Academy of Innovative Semiconductor and Sustainable Manufacturing

ANALOG INTEGRATED CIRCUIT DESIGN AND LAYOUT LAB

LAYOUT AND POST-LAYOUT SIMULATION

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LAB3-1. INVERTER LAYOUT

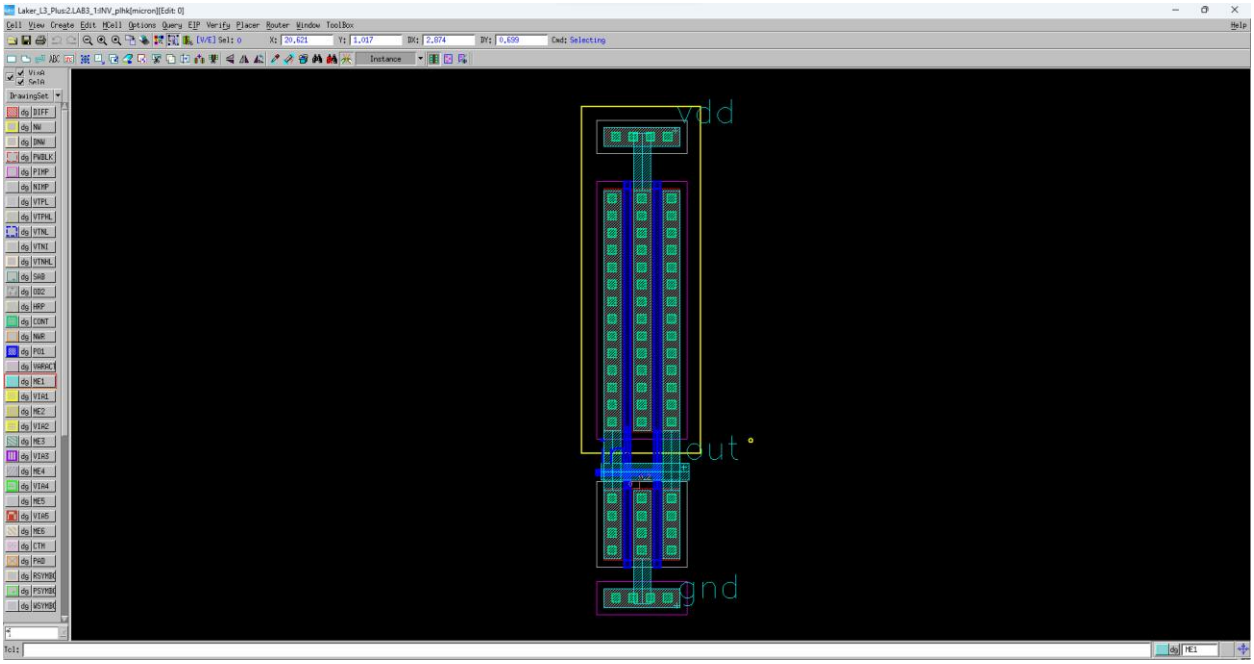

Figure 1. Full Layout

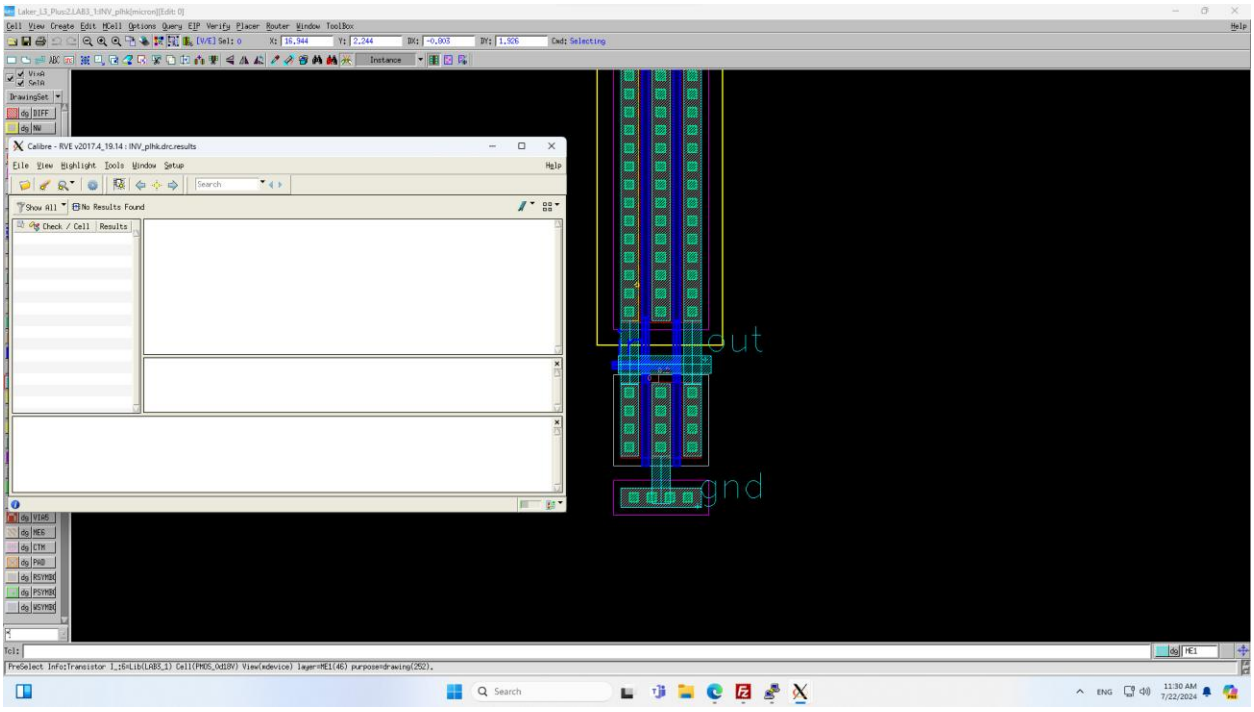

Figure 2. DRC

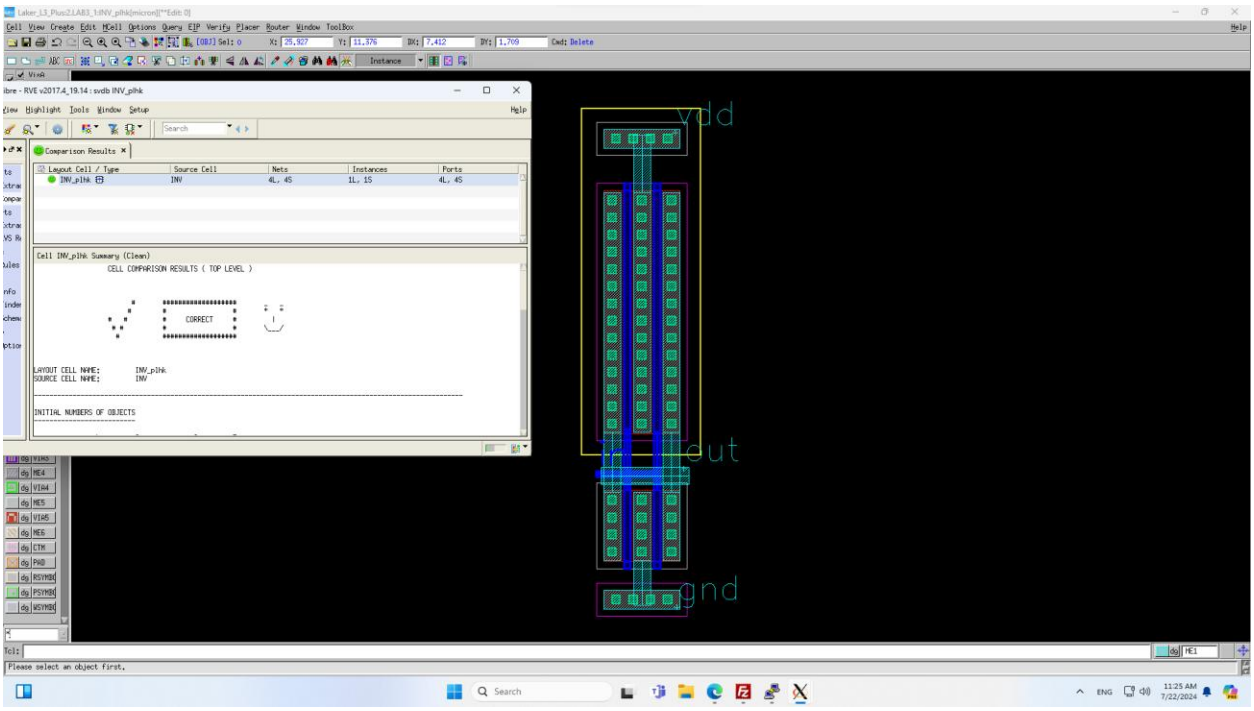

Figure 3. LVS

LAB2_1_4.sp | INV_plhk.pex.netlist

```
* File: INV_plhk.pex.netlist
* Created: Mon Jul 22 11:33:52 2024
* Program "Calibre xRC"
* Version "v2017.4_19.14"
*
.include "INV_plhk.pex.netlist.pex"
.subckt INV_plhk  GND VDD OUT IN
*
* IN    IN
* OUT   OUT
* VDD   VDD
* GND   GND
M0 N_GND_M0_d N_IN_M0_g N_OUT_M0_s N_GND_M0_b N_18 L=1.8e-07 W=2e-06 AD=6.5e-13
