# sky130_osu_sc_18T_ms_ss_1P60_150C.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_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

---

## 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 | 0.02312 | 0.02305 | 0.01755 | 2.18256 | 1.02209 | 2.10745 |
| sky130_osu_sc_18T_ms__addf_l | 0.02311 | 0.02305 | 0.01752 | 1.54766 | 1.02234 | 1.58571 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__addf_1** | 0.00000 | 14.46610 | 17.87250 |
| **sky130_osu_sc_18T_ms__addf_l** | 0.00000 | 14.79460 | 18.20100 |

# 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) | 0.25516 | 2.43104 | 31.74420 |
| | B->CO (RR) | 0.25705 | 2.37475 | 30.74210 |
| | CI->CO (RR) | 0.24337 | 2.46807 | 32.34790 |
| | CON->CO (FR) | 0.03734 | 0.81658 | 10.81090 |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (RR) | 0.24919 | 2.18471 | 25.06410 |
| | B->CO (RR) | 0.25136 | 2.14533 | 24.50660 |
| | CI->CO (RR) | 0.23725 | 2.22157 | 25.67920 |
| | CON->CO (FR) | 0.03807 | 0.82323 | 10.03350 |

**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) | 0.28934 | 2.67602 | 34.96130 |
| | B->CO (FF) | 0.26124 | 2.58869 | 34.13670 |
| | CI->CO (FF) | 0.25499 | 2.66119 | 35.26030 |
| | CON->CO (RF) | 0.04045 | 0.88650 | 11.73730 |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (FF) | 0.28523 | 2.47127 | 28.32500 |
| | B->CO (FF) | 0.25724 | 2.39510 | 27.80250 |
| | CI->CO (FF) | 0.25086 | 2.45690 | 28.64840 |
| | CON->CO (RF) | 0.04446 | 0.95528 | 11.66990 |

**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) | 0.19204 | 1.03798 | 9.77230 |
| | B->CON (FR) | 0.16698 | 1.00050 | 9.81073 |
| | CI->CON (FR) | 0.15772 | 1.02651 | 10.14380 |
| sky130_osu_sc_18T_ms__addf_1 | A->CON (FR) | 0.18211 | 1.02771 | 9.76414 |
| | B->CON (FR) | 0.15756 | 0.99396 | 9.80274 |
| | CI->CON (FR) | 0.14769 | 1.01656 | 10.13530 |

**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) | 0.18364 | 1.02506 | 9.81939 |
| | B->CON (RF) | 0.18666 | 1.03310 | 9.97953 |
| | CI->CON (RF) | 0.17187 | 1.06372 | 10.46820 |
| sky130_osu_sc_18T_ms__addf_1 | A->CON (RF) | 0.17592 | 1.01804 | 9.81336 |
| | B->CON (RF) | 0.17935 | 1.02621 | 9.97419 |
| | CI->CON (RF) | 0.16414 | 1.05628 | 10.46230 |

**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) | 0.42087 | 2.38298 | 26.30980 |
| | B->S (-R) | 0.47366 | 2.44335 | 25.78150 |
| | CI->S (-R) | 0.38448 | 2.36177 | 26.60780 |
| | CON->S (RR) | 0.13008 | 0.85945 | 8.44935 |
| sky130_osu_sc_18T_ms__addf_1 | A->S (-R) | 0.39501 | 2.16717 | 21.76590 |
| | B->S (-R) | 0.44795 | 2.23507 | 21.45210 |
| | CI->S (-R) | 0.35840 | 2.14774 | 22.08430 |
| | CON->S (RR) | 0.12349 | 0.84997 | 7.82920 |

**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) | 0.41822 | 2.31090 | 24.33860 |
| | B->S (-F) | 0.40916 | 2.20534 | 23.52800 |
| | CI->S (-F) | 0.40556 | 2.34268 | 24.95460 |
| | CON->S (FF) | 0.15650 | 0.87752 | 7.78821 |
| sky130_osu_sc_18T_ms__addf_l | A->S (-F) | 0.39987 | 2.19754 | 21.38730 |
| | B->S (-F) | 0.38979 | 2.11000 | 20.91280 |
| | CI->S (-F) | 0.38705 | 2.22873 | 22.01000 |
| | CON->S (FF) | 0.15376 | 0.94349 | 8.13194 |

# 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 | 0.00385 | 0.00512 | 0.02736 |
| | B | 0.00619 | 0.00703 | 0.02648 |
| | CI | 0.00632 | 0.00773 | 0.03008 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00281 | 0.00366 | 0.01810 |
| | B | 0.00516 | 0.00559 | 0.01841 |
| | CI | 0.00528 | 0.00624 | 0.02091 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01589 | 0.01711 | 0.04138 |
| | B | 0.01693 | 0.01798 | 0.03921 |
| | CI | 0.01323 | 0.01453 | 0.03925 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01486 | 0.01573 | 0.03230 |
| | B | 0.01590 | 0.01668 | 0.03089 |
| | CI | 0.01221 | 0.01317 | 0.03060 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01573 | 0.01637 | 0.02773 |
| | B | 0.01618 | 0.01670 | 0.02741 |
| | CI | 0.01479 | 0.01564 | 0.02627 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01475 | 0.01535 | 0.02639 |
| | B | 0.01520 | 0.01574 | 0.02606 |
| | CI | 0.01377 | 0.01458 | 0.02490 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.00374 | 0.00452 | 0.01523 |
| | B | 0.00605 | 0.00639 | 0.01585 |
| | CI | 0.00619 | 0.00703 | 0.01777 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00274 | 0.00340 | 0.01331 |
| | B | 0.00506 | 0.00528 | 0.01407 |
| | CI | 0.00519 | 0.00591 | 0.01591 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01581 | 0.01701 | 0.04020 |
| | B | 0.01687 | 0.01791 | 0.03824 |
| | CI | 0.01316 | 0.01443 | 0.03822 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01480 | 0.01570 | 0.03257 |
| | B | 0.01585 | 0.01664 | 0.03122 |
| | CI | 0.01215 | 0.01313 | 0.03067 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.03565 | 0.03619 | 0.05566 |
| | B | 0.03162 | 0.03242 | 0.05792 |
| | CI | 0.02877 | 0.02906 | 0.04794 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.03441 | 0.03476 | 0.05457 |
| | B | 0.03043 | 0.03121 | 0.05719 |
| | CI | 0.02755 | 0.02772 | 0.04706 |

# SKY130_OSU_SC_18T_MS__ADDHx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.01138 | 0.01232 | 2.12903 | 1.08092 | 2.16201 |
| sky130_osu_sc_18T_ms__addh_l | 0.01138 | 0.01232 | 1.32940 | 1.08150 | 1.35027 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__addh_1 | 0.00000 | 15.94960 | 18.23730 |
| sky130_osu_sc_18T_ms__addh_l | 0.00000 | 9.75393 | 13.26000 |

# 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) | 0.16770 | 0.91537 | 8.51652 |
| | B->CO (RR) | 0.17474 | 0.89354 | 8.50874 |
| sky130_osu_sc_18T_ms__addh_l | A->CO (RR) | 0.16456 | 0.97303 | 8.32513 |
| | B->CO (RR) | 0.17153 | 0.95409 | 8.30509 |

**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) | 0.13113 | 0.82304 | 7.63983 |
| | B->CO (FF) | 0.13900 | 0.84227 | 7.69984 |
| sky130_osu_sc_18T_ms__addh_l | A->CO (FF) | 0.13292 | 0.92436 | 7.85300 |
| | B->CO (FF) | 0.14060 | 0.94451 | 7.91554 |

**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 | 0.22362 | 0.79319 | 5.16411 |
| | A->CON (FR) | !B | 0.10728 | 0.95583 | 10.08100 |
| | B->CON (RR) | A | 0.22928 | 0.77150 | 5.16012 |
| | B->CON (FR) | !A | 0.13494 | 0.97041 | 9.82166 |
| sky130_osu_sc_18T_ms__addh_l | A->CON (RR) | B | 0.19911 | 0.75821 | 5.10854 |
| | A->CON (FR) | !B | 0.09484 | 0.94678 | 10.07150 |
| | B->CON (RR) | A | 0.20492 | 0.73758 | 5.08542 |
| | B->CON (FR) | !A | 0.12253 | 0.95696 | 9.81152 |

**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 | 0.22453 | 0.97498 | 6.97717 |
| | A->CON (RF) | !B | 0.10747 | 0.99800 | 10.55460 |
| | B->CON (FF) | A | 0.21389 | 1.01175 | 7.37769 |
| | B->CON (RF) | !A | 0.13451 | 1.00003 | 10.25660 |
| sky130_osu_sc_18T_ms__addh_l | A->CON (FF) | B | 0.20263 | 0.92575 | 6.75405 |
| | A->CON (RF) | !B | 0.09775 | 0.98765 | 10.54630 |
| | B->CON (FF) | A | 0.19212 | 0.96393 | 7.15573 |
| | B->CON (RF) | !A | 0.12492 | 0.99047 | 10.25010 |

**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 | 0.17380 | 2.33573 | 31.45280 |
| | A->S (FR) | B | 0.29217 | 2.30076 | 27.72940 |
| | B->S (RR) | !A | 0.20205 | 2.30166 | 30.47860 |
| | B->S (FR) | A | 0.28084 | 2.37400 | 28.80350 |
| | CON->S (FR) | - | 0.04089 | 0.83313 | 10.97810 |
| sky130_osu_sc_18T_ms__addh_l | A->S (RR) | !B | 0.16918 | 2.10970 | 24.16960 |
| | A->S (FR) | B | 0.27582 | 2.04060 | 20.25350 |
| | B->S (RR) | !A | 0.19795 | 2.08992 | 23.52050 |
| | B->S (FR) | A | 0.26426 | 2.10226 | 20.99870 |
| | CON->S (FR) | - | 0.04503 | 0.92114 | 10.86470 |

**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 | 0.18828 | 2.45498 | 33.20130 |
| | A->S (RF) | B | 0.29066 | 1.87805 | 21.45100 |
| | B->S (FF) | !A | 0.21599 | 2.47290 | 33.02130 |
| | B->S (RF) | A | 0.29635 | 1.85516 | 21.43440 |
| | CON->S (RF) | - | 0.03860 | 0.86549 | 11.41360 |
| sky130_osu_sc_18T_ms__addh_l | A->S (FF) | !B | 0.18390 | 2.24309 | 25.65770 |
| | A->S (RF) | B | 0.27207 | 1.76928 | 17.11980 |
| | B->S (FF) | !A | 0.21166 | 2.25926 | 25.43630 |
| | B->S (RF) | A | 0.27786 | 1.74980 | 17.09690 |
| | CON->S (RF) | - | 0.04578 | 0.99169 | 11.74070 |

# 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 | 0.00718 | 0.00720 | 0.01489 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00633 | 0.00620 | 0.01466 |
| sky130_osu_sc_18T_ms__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00577 | 0.00570 | 0.01421 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00493 | 0.00471 | 0.01362 |

**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 | 0.01141 | 0.01164 | 0.02510 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01168 | 0.01260 | 0.02697 |
| sky130_osu_sc_18T_ms__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00999 | 0.01001 | 0.02110 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01029 | 0.01089 | 0.02240 |

