# sky130_osu_sc_18T_ms_tt_1P62_25C.ccs Library

| Cell Groups |
| --- |
| SKY130_OSU_SC_18T_MS__ADDFx |
| SKY130_OSU_SC_18T_MS__ADDHx |
| SKY130_OSU_SC_18T_MS__AND2x |
| SKY130_OSU_SC_18T_MS__AOI21 |
| SKY130_OSU_SC_18T_MS__AOI22 |
| SKY130_OSU_SC_18T_MS__BUFx |
| SKY130_OSU_SC_18T_MS__DFFRx |
| SKY130_OSU_SC_18T_MS__DFFSRx |
| SKY130_OSU_SC_18T_MS__DFFSx |
| SKY130_OSU_SC_18T_MS__DFFx |
| SKY130_OSU_SC_18T_MS__INVx |
| SKY130_OSU_SC_18T_MS__MUX2 |
| SKY130_OSU_SC_18T_MS__NAND2x |
| SKY130_OSU_SC_18T_MS__NOR2x |
| SKY130_OSU_SC_18T_MS__OAI21 |
| SKY130_OSU_SC_18T_MS__OAI22 |
| SKY130_OSU_SC_18T_MS__OR2x |
| SKY130_OSU_SC_18T_MS__TBUFIx |
| SKY130_OSU_SC_18T_MS__TNBUFIx |
| SKY130_OSU_SC_18T_MS__XNOR2 |
| SKY130_OSU_SC_18T_MS__XOR2 |
| SKY130_OSU_SC_18T_MS_x |

# SKY130_OSU_SC_18T_MS__ADDFx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__addf_1 | 46.88640 |
| sky130_osu_sc_18T_ms__addf_l | 46.88640 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | | |
|---|---|---|---|---|---|---|
| | A | B | CI | CO | CON | S |
| sky130_osu_sc_18T_ms__addf_1 | 0.02062 | 0.02064 | 0.01575 | 2.53500 | 1.17954 | 2.45734 |
| sky130_osu_sc_18T_ms__addf_l | 0.02062 | 0.02063 | 0.01577 | 1.74492 | 1.17927 | 1.75650 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__addf_1** | 0.00000 | 0.32293 | 0.43506 |
| **sky130_osu_sc_18T_ms__addf_l** | 0.00000 | 0.27881 | 0.39093 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (RR) | 0.16719 | 1.92434 | 27.99720 |
| | B->CO (RR) | 0.14510 | 1.82704 | 26.69890 |
| | CI->CO (RR) | 0.15902 | 1.94841 | 28.45640 |
| | CON->CO (FR) | 0.03015 | 0.78072 | 11.33070 |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (RR) | 0.16906 | 1.79689 | 22.83750 |
| | B->CO (RR) | 0.14741 | 1.71275 | 21.92610 |
| | CI->CO (RR) | 0.16084 | 1.82169 | 23.31930 |
| | CON->CO (FR) | 0.03438 | 0.85498 | 11.42150 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (FF) | 0.22167 | 2.37638 | 34.38280 |
| | B->CO (FF) | 0.19913 | 2.27562 | 32.96500 |
| | CI->CO (FF) | 0.19420 | 2.33610 | 34.29470 |
| | CON->CO (RF) | 0.02746 | 0.70448 | 10.23180 |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (FF) | 0.21745 | 2.13425 | 26.89300 |
| | B->CO (FF) | 0.19602 | 2.05033 | 25.90280 |
| | CI->CO (FF) | 0.18994 | 2.09582 | 26.82820 |
| | CON->CO (RF) | 0.02964 | 0.73186 | 9.77539 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addf_1 | A->CON (FR) | 0.15846 | 1.03322 | 11.10870 |
| | B->CON (FR) | 0.13576 | 0.97734 | 10.72500 |
| | CI->CON (FR) | 0.13095 | 0.99686 | 11.08330 |
| sky130_osu_sc_18T_ms__addf_l | A->CON (FR) | 0.15077 | 1.02540 | 11.09840 |
| | B->CON (FR) | 0.12873 | 0.97003 | 10.71640 |
| | CI->CON (FR) | 0.12329 | 0.98908 | 11.07420 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addf_1 | A->CON (RF) | 0.10637 | 0.74970 | 8.20046 |
| | B->CON (RF) | 0.10034 | 0.73382 | 8.15961 |
| | CI->CON (RF) | 0.09817 | 0.77761 | 8.72107 |
| sky130_osu_sc_18T_ms__addf_l | A->CON (RF) | 0.10238 | 0.74562 | 8.19527 |
| | B->CON (RF) | 0.09675 | 0.73027 | 8.15549 |
| | CI->CON (RF) | 0.09416 | 0.77368 | 8.71596 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addf_1 | A->S (-R) | 0.32020 | 2.13749 | 26.15360 |
| | B->S (-R) | 0.33221 | 2.13253 | 25.34180 |
| | CI->S (-R) | 0.29060 | 2.09187 | 26.05730 |
| | CON->S (RR) | 0.09288 | 0.71157 | 7.60910 |
| sky130_osu_sc_18T_ms__addf_l | A->S (-R) | 0.30753 | 1.98943 | 21.99810 |
| | B->S (-R) | 0.31985 | 1.99405 | 21.49370 |
| | CI->S (-R) | 0.27769 | 1.94561 | 21.93010 |
| | CON->S (RR) | 0.09328 | 0.76667 | 7.66145 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addf_1 | A->S (-F) | 0.27507 | 1.77645 | 20.86120 |
| | B->S (-F) | 0.27031 | 1.69864 | 20.00740 |
| | CI->S (-F) | 0.26584 | 1.79570 | 21.32120 |
| | CON->S (FF) | 0.11225 | 0.75276 | 7.38902 |
| sky130_osu_sc_18T_ms__addf_l | A->S (-F) | 0.26218 | 1.63906 | 17.45020 |
| | B->S (-F) | 0.25713 | 1.57491 | 16.87470 |
| | CI->S (-F) | 0.25281 | 1.65966 | 17.92540 |
| | CON->S (FF) | 0.10906 | 0.77335 | 7.15498 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.00336 | 0.00373 | 0.01171 |
| | B | 0.00525 | 0.00534 | 0.01133 |
| | CI | 0.00533 | 0.00579 | 0.01392 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00253 | 0.00272 | 0.00767 |
| | B | 0.00444 | 0.00433 | 0.00812 |
| | CI | 0.00451 | 0.00477 | 0.00981 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01390 | 0.01430 | 0.02537 |
| | B | 0.01472 | 0.01516 | 0.02421 |
| | CI | 0.01165 | 0.01208 | 0.02342 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01309 | 0.01334 | 0.02058 |
| | B | 0.01390 | 0.01422 | 0.01987 |
| | CI | 0.01084 | 0.01111 | 0.01900 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01388 | 0.01408 | 0.01846 |
| | B | 0.01433 | 0.01456 | 0.01836 |
| | CI | 0.01289 | 0.01344 | 0.01735 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01308 | 0.01323 | 0.01768 |
| | B | 0.01354 | 0.01371 | 0.01755 |
| | CI | 0.01207 | 0.01258 | 0.01653 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.00333 | 0.00355 | 0.00703 |
| | B | 0.00520 | 0.00514 | 0.00792 |
| | CI | 0.00531 | 0.00557 | 0.00916 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00251 | 0.00265 | 0.00595 |
| | B | 0.00439 | 0.00425 | 0.00687 |
| | CI | 0.00450 | 0.00468 | 0.00808 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01390 | 0.01429 | 0.02490 |
| | B | 0.01471 | 0.01515 | 0.02369 |
| | CI | 0.01165 | 0.01207 | 0.02312 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01309 | 0.01334 | 0.02060 |
| | B | 0.01390 | 0.01422 | 0.01996 |
| | CI | 0.01084 | 0.01112 | 0.01892 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.03128 | 0.03156 | 0.03704 |
| | B | 0.02790 | 0.02783 | 0.04078 |
| | CI | 0.02540 | 0.02539 | 0.03114 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.03019 | 0.03026 | 0.03575 |
| | B | 0.02685 | 0.02669 | 0.04008 |
| | CI | 0.02433 | 0.02423 | 0.03023 |

# SKY130_OSU_SC_18T_MS__ADDHx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__addh_1 | 27.83880 |
| sky130_osu_sc_18T_ms__addh_l | 27.83880 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) | | |
|---|---|---|---|---|---|
| | A | B | CO | CON | S |
| sky130_osu_sc_18T_ms__addh_1 | 0.01015 | 0.01107 | 2.51262 | 1.24098 | 2.53298 |
| sky130_osu_sc_18T_ms__addh_l | 0.01015 | 0.01107 | 1.49462 | 1.24613 | 1.51539 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__addh_1 | 0.00000 | 0.37567 | 0.43460 |
| sky130_osu_sc_18T_ms__addh_l | 0.00000 | 0.25434 | 0.33741 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addh_1 | A->CO (RR) | 0.11181 | 0.73261 | 7.50183 |
| | B->CO (RR) | 0.11639 | 0.73306 | 7.58997 |
| sky130_osu_sc_18T_ms__addh_l | A->CO (RR) | 0.11184 | 0.80286 | 7.35200 |
| | B->CO (RR) | 0.11637 | 0.80559 | 7.43519 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addh_1 | A->CO (FF) | 0.09488 | 0.71950 | 7.39994 |
| | B->CO (FF) | 0.10124 | 0.73349 | 7.41448 |
| sky130_osu_sc_18T_ms__addh_l | A->CO (FF) | 0.09446 | 0.75675 | 6.93188 |
| | B->CO (FF) | 0.10068 | 0.77102 | 6.94632 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addh_1 | A->CON (RR) | B | 0.15086 | 0.61388 | 4.06069 |
| | A->CON (FR) | !B | 0.08750 | 0.92969 | 10.88350 |
| | B->CON (RR) | A | 0.15531 | 0.61333 | 4.14730 |
| | B->CON (FR) | !A | 0.10913 | 0.96598 | 11.01680 |
| sky130_osu_sc_18T_ms__addh_l | A->CON (RR) | B | 0.13546 | 0.58773 | 4.00367 |
| | A->CON (FR) | !B | 0.07792 | 0.92080 | 10.90050 |
| | B->CON (RR) | A | 0.13993 | 0.58997 | 4.07940 |
| | B->CON (FR) | !A | 0.09957 | 0.95706 | 11.03480 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addh_1 | A->CON (FF) | B | 0.14668 | 0.77221 | 6.16431 |
| | A->CON (RF) | !B | 0.06308 | 0.72902 | 8.70866 |
| | B->CON (FF) | A | 0.14555 | 0.81105 | 6.55398 |
| | B->CON (RF) | !A | 0.07463 | 0.71796 | 8.35497 |
| sky130_osu_sc_18T_ms__addh_l | A->CON (FF) | B | 0.13327 | 0.73747 | 5.97912 |
| | A->CON (RF) | !B | 0.05816 | 0.72310 | 8.72255 |
| | B->CON (FF) | A | 0.13194 | 0.77662 | 6.36611 |
| | B->CON (RF) | !A | 0.06990 | 0.71405 | 8.36838 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addh_1 | A->S (RR) | !B | 0.11780 | 1.84989 | 27.70290 |
| | A->S (FR) | B | 0.20151 | 1.87147 | 24.86820 |
| | B->S (RR) | !A | 0.12902 | 1.78993 | 26.40020 |
| | B->S (FR) | A | 0.20118 | 1.96019 | 26.18460 |
| | CON->S (FR) | - | 0.03366 | 0.80376 | 11.64740 |
| sky130_osu_sc_18T_ms__addh_l | A->S (RR) | !B | 0.11657 | 1.67445 | 21.08280 |
| | A->S (FR) | B | 0.19195 | 1.67506 | 18.17050 |
| | B->S (RR) | !A | 0.12815 | 1.63255 | 20.25860 |
| | B->S (FR) | A | 0.19136 | 1.74709 | 19.02040 |
| | CON->S (FR) | - | 0.03823 | 0.89507 | 11.56080 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__addh_1 | A->S (FF) | !B | 0.13978 | 2.14329 | 32.12730 |
| | A->S (RF) | B | 0.19388 | 1.47842 | 18.60060 |
| | B->S (FF) | !A | 0.16154 | 2.18489 | 32.33550 |
| | B->S (RF) | A | 0.19827 | 1.47610 | 18.68780 |
| | CON->S (RF) | - | 0.02578 | 0.68630 | 9.95389 |
| sky130_osu_sc_18T_ms__addh_l | A->S (FF) | !B | 0.13423 | 1.86891 | 23.41660 |
| | A->S (RF) | B | 0.18136 | 1.31838 | 13.49270 |
| | B->S (FF) | !A | 0.15580 | 1.90829 | 23.57780 |
| | B->S (RF) | A | 0.18582 | 1.32077 | 13.56310 |
| | CON->S (RF) | - | 0.02941 | 0.74113 | 9.60124 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00642 | 0.00612 | 0.00792 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00578 | 0.00546 | 0.00771 |
| sky130_osu_sc_18T_ms__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00527 | 0.00495 | 0.00856 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00463 | 0.00424 | 0.00778 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01014 | 0.00988 | 0.01518 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01049 | 0.01074 | 0.01637 |
| sky130_osu_sc_18T_ms__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00898 | 0.00869 | 0.01389 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00934 | 0.00947 | 0.01480 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00642 | 0.00615 | 0.00876 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00879 | 0.00891 | 0.01021 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00578 | 0.00549 | 0.00853 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00985 | 0.00985 | 0.01028 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00526 | 0.00494 | 0.00820 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00803 | 0.00810 | 0.00930 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00462 | 0.00422 | 0.00764 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00909 | 0.00904 | 0.00934 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01014 | 0.00988 | 0.01510 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00138 | 0.00142 | 0.00215 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01049 | 0.01071 | 0.01602 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00243 | 0.00232 | 0.00314 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00898 | 0.00868 | 0.01384 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00039 | 0.00037 | 0.00072 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00934 | 0.00948 | 0.01478 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00145 | 0.00131 | 0.00175 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01015 | 0.00989 | 0.01536 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00140 | 0.00151 | 0.00268 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01050 | 0.01078 | 0.01660 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00246 | 0.00241 | 0.00339 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00899 | 0.00870 | 0.01407 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00040 | 0.00040 | 0.00076 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00934 | 0.00950 | 0.01460 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00147 | 0.00130 | 0.00170 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00643 | 0.00613 | 0.00820 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00879 | 0.00897 | 0.01004 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00578 | 0.00546 | 0.00761 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00987 | 0.00991 | 0.01046 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00527 | 0.00496 | 0.00854 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00803 | 0.00813 | 0.00917 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00463 | 0.00424 | 0.00770 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00910 | 0.00905 | 0.00940 |

