OTA REPORT

OTA DESIGN

- I designed Miller OTA.

- Required Specs: -

1- DC gain >= 60 dB

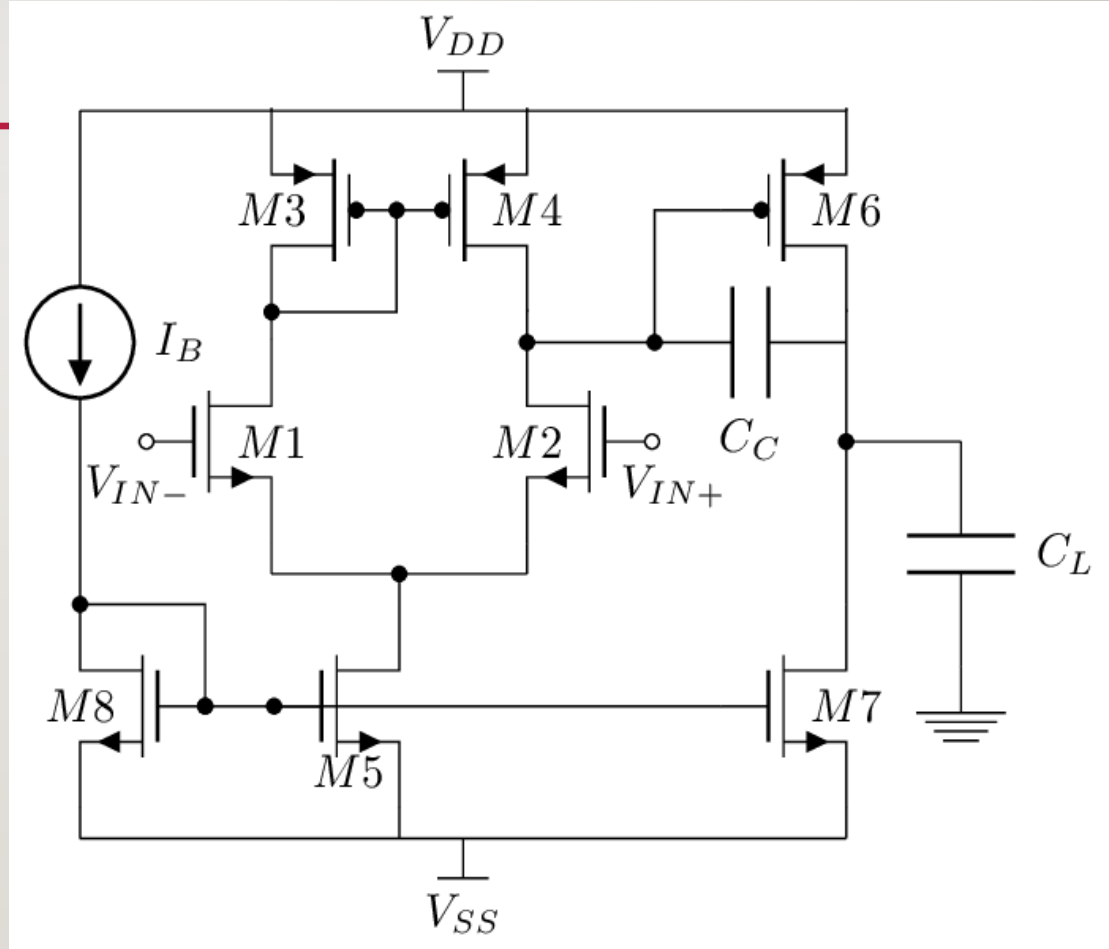
2- GBW >= 30 MHz

3- PM > 60 deg

4- Slew rate = 20v / 1 usec

5- ICMR(+) = 1.6v , ICMR(-) = 0.8v

6- Power < 1mW



OTA DESIGN STEPS

- I used VDD=1.8v ,Cl=2pf and skywater130nm technology

1- To have phase margin >=60 , Cc should be >=0.22 Cl so Cc>=440 fF

2- From slew rate equation we got the Current value , I = SR*Cc so I >= 8.8 uA

3- From GBW equation we got gm1,2 = GBW*2*pi*Cc then W/L)1,2

