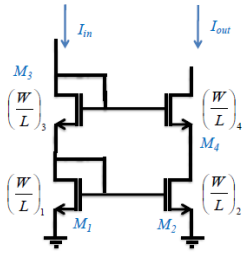
Design the current mirror shown in figure to get

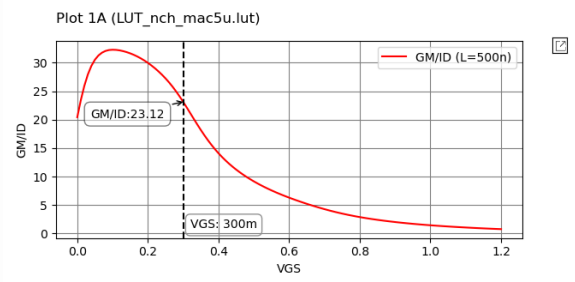
| Spec | |
|---|---|
| Rout | ≥ 800 kΩ |
| VDC @ M4 Drain | 400 mV |
| Mirroring ration | 1 : 1 |
| Input Current | 25 uA |

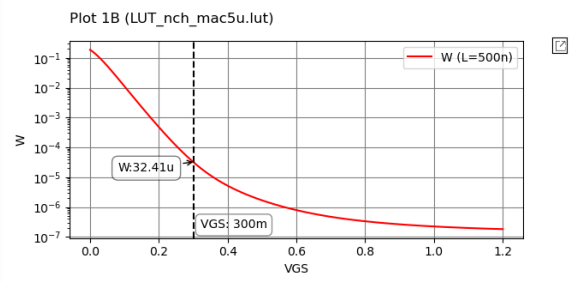


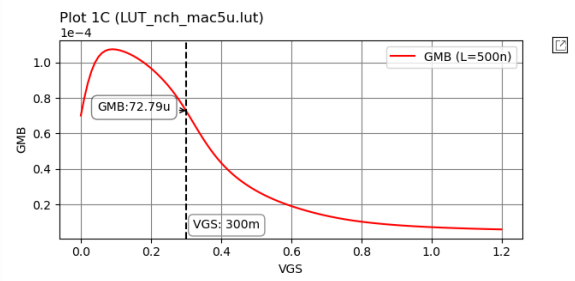

- Steps

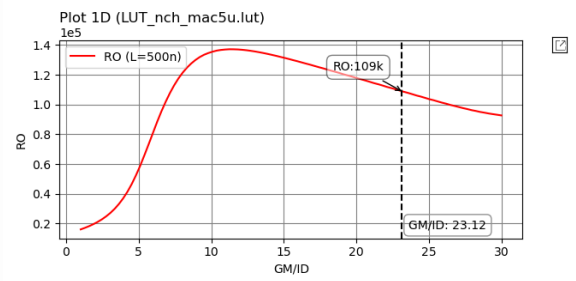
1 | $V_{DC} = V^*_{3,4} + V_{DS1,2} = V^*_{3,4} + V_{GS1,2} = 400\ mV$

