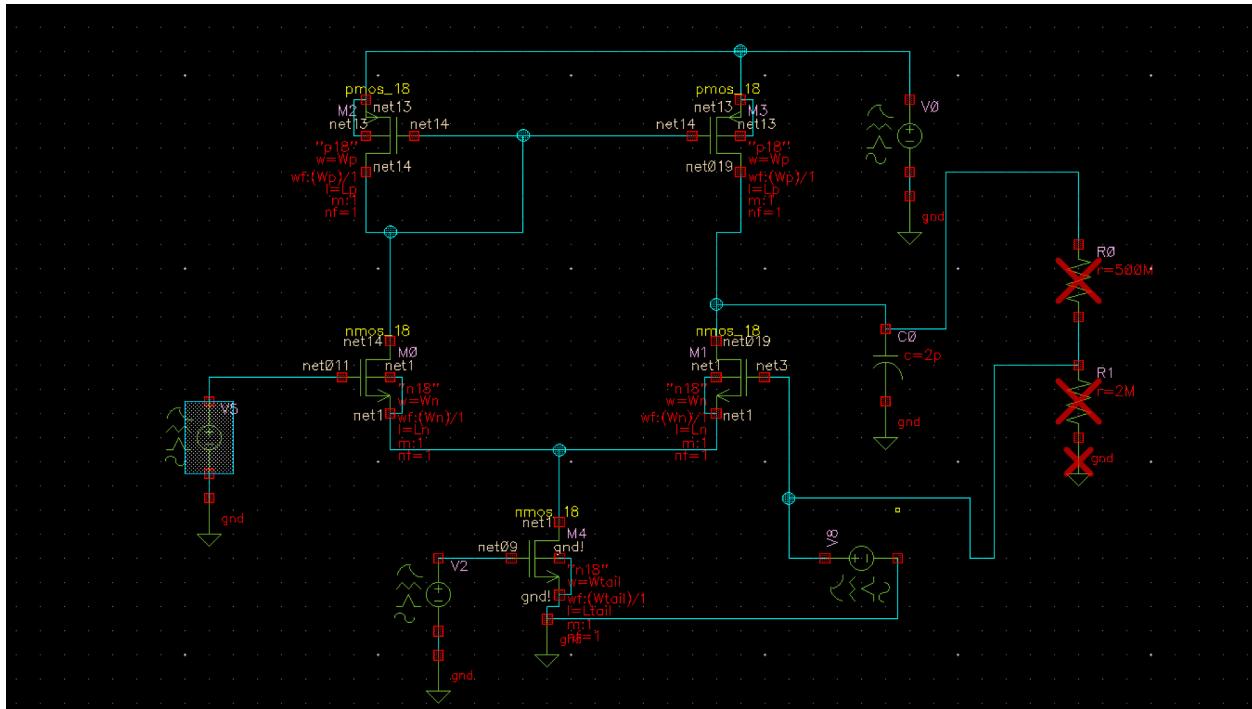


# ASSIGNMENT- 6

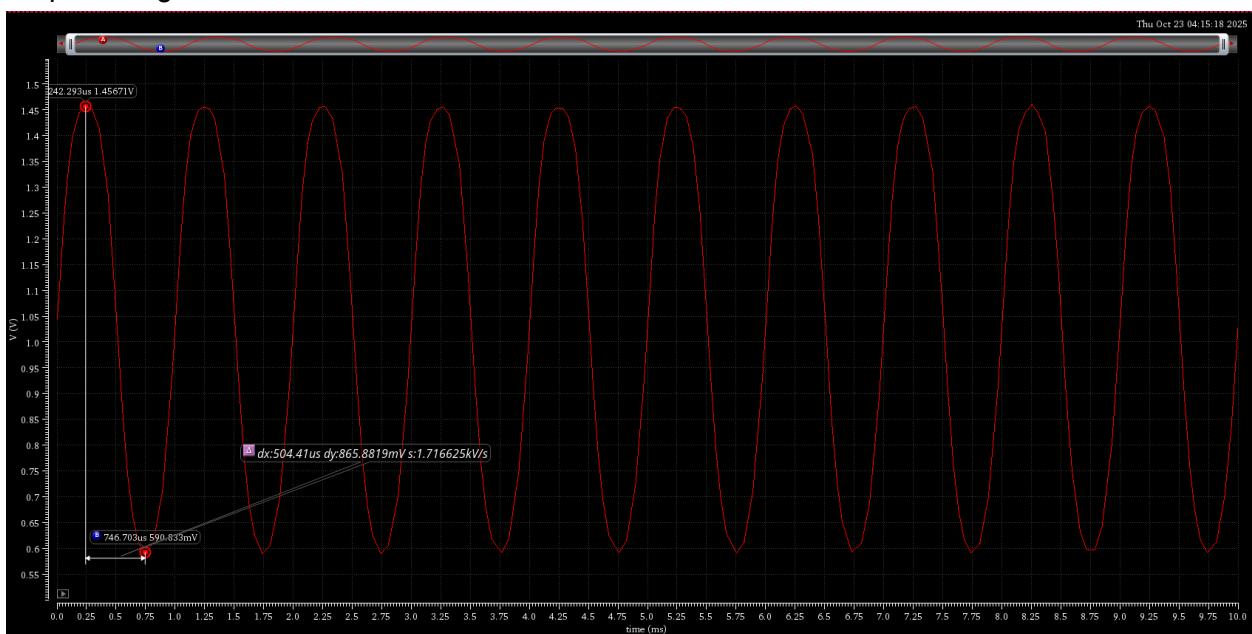
