# sky130_osu_sc_12T_ls_ss_1P60_100C.ccs Library

| Cell Groups |
| --- |
| SKY130_OSU_SC_12T_LS__ADDFx |
| SKY130_OSU_SC_12T_LS__ADDHx |
| SKY130_OSU_SC_12T_LS__AND2x |
| SKY130_OSU_SC_12T_LS__AOI21 |
| SKY130_OSU_SC_12T_LS__AOI22 |
| SKY130_OSU_SC_12T_LS__BUFx |
| SKY130_OSU_SC_12T_LS__DFFRx |
| SKY130_OSU_SC_12T_LS__DFFSRx |
| SKY130_OSU_SC_12T_LS__DFFSx |
| SKY130_OSU_SC_12T_LS__DFFx |
| SKY130_OSU_SC_12T_LS__INVx |
| SKY130_OSU_SC_12T_LS__MUX2 |
| SKY130_OSU_SC_12T_LS__NAND2x |
| SKY130_OSU_SC_12T_LS__NOR2x |
| SKY130_OSU_SC_12T_LS__OAI21 |
| SKY130_OSU_SC_12T_LS__OAI22 |
| SKY130_OSU_SC_12T_LS__OR2x |
| SKY130_OSU_SC_12T_LS__TBUFIx |
| SKY130_OSU_SC_12T_LS__TNBUFIx |
| SKY130_OSU_SC_12T_LS__XNOR2 |
| SKY130_OSU_SC_12T_LS__XOR2 |
| SKY130_OSU_SC_12T_LS_x |

# SKY130_OSU_SC_12T_LS__ADDFx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__addf_1 | 31.25760 |
| sky130_osu_sc_12T_ls__addf_l | 31.25760 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | | |
|---|---|---|---|---|---|---|
| | A | B | CI | CO | CON | S |
| sky130_osu_sc_12T_ls__addf_1 | 0.01149 | 0.01149 | 0.00890 | 0.63749 | 0.28052 | 0.59085 |
| sky130_osu_sc_12T_ls__addf_l | 0.01149 | 0.01149 | 0.00891 | 0.45115 | 0.28071 | 0.59086 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_12T_ls__addf_1** | 0.00000 | 0.01411 | 0.01675 |
| **sky130_osu_sc_12T_ls__addf_l** | 0.00000 | 0.01339 | 0.01661 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addf_1 | A->CO (RR) | 0.33017 | 2.58342 | 27.25820 |
| | B->CO (RR) | 0.32909 | 2.56402 | 27.13700 |
| | CI->CO (RR) | 0.31312 | 2.60519 | 27.82560 |
| | CON->CO (FR) | 0.05390 | 1.02597 | 12.29110 |
| sky130_osu_sc_12T_ls__addf_1 | A->CO (RR) | 0.32906 | 2.41533 | 22.60920 |
| | B->CO (RR) | 0.32803 | 2.40572 | 22.69050 |
| | CI->CO (RR) | 0.31205 | 2.43731 | 23.19220 |
| | CON->CO (FR) | 0.06273 | 1.11423 | 12.23050 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addf_1 | A->CO (FF) | 0.50050 | 3.41920 | 35.21030 |
| | B->CO (FF) | 0.45946 | 3.30879 | 34.27800 |
| | CI->CO (FF) | 0.44803 | 3.37288 | 35.51740 |
| | CON->CO (RF) | 0.03776 | 0.73526 | 8.94428 |
| sky130_osu_sc_12T_ls__addf_1 | A->CO (FF) | 0.49679 | 3.14860 | 28.60320 |
| | B->CO (FF) | 0.45789 | 3.05676 | 27.91600 |
| | CI->CO (FF) | 0.44424 | 3.10167 | 28.92590 |
| | CON->CO (RF) | 0.04464 | 0.81507 | 9.19908 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addf_1 | A->CON (FR) | 0.36490 | 1.51971 | 11.76380 |
| | B->CON (FR) | 0.32687 | 1.43130 | 11.67850 |
| | CI->CON (FR) | 0.31282 | 1.47259 | 12.10490 |
| sky130_osu_sc_12T_ls__addf_l | A->CON (FR) | 0.34554 | 1.50062 | 11.74890 |
| | B->CON (FR) | 0.30855 | 1.41342 | 11.66470 |
| | CI->CON (FR) | 0.29333 | 1.45382 | 12.08990 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addf_1 | A->CON (RF) | 0.19024 | 0.89057 | 7.48472 |
| | B->CON (RF) | 0.19119 | 0.91472 | 7.97834 |
| | CI->CON (RF) | 0.17325 | 0.91344 | 8.12562 |
| sky130_osu_sc_12T_ls__addf_l | A->CON (RF) | 0.18308 | 0.88352 | 7.48060 |
| | B->CON (RF) | 0.18419 | 0.90795 | 7.97372 |
| | CI->CON (RF) | 0.16606 | 0.90646 | 8.12088 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addf_1 | A->S (-R) | 0.72184 | 3.34752 | 28.24330 |
| | B->S (-R) | 0.74747 | 3.36814 | 28.02550 |
| | CI->S (-R) | 0.66550 | 3.29332 | 28.53430 |
| | CON->S (RR) | 0.17742 | 1.06682 | 8.42588 |
| sky130_osu_sc_12T_ls__addf_l | A->S (-R) | 0.69228 | 3.32443 | 28.22420 |
| | B->S (-R) | 0.71839 | 3.34578 | 28.00820 |
| | CI->S (-R) | 0.63583 | 3.27065 | 28.51430 |
| | CON->S (RR) | 0.17749 | 1.06684 | 8.42556 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addf_1 | A->S (-F) | 0.56727 | 2.36584 | 18.57850 |
| | B->S (-F) | 0.57041 | 2.30641 | 18.58440 |
| | CI->S (-F) | 0.54932 | 2.38071 | 19.13690 |
| | CON->S (FF) | 0.22105 | 0.99995 | 6.82521 |
| sky130_osu_sc_12T_ls__addf_l | A->S (-F) | 0.55152 | 2.35474 | 18.56950 |
| | B->S (-F) | 0.55484 | 2.29585 | 18.57550 |
| | CI->S (-F) | 0.53343 | 2.36935 | 19.12770 |
| | CON->S (FF) | 0.22111 | 0.99990 | 6.82498 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addf_1 | A | 0.00233 | 0.00224 | 0.00267 |
| | B | 0.00284 | 0.00288 | 0.00336 |
| | CI | 0.00296 | 0.00307 | 0.00361 |
| sky130_osu_sc_12T_ls__addf_l | A | 0.00208 | 0.00198 | 0.00220 |
| | B | 0.00258 | 0.00259 | 0.00286 |
| | CI | 0.00270 | 0.00279 | 0.00312 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addf_1 | A | 0.00793 | 0.00798 | 0.00892 |
| | B | 0.00778 | 0.00793 | 0.00892 |
| | CI | 0.00684 | 0.00709 | 0.00808 |
| sky130_osu_sc_12T_ls__addf_l | A | 0.00773 | 0.00774 | 0.00831 |
| | B | 0.00758 | 0.00768 | 0.00828 |
| | CI | 0.00662 | 0.00684 | 0.00745 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addf_1 | A | 0.00792 | 0.00791 | 0.00821 |
| | B | 0.00777 | 0.00787 | 0.00817 |
| | CI | 0.00683 | 0.00702 | 0.00736 |
| sky130_osu_sc_12T_ls__addf_l | A | 0.00772 | 0.00770 | 0.00797 |
| | B | 0.00756 | 0.00766 | 0.00793 |
| | CI | 0.00661 | 0.00680 | 0.00712 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addf_1 | A | 0.00231 | 0.00222 | 0.00232 |
| | B | 0.00282 | 0.00282 | 0.00294 |
| | CI | 0.00295 | 0.00302 | 0.00322 |
| sky130_osu_sc_12T_ls__addf_l | A | 0.00206 | 0.00195 | 0.00205 |
| | B | 0.00256 | 0.00256 | 0.00266 |
| | CI | 0.00270 | 0.00276 | 0.00295 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addf_1 | A | 0.00793 | 0.00798 | 0.00884 |
| | B | 0.00778 | 0.00792 | 0.00882 |
| | CI | 0.00684 | 0.00708 | 0.00798 |
| sky130_osu_sc_12T_ls__addf_l | A | 0.00773 | 0.00776 | 0.00856 |
| | B | 0.00757 | 0.00770 | 0.00854 |
| | CI | 0.00662 | 0.00686 | 0.00770 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addf_1 | A | 0.01635 | 0.01614 | 0.01626 |
| | B | 0.01478 | 0.01449 | 0.01543 |
| | CI | 0.01324 | 0.01323 | 0.01359 |
| sky130_osu_sc_12T_ls__addf_l | A | 0.01635 | 0.01614 | 0.01627 |
| | B | 0.01478 | 0.01449 | 0.01544 |
| | CI | 0.01324 | 0.01323 | 0.01359 |

# SKY130_OSU_SC_12T_LS__ADDHx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_12T_ls__addh_1 | 18.55920 |
| sky130_osu_sc_12T_ls__addh_l | 18.55920 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) | | |
|---|---|---|---|---|---|
| | A | B | CO | CON | S |
| sky130_osu_sc_12T_ls__addh_1 | 0.00564 | 0.00593 | 0.62427 | 0.63406 | 0.63957 |
| sky130_osu_sc_12T_ls__addh_l | 0.00566 | 0.00593 | 0.45252 | 0.63512 | 0.45924 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__addh_1 | 0.00000 | 0.01665 | 0.01811 |
| sky130_osu_sc_12T_ls__addh_l | 0.00000 | 0.01522 | 0.01667 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addh_1 | A->CO (RR) | 0.22873 | 1.11810 | 8.50550 |
| | B->CO (RR) | 0.23340 | 1.09828 | 8.55247 |
| sky130_osu_sc_12T_ls__addh_l | A->CO (RR) | 0.22604 | 1.18467 | 8.45767 |
| | B->CO (RR) | 0.23087 | 1.16830 | 8.51145 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addh_1 | A->CO (FF) | 0.18783 | 0.93570 | 7.01451 |
| | B->CO (FF) | 0.19595 | 0.95319 | 7.12210 |
| sky130_osu_sc_12T_ls__addh_l | A->CO (FF) | 0.18768 | 1.00208 | 7.22100 |
| | B->CO (FF) | 0.19570 | 1.02150 | 7.34257 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addh_1 | A->CON (RR) | 0.31674 | 1.17272 | 8.51090 |
| | B->CON (RR) | 0.32122 | 1.15096 | 8.55405 |
| sky130_osu_sc_12T_ls__addh_l | A->CON (RR) | 0.29100 | 1.14133 | 8.42574 |
| | B->CON (RR) | 0.29567 | 1.12250 | 8.47497 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addh_1 | A->CON (FF) | 0.24138 | 0.97399 | 7.08969 |
| | B->CON (FF) | 0.23948 | 0.98267 | 7.18690 |
| sky130_osu_sc_12T_ls__addh_l | A->CON (FF) | 0.22208 | 0.94224 | 6.91953 |
| | B->CON (FF) | 0.22046 | 0.95286 | 7.02465 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addh_1 | A->S (FR) | 0.34553 | 2.04217 | 18.63060 |
| | B->S (FR) | 0.34324 | 2.05028 | 18.77010 |
| | CON->S (FR) | 0.05567 | 1.03523 | 12.40670 |
| sky130_osu_sc_12T_ls__addh_l | A->S (FR) | 0.33116 | 1.96548 | 16.04920 |
| | B->S (FR) | 0.32887 | 1.97576 | 16.18460 |
| | CON->S (FR) | 0.06298 | 1.12315 | 12.38030 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__addh_1 | A->S (RF) | 0.40764 | 2.09252 | 18.46580 |
| | B->S (RF) | 0.41225 | 2.07190 | 18.51030 |
| | CON->S (RF) | 0.03723 | 0.73514 | 8.97873 |
| sky130_osu_sc_12T_ls__addh_l | A->S (RF) | 0.38987 | 1.97697 | 15.36890 |
| | B->S (RF) | 0.39452 | 1.95876 | 15.41710 |
| | CON->S (RF) | 0.04373 | 0.81752 | 9.29973 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00378 | 0.00364 | 0.00395 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00345 | 0.00330 | 0.00345 |
| sky130_osu_sc_12T_ls__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00330 | 0.00311 | 0.00346 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00298 | 0.00279 | 0.00297 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00541 | 0.00525 | 0.00544 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00564 | 0.00567 | 0.00594 |
| sky130_osu_sc_12T_ls__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00492 | 0.00473 | 0.00502 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00515 | 0.00513 | 0.00533 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00379 | 0.00364 | 0.00395 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00345 | 0.00330 | 0.00343 |
| sky130_osu_sc_12T_ls__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00331 | 0.00311 | 0.00343 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00297 | 0.00278 | 0.00292 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00541 | 0.00524 | 0.00550 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00564 | 0.00567 | 0.00595 |
| sky130_osu_sc_12T_ls__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00492 | 0.00471 | 0.00495 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00515 | 0.00513 | 0.00536 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00542 | 0.00525 | 0.00547 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00564 | 0.00568 | 0.00600 |
| sky130_osu_sc_12T_ls__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00492 | 0.00473 | 0.00507 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00515 | 0.00514 | 0.00524 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00378 | 0.00363 | 0.00394 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00345 | 0.00331 | 0.00349 |
| sky130_osu_sc_12T_ls__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00331 | 0.00311 | 0.00348 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00298 | 0.00278 | 0.00305 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addh_1 | (!B * !CO * !CON * S) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !CO * !CON * S) | 0.48691 | 0.46100 | 0.12610 |
| sky130_osu_sc_12T_ls__addh_l | (!B * !CO * !CON * S) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !CO * !CON * S) | 0.48699 | 0.46107 | 0.12617 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__addh_1 | (!A * !CO * !CON * S) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !CO * !CON * S) | 0.48697 | 0.46086 | 0.13564 |
| sky130_osu_sc_12T_ls__addh_l | (!A * !CO * !CON * S) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !CO * !CON * S) | 0.48705 | 0.46093 | 0.13571 |

