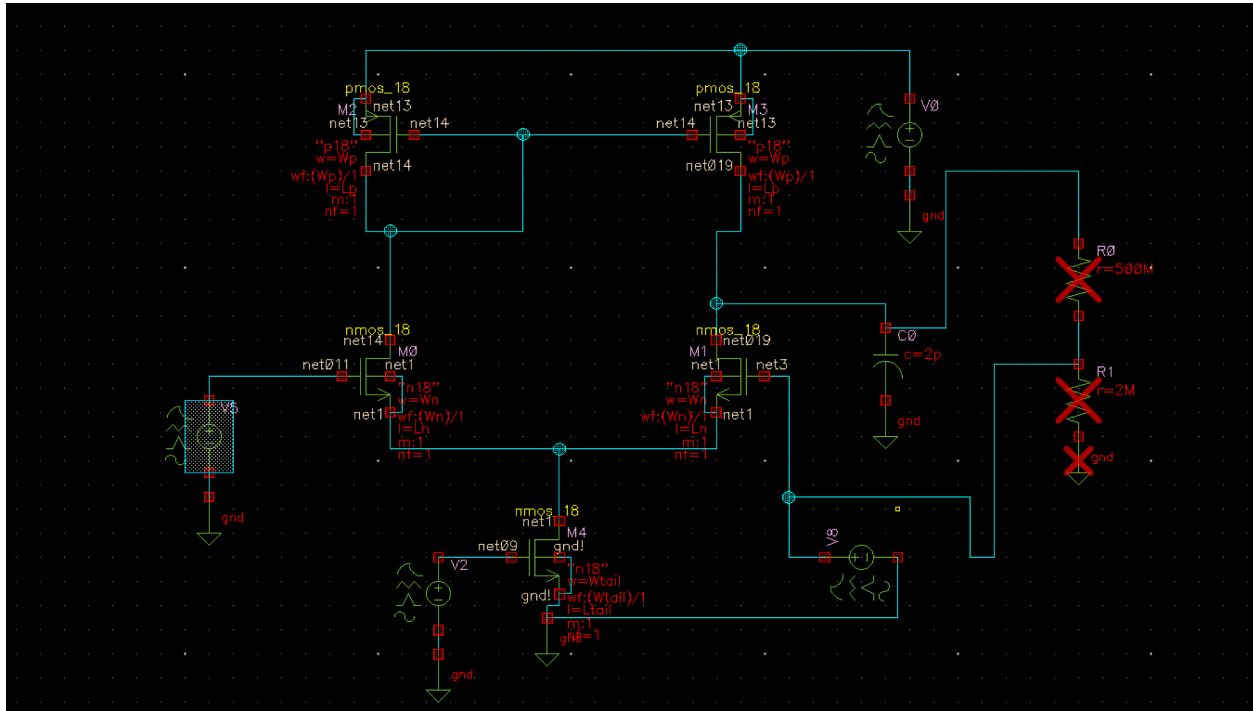


ASSIGNMENT- 6

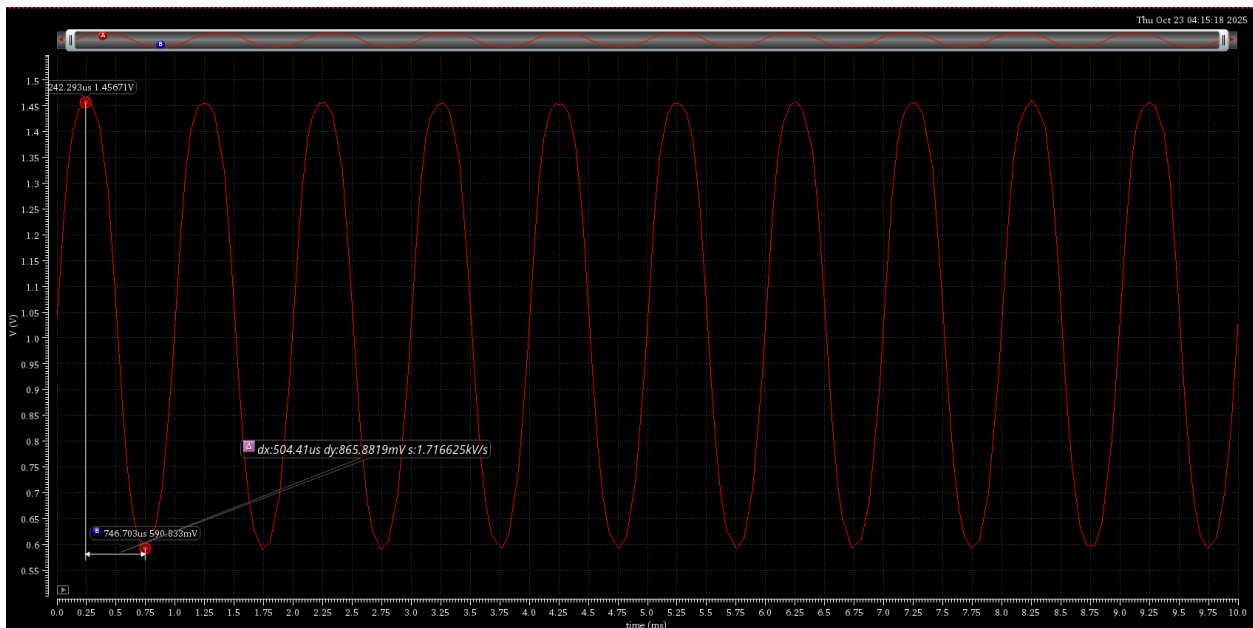