# SKY130_OSU_SC_18T_MS__AND2x

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__and2_1 | 12.45420 |
| sky130_osu_sc_18T_ms__and2_2 | 15.38460 |
| sky130_osu_sc_18T_ms__and2_4 | 21.24540 |
| sky130_osu_sc_18T_ms__and2_6 | 27.10620 |
| sky130_osu_sc_18T_ms__and2_8 | 32.96700 |
| sky130_osu_sc_18T_ms__and2_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_18T_ms__and2_1 | 0.00545 | 0.00555 | 2.51210 |
| sky130_osu_sc_18T_ms__and2_2 | 0.00545 | 0.00555 | 4.86116 |
| sky130_osu_sc_18T_ms__and2_4 | 0.00545 | 0.00556 | 9.26200 |
| sky130_osu_sc_18T_ms__and2_6 | 0.00549 | 0.00555 | 13.65130 |
| sky130_osu_sc_18T_ms__and2_8 | 0.00547 | 0.00557 | 17.44276 |
| sky130_osu_sc_18T_ms__and2_l | 0.00423 | 0.00433 | 1.73704 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__and2_1** | 0.00000 | 0.18105 | 0.28957 |
| **sky130_osu_sc_18T_ms__and2_2** | 0.00000 | 0.28958 | 0.29006 |
| **sky130_osu_sc_18T_ms__and2_4** | 0.00000 | 0.50663 | 0.57866 |
| **sky130_osu_sc_18T_ms__and2_6** | 0.00000 | 0.72369 | 0.86775 |
| **sky130_osu_sc_18T_ms__and2_8** | 0.00000 | 0.94075 | 1.15683 |
| **sky130_osu_sc_18T_ms__and2_l** | 0.00000 | 0.12605 | 0.20162 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__and2_1 | A->Y (RR) | 0.08509 | 0.65514 | 7.21668 |
| | B->Y (RR) | 0.09081 | 0.66445 | 7.21305 |
| sky130_osu_sc_18T_ms__and2_2 | A->Y (RR) | 0.09906 | 0.61545 | 7.32188 |
| | B->Y (RR) | 0.10473 | 0.61761 | 7.32271 |
| sky130_osu_sc_18T_ms__and2_4 | A->Y (RR) | 0.13684 | 0.64498 | 7.66147 |
| | B->Y (RR) | 0.14255 | 0.63882 | 7.67120 |
| sky130_osu_sc_18T_ms__and2_6 | A->Y (RR) | 0.17297 | 0.69011 | 7.97823 |
| | B->Y (RR) | 0.17857 | 0.67837 | 7.98675 |
| sky130_osu_sc_18T_ms__and2_8 | A->Y (RR) | 0.20878 | 0.74074 | 8.18138 |
| | B->Y (RR) | 0.21445 | 0.72210 | 8.18310 |
| sky130_osu_sc_18T_ms__and2_l | A->Y (RR) | 0.09517 | 0.73405 | 7.25543 |
| | B->Y (RR) | 0.10128 | 0.74326 | 7.27218 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__and2_1 | A->Y (FF) | 0.07324 | 0.63479 | 6.82329 |
| | B->Y (FF) | 0.07741 | 0.65185 | 6.86190 |
| sky130_osu_sc_18T_ms__and2_2 | A->Y (FF) | 0.08372 | 0.60415 | 6.88902 |
| | B->Y (FF) | 0.08860 | 0.61740 | 6.93541 |
| sky130_osu_sc_18T_ms__and2_4 | A->Y (FF) | 0.11538 | 0.63145 | 7.17384 |
| | B->Y (FF) | 0.12036 | 0.64153 | 7.22508 |
| sky130_osu_sc_18T_ms__and2_6 | A->Y (FF) | 0.14985 | 0.67271 | 7.43683 |
| | B->Y (FF) | 0.15473 | 0.68327 | 7.48716 |
| sky130_osu_sc_18T_ms__and2_8 | A->Y (FF) | 0.18148 | 0.71153 | 7.47105 |
| | B->Y (FF) | 0.18655 | 0.71963 | 7.51736 |
| sky130_osu_sc_18T_ms__and2_l | A->Y (FF) | 0.07992 | 0.69724 | 6.73678 |
| | B->Y (FF) | 0.08525 | 0.71551 | 6.79411 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__and2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00486 | 0.00447 | 0.01931 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00495 | 0.00427 | 0.01289 |
| sky130_osu_sc_18T_ms__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00974 | 0.00980 | 0.02327 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00984 | 0.00955 | 0.01742 |
| sky130_osu_sc_18T_ms__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02038 | 0.02107 | 0.03365 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02041 | 0.02200 | 0.02887 |
| sky130_osu_sc_18T_ms__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03121 | 0.03215 | 0.04335 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03138 | 0.03214 | 0.03956 |
| sky130_osu_sc_18T_ms__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04240 | 0.04298 | 0.05322 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04255 | 0.04305 | 0.04967 |
| sky130_osu_sc_18T_ms__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00361 | 0.00330 | 0.01316 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00369 | 0.00315 | 0.00922 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__and2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01215 | 0.01278 | 0.02872 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01372 | 0.01418 | 0.02906 |
| sky130_osu_sc_18T_ms__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01533 | 0.01661 | 0.03232 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01693 | 0.01788 | 0.03264 |
| sky130_osu_sc_18T_ms__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02327 | 0.02578 | 0.04130 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02486 | 0.02689 | 0.04132 |
| sky130_osu_sc_18T_ms__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03120 | 0.03506 | 0.05065 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03296 | 0.03574 | 0.05021 |
| sky130_osu_sc_18T_ms__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03940 | 0.04409 | 0.06000 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04094 | 0.04425 | 0.05889 |
| sky130_osu_sc_18T_ms__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00945 | 0.00975 | 0.01996 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01061 | 0.01081 | 0.02044 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__and2_1 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00459 | -0.00462 | -0.00463 |
| sky130_osu_sc_18T_ms__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00459 | -0.00462 | -0.00462 |
| sky130_osu_sc_18T_ms__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00459 | -0.00462 | -0.00462 |
| sky130_osu_sc_18T_ms__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00461 | -0.00464 | -0.00464 |
| sky130_osu_sc_18T_ms__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00458 | -0.00461 | -0.00462 |
| sky130_osu_sc_18T_ms__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00340 | -0.00342 | -0.00343 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__and2_1 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00463 | 0.00466 | 0.00464 |
| sky130_osu_sc_18T_ms__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00463 | 0.00466 | 0.00464 |
| sky130_osu_sc_18T_ms__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00463 | 0.00466 | 0.00465 |
| sky130_osu_sc_18T_ms__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00465 | 0.00469 | 0.00467 |
| sky130_osu_sc_18T_ms__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00463 | 0.00467 | 0.00465 |
| sky130_osu_sc_18T_ms__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00343 | 0.00345 | 0.00344 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__and2_1 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00434 | -0.00436 | -0.00435 |
| sky130_osu_sc_18T_ms__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00434 | -0.00436 | -0.00435 |
| sky130_osu_sc_18T_ms__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00434 | -0.00435 | -0.00435 |
| sky130_osu_sc_18T_ms__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00434 | -0.00436 | -0.00435 |
| sky130_osu_sc_18T_ms__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00434 | -0.00436 | -0.00435 |
| sky130_osu_sc_18T_ms__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00322 | -0.00323 | -0.00323 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__and2_1 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00438 | 0.00439 | 0.00437 |
| sky130_osu_sc_18T_ms__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00438 | 0.00439 | 0.00437 |
| sky130_osu_sc_18T_ms__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00438 | 0.00439 | 0.00437 |
| sky130_osu_sc_18T_ms__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00439 | 0.00439 | 0.00438 |
| sky130_osu_sc_18T_ms__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00439 | 0.00440 | 0.00438 |
| sky130_osu_sc_18T_ms__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00324 | 0.00325 | 0.00324 |

# SKY130_OSU_SC_18T_MS__AOI21

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__aoi21_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_18T_ms__aoi21_l | 0.00517 | 0.00538 | 0.00520 | 1.16127 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__aoi21_l | 0.00000 | 0.06721 | 0.14455 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__aoi21_l | A0->Y (FR) | 0.08673 | 0.95819 | 10.96390 |
| | A1->Y (FR) | 0.07439 | 0.91430 | 10.60000 |
| | B0->Y (FR) | 0.06279 | 0.92600 | 10.93650 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__aoi21_l | A0->Y (RF) | 0.05839 | 0.66812 | 7.71527 |
| | A1->Y (RF) | 0.05297 | 0.68040 | 8.06147 |
| | B0->Y (RF) | 0.03464 | 0.64764 | 7.91474 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.01086 | 0.01077 | 0.01135 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00916 | 0.00905 | 0.00971 |
| | B0 | 0.00846 | 0.00838 | 0.01047 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00239 | 0.00201 | 0.00239 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00242 | 0.00212 | 0.00269 |
| | B0 | -0.00116 | -0.00111 | -0.00062 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00357 | -0.00404 | -0.00406 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | -0.00411 | -0.00414 | -0.00412 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00411 | -0.00413 | -0.00412 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00403 | 0.00408 | 0.00406 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | 0.00411 | 0.00415 | 0.00413 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00414 | 0.00414 | 0.00413 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00355 | -0.00401 | -0.00401 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | -0.00405 | -0.00407 | -0.00407 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00438 | -0.00437 | -0.00442 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00398 | 0.00403 | 0.00401 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | 0.00406 | 0.00412 | 0.00408 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00442 | 0.00446 | 0.00444 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi21_l | (A0 * A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !Y) | -0.00199 | -0.00201 | -0.00200 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi21_l | (A0 * A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !Y) | 0.00219 | 0.00221 | 0.00205 |