4- From ICMR+ equation we got W/L)3,4 and from ICMR- equation we got W/L)5,8

ICMR+ <= VDD-Vsg3+Vth1

ICMR- >= Vgs1+Vov5

5- For PM>=60 gm6 >= 10*gm1 then from W/L)6 / W/L)4 = gm6/gm4 we got W/L)6

6- From equation: W/L)6 / W/L)4 = I6 / I4 we got I6

7- Finally from equation: W/L)7 / W/L)5 = I7 / I5 we got W/L)7

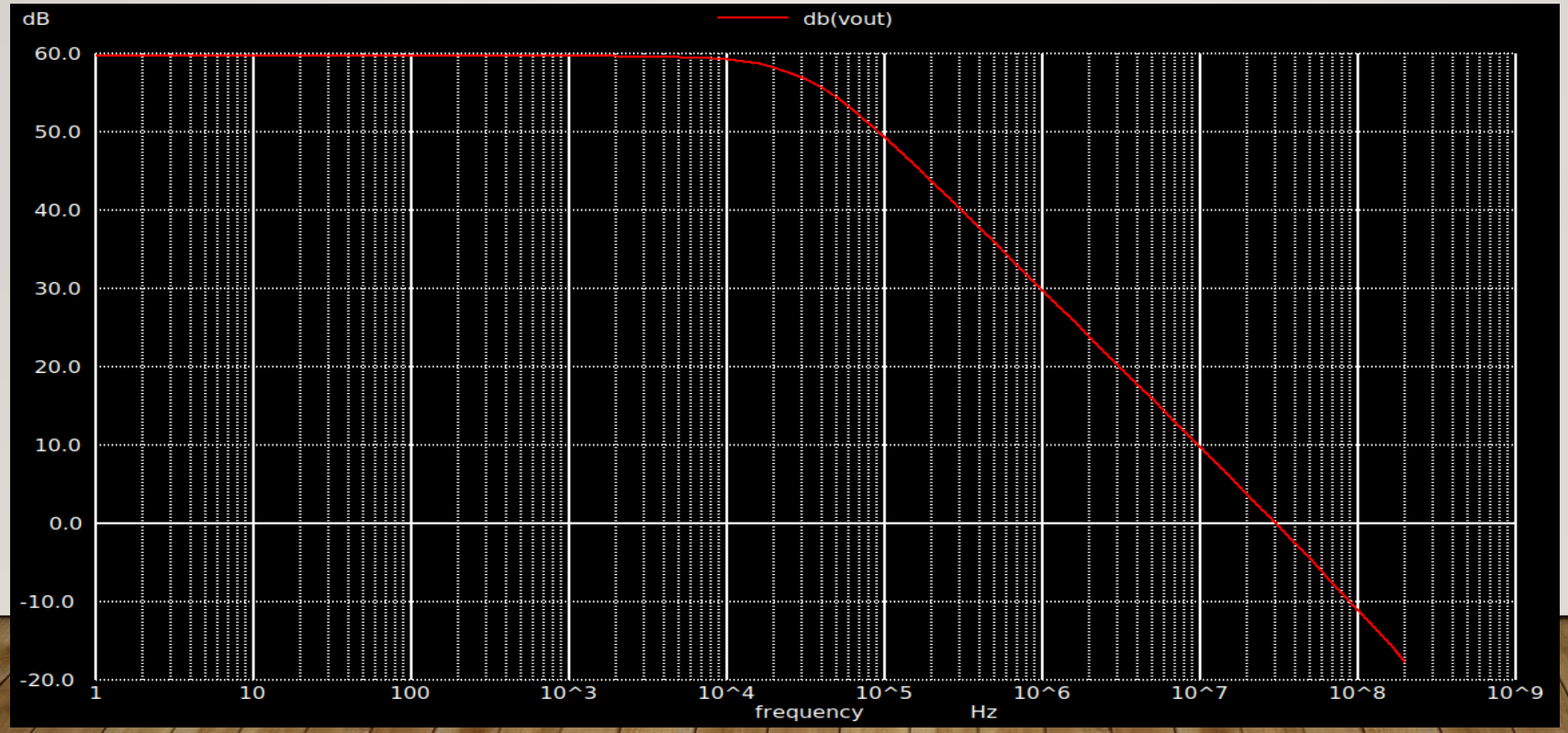
OTA CALCULATED PARAMETERS

Parameter	Value
Iref	20uA
W/L)1,2	25u/0.5u
W/L)3,4	7u/0.5u
W/L)5,8	12u/1u
W/L)6	90u/0.5u
W/L)7	75u/1u
Cc	2pf

