PROJECT – 2

BY

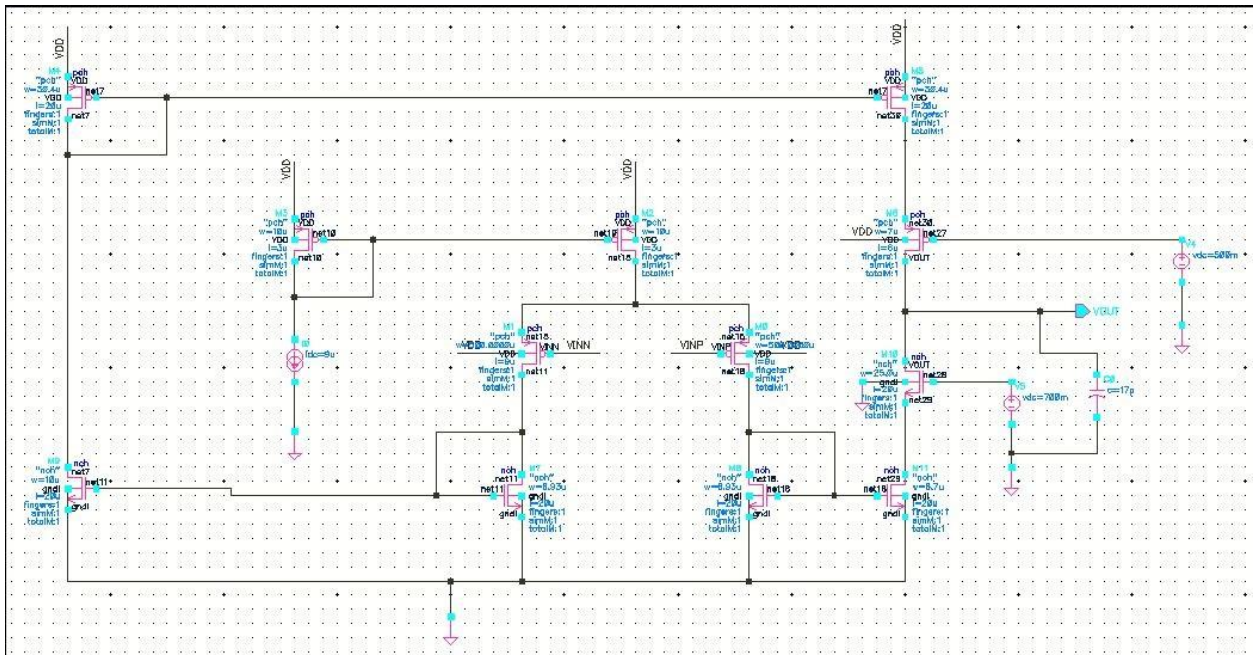
NITHIN KUMAR LOKAYA

SUNNY SHINDE

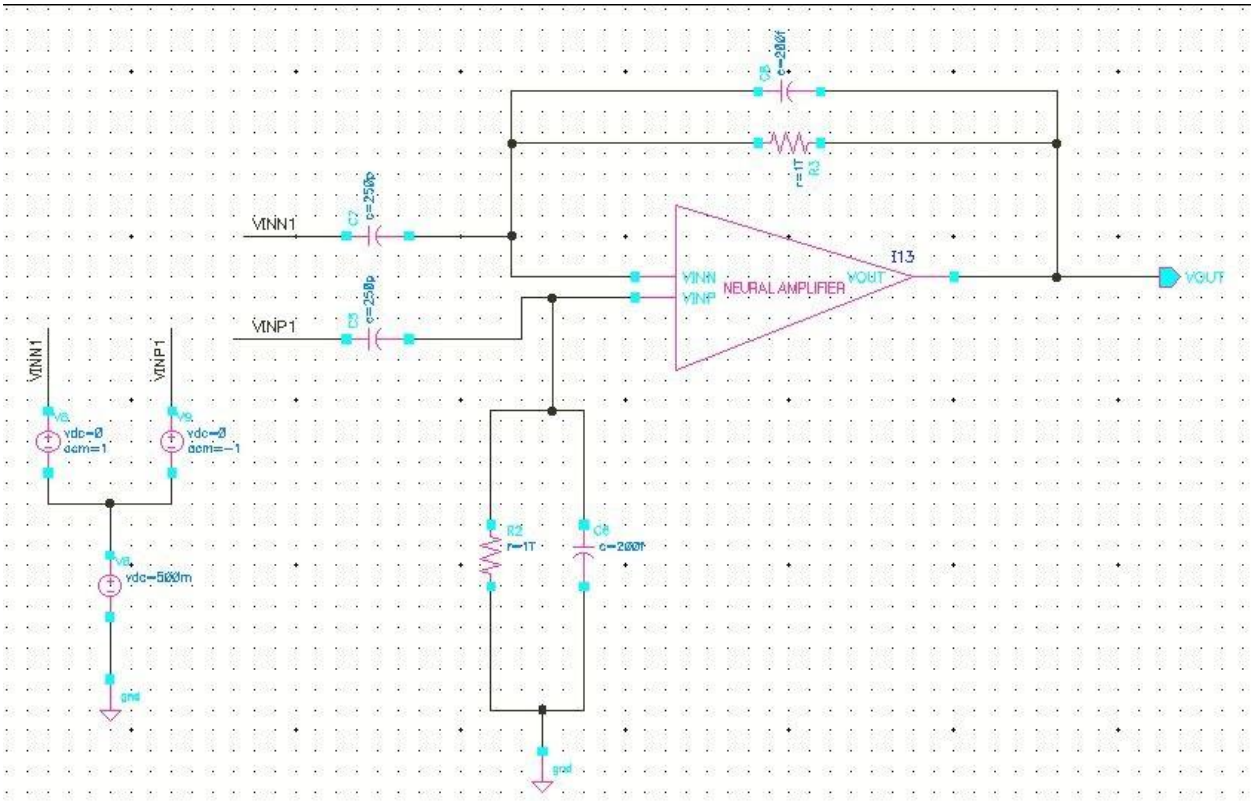
HERAMB SAWANT

1 – NEURAL AMPLIFIER

- **Amplifier Schematics**



- **Testbench**



- **Simulation Results**