# SKY130_OSU_SC_18T_MS__AOI22

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__aoi22_l | 15.38460 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_18T_ms__aoi22_l | 0.00518 | 0.00538 | 0.00554 | 0.00531 | 1.11759 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__aoi22_l | 0.00000 | 0.07400 | 0.28908 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__aoi22_l | A0->Y (FR) | 0.11003 | 0.98655 | 10.90430 |
| | A1->Y (FR) | 0.09802 | 0.95753 | 10.71360 |
| | B0->Y (FR) | 0.06584 | 0.91465 | 10.69520 |
| | B1->Y (FR) | 0.07810 | 0.94746 | 10.93620 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__aoi22_l | A0->Y (RF) | 0.07652 | 0.67962 | 7.57096 |
| | A1->Y (RF) | 0.07110 | 0.69197 | 7.92309 |
| | B0->Y (RF) | 0.03923 | 0.65566 | 7.89373 |
| | B1->Y (RF) | 0.04483 | 0.64311 | 7.54354 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | A0 | 0.01324 | 0.01311 | 0.01362 |
| | A1 | 0.01156 | 0.01141 | 0.01192 |
| | B0 | 0.00905 | 0.00904 | 0.01156 |
| | B1 | 0.01067 | 0.01066 | 0.01319 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | A0 | 0.00491 | 0.00451 | 0.00486 |
| | A1 | 0.00495 | 0.00460 | 0.00516 |
| | B0 | -0.00077 | -0.00075 | -0.00012 |
| | B1 | -0.00064 | -0.00082 | -0.00034 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | (A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * B1 * !Y) | -0.00361 | -0.00404 | -0.00406 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | -0.00411 | -0.00414 | -0.00411 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | -0.00411 | -0.00412 | -0.00412 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00411 | -0.00412 | -0.00412 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | (A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * B1 * !Y) | 0.00403 | 0.00407 | 0.00406 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | 0.00411 | 0.00415 | 0.00413 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | 0.00414 | 0.00414 | 0.00413 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00414 | 0.00414 | 0.00413 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | (A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * B1 * !Y) | -0.00358 | -0.00400 | -0.00401 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | -0.00406 | -0.00409 | -0.00407 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | -0.00438 | -0.00442 | -0.00442 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00438 | -0.00442 | -0.00442 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | (A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * B1 * !Y) | 0.00398 | 0.00402 | 0.00401 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | 0.00407 | 0.00412 | 0.00408 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | 0.00442 | 0.00445 | 0.00443 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00441 | 0.00445 | 0.00443 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | (A0 * A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B1 * !Y) | -0.00200 | -0.00202 | -0.00201 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | -0.00199 | -0.00201 | -0.00200 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | -0.00449 | -0.00452 | -0.00453 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | -0.00449 | -0.00452 | -0.00453 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | (A0 * A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B1 * !Y) | 0.00229 | 0.00230 | 0.00208 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | 0.00200 | 0.00202 | 0.00200 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | 0.00453 | 0.00457 | 0.00454 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | 0.00453 | 0.00457 | 0.00454 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | (A0 * A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B0 * !Y) | -0.00201 | -0.00203 | -0.00202 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | -0.00200 | -0.00202 | -0.00201 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00417 | -0.00420 | -0.00418 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | -0.00417 | -0.00420 | -0.00418 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | (A0 * A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B0 * !Y) | 0.00230 | 0.00231 | 0.00209 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | 0.00200 | 0.00202 | 0.00201 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00420 | 0.00420 | 0.00419 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | 0.00420 | 0.00420 | 0.00419 |

# SKY130_OSU_SC_18T_MS__BUFx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_18T_ms__buf_1** | 9.52380 |
| **sky130_osu_sc_18T_ms__buf_2** | 12.45420 |
| **sky130_osu_sc_18T_ms__buf_4** | 18.31500 |
| **sky130_osu_sc_18T_ms__buf_6** | 24.17580 |
| **sky130_osu_sc_18T_ms__buf_8** | 30.03660 |
| **sky130_osu_sc_18T_ms__buf_l** | 9.52380 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| **sky130_osu_sc_18T_ms__buf_1** | 0.00556 | 2.51064 |
| **sky130_osu_sc_18T_ms__buf_2** | 0.00556 | 4.93137 |
| **sky130_osu_sc_18T_ms__buf_4** | 0.00555 | 9.48224 |
| **sky130_osu_sc_18T_ms__buf_6** | 0.00097 | 1.80000 |
| **sky130_osu_sc_18T_ms__buf_8** | 0.00557 | 17.85828 |
| **sky130_osu_sc_18T_ms__buf_l** | 0.00438 | 1.74361 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__buf_1** | 0.00000 | 0.14503 | 0.14503 |
| **sky130_osu_sc_18T_ms__buf_2** | 0.00000 | 0.21755 | 0.28957 |
| **sky130_osu_sc_18T_ms__buf_4** | 0.00000 | 0.36257 | 0.57866 |
| **sky130_osu_sc_18T_ms__buf_6** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_18T_ms__buf_8** | 0.00000 | 0.65263 | 1.15683 |
| **sky130_osu_sc_18T_ms__buf_l** | 0.00000 | 0.10091 | 0.10091 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_18T_ms__buf_1** | **A->Y (RR)** | 0.06482 | 0.61939 | 7.10671 |
| **sky130_osu_sc_18T_ms__buf_2** | **A->Y (RR)** | 0.07290 | 0.57012 | 7.25503 |
| **sky130_osu_sc_18T_ms__buf_4** | **A->Y (RR)** | 0.09858 | 0.58194 | 7.58830 |
| **sky130_osu_sc_18T_ms__buf_8** | **A->Y (RR)** | 0.14716 | 0.64612 | 7.98530 |
| **sky130_osu_sc_18T_ms__buf_l** | **A->Y (RR)** | 0.07273 | 0.69608 | 7.13359 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_18T_ms__buf_1** | **A->Y (FF)** | 0.06983 | 0.62498 | 6.79855 |
| **sky130_osu_sc_18T_ms__buf_2** | **A->Y (FF)** | 0.08102 | 0.60075 | 6.97007 |
| **sky130_osu_sc_18T_ms__buf_4** | **A->Y (FF)** | 0.11281 | 0.62913 | 7.29355 |
| **sky130_osu_sc_18T_ms__buf_8** | **A->Y (FF)** | 0.17881 | 0.71025 | 7.59644 |
| **sky130_osu_sc_18T_ms__buf_l** | **A->Y (FF)** | 0.07737 | 0.68996 | 6.73583 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__buf_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00452 | 0.00437 | 0.01533 |
| sky130_osu_sc_18T_ms__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00941 | 0.00930 | 0.01993 |
| sky130_osu_sc_18T_ms__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01998 | 0.02043 | 0.03142 |
| sky130_osu_sc_18T_ms__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04113 | 0.04290 | 0.05285 |
| sky130_osu_sc_18T_ms__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00345 | 0.00306 | 0.01122 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__buf_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01173 | 0.01229 | 0.02797 |
| sky130_osu_sc_18T_ms__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01490 | 0.01597 | 0.03113 |
| sky130_osu_sc_18T_ms__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02285 | 0.02504 | 0.03992 |
| sky130_osu_sc_18T_ms__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03928 | 0.04304 | 0.05796 |
| sky130_osu_sc_18T_ms__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00920 | 0.00945 | 0.01961 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_18T_ms__buf_6 | 0.00000 | 0.00000 | 0.00000 |
| | -0.00062 | -0.00062 | -0.00062 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_18T_ms__buf_6 | 0.00000 | 0.00000 | 0.00000 |
| | 0.00062 | 0.00062 | 0.00062 |

# SKY130_OSU_SC_18T_MS__DFFRx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__dffr_1 | 63.73620 |
| sky130_osu_sc_18T_ms__dffr_l | 63.73620 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | |
|---|---|---|---|---|---|
| | D | RN | CK | Q | QN |
| sky130_osu_sc_18T_ms__dffr_1 | 0.00532 | 0.00529 | 0.01539 | 2.45178 | 2.43303 |
| sky130_osu_sc_18T_ms__dffr_l | 0.00532 | 0.00529 | 0.01538 | 1.73956 | 1.74180 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffr_1 | 0.00000 | 0.45022 | 0.68778 |
| sky130_osu_sc_18T_ms__dffr_l | 0.00000 | 0.40610 | 0.64366 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffr_1 | CK->Q (RR) | 0.32611 | 1.53562 | 17.40480 |
| | QN->Q (FR) | 0.03503 | 0.87127 | 12.59460 |
| sky130_osu_sc_18T_ms__dffr_l | CK->Q (RR) | 0.32159 | 1.64635 | 16.99050 |
| | QN->Q (FR) | 0.03766 | 0.91920 | 12.29970 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffr_1 | CK->Q (RF) | 0.32614 | 1.58308 | 18.22630 |
| | QN->Q (RF) | 0.03171 | 0.80733 | 11.64990 |
| | RN->Q (FF) | 0.24003 | 1.57357 | 18.98130 |
| sky130_osu_sc_18T_ms__dffr_l | CK->Q (RF) | 0.33103 | 1.71959 | 17.90710 |
| | QN->Q (RF) | 0.03262 | 0.81662 | 10.90280 |
| | RN->Q (FF) | 0.24533 | 1.70975 | 18.64610 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffr_1 | CK->QN (RR) | 0.28508 | 0.87266 | 7.29813 |
| | RN->QN (FR) | 0.19893 | 0.86278 | 8.04485 |
| sky130_osu_sc_18T_ms__dffr_l | CK->QN (RR) | 0.28550 | 0.93327 | 7.35691 |
| | RN->QN (FR) | 0.19966 | 0.92336 | 8.09651 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_18T_ms__dffr_1** | **CK->QN (RF)** | 0.27800 | 0.81864 | 6.42370 |
| **sky130_osu_sc_18T_ms__dffr_l** | **CK->QN (RF)** | 0.26812 | 0.83661 | 6.16439 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | hold | CK (R) | -0.07082 | -0.09519 | -0.30394 |
| | setup | CK (R) | 0.25945 | 0.29439 | 1.07891 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.07244 | -0.09627 | -0.30210 |
| | setup | CK (R) | 0.26014 | 0.29525 | 1.08894 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | hold | CK (R) | -0.12772 | -0.40070 | -3.05616 |
| | setup | CK (R) | 0.16111 | 0.41347 | 3.11526 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.12735 | -0.40079 | -3.05449 |
| | setup | CK (R) | 0.15733 | 0.41347 | 3.11521 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | hold | CK (R) | -0.07082 | -0.09519 | -0.30394 |
| | setup | CK (R) | 0.25945 | 0.29439 | 1.07891 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.07244 | -0.09627 | -0.30210 |
| | setup | CK (R) | 0.26014 | 0.29525 | 1.08894 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | hold | CK (R) | -0.12772 | -0.40070 | -3.05616 |
| | setup | CK (R) | 0.16111 | 0.41347 | 3.11526 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.12735 | -0.40079 | -3.05449 |
| | setup | CK (R) | 0.15733 | 0.41347 | 3.11521 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | recovery | CK (R) | 0.21133 | 0.24548 | 1.13154 |
| | removal | CK (R) | -0.03726 | -0.04552 | -0.12437 |
| sky130_osu_sc_18T_ms__dffr_l | recovery | CK (R) | 0.21157 | 0.24696 | 1.13986 |
| | removal | CK (R) | -0.03726 | -0.04552 | -0.12437 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | recovery | CK (R) | 0.21133 | 0.24548 | 1.13154 |
| | removal | CK (R) | -0.03726 | -0.04552 | -0.12437 |
| sky130_osu_sc_18T_ms__dffr_l | recovery | CK (R) | 0.21157 | 0.24696 | 1.13986 |
| | removal | CK (R) | -0.03726 | -0.04552 | -0.12437 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | min_pulse_width | RN () | 0.14185 | 0.53345 | 13.33370 |
| | min_pulse_width | RN () | 0.14185 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | RN () | 0.13785 | 0.53345 | 13.33370 |
| | min_pulse_width | RN () | 0.13785 | 0.53345 | 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_18T_ms__dffr_1 | min_pulse_width | CK () | 0.14984 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.17382 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | CK () | 0.14185 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.16982 | 0.53345 | 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_18T_ms__dffr_1 | min_pulse_width | CK () | 0.32566 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.12986 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | CK () | 0.32566 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.12986 | 0.53345 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01193 | 0.00844 | 0.00000 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01065 | 0.00812 | -0.00325 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01347 | 0.01120 | 0.00000 |
| | RN | -0.00158 | -0.10072 | -1.60860 |
| | RN | 0.03115 | 0.02911 | 0.00901 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01215 | 0.01060 | 0.00325 |
| | RN | -0.00158 | -0.08198 | -1.14132 |
| | RN | 0.02982 | 0.02849 | 0.02256 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01346 | 0.01120 | 0.00000 |
| | RN | -0.00158 | -0.10026 | -1.59603 |
| | RN | 0.03113 | 0.02910 | 0.00925 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01214 | 0.01059 | 0.00324 |
| | RN | -0.00158 | -0.08204 | -1.14272 |
| | RN | 0.02981 | 0.02848 | 0.02232 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01189 | 0.00838 | 0.00000 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01059 | 0.00811 | -0.00324 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00341 | -0.00398 | -0.00404 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01462 | 0.01379 | 0.01960 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00655 | 0.00582 | 0.01189 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00341 | -0.00398 | -0.00404 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01462 | 0.01379 | 0.01960 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00655 | 0.00581 | 0.01189 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00401 | 0.00405 | 0.00405 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02434 | 0.02393 | 0.03079 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01144 | 0.01111 | 0.01795 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00401 | 0.00405 | 0.00405 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02434 | 0.02393 | 0.03079 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01144 | 0.01111 | 0.01795 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00462 | 0.00405 | 0.01883 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01288 | 0.01201 | 0.02650 |
| sky130_osu_sc_18T_ms__dffr_l | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00462 | 0.00404 | 0.01883 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01288 | 0.01201 | 0.02650 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.01094 | 0.01109 | 0.02857 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02338 | 0.02305 | 0.04045 |
| sky130_osu_sc_18T_ms__dffr_l | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.01094 | 0.01109 | 0.02857 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02338 | 0.02305 | 0.04045 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00083 | -0.00151 | 0.01285 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00698 | 0.00541 | 0.02003 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00133 | -0.00211 | 0.01215 |
| sky130_osu_sc_18T_ms__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00083 | -0.00151 | 0.01285 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00698 | 0.00541 | 0.02003 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00133 | -0.00211 | 0.01215 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01697 | 0.01736 | 0.03466 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.03704 | 0.03611 | 0.05408 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.02833 | 0.02790 | 0.04465 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.03645 | 0.03681 | 0.06815 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01929 | 0.01940 | 0.03641 |
| sky130_osu_sc_18T_ms__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01697 | 0.01737 | 0.03466 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.03704 | 0.03610 | 0.05408 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.02833 | 0.02792 | 0.04465 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.03645 | 0.03682 | 0.06815 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01929 | 0.01953 | 0.03641 |

