# sky130_osu_sc_15T_ls_tt_1P80_150C.ccs Library

| Cell Groups |
| --- |
| SKY130_OSU_SC_15T_LS__ADDFx |
| SKY130_OSU_SC_15T_LS__ADDHx |
| SKY130_OSU_SC_15T_LS__AND2x |
| SKY130_OSU_SC_15T_LS__AOI21 |
| SKY130_OSU_SC_15T_LS__AOI22 |
| SKY130_OSU_SC_15T_LS__BUFx |
| SKY130_OSU_SC_15T_LS__DFFRx |
| SKY130_OSU_SC_15T_LS__DFFSRx |
| SKY130_OSU_SC_15T_LS__DFFSx |
| SKY130_OSU_SC_15T_LS__DFFx |
| SKY130_OSU_SC_15T_LS__INVx |
| SKY130_OSU_SC_15T_LS__MUX2 |
| SKY130_OSU_SC_15T_LS__NAND2x |
| SKY130_OSU_SC_15T_LS__NOR2x |
| SKY130_OSU_SC_15T_LS__OAI21 |
| SKY130_OSU_SC_15T_LS__OAI22 |
| SKY130_OSU_SC_15T_LS__OR2x |
| SKY130_OSU_SC_15T_LS__TBUFIx |
| SKY130_OSU_SC_15T_LS__TNBUFIx |
| SKY130_OSU_SC_15T_LS__XNOR2 |
| SKY130_OSU_SC_15T_LS__XOR2 |
| SKY130_OSU_SC_15T_LS_x |

# SKY130_OSU_SC_15T_LS__ADDFx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | OUTPUT | | |
|---|---|---|---|---|---|
| A | B | CI | CO | CON | S |
| 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 0 | 1 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__addf_1 | 39.07200 |
| sky130_osu_sc_15T_ls__addf_l | 39.07200 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | | |
|---|---|---|---|---|---|---|
| | A | B | CI | CO | CON | S |
| sky130_osu_sc_15T_ls__addf_1 | 0.01649 | 0.01639 | 0.01266 | 1.84211 | 0.85373 | 1.75942 |
| sky130_osu_sc_15T_ls__addf_l | 0.01649 | 0.01639 | 0.01268 | 1.11590 | 0.85678 | 1.13946 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_ls__addf_1** | 0.00000 | 1.53563 | 1.67464 |
| **sky130_osu_sc_15T_ls__addf_l** | 0.00000 | 1.40821 | 1.54721 |

# Delay Information

**Delay(ns) to CO rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addf_1 | A->CO (RR) | 0.17429 | 1.85523 | 26.68120 |
| | B->CO (RR) | 0.17388 | 1.83171 | 26.19680 |
| | CI->CO (RR) | 0.16537 | 1.89685 | 27.38640 |
| | CON->CO (FR) | 0.02835 | 0.74557 | 10.98340 |
| sky130_osu_sc_15T_ls__addf_1 | A->CO (RR) | 0.17965 | 1.69960 | 20.24900 |
| | B->CO (RR) | 0.17915 | 1.68886 | 20.20860 |
| | CI->CO (RR) | 0.17061 | 1.74029 | 20.98960 |
| | CON->CO (FR) | 0.03587 | 0.84345 | 10.99780 |

**Delay(ns) to CO falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addf_1 | A->CO (FF) | 0.21738 | 2.17061 | 30.93840 |
| | B->CO (FF) | 0.19517 | 2.09822 | 30.19610 |
| | CI->CO (FF) | 0.19001 | 2.17389 | 31.45670 |
| | CON->CO (RF) | 0.02656 | 0.64614 | 9.55289 |
| sky130_osu_sc_15T_ls__addf_1 | A->CO (FF) | 0.20974 | 1.82200 | 21.48440 |
| | B->CO (FF) | 0.18813 | 1.76969 | 21.24810 |
| | CI->CO (FF) | 0.18242 | 1.82675 | 22.03170 |
| | CON->CO (RF) | 0.02833 | 0.63336 | 8.28875 |

**Delay(ns) to CON rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addf_1 | A->CON (FR) | 0.16433 | 0.94863 | 9.92963 |
| | B->CON (FR) | 0.14327 | 0.92220 | 10.06170 |
| | CI->CON (FR) | 0.13702 | 0.95495 | 10.49600 |
| sky130_osu_sc_15T_ls__addf_l | A->CON (FR) | 0.15520 | 0.94084 | 9.94477 |
| | B->CON (FR) | 0.13473 | 0.91502 | 10.07550 |
| | CI->CON (FR) | 0.12786 | 0.94730 | 10.51080 |

**Delay(ns) to CON falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addf_1 | A->CON (RF) | 0.11551 | 0.68802 | 7.27780 |
| | B->CON (RF) | 0.11616 | 0.71331 | 7.72327 |
| | CI->CON (RF) | 0.10660 | 0.73111 | 8.06357 |
| sky130_osu_sc_15T_ls__addf_l | A->CON (RF) | 0.11050 | 0.68389 | 7.28977 |
| | B->CON (RF) | 0.11135 | 0.70969 | 7.73482 |
| | CI->CON (RF) | 0.10157 | 0.72708 | 8.07570 |

**Delay(ns) to S rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addf_1 | A->S (-R) | 0.32143 | 1.98376 | 24.38340 |
| | B->S (-R) | 0.31035 | 1.94194 | 23.76850 |
| | CI->S (-R) | 0.29191 | 1.98319 | 24.90360 |
| | CON->S (RR) | 0.09328 | 0.65831 | 7.20295 |
| sky130_osu_sc_15T_ls__addf_l | A->S (-R) | 0.30890 | 1.81913 | 19.44860 |
| | B->S (-R) | 0.29833 | 1.79613 | 19.27790 |
| | CI->S (-R) | 0.27926 | 1.81945 | 19.98800 |
| | CON->S (RR) | 0.09519 | 0.73032 | 7.20310 |

**Delay(ns) to S falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addf_1 | A->S (-F) | 0.28278 | 1.68583 | 19.90430 |
| | B->S (-F) | 0.28177 | 1.63894 | 19.56680 |
| | CI->S (-F) | 0.27317 | 1.72323 | 20.61040 |
| | CON->S (FF) | 0.10918 | 0.70780 | 7.22073 |
| sky130_osu_sc_15T_ls__addf_l | A->S (-F) | 0.26400 | 1.48443 | 15.13900 |
| | B->S (-F) | 0.26389 | 1.45379 | 15.18460 |
| | CI->S (-F) | 0.25429 | 1.52079 | 15.87360 |
| | CON->S (FF) | 0.10313 | 0.69604 | 6.39630 |

# Power Information

**Internal switching power(pJ) to CO rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__addf_1 | A | 0.00357 | 0.00496 | 0.03281 |
| | B | 0.00551 | 0.00659 | 0.03157 |
| | CI | 0.00563 | 0.00718 | 0.03506 |
| sky130_osu_sc_15T_ls__addf_l | A | 0.00260 | 0.00348 | 0.02029 |
| | B | 0.00456 | 0.00513 | 0.02070 |
| | CI | 0.00466 | 0.00567 | 0.02241 |

**Internal switching power(pJ) to CO falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__addf_1 | A | 0.01405 | 0.01617 | 0.05688 |
| | B | 0.01475 | 0.01657 | 0.05327 |
| | CI | 0.01176 | 0.01404 | 0.05518 |
| sky130_osu_sc_15T_ls__addf_l | A | 0.01310 | 0.01446 | 0.03833 |
| | B | 0.01380 | 0.01499 | 0.03642 |
| | CI | 0.01081 | 0.01237 | 0.03693 |

**Internal switching power(pJ) to CON rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__addf_1 | A | 0.01402 | 0.01525 | 0.03563 |
| | B | 0.01472 | 0.01577 | 0.03410 |
| | CI | 0.01174 | 0.01312 | 0.03404 |
| sky130_osu_sc_15T_ls__addf_l | A | 0.01308 | 0.01420 | 0.03357 |
| | B | 0.01378 | 0.01473 | 0.03212 |
| | CI | 0.01080 | 0.01211 | 0.03199 |

**Internal switching power(pJ) to CON falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__addf_1 | A | 0.00354 | 0.00439 | 0.01929 |
| | B | 0.00545 | 0.00606 | 0.02023 |
| | CI | 0.00560 | 0.00659 | 0.02170 |
| sky130_osu_sc_15T_ls__addf_l | A | 0.00317 | 0.00349 | 0.01621 |
| | B | 0.00452 | 0.00500 | 0.01824 |
| | CI | 0.00464 | 0.00550 | 0.01964 |

**Internal switching power(pJ) to S rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__addf_1 | A | 0.01404 | 0.01609 | 0.05485 |
| | B | 0.01474 | 0.01650 | 0.05141 |
| | CI | 0.01175 | 0.01397 | 0.05321 |
| sky130_osu_sc_15T_ls__addf_l | A | 0.01310 | 0.01448 | 0.03883 |
| | B | 0.00139 | 0.00016 | 0.03851 |
| | CI | 0.00354 | 0.00391 | 0.04058 |

**Internal switching power(pJ) to S falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__addf_1 | A | 0.03105 | 0.03159 | 0.06717 |
| | B | 0.02786 | 0.02859 | 0.06693 |
| | CI | 0.02551 | 0.02585 | 0.05963 |
| sky130_osu_sc_15T_ls__addf_l | A | 0.02973 | 0.03011 | 0.06665 |
| | B | 0.02651 | 0.02736 | 0.06683 |
| | CI | 0.02420 | 0.02457 | 0.05940 |

# SKY130_OSU_SC_15T_LS__ADDHx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT | | |
|---|---|---|---|---|
| A | B | CO | CON | S |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__addh_1 | 23.19900 |
| sky130_osu_sc_15T_ls__addh_l | 23.19900 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) | | |
|---|---|---|---|---|---|
| | A | B | CO | CON | S |
| sky130_osu_sc_15T_ls__addh_1 | 0.00808 | 0.00890 | 1.80160 | 0.92904 | 1.84489 |
| sky130_osu_sc_15T_ls__addh_l | 0.00808 | 0.00890 | 1.15709 | 0.92964 | 1.16537 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__addh_1 | 0.00000 | 1.60730 | 1.81458 |
| sky130_osu_sc_15T_ls__addh_l | 0.00000 | 1.44077 | 1.68716 |

# Delay Information

**Delay(ns) to CO rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addh_1 | A->CO (RR) | 0.11646 | 0.69330 | 7.28977 |
| | B->CO (RR) | 0.12060 | 0.67537 | 7.26353 |
| sky130_osu_sc_15T_ls__addh_l | A->CO (RR) | 0.12035 | 0.76884 | 7.33449 |
| | B->CO (RR) | 0.12451 | 0.75257 | 7.28518 |

**Delay(ns) to CO falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addh_1 | A->CO (FF) | 0.09339 | 0.66789 | 7.09698 |
| | B->CO (FF) | 0.09955 | 0.68489 | 7.19357 |
| sky130_osu_sc_15T_ls__addh_l | A->CO (FF) | 0.08886 | 0.61710 | 5.62515 |
| | B->CO (FF) | 0.09471 | 0.63360 | 5.72065 |

**Delay(ns) to CON rising (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addh_1 | A->CON (RR) | B | 0.16098 | 0.57811 | 3.97606 |
| | A->CON (FR) | !B | 0.08960 | 0.89260 | 10.49800 |
| | B->CON (RR) | A | 0.16449 | 0.55921 | 3.95873 |
| | B->CON (FR) | !A | 0.11138 | 0.88664 | 10.05570 |
| sky130_osu_sc_15T_ls__addh_l | A->CON (RR) | B | 0.14777 | 0.55833 | 3.96149 |
| | A->CON (FR) | !B | 0.08126 | 0.88405 | 10.49350 |
| | B->CON (RR) | A | 0.15138 | 0.54116 | 3.92089 |
| | B->CON (FR) | !A | 0.10303 | 0.87811 | 10.05120 |

**Delay(ns) to CON falling (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addh_1 | A->CON (FF) | B | 0.15157 | 0.74124 | 6.14704 |
| | A->CON (RF) | !B | 0.06768 | 0.70020 | 8.30806 |
| | B->CON (FF) | A | 0.14621 | 0.76758 | 6.47897 |
| | B->CON (RF) | !A | 0.08448 | 0.69928 | 8.08480 |
| sky130_osu_sc_15T_ls__addh_l | A->CON (FF) | B | 0.14084 | 0.72101 | 6.07772 |
| | A->CON (RF) | !B | 0.06296 | 0.69591 | 8.30589 |
| | B->CON (FF) | A | 0.13552 | 0.74737 | 6.41054 |
| | B->CON (RF) | !A | 0.07976 | 0.69396 | 8.08353 |

**Delay(ns) to S rising (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addh_1 | A->S (RR) | !B | 0.11990 | 1.82017 | 27.01780 |
| | A->S (FR) | B | 0.20550 | 1.84900 | 24.68990 |
| | B->S (RR) | !A | 0.13813 | 1.79155 | 26.24690 |
| | B->S (FR) | A | 0.19941 | 1.90372 | 25.57660 |
| | CON->S (FR) | - | 0.03071 | 0.76138 | 11.20500 |
| sky130_osu_sc_15T_ls__addh_l | A->S (RR) | !B | 0.12140 | 1.67192 | 21.13520 |
| | A->S (FR) | B | 0.20131 | 1.68755 | 18.77080 |
| | B->S (RR) | !A | 0.13987 | 1.65259 | 20.61290 |
| | B->S (FR) | A | 0.19498 | 1.73271 | 19.40360 |
| | CON->S (FR) | - | 0.03614 | 0.84821 | 11.17910 |

**Delay(ns) to S falling (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__addh_1 | A->S (FF) | !B | 0.13558 | 1.99860 | 29.65070 |
| | A->S (RF) | B | 0.20154 | 1.39677 | 17.58990 |
| | B->S (FF) | !A | 0.15731 | 1.99729 | 29.26000 |
| | B->S (RF) | A | 0.20503 | 1.37715 | 17.56580 |
| | CON->S (RF) | - | 0.02534 | 0.63465 | 9.39288 |
| sky130_osu_sc_15T_ls__addh_l | A->S (FF) | !B | 0.12808 | 1.71244 | 21.64300 |
| | A->S (RF) | B | 0.18895 | 1.21826 | 12.63040 |
| | B->S (FF) | !A | 0.14989 | 1.71103 | 21.21890 |
| | B->S (RF) | A | 0.19254 | 1.20073 | 12.58410 |
| | CON->S (RF) | - | 0.02699 | 0.63374 | 8.40729 |