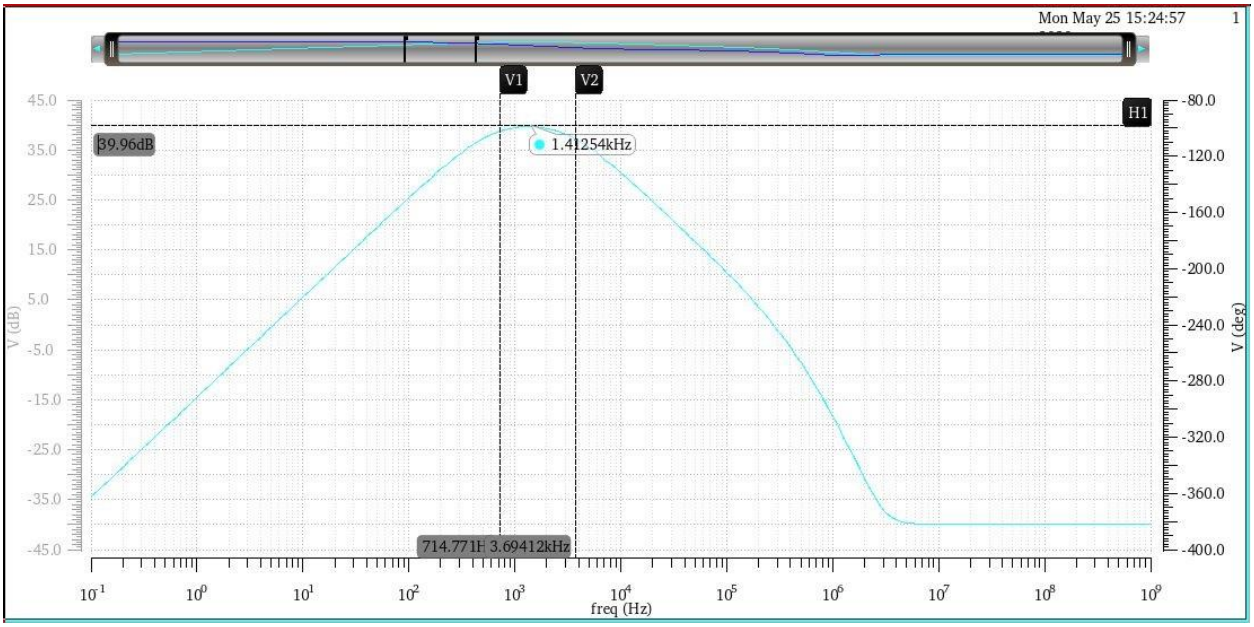
Parameters	Targeted Value	Achieved Value
Supply Voltage	1.2V	1.2V
Supply Current	9uA	9uA
Gain	40 dB	39.96 dB
Bandwidth	7.5 kHz	3.7 kHz
Input-referred Noise	15nV/sqrt (Hz)	2.6pV/sqrt (Hz)
CMRR	≥42 dB	47 dB
PSRR	≥42 dB	49 dB

