# sky130_osu_sc_18T_ms_tt_1P80_150C.ccs Library

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

# SKY130_OSU_SC_18T_MS__ADDFx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.02238 | 0.02224 | 0.01693 | 2.98263 | 1.53030 | 3.05241 |
| sky130_osu_sc_18T_ms__addf_l | 0.02236 | 0.02222 | 0.01693 | 2.19174 | 1.53240 | 2.24725 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__addf_1** | 0.00000 | 324.33300 | 398.24100 |
| **sky130_osu_sc_18T_ms__addf_l** | 0.00000 | 274.62800 | 348.53500 |

# 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) | 0.15660 | 1.75203 | 26.97700 |
| | B->CO (RR) | 0.15691 | 1.71073 | 26.01610 |
| | CI->CO (RR) | 0.14918 | 1.79969 | 27.70130 |
| | CON->CO (FR) | 0.02424 | 0.61999 | 9.34149 |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (RR) | 0.15790 | 1.67399 | 22.97820 |
| | B->CO (RR) | 0.15833 | 1.64176 | 22.37840 |
| | CI->CO (RR) | 0.15049 | 1.72206 | 23.71950 |
| | CON->CO (FR) | 0.02679 | 0.68631 | 9.64231 |

**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) | 0.17175 | 1.89782 | 29.41880 |
| | B->CO (FF) | 0.15251 | 1.84499 | 28.69040 |
| | CI->CO (FF) | 0.14993 | 1.91678 | 29.93160 |
| | CON->CO (RF) | 0.02798 | 0.71402 | 10.87190 |
| sky130_osu_sc_18T_ms__addf_1 | A->CO (FF) | 0.16820 | 1.77421 | 24.46500 |
| | B->CO (FF) | 0.14926 | 1.73272 | 24.05010 |
| | CI->CO (FF) | 0.14634 | 1.79435 | 25.00600 |
| | CON->CO (RF) | 0.03020 | 0.76119 | 10.77830 |

**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) | 0.11753 | 0.75509 | 8.62593 |
| | B->CON (FR) | 0.10011 | 0.74740 | 8.77585 |
| | CI->CON (FR) | 0.09568 | 0.77717 | 9.21665 |
| sky130_osu_sc_18T_ms__addf_l | A->CON (FR) | 0.11170 | 0.74968 | 8.63118 |
| | B->CON (FR) | 0.09472 | 0.74248 | 8.77846 |
| | CI->CON (FR) | 0.08988 | 0.76928 | 9.21935 |

**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) | 0.11877 | 0.78454 | 9.02796 |
| | B->CON (RF) | 0.11958 | 0.79615 | 9.17662 |
| | CI->CON (RF) | 0.11133 | 0.83540 | 9.80009 |
| sky130_osu_sc_18T_ms__addf_l | A->CON (RF) | 0.11381 | 0.78008 | 9.03190 |
| | B->CON (RF) | 0.11499 | 0.79223 | 9.18006 |
| | CI->CON (RF) | 0.10636 | 0.83099 | 9.80419 |

**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) | 0.25136 | 1.70112 | 23.69070 |
| | B->S (-R) | 0.28082 | 1.71193 | 22.79100 |
| | CI->S (-R) | 0.22795 | 1.71711 | 24.20460 |
| | CON->S (RR) | 0.08222 | 0.61948 | 7.68500 |
| sky130_osu_sc_18T_ms__addf_l | A->S (-R) | 0.24116 | 1.58420 | 19.86080 |
| | B->S (-R) | 0.23518 | 1.56211 | 19.34510 |
| | CI->S (-R) | 0.21757 | 1.60104 | 20.39920 |
| | CON->S (RR) | 0.08179 | 0.65959 | 7.72269 |

**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) | 0.25396 | 1.73170 | 23.46360 |
| | B->S (-F) | 0.23571 | 1.64572 | 22.56900 |
| | CI->S (-F) | 0.24693 | 1.77867 | 24.20270 |
| | CON->S (FF) | 0.09609 | 0.65995 | 7.91667 |
| sky130_osu_sc_18T_ms__addf_l | A->S (-F) | 0.24182 | 1.62879 | 19.97830 |
| | B->S (-F) | 0.23510 | 1.56687 | 19.41780 |
| | CI->S (-F) | 0.23460 | 1.67598 | 20.72780 |
| | CON->S (FF) | 0.09362 | 0.70082 | 7.91852 |

# 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 | 0.00987 | 0.01561 | 0.12402 |
| | B | 0.01103 | 0.01613 | 0.11434 |
| | CI | 0.01305 | 0.01898 | 0.12706 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00741 | 0.01173 | 0.08515 |
| | B | 0.00865 | 0.01245 | 0.07940 |
| | CI | 0.01059 | 0.01508 | 0.08828 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.02549 | 0.03127 | 0.14902 |
| | B | 0.02572 | 0.03036 | 0.13623 |
| | CI | 0.02229 | 0.02858 | 0.14810 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.02285 | 0.02740 | 0.11114 |
| | B | 0.02315 | 0.02682 | 0.10239 |
| | CI | 0.01964 | 0.02470 | 0.11039 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.02312 | 0.02695 | 0.09358 |
| | B | 0.02296 | 0.02647 | 0.08884 |
| | CI | 0.01998 | 0.02430 | 0.09375 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.02133 | 0.02500 | 0.08829 |
| | B | 0.02119 | 0.02455 | 0.08369 |
| | CI | 0.01818 | 0.02221 | 0.08821 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.00802 | 0.01197 | 0.07365 |
| | B | 0.01044 | 0.01353 | 0.06919 |
| | CI | 0.01121 | 0.01535 | 0.07737 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00619 | 0.00974 | 0.06520 |
| | B | 0.00871 | 0.01141 | 0.06158 |
| | CI | 0.00938 | 0.01310 | 0.06884 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.02420 | 0.03008 | 0.14988 |
| | B | 0.00292 | 0.00659 | 0.09891 |
| | CI | 0.02100 | 0.02739 | 0.14880 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.00426 | 0.00408 | 0.12042 |
| | B | -0.00036 | 0.00362 | 0.10452 |
| | CI | 0.01227 | 0.01525 | 0.12132 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__addf_1 | A | 0.05400 | 0.05846 | 0.16445 |
| | B | 0.04586 | 0.05168 | 0.17069 |
| | CI | 0.04037 | 0.04506 | 0.14365 |
| sky130_osu_sc_18T_ms__addf_l | A | 0.05098 | 0.05563 | 0.16558 |
| | B | 0.04142 | 0.04780 | 0.16995 |
| | CI | 0.03741 | 0.04215 | 0.14474 |

# SKY130_OSU_SC_18T_MS__ADDHx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.01092 | 0.01193 | 3.11947 | 1.60897 | 3.14940 |
| sky130_osu_sc_18T_ms__addh_l | 0.01092 | 0.01193 | 1.92076 | 1.61029 | 1.96278 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__addh_1 | 0.00000 | 351.16800 | 398.60800 |
| sky130_osu_sc_18T_ms__addh_l | 0.00000 | 281.64200 | 342.92200 |

# 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) | 0.10132 | 0.65289 | 7.76978 |
| | B->CO (RR) | 0.10576 | 0.63492 | 7.80501 |
| sky130_osu_sc_18T_ms__addh_l | A->CO (RR) | 0.10072 | 0.71589 | 7.82463 |
| | B->CO (RR) | 0.10517 | 0.69882 | 7.78745 |

**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) | 0.08047 | 0.61162 | 7.75676 |
| | B->CO (FF) | 0.08638 | 0.62996 | 7.89748 |
| sky130_osu_sc_18T_ms__addh_l | A->CO (FF) | 0.08115 | 0.67830 | 7.57301 |
| | B->CO (FF) | 0.08685 | 0.69762 | 7.72328 |

**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 | 0.13651 | 0.55542 | 4.65919 |
| | A->CON (FR) | !B | 0.06328 | 0.72222 | 8.99132 |
| | B->CON (RR) | A | 0.13981 | 0.53693 | 4.68903 |
| | B->CON (FR) | !A | 0.08135 | 0.70845 | 8.58346 |
| sky130_osu_sc_18T_ms__addh_l | A->CON (RR) | B | 0.12245 | 0.53364 | 4.68262 |
| | A->CON (FR) | !B | 0.05638 | 0.71491 | 8.98854 |
| | B->CON (RR) | A | 0.12585 | 0.51646 | 4.65235 |
| | B->CON (FR) | !A | 0.07447 | 0.70164 | 8.58097 |

**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 | 0.13856 | 0.69001 | 6.48647 |
| | A->CON (RF) | !B | 0.06924 | 0.78895 | 9.83252 |
| | B->CON (FF) | A | 0.13246 | 0.72990 | 7.05237 |
| | B->CON (RF) | !A | 0.08495 | 0.77575 | 9.42715 |
| sky130_osu_sc_18T_ms__addh_l | A->CON (FF) | B | 0.12548 | 0.65688 | 6.30052 |
| | A->CON (RF) | !B | 0.06321 | 0.78250 | 9.82759 |
| | B->CON (FF) | A | 0.11954 | 0.69781 | 6.86337 |
| | B->CON (RF) | !A | 0.07901 | 0.76994 | 9.42625 |

**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 | 0.10579 | 1.76109 | 28.42530 |
| | A->S (FR) | B | 0.17606 | 1.65478 | 24.95690 |
| | B->S (RR) | !A | 0.12243 | 1.71743 | 27.29400 |
| | B->S (FR) | A | 0.16951 | 1.72601 | 26.24310 |
| | CON->S (FR) | - | 0.02708 | 0.65123 | 9.97172 |
| sky130_osu_sc_18T_ms__addh_l | A->S (RR) | !B | 0.10422 | 1.61333 | 22.05760 |
| | A->S (FR) | B | 0.16794 | 1.48229 | 18.41120 |
| | B->S (RR) | !A | 0.12140 | 1.58081 | 21.29730 |
| | B->S (FR) | A | 0.16108 | 1.54325 | 19.33190 |
| | CON->S (FR) | - | 0.03007 | 0.73473 | 10.06020 |

**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 | 0.10866 | 1.80628 | 29.38580 |
| | A->S (RF) | B | 0.17636 | 1.38537 | 19.82340 |
| | B->S (FF) | !A | 0.12676 | 1.79832 | 29.05240 |
| | B->S (RF) | A | 0.17969 | 1.36630 | 19.84580 |
| | CON->S (RF) | - | 0.02668 | 0.71069 | 10.96950 |
| sky130_osu_sc_18T_ms__addh_l | A->S (FF) | !B | 0.10526 | 1.64669 | 22.59170 |
| | A->S (RF) | B | 0.16516 | 1.30056 | 15.74120 |
| | B->S (FF) | !A | 0.12338 | 1.63616 | 22.20860 |
| | B->S (RF) | A | 0.16856 | 1.28311 | 15.69920 |
| | CON->S (RF) | - | 0.03040 | 0.78868 | 10.87320 |

# 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 | 0.01241 | 0.01454 | 0.05824 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01125 | 0.01325 | 0.06765 |
| sky130_osu_sc_18T_ms__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01025 | 0.01239 | 0.05847 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00908 | 0.01102 | 0.06396 |

**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 | 0.01686 | 0.02074 | 0.09676 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01778 | 0.02285 | 0.10596 |
| sky130_osu_sc_18T_ms__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01457 | 0.01761 | 0.07583 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01551 | 0.01950 | 0.08161 |

