# sky130_osu_sc_18T_ms_tt_1P68_25C.ccs Library

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

# SKY130_OSU_SC_18T_MS__ADDFx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_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** | 0.02082 | 0.02082 | 0.01590 | 2.74576 | 1.26798 | 2.65851 |
| **sky130_osu_sc_18T_ms__addf_l** | 0.02081 | 0.02081 | 0.01592 | 1.86602 | 1.26669 | 1.87654 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__addf_1** | 0.00000 | 0.39728 | 0.53676 |
| **sky130_osu_sc_18T_ms__addf_l** | 0.00000 | 0.33901 | 0.47848 |

# 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) | 0.15676 | 1.85996 | 28.00630 |
| | B->CO (RR) | 0.13540 | 1.76405 | 26.67650 |
| | CI->CO (RR) | 0.14911 | 1.88709 | 28.50330 |
| | CON->CO (FR) | 0.02844 | 0.75503 | 11.24910 |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (RR) | 0.15846 | 1.72695 | 22.58200 |
| | B->CO (RR) | 0.13757 | 1.64487 | 21.66590 |
| | CI->CO (RR) | 0.15085 | 1.75481 | 23.10580 |
| | CON->CO (FR) | 0.03233 | 0.82424 | 11.25310 |

**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) | 0.20472 | 2.27339 | 34.06050 |
| | B->CO (FF) | 0.18333 | 2.17438 | 32.61220 |
| | CI->CO (FF) | 0.17883 | 2.24125 | 34.04140 |
| | CON->CO (RF) | 0.02623 | 0.68919 | 10.29460 |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (FF) | 0.20100 | 2.03260 | 26.37470 |
| | B->CO (FF) | 0.18049 | 1.95209 | 25.37630 |
| | CI->CO (FF) | 0.17515 | 2.00131 | 26.38080 |
| | CON->CO (RF) | 0.02827 | 0.71122 | 9.74891 |

**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) | 0.14747 | 0.98289 | 10.84680 |
| | B->CON (FR) | 0.12595 | 0.92925 | 10.45910 |
| | CI->CON (FR) | 0.12177 | 0.95360 | 10.89580 |
| sky130_osu_sc_18T_ms__addf_l | A->CON (FR) | 0.14023 | 0.97527 | 10.83250 |
| | B->CON (FR) | 0.11930 | 0.92135 | 10.44570 |
| | CI->CON (FR) | 0.11448 | 0.94604 | 10.88200 |

**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) | 0.10121 | 0.72266 | 8.09171 |
| | B->CON (RF) | 0.09556 | 0.70791 | 8.06790 |
| | CI->CON (RF) | 0.09354 | 0.75369 | 8.65613 |
| sky130_osu_sc_18T_ms__addf_l | A->CON (RF) | 0.09739 | 0.71854 | 8.08130 |
| | B->CON (RF) | 0.09212 | 0.70458 | 8.05952 |
| | CI->CON (RF) | 0.08969 | 0.74961 | 8.64772 |

**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) | 0.29632 | 2.02508 | 25.88270 |
| | B->S (-R) | 0.30843 | 2.02113 | 25.00090 |
| | CI->S (-R) | 0.26847 | 1.98881 | 25.86270 |
| | CON->S (RR) | 0.08726 | 0.67707 | 7.56520 |
| sky130_osu_sc_18T_ms__addf_l | A->S (-R) | 0.28461 | 1.87810 | 21.53270 |
| | B->S (-R) | 0.29700 | 1.88431 | 20.98620 |
| | CI->S (-R) | 0.25664 | 1.84194 | 21.53990 |
| | CON->S (RR) | 0.08760 | 0.72682 | 7.53839 |

**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) | 0.25674 | 1.71023 | 20.98730 |
| | B->S (-F) | 0.25182 | 1.63572 | 20.11610 |
| | CI->S (-F) | 0.24816 | 1.73351 | 21.48960 |
| | CON->S (FF) | 0.10464 | 0.72317 | 7.46447 |
| sky130_osu_sc_18T_ms__addf_l | A->S (-F) | 0.24472 | 1.57178 | 17.35070 |
| | B->S (-F) | 0.23957 | 1.51047 | 16.77700 |
| | CI->S (-F) | 0.23603 | 1.59591 | 17.86830 |
| | CON->S (FF) | 0.10174 | 0.74113 | 7.15838 |

# 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 | 0.00361 | 0.00418 | 0.01692 |
| | B | 0.00569 | 0.00590 | 0.01561 |
| | CI | 0.00579 | 0.00646 | 0.01948 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00270 | 0.00302 | 0.01096 |
| | B | 0.00480 | 0.00481 | 0.01090 |
| | CI | 0.00489 | 0.00530 | 0.01327 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01507 | 0.01565 | 0.03311 |
| | B | 0.01596 | 0.01652 | 0.03123 |
| | CI | 0.01263 | 0.01323 | 0.03150 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01419 | 0.01459 | 0.02599 |
| | B | 0.01507 | 0.01550 | 0.02487 |
| | CI | 0.01174 | 0.01215 | 0.02465 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01505 | 0.01537 | 0.02267 |
| | B | 0.01552 | 0.01584 | 0.02231 |
| | CI | 0.01398 | 0.01464 | 0.02135 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01418 | 0.01444 | 0.02180 |
| | B | 0.01466 | 0.01492 | 0.02143 |
| | CI | 0.01309 | 0.01371 | 0.02040 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.00357 | 0.00392 | 0.00963 |
| | B | 0.00563 | 0.00561 | 0.01026 |
| | CI | 0.00575 | 0.00615 | 0.01204 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00269 | 0.00293 | 0.00832 |
| | B | 0.00475 | 0.00463 | 0.00898 |
| | CI | 0.00486 | 0.00517 | 0.01071 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.01507 | 0.01563 | 0.03238 |
| | B | 0.01596 | 0.01651 | 0.03057 |
| | CI | 0.01262 | 0.01322 | 0.03077 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.01419 | 0.01459 | 0.02608 |
| | B | 0.01507 | 0.01550 | 0.02470 |
| | CI | 0.01174 | 0.01215 | 0.02458 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.03399 | 0.03423 | 0.04410 |
| | B | 0.03026 | 0.03037 | 0.05021 |
| | CI | 0.02756 | 0.02763 | 0.03758 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.03279 | 0.03283 | 0.04299 |
| | B | 0.02909 | 0.02912 | 0.04966 |
| | CI | 0.02642 | 0.02637 | 0.03677 |

# SKY130_OSU_SC_18T_MS__ADDHx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.01023 | 0.01117 | 2.68151 | 1.34787 | 2.72310 |
| sky130_osu_sc_18T_ms__addh_l | 0.01023 | 0.01117 | 1.59464 | 1.34329 | 1.62324 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__addh_1 | 0.00000 | 0.46325 | 0.53625 |
| sky130_osu_sc_18T_ms__addh_l | 0.00000 | 0.31371 | 0.41649 |

# 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) | 0.10439 | 0.69042 | 7.34444 |
| | B->CO (RR) | 0.10878 | 0.69043 | 7.43508 |
| sky130_osu_sc_18T_ms__addh_l | A->CO (RR) | 0.10457 | 0.75879 | 7.22689 |
| | B->CO (RR) | 0.10890 | 0.76140 | 7.29648 |

**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) | 0.08875 | 0.68718 | 7.38674 |
| | B->CO (FF) | 0.09497 | 0.70126 | 7.39555 |
| sky130_osu_sc_18T_ms__addh_l | A->CO (FF) | 0.08851 | 0.72458 | 6.92025 |
| | B->CO (FF) | 0.09453 | 0.73882 | 6.92665 |

**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 | 0.14147 | 0.57768 | 3.97845 |
| | A->CON (FR) | !B | 0.08078 | 0.89175 | 10.74390 |
| | B->CON (RR) | A | 0.14566 | 0.57713 | 4.06569 |
| | B->CON (FR) | !A | 0.10119 | 0.92149 | 10.82030 |
| sky130_osu_sc_18T_ms__addh_l | A->CON (RR) | B | 0.12701 | 0.55085 | 3.91972 |
| | A->CON (FR) | !B | 0.07189 | 0.88117 | 10.71220 |
| | B->CON (RR) | A | 0.13131 | 0.55295 | 3.98884 |
| | B->CON (FR) | !A | 0.09236 | 0.91072 | 10.78790 |

**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 | 0.13787 | 0.73657 | 6.14119 |
| | A->CON (RF) | !B | 0.05973 | 0.70809 | 8.68924 |
| | B->CON (FF) | A | 0.13657 | 0.77541 | 6.54410 |
| | B->CON (RF) | !A | 0.07078 | 0.69661 | 8.31276 |
| sky130_osu_sc_18T_ms__addh_l | A->CON (FF) | B | 0.12527 | 0.70065 | 5.92202 |
| | A->CON (RF) | !B | 0.05507 | 0.70187 | 8.66732 |
| | B->CON (FF) | A | 0.12374 | 0.73995 | 6.32183 |
| | B->CON (RF) | !A | 0.06628 | 0.69098 | 8.29623 |

**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 | 0.11006 | 1.78511 | 27.56300 |
| | A->S (FR) | B | 0.18837 | 1.79221 | 24.71930 |
| | B->S (RR) | !A | 0.12090 | 1.72551 | 26.22710 |
| | B->S (FR) | A | 0.18773 | 1.88049 | 26.06070 |
| | CON->S (FR) | - | 0.03185 | 0.77643 | 11.52990 |
| sky130_osu_sc_18T_ms__addh_l | A->S (RR) | !B | 0.10899 | 1.61556 | 20.92210 |
| | A->S (FR) | B | 0.17950 | 1.60180 | 18.00520 |
| | B->S (RR) | !A | 0.12020 | 1.57309 | 20.07180 |
| | B->S (FR) | A | 0.17864 | 1.67325 | 18.87060 |
| | CON->S (FR) | - | 0.03606 | 0.86514 | 11.43750 |

**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 | 0.12832 | 2.04689 | 31.59980 |
| | A->S (RF) | B | 0.18123 | 1.41141 | 18.47960 |
| | B->S (FF) | !A | 0.14884 | 2.07994 | 31.75160 |
| | B->S (RF) | A | 0.18544 | 1.40946 | 18.56540 |
| | CON->S (RF) | - | 0.02461 | 0.66950 | 9.96088 |
| sky130_osu_sc_18T_ms__addh_l | A->S (FF) | !B | 0.12337 | 1.78690 | 23.03190 |
| | A->S (RF) | B | 0.16965 | 1.26060 | 13.39000 |
| | B->S (FF) | !A | 0.14382 | 1.82009 | 23.13360 |
| | B->S (RF) | A | 0.17388 | 1.26057 | 13.45980 |
| | CON->S (RF) | - | 0.02802 | 0.72279 | 9.57636 |

# 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 | 0.00694 | 0.00673 | 0.01040 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00622 | 0.00588 | 0.01025 |
| sky130_osu_sc_18T_ms__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00569 | 0.00544 | 0.01134 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00498 | 0.00457 | 0.01060 |

**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 | 0.01096 | 0.01082 | 0.01957 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01133 | 0.01179 | 0.02110 |
| sky130_osu_sc_18T_ms__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00969 | 0.00951 | 0.01785 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01009 | 0.01038 | 0.01887 |