OTA WITH FEEDBACK

23110064

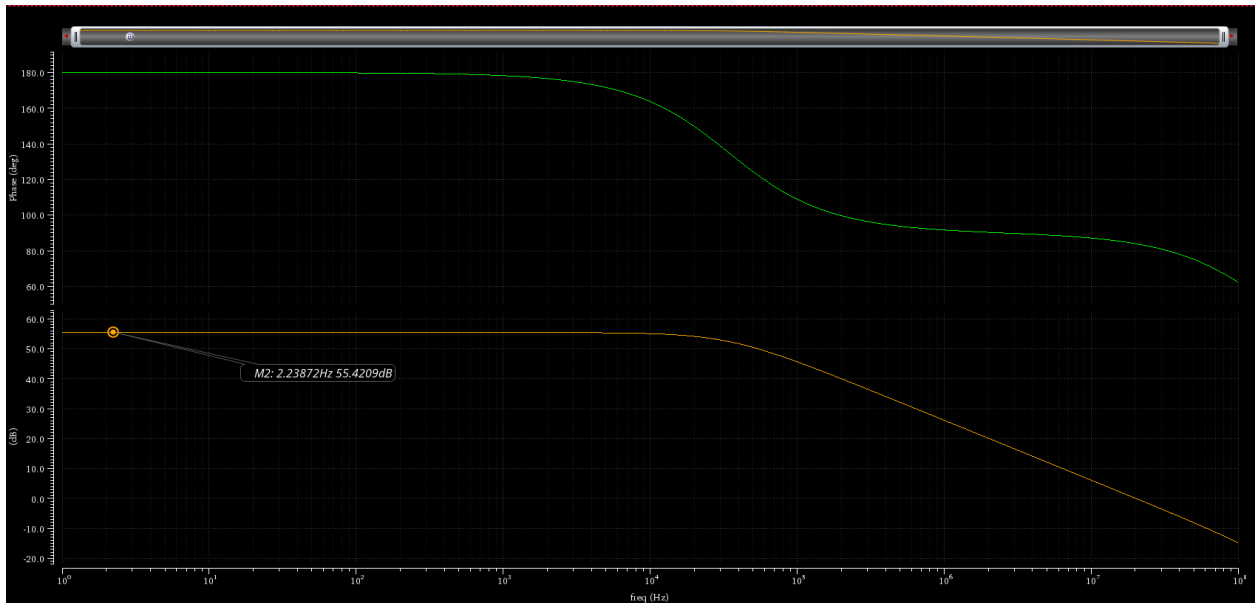
Schematic OPEN LOOP (without feedback)



