# sky130_osu_sc_15T_hs_tt_1P80_25C.ccs Library

| Cell Groups |
| --- |
| SKY130_OSU_SC_15T_HS__ADDFx |
| SKY130_OSU_SC_15T_HS__ADDHx |
| SKY130_OSU_SC_15T_HS__AND2x |
| SKY130_OSU_SC_15T_HS__AOI21 |
| SKY130_OSU_SC_15T_HS__AOI22 |
| SKY130_OSU_SC_15T_HS__BUFx |
| SKY130_OSU_SC_15T_HS__DFFRx |
| SKY130_OSU_SC_15T_HS__DFFSRx |
| SKY130_OSU_SC_15T_HS__DFFSx |
| SKY130_OSU_SC_15T_HS__DFFx |
| SKY130_OSU_SC_15T_HS__INVx |
| SKY130_OSU_SC_15T_HS__MUX2 |
| SKY130_OSU_SC_15T_HS__NAND2x |
| SKY130_OSU_SC_15T_HS__NOR2x |
| SKY130_OSU_SC_15T_HS__OAI21 |
| SKY130_OSU_SC_15T_HS__OAI22 |
| SKY130_OSU_SC_15T_HS__OR2x |
| SKY130_OSU_SC_15T_HS__TBUFIx |
| SKY130_OSU_SC_15T_HS__TNBUFIx |
| SKY130_OSU_SC_15T_HS__XNOR2 |
| SKY130_OSU_SC_15T_HS__XOR2 |
| SKY130_OSU_SC_15T_HS_x |

# SKY130_OSU_SC_15T_HS__ADDFx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__addf_1 | 39.07200 |
| sky130_osu_sc_15T_hs__addf_l | 39.07200 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | | |
|---|---|---|---|---|---|---|
| | A | B | CI | CO | CON | S |
| sky130_osu_sc_15T_hs__addf_1 | 0.01487 | 0.01484 | 0.01157 | 2.09467 | 0.96928 | 1.98328 |
| sky130_osu_sc_15T_hs__addf_l | 0.01487 | 0.01484 | 0.01157 | 1.25919 | 0.97090 | 1.29935 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__addf_1** | 0.00000 | 0.41879 | 0.54078 |
| **sky130_osu_sc_15T_hs__addf_l** | 0.00000 | 0.26828 | 0.39026 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addf_1 | A->CO (RR) | 0.12824 | 1.56308 | 25.11830 |
| | B->CO (RR) | 0.12518 | 1.52220 | 24.34900 |
| | CI->CO (RR) | 0.12180 | 1.60417 | 25.84230 |
| | CON->CO (FR) | 0.02214 | 0.67560 | 10.99620 |
| sky130_osu_sc_15T_hs__addf_l | A->CO (RR) | 0.13468 | 1.43876 | 19.10040 |
| | B->CO (RR) | 0.13140 | 1.41380 | 18.85600 |
| | CI->CO (RR) | 0.12823 | 1.48113 | 19.86920 |
| | CON->CO (FR) | 0.02859 | 0.76806 | 11.06210 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addf_1 | A->CO (FF) | 0.16502 | 1.90492 | 30.34130 |
| | B->CO (FF) | 0.14515 | 1.81719 | 29.20260 |
| | CI->CO (FF) | 0.14255 | 1.89460 | 30.60130 |
| | CON->CO (RF) | 0.02011 | 0.55007 | 9.04343 |
| sky130_osu_sc_15T_hs__addf_l | A->CO (FF) | 0.16026 | 1.57336 | 20.72560 |
| | B->CO (FF) | 0.14068 | 1.50486 | 20.15440 |
| | CI->CO (FF) | 0.13779 | 1.56449 | 21.03100 |
| | CON->CO (RF) | 0.02034 | 0.51519 | 7.42783 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addf_1 | A->CON (FR) | 0.13080 | 0.87155 | 10.34240 |
| | B->CON (FR) | 0.11128 | 0.82644 | 10.15800 |
| | CI->CON (FR) | 0.10839 | 0.86479 | 10.67490 |
| sky130_osu_sc_15T_hs__addf_l | A->CON (FR) | 0.12370 | 0.86539 | 10.34690 |
| | B->CON (FR) | 0.10476 | 0.82066 | 10.16170 |
| | CI->CON (FR) | 0.10129 | 0.85859 | 10.67910 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addf_1 | A->CON (RF) | 0.08288 | 0.55635 | 6.56095 |
| | B->CON (RF) | 0.08120 | 0.57418 | 6.91716 |
| | CI->CON (RF) | 0.07644 | 0.60017 | 7.36991 |
| sky130_osu_sc_15T_hs__addf_l | A->CON (RF) | 0.07979 | 0.55360 | 6.56535 |
| | B->CON (RF) | 0.07829 | 0.57180 | 6.92141 |
| | CI->CON (RF) | 0.07333 | 0.59747 | 7.37439 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addf_1 | A->S (-R) | 0.24432 | 1.71200 | 23.84890 |
| | B->S (-R) | 0.25590 | 1.70730 | 23.05820 |
| | CI->S (-R) | 0.22002 | 1.69829 | 24.11580 |
| | CON->S (RR) | 0.07213 | 0.55364 | 6.83464 |
| sky130_osu_sc_15T_hs__addf_l | A->S (-R) | 0.23776 | 1.58623 | 19.29450 |
| | B->S (-R) | 0.24967 | 1.59284 | 18.84600 |
| | CI->S (-R) | 0.21345 | 1.57426 | 19.58670 |
| | CON->S (RR) | 0.07524 | 0.62367 | 6.88184 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addf_1 | A->S (-F) | 0.20698 | 1.40207 | 18.76180 |
| | B->S (-F) | 0.20246 | 1.34806 | 18.21200 |
| | CI->S (-F) | 0.20009 | 1.44004 | 19.49320 |
| | CON->S (FF) | 0.08189 | 0.62453 | 7.39497 |
| sky130_osu_sc_15T_hs__addf_l | A->S (-F) | 0.19451 | 1.20678 | 13.84210 |
| | B->S (-F) | 0.19074 | 1.17171 | 13.74420 |
| | CI->S (-F) | 0.18753 | 1.24616 | 14.60740 |
| | CON->S (FF) | 0.07736 | 0.58465 | 6.10252 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.00295 | 0.00402 | 0.02886 |
| | B | 0.00326 | 0.00421 | 0.02612 |
| | CI | 0.00471 | 0.00591 | 0.03098 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.00221 | 0.00285 | 0.01756 |
| | B | 0.00254 | 0.00310 | 0.01595 |
| | CI | 0.00396 | 0.00477 | 0.01961 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.01235 | 0.01397 | 0.05284 |
| | B | 0.01304 | 0.01433 | 0.04886 |
| | CI | 0.01033 | 0.01209 | 0.05191 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.01163 | 0.01266 | 0.03499 |
| | B | 0.01194 | 0.01276 | 0.03280 |
| | CI | 0.00961 | 0.01080 | 0.03450 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.01233 | 0.01320 | 0.03160 |
| | B | 0.01262 | 0.01338 | 0.03045 |
| | CI | 0.01032 | 0.01137 | 0.03129 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.01162 | 0.01243 | 0.03004 |
| | B | 0.01193 | 0.01262 | 0.02903 |
| | CI | 0.00961 | 0.01062 | 0.02976 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.00292 | 0.00360 | 0.01638 |
| | B | 0.00325 | 0.00378 | 0.01532 |
| | CI | 0.00469 | 0.00545 | 0.01890 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.00218 | 0.00275 | 0.01464 |
| | B | 0.00252 | 0.00296 | 0.01374 |
| | CI | 0.00395 | 0.00460 | 0.01706 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.01234 | 0.01390 | 0.05055 |
| | B | 0.01303 | 0.01426 | 0.04682 |
| | CI | 0.01033 | 0.01203 | 0.04971 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.01163 | 0.01268 | 0.03568 |
| | B | -0.00605 | -0.00577 | 0.02639 |
| | CI | 0.00303 | 0.00283 | 0.03285 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.02705 | 0.02747 | 0.05475 |
| | B | 0.02434 | 0.02517 | 0.06400 |
| | CI | 0.02216 | 0.02237 | 0.05022 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.02612 | 0.02629 | 0.05439 |
| | B | 0.02341 | 0.02433 | 0.06444 |
| | CI | 0.02124 | 0.02152 | 0.05041 |

# SKY130_OSU_SC_15T_HS__ADDHx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__addh_1 | 23.19900 |
| sky130_osu_sc_15T_hs__addh_l | 23.19900 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) | | |
|---|---|---|---|---|---|
| | A | B | CO | CON | S |
| sky130_osu_sc_15T_hs__addh_1 | 0.00757 | 0.00835 | 2.03880 | 1.04736 | 2.08130 |
| sky130_osu_sc_15T_hs__addh_l | 0.00768 | 0.00860 | 1.31843 | 1.04125 | 1.34792 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__addh_1 | 0.00000 | 0.46290 | 0.53056 |
| sky130_osu_sc_15T_hs__addh_l | 0.00000 | 0.27882 | 0.38456 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addh_1 | A->CO (RR) | 0.08998 | 0.56974 | 6.65855 |
| | B->CO (RR) | 0.09271 | 0.56002 | 6.71006 |
| sky130_osu_sc_15T_hs__addh_l | A->CO (RR) | 0.07886 | 0.60210 | 6.49492 |
| | B->CO (RR) | 0.08181 | 0.59602 | 6.50551 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addh_1 | A->CO (FF) | 0.06860 | 0.51441 | 5.86585 |
| | B->CO (FF) | 0.07287 | 0.52587 | 5.91409 |
| sky130_osu_sc_15T_hs__addh_l | A->CO (FF) | 0.06732 | 0.50818 | 5.27289 |
| | B->CO (FF) | 0.07278 | 0.52306 | 5.32872 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addh_1 | A->CON (RR) | B | 0.12604 | 0.46376 | 3.35986 |
| | A->CON (FR) | !B | 0.07301 | 0.80897 | 10.57270 |
| | B->CON (RR) | A | 0.12840 | 0.45366 | 3.41536 |
| | B->CON (FR) | !A | 0.09001 | 0.81586 | 10.37030 |
| sky130_osu_sc_15T_hs__addh_l | A->CON (RR) | B | 0.10024 | 0.41227 | 3.12117 |
| | A->CON (FR) | !B | 0.06675 | 0.80077 | 10.52760 |
| | B->CON (RR) | A | 0.10296 | 0.40564 | 3.13824 |
| | B->CON (FR) | !A | 0.08371 | 0.80763 | 10.32450 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addh_1 | A->CON (FF) | B | 0.10195 | 0.53149 | 4.79610 |
| | A->CON (RF) | !B | 0.03871 | 0.48415 | 6.33840 |
| | B->CON (FF) | A | 0.10062 | 0.55524 | 5.09341 |
| | B->CON (RF) | !A | 0.04595 | 0.47442 | 6.03468 |
| sky130_osu_sc_15T_hs__addh_l | A->CON (FF) | B | 0.09558 | 0.51848 | 4.83542 |
| | A->CON (RF) | !B | 0.03667 | 0.48101 | 6.31120 |
| | B->CON (FF) | A | 0.09572 | 0.54569 | 5.13596 |
| | B->CON (RF) | !A | 0.04389 | 0.47103 | 6.00906 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addh_1 | A->S (RR) | !B | 0.07584 | 1.32445 | 21.76310 |
| | A->S (FR) | B | 0.13996 | 1.35382 | 19.77850 |
| | B->S (RR) | !A | 0.08334 | 1.28326 | 20.85680 |
| | B->S (FR) | A | 0.13920 | 1.40988 | 20.72000 |
| | CON->S (FR) | - | 0.02439 | 0.68997 | 11.19440 |
| sky130_osu_sc_15T_hs__addh_l | A->S (RR) | !B | 0.07920 | 1.26093 | 17.88100 |
| | A->S (FR) | B | 0.13909 | 1.28616 | 16.05860 |
| | B->S (RR) | !A | 0.08677 | 1.23014 | 17.24000 |
| | B->S (FR) | A | 0.13975 | 1.33781 | 16.74430 |
| | CON->S (FR) | - | 0.02902 | 0.77747 | 11.38420 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__addh_1 | A->S (FF) | !B | 0.10506 | 1.75194 | 28.75170 |
| | A->S (RF) | B | 0.15586 | 1.17422 | 16.48710 |
| | B->S (FF) | !A | 0.12212 | 1.76315 | 28.62350 |
| | B->S (RF) | A | 0.15821 | 1.16337 | 16.53810 |
| | CON->S (RF) | - | 0.01975 | 0.55531 | 9.05909 |
| sky130_osu_sc_15T_hs__addh_l | A->S (FF) | !B | 0.09884 | 1.48128 | 20.92090 |
| | A->S (RF) | B | 0.12926 | 0.95291 | 11.13610 |
| | B->S (FF) | !A | 0.11587 | 1.49125 | 20.75040 |
| | B->S (RF) | A | 0.13197 | 0.94544 | 11.14980 |
| | CON->S (RF) | - | 0.01918 | 0.51995 | 7.64203 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00607 | 0.00623 | 0.01958 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00547 | 0.00551 | 0.02184 |
| sky130_osu_sc_15T_hs__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00529 | 0.00549 | 0.02201 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00470 | 0.00473 | 0.02375 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addh_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00910 | 0.00944 | 0.02782 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00938 | 0.01024 | 0.02963 |
| sky130_osu_sc_15T_hs__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00841 | 0.00883 | 0.02859 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00883 | 0.00968 | 0.03020 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00606 | 0.00622 | 0.01985 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00799 | 0.00854 | 0.01737 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00546 | 0.00552 | 0.02195 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00900 | 0.00914 | 0.01536 |
| sky130_osu_sc_15T_hs__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00528 | 0.00545 | 0.02179 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00757 | 0.00800 | 0.01554 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00469 | 0.00472 | 0.02354 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00856 | 0.00857 | 0.01351 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00910 | 0.00945 | 0.02750 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00116 | 0.00136 | 0.00642 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00938 | 0.01020 | 0.02901 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00205 | 0.00217 | 0.00723 |
| sky130_osu_sc_15T_hs__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00841 | 0.00884 | 0.02866 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00050 | 0.00074 | 0.00481 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00883 | 0.00968 | 0.03012 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00140 | 0.00143 | 0.00547 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00911 | 0.00946 | 0.02837 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00118 | 0.00154 | 0.00631 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00939 | 0.01027 | 0.02994 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00208 | 0.00224 | 0.00692 |
| sky130_osu_sc_15T_hs__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00842 | 0.00884 | 0.02842 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00052 | 0.00074 | 0.00447 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00884 | 0.00968 | 0.03046 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00142 | 0.00144 | 0.00530 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__addh_1 | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00607 | 0.00624 | 0.01999 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00800 | 0.00861 | 0.01796 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00547 | 0.00552 | 0.02223 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00902 | 0.00934 | 0.01698 |
| sky130_osu_sc_15T_hs__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00529 | 0.00550 | 0.02228 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00757 | 0.00798 | 0.01499 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00470 | 0.00473 | 0.02394 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00857 | 0.00863 | 0.01337 |