**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 | 0.00711 | 0.00712 | 0.01508 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00984 | 0.01009 | 0.01513 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00626 | 0.00615 | 0.01502 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01121 | 0.01129 | 0.01510 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00572 | 0.00565 | 0.01423 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00882 | 0.00915 | 0.01287 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00487 | 0.00466 | 0.01367 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01020 | 0.01013 | 0.01281 |

**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 | 0.01139 | 0.01155 | 0.02271 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00190 | 0.00222 | 0.00657 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01168 | 0.01245 | 0.02493 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00291 | 0.00303 | 0.00726 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00998 | 0.01001 | 0.02091 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00064 | 0.00080 | 0.00340 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01028 | 0.01086 | 0.02223 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00164 | 0.00159 | 0.00414 |

**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 | 0.01150 | 0.01174 | 0.02547 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00210 | 0.00260 | 0.00934 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01180 | 0.01273 | 0.02736 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00307 | 0.00335 | 0.00955 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01003 | 0.01006 | 0.02136 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00073 | 0.00089 | 0.00359 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01034 | 0.01097 | 0.02250 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00171 | 0.00168 | 0.00417 |

**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 | 0.00724 | 0.00726 | 0.01534 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00996 | 0.01054 | 0.01606 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00638 | 0.00626 | 0.01521 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01134 | 0.01170 | 0.01659 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00580 | 0.00573 | 0.01449 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00884 | 0.00917 | 0.01272 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00495 | 0.00474 | 0.01380 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01022 | 0.01031 | 0.01284 |

# SKY130_OSU_SC_18T_MS__AND2x

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00610 | 0.00621 | 2.14164 |
| sky130_osu_sc_18T_ms__and2_2 | 0.00610 | 0.00622 | 4.17612 |
| sky130_osu_sc_18T_ms__and2_4 | 0.00610 | 0.00621 | 8.01762 |
| sky130_osu_sc_18T_ms__and2_6 | 0.00614 | 0.00622 | 11.91576 |
| sky130_osu_sc_18T_ms__and2_8 | 0.00612 | 0.00623 | 15.48663 |
| sky130_osu_sc_18T_ms__and2_l | 0.00461 | 0.00473 | 1.55988 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__and2_1** | 0.00000 | 7.49985 | 11.62950 |
| **sky130_osu_sc_18T_ms__and2_2** | 0.00000 | 11.63970 | 11.68300 |
| **sky130_osu_sc_18T_ms__and2_4** | 0.00000 | 20.28920 | 23.16850 |
| **sky130_osu_sc_18T_ms__and2_6** | 0.00000 | 28.93860 | 34.65390 |
| **sky130_osu_sc_18T_ms__and2_8** | 0.00000 | 37.58800 | 46.13920 |
| **sky130_osu_sc_18T_ms__and2_l** | 0.00000 | 7.95376 | 12.46080 |

# 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) | 0.12774 | 0.82246 | 8.32777 |
| | B->Y (RR) | 0.13645 | 0.81006 | 8.19491 |
| sky130_osu_sc_18T_ms__and2_2 | A->Y (RR) | 0.14894 | 0.78848 | 8.43727 |
| | B->Y (RR) | 0.15774 | 0.76741 | 8.30378 |
| sky130_osu_sc_18T_ms__and2_4 | A->Y (RR) | 0.20492 | 0.84005 | 8.75800 |
| | B->Y (RR) | 0.21371 | 0.80816 | 8.60520 |
| sky130_osu_sc_18T_ms__and2_6 | A->Y (RR) | 0.26037 | 0.90884 | 9.10953 |
| | B->Y (RR) | 0.26901 | 0.87205 | 8.92899 |
| sky130_osu_sc_18T_ms__and2_8 | A->Y (RR) | 0.31522 | 0.97546 | 9.38159 |
| | B->Y (RR) | 0.32396 | 0.93860 | 9.18181 |
| sky130_osu_sc_18T_ms__and2_l | A->Y (RR) | 0.13748 | 0.85353 | 7.79332 |
| | B->Y (RR) | 0.14702 | 0.83860 | 7.65202 |

**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) | 0.10160 | 0.72386 | 7.14661 |
| | B->Y (FF) | 0.10673 | 0.74535 | 7.21672 |
| sky130_osu_sc_18T_ms__and2_2 | A->Y (FF) | 0.11531 | 0.67755 | 7.22575 |
| | B->Y (FF) | 0.12148 | 0.69683 | 7.29747 |
| sky130_osu_sc_18T_ms__and2_4 | A->Y (FF) | 0.15920 | 0.71522 | 7.51695 |
| | B->Y (FF) | 0.16553 | 0.72730 | 7.59056 |
| sky130_osu_sc_18T_ms__and2_6 | A->Y (FF) | 0.20678 | 0.77495 | 7.84372 |
| | B->Y (FF) | 0.21317 | 0.78474 | 7.91124 |
| sky130_osu_sc_18T_ms__and2_8 | A->Y (FF) | 0.25162 | 0.82740 | 7.96576 |
| | B->Y (FF) | 0.25810 | 0.83641 | 8.02734 |
| sky130_osu_sc_18T_ms__and2_l | A->Y (FF) | 0.10351 | 0.80708 | 7.42802 |
| | B->Y (FF) | 0.10857 | 0.82947 | 7.52174 |

# 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 | 0.00568 | 0.00634 | 0.03670 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00578 | 0.00562 | 0.02891 |
| sky130_osu_sc_18T_ms__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01137 | 0.01214 | 0.04106 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01147 | 0.01152 | 0.03345 |
| sky130_osu_sc_18T_ms__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02426 | 0.02494 | 0.05244 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02442 | 0.02441 | 0.04482 |
| sky130_osu_sc_18T_ms__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03845 | 0.03779 | 0.06408 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03855 | 0.03758 | 0.05760 |
| sky130_osu_sc_18T_ms__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05401 | 0.05168 | 0.07644 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.05424 | 0.05042 | 0.06897 |
| sky130_osu_sc_18T_ms__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00421 | 0.00471 | 0.02671 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00431 | 0.00418 | 0.02105 |

**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 | 0.01345 | 0.01536 | 0.04602 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01512 | 0.01676 | 0.04636 |
| sky130_osu_sc_18T_ms__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01700 | 0.01949 | 0.04983 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01870 | 0.02083 | 0.05020 |
| sky130_osu_sc_18T_ms__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02630 | 0.02972 | 0.05961 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02795 | 0.03072 | 0.05965 |
| sky130_osu_sc_18T_ms__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03605 | 0.03954 | 0.06962 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03779 | 0.04044 | 0.06941 |
| sky130_osu_sc_18T_ms__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04720 | 0.04931 | 0.07976 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04883 | 0.04994 | 0.07877 |
| sky130_osu_sc_18T_ms__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01028 | 0.01154 | 0.03300 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01150 | 0.01260 | 0.03352 |

**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) | -0.00515 | -0.00517 | -0.00522 |
| sky130_osu_sc_18T_ms__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00510 | -0.00513 | -0.00517 |
| sky130_osu_sc_18T_ms__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00500 | -0.00504 | -0.00507 |
| sky130_osu_sc_18T_ms__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00493 | -0.00495 | -0.00499 |
| sky130_osu_sc_18T_ms__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00480 | -0.00482 | -0.00487 |
| sky130_osu_sc_18T_ms__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00370 | -0.00373 | -0.00374 |

**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) | 0.00531 | 0.00538 | 0.00534 |
| sky130_osu_sc_18T_ms__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00536 | 0.00543 | 0.00539 |
| sky130_osu_sc_18T_ms__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00546 | 0.00552 | 0.00549 |
| sky130_osu_sc_18T_ms__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00558 | 0.00564 | 0.00561 |
| sky130_osu_sc_18T_ms__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00566 | 0.00572 | 0.00569 |
| sky130_osu_sc_18T_ms__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00385 | 0.00392 | 0.00387 |

**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) | -0.00494 | -0.00497 | -0.00496 |
| sky130_osu_sc_18T_ms__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00490 | -0.00492 | -0.00491 |
| sky130_osu_sc_18T_ms__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00480 | -0.00482 | -0.00481 |
| sky130_osu_sc_18T_ms__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00470 | -0.00472 | -0.00471 |
| sky130_osu_sc_18T_ms__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00460 | -0.00462 | -0.00461 |
| sky130_osu_sc_18T_ms__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00355 | -0.00356 | -0.00356 |

**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) | 0.00512 | 0.00516 | 0.00508 |
| sky130_osu_sc_18T_ms__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00517 | 0.00520 | 0.00513 |
| sky130_osu_sc_18T_ms__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00527 | 0.00530 | 0.00523 |
| sky130_osu_sc_18T_ms__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00537 | 0.00540 | 0.00533 |
| sky130_osu_sc_18T_ms__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00547 | 0.00550 | 0.00543 |
| sky130_osu_sc_18T_ms__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00371 | 0.00373 | 0.00368 |

# SKY130_OSU_SC_18T_MS__AOI21

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00584 | 0.00602 | 0.00582 | 1.01721 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__aoi21_l | 0.00000 | 3.19450 | 6.17514 |

# 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) | 0.10541 | 0.95050 | 9.67919 |
| | A1->Y (FR) | 0.09164 | 0.91207 | 9.42210 |
| | B0->Y (FR) | 0.07467 | 0.93761 | 10.04170 |

**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) | 0.10502 | 0.91238 | 9.32868 |
| | A1->Y (RF) | 0.09707 | 0.93935 | 9.87445 |
| | B0->Y (RF) | 0.05420 | 0.83992 | 9.21847 |

# 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 | 0.01233 | 0.01229 | 0.01624 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.01053 | 0.01050 | 0.01446 |
| | B0 | 0.00739 | 0.00774 | 0.01351 |

**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 | 0.00305 | 0.00263 | 0.00565 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00308 | 0.00293 | 0.00633 |
| | B0 | -0.00126 | -0.00109 | 0.00196 |

**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) | -0.00371 | -0.00455 | -0.00468 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | -0.00471 | -0.00474 | -0.00473 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00476 | -0.00479 | -0.00478 |

**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) | 0.00476 | 0.00482 | 0.00481 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | 0.00482 | 0.00489 | 0.00484 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00484 | 0.00484 | 0.00479 |

**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) | -0.00368 | -0.00452 | -0.00464 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | -0.00468 | -0.00468 | -0.00468 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00500 | -0.00503 | -0.00507 |

**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) | 0.00473 | 0.00478 | 0.00476 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | 0.00478 | 0.00481 | 0.00480 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00506 | 0.00516 | 0.00509 |

**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) | -0.00209 | -0.00214 | -0.00210 |

**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) | 0.00237 | 0.00238 | 0.00219 |

# SKY130_OSU_SC_18T_MS__AOI22

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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_1 | 15.38460 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_18T_ms__aoi22_1 | 0.00584 | 0.00603 | 0.00620 | 0.00597 | 0.98049 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__aoi22_1 | 0.00000 | 3.50525 | 11.48290 |

# 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) | 0.13209 | 0.98012 | 9.58496 |
| | A1->Y (FR) | 0.11868 | 0.95334 | 9.45292 |
| | B0->Y (FR) | 0.07831 | 0.93049 | 9.82352 |
| | B1->Y (FR) | 0.09193 | 0.95746 | 10.01410 |

