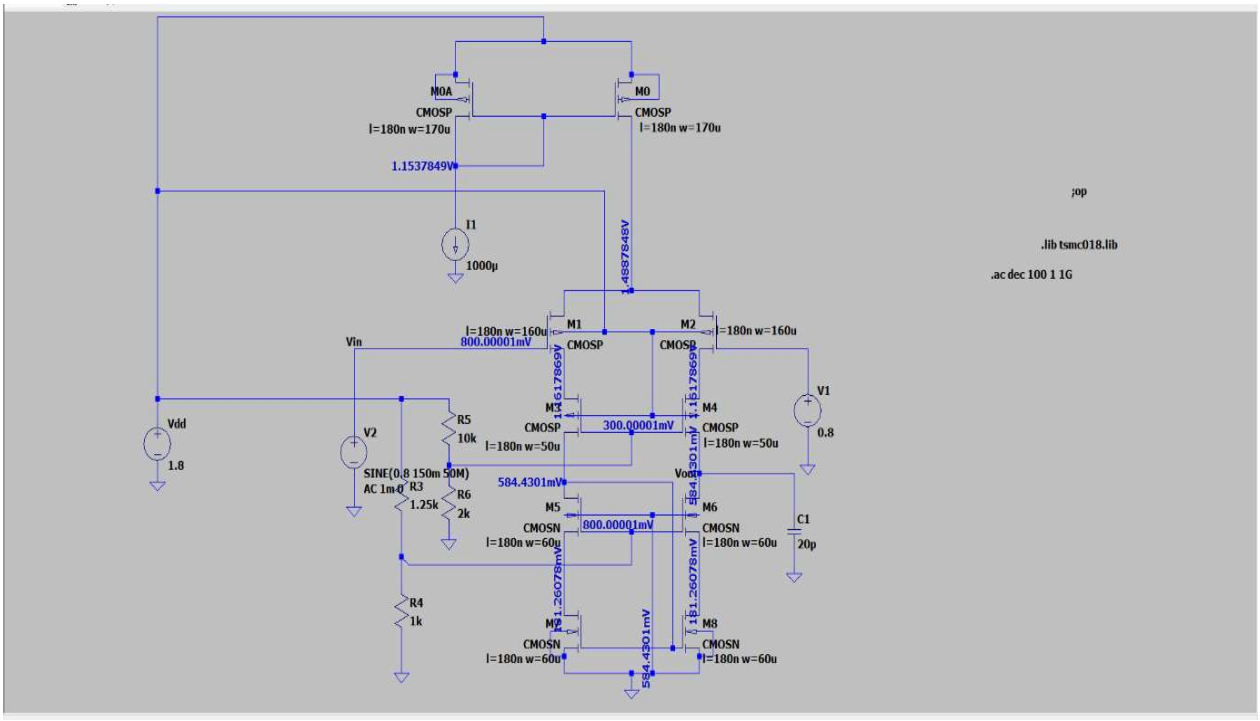
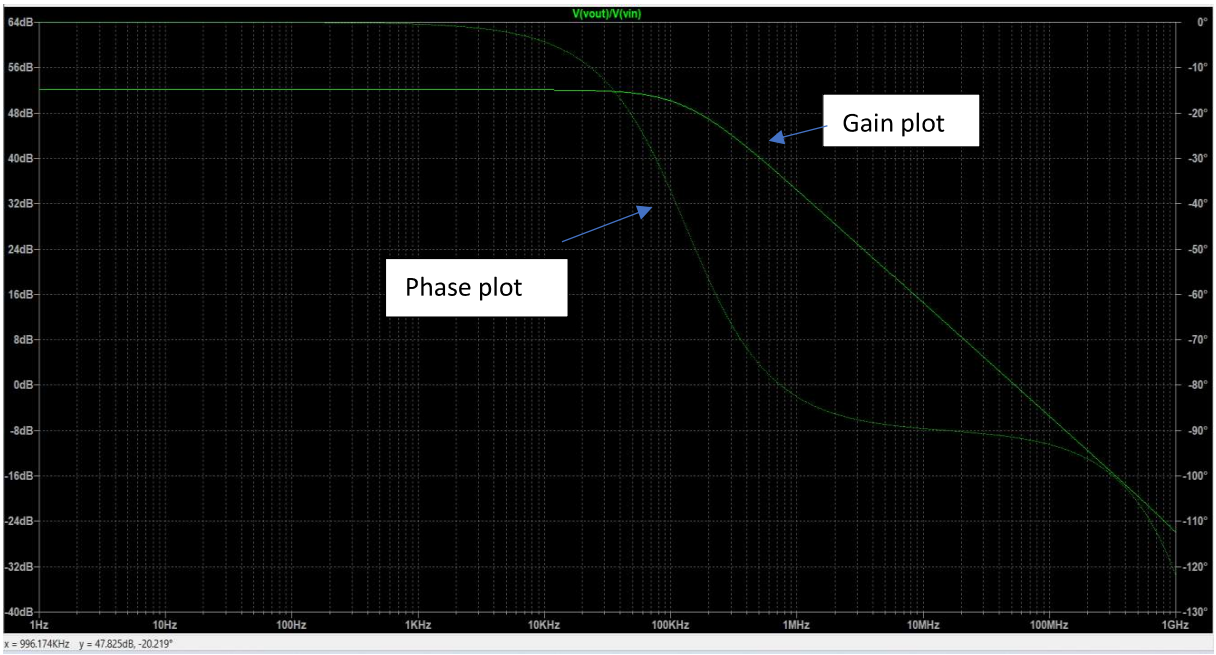
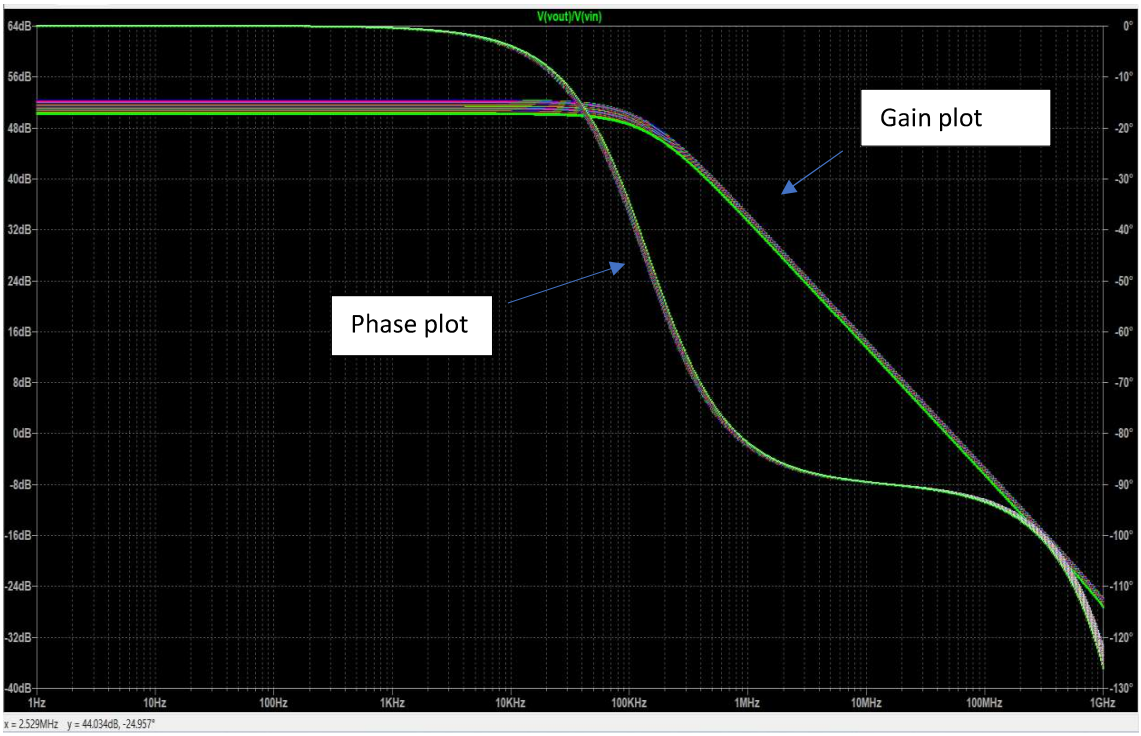
OPEN LOOP:



OPEN LOOP GAIN AND PHASE PLOT:

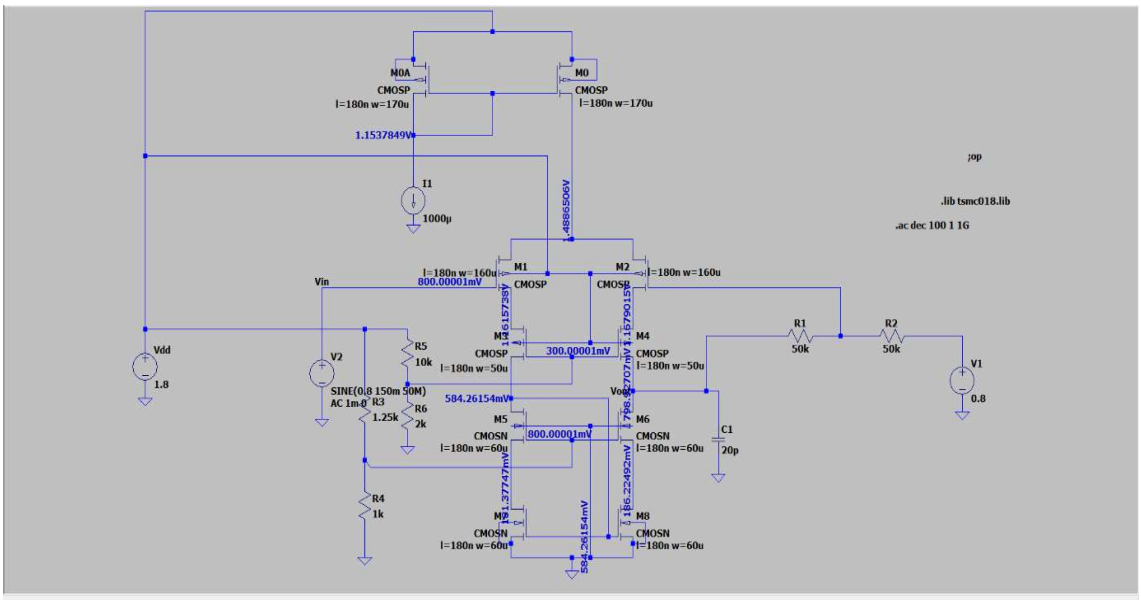


VARIATION OF OPEN LOOP GAIN AND PHASE BY CHANGING TEMPERATURE (.step temp 22 70 2)



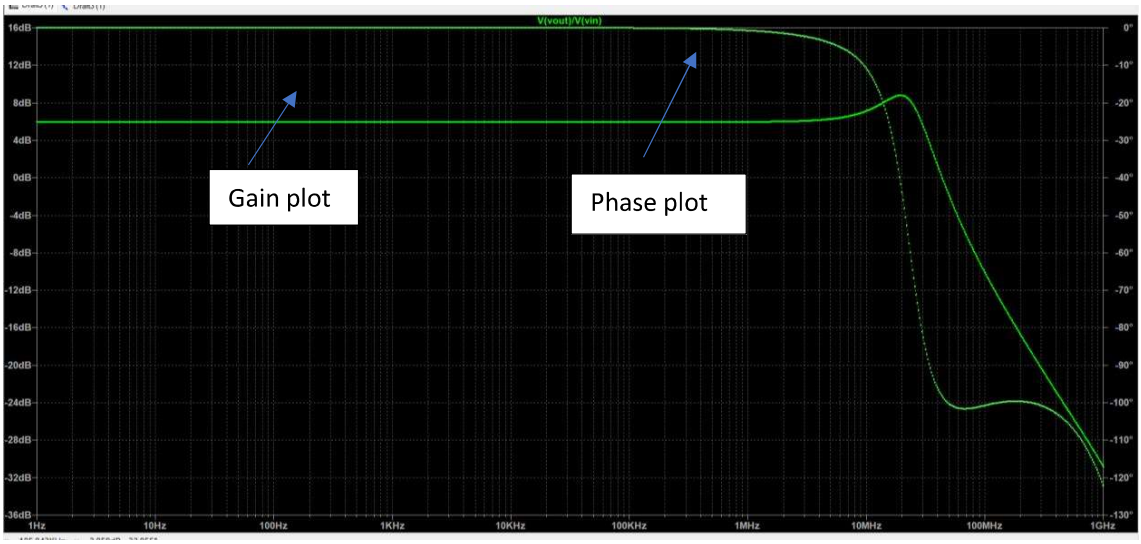
This plot has different temperature from 22 deg to 70 deg with 2 deg increment due to voltage divider circuit for biasing . This problem can be solved by using current mirror for baising.