**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 | 0.00693 | 0.00675 | 0.01124 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00952 | 0.00970 | 0.01207 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00622 | 0.00590 | 0.01144 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01069 | 0.01068 | 0.01169 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00568 | 0.00544 | 0.01114 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00869 | 0.00881 | 0.01092 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00497 | 0.00456 | 0.01072 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00987 | 0.00980 | 0.01058 |

**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 | 0.01095 | 0.01081 | 0.01919 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00146 | 0.00156 | 0.00304 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01133 | 0.01175 | 0.02038 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00259 | 0.00252 | 0.00379 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00969 | 0.00951 | 0.01774 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00038 | 0.00041 | 0.00125 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01008 | 0.01037 | 0.01888 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00152 | 0.00137 | 0.00227 |

**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 | 0.01096 | 0.01082 | 0.01984 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00148 | 0.00166 | 0.00391 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01134 | 0.01183 | 0.02140 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00262 | 0.00261 | 0.00454 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00970 | 0.00953 | 0.01803 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00039 | 0.00044 | 0.00125 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01009 | 0.01041 | 0.01921 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00154 | 0.00138 | 0.00218 |

**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 | 0.00695 | 0.00674 | 0.01034 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00952 | 0.00977 | 0.01177 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00623 | 0.00590 | 0.01017 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01070 | 0.01080 | 0.01191 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00569 | 0.00545 | 0.01158 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00869 | 0.00884 | 0.01072 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00498 | 0.00458 | 0.01101 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00988 | 0.00985 | 0.01063 |

# SKY130_OSU_SC_18T_MS__AND2x

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

## Truth Table

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

## Footprint

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

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_18T_ms__and2_1 | 0.00550 | 0.00560 | 2.71879 |
| sky130_osu_sc_18T_ms__and2_2 | 0.00550 | 0.00560 | 5.18130 |
| sky130_osu_sc_18T_ms__and2_4 | 0.00550 | 0.00561 | 9.98537 |
| sky130_osu_sc_18T_ms__and2_6 | 0.00553 | 0.00560 | 14.46177 |
| sky130_osu_sc_18T_ms__and2_8 | 0.00552 | 0.00562 | 18.58329 |
| sky130_osu_sc_18T_ms__and2_l | 0.00426 | 0.00436 | 1.87503 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__and2_1** | 0.00000 | 0.22340 | 0.35733 |
| **sky130_osu_sc_18T_ms__and2_2** | 0.00000 | 0.35733 | 0.35786 |
| **sky130_osu_sc_18T_ms__and2_4** | 0.00000 | 0.62520 | 0.71413 |
| **sky130_osu_sc_18T_ms__and2_6** | 0.00000 | 0.89306 | 1.07092 |
| **sky130_osu_sc_18T_ms__and2_8** | 0.00000 | 1.16092 | 1.42772 |
| **sky130_osu_sc_18T_ms__and2_l** | 0.00000 | 0.15074 | 0.24111 |

# 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) | 0.07955 | 0.62050 | 7.21168 |
| | B->Y (RR) | 0.08494 | 0.62758 | 7.15157 |
| sky130_osu_sc_18T_ms__and2_2 | A->Y (RR) | 0.09250 | 0.57764 | 7.18906 |
| | B->Y (RR) | 0.09787 | 0.57774 | 7.14088 |
| sky130_osu_sc_18T_ms__and2_4 | A->Y (RR) | 0.12760 | 0.60880 | 7.56263 |
| | B->Y (RR) | 0.13299 | 0.59999 | 7.53315 |
| sky130_osu_sc_18T_ms__and2_6 | A->Y (RR) | 0.16115 | 0.65306 | 7.73609 |
| | B->Y (RR) | 0.16639 | 0.63640 | 7.70973 |
| sky130_osu_sc_18T_ms__and2_8 | A->Y (RR) | 0.19455 | 0.69968 | 7.95768 |
| | B->Y (RR) | 0.19990 | 0.68029 | 7.92714 |
| sky130_osu_sc_18T_ms__and2_l | A->Y (RR) | 0.08895 | 0.69684 | 7.22103 |
| | B->Y (RR) | 0.09472 | 0.70294 | 7.19039 |

**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) | 0.06881 | 0.60856 | 6.89554 |
| | B->Y (FF) | 0.07272 | 0.62442 | 6.92766 |
| sky130_osu_sc_18T_ms__and2_2 | A->Y (FF) | 0.07828 | 0.57252 | 6.84094 |
| | B->Y (FF) | 0.08294 | 0.58558 | 6.88649 |
| sky130_osu_sc_18T_ms__and2_4 | A->Y (FF) | 0.10736 | 0.59947 | 7.15527 |
| | B->Y (FF) | 0.11209 | 0.60946 | 7.20099 |
| sky130_osu_sc_18T_ms__and2_6 | A->Y (FF) | 0.13941 | 0.63991 | 7.29272 |
| | B->Y (FF) | 0.14402 | 0.64802 | 7.34217 |
| sky130_osu_sc_18T_ms__and2_8 | A->Y (FF) | 0.16859 | 0.67655 | 7.31919 |
| | B->Y (FF) | 0.17348 | 0.68357 | 7.38022 |
| sky130_osu_sc_18T_ms__and2_l | A->Y (FF) | 0.07497 | 0.66779 | 6.79199 |
| | B->Y (FF) | 0.07999 | 0.68717 | 6.84566 |

# 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 | 0.00519 | 0.00500 | 0.02955 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00529 | 0.00479 | 0.01913 |
| sky130_osu_sc_18T_ms__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01048 | 0.01091 | 0.03350 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01060 | 0.01037 | 0.02359 |
| sky130_osu_sc_18T_ms__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02201 | 0.02301 | 0.04337 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02217 | 0.02259 | 0.03525 |
| sky130_osu_sc_18T_ms__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03407 | 0.03522 | 0.05506 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03411 | 0.03472 | 0.04814 |
| sky130_osu_sc_18T_ms__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04652 | 0.04748 | 0.06509 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04647 | 0.04696 | 0.05943 |
| sky130_osu_sc_18T_ms__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00385 | 0.00366 | 0.01956 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00394 | 0.00340 | 0.01357 |

**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 | 0.01312 | 0.01433 | 0.03851 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01481 | 0.01573 | 0.03834 |
| sky130_osu_sc_18T_ms__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01659 | 0.01832 | 0.04235 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01831 | 0.01969 | 0.04232 |
| sky130_osu_sc_18T_ms__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02538 | 0.02832 | 0.05181 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02708 | 0.02945 | 0.05159 |
| sky130_osu_sc_18T_ms__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03409 | 0.03806 | 0.06205 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03593 | 0.03892 | 0.06114 |
| sky130_osu_sc_18T_ms__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04337 | 0.04767 | 0.07207 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04505 | 0.04823 | 0.07042 |
| sky130_osu_sc_18T_ms__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01019 | 0.01087 | 0.02622 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01146 | 0.01194 | 0.02660 |

**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) | -0.00499 | -0.00503 | -0.00503 |
| sky130_osu_sc_18T_ms__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00499 | -0.00503 | -0.00503 |
| sky130_osu_sc_18T_ms__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00499 | -0.00502 | -0.00502 |
| sky130_osu_sc_18T_ms__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00501 | -0.00504 | -0.00504 |
| sky130_osu_sc_18T_ms__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00498 | -0.00501 | -0.00502 |
| sky130_osu_sc_18T_ms__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00369 | -0.00372 | -0.00372 |

**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) | 0.00503 | 0.00506 | 0.00505 |
| sky130_osu_sc_18T_ms__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00503 | 0.00506 | 0.00505 |
| sky130_osu_sc_18T_ms__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00503 | 0.00506 | 0.00505 |
| sky130_osu_sc_18T_ms__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00504 | 0.00509 | 0.00508 |
| sky130_osu_sc_18T_ms__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00502 | 0.00507 | 0.00506 |
| sky130_osu_sc_18T_ms__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00371 | 0.00374 | 0.00373 |

**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) | -0.00473 | -0.00474 | -0.00473 |
| sky130_osu_sc_18T_ms__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00473 | -0.00474 | -0.00473 |
| sky130_osu_sc_18T_ms__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00472 | -0.00474 | -0.00473 |
| sky130_osu_sc_18T_ms__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00472 | -0.00473 | -0.00473 |
| sky130_osu_sc_18T_ms__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00472 | -0.00473 | -0.00472 |
| sky130_osu_sc_18T_ms__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00350 | -0.00351 | -0.00350 |

**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) | 0.00477 | 0.00479 | 0.00475 |
| sky130_osu_sc_18T_ms__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00477 | 0.00479 | 0.00475 |
| sky130_osu_sc_18T_ms__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00477 | 0.00479 | 0.00476 |
| sky130_osu_sc_18T_ms__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00477 | 0.00479 | 0.00476 |
| sky130_osu_sc_18T_ms__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00478 | 0.00480 | 0.00476 |
| sky130_osu_sc_18T_ms__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00352 | 0.00352 | 0.00351 |

# SKY130_OSU_SC_18T_MS__AOI21

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__aoi21_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_18T_ms__aoi21_l | 0.00522 | 0.00542 | 0.00524 | 1.25162 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__aoi21_l | 0.00000 | 0.08263 | 0.17840 |

# 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) | 0.08078 | 0.91324 | 10.72580 |
| | A1->Y (FR) | 0.06919 | 0.87016 | 10.35710 |
| | B0->Y (FR) | 0.05834 | 0.88894 | 10.77170 |

**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) | 0.05556 | 0.64439 | 7.60692 |
| | A1->Y (RF) | 0.05040 | 0.65837 | 7.98383 |
| | B0->Y (RF) | 0.03314 | 0.63068 | 7.87734 |

# 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 | 0.01181 | 0.01170 | 0.01303 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00995 | 0.00982 | 0.01119 |
| | B0 | 0.00715 | 0.00724 | 0.01123 |

**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 | 0.00256 | 0.00215 | 0.00297 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00259 | 0.00234 | 0.00346 |
| | B0 | -0.00129 | -0.00116 | -0.00018 |

**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) | -0.00386 | -0.00444 | -0.00442 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | -0.00447 | -0.00450 | -0.00448 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00447 | -0.00449 | -0.00448 |

**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) | 0.00439 | 0.00444 | 0.00442 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | 0.00448 | 0.00450 | 0.00449 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00451 | 0.00451 | 0.00449 |

**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) | -0.00383 | -0.00436 | -0.00437 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | -0.00442 | -0.00443 | -0.00443 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00477 | -0.00481 | -0.00481 |

**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) | 0.00434 | 0.00439 | 0.00437 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | 0.00442 | 0.00448 | 0.00444 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00480 | 0.00484 | 0.00482 |

**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) | -0.00213 | -0.00214 | -0.00214 |

**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) | 0.00234 | 0.00235 | 0.00219 |

# SKY130_OSU_SC_18T_MS__AOI22

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00523 | 0.00543 | 0.00559 | 0.00536 | 1.19774 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__aoi22_1 | 0.00000 | 0.09090 | 0.35679 |

# 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) | 0.10247 | 0.93807 | 10.63280 |
| | A1->Y (FR) | 0.09120 | 0.91035 | 10.44410 |
| | B0->Y (FR) | 0.06111 | 0.87349 | 10.49720 |
| | B1->Y (FR) | 0.07261 | 0.90967 | 10.74630 |

**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) | 0.07300 | 0.65431 | 7.43628 |
| | A1->Y (RF) | 0.06787 | 0.66828 | 7.81550 |
| | B0->Y (RF) | 0.03710 | 0.63872 | 7.78794 |
| | B1->Y (RF) | 0.04239 | 0.61910 | 7.40804 |