# Power Information

**Internal switching power(pJ) to CO rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00654 | 0.00701 | 0.02253 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00579 | 0.00607 | 0.02342 |
| sky130_osu_sc_15T_ls__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00565 | 0.00602 | 0.02208 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00490 | 0.00510 | 0.02191 |

**Internal switching power(pJ) to CO falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00988 | 0.01042 | 0.03089 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01024 | 0.01135 | 0.03298 |
| sky130_osu_sc_15T_ls__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00902 | 0.00942 | 0.02752 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00938 | 0.01026 | 0.02892 |

**Internal switching power(pJ) to CON rising (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00654 | 0.00699 | 0.02198 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00874 | 0.00945 | 0.01943 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00578 | 0.00605 | 0.02296 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01003 | 0.01039 | 0.01920 |
| sky130_osu_sc_15T_ls__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00564 | 0.00600 | 0.02172 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00811 | 0.00866 | 0.01691 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00488 | 0.00508 | 0.02190 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00940 | 0.00960 | 0.01680 |

**Internal switching power(pJ) to CON falling (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00988 | 0.01037 | 0.02916 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00151 | 0.00203 | 0.01004 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01024 | 0.01124 | 0.03075 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00234 | 0.00270 | 0.01044 |
| sky130_osu_sc_15T_ls__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00902 | 0.00941 | 0.02748 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00070 | 0.00109 | 0.00738 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00938 | 0.01025 | 0.02875 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00154 | 0.00176 | 0.00797 |

**Internal switching power(pJ) to S rising (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00990 | 0.01045 | 0.03118 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00154 | 0.00223 | 0.01178 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01026 | 0.01141 | 0.03329 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00239 | 0.00286 | 0.01189 |
| sky130_osu_sc_15T_ls__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00903 | 0.00943 | 0.02793 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00073 | 0.00113 | 0.00723 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00939 | 0.01028 | 0.02945 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00157 | 0.00180 | 0.00761 |

**Internal switching power(pJ) to S falling (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00655 | 0.00704 | 0.02272 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00878 | 0.00968 | 0.02234 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00579 | 0.00609 | 0.02362 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01007 | 0.01073 | 0.02264 |
| sky130_osu_sc_15T_ls__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00565 | 0.00603 | 0.02213 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00812 | 0.00870 | 0.01686 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00490 | 0.00509 | 0.02222 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00941 | 0.00970 | 0.01688 |

# SKY130_OSU_SC_15T_LS__AND2x

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT |
|---|---|---|
| A | B | Y |
| 0 | x | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__and2_1 | 10.37850 |
| sky130_osu_sc_15T_ls__and2_2 | 12.82050 |
| sky130_osu_sc_15T_ls__and2_4 | 17.70450 |
| sky130_osu_sc_15T_ls__and2_6 | 22.58850 |
| sky130_osu_sc_15T_ls__and2_8 | 27.47250 |
| sky130_osu_sc_15T_ls__and2_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_ls__and2_1 | 0.00435 | 0.00447 | 1.81602 |
| sky130_osu_sc_15T_ls__and2_2 | 0.00435 | 0.00447 | 3.53580 |
| sky130_osu_sc_15T_ls__and2_4 | 0.00435 | 0.00448 | 6.79341 |
| sky130_osu_sc_15T_ls__and2_6 | 0.00439 | 0.00447 | 10.00811 |
| sky130_osu_sc_15T_ls__and2_8 | 0.00436 | 0.00448 | 13.00797 |
| sky130_osu_sc_15T_ls__and2_l | 0.00328 | 0.00340 | 1.10084 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_ls__and2_1** | 0.00000 | 0.67173 | 0.73341 |
| **sky130_osu_sc_15T_ls__and2_2** | 0.00000 | 0.74306 | 0.82900 |
| **sky130_osu_sc_15T_ls__and2_4** | 0.00000 | 1.20514 | 1.26829 |
| **sky130_osu_sc_15T_ls__and2_6** | 0.00000 | 1.66722 | 1.77796 |
| **sky130_osu_sc_15T_ls__and2_8** | 0.00000 | 2.12930 | 2.28762 |
| **sky130_osu_sc_15T_ls__and2_l** | 0.00000 | 0.52773 | 0.59008 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__and2_1 | A->Y (RR) | 0.08897 | 0.62478 | 7.18581 |
| | B->Y (RR) | 0.09464 | 0.61355 | 6.99435 |
| sky130_osu_sc_15T_ls__and2_2 | A->Y (RR) | 0.10236 | 0.57608 | 7.21473 |
| | B->Y (RR) | 0.10809 | 0.55835 | 7.01175 |
| sky130_osu_sc_15T_ls__and2_4 | A->Y (RR) | 0.14093 | 0.60185 | 7.45328 |
| | B->Y (RR) | 0.14665 | 0.57536 | 7.24349 |
| sky130_osu_sc_15T_ls__and2_6 | A->Y (RR) | 0.18014 | 0.64945 | 7.65891 |
| | B->Y (RR) | 0.18570 | 0.61628 | 7.44171 |
| sky130_osu_sc_15T_ls__and2_8 | A->Y (RR) | 0.21882 | 0.69925 | 7.84467 |
| | B->Y (RR) | 0.22449 | 0.66171 | 7.61261 |
| sky130_osu_sc_15T_ls__and2_l | A->Y (RR) | 0.09827 | 0.70877 | 6.96919 |
| | B->Y (RR) | 0.10400 | 0.69683 | 6.76759 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__and2_1 | A->Y (FF) | 0.07295 | 0.59897 | 6.75374 |
| | B->Y (FF) | 0.07707 | 0.61609 | 6.84350 |
| sky130_osu_sc_15T_ls__and2_2 | A->Y (FF) | 0.08276 | 0.56122 | 6.76993 |
| | B->Y (FF) | 0.08731 | 0.57476 | 6.86878 |
| sky130_osu_sc_15T_ls__and2_4 | A->Y (FF) | 0.11417 | 0.58371 | 6.92566 |
| | B->Y (FF) | 0.11832 | 0.59336 | 7.02078 |
| sky130_osu_sc_15T_ls__and2_6 | A->Y (FF) | 0.14845 | 0.62733 | 7.09838 |
| | B->Y (FF) | 0.15203 | 0.63414 | 7.18387 |
| sky130_osu_sc_15T_ls__and2_8 | A->Y (FF) | 0.18082 | 0.66560 | 7.16893 |
| | B->Y (FF) | 0.18408 | 0.67099 | 7.24245 |
| sky130_osu_sc_15T_ls__and2_l | A->Y (FF) | 0.08227 | 0.62975 | 5.98065 |
| | B->Y (FF) | 0.08822 | 0.64849 | 6.09341 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__and2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00476 | 0.00655 | 0.05874 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00483 | 0.00583 | 0.04617 |
| sky130_osu_sc_15T_ls__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00955 | 0.01144 | 0.06309 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00963 | 0.01083 | 0.05022 |
| sky130_osu_sc_15T_ls__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02059 | 0.02216 | 0.07150 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02077 | 0.02166 | 0.06103 |
| sky130_osu_sc_15T_ls__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03354 | 0.03400 | 0.08340 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03352 | 0.03294 | 0.07087 |
| sky130_osu_sc_15T_ls__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04757 | 0.04504 | 0.09378 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04754 | 0.04419 | 0.08441 |
| sky130_osu_sc_15T_ls__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00341 | 0.00476 | 0.04196 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00349 | 0.00423 | 0.03303 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__and2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01196 | 0.01452 | 0.06241 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01353 | 0.01586 | 0.06184 |
| sky130_osu_sc_15T_ls__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01537 | 0.01825 | 0.06577 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01697 | 0.01950 | 0.06533 |
| sky130_osu_sc_15T_ls__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02457 | 0.02743 | 0.07405 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02605 | 0.02852 | 0.07354 |
| sky130_osu_sc_15T_ls__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03459 | 0.03700 | 0.08291 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03602 | 0.03759 | 0.08218 |
| sky130_osu_sc_15T_ls__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04647 | 0.04762 | 0.09188 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04785 | 0.04793 | 0.09078 |
| sky130_osu_sc_15T_ls__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00905 | 0.01080 | 0.04381 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01015 | 0.01167 | 0.04332 |

**Passive power(pJ) for A rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__and2_1 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00448 | -0.00450 | -0.00452 |
| sky130_osu_sc_15T_ls__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00448 | -0.00450 | -0.00452 |
| sky130_osu_sc_15T_ls__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00448 | -0.00450 | -0.00451 |
| sky130_osu_sc_15T_ls__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00450 | -0.00452 | -0.00454 |
| sky130_osu_sc_15T_ls__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00447 | -0.00448 | -0.00450 |
| sky130_osu_sc_15T_ls__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00316 | -0.00317 | -0.00318 |

**Passive power(pJ) for A falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__and2_1 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00452 | 0.00453 | 0.00454 |
| sky130_osu_sc_15T_ls__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00452 | 0.00455 | 0.00454 |
| sky130_osu_sc_15T_ls__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00453 | 0.00454 | 0.00455 |
| sky130_osu_sc_15T_ls__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00456 | 0.00466 | 0.00458 |
| sky130_osu_sc_15T_ls__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00454 | 0.00463 | 0.00456 |
| sky130_osu_sc_15T_ls__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00319 | 0.00321 | 0.00320 |

**Passive power(pJ) for B rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__and2_1 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00428 | -0.00429 | -0.00428 |
| sky130_osu_sc_15T_ls__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00428 | -0.00430 | -0.00428 |
| sky130_osu_sc_15T_ls__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00427 | -0.00429 | -0.00428 |
| sky130_osu_sc_15T_ls__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00427 | -0.00429 | -0.00427 |
| sky130_osu_sc_15T_ls__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00427 | -0.00429 | -0.00427 |
| sky130_osu_sc_15T_ls__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00303 | -0.00305 | -0.00303 |

**Passive power(pJ) for B falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__and2_1 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00441 | 0.00433 | 0.00431 |
| sky130_osu_sc_15T_ls__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00441 | 0.00434 | 0.00431 |
| sky130_osu_sc_15T_ls__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00441 | 0.00434 | 0.00431 |
| sky130_osu_sc_15T_ls__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00442 | 0.00434 | 0.00432 |
| sky130_osu_sc_15T_ls__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00442 | 0.00435 | 0.00432 |
| sky130_osu_sc_15T_ls__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00313 | 0.00306 | 0.00305 |

# SKY130_OSU_SC_15T_LS__AOI21

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | OUTPUT |
|---|---|---|---|
| A0 | A1 | B0 | Y |
| 0 | x | 0 | 1 |
| x | x | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | x | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__aoi21_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_15T_ls__aoi21_l | 0.00414 | 0.00429 | 0.00416 | 0.84310 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__aoi21_l | 0.00000 | 0.44034 | 0.76715 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__aoi21_l | A0->Y (FR) | 0.08778 | 0.88316 | 9.96386 |
| | A1->Y (FR) | 0.07419 | 0.83904 | 9.62713 |
| | B0->Y (FR) | 0.06274 | 0.89149 | 10.53670 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__aoi21_l | A0->Y (RF) | 0.06411 | 0.61662 | 6.94207 |
| | A1->Y (RF) | 0.05899 | 0.65261 | 7.61252 |
| | B0->Y (RF) | 0.03372 | 0.58092 | 7.03949 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.01096 | 0.01098 | 0.01974 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00925 | 0.00924 | 0.01783 |
| | B0 | 0.00640 | 0.00713 | 0.01890 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00240 | 0.00229 | 0.01065 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00244 | 0.00263 | 0.01176 |
| | B0 | -0.00105 | -0.00038 | 0.00946 |

**Passive power(pJ) for A0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00346 | -0.00395 | -0.00394 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | -0.00400 | -0.00401 | -0.00400 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00400 | -0.00401 | -0.00400 |

**Passive power(pJ) for A0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00391 | 0.00396 | 0.00394 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | 0.00400 | 0.00405 | 0.00402 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00412 | 0.00405 | 0.00402 |

**Passive power(pJ) for A1 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00341 | -0.00389 | -0.00388 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | -0.00394 | -0.00393 | -0.00394 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00424 | -0.00425 | -0.00427 |

**Passive power(pJ) for A1 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00385 | 0.00391 | 0.00388 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | 0.00394 | 0.00398 | 0.00396 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00427 | 0.00429 | 0.00429 |

**Passive power(pJ) for B0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi21_l | (A0 * A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !Y) | -0.00159 | -0.00160 | -0.00159 |

**Passive power(pJ) for B0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi21_l | (A0 * A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !Y) | 0.00175 | 0.00176 | 0.00164 |

# SKY130_OSU_SC_15T_LS__AOI22

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | | OUTPUT |
|---|---|---|---|---|
| A0 | A1 | B0 | B1 | Y |
| 0 | x | 0 | x | 1 |
| 0 | x | 1 | 0 | 1 |
| x | x | 1 | 1 | 0 |
| 1 | 0 | 0 | x | 1 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | x | x | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__aoi22_1 | 12.82050 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_15T_ls__aoi22_1 | 0.00413 | 0.00427 | 0.00441 | 0.00422 | 0.84247 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__aoi22_1 | 0.00000 | 0.43380 | 0.82085 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__aoi22_l | A0->Y (FR) | 0.10721 | 0.89355 | 9.83763 |
| | A1->Y (FR) | 0.09607 | 0.87403 | 9.74558 |
| | B0->Y (FR) | 0.06452 | 0.87320 | 10.28820 |
| | B1->Y (FR) | 0.07590 | 0.89489 | 10.43090 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__aoi22_l | A0->Y (RF) | 0.08657 | 0.64032 | 6.96687 |
| | A1->Y (RF) | 0.08135 | 0.67639 | 7.63698 |
| | B0->Y (RF) | 0.04106 | 0.63330 | 7.59214 |
| | B1->Y (RF) | 0.04645 | 0.59402 | 6.92224 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | A0 | 0.01361 | 0.01358 | 0.02245 |
| | A1 | 0.01190 | 0.01185 | 0.02055 |
| | B0 | 0.00700 | 0.00770 | 0.01974 |
| | B1 | 0.00869 | 0.00933 | 0.02156 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | A0 | 0.00489 | 0.00477 | 0.01351 |
| | A1 | 0.00492 | 0.00507 | 0.01471 |
| | B0 | -0.00066 | -0.00018 | 0.00951 |
| | B1 | -0.00057 | -0.00036 | 0.00836 |