# SKY130_OSU_SC_18T_MS__DFFSRx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__dffsr_1 | 69.59700 |
| sky130_osu_sc_18T_ms__dffsr_l | 69.59700 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) | |
|---|---|---|---|---|---|---|
| | D | RN | SN | CK | Q | QN |
| sky130_osu_sc_18T_ms__dffsr_1 | 0.00528 | 0.00529 | 0.01137 | 0.01565 | 2.55212 | 2.55005 |
| sky130_osu_sc_18T_ms__dffsr_l | 0.00528 | 0.00529 | 0.01136 | 0.01565 | 1.74158 | 1.74710 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffsr_1 | 0.00000 | 0.49390 | 0.68824 |
| sky130_osu_sc_18T_ms__dffsr_l | 0.00000 | 0.44978 | 0.64412 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK->Q (RR) | 0.33339 | 1.52901 | 17.33230 |
| | QN->Q (FR) | 0.03331 | 0.84847 | 12.39430 |
| | RN->Q (RR) | 0.26635 | 1.47614 | 17.32630 |
| | SN->Q (FR) | 0.24445 | 1.55340 | 18.49690 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->Q (RR) | 0.33797 | 1.67245 | 17.06030 |
| | QN->Q (FR) | 0.03759 | 0.91693 | 12.27280 |
| | RN->Q (RR) | 0.27146 | 1.62018 | 17.06130 |
| | SN->Q (FR) | 0.24926 | 1.69454 | 18.20460 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK->Q (RF) | 0.36938 | 1.60986 | 18.20790 |
| | QN->Q (RF) | 0.02897 | 0.76342 | 11.09290 |
| | RN->Q (FF) | 0.24598 | 1.56614 | 18.95140 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->Q (RF) | 0.37903 | 1.77236 | 17.96960 |
| | QN->Q (RF) | 0.03255 | 0.81453 | 10.89740 |
| | RN->Q (FF) | 0.25594 | 1.72904 | 18.70580 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK->QN (RR) | 0.32926 | 0.91965 | 7.42693 |
| | RN->QN (FR) | 0.20680 | 0.87675 | 8.16932 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->QN (RR) | 0.33264 | 0.98604 | 7.42908 |
| | RN->QN (FR) | 0.21016 | 0.94321 | 8.16478 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK->QN (RF) | 0.28832 | 0.82878 | 6.43849 |
| | RN->QN (RF) | 0.22163 | 0.77611 | 6.43583 |
| | SN->QN (FF) | 0.19980 | 0.85356 | 7.59799 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->QN (RF) | 0.28574 | 0.86445 | 6.24479 |
| | RN->QN (RF) | 0.21953 | 0.81285 | 6.23900 |
| | SN->QN (FF) | 0.19747 | 0.88650 | 7.38475 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | hold | CK (R) | -0.07847 | -0.10526 | -0.36212 |
| | setup | CK (R) | 0.25535 | 0.28841 | 1.10667 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.07683 | -0.10462 | -0.36326 |
| | setup | CK (R) | 0.25604 | 0.28744 | 1.10519 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | hold | CK (R) | -0.14591 | -0.42166 | -3.17213 |
| | setup | CK (R) | 0.18695 | 0.43173 | 3.21983 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.14605 | -0.41943 | -3.17049 |
| | setup | CK (R) | 0.18675 | 0.43173 | 3.21983 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | hold | CK (R) | -0.07847 | -0.10526 | -0.36212 |
| | setup | CK (R) | 0.25535 | 0.28841 | 1.10667 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.07683 | -0.10462 | -0.36326 |
| | setup | CK (R) | 0.25604 | 0.28744 | 1.10519 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | hold | CK (R) | -0.14591 | -0.42166 | -3.17213 |
| | setup | CK (R) | 0.18695 | 0.43173 | 3.21983 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.14605 | -0.41943 | -3.17049 |
| | setup | CK (R) | 0.18675 | 0.43173 | 3.21983 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | recovery | CK (R) | 0.18795 | 0.21653 | 1.05907 |
| | removal | CK (R) | -0.02221 | -0.02642 | -0.08511 |
| | hold | SN (R) | -0.19174 | -0.40613 | -1.90906 |
| | setup | SN (R) | 0.21764 | 0.46483 | 4.57901 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.18730 | 0.21547 | 1.05759 |
| | removal | CK (R) | -0.02221 | -0.02642 | -0.08511 |
| | hold | SN (R) | -0.18552 | -0.39899 | -1.86602 |
| | setup | SN (R) | 0.21716 | 0.45783 | 4.49719 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | recovery | CK (R) | 0.18795 | 0.21653 | 1.05907 |
| | removal | CK (R) | -0.02221 | -0.02642 | -0.08511 |
| | hold | SN (R) | -0.19244 | -0.40613 | -1.90906 |
| | hold | SN (R) | -0.19174 | -0.40726 | -1.91779 |
| | setup | SN (R) | 0.21764 | 0.46364 | 4.35702 |
| | setup | SN (R) | 0.21263 | 0.46483 | 4.57901 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.18730 | 0.21547 | 1.05759 |
| | removal | CK (R) | -0.02221 | -0.02642 | -0.08511 |
| | hold | SN (R) | -0.18883 | -0.39914 | -1.86602 |
| | hold | SN (R) | -0.18552 | -0.39899 | -1.87204 |
| | setup | SN (R) | 0.21716 | 0.45672 | 4.21115 |
| | setup | SN (R) | 0.20440 | 0.45783 | 4.49719 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | min_pulse_width | RN () | 0.16183 | 0.53345 | 13.33370 |
| | min_pulse_width | RN () | 0.16183 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | RN () | 0.16183 | 0.53345 | 13.33370 |
| | min_pulse_width | RN () | 0.15783 | 0.53345 | 13.33370 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | recovery | CK (R) | 0.04715 | 0.09340 | 3.70247 |
| | removal | CK (R) | -0.01776 | -0.06954 | -0.38154 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.04647 | 0.09309 | 3.60671 |
| | removal | CK (R) | -0.01776 | -0.06954 | -0.38554 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | recovery | CK (R) | 0.04715 | 0.09340 | 3.70247 |
| | removal | CK (R) | -0.01776 | -0.06954 | -0.38154 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.04647 | 0.09309 | 3.60671 |
| | removal | CK (R) | -0.01776 | -0.06954 | -0.38554 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | min_pulse_width | SN () | 0.19380 | 0.53345 | 13.33370 |
| | min_pulse_width | SN () | 0.18980 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | SN () | 0.19380 | 0.53345 | 13.33370 |
| | min_pulse_width | SN () | 0.18181 | 0.53345 | 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_18T_ms__dffsr_1 | min_pulse_width | CK () | 0.15384 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.18980 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | CK () | 0.14585 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.18580 | 0.53345 | 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_18T_ms__dffsr_1 | min_pulse_width | CK () | 0.32166 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.16183 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | CK () | 0.32166 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.16183 | 0.53345 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01490 | 0.01245 | 0.00000 |
| | RN | 0.02729 | 0.02508 | 0.00041 |
| | SN | -0.00158 | -0.10318 | -1.67445 |
| | SN | 0.03036 | 0.02798 | 0.00073 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01372 | 0.01120 | -0.00242 |
| | RN | 0.02608 | 0.02385 | 0.00565 |
| | SN | -0.00158 | -0.08203 | -1.14265 |
| | SN | 0.02915 | 0.02675 | 0.00632 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01570 | 0.01383 | 0.00000 |
| | RN | -0.00158 | -0.10318 | -1.67444 |
| | RN | 0.03202 | 0.03020 | 0.01493 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01450 | 0.01306 | 0.00600 |
| | RN | -0.00158 | -0.08203 | -1.14265 |
| | RN | 0.03080 | 0.02938 | 0.02364 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01568 | 0.01382 | 0.00000 |
| | RN | -0.00158 | -0.10312 | -1.67297 |
| | RN | 0.03199 | 0.03017 | 0.01411 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01449 | 0.01306 | 0.00603 |
| | RN | -0.00158 | -0.08219 | -1.14620 |
| | RN | 0.03078 | 0.02938 | 0.02363 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01484 | 0.01238 | 0.00000 |
| | RN | 0.02723 | 0.02503 | -0.00049 |
| | SN | -0.00158 | -0.10312 | -1.67301 |
| | SN | 0.03030 | 0.02795 | 0.00136 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01366 | 0.01116 | -0.00295 |
| | RN | 0.02602 | 0.02380 | 0.00510 |
| | SN | -0.00158 | -0.08219 | -1.14621 |
| | SN | 0.02910 | 0.02672 | 0.00663 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00394 | -0.00402 | -0.00403 |
| | (!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) | 0.01861 | 0.01782 | 0.02360 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00733 | 0.00660 | 0.01252 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00730 | 0.00659 | 0.01253 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00737 | 0.00665 | 0.01257 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00394 | -0.00402 | -0.00403 |
| | (!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) | 0.01862 | 0.01782 | 0.02361 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00733 | 0.00660 | 0.01252 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00730 | 0.00659 | 0.01253 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00737 | 0.00665 | 0.01257 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00403 | 0.00405 | 0.00403 |
| | (!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) | 0.02772 | 0.02727 | 0.03369 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01198 | 0.01170 | 0.01849 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01212 | 0.01182 | 0.01850 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01193 | 0.01168 | 0.01844 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00403 | 0.00405 | 0.00403 |
| | (!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) | 0.02772 | 0.02726 | 0.03368 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01197 | 0.01169 | 0.01848 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01211 | 0.01181 | 0.01849 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01192 | 0.01167 | 0.01843 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__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) | 0.00386 | 0.00336 | 0.01784 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01536 | 0.01447 | 0.02903 |
| sky130_osu_sc_18T_ms__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) | 0.00386 | 0.00336 | 0.01785 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01536 | 0.01447 | 0.02904 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__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) | 0.01161 | 0.01192 | 0.02961 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02454 | 0.02418 | 0.04167 |
| sky130_osu_sc_18T_ms__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) | 0.01160 | 0.01191 | 0.02960 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02452 | 0.02417 | 0.04166 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__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) | -0.00911 | -0.00911 | -0.00918 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00857 | -0.00940 | -0.00941 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00862 | -0.00909 | -0.00905 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00631 | 0.00571 | 0.01247 |
| sky130_osu_sc_18T_ms__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) | -0.00911 | -0.00911 | -0.00918 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00856 | -0.00938 | -0.00940 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00862 | -0.00909 | -0.00905 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00631 | 0.00572 | 0.01248 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__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) | 0.00918 | 0.00926 | 0.00922 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00937 | 0.00946 | 0.00944 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00904 | 0.00910 | 0.00908 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01904 | 0.01857 | 0.02479 |
| sky130_osu_sc_18T_ms__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) | 0.00918 | 0.00926 | 0.00922 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00935 | 0.00944 | 0.00942 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00903 | 0.00909 | 0.00908 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01903 | 0.01857 | 0.02478 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffsr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00083 | -0.00151 | 0.01284 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00784 | 0.00639 | 0.02096 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00767 | 0.00624 | 0.02092 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00112 | -0.00187 | 0.01235 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00528 | 0.00376 | 0.03231 |
| sky130_osu_sc_18T_ms__dffsr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00083 | -0.00151 | 0.01284 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00784 | 0.00638 | 0.02097 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00766 | 0.00623 | 0.02091 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00112 | -0.00187 | 0.01235 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00528 | 0.00376 | 0.03232 |