**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) | 0.14250 | 0.93961 | 9.15971 |
| | A1->Y (RF) | 0.13464 | 0.96945 | 9.70598 |
| | B0->Y (RF) | 0.06640 | 0.89768 | 9.64010 |
| | B1->Y (RF) | 0.07469 | 0.86547 | 9.09441 |

# 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 | 0.01529 | 0.01522 | 0.01922 |
| | A1 | 0.01351 | 0.01340 | 0.01739 |
| | B0 | 0.00803 | 0.00845 | 0.01563 |
| | B1 | 0.00981 | 0.00999 | 0.01737 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | A0 | 0.00614 | 0.00568 | 0.00878 |
| | A1 | 0.00617 | 0.00600 | 0.00947 |
| | B0 | -0.00070 | -0.00051 | 0.00306 |
| | B1 | -0.00058 | -0.00074 | 0.00242 |

**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) | -0.00351 | -0.00448 | -0.00463 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | -0.00466 | -0.00469 | -0.00468 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | -0.00476 | -0.00479 | -0.00478 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00476 | -0.00479 | -0.00478 |

**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) | 0.00483 | 0.00486 | 0.00486 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | 0.00487 | 0.00494 | 0.00489 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | 0.00484 | 0.00484 | 0.00479 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00484 | 0.00484 | 0.00479 |

**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) | -0.00347 | -0.00445 | -0.00458 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | -0.00463 | -0.00466 | -0.00463 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | -0.00500 | -0.00503 | -0.00506 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00500 | -0.00503 | -0.00506 |

**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) | 0.00478 | 0.00481 | 0.00482 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | 0.00483 | 0.00483 | 0.00485 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | 0.00506 | 0.00515 | 0.00508 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00506 | 0.00515 | 0.00508 |

**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) | -0.00211 | -0.00215 | -0.00211 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | -0.00199 | -0.00202 | -0.00204 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | -0.00511 | -0.00515 | -0.00518 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | -0.00511 | -0.00515 | -0.00517 |

**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) | 0.00248 | 0.00249 | 0.00222 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | 0.00214 | 0.00214 | 0.00214 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | 0.00517 | 0.00518 | 0.00519 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | 0.00517 | 0.00518 | 0.00519 |

**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) | -0.00212 | -0.00216 | -0.00212 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | -0.00200 | -0.00204 | -0.00205 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00482 | -0.00483 | -0.00484 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | -0.00482 | -0.00483 | -0.00484 |

**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) | 0.00249 | 0.00250 | 0.00224 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | 0.00214 | 0.00217 | 0.00216 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00490 | 0.00489 | 0.00485 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | 0.00490 | 0.00489 | 0.00485 |

# SKY130_OSU_SC_18T_MS__BUFx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

---

## 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** | 0.00621 | 2.13241 |
| **sky130_osu_sc_18T_ms__buf_2** | 0.00622 | 4.19670 |
| **sky130_osu_sc_18T_ms__buf_4** | 0.00621 | 8.12904 |
| **sky130_osu_sc_18T_ms__buf_6** | 0.00098 | 1.80000 |
| **sky130_osu_sc_18T_ms__buf_8** | 0.00622 | 15.62566 |
| **sky130_osu_sc_18T_ms__buf_l** | 0.00477 | 1.57116 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__buf_1** | 0.00000 | 6.10933 | 6.10937 |
| **sky130_osu_sc_18T_ms__buf_2** | 0.00000 | 8.86841 | 11.63000 |
| **sky130_osu_sc_18T_ms__buf_4** | 0.00000 | 14.68210 | 23.11540 |
| **sky130_osu_sc_18T_ms__buf_6** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_18T_ms__buf_8** | 0.00000 | 26.30940 | 46.08610 |
| **sky130_osu_sc_18T_ms__buf_l** | 0.00000 | 6.43781 | 6.43786 |

# 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)** | 0.09034 | 0.75995 | 8.01919 |
| **sky130_osu_sc_18T_ms__buf_2** | **A->Y (RR)** | 0.10130 | 0.70743 | 8.14160 |
| **sky130_osu_sc_18T_ms__buf_4** | **A->Y (RR)** | 0.13549 | 0.72934 | 8.45278 |
| **sky130_osu_sc_18T_ms__buf_8** | **A->Y (RR)** | 0.20083 | 0.81737 | 8.91703 |
| **sky130_osu_sc_18T_ms__buf_l** | **A->Y (RR)** | 0.09605 | 0.78554 | 7.51690 |

**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)** | 0.09700 | 0.71324 | 7.15281 |
| **sky130_osu_sc_18T_ms__buf_2** | **A->Y (FF)** | 0.11178 | 0.67256 | 7.32074 |
| **sky130_osu_sc_18T_ms__buf_4** | **A->Y (FF)** | 0.15586 | 0.71108 | 7.64899 |
| **sky130_osu_sc_18T_ms__buf_8** | **A->Y (FF)** | 0.24823 | 0.82397 | 8.05845 |
| **sky130_osu_sc_18T_ms__buf_l** | **A->Y (FF)** | 0.10023 | 0.80245 | 7.54158 |

# 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 | 0.00518 | 0.00580 | 0.03279 |
| sky130_osu_sc_18T_ms__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01075 | 0.01173 | 0.03772 |
| sky130_osu_sc_18T_ms__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02294 | 0.02440 | 0.04916 |
| sky130_osu_sc_18T_ms__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04902 | 0.05036 | 0.07429 |
| sky130_osu_sc_18T_ms__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00390 | 0.00447 | 0.02441 |

**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 | 0.01297 | 0.01493 | 0.04651 |
| sky130_osu_sc_18T_ms__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01650 | 0.01893 | 0.05009 |
| sky130_osu_sc_18T_ms__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02579 | 0.02902 | 0.05947 |
| sky130_osu_sc_18T_ms__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04675 | 0.04830 | 0.07876 |
| sky130_osu_sc_18T_ms__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01000 | 0.01131 | 0.03384 |

**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 |
| | -0.00063 | -0.00064 | -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 |
| | 0.00063 | 0.00064 | 0.00062 |

# SKY130_OSU_SC_18T_MS__DFFRx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00599 | 0.00594 | 0.01712 | 2.10157 | 2.10296 |
| sky130_osu_sc_18T_ms__dffr_l | 0.00599 | 0.00594 | 0.01712 | 1.54765 | 1.54089 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffr_1 | 0.00000 | 21.82320 | 30.42630 |
| sky130_osu_sc_18T_ms__dffr_l | 0.00000 | 22.15170 | 30.75480 |

# 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) | 0.43397 | 1.91902 | 19.82330 |
| | QN->Q (FR) | 0.04214 | 0.88726 | 11.65010 |
| sky130_osu_sc_18T_ms__dffr_l | CK->Q (RR) | 0.42506 | 2.02953 | 19.40980 |
| | QN->Q (FR) | 0.04131 | 0.88257 | 10.77140 |

**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) | 0.45827 | 2.01389 | 20.93210 |
| | QN->Q (RF) | 0.04519 | 0.97440 | 12.81440 |
| | RN->Q (FF) | 0.34086 | 1.85168 | 19.97220 |
| sky130_osu_sc_18T_ms__dffr_l | CK->Q (RF) | 0.45283 | 2.11848 | 20.22800 |
| | QN->Q (RF) | 0.04770 | 1.03499 | 12.64900 |
| | RN->Q (FF) | 0.33590 | 1.95601 | 19.25740 |

**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) | 0.39553 | 1.10591 | 8.36445 |
| | RN->QN (FR) | 0.27793 | 0.94393 | 7.40337 |
| sky130_osu_sc_18T_ms__dffr_l | CK->QN (RR) | 0.38495 | 1.09500 | 7.60503 |
| | RN->QN (FR) | 0.26792 | 0.93334 | 6.64114 |

**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)** | 0.37709 | 1.11069 | 8.64095 |
| **sky130_osu_sc_18T_ms__dffr_l** | **CK->QN (RF)** | 0.36619 | 1.16453 | 8.75078 |

# 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) | -0.12140 | -0.12613 | -0.12093 |
| | setup | CK (R) | 0.34054 | 0.35024 | 0.66412 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.11791 | -0.12480 | -0.12239 |
| | setup | CK (R) | 0.33944 | 0.35201 | 0.67284 |

**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) | -0.16711 | -0.37948 | -1.52544 |
| | setup | CK (R) | 0.21213 | 0.39950 | 1.55161 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.16508 | -0.38126 | -1.52321 |
| | setup | CK (R) | 0.21236 | 0.39950 | 1.55165 |

**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) | -0.12140 | -0.12613 | -0.12093 |
| | setup | CK (R) | 0.34054 | 0.35024 | 0.66412 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.11791 | -0.12480 | -0.12239 |
| | setup | CK (R) | 0.33944 | 0.35201 | 0.67284 |

**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) | -0.16711 | -0.37948 | -1.52544 |
| | setup | CK (R) | 0.21213 | 0.39950 | 1.55161 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.16508 | -0.38126 | -1.52321 |
| | setup | CK (R) | 0.21236 | 0.39950 | 1.55165 |

**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) | 0.25804 | 0.28607 | 0.89463 |
| | removal | CK (R) | -0.04343 | -0.04895 | -0.11187 |
| sky130_osu_sc_18T_ms__dffr_l | recovery | CK (R) | 0.25834 | 0.28782 | 0.89988 |
| | removal | CK (R) | -0.04343 | -0.04895 | -0.11187 |

**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) | 0.25804 | 0.28607 | 0.89463 |
| | removal | CK (R) | -0.04343 | -0.04895 | -0.11187 |
| sky130_osu_sc_18T_ms__dffr_l | recovery | CK (R) | 0.25834 | 0.28782 | 0.89988 |
| | removal | CK (R) | -0.04343 | -0.04895 | -0.11187 |

**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 () | 0.19652 | 0.60303 | 13.33370 |
| | min_pulse_width | RN () | 0.19652 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | RN () | 0.18978 | 0.60303 | 13.33370 |
| | min_pulse_width | RN () | 0.18754 | 0.60303 | 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 () | 0.20326 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.24144 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | CK () | 0.19427 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.23470 | 0.60303 | 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 () | 0.42560 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.17855 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | CK () | 0.42785 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.17855 | 0.60303 | 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 | 0.01340 | 0.01194 | 0.01186 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01185 | 0.01104 | 0.02320 |

**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 | 0.01549 | 0.01405 | 0.00860 |
| | RN | -0.00167 | -0.09264 | -1.34497 |
| | RN | 0.03468 | 0.03365 | 0.02990 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01394 | 0.01300 | 0.01822 |
| | RN | -0.00167 | -0.07711 | -0.99047 |
| | RN | 0.03313 | 0.03259 | 0.03846 |

**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 | 0.01534 | 0.01394 | 0.00862 |
| | RN | -0.00167 | -0.09268 | -1.34363 |
| | RN | 0.03460 | 0.03354 | 0.02934 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01377 | 0.01284 | 0.01724 |
| | RN | -0.00167 | -0.07690 | -0.98254 |
| | RN | 0.03302 | 0.03246 | 0.03810 |

**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 | 0.01325 | 0.01183 | 0.01192 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01173 | 0.01093 | 0.02336 |