## OTA WITH FEEDBACK

### 23110064

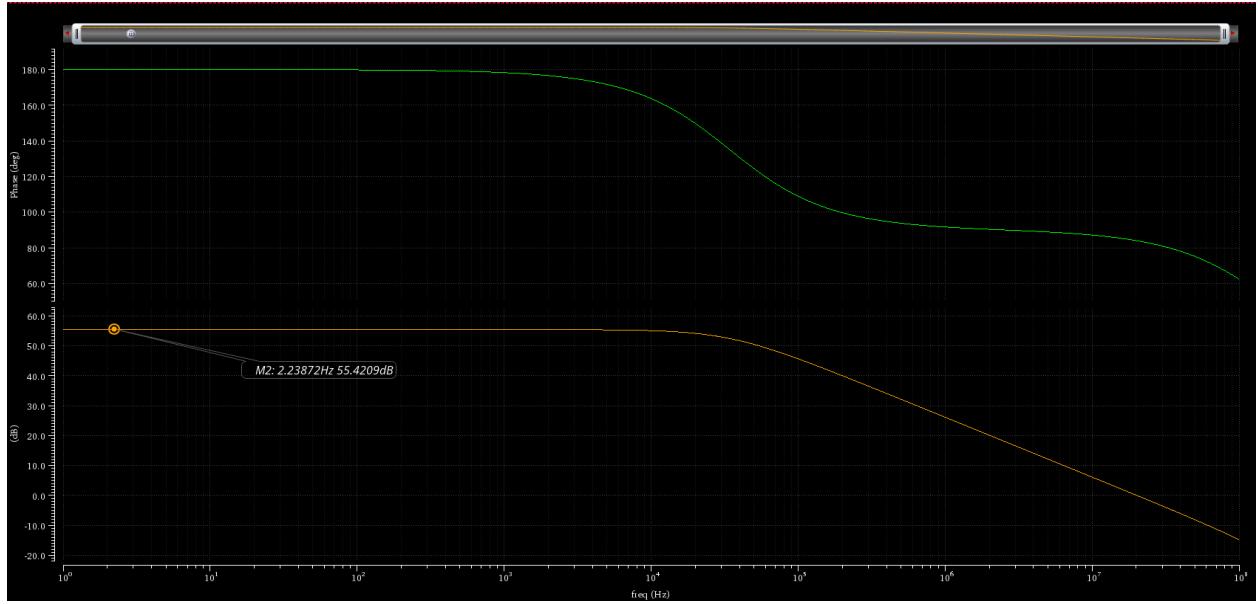
Schematic OPEN LOOP (without feedback)