# SKY130_OSU_SC_12T_LS__AND2x

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__and2_1 | 8.30280 |
| sky130_osu_sc_12T_ls__and2_2 | 10.25640 |
| sky130_osu_sc_12T_ls__and2_4 | 14.16360 |
| sky130_osu_sc_12T_ls__and2_6 | 18.07080 |
| sky130_osu_sc_12T_ls__and2_8 | 21.97800 |
| sky130_osu_sc_12T_ls__and2_l | 8.30280 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_12T_ls__and2_1 | 0.00301 | 0.00312 | 0.62916 |
| sky130_osu_sc_12T_ls__and2_2 | 0.00301 | 0.00312 | 1.26171 |
| sky130_osu_sc_12T_ls__and2_4 | 0.00301 | 0.00312 | 2.45064 |
| sky130_osu_sc_12T_ls__and2_6 | 0.00304 | 0.00311 | 3.64331 |
| sky130_osu_sc_12T_ls__and2_8 | 0.00301 | 0.00312 | 4.77132 |
| sky130_osu_sc_12T_ls__and2_l | 0.00223 | 0.00231 | 0.45297 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_12T_ls__and2_1** | 0.00000 | 0.00636 | 0.00745 |
| **sky130_osu_sc_12T_ls__and2_2** | 0.00000 | 0.00547 | 0.00624 |
| **sky130_osu_sc_12T_ls__and2_4** | 0.00000 | 0.00826 | 0.00917 |
| **sky130_osu_sc_12T_ls__and2_6** | 0.00000 | 0.01106 | 0.01210 |
| **sky130_osu_sc_12T_ls__and2_8** | 0.00000 | 0.01385 | 0.01503 |
| **sky130_osu_sc_12T_ls__and2_l** | 0.00000 | 0.00489 | 0.00581 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__and2_1 | A->Y (RR) | 0.17395 | 1.01918 | 8.13321 |
| | B->Y (RR) | 0.18304 | 1.01413 | 8.22218 |
| sky130_osu_sc_12T_ls__and2_2 | A->Y (RR) | 0.19742 | 0.94824 | 8.45834 |
| | B->Y (RR) | 0.20637 | 0.93190 | 8.50989 |
| sky130_osu_sc_12T_ls__and2_4 | A->Y (RR) | 0.27037 | 0.97299 | 8.93629 |
| | B->Y (RR) | 0.27955 | 0.94959 | 8.93235 |
| sky130_osu_sc_12T_ls__and2_6 | A->Y (RR) | 0.34404 | 1.04164 | 9.37680 |
| | B->Y (RR) | 0.35248 | 1.01436 | 9.31847 |
| sky130_osu_sc_12T_ls__and2_8 | A->Y (RR) | 0.41442 | 1.11276 | 9.67874 |
| | B->Y (RR) | 0.42343 | 1.08724 | 9.59738 |
| sky130_osu_sc_12T_ls__and2_l | A->Y (RR) | 0.18426 | 1.12066 | 8.38411 |
| | B->Y (RR) | 0.19318 | 1.11731 | 8.47481 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_12T_ls__and2_1** | **A->Y (FF)** | 0.14524 | 0.83940 | 6.41862 |
| | **B->Y (FF)** | 0.15132 | 0.85893 | 6.55390 |
| **sky130_osu_sc_12T_ls__and2_2** | **A->Y (FF)** | 0.17193 | 0.82647 | 6.79766 |
| | **B->Y (FF)** | 0.17665 | 0.83826 | 6.91969 |
| **sky130_osu_sc_12T_ls__and2_4** | **A->Y (FF)** | 0.24500 | 0.87988 | 7.36014 |
| | **B->Y (FF)** | 0.24678 | 0.88497 | 7.44196 |
| **sky130_osu_sc_12T_ls__and2_6** | **A->Y (FF)** | 0.32090 | 0.95379 | 7.81992 |
| | **B->Y (FF)** | 0.31915 | 0.95435 | 7.87089 |
| **sky130_osu_sc_12T_ls__and2_8** | **A->Y (FF)** | 0.39228 | 1.03091 | 8.12488 |
| | **B->Y (FF)** | 0.38770 | 1.02568 | 8.15885 |
| **sky130_osu_sc_12T_ls__and2_l** | **A->Y (FF)** | 0.14914 | 0.90621 | 6.50612 |
| | **B->Y (FF)** | 0.15942 | 0.93111 | 6.63632 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__and2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00277 | 0.00246 | 0.00383 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00282 | 0.00242 | 0.00321 |
| sky130_osu_sc_12T_ls__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00513 | 0.00504 | 0.00632 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00517 | 0.00506 | 0.00579 |
| sky130_osu_sc_12T_ls__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01050 | 0.01077 | 0.01215 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01053 | 0.01080 | 0.01169 |
| sky130_osu_sc_12T_ls__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01591 | 0.01656 | 0.01822 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01594 | 0.01660 | 0.01786 |
| sky130_osu_sc_12T_ls__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02129 | 0.02170 | 0.02385 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02139 | 0.02202 | 0.02359 |
| sky130_osu_sc_12T_ls__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00209 | 0.00189 | 0.00273 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00213 | 0.00185 | 0.00234 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__and2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00669 | 0.00660 | 0.00789 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00754 | 0.00739 | 0.00857 |
| sky130_osu_sc_12T_ls__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00831 | 0.00864 | 0.00991 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00917 | 0.00943 | 0.01057 |
| sky130_osu_sc_12T_ls__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01243 | 0.01348 | 0.01480 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01325 | 0.01419 | 0.01542 |
| sky130_osu_sc_12T_ls__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01664 | 0.01840 | 0.02001 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01743 | 0.01907 | 0.02048 |
| sky130_osu_sc_12T_ls__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02066 | 0.02300 | 0.02493 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02151 | 0.02361 | 0.02534 |
| sky130_osu_sc_12T_ls__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00494 | 0.00485 | 0.00576 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00551 | 0.00540 | 0.00624 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__and2_1 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00232 | -0.00235 | -0.00235 |
| sky130_osu_sc_12T_ls__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00232 | -0.00235 | -0.00235 |
| sky130_osu_sc_12T_ls__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00232 | -0.00234 | -0.00235 |
| sky130_osu_sc_12T_ls__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00234 | -0.00236 | -0.00237 |
| sky130_osu_sc_12T_ls__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00232 | -0.00234 | -0.00235 |
| sky130_osu_sc_12T_ls__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00160 | -0.00161 | -0.00161 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__and2_1 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00235 | 0.00237 | 0.00236 |
| sky130_osu_sc_12T_ls__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00236 | 0.00235 | 0.00236 |
| sky130_osu_sc_12T_ls__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00236 | 0.00240 | 0.00236 |
| sky130_osu_sc_12T_ls__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00239 | 0.00242 | 0.00238 |
| sky130_osu_sc_12T_ls__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00236 | 0.00239 | 0.00236 |
| sky130_osu_sc_12T_ls__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00162 | 0.00162 | 0.00162 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__and2_1 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00224 | -0.00225 | -0.00224 |
| sky130_osu_sc_12T_ls__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00224 | -0.00224 | -0.00224 |
| sky130_osu_sc_12T_ls__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00224 | -0.00226 | -0.00224 |
| sky130_osu_sc_12T_ls__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00224 | -0.00225 | -0.00224 |
| sky130_osu_sc_12T_ls__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00224 | -0.00226 | -0.00224 |
| sky130_osu_sc_12T_ls__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00154 | -0.00156 | -0.00155 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__and2_1 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00226 | 0.00225 | 0.00225 |
| sky130_osu_sc_12T_ls__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00226 | 0.00224 | 0.00225 |
| sky130_osu_sc_12T_ls__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00226 | 0.00228 | 0.00225 |
| sky130_osu_sc_12T_ls__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00226 | 0.00228 | 0.00225 |
| sky130_osu_sc_12T_ls__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00226 | 0.00228 | 0.00225 |
| sky130_osu_sc_12T_ls__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00157 | 0.00158 | 0.00155 |

# SKY130_OSU_SC_12T_LS__AOI21

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__aoi21_l | 8.30280 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_12T_ls__aoi21_l | 0.00275 | 0.00293 | 0.00289 | 0.27518 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__aoi21_l | 0.00000 | 0.00429 | 0.00790 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__aoi21_l | A0->Y (FR) | 0.18471 | 1.35793 | 11.64570 |
| | A1->Y (FR) | 0.15336 | 1.26695 | 11.19260 |
| | B0->Y (FR) | 0.14330 | 1.32204 | 12.05120 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__aoi21_l | A0->Y (RF) | 0.10061 | 0.78692 | 7.24423 |
| | A1->Y (RF) | 0.09397 | 0.81142 | 7.81017 |
| | B0->Y (RF) | 0.05432 | 0.71208 | 7.41413 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00561 | 0.00554 | 0.00554 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00479 | 0.00472 | 0.00469 |
| | B0 | 0.00451 | 0.00442 | 0.00447 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00111 | 0.00090 | 0.00091 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00112 | 0.00091 | 0.00097 |
| | B0 | -0.00044 | -0.00052 | -0.00054 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00185 | -0.00194 | -0.00193 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | -0.00198 | -0.00199 | -0.00198 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00198 | -0.00199 | -0.00198 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00193 | 0.00194 | 0.00193 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | 0.00198 | 0.00201 | 0.00199 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00200 | 0.00201 | 0.00199 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00185 | -0.00194 | -0.00193 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | -0.00198 | -0.00199 | -0.00198 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00215 | -0.00216 | -0.00217 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00192 | 0.00194 | 0.00193 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | 0.00198 | 0.00201 | 0.00199 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00217 | 0.00218 | 0.00217 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi21_l | (A0 * A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !Y) | -0.00093 | -0.00093 | -0.00093 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi21_l | (A0 * A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !Y) | 0.00103 | 0.00104 | 0.00096 |

# SKY130_OSU_SC_12T_LS__AOI22

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__aoi22_1 | 10.25640 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_12T_ls__aoi22_1 | 0.00275 | 0.00293 | 0.00307 | 0.00289 | 0.27217 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__aoi22_1 | 0.00000 | 0.00437 | 0.00988 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__aoi22_l | A0->Y (FR) | 0.23452 | 1.41417 | 11.65130 |
| | A1->Y (FR) | 0.21042 | 1.38289 | 11.59340 |
| | B0->Y (FR) | 0.15244 | 1.32159 | 11.97800 |
| | B1->Y (FR) | 0.17692 | 1.35581 | 12.04460 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__aoi22_l | A0->Y (RF) | 0.13343 | 0.82021 | 7.24295 |
| | A1->Y (RF) | 0.12659 | 0.84453 | 7.80890 |
| | B0->Y (RF) | 0.07133 | 0.78045 | 7.73662 |
| | B1->Y (RF) | 0.07876 | 0.75577 | 7.16989 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | A0 | 0.00687 | 0.00680 | 0.00679 |
| | A1 | 0.00607 | 0.00598 | 0.00594 |
| | B0 | 0.00484 | 0.00470 | 0.00480 |
| | B1 | 0.00565 | 0.00554 | 0.00565 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | A0 | 0.00227 | 0.00208 | 0.00205 |
| | A1 | 0.00228 | 0.00208 | 0.00211 |
| | B0 | -0.00023 | -0.00032 | -0.00026 |
| | B1 | -0.00020 | -0.00030 | -0.00030 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | (A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * B1 * !Y) | -0.00186 | -0.00194 | -0.00193 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | -0.00198 | -0.00199 | -0.00198 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | -0.00198 | -0.00198 | -0.00198 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00198 | -0.00198 | -0.00198 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | (A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * B1 * !Y) | 0.00192 | 0.00195 | 0.00193 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | 0.00198 | 0.00200 | 0.00199 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | 0.00200 | 0.00201 | 0.00199 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00200 | 0.00201 | 0.00199 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | (A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * B1 * !Y) | -0.00186 | -0.00194 | -0.00193 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | -0.00198 | -0.00199 | -0.00199 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | -0.00214 | -0.00215 | -0.00216 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00214 | -0.00215 | -0.00216 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | (A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * B1 * !Y) | 0.00192 | 0.00194 | 0.00193 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | 0.00199 | 0.00201 | 0.00199 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | 0.00216 | 0.00217 | 0.00217 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00216 | 0.00217 | 0.00217 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | (A0 * A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B1 * !Y) | -0.00093 | -0.00093 | -0.00093 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | -0.00092 | -0.00093 | -0.00092 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | -0.00223 | -0.00224 | -0.00225 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | -0.00223 | -0.00224 | -0.00225 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | (A0 * A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B1 * !Y) | 0.00107 | 0.00107 | 0.00096 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | 0.00092 | 0.00093 | 0.00092 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | 0.00225 | 0.00227 | 0.00226 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | 0.00225 | 0.00227 | 0.00226 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | (A0 * A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B0 * !Y) | -0.00093 | -0.00094 | -0.00094 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | -0.00093 | -0.00094 | -0.00093 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00208 | -0.00208 | -0.00208 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | -0.00208 | -0.00209 | -0.00208 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__aoi22_l | (A0 * A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B0 * !Y) | 0.00108 | 0.00108 | 0.00098 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | 0.00094 | 0.00094 | 0.00093 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00210 | 0.00210 | 0.00208 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | 0.00210 | 0.00210 | 0.00208 |

