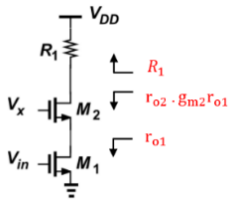
Spec.		
Cascode Amplifier		
DC Gain	23 dB	
BW	≥ 50 MHz	
Power Consumption	≤ 0.8 mW	
Cap Load	1.25 pF	

- Steps

1 | $P_{cons} = V_{DD}\, I_D \leq 0.8\ mW \rightarrow I_D \leq 666\ uA$

2 | $GBW = \frac{g_m}{2\pi C_{out}} \geq 14.2 \times 50\ MHz \rightarrow g_m \geq 5.6\ mS \rightarrow g_m = 6.7\ mS$

3 | Assume $\frac{g_m}{I_D} = 20 \rightarrow I_D = 335\ uA$

4 | Assume $\left(\frac{g_m}{I_D}\right)_2 = 10$ and $L = 2L_{min} = 120\ nm$ to avoid loading $\rightarrow g_{m2} = 3.35\ mS \rightarrow g_{m2} r_{o2} = 10$

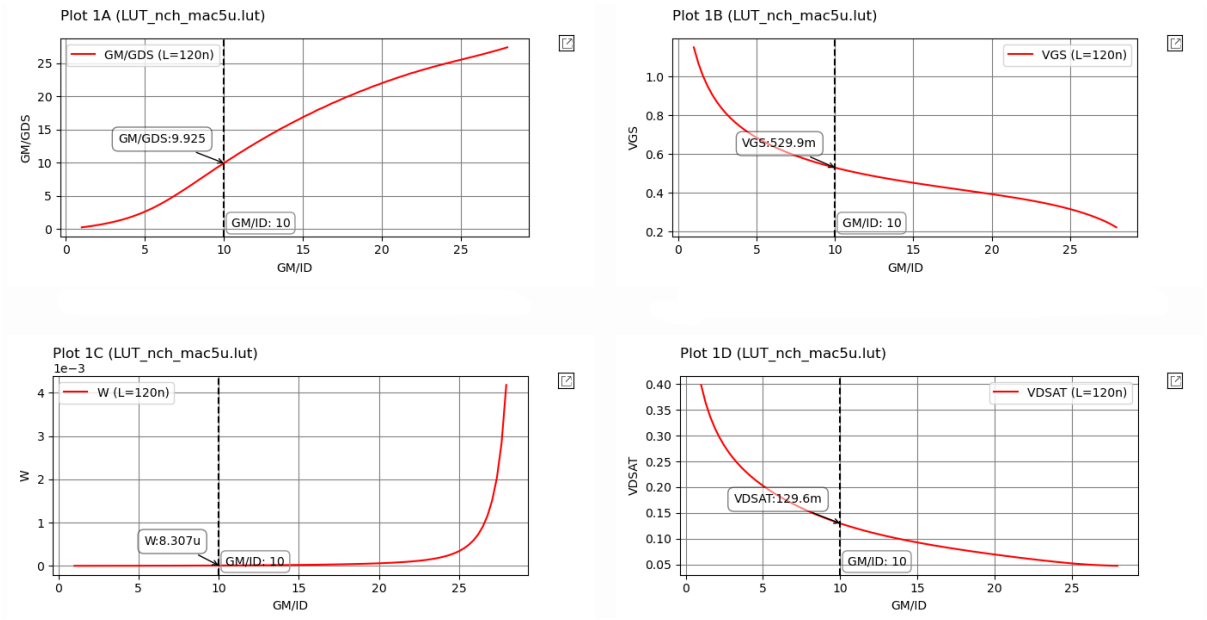


Fig. Sizing of M2

5 | $A_v = g_m R_{out} = 14.2 \rightarrow R_{out} = 2120\ \Omega \rightarrow R_D = 2325\ \Omega$

6 | $\therefore R_{LFD} = g_{m2} r_{o2} r_{o1} = 45\ k\Omega \rightarrow g_{m1} r_{o1} = 31$