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

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

| | | | | |
|---|---|---|---|---|
| **sky130_osu_sc_18T_ms__dffsr_1** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.04128 | 0.04040 | 0.05831 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01702 | 0.01739 | 0.03471 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.02883 | 0.02849 | 0.04519 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.02888 | 0.02852 | 0.04520 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.03981 | 0.03995 | 0.07111 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01913 | 0.01936 | 0.03624 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.02258 | 0.02322 | 0.05618 |
| **sky130_osu_sc_18T_ms__dffsr_l** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.04128 | 0.04040 | 0.05829 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01702 | 0.01739 | 0.03471 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.02883 | 0.02849 | 0.04519 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.02888 | 0.02852 | 0.04520 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.03980 | 0.03995 | 0.07110 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01912 | 0.01936 | 0.03624 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.02257 | 0.02321 | 0.05617 |

# SKY130_OSU_SC_18T_MS__DFFSx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__dffs_1 | 57.87540 |
| sky130_osu_sc_18T_ms__dffs_l | 57.87540 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | |
|---|---|---|---|---|---|
| | D | SN | CK | Q | QN |
| sky130_osu_sc_18T_ms__dffs_1 | 0.00530 | 0.00908 | 0.01543 | 2.45274 | 2.44491 |
| sky130_osu_sc_18T_ms__dffs_l | 0.00530 | 0.00908 | 0.01543 | 1.75009 | 1.75609 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffs_1 | 0.00000 | 0.45696 | 0.69384 |
| sky130_osu_sc_18T_ms__dffs_l | 0.00000 | 0.41283 | 0.64971 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffs_1 | CK->Q (RR) | 0.24572 | 1.44025 | 17.23720 |
| | QN->Q (FR) | 0.03484 | 0.86438 | 12.49460 |
| | SN->Q (FR) | 0.18631 | 1.51512 | 18.26410 |
| sky130_osu_sc_18T_ms__dffs_l | CK->Q (RR) | 0.24674 | 1.56351 | 16.94750 |
| | QN->Q (FR) | 0.03749 | 0.91750 | 12.27060 |
| | SN->Q (FR) | 0.18710 | 1.63114 | 17.94920 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffs_1 | CK->Q (RF) | 0.36259 | 1.62141 | 18.19730 |
| | QN->Q (RF) | 0.03145 | 0.80462 | 11.59960 |
| sky130_osu_sc_18T_ms__dffs_l | CK->Q (RF) | 0.36547 | 1.75959 | 17.99250 |
| | QN->Q (RF) | 0.03242 | 0.81368 | 10.90240 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dffs_1 | CK->QN (RR) | 0.31964 | 0.91426 | 7.32997 |
| sky130_osu_sc_18T_ms__dffs_l | CK->QN (RR) | 0.31832 | 0.97278 | 7.41928 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_18T_ms__dffs_1** | **CK->QN (RF)** | 0.20200 | 0.72781 | 6.33372 |
| | **SN->QN (FF)** | 0.14265 | 0.80419 | 7.35228 |
| **sky130_osu_sc_18T_ms__dffs_l** | **CK->QN (RF)** | 0.19782 | 0.75511 | 6.10171 |
| | **SN->QN (FF)** | 0.13783 | 0.82347 | 7.09687 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | hold | CK (R) | -0.05561 | -0.08199 | -0.26156 |
| | setup | CK (R) | 0.17792 | 0.21934 | 1.05845 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.05480 | -0.08259 | -0.26247 |
| | setup | CK (R) | 0.17752 | 0.21961 | 1.06432 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | hold | CK (R) | -0.13194 | -0.40026 | -3.06717 |
| | setup | CK (R) | 0.17588 | 0.41652 | 3.13483 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.12936 | -0.40026 | -3.06652 |
| | setup | CK (R) | 0.17574 | 0.41650 | 3.13484 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | hold | CK (R) | -0.05561 | -0.08199 | -0.26156 |
| | setup | CK (R) | 0.17792 | 0.21934 | 1.05845 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.05480 | -0.08259 | -0.26247 |
| | setup | CK (R) | 0.17752 | 0.21961 | 1.06432 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | hold | CK (R) | -0.13194 | -0.40026 | -3.06717 |
| | setup | CK (R) | 0.17588 | 0.41652 | 3.13483 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.12936 | -0.40026 | -3.06652 |
| | setup | CK (R) | 0.17574 | 0.41650 | 3.13484 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | recovery | CK (R) | 0.05245 | 0.09097 | 2.79315 |
| | removal | CK (R) | -0.01859 | -0.06302 | -0.37925 |
| sky130_osu_sc_18T_ms__dffs_l | recovery | CK (R) | 0.05007 | 0.09055 | 2.67540 |
| | removal | CK (R) | -0.01859 | -0.06302 | -0.37925 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | recovery | CK (R) | 0.05245 | 0.09097 | 2.79315 |
| | removal | CK (R) | -0.01859 | -0.06302 | -0.37925 |
| sky130_osu_sc_18T_ms__dffs_l | recovery | CK (R) | 0.05007 | 0.09055 | 2.67540 |
| | removal | CK (R) | -0.01859 | -0.06302 | -0.37925 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | min_pulse_width | SN () | 0.12587 | 0.53345 | 13.33370 |
| | min_pulse_width | SN () | 0.12587 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | SN () | 0.12187 | 0.53345 | 13.33370 |
| | min_pulse_width | SN () | 0.12187 | 0.53345 | 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_18T_ms__dffs_1 | min_pulse_width | CK () | 0.10589 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.18181 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | CK () | 0.10189 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.17781 | 0.53345 | 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_18T_ms__dffs_1 | min_pulse_width | CK () | 0.24574 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.15384 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | CK () | 0.24574 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.15384 | 0.53345 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01197 | 0.00846 | 0.00000 |
| | SN | -0.00158 | -0.10075 | -1.60925 |
| | SN | 0.02588 | 0.02236 | -0.01463 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01067 | 0.00813 | -0.00397 |
| | SN | -0.00158 | -0.08228 | -1.14823 |
| | SN | 0.02456 | 0.02205 | 0.00552 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01336 | 0.01124 | 0.00000 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01205 | 0.01061 | 0.00397 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01335 | 0.01128 | 0.00000 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01204 | 0.01060 | 0.00391 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01192 | 0.00842 | 0.00000 |
| | SN | -0.00158 | -0.10055 | -1.60397 |
| | SN | 0.02583 | 0.02231 | -0.01421 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01062 | 0.00810 | -0.00391 |
| | SN | -0.00158 | -0.08244 | -1.15211 |
| | SN | 0.02451 | 0.02201 | 0.00535 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00398 | -0.00408 | -0.00407 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01403 | 0.01315 | 0.01910 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00638 | 0.00565 | 0.01166 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00398 | -0.00408 | -0.00407 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01403 | 0.01315 | 0.01910 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00637 | 0.00565 | 0.01166 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00408 | 0.00409 | 0.00407 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02350 | 0.02299 | 0.02981 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01150 | 0.01123 | 0.01813 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00408 | 0.00409 | 0.00407 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02350 | 0.02300 | 0.02981 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01150 | 0.01123 | 0.01813 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | -0.00680 | -0.00685 | -0.00684 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00490 | 0.00446 | 0.01224 |
| sky130_osu_sc_18T_ms__dffs_l | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | -0.00680 | -0.00685 | -0.00684 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00489 | 0.00446 | 0.01224 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00684 | 0.00692 | 0.00686 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01334 | 0.01299 | 0.02286 |
| sky130_osu_sc_18T_ms__dffs_l | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00684 | 0.00692 | 0.00686 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01334 | 0.01299 | 0.02286 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00085 | -0.00153 | 0.01290 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00123 | -0.00200 | 0.01227 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00429 | 0.00280 | 0.03184 |
| sky130_osu_sc_18T_ms__dffs_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00085 | -0.00153 | 0.01290 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00123 | -0.00200 | 0.01227 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00429 | 0.00280 | 0.03184 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dffs_1 | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.03657 | 0.03565 | 0.05394 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01698 | 0.01738 | 0.03469 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03552 | 0.03569 | 0.06708 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01918 | 0.01935 | 0.03631 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02202 | 0.02271 | 0.05599 |
| sky130_osu_sc_18T_ms__dffs_l | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.03657 | 0.03564 | 0.05394 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01698 | 0.01739 | 0.03469 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03552 | 0.03569 | 0.06708 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01918 | 0.01934 | 0.03631 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02202 | 0.02271 | 0.05599 |