# SKY130_OSU_SC_15T_HS__AND2x

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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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_15T_hs__and2_1 | 10.37850 |
| sky130_osu_sc_15T_hs__and2_2 | 12.82050 |
| sky130_osu_sc_15T_hs__and2_4 | 17.70450 |
| sky130_osu_sc_15T_hs__and2_6 | 22.58850 |
| sky130_osu_sc_15T_hs__and2_8 | 27.47250 |
| sky130_osu_sc_15T_hs__and2_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_hs__and2_1 | 0.00391 | 0.00403 | 2.05360 |
| sky130_osu_sc_15T_hs__and2_2 | 0.00390 | 0.00402 | 3.98577 |
| sky130_osu_sc_15T_hs__and2_4 | 0.00391 | 0.00404 | 7.63755 |
| sky130_osu_sc_15T_hs__and2_6 | 0.00394 | 0.00403 | 11.23602 |
| sky130_osu_sc_15T_hs__and2_8 | 0.00392 | 0.00404 | 14.52659 |
| sky130_osu_sc_15T_hs__and2_l | 0.00308 | 0.00320 | 1.25805 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__and2_1** | 0.00000 | 0.22080 | 0.35168 |
| **sky130_osu_sc_15T_hs__and2_2** | 0.00000 | 0.35140 | 0.36190 |
| **sky130_osu_sc_15T_hs__and2_4** | 0.00000 | 0.61261 | 0.69315 |
| **sky130_osu_sc_15T_hs__and2_6** | 0.00000 | 0.87382 | 1.03462 |
| **sky130_osu_sc_15T_hs__and2_8** | 0.00000 | 1.13503 | 1.37608 |
| **sky130_osu_sc_15T_hs__and2_l** | 0.00000 | 0.03592 | 0.05664 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__and2_1 | A->Y (RR) | 0.06509 | 0.50273 | 6.59230 |
| | B->Y (RR) | 0.06910 | 0.49825 | 6.38368 |
| sky130_osu_sc_15T_hs__and2_2 | A->Y (RR) | 0.07315 | 0.45164 | 6.56908 |
| | B->Y (RR) | 0.07702 | 0.44232 | 6.36267 |
| sky130_osu_sc_15T_hs__and2_4 | A->Y (RR) | 0.10294 | 0.47054 | 6.78016 |
| | B->Y (RR) | 0.10696 | 0.45549 | 6.58483 |
| sky130_osu_sc_15T_hs__and2_6 | A->Y (RR) | 0.13137 | 0.50670 | 6.94494 |
| | B->Y (RR) | 0.13528 | 0.48663 | 6.75447 |
| sky130_osu_sc_15T_hs__and2_8 | A->Y (RR) | 0.15959 | 0.54612 | 7.08000 |
| | B->Y (RR) | 0.16359 | 0.52249 | 6.88539 |
| sky130_osu_sc_15T_hs__and2_1 | A->Y (RR) | 0.07070 | 0.58578 | 6.41143 |
| | B->Y (RR) | 0.07488 | 0.57920 | 6.22883 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_hs__and2_1** | **A->Y (FF)** | 0.05582 | 0.53937 | 6.94044 |
| | **B->Y (FF)** | 0.05834 | 0.55017 | 7.00318 |
| **sky130_osu_sc_15T_hs__and2_2** | **A->Y (FF)** | 0.06188 | 0.48724 | 6.73477 |
| | **B->Y (FF)** | 0.06476 | 0.49625 | 6.79849 |
| **sky130_osu_sc_15T_hs__and2_4** | **A->Y (FF)** | 0.08564 | 0.51321 | 7.12439 |
| | **B->Y (FF)** | 0.08813 | 0.51858 | 7.19318 |
| **sky130_osu_sc_15T_hs__and2_6** | **A->Y (FF)** | 0.11132 | 0.54419 | 7.28069 |
| | **B->Y (FF)** | 0.11326 | 0.54913 | 7.34555 |
| **sky130_osu_sc_15T_hs__and2_8** | **A->Y (FF)** | 0.13522 | 0.57417 | 7.29574 |
| | **B->Y (FF)** | 0.13685 | 0.57803 | 7.35072 |
| **sky130_osu_sc_15T_hs__and2_l** | **A->Y (FF)** | 0.06271 | 0.52823 | 5.56755 |
| | **B->Y (FF)** | 0.06759 | 0.54346 | 5.66384 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__and2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00404 | 0.00522 | 0.05926 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00411 | 0.00444 | 0.04174 |
| sky130_osu_sc_15T_hs__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00823 | 0.00961 | 0.06417 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00830 | 0.00901 | 0.04676 |
| sky130_osu_sc_15T_hs__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01766 | 0.01882 | 0.06842 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01780 | 0.01837 | 0.05239 |
| sky130_osu_sc_15T_hs__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02825 | 0.02857 | 0.07553 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02835 | 0.02824 | 0.05952 |
| sky130_osu_sc_15T_hs__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03964 | 0.03861 | 0.08498 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03978 | 0.03811 | 0.06876 |
| sky130_osu_sc_15T_hs__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00305 | 0.00378 | 0.03745 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00313 | 0.00329 | 0.02633 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__and2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01061 | 0.01307 | 0.05925 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01181 | 0.01397 | 0.05834 |
| sky130_osu_sc_15T_hs__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01335 | 0.01616 | 0.06622 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01457 | 0.01720 | 0.06456 |
| sky130_osu_sc_15T_hs__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02100 | 0.02390 | 0.06997 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02217 | 0.02478 | 0.06915 |
| sky130_osu_sc_15T_hs__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02927 | 0.03237 | 0.07798 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03024 | 0.03288 | 0.07671 |
| sky130_osu_sc_15T_hs__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03874 | 0.04073 | 0.08563 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03984 | 0.04071 | 0.08393 |
| sky130_osu_sc_15T_hs__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00837 | 0.00998 | 0.03907 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00939 | 0.01070 | 0.03879 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__and2_1 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00408 | -0.00408 | -0.00410 |
| sky130_osu_sc_15T_hs__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00407 | -0.00406 | -0.00409 |
| sky130_osu_sc_15T_hs__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00407 | -0.00409 | -0.00410 |
| sky130_osu_sc_15T_hs__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00410 | -0.00410 | -0.00412 |
| sky130_osu_sc_15T_hs__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00407 | -0.00407 | -0.00409 |
| sky130_osu_sc_15T_hs__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00289 | -0.00289 | -0.00292 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__and2_1 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00409 | 0.00419 | 0.00412 |
| sky130_osu_sc_15T_hs__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00409 | 0.00418 | 0.00411 |
| sky130_osu_sc_15T_hs__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00410 | 0.00419 | 0.00412 |
| sky130_osu_sc_15T_hs__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00413 | 0.00422 | 0.00415 |
| sky130_osu_sc_15T_hs__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00410 | 0.00419 | 0.00413 |
| sky130_osu_sc_15T_hs__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00291 | 0.00297 | 0.00292 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__and2_1 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00390 | -0.00393 | -0.00391 |
| sky130_osu_sc_15T_hs__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00389 | -0.00393 | -0.00390 |
| sky130_osu_sc_15T_hs__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00390 | -0.00393 | -0.00391 |
| sky130_osu_sc_15T_hs__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00389 | -0.00392 | -0.00390 |
| sky130_osu_sc_15T_hs__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00389 | -0.00392 | -0.00390 |
| sky130_osu_sc_15T_hs__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00275 | -0.00276 | -0.00276 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__and2_1 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00400 | 0.00393 | 0.00393 |
| sky130_osu_sc_15T_hs__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00400 | 0.00393 | 0.00392 |
| sky130_osu_sc_15T_hs__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00401 | 0.00393 | 0.00393 |
| sky130_osu_sc_15T_hs__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00401 | 0.00393 | 0.00393 |
| sky130_osu_sc_15T_hs__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00402 | 0.00398 | 0.00394 |
| sky130_osu_sc_15T_hs__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00282 | 0.00276 | 0.00277 |

# SKY130_OSU_SC_15T_HS__AOI21

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__aoi21_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_15T_hs__aoi21_l | 0.00370 | 0.00385 | 0.00389 | 0.94209 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__aoi21_l | 0.00000 | 0.08603 | 0.17073 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__aoi21_l | A0->Y (FR) | 0.06790 | 0.81700 | 10.31730 |
| | A1->Y (FR) | 0.05818 | 0.77501 | 9.92806 |
| | B0->Y (FR) | 0.04847 | 0.81348 | 10.65270 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__aoi21_l | A0->Y (RF) | 0.04466 | 0.50306 | 6.26525 |
| | A1->Y (RF) | 0.04090 | 0.52967 | 6.76710 |
| | B0->Y (RF) | 0.02443 | 0.47171 | 6.22194 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00929 | 0.00927 | 0.01491 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00794 | 0.00788 | 0.01339 |
| | B0 | 0.00571 | 0.00636 | 0.01721 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00209 | 0.00188 | 0.00684 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00214 | 0.00212 | 0.00815 |
| | B0 | -0.00101 | -0.00070 | 0.00475 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00302 | -0.00358 | -0.00358 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | -0.00362 | -0.00363 | -0.00362 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00361 | -0.00364 | -0.00362 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00356 | 0.00361 | 0.00358 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | 0.00362 | 0.00363 | 0.00364 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00371 | 0.00369 | 0.00363 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00298 | -0.00353 | -0.00353 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | -0.00356 | -0.00358 | -0.00356 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00382 | -0.00384 | -0.00385 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00350 | 0.00354 | 0.00353 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | 0.00356 | 0.00358 | 0.00358 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00383 | 0.00392 | 0.00385 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi21_l | (A0 * A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !Y) | -0.00171 | -0.00174 | -0.00171 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi21_l | (A0 * A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !Y) | 0.00185 | 0.00186 | 0.00175 |

