

$$r_{out} = g_{m1} r_{o1} r_{o0} \parallel r_{o2}$$

$$g_{m1} r_{o1} r_{o0} = \frac{g_{m1}}{g_{ds01} * g_{ds00}}$$

$$= \frac{8.19182 \text{ m}}{83.9381 \mu * 76.459 \mu}$$

$$= \frac{1}{783.4428964 \text{ m}} = 1.276417 \text{ Ma}$$

$$r_{o2} = \frac{1}{g_{ds02}} = \frac{1}{28.7665 \mu} = 34.762 \text{ ka}$$

$$A_v = g_{m0} r_{out}$$

$$= g_{m0} [g_{m1} r_{o1} r_{o0} \parallel r_{o2}]$$

$$= \frac{8.21376 \text{ m}}{783.4428964 \text{ m} + 28.7665 \mu}$$

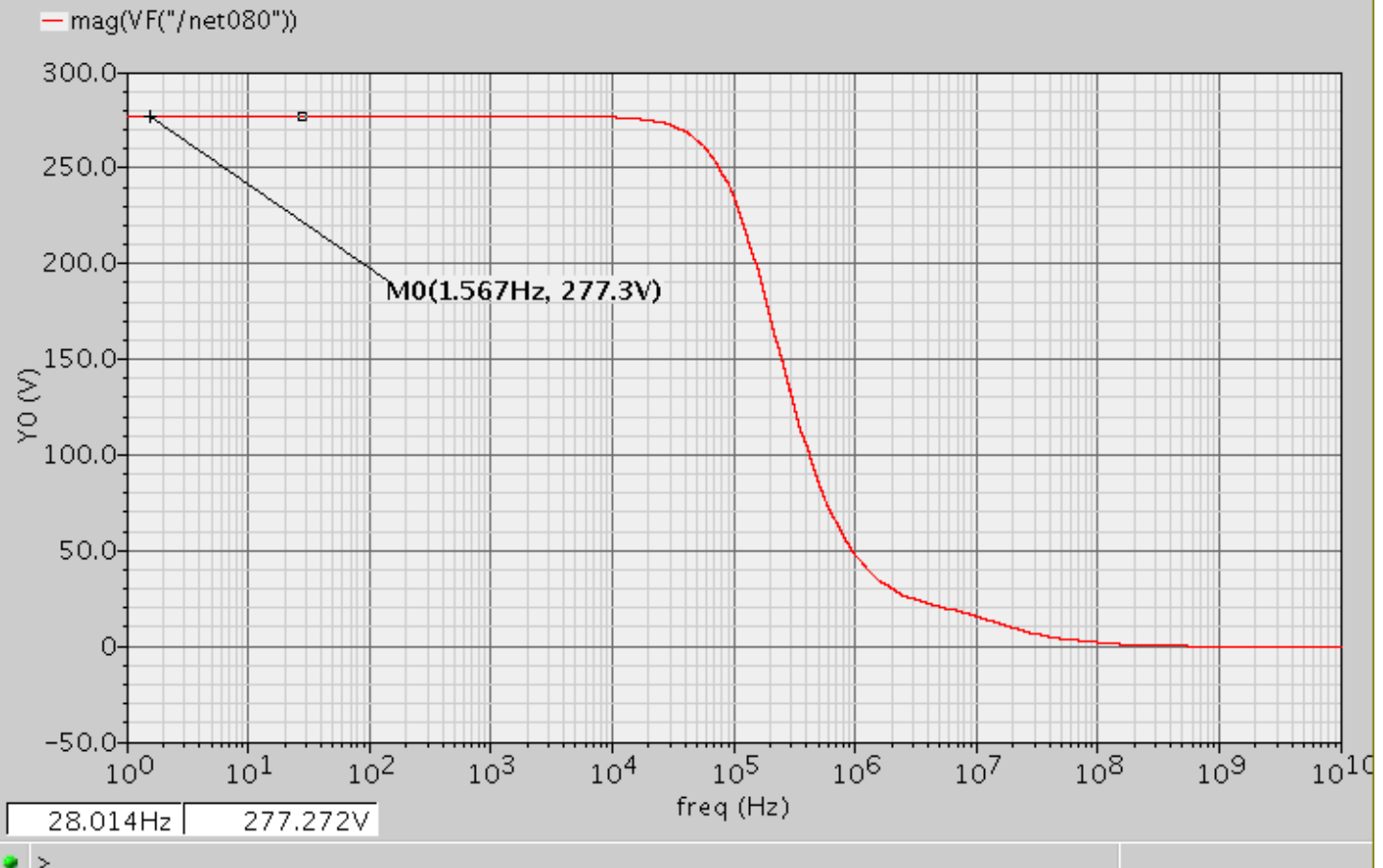
$$= 277.9619585 \text{ volts/volts}$$

$$|A_v| = 277.96 \text{ V/V}$$

Jul 15, 2013

AC Response

1



Calculated AC-Magnitude $|A_v|$ results are meet the simulated AC-magnitude results. I'm hoping whatever using $g_{ds02}=28.7665\mu$ is correct

