# sky130_osu_sc_15T_hs_ss_1P60_-40C.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_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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** | 0.01445 | 0.01444 | 0.01133 | 0.90341 | 0.38815 | 0.86937 |
| **sky130_osu_sc_15T_hs__addf_l** | 0.01444 | 0.01444 | 0.01132 | 0.55909 | 0.38820 | 0.56819 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__addf_1** | 0.00000 | 0.00065 | 0.00072 |
| **sky130_osu_sc_15T_hs__addf_l** | 0.00000 | 0.00072 | 0.00079 |

# 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) | 0.20846 | 1.89101 | 21.62520 |
| | B->CO (RR) | 0.19886 | 1.83138 | 21.11280 |
| | CI->CO (RR) | 0.19970 | 1.91686 | 22.15300 |
| | CON->CO (FR) | 0.04664 | 0.98510 | 12.62430 |
| sky130_osu_sc_15T_hs__addf_l | A->CO (RR) | 0.22154 | 1.81308 | 17.65850 |
| | B->CO (RR) | 0.21156 | 1.77113 | 17.53960 |
| | CI->CO (RR) | 0.21259 | 1.83911 | 18.22370 |
| | CON->CO (FR) | 0.06252 | 1.12630 | 12.80900 |

**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) | 0.42049 | 3.09686 | 34.37810 |
| | B->CO (FF) | 0.38594 | 2.98667 | 33.42450 |
| | CI->CO (FF) | 0.37436 | 3.02217 | 34.14300 |
| | CON->CO (RF) | 0.02692 | 0.58316 | 7.60004 |
| sky130_osu_sc_15T_hs__addf_l | A->CO (FF) | 0.40614 | 2.57970 | 24.27820 |
| | B->CO (FF) | 0.37185 | 2.48926 | 23.67710 |
| | CI->CO (FF) | 0.35972 | 2.50551 | 24.06360 |
| | CON->CO (RF) | 0.02715 | 0.55914 | 6.67910 |

**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) | 0.32319 | 1.49335 | 12.85590 |
| | B->CON (FR) | 0.29265 | 1.42822 | 12.56320 |
| | CI->CON (FR) | 0.27752 | 1.41856 | 12.66240 |
| sky130_osu_sc_15T_hs__addf_l | A->CON (FR) | 0.30597 | 1.47586 | 12.83980 |
| | B->CON (FR) | 0.27570 | 1.41148 | 12.54830 |
| | CI->CON (FR) | 0.25972 | 1.40175 | 12.64600 |

**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) | 0.10486 | 0.61079 | 5.80787 |
| | B->CON (RF) | 0.10004 | 0.61992 | 6.06568 |
| | CI->CON (RF) | 0.09610 | 0.63905 | 6.33464 |
| sky130_osu_sc_15T_hs__addf_l | A->CON (RF) | 0.10087 | 0.60682 | 5.80338 |
| | B->CON (RF) | 0.09630 | 0.61632 | 6.06110 |
| | CI->CON (RF) | 0.09210 | 0.63512 | 6.32986 |

**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) | 0.58144 | 3.11734 | 29.68420 |
| | B->S (-R) | 0.57541 | 3.09478 | 29.31270 |
| | CI->S (-R) | 0.53245 | 3.03635 | 29.42600 |
| | CON->S (RR) | 0.12481 | 0.92368 | 8.27227 |
| sky130_osu_sc_15T_hs__addf_l | A->S (-R) | 0.56223 | 2.84362 | 24.08440 |
| | B->S (-R) | 0.55660 | 2.82660 | 23.87660 |
| | CI->S (-R) | 0.51277 | 2.76181 | 23.84850 |
| | CON->S (RR) | 0.13402 | 1.03548 | 8.29242 |

**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) | 0.38350 | 1.70765 | 15.05140 |
| | B->S (-F) | 0.38308 | 1.64095 | 14.86560 |
| | CI->S (-F) | 0.37415 | 1.72954 | 15.57190 |
| | CON->S (FF) | 0.17228 | 0.85385 | 7.02337 |
| sky130_osu_sc_15T_hs__addf_l | A->S (-F) | 0.35485 | 1.48095 | 11.67290 |
| | B->S (-F) | 0.35647 | 1.43204 | 11.73170 |
| | CI->S (-F) | 0.34532 | 1.50270 | 12.22590 |
| | CON->S (FF) | 0.16384 | 0.80745 | 6.23372 |

# 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 | 0.00250 | 0.00237 | 0.00231 |
| | B | 0.00310 | 0.00311 | 0.00307 |
| | CI | 0.00336 | 0.00344 | 0.00342 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.00194 | 0.00177 | 0.00166 |
| | B | 0.00255 | 0.00247 | 0.00238 |
| | CI | 0.00279 | 0.00282 | 0.00276 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.00990 | 0.00991 | 0.00984 |
| | B | 0.00976 | 0.00989 | 0.00989 |
| | CI | 0.00855 | 0.00882 | 0.00881 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.00937 | 0.00935 | 0.00930 |
| | B | 0.00922 | 0.00932 | 0.00928 |
| | CI | 0.00800 | 0.00824 | 0.00818 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.00989 | 0.00989 | 0.00981 |
| | B | 0.00975 | 0.00987 | 0.00979 |
| | CI | 0.00854 | 0.00877 | 0.00872 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.00937 | 0.00934 | 0.00926 |
| | B | 0.00922 | 0.00932 | 0.00923 |
| | CI | 0.00800 | 0.00822 | 0.00817 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.00246 | 0.00237 | 0.00225 |
| | B | 0.00307 | 0.00305 | 0.00284 |
| | CI | 0.00335 | 0.00342 | 0.00334 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.00191 | 0.00176 | 0.00151 |
| | B | 0.00252 | 0.00244 | 0.00218 |
| | CI | 0.00279 | 0.00281 | 0.00271 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.00990 | 0.00991 | 0.00990 |
| | B | 0.00976 | 0.00989 | 0.00987 |
| | CI | 0.00855 | 0.00882 | 0.00881 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.00937 | 0.00935 | 0.00930 |
| | B | 0.00923 | 0.00932 | 0.00929 |
| | CI | 0.00801 | 0.00825 | 0.00821 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__addf_1 | A | 0.02034 | 0.02051 | 0.02043 |
| | B | 0.01843 | 0.01816 | 0.01816 |
| | CI | 0.01638 | 0.01648 | 0.01643 |
| sky130_osu_sc_15T_hs__addf_l | A | 0.01964 | 0.01965 | 0.01960 |
| | B | 0.01775 | 0.01739 | 0.01739 |
| | CI | 0.01573 | 0.01568 | 0.01566 |