# SKY130_OSU_SC_12T_LS__BUFx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_12T_ls__buf_1 | 6.34920 |
| sky130_osu_sc_12T_ls__buf_2 | 8.30280 |
| sky130_osu_sc_12T_ls__buf_4 | 12.21000 |
| sky130_osu_sc_12T_ls__buf_6 | 16.11720 |
| sky130_osu_sc_12T_ls__buf_8 | 20.02440 |
| sky130_osu_sc_12T_ls__buf_l | 6.34920 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| sky130_osu_sc_12T_ls__buf_1 | 0.00313 | 0.59723 |
| sky130_osu_sc_12T_ls__buf_2 | 0.00313 | 1.23205 |
| sky130_osu_sc_12T_ls__buf_4 | 0.00312 | 2.45334 |
| sky130_osu_sc_12T_ls__buf_6 | 0.00085 | 1.80000 |
| sky130_osu_sc_12T_ls__buf_8 | 0.00312 | 4.80001 |
| sky130_osu_sc_12T_ls__buf_l | 0.00228 | 0.45634 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_12T_ls__buf_1** | 0.00000 | 0.00646 | 0.00646 |
| **sky130_osu_sc_12T_ls__buf_2** | 0.00000 | 0.00588 | 0.00652 |
| **sky130_osu_sc_12T_ls__buf_4** | 0.00000 | 0.00854 | 0.00890 |
| **sky130_osu_sc_12T_ls__buf_6** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_12T_ls__buf_8** | 0.00000 | 0.01385 | 0.01403 |
| **sky130_osu_sc_12T_ls__buf_l** | 0.00000 | 0.00502 | 0.00502 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_12T_ls__buf_1** | **A->Y (RR)** | 0.11908 | 0.95490 | 7.93739 |
| **sky130_osu_sc_12T_ls__buf_2** | **A->Y (RR)** | 0.12540 | 0.85359 | 8.23345 |
| **sky130_osu_sc_12T_ls__buf_4** | **A->Y (RR)** | 0.16620 | 0.84146 | 8.70834 |
| **sky130_osu_sc_12T_ls__buf_8** | **A->Y (RR)** | 0.24796 | 0.90675 | 9.31834 |
| **sky130_osu_sc_12T_ls__buf_l** | **A->Y (RR)** | 0.12820 | 1.05386 | 8.27120 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_12T_ls__buf_1** | **A->Y (FF)** | 0.13786 | 0.81692 | 6.15920 |
| **sky130_osu_sc_12T_ls__buf_2** | **A->Y (FF)** | 0.16434 | 0.81149 | 6.66392 |
| **sky130_osu_sc_12T_ls__buf_4** | **A->Y (FF)** | 0.23808 | 0.86839 | 7.32478 |
| **sky130_osu_sc_12T_ls__buf_8** | **A->Y (FF)** | 0.38505 | 1.02196 | 8.13187 |
| **sky130_osu_sc_12T_ls__buf_l** | **A->Y (FF)** | 0.14481 | 0.89911 | 6.49172 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__buf_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00267 | 0.00221 | 0.00356 |
| sky130_osu_sc_12T_ls__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00500 | 0.00479 | 0.00604 |
| sky130_osu_sc_12T_ls__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01034 | 0.01062 | 0.01187 |
| sky130_osu_sc_12T_ls__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02099 | 0.02196 | 0.02394 |
| sky130_osu_sc_12T_ls__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00202 | 0.00173 | 0.00257 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__buf_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00656 | 0.00636 | 0.00765 |
| sky130_osu_sc_12T_ls__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00816 | 0.00829 | 0.00949 |
| sky130_osu_sc_12T_ls__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01223 | 0.01306 | 0.01428 |
| sky130_osu_sc_12T_ls__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02053 | 0.02254 | 0.02420 |
| sky130_osu_sc_12T_ls__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00492 | 0.00478 | 0.00570 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_12T_ls__buf_6 | 0.00000 | 0.00000 | 0.00000 |
| | -0.00052 | -0.00052 | -0.00051 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_12T_ls__buf_6 | 0.00000 | 0.00000 | 0.00000 |
| | 0.00052 | 0.00052 | 0.00051 |

# SKY130_OSU_SC_12T_LS__DFFRx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__dffr_1 | 42.49080 |
| sky130_osu_sc_12T_ls__dffr_l | 42.49080 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | |
|---|---|---|---|---|---|
| | D | RN | CK | Q | QN |
| sky130_osu_sc_12T_ls__dffr_1 | 0.00287 | 0.00288 | 0.00890 | 0.62818 | 0.62463 |
| sky130_osu_sc_12T_ls__dffr_l | 0.00287 | 0.00288 | 0.00888 | 0.45257 | 0.45356 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__dffr_1 | 0.00000 | 0.02684 | 0.02941 |
| sky130_osu_sc_12T_ls__dffr_l | 0.00000 | 0.02541 | 0.02798 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffr_1 | CK->Q (RR) | 0.69855 | 2.27358 | 16.85920 |
| | QN->Q (FR) | 0.05934 | 1.09319 | 13.03060 |
| sky130_osu_sc_12T_ls__dffr_l | CK->Q (RR) | 0.69328 | 2.44042 | 16.97440 |
| | QN->Q (FR) | 0.06572 | 1.16171 | 12.74510 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffr_1 | CK->Q (RF) | 0.68123 | 2.35422 | 18.40350 |
| | QN->Q (RF) | 0.04030 | 0.77371 | 9.37723 |
| | RN->Q (FF) | 0.49159 | 2.26868 | 19.57420 |
| sky130_osu_sc_12T_ls__dffr_l | CK->Q (RF) | 0.69152 | 2.58665 | 18.78640 |
| | QN->Q (RF) | 0.04620 | 0.84752 | 9.55998 |
| | RN->Q (FF) | 0.50138 | 2.50388 | 19.94870 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffr_1 | CK->QN (RR) | 0.60526 | 1.46793 | 8.71604 |
| | RN->QN (FR) | 0.41536 | 1.38178 | 9.88445 |
| sky130_osu_sc_12T_ls__dffr_l | CK->QN (RR) | 0.60208 | 1.54447 | 8.74524 |
| | RN->QN (FR) | 0.41110 | 1.45938 | 9.91007 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_12T_ls__dffr_1** | **CK->QN (RF)** | 0.59549 | 1.24466 | 5.68205 |
| **sky130_osu_sc_12T_ls__dffr_l** | **CK->QN (RF)** | 0.58145 | 1.29042 | 5.93877 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | hold | CK (R) | -0.14639 | -0.15529 | -0.49219 |
| | setup | CK (R) | 0.52747 | 0.51580 | 1.67578 |
| sky130_osu_sc_12T_ls__dffr_l | hold | CK (R) | -0.14831 | -0.15645 | -0.49190 |
| | setup | CK (R) | 0.52786 | 0.51613 | 1.67845 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | hold | CK (R) | -0.27794 | -0.58389 | -4.45812 |
| | setup | CK (R) | 0.33198 | 0.60206 | 4.49760 |
| sky130_osu_sc_12T_ls__dffr_l | hold | CK (R) | -0.27814 | -0.58474 | -4.45684 |
| | setup | CK (R) | 0.33176 | 0.60206 | 4.49752 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | hold | CK (R) | -0.14639 | -0.15529 | -0.49219 |
| | setup | CK (R) | 0.52747 | 0.51580 | 1.67578 |
| sky130_osu_sc_12T_ls__dffr_l | hold | CK (R) | -0.14831 | -0.15645 | -0.49190 |
| | setup | CK (R) | 0.52786 | 0.51613 | 1.67845 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | hold | CK (R) | -0.27794 | -0.58389 | -4.45812 |
| | setup | CK (R) | 0.33198 | 0.60206 | 4.49760 |
| sky130_osu_sc_12T_ls__dffr_l | hold | CK (R) | -0.27814 | -0.58474 | -4.45684 |
| | setup | CK (R) | 0.33176 | 0.60206 | 4.49752 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | recovery | CK (R) | 0.44395 | 0.45279 | 1.62482 |
| | removal | CK (R) | -0.09079 | -0.10516 | -0.14703 |
| sky130_osu_sc_12T_ls__dffr_l | recovery | CK (R) | 0.44325 | 0.45293 | 1.64346 |
| | removal | CK (R) | -0.09079 | -0.10516 | -0.14703 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | recovery | CK (R) | 0.44395 | 0.45279 | 1.62482 |
| | removal | CK (R) | -0.09079 | -0.10516 | -0.14703 |
| sky130_osu_sc_12T_ls__dffr_l | recovery | CK (R) | 0.44325 | 0.45293 | 1.64346 |
| | removal | CK (R) | -0.09079 | -0.10516 | -0.14703 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | min_pulse_width | RN () | 0.30775 | 0.56498 | 13.33370 |
| | min_pulse_width | RN () | 0.30448 | 0.56279 | 13.33370 |
| sky130_osu_sc_12T_ls__dffr_l | min_pulse_width | RN () | 0.30122 | 0.56060 | 13.33370 |
| | min_pulse_width | RN () | 0.29911 | 0.56060 | 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_12T_ls__dffr_1 | min_pulse_width | CK () | 0.32183 | 0.52124 | 13.33370 |
| | min_pulse_width | CK () | 0.37266 | 0.52124 | 13.33370 |
| sky130_osu_sc_12T_ls__dffr_l | min_pulse_width | CK () | 0.30228 | 0.52124 | 13.33370 |
| | min_pulse_width | CK () | 0.36093 | 0.52124 | 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_12T_ls__dffr_1 | min_pulse_width | CK () | 0.68196 | 0.72899 | 13.33370 |
| | min_pulse_width | CK () | 0.27882 | 0.52124 | 13.33370 |
| sky130_osu_sc_12T_ls__dffr_l | min_pulse_width | CK () | 0.68196 | 0.72899 | 13.33370 |
| | min_pulse_width | CK () | 0.27882 | 0.52124 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00648 | 0.00572 | 0.00292 |
| sky130_osu_sc_12T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00575 | 0.00505 | 0.00418 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00751 | 0.00692 | 0.00384 |
| | RN | -0.00089 | -0.03480 | -0.40203 |
| | RN | 0.01688 | 0.01642 | 0.01309 |
| sky130_osu_sc_12T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00676 | 0.00624 | 0.00484 |
| | RN | -0.00089 | -0.02858 | -0.28965 |
| | RN | 0.01612 | 0.01573 | 0.01405 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00751 | 0.00692 | 0.00384 |
| | RN | -0.00089 | -0.03468 | -0.39976 |
| | RN | 0.01688 | 0.01642 | 0.01307 |
| sky130_osu_sc_12T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00676 | 0.00624 | 0.00483 |
| | RN | -0.00089 | -0.02862 | -0.29028 |
| | RN | 0.01612 | 0.01573 | 0.01402 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00646 | 0.00571 | 0.00294 |
| sky130_osu_sc_12T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00573 | 0.00503 | 0.00410 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00178 | -0.00196 | -0.00195 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00782 | 0.00739 | 0.00794 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00322 | 0.00284 | 0.00345 |
| sky130_osu_sc_12T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00178 | -0.00196 | -0.00195 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00782 | 0.00739 | 0.00794 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00322 | 0.00284 | 0.00345 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00194 | 0.00196 | 0.00195 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01248 | 0.01226 | 0.01262 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00604 | 0.00587 | 0.00639 |
| sky130_osu_sc_12T_ls__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00194 | 0.00196 | 0.00195 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01248 | 0.01226 | 0.01262 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00604 | 0.00587 | 0.00639 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00252 | 0.00209 | 0.00327 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.00742 | 0.00678 | 0.00783 |
| sky130_osu_sc_12T_ls__dffr_l | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00252 | 0.00209 | 0.00327 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.00742 | 0.00678 | 0.00783 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00630 | 0.00602 | 0.00727 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01277 | 0.01229 | 0.01327 |
| sky130_osu_sc_12T_ls__dffr_l | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00630 | 0.00602 | 0.00727 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01277 | 0.01229 | 0.01327 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00042 | -0.00105 | 0.00006 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00391 | 0.00307 | 0.00399 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00047 | -0.00110 | 0.00004 |
| sky130_osu_sc_12T_ls__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00042 | -0.00105 | 0.00006 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00391 | 0.00308 | 0.00399 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00047 | -0.00110 | 0.00004 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.00998 | 0.00959 | 0.01070 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.02033 | 0.01961 | 0.02018 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.01545 | 0.01497 | 0.01573 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.02011 | 0.01934 | 0.02162 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01099 | 0.01056 | 0.01164 |
| sky130_osu_sc_12T_ls__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.00998 | 0.00959 | 0.01070 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.02033 | 0.01961 | 0.02018 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.01545 | 0.01501 | 0.01573 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.02011 | 0.01934 | 0.02162 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01099 | 0.01056 | 0.01164 |