Output swing

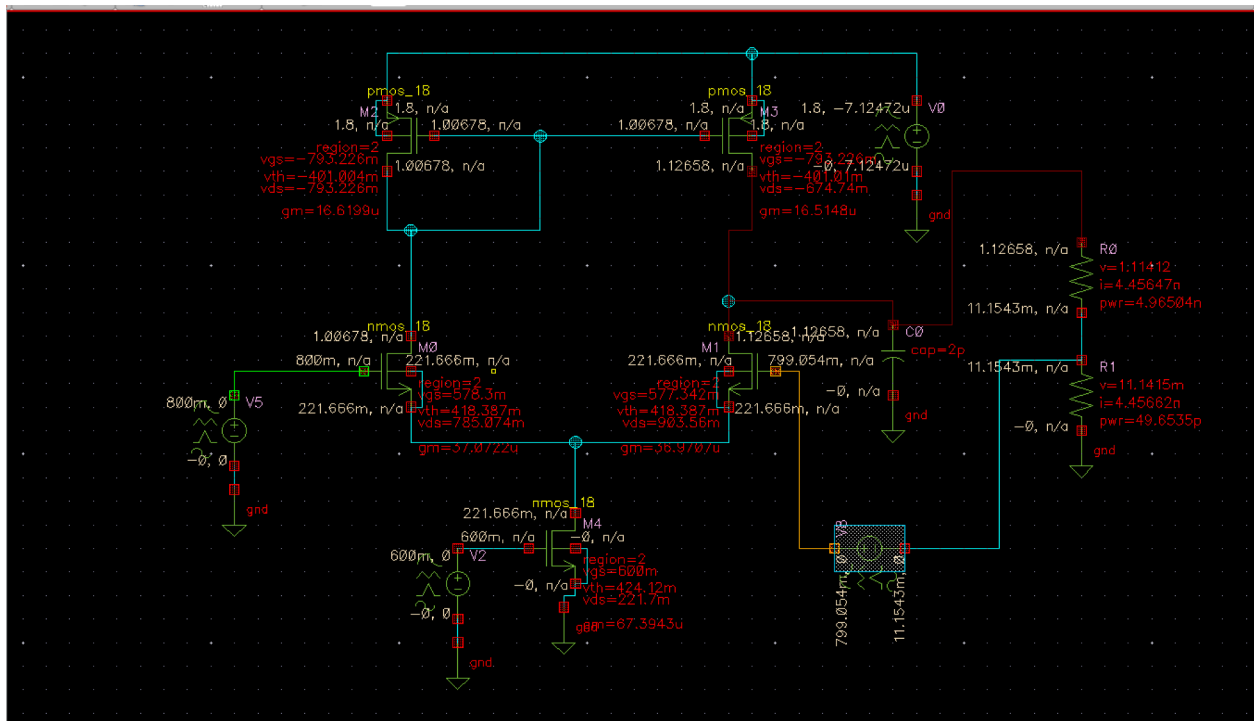


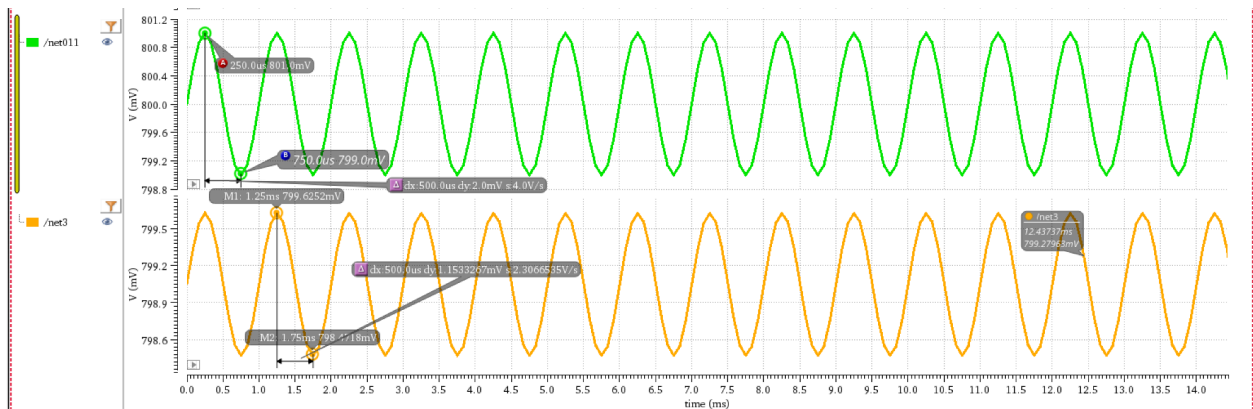
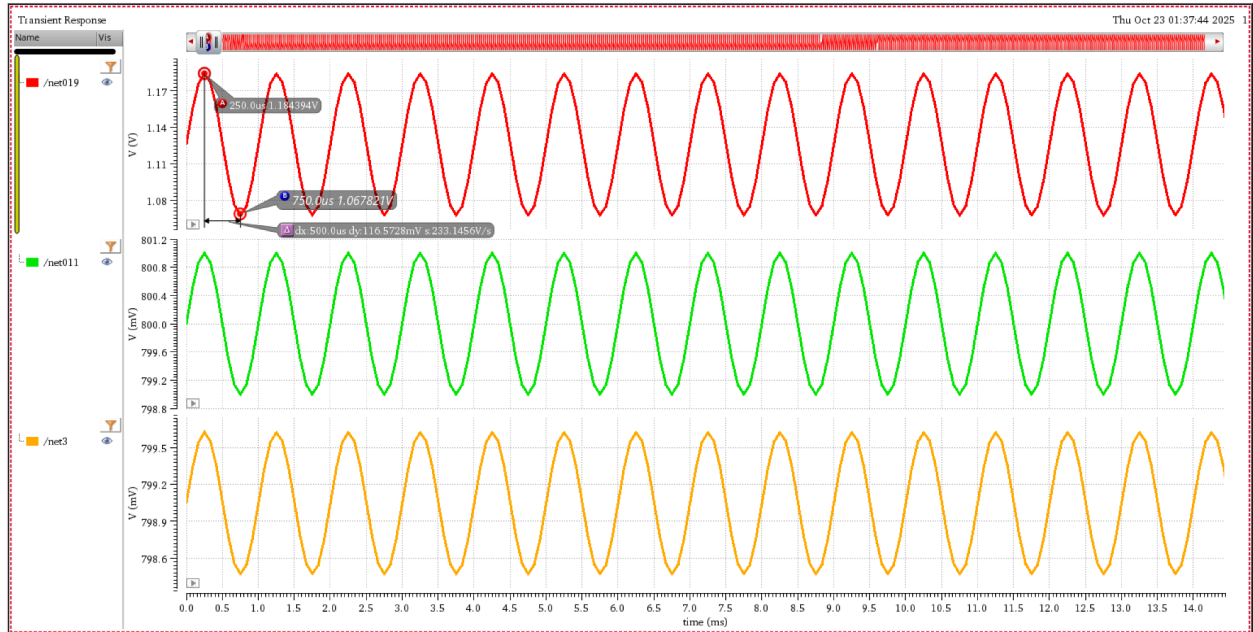
Calculating open loop gain using bode plot