# 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 | 0.01443 | 0.01430 | 0.01550 |
| | A1 | 0.01260 | 0.01245 | 0.01368 |
| | B0 | 0.00776 | 0.00787 | 0.01266 |
| | B1 | 0.01157 | 0.01155 | 0.01601 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | A0 | 0.00530 | 0.00486 | 0.00568 |
| | A1 | 0.00535 | 0.00503 | 0.00617 |
| | B0 | -0.00088 | -0.00088 | 0.00045 |
| | B1 | -0.00074 | -0.00092 | 0.00003 |

**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) | -0.00389 | -0.00443 | -0.00442 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | -0.00446 | -0.00447 | -0.00448 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | -0.00447 | -0.00449 | -0.00448 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00447 | -0.00449 | -0.00448 |

**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) | 0.00438 | 0.00444 | 0.00442 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | 0.00448 | 0.00450 | 0.00449 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | 0.00451 | 0.00450 | 0.00449 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00451 | 0.00450 | 0.00449 |

**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) | -0.00386 | -0.00434 | -0.00437 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | -0.00442 | -0.00444 | -0.00442 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | -0.00477 | -0.00480 | -0.00480 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00477 | -0.00480 | -0.00480 |

**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) | 0.00434 | 0.00439 | 0.00437 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | 0.00442 | 0.00448 | 0.00444 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | 0.00480 | 0.00484 | 0.00482 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00480 | 0.00484 | 0.00482 |

**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) | -0.00214 | -0.00216 | -0.00215 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | -0.00213 | -0.00215 | -0.00214 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | -0.00489 | -0.00491 | -0.00493 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | -0.00488 | -0.00491 | -0.00493 |

**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) | 0.00244 | 0.00245 | 0.00222 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | 0.00214 | 0.00215 | 0.00214 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | 0.00492 | 0.00496 | 0.00494 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | 0.00492 | 0.00497 | 0.00494 |

**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) | -0.00215 | -0.00217 | -0.00216 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | -0.00215 | -0.00216 | -0.00215 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00454 | -0.00456 | -0.00455 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | -0.00454 | -0.00456 | -0.00455 |

**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) | 0.00245 | 0.00246 | 0.00223 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | 0.00215 | 0.00216 | 0.00215 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00458 | 0.00459 | 0.00456 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | 0.00458 | 0.00459 | 0.00456 |

# SKY130_OSU_SC_18T_MS__BUFx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

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

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| **sky130_osu_sc_18T_ms__buf_1** | 0.00560 | 2.67986 |
| **sky130_osu_sc_18T_ms__buf_2** | 0.00561 | 5.24983 |
| **sky130_osu_sc_18T_ms__buf_4** | 0.00560 | 10.09551 |
| **sky130_osu_sc_18T_ms__buf_6** | 0.00097 | 1.80000 |
| **sky130_osu_sc_18T_ms__buf_8** | 0.00562 | 19.00384 |
| **sky130_osu_sc_18T_ms__buf_l** | 0.00441 | 1.86248 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__buf_1** | 0.00000 | 0.17893 | 0.17893 |
| **sky130_osu_sc_18T_ms__buf_2** | 0.00000 | 0.26840 | 0.35733 |
| **sky130_osu_sc_18T_ms__buf_4** | 0.00000 | 0.44733 | 0.71413 |
| **sky130_osu_sc_18T_ms__buf_6** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_18T_ms__buf_8** | 0.00000 | 0.80519 | 1.42772 |
| **sky130_osu_sc_18T_ms__buf_l** | 0.00000 | 0.12066 | 0.12066 |

# 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)** | 0.06118 | 0.58297 | 6.97123 |
| **sky130_osu_sc_18T_ms__buf_2** | **A->Y (RR)** | 0.06879 | 0.53533 | 7.08221 |
| **sky130_osu_sc_18T_ms__buf_4** | **A->Y (RR)** | 0.09293 | 0.54743 | 7.37799 |
| **sky130_osu_sc_18T_ms__buf_8** | **A->Y (RR)** | 0.13855 | 0.61155 | 7.73765 |
| **sky130_osu_sc_18T_ms__buf_l** | **A->Y (RR)** | 0.06855 | 0.65644 | 6.99567 |

**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)** | 0.06556 | 0.59665 | 6.80068 |
| **sky130_osu_sc_18T_ms__buf_2** | **A->Y (FF)** | 0.07574 | 0.56913 | 6.93245 |
| **sky130_osu_sc_18T_ms__buf_4** | **A->Y (FF)** | 0.10496 | 0.59576 | 7.21406 |
| **sky130_osu_sc_18T_ms__buf_8** | **A->Y (FF)** | 0.16609 | 0.67513 | 7.45823 |
| **sky130_osu_sc_18T_ms__buf_l** | **A->Y (FF)** | 0.07249 | 0.65909 | 6.74631 |

# 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 | 0.00482 | 0.00462 | 0.02250 |
| sky130_osu_sc_18T_ms__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01012 | 0.01040 | 0.02734 |
| sky130_osu_sc_18T_ms__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02159 | 0.02239 | 0.03824 |
| sky130_osu_sc_18T_ms__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04480 | 0.04714 | 0.06417 |
| sky130_osu_sc_18T_ms__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00368 | 0.00346 | 0.01636 |

**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 | 0.01264 | 0.01380 | 0.03757 |
| sky130_osu_sc_18T_ms__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01609 | 0.01761 | 0.04106 |
| sky130_osu_sc_18T_ms__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02489 | 0.02751 | 0.05053 |
| sky130_osu_sc_18T_ms__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04295 | 0.04647 | 0.06998 |
| sky130_osu_sc_18T_ms__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00990 | 0.01047 | 0.02597 |

**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 |
| | -0.00067 | -0.00067 | -0.00066 |

**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 |
| | 0.00067 | 0.00067 | 0.00066 |

# SKY130_OSU_SC_18T_MS__DFFRx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00537 | 0.00533 | 0.01548 | 2.63482 | 2.59999 |
| sky130_osu_sc_18T_ms__dffr_l | 0.00537 | 0.00533 | 0.01546 | 1.86753 | 1.85980 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffr_1 | 0.00000 | 0.55203 | 0.84648 |
| sky130_osu_sc_18T_ms__dffr_l | 0.00000 | 0.49376 | 0.78821 |

# 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) | 0.30187 | 1.46600 | 17.35910 |
| | QN->Q (FR) | 0.03316 | 0.84459 | 12.51750 |
| sky130_osu_sc_18T_ms__dffr_l | CK->Q (RR) | 0.29776 | 1.57437 | 16.93630 |
| | QN->Q (FR) | 0.03550 | 0.88991 | 12.19630 |

**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) | 0.30446 | 1.50796 | 18.07760 |
| | QN->Q (RF) | 0.03031 | 0.79205 | 11.72230 |
| | RN->Q (FF) | 0.22506 | 1.50292 | 18.84060 |
| sky130_osu_sc_18T_ms__dffr_l | CK->Q (RF) | 0.30884 | 1.63916 | 17.73250 |
| | QN->Q (RF) | 0.03113 | 0.80032 | 10.94170 |
| | RN->Q (FF) | 0.22986 | 1.63386 | 18.49240 |

**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) | 0.26628 | 0.81947 | 7.12807 |
| | RN->QN (FR) | 0.18682 | 0.81467 | 7.89221 |
| sky130_osu_sc_18T_ms__dffr_l | CK->QN (RR) | 0.26659 | 0.87776 | 7.17956 |
| | RN->QN (FR) | 0.18749 | 0.87294 | 7.93598 |

**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)** | 0.25743 | 0.77398 | 6.40664 |
| **sky130_osu_sc_18T_ms__dffr_l** | **CK->QN (RF)** | 0.24841 | 0.79270 | 6.13888 |

# 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) | -0.06686 | -0.09097 | -0.21144 |
| | setup | CK (R) | 0.23825 | 0.28058 | 0.95174 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.06850 | -0.08896 | -0.21010 |
| | setup | CK (R) | 0.23887 | 0.28095 | 0.95949 |

**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) | -0.11720 | -0.37121 | -2.88515 |
| | setup | CK (R) | 0.15069 | 0.38378 | 2.96596 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.12003 | -0.37053 | -2.88167 |
| | setup | CK (R) | 0.15041 | 0.38378 | 2.96596 |

**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) | -0.06686 | -0.09097 | -0.21144 |
| | setup | CK (R) | 0.23825 | 0.28058 | 0.95174 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.06850 | -0.08896 | -0.21010 |
| | setup | CK (R) | 0.23887 | 0.28095 | 0.95949 |

**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) | -0.11720 | -0.37121 | -2.88515 |
| | setup | CK (R) | 0.15069 | 0.38378 | 2.96596 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.12003 | -0.37053 | -2.88167 |
| | setup | CK (R) | 0.15041 | 0.38378 | 2.96596 |

**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) | 0.19479 | 0.23341 | 1.07167 |
| | removal | CK (R) | -0.03506 | -0.04360 | -0.12327 |
| sky130_osu_sc_18T_ms__dffr_l | recovery | CK (R) | 0.19381 | 0.23160 | 1.08003 |
| | removal | CK (R) | -0.03506 | -0.04360 | -0.12327 |

**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) | 0.19479 | 0.23341 | 1.07167 |
| | removal | CK (R) | -0.03506 | -0.04360 | -0.12327 |
| sky130_osu_sc_18T_ms__dffr_l | recovery | CK (R) | 0.19381 | 0.23160 | 1.08003 |
| | removal | CK (R) | -0.03506 | -0.04360 | -0.12327 |

**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 () | 0.13104 | 0.52490 | 13.33370 |
| | min_pulse_width | RN () | 0.13104 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | RN () | 0.13104 | 0.52490 | 13.33370 |
| | min_pulse_width | RN () | 0.13104 | 0.52490 | 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 () | 0.13891 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.15861 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | CK () | 0.13104 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.15467 | 0.52490 | 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 () | 0.30040 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.12316 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | CK () | 0.30434 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.12316 | 0.52490 | 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 | 0.01284 | 0.00896 | 0.00000 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01144 | 0.00875 | -0.00343 |

**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 | 0.01455 | 0.01197 | 0.00000 |
| | RN | -0.00169 | -0.11286 | -1.85912 |
| | RN | 0.03372 | 0.03150 | 0.00993 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01312 | 0.01141 | 0.00580 |
| | RN | -0.00169 | -0.09180 | -1.31773 |
| | RN | 0.03228 | 0.03093 | 0.02642 |

**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 | 0.01454 | 0.01197 | 0.00000 |
| | RN | -0.00169 | -0.11196 | -1.83413 |
| | RN | 0.03370 | 0.03147 | 0.01009 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01312 | 0.01141 | 0.00552 |
| | RN | -0.00169 | -0.09157 | -1.31216 |
| | RN | 0.03227 | 0.03091 | 0.02658 |

**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 | 0.01279 | 0.00896 | 0.00000 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01138 | 0.00874 | -0.00341 |

**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 | -0.00370 | -0.00434 | -0.00440 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01585 | 0.01499 | 0.02560 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00708 | 0.00633 | 0.01726 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00370 | -0.00434 | -0.00440 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01585 | 0.01499 | 0.02560 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00707 | 0.00633 | 0.01723 |