# SKY130_OSU_SC_12T_LS__DFFSRx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__dffsr_1** | 46.39800 |
| **sky130_osu_sc_12T_ls__dffsr_l** | 46.39800 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) | |
|---|---|---|---|---|---|---|
| | **D** | **RN** | **SN** | **CK** | **Q** | **QN** |
| **sky130_osu_sc_12T_ls__dffsr_1** | 0.00283 | 0.00289 | 0.00664 | 0.00903 | 0.63577 | 0.64096 |
| **sky130_osu_sc_12T_ls__dffsr_l** | 0.00283 | 0.00289 | 0.00665 | 0.00902 | 0.45128 | 0.45270 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_12T_ls__dffsr_1** | 0.00000 | 0.03012 | 0.03872 |
| **sky130_osu_sc_12T_ls__dffsr_l** | 0.00000 | 0.02869 | 0.03729 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK->Q (RR) | 0.73310 | 2.31832 | 17.01600 |
| | QN->Q (FR) | 0.05678 | 1.06584 | 12.75100 |
| | RN->Q (RR) | 0.58785 | 2.19473 | 17.05550 |
| | SN->Q (FR) | 0.55176 | 2.21750 | 18.54500 |
| sky130_osu_sc_12T_ls__dffsr_l | CK->Q (RR) | 0.73818 | 2.50122 | 17.07580 |
| | QN->Q (FR) | 0.06561 | 1.15907 | 12.71510 |
| | RN->Q (RR) | 0.59330 | 2.37767 | 17.11440 |
| | SN->Q (FR) | 0.55427 | 2.39681 | 18.56950 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK->Q (RF) | 0.79861 | 2.47472 | 18.49560 |
| | QN->Q (RF) | 0.04004 | 0.77601 | 9.42859 |
| | RN->Q (FF) | 0.52186 | 2.29567 | 19.66650 |
| sky130_osu_sc_12T_ls__dffsr_l | CK->Q (RF) | 0.81155 | 2.71919 | 18.88340 |
| | QN->Q (RF) | 0.04599 | 0.84620 | 9.54310 |
| | RN->Q (FF) | 0.53757 | 2.54178 | 20.04840 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK->QN (RR) | 0.72024 | 1.59553 | 8.87761 |
| | RN->QN (FR) | 0.44580 | 1.41623 | 10.04690 |
| sky130_osu_sc_12T_ls__dffsr_l | CK->QN (RR) | 0.71897 | 1.67612 | 8.87802 |
| | RN->QN (FR) | 0.44625 | 1.49986 | 10.04350 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK->QN (RF) | 0.63395 | 1.30208 | 5.92496 |
| | RN->QN (RF) | 0.48917 | 1.18056 | 5.96219 |
| | SN->QN (FF) | 0.45283 | 1.20327 | 7.44892 |
| sky130_osu_sc_12T_ls__dffsr_l | CK->QN (RF) | 0.62866 | 1.35311 | 6.07760 |
| | RN->QN (RF) | 0.48355 | 1.23195 | 6.11315 |
| | SN->QN (FF) | 0.44464 | 1.25033 | 7.56433 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | hold | CK (R) | -0.16827 | -0.17609 | -0.60828 |
| | setup | CK (R) | 0.54096 | 0.52578 | 1.74168 |
| sky130_osu_sc_12T_ls__dffsr_l | hold | CK (R) | -0.16773 | -0.17609 | -0.60906 |
| | setup | CK (R) | 0.53948 | 0.52548 | 1.74027 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | hold | CK (R) | -0.32353 | -0.61476 | -4.64274 |
| | setup | CK (R) | 0.39922 | 0.63405 | 4.67049 |
| sky130_osu_sc_12T_ls__dffsr_l | hold | CK (R) | -0.32196 | -0.61589 | -4.64347 |
| | setup | CK (R) | 0.39846 | 0.63399 | 4.67048 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | hold | CK (R) | -0.16827 | -0.17609 | -0.60828 |
| | setup | CK (R) | 0.54096 | 0.52578 | 1.74168 |
| sky130_osu_sc_12T_ls__dffsr_l | hold | CK (R) | -0.16773 | -0.17609 | -0.60906 |
| | setup | CK (R) | 0.53948 | 0.52548 | 1.74027 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | hold | CK (R) | -0.32353 | -0.61476 | -4.64274 |
| | setup | CK (R) | 0.39922 | 0.63405 | 4.67049 |
| sky130_osu_sc_12T_ls__dffsr_l | hold | CK (R) | -0.32196 | -0.61589 | -4.64347 |
| | setup | CK (R) | 0.39846 | 0.63399 | 4.67048 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | recovery | CK (R) | 0.41284 | 0.41465 | 1.55366 |
| | removal | CK (R) | -0.06106 | -0.06894 | -0.12071 |
| | hold | SN (R) | -0.43900 | -0.66221 | -3.51402 |
| | setup | SN (R) | 0.48124 | 0.71381 | 5.67824 |
| sky130_osu_sc_12T_ls__dffsr_l | recovery | CK (R) | 0.41261 | 0.41286 | 1.54998 |
| | removal | CK (R) | -0.06106 | -0.06894 | -0.12071 |
| | hold | SN (R) | -0.43052 | -0.65025 | -3.44257 |
| | setup | SN (R) | 0.47777 | 0.70019 | 5.59088 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | recovery | CK (R) | 0.41284 | 0.41465 | 1.55366 |
| | removal | CK (R) | -0.06106 | -0.06894 | -0.12071 |
| | hold | SN (R) | -0.44132 | -0.66221 | -3.51402 |
| | hold | SN (R) | -0.43900 | -0.66467 | -3.52875 |
| | setup | SN (R) | 0.47675 | 0.70731 | 5.56714 |
| | setup | SN (R) | 0.48124 | 0.71381 | 5.67824 |
| sky130_osu_sc_12T_ls__dffsr_l | recovery | CK (R) | 0.41261 | 0.41286 | 1.54998 |
| | removal | CK (R) | -0.06106 | -0.06894 | -0.12071 |
| | hold | SN (R) | -0.43278 | -0.65025 | -3.44257 |
| | hold | SN (R) | -0.43052 | -0.65387 | -3.47512 |
| | setup | SN (R) | 0.47777 | 0.69510 | 5.47229 |
| | setup | SN (R) | 0.45437 | 0.70019 | 5.59088 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | min_pulse_width | RN () | 0.34511 | 0.59341 | 13.33370 |
| | min_pulse_width | RN () | 0.35853 | 0.59341 | 13.33370 |
| sky130_osu_sc_12T_ls__dffsr_l | min_pulse_width | RN () | 0.34485 | 0.58903 | 13.33370 |
| | min_pulse_width | RN () | 0.34929 | 0.58903 | 13.33370 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | recovery | CK (R) | 0.09615 | 0.12207 | 2.68979 |
| | removal | CK (R) | -0.03492 | -0.08256 | -0.59931 |
| sky130_osu_sc_12T_ls__dffsr_l | recovery | CK (R) | 0.09527 | 0.12152 | 2.55861 |
| | removal | CK (R) | -0.03741 | -0.08007 | -0.60180 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | recovery | CK (R) | 0.09615 | 0.12207 | 2.68979 |
| | removal | CK (R) | -0.03492 | -0.08256 | -0.59931 |
| sky130_osu_sc_12T_ls__dffsr_l | recovery | CK (R) | 0.09527 | 0.12152 | 2.55861 |
| | removal | CK (R) | -0.03741 | -0.08007 | -0.60180 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | min_pulse_width | SN () | 0.42702 | 0.68744 | 13.33370 |
| | min_pulse_width | SN () | 0.44141 | 0.68963 | 13.33370 |
| sky130_osu_sc_12T_ls__dffsr_l | min_pulse_width | SN () | 0.42804 | 0.67651 | 13.33370 |
| | min_pulse_width | SN () | 0.41912 | 0.67870 | 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_12T_ls__dffsr_1 | min_pulse_width | CK () | 0.33747 | 0.52124 | 13.33370 |
| | min_pulse_width | CK () | 0.39612 | 0.52124 | 13.33370 |
| sky130_osu_sc_12T_ls__dffsr_l | min_pulse_width | CK () | 0.32574 | 0.52124 | 13.33370 |
| | min_pulse_width | CK () | 0.39221 | 0.52124 | 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_12T_ls__dffsr_1 | min_pulse_width | CK () | 0.70060 | 0.73993 | 13.33370 |
| | min_pulse_width | CK () | 0.35605 | 0.56060 | 13.33370 |
| sky130_osu_sc_12T_ls__dffsr_l | min_pulse_width | CK () | 0.69853 | 0.73774 | 13.33370 |
| | min_pulse_width | CK () | 0.35605 | 0.56060 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00806 | 0.00735 | 0.00444 |
| | RN | 0.01491 | 0.01443 | 0.01070 |
| | SN | -0.00089 | -0.03505 | -0.40689 |
| | SN | 0.01656 | 0.01611 | 0.01210 |
| sky130_osu_sc_12T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00736 | 0.00672 | 0.00592 |
| | RN | 0.01421 | 0.01379 | 0.01209 |
| | SN | -0.00089 | -0.02854 | -0.28882 |
| | SN | 0.01586 | 0.01547 | 0.01347 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00867 | 0.00826 | 0.00619 |
| | RN | -0.00089 | -0.03505 | -0.40689 |
| | RN | 0.01777 | 0.01736 | 0.01508 |
| sky130_osu_sc_12T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00794 | 0.00750 | 0.00613 |
| | RN | -0.00089 | -0.02854 | -0.28882 |
| | RN | 0.01703 | 0.01659 | 0.01499 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00867 | 0.00825 | 0.00619 |
| | RN | -0.00089 | -0.03522 | -0.41021 |
| | RN | 0.01777 | 0.01736 | 0.01507 |
| sky130_osu_sc_12T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00794 | 0.00750 | 0.00615 |
| | RN | -0.00089 | -0.02859 | -0.28973 |
| | RN | 0.01703 | 0.01659 | 0.01493 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00804 | 0.00733 | 0.00433 |
| | RN | 0.01489 | 0.01441 | 0.01054 |
| | SN | -0.00089 | -0.03522 | -0.41016 |
| | SN | 0.01654 | 0.01609 | 0.01210 |
| sky130_osu_sc_12T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00735 | 0.00670 | 0.00579 |
| | RN | 0.01419 | 0.01377 | 0.01199 |
| | SN | -0.00089 | -0.02859 | -0.28971 |
| | SN | 0.01584 | 0.01545 | 0.01347 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00191 | -0.00197 | -0.00196 |
| | (!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) | 0.00998 | 0.00959 | 0.01013 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00360 | 0.00324 | 0.00382 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00357 | 0.00321 | 0.00380 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00362 | 0.00326 | 0.00384 |
| sky130_osu_sc_12T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00192 | -0.00197 | -0.00196 |
| | (!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) | 0.00998 | 0.00959 | 0.01013 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00360 | 0.00324 | 0.00382 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00357 | 0.00321 | 0.00380 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00362 | 0.00326 | 0.00384 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00197 | 0.00197 | 0.00196 |
| | (!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) | 0.01438 | 0.01417 | 0.01442 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00667 | 0.00652 | 0.00701 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00669 | 0.00655 | 0.00702 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00664 | 0.00649 | 0.00699 |
| sky130_osu_sc_12T_ls__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00197 | 0.00197 | 0.00196 |
| | (!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) | 0.01438 | 0.01417 | 0.01442 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00667 | 0.00652 | 0.00701 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00669 | 0.00655 | 0.00702 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00664 | 0.00649 | 0.00699 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_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) | 0.00211 | 0.00166 | 0.00276 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.00883 | 0.00819 | 0.00912 |
| sky130_osu_sc_12T_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) | 0.00211 | 0.00166 | 0.00276 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.00883 | 0.00819 | 0.00912 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_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) | 0.00698 | 0.00669 | 0.00796 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01367 | 0.01315 | 0.01406 |
| sky130_osu_sc_12T_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) | 0.00698 | 0.00669 | 0.00796 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01367 | 0.01315 | 0.01406 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_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) | -0.00492 | -0.00495 | -0.00496 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00522 | -0.00531 | -0.00532 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00490 | -0.00496 | -0.00498 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00238 | 0.00198 | 0.00270 |
| sky130_osu_sc_12T_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) | -0.00492 | -0.00495 | -0.00496 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00522 | -0.00531 | -0.00532 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00491 | -0.00496 | -0.00498 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00238 | 0.00200 | 0.00270 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_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) | 0.00497 | 0.00500 | 0.00497 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00529 | 0.00531 | 0.00532 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00498 | 0.00496 | 0.00498 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01095 | 0.01068 | 0.01103 |
| sky130_osu_sc_12T_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) | 0.00497 | 0.00500 | 0.00497 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00529 | 0.00531 | 0.00532 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00498 | 0.00496 | 0.00498 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01095 | 0.01068 | 0.01103 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffsr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00047 | -0.00110 | 0.00002 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00468 | 0.00389 | 0.00480 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00463 | 0.00386 | 0.00474 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00035 | -0.00098 | 0.00015 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00262 | 0.00151 | 0.00386 |
| sky130_osu_sc_12T_ls__dffsr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00047 | -0.00111 | 0.00002 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00468 | 0.00389 | 0.00480 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00463 | 0.00386 | 0.00474 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00035 | -0.00098 | 0.00015 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00262 | 0.00151 | 0.00386 |