**Passive power(pJ) for A0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | (A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * B1 * !Y) | -0.00340 | -0.00394 | -0.00394 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | -0.00400 | -0.00401 | -0.00400 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | -0.00400 | -0.00402 | -0.00400 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00400 | -0.00402 | -0.00400 |

**Passive power(pJ) for A0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | (A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * B1 * !Y) | 0.00392 | 0.00395 | 0.00394 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | 0.00400 | 0.00406 | 0.00402 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | 0.00412 | 0.00405 | 0.00402 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00412 | 0.00405 | 0.00402 |

**Passive power(pJ) for A1 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | (A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * B1 * !Y) | -0.00338 | -0.00388 | -0.00388 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | -0.00394 | -0.00395 | -0.00394 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | -0.00423 | -0.00424 | -0.00426 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00423 | -0.00425 | -0.00426 |

**Passive power(pJ) for A1 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | (A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * B1 * !Y) | 0.00386 | 0.00390 | 0.00388 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | 0.00394 | 0.00397 | 0.00396 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | 0.00425 | 0.00430 | 0.00428 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00426 | 0.00430 | 0.00428 |

**Passive power(pJ) for B0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | (A0 * A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B1 * !Y) | -0.00159 | -0.00161 | -0.00160 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | -0.00157 | -0.00159 | -0.00158 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | -0.00435 | -0.00437 | -0.00440 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | -0.00435 | -0.00437 | -0.00440 |

**Passive power(pJ) for B0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | (A0 * A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B1 * !Y) | 0.00184 | 0.00185 | 0.00167 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | 0.00159 | 0.00161 | 0.00160 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | 0.00440 | 0.00443 | 0.00442 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | 0.00440 | 0.00444 | 0.00442 |

**Passive power(pJ) for B1 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | (A0 * A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B0 * !Y) | -0.00161 | -0.00162 | -0.00162 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | -0.00158 | -0.00160 | -0.00160 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00407 | -0.00409 | -0.00407 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | -0.00407 | -0.00409 | -0.00407 |

**Passive power(pJ) for B1 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__aoi22_l | (A0 * A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B0 * !Y) | 0.00186 | 0.00186 | 0.00168 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | 0.00160 | 0.00162 | 0.00161 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00419 | 0.00411 | 0.00409 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | 0.00419 | 0.00411 | 0.00409 |

# SKY130_OSU_SC_15T_LS__BUFx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | OUTPUT |
|---|---|
| A | Y |
| 0 | 0 |
| 1 | 1 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__buf_1 | 7.93650 |
| sky130_osu_sc_15T_ls__buf_2 | 10.37850 |
| sky130_osu_sc_15T_ls__buf_4 | 15.26250 |
| sky130_osu_sc_15T_ls__buf_6 | 20.14650 |
| sky130_osu_sc_15T_ls__buf_8 | 25.03050 |
| sky130_osu_sc_15T_ls__buf_l | 7.93650 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| sky130_osu_sc_15T_ls__buf_1 | 0.00446 | 1.78330 |
| sky130_osu_sc_15T_ls__buf_2 | 0.00449 | 3.54153 |
| sky130_osu_sc_15T_ls__buf_4 | 0.00449 | 6.86838 |
| sky130_osu_sc_15T_ls__buf_6 | 0.00092 | 1.80000 |
| sky130_osu_sc_15T_ls__buf_8 | 0.00449 | 13.26445 |
| sky130_osu_sc_15T_ls__buf_l | 0.00342 | 1.10370 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_ls__buf_1** | 0.00000 | 0.67016 | 0.67016 |
| **sky130_osu_sc_15T_ls__buf_2** | 0.00000 | 0.74958 | 0.76575 |
| **sky130_osu_sc_15T_ls__buf_4** | 0.00000 | 1.16408 | 1.24307 |
| **sky130_osu_sc_15T_ls__buf_6** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_15T_ls__buf_8** | 0.00000 | 1.99308 | 2.26239 |
| **sky130_osu_sc_15T_ls__buf_l** | 0.00000 | 0.54274 | 0.54274 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_ls__buf_1** | **A->Y (RR)** | 0.06536 | 0.57616 | 6.82057 |
| **sky130_osu_sc_15T_ls__buf_2** | **A->Y (RR)** | 0.07436 | 0.52016 | 6.90806 |
| **sky130_osu_sc_15T_ls__buf_4** | **A->Y (RR)** | 0.10017 | 0.52720 | 7.14399 |
| **sky130_osu_sc_15T_ls__buf_8** | **A->Y (RR)** | 0.15104 | 0.59434 | 7.50064 |
| **sky130_osu_sc_15T_ls__buf_l** | **A->Y (RR)** | 0.07363 | 0.65714 | 6.61954 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_ls__buf_1** | **A->Y (FF)** | 0.06893 | 0.58860 | 6.71746 |
| **sky130_osu_sc_15T_ls__buf_2** | **A->Y (FF)** | 0.08046 | 0.56841 | 7.07478 |
| **sky130_osu_sc_15T_ls__buf_4** | **A->Y (FF)** | 0.11220 | 0.59301 | 7.34885 |
| **sky130_osu_sc_15T_ls__buf_8** | **A->Y (FF)** | 0.17908 | 0.67615 | 7.67773 |
| **sky130_osu_sc_15T_ls__buf_l** | **A->Y (FF)** | 0.07885 | 0.62434 | 6.07699 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__buf_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00441 | 0.00634 | 0.05416 |
| sky130_osu_sc_15T_ls__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00902 | 0.01090 | 0.05404 |
| sky130_osu_sc_15T_ls__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01955 | 0.02176 | 0.06505 |
| sky130_osu_sc_15T_ls__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04272 | 0.04471 | 0.08773 |
| sky130_osu_sc_15T_ls__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00327 | 0.00466 | 0.03799 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__buf_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01148 | 0.01419 | 0.06340 |
| sky130_osu_sc_15T_ls__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01493 | 0.01771 | 0.06292 |
| sky130_osu_sc_15T_ls__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02401 | 0.02674 | 0.07161 |
| sky130_osu_sc_15T_ls__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04563 | 0.04546 | 0.08930 |
| sky130_osu_sc_15T_ls__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00873 | 0.01054 | 0.04479 |

**Passive power(pJ) for A rising :**

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_15T_ls__buf_6 | 0.00000 | 0.00000 | 0.00000 |
| | -0.00074 | -0.00075 | -0.00072 |

**Passive power(pJ) for A falling :**

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_15T_ls__buf_6 | 0.00000 | 0.00000 | 0.00000 |
| | 0.00074 | 0.00075 | 0.00072 |

# SKY130_OSU_SC_15T_LS__DFFRx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | OUTPUT | |
|---|---|---|---|---|
| D | RN | CK | Q | QN |
| 0 | 1 | R | 0 | 1 |
| 1 | 1 | R | 1 | 0 |
| x | 0 | x | 0 | 1 |
| x | 1 | x | IQ | IQN |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__dffr_1 | 53.11350 |
| sky130_osu_sc_15T_ls__dffr_l | 53.11350 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | |
|---|---|---|---|---|---|
| | D | RN | CK | Q | QN |
| sky130_osu_sc_15T_ls__dffr_1 | 0.00425 | 0.00421 | 0.01218 | 1.66212 | 1.66552 |
| sky130_osu_sc_15T_ls__dffr_l | 0.00425 | 0.00421 | 0.01218 | 1.10407 | 1.10448 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__dffr_1 | 0.00000 | 2.65666 | 3.13230 |
| sky130_osu_sc_15T_ls__dffr_l | 0.00000 | 2.52923 | 3.00487 |

# Delay Information

**Delay(ns) to Q rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffr_1 | CK->Q (RR) | 0.34879 | 1.49795 | 16.14320 |
| | QN->Q (FR) | 0.03501 | 0.85341 | 12.28410 |
| sky130_osu_sc_15T_ls__dffr_l | CK->Q (RR) | 0.33872 | 1.58664 | 15.19880 |
| | QN->Q (FR) | 0.03933 | 0.91380 | 11.89240 |

**Delay(ns) to Q falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffr_1 | CK->Q (RF) | 0.33093 | 1.47465 | 16.27770 |
| | QN->Q (RF) | 0.02932 | 0.69172 | 9.94417 |
| | RN->Q (FF) | 0.24290 | 1.46905 | 17.21650 |
| sky130_osu_sc_15T_ls__dffr_l | CK->Q (RF) | 0.33633 | 1.60207 | 15.56340 |
| | QN->Q (RF) | 0.02993 | 0.68116 | 8.90160 |
| | RN->Q (FF) | 0.24821 | 1.59660 | 16.50170 |

**Delay(ns) to QN rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffr_1 | CK->QN (RR) | 0.29249 | 0.83696 | 6.95736 |
| | RN->QN (FR) | 0.20368 | 0.83223 | 7.89876 |
| sky130_osu_sc_15T_ls__dffr_l | CK->QN (RR) | 0.29457 | 0.91643 | 7.02431 |
| | RN->QN (FR) | 0.20619 | 0.91148 | 7.95878 |

**Delay(ns) to QN falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_ls__dffr_1** | **CK->QN (RF)** | 0.30007 | 0.78999 | 5.81779 |
| **sky130_osu_sc_15T_ls__dffr_l** | **CK->QN (RF)** | 0.28310 | 0.77854 | 5.13767 |

# Constraint Information

**Constraints(ns) for D rising :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | hold | CK (R) | -0.09646 | -0.09890 | 0.02447 |
| | setup | CK (R) | 0.27717 | 0.30142 | 0.86420 |
| sky130_osu_sc_15T_ls__dffr_l | hold | CK (R) | -0.09717 | -0.09941 | 0.02314 |
| | setup | CK (R) | 0.27839 | 0.30355 | 0.88053 |

**Constraints(ns) for D falling :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | hold | CK (R) | -0.12924 | -0.32741 | -3.05798 |
| | setup | CK (R) | 0.15667 | 0.33956 | 3.22871 |
| sky130_osu_sc_15T_ls__dffr_l | hold | CK (R) | -0.12704 | -0.32587 | -3.02949 |
| | setup | CK (R) | 0.15652 | 0.33956 | 3.22871 |

**Constraints(ns) for D rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | hold | CK (R) | -0.09646 | -0.09890 | 0.02447 |
| | setup | CK (R) | 0.27717 | 0.30142 | 0.86420 |
| sky130_osu_sc_15T_ls__dffr_l | hold | CK (R) | -0.09717 | -0.09941 | 0.02314 |
| | setup | CK (R) | 0.27839 | 0.30355 | 0.88053 |

**Constraints(ns) for D falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | hold | CK (R) | -0.12924 | -0.32741 | -3.05798 |
| | setup | CK (R) | 0.15667 | 0.33956 | 3.22871 |
| sky130_osu_sc_15T_ls__dffr_l | hold | CK (R) | -0.12704 | -0.32587 | -3.02949 |
| | setup | CK (R) | 0.15652 | 0.33956 | 3.22871 |

**Constraints(ns) for RN rising :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | recovery | CK (R) | 0.22512 | 0.25819 | 1.14432 |
| | removal | CK (R) | -0.05699 | -0.06527 | -0.13417 |
| sky130_osu_sc_15T_ls__dffr_l | recovery | CK (R) | 0.22642 | 0.26013 | 1.15724 |
| | removal | CK (R) | -0.05699 | -0.06527 | -0.13417 |

**Constraints(ns) for RN rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | recovery | CK (R) | 0.22512 | 0.25819 | 1.14432 |
| | removal | CK (R) | -0.05699 | -0.06527 | -0.13417 |
| sky130_osu_sc_15T_ls__dffr_l | recovery | CK (R) | 0.22642 | 0.26013 | 1.15724 |
| | removal | CK (R) | -0.05699 | -0.06527 | -0.13417 |

**Constraints(ns) for RN falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | min_pulse_width | RN () | 0.14008 | 0.50171 | 13.33370 |
| | min_pulse_width | RN () | 0.13631 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffr_l | min_pulse_width | RN () | 0.13631 | 0.50171 | 13.33370 |
| | min_pulse_width | RN () | 0.13631 | 0.50171 | 13.33370 |

**Constraints(ns) for CK rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | min_pulse_width | CK () | 0.17021 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.17021 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffr_l | min_pulse_width | CK () | 0.15891 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.16645 | 0.50171 | 13.33370 |

**Constraints(ns) for CK falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | min_pulse_width | CK () | 0.34349 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.12878 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffr_l | min_pulse_width | CK () | 0.34349 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.12878 | 0.50171 | 13.33370 |

# Power Information

**Internal switching power(pJ) to Q rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01177 | 0.01155 | 0.02692 |
| sky130_osu_sc_15T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01030 | 0.01076 | 0.03993 |

**Internal switching power(pJ) to Q falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01365 | 0.01210 | 0.00807 |
| | RN | -0.00148 | -0.08816 | -1.34631 |
| | RN | 0.03088 | 0.02960 | 0.02617 |
| sky130_osu_sc_15T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01222 | 0.01178 | 0.02748 |
| | RN | -0.00148 | -0.06897 | -0.89429 |
| | RN | 0.02943 | 0.02927 | 0.04555 |

**Internal switching power(pJ) to QN rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01363 | 0.01209 | 0.00770 |
| | RN | -0.00148 | -0.08827 | -1.34892 |
| | RN | 0.03086 | 0.02959 | 0.02613 |
| sky130_osu_sc_15T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01221 | 0.01178 | 0.02729 |
| | RN | -0.00148 | -0.06899 | -0.89461 |
| | RN | 0.02942 | 0.02925 | 0.04553 |

**Internal switching power(pJ) to QN falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01171 | 0.01151 | 0.02608 |
| sky130_osu_sc_15T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01023 | 0.01070 | 0.04005 |

**Passive power(pJ) for D rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00324 | -0.00386 | -0.00390 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01447 | 0.01483 | 0.05546 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00628 | 0.00672 | 0.04723 |
| sky130_osu_sc_15T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00324 | -0.00386 | -0.00390 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01447 | 0.01483 | 0.05545 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00628 | 0.00672 | 0.04723 |

**Passive power(pJ) for D falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00392 | 0.00397 | 0.00395 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02399 | 0.02454 | 0.06651 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01158 | 0.01215 | 0.05292 |
| sky130_osu_sc_15T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00392 | 0.00396 | 0.00395 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02399 | 0.02454 | 0.06651 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01158 | 0.01215 | 0.05292 |