**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 | 0.01105 | 0.01320 | 0.05617 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01565 | 0.01833 | 0.05149 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00990 | 0.01191 | 0.06550 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01735 | 0.01911 | 0.04884 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00902 | 0.01115 | 0.05675 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01292 | 0.01511 | 0.04142 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00788 | 0.00982 | 0.06267 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01466 | 0.01599 | 0.03874 |

**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 | 0.01644 | 0.01989 | 0.08341 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00745 | 0.00993 | 0.04334 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01746 | 0.02197 | 0.09075 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00773 | 0.00994 | 0.04230 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01427 | 0.01726 | 0.07427 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00523 | 0.00680 | 0.02809 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01529 | 0.01921 | 0.08019 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00551 | 0.00682 | 0.02806 |

**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 | 0.01846 | 0.02237 | 0.09881 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01089 | 0.01402 | 0.06227 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01982 | 0.02496 | 0.10866 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01067 | 0.01338 | 0.05714 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01541 | 0.01845 | 0.07717 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00714 | 0.00877 | 0.03067 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01660 | 0.02060 | 0.08329 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00716 | 0.00850 | 0.02948 |

**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 | 0.01371 | 0.01589 | 0.06065 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01797 | 0.02081 | 0.06021 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01254 | 0.01461 | 0.06883 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01974 | 0.02193 | 0.05863 |
| sky130_osu_sc_18T_ms__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01087 | 0.01306 | 0.05884 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01375 | 0.01600 | 0.04149 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00969 | 0.01163 | 0.06453 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01553 | 0.01693 | 0.03924 |

# SKY130_OSU_SC_18T_MS__AND2x

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00587 | 0.00601 | 3.16328 |
| sky130_osu_sc_18T_ms__and2_2 | 0.00587 | 0.00601 | 6.09531 |
| sky130_osu_sc_18T_ms__and2_4 | 0.00588 | 0.00602 | 11.66609 |
| sky130_osu_sc_18T_ms__and2_6 | 0.00591 | 0.00601 | 17.12609 |
| sky130_osu_sc_18T_ms__and2_8 | 0.00590 | 0.00604 | 21.94160 |
| sky130_osu_sc_18T_ms__and2_l | 0.00452 | 0.00464 | 2.20273 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__and2_1** | 0.00000 | 166.10600 | 265.24200 |
| **sky130_osu_sc_18T_ms__and2_2** | 0.00000 | 265.33600 | 265.44700 |
| **sky130_osu_sc_18T_ms__and2_4** | 0.00000 | 464.17800 | 530.33900 |
| **sky130_osu_sc_18T_ms__and2_6** | 0.00000 | 663.01500 | 795.29400 |
| **sky130_osu_sc_18T_ms__and2_8** | 0.00000 | 861.82100 | 1060.22000 |
| **sky130_osu_sc_18T_ms__and2_l** | 0.00000 | 104.08300 | 166.18100 |

# 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) | 0.07756 | 0.59677 | 7.84710 |
| | B->Y (RR) | 0.08299 | 0.57635 | 7.49133 |
| sky130_osu_sc_18T_ms__and2_2 | A->Y (RR) | 0.09012 | 0.55874 | 7.85989 |
| | B->Y (RR) | 0.09565 | 0.53492 | 7.49316 |
| sky130_osu_sc_18T_ms__and2_4 | A->Y (RR) | 0.12497 | 0.58522 | 8.05095 |
| | B->Y (RR) | 0.13055 | 0.55441 | 7.68214 |
| sky130_osu_sc_18T_ms__and2_6 | A->Y (RR) | 0.16117 | 0.62849 | 8.21072 |
| | B->Y (RR) | 0.16667 | 0.59319 | 7.83435 |
| sky130_osu_sc_18T_ms__and2_8 | A->Y (RR) | 0.19683 | 0.67429 | 8.32699 |
| | B->Y (RR) | 0.20245 | 0.63479 | 7.93271 |
| sky130_osu_sc_18T_ms__and2_l | A->Y (RR) | 0.08500 | 0.64547 | 7.61065 |
| | B->Y (RR) | 0.09086 | 0.62545 | 7.27844 |

**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) | 0.06376 | 0.54463 | 7.30991 |
| | B->Y (FF) | 0.06672 | 0.55859 | 7.42013 |
| sky130_osu_sc_18T_ms__and2_2 | A->Y (FF) | 0.07072 | 0.48465 | 7.19301 |
| | B->Y (FF) | 0.07454 | 0.49896 | 7.32713 |
| sky130_osu_sc_18T_ms__and2_4 | A->Y (FF) | 0.09667 | 0.49256 | 7.31409 |
| | B->Y (FF) | 0.10061 | 0.50439 | 7.44637 |
| sky130_osu_sc_18T_ms__and2_6 | A->Y (FF) | 0.12573 | 0.52834 | 7.41551 |
| | B->Y (FF) | 0.12960 | 0.53814 | 7.54902 |
| sky130_osu_sc_18T_ms__and2_8 | A->Y (FF) | 0.15323 | 0.56202 | 7.30981 |
| | B->Y (FF) | 0.15726 | 0.57125 | 7.44407 |
| sky130_osu_sc_18T_ms__and2_l | A->Y (FF) | 0.06818 | 0.61472 | 7.28876 |
| | B->Y (FF) | 0.07186 | 0.63190 | 7.42709 |

# 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 | 0.01337 | 0.02130 | 0.17663 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01336 | 0.01900 | 0.14065 |
| sky130_osu_sc_18T_ms__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02077 | 0.02796 | 0.18366 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02080 | 0.02589 | 0.14616 |
| sky130_osu_sc_18T_ms__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03872 | 0.04390 | 0.19521 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03875 | 0.04198 | 0.15951 |
| sky130_osu_sc_18T_ms__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.06203 | 0.06256 | 0.20873 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.06215 | 0.05966 | 0.17417 |
| sky130_osu_sc_18T_ms__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.08881 | 0.08214 | 0.22489 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.08886 | 0.07826 | 0.18757 |
| sky130_osu_sc_18T_ms__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00897 | 0.01455 | 0.12397 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00902 | 0.01315 | 0.10203 |

**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 | 0.01959 | 0.03010 | 0.17336 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02162 | 0.03181 | 0.17174 |
| sky130_osu_sc_18T_ms__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02803 | 0.03833 | 0.18036 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03007 | 0.03972 | 0.17871 |
| sky130_osu_sc_18T_ms__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05018 | 0.05765 | 0.19600 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.05205 | 0.05888 | 0.19385 |
| sky130_osu_sc_18T_ms__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.07395 | 0.07772 | 0.21255 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.07569 | 0.07858 | 0.20940 |
| sky130_osu_sc_18T_ms__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.10220 | 0.09849 | 0.22922 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.10377 | 0.09833 | 0.22377 |
| sky130_osu_sc_18T_ms__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01461 | 0.02174 | 0.12003 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01614 | 0.02308 | 0.12010 |

**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) | -0.00513 | -0.00518 | -0.00520 |
| sky130_osu_sc_18T_ms__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00398 | -0.00403 | -0.00405 |
| sky130_osu_sc_18T_ms__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00168 | -0.00173 | -0.00175 |
| sky130_osu_sc_18T_ms__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00059 | 0.00054 | 0.00052 |
| sky130_osu_sc_18T_ms__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00292 | 0.00287 | 0.00285 |
| sky130_osu_sc_18T_ms__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00388 | -0.00391 | -0.00393 |

**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) | 0.00751 | 0.00756 | 0.00753 |
| sky130_osu_sc_18T_ms__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00867 | 0.00872 | 0.00869 |
| sky130_osu_sc_18T_ms__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.01098 | 0.01103 | 0.01100 |
| sky130_osu_sc_18T_ms__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.01332 | 0.01336 | 0.01334 |
| sky130_osu_sc_18T_ms__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.01560 | 0.01565 | 0.01562 |
| sky130_osu_sc_18T_ms__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00538 | 0.00541 | 0.00539 |

**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) | -0.00486 | -0.00487 | -0.00486 |
| sky130_osu_sc_18T_ms__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00371 | -0.00373 | -0.00371 |
| sky130_osu_sc_18T_ms__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00141 | -0.00144 | -0.00141 |
| sky130_osu_sc_18T_ms__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00089 | 0.00087 | 0.00089 |
| sky130_osu_sc_18T_ms__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00319 | 0.00317 | 0.00319 |
| sky130_osu_sc_18T_ms__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00368 | -0.00369 | -0.00368 |

**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) | 0.00733 | 0.00725 | 0.00720 |
| sky130_osu_sc_18T_ms__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00849 | 0.00840 | 0.00835 |
| sky130_osu_sc_18T_ms__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.01080 | 0.01071 | 0.01066 |
| sky130_osu_sc_18T_ms__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.01311 | 0.01302 | 0.01297 |
| sky130_osu_sc_18T_ms__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.01542 | 0.01533 | 0.01528 |
| sky130_osu_sc_18T_ms__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00524 | 0.00517 | 0.00514 |

# SKY130_OSU_SC_18T_MS__AOI21

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

## Truth Table

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

## Footprint

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

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_18T_ms__aoi21_l | 0.00565 | 0.00581 | 0.00561 | 1.50145 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__aoi21_l | 0.00000 | 69.44720 | 141.46900 |

# 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) | 0.06506 | 0.69833 | 8.49049 |
| | A1->Y (FR) | 0.05606 | 0.66781 | 8.19304 |
| | B0->Y (FR) | 0.04588 | 0.72310 | 9.07265 |

**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) | 0.06665 | 0.69649 | 8.41035 |
| | A1->Y (RF) | 0.06140 | 0.73611 | 9.02368 |
| | B0->Y (RF) | 0.03551 | 0.67427 | 8.55040 |

# 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 | 0.01505 | 0.01667 | 0.05093 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.01272 | 0.01437 | 0.04785 |
| | B0 | 0.00873 | 0.01246 | 0.05668 |

**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 | 0.00672 | 0.00751 | 0.03061 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00688 | 0.00816 | 0.03275 |
| | B0 | 0.00134 | 0.00335 | 0.02837 |

**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 | -0.00496 | -0.00458 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | -0.00456 | -0.00460 | -0.00457 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00572 | -0.00574 | -0.00572 |

**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) | 0.00691 | 0.00693 | 0.00675 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | 0.00687 | 0.00692 | 0.00689 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00588 | 0.00579 | 0.00575 |

**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) | -0.00381 | -0.00492 | -0.00452 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | -0.00450 | -0.00453 | -0.00451 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00603 | -0.00608 | -0.00610 |

**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) | 0.00685 | 0.00685 | 0.00670 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | 0.00680 | 0.00688 | 0.00683 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00609 | 0.00616 | 0.00612 |

**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) | -0.00218 | -0.00220 | -0.00211 |

**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) | 0.00396 | 0.00395 | 0.00338 |

# SKY130_OSU_SC_18T_MS__AOI22

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00565 | 0.00581 | 0.00597 | 0.00574 | 1.43043 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__aoi22_1 | 0.00000 | 77.89550 | 264.37800 |

# 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) | 0.08161 | 0.71432 | 8.36571 |
| | A1->Y (FR) | 0.07291 | 0.69388 | 8.20669 |
| | B0->Y (FR) | 0.04784 | 0.71335 | 8.80130 |
| | B1->Y (FR) | 0.05653 | 0.73921 | 9.04535 |