CLOSED LOOP SYSTEM



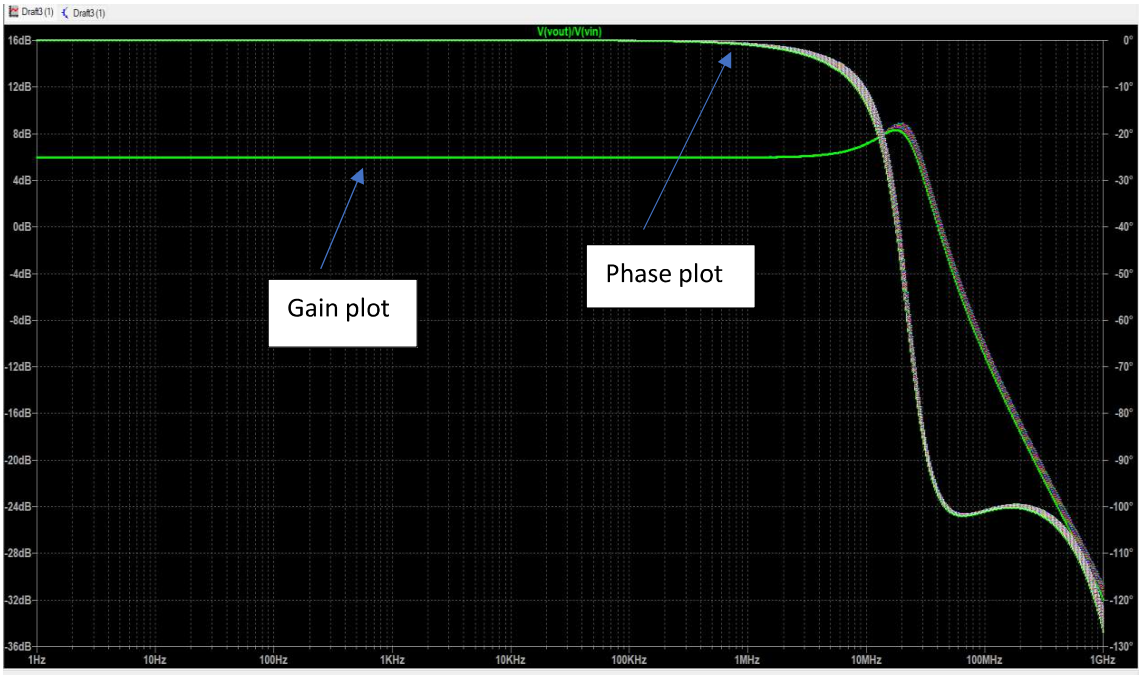
MAGNITUDE AND PHASE PLOT OF CLOSED LOOP SYSTEM

d



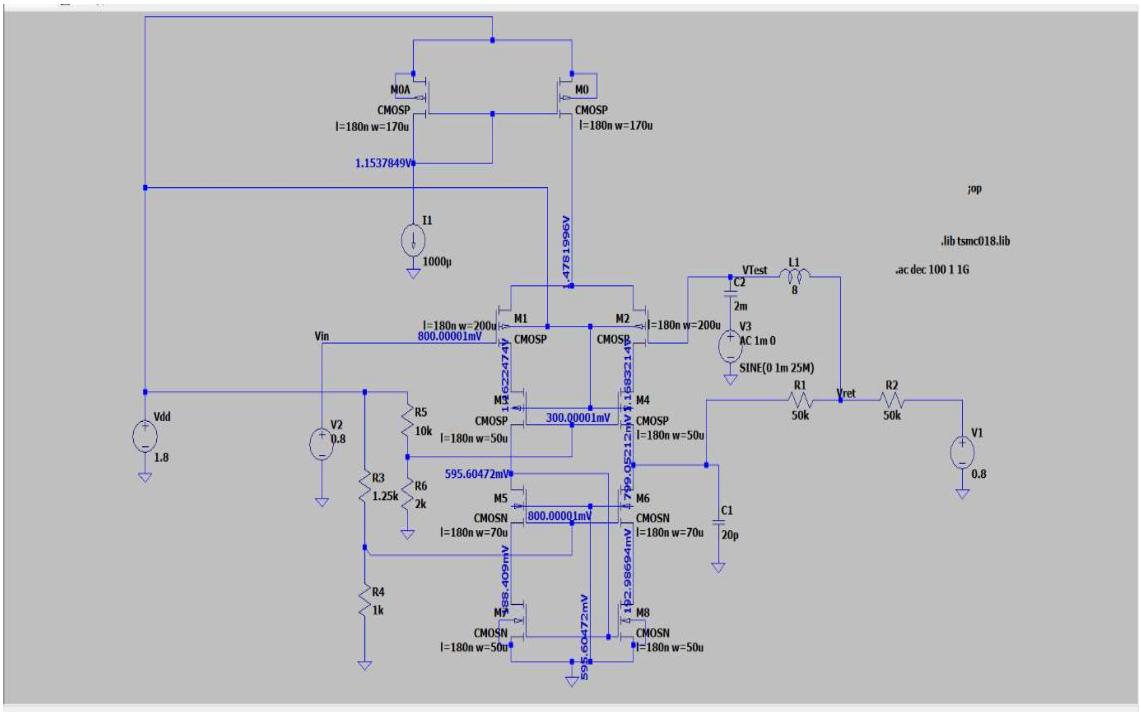
The spike is due to parasitic capacitance of gate (Cgg).

VARIATION OF CLOSED LOOP GAIN AND PHASE PLOT BY CHANGING TEMPERATURE (.step temp 22 70 2)

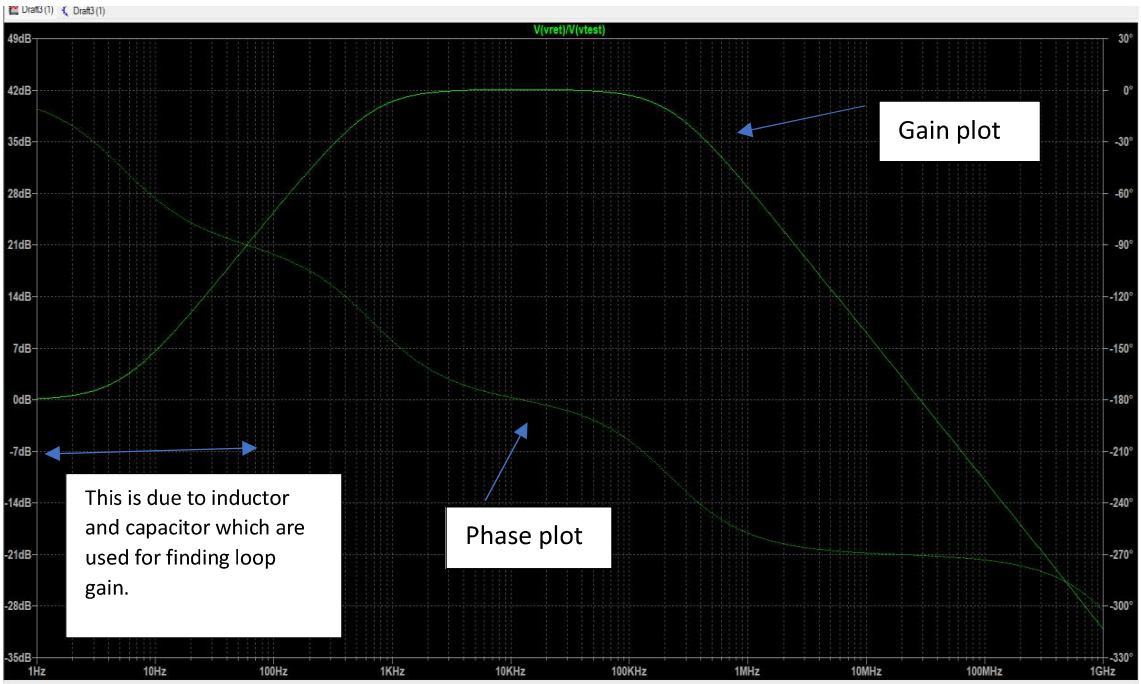


This plot has different temperature from 22 deg to 70 deg with 2 deg increment due to voltage divider circuit for biasing . This problem can be solved by using current mirror for baising.