# SKY130_OSU_SC_15T_HS__AOI22

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_15T_hs__aoi22_l** | 12.82050 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | **A0** | **A1** | **B0** | **B1** | **Y** |
| **sky130_osu_sc_15T_hs__aoi22_l** | 0.00370 | 0.00382 | 0.00397 | 0.00378 | 0.96369 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_15T_hs__aoi22_l** | 0.00000 | 0.09844 | 0.34147 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__aoi22_l | A0->Y (FR) | 0.08154 | 0.82738 | 10.31780 |
| | A1->Y (FR) | 0.07394 | 0.81127 | 10.21470 |
| | B0->Y (FR) | 0.04850 | 0.79938 | 10.51890 |
| | B1->Y (FR) | 0.05625 | 0.81818 | 10.67970 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__aoi22_l | A0->Y (RF) | 0.05964 | 0.52449 | 6.38227 |
| | A1->Y (RF) | 0.05594 | 0.54965 | 6.88675 |
| | B0->Y (RF) | 0.02991 | 0.52263 | 6.85672 |
| | B1->Y (RF) | 0.03363 | 0.49440 | 6.35298 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | A0 | 0.01136 | 0.01106 | 0.01693 |
| | A1 | 0.01002 | 0.00993 | 0.01559 |
| | B0 | 0.00612 | 0.00662 | 0.01788 |
| | B1 | 0.00743 | 0.00806 | 0.01908 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | A0 | 0.00432 | 0.00410 | 0.00913 |
| | A1 | 0.00437 | 0.00435 | 0.01050 |
| | B0 | -0.00071 | -0.00043 | 0.00578 |
| | B1 | -0.00063 | -0.00058 | 0.00448 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | (A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * B1 * !Y) | -0.00305 | -0.00357 | -0.00358 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | -0.00361 | -0.00364 | -0.00362 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | -0.00361 | -0.00364 | -0.00362 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00361 | -0.00364 | -0.00362 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | (A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * B1 * !Y) | 0.00355 | 0.00360 | 0.00358 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | 0.00362 | 0.00369 | 0.00364 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | 0.00371 | 0.00369 | 0.00363 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00371 | 0.00370 | 0.00363 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | (A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * B1 * !Y) | -0.00302 | -0.00352 | -0.00352 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | -0.00356 | -0.00358 | -0.00356 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | -0.00381 | -0.00383 | -0.00383 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00381 | -0.00383 | -0.00383 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | (A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * B1 * !Y) | 0.00349 | 0.00353 | 0.00352 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | 0.00356 | 0.00361 | 0.00358 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | 0.00382 | 0.00391 | 0.00384 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00382 | 0.00391 | 0.00384 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | (A0 * A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B1 * !Y) | -0.00172 | -0.00175 | -0.00172 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | -0.00171 | -0.00172 | -0.00172 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | -0.00395 | -0.00398 | -0.00398 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | -0.00395 | -0.00398 | -0.00398 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | (A0 * A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B1 * !Y) | 0.00193 | 0.00195 | 0.00177 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | 0.00171 | 0.00172 | 0.00172 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | 0.00396 | 0.00399 | 0.00398 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | 0.00396 | 0.00399 | 0.00398 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | (A0 * A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B0 * !Y) | -0.00172 | -0.00177 | -0.00173 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | -0.00172 | -0.00174 | -0.00173 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00368 | -0.00369 | -0.00369 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | -0.00368 | -0.00369 | -0.00369 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | (A0 * A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * B0 * !Y) | 0.00195 | 0.00196 | 0.00178 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | 0.00172 | 0.00174 | 0.00173 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00378 | 0.00371 | 0.00370 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | 0.00378 | 0.00371 | 0.00370 |

# SKY130_OSU_SC_15T_HS__BUFx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__buf_1 | 7.93650 |
| sky130_osu_sc_15T_hs__buf_2 | 10.37850 |
| sky130_osu_sc_15T_hs__buf_4 | 15.26250 |
| sky130_osu_sc_15T_hs__buf_6 | 20.14650 |
| sky130_osu_sc_15T_hs__buf_8 | 25.03050 |
| sky130_osu_sc_15T_hs__buf_l | 7.93650 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| sky130_osu_sc_15T_hs__buf_1 | 0.00403 | 2.01387 |
| sky130_osu_sc_15T_hs__buf_2 | 0.00404 | 3.97796 |
| sky130_osu_sc_15T_hs__buf_4 | 0.00403 | 7.72490 |
| sky130_osu_sc_15T_hs__buf_6 | 0.00090 | 1.80000 |
| sky130_osu_sc_15T_hs__buf_8 | 0.00405 | 14.87719 |
| sky130_osu_sc_15T_hs__buf_l | 0.00321 | 1.25225 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__buf_1** | 0.00000 | 0.18095 | 0.18095 |
| **sky130_osu_sc_15T_hs__buf_2** | 0.00000 | 0.27143 | 0.35168 |
| **sky130_osu_sc_15T_hs__buf_4** | 0.00000 | 0.45238 | 0.69315 |
| **sky130_osu_sc_15T_hs__buf_6** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_15T_hs__buf_8** | 0.00000 | 0.81427 | 1.37609 |
| **sky130_osu_sc_15T_hs__buf_l** | 0.00000 | 0.03044 | 0.03044 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_hs__buf_1** | **A->Y (RR)** | 0.05088 | 0.47246 | 6.26966 |
| **sky130_osu_sc_15T_hs__buf_2** | **A->Y (RR)** | 0.05666 | 0.41555 | 6.29150 |
| **sky130_osu_sc_15T_hs__buf_4** | **A->Y (RR)** | 0.07683 | 0.41800 | 6.51088 |
| **sky130_osu_sc_15T_hs__buf_8** | **A->Y (RR)** | 0.11633 | 0.47185 | 6.81184 |
| **sky130_osu_sc_15T_hs__buf_l** | **A->Y (RR)** | 0.05574 | 0.54945 | 6.08449 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_hs__buf_1** | **A->Y (FF)** | 0.05296 | 0.52924 | 6.87461 |
| **sky130_osu_sc_15T_hs__buf_2** | **A->Y (FF)** | 0.06029 | 0.49422 | 6.99319 |
| **sky130_osu_sc_15T_hs__buf_4** | **A->Y (FF)** | 0.08341 | 0.50965 | 7.23928 |
| **sky130_osu_sc_15T_hs__buf_8** | **A->Y (FF)** | 0.13275 | 0.57335 | 7.47403 |
| **sky130_osu_sc_15T_hs__buf_l** | **A->Y (FF)** | 0.06018 | 0.52122 | 5.59628 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__buf_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00375 | 0.00487 | 0.04631 |
| sky130_osu_sc_15T_hs__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00785 | 0.00906 | 0.05056 |
| sky130_osu_sc_15T_hs__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01696 | 0.01854 | 0.05873 |
| sky130_osu_sc_15T_hs__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03692 | 0.03856 | 0.07481 |
| sky130_osu_sc_15T_hs__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00297 | 0.00359 | 0.03020 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__buf_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01021 | 0.01294 | 0.05917 |
| sky130_osu_sc_15T_hs__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01299 | 0.01576 | 0.06212 |
| sky130_osu_sc_15T_hs__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02056 | 0.02342 | 0.06945 |
| sky130_osu_sc_15T_hs__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03837 | 0.03969 | 0.08445 |
| sky130_osu_sc_15T_hs__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00810 | 0.00960 | 0.03911 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_15T_hs__buf_6 | 0.00000 | 0.00000 | 0.00000 |
| | -0.00072 | -0.00072 | -0.00070 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_15T_hs__buf_6 | 0.00000 | 0.00000 | 0.00000 |
| | 0.00072 | 0.00072 | 0.00070 |

# SKY130_OSU_SC_15T_HS__DFFRx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__dffr_1 | 53.11350 |
| sky130_osu_sc_15T_hs__dffr_l | 53.11350 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | |
|---|---|---|---|---|---|
| | D | RN | CK | Q | QN |
| sky130_osu_sc_15T_hs__dffr_1 | 0.00380 | 0.00377 | 0.01114 | 1.86965 | 1.86099 |
| sky130_osu_sc_15T_hs__dffr_l | 0.00380 | 0.00377 | 0.01113 | 1.26898 | 1.25508 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__dffr_1 | 0.00000 | 0.52086 | 0.85232 |
| sky130_osu_sc_15T_hs__dffr_l | 0.00000 | 0.36809 | 0.69956 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffr_1 | CK->Q (RR) | 0.25981 | 1.22546 | 14.89000 |
| | QN->Q (FR) | 0.02808 | 0.79125 | 12.58120 |
| sky130_osu_sc_15T_hs__dffr_l | CK->Q (RR) | 0.26217 | 1.41133 | 15.54890 |
| | QN->Q (FR) | 0.03113 | 0.84866 | 12.26920 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffr_1 | CK->Q (RF) | 0.25957 | 1.21797 | 14.96110 |
| | QN->Q (RF) | 0.02221 | 0.59538 | 9.46326 |
| | RN->Q (FF) | 0.19437 | 1.27437 | 16.67930 |
| sky130_osu_sc_15T_hs__dffr_l | CK->Q (RF) | 0.26677 | 1.41377 | 15.60930 |
| | QN->Q (RF) | 0.02513 | 0.65279 | 9.43758 |
| | RN->Q (FF) | 0.20193 | 1.46963 | 17.32690 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffr_1 | CK->QN (RR) | 0.23216 | 0.68405 | 6.30869 |
| | RN->QN (FR) | 0.16691 | 0.74035 | 8.02954 |
| sky130_osu_sc_15T_hs__dffr_l | CK->QN (RR) | 0.23286 | 0.75319 | 6.39257 |
| | RN->QN (FR) | 0.16783 | 0.80948 | 8.10712 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_hs__dffr_1** | **CK->QN (RF)** | 0.22158 | 0.60631 | 4.89896 |
| **sky130_osu_sc_15T_hs__dffr_l** | **CK->QN (RF)** | 0.21735 | 0.65723 | 5.05090 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | hold | CK (R) | -0.06010 | -0.06900 | 0.03966 |
| | setup | CK (R) | 0.20654 | 0.23651 | 0.67509 |
| sky130_osu_sc_15T_hs__dffr_l | hold | CK (R) | -0.06060 | -0.06900 | 0.03854 |
| | setup | CK (R) | 0.20376 | 0.23782 | 0.67605 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | hold | CK (R) | -0.10396 | -0.29646 | -3.39333 |
| | setup | CK (R) | 0.12510 | 0.30625 | 3.67319 |
| sky130_osu_sc_15T_hs__dffr_l | hold | CK (R) | -0.10107 | -0.29445 | -3.41580 |
| | setup | CK (R) | 0.12510 | 0.30625 | 3.67325 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | hold | CK (R) | -0.06010 | -0.06900 | 0.03966 |
| | setup | CK (R) | 0.20654 | 0.23651 | 0.67509 |
| sky130_osu_sc_15T_hs__dffr_l | hold | CK (R) | -0.06060 | -0.06900 | 0.03854 |
| | setup | CK (R) | 0.20376 | 0.23782 | 0.67605 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | hold | CK (R) | -0.10396 | -0.29646 | -3.39333 |
| | setup | CK (R) | 0.12510 | 0.30625 | 3.67319 |
| sky130_osu_sc_15T_hs__dffr_l | hold | CK (R) | -0.10107 | -0.29445 | -3.41580 |
| | setup | CK (R) | 0.12510 | 0.30625 | 3.67325 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | recovery | CK (R) | 0.17681 | 0.21061 | 1.00146 |
| | removal | CK (R) | -0.04312 | -0.05261 | -0.11548 |
| sky130_osu_sc_15T_hs__dffr_l | recovery | CK (R) | 0.17254 | 0.20995 | 1.00268 |
| | removal | CK (R) | -0.04357 | -0.05261 | -0.11548 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | recovery | CK (R) | 0.17681 | 0.21061 | 1.00146 |
| | removal | CK (R) | -0.04312 | -0.05261 | -0.11548 |
| sky130_osu_sc_15T_hs__dffr_l | recovery | CK (R) | 0.17254 | 0.20995 | 1.00268 |
| | removal | CK (R) | -0.04357 | -0.05261 | -0.11548 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | min_pulse_width | RN () | 0.11658 | 0.44556 | 13.33370 |
| | min_pulse_width | RN () | 0.11658 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffr_l | min_pulse_width | RN () | 0.11322 | 0.44556 | 13.33370 |
| | min_pulse_width | RN () | 0.11322 | 0.44556 | 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_15T_hs__dffr_1 | min_pulse_width | CK () | 0.12329 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.13672 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffr_l | min_pulse_width | CK () | 0.11658 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.13001 | 0.44556 | 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_15T_hs__dffr_1 | min_pulse_width | CK () | 0.25757 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.10651 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffr_l | min_pulse_width | CK () | 0.25757 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.10651 | 0.44556 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01036 | 0.00922 | 0.01272 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00900 | 0.00896 | 0.03461 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01163 | 0.00950 | -0.00150 |
| | RN | -0.00131 | -0.09015 | -1.51441 |
| | RN | 0.02671 | 0.02515 | 0.01484 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01030 | 0.00933 | 0.02113 |
| | RN | -0.00131 | -0.07144 | -1.02787 |
| | RN | 0.02538 | 0.02499 | 0.03747 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01162 | 0.00949 | -0.00119 |
| | RN | -0.00131 | -0.08989 | -1.50736 |
| | RN | 0.02670 | 0.02517 | 0.01495 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01030 | 0.00934 | 0.02132 |
| | RN | -0.00131 | -0.07097 | -1.01659 |
| | RN | 0.02537 | 0.02499 | 0.03740 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01031 | 0.00921 | 0.01281 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00895 | 0.00895 | 0.03441 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00290 | -0.00350 | -0.00355 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01246 | 0.01248 | 0.04662 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00555 | 0.00565 | 0.03994 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00290 | -0.00350 | -0.00355 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01246 | 0.01248 | 0.04662 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00555 | 0.00565 | 0.03994 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00354 | 0.00357 | 0.00357 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02084 | 0.02109 | 0.05624 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00960 | 0.00993 | 0.04454 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00354 | 0.00357 | 0.00357 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.02084 | 0.02109 | 0.05624 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00960 | 0.00993 | 0.04454 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00393 | 0.00511 | 0.06530 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01108 | 0.01198 | 0.07275 |
| sky130_osu_sc_15T_hs__dffr_l | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00393 | 0.00511 | 0.06530 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01108 | 0.01196 | 0.07275 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00959 | 0.01204 | 0.07250 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02072 | 0.02296 | 0.08377 |
| sky130_osu_sc_15T_hs__dffr_l | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !Q * QN) + (!CK * !D * !Q * QN) | 0.00959 | 0.01204 | 0.07250 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.02072 | 0.02295 | 0.08377 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00090 | 0.00007 | 0.06007 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00561 | 0.00586 | 0.06811 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00128 | -0.00026 | 0.05940 |
| sky130_osu_sc_15T_hs__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00090 | 0.00007 | 0.06007 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00561 | 0.00586 | 0.06811 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00128 | -0.00026 | 0.05940 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01503 | 0.01731 | 0.07813 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.03212 | 0.03345 | 0.10769 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.02479 | 0.02651 | 0.08858 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.03156 | 0.03549 | 0.13438 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01708 | 0.01917 | 0.07924 |
| sky130_osu_sc_15T_hs__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01503 | 0.01731 | 0.07813 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.03212 | 0.03345 | 0.10769 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.02478 | 0.02651 | 0.08858 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.03156 | 0.03549 | 0.13438 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01708 | 0.01917 | 0.07923 |