	Pmos 2V-M2	nmos 2V-M1	nmos 2V-M0
W	$5.97\mu \times 106 = 631.76\mu\text{m}$	120 μm	124.3 μm
L	1 μm	400nm	400nm
	Pmos 2V-M3		
W	5.97 μm		
L	1 μm		

Process: 180nm Technology

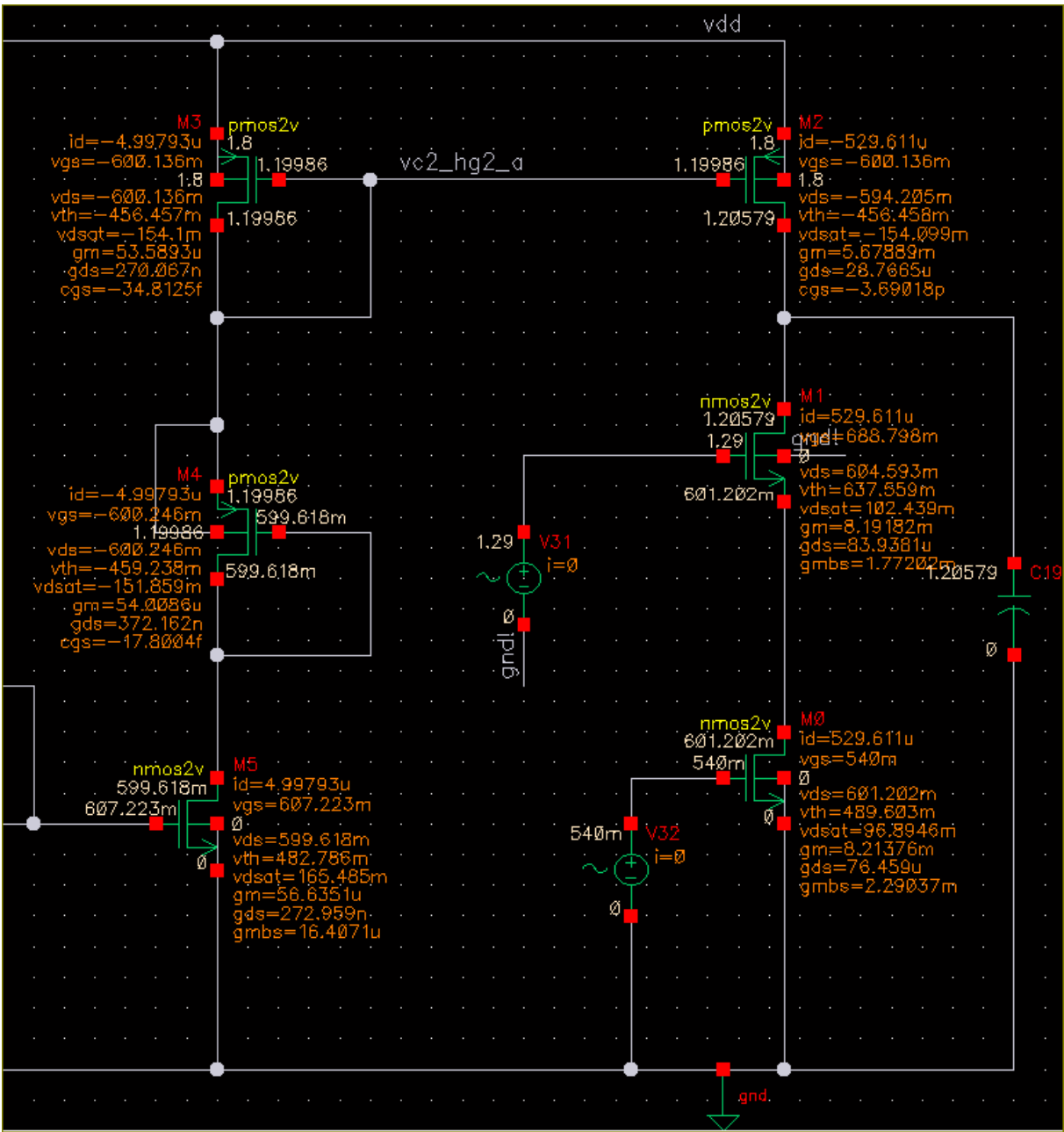


Fig (a)