Output swing

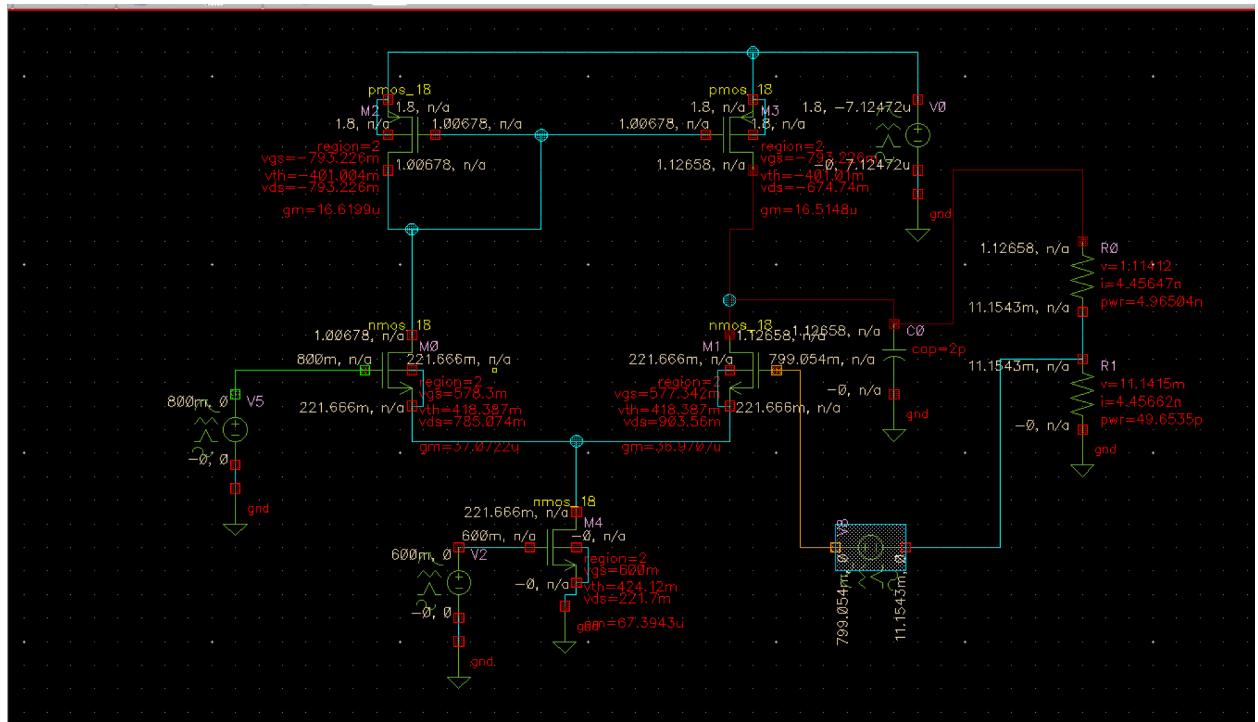


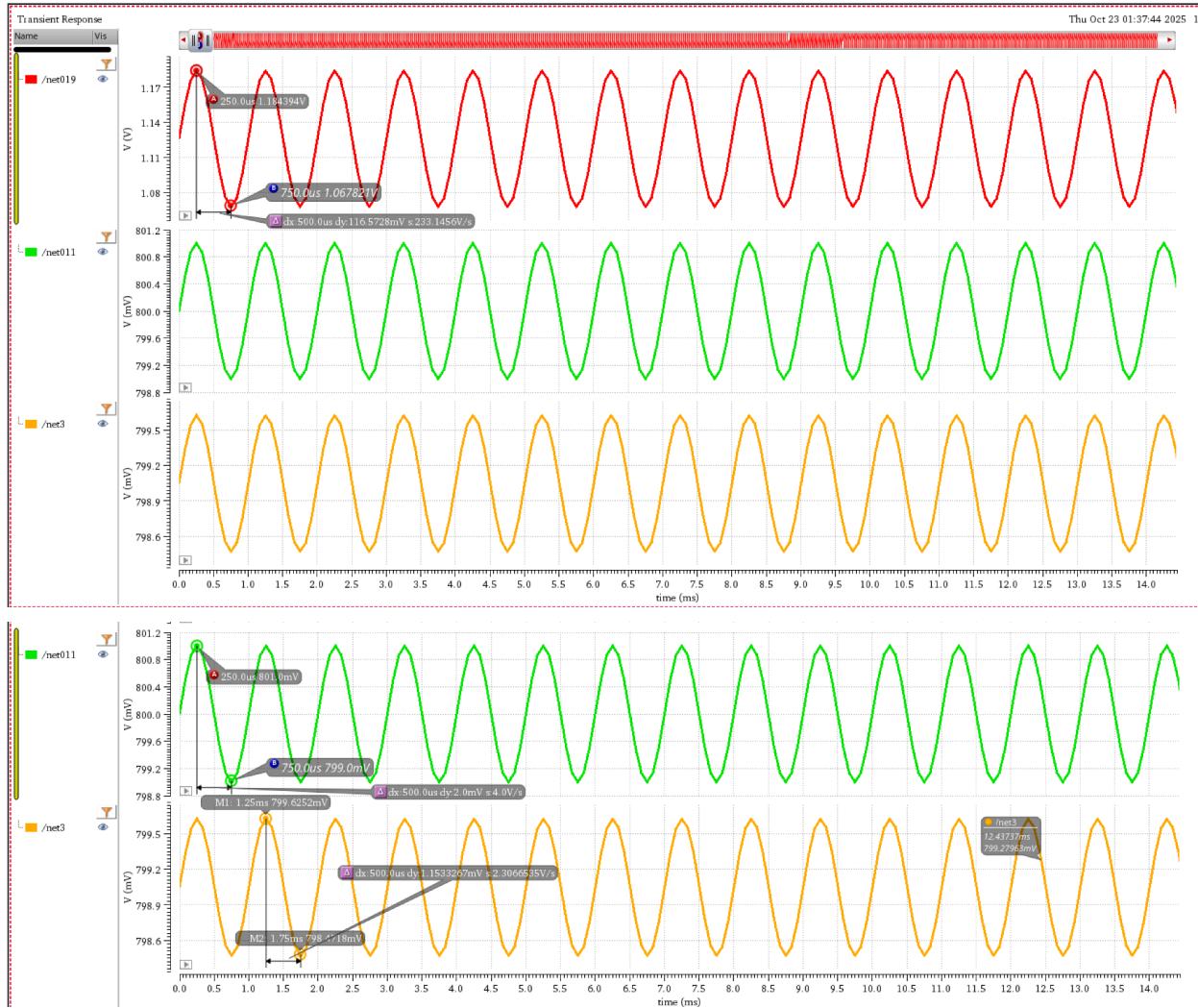
## Calculating open loop gain using bode plot