**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) | 0.08949 | 0.70761 | 8.17310 |
| | A1->Y (RF) | 0.08426 | 0.74499 | 8.78948 |
| | B0->Y (RF) | 0.04121 | 0.70188 | 8.75139 |
| | B1->Y (RF) | 0.04668 | 0.66151 | 8.13451 |

# 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 | 0.01878 | 0.02031 | 0.05648 |
| | A1 | 0.01647 | 0.01800 | 0.05332 |
| | B0 | 0.00946 | 0.01335 | 0.06072 |
| | B1 | 0.01177 | 0.01552 | 0.06291 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__aoi22_l | A0 | 0.01056 | 0.01125 | 0.03622 |
| | A1 | 0.01074 | 0.01187 | 0.03814 |
| | B0 | 0.00512 | 0.00682 | 0.03143 |
| | B1 | 0.00504 | 0.00627 | 0.02934 |

**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) | -0.00332 | -0.00456 | -0.00356 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | -0.00341 | -0.00343 | -0.00342 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | -0.00572 | -0.00574 | -0.00571 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00572 | -0.00574 | -0.00571 |

**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) | 0.00809 | 0.00811 | 0.00766 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | 0.00801 | 0.00806 | 0.00803 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | 0.00588 | 0.00579 | 0.00575 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00588 | 0.00579 | 0.00575 |

**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) | -0.00327 | -0.00452 | -0.00351 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | -0.00335 | -0.00339 | -0.00336 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | -0.00603 | -0.00603 | -0.00609 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00603 | -0.00603 | -0.00610 |

**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) | 0.00804 | 0.00805 | 0.00761 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | 0.00795 | 0.00803 | 0.00797 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | 0.00609 | 0.00615 | 0.00612 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00609 | 0.00615 | 0.00612 |

**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) | -0.00218 | -0.00220 | -0.00212 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | -0.00094 | -0.00096 | -0.00098 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | -0.00616 | -0.00620 | -0.00624 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | -0.00616 | -0.00621 | -0.00624 |

**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) | 0.00405 | 0.00405 | 0.00342 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | 0.00348 | 0.00351 | 0.00340 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | 0.00623 | 0.00633 | 0.00626 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | 0.00623 | 0.00633 | 0.00626 |

**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) | -0.00219 | -0.00221 | -0.00213 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | -0.00095 | -0.00098 | -0.00099 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00579 | -0.00580 | -0.00579 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | -0.00579 | -0.00581 | -0.00579 |

**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) | 0.00406 | 0.00406 | 0.00344 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | 0.00350 | 0.00351 | 0.00342 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00596 | 0.00587 | 0.00582 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | 0.00596 | 0.00587 | 0.00582 |

# SKY130_OSU_SC_18T_MS__BUFx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_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** | 0.00600 | 3.16064 |
| **sky130_osu_sc_18T_ms__buf_2** | 0.00601 | 6.12751 |
| **sky130_osu_sc_18T_ms__buf_4** | 0.00600 | 11.80118 |
| **sky130_osu_sc_18T_ms__buf_6** | 0.00097 | 1.80000 |
| **sky130_osu_sc_18T_ms__buf_8** | 0.00602 | 22.70400 |
| **sky130_osu_sc_18T_ms__buf_l** | 0.00468 | 2.21853 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__buf_1** | 0.00000 | 133.11000 | 133.12000 |
| **sky130_osu_sc_18T_ms__buf_2** | 0.00000 | 199.33500 | 265.37000 |
| **sky130_osu_sc_18T_ms__buf_4** | 0.00000 | 332.09700 | 530.32800 |
| **sky130_osu_sc_18T_ms__buf_6** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_18T_ms__buf_8** | 0.00000 | 597.60300 | 1060.21000 |
| **sky130_osu_sc_18T_ms__buf_l** | 0.00000 | 83.40140 | 83.40580 |

# 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)** | 0.05838 | 0.54312 | 7.33914 |
| **sky130_osu_sc_18T_ms__buf_2** | **A->Y (RR)** | 0.06545 | 0.49592 | 7.32459 |
| **sky130_osu_sc_18T_ms__buf_4** | **A->Y (RR)** | 0.08752 | 0.50568 | 7.50328 |
| **sky130_osu_sc_18T_ms__buf_8** | **A->Y (RR)** | 0.13269 | 0.57111 | 7.82364 |
| **sky130_osu_sc_18T_ms__buf_l** | **A->Y (RR)** | 0.06423 | 0.59027 | 7.13150 |

**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)** | 0.06066 | 0.54425 | 7.47334 |
| **sky130_osu_sc_18T_ms__buf_2** | **A->Y (FF)** | 0.06840 | 0.48794 | 7.44317 |
| **sky130_osu_sc_18T_ms__buf_4** | **A->Y (FF)** | 0.09440 | 0.49544 | 7.56754 |
| **sky130_osu_sc_18T_ms__buf_8** | **A->Y (FF)** | 0.15085 | 0.56658 | 7.71952 |
| **sky130_osu_sc_18T_ms__buf_l** | **A->Y (FF)** | 0.06583 | 0.61935 | 7.52629 |

# 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 | 0.00928 | 0.01726 | 0.15161 |
| sky130_osu_sc_18T_ms__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01611 | 0.02394 | 0.15765 |
| sky130_osu_sc_18T_ms__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03178 | 0.04017 | 0.17345 |
| sky130_osu_sc_18T_ms__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.07117 | 0.07618 | 0.20622 |
| sky130_osu_sc_18T_ms__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00652 | 0.01239 | 0.11270 |

**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 | 0.01889 | 0.03025 | 0.18107 |
| sky130_osu_sc_18T_ms__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02733 | 0.03842 | 0.18729 |
| sky130_osu_sc_18T_ms__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04930 | 0.05752 | 0.20259 |
| sky130_osu_sc_18T_ms__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.10192 | 0.09832 | 0.23302 |
| sky130_osu_sc_18T_ms__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01419 | 0.02196 | 0.12720 |

**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 |
| | -0.00082 | -0.00082 | -0.00079 |

**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 |
| | 0.00082 | 0.00082 | 0.00079 |

# SKY130_OSU_SC_18T_MS__DFFRx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_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** | 0.00581 | 0.00571 | 0.01642 | 2.92774 | 2.90447 |
| **sky130_osu_sc_18T_ms__dffr_l** | 0.00581 | 0.00571 | 0.01642 | 2.18634 | 2.17967 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_18T_ms__dffr_1** | 0.00000 | 439.55900 | 689.35400 |
| **sky130_osu_sc_18T_ms__dffr_l** | 0.00000 | 389.85400 | 639.65600 |

# 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) | 0.26547 | 1.38537 | 17.63090 |
| | QN->Q (FR) | 0.02817 | 0.70379 | 10.59730 |
| sky130_osu_sc_18T_ms__dffr_l | CK->Q (RR) | 0.26203 | 1.51975 | 18.03910 |
| | QN->Q (FR) | 0.02943 | 0.74623 | 10.50260 |

**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) | 0.27942 | 1.42089 | 18.24900 |
| | QN->Q (RF) | 0.03165 | 0.81593 | 12.34760 |
| | RN->Q (FF) | 0.21002 | 1.31189 | 17.54320 |
| sky130_osu_sc_18T_ms__dffr_l | CK->Q (RF) | 0.28149 | 1.55555 | 18.47400 |
| | QN->Q (RF) | 0.03269 | 0.84256 | 11.91950 |
| | RN->Q (FF) | 0.21260 | 1.44747 | 17.76660 |

**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) | 0.24172 | 0.73926 | 6.98970 |
| | RN->QN (FR) | 0.17226 | 0.63074 | 6.28370 |
| sky130_osu_sc_18T_ms__dffr_l | CK->QN (RR) | 0.24065 | 0.78446 | 7.09320 |
| | RN->QN (FR) | 0.17164 | 0.67621 | 6.38433 |

**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)** | 0.23343 | 0.80554 | 8.05304 |
| **sky130_osu_sc_18T_ms__dffr_l** | **CK->QN (RF)** | 0.22575 | 0.84862 | 8.14149 |

# 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) | -0.07766 | -0.07547 | 0.08144 |
| | setup | CK (R) | 0.21298 | 0.23303 | 0.23345 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.08050 | -0.07547 | 0.08139 |
| | setup | CK (R) | 0.21308 | 0.23386 | 0.23960 |

**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) | -0.10360 | -0.22667 | -1.77879 |
| | setup | CK (R) | 0.12921 | 0.24080 | 1.84618 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.10030 | -0.22727 | -1.77734 |
| | setup | CK (R) | 0.12921 | 0.24080 | 1.84618 |

**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) | -0.07766 | -0.07547 | 0.08144 |
| | setup | CK (R) | 0.21298 | 0.23303 | 0.23345 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.08050 | -0.07547 | 0.08139 |
| | setup | CK (R) | 0.21308 | 0.23386 | 0.23960 |

**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) | -0.10360 | -0.22667 | -1.77879 |
| | setup | CK (R) | 0.12921 | 0.24080 | 1.84618 |
| sky130_osu_sc_18T_ms__dffr_l | hold | CK (R) | -0.10030 | -0.22727 | -1.77734 |
| | setup | CK (R) | 0.12921 | 0.24080 | 1.84618 |

**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) | 0.16293 | 0.19964 | 0.73419 |
| | removal | CK (R) | -0.03366 | -0.04302 | -0.12430 |
| sky130_osu_sc_18T_ms__dffr_l | recovery | CK (R) | 0.16317 | 0.20025 | 0.73926 |
| | removal | CK (R) | -0.03366 | -0.04302 | -0.12430 |

**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) | 0.16293 | 0.19964 | 0.73419 |
| | removal | CK (R) | -0.03366 | -0.04302 | -0.12430 |
| sky130_osu_sc_18T_ms__dffr_l | recovery | CK (R) | 0.16317 | 0.20025 | 0.73926 |
| | removal | CK (R) | -0.03366 | -0.04302 | -0.12430 |

**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 () | 0.11729 | 0.54688 | 13.33370 |
| | min_pulse_width | RN () | 0.11934 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | RN () | 0.11525 | 0.54688 | 13.33370 |
| | min_pulse_width | RN () | 0.11525 | 0.54688 | 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 () | 0.12957 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.14389 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | CK () | 0.12343 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.13979 | 0.54688 | 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 () | 0.26458 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.10911 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffr_l | min_pulse_width | CK () | 0.26458 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.10706 | 0.54688 | 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 | 0.02573 | 0.02993 | 0.09728 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02301 | 0.02862 | 0.12346 |

**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 | 0.02794 | 0.02885 | 0.06787 |
| | RN | -0.00194 | -0.13817 | -2.37125 |
| | RN | 0.04720 | 0.04951 | 0.09250 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02524 | 0.02759 | 0.09411 |
| | RN | -0.00194 | -0.11596 | -1.77082 |
| | RN | 0.04447 | 0.04820 | 0.11896 |

**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 | 0.02519 | 0.02612 | 0.06504 |
| | RN | -0.00194 | -0.13751 | -2.34479 |
| | RN | 0.04576 | 0.04808 | 0.09134 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02281 | 0.02516 | 0.09162 |
| | RN | -0.00194 | -0.11575 | -1.76123 |
| | RN | 0.04332 | 0.04705 | 0.11740 |

**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 | 0.02357 | 0.02782 | 0.09574 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02102 | 0.02661 | 0.12111 |

**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 | 0.00073 | -0.00024 | 0.00029 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02460 | 0.02899 | 0.15602 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01262 | 0.01704 | 0.13843 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00030 | -0.00068 | -0.00014 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02417 | 0.02856 | 0.15559 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01219 | 0.01661 | 0.13800 |