OTA SIMULATIONS

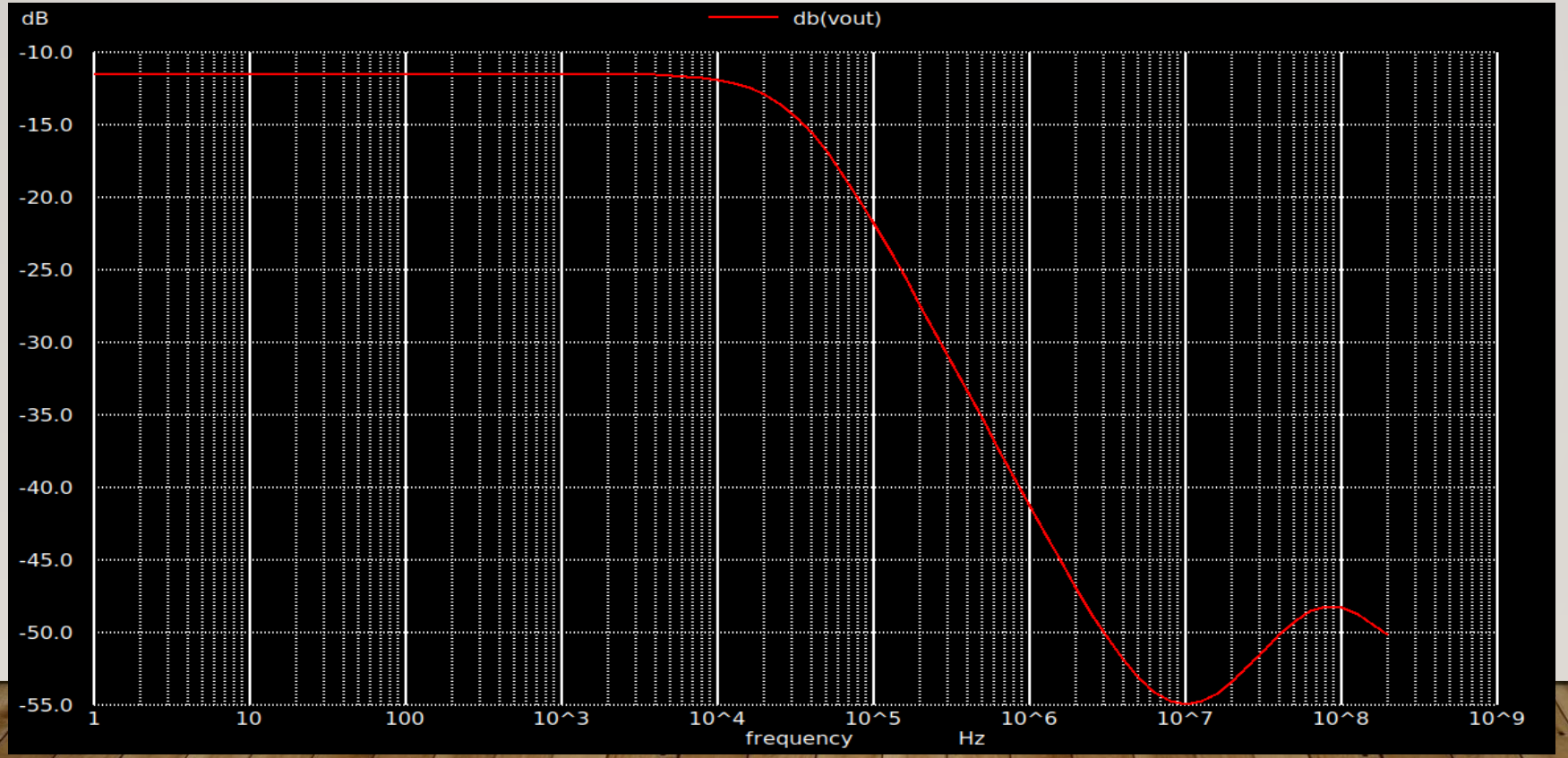
1. DC analysis to check the DC operating point and ensure that all transistors are in sat.

