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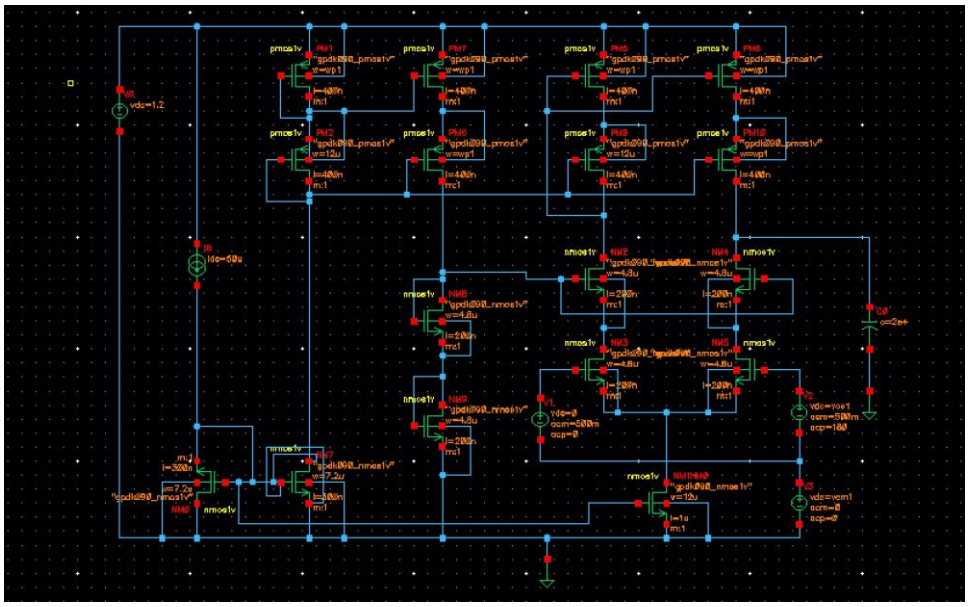
10-24-20

ECE 546

Lab 4 Cascade DiffAmplifier

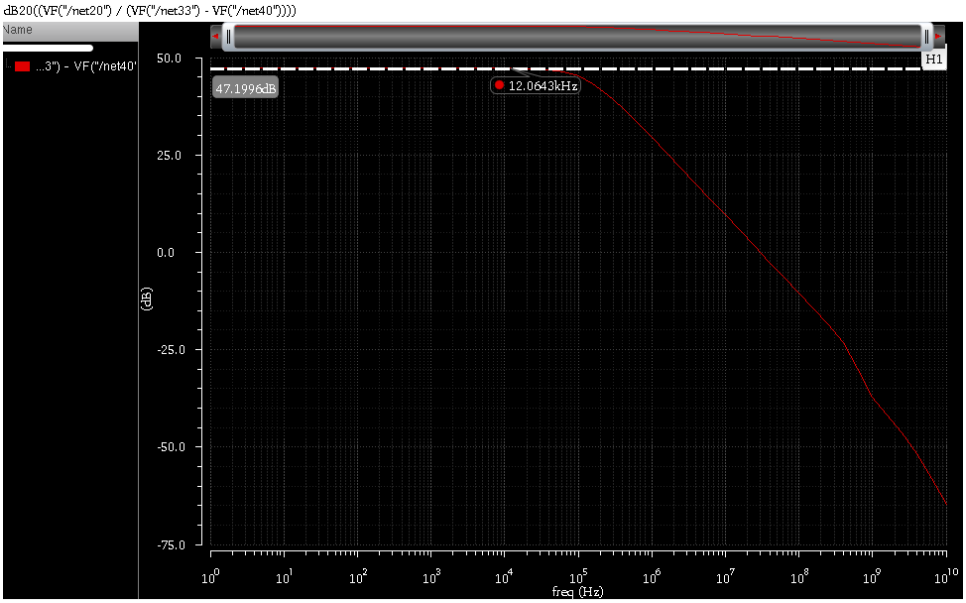
1.