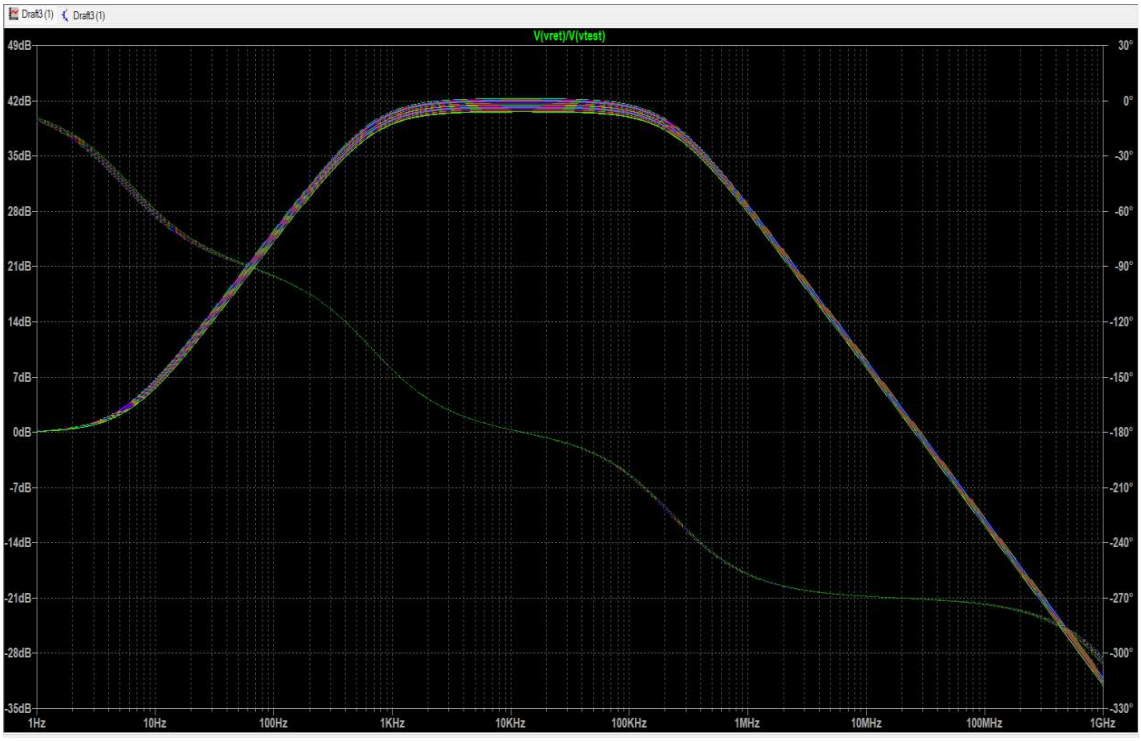
LOOP GAIN CIRCUIT



LOOP GAIN, MAGNITUDE AND PHASE PLOT

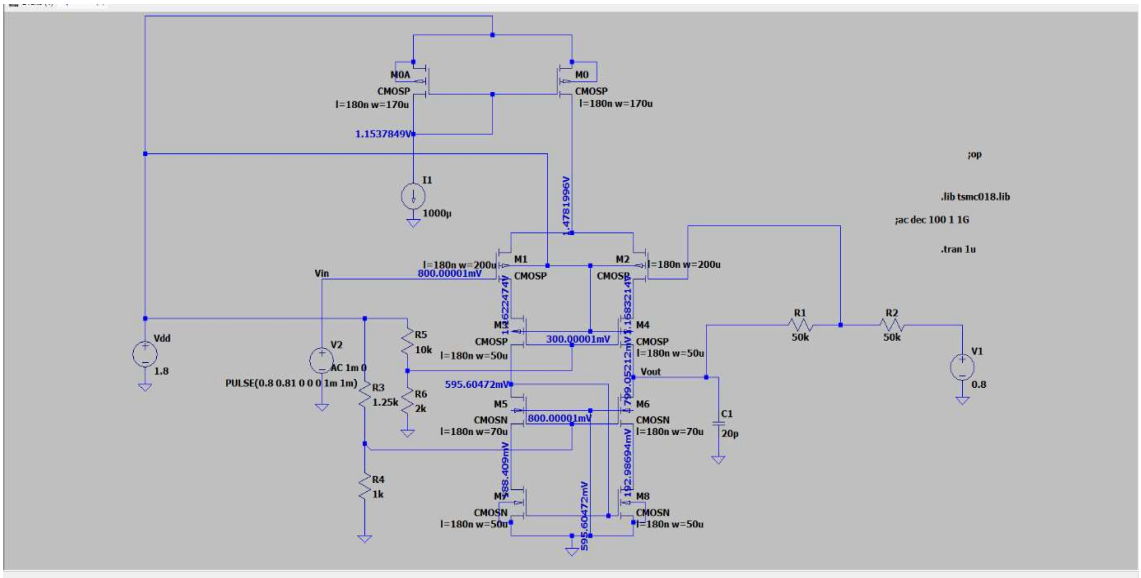


VARIATION OF LOOP GAIN, MAGNITUDE AND PHASE PLOT BY VARIATION IN TEMPERATURE (.step temp 22 70 2)

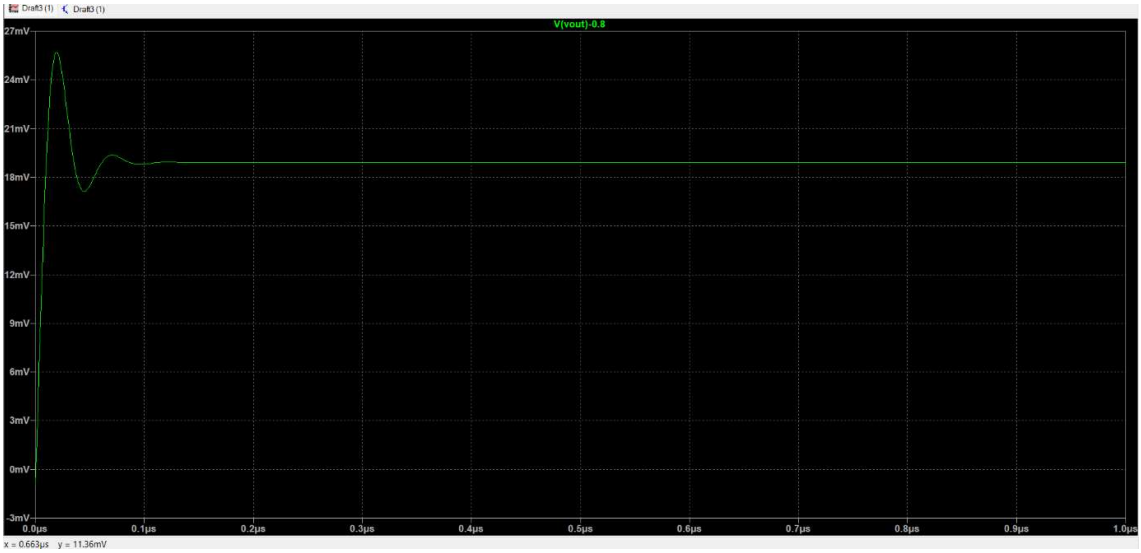


This plot has different temperature from 22 deg to 70 deg with 2 deg increment due to voltage divider circuit for biasing . This problem can be solved by using current mirror for baising.

TRANSIENT ANALYSIS FOR THE STEP INPUT

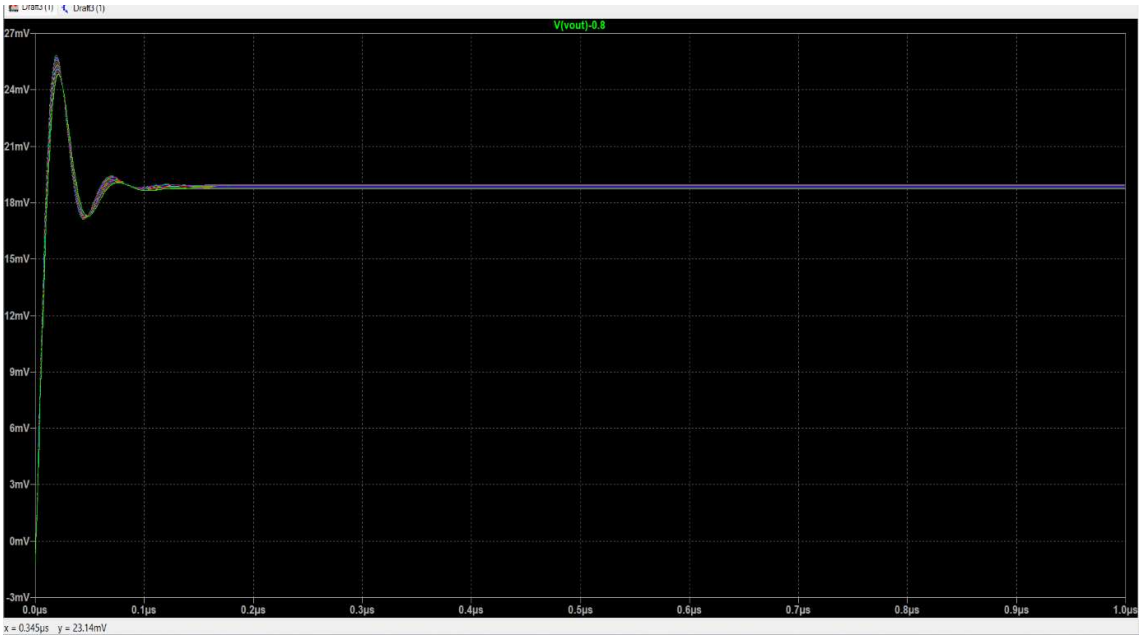


TRANSIENT ANALYSIS FOR THE STEP INPUT

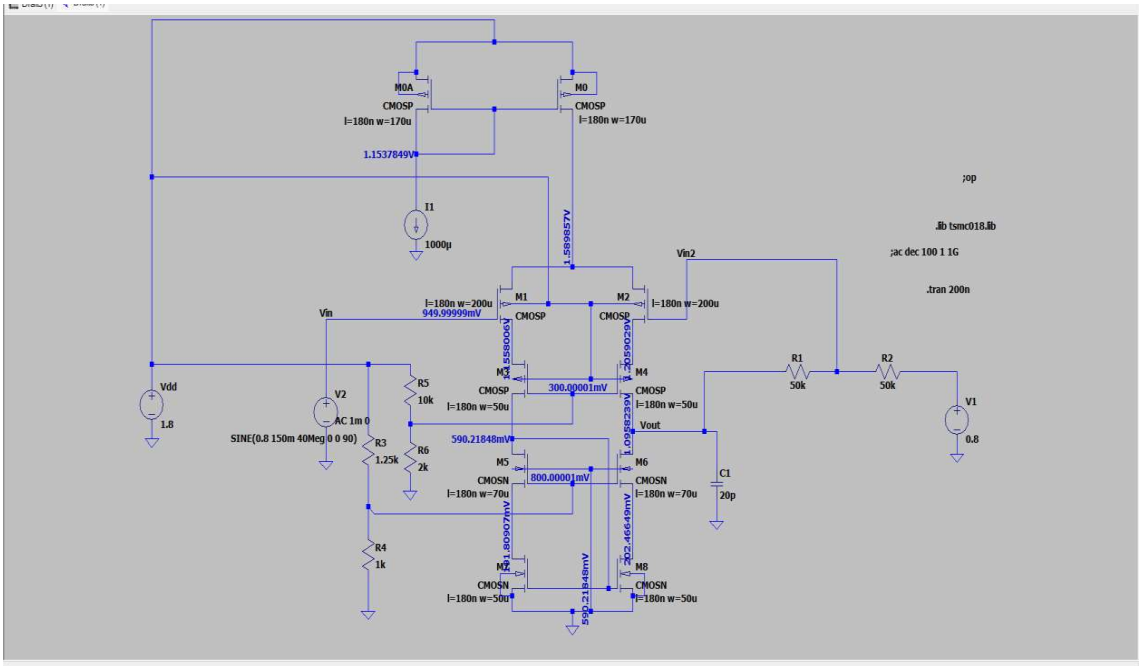


The response is similar to underdamped second order system because of parasitic capacitance. Bias voltage = 0.8V.