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

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

| | | | | |
|---|---|---|---|---|
| **sky130_osu_sc_12T_ls__dffsr_1** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.02271 | 0.02203 | 0.02258 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01016 | 0.00975 | 0.01086 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.01577 | 0.01535 | 0.01609 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.01581 | 0.01540 | 0.01613 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.02207 | 0.02124 | 0.02337 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01100 | 0.01059 | 0.01167 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.01367 | 0.01296 | 0.01534 |
| **sky130_osu_sc_12T_ls__dffsr_l** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.02271 | 0.02203 | 0.02258 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01016 | 0.00975 | 0.01086 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.01577 | 0.01535 | 0.01609 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.01581 | 0.01540 | 0.01613 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.02207 | 0.02124 | 0.02337 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01100 | 0.01059 | 0.01167 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.01367 | 0.01296 | 0.01532 |

# SKY130_OSU_SC_12T_LS__DFFSx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__dffs_1 | 38.58360 |
| sky130_osu_sc_12T_ls__dffs_l | 38.58360 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | |
|---|---|---|---|---|---|
| | D | SN | CK | Q | QN |
| sky130_osu_sc_12T_ls__dffs_1 | 0.00285 | 0.00536 | 0.00895 | 0.62203 | 0.62685 |
| sky130_osu_sc_12T_ls__dffs_l | 0.00285 | 0.00536 | 0.00895 | 0.45521 | 0.45540 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__dffs_1 | 0.00000 | 0.02157 | 0.02315 |
| sky130_osu_sc_12T_ls__dffs_l | 0.00000 | 0.02014 | 0.02172 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffs_1 | CK->Q (RR) | 0.50493 | 2.04067 | 16.48760 |
| | QN->Q (FR) | 0.05938 | 1.08850 | 12.93020 |
| | SN->Q (FR) | 0.37633 | 2.05028 | 18.05400 |
| sky130_osu_sc_12T_ls__dffs_l | CK->Q (RR) | 0.51063 | 2.23945 | 16.86700 |
| | QN->Q (FR) | 0.06572 | 1.16111 | 12.76740 |
| | SN->Q (FR) | 0.38064 | 2.24677 | 18.37310 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffs_1 | CK->Q (RF) | 0.78029 | 2.45667 | 18.32930 |
| | QN->Q (RF) | 0.04014 | 0.76924 | 9.31597 |
| sky130_osu_sc_12T_ls__dffs_l | CK->Q (RF) | 0.78385 | 2.69532 | 18.97110 |
| | QN->Q (RF) | 0.04608 | 0.84786 | 9.57511 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffs_1 | CK->QN (RR) | 0.69995 | 1.57918 | 8.83470 |
| sky130_osu_sc_12T_ls__dffs_l | CK->QN (RR) | 0.69019 | 1.64624 | 8.86199 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dffs_1 | CK->QN (RF) | 0.41397 | 1.02718 | 5.49021 |
| | SN->QN (FF) | 0.28443 | 1.03820 | 7.05526 |
| sky130_osu_sc_12T_ls__dffs_l | CK->QN (RF) | 0.41011 | 1.09026 | 5.77013 |
| | SN->QN (FF) | 0.27920 | 1.09780 | 7.27349 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | hold | CK (R) | -0.12010 | -0.13517 | -0.46684 |
| | setup | CK (R) | 0.35733 | 0.35865 | 1.61152 |
| sky130_osu_sc_12T_ls__dffs_l | hold | CK (R) | -0.12090 | -0.13445 | -0.47081 |
| | setup | CK (R) | 0.35667 | 0.35354 | 1.61447 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | hold | CK (R) | -0.29336 | -0.58761 | -4.49421 |
| | setup | CK (R) | 0.38228 | 0.61350 | 4.54091 |
| sky130_osu_sc_12T_ls__dffs_l | hold | CK (R) | -0.29340 | -0.58669 | -4.49313 |
| | setup | CK (R) | 0.38186 | 0.61350 | 4.54079 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | hold | CK (R) | -0.12010 | -0.13517 | -0.46684 |
| | setup | CK (R) | 0.35733 | 0.35865 | 1.61152 |
| sky130_osu_sc_12T_ls__dffs_l | hold | CK (R) | -0.12090 | -0.13445 | -0.47081 |
| | setup | CK (R) | 0.35667 | 0.35354 | 1.61447 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | hold | CK (R) | -0.29336 | -0.58761 | -4.49421 |
| | setup | CK (R) | 0.38228 | 0.61350 | 4.54091 |
| sky130_osu_sc_12T_ls__dffs_l | hold | CK (R) | -0.29340 | -0.58669 | -4.49313 |
| | setup | CK (R) | 0.38186 | 0.61350 | 4.54079 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | recovery | CK (R) | 0.11215 | 0.14600 | 1.81841 |
| | removal | CK (R) | -0.05036 | -0.10017 | -0.88547 |
| sky130_osu_sc_12T_ls__dffs_l | recovery | CK (R) | 0.11108 | 0.14600 | 1.69443 |
| | removal | CK (R) | -0.05036 | -0.10017 | -0.88547 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | recovery | CK (R) | 0.11215 | 0.14600 | 1.81841 |
| | removal | CK (R) | -0.05036 | -0.10017 | -0.88547 |
| sky130_osu_sc_12T_ls__dffs_l | recovery | CK (R) | 0.11108 | 0.14600 | 1.69443 |
| | removal | CK (R) | -0.05036 | -0.10017 | -0.88547 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | min_pulse_width | SN () | 0.25504 | 0.63277 | 13.33370 |
| | min_pulse_width | SN () | 0.25828 | 0.63496 | 13.33370 |
| sky130_osu_sc_12T_ls__dffs_l | min_pulse_width | SN () | 0.24918 | 0.61746 | 13.33370 |
| | min_pulse_width | SN () | 0.24851 | 0.62184 | 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_12T_ls__dffs_1 | min_pulse_width | CK () | 0.22016 | 0.52124 | 13.33370 |
| | min_pulse_width | CK () | 0.39221 | 0.52124 | 13.33370 |
| sky130_osu_sc_12T_ls__dffs_l | min_pulse_width | CK () | 0.21235 | 0.52124 | 13.33370 |
| | min_pulse_width | CK () | 0.38048 | 0.52124 | 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_12T_ls__dffs_1 | min_pulse_width | CK () | 0.51100 | 0.59122 | 13.33370 |
| | min_pulse_width | CK () | 0.34439 | 0.53217 | 13.33370 |
| sky130_osu_sc_12T_ls__dffs_l | min_pulse_width | CK () | 0.51100 | 0.59122 | 13.33370 |
| | min_pulse_width | CK () | 0.34039 | 0.53217 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00649 | 0.00573 | 0.00316 |
| | SN | -0.00089 | -0.03459 | -0.39810 |
| | SN | 0.01394 | 0.01337 | 0.00992 |
| sky130_osu_sc_12T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00575 | 0.00504 | 0.00430 |
| | SN | -0.00089 | -0.02868 | -0.29134 |
| | SN | 0.01319 | 0.01269 | 0.01100 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00745 | 0.00692 | 0.00398 |
| sky130_osu_sc_12T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00671 | 0.00624 | 0.00490 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00745 | 0.00693 | 0.00396 |
| sky130_osu_sc_12T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00671 | 0.00624 | 0.00491 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00647 | 0.00571 | 0.00300 |
| | SN | -0.00089 | -0.03475 | -0.40114 |
| | SN | 0.01392 | 0.01335 | 0.00974 |
| sky130_osu_sc_12T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00573 | 0.00503 | 0.00416 |
| | SN | -0.00089 | -0.02869 | -0.29144 |
| | SN | 0.01318 | 0.01267 | 0.01104 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00194 | -0.00199 | -0.00199 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00757 | 0.00714 | 0.00763 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00321 | 0.00283 | 0.00343 |
| sky130_osu_sc_12T_ls__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00194 | -0.00199 | -0.00199 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00757 | 0.00714 | 0.00763 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00321 | 0.00283 | 0.00343 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00200 | 0.00199 | 0.00199 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01237 | 0.01214 | 0.01249 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00615 | 0.00599 | 0.00651 |
| sky130_osu_sc_12T_ls__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00200 | 0.00199 | 0.00199 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01237 | 0.01214 | 0.01249 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00615 | 0.00599 | 0.00651 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | -0.00354 | -0.00356 | -0.00356 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00253 | 0.00213 | 0.00269 |
| sky130_osu_sc_12T_ls__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | -0.00354 | -0.00356 | -0.00356 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00253 | 0.00213 | 0.00269 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00357 | 0.00361 | 0.00357 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00744 | 0.00713 | 0.00774 |
| sky130_osu_sc_12T_ls__dffs_l | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00357 | 0.00361 | 0.00357 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00744 | 0.00713 | 0.00774 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00042 | -0.00105 | 0.00006 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00041 | -0.00104 | 0.00011 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00229 | 0.00117 | 0.00358 |
| sky130_osu_sc_12T_ls__dffs_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00042 | -0.00105 | 0.00006 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00041 | -0.00104 | 0.00011 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00229 | 0.00117 | 0.00358 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dffs_1 | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.02013 | 0.01944 | 0.01994 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.00999 | 0.00961 | 0.01071 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.01990 | 0.01906 | 0.02129 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01093 | 0.01054 | 0.01159 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.01296 | 0.01231 | 0.01471 |
| sky130_osu_sc_12T_ls__dffs_l | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.02013 | 0.01944 | 0.01994 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.00999 | 0.00961 | 0.01071 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.01990 | 0.01906 | 0.02129 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01093 | 0.01054 | 0.01159 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.01296 | 0.01230 | 0.01471 |