f3db, Mirror pole calculations for fig (a) is given below which is differ from simulation results

fig (a)

$$\omega_{p1, out} = \frac{1}{\frac{1}{g_{ds2}} (C_{gd2} + C_{db2} + C_{gd1} + C_{db1} + C_L)}$$

$$\omega_{p1, out} = \frac{1}{\frac{1}{28.7665 \mu} (207.915 f + 646.468 f + 43.757 f + 86.0253 f + 5 p)}$$

$$f_{p1, out} = \frac{1}{34.76265795 k (5.9841653 p) \times 2\pi}$$

$$f_{3dB} = f_{p1, out} = 765.074232 \text{ KHz}$$

Simulation f3db = 158.4 kHz which is differ from calculated. Mirror pole calculations are given below which I'm not observed in simulation results

$$\omega_{P_{mirror}} = \frac{g_{m3}}{(C_{gs3} + C_{db3} + C_{gs2} + C_{gs4})} = \frac{53.5893 \mu}{(34.825 f + 6.0885 f + 3.69 p + 17.8004 f)}$$

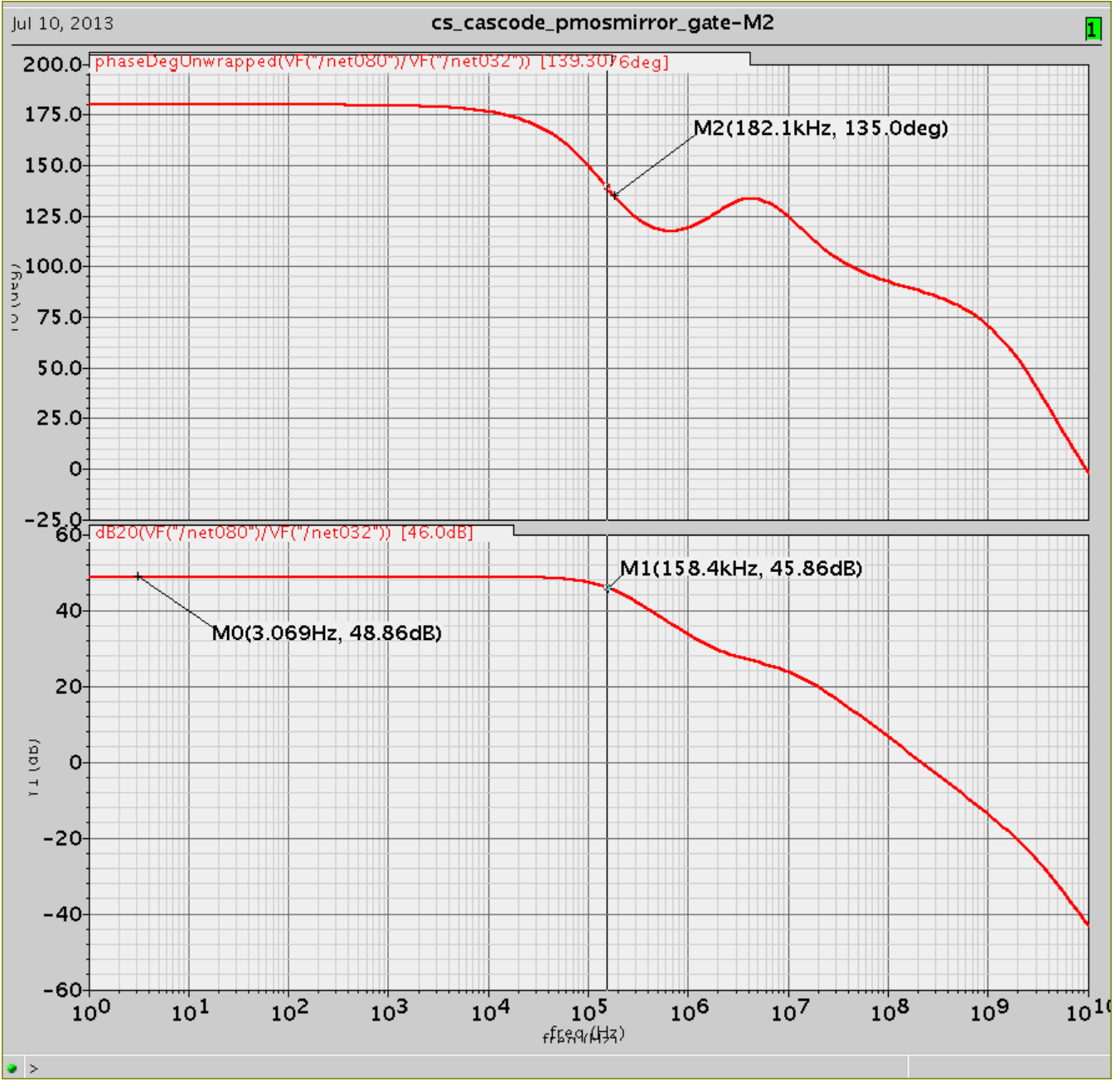
$$f_{P_{mirror}} = \frac{53.5893 \mu}{3.7488814 p \times 2\pi} = 2.275079172 \text{ MHz}$$