# SKY130_OSU_SC_15T_HS__DFFSRx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_15T_hs__dffsr_1** | 57.99750 |
| **sky130_osu_sc_15T_hs__dffsr_l** | 57.99750 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) | |
|---|---|---|---|---|---|---|
| | **D** | **RN** | **SN** | **CK** | **Q** | **QN** |
| **sky130_osu_sc_15T_hs__dffsr_1** | 0.00376 | 0.00378 | 0.00835 | 0.01140 | 2.09149 | 2.09258 |
| **sky130_osu_sc_15T_hs__dffsr_l** | 0.00376 | 0.00378 | 0.00833 | 0.01139 | 1.25511 | 1.25806 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_15T_hs__dffsr_1** | 0.00000 | 0.63808 | 0.86464 |
| **sky130_osu_sc_15T_hs__dffsr_l** | 0.00000 | 0.48531 | 0.71188 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK->Q (RR) | 0.25472 | 1.24738 | 16.02510 |
| | QN->Q (FR) | 0.02443 | 0.73325 | 11.97500 |
| | RN->Q (RR) | 0.20646 | 1.20968 | 16.05830 |
| | SN->Q (FR) | 0.18668 | 1.31320 | 17.93930 |
| sky130_osu_sc_15T_hs__dffsr_l | CK->Q (RR) | 0.26463 | 1.41006 | 15.37700 |
| | QN->Q (FR) | 0.03112 | 0.84345 | 12.16410 |
| | RN->Q (RR) | 0.21658 | 1.37291 | 15.40570 |
| | SN->Q (FR) | 0.19657 | 1.47346 | 17.28100 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK->Q (RF) | 0.28664 | 1.26566 | 15.94780 |
| | QN->Q (RF) | 0.02191 | 0.62114 | 10.18220 |
| | RN->Q (FF) | 0.20160 | 1.30602 | 17.67780 |
| sky130_osu_sc_15T_hs__dffsr_l | CK->Q (RF) | 0.29940 | 1.44349 | 15.47040 |
| | QN->Q (RF) | 0.02509 | 0.64963 | 9.36712 |
| | RN->Q (FF) | 0.21356 | 1.48270 | 17.19460 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK->QN (RR) | 0.25926 | 0.70737 | 6.48509 |
| | RN->QN (FR) | 0.17443 | 0.74803 | 8.21239 |
| sky130_osu_sc_15T_hs__dffsr_l | CK->QN (RR) | 0.26509 | 0.79097 | 6.44516 |
| | RN->QN (FR) | 0.17935 | 0.82997 | 8.16624 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK->QN (RF) | 0.22021 | 0.62907 | 5.55850 |
| | RN->QN (RF) | 0.17286 | 0.59294 | 5.59955 |
| | SN->QN (FF) | 0.15257 | 0.69478 | 7.46576 |
| sky130_osu_sc_15T_hs__dffsr_1 | CK->QN (RF) | 0.22129 | 0.66484 | 5.07497 |
| | RN->QN (RF) | 0.17405 | 0.62925 | 5.11283 |
| | SN->QN (FF) | 0.15360 | 0.72832 | 6.97857 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | hold | CK (R) | -0.06291 | -0.07161 | 0.00538 |
| | setup | CK (R) | 0.19393 | 0.22585 | 0.74778 |
| sky130_osu_sc_15T_hs__dffsr_l | hold | CK (R) | -0.06127 | -0.07253 | 0.00621 |
| | setup | CK (R) | 0.19160 | 0.22481 | 0.75255 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | hold | CK (R) | -0.11038 | -0.31019 | -3.29024 |
| | setup | CK (R) | 0.14088 | 0.31942 | 3.71158 |
| sky130_osu_sc_15T_hs__dffsr_l | hold | CK (R) | -0.11365 | -0.30765 | -3.22896 |
| | setup | CK (R) | 0.14158 | 0.31942 | 3.70960 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | hold | CK (R) | -0.06291 | -0.07161 | 0.00538 |
| | setup | CK (R) | 0.19393 | 0.22585 | 0.74778 |
| sky130_osu_sc_15T_hs__dffsr_l | hold | CK (R) | -0.06127 | -0.07253 | 0.00621 |
| | setup | CK (R) | 0.19160 | 0.22481 | 0.75255 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | hold | CK (R) | -0.11038 | -0.31019 | -3.29024 |
| | setup | CK (R) | 0.14088 | 0.31942 | 3.71158 |
| sky130_osu_sc_15T_hs__dffsr_l | hold | CK (R) | -0.11365 | -0.30765 | -3.22896 |
| | setup | CK (R) | 0.14158 | 0.31942 | 3.70960 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | recovery | CK (R) | 0.14798 | 0.18051 | 0.95255 |
| | removal | CK (R) | -0.02209 | -0.02703 | -0.05345 |
| | hold | SN (R) | -0.14645 | -0.27623 | -1.15139 |
| | setup | SN (R) | 0.17090 | 0.32107 | 4.72381 |
| sky130_osu_sc_15T_hs__dffsr_l | recovery | CK (R) | 0.14420 | 0.17818 | 0.95013 |
| | removal | CK (R) | -0.02209 | -0.02703 | -0.05345 |
| | hold | SN (R) | -0.14594 | -0.27229 | -1.11963 |
| | setup | SN (R) | 0.17197 | 0.31542 | 4.72390 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | recovery | CK (R) | 0.14798 | 0.18051 | 0.95255 |
| | removal | CK (R) | -0.02209 | -0.02703 | -0.05345 |
| | hold | SN (R) | -0.14645 | -0.27623 | -1.15139 |
| | hold | SN (R) | -0.14824 | -0.27789 | -1.15855 |
| | setup | SN (R) | 0.16945 | 0.31715 | 4.46997 |
| | setup | SN (R) | 0.17090 | 0.32107 | 4.72381 |
| sky130_osu_sc_15T_hs__dffsr_l | recovery | CK (R) | 0.14420 | 0.17818 | 0.95013 |
| | removal | CK (R) | -0.02209 | -0.02703 | -0.05345 |
| | hold | SN (R) | -0.14709 | -0.27229 | -1.12233 |
| | hold | SN (R) | -0.14594 | -0.27397 | -1.11963 |
| | setup | SN (R) | 0.17197 | 0.31173 | 4.38291 |
| | setup | SN (R) | 0.16204 | 0.31542 | 4.72390 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | min_pulse_width | RN () | 0.13672 | 0.44556 | 13.33370 |
| | min_pulse_width | RN () | 0.13672 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffsr_l | min_pulse_width | RN () | 0.13672 | 0.44556 | 13.33370 |
| | min_pulse_width | RN () | 0.13336 | 0.44556 | 13.33370 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | recovery | CK (R) | 0.03867 | 0.07298 | 5.56426 |
| | removal | CK (R) | -0.01780 | -0.05671 | -0.28412 |
| sky130_osu_sc_15T_hs__dffsr_l | recovery | CK (R) | 0.03771 | 0.07292 | 5.54413 |
| | removal | CK (R) | -0.01780 | -0.05671 | -0.28412 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | recovery | CK (R) | 0.03867 | 0.07298 | 5.56426 |
| | removal | CK (R) | -0.01780 | -0.05671 | -0.28412 |
| sky130_osu_sc_15T_hs__dffsr_l | recovery | CK (R) | 0.03771 | 0.07292 | 5.54413 |
| | removal | CK (R) | -0.01780 | -0.05671 | -0.28412 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | min_pulse_width | SN () | 0.14679 | 0.44556 | 13.33370 |
| | min_pulse_width | SN () | 0.15015 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffsr_l | min_pulse_width | SN () | 0.14679 | 0.44556 | 13.33370 |
| | min_pulse_width | SN () | 0.14008 | 0.44556 | 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_15T_hs__dffsr_1 | min_pulse_width | CK () | 0.11658 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.14679 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffsr_l | min_pulse_width | CK () | 0.10986 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.14343 | 0.44556 | 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_15T_hs__dffsr_1 | min_pulse_width | CK () | 0.24750 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.12329 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffsr_l | min_pulse_width | CK () | 0.24414 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.12329 | 0.44556 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01296 | 0.01150 | 0.00904 |
| | RN | 0.02398 | 0.02191 | 0.00751 |
| | SN | -0.00131 | -0.09642 | -1.69410 |
| | SN | 0.02249 | 0.01986 | 0.00372 |
| sky130_osu_sc_15T_hs__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01175 | 0.01164 | 0.03762 |
| | RN | 0.02277 | 0.02200 | 0.03647 |
| | SN | -0.00131 | -0.07097 | -1.01664 |
| | SN | 0.02556 | 0.02416 | 0.03217 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01372 | 0.01270 | 0.01623 |
| | RN | -0.00131 | -0.09642 | -1.69409 |
| | RN | 0.02802 | 0.02742 | 0.03235 |
| sky130_osu_sc_15T_hs__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01247 | 0.01160 | 0.02377 |
| | RN | -0.00131 | -0.07097 | -1.01664 |
| | RN | 0.02674 | 0.02629 | 0.03977 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01370 | 0.01268 | 0.01605 |
| | RN | -0.00131 | -0.09645 | -1.69481 |
| | RN | 0.02800 | 0.02739 | 0.03164 |
| sky130_osu_sc_15T_hs__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01246 | 0.01160 | 0.02373 |
| | RN | -0.00131 | -0.07107 | -1.01900 |
| | RN | 0.02672 | 0.02629 | 0.03927 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01291 | 0.01150 | 0.00876 |
| | RN | 0.02393 | 0.02184 | 0.00775 |
| | SN | -0.00131 | -0.09645 | -1.69487 |
| | SN | 0.02245 | 0.01978 | 0.00353 |
| sky130_osu_sc_15T_hs__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01170 | 0.01160 | 0.03699 |
| | RN | 0.02271 | 0.02196 | 0.03619 |
| | SN | -0.00131 | -0.07107 | -1.01897 |
| | SN | 0.02550 | 0.02408 | 0.03251 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00347 | -0.00355 | -0.00355 |
| | (!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) | 0.01606 | 0.01606 | 0.05007 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00640 | 0.00648 | 0.04044 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00635 | 0.00645 | 0.04045 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00642 | 0.00651 | 0.04049 |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00347 | -0.00355 | -0.00355 |
| | (!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) | 0.01606 | 0.01606 | 0.05007 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00640 | 0.00648 | 0.04044 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00635 | 0.00645 | 0.04045 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00641 | 0.00651 | 0.04049 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00362 | 0.00356 | 0.00355 |
| | (!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) | 0.02428 | 0.02443 | 0.05901 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01029 | 0.01066 | 0.04495 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01042 | 0.01072 | 0.04493 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01022 | 0.01059 | 0.04488 |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00362 | 0.00356 | 0.00355 |
| | (!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) | 0.02427 | 0.02442 | 0.05900 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.01027 | 0.01065 | 0.04494 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.01041 | 0.01071 | 0.04492 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.01021 | 0.01058 | 0.04487 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__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) | 0.00346 | 0.00452 | 0.06445 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01342 | 0.01415 | 0.07512 |
| sky130_osu_sc_15T_hs__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) | 0.00346 | 0.00453 | 0.06446 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01342 | 0.01416 | 0.07513 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__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) | 0.01036 | 0.01289 | 0.07350 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02196 | 0.02418 | 0.08527 |
| sky130_osu_sc_15T_hs__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) | 0.01034 | 0.01288 | 0.07349 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.02194 | 0.02416 | 0.08526 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__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) | -0.00806 | -0.00810 | -0.00811 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00768 | -0.00869 | -0.00867 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00774 | -0.00824 | -0.00824 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00540 | 0.00566 | 0.04177 |
| sky130_osu_sc_15T_hs__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) | -0.00806 | -0.00811 | -0.00811 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00767 | -0.00867 | -0.00865 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00773 | -0.00823 | -0.00823 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00545 | 0.00568 | 0.04178 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__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) | 0.00810 | 0.00828 | 0.00814 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00864 | 0.00875 | 0.00870 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00822 | 0.00830 | 0.00827 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01691 | 0.01684 | 0.05118 |
| sky130_osu_sc_15T_hs__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) | 0.00810 | 0.00828 | 0.00814 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00862 | 0.00873 | 0.00868 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00821 | 0.00829 | 0.00826 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01689 | 0.01675 | 0.05117 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffsr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00090 | 0.00007 | 0.06008 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00662 | 0.00694 | 0.06900 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00644 | 0.00675 | 0.06891 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00107 | -0.00006 | 0.05962 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00448 | 0.00624 | 0.11541 |
| sky130_osu_sc_15T_hs__dffsr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00090 | 0.00006 | 0.06008 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00661 | 0.00692 | 0.06899 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00642 | 0.00674 | 0.06890 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00107 | -0.00006 | 0.05962 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00448 | 0.00624 | 0.11542 |