- **Transistor Parameters**

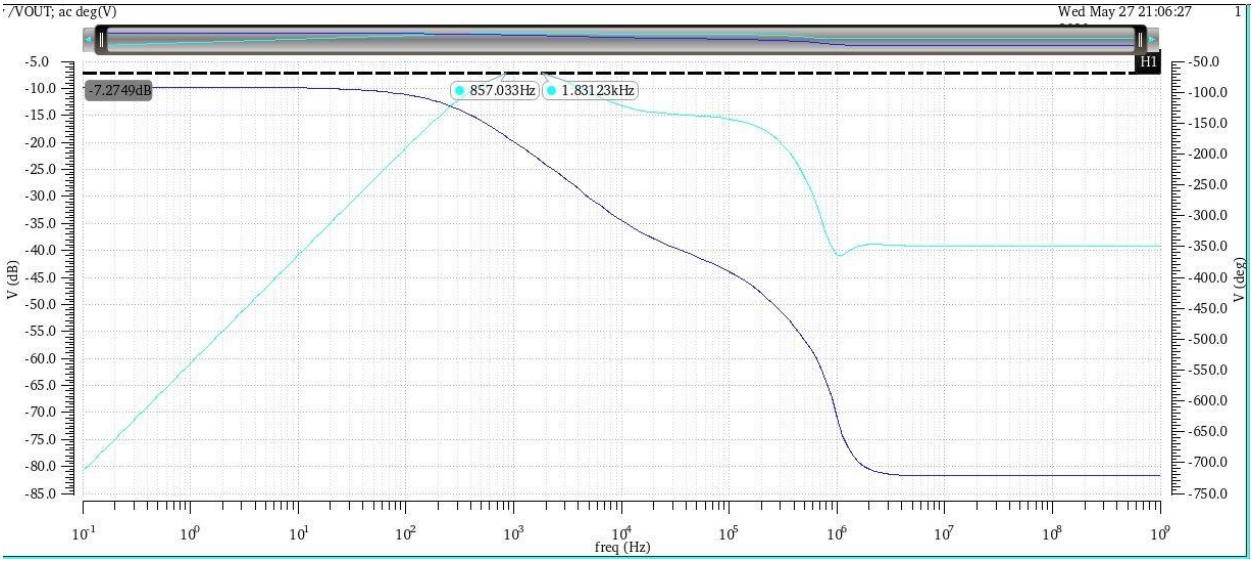
Device Name	W/L (um)	Gm/Id	Vov
M1, M2	500/9	19	75mV
M3, M4, M5, M6	6.9/20	9	119mV
M7, M8	30.4/20	9	116mV
M9, M10	10/3	10	125m
M_{cascN}	25/20	9	120mV
M_{sacsP}	7/6	10	120mV