Figure 1: Cascade Differential Amplifier Schematic

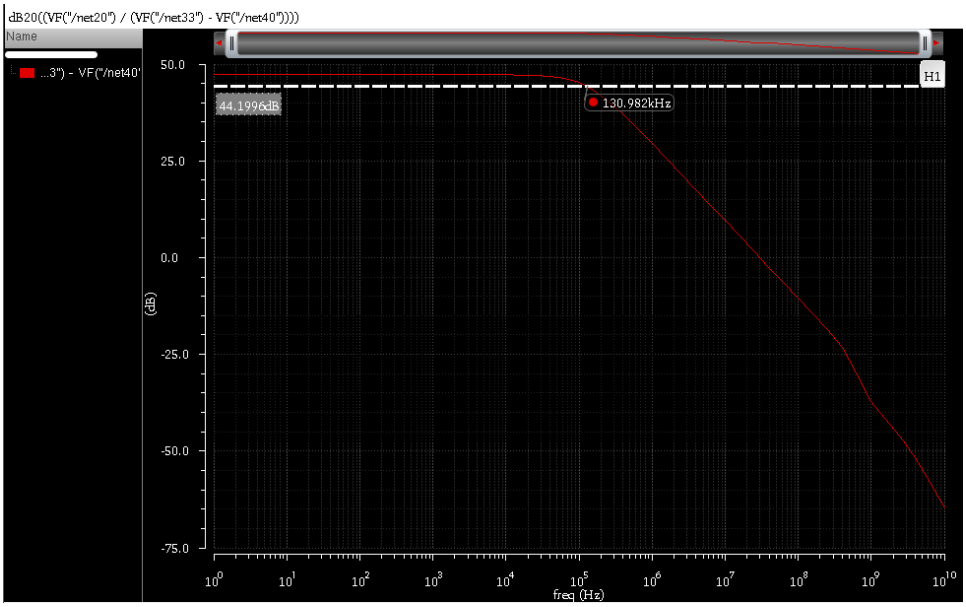


1) Performing simulation to find the amplifier gain and -3dB bandwidth with common mode input at 400.

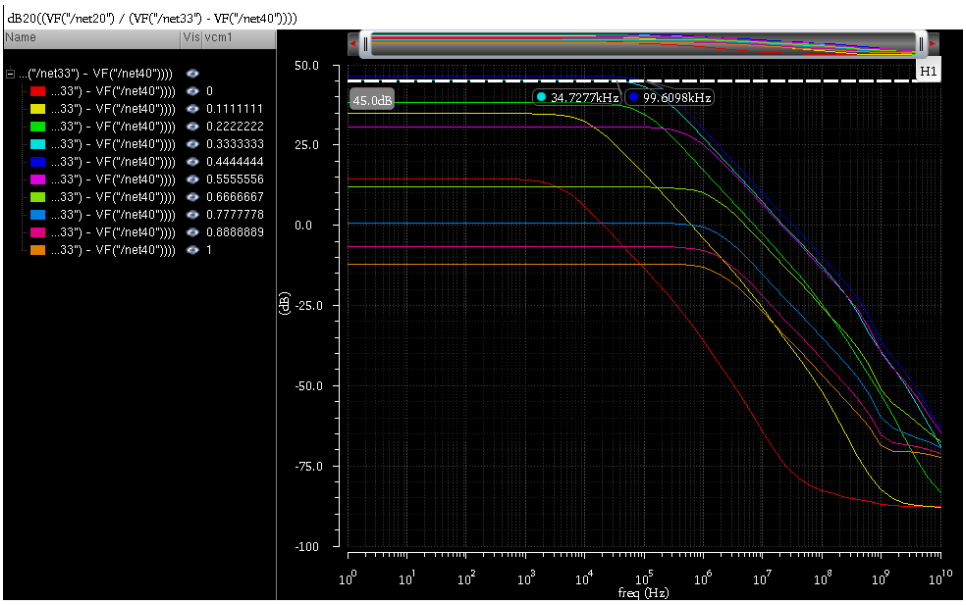
Amplifier Gain at 47.1996dB



Results of -3dB bandwidth subtracted from 47.1996dB by -3dB.