**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 | 0.00437 | 0.00443 | 0.00441 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02643 | 0.02604 | 0.03821 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01244 | 0.01213 | 0.02412 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00437 | 0.00443 | 0.00441 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02643 | 0.02604 | 0.03821 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01244 | 0.01213 | 0.02412 |

**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) | 0.00494 | 0.00456 | 0.02944 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01390 | 0.01321 | 0.03787 |
| 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) | 0.00494 | 0.00456 | 0.02943 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01390 | 0.01321 | 0.03787 |

**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) | 0.01183 | 0.01244 | 0.04012 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02533 | 0.02542 | 0.05283 |
| 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) | 0.01183 | 0.01244 | 0.04012 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02533 | 0.02542 | 0.05283 |

**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) | -0.00096 | -0.00136 | 0.02293 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00753 | 0.00605 | 0.03101 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00148 | -0.00202 | 0.02212 |
| sky130_osu_sc_18T_ms__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00096 | -0.00136 | 0.02293 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00753 | 0.00605 | 0.03097 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00148 | -0.00202 | 0.02212 |

**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) | 0.01825 | 0.01925 | 0.04665 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.04010 | 0.03946 | 0.06917 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.03066 | 0.03072 | 0.05765 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.03937 | 0.04063 | 0.08910 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02086 | 0.02155 | 0.04845 |
| sky130_osu_sc_18T_ms__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01825 | 0.01912 | 0.04665 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.04010 | 0.03948 | 0.06917 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.03066 | 0.03072 | 0.05765 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.03937 | 0.04047 | 0.08910 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02086 | 0.02155 | 0.04845 |

# SKY130_OSU_SC_18T_MS__DFFSRx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_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** | 0.00533 | 0.00534 | 0.01147 | 0.01574 | 2.76567 | 2.73857 |
| **sky130_osu_sc_18T_ms__dffsr_l** | 0.00533 | 0.00534 | 0.01146 | 0.01574 | 1.86082 | 1.86299 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_18T_ms__dffsr_1** | 0.00000 | 0.60743 | 0.84698 |
| **sky130_osu_sc_18T_ms__dffsr_l** | 0.00000 | 0.54916 | 0.78871 |

# 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) | 0.30924 | 1.46328 | 17.40970 |
| | QN->Q (FR) | 0.03149 | 0.82511 | 12.36420 |
| | RN->Q (RR) | 0.24732 | 1.41331 | 17.40610 |
| | SN->Q (FR) | 0.22640 | 1.49029 | 18.51690 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->Q (RR) | 0.31356 | 1.59526 | 16.91160 |
| | QN->Q (FR) | 0.03543 | 0.88685 | 12.13330 |
| | RN->Q (RR) | 0.25221 | 1.54856 | 16.90200 |
| | SN->Q (FR) | 0.23105 | 1.61957 | 18.00030 |

**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) | 0.34448 | 1.53596 | 18.17880 |
| | QN->Q (RF) | 0.02768 | 0.74933 | 11.19740 |
| | RN->Q (FF) | 0.23052 | 1.50019 | 18.93450 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->Q (RF) | 0.35349 | 1.68446 | 17.70660 |
| | QN->Q (RF) | 0.03107 | 0.79629 | 10.90530 |
| | RN->Q (FF) | 0.23949 | 1.64892 | 18.45950 |

**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) | 0.30726 | 0.86378 | 7.27842 |
| | RN->QN (FR) | 0.19390 | 0.82862 | 8.03361 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->QN (RR) | 0.31050 | 0.92679 | 7.23853 |
| | RN->QN (FR) | 0.19703 | 0.89143 | 7.98628 |

**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) | 0.26763 | 0.78434 | 6.43991 |
| | RN->QN (RF) | 0.20604 | 0.73462 | 6.43372 |
| | SN->QN (FF) | 0.18519 | 0.81158 | 7.54668 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->QN (RF) | 0.26544 | 0.81896 | 6.20345 |
| | RN->QN (RF) | 0.20430 | 0.77193 | 6.19364 |
| | SN->QN (FF) | 0.18323 | 0.84310 | 7.29380 |

# 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) | -0.07189 | -0.09837 | -0.26601 |
| | setup | CK (R) | 0.23512 | 0.27558 | 0.97838 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.07155 | -0.09921 | -0.26679 |
| | setup | CK (R) | 0.23559 | 0.27412 | 0.97935 |

**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) | -0.13384 | -0.38777 | -2.98110 |
| | setup | CK (R) | 0.17238 | 0.40204 | 3.05122 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.13415 | -0.38915 | -2.98125 |
| | setup | CK (R) | 0.17345 | 0.40185 | 3.05076 |

**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) | -0.07189 | -0.09837 | -0.26601 |
| | setup | CK (R) | 0.23512 | 0.27558 | 0.97838 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.07155 | -0.09921 | -0.26679 |
| | setup | CK (R) | 0.23559 | 0.27412 | 0.97935 |

**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) | -0.13384 | -0.38777 | -2.98110 |
| | setup | CK (R) | 0.17238 | 0.40204 | 3.05122 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.13415 | -0.38915 | -2.98125 |
| | setup | CK (R) | 0.17345 | 0.40185 | 3.05076 |

**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) | 0.17448 | 0.20639 | 1.00298 |
| | removal | CK (R) | -0.01998 | -0.02608 | -0.07918 |
| | hold | SN (R) | -0.17530 | -0.37431 | -1.66143 |
| | setup | SN (R) | 0.19986 | 0.43290 | 4.56950 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.17364 | 0.20555 | 1.00187 |
| | removal | CK (R) | -0.01998 | -0.02608 | -0.07918 |
| | hold | SN (R) | -0.17241 | -0.36752 | -1.62126 |
| | setup | SN (R) | 0.20339 | 0.42636 | 4.47000 |

**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) | 0.17448 | 0.20639 | 1.00298 |
| | removal | CK (R) | -0.01998 | -0.02608 | -0.07918 |
| | hold | SN (R) | -0.17591 | -0.37431 | -1.66143 |
| | hold | SN (R) | -0.17530 | -0.37471 | -1.66894 |
| | setup | SN (R) | 0.19986 | 0.43176 | 4.34188 |
| | setup | SN (R) | 0.19910 | 0.43290 | 4.56950 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.17364 | 0.20555 | 1.00187 |
| | removal | CK (R) | -0.01998 | -0.02608 | -0.07918 |
| | hold | SN (R) | -0.17241 | -0.36752 | -1.62126 |
| | hold | SN (R) | -0.17455 | -0.36863 | -1.62813 |
| | setup | SN (R) | 0.20339 | 0.42179 | 4.23032 |
| | setup | SN (R) | 0.19002 | 0.42636 | 4.47000 |

**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 () | 0.15073 | 0.52490 | 13.33370 |
| | min_pulse_width | RN () | 0.15073 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | RN () | 0.15073 | 0.52490 | 13.33370 |
| | min_pulse_width | RN () | 0.14679 | 0.52490 | 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) | 0.04776 | 0.08976 | 3.99703 |
| | removal | CK (R) | -0.01726 | -0.06861 | -0.33816 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.04680 | 0.08976 | 3.87092 |
| | removal | CK (R) | -0.01941 | -0.06646 | -0.33925 |

**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) | 0.04776 | 0.08976 | 3.99703 |
| | removal | CK (R) | -0.01726 | -0.06861 | -0.33816 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.04680 | 0.08976 | 3.87092 |
| | removal | CK (R) | -0.01941 | -0.06646 | -0.33925 |

**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 () | 0.17830 | 0.52490 | 13.33370 |
| | min_pulse_width | SN () | 0.17830 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | SN () | 0.17830 | 0.52490 | 13.33370 |
| | min_pulse_width | SN () | 0.17042 | 0.52490 | 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 () | 0.14285 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.17436 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | CK () | 0.13891 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.17436 | 0.52490 | 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 () | 0.30040 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.15073 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | CK () | 0.30040 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.15073 | 0.52490 | 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 | 0.01609 | 0.01343 | 0.00000 |
| | RN | 0.02946 | 0.02707 | 0.00003 |
| | SN | -0.00169 | -0.11619 | -1.95146 |
| | SN | 0.03287 | 0.03009 | -0.00065 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01479 | 0.01210 | 0.00032 |
| | RN | 0.02815 | 0.02571 | 0.00694 |
| | SN | -0.00169 | -0.09160 | -1.31299 |
| | SN | 0.03157 | 0.02878 | 0.00685 |

**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 | 0.01696 | 0.01482 | 0.00000 |
| | RN | -0.00169 | -0.11619 | -1.95145 |
| | RN | 0.03468 | 0.03268 | 0.01537 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01566 | 0.01407 | 0.00890 |
| | RN | -0.00169 | -0.09160 | -1.31299 |
| | RN | 0.03335 | 0.03192 | 0.02821 |

**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 | 0.01694 | 0.01481 | 0.00000 |
| | RN | -0.00169 | -0.11550 | -1.93215 |
| | RN | 0.03464 | 0.03265 | 0.01580 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01564 | 0.01407 | 0.00859 |
| | RN | -0.00169 | -0.09167 | -1.31441 |
| | RN | 0.03333 | 0.03189 | 0.02814 |

**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 | 0.01603 | 0.01338 | 0.00000 |
| | RN | 0.02940 | 0.02703 | -0.00011 |
| | SN | -0.00169 | -0.11550 | -1.93224 |
| | SN | 0.03281 | 0.03002 | 0.00075 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01473 | 0.01208 | -0.00021 |
| | RN | 0.02809 | 0.02567 | 0.00697 |
| | SN | -0.00169 | -0.09167 | -1.31445 |
| | SN | 0.03151 | 0.02875 | 0.00746 |

**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 | -0.00430 | -0.00439 | -0.00439 |
| | (!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) | 0.02021 | 0.01938 | 0.02994 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00793 | 0.00720 | 0.01791 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00790 | 0.00718 | 0.01793 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00797 | 0.00725 | 0.01796 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00430 | -0.00439 | -0.00439 |
| | (!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) | 0.02021 | 0.01938 | 0.02994 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00793 | 0.00720 | 0.01791 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00790 | 0.00718 | 0.01793 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00797 | 0.00725 | 0.01796 |

**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 | 0.00439 | 0.00441 | 0.00439 |
| | (!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) | 0.03010 | 0.02962 | 0.04122 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01302 | 0.01280 | 0.02465 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01318 | 0.01287 | 0.02467 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01296 | 0.01274 | 0.02460 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00439 | 0.00441 | 0.00439 |
| | (!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) | 0.03009 | 0.02961 | 0.04119 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01301 | 0.01278 | 0.02464 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01317 | 0.01286 | 0.02466 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01295 | 0.01273 | 0.02459 |

**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) | 0.00406 | 0.00386 | 0.02833 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01656 | 0.01593 | 0.04027 |
| 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) | 0.00406 | 0.00386 | 0.02834 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01656 | 0.01593 | 0.04027 |

**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) | 0.01254 | 0.01334 | 0.04127 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02657 | 0.02665 | 0.05413 |
| 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) | 0.01253 | 0.01333 | 0.04125 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02656 | 0.02664 | 0.05412 |

**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) | -0.00990 | -0.00989 | -0.00998 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00924 | -0.01018 | -0.01023 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00933 | -0.00982 | -0.00984 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00685 | 0.00615 | 0.01824 |
| 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) | -0.00990 | -0.00989 | -0.00998 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00922 | -0.01017 | -0.01021 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00932 | -0.00981 | -0.00983 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00685 | 0.00616 | 0.01825 |