- **Simulated Graphs**

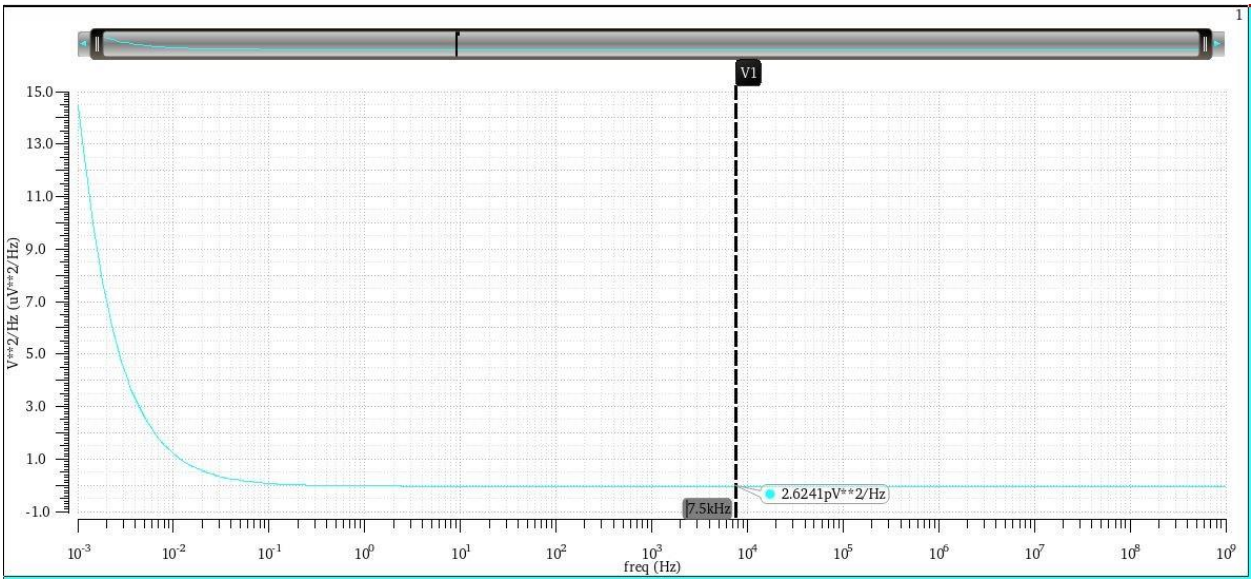
A – Gain and Bandwidth



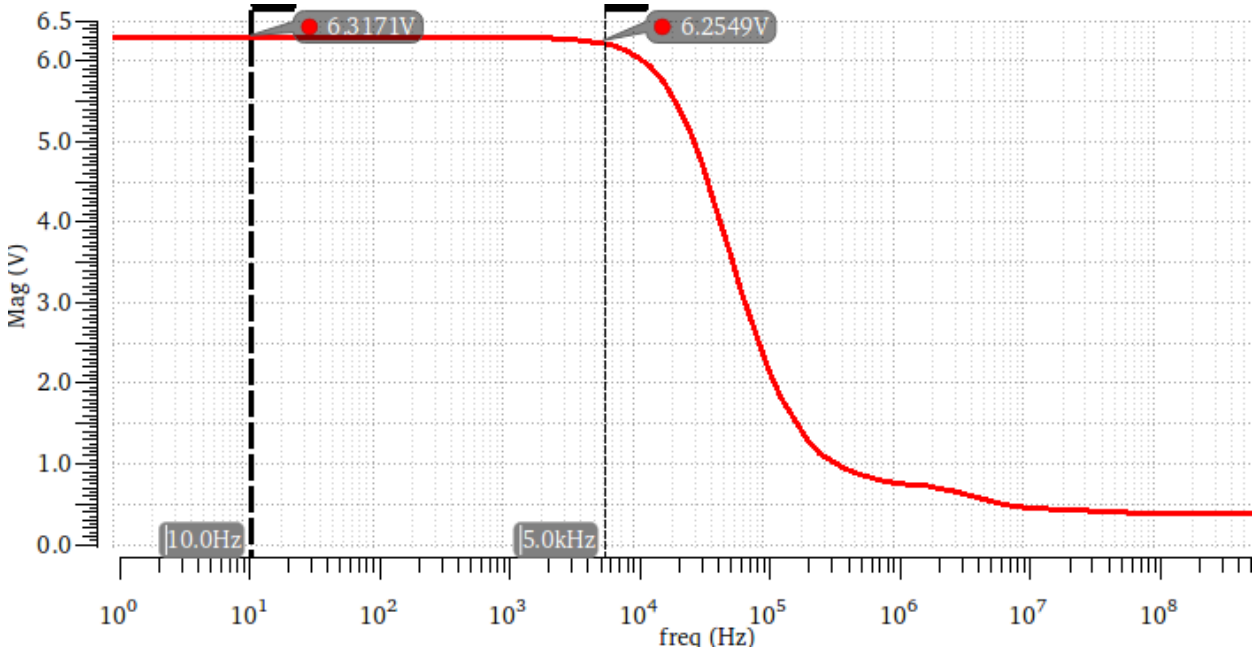
B - CMRR



C - Noise

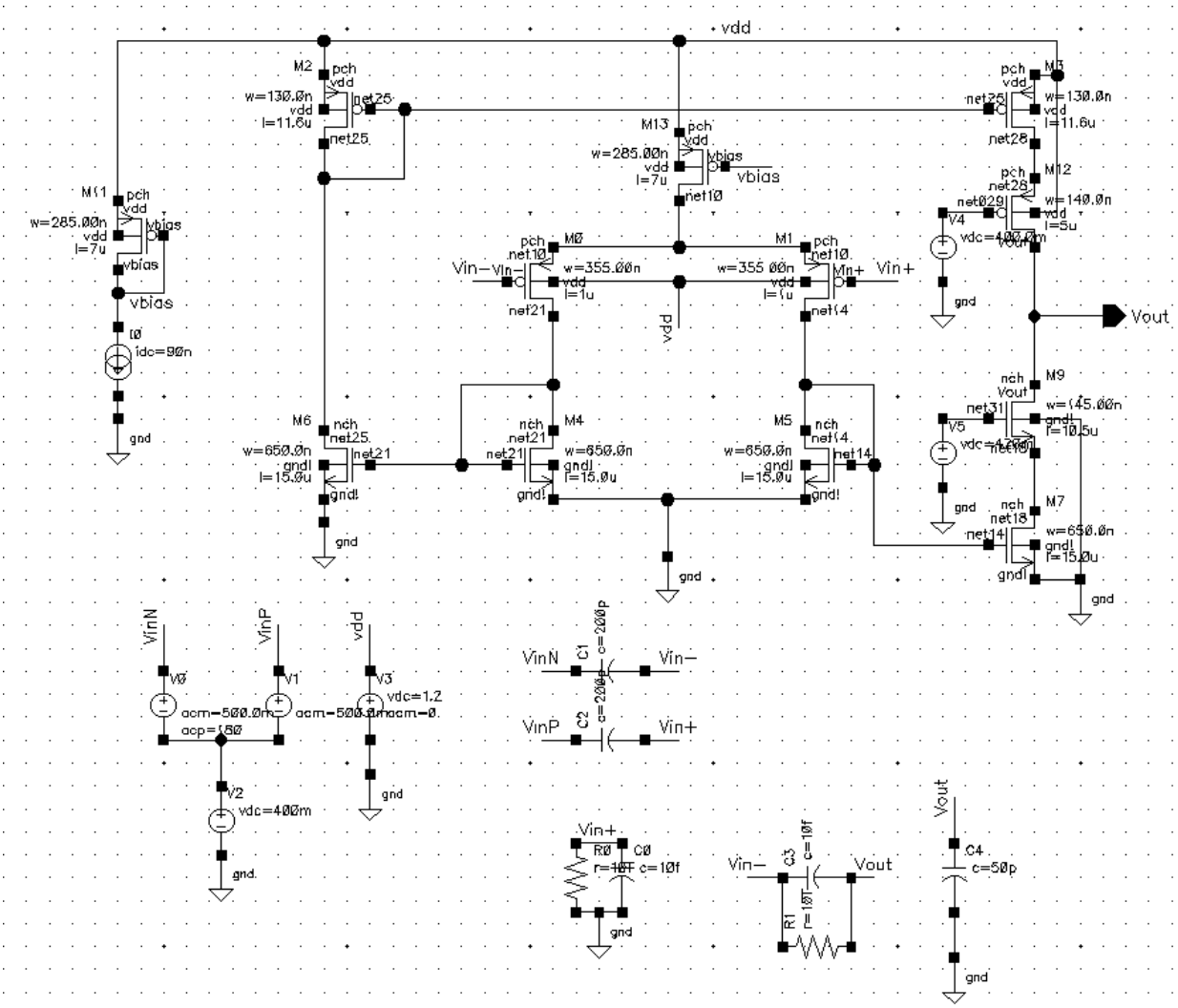