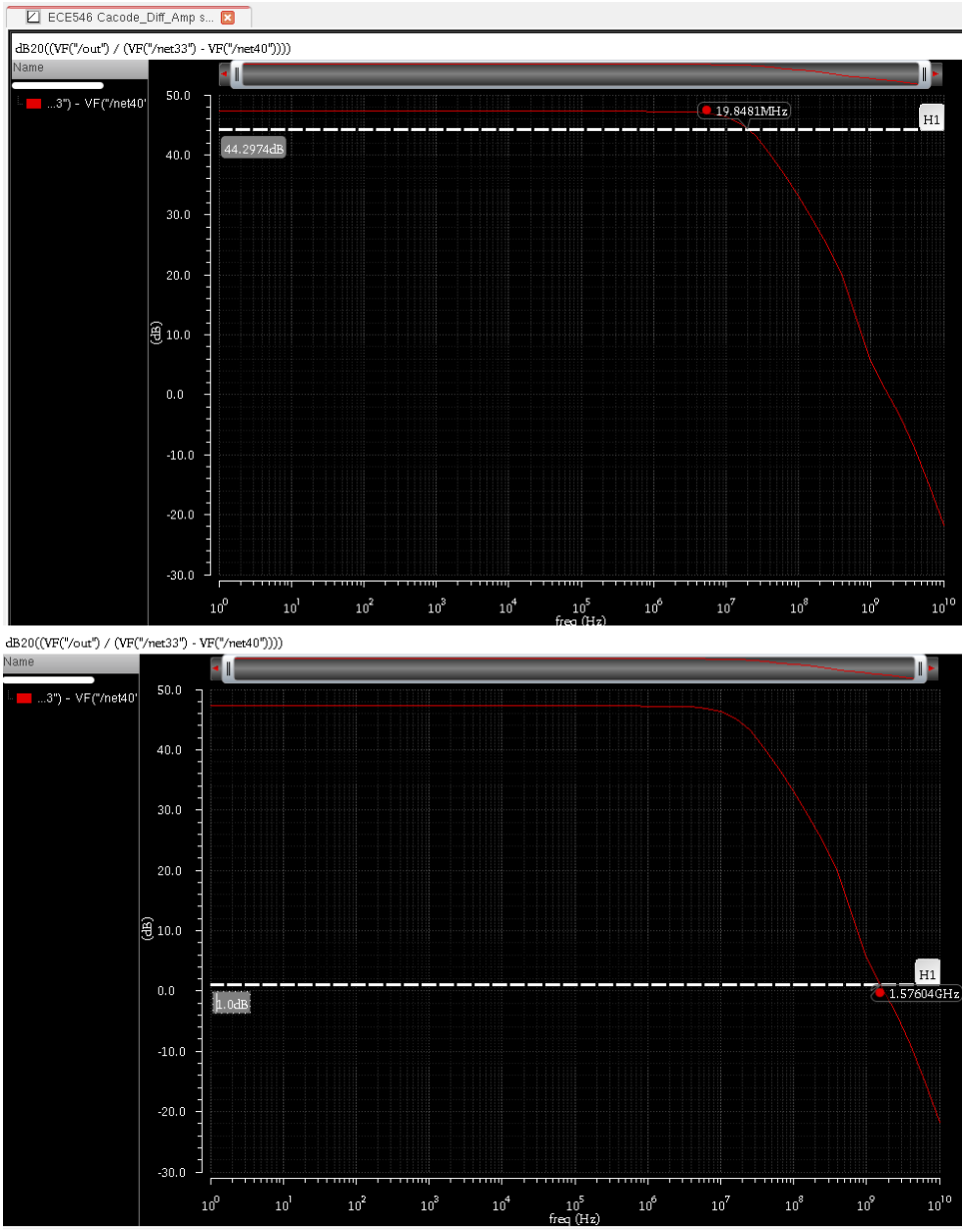


2) common mode input range (assume the minimum gain requirement is 40dB(100) and -3dB bandwidth should not smaller than 90% of the value obtained in 1)

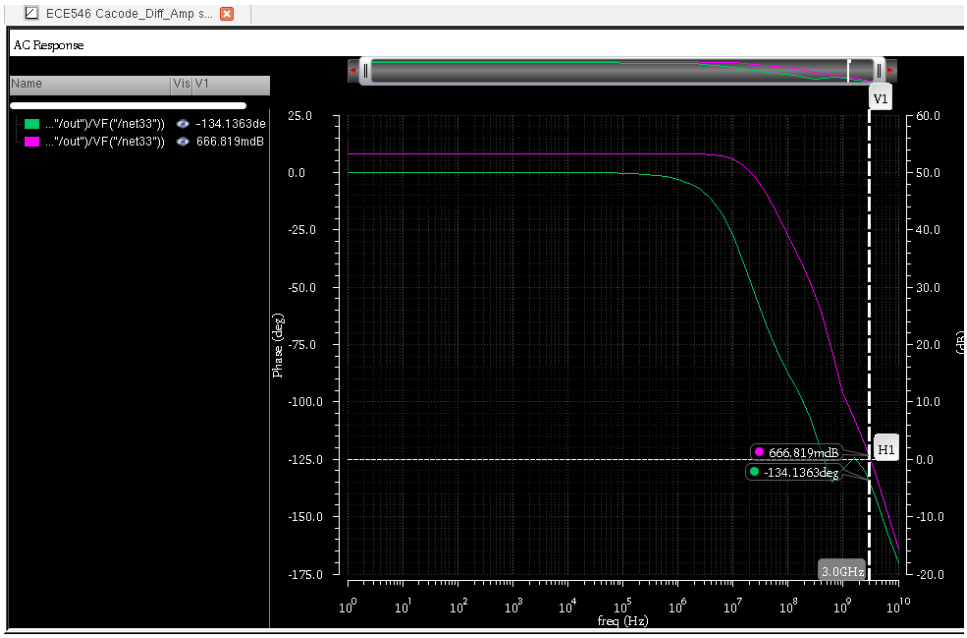


3) With common mode input at 400mV compare the - 3dB and unity gain bandwidths, and phase margin with and without the output load cap.