2. AC analysis:- a) Differential gain



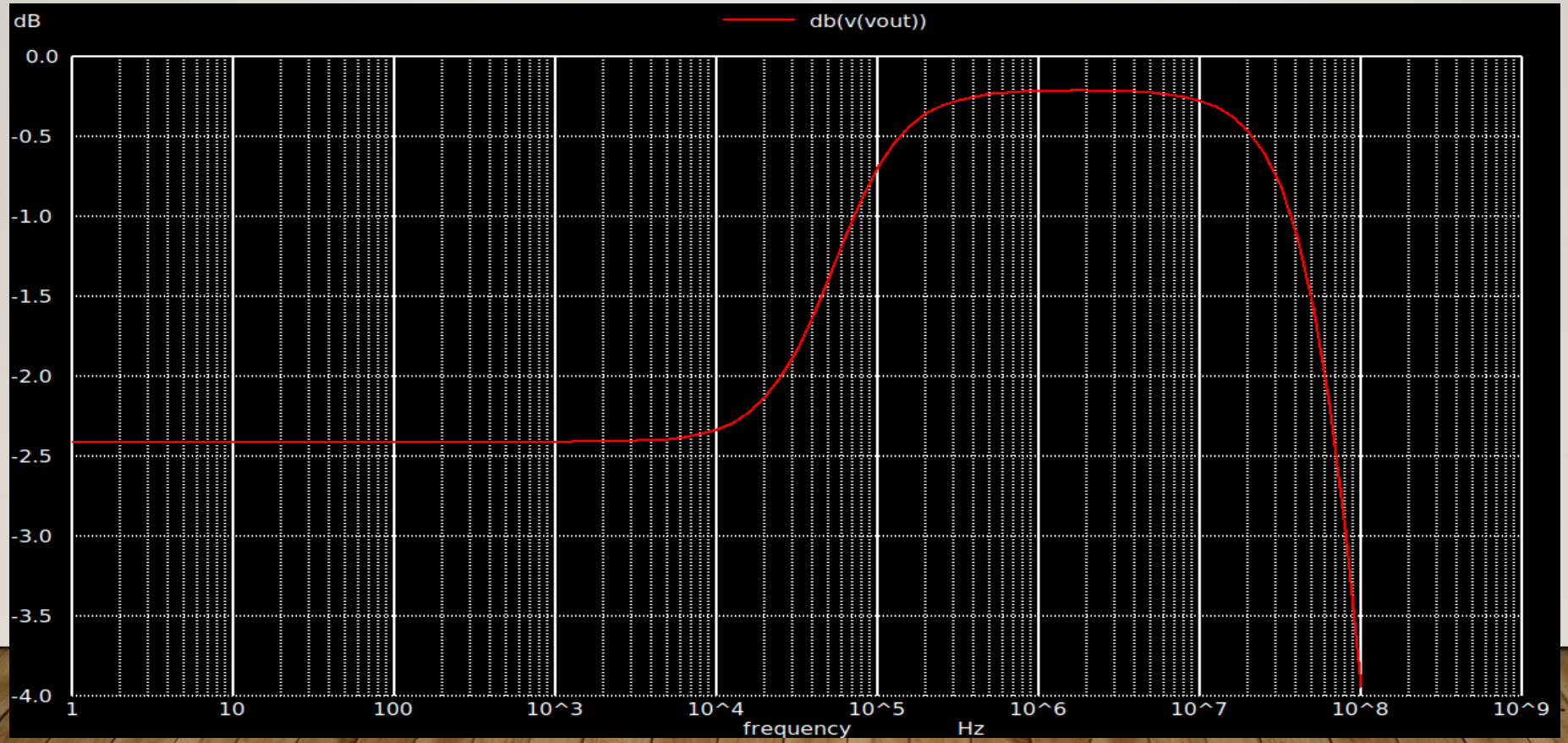
OTA SIMULATIONS

2- AC analysis b) Common mode gain



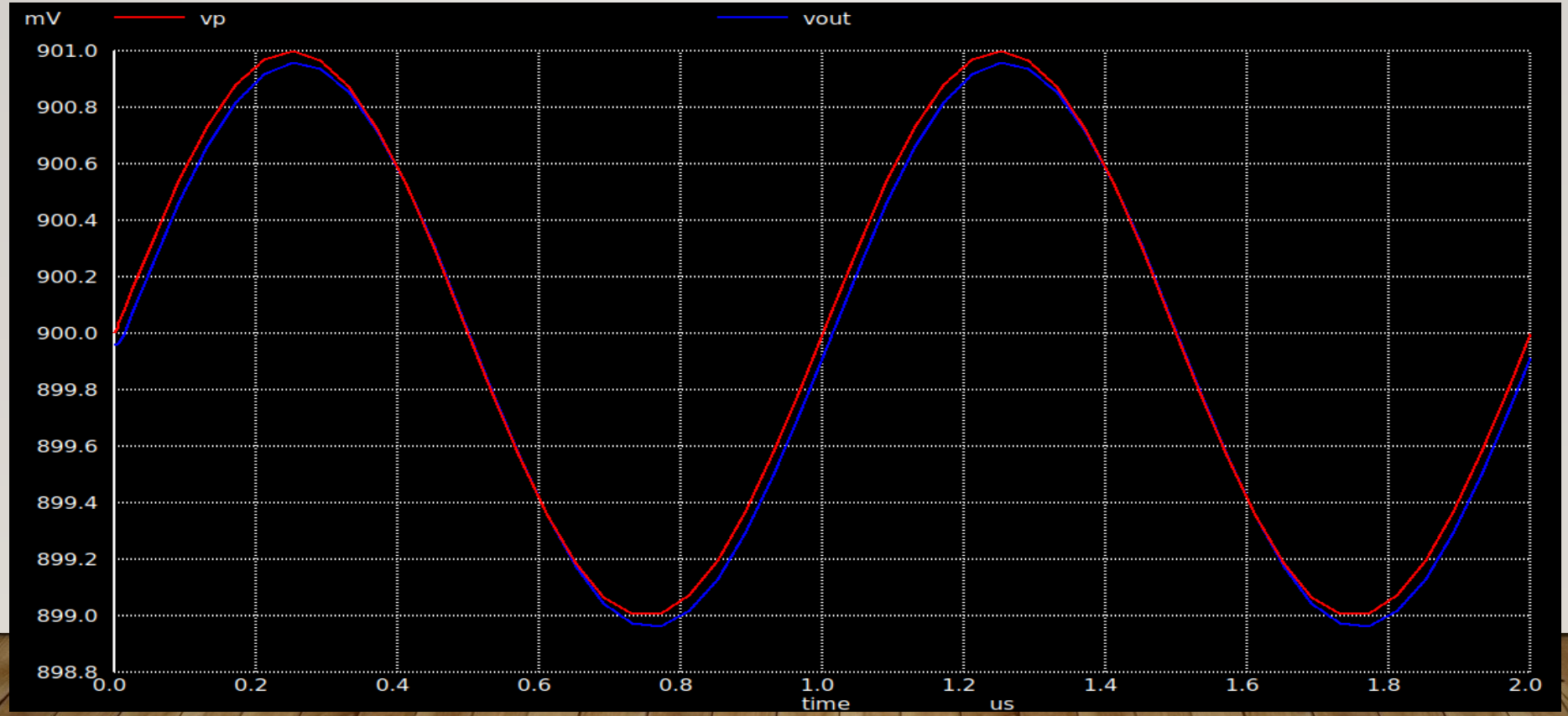
