Design a Common Source Amplifier to achieve the following specs

Spec.	
DC Gain	0 dB
BW	$\geq$ 30 GHz
Power Consumption	$\leq$ 1.7 mW
Cap Load	70 fF

$$P_{cons} = V_{DD}\, I_D \leq 1.7\ mW \rightarrow I_D \leq 1.4\ mA$$

$$GBW = \frac{g_m}{2\pi C_{out}} \geq 1 * 30\ GHz \rightarrow g_m \geq 13.2\ mS$$

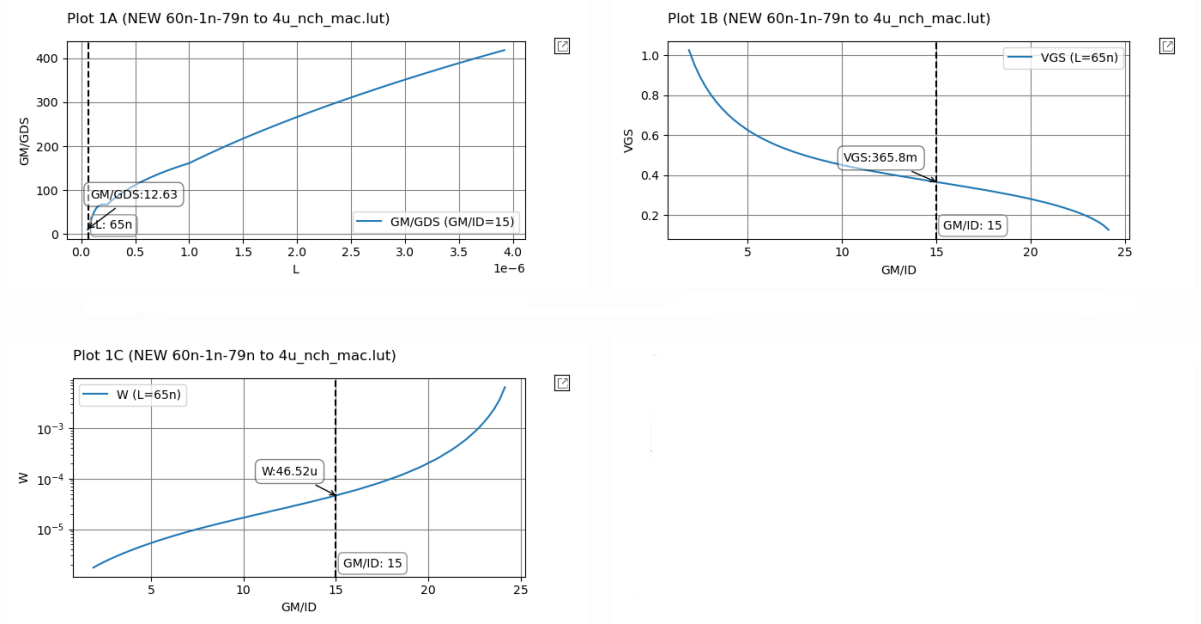
$$g_m = 21\ mS \rightarrow \frac{g_m}{I_D} = 15$$

$$A_v = g_m R_{out} = 1 \rightarrow R_{out} = 50\ \Omega \rightarrow R_D = 55\ \Omega$$

$$R_{out} = \frac{R_D . r_o}{R_D + r_o} = 50 \rightarrow r_o \geq 550\ \Omega \rightarrow \frac{g_m}{g_{ds}} \geq 11.55$$

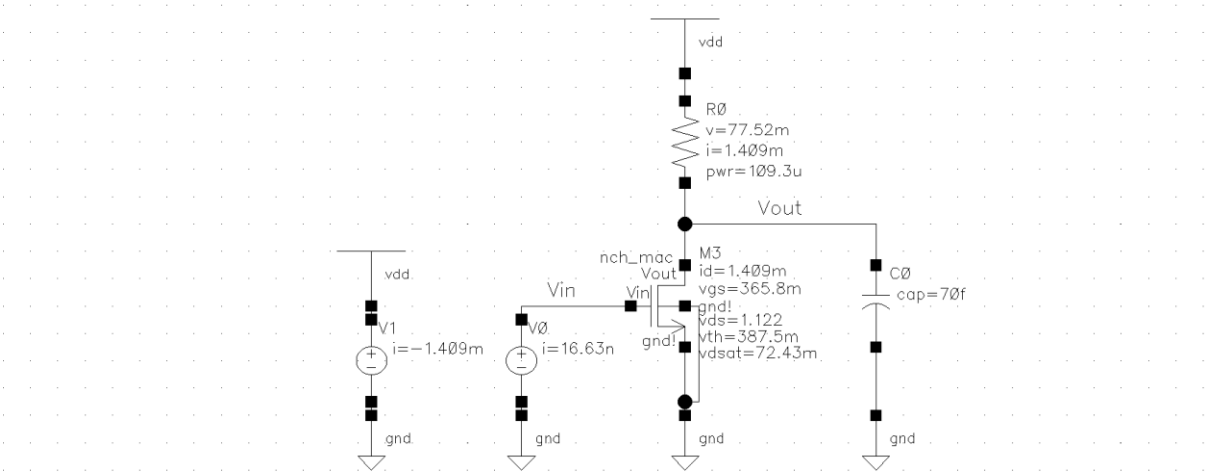
$$V_{DS} = V_{out} = V_{DD} - I_D * R_D = 1.2 - 1.4m *\ 55 = 1.123\ V$$

$$V_{SB} = 0$$



Simulations

DC Operating Points



AC Analysis