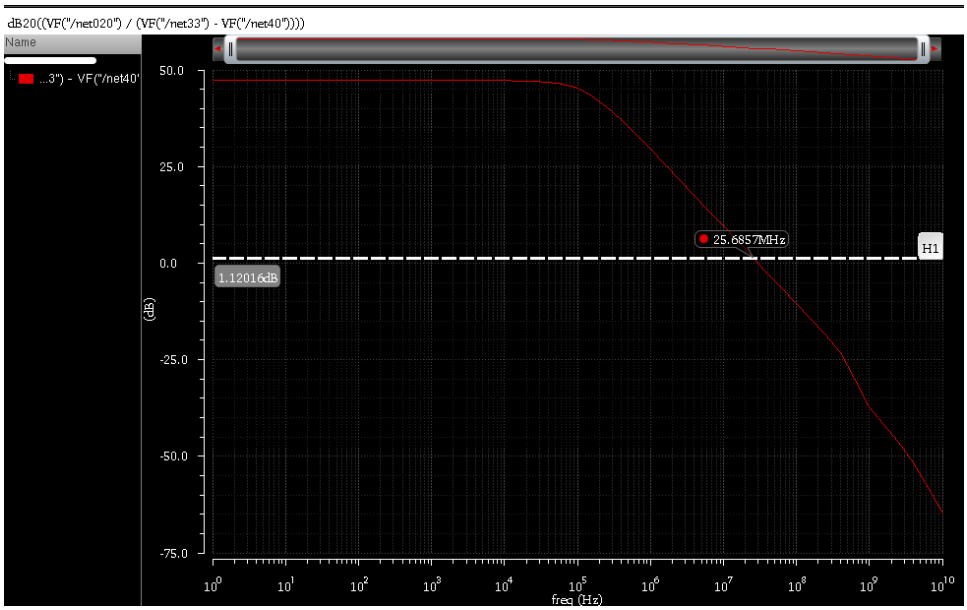
-3dB and the unity gain bandwidth (without the load capacitor)

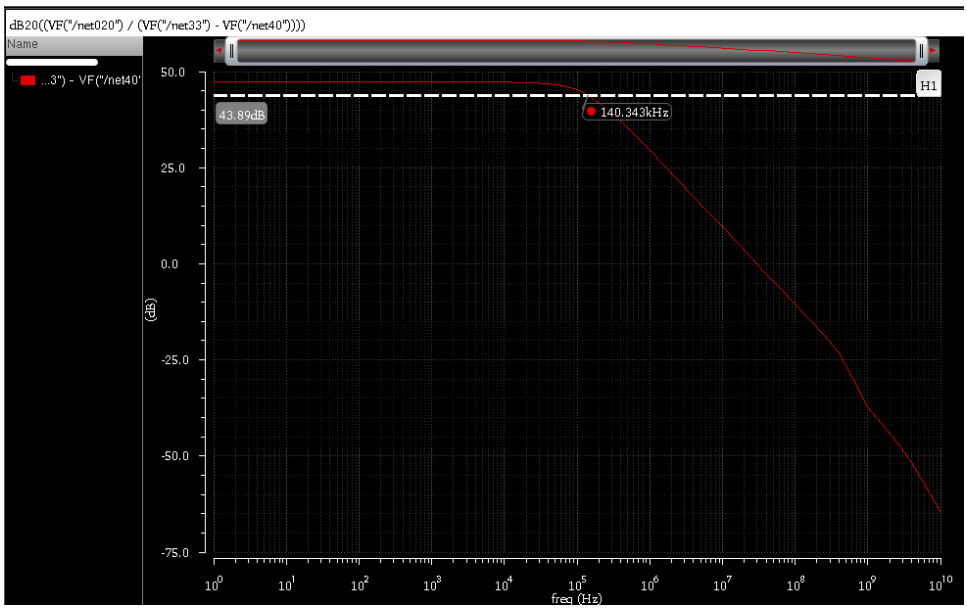


The phase Margin of the amplifier is at –134.136dB subtracted by 180 will be 45.864dB

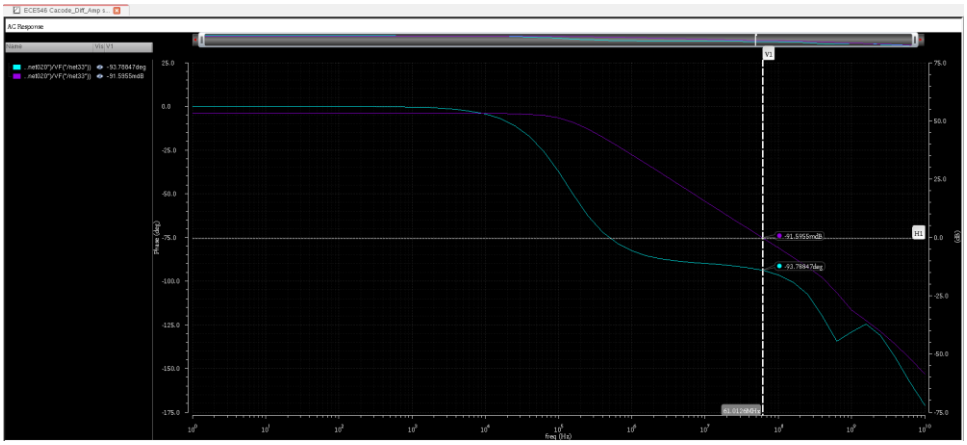


-3dB and the unity gain bandwidth (with load capacitor)