**Passive power(pJ) for RN rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00414 | 0.00580 | 0.06253 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01256 | 0.01393 | 0.07181 |
| sky130_osu_sc_15T_ls__dffr_l | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00414 | 0.00580 | 0.06253 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01255 | 0.01393 | 0.07181 |

**Passive power(pJ) for RN falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.01092 | 0.01331 | 0.07004 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02314 | 0.02523 | 0.08311 |
| sky130_osu_sc_15T_ls__dffr_l | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.01092 | 0.01331 | 0.07004 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02314 | 0.02523 | 0.08310 |

**Passive power(pJ) for CK rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00094 | 0.00048 | 0.05722 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00714 | 0.00796 | 0.06672 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00132 | 0.00032 | 0.05652 |
| sky130_osu_sc_15T_ls__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00094 | 0.00048 | 0.05722 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00713 | 0.00796 | 0.06672 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00132 | 0.00032 | 0.05652 |

**Passive power(pJ) for CK falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01619 | 0.01864 | 0.07555 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.03634 | 0.03768 | 0.10599 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.02758 | 0.02958 | 0.08729 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.03525 | 0.03950 | 0.13209 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01901 | 0.02123 | 0.07723 |
| sky130_osu_sc_15T_ls__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01619 | 0.01864 | 0.07555 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.03634 | 0.03767 | 0.10598 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.02758 | 0.02958 | 0.08729 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.03525 | 0.03951 | 0.13209 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01901 | 0.02123 | 0.07723 |

# SKY130_OSU_SC_15T_LS__DFFSRx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | | OUTPUT | |
|---|---|---|---|---|---|
| **D** | **RN** | **SN** | **CK** | **Q** | **QN** |
| **0** | **1** | **1** | **R** | **0** | **1** |
| **1** | **1** | **1** | **R** | **1** | **0** |
| **x** | **0** | **x** | **x** | **0** | **1** |
| **x** | **1** | **0** | **x** | **1** | **0** |
| **x** | **1** | **1** | **x** | **IQ** | **IQN** |

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_15T_ls__dffsr_1** | 57.99750 |
| **sky130_osu_sc_15T_ls__dffsr_l** | 57.99750 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) | |
|---|---|---|---|---|---|---|
| | **D** | **RN** | **SN** | **CK** | **Q** | **QN** |
| **sky130_osu_sc_15T_ls__dffsr_1** | 0.00421 | 0.00422 | 0.00927 | 0.01242 | 1.84371 | 1.85263 |
| **sky130_osu_sc_15T_ls__dffsr_l** | 0.00421 | 0.00422 | 0.00926 | 0.01242 | 1.11844 | 1.10559 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_15T_ls__dffsr_1** | 0.00000 | 2.95525 | 3.78729 |
| **sky130_osu_sc_15T_ls__dffsr_l** | 0.00000 | 2.82782 | 3.65987 |

# Delay Information

**Delay(ns) to Q rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK->Q (RR) | 0.34222 | 1.52287 | 17.29260 |
| | QN->Q (FR) | 0.03095 | 0.80106 | 11.82620 |
| | RN->Q (RR) | 0.27316 | 1.46601 | 17.30420 |
| | SN->Q (FR) | 0.24547 | 1.50652 | 18.32390 |
| sky130_osu_sc_15T_ls__dffsr_l | CK->Q (RR) | 0.34240 | 1.60126 | 15.39230 |
| | QN->Q (FR) | 0.03935 | 0.91671 | 11.96980 |
| | RN->Q (RR) | 0.27395 | 1.54549 | 15.39040 |
| | SN->Q (FR) | 0.24609 | 1.58193 | 16.38160 |

**Delay(ns) to Q falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK->Q (RF) | 0.39069 | 1.56373 | 17.32280 |
| | QN->Q (RF) | 0.02898 | 0.71836 | 10.63650 |
| | RN->Q (FF) | 0.25164 | 1.50961 | 18.25040 |
| sky130_osu_sc_15T_ls__dffsr_l | CK->Q (RF) | 0.40152 | 1.68450 | 15.83480 |
| | QN->Q (RF) | 0.02988 | 0.68371 | 8.96101 |
| | RN->Q (FF) | 0.26259 | 1.63016 | 16.76090 |

**Delay(ns) to QN rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK->QN (RR) | 0.35179 | 0.90005 | 7.19908 |
| | RN->QN (FR) | 0.21353 | 0.84605 | 8.12408 |
| sky130_osu_sc_15T_ls__dffsr_l | CK->QN (RR) | 0.35885 | 0.98986 | 7.10824 |
| | RN->QN (FR) | 0.22048 | 0.93654 | 8.02889 |

**Delay(ns) to QN falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK->QN (RF) | 0.29785 | 0.81145 | 6.43894 |
| | RN->QN (RF) | 0.22920 | 0.75539 | 6.44809 |
| | SN->QN (FF) | 0.20157 | 0.79549 | 7.46089 |
| sky130_osu_sc_15T_ls__dffsr_l | CK->QN (RF) | 0.28879 | 0.78541 | 5.14561 |
| | RN->QN (RF) | 0.22065 | 0.72993 | 5.15071 |
| | SN->QN (FF) | 0.19301 | 0.76618 | 6.15238 |

# Constraint Information

**Constraints(ns) for D rising :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | hold | CK (R) | -0.09665 | -0.10157 | -0.01983 |
| | setup | CK (R) | 0.26118 | 0.28631 | 0.92212 |
| sky130_osu_sc_15T_ls__dffsr_l | hold | CK (R) | -0.09553 | -0.10175 | -0.02107 |
| | setup | CK (R) | 0.26067 | 0.28646 | 0.93268 |

**Constraints(ns) for D falling :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | hold | CK (R) | -0.15054 | -0.35370 | -3.09768 |
| | setup | CK (R) | 0.19022 | 0.36467 | 3.30414 |
| sky130_osu_sc_15T_ls__dffsr_l | hold | CK (R) | -0.15080 | -0.35060 | -3.08123 |
| | setup | CK (R) | 0.18961 | 0.36434 | 3.30484 |

**Constraints(ns) for D rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | hold | CK (R) | -0.09665 | -0.10157 | -0.01983 |
| | setup | CK (R) | 0.26118 | 0.28631 | 0.92212 |
| sky130_osu_sc_15T_ls__dffsr_l | hold | CK (R) | -0.09553 | -0.10175 | -0.02107 |
| | setup | CK (R) | 0.26067 | 0.28646 | 0.93268 |

**Constraints(ns) for D falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | hold | CK (R) | -0.15054 | -0.35370 | -3.09768 |
| | setup | CK (R) | 0.19022 | 0.36467 | 3.30414 |
| sky130_osu_sc_15T_ls__dffsr_l | hold | CK (R) | -0.15080 | -0.35060 | -3.08123 |
| | setup | CK (R) | 0.18961 | 0.36434 | 3.30484 |

**Constraints(ns) for RN rising :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | recovery | CK (R) | 0.18668 | 0.21622 | 1.07702 |
| | removal | CK (R) | -0.02537 | -0.03123 | -0.06584 |
| | hold | SN (R) | -0.19546 | -0.34692 | -1.29012 |
| | setup | SN (R) | 0.22332 | 0.39488 | 4.76561 |
| sky130_osu_sc_15T_ls__dffsr_l | recovery | CK (R) | 0.18659 | 0.21628 | 1.08296 |
| | removal | CK (R) | -0.02537 | -0.03123 | -0.06584 |
| | hold | SN (R) | -0.18617 | -0.33551 | -1.23279 |
| | setup | SN (R) | 0.22155 | 0.38238 | 4.71328 |

**Constraints(ns) for RN rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | recovery | CK (R) | 0.18668 | 0.21622 | 1.07702 |
| | removal | CK (R) | -0.02537 | -0.03123 | -0.06584 |
| | hold | SN (R) | -0.19546 | -0.34692 | -1.29012 |
| | hold | SN (R) | -0.19667 | -0.34998 | -1.29807 |
| | setup | SN (R) | 0.22169 | 0.39081 | 4.52074 |
| | setup | SN (R) | 0.22332 | 0.39488 | 4.76561 |
| sky130_osu_sc_15T_ls__dffsr_l | recovery | CK (R) | 0.18659 | 0.21628 | 1.08296 |
| | removal | CK (R) | -0.02537 | -0.03123 | -0.06584 |
| | hold | SN (R) | -0.18802 | -0.33551 | -1.23279 |
| | hold | SN (R) | -0.18617 | -0.33783 | -1.24582 |
| | setup | SN (R) | 0.22155 | 0.37888 | 4.41526 |
| | setup | SN (R) | 0.21334 | 0.38238 | 4.71328 |

**Constraints(ns) for RN falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | min_pulse_width | RN () | 0.16268 | 0.50171 | 13.33370 |
| | min_pulse_width | RN () | 0.16645 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffsr_l | min_pulse_width | RN () | 0.16268 | 0.50171 | 13.33370 |
| | min_pulse_width | RN () | 0.15891 | 0.50171 | 13.33370 |

**Constraints(ns) for SN rising :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | recovery | CK (R) | 0.05622 | 0.09438 | 4.66831 |
| | removal | CK (R) | -0.02949 | -0.07188 | -0.35795 |
| sky130_osu_sc_15T_ls__dffsr_l | recovery | CK (R) | 0.05428 | 0.09369 | 4.56403 |
| | removal | CK (R) | -0.02738 | -0.07398 | -0.35878 |

**Constraints(ns) for SN rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | recovery | CK (R) | 0.05622 | 0.09438 | 4.66831 |
| | removal | CK (R) | -0.02949 | -0.07188 | -0.35795 |
| sky130_osu_sc_15T_ls__dffsr_l | recovery | CK (R) | 0.05428 | 0.09369 | 4.56403 |
| | removal | CK (R) | -0.02738 | -0.07398 | -0.35878 |

**Constraints(ns) for SN falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | min_pulse_width | SN () | 0.19281 | 0.50171 | 13.33370 |
| | min_pulse_width | SN () | 0.19658 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffsr_l | min_pulse_width | SN () | 0.19281 | 0.50171 | 13.33370 |
| | min_pulse_width | SN () | 0.18528 | 0.50171 | 13.33370 |

**Constraints(ns) for CK rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | min_pulse_width | CK () | 0.15891 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.19658 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffsr_l | min_pulse_width | CK () | 0.15514 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.19281 | 0.50171 | 13.33370 |

**Constraints(ns) for CK falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | min_pulse_width | CK () | 0.32843 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.17021 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffsr_l | min_pulse_width | CK () | 0.32843 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.17021 | 0.50171 | 13.33370 |

# Power Information

**Internal switching power(pJ) to Q rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01490 | 0.01444 | 0.02578 |
| | RN | 0.02691 | 0.02575 | 0.02415 |
| | SN | -0.00148 | -0.09382 | -1.49340 |
| | SN | 0.03031 | 0.02832 | 0.02714 |
| sky130_osu_sc_15T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01358 | 0.01397 | 0.04395 |
| | RN | 0.02558 | 0.02533 | 0.04236 |
| | SN | -0.00148 | -0.06951 | -0.90594 |
| | SN | 0.02898 | 0.02788 | 0.04303 |

**Internal switching power(pJ) to Q falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01592 | 0.01546 | 0.02426 |
| | RN | -0.00148 | -0.09382 | -1.49339 |
| | RN | 0.03213 | 0.03176 | 0.04178 |
| sky130_osu_sc_15T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01455 | 0.01422 | 0.02982 |
| | RN | -0.00148 | -0.06951 | -0.90593 |
| | RN | 0.03073 | 0.03051 | 0.04751 |

**Internal switching power(pJ) to QN rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01589 | 0.01543 | 0.02394 |
| | RN | -0.00148 | -0.09409 | -1.50013 |
| | RN | 0.03210 | 0.03172 | 0.04178 |
| sky130_osu_sc_15T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01454 | 0.01422 | 0.02984 |
| | RN | -0.00148 | -0.06903 | -0.89551 |
| | RN | 0.03072 | 0.03049 | 0.04773 |

**Internal switching power(pJ) to QN falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01485 | 0.01442 | 0.02519 |
| | RN | 0.02685 | 0.02569 | 0.02371 |
| | SN | -0.00148 | -0.09409 | -1.50046 |
| | SN | 0.03026 | 0.02829 | 0.02694 |
| sky130_osu_sc_15T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01352 | 0.01392 | 0.04295 |
| | RN | 0.02551 | 0.02527 | 0.04169 |
| | SN | -0.00148 | -0.06903 | -0.89544 |
| | SN | 0.02891 | 0.02779 | 0.04487 |

**Passive power(pJ) for D rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00383 | -0.00388 | -0.00390 |
| | (!CK * RN * SN * Q * !QN) + (!CK * RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * SN * Q * !QN) + (!CK * RN * SN * !Q * QN) | 0.01888 | 0.01923 | 0.05965 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00725 | 0.00769 | 0.04786 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00719 | 0.00765 | 0.04787 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00725 | 0.00771 | 0.04790 |
| sky130_osu_sc_15T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00383 | -0.00389 | -0.00390 |
| | (!CK * RN * SN * Q * !QN) + (!CK * RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * SN * Q * !QN) + (!CK * RN * SN * !Q * QN) | 0.01888 | 0.01923 | 0.05965 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00725 | 0.00769 | 0.04786 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00719 | 0.00764 | 0.04787 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00725 | 0.00771 | 0.04790 |

**Passive power(pJ) for D falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00403 | 0.00397 | 0.00393 |
| | (!CK * RN * SN * Q * !QN) + (!CK * RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * SN * Q * !QN) + (!CK * RN * SN * !Q * QN) | 0.02768 | 0.02806 | 0.06933 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01224 | 0.01284 | 0.05336 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01237 | 0.01290 | 0.05333 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01218 | 0.01276 | 0.05327 |
| sky130_osu_sc_15T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00403 | 0.00396 | 0.00393 |
| | (!CK * RN * SN * Q * !QN) + (!CK * RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * SN * Q * !QN) + (!CK * RN * SN * !Q * QN) | 0.02766 | 0.02805 | 0.06932 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01223 | 0.01282 | 0.05335 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01235 | 0.01288 | 0.05332 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01216 | 0.01275 | 0.05326 |