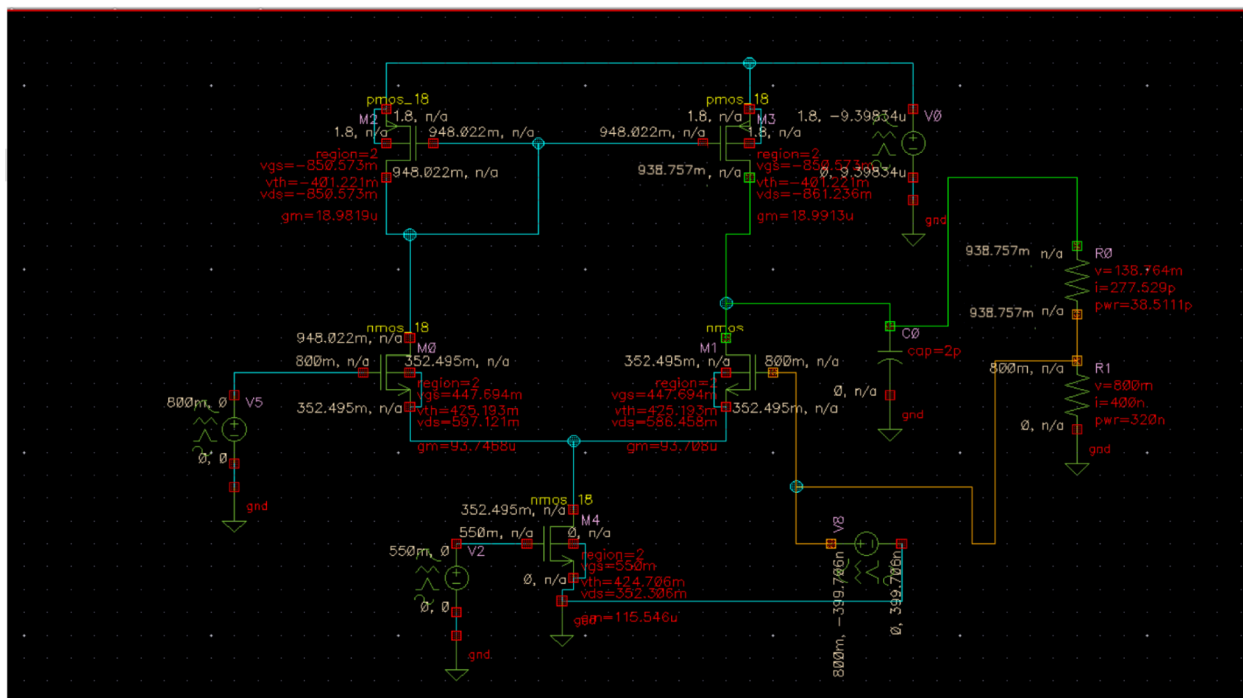
Open loop gain = 55.4dB

ITERATION 1 (with feedback)



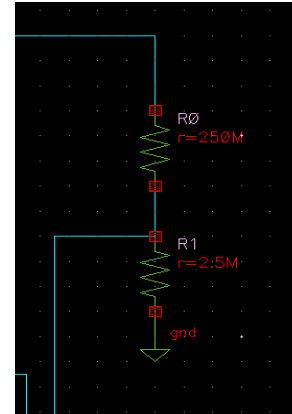


I am not getting swing so i am trying to tune the W,L values to get swing
ITERATION 2 (Final) With feedback (Betafactor = 100)