**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 | -0.00348 | -0.00428 | -0.00443 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01649 | 0.01592 | 0.03624 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00749 | 0.00700 | 0.02747 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00348 | -0.00429 | -0.00443 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01649 | 0.01592 | 0.03624 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00749 | 0.00700 | 0.02748 |

**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 | 0.00497 | 0.00502 | 0.00501 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02801 | 0.02792 | 0.05030 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01325 | 0.01325 | 0.03514 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00498 | 0.00502 | 0.00501 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02801 | 0.02793 | 0.05030 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01325 | 0.01326 | 0.03514 |

**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) | 0.00506 | 0.00537 | 0.03817 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01395 | 0.01403 | 0.04735 |
| 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) | 0.00506 | 0.00537 | 0.03818 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01396 | 0.01404 | 0.04735 |

**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) | 0.01199 | 0.01342 | 0.04823 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02606 | 0.02698 | 0.06192 |
| 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) | 0.01199 | 0.01342 | 0.04824 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02606 | 0.02698 | 0.06193 |

**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) | -0.00088 | -0.00082 | 0.03167 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00770 | 0.00736 | 0.04109 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00138 | -0.00121 | 0.03085 |
| sky130_osu_sc_18T_ms__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00088 | -0.00082 | 0.03167 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00771 | 0.00736 | 0.04109 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00137 | -0.00121 | 0.03085 |

**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) | 0.01817 | 0.01974 | 0.05454 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.04114 | 0.04123 | 0.07933 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.03171 | 0.03256 | 0.06699 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.04032 | 0.04267 | 0.10297 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02155 | 0.02294 | 0.05705 |
| sky130_osu_sc_18T_ms__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01817 | 0.01976 | 0.05454 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.04114 | 0.04123 | 0.07933 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.03172 | 0.03256 | 0.06699 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.04032 | 0.04267 | 0.10297 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02155 | 0.02294 | 0.05705 |

# SKY130_OSU_SC_18T_MS__DFFSRx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00595 | 0.00595 | 0.01268 | 0.01736 | 2.16554 | 2.17558 |
| sky130_osu_sc_18T_ms__dffsr_l | 0.00595 | 0.00595 | 0.01266 | 0.01736 | 1.54649 | 1.54180 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffsr_1 | 0.00000 | 22.94290 | 30.85840 |
| sky130_osu_sc_18T_ms__dffsr_l | 0.00000 | 23.27130 | 31.18680 |

# 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) | 0.46249 | 1.93621 | 19.80870 |
| | QN->Q (FR) | 0.04042 | 0.86979 | 11.51150 |
| | RN->Q (RR) | 0.36567 | 1.85649 | 19.74520 |
| | SN->Q (FR) | 0.32528 | 1.77667 | 19.02220 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->Q (RR) | 0.46338 | 2.07556 | 19.46110 |
| | QN->Q (FR) | 0.04123 | 0.88045 | 10.73920 |
| | RN->Q (RR) | 0.36695 | 1.99693 | 19.38840 |
| | SN->Q (FR) | 0.32640 | 1.91192 | 18.64510 |

**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) | 0.54145 | 2.08866 | 20.95870 |
| | QN->Q (RF) | 0.04197 | 0.93287 | 12.33360 |
| | RN->Q (FF) | 0.34837 | 1.85143 | 19.96150 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->Q (RF) | 0.54018 | 2.21490 | 20.29960 |
| | QN->Q (RF) | 0.04761 | 1.03378 | 12.63170 |
| | RN->Q (FF) | 0.34815 | 1.98044 | 19.29800 |

**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) | 0.47860 | 1.19944 | 8.51867 |
| | RN->QN (FR) | 0.28680 | 0.96435 | 7.52343 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->QN (RR) | 0.47013 | 1.19206 | 7.70704 |
| | RN->QN (FR) | 0.27967 | 0.95744 | 6.70716 |

**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) | 0.40800 | 1.13946 | 8.64510 |
| | RN->QN (RF) | 0.31133 | 1.06019 | 8.58240 |
| | SN->QN (FF) | 0.27113 | 0.97998 | 7.86027 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->QN (RF) | 0.40517 | 1.21255 | 8.82915 |
| | RN->QN (RF) | 0.30902 | 1.13454 | 8.76122 |
| | SN->QN (FF) | 0.26850 | 1.04933 | 8.02531 |

# 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) | -0.13817 | -0.14586 | -0.19812 |
| | setup | CK (R) | 0.35493 | 0.36266 | 0.74097 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.13611 | -0.14649 | -0.19619 |
| | setup | CK (R) | 0.35482 | 0.36249 | 0.74440 |

**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) | -0.19209 | -0.40732 | -1.60933 |
| | setup | CK (R) | 0.26363 | 0.42217 | 1.63544 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.19370 | -0.40642 | -1.60967 |
| | setup | CK (R) | 0.26386 | 0.42203 | 1.63551 |

**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) | -0.13817 | -0.14586 | -0.19812 |
| | setup | CK (R) | 0.35493 | 0.36266 | 0.74097 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.13611 | -0.14649 | -0.19619 |
| | setup | CK (R) | 0.35482 | 0.36249 | 0.74440 |

**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) | -0.19209 | -0.40732 | -1.60933 |
| | setup | CK (R) | 0.26363 | 0.42217 | 1.63544 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.19370 | -0.40642 | -1.60967 |
| | setup | CK (R) | 0.26386 | 0.42203 | 1.63551 |

**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) | 0.24052 | 0.26164 | 0.85532 |
| | removal | CK (R) | -0.03256 | -0.03456 | -0.07515 |
| | hold | SN (R) | -0.25535 | -0.47381 | -1.76733 |
| | setup | SN (R) | 0.29460 | 0.54092 | 3.30019 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.24029 | 0.26180 | 0.85847 |
| | removal | CK (R) | -0.03021 | -0.03456 | -0.07615 |
| | hold | SN (R) | -0.25068 | -0.46548 | -1.72092 |
| | setup | SN (R) | 0.29472 | 0.52927 | 3.20703 |

**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) | 0.24052 | 0.26164 | 0.85532 |
| | removal | CK (R) | -0.03256 | -0.03456 | -0.07515 |
| | hold | SN (R) | -0.25540 | -0.47381 | -1.76733 |
| | hold | SN (R) | -0.25535 | -0.47774 | -1.78100 |
| | setup | SN (R) | 0.29460 | 0.53618 | 3.13126 |
| | setup | SN (R) | 0.29108 | 0.54092 | 3.30019 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.24029 | 0.26180 | 0.85847 |
| | removal | CK (R) | -0.03021 | -0.03456 | -0.07615 |
| | hold | SN (R) | -0.25100 | -0.46548 | -1.72092 |
| | hold | SN (R) | -0.25068 | -0.46828 | -1.73091 |
| | setup | SN (R) | 0.29472 | 0.52585 | 3.03902 |
| | setup | SN (R) | 0.27756 | 0.52927 | 3.20703 |

**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 () | 0.22347 | 0.60303 | 13.33370 |
| | min_pulse_width | RN () | 0.22572 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | RN () | 0.22122 | 0.60303 | 13.33370 |
| | min_pulse_width | RN () | 0.21673 | 0.60303 | 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) | 0.08712 | 0.12809 | 2.43091 |
| | removal | CK (R) | -0.03654 | -0.09543 | -0.40473 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.08704 | 0.12830 | 2.32399 |
| | removal | CK (R) | -0.03654 | -0.09543 | -0.40473 |

**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) | 0.08712 | 0.12809 | 2.43091 |
| | removal | CK (R) | -0.03654 | -0.09543 | -0.40473 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.08704 | 0.12830 | 2.32399 |
| | removal | CK (R) | -0.03654 | -0.09543 | -0.40473 |

**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 () | 0.25042 | 0.60303 | 13.33370 |
| | min_pulse_width | SN () | 0.25042 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | SN () | 0.25042 | 0.60303 | 13.33370 |
| | min_pulse_width | SN () | 0.23694 | 0.60303 | 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 () | 0.22122 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.26165 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | CK () | 0.21449 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.25940 | 0.60303 | 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 () | 0.44357 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.23470 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | CK () | 0.44357 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.23470 | 0.60303 | 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 | 0.01684 | 0.01611 | 0.02535 |
| | RN | 0.03049 | 0.02988 | 0.03051 |
| | SN | -0.00167 | -0.09432 | -1.38594 |
| | SN | 0.03426 | 0.03298 | 0.03507 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01540 | 0.01456 | 0.02695 |
| | RN | 0.02903 | 0.02833 | 0.03227 |
| | SN | -0.00167 | -0.07707 | -0.98975 |
| | SN | 0.03280 | 0.03145 | 0.03641 |

**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 | 0.01816 | 0.01709 | 0.01557 |
| | RN | -0.00167 | -0.09432 | -1.38593 |
| | RN | 0.03586 | 0.03492 | 0.03486 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01674 | 0.01591 | 0.02045 |
| | RN | -0.00167 | -0.07707 | -0.98973 |
| | RN | 0.03442 | 0.03370 | 0.04005 |

**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 | 0.01801 | 0.01699 | 0.01506 |
| | RN | -0.00167 | -0.09459 | -1.39075 |
| | RN | 0.03574 | 0.03481 | 0.03448 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01654 | 0.01570 | 0.02049 |
| | RN | -0.00167 | -0.07693 | -0.98310 |
| | RN | 0.03427 | 0.03355 | 0.03955 |

**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 | 0.01669 | 0.01596 | 0.02534 |
| | RN | 0.03033 | 0.02973 | 0.03033 |
| | SN | -0.00167 | -0.09459 | -1.39226 |
| | SN | 0.03410 | 0.03283 | 0.03465 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01527 | 0.01445 | 0.02660 |
| | RN | 0.02891 | 0.02820 | 0.03214 |
| | SN | -0.00167 | -0.07693 | -0.98666 |
| | SN | 0.03268 | 0.03137 | 0.03655 |

**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 | -0.00440 | -0.00442 | -0.00445 |
| | (!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) | 0.02098 | 0.02045 | 0.04064 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00855 | 0.00805 | 0.02830 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00854 | 0.00806 | 0.02841 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00861 | 0.00814 | 0.02837 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00440 | -0.00442 | -0.00444 |
| | (!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) | 0.02098 | 0.02045 | 0.04064 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00855 | 0.00806 | 0.02830 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00854 | 0.00806 | 0.02841 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00861 | 0.00814 | 0.02837 |

**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 | 0.00500 | 0.00496 | 0.00495 |
| | (!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) | 0.03199 | 0.03180 | 0.05352 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01369 | 0.01377 | 0.03552 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01414 | 0.01407 | 0.03561 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01366 | 0.01370 | 0.03548 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00500 | 0.00497 | 0.00495 |
| | (!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) | 0.03198 | 0.03179 | 0.05352 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01368 | 0.01376 | 0.03551 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01414 | 0.01407 | 0.03561 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01365 | 0.01370 | 0.03548 |

**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) | 0.00412 | 0.00435 | 0.03700 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01659 | 0.01656 | 0.04976 |
| 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) | 0.00412 | 0.00437 | 0.03701 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01660 | 0.01657 | 0.04977 |

**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) | 0.01251 | 0.01414 | 0.04923 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02723 | 0.02812 | 0.06324 |
| 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) | 0.01250 | 0.01413 | 0.04922 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02722 | 0.02811 | 0.06324 |

