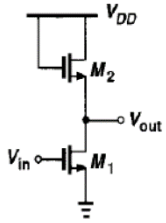
Design a single ended amplifier shown in the fig to achieve the following specs

Spec.	
DC Gain	6 dB
BW	≥ 10 GHz
Power Consumption	≤ 1.5 mW
Cap Load	50 fF



$$P_{cons} = V_{DD}\, I_D \leq 1.5\ mW \rightarrow I_D \leq 1.25\ mA$$

$$GBW = \frac{g_{m1}}{2\pi C_{out}} \geq 2 * 10\ GHz \rightarrow g_{m1} \geq 6.28\ mS$$

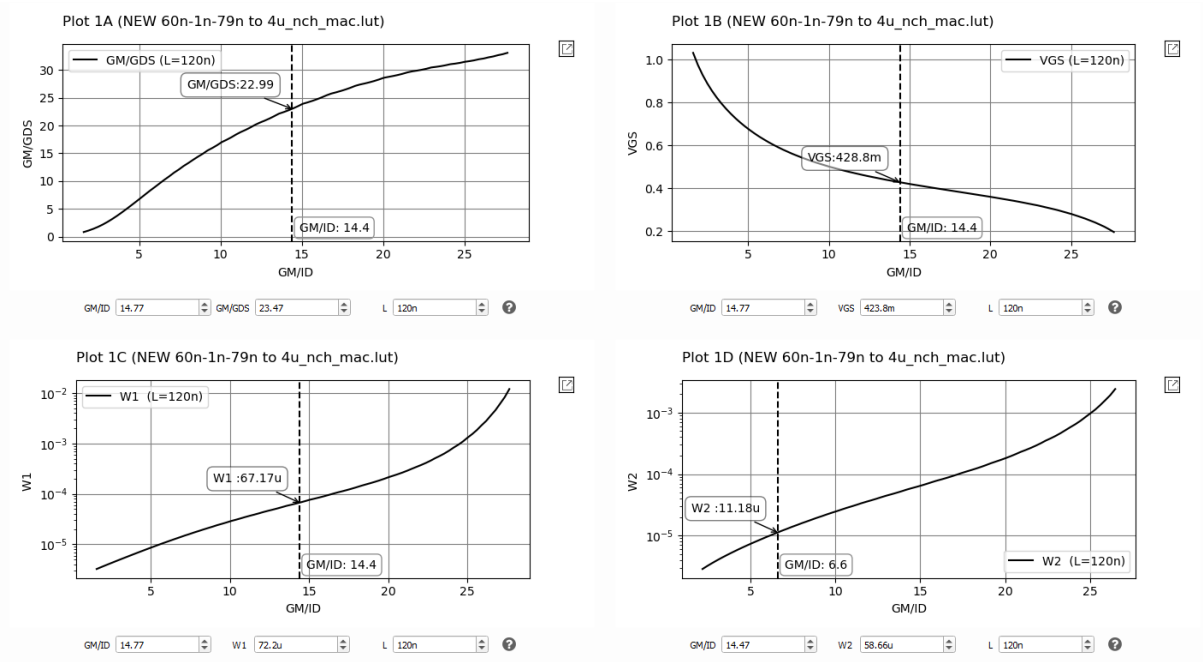
$$g_{m1} = 18\ mS \rightarrow \left(\frac{g_m}{I_D}\right)_1 = 14.4$$

$$A_v = g_{m1} R_{out} = 2 \rightarrow R_{out} = 115\ \Omega$$

$$R_{D1} = \frac{1}{g_{m2}} = 127\ \Omega$$

$$R_{out} = \frac{R_{D1}.r_{o1}}{R_{D1} + r_{o1}} = 115 \rightarrow r_{o1} \geq 1220\ \Omega \rightarrow \frac{g_m}{g_{ds}} \geq 22$$

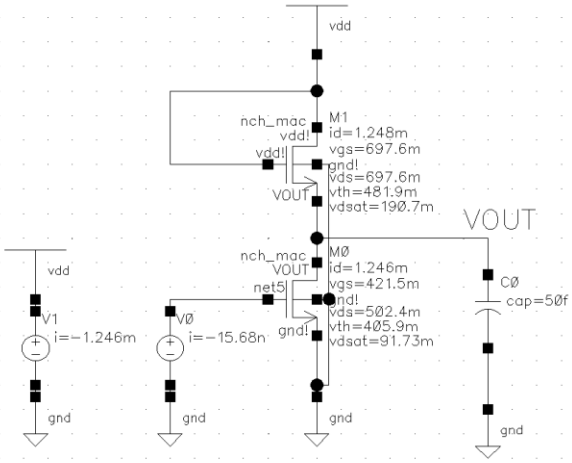
$$\text{Assume } V_{out} = 300\ mV \text{ and } L_1 = L_2$$



With some fine tuning W2 reduced to 9.67 um, and VGS to 421.5 mV

Apply to Cadence

1. DC OP



2. AC Analysis