VARIATION IN TRANSIENT RESPONSE BY CHANGING TEMPERATURE (.step temp 22 70 2)

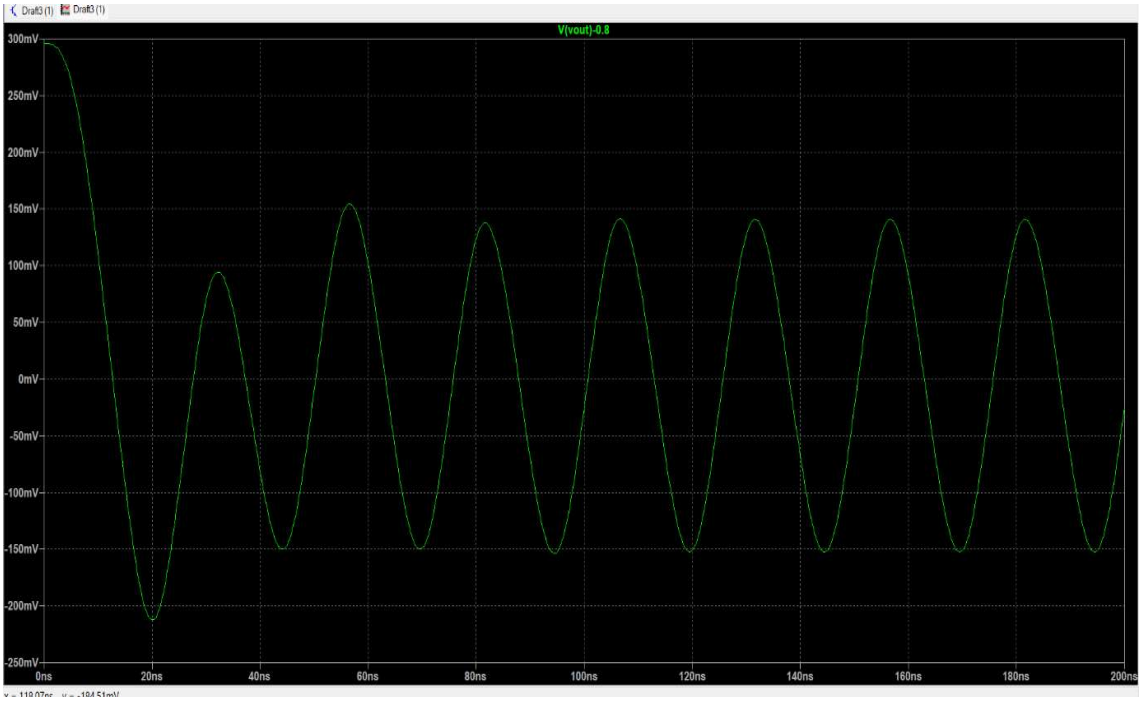


TRANSIENT ANALYSIS FOR SINUSOIDAL INPUT



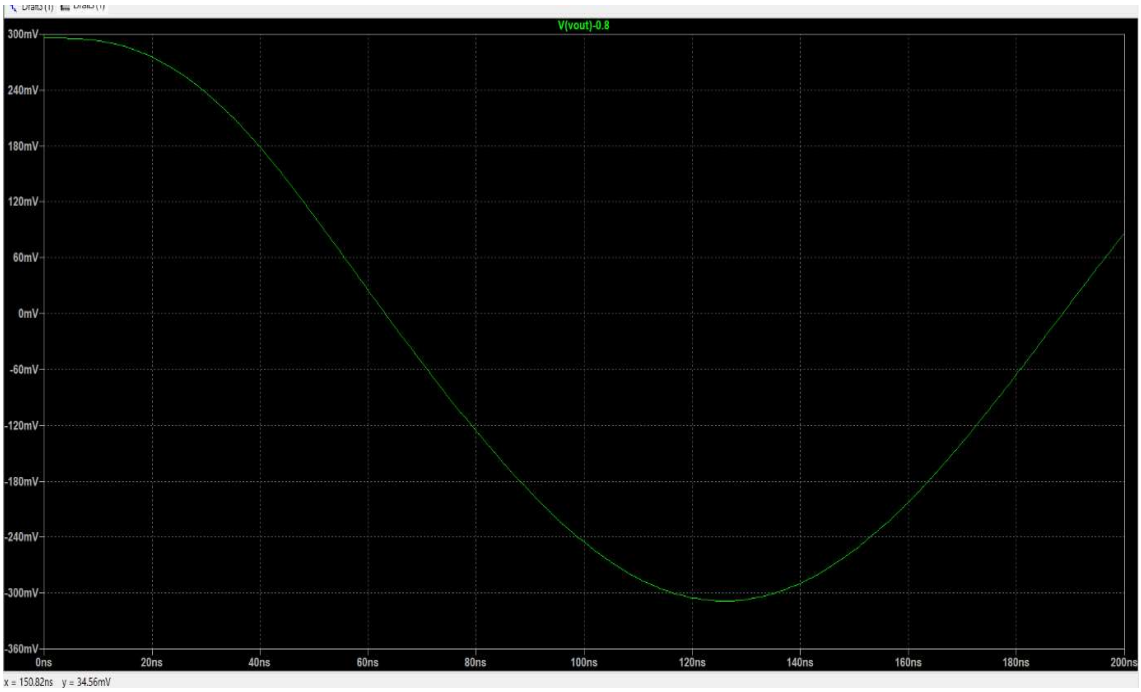
TRANSIENT RESPONSE WHEN INPUT IS 150mv COS(W_{3db}t)

W_{3db} = 2π*40MHz=251.32MHz)

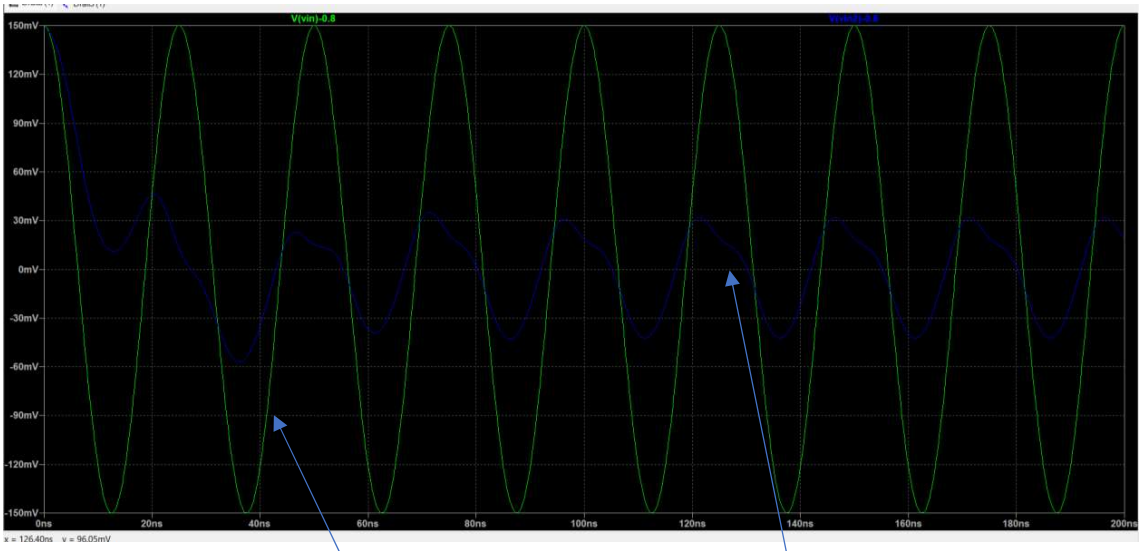


TRANSIENT RESPONSE WHEN INPUT IS 150mv COS(W_{3db} *10/t)