**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) | 0.00998 | 0.01006 | 0.01002 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.01019 | 0.01027 | 0.01026 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00983 | 0.00990 | 0.00988 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.02069 | 0.02019 | 0.03151 |
| 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) | 0.00998 | 0.01006 | 0.01002 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.01017 | 0.01025 | 0.01024 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00982 | 0.00989 | 0.00987 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.02068 | 0.02016 | 0.03150 |

**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) | -0.00096 | -0.00137 | 0.02292 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00848 | 0.00708 | 0.03195 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00827 | 0.00687 | 0.03184 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00126 | -0.00186 | 0.02233 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00562 | 0.00443 | 0.05155 |
| sky130_osu_sc_18T_ms__dffsr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00096 | -0.00137 | 0.02292 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00847 | 0.00707 | 0.03194 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00826 | 0.00687 | 0.03183 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00126 | -0.00186 | 0.02233 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00562 | 0.00442 | 0.05155 |

**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)** | 0.04473 | 0.04421 | 0.07372 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01831 | 0.01917 | 0.04670 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.03122 | 0.03135 | 0.05829 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.03130 | 0.03124 | 0.05822 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.04301 | 0.04380 | 0.09225 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.02068 | 0.02137 | 0.04828 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.02434 | 0.02571 | 0.07743 |
| **sky130_osu_sc_18T_ms__dffsr_l** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.04473 | 0.04421 | 0.07372 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01831 | 0.01917 | 0.04670 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.03122 | 0.03135 | 0.05829 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.03130 | 0.03124 | 0.05822 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.04300 | 0.04379 | 0.09224 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.02068 | 0.02137 | 0.04828 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.02433 | 0.02569 | 0.07742 |

# SKY130_OSU_SC_18T_MS__DFFSx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00536 | 0.00914 | 0.01553 | 2.63212 | 2.62887 |
| sky130_osu_sc_18T_ms__dffs_l | 0.00536 | 0.00914 | 0.01553 | 1.86706 | 1.87872 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffs_1 | 0.00000 | 0.55727 | 0.84066 |
| sky130_osu_sc_18T_ms__dffs_l | 0.00000 | 0.49900 | 0.78239 |

# 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) | 0.22963 | 1.37737 | 17.17530 |
| | QN->Q (FR) | 0.03297 | 0.83763 | 12.40260 |
| | SN->Q (FR) | 0.17461 | 1.45478 | 18.16680 |
| sky130_osu_sc_18T_ms__dffs_l | CK->Q (RR) | 0.23044 | 1.49539 | 16.78860 |
| | QN->Q (FR) | 0.03533 | 0.88631 | 12.11880 |
| | SN->Q (FR) | 0.17496 | 1.56369 | 17.75930 |

**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) | 0.33754 | 1.54274 | 18.01930 |
| | QN->Q (RF) | 0.03007 | 0.78884 | 11.66060 |
| sky130_osu_sc_18T_ms__dffs_l | CK->Q (RF) | 0.34023 | 1.67211 | 17.70560 |
| | QN->Q (RF) | 0.03094 | 0.79504 | 10.90030 |

**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) | 0.29775 | 0.85919 | 7.19765 |
| sky130_osu_sc_18T_ms__dffs_l | CK->QN (RR) | 0.29655 | 0.91492 | 7.25166 |

**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) | 0.18912 | 0.69377 | 6.35790 |
| | SN->QN (FF) | 0.13384 | 0.77040 | 7.34729 |
| sky130_osu_sc_18T_ms__dffs_l | CK->QN (RF) | 0.18522 | 0.72064 | 6.09444 |
| | SN->QN (FF) | 0.12936 | 0.78906 | 7.05936 |

# 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) | -0.05103 | -0.07668 | -0.17644 |
| | setup | CK (R) | 0.16373 | 0.21005 | 0.94200 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.05235 | -0.07599 | -0.17736 |
| | setup | CK (R) | 0.16297 | 0.21057 | 0.95126 |

**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) | -0.12234 | -0.37128 | -2.88563 |
| | setup | CK (R) | 0.16583 | 0.38677 | 2.98233 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.11925 | -0.37128 | -2.88451 |
| | setup | CK (R) | 0.16578 | 0.38677 | 2.98230 |

**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) | -0.05103 | -0.07668 | -0.17644 |
| | setup | CK (R) | 0.16373 | 0.21005 | 0.94200 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.05235 | -0.07599 | -0.17736 |
| | setup | CK (R) | 0.16297 | 0.21057 | 0.95126 |

**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) | -0.12234 | -0.37128 | -2.88563 |
| | setup | CK (R) | 0.16583 | 0.38677 | 2.98233 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.11925 | -0.37128 | -2.88451 |
| | setup | CK (R) | 0.16578 | 0.38677 | 2.98230 |

**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) | 0.04847 | 0.08626 | 3.01252 |
| | removal | CK (R) | -0.02019 | -0.06218 | -0.34647 |
| sky130_osu_sc_18T_ms__dffs_l | recovery | CK (R) | 0.04822 | 0.08612 | 2.91215 |
| | removal | CK (R) | -0.02019 | -0.06218 | -0.34647 |

**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) | 0.04847 | 0.08626 | 3.01252 |
| | removal | CK (R) | -0.02019 | -0.06218 | -0.34647 |
| sky130_osu_sc_18T_ms__dffs_l | recovery | CK (R) | 0.04822 | 0.08612 | 2.91215 |
| | removal | CK (R) | -0.02019 | -0.06218 | -0.34647 |

**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 () | 0.11528 | 0.52490 | 13.33370 |
| | min_pulse_width | SN () | 0.11922 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | SN () | 0.11528 | 0.52490 | 13.33370 |
| | min_pulse_width | SN () | 0.11134 | 0.52490 | 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 () | 0.09953 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.17042 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | CK () | 0.09559 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.16648 | 0.52490 | 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 () | 0.22950 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.14285 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | CK () | 0.22950 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.14285 | 0.52490 | 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 | 0.01287 | 0.00902 | 0.00000 |
| | SN | -0.00169 | -0.11279 | -1.85723 |
| | SN | 0.02794 | 0.02405 | -0.01733 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01144 | 0.00875 | -0.00291 |
| | SN | -0.00169 | -0.09179 | -1.31739 |
| | SN | 0.02652 | 0.02383 | 0.00722 |

**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 | 0.01443 | 0.01202 | 0.00000 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01301 | 0.01140 | 0.00680 |

**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 | 0.01442 | 0.01201 | 0.00000 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01300 | 0.01140 | 0.00641 |

**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 | 0.01281 | 0.00897 | 0.00000 |
| | SN | -0.00169 | -0.11270 | -1.85476 |
| | SN | 0.02790 | 0.02400 | -0.01733 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01139 | 0.00879 | -0.00314 |
| | SN | -0.00169 | -0.09213 | -1.32555 |
| | SN | 0.02647 | 0.02378 | 0.00739 |

**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 | -0.00435 | -0.00444 | -0.00444 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01517 | 0.01427 | 0.02530 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00689 | 0.00615 | 0.01703 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00435 | -0.00444 | -0.00443 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01517 | 0.01427 | 0.02530 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00689 | 0.00615 | 0.01703 |

**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 | 0.00444 | 0.00446 | 0.00444 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02550 | 0.02499 | 0.03702 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01250 | 0.01225 | 0.02435 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00444 | 0.00446 | 0.00443 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02550 | 0.02499 | 0.03702 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01250 | 0.01225 | 0.02435 |

**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) | -0.00738 | -0.00741 | -0.00742 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00530 | 0.00502 | 0.01832 |
| 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) | -0.00738 | -0.00740 | -0.00742 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00530 | 0.00502 | 0.01832 |

**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) | 0.00742 | 0.00751 | 0.00744 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01445 | 0.01428 | 0.03005 |
| 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) | 0.00742 | 0.00751 | 0.00744 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01445 | 0.01428 | 0.03005 |

**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) | -0.00098 | -0.00135 | 0.02294 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00138 | -0.00193 | 0.02224 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00452 | 0.00338 | 0.05113 |
| sky130_osu_sc_18T_ms__dffs_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00098 | -0.00135 | 0.02294 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00138 | -0.00193 | 0.02224 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00452 | 0.00338 | 0.05113 |

**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) | 0.03957 | 0.03902 | 0.06919 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01826 | 0.01913 | 0.04668 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03834 | 0.03920 | 0.08787 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.02075 | 0.02143 | 0.04837 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02372 | 0.02512 | 0.07734 |
| sky130_osu_sc_18T_ms__dffs_l | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.03957 | 0.03902 | 0.06919 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01826 | 0.01913 | 0.04668 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03834 | 0.03921 | 0.08787 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.02074 | 0.02143 | 0.04836 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02372 | 0.02511 | 0.07734 |

# SKY130_OSU_SC_18T_MS__DFFx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

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

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) | |
|---|---|---|---|---|
| | D | CK | Q | QN |
| sky130_osu_sc_18T_ms__dff_1 | 0.00551 | 0.01532 | 2.74780 | 2.73815 |
| sky130_osu_sc_18T_ms__dff_l | 0.00551 | 0.01532 | 1.85720 | 1.83558 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dff_1 | 0.00000 | 0.55885 | 0.71567 |
| sky130_osu_sc_18T_ms__dff_l | 0.00000 | 0.50058 | 0.65740 |

# 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) | 0.20466 | 1.33500 | 17.08600 |
| | QN->Q (FR) | 0.03126 | 0.81785 | 12.25410 |
| sky130_osu_sc_18T_ms__dff_l | CK->Q (RR) | 0.21256 | 1.48324 | 16.77430 |
| | QN->Q (FR) | 0.03601 | 0.89836 | 12.29410 |

**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) | 0.28440 | 1.46238 | 17.93780 |
| | QN->Q (RF) | 0.02753 | 0.74492 | 11.11610 |
| sky130_osu_sc_18T_ms__dff_l | CK->Q (RF) | 0.29522 | 1.62802 | 17.73460 |
| | QN->Q (RF) | 0.03100 | 0.79392 | 10.86720 |

**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) | 0.24863 | 0.79576 | 7.17797 |
| sky130_osu_sc_18T_ms__dff_l | CK->QN (RR) | 0.25324 | 0.86464 | 7.15138 |

**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) | 0.16697 | 0.66240 | 6.25374 |
| sky130_osu_sc_18T_ms__dff_l | CK->QN (RF) | 0.16791 | 0.69966 | 5.94148 |

# 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) | -0.04845 | -0.07573 | -0.19245 |
| | setup | CK (R) | 0.13975 | 0.18693 | 0.96719 |
| sky130_osu_sc_18T_ms__dff_l | hold | CK (R) | -0.04909 | -0.07589 | -0.19154 |
| | setup | CK (R) | 0.13972 | 0.18543 | 0.97080 |

**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) | -0.10919 | -0.37093 | -2.88485 |
| | setup | CK (R) | 0.13436 | 0.38191 | 2.98594 |
| sky130_osu_sc_18T_ms__dff_l | hold | CK (R) | -0.11217 | -0.37110 | -2.88983 |
| | setup | CK (R) | 0.13425 | 0.38191 | 2.98833 |