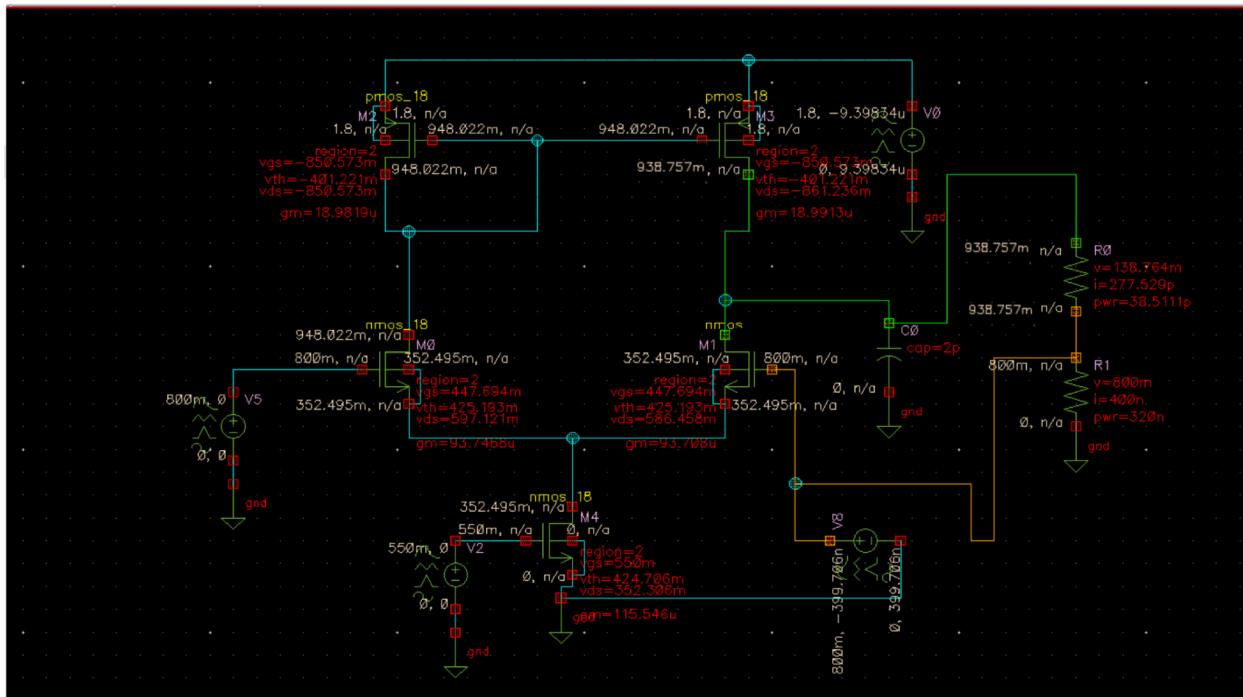
Open loop gain = 55.4dB

## ITERATION 1 (with feedback)



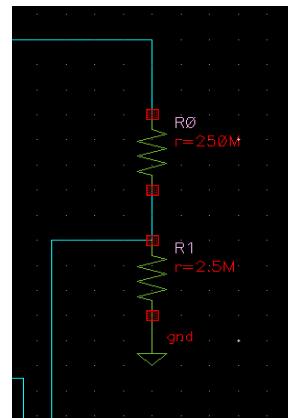


I am not getting swing so i am trying to tune the W,L values to get swing  
**ITERATION 2 (Final) With feedback (Betafactor = 100)**