W_{3db} /10 = 25.132MHz



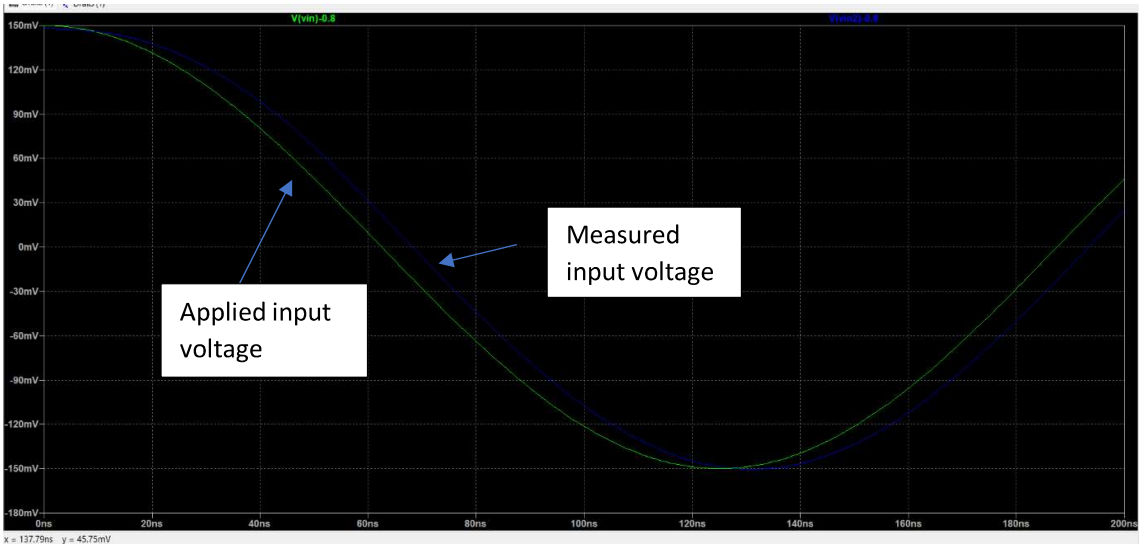
DIFFERENCE IN THE INPUT NODE VOLTAGE WHEN Vi = 150mCOS(W_{3db} t)



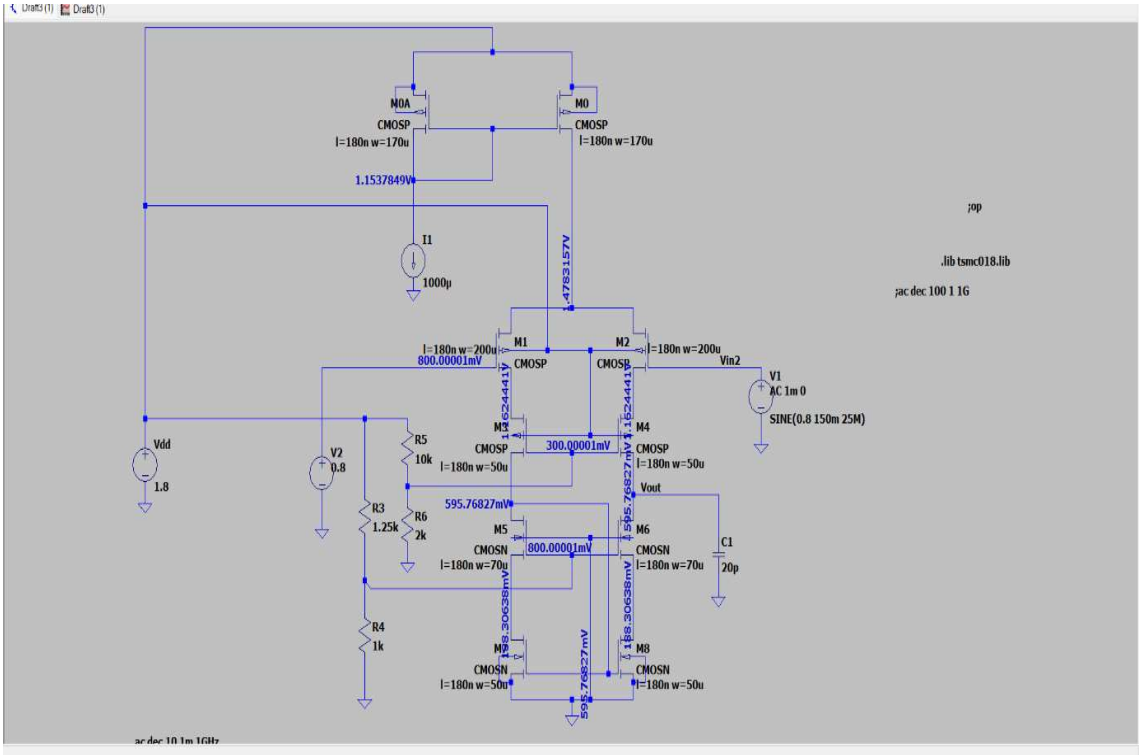
Applied input voltage

Measured input voltage

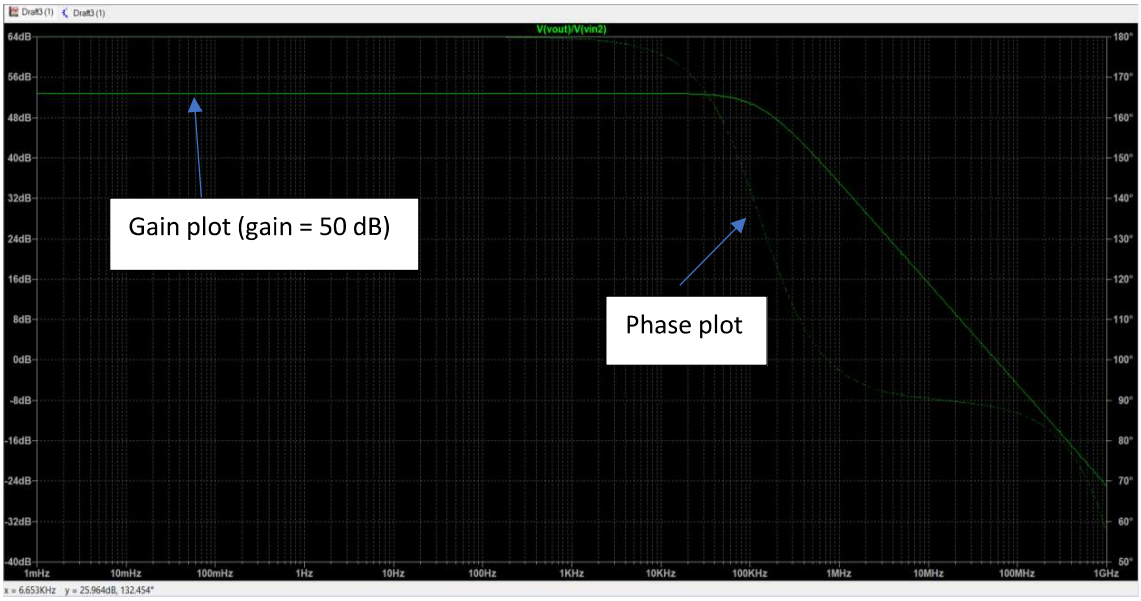
DIFFERENCE IN THE INPUT NODE VOLTAGE WHEN Vi = 150mCOS(W_{3db} t/10)