D - PSRR



2 – EEG AMPLIFIER

- **Amplifier Schematics**



- **Simulation Results**

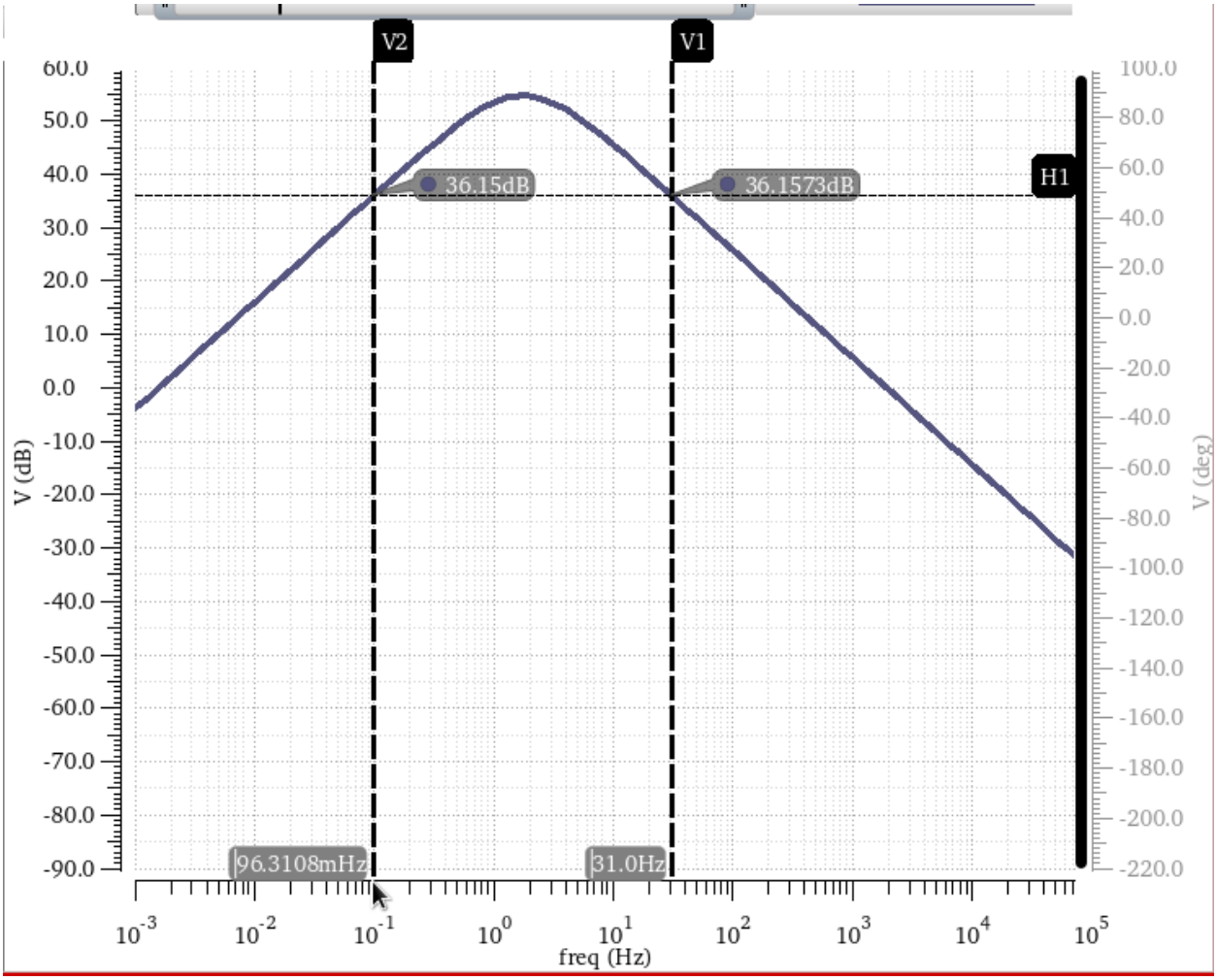
Parameters	Targeted Value	Achieved Value
Supply Voltage	1.2V	1.2V
Supply Current	128nA	128nA
Gain	40 dB	55 dB
Bandwidth	30 Hz	31 Hz
Input-referred Noise	2.4uV/sqrt (Hz)	1.2uV/sqrt (Hz)
CMRR	≥88 dB	85 dB
PSRR	≥80 dB	83 dB