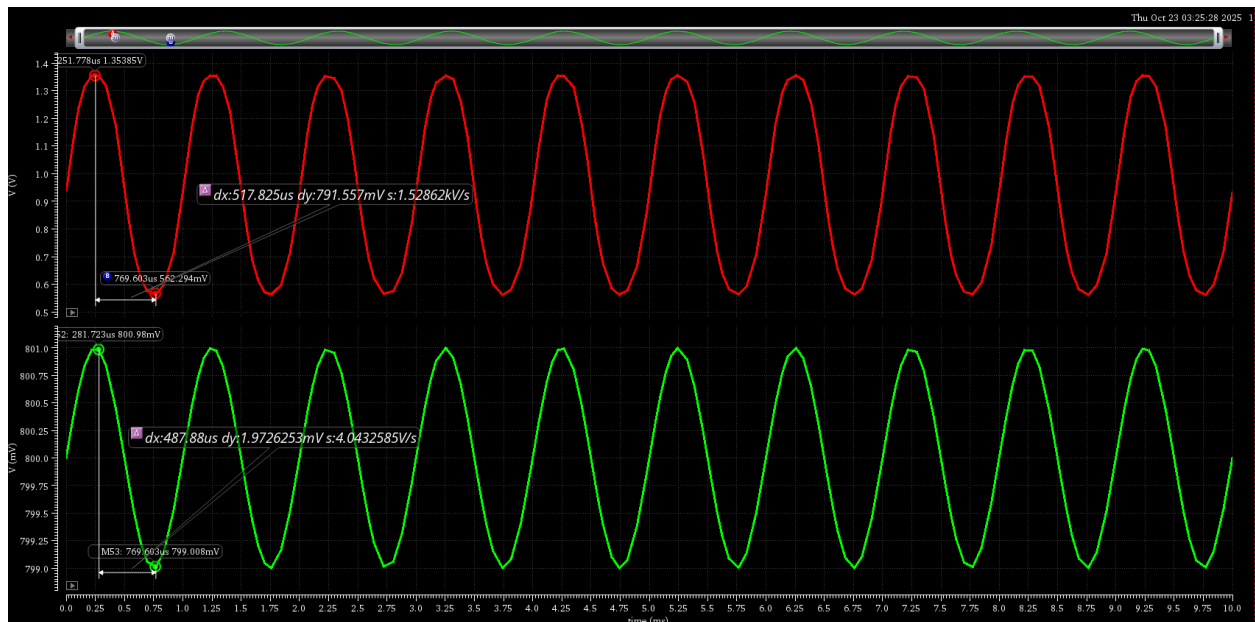


Design Variables

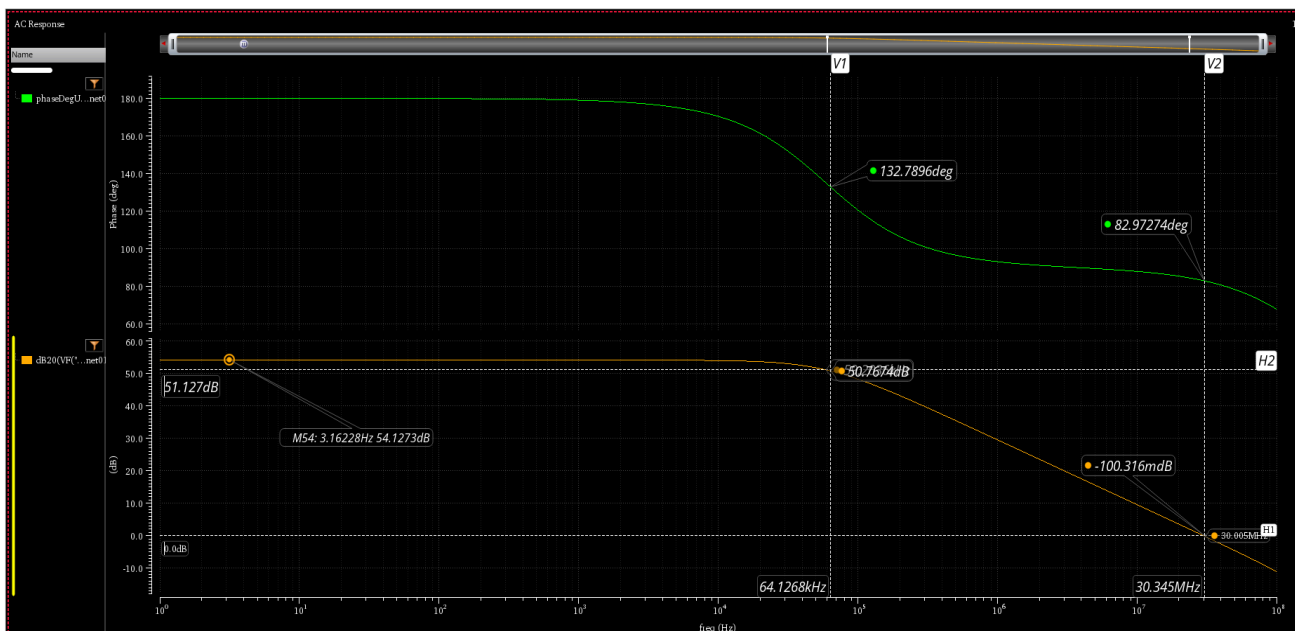
	Name	Value
1	Ln	1
2	Lp	1
3	Ltail	1
4	Wn	9
5	Wp	980m
6	Wtail	3.55