# SKY130_OSU_SC_12T_LS__DFFx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_12T_ls__dff_1 | 32.23440 |
| sky130_osu_sc_12T_ls__dff_l | 32.23440 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | D | CK | Q |
| sky130_osu_sc_12T_ls__dff_1 | 0.00300 | 0.00879 | 0.58987 |
| sky130_osu_sc_12T_ls__dff_l | 0.00300 | 0.00879 | 0.43634 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__dff_1 | 0.00000 | 0.02389 | 0.02706 |
| sky130_osu_sc_12T_ls__dff_l | 0.00000 | 0.02246 | 0.02562 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dff_1 | CK->Q (RR) | 0.43659 | 1.28592 | 8.37217 |
| sky130_osu_sc_12T_ls__dff_l | CK->Q (RR) | 0.43882 | 1.36757 | 8.42346 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__dff_1 | CK->Q (RF) | 0.62847 | 1.23700 | 5.61704 |
| sky130_osu_sc_12T_ls__dff_l | CK->Q (RF) | 0.63213 | 1.31448 | 5.97128 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | hold | CK (R) | -0.11797 | -0.13706 | -0.51141 |
| | setup | CK (R) | 0.30375 | 0.30571 | 1.61045 |
| sky130_osu_sc_12T_ls__dff_l | hold | CK (R) | -0.11791 | -0.13714 | -0.50876 |
| | setup | CK (R) | 0.30304 | 0.30571 | 1.60464 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | hold | CK (R) | -0.27054 | -0.58949 | -4.52114 |
| | setup | CK (R) | 0.31649 | 0.60870 | 4.56245 |
| sky130_osu_sc_12T_ls__dff_l | hold | CK (R) | -0.26920 | -0.58653 | -4.52390 |
| | setup | CK (R) | 0.31647 | 0.60861 | 4.56239 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | min_pulse_width | CK () | 0.19670 | 0.52124 | 13.33370 |
| | min_pulse_width | CK () | 0.34920 | 0.52124 | 13.33370 |
| sky130_osu_sc_12T_ls__dff_l | min_pulse_width | CK () | 0.19279 | 0.52124 | 13.33370 |
| | min_pulse_width | CK () | 0.34529 | 0.52124 | 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_12T_ls__dff_1** | **min_pulse_width** | **CK ()** | 0.45269 | 0.56279 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.26135 | 0.52561 | 13.33370 |
| **sky130_osu_sc_12T_ls__dff_l** | **min_pulse_width** | **CK ()** | 0.45269 | 0.56279 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.26135 | 0.52561 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01374 | 0.01251 | 0.01507 |
| sky130_osu_sc_12T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01223 | 0.01096 | 0.01341 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01531 | 0.01463 | 0.01553 |
| sky130_osu_sc_12T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01382 | 0.01311 | 0.01400 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00177 | -0.00195 | -0.00194 |
| | !CK | 0.00000 | 0.00000 | 0.00000 |
| | !CK | 0.00708 | 0.00662 | 0.00712 |
| sky130_osu_sc_12T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00177 | -0.00195 | -0.00194 |
| | !CK | 0.00000 | 0.00000 | 0.00000 |
| | !CK | 0.00708 | 0.00663 | 0.00712 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00193 | 0.00195 | 0.00194 |
| | !CK | 0.00000 | 0.00000 | 0.00000 |
| | !CK | 0.01286 | 0.01256 | 0.01303 |
| sky130_osu_sc_12T_ls__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00193 | 0.00195 | 0.00194 |
| | !CK | 0.00000 | 0.00000 | 0.00000 |
| | !CK | 0.01286 | 0.01256 | 0.01303 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | (D * Q) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q) | -0.00045 | -0.00108 | 0.00004 |
| | (!D * !Q) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q) | -0.00044 | -0.00104 | 0.00012 |
| sky130_osu_sc_12T_ls__dff_l | (D * Q) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q) | -0.00045 | -0.00108 | 0.00004 |
| | (!D * !Q) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q) | -0.00044 | -0.00104 | 0.00012 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__dff_1 | (D * Q) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q) | 0.00996 | 0.00958 | 0.01069 |
| | (D * !Q) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q) | 0.01961 | 0.01893 | 0.01951 |
| | (!D * Q) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q) | 0.02023 | 0.01935 | 0.02163 |
| | (!D * !Q) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q) | 0.01087 | 0.01043 | 0.01153 |
| sky130_osu_sc_12T_ls__dff_l | (D * Q) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q) | 0.00996 | 0.00959 | 0.01069 |
| | (D * !Q) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q) | 0.01961 | 0.01893 | 0.01951 |
| | (!D * Q) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q) | 0.02023 | 0.01937 | 0.02163 |
| | (!D * !Q) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q) | 0.01087 | 0.01043 | 0.01153 |

# SKY130_OSU_SC_12T_LS__INVx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_12T_ls__inv_1** | 4.39560 |
| **sky130_osu_sc_12T_ls__inv_10** | 21.97800 |
| **sky130_osu_sc_12T_ls__inv_2** | 6.34920 |
| **sky130_osu_sc_12T_ls__inv_3** | 8.30280 |
| **sky130_osu_sc_12T_ls__inv_4** | 10.25640 |
| **sky130_osu_sc_12T_ls__inv_6** | 14.16360 |
| **sky130_osu_sc_12T_ls__inv_8** | 18.07080 |
| **sky130_osu_sc_12T_ls__inv_l** | 4.38570 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| sky130_osu_sc_12T_ls__inv_1 | 0.00292 | 0.58478 |
| sky130_osu_sc_12T_ls__inv_10 | 0.02620 | 5.88992 |
| sky130_osu_sc_12T_ls__inv_2 | 0.00543 | 1.21781 |
| sky130_osu_sc_12T_ls__inv_3 | 0.00805 | 1.79908 |
| sky130_osu_sc_12T_ls__inv_4 | 0.01060 | 2.42207 |
| sky130_osu_sc_12T_ls__inv_6 | 0.01587 | 3.61839 |
| sky130_osu_sc_12T_ls__inv_8 | 0.02103 | 4.79036 |
| sky130_osu_sc_12T_ls__inv_l | 0.00224 | 0.43040 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__inv_1 | 0.00000 | 0.00323 | 0.00414 |
| sky130_osu_sc_12T_ls__inv_10 | 0.00000 | 0.01328 | 0.01465 |
| sky130_osu_sc_12T_ls__inv_2 | 0.00000 | 0.00266 | 0.00293 |
| sky130_osu_sc_12T_ls__inv_3 | 0.00000 | 0.00588 | 0.00707 |
| sky130_osu_sc_12T_ls__inv_4 | 0.00000 | 0.00531 | 0.00586 |
| sky130_osu_sc_12T_ls__inv_6 | 0.00000 | 0.00797 | 0.00879 |
| sky130_osu_sc_12T_ls__inv_8 | 0.00000 | 0.01062 | 0.01172 |
| sky130_osu_sc_12T_ls__inv_l | 0.00000 | 0.00251 | 0.00285 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_12T_ls__inv_1** | **A->Y (FR)** | 0.05817 | 1.03756 | 12.15650 |
| **sky130_osu_sc_12T_ls__inv_10** | **A->Y (FR)** | 0.05373 | 0.67074 | 12.16340 |
| **sky130_osu_sc_12T_ls__inv_2** | **A->Y (FR)** | 0.04182 | 0.87859 | 12.22670 |
| **sky130_osu_sc_12T_ls__inv_3** | **A->Y (FR)** | 0.04325 | 0.81546 | 12.24680 |
| **sky130_osu_sc_12T_ls__inv_4** | **A->Y (FR)** | 0.04119 | 0.76686 | 12.23200 |
| **sky130_osu_sc_12T_ls__inv_6** | **A->Y (FR)** | 0.04333 | 0.71963 | 12.23660 |
| **sky130_osu_sc_12T_ls__inv_8** | **A->Y (FR)** | 0.04790 | 0.69048 | 12.21600 |
| **sky130_osu_sc_12T_ls__inv_l** | **A->Y (FR)** | 0.06628 | 1.12053 | 12.15310 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_12T_ls__inv_1** | **A->Y (RF)** | 0.03775 | 0.71504 | 8.58701 |
| **sky130_osu_sc_12T_ls__inv_10** | **A->Y (RF)** | 0.04086 | 0.50028 | 8.79424 |
| **sky130_osu_sc_12T_ls__inv_2** | **A->Y (RF)** | 0.02912 | 0.63461 | 8.75813 |
| **sky130_osu_sc_12T_ls__inv_3** | **A->Y (RF)** | 0.03043 | 0.59963 | 8.82542 |
| **sky130_osu_sc_12T_ls__inv_4** | **A->Y (RF)** | 0.02916 | 0.57173 | 8.83703 |
| **sky130_osu_sc_12T_ls__inv_6** | **A->Y (RF)** | 0.03263 | 0.53952 | 8.85975 |
| **sky130_osu_sc_12T_ls__inv_8** | **A->Y (RF)** | 0.03651 | 0.51638 | 8.85175 |
| **sky130_osu_sc_12T_ls__inv_l** | **A->Y (RF)** | 0.04492 | 0.80303 | 8.98951 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__inv_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00340 | 0.00335 | 0.00348 |
| sky130_osu_sc_12T_ls__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02801 | 0.02764 | 0.03027 |
| sky130_osu_sc_12T_ls__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00587 | 0.00587 | 0.00619 |
| sky130_osu_sc_12T_ls__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00903 | 0.00899 | 0.00951 |
| sky130_osu_sc_12T_ls__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01148 | 0.01100 | 0.01224 |
| sky130_osu_sc_12T_ls__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01702 | 0.01721 | 0.01831 |
| sky130_osu_sc_12T_ls__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02253 | 0.02270 | 0.02431 |
| sky130_osu_sc_12T_ls__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00261 | 0.00258 | 0.00264 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| **sky130_osu_sc_12T_ls__inv_1** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00053 | -0.00059 | -0.00052 |
| **sky130_osu_sc_12T_ls__inv_10** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00976 | -0.00953 | -0.00764 |
| **sky130_osu_sc_12T_ls__inv_2** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00180 | -0.00183 | -0.00161 |
| **sky130_osu_sc_12T_ls__inv_3** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00232 | -0.00242 | -0.00203 |
| **sky130_osu_sc_12T_ls__inv_4** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00366 | -0.00367 | -0.00313 |
| **sky130_osu_sc_12T_ls__inv_6** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00561 | -0.00564 | -0.00464 |
| **sky130_osu_sc_12T_ls__inv_8** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00763 | -0.00768 | -0.00614 |
| **sky130_osu_sc_12T_ls__inv_l** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00037 | -0.00041 | -0.00040 |

# SKY130_OSU_SC_12T_LS__MUX2

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__mux2_1 | 12.21000 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | S0 | Y |
| sky130_osu_sc_12T_ls__mux2_1 | 0.08031 | 0.08021 | 0.00601 | 0.07659 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__mux2_1 | 0.00000 | 0.01073 | 0.01346 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_12T_ls__mux2_1 | A0->Y (RR) | - | 0.02878 | 0.41191 | 3.65236 |
| | A1->Y (RR) | - | 0.03552 | 0.41669 | 3.66041 |
| | S0->Y (RR) | (!A0 * A1) | 0.09270 | 0.46019 | 1.66394 |
| | S0->Y (FR) | (A0 * !A1) | 0.06066 | 0.56573 | 3.84922 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_12T_ls__mux2_1 | A0->Y (FF) | - | 0.03108 | 0.37419 | 3.17482 |
| | A1->Y (FF) | - | 0.02636 | 0.37042 | 3.16893 |
| | S0->Y (FF) | (!A0 * A1) | 0.13353 | 0.55247 | 2.69499 |
| | S0->Y (RF) | (A0 * !A1) | 0.04043 | 0.42539 | 2.78774 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__mux2_1 | A0 | - | 0.00000 | 0.00000 | 0.00000 |
| | A0 | - | -0.00325 | -0.00325 | -0.00326 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | -0.00222 | -0.00222 | -0.00222 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00434 | 0.00406 | 0.00549 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | -0.00210 | -0.00262 | -0.00124 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__mux2_1 | A0 | - | 0.00000 | 0.00000 | 0.00000 |
| | A0 | - | 0.00325 | 0.00326 | 0.00326 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | 0.00222 | 0.00222 | 0.00222 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00069 | 0.00016 | 0.00158 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | 0.00896 | 0.00866 | 0.00995 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__mux2_1 | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * S0 * Y) + (!A1 * S0 * !Y) | -0.00083 | -0.00082 | -0.00082 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__mux2_1 | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00083 | 0.00082 | 0.00082 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__mux2_1 | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | -0.00100 | -0.00099 | -0.00099 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__mux2_1 | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00100 | 0.00099 | 0.00099 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__mux2_1 | (A0 * A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * Y) | -0.00073 | -0.00123 | 0.00018 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | -0.00070 | -0.00124 | 0.00016 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__mux2_1 | (A0 * A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * Y) | 0.00694 | 0.00663 | 0.00797 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | 0.00635 | 0.00605 | 0.00750 |