**Passive power(pJ) for RN rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | (CK * SN * !Q * QN) + (!CK * !D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * SN * !Q * QN) + (!CK * !D * SN * !Q * QN) | 0.00323 | 0.00478 | 0.06138 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01512 | 0.01637 | 0.07450 |
| sky130_osu_sc_15T_ls__dffsr_l | (CK * SN * !Q * QN) + (!CK * !D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * SN * !Q * QN) + (!CK * !D * SN * !Q * QN) | 0.00323 | 0.00490 | 0.06139 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01513 | 0.01638 | 0.07451 |

**Passive power(pJ) for RN falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | (CK * SN * !Q * QN) + (!CK * !D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * SN * !Q * QN) + (!CK * !D * SN * !Q * QN) | 0.01172 | 0.01424 | 0.07118 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02452 | 0.02658 | 0.08474 |
| sky130_osu_sc_15T_ls__dffsr_l | (CK * SN * !Q * QN) + (!CK * !D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * SN * !Q * QN) + (!CK * !D * SN * !Q * QN) | 0.01170 | 0.01423 | 0.07117 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02450 | 0.02655 | 0.08472 |

**Passive power(pJ) for SN rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | (CK * RN * Q * !QN) + (!CK * D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * RN * Q * !QN) + (!CK * D * RN * Q * !QN) | -0.00889 | -0.00892 | -0.00895 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00856 | -0.00942 | -0.00941 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00854 | -0.00898 | -0.00898 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00611 | 0.00667 | 0.04790 |
| sky130_osu_sc_15T_ls__dffsr_l | (CK * RN * Q * !QN) + (!CK * D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * RN * Q * !QN) + (!CK * D * RN * Q * !QN) | -0.00889 | -0.00893 | -0.00895 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00854 | -0.00940 | -0.00939 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00853 | -0.00898 | -0.00897 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00612 | 0.00668 | 0.04791 |

**Passive power(pJ) for SN falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | (CK * RN * Q * !QN) + (!CK * D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * RN * Q * !QN) + (!CK * D * RN * Q * !QN) | 0.00898 | 0.00907 | 0.00903 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00942 | 0.00955 | 0.00947 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00899 | 0.00909 | 0.00905 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01936 | 0.01938 | 0.05902 |
| sky130_osu_sc_15T_ls__dffsr_l | (CK * RN * Q * !QN) + (!CK * D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * RN * Q * !QN) + (!CK * D * RN * Q * !QN) | 0.00898 | 0.00907 | 0.00903 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00940 | 0.00953 | 0.00945 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00899 | 0.00909 | 0.00904 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01935 | 0.01934 | 0.05901 |

**Passive power(pJ) for CK rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffsr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00094 | 0.00047 | 0.05723 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00811 | 0.00900 | 0.06757 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00793 | 0.00882 | 0.06752 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00111 | 0.00053 | 0.05674 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00481 | 0.00783 | 0.11074 |
| sky130_osu_sc_15T_ls__dffsr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00094 | 0.00047 | 0.05723 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00809 | 0.00899 | 0.06756 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00791 | 0.00881 | 0.06751 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00111 | 0.00053 | 0.05674 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00481 | 0.00776 | 0.11074 |

**Passive power(pJ) for CK falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |

| | | | | |
|---|---|---|---|---|
| **sky130_osu_sc_15T_ls__dffsr_1** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.04098 | 0.04240 | 0.11061 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01624 | 0.01870 | 0.07562 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.02825 | 0.03028 | 0.08796 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.02830 | 0.03035 | 0.08815 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.03882 | 0.04268 | 0.13579 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01888 | 0.02109 | 0.07710 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.02216 | 0.02627 | 0.12990 |
| **sky130_osu_sc_15T_ls__dffsr_l** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.04098 | 0.04240 | 0.11061 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01624 | 0.01870 | 0.07561 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.02825 | 0.03028 | 0.08796 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.02830 | 0.03035 | 0.08815 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.03881 | 0.04267 | 0.13578 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01888 | 0.02109 | 0.07710 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.02215 | 0.02626 | 0.12990 |

# SKY130_OSU_SC_15T_LS__DFFSx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | OUTPUT | |
|---|---|---|---|---|
| D | SN | CK | Q | QN |
| 0 | 1 | R | 0 | 1 |
| 1 | 1 | R | 1 | 0 |
| x | 0 | x | 1 | 0 |
| x | 1 | x | IQ | IQN |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__dffs_1 | 48.22950 |
| sky130_osu_sc_15T_ls__dffs_l | 48.22950 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | |
|---|---|---|---|---|---|
| | D | SN | CK | Q | QN |
| sky130_osu_sc_15T_ls__dffs_1 | 0.00424 | 0.00728 | 0.01219 | 1.67094 | 1.67436 |
| sky130_osu_sc_15T_ls__dffs_l | 0.00424 | 0.00728 | 0.01219 | 1.11132 | 1.10711 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__dffs_1 | 0.00000 | 2.17874 | 2.51014 |
| sky130_osu_sc_15T_ls__dffs_l | 0.00000 | 2.05132 | 2.38272 |

# Delay Information

**Delay(ns) to Q rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffs_1 | CK->Q (RR) | 0.27375 | 1.40853 | 16.08930 |
| | QN->Q (FR) | 0.03499 | 0.85192 | 12.26670 |
| | SN->Q (FR) | 0.20700 | 1.48427 | 17.41580 |
| sky130_osu_sc_15T_ls__dffs_l | CK->Q (RR) | 0.27101 | 1.50913 | 15.17930 |
| | QN->Q (FR) | 0.03929 | 0.91364 | 11.90100 |
| | SN->Q (FR) | 0.20494 | 1.57897 | 16.47040 |

**Delay(ns) to Q falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffs_1 | CK->Q (RF) | 0.37284 | 1.52735 | 16.37390 |
| | QN->Q (RF) | 0.02918 | 0.69058 | 9.94252 |
| sky130_osu_sc_15T_ls__dffs_l | CK->Q (RF) | 0.37626 | 1.65215 | 15.68240 |
| | QN->Q (RF) | 0.02983 | 0.68013 | 8.91323 |

**Delay(ns) to QN rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffs_1 | CK->QN (RR) | 0.33297 | 0.88860 | 7.02055 |
| sky130_osu_sc_15T_ls__dffs_l | CK->QN (RR) | 0.33336 | 0.96312 | 7.07095 |

**Delay(ns) to QN falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dffs_1 | CK->QN (RF) | 0.22922 | 0.70168 | 5.73889 |
| | SN->QN (FF) | 0.16196 | 0.77765 | 7.06109 |
| sky130_osu_sc_15T_ls__dffs_l | CK->QN (RF) | 0.21963 | 0.69947 | 5.05138 |
| | SN->QN (FF) | 0.15278 | 0.76866 | 6.34000 |

# Constraint Information

**Constraints(ns) for D rising :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | hold | CK (R) | -0.07208 | -0.08258 | 0.02575 |
| | setup | CK (R) | 0.20180 | 0.23419 | 0.91524 |
| sky130_osu_sc_15T_ls__dffs_l | hold | CK (R) | -0.07451 | -0.08145 | 0.02786 |
| | setup | CK (R) | 0.20213 | 0.23471 | 0.93802 |

**Constraints(ns) for D falling :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | hold | CK (R) | -0.13490 | -0.32855 | -2.72046 |
| | setup | CK (R) | 0.17146 | 0.34231 | 3.24651 |
| sky130_osu_sc_15T_ls__dffs_l | hold | CK (R) | -0.13510 | -0.33096 | -2.60153 |
| | setup | CK (R) | 0.17146 | 0.34231 | 3.24651 |

**Constraints(ns) for D rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | hold | CK (R) | -0.07208 | -0.08258 | 0.02575 |
| | setup | CK (R) | 0.20180 | 0.23419 | 0.91524 |
| sky130_osu_sc_15T_ls__dffs_l | hold | CK (R) | -0.07451 | -0.08145 | 0.02786 |
| | setup | CK (R) | 0.20213 | 0.23471 | 0.93802 |

**Constraints(ns) for D falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | hold | CK (R) | -0.13490 | -0.32855 | -2.72046 |
| | setup | CK (R) | 0.17146 | 0.34231 | 3.24651 |
| sky130_osu_sc_15T_ls__dffs_l | hold | CK (R) | -0.13510 | -0.33096 | -2.60153 |
| | setup | CK (R) | 0.17146 | 0.34231 | 3.24651 |

**Constraints(ns) for SN rising :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | recovery | CK (R) | 0.05252 | 0.07603 | 3.15327 |
| | removal | CK (R) | -0.02279 | -0.05902 | -0.18871 |
| sky130_osu_sc_15T_ls__dffs_l | recovery | CK (R) | 0.05153 | 0.07603 | 2.99162 |
| | removal | CK (R) | -0.02279 | -0.05902 | -0.18871 |

**Constraints(ns) for SN rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | recovery | CK (R) | 0.05252 | 0.07603 | 3.15327 |
| | removal | CK (R) | -0.02279 | -0.05902 | -0.18871 |
| sky130_osu_sc_15T_ls__dffs_l | recovery | CK (R) | 0.05153 | 0.07603 | 2.99162 |
| | removal | CK (R) | -0.02279 | -0.05902 | -0.18871 |

**Constraints(ns) for SN falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | min_pulse_width | SN () | 0.14384 | 0.50171 | 13.33370 |
| | min_pulse_width | SN () | 0.14761 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffs_l | min_pulse_width | SN () | 0.14384 | 0.50171 | 13.33370 |
| | min_pulse_width | SN () | 0.14008 | 0.50171 | 13.33370 |

**Constraints(ns) for CK rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | min_pulse_width | CK () | 0.12501 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.18528 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffs_l | min_pulse_width | CK () | 0.12124 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.17775 | 0.50171 | 13.33370 |

**Constraints(ns) for CK falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | min_pulse_width | CK () | 0.26815 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.15138 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dffs_l | min_pulse_width | CK () | 0.26815 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.15138 | 0.50171 | 13.33370 |

# Power Information

**Internal switching power(pJ) to Q rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01169 | 0.01161 | 0.02751 |
| | SN | -0.00148 | -0.08844 | -1.35346 |
| | SN | 0.02511 | 0.02408 | 0.02666 |
| sky130_osu_sc_15T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01024 | 0.01081 | 0.04037 |
| | SN | -0.00148 | -0.06924 | -0.90017 |
| | SN | 0.02365 | 0.02330 | 0.03953 |

**Internal switching power(pJ) to Q falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01358 | 0.01215 | 0.00884 |
| sky130_osu_sc_15T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01214 | 0.01179 | 0.02794 |

**Internal switching power(pJ) to QN rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01357 | 0.01213 | 0.00854 |
| sky130_osu_sc_15T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01214 | 0.01178 | 0.02780 |

**Internal switching power(pJ) to QN falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01164 | 0.01159 | 0.02759 |
| | SN | -0.00148 | -0.08855 | -1.35607 |
| | SN | 0.02506 | 0.02404 | 0.02622 |
| sky130_osu_sc_15T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01018 | 0.01075 | 0.04024 |
| | SN | -0.00148 | -0.06908 | -0.89667 |
| | SN | 0.02359 | 0.02322 | 0.03925 |

**Passive power(pJ) for D rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00390 | -0.00395 | -0.00397 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01376 | 0.01417 | 0.05576 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00619 | 0.00664 | 0.04708 |
| sky130_osu_sc_15T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00390 | -0.00395 | -0.00397 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01376 | 0.01417 | 0.05576 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00619 | 0.00664 | 0.04708 |

**Passive power(pJ) for D falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00408 | 0.00401 | 0.00397 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02346 | 0.02391 | 0.06560 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01170 | 0.01234 | 0.05319 |
| sky130_osu_sc_15T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00408 | 0.00401 | 0.00397 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02346 | 0.02391 | 0.06560 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01170 | 0.01234 | 0.05319 |

**Passive power(pJ) for SN rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | -0.00637 | -0.00641 | -0.00642 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00499 | 0.00567 | 0.04120 |
| sky130_osu_sc_15T_ls__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | -0.00637 | -0.00641 | -0.00642 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00499 | 0.00567 | 0.04120 |

**Passive power(pJ) for SN falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00655 | 0.00653 | 0.00647 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01316 | 0.01381 | 0.04906 |
| sky130_osu_sc_15T_ls__dffs_l | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00655 | 0.00653 | 0.00647 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01316 | 0.01381 | 0.04906 |

**Passive power(pJ) for CK rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00098 | 0.00044 | 0.05723 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00127 | 0.00036 | 0.05662 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00369 | 0.00676 | 0.11029 |
| sky130_osu_sc_15T_ls__dffs_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00098 | 0.00044 | 0.05723 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00128 | 0.00036 | 0.05662 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00369 | 0.00675 | 0.11028 |

**Passive power(pJ) for CK falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dffs_1 | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.03584 | 0.03723 | 0.10655 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01620 | 0.01865 | 0.07562 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03452 | 0.03849 | 0.13115 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01894 | 0.02117 | 0.07721 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02152 | 0.02594 | 0.12998 |
| sky130_osu_sc_15T_ls__dffs_l | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.03584 | 0.03723 | 0.10654 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01620 | 0.01866 | 0.07561 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03452 | 0.03850 | 0.13115 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01894 | 0.02117 | 0.07721 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02151 | 0.02594 | 0.12998 |

# SKY130_OSU_SC_15T_LS__DFFx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT | |
|---|---|---|---|
| D | CK | Q | QN |
| 0 | R | 0 | 1 |
| 1 | R | 1 | 0 |
| x | x | IQ | IQN |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__dff_1 | 40.29300 |
| sky130_osu_sc_15T_ls__dff_l | 40.29300 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) | |
|---|---|---|---|---|
| | D | CK | Q | QN |
| sky130_osu_sc_15T_ls__dff_1 | 0.00440 | 0.01217 | 1.87191 | 1.86167 |
| sky130_osu_sc_15T_ls__dff_l | 0.00440 | 0.01217 | 1.01990 | 1.01093 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__dff_1 | 0.00000 | 2.35909 | 2.69941 |
| sky130_osu_sc_15T_ls__dff_l | 0.00000 | 2.23166 | 2.57198 |

# Delay Information

**Delay(ns) to Q rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dff_1 | CK->Q (RR) | 0.22970 | 1.40039 | 17.38440 |
| | QN->Q (FR) | 0.03077 | 0.80169 | 11.90270 |
| sky130_osu_sc_15T_ls__dff_l | CK->Q (RR) | 0.23734 | 1.45279 | 14.36790 |
| | QN->Q (FR) | 0.04373 | 0.96964 | 12.34160 |