# SKY130_OSU_SC_18T_MS__DFFx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__dff_1 | 48.35160 |
| sky130_osu_sc_18T_ms__dff_l | 48.35160 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) | |
|---|---|---|---|---|
| | D | CK | Q | QN |
| sky130_osu_sc_18T_ms__dff_1 | 0.00546 | 0.01525 | 2.55795 | 2.56150 |
| sky130_osu_sc_18T_ms__dff_l | 0.00546 | 0.01523 | 1.71735 | 1.73208 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dff_1 | 0.00000 | 0.45390 | 0.58008 |
| sky130_osu_sc_18T_ms__dff_l | 0.00000 | 0.40978 | 0.53596 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dff_1 | CK->Q (RR) | 0.21891 | 1.39452 | 17.14090 |
| | QN->Q (FR) | 0.03307 | 0.84405 | 12.35250 |
| sky130_osu_sc_18T_ms__dff_l | CK->Q (RR) | 0.22734 | 1.54134 | 16.71560 |
| | QN->Q (FR) | 0.03819 | 0.92528 | 12.33630 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dff_1 | CK->Q (RF) | 0.30502 | 1.53779 | 18.11530 |
| | QN->Q (RF) | 0.02882 | 0.76114 | 11.07120 |
| sky130_osu_sc_18T_ms__dff_l | CK->Q (RF) | 0.31663 | 1.70363 | 17.77700 |
| | QN->Q (RF) | 0.03248 | 0.80882 | 10.78490 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dff_1 | CK->QN (RR) | 0.26653 | 0.84840 | 7.35273 |
| sky130_osu_sc_18T_ms__dff_l | CK->QN (RR) | 0.27141 | 0.92178 | 7.37580 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__dff_1 | CK->QN (RF) | 0.17829 | 0.69663 | 6.26618 |
| sky130_osu_sc_18T_ms__dff_l | CK->QN (RF) | 0.17918 | 0.73562 | 6.00606 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | hold | CK (R) | -0.05267 | -0.08187 | -0.27754 |
| | setup | CK (R) | 0.14774 | 0.19579 | 1.08076 |
| sky130_osu_sc_18T_ms__dff_l | hold | CK (R) | -0.05255 | -0.08098 | -0.27530 |
| | setup | CK (R) | 0.14796 | 0.19256 | 1.08333 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | hold | CK (R) | -0.11968 | -0.39865 | -3.07354 |
| | setup | CK (R) | 0.14488 | 0.41386 | 3.14196 |
| sky130_osu_sc_18T_ms__dff_l | hold | CK (R) | -0.11910 | -0.39865 | -3.07354 |
| | setup | CK (R) | 0.14540 | 0.41386 | 3.14196 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | min_pulse_width | CK () | 0.09789 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.16583 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dff_l | min_pulse_width | CK () | 0.09789 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.16183 | 0.53345 | 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_18T_ms__dff_1 | min_pulse_width | CK () | 0.21777 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.11388 | 0.53345 | 13.33370 |
| sky130_osu_sc_18T_ms__dff_l | min_pulse_width | CK () | 0.21378 | 0.53345 | 13.33370 |
| | min_pulse_width | CK () | 0.11388 | 0.53345 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01259 | 0.00999 | 0.00000 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01140 | 0.00882 | -0.00301 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01363 | 0.01179 | 0.00000 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01245 | 0.01090 | 0.00301 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01362 | 0.01179 | 0.00000 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01245 | 0.01088 | 0.00285 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01255 | 0.00999 | 0.00000 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01135 | 0.00880 | -0.00285 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00341 | -0.00399 | -0.00404 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01316 | 0.01239 | 0.01852 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00341 | -0.00399 | -0.00404 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01316 | 0.01239 | 0.01852 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00400 | 0.00404 | 0.00404 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02418 | 0.02368 | 0.03055 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00400 | 0.00404 | 0.00404 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02418 | 0.02379 | 0.03055 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00085 | -0.00153 | 0.01292 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00122 | -0.00197 | 0.01230 |
| sky130_osu_sc_18T_ms__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00085 | -0.00153 | 0.01292 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00122 | -0.00197 | 0.01230 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__dff_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01692 | 0.01733 | 0.03463 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03576 | 0.03484 | 0.05336 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03604 | 0.03621 | 0.06786 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01911 | 0.01922 | 0.03624 |
| sky130_osu_sc_18T_ms__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01692 | 0.01732 | 0.03463 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03577 | 0.03484 | 0.05336 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03604 | 0.03621 | 0.06787 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01910 | 0.01934 | 0.03624 |

# SKY130_OSU_SC_18T_MS__INVx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_18T_ms__inv_1** | 6.59340 |
| **sky130_osu_sc_18T_ms__inv_10** | 32.96700 |
| **sky130_osu_sc_18T_ms__inv_2** | 9.52380 |
| **sky130_osu_sc_18T_ms__inv_3** | 12.45420 |
| **sky130_osu_sc_18T_ms__inv_4** | 15.38460 |
| **sky130_osu_sc_18T_ms__inv_6** | 21.24540 |
| **sky130_osu_sc_18T_ms__inv_8** | 27.10620 |
| **sky130_osu_sc_18T_ms__inv_l** | 6.59340 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| sky130_osu_sc_18T_ms__inv_1 | 0.00533 | 2.44524 |
| sky130_osu_sc_18T_ms__inv_10 | 0.05028 | 21.37720 |
| sky130_osu_sc_18T_ms__inv_2 | 0.01025 | 4.74527 |
| sky130_osu_sc_18T_ms__inv_3 | 0.01528 | 6.77603 |
| sky130_osu_sc_18T_ms__inv_4 | 0.02022 | 9.12345 |
| sky130_osu_sc_18T_ms__inv_6 | 0.03032 | 13.56094 |
| sky130_osu_sc_18T_ms__inv_8 | 0.04031 | 17.58136 |
| sky130_osu_sc_18T_ms__inv_l | 0.00413 | 1.65669 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__inv_1 | 0.00000 | 0.07252 | 0.14455 |
| sky130_osu_sc_18T_ms__inv_10 | 0.00000 | 0.72515 | 1.44543 |
| sky130_osu_sc_18T_ms__inv_2 | 0.00000 | 0.14503 | 0.28909 |
| sky130_osu_sc_18T_ms__inv_3 | 0.00000 | 0.21755 | 0.43363 |
| sky130_osu_sc_18T_ms__inv_4 | 0.00000 | 0.29006 | 0.57817 |
| sky130_osu_sc_18T_ms__inv_6 | 0.00000 | 0.43509 | 0.86726 |
| sky130_osu_sc_18T_ms__inv_8 | 0.00000 | 0.58012 | 1.15635 |
| sky130_osu_sc_18T_ms__inv_l | 0.00000 | 0.05045 | 0.10071 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_18T_ms__inv_1** | **A->Y (FR)** | 0.03126 | 0.77641 | 11.16620 |
| **sky130_osu_sc_18T_ms__inv_10** | **A->Y (FR)** | 0.04895 | 0.54639 | 11.07800 |
| **sky130_osu_sc_18T_ms__inv_2** | **A->Y (FR)** | 0.02616 | 0.67477 | 11.06520 |
| **sky130_osu_sc_18T_ms__inv_3** | **A->Y (FR)** | 0.02924 | 0.63416 | 11.06360 |
| **sky130_osu_sc_18T_ms__inv_4** | **A->Y (FR)** | 0.03048 | 0.60824 | 11.05670 |
| **sky130_osu_sc_18T_ms__inv_6** | **A->Y (FR)** | 0.03502 | 0.57581 | 11.13100 |
| **sky130_osu_sc_18T_ms__inv_8** | **A->Y (FR)** | 0.04157 | 0.55444 | 11.05900 |
| **sky130_osu_sc_18T_ms__inv_l** | **A->Y (FR)** | 0.03549 | 0.84592 | 11.14300 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_18T_ms__inv_1** | **A->Y (RF)** | 0.02587 | 0.67283 | 9.70762 |
| **sky130_osu_sc_18T_ms__inv_10** | **A->Y (RF)** | 0.04305 | 0.45211 | 9.38109 |
| **sky130_osu_sc_18T_ms__inv_2** | **A->Y (RF)** | 0.02202 | 0.58597 | 9.58499 |
| **sky130_osu_sc_18T_ms__inv_3** | **A->Y (RF)** | 0.02424 | 0.54973 | 9.58147 |
| **sky130_osu_sc_18T_ms__inv_4** | **A->Y (RF)** | 0.02463 | 0.51870 | 9.58039 |
| **sky130_osu_sc_18T_ms__inv_6** | **A->Y (RF)** | 0.03108 | 0.49053 | 9.61694 |
| **sky130_osu_sc_18T_ms__inv_8** | **A->Y (RF)** | 0.03703 | 0.46793 | 9.51263 |
| **sky130_osu_sc_18T_ms__inv_l** | **A->Y (RF)** | 0.02895 | 0.71383 | 9.47480 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__inv_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00615 | 0.00635 | 0.00648 |
| sky130_osu_sc_18T_ms__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05334 | 0.05826 | 0.07743 |
| sky130_osu_sc_18T_ms__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01105 | 0.01189 | 0.01536 |
| sky130_osu_sc_18T_ms__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01691 | 0.01698 | 0.02344 |
| sky130_osu_sc_18T_ms__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02182 | 0.02352 | 0.03062 |
| sky130_osu_sc_18T_ms__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03233 | 0.03471 | 0.03752 |
| sky130_osu_sc_18T_ms__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04280 | 0.04849 | 0.06152 |
| sky130_osu_sc_18T_ms__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00477 | 0.00485 | 0.00279 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__inv_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00136 | -0.00124 | -0.00075 |
| sky130_osu_sc_18T_ms__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.02206 | -0.02060 | -0.01271 |
| sky130_osu_sc_18T_ms__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00429 | -0.00382 | -0.00276 |
| sky130_osu_sc_18T_ms__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00576 | -0.00537 | -0.00333 |
| sky130_osu_sc_18T_ms__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00879 | -0.00801 | -0.00534 |
| sky130_osu_sc_18T_ms__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01342 | -0.01237 | -0.00783 |
| sky130_osu_sc_18T_ms__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01805 | -0.01675 | -0.01036 |
| sky130_osu_sc_18T_ms__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00097 | -0.00092 | -0.00052 |

# SKY130_OSU_SC_18T_MS__MUX2

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

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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_18T_ms__mux2_1** | 18.31500 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | **A0** | **A1** | **S0** | **Y** |
| **sky130_osu_sc_18T_ms__mux2_1** | 0.45363 | 0.45378 | 0.01083 | 0.45697 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_18T_ms__mux2_1** | 0.00000 | 0.14538 | 0.14570 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__mux2_1 | A0->Y (RR) | - | 0.01877 | 0.35075 | 3.61373 |
| | A1->Y (RR) | - | 0.01994 | 0.35083 | 3.61813 |
| | S0->Y (RR) | (!A0 * A1) | 0.05565 | 0.33731 | 1.59722 |
| | S0->Y (FR) | (A0 * !A1) | 0.04565 | 0.44044 | 3.56384 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__mux2_1 | A0->Y (FF) | - | 0.01638 | 0.33167 | 3.35780 |
| | A1->Y (FF) | - | 0.01605 | 0.33005 | 3.34951 |
| | S0->Y (FF) | (!A0 * A1) | 0.07059 | 0.39806 | 2.23444 |
| | S0->Y (RF) | (A0 * !A1) | 0.03060 | 0.37343 | 2.96758 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__mux2_1 | A0 | - | 0.00000 | 0.00000 | 0.00000 |
| | A0 | - | -0.00645 | -0.00646 | -0.00646 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | -0.00451 | -0.00451 | -0.00451 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00721 | 0.00766 | 0.02621 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | -0.00441 | -0.00484 | 0.01119 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__mux2_1 | A0 | - | 0.00000 | 0.00000 | 0.00000 |
| | A0 | - | 0.00645 | 0.00646 | 0.00646 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | 0.00451 | 0.00451 | 0.00451 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00126 | 0.00097 | 0.01757 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | 0.01654 | 0.01686 | 0.03475 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__mux2_1 | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * S0 * Y) + (!A1 * S0 * !Y) | -0.00166 | -0.00165 | -0.00165 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__mux2_1 | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00166 | 0.00165 | 0.00165 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__mux2_1 | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | -0.00196 | -0.00195 | -0.00196 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__mux2_1 | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00196 | 0.00195 | 0.00196 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__mux2_1 | (A0 * A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * Y) | -0.00160 | -0.00188 | 0.01441 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | -0.00155 | -0.00201 | 0.01461 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__mux2_1 | (A0 * A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * Y) | 0.01246 | 0.01294 | 0.03076 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | 0.01130 | 0.01188 | 0.03017 |

# SKY130_OSU_SC_18T_MS__NAND2x

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__nand2_1 | 9.52380 |
| sky130_osu_sc_18T_ms__nand2_l | 9.52380 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_18T_ms__nand2_1 | 0.00535 | 0.00531 | 2.03306 |
| sky130_osu_sc_18T_ms__nand2_l | 0.00414 | 0.00411 | 1.42455 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__nand2_1 | 0.00000 | 0.07252 | 0.28909 |
| sky130_osu_sc_18T_ms__nand2_l | 0.00000 | 0.05047 | 0.20142 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__nand2_1 | A->Y (FR) | 0.03188 | 0.73976 | 10.15490 |
| | B->Y (FR) | 0.03759 | 0.73834 | 10.05190 |
| sky130_osu_sc_18T_ms__nand2_l | A->Y (FR) | 0.03602 | 0.81001 | 10.31220 |
| | B->Y (FR) | 0.04288 | 0.81290 | 10.27200 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__nand2_1 | A->Y (RF) | 0.03698 | 0.79896 | 11.10800 |
| | B->Y (RF) | 0.04235 | 0.78710 | 10.81850 |
| sky130_osu_sc_18T_ms__nand2_l | A->Y (RF) | 0.04203 | 0.87022 | 11.11000 |
| | B->Y (RF) | 0.04720 | 0.86262 | 10.81370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00653 | 0.00672 | 0.00894 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00826 | 0.00834 | 0.01043 |
| sky130_osu_sc_18T_ms__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00503 | 0.00511 | 0.00647 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00629 | 0.00630 | 0.00765 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00090 | -0.00093 | -0.00041 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00084 | -0.00096 | -0.00059 |
| sky130_osu_sc_18T_ms__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00069 | -0.00072 | -0.00032 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00066 | -0.00074 | -0.00046 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nand2_1 | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00452 | -0.00455 | -0.00455 |
| sky130_osu_sc_18T_ms__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00332 | -0.00334 | -0.00334 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nand2_1 | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00454 | 0.00458 | 0.00456 |
| sky130_osu_sc_18T_ms__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00333 | 0.00336 | 0.00335 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nand2_1 | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00421 | -0.00422 | -0.00422 |
| sky130_osu_sc_18T_ms__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00309 | -0.00310 | -0.00309 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nand2_1 | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00424 | 0.00427 | 0.00423 |
| sky130_osu_sc_18T_ms__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00311 | 0.00313 | 0.00310 |