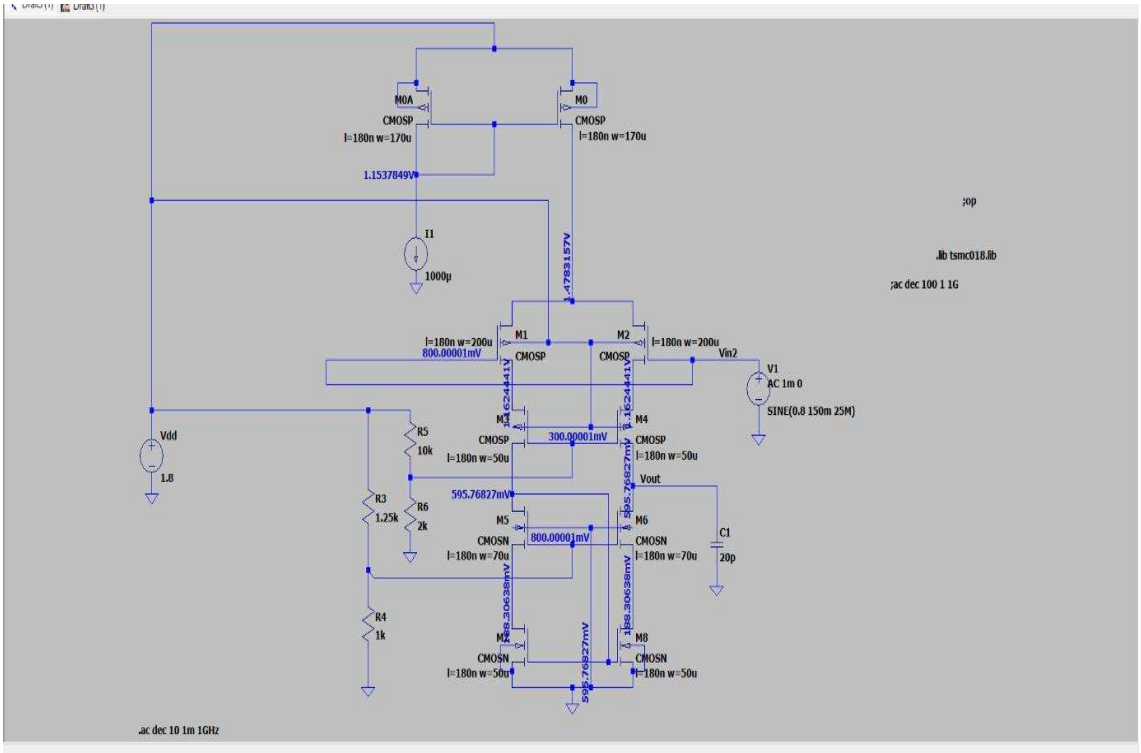
CIRCUIT FOR DIFFERENTIAL MODE GAIN



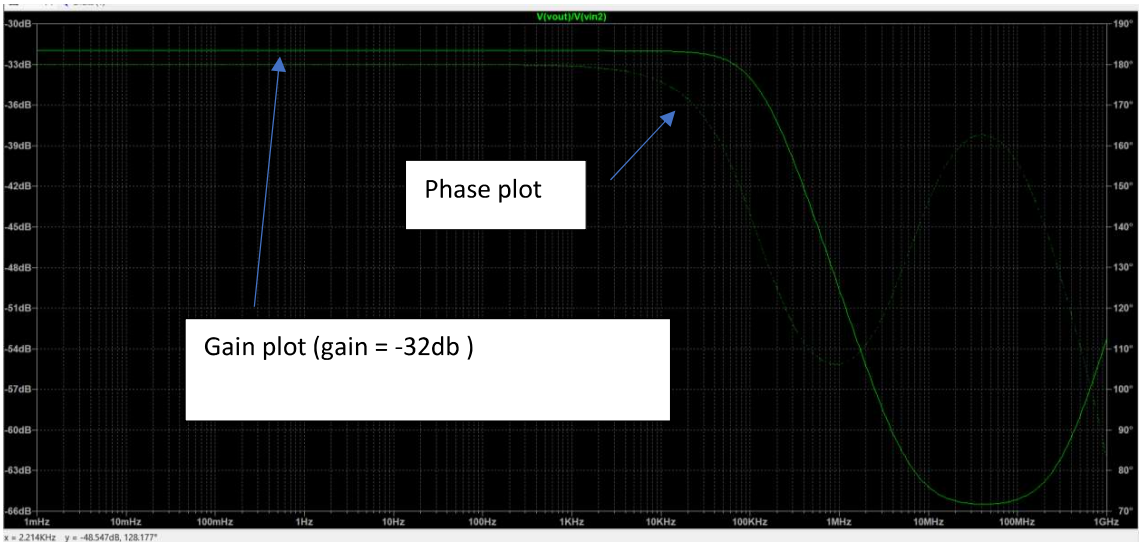
DIFFERENTIAL MODE GAIN AND PHASE PLOT



CIRCUIT FOR COMMON MODE GAIN



COMMON MODE GAIN AND PHASE PLOT



COMMON MODE REJECTION RATIO (CMRR):

Common Mode Rejection Ratio (CMRR):

The CMRR is the ratio of Differential gain (A_d) to Common mode gain (A_{cm}).

