Design a Degenerated CS Amplifier that meets the following specs

Spec.	
DC Gain	6 dB
BW	≥ 1 GHz
Power Consumption	≤ 0.4 mW
Cap Load	100 fF

$$P_{cons} = V_{DD}\, I_D \leq 0.4\ \text{mW} \rightarrow I_D \leq 333\ \text{uA}$$

$$GBW = \frac{G_m}{2\pi\, C_{out}} \geq 2 * 1\ \text{GHz} \rightarrow G_m \geq 1.256\ \text{mS} \rightarrow G_m = 1.5\ \text{mS}$$

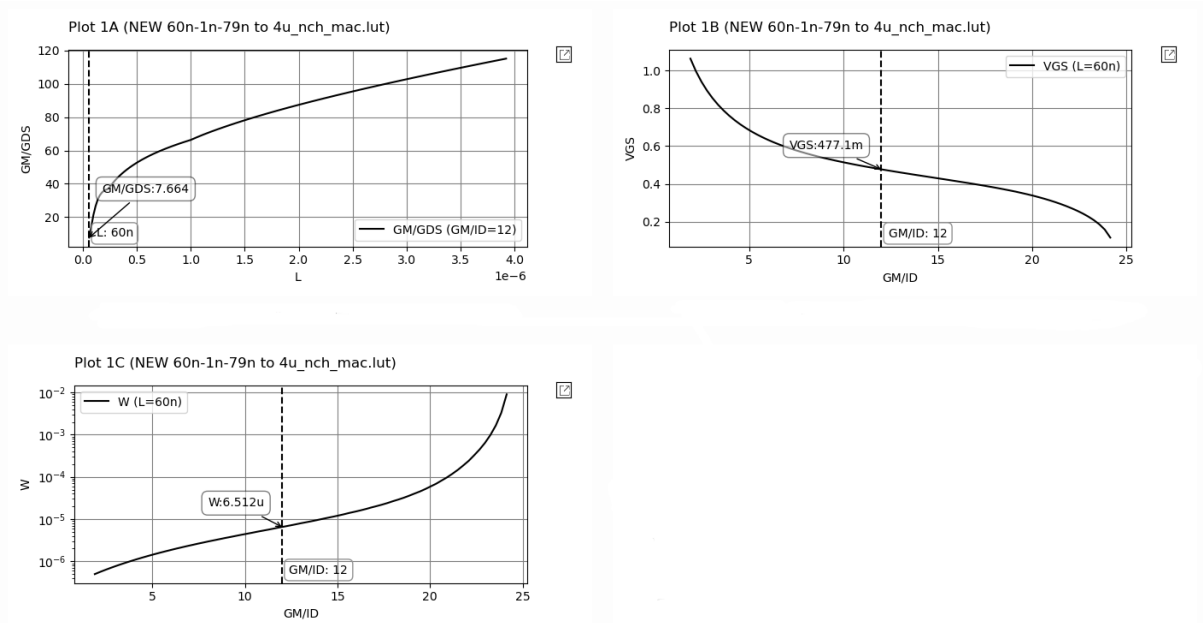
$$G_m = \frac{g_m}{1 + g_m R_S} = 1.5\ \text{mS} \rightarrow \text{Assume}\ \frac{g_m}{I_D} = 12\ \text{mS} \rightarrow g_m = 4\ \text{mS}$$

$$A_v = G_m R_{out} = 2 \rightarrow R_{out} = R_D \,||\, r_o(1 + g_m R_S) = 1.34\ \text{k}\Omega \rightarrow R_D = 1.82\ \text{k}\Omega$$

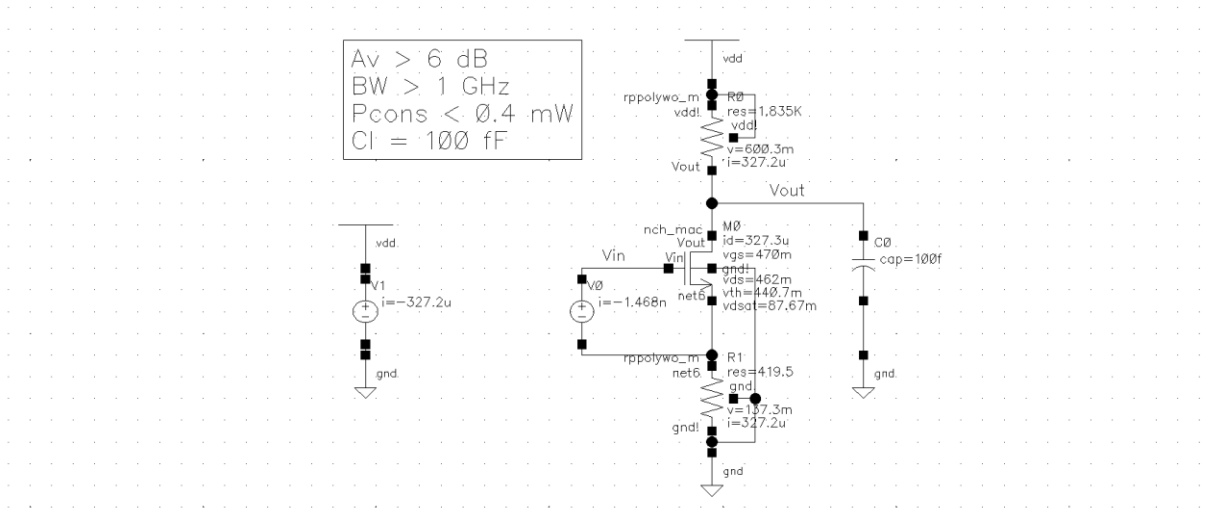
$$r_o = 1906\ \Omega \rightarrow R_S = 417\ \Omega \rightarrow \frac{g_m}{g_{ds}} \geq 7.62$$

$$V_{DS} = 1.2 - 330\text{u} * 1.82\text{k} - 330\text{u} * 417 = 0.46\ \text{V}$$

$$V_{SB} = 0.1375\ \text{V}$$



DC OP



AC Analysis