# SKY130_OSU_SC_18T_MS__NOR2x

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__nor2_1 | 9.52380 |
| sky130_osu_sc_18T_ms__nor2_l | 9.52380 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_18T_ms__nor2_1 | 0.00535 | 0.00565 | 1.24929 |
| sky130_osu_sc_18T_ms__nor2_l | 0.00406 | 0.00440 | 0.86367 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__nor2_1 | 0.00000 | 0.05013 | 0.14455 |
| sky130_osu_sc_18T_ms__nor2_l | 0.00000 | 0.03709 | 0.10071 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__nor2_1 | A->Y (FR) | 0.06533 | 0.92277 | 11.00500 |
| | B->Y (FR) | 0.04949 | 0.89225 | 10.87080 |
| sky130_osu_sc_18T_ms__nor2_l | A->Y (FR) | 0.07333 | 1.01372 | 10.99380 |
| | B->Y (FR) | 0.05933 | 0.99380 | 11.00910 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__nor2_1 | A->Y (RF) | 0.03486 | 0.56766 | 6.91532 |
| | B->Y (RF) | 0.02745 | 0.55435 | 6.89505 |
| sky130_osu_sc_18T_ms__nor2_l | A->Y (RF) | 0.03749 | 0.60152 | 6.82772 |
| | B->Y (RF) | 0.03060 | 0.58958 | 6.81038 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00886 | 0.00878 | 0.00946 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00671 | 0.00674 | 0.00945 |
| sky130_osu_sc_18T_ms__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00651 | 0.00644 | 0.00691 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00514 | 0.00515 | 0.00675 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00099 | 0.00075 | 0.00141 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00107 | -0.00097 | -0.00035 |
| sky130_osu_sc_18T_ms__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00065 | 0.00048 | 0.00106 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00072 | -0.00066 | -0.00015 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nor2_1 | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00343 | -0.00402 | -0.00406 |
| sky130_osu_sc_18T_ms__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00249 | -0.00286 | -0.00289 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nor2_1 | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00402 | 0.00406 | 0.00406 |
| sky130_osu_sc_18T_ms__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00287 | 0.00289 | 0.00289 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nor2_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00199 | -0.00201 | -0.00200 |
| sky130_osu_sc_18T_ms__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00148 | -0.00149 | -0.00149 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__nor2_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00210 | 0.00212 | 0.00204 |
| sky130_osu_sc_18T_ms__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00156 | 0.00157 | 0.00151 |

# SKY130_OSU_SC_18T_MS__OAI21

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__oai21_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_18T_ms__oai21_l | 0.00539 | 0.00545 | 0.00458 | 1.26617 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__oai21_l | 0.00000 | 0.06301 | 0.24526 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__oai21_l | A0->Y (FR) | 0.06651 | 0.91965 | 11.04830 |
| | A1->Y (FR) | 0.08653 | 0.95504 | 11.19330 |
| | B0->Y (FR) | 0.04416 | 0.77991 | 9.59972 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__oai21_l | A0->Y (RF) | 0.05290 | 0.71192 | 8.50568 |
| | A1->Y (RF) | 0.06341 | 0.70589 | 8.29126 |
| | B0->Y (RF) | 0.04100 | 0.73047 | 9.02066 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00914 | 0.00913 | 0.01145 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.01130 | 0.01117 | 0.01173 |
| | B0 | 0.00769 | 0.00773 | 0.00933 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00029 | 0.00012 | 0.00052 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00231 | 0.00196 | 0.00234 |
| | B0 | 0.00308 | 0.00301 | 0.00351 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00200 | -0.00201 | -0.00201 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | -0.00399 | -0.00405 | -0.00406 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00413 | -0.00414 | -0.00413 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00211 | 0.00212 | 0.00204 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | 0.00403 | 0.00405 | 0.00406 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00413 | 0.00417 | 0.00415 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00337 | -0.00395 | -0.00399 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | -0.00395 | -0.00405 | -0.00403 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00408 | -0.00410 | -0.00410 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00396 | 0.00403 | 0.00399 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | 0.00401 | 0.00408 | 0.00403 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00409 | 0.00414 | 0.00411 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai21_l | (!A0 * !A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * Y) | -0.00337 | -0.00340 | -0.00344 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai21_l | (!A0 * !A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * Y) | 0.00344 | 0.00347 | 0.00345 |

# SKY130_OSU_SC_18T_MS__OAI22

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__oai22_1 | 15.38460 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_18T_ms__oai22_1 | 0.00523 | 0.00550 | 0.00565 | 0.00553 | 1.23838 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__oai22_1 | 0.00000 | 0.07518 | 0.28909 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__oai22_l | A0->Y (FR) | 0.09401 | 0.95152 | 10.99690 |
| | A1->Y (FR) | 0.07811 | 0.91904 | 10.86500 |
| | B0->Y (FR) | 0.05570 | 0.89714 | 10.85860 |
| | B1->Y (FR) | 0.07211 | 0.92932 | 10.99560 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__oai22_l | A0->Y (RF) | 0.09108 | 0.76347 | 8.57212 |
| | A1->Y (RF) | 0.07232 | 0.73277 | 8.44869 |
| | B0->Y (RF) | 0.06051 | 0.74891 | 8.93864 |
| | B1->Y (RF) | 0.08072 | 0.79092 | 9.19164 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | A0 | 0.01471 | 0.01458 | 0.01515 |
| | A1 | 0.01254 | 0.01251 | 0.01475 |
| | B0 | 0.00935 | 0.00944 | 0.01169 |
| | B1 | 0.01162 | 0.01152 | 0.01213 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | A0 | 0.00379 | 0.00345 | 0.00379 |
| | A1 | 0.00194 | 0.00168 | 0.00202 |
| | B0 | -0.00044 | -0.00041 | 0.00017 |
| | B1 | 0.00382 | 0.00349 | 0.00405 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00343 | -0.00401 | -0.00406 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | -0.00342 | -0.00401 | -0.00406 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | -0.00396 | -0.00405 | -0.00404 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | -0.00410 | -0.00413 | -0.00410 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00402 | 0.00406 | 0.00406 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | 0.00402 | 0.00406 | 0.00406 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | 0.00402 | 0.00406 | 0.00404 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | 0.00410 | 0.00415 | 0.00412 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00198 | -0.00200 | -0.00199 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | -0.00198 | -0.00200 | -0.00199 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | -0.00395 | -0.00403 | -0.00402 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | -0.00408 | -0.00411 | -0.00409 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00209 | 0.00211 | 0.00203 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | 0.00209 | 0.00211 | 0.00203 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | 0.00399 | 0.00403 | 0.00402 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | 0.00409 | 0.00413 | 0.00411 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | (A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B1 * !Y) | -0.00197 | -0.00199 | -0.00198 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | -0.00197 | -0.00199 | -0.00198 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | -0.00439 | -0.00447 | -0.00444 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | -0.00441 | -0.00443 | -0.00451 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | (A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B1 * !Y) | 0.00209 | 0.00210 | 0.00201 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | 0.00208 | 0.00210 | 0.00201 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | 0.00443 | 0.00447 | 0.00444 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | 0.00451 | 0.00455 | 0.00453 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00339 | -0.00396 | -0.00400 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | -0.00340 | -0.00396 | -0.00400 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | -0.00445 | -0.00453 | -0.00452 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | -0.00447 | -0.00450 | -0.00457 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00397 | 0.00400 | 0.00400 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | 0.00397 | 0.00400 | 0.00400 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | 0.00451 | 0.00455 | 0.00452 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | 0.00457 | 0.00461 | 0.00459 |

# SKY130_OSU_SC_18T_MS__OR2x

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

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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_18T_ms__or2_1 | 12.45420 |
| sky130_osu_sc_18T_ms__or2_2 | 15.38460 |
| sky130_osu_sc_18T_ms__or2_4 | 21.24540 |
| sky130_osu_sc_18T_ms__or2_8 | 32.96700 |
| sky130_osu_sc_18T_ms__or2_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_18T_ms__or2_1 | 0.00568 | 0.00547 | 2.49598 |
| sky130_osu_sc_18T_ms__or2_2 | 0.00568 | 0.00547 | 4.84471 |
| sky130_osu_sc_18T_ms__or2_4 | 0.00568 | 0.00548 | 9.25843 |
| sky130_osu_sc_18T_ms__or2_8 | 0.00568 | 0.00549 | 17.46865 |
| sky130_osu_sc_18T_ms__or2_l | 0.00447 | 0.00422 | 1.72175 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__or2_1** | 0.00000 | 0.08663 | 0.14552 |
| **sky130_osu_sc_18T_ms__or2_2** | 0.00000 | 0.12313 | 0.29006 |
| **sky130_osu_sc_18T_ms__or2_4** | 0.00000 | 0.19613 | 0.57915 |
| **sky130_osu_sc_18T_ms__or2_8** | 0.00000 | 0.34213 | 1.15732 |
| **sky130_osu_sc_18T_ms__or2_l** | 0.00000 | 0.06242 | 0.10110 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__or2_1 | A->Y (RR) | 0.07649 | 0.66097 | 7.11812 |
| | B->Y (RR) | 0.06686 | 0.62376 | 7.04260 |
| sky130_osu_sc_18T_ms__or2_2 | A->Y (RR) | 0.08508 | 0.60436 | 7.22041 |
| | B->Y (RR) | 0.07514 | 0.57291 | 7.14152 |
| sky130_osu_sc_18T_ms__or2_4 | A->Y (RR) | 0.11115 | 0.60860 | 7.55825 |
| | B->Y (RR) | 0.10100 | 0.58488 | 7.47698 |
| sky130_osu_sc_18T_ms__or2_8 | A->Y (RR) | 0.15973 | 0.66729 | 8.03087 |
| | B->Y (RR) | 0.14934 | 0.65094 | 7.95939 |
| sky130_osu_sc_18T_ms__or2_l | A->Y (RR) | 0.08469 | 0.73975 | 7.20367 |
| | B->Y (RR) | 0.07529 | 0.70485 | 7.12775 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__or2_1 | A->Y (FF) | 0.12506 | 0.73437 | 7.18248 |
| | B->Y (FF) | 0.10391 | 0.68332 | 6.96208 |
| sky130_osu_sc_18T_ms__or2_2 | A->Y (FF) | 0.14972 | 0.71360 | 7.33396 |
| | B->Y (FF) | 0.12873 | 0.67385 | 7.07188 |
| sky130_osu_sc_18T_ms__or2_4 | A->Y (FF) | 0.21049 | 0.76367 | 7.70884 |
| | B->Y (FF) | 0.18954 | 0.73462 | 7.42990 |
| sky130_osu_sc_18T_ms__or2_8 | A->Y (FF) | 0.33368 | 0.89475 | 8.10999 |
| | B->Y (FF) | 0.31279 | 0.86639 | 7.83889 |
| sky130_osu_sc_18T_ms__or2_l | A->Y (FF) | 0.13826 | 0.79296 | 7.08032 |
| | B->Y (FF) | 0.11742 | 0.75322 | 6.88769 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__or2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00687 | 0.00612 | 0.01307 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00494 | 0.00456 | 0.01562 |
| sky130_osu_sc_18T_ms__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01179 | 0.01145 | 0.01854 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00979 | 0.00987 | 0.02027 |
| sky130_osu_sc_18T_ms__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02233 | 0.02289 | 0.02905 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02034 | 0.02119 | 0.03070 |
| sky130_osu_sc_18T_ms__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04376 | 0.04516 | 0.05328 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04154 | 0.04368 | 0.05450 |
| sky130_osu_sc_18T_ms__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00510 | 0.00449 | 0.00983 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00381 | 0.00352 | 0.01138 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__or2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01434 | 0.01427 | 0.02056 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01191 | 0.01258 | 0.02850 |
| sky130_osu_sc_18T_ms__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01749 | 0.01811 | 0.02413 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01505 | 0.01643 | 0.03142 |
| sky130_osu_sc_18T_ms__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02551 | 0.02718 | 0.03303 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02312 | 0.02514 | 0.03947 |
| sky130_osu_sc_18T_ms__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04362 | 0.04456 | 0.05118 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04040 | 0.04322 | 0.05672 |
| sky130_osu_sc_18T_ms__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01095 | 0.01078 | 0.01531 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00924 | 0.00974 | 0.01996 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__or2_1 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00346 | -0.00404 | -0.00408 |
| sky130_osu_sc_18T_ms__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00345 | -0.00404 | -0.00408 |
| sky130_osu_sc_18T_ms__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00345 | -0.00404 | -0.00408 |
| sky130_osu_sc_18T_ms__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00345 | -0.00404 | -0.00408 |
| sky130_osu_sc_18T_ms__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00250 | -0.00287 | -0.00290 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__or2_1 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00404 | 0.00405 | 0.00408 |
| sky130_osu_sc_18T_ms__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00404 | 0.00404 | 0.00408 |
| sky130_osu_sc_18T_ms__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00404 | 0.00404 | 0.00408 |
| sky130_osu_sc_18T_ms__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00404 | 0.00412 | 0.00408 |
| sky130_osu_sc_18T_ms__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00288 | 0.00291 | 0.00290 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__or2_1 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00200 | -0.00202 | -0.00201 |
| sky130_osu_sc_18T_ms__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00200 | -0.00202 | -0.00201 |
| sky130_osu_sc_18T_ms__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00200 | -0.00202 | -0.00201 |
| sky130_osu_sc_18T_ms__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00200 | -0.00202 | -0.00201 |
| sky130_osu_sc_18T_ms__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00150 | -0.00152 | -0.00151 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__or2_1 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00213 | 0.00213 | 0.00205 |
| sky130_osu_sc_18T_ms__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00213 | 0.00213 | 0.00205 |
| sky130_osu_sc_18T_ms__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00213 | 0.00214 | 0.00205 |
| sky130_osu_sc_18T_ms__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00213 | 0.00214 | 0.00205 |
| sky130_osu_sc_18T_ms__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00160 | 0.00160 | 0.00154 |