# SKY130_OSU_SC_12T_LS__NAND2x

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__nand2_1 | 6.34920 |
| sky130_osu_sc_12T_ls__nand2_l | 6.34920 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_12T_ls__nand2_1 | 0.00290 | 0.00290 | 0.55826 |
| sky130_osu_sc_12T_ls__nand2_l | 0.00219 | 0.00222 | 0.40705 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__nand2_1 | 0.00000 | 0.00268 | 0.00331 |
| sky130_osu_sc_12T_ls__nand2_l | 0.00000 | 0.00221 | 0.00296 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__nand2_1 | A->Y (FR) | 0.06135 | 1.02559 | 11.86640 |
| | B->Y (FR) | 0.06942 | 1.00576 | 11.55020 |
| sky130_osu_sc_12T_ls__nand2_l | A->Y (FR) | 0.06732 | 1.10178 | 11.78910 |
| | B->Y (FR) | 0.07809 | 1.11019 | 11.78540 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__nand2_1 | A->Y (RF) | 0.06709 | 1.00298 | 11.39370 |
| | B->Y (RF) | 0.07485 | 0.97749 | 10.88490 |
| sky130_osu_sc_12T_ls__nand2_l | A->Y (RF) | 0.07608 | 1.11702 | 11.70700 |
| | B->Y (RF) | 0.08371 | 1.09730 | 11.23770 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00359 | 0.00355 | 0.00366 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00444 | 0.00435 | 0.00448 |
| sky130_osu_sc_12T_ls__nand2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00263 | 0.00260 | 0.00267 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00320 | 0.00316 | 0.00323 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00030 | -0.00038 | -0.00032 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00028 | -0.00038 | -0.00035 |
| sky130_osu_sc_12T_ls__nand2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00018 | -0.00024 | -0.00023 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00018 | -0.00024 | -0.00024 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nand2_1 | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00224 | -0.00226 | -0.00227 |
| sky130_osu_sc_12T_ls__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00156 | -0.00156 | -0.00157 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nand2_1 | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00226 | 0.00227 | 0.00228 |
| sky130_osu_sc_12T_ls__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00157 | 0.00157 | 0.00157 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nand2_1 | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00211 | -0.00213 | -0.00212 |
| sky130_osu_sc_12T_ls__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00148 | -0.00148 | -0.00148 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nand2_1 | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00214 | 0.00215 | 0.00212 |
| sky130_osu_sc_12T_ls__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00149 | 0.00150 | 0.00148 |

# SKY130_OSU_SC_12T_LS__NOR2x

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__nor2_1 | 6.34920 |
| sky130_osu_sc_12T_ls__nor2_l | 6.34920 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_12T_ls__nor2_1 | 0.00285 | 0.00314 | 0.29667 |
| sky130_osu_sc_12T_ls__nor2_l | 0.00210 | 0.00232 | 0.21984 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__nor2_1 | 0.00000 | 0.00374 | 0.00431 |
| sky130_osu_sc_12T_ls__nor2_l | 0.00000 | 0.00298 | 0.00365 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__nor2_1 | A->Y (FR) | 0.13811 | 1.28250 | 11.69620 |
| | B->Y (FR) | 0.11308 | 1.26116 | 12.00160 |
| sky130_osu_sc_12T_ls__nor2_l | A->Y (FR) | 0.14449 | 1.37904 | 11.62920 |
| | B->Y (FR) | 0.12505 | 1.35968 | 11.88570 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__nor2_1 | A->Y (RF) | 0.04937 | 0.61346 | 6.39352 |
| | B->Y (RF) | 0.04005 | 0.60002 | 6.37099 |
| sky130_osu_sc_12T_ls__nor2_l | A->Y (RF) | 0.05559 | 0.67282 | 6.73887 |
| | B->Y (RF) | 0.04668 | 0.66248 | 6.71873 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00467 | 0.00460 | 0.00460 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00369 | 0.00358 | 0.00372 |
| sky130_osu_sc_12T_ls__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00330 | 0.00325 | 0.00325 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00271 | 0.00265 | 0.00270 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00047 | 0.00028 | 0.00037 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00042 | -0.00045 | -0.00040 |
| sky130_osu_sc_12T_ls__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00034 | 0.00022 | 0.00026 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00025 | -0.00029 | -0.00028 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nor2_1 | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00178 | -0.00197 | -0.00196 |
| sky130_osu_sc_12T_ls__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00119 | -0.00130 | -0.00131 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nor2_1 | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00196 | 0.00197 | 0.00196 |
| sky130_osu_sc_12T_ls__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00131 | 0.00130 | 0.00131 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nor2_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00093 | -0.00093 | -0.00093 |
| sky130_osu_sc_12T_ls__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00065 | -0.00066 | -0.00064 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__nor2_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00099 | 0.00098 | 0.00095 |
| sky130_osu_sc_12T_ls__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00068 | 0.00069 | 0.00066 |

# SKY130_OSU_SC_12T_LS__OAI21

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

---

## 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_12T_ls__oai21_l | 8.30280 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_12T_ls__oai21_l | 0.00290 | 0.00298 | 0.00250 | 0.29578 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__oai21_l | 0.00000 | 0.00452 | 0.00716 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__oai21_l | A0->Y (FR) | 0.15663 | 1.30809 | 12.04000 |
| | A1->Y (FR) | 0.18741 | 1.33550 | 11.73540 |
| | B0->Y (FR) | 0.08471 | 0.99362 | 9.96859 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__oai21_l | A0->Y (RF) | 0.08839 | 0.80209 | 7.59104 |
| | A1->Y (RF) | 0.10892 | 0.81252 | 7.52985 |
| | B0->Y (RF) | 0.07015 | 0.81891 | 8.22117 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00498 | 0.00487 | 0.00496 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00601 | 0.00593 | 0.00590 |
| | B0 | 0.00409 | 0.00392 | 0.00414 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00025 | 0.00018 | 0.00018 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00117 | 0.00097 | 0.00098 |
| | B0 | 0.00155 | 0.00145 | 0.00151 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00094 | -0.00095 | -0.00094 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | -0.00195 | -0.00198 | -0.00198 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00204 | -0.00204 | -0.00204 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00100 | 0.00099 | 0.00095 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | 0.00197 | 0.00198 | 0.00198 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00204 | 0.00205 | 0.00205 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00173 | -0.00190 | -0.00190 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | -0.00193 | -0.00197 | -0.00197 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00201 | -0.00202 | -0.00202 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00189 | 0.00190 | 0.00190 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | 0.00196 | 0.00197 | 0.00197 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00201 | 0.00203 | 0.00202 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai21_l | (!A0 * !A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * Y) | -0.00162 | -0.00163 | -0.00166 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai21_l | (!A0 * !A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * Y) | 0.00167 | 0.00168 | 0.00167 |

# SKY130_OSU_SC_12T_LS__OAI22

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__oai22_l | 10.25640 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_12T_ls__oai22_l | 0.00272 | 0.00286 | 0.00304 | 0.00300 | 0.30434 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__oai22_l | 0.00000 | 0.00379 | 0.00725 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__oai22_l | A0->Y (FR) | 0.20202 | 1.34368 | 11.76410 |
| | A1->Y (FR) | 0.17570 | 1.32308 | 12.08130 |
| | B0->Y (FR) | 0.12052 | 1.26434 | 12.02410 |
| | B1->Y (FR) | 0.14930 | 1.28662 | 11.71040 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__oai22_l | A0->Y (RF) | 0.14394 | 0.87778 | 7.80117 |
| | A1->Y (RF) | 0.11691 | 0.84602 | 7.74742 |
| | B0->Y (RF) | 0.10058 | 0.86255 | 8.35947 |
| | B1->Y (RF) | 0.12886 | 0.89371 | 8.42900 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | A0 | 0.00767 | 0.00759 | 0.00758 |
| | A1 | 0.00662 | 0.00650 | 0.00660 |
| | B0 | 0.00492 | 0.00484 | 0.00494 |
| | B1 | 0.00603 | 0.00594 | 0.00592 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | A0 | 0.00176 | 0.00160 | 0.00158 |
| | A1 | 0.00093 | 0.00087 | 0.00082 |
| | B0 | 0.00092 | 0.00084 | 0.00087 |
| | B1 | 0.00178 | 0.00158 | 0.00162 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00175 | -0.00193 | -0.00192 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | -0.00175 | -0.00192 | -0.00192 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | -0.00187 | -0.00193 | -0.00192 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | -0.00196 | -0.00197 | -0.00196 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00192 | 0.00193 | 0.00192 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | 0.00192 | 0.00192 | 0.00192 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | 0.00191 | 0.00193 | 0.00192 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | 0.00196 | 0.00199 | 0.00197 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00092 | -0.00093 | -0.00091 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | -0.00091 | -0.00091 | -0.00091 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | -0.00187 | -0.00190 | -0.00190 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | -0.00195 | -0.00196 | -0.00196 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00096 | 0.00096 | 0.00093 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | 0.00096 | 0.00096 | 0.00093 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | 0.00189 | 0.00190 | 0.00190 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | 0.00196 | 0.00196 | 0.00196 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | (A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B1 * !Y) | -0.00091 | -0.00092 | -0.00092 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | -0.00092 | -0.00092 | -0.00092 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | -0.00216 | -0.00220 | -0.00219 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | -0.00218 | -0.00218 | -0.00224 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | (A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B1 * !Y) | 0.00097 | 0.00098 | 0.00094 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | 0.00097 | 0.00098 | 0.00094 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | 0.00220 | 0.00220 | 0.00219 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | 0.00225 | 0.00226 | 0.00226 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00174 | -0.00191 | -0.00191 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | -0.00174 | -0.00192 | -0.00191 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | -0.00220 | -0.00226 | -0.00225 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | -0.00222 | -0.00223 | -0.00228 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00191 | 0.00191 | 0.00191 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | 0.00191 | 0.00192 | 0.00191 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | 0.00225 | 0.00228 | 0.00225 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | 0.00229 | 0.00233 | 0.00230 |

# SKY130_OSU_SC_12T_LS__OR2x

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__or2_1 | 8.30280 |
| sky130_osu_sc_12T_ls__or2_2 | 10.25640 |
| sky130_osu_sc_12T_ls__or2_4 | 14.16360 |
| sky130_osu_sc_12T_ls__or2_8 | 21.97800 |
| sky130_osu_sc_12T_ls__or2_l | 8.30280 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_12T_ls__or2_1 | 0.00320 | 0.00298 | 0.59920 |
| sky130_osu_sc_12T_ls__or2_2 | 0.00321 | 0.00298 | 1.22386 |
| sky130_osu_sc_12T_ls__or2_4 | 0.00320 | 0.00298 | 2.43059 |
| sky130_osu_sc_12T_ls__or2_8 | 0.00319 | 0.00298 | 4.75407 |
| sky130_osu_sc_12T_ls__or2_l | 0.00235 | 0.00221 | 0.43592 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_12T_ls__or2_1** | 0.00000 | 0.00658 | 0.00688 |
| **sky130_osu_sc_12T_ls__or2_2** | 0.00000 | 0.00632 | 0.00694 |
| **sky130_osu_sc_12T_ls__or2_4** | 0.00000 | 0.00884 | 0.00932 |
| **sky130_osu_sc_12T_ls__or2_8** | 0.00000 | 0.01388 | 0.01410 |
| **sky130_osu_sc_12T_ls__or2_l** | 0.00000 | 0.00539 | 0.00608 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__or2_1 | A->Y (RR) | 0.13686 | 1.00688 | 8.21181 |
| | B->Y (RR) | 0.12141 | 0.96439 | 7.98635 |
| sky130_osu_sc_12T_ls__or2_2 | A->Y (RR) | 0.14420 | 0.89438 | 8.40993 |
| | B->Y (RR) | 0.12828 | 0.85918 | 8.21304 |
| sky130_osu_sc_12T_ls__or2_4 | A->Y (RR) | 0.18542 | 0.87311 | 8.84709 |
| | B->Y (RR) | 0.16906 | 0.84637 | 8.69200 |
| sky130_osu_sc_12T_ls__or2_8 | A->Y (RR) | 0.26692 | 0.93018 | 9.41380 |
| | B->Y (RR) | 0.25003 | 0.91011 | 9.29723 |
| sky130_osu_sc_12T_ls__or2_l | A->Y (RR) | 0.14751 | 1.10883 | 8.45538 |
| | B->Y (RR) | 0.13220 | 1.06958 | 8.24058 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__or2_1 | A->Y (FF) | 0.27121 | 0.96768 | 6.60089 |
| | B->Y (FF) | 0.23320 | 0.93481 | 6.43207 |
| sky130_osu_sc_12T_ls__or2_2 | A->Y (FF) | 0.33075 | 0.98958 | 7.07862 |
| | B->Y (FF) | 0.29271 | 0.95877 | 6.96727 |
| sky130_osu_sc_12T_ls__or2_4 | A->Y (FF) | 0.47468 | 1.12763 | 7.74760 |
| | B->Y (FF) | 0.43694 | 1.09802 | 7.74243 |
| sky130_osu_sc_12T_ls__or2_8 | A->Y (FF) | 0.76128 | 1.44403 | 8.59874 |
| | B->Y (FF) | 0.72367 | 1.41304 | 8.72717 |
| sky130_osu_sc_12T_ls__or2_l | A->Y (FF) | 0.28129 | 1.04086 | 6.74105 |
| | B->Y (FF) | 0.24649 | 1.00898 | 6.54985 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__or2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00367 | 0.00325 | 0.00427 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00278 | 0.00242 | 0.00373 |
| sky130_osu_sc_12T_ls__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00603 | 0.00586 | 0.00765 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00513 | 0.00508 | 0.00629 |
| sky130_osu_sc_12T_ls__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01141 | 0.01169 | 0.01285 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01048 | 0.01096 | 0.01217 |
| sky130_osu_sc_12T_ls__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02209 | 0.02305 | 0.02476 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02119 | 0.02236 | 0.02447 |
| sky130_osu_sc_12T_ls__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00274 | 0.00244 | 0.00309 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00214 | 0.00187 | 0.00269 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__or2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00782 | 0.00766 | 0.00811 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00653 | 0.00650 | 0.00774 |
| sky130_osu_sc_12T_ls__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00944 | 0.00969 | 0.01011 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00819 | 0.00847 | 0.00964 |
| sky130_osu_sc_12T_ls__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01366 | 0.01442 | 0.01499 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01226 | 0.01316 | 0.01444 |
| sky130_osu_sc_12T_ls__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02211 | 0.02340 | 0.02485 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02110 | 0.02213 | 0.02424 |
| sky130_osu_sc_12T_ls__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00567 | 0.00556 | 0.00587 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00481 | 0.00478 | 0.00566 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__or2_1 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00181 | -0.00197 | -0.00198 |
| sky130_osu_sc_12T_ls__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00181 | -0.00197 | -0.00197 |
| sky130_osu_sc_12T_ls__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00181 | -0.00197 | -0.00198 |
| sky130_osu_sc_12T_ls__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00181 | -0.00197 | -0.00198 |
| sky130_osu_sc_12T_ls__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00120 | -0.00132 | -0.00131 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__or2_1 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00197 | 0.00197 | 0.00198 |
| sky130_osu_sc_12T_ls__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00197 | 0.00197 | 0.00197 |
| sky130_osu_sc_12T_ls__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00197 | 0.00197 | 0.00198 |
| sky130_osu_sc_12T_ls__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00197 | 0.00197 | 0.00198 |
| sky130_osu_sc_12T_ls__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00132 | 0.00133 | 0.00131 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__or2_1 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00094 | -0.00095 | -0.00093 |
| sky130_osu_sc_12T_ls__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00094 | -0.00095 | -0.00093 |
| sky130_osu_sc_12T_ls__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00094 | -0.00095 | -0.00093 |
| sky130_osu_sc_12T_ls__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00094 | -0.00095 | -0.00093 |
| sky130_osu_sc_12T_ls__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00064 | -0.00064 | -0.00063 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__or2_1 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00100 | 0.00100 | 0.00095 |
| sky130_osu_sc_12T_ls__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00100 | 0.00100 | 0.00095 |
| sky130_osu_sc_12T_ls__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00100 | 0.00100 | 0.00095 |
| sky130_osu_sc_12T_ls__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00100 | 0.00100 | 0.00095 |
| sky130_osu_sc_12T_ls__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00068 | 0.00068 | 0.00064 |