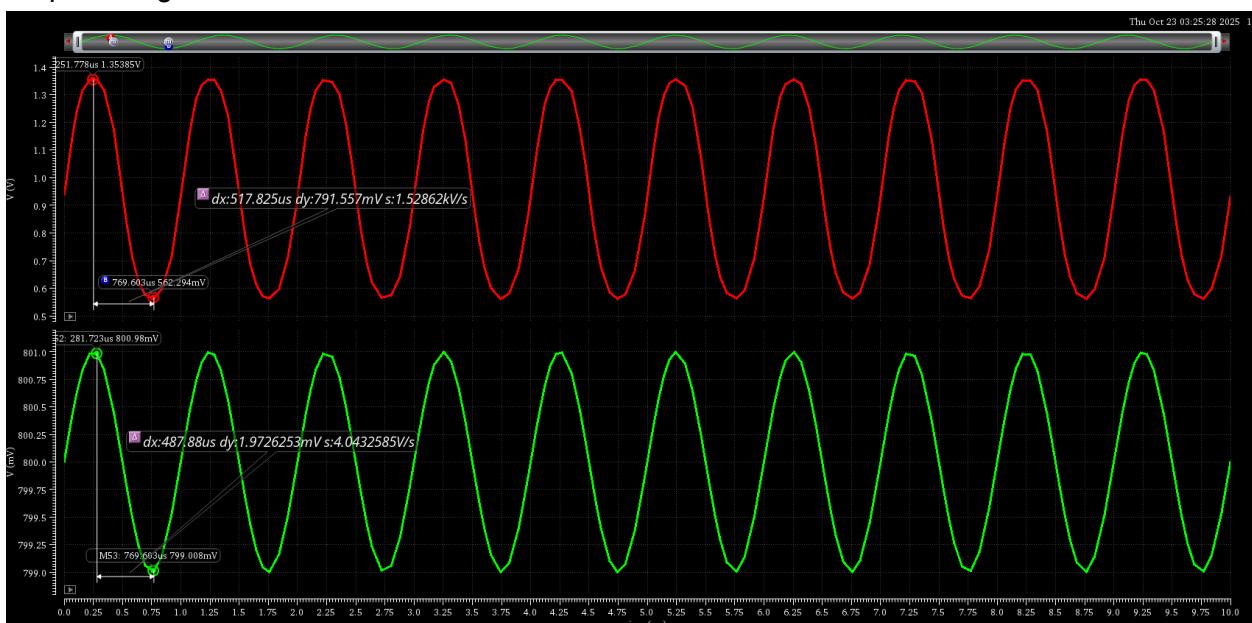


**Design Variables**

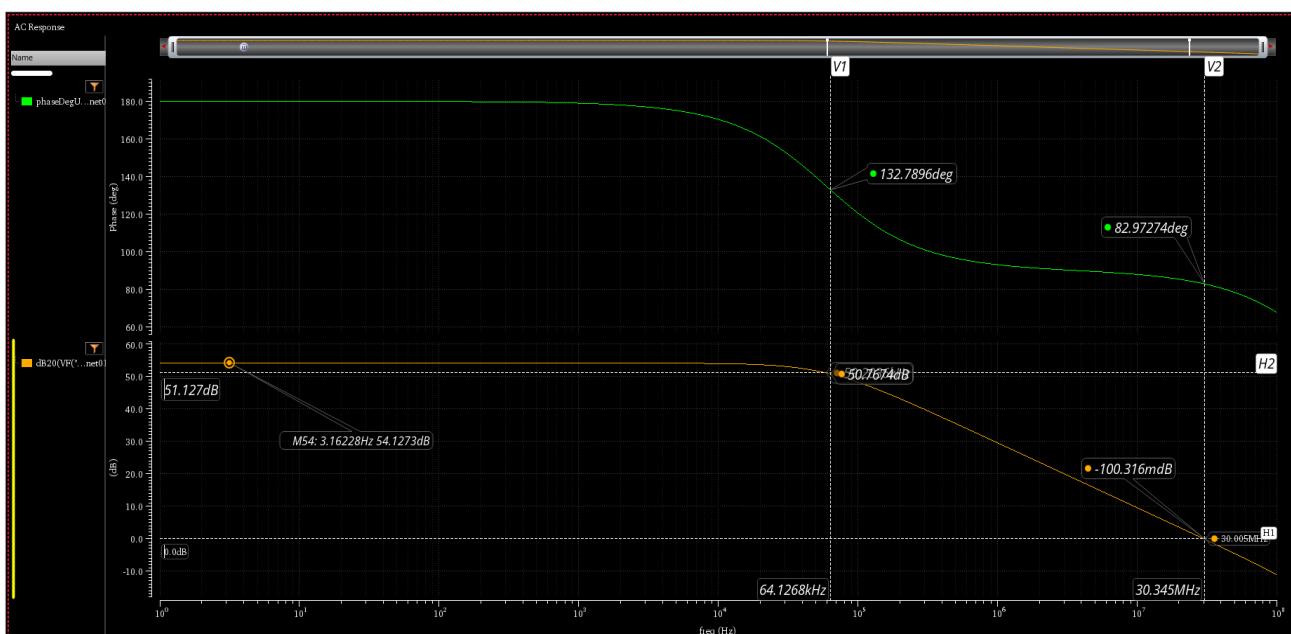
Name	Value
1 Ln	1
2 Lp	1
3 Ltail	1
4 Wn	9
5 Wp	980m
6 Wtail	3.55