**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 () | 0.09165 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.15467 | 0.52490 | 13.33370 |
| sky130_osu_sc_18T_ms__dff_l | min_pulse_width | CK () | 0.09165 | 0.52490 | 13.33370 |
| | min_pulse_width | CK () | 0.15073 | 0.52490 | 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 ()** | 0.20193 | 0.52490 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.10740 | 0.52490 | 13.33370 |
| **sky130_osu_sc_18T_ms__dff_l** | **min_pulse_width** | **CK ()** | 0.20193 | 0.52490 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.10740 | 0.52490 | 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 | 0.01354 | 0.01081 | 0.00000 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01223 | 0.00953 | -0.00172 |

**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 | 0.01472 | 0.01263 | 0.00000 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01345 | 0.01171 | 0.00506 |

**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 | 0.01471 | 0.01263 | 0.00000 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01344 | 0.01173 | 0.00516 |

**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 | 0.01349 | 0.01080 | 0.00000 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01218 | 0.00952 | -0.00131 |

**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 | -0.00370 | -0.00433 | -0.00439 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01421 | 0.01345 | 0.02478 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00370 | -0.00433 | -0.00439 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01421 | 0.01346 | 0.02479 |

**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 | 0.00436 | 0.00442 | 0.00440 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02622 | 0.02577 | 0.03796 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00436 | 0.00442 | 0.00440 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02623 | 0.02578 | 0.03797 |

**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) | -0.00099 | -0.00134 | 0.02296 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00137 | -0.00196 | 0.02228 |
| sky130_osu_sc_18T_ms__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00099 | -0.00134 | 0.02296 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00137 | -0.00196 | 0.02228 |

**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) | 0.01820 | 0.01906 | 0.04663 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03868 | 0.03820 | 0.06865 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03889 | 0.03981 | 0.08881 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02066 | 0.02136 | 0.04829 |
| sky130_osu_sc_18T_ms__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01819 | 0.01906 | 0.04663 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03869 | 0.03821 | 0.06866 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03890 | 0.03981 | 0.08882 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02066 | 0.02136 | 0.04829 |

# SKY130_OSU_SC_18T_MS__INVx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

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

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| sky130_osu_sc_18T_ms__inv_1 | 0.00538 | 2.63888 |
| sky130_osu_sc_18T_ms__inv_10 | 0.05075 | 22.88553 |
| sky130_osu_sc_18T_ms__inv_2 | 0.01034 | 5.11196 |
| sky130_osu_sc_18T_ms__inv_3 | 0.01542 | 7.29744 |
| sky130_osu_sc_18T_ms__inv_4 | 0.02041 | 9.81824 |
| sky130_osu_sc_18T_ms__inv_6 | 0.03061 | 14.40922 |
| sky130_osu_sc_18T_ms__inv_8 | 0.04069 | 18.83664 |
| sky130_osu_sc_18T_ms__inv_l | 0.00416 | 1.77084 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__inv_1 | 0.00000 | 0.08947 | 0.17840 |
| sky130_osu_sc_18T_ms__inv_10 | 0.00000 | 0.89465 | 1.78399 |
| sky130_osu_sc_18T_ms__inv_2 | 0.00000 | 0.17893 | 0.35680 |
| sky130_osu_sc_18T_ms__inv_3 | 0.00000 | 0.26840 | 0.53520 |
| sky130_osu_sc_18T_ms__inv_4 | 0.00000 | 0.35786 | 0.71359 |
| sky130_osu_sc_18T_ms__inv_6 | 0.00000 | 0.53679 | 1.07039 |
| sky130_osu_sc_18T_ms__inv_8 | 0.00000 | 0.71572 | 1.42719 |
| sky130_osu_sc_18T_ms__inv_l | 0.00000 | 0.06033 | 0.12045 |

# 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)** | 0.02950 | 0.75067 | 11.07320 |
| **sky130_osu_sc_18T_ms__inv_10** | **A->Y (FR)** | 0.04677 | 0.52355 | 10.94740 |
| **sky130_osu_sc_18T_ms__inv_2** | **A->Y (FR)** | 0.02480 | 0.65136 | 10.95820 |
| **sky130_osu_sc_18T_ms__inv_3** | **A->Y (FR)** | 0.02778 | 0.61386 | 10.96160 |
| **sky130_osu_sc_18T_ms__inv_4** | **A->Y (FR)** | 0.02902 | 0.58535 | 10.94870 |
| **sky130_osu_sc_18T_ms__inv_6** | **A->Y (FR)** | 0.03342 | 0.55130 | 10.95030 |
| **sky130_osu_sc_18T_ms__inv_8** | **A->Y (FR)** | 0.03969 | 0.53129 | 10.92840 |
| **sky130_osu_sc_18T_ms__inv_l** | **A->Y (FR)** | 0.03341 | 0.81553 | 11.00590 |

**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)** | 0.02468 | 0.65605 | 9.72837 |
| **sky130_osu_sc_18T_ms__inv_10** | **A->Y (RF)** | 0.04168 | 0.43365 | 9.35549 |
| **sky130_osu_sc_18T_ms__inv_2** | **A->Y (RF)** | 0.02107 | 0.56854 | 9.59404 |
| **sky130_osu_sc_18T_ms__inv_3** | **A->Y (RF)** | 0.02326 | 0.53251 | 9.59168 |
| **sky130_osu_sc_18T_ms__inv_4** | **A->Y (RF)** | 0.02369 | 0.50086 | 9.58623 |
| **sky130_osu_sc_18T_ms__inv_6** | **A->Y (RF)** | 0.03003 | 0.47088 | 9.55358 |
| **sky130_osu_sc_18T_ms__inv_8** | **A->Y (RF)** | 0.03579 | 0.44968 | 9.49119 |
| **sky130_osu_sc_18T_ms__inv_l** | **A->Y (RF)** | 0.02759 | 0.69471 | 9.44017 |

# 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 | 0.00664 | 0.00703 | 0.01015 |
| sky130_osu_sc_18T_ms__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05778 | 0.06658 | 0.09842 |
| sky130_osu_sc_18T_ms__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01193 | 0.01322 | 0.01930 |
| sky130_osu_sc_18T_ms__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01826 | 0.02080 | 0.02949 |
| sky130_osu_sc_18T_ms__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02357 | 0.02627 | 0.03860 |
| sky130_osu_sc_18T_ms__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03493 | 0.03960 | 0.05811 |
| sky130_osu_sc_18T_ms__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04628 | 0.05463 | 0.07783 |
| sky130_osu_sc_18T_ms__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00515 | 0.00532 | 0.00727 |

**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 | -0.00152 | -0.00131 | -0.00046 |
| sky130_osu_sc_18T_ms__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.02352 | -0.02151 | -0.00978 |
| sky130_osu_sc_18T_ms__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00473 | -0.00400 | -0.00225 |
| sky130_osu_sc_18T_ms__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00636 | -0.00572 | -0.00247 |
| sky130_osu_sc_18T_ms__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00963 | -0.00846 | -0.00424 |
| sky130_osu_sc_18T_ms__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01469 | -0.01339 | -0.00608 |
| sky130_osu_sc_18T_ms__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01959 | -0.01776 | -0.00790 |
| sky130_osu_sc_18T_ms__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00108 | -0.00098 | -0.00026 |

# SKY130_OSU_SC_18T_MS__MUX2

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_18T_ms__mux2_1** | 18.31500 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | **A0** | **A1** | **S0** | **Y** |
| **sky130_osu_sc_18T_ms__mux2_1** | 0.55866 | 0.55905 | 0.01093 | 0.56965 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_18T_ms__mux2_1** | 0.00000 | 0.17945 | 0.18024 |

# 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) | - | 0.01736 | 0.33214 | 3.52240 |
| | A1->Y (RR) | - | 0.01841 | 0.33292 | 3.52633 |
| | S0->Y (RR) | (!A0 * A1) | 0.05232 | 0.32363 | 1.71376 |
| | S0->Y (FR) | (A0 * !A1) | 0.04351 | 0.42352 | 3.62899 |

**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) | - | 0.01508 | 0.32126 | 3.36470 |
| | A1->Y (FF) | - | 0.01488 | 0.31957 | 3.35573 |
| | S0->Y (FF) | (!A0 * A1) | 0.06617 | 0.38315 | 2.34695 |
| | S0->Y (RF) | (A0 * !A1) | 0.02939 | 0.36311 | 3.06115 |

# 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 | - | -0.00695 | -0.00696 | -0.00696 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | -0.00483 | -0.00485 | -0.00485 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00776 | 0.00879 | 0.03771 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | -0.00480 | -0.00495 | 0.02141 |

**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 | - | 0.00695 | 0.00696 | 0.00696 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | 0.00484 | 0.00485 | 0.00485 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00132 | 0.00125 | 0.02836 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | 0.01788 | 0.01869 | 0.04689 |

**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) | -0.00177 | -0.00176 | -0.00177 |

**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) | 0.00177 | 0.00176 | 0.00177 |

**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) | -0.00209 | -0.00209 | -0.00209 |

**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) | 0.00209 | 0.00209 | 0.00209 |

**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) | -0.00177 | -0.00189 | 0.02491 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | -0.00172 | -0.00189 | 0.02514 |

**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) | 0.01347 | 0.01451 | 0.04257 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | 0.01218 | 0.01338 | 0.04194 |

# SKY130_OSU_SC_18T_MS__NAND2x

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00540 | 0.00536 | 2.16503 |
| sky130_osu_sc_18T_ms__nand2_l | 0.00417 | 0.00414 | 1.50407 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__nand2_1 | 0.00000 | 0.08947 | 0.35680 |
| sky130_osu_sc_18T_ms__nand2_l | 0.00000 | 0.06035 | 0.24089 |

# 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) | 0.03005 | 0.70982 | 9.97699 |
| | B->Y (FR) | 0.03549 | 0.70780 | 9.87328 |
| sky130_osu_sc_18T_ms__nand2_l | A->Y (FR) | 0.03388 | 0.77769 | 10.09150 |
| | B->Y (FR) | 0.04044 | 0.78040 | 10.04950 |

**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) | 0.03491 | 0.77191 | 10.99000 |
| | B->Y (RF) | 0.03998 | 0.75792 | 10.66980 |
| sky130_osu_sc_18T_ms__nand2_l | A->Y (RF) | 0.03963 | 0.84054 | 10.93590 |
| | B->Y (RF) | 0.04451 | 0.82922 | 10.60640 |

# 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 | 0.00706 | 0.00680 | 0.01077 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00894 | 0.00853 | 0.01259 |
| sky130_osu_sc_18T_ms__nand2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00543 | 0.00560 | 0.00778 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00681 | 0.00691 | 0.00909 |

**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 | -0.00104 | -0.00101 | -0.00007 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00097 | -0.00108 | -0.00040 |
| sky130_osu_sc_18T_ms__nand2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00079 | -0.00079 | -0.00004 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00075 | -0.00083 | -0.00030 |

**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) | -0.00491 | -0.00494 | -0.00495 |
| sky130_osu_sc_18T_ms__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00360 | -0.00362 | -0.00363 |

**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) | 0.00494 | 0.00498 | 0.00496 |
| sky130_osu_sc_18T_ms__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00362 | 0.00365 | 0.00364 |

**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) | -0.00458 | -0.00459 | -0.00459 |
| sky130_osu_sc_18T_ms__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00335 | -0.00338 | -0.00336 |

**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) | 0.00461 | 0.00464 | 0.00460 |
| sky130_osu_sc_18T_ms__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00338 | 0.00340 | 0.00337 |