**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) | -0.01012 | -0.01019 | -0.01025 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00859 | -0.01026 | -0.01049 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00918 | -0.01003 | -0.01012 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00785 | 0.00758 | 0.02846 |
| 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) | -0.01012 | -0.01018 | -0.01025 |
| | (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 | -0.01024 | -0.01047 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00917 | -0.01002 | -0.01011 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00786 | 0.00760 | 0.02847 |

**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) | 0.01067 | 0.01087 | 0.01072 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.01094 | 0.01105 | 0.01101 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.01058 | 0.01068 | 0.01065 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.02150 | 0.02125 | 0.04203 |
| 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) | 0.01067 | 0.01087 | 0.01072 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.01093 | 0.01104 | 0.01100 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.01058 | 0.01068 | 0.01065 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.02150 | 0.02121 | 0.04203 |

**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) | -0.00088 | -0.00082 | 0.03167 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00877 | 0.00847 | 0.04195 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00830 | 0.00806 | 0.04172 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00118 | -0.00102 | 0.03106 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00596 | 0.00610 | 0.06664 |
| sky130_osu_sc_18T_ms__dffsr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00087 | -0.00082 | 0.03167 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00876 | 0.00847 | 0.04195 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00830 | 0.00805 | 0.04171 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00117 | -0.00101 | 0.03107 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00596 | 0.00610 | 0.06665 |

**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)** | 0.04607 | 0.04629 | 0.08407 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01822 | 0.01979 | 0.05459 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.03250 | 0.03331 | 0.06786 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.03259 | 0.03340 | 0.06781 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.04427 | 0.04633 | 0.10646 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.02145 | 0.02283 | 0.05693 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.02449 | 0.02715 | 0.09161 |
| **sky130_osu_sc_18T_ms__dffsr_l** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.04607 | 0.04630 | 0.08407 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01822 | 0.01980 | 0.05459 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.03251 | 0.03332 | 0.06786 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.03259 | 0.03341 | 0.06781 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.04426 | 0.04633 | 0.10645 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.02145 | 0.02283 | 0.05694 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.02448 | 0.02715 | 0.09161 |

# SKY130_OSU_SC_18T_MS__DFFSx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00598 | 0.00984 | 0.01713 | 2.10013 | 2.11344 |
| sky130_osu_sc_18T_ms__dffs_l | 0.00598 | 0.00984 | 0.01713 | 1.54863 | 1.54490 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffs_1 | 0.00000 | 23.32420 | 37.25140 |
| sky130_osu_sc_18T_ms__dffs_l | 0.00000 | 23.65270 | 37.57990 |

# 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) | 0.33679 | 1.80032 | 19.62080 |
| | QN->Q (FR) | 0.04194 | 0.88220 | 11.58140 |
| | SN->Q (FR) | 0.23446 | 1.70836 | 18.73980 |
| sky130_osu_sc_18T_ms__dffs_l | CK->Q (RR) | 0.33476 | 1.92333 | 19.25970 |
| | QN->Q (FR) | 0.04113 | 0.87850 | 10.71870 |
| | SN->Q (FR) | 0.23358 | 1.82325 | 18.33480 |

**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) | 0.52906 | 2.09823 | 20.94850 |
| | QN->Q (RF) | 0.04487 | 0.97284 | 12.76250 |
| sky130_osu_sc_18T_ms__dffs_l | CK->Q (RF) | 0.51768 | 2.19634 | 20.27010 |
| | QN->Q (RF) | 0.04745 | 1.03224 | 12.61910 |

**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) | 0.46202 | 1.19300 | 8.45181 |
| sky130_osu_sc_18T_ms__dffs_l | CK->QN (RR) | 0.44594 | 1.17376 | 7.67592 |

**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) | 0.28379 | 0.99832 | 8.53179 |
| | SN->QN (FF) | 0.18152 | 0.90681 | 7.65049 |
| sky130_osu_sc_18T_ms__dffs_l | CK->QN (RF) | 0.27962 | 1.06172 | 8.63763 |
| | SN->QN (FF) | 0.17813 | 0.96201 | 7.71567 |

# 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) | -0.10013 | -0.10927 | -0.09450 |
| | setup | CK (R) | 0.24667 | 0.26403 | 0.63789 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.09707 | -0.10801 | -0.09163 |
| | setup | CK (R) | 0.24626 | 0.26460 | 0.64116 |

**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) | -0.17561 | -0.38208 | -1.54098 |
| | setup | CK (R) | 0.24846 | 0.39913 | 1.56630 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.17544 | -0.38159 | -1.53961 |
| | setup | CK (R) | 0.24929 | 0.39931 | 1.56621 |

**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) | -0.10013 | -0.10927 | -0.09450 |
| | setup | CK (R) | 0.24667 | 0.26403 | 0.63789 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.09707 | -0.10801 | -0.09163 |
| | setup | CK (R) | 0.24626 | 0.26460 | 0.64116 |

**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) | -0.17561 | -0.38208 | -1.54098 |
| | setup | CK (R) | 0.24846 | 0.39913 | 1.56630 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.17544 | -0.38159 | -1.53961 |
| | setup | CK (R) | 0.24929 | 0.39931 | 1.56621 |

**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) | 0.09088 | 0.12500 | 1.36855 |
| | removal | CK (R) | -0.03976 | -0.09042 | -0.51401 |
| sky130_osu_sc_18T_ms__dffs_l | recovery | CK (R) | 0.09215 | 0.12500 | 1.27635 |
| | removal | CK (R) | -0.03976 | -0.09042 | -0.51401 |

**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) | 0.09088 | 0.12500 | 1.36855 |
| | removal | CK (R) | -0.03976 | -0.09042 | -0.51401 |
| sky130_osu_sc_18T_ms__dffs_l | recovery | CK (R) | 0.09215 | 0.12500 | 1.27635 |
| | removal | CK (R) | -0.03976 | -0.09042 | -0.51401 |

**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 () | 0.14711 | 0.60303 | 13.33370 |
| | min_pulse_width | SN () | 0.14711 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | SN () | 0.14711 | 0.60303 | 13.33370 |
| | min_pulse_width | SN () | 0.13812 | 0.60303 | 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 () | 0.15609 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.26165 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | CK () | 0.15160 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.25267 | 0.60303 | 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 () | 0.33352 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.22347 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | CK () | 0.33352 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.22347 | 0.60303 | 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 | 0.01331 | 0.01194 | 0.01207 |
| | SN | -0.00167 | -0.09260 | -1.34408 |
| | SN | 0.02857 | 0.02689 | 0.02171 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01176 | 0.01100 | 0.02337 |
| | SN | -0.00167 | -0.07713 | -0.99111 |
| | SN | 0.02701 | 0.02597 | 0.03267 |

**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 | 0.01552 | 0.01426 | 0.01012 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01397 | 0.01311 | 0.01838 |

**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 | 0.01533 | 0.01408 | 0.00975 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01375 | 0.01292 | 0.01804 |

**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 | 0.01320 | 0.01183 | 0.01211 |
| | SN | -0.00167 | -0.09296 | -1.35245 |
| | SN | 0.02845 | 0.02676 | 0.02098 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01167 | 0.01094 | 0.02334 |
| | SN | -0.00167 | -0.07702 | -0.98864 |
| | SN | 0.02691 | 0.02586 | 0.03231 |

**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 | -0.00439 | -0.00441 | -0.00443 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01542 | 0.01490 | 0.03618 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00727 | 0.00678 | 0.02724 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00439 | -0.00441 | -0.00443 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01542 | 0.01490 | 0.03618 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00727 | 0.00678 | 0.02724 |

**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 | 0.00510 | 0.00507 | 0.00505 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02683 | 0.02667 | 0.04884 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01314 | 0.01322 | 0.03522 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00510 | 0.00507 | 0.00505 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02684 | 0.02667 | 0.04884 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01314 | 0.01322 | 0.03523 |

**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) | -0.00736 | -0.00743 | -0.00742 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00597 | 0.00588 | 0.02558 |
| 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) | -0.00736 | -0.00743 | -0.00742 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00597 | 0.00588 | 0.02558 |

**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) | 0.00780 | 0.00779 | 0.00778 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01465 | 0.01497 | 0.03662 |
| 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) | 0.00780 | 0.00779 | 0.00778 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01465 | 0.01498 | 0.03663 |

**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) | -0.00095 | -0.00089 | 0.03162 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00121 | -0.00104 | 0.03105 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00462 | 0.00480 | 0.06597 |
| sky130_osu_sc_18T_ms__dffs_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00095 | -0.00089 | 0.03163 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00121 | -0.00104 | 0.03105 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00462 | 0.00480 | 0.06597 |

**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) | 0.04047 | 0.04062 | 0.07931 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01813 | 0.01970 | 0.05452 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03896 | 0.04115 | 0.10136 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.02152 | 0.02291 | 0.05705 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02385 | 0.02659 | 0.09147 |
| sky130_osu_sc_18T_ms__dffs_l | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.04047 | 0.04062 | 0.07931 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01813 | 0.01972 | 0.05452 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03897 | 0.04114 | 0.10137 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.02152 | 0.02292 | 0.05705 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02385 | 0.02659 | 0.09148 |

# SKY130_OSU_SC_18T_MS__DFFx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

---

## 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 | 0.00613 | 0.01711 | 2.17195 | 2.18835 |
| sky130_osu_sc_18T_ms__dff_l | 0.00613 | 0.01711 | 1.55840 | 1.55330 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dff_1 | 0.00000 | 20.25080 | 24.55140 |
| sky130_osu_sc_18T_ms__dff_l | 0.00000 | 20.57920 | 24.87990 |

# 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) | 0.32034 | 1.77261 | 19.63990 |
| | QN->Q (FR) | 0.04019 | 0.86736 | 11.49130 |
| sky130_osu_sc_18T_ms__dff_l | CK->Q (RR) | 0.32598 | 1.93053 | 19.46410 |
| | QN->Q (FR) | 0.04184 | 0.89234 | 10.92620 |

**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) | 0.42793 | 1.95922 | 20.84490 |
| | QN->Q (RF) | 0.04179 | 0.93261 | 12.32500 |
| sky130_osu_sc_18T_ms__dff_l | CK->Q (RF) | 0.43124 | 2.10804 | 20.43380 |
| | QN->Q (RF) | 0.04755 | 1.03242 | 12.67000 |

**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) | 0.36895 | 1.07200 | 8.41820 |
| sky130_osu_sc_18T_ms__dff_l | CK->QN (RR) | 0.36431 | 1.07696 | 7.69050 |

**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) | 0.26976 | 0.97774 | 8.48736 |
| sky130_osu_sc_18T_ms__dff_l | CK->QN (RF) | 0.27099 | 1.05948 | 8.69129 |

# 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) | -0.09631 | -0.11360 | -0.12238 |
| | setup | CK (R) | 0.22737 | 0.24601 | 0.65378 |
| sky130_osu_sc_18T_ms__dff_l | hold | CK (R) | -0.10003 | -0.11360 | -0.12242 |
| | setup | CK (R) | 0.22728 | 0.24552 | 0.65639 |

**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) | -0.15645 | -0.38309 | -1.54993 |
| | setup | CK (R) | 0.18942 | 0.39950 | 1.58002 |
| sky130_osu_sc_18T_ms__dff_l | hold | CK (R) | -0.15641 | -0.38436 | -1.55369 |
| | setup | CK (R) | 0.18942 | 0.39950 | 1.58002 |