Output swing



Bode plot



From the above image

1. gain = 51.127 dB

2. Band Width = 64.1368kHz

3. Unity gain bandwidth = 30.345MHz

4. GBW = 23MHz

5. Phase margin = $180 + 82.97 = 262.97$

6. $\beta = \frac{R2}{R2+R1} = \frac{2.5}{2.5+250} = \frac{1}{101}$

7. $\text{ERROR} = \frac{(10^{\frac{55.4}{20}} - 10^{\frac{54.1273}{20}})}{10^{\frac{55.4}{20}}} \times 100 = 14\% \text{ error}$

Calculations

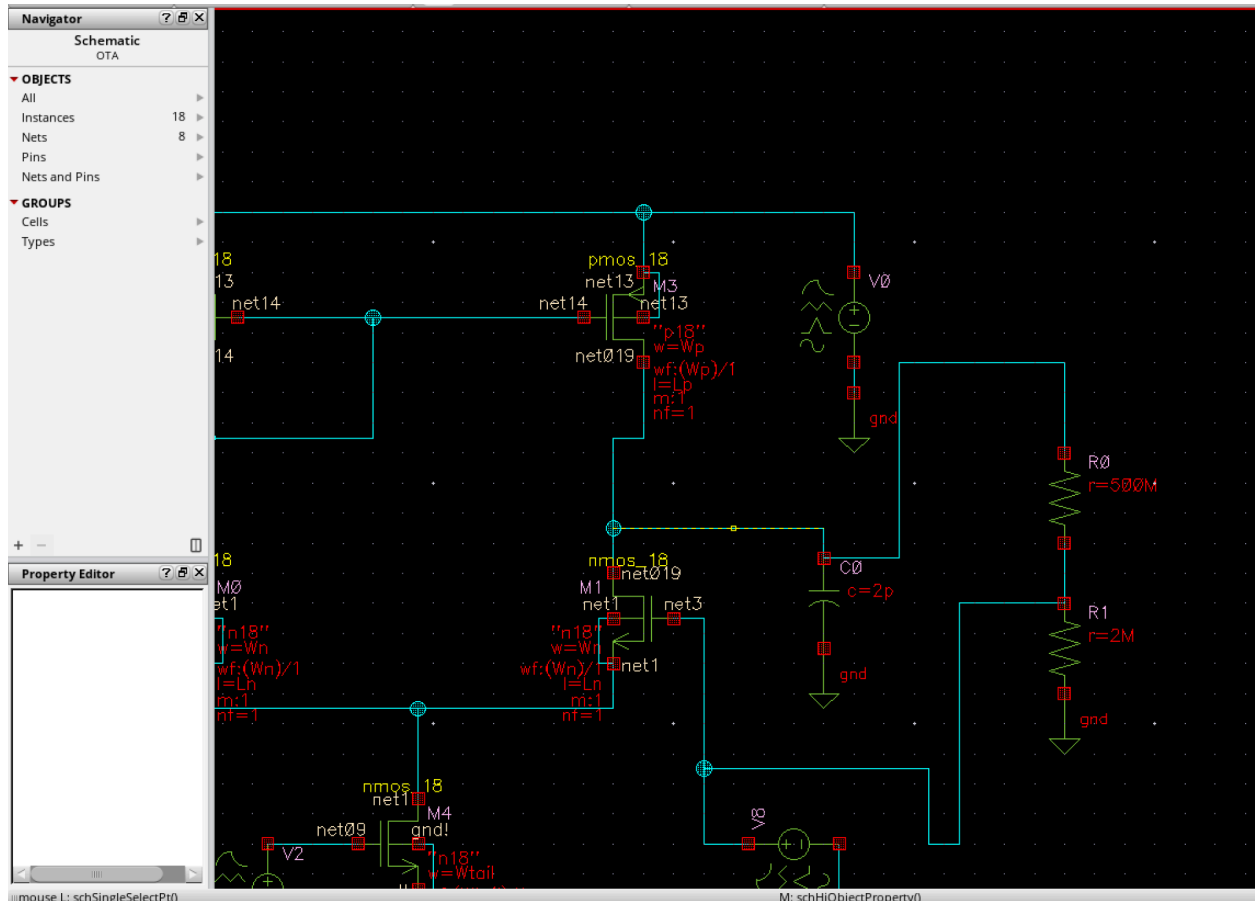
$$10^{\frac{51.127}{20}} \times 64.1368 \times 1000$$