# SKY130_OSU_SC_18T_MS__NOR2x

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00540 | 0.00570 | 1.35777 |
| sky130_osu_sc_18T_ms__nor2_l | 0.00409 | 0.00443 | 0.92855 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__nor2_1 | 0.00000 | 0.06156 | 0.17840 |
| sky130_osu_sc_18T_ms__nor2_l | 0.00000 | 0.04414 | 0.12045 |

# 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) | 0.06081 | 0.88185 | 10.81500 |
| | B->Y (FR) | 0.04581 | 0.85493 | 10.73830 |
| sky130_osu_sc_18T_ms__nor2_l | A->Y (FR) | 0.06805 | 0.96531 | 10.73280 |
| | B->Y (FR) | 0.05481 | 0.95170 | 10.81100 |

**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) | 0.03349 | 0.55119 | 6.87449 |
| | B->Y (RF) | 0.02625 | 0.54230 | 6.85405 |
| sky130_osu_sc_18T_ms__nor2_l | A->Y (RF) | 0.03596 | 0.58399 | 6.74753 |
| | B->Y (RF) | 0.02921 | 0.57591 | 6.73009 |

# 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 | 0.00963 | 0.00955 | 0.01103 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00725 | 0.00703 | 0.01201 |
| sky130_osu_sc_18T_ms__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00706 | 0.00700 | 0.00804 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00554 | 0.00564 | 0.00842 |

**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 | 0.00105 | 0.00085 | 0.00211 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00119 | -0.00116 | 0.00020 |
| sky130_osu_sc_18T_ms__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00069 | 0.00055 | 0.00162 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00080 | -0.00075 | 0.00031 |

**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) | -0.00372 | -0.00437 | -0.00442 |
| sky130_osu_sc_18T_ms__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00269 | -0.00314 | -0.00315 |

**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) | 0.00438 | 0.00442 | 0.00442 |
| sky130_osu_sc_18T_ms__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00313 | 0.00315 | 0.00315 |

**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) | -0.00213 | -0.00215 | -0.00214 |
| sky130_osu_sc_18T_ms__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00159 | -0.00160 | -0.00159 |

**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) | 0.00225 | 0.00226 | 0.00218 |
| sky130_osu_sc_18T_ms__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00166 | 0.00168 | 0.00162 |

# SKY130_OSU_SC_18T_MS__OAI21

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00544 | 0.00550 | 0.00462 | 1.34224 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__oai21_l | 0.00000 | 0.07614 | 0.29885 |

# 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) | 0.06157 | 0.87038 | 10.74640 |
| | A1->Y (FR) | 0.08059 | 0.90373 | 10.82430 |
| | B0->Y (FR) | 0.04155 | 0.74946 | 9.40707 |

**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) | 0.05008 | 0.68315 | 8.33254 |
| | A1->Y (RF) | 0.06023 | 0.67750 | 8.11930 |
| | B0->Y (RF) | 0.03868 | 0.70333 | 8.89293 |

# 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 | 0.00991 | 0.00936 | 0.01399 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.01230 | 0.01214 | 0.01351 |
| | B0 | 0.00834 | 0.00850 | 0.01131 |

**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 | 0.00027 | 0.00007 | 0.00090 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00246 | 0.00208 | 0.00286 |
| | B0 | 0.00084 | 0.00079 | 0.00192 |

**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) | -0.00214 | -0.00215 | -0.00215 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | -0.00435 | -0.00443 | -0.00442 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00450 | -0.00451 | -0.00450 |

**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) | 0.00225 | 0.00227 | 0.00218 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | 0.00439 | 0.00443 | 0.00442 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00450 | 0.00454 | 0.00451 |

**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) | -0.00366 | -0.00434 | -0.00435 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | -0.00430 | -0.00441 | -0.00439 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00444 | -0.00447 | -0.00446 |

**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) | 0.00431 | 0.00436 | 0.00435 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | 0.00437 | 0.00441 | 0.00439 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00445 | 0.00451 | 0.00447 |

**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) | -0.00366 | -0.00369 | -0.00373 |

**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) | 0.00373 | 0.00376 | 0.00375 |

# SKY130_OSU_SC_18T_MS__OAI22

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__oai22_1 | 15.38460 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_18T_ms__oai22_1 | 0.00528 | 0.00555 | 0.00570 | 0.00558 | 1.33733 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__oai22_1 | 0.00000 | 0.09232 | 0.35680 |

# 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) | 0.08751 | 0.90711 | 10.76110 |
| | A1->Y (FR) | 0.07247 | 0.88013 | 10.68840 |
| | B0->Y (FR) | 0.05169 | 0.85740 | 10.68420 |
| | B1->Y (FR) | 0.06715 | 0.88628 | 10.76110 |

**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) | 0.08712 | 0.73734 | 8.49441 |
| | A1->Y (RF) | 0.06889 | 0.70841 | 8.36832 |
| | B0->Y (RF) | 0.05765 | 0.72729 | 8.90235 |
| | B1->Y (RF) | 0.07731 | 0.76945 | 9.16694 |

# 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 | 0.01603 | 0.01588 | 0.01718 |
| | A1 | 0.01362 | 0.01336 | 0.01755 |
| | B0 | 0.01016 | 0.01002 | 0.01423 |
| | B1 | 0.01267 | 0.01254 | 0.01389 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | A0 | 0.00408 | 0.00371 | 0.00443 |
| | A1 | -0.00045 | -0.00063 | 0.00019 |
| | B0 | -0.00052 | -0.00040 | 0.00071 |
| | B1 | 0.00411 | 0.00379 | 0.00487 |

**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) | -0.00371 | -0.00436 | -0.00442 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | -0.00371 | -0.00436 | -0.00442 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | -0.00432 | -0.00440 | -0.00440 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | -0.00446 | -0.00449 | -0.00447 |

**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) | 0.00439 | 0.00442 | 0.00442 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | 0.00439 | 0.00442 | 0.00442 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | 0.00437 | 0.00440 | 0.00440 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | 0.00446 | 0.00451 | 0.00448 |

**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) | -0.00212 | -0.00214 | -0.00213 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | -0.00212 | -0.00214 | -0.00213 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | -0.00430 | -0.00440 | -0.00437 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | -0.00444 | -0.00447 | -0.00446 |

**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 | 0.00217 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | 0.00223 | 0.00225 | 0.00217 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | 0.00435 | 0.00442 | 0.00437 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | 0.00445 | 0.00449 | 0.00447 |

**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) | -0.00211 | -0.00213 | -0.00212 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | -0.00211 | -0.00213 | -0.00212 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | -0.00478 | -0.00486 | -0.00483 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | -0.00480 | -0.00481 | -0.00490 |

**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) | 0.00223 | 0.00224 | 0.00215 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | 0.00222 | 0.00224 | 0.00215 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | 0.00482 | 0.00487 | 0.00483 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | 0.00491 | 0.00495 | 0.00493 |

**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) | -0.00368 | -0.00431 | -0.00436 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | -0.00368 | -0.00431 | -0.00436 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | -0.00484 | -0.00492 | -0.00491 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | -0.00487 | -0.00490 | -0.00497 |

**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) | 0.00433 | 0.00436 | 0.00436 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | 0.00433 | 0.00437 | 0.00436 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | 0.00490 | 0.00492 | 0.00491 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | 0.00497 | 0.00501 | 0.00499 |

# SKY130_OSU_SC_18T_MS__OR2x

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__or2_1 | 12.45420 |
| sky130_osu_sc_18T_ms__or2_2 | 15.38460 |
| sky130_osu_sc_18T_ms__or2_4 | 21.24540 |
| sky130_osu_sc_18T_ms__or2_8 | 32.96700 |
| sky130_osu_sc_18T_ms__or2_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_18T_ms__or2_1 | 0.00573 | 0.00552 | 2.67424 |
| sky130_osu_sc_18T_ms__or2_2 | 0.00573 | 0.00552 | 5.19178 |
| sky130_osu_sc_18T_ms__or2_4 | 0.00573 | 0.00553 | 9.87348 |
| sky130_osu_sc_18T_ms__or2_8 | 0.00573 | 0.00555 | 18.69060 |
| sky130_osu_sc_18T_ms__or2_l | 0.00450 | 0.00425 | 1.83084 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__or2_1** | 0.00000 | 0.10656 | 0.17946 |
| **sky130_osu_sc_18T_ms__or2_2** | 0.00000 | 0.15156 | 0.35786 |
| **sky130_osu_sc_18T_ms__or2_4** | 0.00000 | 0.24155 | 0.71466 |
| **sky130_osu_sc_18T_ms__or2_8** | 0.00000 | 0.42155 | 1.42825 |
| **sky130_osu_sc_18T_ms__or2_l** | 0.00000 | 0.07441 | 0.12087 |

# 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) | 0.07256 | 0.62456 | 6.96280 |
| | B->Y (RR) | 0.06315 | 0.58693 | 6.91830 |
| sky130_osu_sc_18T_ms__or2_2 | A->Y (RR) | 0.08067 | 0.56949 | 7.05718 |
| | B->Y (RR) | 0.07098 | 0.53918 | 7.00125 |
| sky130_osu_sc_18T_ms__or2_4 | A->Y (RR) | 0.10522 | 0.57341 | 7.33832 |
| | B->Y (RR) | 0.09532 | 0.55074 | 7.27228 |
| sky130_osu_sc_18T_ms__or2_8 | A->Y (RR) | 0.15080 | 0.63328 | 7.80605 |
| | B->Y (RR) | 0.14068 | 0.61529 | 7.74455 |
| sky130_osu_sc_18T_ms__or2_l | A->Y (RR) | 0.08020 | 0.69842 | 7.00295 |
| | B->Y (RR) | 0.07105 | 0.66394 | 6.94232 |

**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) | 0.11591 | 0.69717 | 7.15881 |
| | B->Y (FF) | 0.09582 | 0.65335 | 7.01498 |
| sky130_osu_sc_18T_ms__or2_2 | A->Y (FF) | 0.13810 | 0.67195 | 7.27827 |
| | B->Y (FF) | 0.11818 | 0.63767 | 7.09197 |
| sky130_osu_sc_18T_ms__or2_4 | A->Y (FF) | 0.19335 | 0.71960 | 7.58449 |
| | B->Y (FF) | 0.17353 | 0.69608 | 7.37147 |
| sky130_osu_sc_18T_ms__or2_8 | A->Y (FF) | 0.30623 | 0.84174 | 7.93870 |
| | B->Y (FF) | 0.28647 | 0.82305 | 7.73078 |
| sky130_osu_sc_18T_ms__or2_l | A->Y (FF) | 0.12811 | 0.75287 | 7.00030 |
| | B->Y (FF) | 0.10828 | 0.71817 | 6.89887 |

# 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 | 0.00738 | 0.00673 | 0.01792 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00530 | 0.00517 | 0.02258 |
| sky130_osu_sc_18T_ms__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01270 | 0.01240 | 0.02389 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01055 | 0.01078 | 0.02718 |
| sky130_osu_sc_18T_ms__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02416 | 0.02480 | 0.03644 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02200 | 0.02321 | 0.03941 |
| sky130_osu_sc_18T_ms__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04765 | 0.04874 | 0.06366 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04543 | 0.04795 | 0.06569 |
| sky130_osu_sc_18T_ms__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00547 | 0.00493 | 0.01336 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00409 | 0.00397 | 0.01632 |