**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 () | 0.15609 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.23021 | 0.60303 | 13.33370 |
| sky130_osu_sc_18T_ms__dff_l | min_pulse_width | CK () | 0.15160 | 0.60303 | 13.33370 |
| | min_pulse_width | CK () | 0.22572 | 0.60303 | 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 ()** | 0.31331 | 0.60303 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.15160 | 0.60303 | 13.33370 |
| **sky130_osu_sc_18T_ms__dff_l** | **min_pulse_width** | **CK ()** | 0.31331 | 0.60303 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.14935 | 0.60303 | 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 | 0.01403 | 0.01336 | 0.02370 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01259 | 0.01183 | 0.02474 |

**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 | 0.01562 | 0.01463 | 0.01388 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01423 | 0.01329 | 0.01692 |

**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 | 0.01550 | 0.01451 | 0.01457 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01408 | 0.01313 | 0.01686 |

**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 | 0.01391 | 0.01324 | 0.02362 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01250 | 0.01177 | 0.02471 |

**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 | -0.00353 | -0.00433 | -0.00448 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01482 | 0.01441 | 0.03612 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00353 | -0.00433 | -0.00447 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01483 | 0.01442 | 0.03612 |

**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 | 0.00491 | 0.00496 | 0.00495 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02762 | 0.02745 | 0.05004 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00492 | 0.00496 | 0.00495 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02762 | 0.02745 | 0.05005 |

**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) | -0.00096 | -0.00089 | 0.03164 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00131 | -0.00114 | 0.03097 |
| sky130_osu_sc_18T_ms__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00096 | -0.00089 | 0.03164 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00131 | -0.00113 | 0.03098 |

**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) | 0.01806 | 0.01965 | 0.05447 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03991 | 0.04006 | 0.07889 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03961 | 0.04193 | 0.10293 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02133 | 0.02271 | 0.05686 |
| sky130_osu_sc_18T_ms__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01807 | 0.01965 | 0.05447 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03992 | 0.04007 | 0.07890 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03962 | 0.04194 | 0.10283 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02133 | 0.02272 | 0.05687 |

# SKY130_OSU_SC_18T_MS__INVx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

---

## 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 | 0.00599 | 2.04337 |
| sky130_osu_sc_18T_ms__inv_10 | 0.05682 | 18.33245 |
| sky130_osu_sc_18T_ms__inv_2 | 0.01155 | 4.03753 |
| sky130_osu_sc_18T_ms__inv_3 | 0.01724 | 5.79887 |
| sky130_osu_sc_18T_ms__inv_4 | 0.02284 | 7.79775 |
| sky130_osu_sc_18T_ms__inv_6 | 0.03425 | 11.37745 |
| sky130_osu_sc_18T_ms__inv_8 | 0.04554 | 15.01748 |
| sky130_osu_sc_18T_ms__inv_l | 0.00451 | 1.51443 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__inv_1 | 0.00000 | 3.05465 | 5.96489 |
| sky130_osu_sc_18T_ms__inv_10 | 0.00000 | 29.06790 | 57.42600 |
| sky130_osu_sc_18T_ms__inv_2 | 0.00000 | 5.81367 | 11.48540 |
| sky130_osu_sc_18T_ms__inv_3 | 0.00000 | 8.86824 | 17.45010 |
| sky130_osu_sc_18T_ms__inv_4 | 0.00000 | 11.62730 | 22.97060 |
| sky130_osu_sc_18T_ms__inv_6 | 0.00000 | 17.44080 | 34.45580 |
| sky130_osu_sc_18T_ms__inv_8 | 0.00000 | 23.25440 | 45.94100 |
| sky130_osu_sc_18T_ms__inv_l | 0.00000 | 3.21887 | 6.33105 |

# 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)** | 0.03848 | 0.79879 | 10.43420 |
| **sky130_osu_sc_18T_ms__inv_10** | **A->Y (FR)** | 0.05313 | 0.52821 | 10.30020 |
| **sky130_osu_sc_18T_ms__inv_2** | **A->Y (FR)** | 0.03161 | 0.69124 | 10.41110 |
| **sky130_osu_sc_18T_ms__inv_3** | **A->Y (FR)** | 0.03463 | 0.64253 | 10.36560 |
| **sky130_osu_sc_18T_ms__inv_4** | **A->Y (FR)** | 0.03548 | 0.60813 | 10.37110 |
| **sky130_osu_sc_18T_ms__inv_6** | **A->Y (FR)** | 0.03969 | 0.56451 | 10.29510 |
| **sky130_osu_sc_18T_ms__inv_8** | **A->Y (FR)** | 0.04602 | 0.54146 | 10.30700 |
| **sky130_osu_sc_18T_ms__inv_l** | **A->Y (FR)** | 0.03913 | 0.82131 | 9.96941 |

**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)** | 0.03858 | 0.84630 | 10.98600 |
| **sky130_osu_sc_18T_ms__inv_10** | **A->Y (RF)** | 0.05798 | 0.57299 | 10.65880 |
| **sky130_osu_sc_18T_ms__inv_2** | **A->Y (RF)** | 0.03192 | 0.73405 | 10.94540 |
| **sky130_osu_sc_18T_ms__inv_3** | **A->Y (RF)** | 0.03462 | 0.68784 | 10.90830 |
| **sky130_osu_sc_18T_ms__inv_4** | **A->Y (RF)** | 0.03468 | 0.65268 | 10.91490 |
| **sky130_osu_sc_18T_ms__inv_6** | **A->Y (RF)** | 0.04269 | 0.61269 | 10.81550 |
| **sky130_osu_sc_18T_ms__inv_8** | **A->Y (RF)** | 0.05016 | 0.59057 | 10.79390 |
| **sky130_osu_sc_18T_ms__inv_l** | **A->Y (RF)** | 0.04369 | 0.94096 | 11.49870 |

# 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 | 0.00693 | 0.00709 | 0.01302 |
| sky130_osu_sc_18T_ms__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.06074 | 0.07205 | 0.12527 |
| sky130_osu_sc_18T_ms__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01250 | 0.01366 | 0.02491 |
| sky130_osu_sc_18T_ms__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01910 | 0.02235 | 0.03779 |
| sky130_osu_sc_18T_ms__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02467 | 0.02855 | 0.04986 |
| sky130_osu_sc_18T_ms__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03666 | 0.04300 | 0.07476 |
| sky130_osu_sc_18T_ms__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04867 | 0.05719 | 0.09997 |
| sky130_osu_sc_18T_ms__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00525 | 0.00560 | 0.00920 |

**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** | -0.00148 | -0.00111 | 0.00152 |
| **sky130_osu_sc_18T_ms__inv_10** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.02383 | -0.01822 | 0.01070 |
| **sky130_osu_sc_18T_ms__inv_2** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00473 | -0.00380 | 0.00167 |
| **sky130_osu_sc_18T_ms__inv_3** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00629 | -0.00500 | 0.00356 |
| **sky130_osu_sc_18T_ms__inv_4** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00961 | -0.00712 | 0.00368 |
| **sky130_osu_sc_18T_ms__inv_6** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.01479 | -0.01055 | 0.00578 |
| **sky130_osu_sc_18T_ms__inv_8** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.01973 | -0.01542 | 0.00788 |
| **sky130_osu_sc_18T_ms__inv_l** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00098 | -0.00070 | 0.00138 |

# SKY130_OSU_SC_18T_MS__MUX2

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.13423 | 0.13404 | 0.01214 | 0.12549 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__mux2_1 | 0.00000 | 6.34991 | 6.50159 |

# 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) | - | 0.02551 | 0.25346 | 1.50888 |
| | A1->Y (RR) | - | 0.02714 | 0.25513 | 1.51632 |
| | S0->Y (RR) | (!A0 * A1) | 0.07883 | 0.36918 | 1.59710 |
| | S0->Y (FR) | (A0 * !A1) | 0.05367 | 0.32522 | 1.37703 |

**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) | - | 0.02206 | 0.25207 | 1.52913 |
| | A1->Y (FF) | - | 0.02104 | 0.25058 | 1.52209 |
| | S0->Y (FF) | (!A0 * A1) | 0.09035 | 0.32070 | 0.69782 |
| | S0->Y (RF) | (A0 * !A1) | 0.04480 | 0.37667 | 2.22439 |

# 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 | - | -0.00697 | -0.00697 | -0.00698 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | -0.00490 | -0.00490 | -0.00490 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00765 | 0.00959 | 0.04542 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | -0.00505 | -0.00441 | 0.02930 |

**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 | - | 0.00698 | 0.00699 | 0.00699 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | 0.00517 | 0.00518 | 0.00518 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00147 | 0.00253 | 0.03675 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | 0.01840 | 0.02004 | 0.05516 |

**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) | -0.00171 | -0.00171 | -0.00171 |

**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) | 0.00181 | 0.00181 | 0.00181 |

**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) | -0.00208 | -0.00207 | -0.00207 |

**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) | 0.00208 | 0.00207 | 0.00207 |

**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) | -0.00182 | -0.00112 | 0.03300 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | -0.00177 | -0.00113 | 0.03330 |

**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) | 0.01388 | 0.01568 | 0.05082 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | 0.01221 | 0.01427 | 0.04988 |

# SKY130_OSU_SC_18T_MS__NAND2x

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00600 | 0.00597 | 1.28281 |
| sky130_osu_sc_18T_ms__nand2_l | 0.00452 | 0.00450 | 0.84606 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__nand2_1 | 0.00000 | 2.99004 | 11.48510 |
| sky130_osu_sc_18T_ms__nand2_l | 0.00000 | 3.17873 | 12.35400 |

# 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) | 0.03963 | 0.69517 | 8.06460 |
| | B->Y (FR) | 0.04627 | 0.69769 | 8.01615 |
| sky130_osu_sc_18T_ms__nand2_l | A->Y (FR) | 0.03993 | 0.68543 | 7.27358 |
| | B->Y (FR) | 0.04659 | 0.68991 | 7.25530 |

**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) | 0.06151 | 0.97943 | 11.30960 |
| | B->Y (RF) | 0.06964 | 0.94630 | 10.78690 |
| sky130_osu_sc_18T_ms__nand2_l | A->Y (RF) | 0.07157 | 1.07584 | 11.15710 |
| | B->Y (RF) | 0.07979 | 1.04451 | 10.60960 |

# 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 | 0.00736 | 0.00777 | 0.01466 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00919 | 0.00949 | 0.01655 |
| sky130_osu_sc_18T_ms__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00553 | 0.00591 | 0.01095 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00684 | 0.00715 | 0.01230 |

**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 | -0.00085 | -0.00064 | 0.00250 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00078 | -0.00091 | 0.00187 |
| sky130_osu_sc_18T_ms__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00053 | -0.00043 | 0.00226 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00048 | -0.00058 | 0.00181 |

**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) | -0.00513 | -0.00517 | -0.00519 |
| sky130_osu_sc_18T_ms__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00366 | -0.00370 | -0.00371 |

**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) | 0.00518 | 0.00525 | 0.00521 |
| sky130_osu_sc_18T_ms__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00371 | 0.00375 | 0.00373 |

**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) | -0.00487 | -0.00488 | -0.00487 |
| sky130_osu_sc_18T_ms__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00347 | -0.00349 | -0.00348 |