**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 | 0.01172 | 0.01169 | 0.01153 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.03846 | 0.04424 | 0.17284 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01762 | 0.02336 | 0.14866 |
| sky130_osu_sc_18T_ms__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01129 | 0.01126 | 0.01110 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.03803 | 0.04381 | 0.17240 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.01719 | 0.02292 | 0.14822 |

**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) | 0.01045 | 0.01933 | 0.19819 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02100 | 0.02998 | 0.21741 |
| 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) | 0.01001 | 0.01889 | 0.19776 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02057 | 0.02955 | 0.21698 |

**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) | 0.01708 | 0.02871 | 0.21004 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.03556 | 0.04654 | 0.23408 |
| 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) | 0.01665 | 0.02828 | 0.20960 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.03513 | 0.04610 | 0.23365 |

**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) | 0.00350 | 0.01203 | 0.19013 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.01234 | 0.02059 | 0.21168 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.00260 | 0.01111 | 0.18839 |
| sky130_osu_sc_18T_ms__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.00306 | 0.01160 | 0.18970 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.01191 | 0.02016 | 0.21124 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.00216 | 0.01068 | 0.18795 |

**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) | 0.02518 | 0.03690 | 0.21731 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.05380 | 0.06358 | 0.28816 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.04200 | 0.05205 | 0.23998 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.05276 | 0.07321 | 0.36007 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02914 | 0.04032 | 0.21965 |
| sky130_osu_sc_18T_ms__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.02475 | 0.03646 | 0.21688 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.05337 | 0.06315 | 0.28773 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.04157 | 0.05162 | 0.23955 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.05232 | 0.07278 | 0.35966 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02870 | 0.03989 | 0.21921 |

# SKY130_OSU_SC_18T_MS__DFFSRx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_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** | 0.00576 | 0.00572 | 0.01227 | 0.01666 | 3.11948 | 3.10001 |
| **sky130_osu_sc_18T_ms__dffsr_l** | 0.00576 | 0.00572 | 0.01226 | 0.01666 | 2.18722 | 2.18170 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_18T_ms__dffsr_1** | 0.00000 | 503.45300 | 689.70400 |
| **sky130_osu_sc_18T_ms__dffsr_l** | 0.00000 | 453.74100 | 639.99400 |

# 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) | 0.27517 | 1.39356 | 18.05070 |
| | QN->Q (FR) | 0.02681 | 0.69139 | 10.57060 |
| | RN->Q (RR) | 0.22003 | 1.34722 | 18.04430 |
| | SN->Q (FR) | 0.19270 | 1.27825 | 17.32180 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->Q (RR) | 0.27847 | 1.53501 | 18.02610 |
| | QN->Q (FR) | 0.02937 | 0.74450 | 10.47130 |
| | RN->Q (RR) | 0.22389 | 1.48848 | 18.02130 |
| | SN->Q (FR) | 0.19635 | 1.41586 | 17.29550 |

**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) | 0.32717 | 1.47201 | 18.66580 |
| | QN->Q (RF) | 0.02924 | 0.77994 | 12.00650 |
| | RN->Q (FF) | 0.21260 | 1.31924 | 17.94010 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->Q (RF) | 0.33354 | 1.61519 | 18.52830 |
| | QN->Q (RF) | 0.03263 | 0.84086 | 11.90950 |
| | RN->Q (FF) | 0.21886 | 1.46179 | 17.80420 |

**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) | 0.28986 | 0.79736 | 7.21893 |
| | RN->QN (FR) | 0.17615 | 0.64477 | 6.49615 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->QN (RR) | 0.29164 | 0.84333 | 7.15122 |
| | RN->QN (FR) | 0.17773 | 0.69110 | 6.42570 |

**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) | 0.24434 | 0.81229 | 8.18344 |
| | RN->QN (RF) | 0.18932 | 0.76600 | 8.18016 |
| | SN->QN (FF) | 0.16205 | 0.69672 | 7.46046 |
| sky130_osu_sc_18T_ms__dffsr_l | CK->QN (RF) | 0.24256 | 0.86474 | 8.15109 |
| | RN->QN (RF) | 0.18818 | 0.81923 | 8.14440 |
| | SN->QN (FF) | 0.16073 | 0.74568 | 7.41834 |

# 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) | -0.08276 | -0.08422 | 0.05788 |
| | setup | CK (R) | 0.21079 | 0.23550 | 0.29605 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.08132 | -0.08296 | 0.05837 |
| | setup | CK (R) | 0.21158 | 0.23514 | 0.29315 |

**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) | -0.11763 | -0.24664 | -1.82253 |
| | setup | CK (R) | 0.15517 | 0.25917 | 1.89545 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.11793 | -0.24458 | -1.82624 |
| | setup | CK (R) | 0.15477 | 0.25890 | 1.89558 |

**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) | -0.08276 | -0.08422 | 0.05788 |
| | setup | CK (R) | 0.21079 | 0.23550 | 0.29605 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.08132 | -0.08296 | 0.05837 |
| | setup | CK (R) | 0.21158 | 0.23514 | 0.29315 |

**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) | -0.11763 | -0.24664 | -1.82253 |
| | setup | CK (R) | 0.15517 | 0.25917 | 1.89545 |
| sky130_osu_sc_18T_ms__dffsr_l | hold | CK (R) | -0.11793 | -0.24458 | -1.82624 |
| | setup | CK (R) | 0.15477 | 0.25890 | 1.89558 |

**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) | 0.14790 | 0.18097 | 0.72592 |
| | removal | CK (R) | -0.01759 | -0.02542 | -0.06313 |
| | hold | SN (R) | -0.14907 | -0.29237 | -1.05563 |
| | setup | SN (R) | 0.18128 | 0.34990 | 2.85032 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.14563 | 0.18188 | 0.72324 |
| | removal | CK (R) | -0.01774 | -0.02542 | -0.06313 |
| | hold | SN (R) | -0.14829 | -0.28548 | -1.02452 |
| | setup | SN (R) | 0.17956 | 0.34173 | 2.79215 |

**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) | 0.14790 | 0.18097 | 0.72592 |
| | removal | CK (R) | -0.01759 | -0.02542 | -0.06313 |
| | hold | SN (R) | -0.14907 | -0.29237 | -1.05919 |
| | hold | SN (R) | -0.14974 | -0.29613 | -1.05563 |
| | setup | SN (R) | 0.18128 | 0.34748 | 2.64089 |
| | setup | SN (R) | 0.17600 | 0.34990 | 2.85032 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.14563 | 0.18188 | 0.72324 |
| | removal | CK (R) | -0.01774 | -0.02542 | -0.06313 |
| | hold | SN (R) | -0.14956 | -0.28548 | -1.02987 |
| | hold | SN (R) | -0.14829 | -0.28770 | -1.02452 |
| | setup | SN (R) | 0.17956 | 0.33857 | 2.57638 |
| | setup | SN (R) | 0.16849 | 0.34173 | 2.79215 |

**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 () | 0.13570 | 0.54688 | 13.33370 |
| | min_pulse_width | RN () | 0.13570 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | RN () | 0.13570 | 0.54688 | 13.33370 |
| | min_pulse_width | RN () | 0.13161 | 0.54688 | 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) | 0.05348 | 0.08733 | 2.26622 |
| | removal | CK (R) | -0.02562 | -0.06466 | -0.29674 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.05316 | 0.08694 | 2.20237 |
| | removal | CK (R) | -0.02739 | -0.06689 | -0.29851 |

**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) | 0.05348 | 0.08733 | 2.26622 |
| | removal | CK (R) | -0.02562 | -0.06466 | -0.29674 |
| sky130_osu_sc_18T_ms__dffsr_l | recovery | CK (R) | 0.05316 | 0.08694 | 2.20237 |
| | removal | CK (R) | -0.02739 | -0.06689 | -0.29851 |

**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 () | 0.15207 | 0.54688 | 13.33370 |
| | min_pulse_width | SN () | 0.15002 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | SN () | 0.15207 | 0.54688 | 13.33370 |
| | min_pulse_width | SN () | 0.14389 | 0.54688 | 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 () | 0.13366 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.16025 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | CK () | 0.12957 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.15821 | 0.54688 | 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 () | 0.26662 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.13775 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffsr_l | min_pulse_width | CK () | 0.26662 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.13570 | 0.54688 | 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 | 0.02996 | 0.03544 | 0.12674 |
| | RN | 0.04659 | 0.04945 | 0.11784 |
| | SN | -0.00194 | -0.14353 | -2.52663 |
| | SN | 0.04080 | 0.04316 | 0.11392 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02733 | 0.03262 | 0.12686 |
| | RN | 0.04398 | 0.04671 | 0.11809 |
| | SN | -0.00194 | -0.11599 | -1.77155 |
| | SN | 0.03820 | 0.04051 | 0.11497 |

**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 | 0.03377 | 0.03517 | 0.08146 |
| | RN | -0.00194 | -0.14353 | -2.52659 |
| | RN | 0.05166 | 0.05449 | 0.10823 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.03110 | 0.03350 | 0.10081 |
| | RN | -0.00194 | -0.11599 | -1.77153 |
| | RN | 0.04905 | 0.05281 | 0.12754 |

**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 | 0.03036 | 0.03175 | 0.07837 |
| | RN | -0.00194 | -0.14299 | -2.50499 |
| | RN | 0.04897 | 0.05178 | 0.10547 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02795 | 0.03037 | 0.09772 |
| | RN | -0.00194 | -0.11582 | -1.76283 |
| | RN | 0.04662 | 0.05038 | 0.12474 |

**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 | 0.02779 | 0.03324 | 0.12438 |
| | RN | 0.04440 | 0.04731 | 0.11547 |
| | SN | -0.00194 | -0.14299 | -2.51059 |
| | SN | 0.03944 | 0.04184 | 0.11255 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02535 | 0.03066 | 0.12550 |
| | RN | 0.04197 | 0.04471 | 0.11684 |
| | SN | -0.00194 | -0.11582 | -1.76689 |
| | SN | 0.03703 | 0.03933 | 0.11372 |

**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 | 0.00027 | 0.00024 | 0.00028 |
| | (!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) | 0.03024 | 0.03449 | 0.16223 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01405 | 0.01834 | 0.14008 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01434 | 0.01860 | 0.13952 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01535 | 0.01963 | 0.14088 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00017 | -0.00019 | -0.00016 |
| | (!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) | 0.02981 | 0.03406 | 0.16180 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01362 | 0.01791 | 0.13965 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01391 | 0.01817 | 0.13909 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01492 | 0.01920 | 0.14045 |

**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 | 0.01176 | 0.01172 | 0.01163 |
| | (!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) | 0.04344 | 0.04878 | 0.17701 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01961 | 0.02519 | 0.14970 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01917 | 0.02456 | 0.14948 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01998 | 0.02556 | 0.15050 |
| sky130_osu_sc_18T_ms__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01133 | 0.01128 | 0.01120 |
| | (!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) | 0.04300 | 0.04833 | 0.17657 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01917 | 0.02474 | 0.14926 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01872 | 0.02412 | 0.14904 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01953 | 0.02512 | 0.15006 |

**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) | 0.01046 | 0.01926 | 0.19795 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02465 | 0.03356 | 0.22400 |
| 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) | 0.01002 | 0.01884 | 0.19752 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02422 | 0.03314 | 0.22357 |