(b)

$$\omega_{P_{mirror}} = \frac{g_{ds3}}{C_{gs3} + C_{db3} + C_{gs2} + C_{gs4}} = \frac{270.067 n}{3.7488814 p}$$

$$f_{P_{mirror}} = \frac{270.067 n}{3.7488814 p \times 2\pi} = 11.46541953 \text{ KHz}$$

Frequency response of Fig (a) simulation plots are given next page



Freq Response of Fig (a)

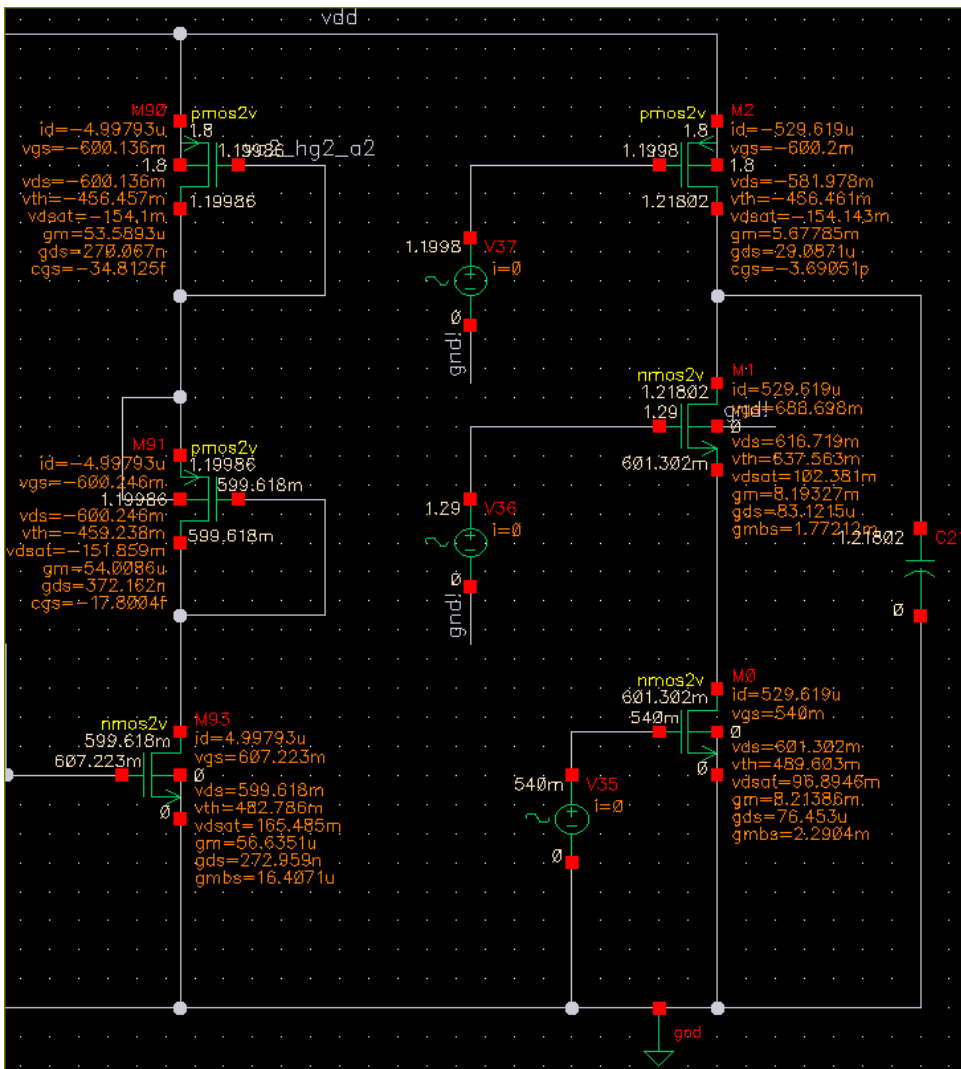


Fig (b)

f3db calculations for fig (b) is given below which is meets the simulation results

fig (b)