- **Amplifier Parameters**

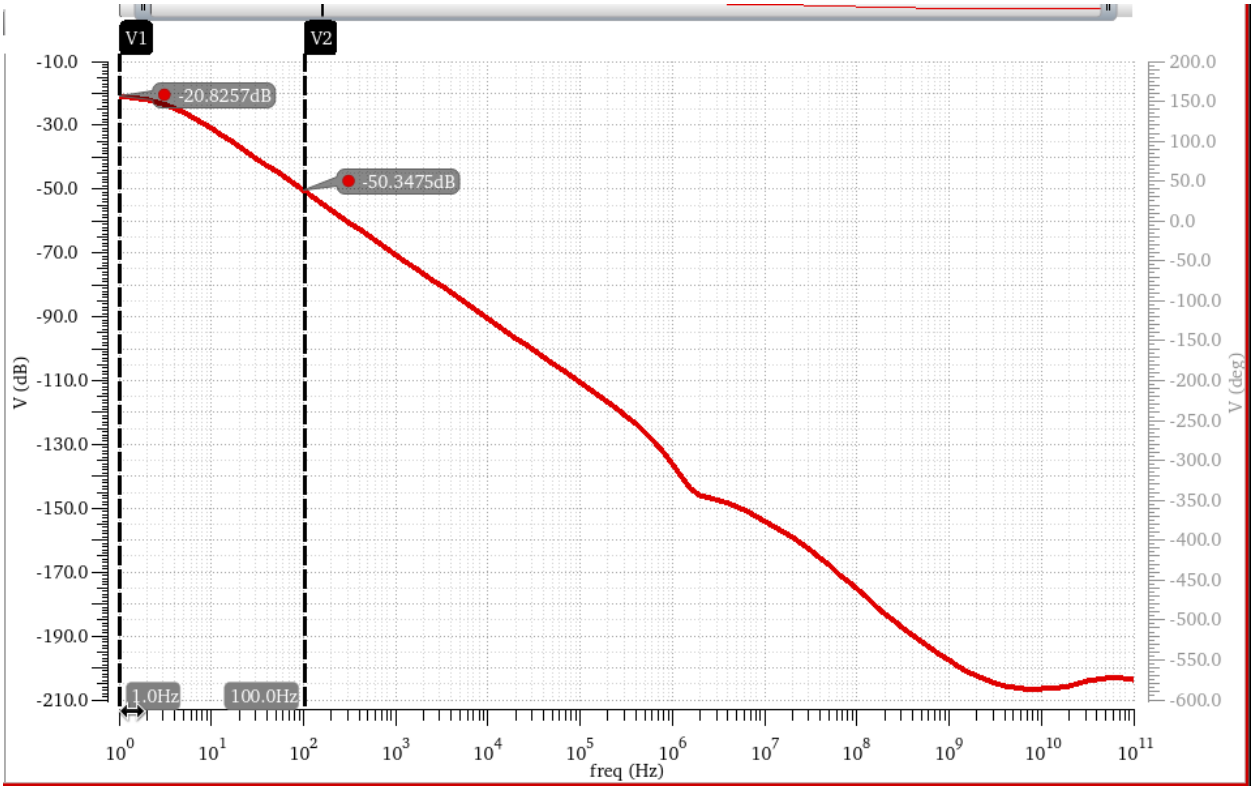
Device Name	W/L (m)	Gm/Id	Vov
M1, M2	355n/1u	22.527	55mV
M3, M4, M5, M6	650n/15u	10.656	135mV
M7, M8	130n/11.6u	9.36	150mV
M9, M10	285n/7u	12.375	110.05mV
M_{cascN}	145n/10.5u	13.511	100mV
M_{sacsP}	140n/5u	11.911	140mV