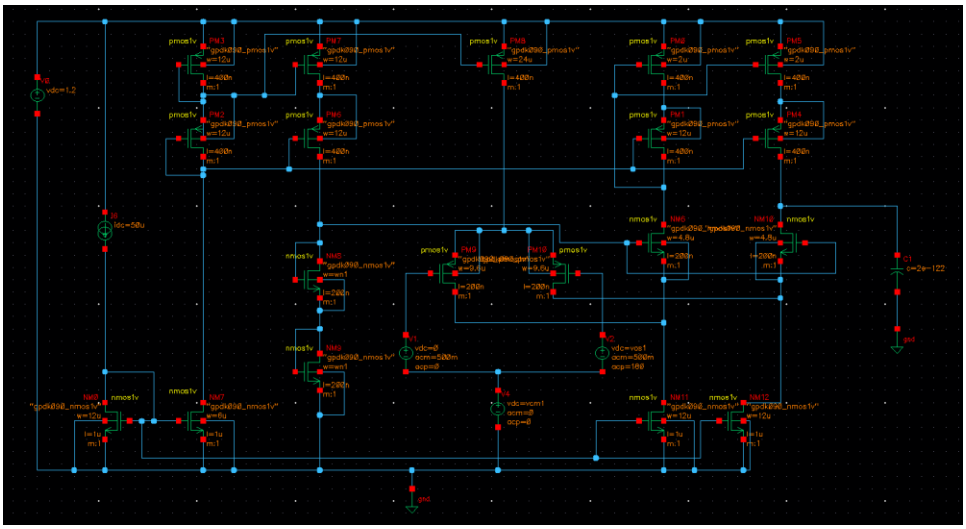


The Phase Margin of the amplifier with the capacitor.



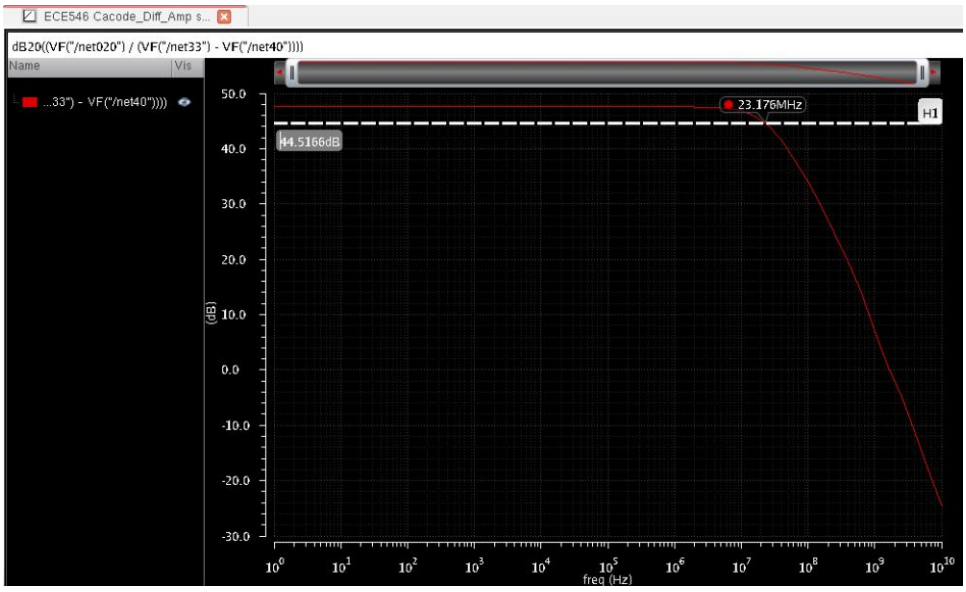
2.

Figure 2. Cascode Differential Amplifier Schematic.