**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) | 0.01758 | 0.02954 | 0.21171 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.03715 | 0.04821 | 0.23790 |
| 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) | 0.01713 | 0.02910 | 0.21127 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.03670 | 0.04777 | 0.23721 |

**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) | -0.00758 | -0.00762 | -0.00772 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00674 | -0.00900 | -0.00830 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00642 | -0.00758 | -0.00719 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01449 | 0.01866 | 0.13858 |
| 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) | -0.00801 | -0.00806 | -0.00815 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00715 | -0.00941 | -0.00871 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00685 | -0.00801 | -0.00762 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01407 | 0.01823 | 0.13816 |

**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) | 0.01753 | 0.01766 | 0.01759 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.01756 | 0.01755 | 0.01724 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.01773 | 0.01783 | 0.01760 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.02965 | 0.03383 | 0.15620 |
| 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) | 0.01710 | 0.01722 | 0.01716 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.01710 | 0.01710 | 0.01679 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.01729 | 0.01739 | 0.01716 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.02921 | 0.03338 | 0.15576 |

**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) | 0.00351 | 0.01203 | 0.19025 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.01406 | 0.02232 | 0.21321 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.01494 | 0.02319 | 0.21398 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00402 | 0.01254 | 0.18992 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.01269 | 0.02797 | 0.34481 |
| sky130_osu_sc_18T_ms__dffsr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.00308 | 0.01160 | 0.18982 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.01361 | 0.02188 | 0.21277 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.01450 | 0.02275 | 0.21354 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00358 | 0.01211 | 0.18949 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.01226 | 0.02754 | 0.34438 |

**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)** | 0.06039 | 0.07035 | 0.29451 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.02524 | 0.03700 | 0.21749 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.04346 | 0.05368 | 0.24119 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.04439 | 0.05464 | 0.24248 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.05813 | 0.07802 | 0.36553 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.03034 | 0.04153 | 0.22096 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.03216 | 0.05255 | 0.37416 |
| **sky130_osu_sc_18T_ms__dffsr_l** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.05996 | 0.06992 | 0.29408 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.02481 | 0.03656 | 0.21705 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.04303 | 0.05325 | 0.24075 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.04396 | 0.05421 | 0.24205 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.05768 | 0.07758 | 0.36508 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.02991 | 0.04109 | 0.22052 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.03171 | 0.05211 | 0.37372 |

# SKY130_OSU_SC_18T_MS__DFFSx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00579 | 0.00967 | 0.01643 | 2.94159 | 2.91089 |
| sky130_osu_sc_18T_ms__dffs_l | 0.00579 | 0.00967 | 0.01643 | 2.20684 | 2.18561 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dffs_1 | 0.00000 | 445.66900 | 598.84100 |
| sky130_osu_sc_18T_ms__dffs_l | 0.00000 | 395.96700 | 549.13100 |

# 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) | 0.21336 | 1.32175 | 17.54770 |
| | QN->Q (FR) | 0.02799 | 0.69984 | 10.53720 |
| | SN->Q (FR) | 0.15137 | 1.26019 | 16.96360 |
| sky130_osu_sc_18T_ms__dffs_l | CK->Q (RR) | 0.21379 | 1.46588 | 18.05650 |
| | QN->Q (FR) | 0.02928 | 0.74490 | 10.49530 |
| | SN->Q (FR) | 0.15216 | 1.39703 | 17.44560 |

**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) | 0.31378 | 1.46676 | 18.31690 |
| | QN->Q (RF) | 0.03143 | 0.81279 | 12.33200 |
| sky130_osu_sc_18T_ms__dffs_l | CK->Q (RF) | 0.31431 | 1.60234 | 18.64040 |
| | QN->Q (RF) | 0.03252 | 0.84101 | 11.95360 |

**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) | 0.27440 | 0.78322 | 7.01408 |
| sky130_osu_sc_18T_ms__dffs_l | CK->QN (RR) | 0.27197 | 0.82546 | 7.12517 |

**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) | 0.18281 | 0.74242 | 7.94705 |
| | SN->QN (FF) | 0.12072 | 0.68073 | 7.36144 |
| sky130_osu_sc_18T_ms__dffs_l | CK->QN (RF) | 0.17930 | 0.79178 | 8.04914 |
| | SN->QN (FF) | 0.11779 | 0.72352 | 7.44163 |

# 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) | -0.06452 | -0.06651 | 0.10129 |
| | setup | CK (R) | 0.15888 | 0.18657 | 0.26733 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.06327 | -0.06571 | 0.09716 |
| | setup | CK (R) | 0.15847 | 0.18687 | 0.27187 |

**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) | -0.10446 | -0.22872 | -1.79883 |
| | setup | CK (R) | 0.14232 | 0.24089 | 1.86784 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.10487 | -0.22872 | -1.79823 |
| | setup | CK (R) | 0.14216 | 0.24089 | 1.86783 |

**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) | -0.06452 | -0.06651 | 0.10129 |
| | setup | CK (R) | 0.15888 | 0.18657 | 0.26733 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.06327 | -0.06571 | 0.09716 |
| | setup | CK (R) | 0.15847 | 0.18687 | 0.27187 |

**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) | -0.10446 | -0.22872 | -1.79883 |
| | setup | CK (R) | 0.14232 | 0.24089 | 1.86784 |
| sky130_osu_sc_18T_ms__dffs_l | hold | CK (R) | -0.10487 | -0.22872 | -1.79823 |
| | setup | CK (R) | 0.14216 | 0.24089 | 1.86783 |

**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) | 0.05170 | 0.07743 | 1.32119 |
| | removal | CK (R) | -0.02564 | -0.06018 | -0.33428 |
| sky130_osu_sc_18T_ms__dffs_l | recovery | CK (R) | 0.05166 | 0.07737 | 1.25321 |
| | removal | CK (R) | -0.02564 | -0.06018 | -0.33428 |

**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) | 0.05170 | 0.07743 | 1.32119 |
| | removal | CK (R) | -0.02564 | -0.06018 | -0.33428 |
| sky130_osu_sc_18T_ms__dffs_l | recovery | CK (R) | 0.05166 | 0.07737 | 1.25321 |
| | removal | CK (R) | -0.02564 | -0.06018 | -0.33428 |

**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 () | 0.09888 | 0.54688 | 13.33370 |
| | min_pulse_width | SN () | 0.09888 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | SN () | 0.09888 | 0.54688 | 13.33370 |
| | min_pulse_width | SN () | 0.09274 | 0.54688 | 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 () | 0.10297 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.15411 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | CK () | 0.09888 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.15002 | 0.54688 | 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 () | 0.21344 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.12548 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dffs_l | min_pulse_width | CK () | 0.21344 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.12548 | 0.54688 | 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 | 0.02317 | 0.02747 | 0.09571 |
| | SN | -0.00194 | -0.13856 | -2.38252 |
| | SN | 0.03198 | 0.03418 | 0.07941 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02057 | 0.02612 | 0.12114 |
| | SN | -0.00194 | -0.11662 | -1.78745 |
| | SN | 0.02936 | 0.03288 | 0.10477 |

**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 | 0.02905 | 0.03010 | 0.07475 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02633 | 0.02878 | 0.09757 |

**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 | 0.02594 | 0.02699 | 0.06971 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02353 | 0.02600 | 0.09488 |

**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 | 0.02152 | 0.02594 | 0.09474 |
| | SN | -0.00194 | -0.13769 | -2.35726 |
| | SN | 0.03113 | 0.03336 | 0.07911 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01907 | 0.02467 | 0.11950 |
| | SN | -0.00194 | -0.11594 | -1.77006 |
| | SN | 0.02869 | 0.03224 | 0.10351 |

**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 | -0.00052 | -0.00054 | -0.00051 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02249 | 0.02740 | 0.15762 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01147 | 0.01593 | 0.13827 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00095 | -0.00097 | -0.00094 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02206 | 0.02697 | 0.15718 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01104 | 0.01550 | 0.13784 |

**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 | 0.01109 | 0.01104 | 0.01096 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.03652 | 0.04210 | 0.17078 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01784 | 0.02364 | 0.14872 |
| sky130_osu_sc_18T_ms__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01066 | 0.01061 | 0.01052 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.03609 | 0.04166 | 0.17034 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.01741 | 0.02321 | 0.14828 |

**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) | -0.00548 | -0.00554 | -0.00553 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01121 | 0.01524 | 0.12309 |
| 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) | -0.00591 | -0.00598 | -0.00596 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01078 | 0.01481 | 0.12266 |

**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) | 0.01316 | 0.01316 | 0.01307 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.02018 | 0.02579 | 0.13749 |
| 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) | 0.01272 | 0.01273 | 0.01264 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01975 | 0.02536 | 0.13706 |

**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) | 0.00232 | 0.01099 | 0.18923 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.00326 | 0.01180 | 0.18933 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.01003 | 0.02574 | 0.34379 |
| sky130_osu_sc_18T_ms__dffs_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.00188 | 0.01056 | 0.18879 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.00282 | 0.01137 | 0.18890 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00960 | 0.02531 | 0.34335 |

**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) | 0.05262 | 0.06265 | 0.28905 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.02403 | 0.03577 | 0.21643 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.05089 | 0.07107 | 0.35765 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.02955 | 0.04076 | 0.22033 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.03027 | 0.05100 | 0.37367 |
| sky130_osu_sc_18T_ms__dffs_l | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.05219 | 0.06222 | 0.28862 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.02360 | 0.03534 | 0.21600 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.05045 | 0.07059 | 0.35722 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.02912 | 0.04032 | 0.21990 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.02984 | 0.05057 | 0.37324 |

# SKY130_OSU_SC_18T_MS__DFFx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00595 | 0.01641 | 3.13021 | 3.10830 |
| sky130_osu_sc_18T_ms__dff_l | 0.00595 | 0.01641 | 2.19631 | 2.18566 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__dff_1 | 0.00000 | 447.28400 | 556.75400 |
| sky130_osu_sc_18T_ms__dff_l | 0.00000 | 397.57100 | 507.04300 |

# 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) | 0.19490 | 1.30397 | 17.95290 |
| | QN->Q (FR) | 0.02663 | 0.68889 | 10.54090 |
| sky130_osu_sc_18T_ms__dff_l | CK->Q (RR) | 0.20099 | 1.45721 | 18.05650 |
| | QN->Q (FR) | 0.02985 | 0.75644 | 10.66260 |

**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) | 0.26091 | 1.39532 | 18.61460 |
| | QN->Q (RF) | 0.02911 | 0.77635 | 11.99640 |
| sky130_osu_sc_18T_ms__dff_l | CK->Q (RF) | 0.26848 | 1.55102 | 18.65250 |
| | QN->Q (RF) | 0.03260 | 0.84007 | 11.91660 |

**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) | 0.22543 | 0.72017 | 7.13933 |
| sky130_osu_sc_18T_ms__dff_l | CK->QN (RR) | 0.22801 | 0.77498 | 7.17262 |

**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) | 0.16565 | 0.72279 | 8.07084 |
| sky130_osu_sc_18T_ms__dff_l | CK->QN (RF) | 0.16655 | 0.77985 | 8.03950 |

# 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) | -0.05730 | -0.06243 | 0.09186 |
| | setup | CK (R) | 0.13670 | 0.16893 | 0.27540 |
| sky130_osu_sc_18T_ms__dff_l | hold | CK (R) | -0.05778 | -0.06243 | 0.09059 |
| | setup | CK (R) | 0.13784 | 0.17152 | 0.27597 |