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

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

| | | | | |
|---|---|---|---|---|
| **sky130_osu_sc_15T_hs__dffsr_1** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.03598 | 0.03735 | 0.11076 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01509 | 0.01734 | 0.07820 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.02536 | 0.02717 | 0.08904 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.02542 | 0.02726 | 0.08908 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.03490 | 0.03847 | 0.13757 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01693 | 0.01902 | 0.07910 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.01987 | 0.02385 | 0.13386 |
| **sky130_osu_sc_15T_hs__dffsr_l** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.03598 | 0.03735 | 0.11077 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01509 | 0.01734 | 0.07820 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.02536 | 0.02716 | 0.08904 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.02541 | 0.02729 | 0.08904 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.03489 | 0.03846 | 0.13757 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01693 | 0.01902 | 0.07910 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.01986 | 0.02384 | 0.13385 |

# SKY130_OSU_SC_15T_HS__DFFSx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__dffs_1 | 48.22950 |
| sky130_osu_sc_15T_hs__dffs_l | 48.22950 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) | |
|---|---|---|---|---|---|
| | D | SN | CK | Q | QN |
| sky130_osu_sc_15T_hs__dffs_1 | 0.00379 | 0.00654 | 0.01114 | 1.87209 | 1.88091 |
| sky130_osu_sc_15T_hs__dffs_l | 0.00379 | 0.00653 | 0.01114 | 1.26189 | 1.26585 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__dffs_1 | 0.00000 | 0.45531 | 0.67735 |
| sky130_osu_sc_15T_hs__dffs_l | 0.00000 | 0.30255 | 0.52458 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffs_1 | CK->Q (RR) | 0.20326 | 1.15582 | 14.79120 |
| | QN->Q (FR) | 0.02806 | 0.78904 | 12.52300 |
| | SN->Q (FR) | 0.15770 | 1.28393 | 16.74080 |
| sky130_osu_sc_15T_hs__dffs_l | CK->Q (RR) | 0.20929 | 1.34459 | 15.35650 |
| | QN->Q (FR) | 0.03109 | 0.84330 | 12.17980 |
| | SN->Q (FR) | 0.16408 | 1.46756 | 17.29050 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffs_1 | CK->Q (RF) | 0.28968 | 1.25401 | 14.97630 |
| | QN->Q (RF) | 0.02210 | 0.59372 | 9.43683 |
| sky130_osu_sc_15T_hs__dffs_l | CK->Q (RF) | 0.29582 | 1.44282 | 15.52810 |
| | QN->Q (RF) | 0.02504 | 0.64903 | 9.38239 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffs_1 | CK->QN (RR) | 0.26150 | 0.72256 | 6.38925 |
| sky130_osu_sc_15T_hs__dffs_l | CK->QN (RR) | 0.26098 | 0.78898 | 6.46441 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dffs_1 | CK->QN (RF) | 0.16837 | 0.54135 | 4.86558 |
| | SN->QN (FF) | 0.12220 | 0.66912 | 6.81977 |
| sky130_osu_sc_15T_hs__dffs_l | CK->QN (RF) | 0.16779 | 0.59859 | 5.01507 |
| | SN->QN (FF) | 0.12203 | 0.72157 | 6.94673 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | hold | CK (R) | -0.04492 | -0.05688 | 0.05919 |
| | setup | CK (R) | 0.14639 | 0.18602 | 0.60367 |
| sky130_osu_sc_15T_hs__dffs_l | hold | CK (R) | -0.04444 | -0.05653 | 0.06047 |
| | setup | CK (R) | 0.14595 | 0.18477 | 0.60548 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | hold | CK (R) | -0.10329 | -0.29678 | -3.56599 |
| | setup | CK (R) | 0.13836 | 0.30923 | 3.68632 |
| sky130_osu_sc_15T_hs__dffs_l | hold | CK (R) | -0.10587 | -0.29691 | -3.56275 |
| | setup | CK (R) | 0.13797 | 0.30923 | 3.68632 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | hold | CK (R) | -0.04492 | -0.05688 | 0.05919 |
| | setup | CK (R) | 0.14639 | 0.18602 | 0.60367 |
| sky130_osu_sc_15T_hs__dffs_l | hold | CK (R) | -0.04444 | -0.05653 | 0.06047 |
| | setup | CK (R) | 0.14595 | 0.18477 | 0.60548 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | hold | CK (R) | -0.10329 | -0.29678 | -3.56599 |
| | setup | CK (R) | 0.13836 | 0.30923 | 3.68632 |
| sky130_osu_sc_15T_hs__dffs_l | hold | CK (R) | -0.10587 | -0.29691 | -3.56275 |
| | setup | CK (R) | 0.13797 | 0.30923 | 3.68632 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | recovery | CK (R) | 0.04783 | 0.08674 | 4.55927 |
| | removal | CK (R) | -0.02758 | -0.07184 | -0.39363 |
| sky130_osu_sc_15T_hs__dffs_l | recovery | CK (R) | 0.04709 | 0.08674 | 4.48441 |
| | removal | CK (R) | -0.02758 | -0.07184 | -0.39363 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | recovery | CK (R) | 0.04783 | 0.08674 | 4.55927 |
| | removal | CK (R) | -0.02758 | -0.07184 | -0.39363 |
| sky130_osu_sc_15T_hs__dffs_l | recovery | CK (R) | 0.04709 | 0.08674 | 4.48441 |
| | removal | CK (R) | -0.02758 | -0.07184 | -0.39363 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | min_pulse_width | SN () | 0.10651 | 0.44556 | 13.33370 |
| | min_pulse_width | SN () | 0.11322 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffs_l | min_pulse_width | SN () | 0.10651 | 0.44556 | 13.33370 |
| | min_pulse_width | SN () | 0.10651 | 0.44556 | 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_15T_hs__dffs_1 | min_pulse_width | CK () | 0.08972 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.14679 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffs_l | min_pulse_width | CK () | 0.08636 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.14008 | 0.44556 | 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_15T_hs__dffs_1 | min_pulse_width | CK () | 0.20050 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.12329 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dffs_l | min_pulse_width | CK () | 0.19714 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.11993 | 0.44556 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01035 | 0.00926 | 0.01345 |
| | SN | -0.00131 | -0.09022 | -1.51639 |
| | SN | 0.02233 | 0.02036 | 0.00706 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00901 | 0.00904 | 0.03506 |
| | SN | -0.00131 | -0.07120 | -1.02213 |
| | SN | 0.02099 | 0.02007 | 0.02829 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01156 | 0.00954 | -0.00029 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01022 | 0.00935 | 0.02190 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01155 | 0.00953 | -0.00045 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01022 | 0.00934 | 0.02177 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01030 | 0.00929 | 0.01327 |
| | SN | -0.00131 | -0.09047 | -1.52342 |
| | SN | 0.02229 | 0.02031 | 0.00615 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00897 | 0.00899 | 0.03451 |
| | SN | -0.00131 | -0.07134 | -1.02529 |
| | SN | 0.02095 | 0.02002 | 0.02796 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00353 | -0.00361 | -0.00360 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01175 | 0.01180 | 0.04667 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00544 | 0.00555 | 0.03981 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00353 | -0.00361 | -0.00360 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01175 | 0.01179 | 0.04667 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00543 | 0.00555 | 0.03980 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00367 | 0.00361 | 0.00360 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02044 | 0.02061 | 0.05557 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00973 | 0.01012 | 0.04482 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00367 | 0.00361 | 0.00360 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.02044 | 0.02061 | 0.05557 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00973 | 0.01012 | 0.04482 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | -0.00581 | -0.00587 | -0.00584 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00447 | 0.00446 | 0.03171 |
| sky130_osu_sc_15T_hs__dffs_l | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | -0.00581 | -0.00587 | -0.00584 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00447 | 0.00446 | 0.03171 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00588 | 0.00589 | 0.00587 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01162 | 0.01193 | 0.04049 |
| sky130_osu_sc_15T_hs__dffs_l | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * Q * !QN) + (!CK * D * Q * !QN) | 0.00588 | 0.00589 | 0.00586 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.01161 | 0.01192 | 0.04049 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00093 | 0.00004 | 0.06011 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00123 | -0.00021 | 0.05950 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00346 | 0.00540 | 0.11525 |
| sky130_osu_sc_15T_hs__dffs_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00093 | 0.00004 | 0.06011 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00123 | -0.00021 | 0.05950 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00346 | 0.00540 | 0.11525 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dffs_1 | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.03162 | 0.03294 | 0.10810 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01504 | 0.01733 | 0.07821 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03099 | 0.03465 | 0.13355 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01701 | 0.01909 | 0.07923 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.01922 | 0.02334 | 0.13397 |
| sky130_osu_sc_15T_hs__dffs_l | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.03162 | 0.03294 | 0.10810 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01504 | 0.01733 | 0.07821 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.03099 | 0.03466 | 0.13354 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01701 | 0.01909 | 0.07923 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.01922 | 0.02335 | 0.13397 |

# SKY130_OSU_SC_15T_HS__DFFx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__dff_1 | 40.29300 |
| sky130_osu_sc_15T_hs__dff_l | 40.29300 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) | |
|---|---|---|---|---|
| | D | CK | Q | QN |
| sky130_osu_sc_15T_hs__dff_1 | 0.00394 | 0.01099 | 2.10562 | 2.09555 |
| sky130_osu_sc_15T_hs__dff_l | 0.00394 | 0.01099 | 1.14094 | 1.13660 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__dff_1 | 0.00000 | 0.58278 | 0.72061 |
| sky130_osu_sc_15T_hs__dff_l | 0.00000 | 0.43227 | 0.57009 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dff_1 | CK->Q (RR) | 0.16876 | 1.14764 | 15.97820 |
| | QN->Q (FR) | 0.02427 | 0.73259 | 11.98160 |
| sky130_osu_sc_15T_hs__dff_l | CK->Q (RR) | 0.17523 | 1.15274 | 12.50320 |
| | QN->Q (FR) | 0.03609 | 0.90521 | 12.69870 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dff_1 | CK->Q (RF) | 0.23721 | 1.21154 | 15.96800 |
| | QN->Q (RF) | 0.02184 | 0.62123 | 10.20260 |
| sky130_osu_sc_15T_hs__dff_l | CK->Q (RF) | 0.25165 | 1.27983 | 13.28440 |
| | QN->Q (RF) | 0.02180 | 0.54892 | 7.78045 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dff_1 | CK->QN (RR) | 0.21048 | 0.65076 | 6.41562 |
| sky130_osu_sc_15T_hs__dff_l | CK->QN (RR) | 0.22217 | 0.75317 | 6.27875 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__dff_1 | CK->QN (RF) | 0.13777 | 0.52815 | 5.42671 |
| sky130_osu_sc_15T_hs__dff_l | CK->QN (RF) | 0.13481 | 0.46313 | 3.32530 |