+ AS=1.12e-12 PD=6.5e-07 PS=3.12e-06
M1 N_GND_M1_d N_IN_M1_g N_OUT_M1_s N_GND_M0_b N_18 L=1.8e-07 W=2e-06 AD=6.5e-13
+ AS=1.12e-12 PD=6.5e-07 PS=3.12e-06
M2 N_VDD_M2_d N_IN_M2_g N_OUT_M2_s N_VDD_M2_b P_18 L=1.8e-07 W=6.8e-06
+ AD=2.21e-12 AS=3.808e-12 PD=6.5e-07 PS=7.92e-06
M3 N_VDD_M3_d N_IN_M3_g N_OUT_M3_s N_VDD_M2_b P_18 L=1.8e-07 W=6.8e-06
+ AD=2.21e-12 AS=3.808e-12 PD=6.5e-07 PS=7.92e-06
*
.include "INV_plhk.pex.netlist.INV_PLHK.pxi"
*
.ends
*
*
```

Figure 4. File PEX

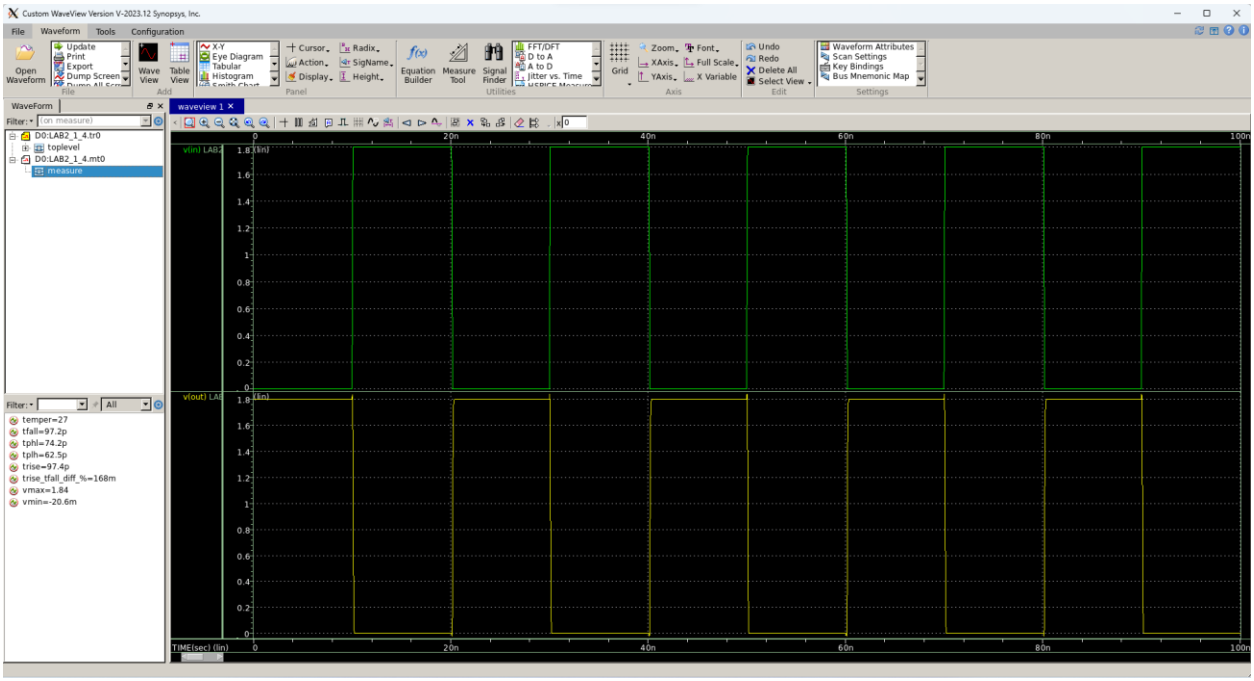

Figure 5. Output Waveform

```
******
* testbench for mos characteristic *

****** transient analysis tnom=  25.000 temp=  27.000 ******
vmax=   1.839554     at=  10.033833n
            from=   0.             to= 100.000000n
vmin= -19.702757m    at=  40.131790n
            from=   0.             to= 100.000000n
trise=  94.722757p  targ=  40.263272n   trig=  40.168550n
tfall=  94.210498p  targ=  30.169511n   trig=  30.075301n
trise_tfall_diff_%= 542.264698m
tplh=  55.191856p  targ=  20.205192n   trig=  20.150000n
tphl=  68.767887p  targ=  30.118768n   trig=  30.050000n
```

SPEC

Figure 6. Spec Lab2_1_4

Comment:

When comparing the Spec results with the layout results, the Trise and Tfall of the layout results are larger than those in the Spec. This increases the delay time, which is not good for the Inverter circuit. The decrease in the trise_tfall_diff value indicates the symmetry of the transition time from high to low and vice versa.

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