**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) | -0.09359 | -0.22988 | -1.78634 |
| | setup | CK (R) | 0.11492 | 0.24080 | 1.85570 |
| sky130_osu_sc_18T_ms__dff_l | hold | CK (R) | -0.09201 | -0.22988 | -1.78372 |
| | setup | CK (R) | 0.11492 | 0.24080 | 1.85570 |

**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 () | 0.09479 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.13775 | 0.54688 | 13.33370 |
| sky130_osu_sc_18T_ms__dff_l | min_pulse_width | CK () | 0.09274 | 0.54688 | 13.33370 |
| | min_pulse_width | CK () | 0.13366 | 0.54688 | 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 ()** | 0.19298 | 0.54688 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.08865 | 0.54688 | 13.33370 |
| **sky130_osu_sc_18T_ms__dff_l** | **min_pulse_width** | **CK ()** | 0.19298 | 0.54688 | 13.33370 |
| | **min_pulse_width** | **CK ()** | 0.08865 | 0.54688 | 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 | 0.02400 | 0.03011 | 0.12536 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02156 | 0.02742 | 0.12580 |

**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 | 0.02815 | 0.02990 | 0.07908 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02567 | 0.02803 | 0.09334 |

**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 | 0.02546 | 0.02722 | 0.07659 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02328 | 0.02565 | 0.09137 |

**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 | 0.02235 | 0.02850 | 0.12344 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.02002 | 0.02595 | 0.12395 |

**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 | -0.00043 | -0.00139 | -0.00085 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02132 | 0.02651 | 0.16002 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00086 | -0.00182 | -0.00128 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02089 | 0.02608 | 0.15960 |

**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 | 0.01056 | 0.01053 | 0.01037 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.03698 | 0.04292 | 0.17417 |
| sky130_osu_sc_18T_ms__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01012 | 0.01009 | 0.00993 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.03655 | 0.04250 | 0.17375 |

**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) | 0.00231 | 0.01100 | 0.18922 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.00270 | 0.01126 | 0.18877 |
| sky130_osu_sc_18T_ms__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.00188 | 0.01057 | 0.18878 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.00226 | 0.01083 | 0.18834 |

**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) | 0.02396 | 0.03575 | 0.21635 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.05155 | 0.06163 | 0.28928 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.05145 | 0.07229 | 0.36362 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02888 | 0.04011 | 0.21964 |
| sky130_osu_sc_18T_ms__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.02353 | 0.03532 | 0.21591 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.05112 | 0.06121 | 0.28885 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.05103 | 0.07186 | 0.36320 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.02845 | 0.03967 | 0.21921 |

# SKY130_OSU_SC_18T_MS__INVx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00576 | 3.04108 |
| sky130_osu_sc_18T_ms__inv_10 | 0.05452 | 25.41603 |
| sky130_osu_sc_18T_ms__inv_2 | 0.01110 | 5.69082 |
| sky130_osu_sc_18T_ms__inv_3 | 0.01655 | 8.34106 |
| sky130_osu_sc_18T_ms__inv_4 | 0.02193 | 10.93468 |
| sky130_osu_sc_18T_ms__inv_6 | 0.03288 | 16.15496 |
| sky130_osu_sc_18T_ms__inv_8 | 0.04371 | 20.95431 |
| sky130_osu_sc_18T_ms__inv_l | 0.00441 | 2.10361 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__inv_1 | 0.00000 | 66.55050 | 132.73600 |
| sky130_osu_sc_18T_ms__inv_10 | 0.00000 | 663.66700 | 1324.52000 |
| sky130_osu_sc_18T_ms__inv_2 | 0.00000 | 132.76400 | 264.96400 |
| sky130_osu_sc_18T_ms__inv_3 | 0.00000 | 199.29100 | 397.65300 |
| sky130_osu_sc_18T_ms__inv_4 | 0.00000 | 265.50500 | 529.88200 |
| sky130_osu_sc_18T_ms__inv_6 | 0.00000 | 398.23900 | 794.78600 |
| sky130_osu_sc_18T_ms__inv_8 | 0.00000 | 530.96800 | 1059.68000 |
| sky130_osu_sc_18T_ms__inv_l | 0.00000 | 41.69790 | 83.17210 |

# 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)** | 0.02507 | 0.62951 | 9.53220 |
| **sky130_osu_sc_18T_ms__inv_10** | **A->Y (FR)** | 0.03821 | 0.38665 | 9.16204 |
| **sky130_osu_sc_18T_ms__inv_2** | **A->Y (FR)** | 0.02112 | 0.52554 | 9.22680 |
| **sky130_osu_sc_18T_ms__inv_3** | **A->Y (FR)** | 0.02351 | 0.48884 | 9.36046 |
| **sky130_osu_sc_18T_ms__inv_4** | **A->Y (FR)** | 0.02437 | 0.45259 | 9.20531 |
| **sky130_osu_sc_18T_ms__inv_6** | **A->Y (FR)** | 0.02792 | 0.41797 | 9.23599 |
| **sky130_osu_sc_18T_ms__inv_8** | **A->Y (FR)** | 0.03272 | 0.39663 | 9.16698 |
| **sky130_osu_sc_18T_ms__inv_l** | **A->Y (FR)** | 0.02766 | 0.68253 | 9.47622 |

**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)** | 0.02658 | 0.69985 | 10.66990 |
| **sky130_osu_sc_18T_ms__inv_10** | **A->Y (RF)** | 0.04463 | 0.44085 | 9.91005 |
| **sky130_osu_sc_18T_ms__inv_2** | **A->Y (RF)** | 0.02259 | 0.58966 | 10.26790 |
| **sky130_osu_sc_18T_ms__inv_3** | **A->Y (RF)** | 0.02491 | 0.55082 | 10.39190 |
| **sky130_osu_sc_18T_ms__inv_4** | **A->Y (RF)** | 0.02525 | 0.51478 | 10.22460 |
| **sky130_osu_sc_18T_ms__inv_6** | **A->Y (RF)** | 0.03162 | 0.47953 | 10.21480 |
| **sky130_osu_sc_18T_ms__inv_8** | **A->Y (RF)** | 0.03775 | 0.45614 | 10.08540 |
| **sky130_osu_sc_18T_ms__inv_l** | **A->Y (RF)** | 0.02959 | 0.74460 | 10.46780 |

# 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 | 0.00814 | 0.01246 | 0.05158 |
| sky130_osu_sc_18T_ms__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.07414 | 0.13901 | 0.52810 |
| sky130_osu_sc_18T_ms__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01472 | 0.02506 | 0.10479 |
| sky130_osu_sc_18T_ms__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02253 | 0.03866 | 0.15507 |
| sky130_osu_sc_18T_ms__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02915 | 0.05223 | 0.20936 |
| sky130_osu_sc_18T_ms__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04371 | 0.08119 | 0.31088 |
| sky130_osu_sc_18T_ms__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05853 | 0.10948 | 0.42005 |
| sky130_osu_sc_18T_ms__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00625 | 0.00899 | 0.03669 |

**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** | 0.00173 | 0.00394 | 0.02398 |
| **sky130_osu_sc_18T_ms__inv_10** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | 0.01395 | 0.04410 | 0.24560 |
| **sky130_osu_sc_18T_ms__inv_2** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | 0.00127 | 0.00699 | 0.04744 |
| **sky130_osu_sc_18T_ms__inv_3** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | 0.00311 | 0.01252 | 0.07157 |
| **sky130_osu_sc_18T_ms__inv_4** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | 0.00290 | 0.01529 | 0.09615 |
| **sky130_osu_sc_18T_ms__inv_6** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | 0.00426 | 0.02460 | 0.14464 |
| **sky130_osu_sc_18T_ms__inv_8** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | 0.00740 | 0.03520 | 0.19431 |
| **sky130_osu_sc_18T_ms__inv_l** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | 0.00090 | 0.00282 | 0.01860 |

# SKY130_OSU_SC_18T_MS__MUX2

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_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** | 0.07178 | 0.07158 | 0.01168 | 0.06245 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_18T_ms__mux2_1** | 0.00000 | 133.31800 | 133.31800 |

# 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) | - | 0.01526 | 0.07786 | 0.26126 |
| | A1->Y (RR) | - | 0.01614 | 0.07846 | 0.26155 |
| | S0->Y (RR) | (!A0 * A1) | 0.05021 | 0.20881 | 0.85914 |
| | S0->Y (FR) | (A0 * !A1) | 0.03694 | 0.15071 | 0.47282 |

**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) | - | 0.01276 | 0.07976 | 0.26904 |
| | A1->Y (FF) | - | 0.01266 | 0.07970 | 0.26928 |
| | S0->Y (FF) | (!A0 * A1) | 0.05605 | 0.16649 | 0.22597 |
| | S0->Y (RF) | (A0 * !A1) | 0.03222 | 0.20637 | 1.19363 |

# 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 | - | -0.00834 | -0.00835 | -0.00837 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | -0.00282 | -0.00281 | -0.00285 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00888 | 0.02150 | 0.20234 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | -0.00529 | 0.00461 | 0.18326 |

**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 | - | 0.00836 | 0.00836 | 0.00837 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | 0.00894 | 0.00894 | 0.00895 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00274 | 0.01344 | 0.19320 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | 0.02198 | 0.03356 | 0.21366 |

**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) | -0.00088 | -0.00088 | -0.00088 |

**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) | 0.00319 | 0.00318 | 0.00319 |

**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) | -0.00237 | -0.00236 | -0.00237 |

**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) | 0.00237 | 0.00236 | 0.00237 |

**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) | -0.00107 | 0.00932 | 0.18807 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | -0.00106 | 0.00957 | 0.18868 |

**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) | 0.01655 | 0.02855 | 0.20852 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | 0.01441 | 0.02709 | 0.20768 |

# SKY130_OSU_SC_18T_MS__NAND2x

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00577 | 0.00575 | 1.87503 |
| sky130_osu_sc_18T_ms__nand2_l | 0.00442 | 0.00441 | 1.31794 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__nand2_1 | 0.00000 | 66.45450 | 264.88100 |
| sky130_osu_sc_18T_ms__nand2_l | 0.00000 | 41.64200 | 165.95400 |

# 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) | 0.02563 | 0.53382 | 7.14672 |
| | B->Y (FR) | 0.03002 | 0.53395 | 7.07809 |
| sky130_osu_sc_18T_ms__nand2_l | A->Y (FR) | 0.02810 | 0.58296 | 7.18594 |
| | B->Y (FR) | 0.03330 | 0.58608 | 7.16130 |

**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) | 0.03895 | 0.77154 | 10.37730 |
| | B->Y (RF) | 0.04404 | 0.73156 | 9.78548 |
| sky130_osu_sc_18T_ms__nand2_l | A->Y (RF) | 0.04382 | 0.83804 | 10.28300 |
| | B->Y (RF) | 0.04887 | 0.79789 | 9.68383 |

# 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 | 0.00866 | 0.01296 | 0.05762 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01100 | 0.01514 | 0.06210 |
| sky130_osu_sc_18T_ms__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00660 | 0.00917 | 0.04038 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00833 | 0.01084 | 0.04344 |

**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 | 0.00601 | 0.00775 | 0.02969 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00591 | 0.00720 | 0.02834 |
| sky130_osu_sc_18T_ms__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00360 | 0.00482 | 0.02260 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00355 | 0.00449 | 0.02152 |

**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) | -0.00619 | -0.00624 | -0.00626 |
| sky130_osu_sc_18T_ms__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00449 | -0.00453 | -0.00454 |