# Constraint Information

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | hold | CK (R) | -0.03932 | -0.04915 | 0.03512 |
| | setup | CK (R) | 0.11486 | 0.15949 | 0.55471 |
| sky130_osu_sc_15T_hs__dff_l | hold | CK (R) | -0.03761 | -0.04915 | 0.03696 |
| | setup | CK (R) | 0.11364 | 0.15807 | 0.56118 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | hold | CK (R) | -0.08998 | -0.29491 | -3.58908 |
| | setup | CK (R) | 0.11034 | 0.30524 | 3.67531 |
| sky130_osu_sc_15T_hs__dff_l | hold | CK (R) | -0.09341 | -0.29491 | -3.58771 |
| | setup | CK (R) | 0.11000 | 0.30531 | 3.67528 |

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

| Cell Name | Timing Check | Ref Pin(trans) | Reference Slew Rate(ns) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | min_pulse_width | CK () | 0.07294 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.12329 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dff_l | min_pulse_width | CK () | 0.07294 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.12329 | 0.44556 | 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_15T_hs__dff_1 | min_pulse_width | CK () | 0.16357 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.08972 | 0.44556 | 13.33370 |
| sky130_osu_sc_15T_hs__dff_l | min_pulse_width | CK () | 0.16357 | 0.44556 | 13.33370 |
| | min_pulse_width | CK () | 0.08972 | 0.44556 | 13.33370 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01096 | 0.00954 | 0.00860 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01003 | 0.00970 | 0.03373 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01181 | 0.01084 | 0.01520 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01078 | 0.00931 | 0.01489 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01180 | 0.01085 | 0.01530 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01078 | 0.00933 | 0.01493 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.01092 | 0.00957 | 0.00819 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00997 | 0.00967 | 0.03357 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00290 | -0.00349 | -0.00354 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01122 | 0.01140 | 0.04686 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00290 | -0.00349 | -0.00354 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01123 | 0.01140 | 0.04686 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00353 | 0.00356 | 0.00355 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02123 | 0.02142 | 0.05678 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00353 | 0.00356 | 0.00355 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.02123 | 0.02142 | 0.05679 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00093 | 0.00005 | 0.06014 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00121 | -0.00018 | 0.05957 |
| sky130_osu_sc_15T_hs__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00093 | 0.00005 | 0.06014 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00121 | -0.00018 | 0.05957 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__dff_1 | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01496 | 0.01726 | 0.07815 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03113 | 0.03261 | 0.10823 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03158 | 0.03540 | 0.13563 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01692 | 0.01903 | 0.07915 |
| sky130_osu_sc_15T_hs__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01496 | 0.01726 | 0.07815 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.03113 | 0.03262 | 0.10823 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.03159 | 0.03540 | 0.13564 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01692 | 0.01902 | 0.07915 |

# SKY130_OSU_SC_15T_HS__INVx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__inv_1 | 5.49450 |
| sky130_osu_sc_15T_hs__inv_10 | 27.47250 |
| sky130_osu_sc_15T_hs__inv_2 | 7.93650 |
| sky130_osu_sc_15T_hs__inv_3 | 10.37850 |
| sky130_osu_sc_15T_hs__inv_4 | 12.82050 |
| sky130_osu_sc_15T_hs__inv_6 | 17.70450 |
| sky130_osu_sc_15T_hs__inv_8 | 22.58850 |
| sky130_osu_sc_15T_hs__inv_l | 5.49450 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | Max Cap(pf) |
|---|---|---|
| | A | Y |
| sky130_osu_sc_15T_hs__inv_1 | 0.00381 | 1.96781 |
| sky130_osu_sc_15T_hs__inv_10 | 0.03501 | 17.55588 |
| sky130_osu_sc_15T_hs__inv_2 | 0.00721 | 3.84118 |
| sky130_osu_sc_15T_hs__inv_3 | 0.01072 | 5.54319 |
| sky130_osu_sc_15T_hs__inv_4 | 0.01415 | 7.45937 |
| sky130_osu_sc_15T_hs__inv_6 | 0.02119 | 10.98954 |
| sky130_osu_sc_15T_hs__inv_8 | 0.02808 | 14.51231 |
| sky130_osu_sc_15T_hs__inv_l | 0.00297 | 1.08986 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__inv_1 | 0.00000 | 0.09048 | 0.17073 |
| sky130_osu_sc_15T_hs__inv_10 | 0.00000 | 0.90475 | 1.70733 |
| sky130_osu_sc_15T_hs__inv_2 | 0.00000 | 0.18095 | 0.34147 |
| sky130_osu_sc_15T_hs__inv_3 | 0.00000 | 0.27143 | 0.51220 |
| sky130_osu_sc_15T_hs__inv_4 | 0.00000 | 0.36190 | 0.68293 |
| sky130_osu_sc_15T_hs__inv_6 | 0.00000 | 0.54285 | 1.02440 |
| sky130_osu_sc_15T_hs__inv_8 | 0.00000 | 0.72380 | 1.36587 |
| sky130_osu_sc_15T_hs__inv_l | 0.00000 | 0.01522 | 0.02620 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_hs__inv_1** | **A->Y (FR)** | 0.02321 | 0.67365 | 10.79370 |
| **sky130_osu_sc_15T_hs__inv_10** | **A->Y (FR)** | 0.03369 | 0.45018 | 10.62220 |
| **sky130_osu_sc_15T_hs__inv_2** | **A->Y (FR)** | 0.01886 | 0.57679 | 10.64410 |
| **sky130_osu_sc_15T_hs__inv_3** | **A->Y (FR)** | 0.02100 | 0.54177 | 10.68760 |
| **sky130_osu_sc_15T_hs__inv_4** | **A->Y (FR)** | 0.02156 | 0.51218 | 10.66690 |
| **sky130_osu_sc_15T_hs__inv_6** | **A->Y (FR)** | 0.02395 | 0.48031 | 10.66370 |
| **sky130_osu_sc_15T_hs__inv_8** | **A->Y (FR)** | 0.02874 | 0.46259 | 10.68310 |
| **sky130_osu_sc_15T_hs__inv_l** | **A->Y (FR)** | 0.03115 | 0.76746 | 10.66820 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| **sky130_osu_sc_15T_hs__inv_1** | **A->Y (RF)** | 0.01971 | 0.54014 | 8.69273 |
| **sky130_osu_sc_15T_hs__inv_10** | **A->Y (RF)** | 0.02836 | 0.32064 | 8.48726 |
| **sky130_osu_sc_15T_hs__inv_2** | **A->Y (RF)** | 0.01602 | 0.45460 | 8.60548 |
| **sky130_osu_sc_15T_hs__inv_3** | **A->Y (RF)** | 0.01751 | 0.42077 | 8.67258 |
| **sky130_osu_sc_15T_hs__inv_4** | **A->Y (RF)** | 0.01725 | 0.39056 | 8.66413 |
| **sky130_osu_sc_15T_hs__inv_6** | **A->Y (RF)** | 0.02074 | 0.35700 | 8.65026 |
| **sky130_osu_sc_15T_hs__inv_8** | **A->Y (RF)** | 0.02489 | 0.33727 | 8.64365 |
| **sky130_osu_sc_15T_hs__inv_l** | **A->Y (RF)** | 0.01988 | 0.48770 | 6.78332 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__inv_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00532 | 0.00615 | 0.01467 |
| sky130_osu_sc_15T_hs__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04561 | 0.06245 | 0.14312 |
| sky130_osu_sc_15T_hs__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00940 | 0.01143 | 0.02838 |
| sky130_osu_sc_15T_hs__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01444 | 0.01788 | 0.04277 |
| sky130_osu_sc_15T_hs__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01858 | 0.02457 | 0.05630 |
| sky130_osu_sc_15T_hs__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02754 | 0.03674 | 0.08458 |
| sky130_osu_sc_15T_hs__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03643 | 0.04736 | 0.11290 |
| sky130_osu_sc_15T_hs__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00409 | 0.00453 | 0.01092 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__inv_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00121 | -0.00081 | 0.00390 |
| sky130_osu_sc_15T_hs__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01782 | -0.01168 | 0.03611 |
| sky130_osu_sc_15T_hs__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00372 | -0.00272 | 0.00684 |
| sky130_osu_sc_15T_hs__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00490 | -0.00350 | 0.01085 |
| sky130_osu_sc_15T_hs__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00740 | -0.00518 | 0.01372 |
| sky130_osu_sc_15T_hs__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01135 | -0.00749 | 0.02091 |
| sky130_osu_sc_15T_hs__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.01505 | -0.01001 | 0.02825 |
| sky130_osu_sc_15T_hs__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00075 | -0.00042 | 0.00312 |

# SKY130_OSU_SC_15T_HS__MUX2

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__mux2_1 | 15.26250 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | S0 | Y |
| sky130_osu_sc_15T_hs__mux2_1 | 0.63299 | 0.63368 | 0.00779 | 0.67013 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__mux2_1 | 0.00000 | 0.18144 | 0.18144 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__mux2_1 | A0->Y (RR) | - | 0.01150 | 0.23638 | 2.75102 |
| | A1->Y (RR) | - | 0.01260 | 0.23764 | 2.74826 |
| | S0->Y (RR) | (!A0 * A1) | 0.04025 | 0.26139 | 1.78694 |
| | S0->Y (FR) | (A0 * !A1) | 0.03054 | 0.37388 | 4.02145 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__mux2_1 | A0->Y (FF) | - | 0.01185 | 0.25379 | 2.97108 |
| | A1->Y (FF) | - | 0.01112 | 0.25216 | 2.96264 |
| | S0->Y (FF) | (!A0 * A1) | 0.05093 | 0.36143 | 3.22722 |
| | S0->Y (RF) | (A0 * !A1) | 0.02249 | 0.29321 | 2.91955 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__mux2_1 | A0 | - | 0.00000 | 0.00000 | 0.00000 |
| | A0 | - | -0.00552 | -0.00551 | -0.00554 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | -0.00380 | -0.00380 | -0.00382 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00645 | 0.00912 | 0.07110 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | -0.00387 | -0.00226 | 0.05877 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__mux2_1 | A0 | - | 0.00000 | 0.00000 | 0.00000 |
| | A0 | - | 0.00552 | 0.00553 | 0.00554 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | 0.00381 | 0.00382 | 0.00382 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00100 | 0.00296 | 0.06438 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | 0.01452 | 0.01701 | 0.07804 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__mux2_1 | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * S0 * Y) + (!A1 * S0 * !Y) | -0.00137 | -0.00136 | -0.00136 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__mux2_1 | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * S0 * Y) + (!A1 * S0 * !Y) | 0.00137 | 0.00136 | 0.00137 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__mux2_1 | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | -0.00163 | -0.00162 | -0.00163 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__mux2_1 | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !S0 * Y) + (!A0 * !S0 * !Y) | 0.00163 | 0.00162 | 0.00163 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__mux2_1 | (A0 * A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * Y) | -0.00146 | 0.00028 | 0.06140 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | -0.00142 | 0.00023 | 0.06158 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__mux2_1 | (A0 * A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * Y) | 0.01100 | 0.01339 | 0.07461 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | 0.00996 | 0.01263 | 0.07426 |

# SKY130_OSU_SC_15T_HS__NAND2x

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__nand2_1 | 7.93650 |
| sky130_osu_sc_15T_hs__nand2_l | 7.93650 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_hs__nand2_1 | 0.00381 | 0.00380 | 1.72217 |
| sky130_osu_sc_15T_hs__nand2_l | 0.00297 | 0.00298 | 1.08340 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__nand2_1 | 0.00000 | 0.09019 | 0.34147 |
| sky130_osu_sc_15T_hs__nand2_l | 0.00000 | 0.01521 | 0.05241 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__nand2_1 | A->Y (FR) | 0.02394 | 0.64788 | 10.04000 |
| | B->Y (FR) | 0.02771 | 0.64214 | 9.88288 |
| sky130_osu_sc_15T_hs__nand2_l | A->Y (FR) | 0.03202 | 0.76870 | 10.66400 |
| | B->Y (FR) | 0.03845 | 0.77336 | 10.63830 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__nand2_1 | A->Y (RF) | 0.02778 | 0.64023 | 10.00450 |
| | B->Y (RF) | 0.03134 | 0.61857 | 9.54784 |
| sky130_osu_sc_15T_hs__nand2_l | A->Y (RF) | 0.02812 | 0.61200 | 8.45878 |
| | B->Y (RF) | 0.03144 | 0.58000 | 7.83292 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00566 | 0.00647 | 0.01464 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00701 | 0.00763 | 0.01600 |
| sky130_osu_sc_15T_hs__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00431 | 0.00478 | 0.01034 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00547 | 0.00575 | 0.01153 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00085 | -0.00047 | 0.00389 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00081 | -0.00076 | 0.00288 |
| sky130_osu_sc_15T_hs__nand2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00055 | -0.00029 | 0.00277 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00051 | -0.00050 | 0.00232 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nand2_1 | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00398 | -0.00401 | -0.00401 |
| sky130_osu_sc_15T_hs__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00277 | -0.00277 | -0.00280 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nand2_1 | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00399 | 0.00409 | 0.00402 |
| sky130_osu_sc_15T_hs__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00279 | 0.00285 | 0.00280 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nand2_1 | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00373 | -0.00376 | -0.00374 |
| sky130_osu_sc_15T_hs__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00258 | -0.00259 | -0.00259 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nand2_1 | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00383 | 0.00377 | 0.00376 |
| sky130_osu_sc_15T_hs__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00265 | 0.00259 | 0.00260 |