2 | Assume $V_{GS1,2} = 300\ mV$ and large L for the large Rout : $L = 500\ nm$



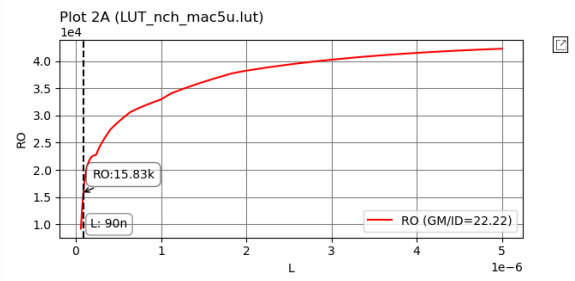



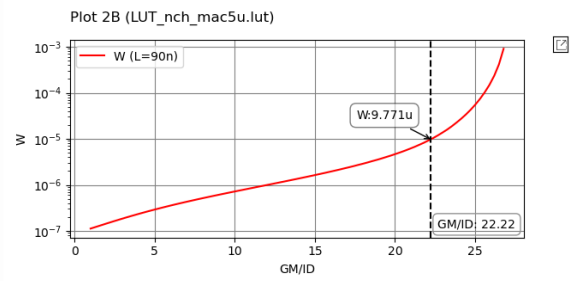



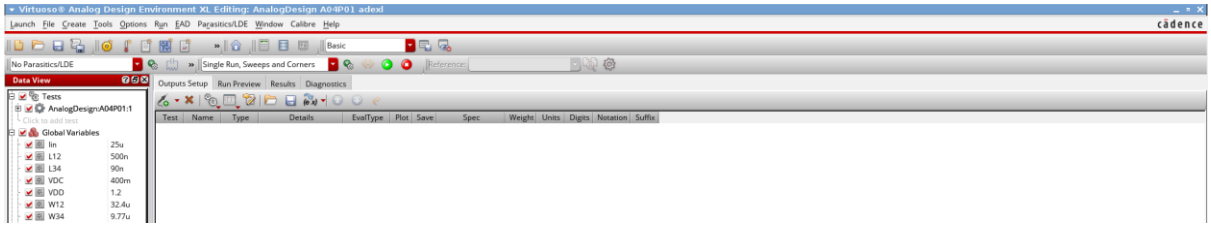

3 | $V^*_{3,4} \le 100\ mV \rightarrow V^*_{3,4} = 90\ nm \rightarrow \frac{g_m}{I_D} = 22.22 \rightarrow g_{m3,4} = 555.5\ uS$

4 | $\because R_{out} = r_{o3,4}\left[1 + \left(g_{m3,4} + g_{mb3,4}\right)r_{o1,2}\right] \rightarrow r_{o3,4} \ge 11.55\ k\Omega$



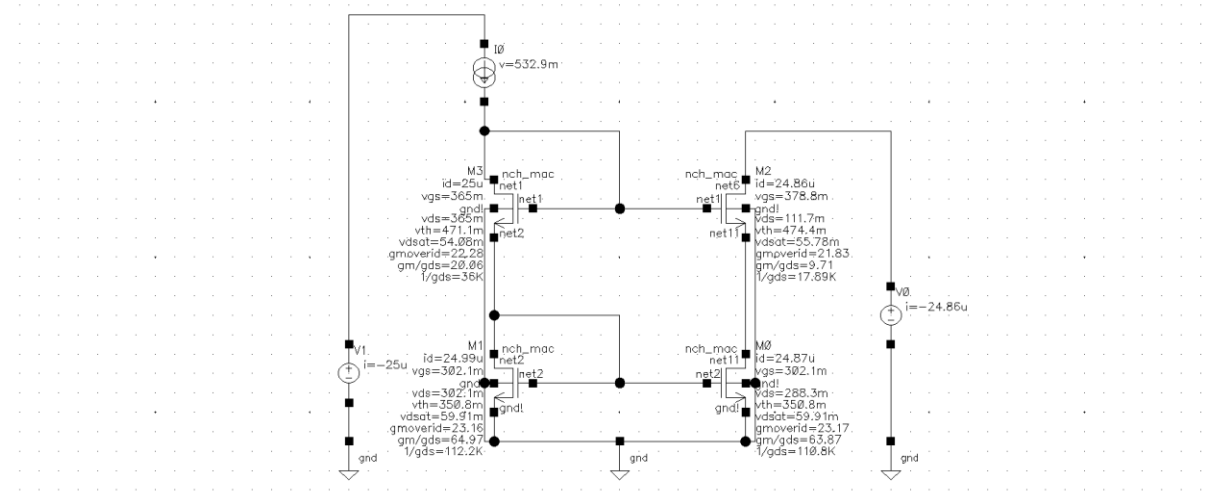



- Setup



- Results

1. DC Operating Points




2. Rout