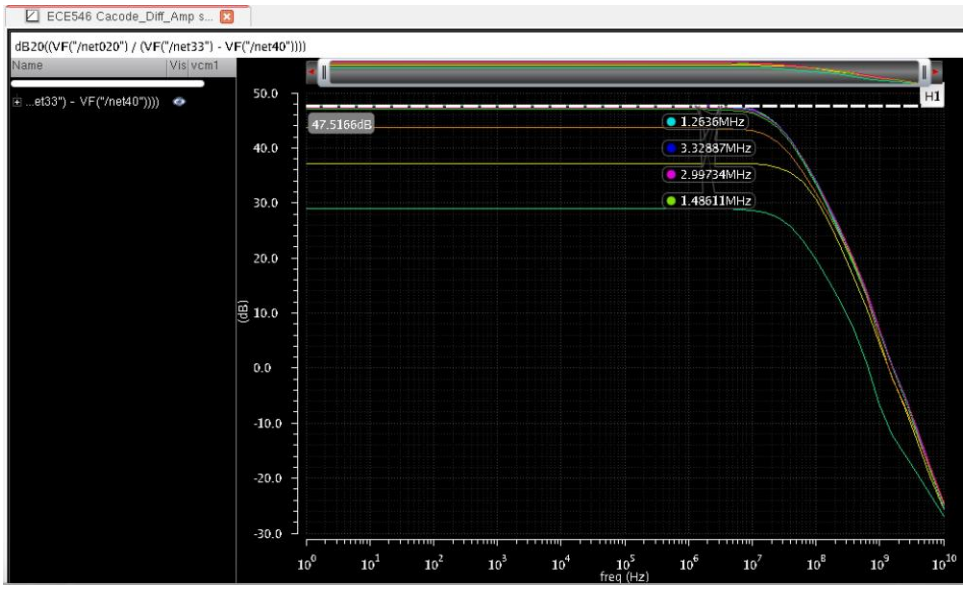


1) Perform simulation to find: 1) amplifier gain and -3dB bandwidth with common mode input at 700mV.

The gain is at 47.5166db and the –3db stands at 44.5166db

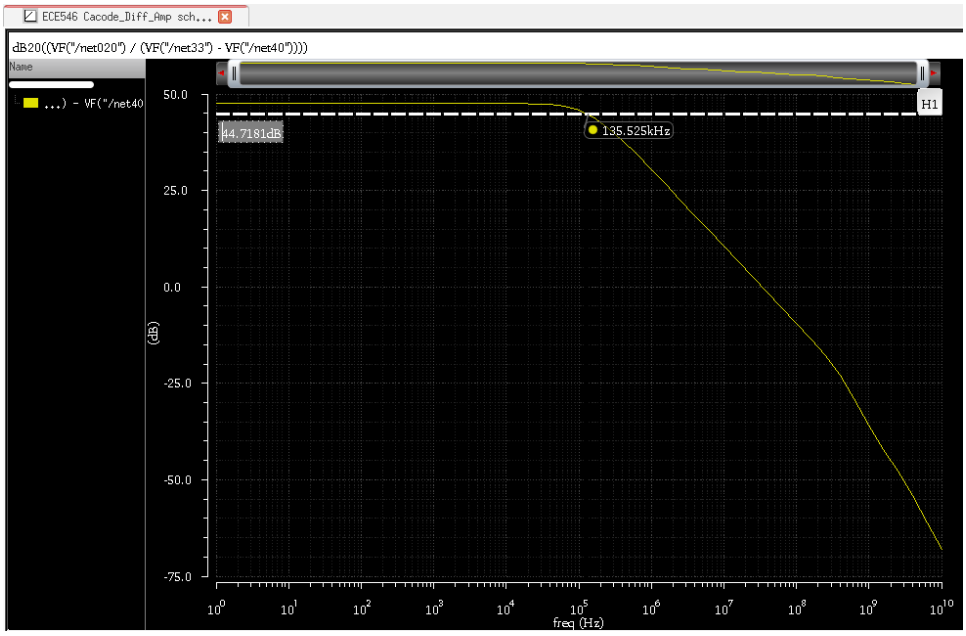


2) common mode input range (assume the minimum gain requirement is 40dB (100) and -3dB bandwidth should not be smaller than 90% of the value obtained in 1))