**Delay(ns) to Q falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dff_1 | CK->Q (RF) | 0.31622 | 1.48649 | 17.46430 |
| | QN->Q (RF) | 0.02888 | 0.72017 | 10.71630 |
| sky130_osu_sc_15T_ls__dff_l | CK->Q (RF) | 0.33172 | 1.58717 | 14.97760 |
| | QN->Q (RF) | 0.02997 | 0.66065 | 8.47772 |

**Delay(ns) to QN rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dff_1 | CK->QN (RR) | 0.27873 | 0.81508 | 7.12616 |
| sky130_osu_sc_15T_ls__dff_l | CK->QN (RR) | 0.28980 | 0.91983 | 6.90113 |

**Delay(ns) to QN falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__dff_1 | CK->QN (RF) | 0.18958 | 0.68238 | 6.31701 |
| sky130_osu_sc_15T_ls__dff_l | CK->QN (RF) | 0.18587 | 0.64355 | 4.58785 |

# Constraint Information

**Constraints(ns) for D rising :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | hold | CK (R) | -0.06503 | -0.07625 | 0.02249 |
| | setup | CK (R) | 0.15785 | 0.19470 | 1.00115 |
| sky130_osu_sc_15T_ls__dff_l | hold | CK (R) | -0.06521 | -0.07625 | 0.02406 |
| | setup | CK (R) | 0.15596 | 0.19322 | 1.00225 |

**Constraints(ns) for D falling :**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | hold | CK (R) | -0.12212 | -0.33365 | -2.40766 |
| | setup | CK (R) | 0.14560 | 0.34610 | 3.26539 |
| sky130_osu_sc_15T_ls__dff_l | hold | CK (R) | -0.12409 | -0.33421 | -2.41712 |
| | setup | CK (R) | 0.14560 | 0.34610 | 3.26542 |

**Constraints(ns) for CK rising (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | min_pulse_width | CK () | 0.10617 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.16645 | 0.50171 | 13.33370 |
| sky130_osu_sc_15T_ls__dff_l | min_pulse_width | CK () | 0.10241 | 0.50171 | 13.33370 |
| | min_pulse_width | CK () | 0.16268 | 0.50171 | 13.33370 |

**Constraints(ns) for CK falling (conditional):**

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| **sky130_osu_sc_15T_ls__dff_1** | **min_pulse_width** | **CK ()** | 0.22295 | 0.50171 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.11747 | 0.50171 | 13.33370 |
| **sky130_osu_sc_15T_ls__dff_l** | **min_pulse_width** | **CK ()** | 0.22295 | 0.50171 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.11747 | 0.50171 | 13.33370 |

# Power Information

**Internal switching power(pJ) to Q rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01232 | 0.01206 | 0.02415 |
| sky130_osu_sc_15T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01104 | 0.01167 | 0.04336 |

**Internal switching power(pJ) to Q falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01384 | 0.01340 | 0.02273 |
| sky130_osu_sc_15T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01246 | 0.01152 | 0.02082 |

**Internal switching power(pJ) to QN rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01381 | 0.01339 | 0.02273 |
| sky130_osu_sc_15T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01246 | 0.01150 | 0.02088 |

**Internal switching power(pJ) to QN falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01228 | 0.01205 | 0.02384 |
| sky130_osu_sc_15T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01099 | 0.01164 | 0.04281 |

**Passive power(pJ) for D rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00324 | -0.00386 | -0.00390 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01298 | 0.01354 | 0.05567 |
| sky130_osu_sc_15T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00324 | -0.00386 | -0.00390 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01299 | 0.01354 | 0.05567 |

**Passive power(pJ) for D falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00390 | 0.00397 | 0.00393 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02431 | 0.02478 | 0.06698 |
| sky130_osu_sc_15T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00390 | 0.00397 | 0.00393 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02431 | 0.02478 | 0.06698 |

**Passive power(pJ) for CK rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00098 | 0.00046 | 0.05726 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00126 | 0.00040 | 0.05667 |
| sky130_osu_sc_15T_ls__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00098 | 0.00045 | 0.05726 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00126 | 0.00040 | 0.05667 |

**Passive power(pJ) for CK falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__dff_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01610 | 0.01846 | 0.07554 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03507 | 0.03654 | 0.10678 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03511 | 0.03909 | 0.13351 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01884 | 0.02107 | 0.07712 |
| sky130_osu_sc_15T_ls__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01610 | 0.01846 | 0.07554 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03507 | 0.03655 | 0.10679 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03512 | 0.03909 | 0.13351 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01884 | 0.02107 | 0.07712 |

# SKY130_OSU_SC_15T_LS__INVx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | OUTPUT |
|---|---|
| A | Y |
| 0 | 1 |
| 1 | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_15T_ls__inv_1** | 5.49450 |
| **sky130_osu_sc_15T_ls__inv_10** | 27.47250 |
| **sky130_osu_sc_15T_ls__inv_2** | 7.93650 |
| **sky130_osu_sc_15T_ls__inv_3** | 10.37850 |
| **sky130_osu_sc_15T_ls__inv_4** | 12.82050 |
| **sky130_osu_sc_15T_ls__inv_6** | 17.70450 |
| **sky130_osu_sc_15T_ls__inv_8** | 22.58850 |
| **sky130_osu_sc_15T_ls__inv_l** | 5.49450 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| sky130_osu_sc_15T_ls__inv_1 | 0.00427 | 1.71758 |
| sky130_osu_sc_15T_ls__inv_10 | 0.03961 | 15.84064 |
| sky130_osu_sc_15T_ls__inv_2 | 0.00811 | 3.42360 |
| sky130_osu_sc_15T_ls__inv_3 | 0.01208 | 4.96571 |
| sky130_osu_sc_15T_ls__inv_4 | 0.01596 | 6.67087 |
| sky130_osu_sc_15T_ls__inv_6 | 0.02391 | 9.79927 |
| sky130_osu_sc_15T_ls__inv_8 | 0.03176 | 12.87426 |
| sky130_osu_sc_15T_ls__inv_l | 0.00317 | 0.98345 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__inv_1 | 0.00000 | 0.33508 | 0.44642 |
| sky130_osu_sc_15T_ls__inv_10 | 0.00000 | 2.07249 | 2.54829 |
| sky130_osu_sc_15T_ls__inv_2 | 0.00000 | 0.41450 | 0.50966 |
| sky130_osu_sc_15T_ls__inv_3 | 0.00000 | 0.74958 | 0.95607 |
| sky130_osu_sc_15T_ls__inv_4 | 0.00000 | 0.82900 | 1.01932 |
| sky130_osu_sc_15T_ls__inv_6 | 0.00000 | 1.24349 | 1.52898 |
| sky130_osu_sc_15T_ls__inv_8 | 0.00000 | 1.65799 | 2.03863 |
| sky130_osu_sc_15T_ls__inv_l | 0.00000 | 0.27137 | 0.30445 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_ls__inv_1** | **A->Y (FR)** | 0.02961 | 0.73923 | 10.69970 |
| **sky130_osu_sc_15T_ls__inv_10** | **A->Y (FR)** | 0.04006 | 0.49202 | 10.65460 |
| **sky130_osu_sc_15T_ls__inv_2** | **A->Y (FR)** | 0.02393 | 0.63535 | 10.67300 |
| **sky130_osu_sc_15T_ls__inv_3** | **A->Y (FR)** | 0.02620 | 0.59488 | 10.71150 |
| **sky130_osu_sc_15T_ls__inv_4** | **A->Y (FR)** | 0.02660 | 0.56357 | 10.68890 |
| **sky130_osu_sc_15T_ls__inv_6** | **A->Y (FR)** | 0.02987 | 0.52580 | 10.65190 |
| **sky130_osu_sc_15T_ls__inv_8** | **A->Y (FR)** | 0.03462 | 0.50338 | 10.62750 |
| **sky130_osu_sc_15T_ls__inv_l** | **A->Y (FR)** | 0.03857 | 0.84151 | 10.62490 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_ls__inv_1** | **A->Y (RF)** | 0.02631 | 0.63153 | 9.16197 |
| **sky130_osu_sc_15T_ls__inv_10** | **A->Y (RF)** | 0.03664 | 0.39685 | 9.10560 |
| **sky130_osu_sc_15T_ls__inv_2** | **A->Y (RF)** | 0.02145 | 0.54219 | 9.18346 |
| **sky130_osu_sc_15T_ls__inv_3** | **A->Y (RF)** | 0.02333 | 0.50435 | 9.26465 |
| **sky130_osu_sc_15T_ls__inv_4** | **A->Y (RF)** | 0.02313 | 0.47151 | 9.25041 |
| **sky130_osu_sc_15T_ls__inv_6** | **A->Y (RF)** | 0.02781 | 0.43525 | 9.21505 |
| **sky130_osu_sc_15T_ls__inv_8** | **A->Y (RF)** | 0.03214 | 0.41266 | 9.17566 |
| **sky130_osu_sc_15T_ls__inv_l** | **A->Y (RF)** | 0.02790 | 0.60401 | 7.68220 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__inv_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00603 | 0.00690 | 0.01627 |
| sky130_osu_sc_15T_ls__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05169 | 0.06631 | 0.15710 |
| sky130_osu_sc_15T_ls__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01067 | 0.01297 | 0.03114 |
| sky130_osu_sc_15T_ls__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01636 | 0.02035 | 0.04701 |
| sky130_osu_sc_15T_ls__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02101 | 0.02595 | 0.06190 |
| sky130_osu_sc_15T_ls__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03122 | 0.04070 | 0.09336 |
| sky130_osu_sc_15T_ls__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04139 | 0.05389 | 0.12527 |
| sky130_osu_sc_15T_ls__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00448 | 0.00505 | 0.01289 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__inv_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00129 | -0.00059 | 0.00685 |
| sky130_osu_sc_15T_ls__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01937 | -0.00862 | 0.06549 |
| sky130_osu_sc_15T_ls__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00396 | -0.00234 | 0.01253 |
| sky130_osu_sc_15T_ls__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00529 | -0.00262 | 0.01947 |
| sky130_osu_sc_15T_ls__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00801 | -0.00401 | 0.02519 |
| sky130_osu_sc_15T_ls__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01223 | -0.00576 | 0.03792 |
| sky130_osu_sc_15T_ls__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01619 | -0.00772 | 0.05114 |
| sky130_osu_sc_15T_ls__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00080 | -0.00033 | 0.00646 |

# SKY130_OSU_SC_15T_LS__MUX2

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | OUTPUT |
|---|---|---|---|
| **A0** | **A1** | **S0** | **Y** |
| **0** | **0** | **x** | **0** |
| **0** | **1** | **0** | **0** |
| **x** | **1** | **1** | **1** |
| **1** | **x** | **0** | **1** |
| **1** | **0** | **1** | **0** |

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_15T_ls__mux2_1** | 15.26250 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | **A0** | **A1** | **S0** | **Y** |
| **sky130_osu_sc_15T_ls__mux2_1** | 0.06800 | 0.06785 | 0.00871 | 0.06143 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_15T_ls__mux2_1** | 0.00000 | 0.88635 | 0.92870 |

# Delay Information

**Delay(ns) to Y rising (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__mux2_1 | A0->Y (RR) | - | 0.01618 | 0.11704 | 0.48215 |
| | A1->Y (RR) | - | 0.01793 | 0.11903 | 0.48229 |
| | S0->Y (RR) | (!A0 * A1) | 0.05380 | 0.19754 | 0.26459 |
| | S0->Y (FR) | (A0 * !A1) | 0.03776 | 0.26800 | 1.60309 |

**Delay(ns) to Y falling (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__mux2_1 | A0->Y (FF) | - | 0.01600 | 0.12764 | 0.53462 |
| | A1->Y (FF) | - | 0.01480 | 0.12600 | 0.53333 |
| | S0->Y (FF) | (!A0 * A1) | 0.06587 | 0.27466 | 1.24609 |
| | S0->Y (RF) | (A0 * !A1) | 0.02988 | 0.19192 | 0.67223 |

# Power Information

**Internal switching power(pJ) to Y rising (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__mux2_1 | A0 | - | 0.00000 | 0.00000 | 0.00000 |
| | A0 | - | -0.00604 | -0.00605 | -0.00607 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | -0.00414 | -0.00414 | -0.00415 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00697 | 0.00976 | 0.06791 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | -0.00417 | -0.00208 | 0.05517 |

**Internal switching power(pJ) to Y falling (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__mux2_1 | A0 | - | 0.00000 | 0.00000 | 0.00000 |
| | A0 | - | 0.00605 | 0.00607 | 0.00608 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | 0.00416 | 0.00416 | 0.00417 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00113 | 0.00350 | 0.06135 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | 0.01620 | 0.01877 | 0.07586 |

**Passive power(pJ) for A0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__mux2_1 | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * S0 * Y) + (!A1 * S0 * !Y) | -0.00147 | -0.00147 | -0.00147 |

**Passive power(pJ) for A0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__mux2_1 | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00148 | 0.00148 | 0.00148 |

**Passive power(pJ) for A1 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__mux2_1 | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | -0.00176 | -0.00176 | -0.00175 |

**Passive power(pJ) for A1 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__mux2_1 | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00176 | 0.00176 | 0.00176 |

**Passive power(pJ) for S0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__mux2_1 | (A0 * A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * Y) | -0.00155 | 0.00082 | 0.05823 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | -0.00150 | 0.00063 | 0.05840 |

**Passive power(pJ) for S0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__mux2_1 | (A0 * A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * Y) | 0.01232 | 0.01480 | 0.07224 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | 0.01085 | 0.01365 | 0.07167 |

# SKY130_OSU_SC_15T_LS__NAND2x

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT |
|---|---|---|
| A | B | Y |
| 0 | x | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__nand2_1 | 7.93650 |
| sky130_osu_sc_15T_ls__nand2_l | 7.93650 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_ls__nand2_1 | 0.00427 | 0.00425 | 1.32609 |
| sky130_osu_sc_15T_ls__nand2_l | 0.00317 | 0.00318 | 0.97567 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__nand2_1 | 0.00000 | 0.28098 | 0.50966 |
| sky130_osu_sc_15T_ls__nand2_l | 0.00000 | 0.23982 | 0.35178 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__nand2_1 | A->Y (FR) | 0.03095 | 0.68157 | 9.26385 |
| | B->Y (FR) | 0.03630 | 0.67839 | 9.14986 |
| sky130_osu_sc_15T_ls__nand2_l | A->Y (FR) | 0.04005 | 0.84190 | 10.59940 |
| | B->Y (FR) | 0.04761 | 0.84763 | 10.58010 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__nand2_1 | A->Y (RF) | 0.04000 | 0.75964 | 10.24810 |
| | B->Y (RF) | 0.04531 | 0.72366 | 9.64934 |
| sky130_osu_sc_15T_ls__nand2_l | A->Y (RF) | 0.04251 | 0.80633 | 10.04240 |
| | B->Y (RF) | 0.04721 | 0.76880 | 9.38829 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00643 | 0.00701 | 0.01685 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00817 | 0.00853 | 0.01877 |
| sky130_osu_sc_15T_ls__nand2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00473 | 0.00526 | 0.01195 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00597 | 0.00635 | 0.01325 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00083 | -0.00041 | 0.00728 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00078 | -0.00058 | 0.00637 |
| sky130_osu_sc_15T_ls__nand2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00055 | -0.00015 | 0.00560 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00051 | -0.00035 | 0.00505 |