**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) | 0.00493 | 0.00494 | 0.00489 |
| sky130_osu_sc_18T_ms__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00353 | 0.00353 | 0.00349 |

# SKY130_OSU_SC_18T_MS__NOR2x

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

---

## 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 | 0.00599 | 0.00631 | 1.08526 |
| sky130_osu_sc_18T_ms__nor2_l | 0.00444 | 0.00478 | 0.80452 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__nor2_1 | 0.00000 | 2.48087 | 5.96402 |
| sky130_osu_sc_18T_ms__nor2_l | 0.00000 | 2.77400 | 6.32966 |

# 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) | 0.08161 | 0.91827 | 9.78962 |
| | B->Y (FR) | 0.06027 | 0.91459 | 10.05510 |
| sky130_osu_sc_18T_ms__nor2_l | A->Y (FR) | 0.08198 | 0.95806 | 9.42921 |
| | B->Y (FR) | 0.06541 | 0.97115 | 9.94157 |

**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) | 0.05529 | 0.72174 | 7.94195 |
| | B->Y (RF) | 0.04145 | 0.70182 | 7.91685 |
| sky130_osu_sc_18T_ms__nor2_l | A->Y (RF) | 0.06017 | 0.78643 | 8.22037 |
| | B->Y (RF) | 0.04675 | 0.76962 | 8.19837 |

# 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 | 0.01023 | 0.01024 | 0.01460 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00750 | 0.00797 | 0.01528 |
| sky130_osu_sc_18T_ms__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00731 | 0.00732 | 0.01063 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00561 | 0.00560 | 0.01084 |

**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 | 0.00131 | 0.00131 | 0.00506 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00114 | -0.00080 | 0.00290 |
| sky130_osu_sc_18T_ms__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00090 | 0.00091 | 0.00399 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00070 | -0.00042 | 0.00249 |

**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) | -0.00371 | -0.00452 | -0.00466 |
| sky130_osu_sc_18T_ms__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00266 | -0.00315 | -0.00323 |

**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) | 0.00477 | 0.00481 | 0.00480 |
| sky130_osu_sc_18T_ms__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00335 | 0.00339 | 0.00337 |

**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) | -0.00210 | -0.00214 | -0.00211 |
| sky130_osu_sc_18T_ms__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00155 | -0.00157 | -0.00155 |

**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) | 0.00224 | 0.00226 | 0.00216 |
| sky130_osu_sc_18T_ms__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00166 | 0.00167 | 0.00160 |

# SKY130_OSU_SC_18T_MS__OAI21

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00605 | 0.00612 | 0.00500 | 1.07520 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__oai21_l | 0.00000 | 3.71242 | 12.29450 |

# 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) | 0.08082 | 0.93551 | 10.05670 |
| | A1->Y (FR) | 0.10620 | 0.94601 | 9.78860 |
| | B0->Y (FR) | 0.04946 | 0.74161 | 8.21222 |

**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) | 0.08601 | 0.94372 | 10.05680 |
| | A1->Y (RF) | 0.11094 | 0.94963 | 9.82406 |
| | B0->Y (RF) | 0.06592 | 0.97076 | 10.69370 |

# 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 | 0.01018 | 0.01049 | 0.01673 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.01289 | 0.01283 | 0.01606 |
| | B0 | 0.00878 | 0.00923 | 0.01500 |

**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 | 0.00051 | 0.00032 | 0.00308 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00289 | 0.00250 | 0.00529 |
| | B0 | 0.00098 | 0.00123 | 0.00445 |

**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) | -0.00205 | -0.00208 | -0.00206 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | -0.00470 | -0.00475 | -0.00472 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00479 | -0.00481 | -0.00480 |

**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) | 0.00229 | 0.00232 | 0.00222 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | 0.00470 | 0.00475 | 0.00472 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00481 | 0.00485 | 0.00481 |

**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) | -0.00359 | -0.00441 | -0.00454 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | -0.00466 | -0.00472 | -0.00469 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00475 | -0.00477 | -0.00476 |

**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) | 0.00476 | 0.00480 | 0.00480 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | 0.00466 | 0.00473 | 0.00469 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00477 | 0.00482 | 0.00477 |

**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) | -0.00370 | -0.00372 | -0.00381 |

**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) | 0.00381 | 0.00388 | 0.00383 |

# SKY130_OSU_SC_18T_MS__OAI22

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00590 | 0.00616 | 0.00630 | 0.00618 | 1.07234 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__oai22_1 | 0.00000 | 3.53907 | 11.49320 |

# 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) | 0.11024 | 0.95013 | 9.75788 |
| | A1->Y (FR) | 0.09445 | 0.93918 | 10.02460 |
| | B0->Y (FR) | 0.06892 | 0.92336 | 10.01180 |
| | B1->Y (FR) | 0.09085 | 0.92834 | 9.74699 |

**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) | 0.15948 | 1.03882 | 10.26700 |
| | A1->Y (RF) | 0.12372 | 0.99015 | 10.11700 |
| | B0->Y (RF) | 0.10605 | 1.01555 | 10.72520 |
| | B1->Y (RF) | 0.14360 | 1.07212 | 10.97170 |

# 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 | 0.01696 | 0.01688 | 0.02064 |
| | A1 | 0.01422 | 0.01449 | 0.02069 |
| | B0 | 0.01070 | 0.01107 | 0.01729 |
| | B1 | 0.01353 | 0.01352 | 0.01729 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | A0 | 0.00475 | 0.00434 | 0.00707 |
| | A1 | 0.00258 | 0.00226 | 0.00492 |
| | B0 | -0.00038 | -0.00022 | 0.00322 |
| | B1 | 0.00476 | 0.00455 | 0.00769 |

**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) | -0.00370 | -0.00451 | -0.00466 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | -0.00368 | -0.00449 | -0.00463 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | -0.00467 | -0.00470 | -0.00470 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | -0.00476 | -0.00477 | -0.00477 |

**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) | 0.00477 | 0.00482 | 0.00480 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | 0.00479 | 0.00484 | 0.00483 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | 0.00467 | 0.00470 | 0.00470 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | 0.00478 | 0.00482 | 0.00478 |

**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) | -0.00209 | -0.00213 | -0.00209 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | -0.00206 | -0.00211 | -0.00207 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | -0.00466 | -0.00470 | -0.00468 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | -0.00475 | -0.00478 | -0.00476 |

**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) | 0.00223 | 0.00225 | 0.00215 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | 0.00225 | 0.00227 | 0.00217 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | 0.00466 | 0.00470 | 0.00468 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | 0.00477 | 0.00481 | 0.00477 |

**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) | -0.00208 | -0.00212 | -0.00208 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | -0.00205 | -0.00210 | -0.00206 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | -0.00507 | -0.00512 | -0.00510 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | -0.00500 | -0.00504 | -0.00515 |

**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) | 0.00222 | 0.00224 | 0.00214 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | 0.00224 | 0.00225 | 0.00216 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | 0.00510 | 0.00518 | 0.00510 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | 0.00515 | 0.00525 | 0.00518 |

**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) | -0.00365 | -0.00447 | -0.00460 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | -0.00363 | -0.00445 | -0.00458 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | -0.00513 | -0.00518 | -0.00516 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | -0.00505 | -0.00510 | -0.00520 |

**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) | 0.00472 | 0.00476 | 0.00475 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | 0.00474 | 0.00478 | 0.00477 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | 0.00517 | 0.00519 | 0.00516 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | 0.00521 | 0.00527 | 0.00524 |

# SKY130_OSU_SC_18T_MS__OR2x

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

---

## 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 | 0.00632 | 0.00613 | 2.15060 |
| sky130_osu_sc_18T_ms__or2_2 | 0.00633 | 0.00613 | 4.16342 |
| sky130_osu_sc_18T_ms__or2_4 | 0.00633 | 0.00614 | 8.11687 |
| sky130_osu_sc_18T_ms__or2_8 | 0.00634 | 0.00615 | 15.34693 |
| sky130_osu_sc_18T_ms__or2_l | 0.00485 | 0.00461 | 1.55731 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__or2_1** | 0.00000 | 4.08469 | 6.10842 |
| **sky130_osu_sc_18T_ms__or2_2** | 0.00000 | 5.46300 | 11.62750 |
| **sky130_osu_sc_18T_ms__or2_4** | 0.00000 | 8.44083 | 23.11300 |
| **sky130_osu_sc_18T_ms__or2_8** | 0.00000 | 14.39640 | 46.08380 |
| **sky130_osu_sc_18T_ms__or2_l** | 0.00000 | 4.44094 | 6.43634 |

# 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) | 0.11132 | 0.82209 | 8.15887 |
| | B->Y (RR) | 0.09360 | 0.76726 | 8.00609 |
| sky130_osu_sc_18T_ms__or2_2 | A->Y (RR) | 0.12279 | 0.75942 | 8.19619 |
| | B->Y (RR) | 0.10472 | 0.71170 | 8.04514 |
| sky130_osu_sc_18T_ms__or2_4 | A->Y (RR) | 0.15743 | 0.77216 | 8.57076 |
| | B->Y (RR) | 0.13894 | 0.73558 | 8.43478 |
| sky130_osu_sc_18T_ms__or2_8 | A->Y (RR) | 0.22295 | 0.84688 | 8.96463 |
| | B->Y (RR) | 0.20388 | 0.81937 | 8.84280 |
| sky130_osu_sc_18T_ms__or2_l | A->Y (RR) | 0.11775 | 0.84570 | 7.61292 |
| | B->Y (RR) | 0.09968 | 0.79427 | 7.44668 |

**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) | 0.16986 | 0.83018 | 7.56779 |
| | B->Y (FF) | 0.14273 | 0.79583 | 7.51491 |
| sky130_osu_sc_18T_ms__or2_2 | A->Y (FF) | 0.20122 | 0.79585 | 7.62162 |
| | B->Y (FF) | 0.17416 | 0.77597 | 7.58015 |
| sky130_osu_sc_18T_ms__or2_4 | A->Y (FF) | 0.28291 | 0.86142 | 8.05523 |
| | B->Y (FF) | 0.25605 | 0.85488 | 8.02577 |
| sky130_osu_sc_18T_ms__or2_8 | A->Y (FF) | 0.45128 | 1.03677 | 8.41382 |
| | B->Y (FF) | 0.42449 | 1.02928 | 8.42957 |
| sky130_osu_sc_18T_ms__or2_l | A->Y (FF) | 0.17417 | 0.90623 | 7.80910 |
| | B->Y (FF) | 0.15043 | 0.88896 | 7.82397 |

# 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 | 0.00800 | 0.00814 | 0.02857 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00567 | 0.00615 | 0.03166 |
| sky130_osu_sc_18T_ms__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01358 | 0.01404 | 0.03441 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01121 | 0.01218 | 0.03671 |
| sky130_osu_sc_18T_ms__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02590 | 0.02686 | 0.04688 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02344 | 0.02503 | 0.04824 |
| sky130_osu_sc_18T_ms__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05215 | 0.05307 | 0.07384 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04957 | 0.05185 | 0.07498 |
| sky130_osu_sc_18T_ms__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00587 | 0.00596 | 0.02173 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00430 | 0.00468 | 0.02322 |