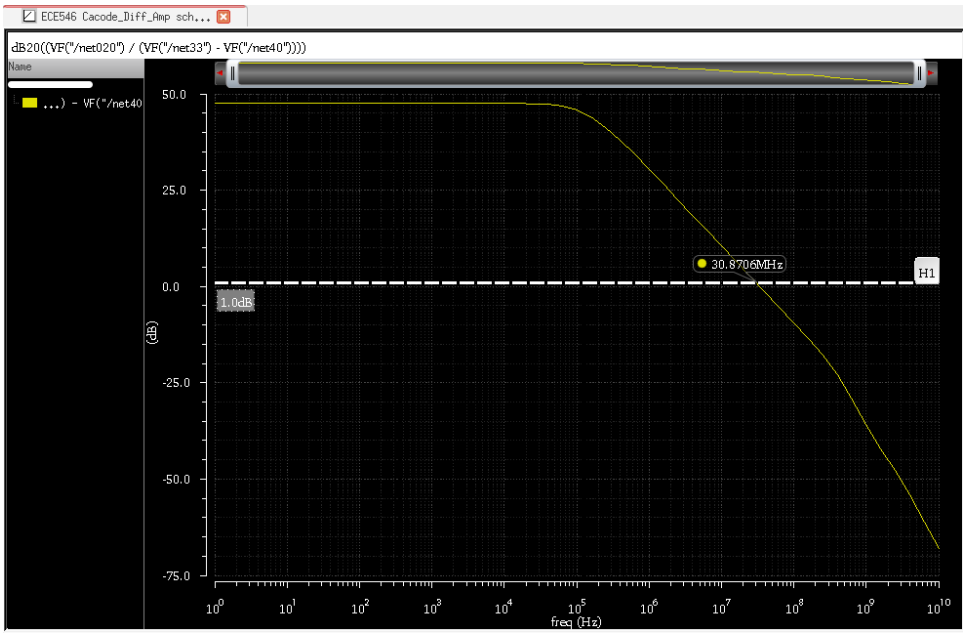


3) With common mode input at 700mV, compare the -3dB and unity gain bandwidths, and phase margin with and without the output load cap.

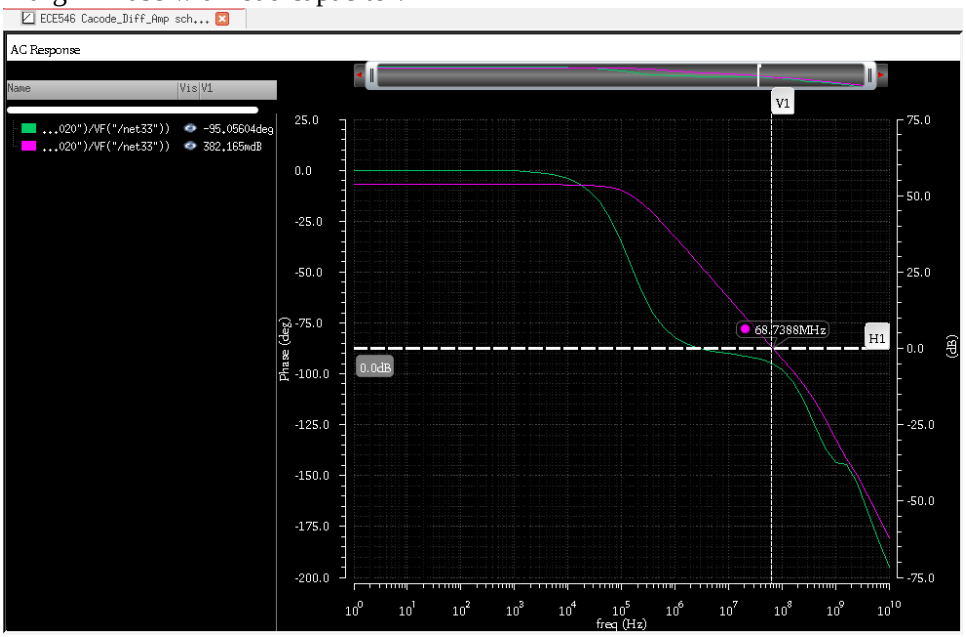
-3 and Unity bandwidth with load capacitor.