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 =  $180 + 82.97 = 262.97$

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

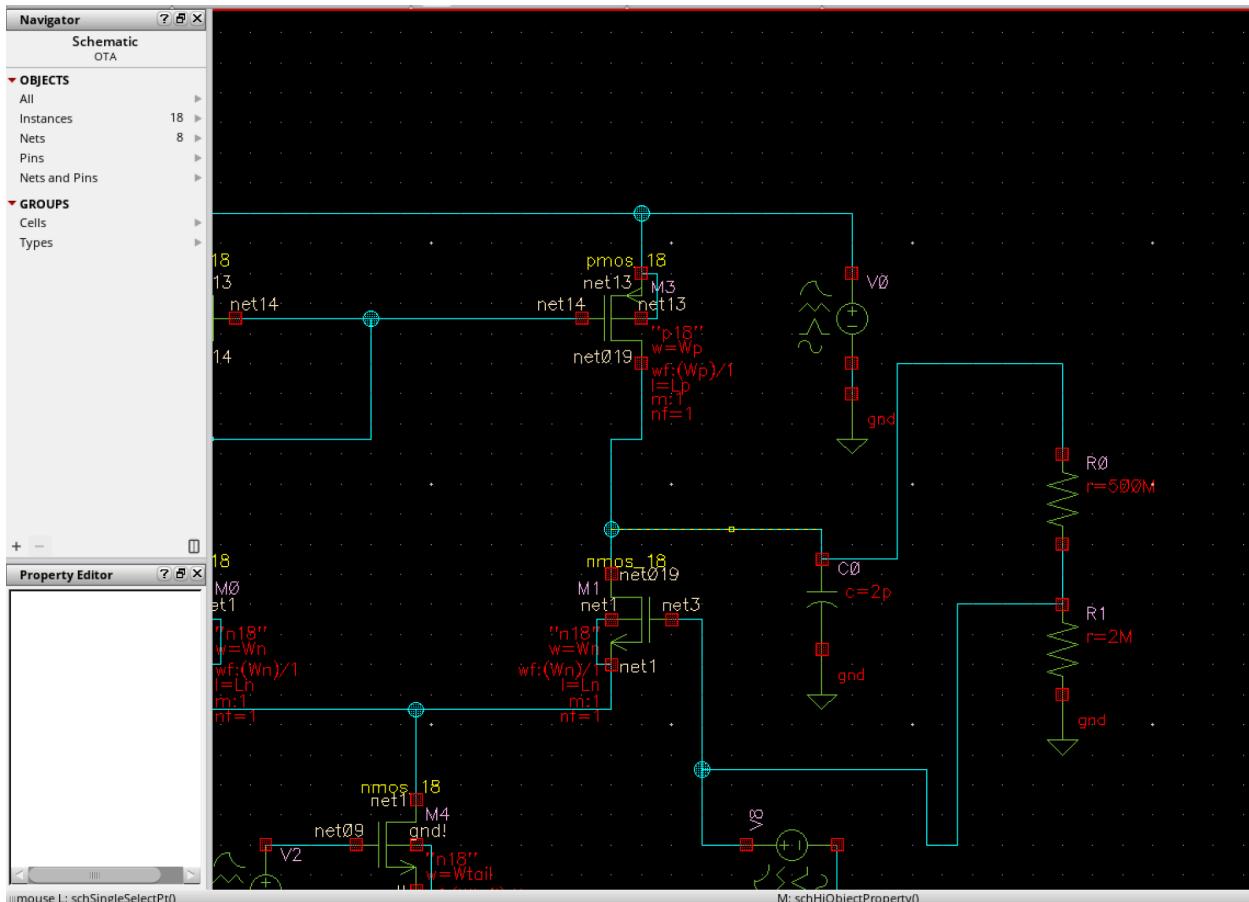
$$7. \text{ERROR} = \frac{(10^{\frac{55.4}{20}} - 10^{\frac{54.1273}{20}})}{10^{\frac{55.4}{20}}} \times 100 = 14\% \text{ error}$$