**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 | 0.01553 | 0.01547 | 0.02624 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01284 | 0.01403 | 0.03847 |
| sky130_osu_sc_18T_ms__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01898 | 0.01963 | 0.03008 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01628 | 0.01810 | 0.04139 |
| sky130_osu_sc_18T_ms__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02789 | 0.02937 | 0.03952 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02539 | 0.02759 | 0.04966 |
| sky130_osu_sc_18T_ms__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04815 | 0.04827 | 0.05880 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04542 | 0.04616 | 0.06770 |
| sky130_osu_sc_18T_ms__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01183 | 0.01169 | 0.01930 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00996 | 0.01076 | 0.02664 |

**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) | -0.00374 | -0.00439 | -0.00444 |
| sky130_osu_sc_18T_ms__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00374 | -0.00439 | -0.00444 |
| sky130_osu_sc_18T_ms__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00374 | -0.00439 | -0.00444 |
| sky130_osu_sc_18T_ms__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00374 | -0.00439 | -0.00444 |
| sky130_osu_sc_18T_ms__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00271 | -0.00317 | -0.00316 |

**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) | 0.00440 | 0.00444 | 0.00444 |
| sky130_osu_sc_18T_ms__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00440 | 0.00444 | 0.00444 |
| sky130_osu_sc_18T_ms__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00440 | 0.00444 | 0.00444 |
| sky130_osu_sc_18T_ms__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00440 | 0.00444 | 0.00444 |
| sky130_osu_sc_18T_ms__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00313 | 0.00317 | 0.00316 |

**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) | -0.00214 | -0.00216 | -0.00215 |
| sky130_osu_sc_18T_ms__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00214 | -0.00216 | -0.00215 |
| sky130_osu_sc_18T_ms__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00214 | -0.00216 | -0.00215 |
| sky130_osu_sc_18T_ms__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00214 | -0.00216 | -0.00215 |
| sky130_osu_sc_18T_ms__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00161 | -0.00162 | -0.00162 |

**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) | 0.00228 | 0.00228 | 0.00219 |
| sky130_osu_sc_18T_ms__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00228 | 0.00228 | 0.00219 |
| sky130_osu_sc_18T_ms__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00228 | 0.00228 | 0.00219 |
| sky130_osu_sc_18T_ms__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00228 | 0.00228 | 0.00219 |
| sky130_osu_sc_18T_ms__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00171 | 0.00171 | 0.00164 |

# SKY130_OSU_SC_18T_MS__TBUFIx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__tbufi_1 | 12.45420 |
| sky130_osu_sc_18T_ms__tbufi_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_18T_ms__tbufi_1 | 0.00570 | 0.00722 | 1.35694 |
| sky130_osu_sc_18T_ms__tbufi_l | 0.00444 | 0.00564 | 0.92627 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__tbufi_1 | 0.00000 | 0.08982 | 0.35680 |
| sky130_osu_sc_18T_ms__tbufi_l | 0.00000 | 0.06049 | 0.24090 |

# 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) | 0.04382 | 0.85059 | 10.72720 |
| | OE->Y (FR) | 0.04884 | 0.36657 | 4.86252 |
| | OE->Y (RR) | 0.08300 | 0.71271 | 6.99262 |
| sky130_osu_sc_18T_ms__tbufi_l | A->Y (FR) | 0.05268 | 0.95067 | 10.80750 |
| | OE->Y (FR) | 0.05254 | 0.36636 | 4.86227 |
| | OE->Y (RR) | 0.09193 | 0.80925 | 6.99484 |

**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) | 0.03406 | 0.65552 | 8.32592 |
| | OE->Y (FF) | 0.04937 | 0.36656 | 4.86240 |
| | OE->Y (RF) | 0.03306 | 0.63645 | 7.95894 |
| sky130_osu_sc_18T_ms__tbufi_l | A->Y (RF) | 0.03914 | 0.70342 | 8.20287 |
| | OE->Y (FF) | 0.05324 | 0.36636 | 4.86226 |
| | OE->Y (RF) | 0.03854 | 0.68587 | 7.82113 |

# 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 | 0.00677 | 0.00668 | 0.01110 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00682 | 0.00678 | 0.02965 |
| sky130_osu_sc_18T_ms__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00520 | 0.00532 | 0.00782 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00490 | 0.00484 | 0.02061 |

**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 | -0.00121 | -0.00101 | 0.00008 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00455 | 0.00449 | 0.03166 |
| sky130_osu_sc_18T_ms__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00080 | -0.00071 | 0.00020 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00320 | 0.00311 | 0.02096 |

**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) | -0.00348 | -0.00354 | -0.00349 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00306 | -0.00310 | -0.00307 |
| sky130_osu_sc_18T_ms__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00267 | -0.00269 | -0.00268 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00239 | -0.00242 | -0.00240 |

**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) | 0.00348 | 0.00354 | 0.00349 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00315 | 0.00317 | 0.00312 |
| sky130_osu_sc_18T_ms__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00267 | 0.00269 | 0.00268 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00245 | 0.00247 | 0.00243 |

**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) | 0.00268 | 0.00275 | 0.03029 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00237 | 0.00265 | 0.02990 |
| sky130_osu_sc_18T_ms__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00185 | 0.00186 | 0.01997 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00163 | 0.00180 | 0.01971 |

**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) | 0.00790 | 0.00854 | 0.03720 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00787 | 0.00868 | 0.03731 |
| sky130_osu_sc_18T_ms__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00623 | 0.00648 | 0.02521 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00623 | 0.00660 | 0.02531 |

# SKY130_OSU_SC_18T_MS__TNBUFIx

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

## Truth Table

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

## Footprint

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

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_18T_ms__tnbufi_1 | 0.00569 | 0.00893 | 1.35599 |
| sky130_osu_sc_18T_ms__tnbufi_l | 0.00443 | 0.00672 | 0.92587 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__tnbufi_1 | 0.00000 | 0.14911 | 0.17893 |
| sky130_osu_sc_18T_ms__tnbufi_l | 0.00000 | 0.10057 | 0.12067 |

# 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) | 0.04415 | 0.85041 | 10.72250 |
| | OE->Y (RR) | 0.03074 | 0.36769 | 4.86358 |
| | OE->Y (FR) | 0.05748 | 0.87743 | 10.79680 |
| sky130_osu_sc_18T_ms__tnbufi_l | A->Y (FR) | 0.05314 | 0.95051 | 10.80450 |
| | OE->Y (RR) | 0.03250 | 0.36797 | 4.86386 |
| | OE->Y (FR) | 0.06469 | 0.96289 | 10.72850 |

**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) | 0.03359 | 0.65497 | 8.32283 |
| | OE->Y (RF) | 0.03058 | 0.36768 | 4.86359 |
| | OE->Y (FF) | 0.05804 | 0.55028 | 5.40995 |
| sky130_osu_sc_18T_ms__tnbufi_l | A->Y (RF) | 0.03857 | 0.70313 | 8.20076 |
| | OE->Y (RF) | 0.03228 | 0.36795 | 4.86385 |
| | OE->Y (FF) | 0.06619 | 0.61423 | 5.32430 |

# 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 | 0.00694 | 0.00684 | 0.01126 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01702 | 0.01843 | 0.04809 |
| sky130_osu_sc_18T_ms__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00537 | 0.00548 | 0.00798 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01273 | 0.01355 | 0.03298 |

**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 | -0.00143 | -0.00122 | -0.00012 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01503 | 0.01645 | 0.04324 |
| sky130_osu_sc_18T_ms__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00102 | -0.00091 | -0.00001 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01123 | 0.01205 | 0.02910 |

**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) | -0.00300 | -0.00305 | -0.00301 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00262 | -0.00265 | -0.00263 |
| sky130_osu_sc_18T_ms__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00222 | -0.00223 | -0.00222 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00196 | -0.00199 | -0.00197 |

**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) | 0.00300 | 0.00305 | 0.00301 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00269 | 0.00271 | 0.00267 |
| sky130_osu_sc_18T_ms__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00222 | 0.00223 | 0.00222 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00202 | 0.00203 | 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) | -0.00522 | -0.00566 | 0.02286 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00525 | -0.00537 | 0.02289 |
| sky130_osu_sc_18T_ms__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00372 | -0.00405 | 0.01466 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00373 | -0.00385 | 0.01470 |

**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) | 0.01287 | 0.01450 | 0.04390 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.01265 | 0.01425 | 0.04372 |
| sky130_osu_sc_18T_ms__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00967 | 0.01059 | 0.02990 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00952 | 0.01045 | 0.02977 |

# SKY130_OSU_SC_18T_MS__XNOR2

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.01126 | 0.01029 | 1.42657 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__xnor2_l | 0.00000 | 0.30099 | 0.53573 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__xnor2_l | A->Y (RR) | B | 0.10522 | 0.76694 | 7.38588 |
| | A->Y (FR) | !B | 0.05762 | 0.88232 | 11.02080 |
| | B->Y (RR) | A | 0.08378 | 0.74278 | 7.38411 |
| | B->Y (FR) | !A | 0.07980 | 0.91096 | 11.11370 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_18T_ms__xnor2_l | A->Y (FF) | B | 0.10189 | 0.66093 | 6.04939 |
| | A->Y (RF) | !B | 0.05020 | 0.67713 | 8.41411 |
| | B->Y (FF) | A | 0.08869 | 0.64940 | 6.05126 |
| | B->Y (RF) | !A | 0.06266 | 0.69217 | 8.41872 |

# 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 | 0.00672 | 0.00643 | 0.02858 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01669 | 0.01751 | 0.04987 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00216 | 0.00225 | 0.02909 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01849 | 0.01932 | 0.04846 |

**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 | 0.02087 | 0.02095 | 0.04864 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00446 | 0.00412 | 0.03101 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01879 | 0.02001 | 0.04868 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00599 | 0.00549 | 0.03230 |

# SKY130_OSU_SC_18T_MS__XOR2

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.01126 | 0.01034 | 1.40711 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__xor2_l | 0.00000 | 0.30099 | 0.48623 |

# 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 | 0.10042 | 0.74952 | 7.32606 |
| | A->Y (FR) | B | 0.07165 | 0.90234 | 11.09790 |
| | B->Y (RR) | !A | 0.08652 | 0.74231 | 7.34139 |
| | B->Y (FR) | A | 0.07797 | 0.90879 | 11.08130 |

**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 | 0.08845 | 0.63437 | 5.74166 |
| | A->Y (RF) | B | 0.04850 | 0.68932 | 8.50009 |
| | B->Y (FF) | !A | 0.08256 | 0.62828 | 5.79588 |
| | B->Y (RF) | A | 0.05832 | 0.67180 | 8.14653 |

# 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 | 0.01955 | 0.02059 | 0.05059 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00343 | 0.00233 | 0.02862 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.02017 | 0.02125 | 0.05086 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00190 | 0.00184 | 0.02893 |

**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 | 0.00399 | 0.00336 | 0.03133 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.02113 | 0.02226 | 0.04841 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00402 | 0.00346 | 0.03067 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01908 | 0.02048 | 0.04931 |

# SKY130_OSU_SC_18T_MS_x

*sky130_osu_sc_18T_ms_tt_1P68_25C.ccs*
*Cell Library: Process , Voltage 1.68,*
*Temp 25.00*

## Truth Table

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

## Footprint

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

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) |
|---|---|
| | A |
| **sky130_osu_sc_18T_ms__ant** | 0.76314 |
| **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 | 316518.00000 | 633036.00000 |
| **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 |
| | -0.00202 | 0.08466 | 1.09838 |

**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 |
| | 5.50725 | 5.20643 | 1.34050 |