# SKY130_OSU_SC_12T_LS__TBUFIx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__tbufi_1 | 8.30280 |
| sky130_osu_sc_12T_ls__tbufi_l | 8.30280 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_12T_ls__tbufi_1 | 0.00311 | 0.00401 | 0.30535 |
| sky130_osu_sc_12T_ls__tbufi_l | 0.00233 | 0.00299 | 0.21834 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__tbufi_1 | 0.00000 | 0.00581 | 0.00828 |
| sky130_osu_sc_12T_ls__tbufi_l | 0.00000 | 0.00474 | 0.00569 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__tbufi_1 | A->Y (FR) | 0.10535 | 1.24983 | 12.03500 |
| | OE->Y (FR) | 0.09106 | 0.39998 | 4.68818 |
| | OE->Y (RR) | 0.16947 | 1.18257 | 7.99920 |
| sky130_osu_sc_12T_ls__tbufi_l | A->Y (FR) | 0.12028 | 1.35229 | 11.83680 |
| | OE->Y (FR) | 0.09033 | 0.39383 | 4.68811 |
| | OE->Y (RR) | 0.18180 | 1.30828 | 8.16937 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__tbufi_1 | A->Y (RF) | 0.06538 | 0.80271 | 8.17249 |
| | OE->Y (FF) | 0.09310 | 0.40234 | 4.68819 |
| | OE->Y (RF) | 0.05857 | 0.76551 | 7.60292 |
| sky130_osu_sc_12T_ls__tbufi_l | A->Y (RF) | 0.07509 | 0.88389 | 8.32252 |
| | OE->Y (FF) | 0.09247 | 0.39317 | 4.68811 |
| | OE->Y (RF) | 0.06714 | 0.84636 | 7.80097 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00346 | 0.00336 | 0.00347 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00341 | 0.00295 | 0.00447 |
| sky130_osu_sc_12T_ls__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00255 | 0.00250 | 0.00253 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00243 | 0.00210 | 0.00306 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00041 | -0.00046 | -0.00041 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00220 | 0.00172 | 0.00322 |
| sky130_osu_sc_12T_ls__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00024 | -0.00029 | -0.00028 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00151 | 0.00117 | 0.00212 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tbufi_1 | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00158 | -0.00160 | -0.00159 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00141 | -0.00142 | -0.00141 |
| sky130_osu_sc_12T_ls__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00112 | -0.00113 | -0.00113 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00100 | -0.00102 | -0.00101 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tbufi_1 | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00158 | 0.00160 | 0.00159 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00145 | 0.00145 | 0.00143 |
| sky130_osu_sc_12T_ls__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00112 | 0.00113 | 0.00113 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00103 | 0.00104 | 0.00102 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00128 | 0.00084 | 0.00229 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00113 | 0.00066 | 0.00214 |
| sky130_osu_sc_12T_ls__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00087 | 0.00057 | 0.00148 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00076 | 0.00042 | 0.00136 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00404 | 0.00369 | 0.00505 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00421 | 0.00384 | 0.00517 |
| sky130_osu_sc_12T_ls__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00299 | 0.00273 | 0.00370 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00311 | 0.00284 | 0.00377 |

# SKY130_OSU_SC_12T_LS__TNBUFIx

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__tnbufi_1 | 8.30280 |
| sky130_osu_sc_12T_ls__tnbufi_l | 8.30280 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_12T_ls__tnbufi_1 | 0.00311 | 0.00469 | 0.30551 |
| sky130_osu_sc_12T_ls__tnbufi_l | 0.00223 | 0.00346 | 0.22208 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__tnbufi_1 | 0.00000 | 0.00642 | 0.00743 |
| sky130_osu_sc_12T_ls__tnbufi_l | 0.00000 | 0.00497 | 0.00550 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__tnbufi_1 | A->Y (FR) | 0.10654 | 1.25009 | 12.03870 |
| | OE->Y (RR) | 0.04684 | 0.35132 | 4.68839 |
| | OE->Y (FR) | 0.12193 | 1.26314 | 11.71810 |
| sky130_osu_sc_12T_ls__tnbufi_l | A->Y (FR) | 0.11836 | 1.35853 | 11.95740 |
| | OE->Y (RR) | 0.05221 | 0.35101 | 4.68810 |
| | OE->Y (FR) | 0.13118 | 1.37336 | 11.69990 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_12T_ls__tnbufi_1 | A->Y (RF) | 0.06401 | 0.79954 | 8.17405 |
| | OE->Y (RF) | 0.04604 | 0.35132 | 4.68842 |
| | OE->Y (FF) | 0.11843 | 0.82841 | 5.63345 |
| sky130_osu_sc_12T_ls__tnbufi_l | A->Y (RF) | 0.07162 | 0.88738 | 8.39056 |
| | OE->Y (RF) | 0.05186 | 0.35103 | 4.68812 |
| | OE->Y (FF) | 0.13161 | 0.90776 | 5.59437 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tnbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00358 | 0.00348 | 0.00359 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00842 | 0.00824 | 0.00983 |
| sky130_osu_sc_12T_ls__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00261 | 0.00256 | 0.00259 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00624 | 0.00607 | 0.00717 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tnbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00057 | -0.00060 | -0.00055 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00732 | 0.00715 | 0.00865 |
| sky130_osu_sc_12T_ls__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00040 | -0.00043 | -0.00043 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00543 | 0.00529 | 0.00631 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tnbufi_1 | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00131 | -0.00132 | -0.00132 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00116 | -0.00116 | -0.00116 |
| sky130_osu_sc_12T_ls__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00089 | -0.00089 | -0.00089 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00078 | -0.00079 | -0.00078 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tnbufi_1 | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00131 | 0.00132 | 0.00132 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00118 | 0.00118 | 0.00117 |
| sky130_osu_sc_12T_ls__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00089 | 0.00089 | 0.00089 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00081 | 0.00081 | 0.00079 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tnbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00224 | -0.00285 | -0.00134 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00213 | -0.00278 | -0.00131 |
| sky130_osu_sc_12T_ls__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00150 | -0.00196 | -0.00100 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00144 | -0.00193 | -0.00099 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_12T_ls__tnbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00630 | 0.00610 | 0.00769 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00618 | 0.00599 | 0.00758 |
| sky130_osu_sc_12T_ls__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00470 | 0.00455 | 0.00562 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00465 | 0.00447 | 0.00555 |

# SKY130_OSU_SC_12T_LS__XNOR2

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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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_12T_ls__xnor2_l | 14.16360 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_12T_ls__xnor2_l | 0.00622 | 0.00533 | 0.31128 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__xnor2_l | 0.00000 | 0.01039 | 0.01145 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_12T_ls__xnor2_l | A->Y (RR) | B | 0.21733 | 1.25098 | 8.25731 |
| | A->Y (FR) | !B | 0.14270 | 1.29381 | 12.14330 |
| | B->Y (RR) | A | 0.18015 | 1.21327 | 8.20094 |
| | B->Y (FR) | !A | 0.16712 | 1.30966 | 11.81540 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_12T_ls__xnor2_l | A->Y (FF) | B | 0.20570 | 0.97310 | 6.17666 |
| | A->Y (RF) | !B | 0.08747 | 0.79548 | 7.70711 |
| | B->Y (FF) | A | 0.17731 | 0.94416 | 6.13922 |
| | B->Y (RF) | !A | 0.10678 | 0.82042 | 7.73641 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__xnor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00357 | 0.00301 | 0.00442 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00869 | 0.00828 | 0.00981 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00163 | 0.00124 | 0.00270 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00918 | 0.00888 | 0.01039 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__xnor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01008 | 0.00959 | 0.01085 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00234 | 0.00177 | 0.00322 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00919 | 0.00909 | 0.01051 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00287 | 0.00225 | 0.00372 |

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*Temp 100.00*

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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_12T_ls__xor2_l | 14.16360 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_12T_ls__xor2_l | 0.00623 | 0.00537 | 0.29800 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_12T_ls__xor2_l | 0.00000 | 0.01039 | 0.01217 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_12T_ls__xor2_l | A->Y (RR) | !B | 0.22269 | 1.25635 | 8.19456 |
| | A->Y (FR) | B | 0.16852 | 1.31058 | 11.75270 |
| | B->Y (RR) | !A | 0.18778 | 1.22790 | 8.16233 |
| | B->Y (FR) | A | 0.18367 | 1.33030 | 11.77140 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_12T_ls__xor2_l | A->Y (FF) | !B | 0.19183 | 0.94518 | 6.00062 |
| | A->Y (RF) | B | 0.09530 | 0.83468 | 8.12066 |
| | B->Y (FF) | !A | 0.18271 | 0.93992 | 5.99930 |
| | B->Y (RF) | A | 0.10257 | 0.80857 | 7.55689 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__xor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00994 | 0.00958 | 0.01104 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00209 | 0.00129 | 0.00266 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01009 | 0.00977 | 0.01129 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00152 | 0.00109 | 0.00254 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_12T_ls__xor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00191 | 0.00118 | 0.00267 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01051 | 0.01027 | 0.01162 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00193 | 0.00128 | 0.00272 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00932 | 0.00926 | 0.01066 |

# SKY130_OSU_SC_12T_LS_x

*sky130_osu_sc_12T_ls_ss_1P60_100C.ccs*
*Cell Library: Process , Voltage 1.60,*
*Temp 100.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_12T_ls__ant** | 4.39560 |
| **sky130_osu_sc_12T_ls__tiehi** | 4.39560 |
| **sky130_osu_sc_12T_ls__tielo** | 4.39560 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) |
|---|---|
| | A |
| **sky130_osu_sc_12T_ls__ant** | 0.14226 |
| **sky130_osu_sc_12T_ls__tiehi** | 0.00000 |
| **sky130_osu_sc_12T_ls__tielo** | 0.00000 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_12T_ls__ant** | 0.00000 | 61890.30000 | 123781.00000 |
| **sky130_osu_sc_12T_ls__tiehi** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_12T_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_12T_ls__ant | 0.00000 | 0.00000 | 0.00000 |
| | -0.00170 | 0.01265 | 0.18338 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_12T_ls__ant | 0.00000 | 0.00000 | 0.00000 |
| | 1.07819 | 1.01742 | 0.23333 |