$$\therefore 23091773.43282630478$$

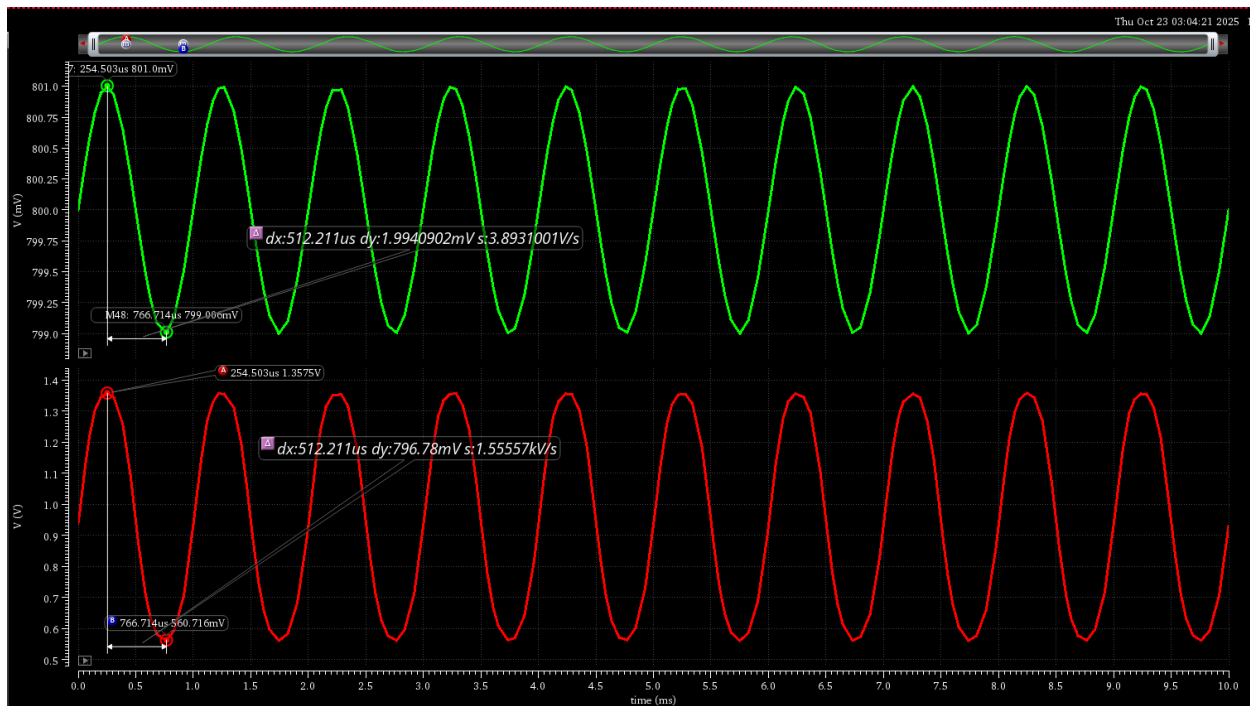
$$\frac{(10^{\frac{55.42}{20}} - 10^{\frac{54.1273}{20}})}{10^{\frac{55.42}{20}}} \times 100$$