# SKY130_OSU_SC_18T_MS__TBUFIx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

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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_18T_ms__tbufi_1 | 12.45420 |
| sky130_osu_sc_18T_ms__tbufi_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_18T_ms__tbufi_1 | 0.00565 | 0.00716 | 1.29965 |
| sky130_osu_sc_18T_ms__tbufi_l | 0.00441 | 0.00561 | 0.86224 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__tbufi_1 | 0.00000 | 0.07284 | 0.28909 |
| sky130_osu_sc_18T_ms__tbufi_l | 0.00000 | 0.05060 | 0.20143 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__tbufi_1 | A->Y (FR) | 0.04725 | 0.90169 | 11.13590 |
| | OE->Y (FR) | 0.05078 | 0.36128 | 4.73387 |
| | OE->Y (RR) | 0.08868 | 0.77195 | 7.36552 |
| sky130_osu_sc_18T_ms__tbufi_l | A->Y (FR) | 0.05696 | 0.99294 | 11.01150 |
| | OE->Y (FR) | 0.05470 | 0.36111 | 4.73365 |
| | OE->Y (RR) | 0.09841 | 0.86093 | 7.17357 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__tbufi_1 | A->Y (RF) | 0.03599 | 0.68432 | 8.53861 |
| | OE->Y (FF) | 0.05125 | 0.36126 | 4.73386 |
| | OE->Y (RF) | 0.03507 | 0.66644 | 8.20549 |
| sky130_osu_sc_18T_ms__tbufi_l | A->Y (RF) | 0.04145 | 0.72694 | 8.28570 |
| | OE->Y (FF) | 0.05552 | 0.36106 | 4.73365 |
| | OE->Y (RF) | 0.04089 | 0.71088 | 7.93589 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00627 | 0.00641 | 0.00877 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00630 | 0.00617 | 0.02035 |
| sky130_osu_sc_18T_ms__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00482 | 0.00485 | 0.00629 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00452 | 0.00425 | 0.01427 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00108 | -0.00098 | -0.00041 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00425 | 0.00389 | 0.02068 |
| sky130_osu_sc_18T_ms__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00072 | -0.00068 | -0.00021 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00299 | 0.00270 | 0.01374 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tbufi_1 | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00323 | -0.00329 | -0.00324 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00285 | -0.00289 | -0.00287 |
| sky130_osu_sc_18T_ms__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00248 | -0.00250 | -0.00249 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00223 | -0.00226 | -0.00224 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tbufi_1 | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00323 | 0.00329 | 0.00324 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00294 | 0.00297 | 0.00291 |
| sky130_osu_sc_18T_ms__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00248 | 0.00250 | 0.00249 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00229 | 0.00231 | 0.00226 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00249 | 0.00220 | 0.01924 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00220 | 0.00211 | 0.01888 |
| sky130_osu_sc_18T_ms__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00172 | 0.00148 | 0.01272 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00152 | 0.00144 | 0.01247 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00732 | 0.00742 | 0.02569 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00729 | 0.00756 | 0.02580 |
| sky130_osu_sc_18T_ms__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00577 | 0.00573 | 0.01758 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00579 | 0.00583 | 0.01766 |

# SKY130_OSU_SC_18T_MS__TNBUFIx

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__tnbufi_1 | 12.45420 |
| sky130_osu_sc_18T_ms__tnbufi_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_18T_ms__tnbufi_1 | 0.00565 | 0.00884 | 1.29375 |
| sky130_osu_sc_18T_ms__tnbufi_l | 0.00440 | 0.00666 | 0.86229 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__tnbufi_1 | 0.00000 | 0.12086 | 0.14503 |
| sky130_osu_sc_18T_ms__tnbufi_l | 0.00000 | 0.08411 | 0.10091 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__tnbufi_1 | A->Y (FR) | 0.04767 | 0.90020 | 11.10390 |
| | OE->Y (RR) | 0.03190 | 0.36231 | 4.73498 |
| | OE->Y (FR) | 0.06165 | 0.92996 | 11.24670 |
| sky130_osu_sc_18T_ms__tnbufi_l | A->Y (FR) | 0.05750 | 0.99297 | 11.01190 |
| | OE->Y (RR) | 0.03372 | 0.36261 | 4.73526 |
| | OE->Y (FR) | 0.06948 | 1.01072 | 10.99740 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_18T_ms__tnbufi_1 | A->Y (RF) | 0.03551 | 0.68301 | 8.51768 |
| | OE->Y (RF) | 0.03164 | 0.36232 | 4.73494 |
| | OE->Y (FF) | 0.06186 | 0.58569 | 5.54444 |
| sky130_osu_sc_18T_ms__tnbufi_l | A->Y (RF) | 0.04083 | 0.72674 | 8.28576 |
| | OE->Y (RF) | 0.03349 | 0.36260 | 4.73528 |
| | OE->Y (FF) | 0.07059 | 0.64518 | 5.34683 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tnbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00642 | 0.00656 | 0.00893 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01569 | 0.01652 | 0.03563 |
| sky130_osu_sc_18T_ms__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00498 | 0.00500 | 0.00645 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01176 | 0.01217 | 0.02470 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tnbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00129 | -0.00117 | -0.00059 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01390 | 0.01472 | 0.03226 |
| sky130_osu_sc_18T_ms__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00092 | -0.00087 | -0.00039 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01040 | 0.01078 | 0.02197 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tnbufi_1 | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00279 | -0.00283 | -0.00280 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00244 | -0.00247 | -0.00245 |
| sky130_osu_sc_18T_ms__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00206 | -0.00209 | -0.00207 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00183 | -0.00185 | -0.00184 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tnbufi_1 | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00279 | 0.00283 | 0.00280 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00252 | 0.00254 | 0.00249 |
| sky130_osu_sc_18T_ms__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00206 | 0.00209 | 0.00207 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00188 | 0.00190 | 0.00186 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tnbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00476 | -0.00555 | 0.01233 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00479 | -0.00535 | 0.01236 |
| sky130_osu_sc_18T_ms__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00340 | -0.00397 | 0.00778 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00341 | -0.00386 | 0.00780 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__tnbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.01187 | 0.01283 | 0.03176 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.01166 | 0.01260 | 0.03156 |
| sky130_osu_sc_18T_ms__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00894 | 0.00941 | 0.02182 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00880 | 0.00925 | 0.02166 |

# SKY130_OSU_SC_18T_MS__XNOR2

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__xnor2_l | 21.24540 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_18T_ms__xnor2_l | 0.01116 | 0.01019 | 1.31136 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__xnor2_l | 0.00000 | 0.24443 | 0.43412 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__xnor2_l | A->Y (RR) | B | 0.11257 | 0.81381 | 7.48698 |
| | A->Y (FR) | !B | 0.06227 | 0.91874 | 11.15550 |
| | B->Y (RR) | A | 0.08966 | 0.78695 | 7.46207 |
| | B->Y (FR) | !A | 0.08552 | 0.95356 | 11.30460 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__xnor2_l | A->Y (FF) | B | 0.10786 | 0.69251 | 6.01554 |
| | A->Y (RF) | !B | 0.05316 | 0.69816 | 8.45272 |
| | B->Y (FF) | A | 0.09425 | 0.67951 | 6.01585 |
| | B->Y (RF) | !A | 0.06582 | 0.71405 | 8.45797 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__xnor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00619 | 0.00565 | 0.01936 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01545 | 0.01578 | 0.03629 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00206 | 0.00186 | 0.01846 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01705 | 0.01740 | 0.03599 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__xnor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01932 | 0.01902 | 0.03661 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00418 | 0.00360 | 0.02003 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01737 | 0.01805 | 0.03634 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00562 | 0.00490 | 0.02125 |

# SKY130_OSU_SC_18T_MS__XOR2

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## 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_18T_ms__xor2_l | 21.24540 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_18T_ms__xor2_l | 0.01116 | 0.01024 | 1.28273 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__xor2_l | 0.00000 | 0.24443 | 0.39576 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__xor2_l | A->Y (RR) | !B | 0.10737 | 0.79238 | 7.35191 |
| | A->Y (FR) | B | 0.07700 | 0.94109 | 11.22410 |
| | B->Y (RR) | !A | 0.09254 | 0.78464 | 7.36374 |
| | B->Y (FR) | A | 0.08368 | 0.94837 | 11.21000 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__xor2_l | A->Y (FF) | !B | 0.09442 | 0.66373 | 5.69402 |
| | A->Y (RF) | B | 0.05116 | 0.70605 | 8.48999 |
| | B->Y (FF) | !A | 0.08804 | 0.65717 | 5.72697 |
| | B->Y (RF) | A | 0.06121 | 0.69188 | 8.16066 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__xor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01805 | 0.01854 | 0.03762 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00323 | 0.00199 | 0.01804 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01861 | 0.01913 | 0.03803 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00184 | 0.00151 | 0.01817 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_18T_ms__xor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00378 | 0.00323 | 0.01989 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01954 | 0.02008 | 0.03702 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00382 | 0.00303 | 0.01960 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01763 | 0.01847 | 0.03680 |

# SKY130_OSU_SC_18T_MS_x

*sky130_osu_sc_18T_ms_tt_1P62_25C.ccs*
*Cell Library: Process , Voltage 1.62,*
*Temp 25.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_18T_ms__ant** | 6.59340 |
| **sky130_osu_sc_18T_ms__tiehi** | 6.59340 |
| **sky130_osu_sc_18T_ms__tielo** | 6.59340 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) |
|---|---|
| | A |
| **sky130_osu_sc_18T_ms__ant** | 0.68665 |
| **sky130_osu_sc_18T_ms__tiehi** | 0.00000 |
| **sky130_osu_sc_18T_ms__tielo** | 0.00000 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__ant** | 0.00000 | 274720.00000 | 549440.00000 |
| **sky130_osu_sc_18T_ms__tiehi** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_18T_ms__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_18T_ms__ant | 0.00000 | 0.00000 | 0.00000 |
| | -0.00206 | 0.07151 | 0.91955 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_18T_ms__ant | 0.00000 | 0.00000 | 0.00000 |
| | 4.78006 | 4.51334 | 1.13028 |