## Calculations

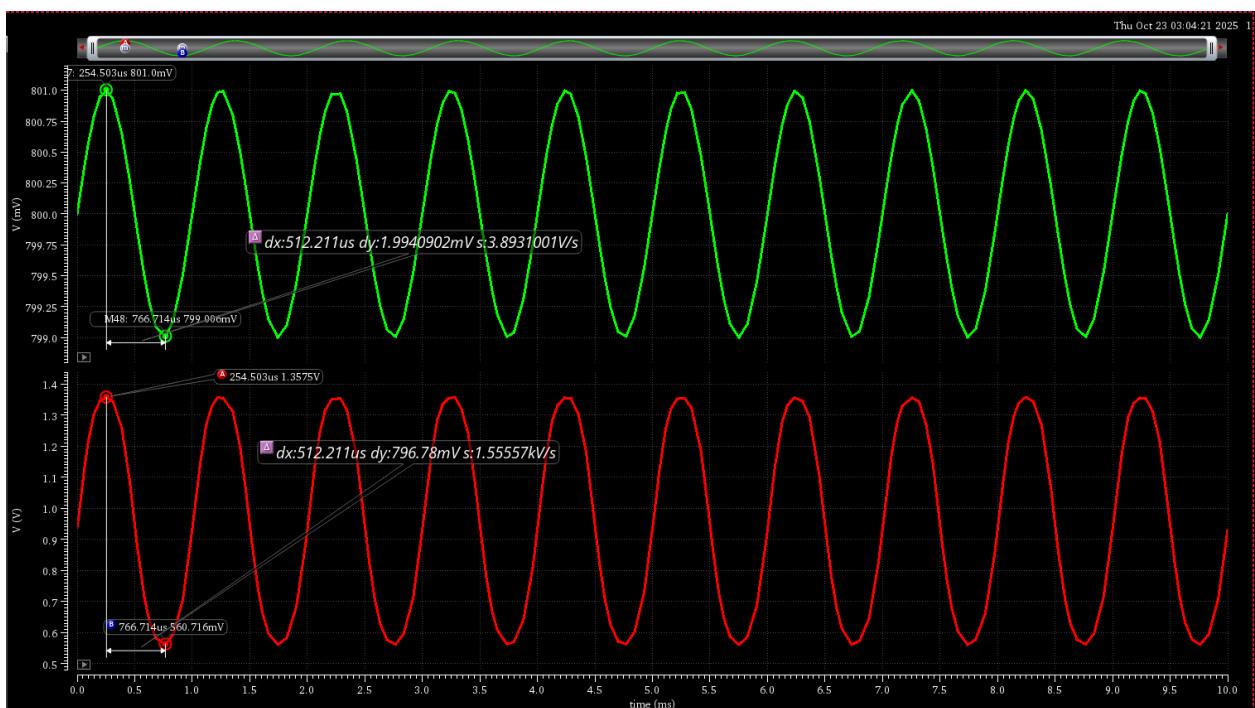
$$\begin{aligned} & 10^{\frac{51.127}{20}} \times 64.1368 \times 1000 \\ & \therefore 23091773.43282630478 \end{aligned}$$

$$\begin{aligned} & \frac{(10^{\frac{55.42}{20}} - 10^{\frac{54.1273}{20}})}{10^{\frac{55.42}{20}}} \times 100 \\ & \therefore 13.82823269974 \end{aligned}$$