**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) | 0.00626 | 0.00631 | 0.00628 |
| sky130_osu_sc_18T_ms__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00454 | 0.00458 | 0.00456 |

**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) | -0.00584 | -0.00587 | -0.00584 |
| sky130_osu_sc_18T_ms__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00423 | -0.00425 | -0.00423 |

**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) | 0.00600 | 0.00593 | 0.00587 |
| sky130_osu_sc_18T_ms__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00435 | 0.00429 | 0.00425 |

# SKY130_OSU_SC_18T_MS__NOR2x

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00578 | 0.00608 | 1.64864 |
| sky130_osu_sc_18T_ms__nor2_l | 0.00435 | 0.00469 | 1.15494 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__nor2_1 | 0.00000 | 54.13170 | 132.55600 |
| sky130_osu_sc_18T_ms__nor2_l | 0.00000 | 36.18950 | 83.06930 |

# 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) | 0.04996 | 0.68264 | 8.71119 |
| | B->Y (FR) | 0.03628 | 0.70279 | 9.13023 |
| sky130_osu_sc_18T_ms__nor2_l | A->Y (FR) | 0.05417 | 0.74969 | 8.67486 |
| | B->Y (FR) | 0.04218 | 0.77952 | 9.22320 |

**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) | 0.03781 | 0.58778 | 7.45073 |
| | B->Y (RF) | 0.02871 | 0.57364 | 7.42643 |
| sky130_osu_sc_18T_ms__nor2_l | A->Y (RF) | 0.04030 | 0.62282 | 7.34383 |
| | B->Y (RF) | 0.03179 | 0.61242 | 7.32196 |

# 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 | 0.01236 | 0.01453 | 0.05206 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00883 | 0.01309 | 0.06193 |
| sky130_osu_sc_18T_ms__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00897 | 0.01040 | 0.03844 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00670 | 0.00916 | 0.04331 |

**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 | 0.00285 | 0.00478 | 0.03352 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00115 | 0.00347 | 0.03058 |
| sky130_osu_sc_18T_ms__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00198 | 0.00358 | 0.02610 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00066 | 0.00228 | 0.02379 |

**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) | -0.00416 | -0.00510 | -0.00456 |
| sky130_osu_sc_18T_ms__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00300 | -0.00362 | -0.00331 |

**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) | 0.00690 | 0.00689 | 0.00669 |
| sky130_osu_sc_18T_ms__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00476 | 0.00478 | 0.00466 |

**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) | -0.00225 | -0.00227 | -0.00221 |
| sky130_osu_sc_18T_ms__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00168 | -0.00170 | -0.00165 |

**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) | 0.00315 | 0.00316 | 0.00284 |
| sky130_osu_sc_18T_ms__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00233 | 0.00234 | 0.00213 |

# SKY130_OSU_SC_18T_MS__OAI21

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_18T_ms__oai21_l | 12.45420 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_18T_ms__oai21_l | 0.00583 | 0.00593 | 0.00488 | 1.60158 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__oai21_l | 0.00000 | 58.42410 | 215.62600 |

# 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) | 0.04841 | 0.70920 | 8.99719 |
| | A1->Y (FR) | 0.06542 | 0.69494 | 8.59146 |
| | B0->Y (FR) | 0.03369 | 0.62541 | 8.01375 |

**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) | 0.05532 | 0.73374 | 9.26637 |
| | A1->Y (RF) | 0.07026 | 0.73065 | 8.99088 |
| | B0->Y (RF) | 0.04243 | 0.77869 | 10.02080 |

# 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 | 0.01228 | 0.01545 | 0.05566 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.01577 | 0.01742 | 0.04996 |
| | B0 | 0.00726 | 0.01045 | 0.04789 |

**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 | 0.00592 | 0.00689 | 0.02694 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00708 | 0.00778 | 0.02933 |
| | B0 | 0.00318 | 0.00475 | 0.02591 |

**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) | -0.00153 | -0.00155 | -0.00149 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | -0.00572 | -0.00576 | -0.00573 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00573 | -0.00576 | -0.00574 |

**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) | 0.00388 | 0.00388 | 0.00356 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | 0.00572 | 0.00576 | 0.00574 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00584 | 0.00579 | 0.00576 |

**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) | -0.00333 | -0.00430 | -0.00377 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | -0.00567 | -0.00572 | -0.00568 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00568 | -0.00570 | -0.00569 |

**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) | 0.00754 | 0.00755 | 0.00734 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | 0.00567 | 0.00574 | 0.00570 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00579 | 0.00577 | 0.00572 |

**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) | -0.00455 | -0.00459 | -0.00466 |

**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) | 0.00466 | 0.00472 | 0.00469 |

# SKY130_OSU_SC_18T_MS__OAI22

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

## Truth Table

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

## Footprint

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

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_18T_ms__oai22_1 | 0.00571 | 0.00594 | 0.00607 | 0.00596 | 1.57315 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__oai22_1 | 0.00000 | 80.96890 | 264.51800 |

# 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) | 0.07078 | 0.69224 | 8.44657 |
| | A1->Y (FR) | 0.05712 | 0.71074 | 8.87308 |
| | B0->Y (FR) | 0.03991 | 0.69413 | 8.86624 |
| | B1->Y (FR) | 0.05383 | 0.67545 | 8.44076 |

**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) | 0.10249 | 0.79393 | 9.37031 |
| | A1->Y (RF) | 0.07964 | 0.75914 | 9.21676 |
| | B0->Y (RF) | 0.06796 | 0.80245 | 9.95547 |
| | B1->Y (RF) | 0.09182 | 0.84674 | 10.24020 |

# 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 | 0.02086 | 0.02239 | 0.05321 |
| | A1 | 0.01527 | 0.01862 | 0.06286 |
| | B0 | 0.00947 | 0.01306 | 0.05674 |
| | B1 | 0.01314 | 0.01488 | 0.04741 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_18T_ms__oai22_l | A0 | 0.00766 | 0.00827 | 0.02936 |
| | A1 | 0.00598 | 0.00689 | 0.02691 |
| | B0 | 0.00277 | 0.00450 | 0.02870 |
| | B1 | 0.00432 | 0.00564 | 0.03026 |

**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) | -0.00406 | -0.00503 | -0.00450 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | -0.00348 | -0.00445 | -0.00392 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | -0.00568 | -0.00573 | -0.00569 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | -0.00569 | -0.00572 | -0.00570 |

**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) | 0.00695 | 0.00697 | 0.00676 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | 0.00754 | 0.00755 | 0.00735 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | 0.00568 | 0.00573 | 0.00571 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | 0.00582 | 0.00576 | 0.00573 |

**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) | -0.00217 | -0.00219 | -0.00212 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | -0.00158 | -0.00161 | -0.00154 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | -0.00567 | -0.00571 | -0.00568 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | -0.00568 | -0.00572 | -0.00569 |

**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) | 0.00321 | 0.00321 | 0.00289 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | 0.00379 | 0.00380 | 0.00347 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | 0.00567 | 0.00571 | 0.00569 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | 0.00580 | 0.00576 | 0.00572 |

**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) | -0.00215 | -0.00218 | -0.00211 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | -0.00157 | -0.00161 | -0.00153 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | -0.00620 | -0.00625 | -0.00621 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | -0.00604 | -0.00608 | -0.00621 |

**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) | 0.00319 | 0.00320 | 0.00288 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | 0.00378 | 0.00379 | 0.00346 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | 0.00629 | 0.00632 | 0.00625 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | 0.00623 | 0.00628 | 0.00624 |

**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) | -0.00401 | -0.00497 | -0.00443 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | -0.00342 | -0.00438 | -0.00385 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | -0.00627 | -0.00632 | -0.00627 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | -0.00612 | -0.00617 | -0.00628 |

**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) | 0.00688 | 0.00690 | 0.00670 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | 0.00747 | 0.00753 | 0.00728 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | 0.00636 | 0.00642 | 0.00633 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | 0.00628 | 0.00635 | 0.00632 |

# SKY130_OSU_SC_18T_MS__OR2x

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00614 | 0.00592 | 3.16320 |
| sky130_osu_sc_18T_ms__or2_2 | 0.00614 | 0.00592 | 6.06510 |
| sky130_osu_sc_18T_ms__or2_4 | 0.00615 | 0.00593 | 11.75430 |
| sky130_osu_sc_18T_ms__or2_8 | 0.00617 | 0.00595 | 22.05613 |
| sky130_osu_sc_18T_ms__or2_l | 0.00477 | 0.00452 | 2.20797 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_18T_ms__or2_1** | 0.00000 | 87.59850 | 133.32000 |
| **sky130_osu_sc_18T_ms__or2_2** | 0.00000 | 120.81100 | 265.57100 |
| **sky130_osu_sc_18T_ms__or2_4** | 0.00000 | 187.47400 | 530.53100 |
| **sky130_osu_sc_18T_ms__or2_8** | 0.00000 | 320.79200 | 1060.42000 |
| **sky130_osu_sc_18T_ms__or2_l** | 0.00000 | 57.15680 | 83.50110 |

# 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) | 0.07277 | 0.57694 | 7.22973 |
| | B->Y (RR) | 0.06075 | 0.53956 | 7.11486 |
| sky130_osu_sc_18T_ms__or2_2 | A->Y (RR) | 0.08020 | 0.52655 | 7.18416 |
| | B->Y (RR) | 0.06803 | 0.49293 | 7.06197 |
| sky130_osu_sc_18T_ms__or2_4 | A->Y (RR) | 0.10282 | 0.53506 | 7.45209 |
| | B->Y (RR) | 0.09023 | 0.50594 | 7.33012 |
| sky130_osu_sc_18T_ms__or2_8 | A->Y (RR) | 0.14851 | 0.59346 | 7.68548 |
| | B->Y (RR) | 0.13523 | 0.56933 | 7.56505 |
| sky130_osu_sc_18T_ms__or2_l | A->Y (RR) | 0.07890 | 0.62631 | 7.08145 |
| | B->Y (RR) | 0.06697 | 0.59152 | 6.93939 |

**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) | 0.10112 | 0.61331 | 7.74498 |
| | B->Y (FF) | 0.08328 | 0.60523 | 7.95302 |
| sky130_osu_sc_18T_ms__or2_2 | A->Y (FF) | 0.11804 | 0.56079 | 7.62970 |
| | B->Y (FF) | 0.10029 | 0.55873 | 7.83336 |
| sky130_osu_sc_18T_ms__or2_4 | A->Y (FF) | 0.16520 | 0.58522 | 7.85329 |
| | B->Y (FF) | 0.14756 | 0.59218 | 8.04443 |
| sky130_osu_sc_18T_ms__or2_8 | A->Y (FF) | 0.26428 | 0.68408 | 7.86635 |
| | B->Y (FF) | 0.24663 | 0.70135 | 8.05014 |
| sky130_osu_sc_18T_ms__or2_l | A->Y (FF) | 0.10916 | 0.68417 | 7.75276 |
| | B->Y (FF) | 0.09209 | 0.68383 | 8.01908 |

# 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 | 0.01127 | 0.01677 | 0.12055 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00999 | 0.01719 | 0.13935 |
| sky130_osu_sc_18T_ms__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01832 | 0.02416 | 0.12812 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01686 | 0.02416 | 0.14384 |
| sky130_osu_sc_18T_ms__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03445 | 0.04025 | 0.14540 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03262 | 0.04054 | 0.16059 |
| sky130_osu_sc_18T_ms__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.07476 | 0.07654 | 0.18368 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.07213 | 0.07656 | 0.18798 |
| sky130_osu_sc_18T_ms__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00821 | 0.01229 | 0.09053 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00714 | 0.01245 | 0.10060 |