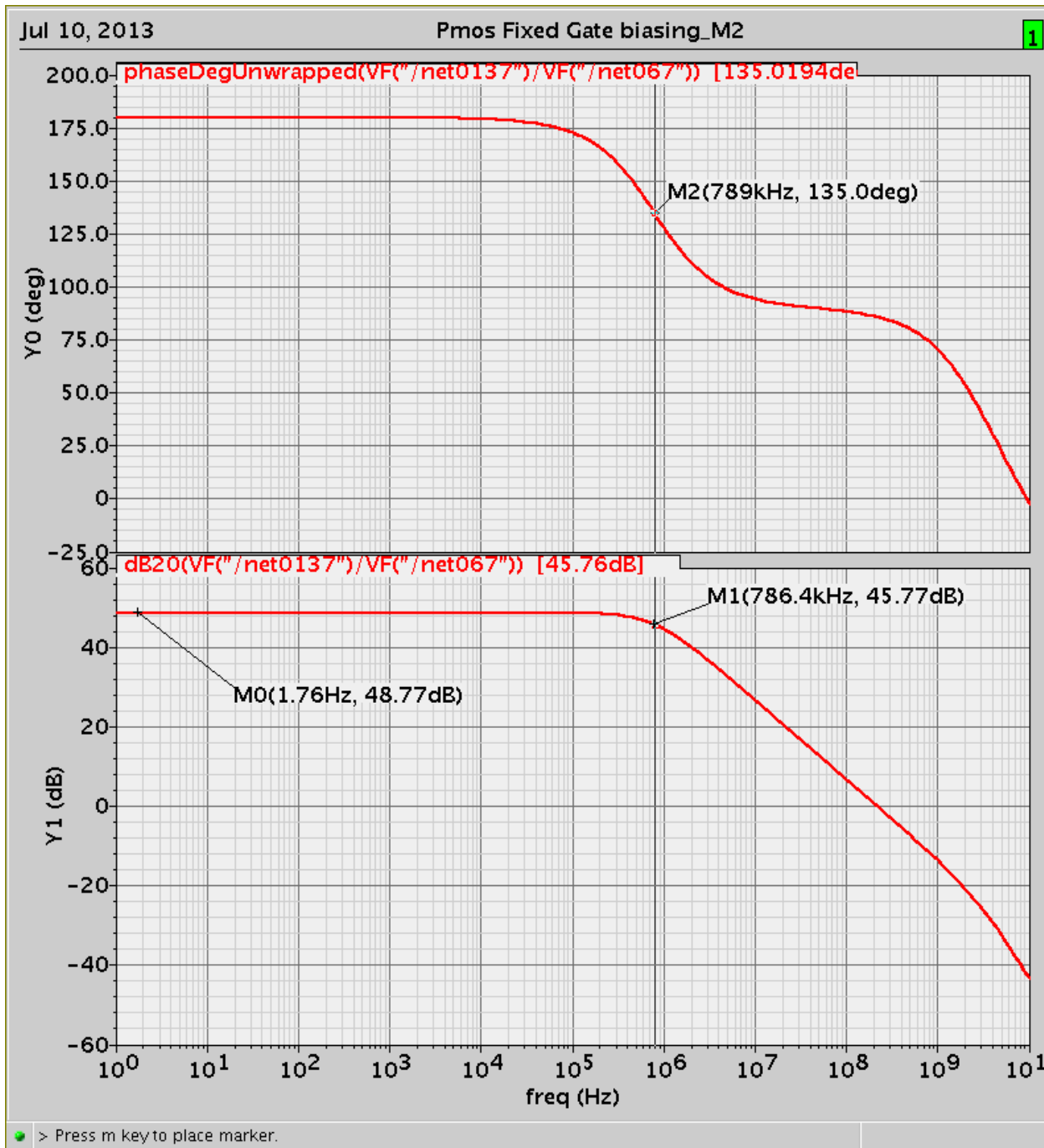
$$\omega_{pout} = \frac{1}{g_{ds2} (C_{gd2} + C_{db2} + C_{gd1} + C_{db1} + C_L)}$$

$$\omega_{pout} = \frac{1}{29.087\mu s (208.005 f + 648.735 f + 43.7555 f + 85.831 f + 5p)}$$

$$f_{pout} = \frac{1}{34.37950157 k \times (5.9863265 p) \times 2\pi}$$

$f_{3dB} = f_{pout} = 773 kHz$

Simulation f3db = 786.4 kHz frequency response of above calculation plots are on next page



Freq Response of Fig (b)