OTA SIMULATIONS

2- AC analysis c) PSRR



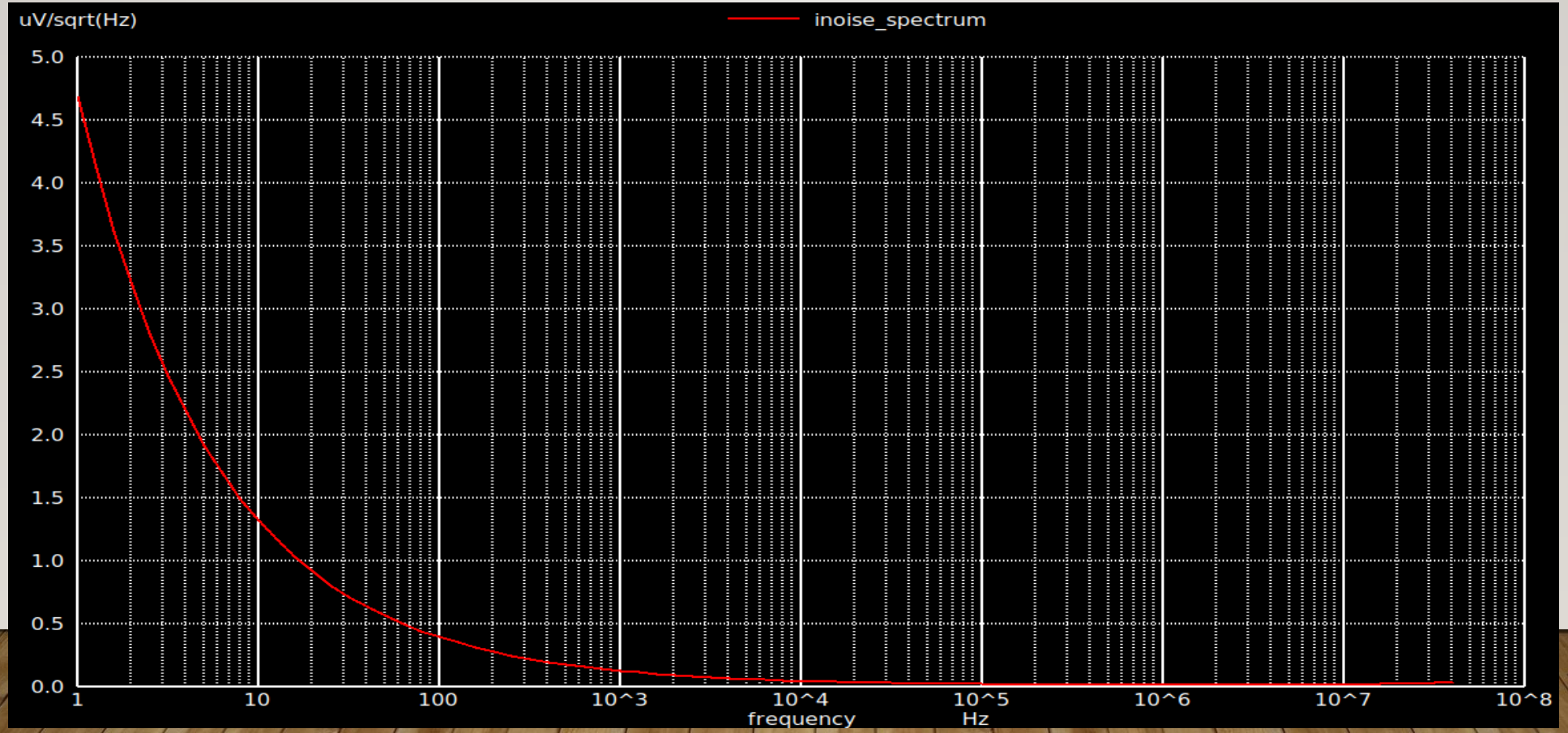
OTA SIMULATIONS

3- Transient analysis (The OTA as buffer)



OTA SIMULATIONS

4- Noise analysis (Input referred noise)



OTA ACHIEVED SPECS

spec	value
Av	60 dB
Acm	-11.5 dB
CMRR	71.5 dB
PSRR	57 dB
GBW	30MHz
PM	52 deg
Power	318 uW