**Passive power(pJ) for A rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nand2_1 | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00440 | -0.00441 | -0.00444 |
| sky130_osu_sc_15T_ls__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00305 | -0.00305 | -0.00307 |

**Passive power(pJ) for A falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nand2_1 | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00443 | 0.00453 | 0.00445 |
| sky130_osu_sc_15T_ls__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00307 | 0.00314 | 0.00308 |

**Passive power(pJ) for B rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nand2_1 | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00412 | -0.00413 | -0.00412 |
| sky130_osu_sc_15T_ls__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00286 | -0.00286 | -0.00286 |

**Passive power(pJ) for B falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nand2_1 | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00424 | 0.00417 | 0.00414 |
| sky130_osu_sc_15T_ls__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00295 | 0.00289 | 0.00287 |

# SKY130_OSU_SC_15T_LS__NOR2x

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT |
|---|---|---|
| A | B | Y |
| 0 | 0 | 1 |
| x | 1 | 0 |
| 1 | x | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__nor2_1 | 7.93650 |
| sky130_osu_sc_15T_ls__nor2_l | 7.93650 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_ls__nor2_1 | 0.00424 | 0.00453 | 0.92039 |
| sky130_osu_sc_15T_ls__nor2_l | 0.00308 | 0.00340 | 0.56377 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__nor2_1 | 0.00000 | 0.35823 | 0.44641 |
| sky130_osu_sc_15T_ls__nor2_l | 0.00000 | 0.29669 | 0.37979 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__nor2_1 | A->Y (FR) | 0.06480 | 0.84072 | 10.02360 |
| | B->Y (FR) | 0.04846 | 0.85113 | 10.47170 |
| sky130_osu_sc_15T_ls__nor2_l | A->Y (FR) | 0.07783 | 0.95552 | 9.88780 |
| | B->Y (FR) | 0.06287 | 0.97106 | 10.43330 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__nor2_1 | A->Y (RF) | 0.03731 | 0.52804 | 6.37181 |
| | B->Y (RF) | 0.02830 | 0.51364 | 6.35017 |
| sky130_osu_sc_15T_ls__nor2_l | A->Y (RF) | 0.03639 | 0.51304 | 5.48757 |
| | B->Y (RF) | 0.02964 | 0.50172 | 5.46792 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00898 | 0.00891 | 0.01847 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00656 | 0.00702 | 0.01947 |
| sky130_osu_sc_15T_ls__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00630 | 0.00639 | 0.01466 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00480 | 0.00506 | 0.01492 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00101 | 0.00136 | 0.01155 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00095 | -0.00022 | 0.00962 |
| sky130_osu_sc_15T_ls__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00063 | 0.00094 | 0.00989 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00056 | -0.00003 | 0.00851 |

**Passive power(pJ) for A rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nor2_1 | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00328 | -0.00391 | -0.00394 |
| sky130_osu_sc_15T_ls__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00225 | -0.00262 | -0.00263 |

**Passive power(pJ) for A falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nor2_1 | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00391 | 0.00396 | 0.00394 |
| sky130_osu_sc_15T_ls__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00261 | 0.00264 | 0.00263 |

**Passive power(pJ) for B rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nor2_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00161 | -0.00161 | -0.00160 |
| sky130_osu_sc_15T_ls__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00110 | -0.00109 | -0.00109 |

**Passive power(pJ) for B falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__nor2_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00169 | 0.00170 | 0.00164 |
| sky130_osu_sc_15T_ls__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00116 | 0.00115 | 0.00112 |

# SKY130_OSU_SC_15T_LS__OAI21

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | OUTPUT |
|---|---|---|---|
| A0 | A1 | B0 | Y |
| 0 | 0 | x | 1 |
| x | 1 | 0 | 1 |
| x | 1 | 1 | 0 |
| 1 | x | 0 | 1 |
| 1 | x | 1 | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__oai21_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_15T_ls__oai21_l | 0.00428 | 0.00436 | 0.00359 | 0.88592 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__oai21_l | 0.00000 | 0.41623 | 0.75086 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__oai21_l | A0->Y (FR) | 0.06798 | 0.87446 | 10.39620 |
| | A1->Y (FR) | 0.08799 | 0.86905 | 9.96787 |
| | B0->Y (FR) | 0.04797 | 0.78553 | 9.63330 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__oai21_l | A0->Y (RF) | 0.05481 | 0.64154 | 7.47861 |
| | A1->Y (RF) | 0.06842 | 0.64067 | 7.30255 |
| | B0->Y (RF) | 0.04229 | 0.68367 | 8.31823 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00913 | 0.00970 | 0.02016 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.01156 | 0.01156 | 0.02011 |
| | B0 | 0.00771 | 0.00776 | 0.01683 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00021 | 0.00035 | 0.00822 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00219 | 0.00207 | 0.01015 |
| | B0 | 0.00081 | 0.00120 | 0.00886 |

**Passive power(pJ) for A0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00160 | -0.00164 | -0.00161 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | -0.00392 | -0.00397 | -0.00394 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00402 | -0.00403 | -0.00402 |

**Passive power(pJ) for A0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00170 | 0.00170 | 0.00165 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | 0.00392 | 0.00397 | 0.00394 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00409 | 0.00405 | 0.00404 |

**Passive power(pJ) for A1 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00319 | -0.00383 | -0.00386 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | -0.00388 | -0.00392 | -0.00390 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00397 | -0.00399 | -0.00397 |

**Passive power(pJ) for A1 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00383 | 0.00388 | 0.00386 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | 0.00388 | 0.00392 | 0.00390 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00405 | 0.00401 | 0.00399 |

**Passive power(pJ) for B0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai21_l | (!A0 * !A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * Y) | -0.00311 | -0.00312 | -0.00318 |

**Passive power(pJ) for B0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai21_l | (!A0 * !A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * Y) | 0.00318 | 0.00321 | 0.00320 |

# SKY130_OSU_SC_15T_LS__OAI22

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | | | OUTPUT |
|---|---|---|---|---|
| A0 | A1 | B0 | B1 | Y |
| 0 | 0 | x | x | 1 |
| x | 1 | 0 | 0 | 1 |
| x | 1 | x | 1 | 0 |
| x | 1 | 1 | x | 0 |
| 1 | x | 0 | 0 | 1 |
| 1 | x | x | 1 | 0 |
| 1 | x | 1 | x | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__oai22_1 | 12.82050 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_15T_ls__oai22_1 | 0.00415 | 0.00437 | 0.00448 | 0.00439 | 0.90379 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__oai22_1 | 0.00000 | 0.38008 | 0.52960 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__oai22_l | A0->Y (FR) | 0.09565 | 0.86972 | 9.94339 |
| | A1->Y (FR) | 0.07910 | 0.87926 | 10.38980 |
| | B0->Y (FR) | 0.05567 | 0.85575 | 10.37350 |
| | B1->Y (FR) | 0.07338 | 0.84968 | 9.92860 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__oai22_l | A0->Y (RF) | 0.09780 | 0.70019 | 7.67409 |
| | A1->Y (RF) | 0.07721 | 0.67384 | 7.60791 |
| | B0->Y (RF) | 0.06602 | 0.71817 | 8.45764 |
| | B1->Y (RF) | 0.08729 | 0.74487 | 8.55433 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | A0 | 0.01525 | 0.01526 | 0.02346 |
| | A1 | 0.01279 | 0.01323 | 0.02375 |
| | B0 | 0.00691 | 0.00756 | 0.01884 |
| | B1 | 0.01196 | 0.01206 | 0.02005 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | A0 | 0.00374 | 0.00362 | 0.01145 |
| | A1 | -0.00029 | -0.00017 | 0.00773 |
| | B0 | -0.00032 | 0.00015 | 0.00928 |
| | B1 | 0.00158 | 0.00181 | 0.01083 |

**Passive power(pJ) for A0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00328 | -0.00391 | -0.00394 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | -0.00327 | -0.00391 | -0.00394 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | -0.00389 | -0.00393 | -0.00392 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | -0.00398 | -0.00399 | -0.00398 |

**Passive power(pJ) for A0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00392 | 0.00397 | 0.00394 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | 0.00392 | 0.00397 | 0.00394 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | 0.00390 | 0.00393 | 0.00392 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | 0.00408 | 0.00403 | 0.00400 |

**Passive power(pJ) for A1 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00159 | -0.00160 | -0.00159 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | -0.00159 | -0.00160 | -0.00159 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | -0.00384 | -0.00388 | -0.00388 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | -0.00395 | -0.00398 | -0.00396 |

**Passive power(pJ) for A1 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00168 | 0.00168 | 0.00162 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | 0.00168 | 0.00168 | 0.00162 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | 0.00386 | 0.00388 | 0.00388 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | 0.00404 | 0.00399 | 0.00398 |

**Passive power(pJ) for B0 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | (A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B1 * !Y) | -0.00157 | -0.00158 | -0.00158 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | -0.00157 | -0.00159 | -0.00158 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | -0.00428 | -0.00431 | -0.00431 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | -0.00426 | -0.00428 | -0.00436 |

**Passive power(pJ) for B0 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | (A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B1 * !Y) | 0.00166 | 0.00167 | 0.00161 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | 0.00166 | 0.00168 | 0.00161 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | 0.00435 | 0.00437 | 0.00431 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | 0.00437 | 0.00440 | 0.00439 |

**Passive power(pJ) for B1 rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00322 | -0.00385 | -0.00387 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | -0.00322 | -0.00385 | -0.00387 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | -0.00436 | -0.00443 | -0.00441 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | -0.00434 | -0.00436 | -0.00444 |

**Passive power(pJ) for B1 falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00384 | 0.00389 | 0.00387 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | 0.00384 | 0.00388 | 0.00387 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | 0.00443 | 0.00448 | 0.00441 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | 0.00446 | 0.00449 | 0.00447 |

# SKY130_OSU_SC_15T_LS__OR2x

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT |
|---|---|---|
| A | B | Y |
| 0 | 0 | 0 |
| x | 1 | 1 |
| 1 | x | 1 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__or2_1 | 10.37850 |
| sky130_osu_sc_15T_ls__or2_2 | 12.82050 |
| sky130_osu_sc_15T_ls__or2_4 | 17.70450 |
| sky130_osu_sc_15T_ls__or2_8 | 27.47250 |
| sky130_osu_sc_15T_ls__or2_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_ls__or2_1 | 0.00460 | 0.00436 | 1.78256 |
| sky130_osu_sc_15T_ls__or2_2 | 0.00460 | 0.00436 | 3.54676 |
| sky130_osu_sc_15T_ls__or2_4 | 0.00460 | 0.00437 | 6.76808 |
| sky130_osu_sc_15T_ls__or2_8 | 0.00460 | 0.00437 | 13.00459 |
| sky130_osu_sc_15T_ls__or2_l | 0.00348 | 0.00323 | 1.00690 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_ls__or2_1** | 0.00000 | 0.64221 | 0.76575 |
| **sky130_osu_sc_15T_ls__or2_2** | 0.00000 | 0.72972 | 0.82900 |
| **sky130_osu_sc_15T_ls__or2_4** | 0.00000 | 1.09663 | 1.33867 |
| **sky130_osu_sc_15T_ls__or2_8** | 0.00000 | 1.83047 | 2.35800 |
| **sky130_osu_sc_15T_ls__or2_l** | 0.00000 | 0.55568 | 0.68424 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__or2_1 | A->Y (RR) | 0.08150 | 0.62074 | 6.83666 |
| | B->Y (RR) | 0.06938 | 0.58274 | 6.70579 |
| sky130_osu_sc_15T_ls__or2_2 | A->Y (RR) | 0.08946 | 0.55838 | 6.93646 |
| | B->Y (RR) | 0.07696 | 0.52403 | 6.80569 |
| sky130_osu_sc_15T_ls__or2_4 | A->Y (RR) | 0.11565 | 0.55754 | 7.09710 |
| | B->Y (RR) | 0.10282 | 0.52962 | 6.96788 |
| sky130_osu_sc_15T_ls__or2_8 | A->Y (RR) | 0.16675 | 0.61800 | 7.46268 |
| | B->Y (RR) | 0.15356 | 0.59688 | 7.34984 |
| sky130_osu_sc_15T_ls__or2_l | A->Y (RR) | 0.08829 | 0.70521 | 6.47699 |
| | B->Y (RR) | 0.07734 | 0.67096 | 6.31289 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__or2_1 | A->Y (FF) | 0.12488 | 0.67600 | 7.14961 |
| | B->Y (FF) | 0.10344 | 0.66901 | 7.30414 |
| sky130_osu_sc_15T_ls__or2_2 | A->Y (FF) | 0.14763 | 0.65070 | 7.33895 |
| | B->Y (FF) | 0.12634 | 0.65060 | 7.48671 |
| sky130_osu_sc_15T_ls__or2_4 | A->Y (FF) | 0.20805 | 0.69458 | 7.56507 |
| | B->Y (FF) | 0.18684 | 0.70540 | 7.71286 |
| sky130_osu_sc_15T_ls__or2_8 | A->Y (FF) | 0.33304 | 0.82495 | 7.89867 |
| | B->Y (FF) | 0.31182 | 0.83832 | 8.05775 |
| sky130_osu_sc_15T_ls__or2_l | A->Y (FF) | 0.14444 | 0.68084 | 5.90941 |
| | B->Y (FF) | 0.12058 | 0.68184 | 6.08178 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__or2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00667 | 0.00757 | 0.04370 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00485 | 0.00665 | 0.04693 |
| sky130_osu_sc_15T_ls__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01138 | 0.01255 | 0.04871 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00946 | 0.01155 | 0.05881 |
| sky130_osu_sc_15T_ls__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02196 | 0.02336 | 0.06020 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01995 | 0.02264 | 0.06179 |
| sky130_osu_sc_15T_ls__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04530 | 0.04576 | 0.08445 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04326 | 0.04499 | 0.08524 |
| sky130_osu_sc_15T_ls__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00478 | 0.00560 | 0.03132 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00359 | 0.00493 | 0.03138 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__or2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01453 | 0.01517 | 0.05043 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01174 | 0.01428 | 0.06203 |
| sky130_osu_sc_15T_ls__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01818 | 0.01893 | 0.05388 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01540 | 0.01796 | 0.06428 |
| sky130_osu_sc_15T_ls__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02893 | 0.02821 | 0.06225 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02609 | 0.02679 | 0.07082 |
| sky130_osu_sc_15T_ls__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05821 | 0.04800 | 0.08033 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.05516 | 0.04616 | 0.08791 |
| sky130_osu_sc_15T_ls__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01062 | 0.01088 | 0.03809 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00875 | 0.01028 | 0.04271 |