# SKY130_OSU_SC_15T_HS__NOR2x

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__nor2_1 | 7.93650 |
| sky130_osu_sc_15T_hs__nor2_l | 7.93650 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_hs__nor2_1 | 0.00379 | 0.00407 | 1.05248 |
| sky130_osu_sc_15T_hs__nor2_l | 0.00287 | 0.00319 | 0.64244 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__nor2_1 | 0.00000 | 0.06704 | 0.17073 |
| sky130_osu_sc_15T_hs__nor2_l | 0.00000 | 0.01223 | 0.02620 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__nor2_1 | A->Y (FR) | 0.04968 | 0.78394 | 10.43900 |
| | B->Y (FR) | 0.03726 | 0.77991 | 10.63030 |
| sky130_osu_sc_15T_hs__nor2_l | A->Y (FR) | 0.06145 | 0.88999 | 10.33570 |
| | B->Y (FR) | 0.05032 | 0.89077 | 10.64390 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__nor2_1 | A->Y (RF) | 0.02737 | 0.44027 | 5.87940 |
| | B->Y (RF) | 0.02102 | 0.43184 | 5.86133 |
| sky130_osu_sc_15T_hs__nor2_l | A->Y (RF) | 0.02501 | 0.41044 | 4.83355 |
| | B->Y (RF) | 0.02099 | 0.40555 | 4.81832 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00762 | 0.00765 | 0.01367 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00571 | 0.00639 | 0.01744 |
| sky130_osu_sc_15T_hs__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00556 | 0.00555 | 0.01012 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00437 | 0.00449 | 0.01245 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nor2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00086 | 0.00122 | 0.00753 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00094 | -0.00051 | 0.00586 |
| sky130_osu_sc_15T_hs__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00052 | 0.00076 | 0.00544 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00054 | -0.00032 | 0.00437 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nor2_1 | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00294 | -0.00352 | -0.00357 |
| sky130_osu_sc_15T_hs__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00200 | -0.00235 | -0.00236 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nor2_1 | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00355 | 0.00358 | 0.00357 |
| sky130_osu_sc_15T_hs__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00235 | 0.00237 | 0.00236 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nor2_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00172 | -0.00176 | -0.00172 |
| sky130_osu_sc_15T_hs__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00112 | -0.00114 | -0.00112 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__nor2_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00179 | 0.00182 | 0.00175 |
| sky130_osu_sc_15T_hs__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00117 | 0.00118 | 0.00114 |

# SKY130_OSU_SC_15T_HS__OAI21

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__oai21_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | Max Cap(pf) |
|---|---|---|---|---|
| | A0 | A1 | B0 | Y |
| sky130_osu_sc_15T_hs__oai21_l | 0.00384 | 0.00392 | 0.00320 | 1.01875 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__oai21_l | 0.00000 | 0.04681 | 0.19694 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__oai21_l | A0->Y (FR) | 0.05164 | 0.79903 | 10.62660 |
| | A1->Y (FR) | 0.06744 | 0.80822 | 10.45670 |
| | B0->Y (FR) | 0.03717 | 0.71864 | 9.81859 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__oai21_l | A0->Y (RF) | 0.03832 | 0.52014 | 6.75053 |
| | A1->Y (RF) | 0.04680 | 0.51821 | 6.59937 |
| | B0->Y (RF) | 0.02998 | 0.56117 | 7.54881 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00780 | 0.00837 | 0.01811 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00972 | 0.00969 | 0.01520 |
| | B0 | 0.00656 | 0.00650 | 0.01403 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai21_l | A0 | 0.00000 | 0.00000 | 0.00000 |
| | A0 | 0.00014 | 0.00018 | 0.00481 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00197 | 0.00176 | 0.00650 |
| | B0 | 0.00076 | 0.00097 | 0.00572 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00173 | -0.00175 | -0.00173 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | -0.00356 | -0.00361 | -0.00359 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00364 | -0.00367 | -0.00364 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai21_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00181 | 0.00182 | 0.00175 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | 0.00358 | 0.00361 | 0.00359 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00368 | 0.00368 | 0.00366 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00285 | -0.00350 | -0.00349 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | -0.00350 | -0.00358 | -0.00355 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00359 | -0.00359 | -0.00360 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai21_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00347 | 0.00350 | 0.00350 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | 0.00353 | 0.00358 | 0.00355 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00363 | 0.00363 | 0.00361 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai21_l | (!A0 * !A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * Y) | -0.00281 | -0.00282 | -0.00287 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai21_l | (!A0 * !A1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * Y) | 0.00286 | 0.00292 | 0.00287 |

# SKY130_OSU_SC_15T_HS__OAI22

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__oai22_l | 12.82050 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | | | Max Cap(pf) |
|---|---|---|---|---|---|
| | A0 | A1 | B0 | B1 | Y |
| sky130_osu_sc_15T_hs__oai22_l | 0.00371 | 0.00393 | 0.00403 | 0.00393 | 1.03684 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__oai22_l | 0.00000 | 0.09985 | 0.34147 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__oai22_l | A0->Y (FR) | 0.07113 | 0.80219 | 10.37420 |
| | A1->Y (FR) | 0.05855 | 0.79755 | 10.56820 |
| | B0->Y (FR) | 0.04076 | 0.78139 | 10.56140 |
| | B1->Y (FR) | 0.05584 | 0.78806 | 10.37510 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__oai22_l | A0->Y (RF) | 0.06667 | 0.56041 | 6.90464 |
| | A1->Y (RF) | 0.05270 | 0.54189 | 6.85085 |
| | B0->Y (RF) | 0.04514 | 0.58307 | 7.65896 |
| | B1->Y (RF) | 0.05957 | 0.60149 | 7.75936 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | A0 | 0.01259 | 0.01256 | 0.01773 |
| | A1 | 0.01063 | 0.01107 | 0.02075 |
| | B0 | 0.00603 | 0.00647 | 0.01700 |
| | B1 | 0.00810 | 0.00806 | 0.01361 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | A0 | 0.00329 | 0.00309 | 0.00769 |
| | A1 | -0.00039 | -0.00037 | 0.00431 |
| | B0 | -0.00041 | -0.00012 | 0.00582 |
| | B1 | 0.00135 | 0.00155 | 0.00716 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00292 | -0.00353 | -0.00357 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | -0.00292 | -0.00353 | -0.00357 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | -0.00352 | -0.00357 | -0.00356 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | -0.00360 | -0.00362 | -0.00361 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00354 | 0.00358 | 0.00357 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | 0.00354 | 0.00358 | 0.00357 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | 0.00354 | 0.00358 | 0.00356 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | 0.00363 | 0.00363 | 0.00362 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | -0.00171 | -0.00174 | -0.00171 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | -0.00171 | -0.00174 | -0.00171 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | -0.00349 | -0.00355 | -0.00353 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | -0.00357 | -0.00360 | -0.00358 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | (A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * B0 * !Y) | 0.00178 | 0.00180 | 0.00173 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | 0.00178 | 0.00181 | 0.00173 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | 0.00351 | 0.00355 | 0.00353 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | 0.00360 | 0.00360 | 0.00359 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | (A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B1 * !Y) | -0.00170 | -0.00173 | -0.00170 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | -0.00168 | -0.00173 | -0.00169 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | -0.00385 | -0.00393 | -0.00389 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | -0.00386 | -0.00390 | -0.00394 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | (A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B1 * !Y) | 0.00177 | 0.00179 | 0.00172 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | 0.00177 | 0.00177 | 0.00172 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | 0.00389 | 0.00393 | 0.00389 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | 0.00393 | 0.00395 | 0.00396 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | -0.00287 | -0.00349 | -0.00350 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | -0.00287 | -0.00349 | -0.00350 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | -0.00393 | -0.00397 | -0.00398 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | -0.00394 | -0.00394 | -0.00402 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | (A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * B0 * !Y) | 0.00348 | 0.00351 | 0.00351 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | 0.00348 | 0.00352 | 0.00351 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | 0.00397 | 0.00401 | 0.00398 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | 0.00401 | 0.00411 | 0.00403 |

# SKY130_OSU_SC_15T_HS__OR2x

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__or2_1 | 10.37850 |
| sky130_osu_sc_15T_hs__or2_2 | 12.82050 |
| sky130_osu_sc_15T_hs__or2_4 | 17.70450 |
| sky130_osu_sc_15T_hs__or2_8 | 27.47250 |
| sky130_osu_sc_15T_hs__or2_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_hs__or2_1 | 0.00414 | 0.00391 | 2.02055 |
| sky130_osu_sc_15T_hs__or2_2 | 0.00415 | 0.00391 | 3.95011 |
| sky130_osu_sc_15T_hs__or2_4 | 0.00415 | 0.00391 | 7.58791 |
| sky130_osu_sc_15T_hs__or2_8 | 0.00415 | 0.00392 | 14.50482 |
| sky130_osu_sc_15T_hs__or2_l | 0.00328 | 0.00303 | 1.13085 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__or2_1** | 0.00000 | 0.11739 | 0.19117 |
| **sky130_osu_sc_15T_hs__or2_2** | 0.00000 | 0.16773 | 0.36190 |
| **sky130_osu_sc_15T_hs__or2_4** | 0.00000 | 0.26843 | 0.70337 |
| **sky130_osu_sc_15T_hs__or2_8** | 0.00000 | 0.46981 | 1.38630 |
| **sky130_osu_sc_15T_hs__or2_l** | 0.00000 | 0.02196 | 0.03467 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__or2_1 | A->Y (RR) | 0.06123 | 0.50408 | 6.19797 |
| | B->Y (RR) | 0.05237 | 0.47584 | 6.16649 |
| sky130_osu_sc_15T_hs__or2_2 | A->Y (RR) | 0.06756 | 0.44320 | 6.18711 |
| | B->Y (RR) | 0.05835 | 0.41806 | 6.14245 |
| sky130_osu_sc_15T_hs__or2_4 | A->Y (RR) | 0.08807 | 0.44113 | 6.39062 |
| | B->Y (RR) | 0.07869 | 0.42022 | 6.32873 |
| sky130_osu_sc_15T_hs__or2_8 | A->Y (RR) | 0.12760 | 0.49007 | 6.70957 |
| | B->Y (RR) | 0.11809 | 0.47372 | 6.64632 |
| sky130_osu_sc_15T_hs__or2_l | A->Y (RR) | 0.06551 | 0.59116 | 5.93630 |
| | B->Y (RR) | 0.05866 | 0.56736 | 5.85929 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__or2_1 | A->Y (FF) | 0.09372 | 0.59669 | 7.16298 |
| | B->Y (FF) | 0.07691 | 0.58081 | 7.26608 |
| sky130_osu_sc_15T_hs__or2_2 | A->Y (FF) | 0.11017 | 0.56806 | 7.23785 |
| | B->Y (FF) | 0.09346 | 0.55839 | 7.31645 |
| sky130_osu_sc_15T_hs__or2_4 | A->Y (FF) | 0.15449 | 0.60006 | 7.48503 |
| | B->Y (FF) | 0.13780 | 0.59774 | 7.53153 |
| sky130_osu_sc_15T_hs__or2_8 | A->Y (FF) | 0.24698 | 0.69943 | 7.73009 |
| | B->Y (FF) | 0.23040 | 0.70063 | 7.76701 |
| sky130_osu_sc_15T_hs__or2_l | A->Y (FF) | 0.11164 | 0.57633 | 5.46800 |
| | B->Y (FF) | 0.09272 | 0.56789 | 5.56105 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__or2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00586 | 0.00613 | 0.03533 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00416 | 0.00560 | 0.04419 |
| sky130_osu_sc_15T_hs__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01001 | 0.01061 | 0.04080 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00823 | 0.00987 | 0.04867 |
| sky130_osu_sc_15T_hs__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01915 | 0.02013 | 0.05064 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01739 | 0.01943 | 0.05744 |
| sky130_osu_sc_15T_hs__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03915 | 0.04002 | 0.06831 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.03736 | 0.03986 | 0.07435 |
| sky130_osu_sc_15T_hs__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00430 | 0.00442 | 0.02094 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00325 | 0.00403 | 0.02365 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__or2_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01253 | 0.01285 | 0.04088 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01027 | 0.01280 | 0.06220 |
| sky130_osu_sc_15T_hs__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01547 | 0.01599 | 0.04383 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01320 | 0.01574 | 0.06377 |
| sky130_osu_sc_15T_hs__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02406 | 0.02403 | 0.05097 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02179 | 0.02351 | 0.06870 |
| sky130_osu_sc_15T_hs__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.04727 | 0.03993 | 0.06568 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.04549 | 0.03899 | 0.08072 |
| sky130_osu_sc_15T_hs__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00962 | 0.00954 | 0.02792 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00805 | 0.00933 | 0.03749 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__or2_1 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00295 | -0.00359 | -0.00359 |
| sky130_osu_sc_15T_hs__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00295 | -0.00359 | -0.00359 |
| sky130_osu_sc_15T_hs__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00295 | -0.00359 | -0.00359 |
| sky130_osu_sc_15T_hs__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00295 | -0.00360 | -0.00359 |
| sky130_osu_sc_15T_hs__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00201 | -0.00240 | -0.00239 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__or2_1 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00356 | 0.00360 | 0.00359 |
| sky130_osu_sc_15T_hs__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00356 | 0.00360 | 0.00359 |
| sky130_osu_sc_15T_hs__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00357 | 0.00360 | 0.00359 |
| sky130_osu_sc_15T_hs__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00357 | 0.00360 | 0.00360 |
| sky130_osu_sc_15T_hs__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00237 | 0.00240 | 0.00239 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__or2_1 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00172 | -0.00175 | -0.00173 |
| sky130_osu_sc_15T_hs__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00172 | -0.00175 | -0.00173 |
| sky130_osu_sc_15T_hs__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00172 | -0.00175 | -0.00173 |
| sky130_osu_sc_15T_hs__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00172 | -0.00175 | -0.00173 |
| sky130_osu_sc_15T_hs__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00115 | -0.00116 | -0.00115 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__or2_1 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00181 | 0.00183 | 0.00175 |
| sky130_osu_sc_15T_hs__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00181 | 0.00183 | 0.00176 |
| sky130_osu_sc_15T_hs__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00182 | 0.00183 | 0.00176 |
| sky130_osu_sc_15T_hs__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00182 | 0.00184 | 0.00176 |
| sky130_osu_sc_15T_hs__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00120 | 0.00121 | 0.00117 |