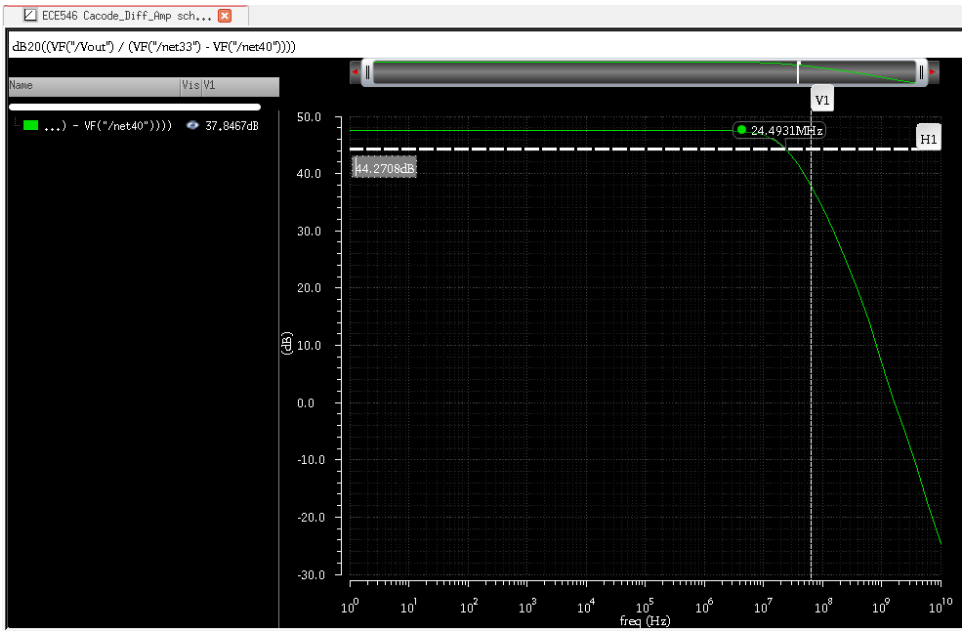
Unity bandwidth



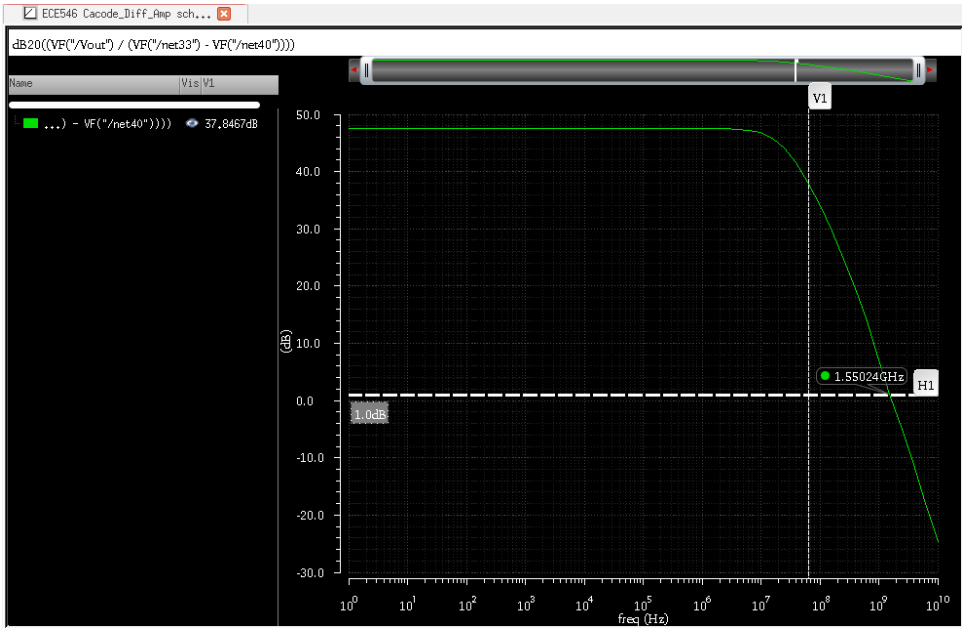
Margin Phase with load capacitor.



-3 and Unity bandwidth without load capacitor.

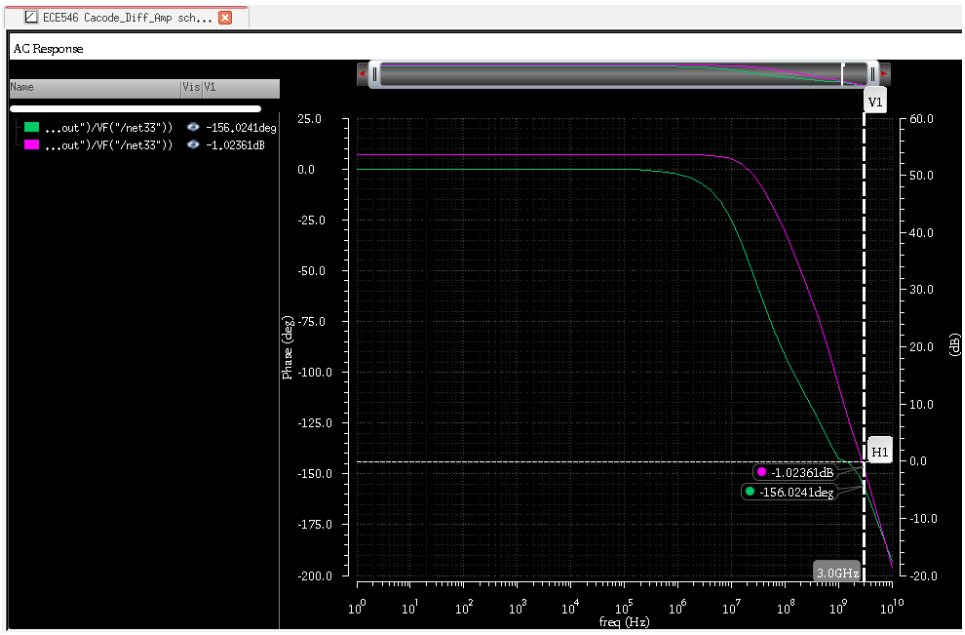


Unity bandwidth



Margin Phase without load capacitor.

Here the phase margin stands at –156.024. When subtracted by 180 gives a 23.976dB - which is way below 40dB.


ECE546 Cacode_Diff_Amp sch...
AC Response
Name
Vis
V1
...out")/VF("/net33"))
-156.0241deg
...out")/VF("/net33"))
-1.02361dB
V1
H1
-1.02361dB
-156.0241deg
3.0GHz
Phase (deg)
(dB)
freq (Hz)