$$\therefore 13.82823269974$$

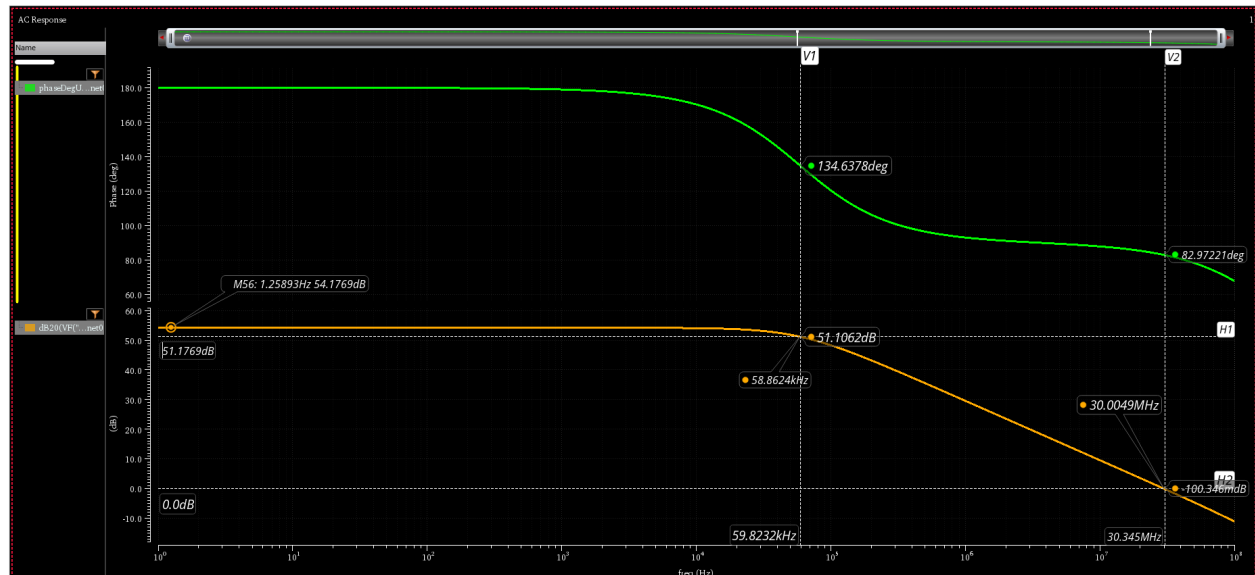
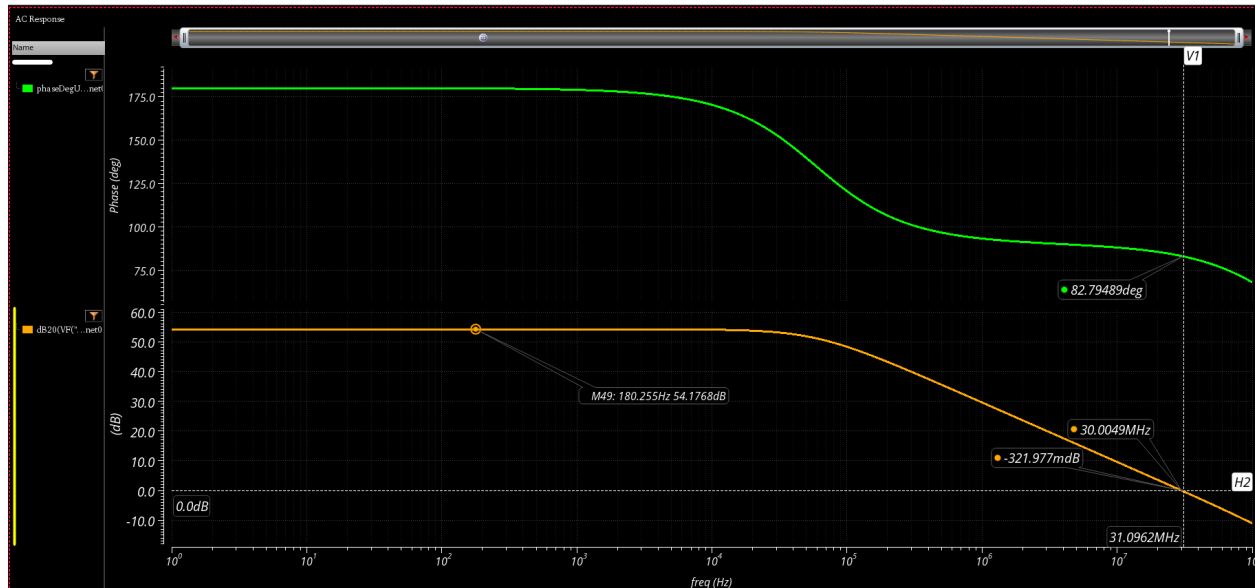
With feedback (Betafactor = 200)



Output swing



Bode plot



From the above image

8. gain = 54.1769 dB
9. Band Width = 59.8232kHz
10. Swing = 796.78mv
11. Unity gain bandwidth = 30.345MHz
12. GBW = 30.59MHz

$$13. \text{ Phase margin} = 180 + 82.97 = 262.97$$

$$14. \beta = \frac{R2}{R2+R1} = \frac{2}{2+400} = \frac{1}{201}$$

$$15. \text{ ERROR} = \frac{(10^{\frac{55.4}{20}} - 10^{\frac{54.17693}{20}})}{10^{\frac{55.4}{20}}} \times 100 = 13\% \text{ error}$$

CALCULATIONS

$$\frac{10^{\frac{54.1769}{20}}}{1} \times 59.8232 \times 1000$$

$$\therefore 30599521.84436656371$$

$$\frac{(10^{\frac{55.42}{20}} - 10^{\frac{54.1769}{20}})}{10^{\frac{55.42}{20}}} \times 100$$

$$\therefore 13.33474883235$$