# SKY130_OSU_SC_15T_HS__TBUFIx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__tbufi_1 | 10.37850 |
| sky130_osu_sc_15T_hs__tbufi_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_15T_hs__tbufi_1 | 0.00405 | 0.00509 | 1.06186 |
| sky130_osu_sc_15T_hs__tbufi_l | 0.00319 | 0.00415 | 0.64140 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__tbufi_1 | 0.00000 | 0.09481 | 0.34147 |
| sky130_osu_sc_15T_hs__tbufi_l | 0.00000 | 0.01710 | 0.05241 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__tbufi_1 | A->Y (FR) | 0.03578 | 0.77656 | 10.62180 |
| | OE->Y (FR) | 0.04120 | 0.33629 | 5.09353 |
| | OE->Y (RR) | 0.06923 | 0.59501 | 6.37513 |
| sky130_osu_sc_15T_hs__tbufi_l | A->Y (FR) | 0.04870 | 0.88918 | 10.63160 |
| | OE->Y (FR) | 0.04819 | 0.33608 | 5.09339 |
| | OE->Y (RR) | 0.07723 | 0.69513 | 6.09157 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__tbufi_1 | A->Y (RF) | 0.02721 | 0.53434 | 7.29522 |
| | OE->Y (FF) | 0.04165 | 0.33630 | 5.09364 |
| | OE->Y (RF) | 0.02528 | 0.50365 | 6.77689 |
| sky130_osu_sc_15T_hs__tbufi_l | A->Y (RF) | 0.02793 | 0.50569 | 6.04980 |
| | OE->Y (FF) | 0.04867 | 0.33606 | 5.09336 |
| | OE->Y (RF) | 0.02626 | 0.46518 | 5.42390 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00544 | 0.00605 | 0.01581 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00546 | 0.00710 | 0.06042 |
| sky130_osu_sc_15T_hs__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00415 | 0.00422 | 0.01125 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00391 | 0.00479 | 0.03677 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00095 | -0.00059 | 0.00496 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00363 | 0.00538 | 0.06629 |
| sky130_osu_sc_15T_hs__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00055 | -0.00034 | 0.00372 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00244 | 0.00339 | 0.04053 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tbufi_1 | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00284 | -0.00289 | -0.00286 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00253 | -0.00256 | -0.00254 |
| sky130_osu_sc_15T_hs__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00204 | -0.00205 | -0.00205 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00184 | -0.00187 | -0.00183 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tbufi_1 | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00284 | 0.00289 | 0.00286 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00258 | 0.00262 | 0.00256 |
| sky130_osu_sc_15T_hs__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00204 | 0.00205 | 0.00205 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00186 | 0.00188 | 0.00184 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00219 | 0.00408 | 0.06631 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00194 | 0.00387 | 0.06604 |
| sky130_osu_sc_15T_hs__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00142 | 0.00244 | 0.04012 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00126 | 0.00232 | 0.03994 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00651 | 0.00901 | 0.07101 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00653 | 0.00911 | 0.07109 |
| sky130_osu_sc_15T_hs__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00509 | 0.00644 | 0.04399 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00514 | 0.00651 | 0.04409 |

# SKY130_OSU_SC_15T_HS__TNBUFIx

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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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_15T_hs__tnbufi_1 | 10.37850 |
| sky130_osu_sc_15T_hs__tnbufi_l | 10.37850 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | OE | Y |
| sky130_osu_sc_15T_hs__tnbufi_1 | 0.00405 | 0.00633 | 1.06188 |
| sky130_osu_sc_15T_hs__tnbufi_l | 0.00319 | 0.00466 | 0.64153 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__tnbufi_1 | 0.00000 | 0.14831 | 0.18095 |
| sky130_osu_sc_15T_hs__tnbufi_l | 0.00000 | 0.02442 | 0.03044 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__tnbufi_1 | A->Y (FR) | 0.03609 | 0.77653 | 10.62170 |
| | OE->Y (RR) | 0.02503 | 0.33678 | 5.09406 |
| | OE->Y (FR) | 0.04708 | 0.77905 | 10.40860 |
| sky130_osu_sc_15T_hs__tnbufi_l | A->Y (FR) | 0.04903 | 0.88914 | 10.63270 |
| | OE->Y (RR) | 0.02463 | 0.33674 | 5.09408 |
| | OE->Y (FR) | 0.05853 | 0.88816 | 10.30120 |

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

| Cell Name | Timing Arc(Dir) | Delay(ns) | | |
|---|---|---|---|---|
| | | First | Mid | Last |
| sky130_osu_sc_15T_hs__tnbufi_1 | A->Y (RF) | 0.02678 | 0.53418 | 7.29516 |
| | OE->Y (RF) | 0.02490 | 0.33675 | 5.09407 |
| | OE->Y (FF) | 0.04527 | 0.48381 | 5.49590 |
| sky130_osu_sc_15T_hs__tnbufi_l | A->Y (RF) | 0.02741 | 0.50547 | 6.05043 |
| | OE->Y (RF) | 0.02445 | 0.33674 | 5.09414 |
| | OE->Y (FF) | 0.05261 | 0.47811 | 4.54508 |

# Power Information

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tnbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00560 | 0.00621 | 0.01596 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01357 | 0.01665 | 0.07920 |
| sky130_osu_sc_15T_hs__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00432 | 0.00438 | 0.01141 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01013 | 0.01189 | 0.04959 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tnbufi_1 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00117 | -0.00079 | 0.00475 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01193 | 0.01547 | 0.06827 |
| sky130_osu_sc_15T_hs__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00076 | -0.00054 | 0.00351 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00883 | 0.01079 | 0.04376 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tnbufi_1 | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00241 | -0.00246 | -0.00243 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00213 | -0.00216 | -0.00214 |
| sky130_osu_sc_15T_hs__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00163 | -0.00164 | -0.00164 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00145 | -0.00147 | -0.00145 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tnbufi_1 | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00241 | 0.00246 | 0.00243 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00217 | 0.00220 | 0.00216 |
| sky130_osu_sc_15T_hs__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00163 | 0.00164 | 0.00164 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00147 | 0.00148 | 0.00145 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tnbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00415 | -0.00244 | 0.06042 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00416 | -0.00241 | 0.06046 |
| sky130_osu_sc_15T_hs__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00265 | -0.00181 | 0.03622 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00264 | -0.00177 | 0.03623 |

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

| Cell Name | When | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__tnbufi_1 | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.01028 | 0.01378 | 0.07661 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.01013 | 0.01347 | 0.07648 |
| sky130_osu_sc_15T_hs__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00764 | 0.00957 | 0.04759 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00755 | 0.00968 | 0.04753 |

# SKY130_OSU_SC_15T_HS__XNOR2

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__xnor2_l | 17.70450 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_hs__xnor2_l | 0.00804 | 0.00713 | 1.07628 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__xnor2_l | 0.00000 | 0.31262 | 0.52242 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__xnor2_l | A->Y (RR) | B | 0.08558 | 0.62252 | 6.45735 |
| | A->Y (FR) | !B | 0.04555 | 0.78516 | 10.64110 |
| | B->Y (RR) | A | 0.06778 | 0.60593 | 6.53317 |
| | B->Y (FR) | !A | 0.06225 | 0.79246 | 10.46310 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__xnor2_l | A->Y (FF) | B | 0.08151 | 0.55433 | 5.79210 |
| | A->Y (RF) | !B | 0.03664 | 0.51617 | 6.86260 |
| | B->Y (FF) | A | 0.06986 | 0.54332 | 5.79332 |
| | B->Y (RF) | !A | 0.04701 | 0.52950 | 6.86644 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__xnor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00520 | 0.00653 | 0.06035 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01306 | 0.01586 | 0.08706 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00152 | 0.00348 | 0.06602 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01433 | 0.01692 | 0.08263 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__xnor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01676 | 0.01861 | 0.07962 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00357 | 0.00521 | 0.07046 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01505 | 0.01780 | 0.08050 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00490 | 0.00642 | 0.07112 |

# SKY130_OSU_SC_15T_HS__XOR2

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_15T_hs__xor2_1 | 17.70450 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) | | Max Cap(pf) |
|---|---|---|---|
| | A | B | Y |
| sky130_osu_sc_15T_hs__xor2_1 | 0.00806 | 0.00718 | 1.05901 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__xor2_1 | 0.00000 | 0.31262 | 0.48995 |

# Delay Information

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__xor2_l | A->Y (RR) | !B | 0.08173 | 0.61590 | 6.53229 |
| | A->Y (FR) | B | 0.05997 | 0.79529 | 10.51940 |
| | B->Y (RR) | !A | 0.07136 | 0.61384 | 6.55491 |
| | B->Y (FR) | A | 0.06366 | 0.79795 | 10.49550 |

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

| Cell Name | Timing Arc(Dir) | When | Delay(ns) | | |
|---|---|---|---|---|---|
| | | | First | Mid | Last |
| sky130_osu_sc_15T_hs__xor2_l | A->Y (FF) | !B | 0.07138 | 0.54336 | 5.61169 |
| | A->Y (RF) | B | 0.03925 | 0.55290 | 7.29059 |
| | B->Y (FF) | !A | 0.06764 | 0.54159 | 5.74225 |
| | B->Y (RF) | A | 0.04652 | 0.52813 | 6.79901 |

# Power Information

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__xor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.01563 | 0.01822 | 0.08468 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00228 | 0.00297 | 0.06320 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01587 | 0.01853 | 0.08335 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00135 | 0.00313 | 0.06513 |

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

| Cell Name | Input | When | Power(pJ) | | |
|---|---|---|---|---|---|
| | | | first | mid | last |
| sky130_osu_sc_15T_hs__xor2_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00321 | 0.00467 | 0.07106 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01705 | 0.01964 | 0.07237 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00327 | 0.00463 | 0.06849 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01530 | 0.01847 | 0.08037 |

# SKY130_OSU_SC_15T_HS_x

*sky130_osu_sc_15T_hs_tt_1P80_25C.ccs*
*Cell Library: Process , Voltage 1.80,*
*Temp 25.00*

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## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| **sky130_osu_sc_15T_hs__ant** | 5.49450 |
| **sky130_osu_sc_15T_hs__tiehi** | 5.49450 |
| **sky130_osu_sc_15T_hs__tielo** | 5.49450 |

## Pin Capacitance Information

| Cell Name | Pin Cap(pf) |
|---|---|
| | A |
| **sky130_osu_sc_15T_hs__ant** | 0.62548 |
| **sky130_osu_sc_15T_hs__tiehi** | 0.00000 |
| **sky130_osu_sc_15T_hs__tielo** | 0.00000 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__ant** | 0.00000 | 279301.00000 | 558602.00000 |
| **sky130_osu_sc_15T_hs__tiehi** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_15T_hs__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_15T_hs__ant | 0.00000 | 0.00000 | 0.00000 |
| | -0.00198 | 0.06930 | 1.03142 |

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

| Cell Name | Power(pJ) | | |
|---|---|---|---|
| | first | mid | last |
| sky130_osu_sc_15T_hs__ant | 0.00000 | 0.00000 | 0.00000 |
| | 4.86144 | 4.62991 | 1.24501 |