**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 | 0.02320 | 0.02908 | 0.14161 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01937 | 0.02949 | 0.17809 |
| sky130_osu_sc_18T_ms__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03245 | 0.03726 | 0.14778 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02864 | 0.03737 | 0.18287 |
| sky130_osu_sc_18T_ms__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.05835 | 0.05684 | 0.16182 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.05457 | 0.05721 | 0.19463 |
| sky130_osu_sc_18T_ms__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.12583 | 0.09959 | 0.19174 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.12171 | 0.09907 | 0.22186 |
| sky130_osu_sc_18T_ms__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01706 | 0.02126 | 0.10243 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01442 | 0.02131 | 0.12628 |

**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) | -0.00410 | -0.00510 | -0.00458 |
| sky130_osu_sc_18T_ms__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00409 | -0.00509 | -0.00458 |
| sky130_osu_sc_18T_ms__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00409 | -0.00509 | -0.00457 |
| sky130_osu_sc_18T_ms__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00408 | -0.00508 | -0.00456 |
| sky130_osu_sc_18T_ms__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00297 | -0.00362 | -0.00332 |

**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) | 0.00692 | 0.00692 | 0.00672 |
| sky130_osu_sc_18T_ms__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00692 | 0.00692 | 0.00672 |
| sky130_osu_sc_18T_ms__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00693 | 0.00693 | 0.00673 |
| sky130_osu_sc_18T_ms__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00694 | 0.00694 | 0.00674 |
| sky130_osu_sc_18T_ms__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00479 | 0.00482 | 0.00468 |

**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) | -0.00225 | -0.00228 | -0.00221 |
| sky130_osu_sc_18T_ms__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00225 | -0.00228 | -0.00221 |
| sky130_osu_sc_18T_ms__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00225 | -0.00227 | -0.00221 |
| sky130_osu_sc_18T_ms__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00223 | -0.00226 | -0.00220 |
| sky130_osu_sc_18T_ms__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00171 | -0.00173 | -0.00168 |

**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) | 0.00319 | 0.00318 | 0.00286 |
| sky130_osu_sc_18T_ms__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00319 | 0.00318 | 0.00286 |
| sky130_osu_sc_18T_ms__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00320 | 0.00319 | 0.00286 |
| sky130_osu_sc_18T_ms__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00321 | 0.00320 | 0.00287 |
| sky130_osu_sc_18T_ms__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00239 | 0.00238 | 0.00217 |

# SKY130_OSU_SC_18T_MS__TBUFIx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00607 | 0.00764 | 1.66180 |
| sky130_osu_sc_18T_ms__tbufi_l | 0.00470 | 0.00594 | 1.15491 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__tbufi_1 | 0.00000 | 66.82120 | 265.22300 |
| sky130_osu_sc_18T_ms__tbufi_l | 0.00000 | 41.88050 | 166.21000 |

# 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) | 0.03524 | 0.70055 | 9.13739 |
| | OE->Y (FR) | 0.04559 | 0.39681 | 5.09400 |
| | OE->Y (RR) | 0.07498 | 0.63734 | 7.12767 |
| sky130_osu_sc_18T_ms__tbufi_l | A->Y (FR) | 0.04101 | 0.77707 | 9.20082 |
| | OE->Y (FR) | 0.04767 | 0.39662 | 5.09376 |
| | OE->Y (RR) | 0.08102 | 0.70413 | 7.00346 |

**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) | 0.03873 | 0.73574 | 9.59036 |
| | OE->Y (FF) | 0.04639 | 0.39683 | 5.09399 |
| | OE->Y (RF) | 0.03539 | 0.68517 | 8.91492 |
| sky130_osu_sc_18T_ms__tbufi_l | A->Y (RF) | 0.04396 | 0.79534 | 9.42678 |
| | OE->Y (FF) | 0.04838 | 0.39661 | 5.09376 |
| | OE->Y (RF) | 0.04101 | 0.74405 | 8.73461 |

# 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 | 0.01203 | 0.01552 | 0.05545 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01223 | 0.02158 | 0.17966 |
| sky130_osu_sc_18T_ms__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00867 | 0.01088 | 0.03877 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00840 | 0.01521 | 0.12991 |

**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 | 0.00538 | 0.00726 | 0.02923 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01239 | 0.02252 | 0.19967 |
| sky130_osu_sc_18T_ms__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00330 | 0.00459 | 0.02228 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00812 | 0.01532 | 0.14029 |

**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) | -0.00422 | -0.00425 | -0.00420 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00329 | -0.00332 | -0.00327 |
| sky130_osu_sc_18T_ms__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00325 | -0.00328 | -0.00323 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00260 | -0.00262 | -0.00259 |

**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) | 0.00422 | 0.00425 | 0.00420 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00388 | 0.00390 | 0.00373 |
| sky130_osu_sc_18T_ms__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00325 | 0.00328 | 0.00323 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00305 | 0.00306 | 0.00294 |

**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) | 0.00599 | 0.01665 | 0.19737 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00429 | 0.01501 | 0.19617 |
| sky130_osu_sc_18T_ms__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00395 | 0.01152 | 0.13914 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00287 | 0.01046 | 0.13831 |

**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) | 0.01011 | 0.02232 | 0.20484 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00950 | 0.02192 | 0.20401 |
| sky130_osu_sc_18T_ms__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00785 | 0.01625 | 0.14489 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00744 | 0.01594 | 0.14439 |

# SKY130_OSU_SC_18T_MS__TNBUFIx

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00607 | 0.00966 | 1.66164 |
| sky130_osu_sc_18T_ms__tnbufi_l | 0.00469 | 0.00721 | 1.15513 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__tnbufi_1 | 0.00000 | 110.95400 | 133.11500 |
| sky130_osu_sc_18T_ms__tnbufi_l | 0.00000 | 69.53460 | 83.42220 |

# 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) | 0.03532 | 0.70054 | 9.13630 |
| | OE->Y (RR) | 0.03397 | 0.39849 | 5.09566 |
| | OE->Y (FR) | 0.04712 | 0.67483 | 8.61088 |
| sky130_osu_sc_18T_ms__tnbufi_l | A->Y (FR) | 0.04123 | 0.77713 | 9.20148 |
| | OE->Y (RR) | 0.03574 | 0.39880 | 5.09599 |
| | OE->Y (FR) | 0.05162 | 0.74163 | 8.53201 |

**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) | 0.03824 | 0.73553 | 9.58983 |
| | OE->Y (RF) | 0.03351 | 0.39848 | 5.09567 |
| | OE->Y (FF) | 0.05563 | 0.53906 | 6.20198 |
| sky130_osu_sc_18T_ms__tnbufi_l | A->Y (RF) | 0.04338 | 0.79518 | 9.42752 |
| | OE->Y (RF) | 0.03536 | 0.39881 | 5.09602 |
| | OE->Y (FF) | 0.06270 | 0.61580 | 6.18699 |

# 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 | 0.00854 | 0.01205 | 0.05240 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.02144 | 0.03469 | 0.21633 |
| sky130_osu_sc_18T_ms__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00655 | 0.00878 | 0.03687 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01585 | 0.02491 | 0.15349 |

**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 | 0.00167 | 0.00357 | 0.02559 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.02162 | 0.03427 | 0.20236 |
| sky130_osu_sc_18T_ms__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00088 | 0.00219 | 0.01985 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01566 | 0.02435 | 0.14057 |

**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) | -0.00276 | -0.00280 | -0.00264 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00160 | -0.00162 | -0.00158 |
| sky130_osu_sc_18T_ms__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00215 | -0.00218 | -0.00205 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00136 | -0.00137 | -0.00134 |

**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) | 0.00480 | 0.00482 | 0.00477 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00450 | 0.00452 | 0.00436 |
| sky130_osu_sc_18T_ms__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00343 | 0.00345 | 0.00340 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00326 | 0.00327 | 0.00316 |

**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) | -0.00525 | 0.00541 | 0.18811 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00598 | 0.00505 | 0.18716 |
| sky130_osu_sc_18T_ms__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00381 | 0.00376 | 0.13260 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00432 | 0.00351 | 0.13204 |

**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) | 0.01739 | 0.03085 | 0.21411 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.01586 | 0.02962 | 0.21289 |
| sky130_osu_sc_18T_ms__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.01278 | 0.02199 | 0.15128 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.01181 | 0.02134 | 0.15054 |

# SKY130_OSU_SC_18T_MS__XNOR2

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.01202 | 0.01110 | 1.67767 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__xnor2_l | 0.00000 | 237.03100 | 397.60900 |

# 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 | 0.09391 | 0.66942 | 7.23349 |
| | A->Y (FR) | !B | 0.04527 | 0.70678 | 9.11776 |
| | B->Y (RR) | A | 0.07496 | 0.65568 | 7.37451 |
| | B->Y (FR) | !A | 0.06448 | 0.69641 | 8.73915 |

**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 | 0.10561 | 0.63700 | 6.70097 |
| | A->Y (RF) | !B | 0.05486 | 0.72804 | 9.32996 |
| | B->Y (FF) | A | 0.08670 | 0.62214 | 6.71623 |
| | B->Y (RF) | !A | 0.07177 | 0.74665 | 9.32505 |

# 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 | 0.01589 | 0.02445 | 0.18190 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.02048 | 0.03524 | 0.24981 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00897 | 0.01943 | 0.20055 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.02328 | 0.03645 | 0.23937 |

**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 | 0.03266 | 0.04321 | 0.21930 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01579 | 0.02627 | 0.21905 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.03293 | 0.04511 | 0.22502 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01450 | 0.02498 | 0.21703 |

# SKY130_OSU_SC_18T_MS__XOR2

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.01203 | 0.01114 | 1.68728 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_18T_ms__xor2_l | 0.00000 | 237.03700 | 415.37500 |

# 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 | 0.08746 | 0.66256 | 7.40008 |
| | A->Y (FR) | B | 0.05855 | 0.69761 | 8.88436 |
| | B->Y (RR) | !A | 0.07678 | 0.65849 | 7.42837 |
| | B->Y (FR) | A | 0.06339 | 0.70075 | 8.85342 |

**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 | 0.08551 | 0.60658 | 6.40339 |
| | A->Y (RF) | B | 0.05861 | 0.76471 | 9.67781 |
| | B->Y (FF) | !A | 0.08146 | 0.60830 | 6.58084 |
| | B->Y (RF) | A | 0.06722 | 0.72888 | 9.11779 |

# 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 | 0.02821 | 0.04216 | 0.25270 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00727 | 0.01612 | 0.19567 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.02916 | 0.04299 | 0.25047 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00528 | 0.01559 | 0.19882 |

**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 | 0.01548 | 0.02642 | 0.22735 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.03218 | 0.04397 | 0.21033 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01533 | 0.02590 | 0.22185 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.02994 | 0.04248 | 0.22396 |

# SKY130_OSU_SC_18T_MS_x

*sky130_osu_sc_18T_ms_tt_1P80_150C.ccs*
*Cell Library: Process , Voltage 1.80, Temp 150.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_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** | 1.22042 |
| **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 | 440167.00000 | 880333.00000 |
| **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 |
| | -0.00074 | 0.15769 | 2.00001 |

**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 |
| | 7.65782 | 7.25664 | 2.33476 |