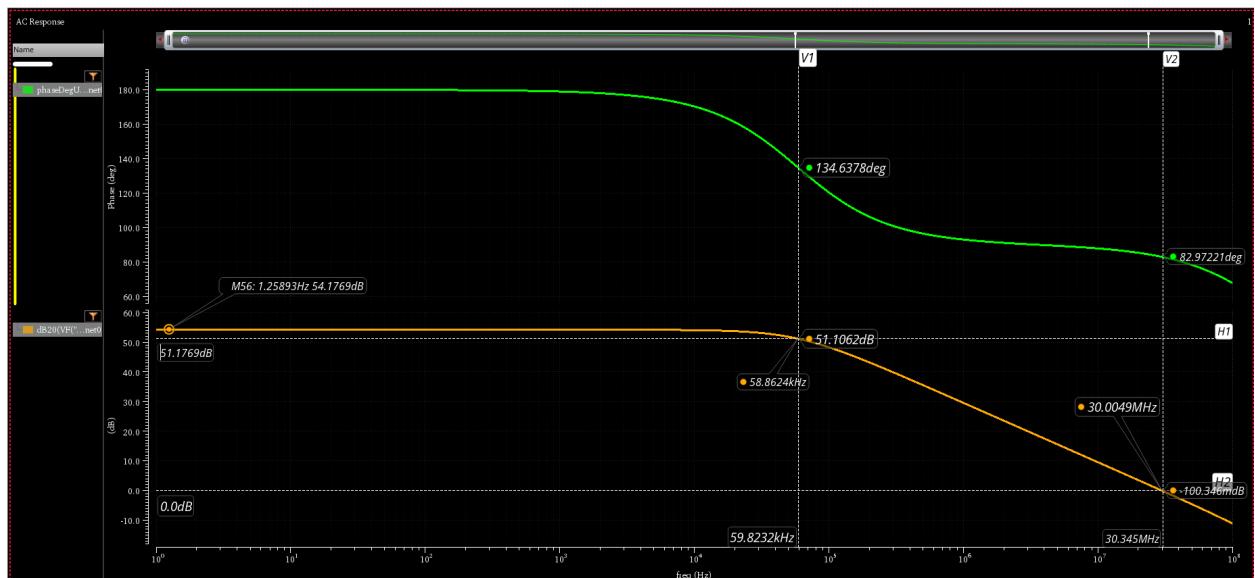
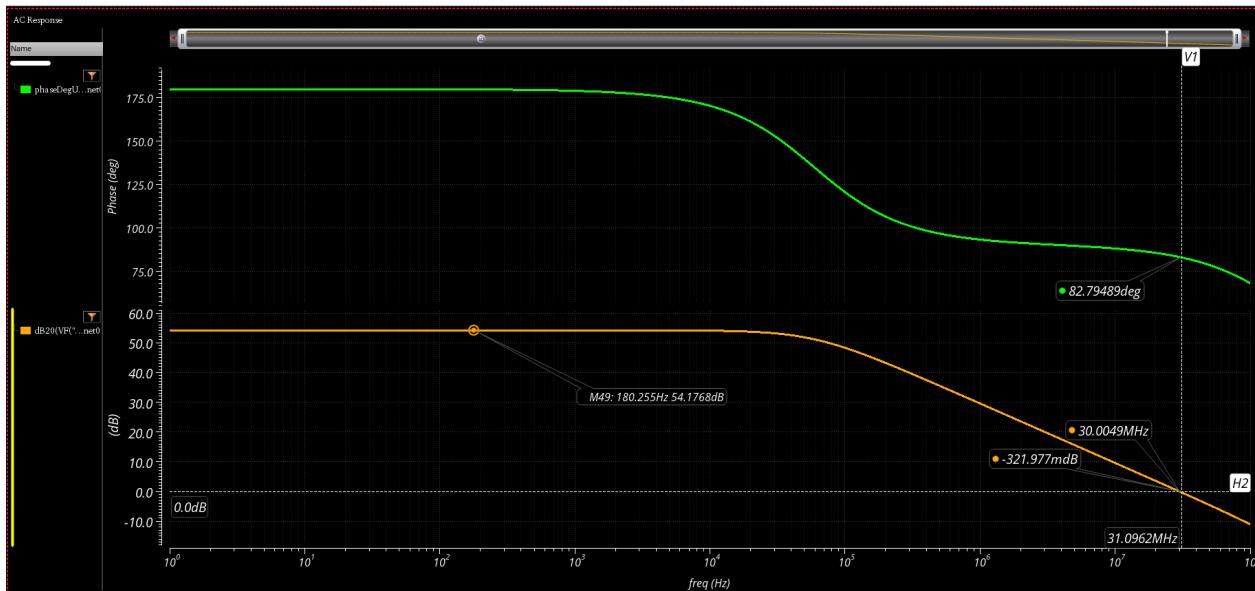
## With feedback (Betafactor = 200)



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

$$\begin{aligned} & \frac{54.1769}{20} \\ & 10 \frac{54.1769}{20} \times 59.8232 \times 1000 \\ & \vdots 30\ 599\ 521.844\ 366\ 563\ 71 \end{aligned}$$

$$\begin{aligned} & \frac{55.42}{20} \quad \frac{54.1769}{20} \\ & (10^{\frac{55.42}{20}} - 10^{\frac{54.1769}{20}}) \times 100 \\ & \vdots 13.334\ 748\ 832\ 35 \end{aligned}$$