7 | $V_{out} = V_{DD} - I_D * R_D = 455\ mV$

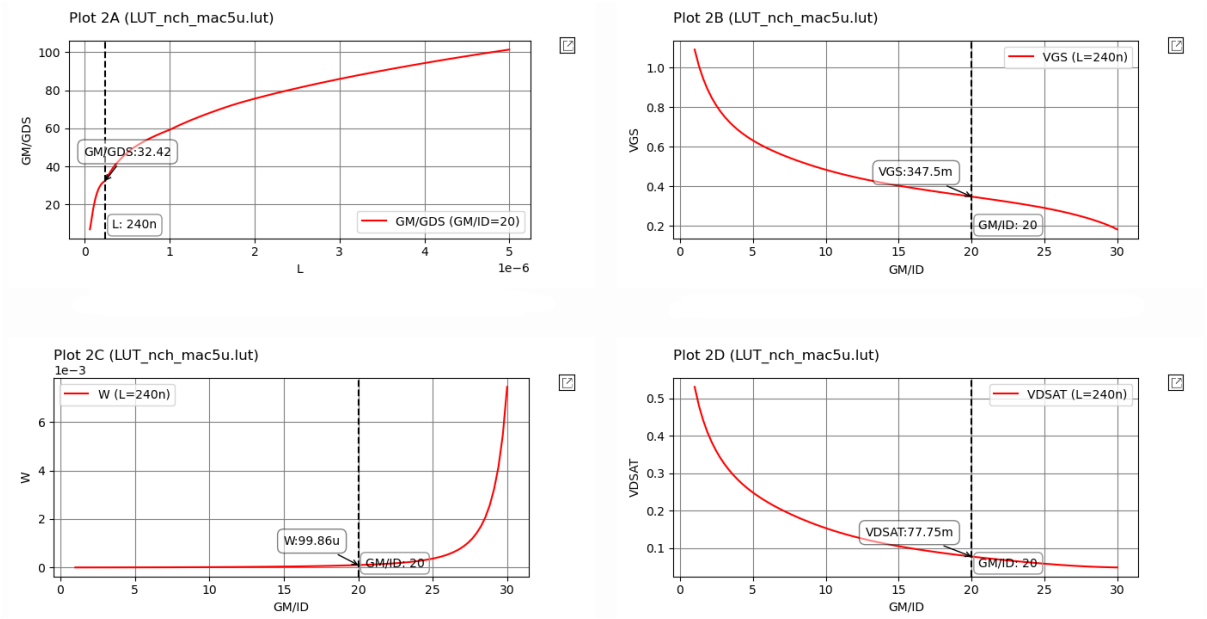
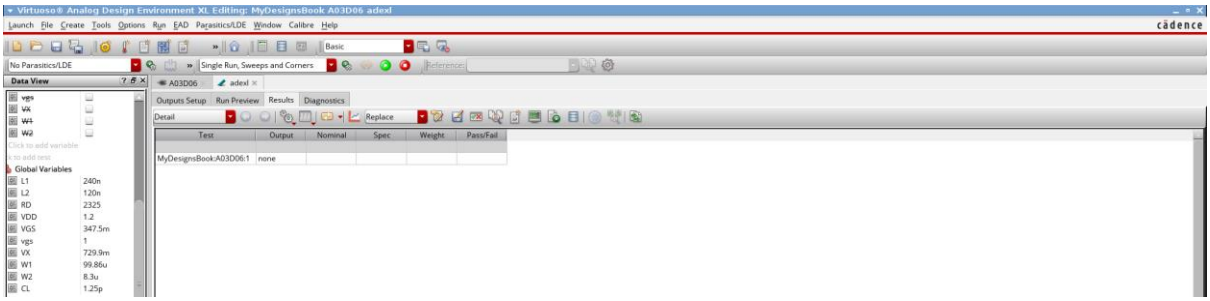


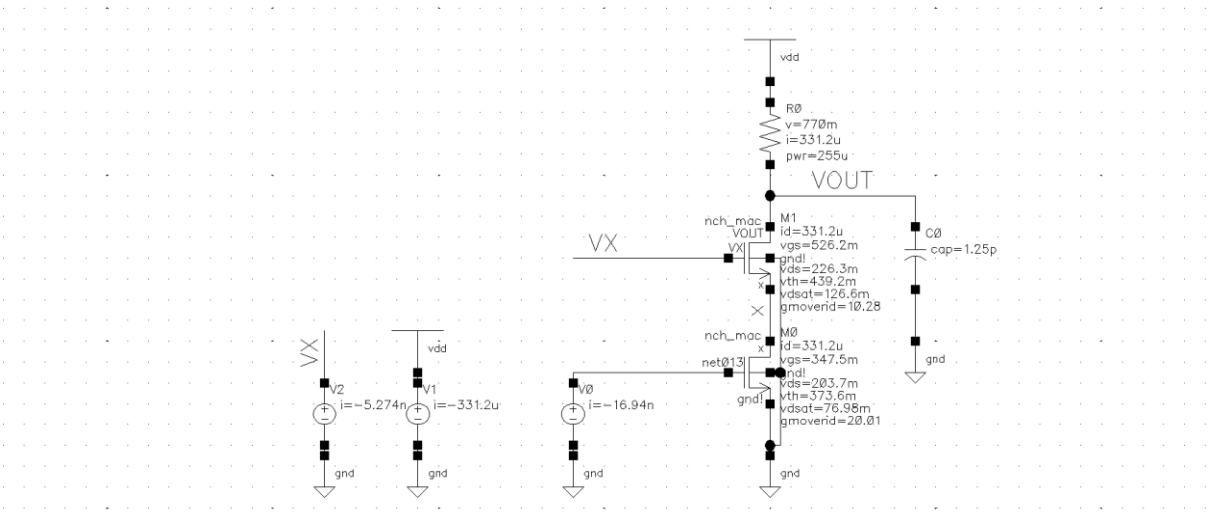
Fig. Sizing of M1

- Setup



- Results

1. DC Operating Points



2. AC Analysis