$$CMRR = \frac{A_d}{A_{cm}}$$

$$(CMRR)_{dB} = 20 \log_{10}\left(\frac{A_d}{A_{cm}}\right)$$

$$= 20 \log_{10}(A_d) - 20 \log_{10}(A_{cm})$$

$$= (50)_{dB} - (-32)_{dB}$$

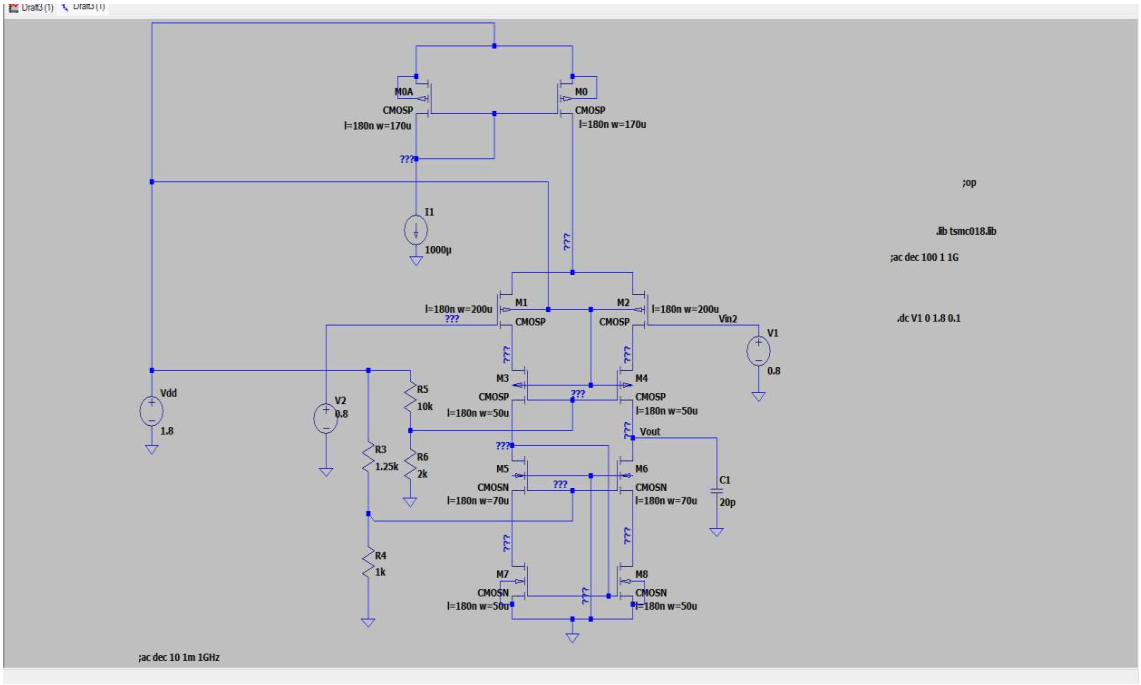
$$= (82)_{dB}$$

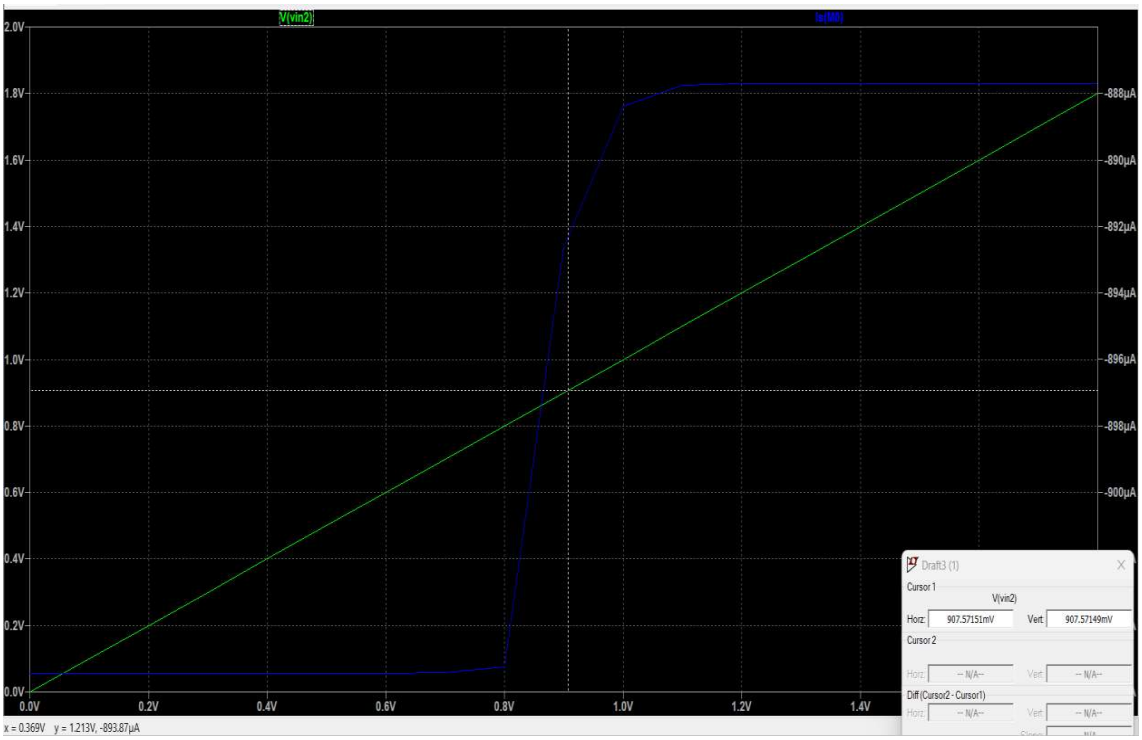
$\therefore 20 \log_{10}(A_d) = (50)_{dB}$

$20 \log_{10}(A_{cm}) = (-32)_{dB}$

} → from magnitude plot of A_d & A_{cm}.

ICMR:





ICMR^{-} =907.57mv

Tabular form for gm, gds, cgs, cgd, Vov for all transistors:

Semiconductor Device Operating Points:

--- BSIM3 MOSFETS ---

Name:	m3	m4	m0a	m0	m2
Model:	cmosp	cmosp	cmosp	cmosp	cmosp
Id:	4.53e-04	4.53e-04	1.00e-03	9.05e-04	4.53e-04
Vgs:	-2.96e-01	-2.96e-01	0.00e+00	-3.25e-01	-3.62e-01
Vds:	5.67e-01	5.67e-01	6.46e-01	3.22e-01	3.16e-01
Vbs:	1.20e+00	1.20e+00	6.46e-01	3.22e-01	6.38e-01
Vth:	-6.85e-01	-6.85e-01	-5.09e-01	-5.10e-01	-6.03e-01
Vdsat:	-1.66e-01	-1.66e-01	-1.26e-01	-1.25e-01	-9.43e-02
Gm:	4.36e-03	4.36e-03	1.24e-02	1.11e-02	7.44e-03
Gds:	1.17e-04	1.17e-04	2.06e-04	4.43e-04	2.14e-04
Gmb	1.12e-03	1.12e-03	3.69e-03	3.34e-03	2.02e-03
Cbd:	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
Cbs:	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
Cgsov:	3.18e-14	3.18e-14	1.08e-13	1.08e-13	1.27e-13
Cgdov:	3.18e-14	3.18e-14	1.08e-13	1.08e-13	1.27e-13
Cgbov:	1.21e-19	1.21e-19	1.21e-19	1.21e-19	1.21e-19
dQgdVgb:	1.07e-13	1.07e-13	3.63e-13	3.63e-13	4.14e-13
dQgdVdb:	-3.16e-14	-3.16e-14	-1.08e-13	-1.08e-13	-1.27e-13
dQgdVsb:	-7.47e-14	-7.47e-14	-2.50e-13	-2.50e-13	-2.79e-13
dQddVgb:	-4.87e-14	-4.87e-14	-1.64e-13	-1.64e-13	-1.87e-13
dQddVdb:	3.17e-14	3.17e-14	1.08e-13	1.08e-13	1.27e-13
dQddVsb:	2.12e-14	2.12e-14	7.38e-14	7.39e-14	7.70e-14
dQbdVgb:	-9.51e-15	-9.51e-15	-3.45e-14	-3.42e-14	-3.90e-14
dQbdVdb:	-2.04e-17	-2.04e-17	-1.68e-17	-2.60e-16	-1.52e-16
dQbdVsb:	5.63e-16	5.63e-16	-5.55e-15	-5.71e-15	-1.58e-15

Name:	m1	m6	m5	m7	m8
Model:	cmosp	cmosn	cmosn	cmosn	cmosn
Id:	4.53e-04	4.53e-04	4.53e-04	4.53e-04	4.53e-04
Vgs:	-3.62e-01	6.12e-01	6.12e-01	5.96e-01	5.96e-01
Vds:	3.16e-01	4.07e-01	4.07e-01	1.88e-01	1.88e-01
Vbs:	6.38e-01	-1.88e-01	-1.88e-01	0.00e+00	0.00e+00
Vth:	-6.03e-01	5.49e-01	5.49e-01	5.01e-01	5.01e-01
Vdsat:	-9.43e-02	7.53e-02	7.53e-02	8.72e-02	8.72e-02
Gm:	7.44e-03	7.98e-03	7.98e-03	6.92e-03	6.92e-03
Gds:	2.14e-04	2.60e-04	2.60e-04	4.94e-04	4.94e-04
Gmb	2.02e-03	1.88e-03	1.88e-03	1.73e-03	1.73e-03
Cbd:	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
Cbs:	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
Cgsov:	1.27e-13	5.76e-14	5.76e-14	4.12e-14	4.12e-14
Cgdov:	1.27e-13	5.76e-14	5.76e-14	4.12e-14	4.12e-14
Cgbov:	1.21e-19	1.46e-19	1.46e-19	1.46e-19	1.46e-19
dQgdVgb:	4.14e-13	1.81e-13	1.81e-13	1.33e-13	1.33e-13
dQgdVdb:	-1.27e-13	-5.73e-14	-5.73e-14	-4.11e-14	-4.11e-14
dQgdVsb:	-2.79e-13	-1.16e-13	-1.16e-13	-8.67e-14	-8.67e-14
dQddVgb:	-1.87e-13	-8.22e-14	-8.22e-14	-6.06e-14	-6.06e-14
dQddVdb:	1.27e-13	5.75e-14	5.75e-14	4.13e-14	4.13e-14
dQddVsb:	7.70e-14	3.10e-14	3.10e-14	2.46e-14	2.46e-14
dQbdVgb:	-3.90e-14	-1.69e-14	-1.69e-14	-1.19e-14	-1.19e-14
dQbdVdb:	-1.52e-16	-8.63e-18	-8.63e-18	-2.79e-16	-2.79e-16
dQbdVsb:	-1.58e-15	-3.31e-15	-3.31e-15	-3.69e-15	-3.69e-15