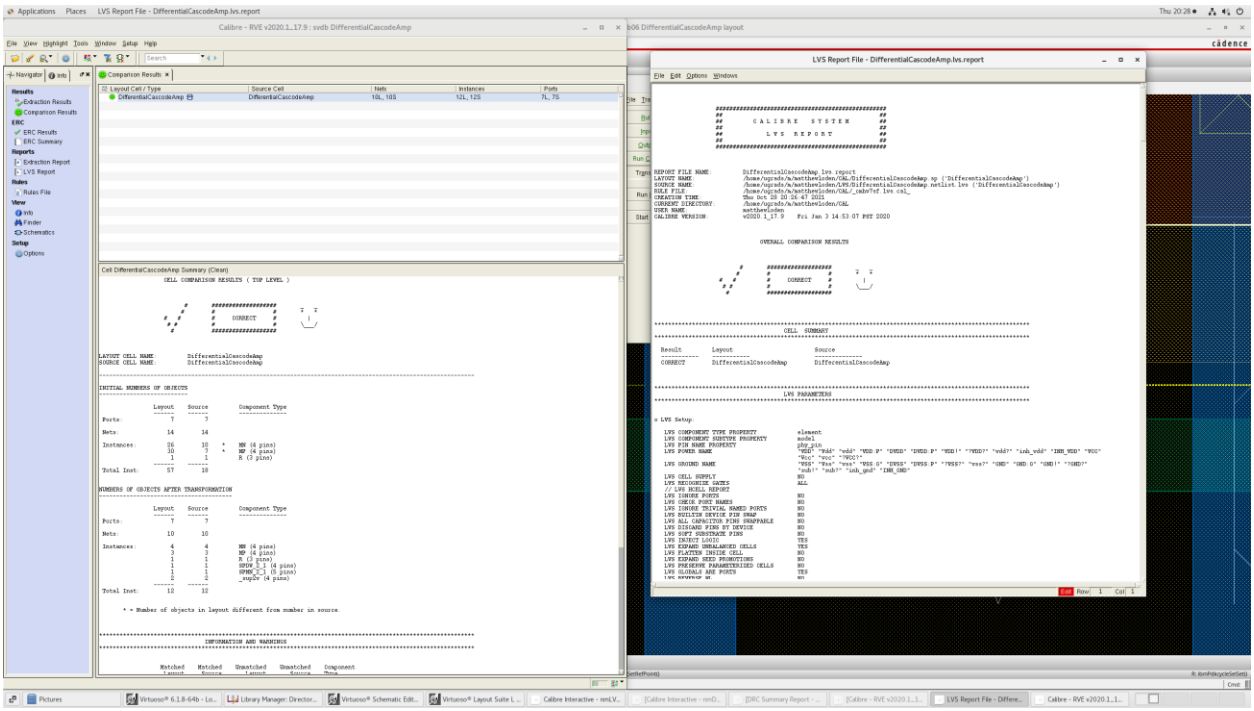
Layout:


VDD
Vout
Vinp
Vinn
VbiasN
VSS

DRC:

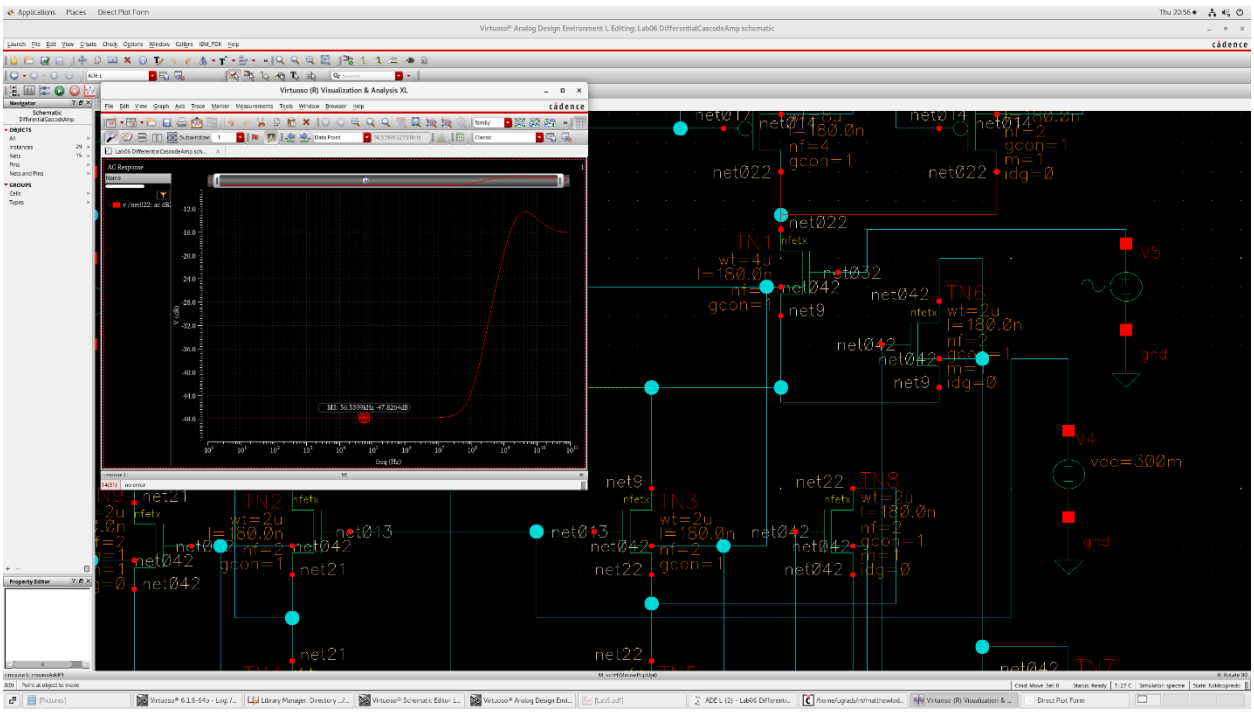

DRC Summary Report - DifferentialCascodeAmp.drc.summary
Random Crap

LVS:

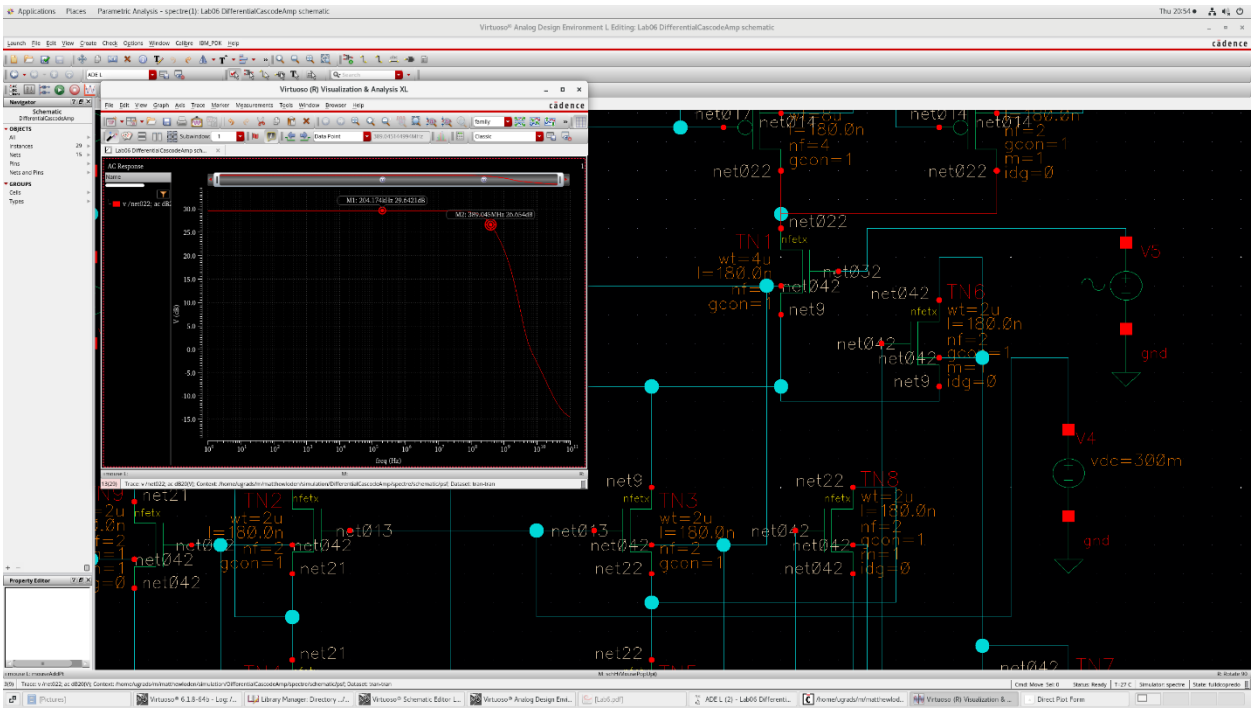


PostLayout Simulations

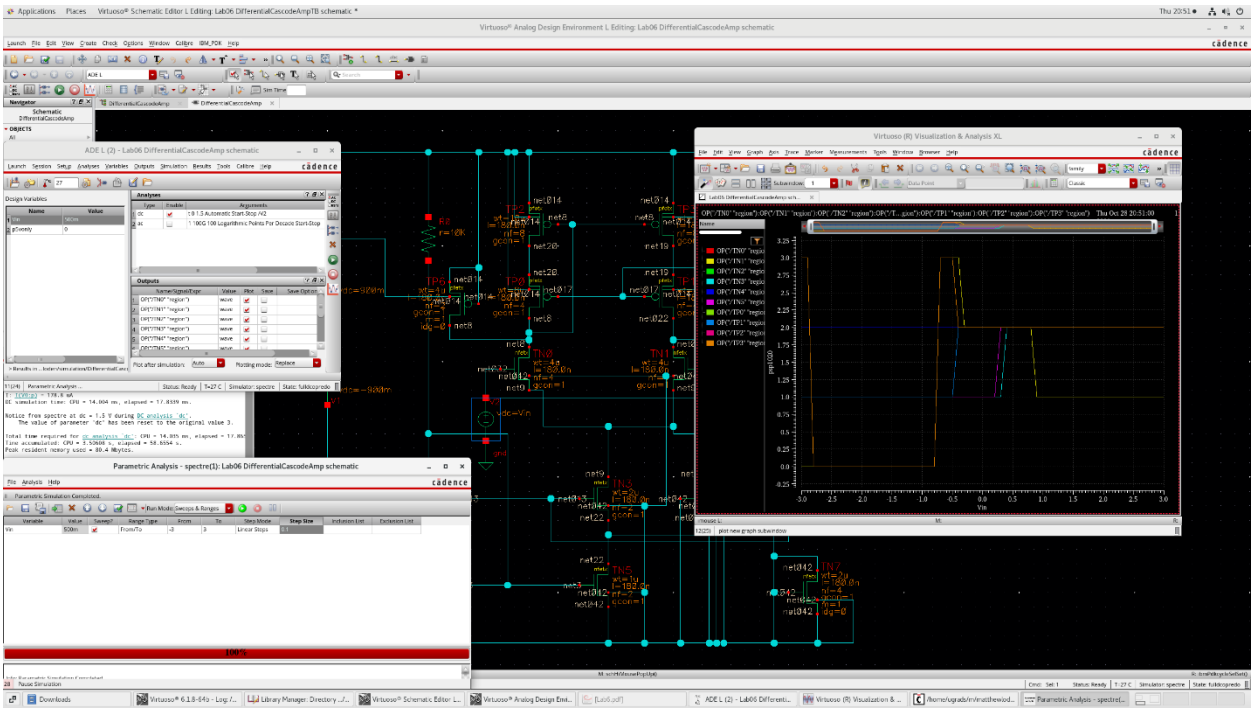
ACM:



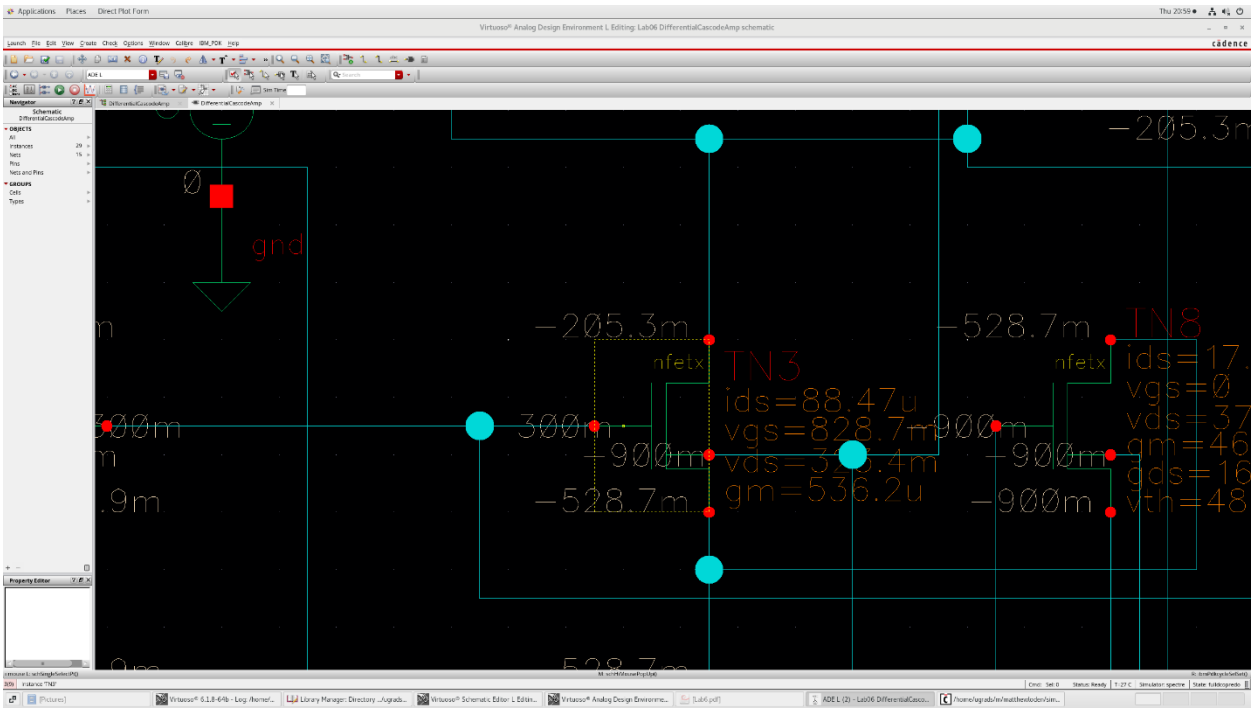
ADM:



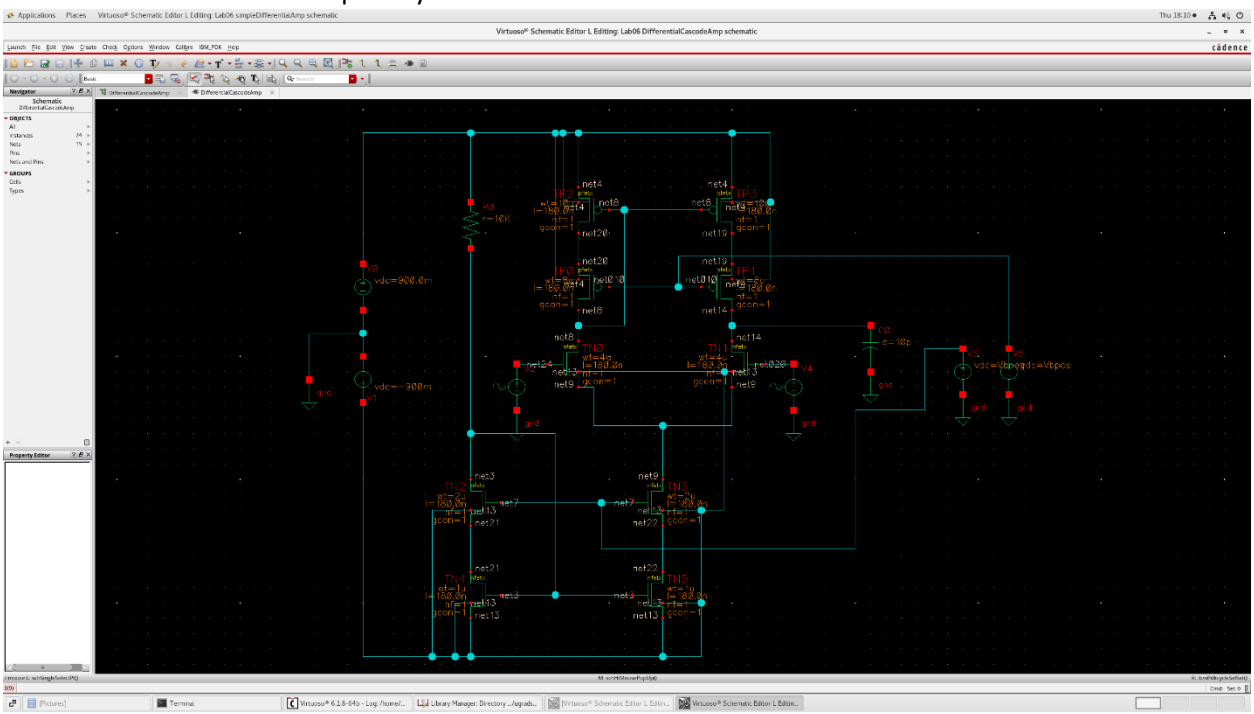
CMVR:



Itail:



Testbench Used to simulate postlayout data:



Data Analyzed:

Complex	PreLayout	linear Scale	PostLayout	linear Scale	Expected
ADM	29.777	30.821232	29.642	30.3458984	
ACM	-48.83	0.0036183	-47.826	0.00406163	
P1	660000		389000		
CMVR	500mV		500mV		500mV
CMRR	78.607		77.468		>60dB
Slew Rate	88440000		88440000		10000000
itail	8.84E-07		8.844E-07		100uA
GBW	20342013		11804554		5000000

The data for both the prelayout and postlayout were both nominal and met required criteria.