- **Simulated Graphs**

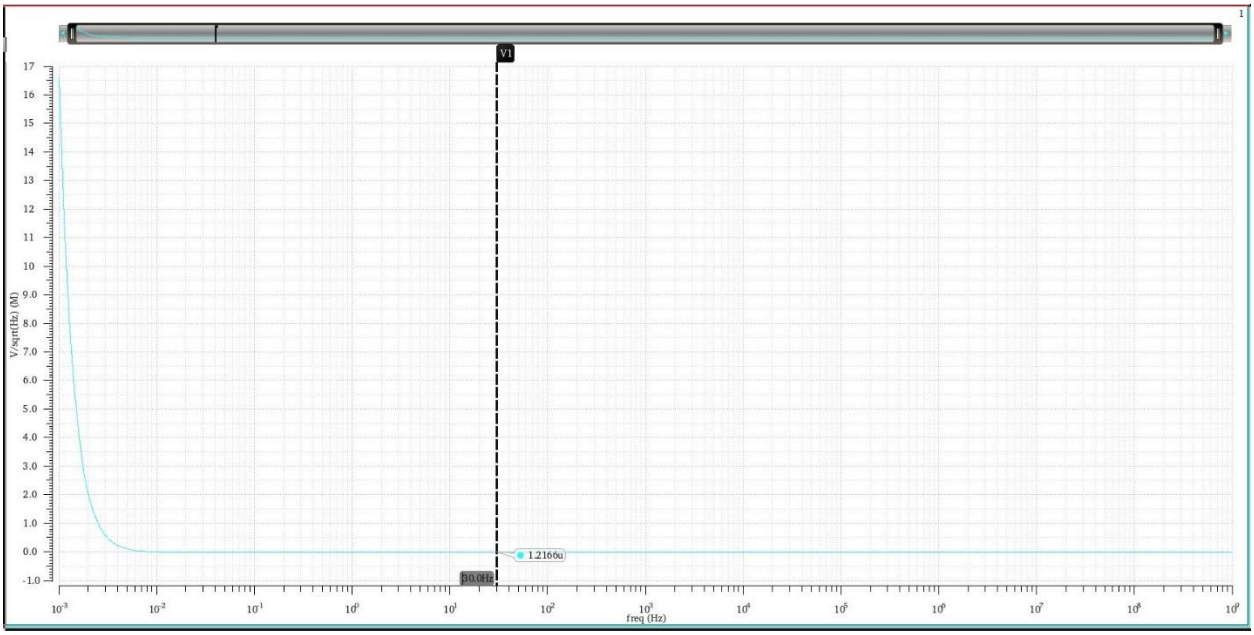
A – Gain & Bandwidth



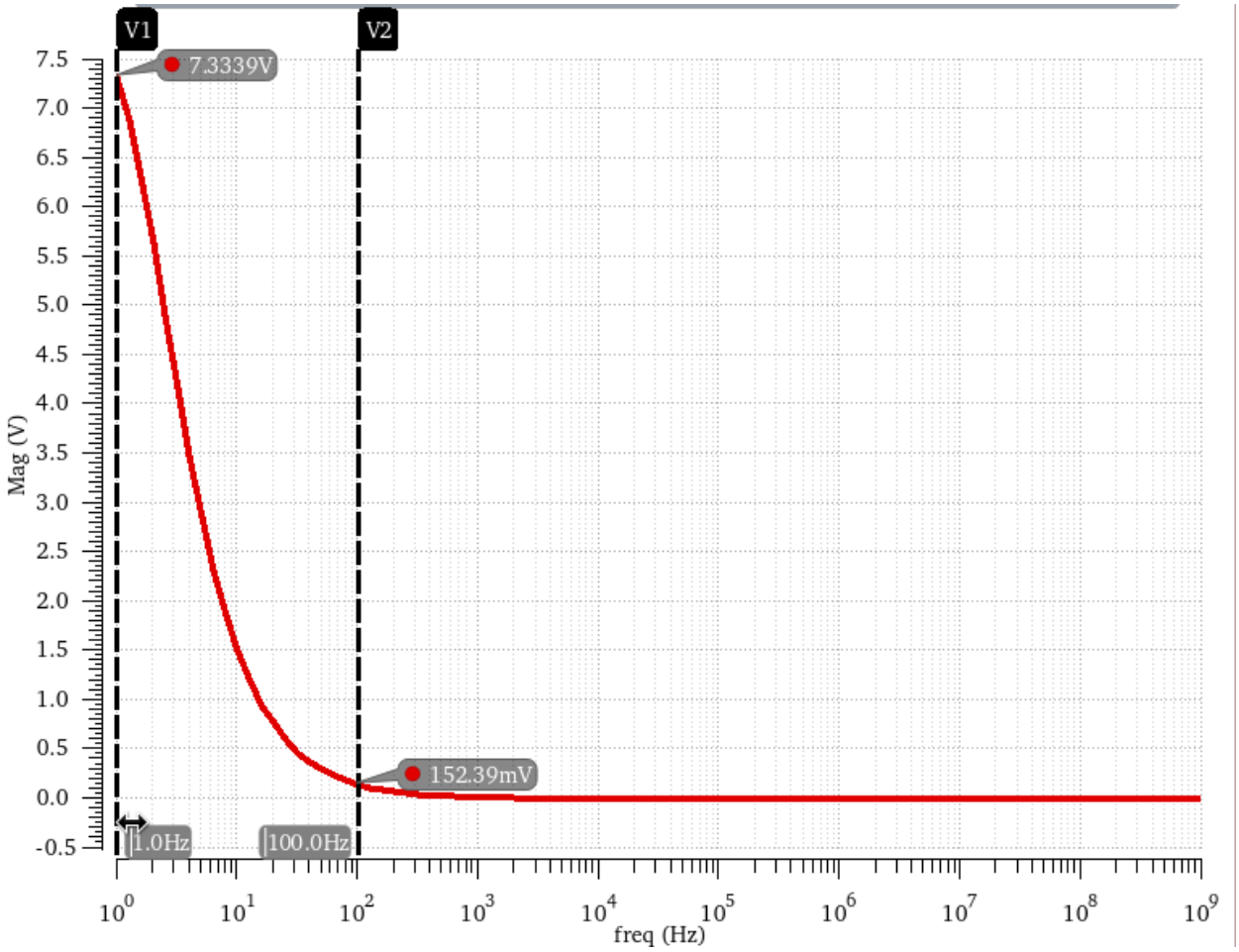
B - CMRR



C – Noise



D – PSRR


V1
V2
7.3339V
152.39mV
1.0Hz
100.0Hz
Mag (V)
freq (Hz)
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
10^0
10^1
10^2
10^3
10^4
10^5
10^6
10^7
10^8
10^9