**Passive power(pJ) for A rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__or2_1 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00331 | -0.00393 | -0.00396 |
| sky130_osu_sc_15T_ls__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00331 | -0.00393 | -0.00396 |
| sky130_osu_sc_15T_ls__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00330 | -0.00393 | -0.00396 |
| sky130_osu_sc_15T_ls__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00330 | -0.00393 | -0.00395 |
| sky130_osu_sc_15T_ls__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00227 | -0.00264 | -0.00265 |

**Passive power(pJ) for A falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__or2_1 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00393 | 0.00398 | 0.00396 |
| sky130_osu_sc_15T_ls__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00393 | 0.00398 | 0.00396 |
| sky130_osu_sc_15T_ls__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00393 | 0.00399 | 0.00397 |
| sky130_osu_sc_15T_ls__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00394 | 0.00399 | 0.00398 |
| sky130_osu_sc_15T_ls__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00264 | 0.00268 | 0.00266 |

**Passive power(pJ) for B rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__or2_1 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00160 | -0.00164 | -0.00161 |
| sky130_osu_sc_15T_ls__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00160 | -0.00164 | -0.00161 |
| sky130_osu_sc_15T_ls__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00160 | -0.00164 | -0.00160 |
| sky130_osu_sc_15T_ls__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00159 | -0.00164 | -0.00160 |
| sky130_osu_sc_15T_ls__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00112 | -0.00114 | -0.00112 |

**Passive power(pJ) for B falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__or2_1 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00171 | 0.00173 | 0.00165 |
| sky130_osu_sc_15T_ls__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00171 | 0.00170 | 0.00165 |
| sky130_osu_sc_15T_ls__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00171 | 0.00170 | 0.00165 |
| sky130_osu_sc_15T_ls__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00172 | 0.00171 | 0.00166 |
| sky130_osu_sc_15T_ls__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00119 | 0.00120 | 0.00115 |

# SKY130_OSU_SC_15T_LS__TBUFIx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT |
|---|---|---|
| A | OE | Y |
| - | 0 | HiZ |
| 0 | 1 | 1 |
| 1 | 1 | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__tbufi_1 | 10.37850 |
| sky130_osu_sc_15T_ls__tbufi_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_15T_ls__tbufi_1 | 0.00451 | 0.00575 | 0.93075 |
| sky130_osu_sc_15T_ls__tbufi_l | 0.00340 | 0.00438 | 0.56408 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__tbufi_1 | 0.00000 | 0.53655 | 0.89283 |
| sky130_osu_sc_15T_ls__tbufi_l | 0.00000 | 0.45340 | 0.60889 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__tbufi_1 | A->Y (FR) | 0.04615 | 0.84622 | 10.48200 |
| | OE->Y (FR) | 0.05164 | 0.37030 | 5.09364 |
| | OE->Y (RR) | 0.08998 | 0.70800 | 6.79560 |
| sky130_osu_sc_15T_ls__tbufi_l | A->Y (FR) | 0.06073 | 0.96952 | 10.42610 |
| | OE->Y (FR) | 0.05962 | 0.37012 | 5.09343 |
| | OE->Y (RR) | 0.10103 | 0.81327 | 6.50720 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__tbufi_1 | A->Y (RF) | 0.03918 | 0.66231 | 8.17838 |
| | OE->Y (FF) | 0.05271 | 0.37028 | 5.09358 |
| | OE->Y (RF) | 0.03606 | 0.61763 | 7.49583 |
| sky130_osu_sc_15T_ls__tbufi_l | A->Y (RF) | 0.04223 | 0.65099 | 7.09130 |
| | OE->Y (FF) | 0.06067 | 0.37008 | 5.09345 |
| | OE->Y (RF) | 0.03830 | 0.60113 | 6.32509 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00618 | 0.00634 | 0.01737 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00649 | 0.00862 | 0.06100 |
| sky130_osu_sc_15T_ls__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00455 | 0.00475 | 0.01329 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00450 | 0.00609 | 0.04389 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00097 | -0.00036 | 0.00810 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00403 | 0.00623 | 0.06418 |
| sky130_osu_sc_15T_ls__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00057 | -0.00012 | 0.00716 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00270 | 0.00437 | 0.04622 |

**Passive power(pJ) for A rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tbufi_1 | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00289 | -0.00294 | -0.00290 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00244 | -0.00244 | -0.00244 |
| sky130_osu_sc_15T_ls__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00211 | -0.00214 | -0.00212 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00181 | -0.00181 | -0.00181 |

**Passive power(pJ) for A falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tbufi_1 | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00289 | 0.00294 | 0.00290 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00249 | 0.00251 | 0.00247 |
| sky130_osu_sc_15T_ls__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00211 | 0.00214 | 0.00212 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00185 | 0.00185 | 0.00183 |

**Passive power(pJ) for OE rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00246 | 0.00478 | 0.06327 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00213 | 0.00448 | 0.06294 |
| sky130_osu_sc_15T_ls__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00163 | 0.00337 | 0.04537 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00140 | 0.00316 | 0.04512 |

**Passive power(pJ) for OE falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00726 | 0.00979 | 0.06789 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00733 | 0.00992 | 0.06799 |
| sky130_osu_sc_15T_ls__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00548 | 0.00726 | 0.04877 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00558 | 0.00737 | 0.04886 |

# SKY130_OSU_SC_15T_LS__TNBUFIx

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT |
|---|---|---|
| A | OE | Y |
| 0 | 0 | 1 |
| 1 | 0 | 0 |
| - | 1 | HiZ |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__tnbufi_1 | 10.37850 |
| sky130_osu_sc_15T_ls__tnbufi_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_15T_ls__tnbufi_1 | 0.00450 | 0.00703 | 0.92546 |
| sky130_osu_sc_15T_ls__tnbufi_l | 0.00339 | 0.00504 | 0.56994 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__tnbufi_1 | 0.00000 | 0.61077 | 0.68593 |
| sky130_osu_sc_15T_ls__tnbufi_l | 0.00000 | 0.47545 | 0.54273 |

# Delay Information

**Delay(ns) to Y rising :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__tnbufi_1 | A->Y (FR) | 0.04661 | 0.84439 | 10.44390 |
| | OE->Y (RR) | 0.03366 | 0.37088 | 5.09424 |
| | OE->Y (FR) | 0.06019 | 0.83553 | 9.93968 |
| sky130_osu_sc_15T_ls__tnbufi_l | A->Y (FR) | 0.06126 | 0.97364 | 10.49440 |
| | OE->Y (RR) | 0.03356 | 0.37083 | 5.09418 |
| | OE->Y (FR) | 0.07344 | 0.95560 | 9.86851 |

**Delay(ns) to Y falling :**

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_ls__tnbufi_1 | A->Y (RF) | 0.03857 | 0.66069 | 8.15013 |
| | OE->Y (RF) | 0.03358 | 0.37089 | 5.09426 |
| | OE->Y (FF) | 0.06220 | 0.57922 | 5.76076 |
| sky130_osu_sc_15T_ls__tnbufi_l | A->Y (RF) | 0.04150 | 0.65316 | 7.13713 |
| | OE->Y (RF) | 0.03322 | 0.37085 | 5.09421 |
| | OE->Y (FF) | 0.07050 | 0.60165 | 5.12016 |

# Power Information

**Internal switching power(pJ) to Y rising :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tnbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00635 | 0.00649 | 0.01757 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01569 | 0.01888 | 0.07769 |
| sky130_osu_sc_15T_ls__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00472 | 0.00491 | 0.01340 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01121 | 0.01340 | 0.05519 |

**Internal switching power(pJ) to Y falling :**

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tnbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00120 | -0.00057 | 0.00793 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01346 | 0.01663 | 0.06846 |
| sky130_osu_sc_15T_ls__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00079 | -0.00033 | 0.00691 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00958 | 0.01186 | 0.04995 |

**Passive power(pJ) for A rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tnbufi_1 | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00245 | -0.00249 | -0.00246 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00204 | -0.00204 | -0.00203 |
| sky130_osu_sc_15T_ls__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00169 | -0.00172 | -0.00170 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00142 | -0.00142 | -0.00142 |

**Passive power(pJ) for A falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tnbufi_1 | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00245 | 0.00249 | 0.00246 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00208 | 0.00210 | 0.00207 |
| sky130_osu_sc_15T_ls__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00169 | 0.00172 | 0.00170 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00145 | 0.00145 | 0.00143 |

**Passive power(pJ) for OE rising (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tnbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00455 | -0.00258 | 0.05643 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00454 | -0.00252 | 0.05647 |
| sky130_osu_sc_15T_ls__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00299 | -0.00145 | 0.04083 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00294 | -0.00139 | 0.04087 |

**Passive power(pJ) for OE falling (conditional):**

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_ls__tnbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.01163 | 0.01507 | 0.07414 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.01145 | 0.01499 | 0.07406 |
| sky130_osu_sc_15T_ls__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00831 | 0.01069 | 0.05285 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00822 | 0.01063 | 0.05277 |

# SKY130_OSU_SC_15T_LS__XNOR2

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT |
|---|---|---|
| A | B | Y |
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__xnor2_l | 17.70450 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_ls__xnor2_l | 0.00896 | 0.00804 | 0.95139 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__xnor2_l | 0.00000 | 1.11126 | 1.25371 |

# Delay Information

**Delay(ns) to Y rising (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__xnor2_l | A->Y (RR) | B | 0.11314 | 0.74866 | 6.96923 |
| | A->Y (FR) | !B | 0.06205 | 0.86995 | 10.57740 |
| | B->Y (RR) | A | 0.08985 | 0.72727 | 7.03153 |
| | B->Y (FR) | !A | 0.08250 | 0.86266 | 10.14570 |

**Delay(ns) to Y falling (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__xnor2_l | A->Y (FF) | B | 0.11424 | 0.67722 | 6.16806 |
| | A->Y (RF) | !B | 0.05332 | 0.63912 | 7.66308 |
| | B->Y (FF) | A | 0.09520 | 0.65937 | 6.16068 |
| | B->Y (RF) | !A | 0.06884 | 0.65800 | 7.67323 |

# Power Information

**Internal switching power(pJ) to Y rising (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__xnor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00672 | 0.00857 | 0.06131 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01526 | 0.01825 | 0.08668 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00203 | 0.00447 | 0.06327 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01700 | 0.01974 | 0.08500 |

**Internal switching power(pJ) to Y falling (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__xnor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01874 | 0.02068 | 0.07799 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00416 | 0.00639 | 0.07158 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01697 | 0.01987 | 0.07851 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00532 | 0.00740 | 0.07219 |

# SKY130_OSU_SC_15T_LS__XOR2

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT | | OUTPUT |
|---|---|---|
| A | B | Y |
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_ls__xor2_1 | 17.70450 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_ls__xor2_1 | 0.00898 | 0.00809 | 0.93020 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_ls__xor2_1 | 0.00000 | 1.11126 | 1.34572 |

# Delay Information

**Delay(ns) to Y rising (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__xor2_l | A->Y (RR) | !B | 0.10920 | 0.73871 | 6.97306 |
| | A->Y (FR) | B | 0.07810 | 0.85795 | 10.12770 |
| | B->Y (RR) | !A | 0.09394 | 0.73272 | 6.98935 |
| | B->Y (FR) | A | 0.08500 | 0.86499 | 10.11120 |

**Delay(ns) to Y falling (conditional):**

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_ls__xor2_l | A->Y (FF) | !B | 0.09758 | 0.65627 | 5.95620 |
| | A->Y (RF) | B | 0.05921 | 0.68890 | 8.19116 |
| | B->Y (FF) | !A | 0.09283 | 0.65541 | 6.06703 |
| | B->Y (RF) | A | 0.06787 | 0.65401 | 7.56569 |

# Power Information

**Internal switching power(pJ) to Y rising (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__xor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01811 | 0.02086 | 0.08635 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00319 | 0.00441 | 0.06122 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01870 | 0.02151 | 0.08626 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00184 | 0.00414 | 0.06246 |

**Internal switching power(pJ) to Y falling (conditional):**

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_ls__xor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00343 | 0.00545 | 0.07154 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01918 | 0.02189 | 0.07302 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00351 | 0.00543 | 0.06963 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01725 | 0.02025 | 0.07861 |

# SKY130_OSU_SC_15T_LS_x

*sky130_osu_sc_15T_ls_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 150.00*

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## Truth Table

| INPUT |
|---|
| A |
| x |

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_15T_ls__ant** | 5.49450 |
| **sky130_osu_sc_15T_ls__tiehi** | 5.49450 |
| **sky130_osu_sc_15T_ls__tielo** | 5.49450 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) |
|---|---|
| | A |
| **sky130_osu_sc_15T_ls__ant** | 0.56189 |
| **sky130_osu_sc_15T_ls__tiehi** | 0.00000 |
| **sky130_osu_sc_15T_ls__tielo** | 0.00000 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_ls__ant** | 0.00000 | 237090.00000 | 474180.00000 |
| **sky130_osu_sc_15T_ls__tiehi** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_15T_ls__tielo** | 0.00000 | 0.00000 | 0.00000 |

# Passive Power Information

**Passive power(pJ) for A rising :**

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_15T_ls__ant | 0.00000 | 0.00000 | 0.00000 |
| | -0.00210 | 0.06741 | 0.92255 |

**Passive power(pJ) for A falling :**

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_15T_ls__ant | 0.00000 | 0.00000 | 0.00000 |
| | 4.12664 | 3.91407 | 1.10535 |