**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 | 0.01617 | 0.01653 | 0.03777 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01316 | 0.01506 | 0.04597 |
| sky130_osu_sc_18T_ms__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01983 | 0.02077 | 0.04150 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01685 | 0.01912 | 0.04906 |
| sky130_osu_sc_18T_ms__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03003 | 0.03083 | 0.05089 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02704 | 0.02897 | 0.05771 |
| sky130_osu_sc_18T_ms__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05554 | 0.05109 | 0.07007 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.05258 | 0.04850 | 0.07613 |
| sky130_osu_sc_18T_ms__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01207 | 0.01230 | 0.02819 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01002 | 0.01131 | 0.03343 |

**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) | -0.00370 | -0.00454 | -0.00467 |
| sky130_osu_sc_18T_ms__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00370 | -0.00454 | -0.00467 |
| sky130_osu_sc_18T_ms__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00370 | -0.00454 | -0.00467 |
| sky130_osu_sc_18T_ms__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00369 | -0.00454 | -0.00467 |
| sky130_osu_sc_18T_ms__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00265 | -0.00316 | -0.00324 |

**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) | 0.00479 | 0.00485 | 0.00482 |
| sky130_osu_sc_18T_ms__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00479 | 0.00485 | 0.00482 |
| sky130_osu_sc_18T_ms__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00479 | 0.00480 | 0.00482 |
| sky130_osu_sc_18T_ms__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00480 | 0.00480 | 0.00483 |
| sky130_osu_sc_18T_ms__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00336 | 0.00339 | 0.00338 |

**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) | -0.00211 | -0.00213 | -0.00211 |
| sky130_osu_sc_18T_ms__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00211 | -0.00213 | -0.00211 |
| sky130_osu_sc_18T_ms__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00211 | -0.00213 | -0.00211 |
| sky130_osu_sc_18T_ms__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00210 | -0.00213 | -0.00211 |
| sky130_osu_sc_18T_ms__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00157 | -0.00159 | -0.00158 |

**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) | 0.00227 | 0.00228 | 0.00217 |
| sky130_osu_sc_18T_ms__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00227 | 0.00228 | 0.00217 |
| sky130_osu_sc_18T_ms__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00227 | 0.00228 | 0.00217 |
| sky130_osu_sc_18T_ms__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00228 | 0.00228 | 0.00217 |
| sky130_osu_sc_18T_ms__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00171 | 0.00171 | 0.00163 |

# SKY130_OSU_SC_18T_MS__TBUFIx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00630 | 0.00785 | 1.08546 |
| sky130_osu_sc_18T_ms__tbufi_l | 0.00479 | 0.00600 | 0.80173 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__tbufi_1 | 0.00000 | 3.21278 | 11.92870 |
| sky130_osu_sc_18T_ms__tbufi_l | 0.00000 | 3.33888 | 12.66040 |

# 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) | 0.05795 | 0.90867 | 10.04380 |
| | OE->Y (FR) | 0.06496 | 0.39529 | 4.68897 |
| | OE->Y (RR) | 0.11989 | 0.89369 | 7.82648 |
| sky130_osu_sc_18T_ms__tbufi_l | A->Y (FR) | 0.06318 | 0.96920 | 9.92181 |
| | OE->Y (FR) | 0.06256 | 0.39497 | 4.68872 |
| | OE->Y (RR) | 0.12345 | 0.95953 | 7.73706 |

**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) | 0.06053 | 0.92025 | 10.22170 |
| | OE->Y (FF) | 0.06630 | 0.39520 | 4.68896 |
| | OE->Y (RF) | 0.05494 | 0.87793 | 9.65192 |
| sky130_osu_sc_18T_ms__tbufi_l | A->Y (RF) | 0.07140 | 1.05373 | 10.79170 |
| | OE->Y (FF) | 0.06357 | 0.39495 | 4.68870 |
| | OE->Y (RF) | 0.06592 | 1.00993 | 10.21300 |

# 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 | 0.00724 | 0.00774 | 0.01405 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00746 | 0.00818 | 0.03952 |
| sky130_osu_sc_18T_ms__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00549 | 0.00547 | 0.01004 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00525 | 0.00584 | 0.02879 |

**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 | -0.00099 | -0.00071 | 0.00257 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00504 | 0.00577 | 0.04034 |
| sky130_osu_sc_18T_ms__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00051 | -0.00028 | 0.00224 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00359 | 0.00418 | 0.02904 |

**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) | -0.00349 | -0.00348 | -0.00350 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00296 | -0.00302 | -0.00297 |
| sky130_osu_sc_18T_ms__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00264 | -0.00265 | -0.00265 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00229 | -0.00232 | -0.00230 |

**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) | 0.00349 | 0.00348 | 0.00350 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00306 | 0.00309 | 0.00302 |
| sky130_osu_sc_18T_ms__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00264 | 0.00265 | 0.00265 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00237 | 0.00239 | 0.00234 |

**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) | 0.00308 | 0.00397 | 0.03867 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00256 | 0.00343 | 0.03811 |
| sky130_osu_sc_18T_ms__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00210 | 0.00276 | 0.02782 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00173 | 0.00241 | 0.02744 |

**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) | 0.00834 | 0.00985 | 0.04539 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00814 | 0.00979 | 0.04535 |
| sky130_osu_sc_18T_ms__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00640 | 0.00745 | 0.03299 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00626 | 0.00739 | 0.03299 |

# SKY130_OSU_SC_18T_MS__TNBUFIx

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.00630 | 0.01011 | 1.08550 |
| sky130_osu_sc_18T_ms__tnbufi_l | 0.00479 | 0.00742 | 0.80173 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__tnbufi_1 | 0.00000 | 5.15297 | 6.16232 |
| sky130_osu_sc_18T_ms__tnbufi_l | 0.00000 | 5.41371 | 6.48340 |

# 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) | 0.05843 | 0.90893 | 10.04410 |
| | OE->Y (RR) | 0.04677 | 0.39685 | 4.69067 |
| | OE->Y (FR) | 0.07603 | 0.91230 | 9.75274 |
| sky130_osu_sc_18T_ms__tnbufi_l | A->Y (FR) | 0.06373 | 0.96927 | 9.92182 |
| | OE->Y (RR) | 0.04972 | 0.39712 | 4.69086 |
| | OE->Y (FR) | 0.07719 | 0.95263 | 9.38614 |

**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) | 0.05971 | 0.92312 | 10.22170 |
| | OE->Y (RF) | 0.04626 | 0.39686 | 4.69064 |
| | OE->Y (FF) | 0.08845 | 0.71404 | 6.19517 |
| sky130_osu_sc_18T_ms__tnbufi_l | A->Y (RF) | 0.07041 | 1.05335 | 10.79130 |
| | OE->Y (RF) | 0.04927 | 0.39713 | 4.69086 |
| | OE->Y (FF) | 0.09816 | 0.84119 | 6.68581 |

# 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 | 0.00723 | 0.00773 | 0.01405 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01779 | 0.02005 | 0.05675 |
| sky130_osu_sc_18T_ms__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00547 | 0.00545 | 0.01003 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01299 | 0.01452 | 0.04089 |

**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 | -0.00134 | -0.00103 | 0.00224 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01559 | 0.01792 | 0.05255 |
| sky130_osu_sc_18T_ms__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00087 | -0.00063 | 0.00188 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01148 | 0.01301 | 0.03775 |

**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) | -0.00308 | -0.00308 | -0.00309 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00250 | -0.00255 | -0.00251 |
| sky130_osu_sc_18T_ms__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00227 | -0.00227 | -0.00227 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00184 | -0.00188 | -0.00185 |

**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) | 0.00308 | 0.00308 | 0.00309 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00269 | 0.00271 | 0.00266 |
| sky130_osu_sc_18T_ms__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00227 | 0.00227 | 0.00227 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00202 | 0.00204 | 0.00199 |

**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) | -0.00540 | -0.00503 | 0.03052 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00565 | -0.00514 | 0.03049 |
| sky130_osu_sc_18T_ms__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00380 | -0.00341 | 0.02219 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00398 | -0.00351 | 0.02216 |

**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) | 0.01346 | 0.01590 | 0.05238 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.01308 | 0.01553 | 0.05202 |
| sky130_osu_sc_18T_ms__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00991 | 0.01161 | 0.03781 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00965 | 0.01131 | 0.03756 |

# SKY130_OSU_SC_18T_MS__XNOR2

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

---

## 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** | 0.01247 | 0.01152 | 1.10629 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_18T_ms__xnor2_l** | 0.00000 | 10.62490 | 17.61660 |

# 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_1 | A->Y (RR) | B | 0.15053 | 0.94685 | 8.03037 |
| | A->Y (FR) | !B | 0.07635 | 0.93513 | 10.14340 |
| | B->Y (RR) | A | 0.11969 | 0.91496 | 8.04585 |
| | B->Y (FR) | !A | 0.10389 | 0.94473 | 9.89561 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__xnor2_1 | A->Y (FF) | B | 0.17116 | 0.87532 | 6.78440 |
| | A->Y (RF) | !B | 0.08613 | 0.92634 | 9.99401 |
| | B->Y (FF) | A | 0.13782 | 0.84434 | 6.76689 |
| | B->Y (RF) | !A | 0.11331 | 0.95899 | 10.01680 |

# 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 | 0.00754 | 0.00796 | 0.03863 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01728 | 0.01920 | 0.06064 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00220 | 0.00308 | 0.03767 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01945 | 0.02119 | 0.06008 |

**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 | 0.02193 | 0.02280 | 0.05776 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00490 | 0.00534 | 0.04185 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01968 | 0.02170 | 0.05747 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00630 | 0.00660 | 0.04310 |

# SKY130_OSU_SC_18T_MS__XOR2

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

## 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 | 0.01246 | 0.01156 | 1.10364 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__xor2_l | 0.00000 | 10.62490 | 18.00440 |

# 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 | 0.14016 | 0.93054 | 8.05086 |
| | A->Y (FR) | B | 0.09525 | 0.93595 | 9.93253 |
| | B->Y (RR) | !A | 0.12213 | 0.91822 | 8.05678 |
| | B->Y (FR) | A | 0.10335 | 0.94538 | 9.92522 |

**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 | 0.13895 | 0.83016 | 6.52333 |
| | A->Y (RF) | B | 0.09490 | 0.97180 | 10.35400 |
| | B->Y (FF) | !A | 0.13130 | 0.82769 | 6.58909 |
| | B->Y (RF) | A | 0.10643 | 0.93947 | 9.82021 |

# 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 | 0.02045 | 0.02231 | 0.06205 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00342 | 0.00331 | 0.03731 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.02122 | 0.02314 | 0.06253 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00180 | 0.00257 | 0.03719 |

**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 | 0.00457 | 0.00487 | 0.04236 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.02172 | 0.02367 | 0.05771 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00459 | 0.00482 | 0.04160 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01986 | 0.02207 | 0.05817 |

# SKY130_OSU_SC_18T_MS_x

*sky130_osu_sc_18T_ms_ss_1P60_150C.ccs*
*Cell Library: Process , Voltage 1.60, Temp 150.00*

---

## 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** | 0.68619 |
| **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 | 219719.00000 | 439438.00000 |
| **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 |
| | -0.00211 | 0.07399 | 0.88722 |

**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 |
| | 3.82325 | 3.59874 | 1.05807 |