# SKY130_OSU_SC_15T_HS__ADDHx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00743 | 0.00811 | 0.88350 | 0.41320 | 0.88650 |
| sky130_osu_sc_15T_hs__addh_l | 0.00756 | 0.00837 | 0.58208 | 0.41356 | 0.58114 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__addh_1 | 0.00000 | 0.00057 | 0.00067 |
| sky130_osu_sc_15T_hs__addh_l | 0.00000 | 0.00067 | 0.00075 |

# 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) | 0.15705 | 0.94433 | 8.03183 |
| | B->CO (RR) | 0.16020 | 0.93793 | 8.14301 |
| sky130_osu_sc_15T_hs__addh_l | A->CO (RR) | 0.14143 | 1.00877 | 7.92120 |
| | B->CO (RR) | 0.14489 | 1.00647 | 8.04180 |

**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) | 0.14838 | 0.74598 | 6.23926 |
| | B->CO (FF) | 0.15600 | 0.75604 | 6.29208 |
| sky130_osu_sc_15T_hs__addh_l | A->CO (FF) | 0.14400 | 0.73784 | 5.84750 |
| | B->CO (FF) | 0.15494 | 0.75344 | 5.92681 |

**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 | 0.22890 | 0.79051 | 4.37047 |
| | A->CON (FR) | !B | 0.19632 | 1.32311 | 12.64570 |
| | B->CON (RR) | A | 0.23197 | 0.78291 | 4.47186 |
| | B->CON (FR) | !A | 0.23051 | 1.38510 | 12.87800 |
| sky130_osu_sc_15T_hs__addh_l | A->CON (RR) | B | 0.18459 | 0.71862 | 4.05269 |
| | A->CON (FR) | !B | 0.17898 | 1.30613 | 12.63450 |
| | B->CON (RR) | A | 0.18826 | 0.71509 | 4.16923 |
| | B->CON (FR) | !A | 0.21327 | 1.36788 | 12.86600 |

**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 | 0.19343 | 0.76662 | 5.56211 |
| | A->CON (RF) | !B | 0.05134 | 0.52484 | 5.51620 |
| | B->CON (FF) | A | 0.19734 | 0.78589 | 5.72913 |
| | B->CON (RF) | !A | 0.05838 | 0.52120 | 5.34271 |
| sky130_osu_sc_15T_hs__addh_l | A->CON (FF) | B | 0.17984 | 0.74644 | 5.45946 |
| | A->CON (RF) | !B | 0.04852 | 0.52189 | 5.51385 |
| | B->CON (FF) | A | 0.18700 | 0.77206 | 5.65430 |
| | B->CON (RF) | !A | 0.05561 | 0.51804 | 5.34062 |

**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 | 0.13144 | 1.59542 | 18.93450 |
| | A->S (FR) | B | 0.27615 | 1.81300 | 18.29800 |
| | B->S (RR) | !A | 0.13786 | 1.55548 | 18.34430 |
| | B->S (FR) | A | 0.28206 | 1.86816 | 18.92180 |
| | CON->S (FR) | - | 0.04948 | 0.99427 | 12.61830 |
| sky130_osu_sc_15T_hs__addh_l | A->S (RR) | !B | 0.13988 | 1.58129 | 16.49180 |
| | A->S (FR) | B | 0.27401 | 1.78724 | 15.85470 |
| | B->S (RR) | !A | 0.14659 | 1.54971 | 16.07430 |
| | B->S (FR) | A | 0.28318 | 1.83880 | 16.31850 |
| | CON->S (FR) | - | 0.06207 | 1.12984 | 12.96430 |

**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 | 0.27897 | 2.78286 | 32.30810 |
| | A->S (RF) | B | 0.29052 | 1.70258 | 16.10060 |
| | B->S (FF) | !A | 0.31329 | 2.84833 | 32.58810 |
| | B->S (RF) | A | 0.29364 | 1.69596 | 16.21070 |
| | CON->S (RF) | - | 0.02640 | 0.58286 | 7.57016 |
| sky130_osu_sc_15T_hs__addh_l | A->S (FF) | !B | 0.26065 | 2.33541 | 23.75530 |
| | A->S (RF) | B | 0.24421 | 1.39992 | 11.11140 |
| | B->S (FF) | !A | 0.29485 | 2.40234 | 24.00590 |
| | B->S (RF) | A | 0.24780 | 1.39668 | 11.22180 |
| | CON->S (RF) | - | 0.02563 | 0.55931 | 6.73851 |

# 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 | 0.00462 | 0.00439 | 0.00416 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00429 | 0.00406 | 0.00379 |
| sky130_osu_sc_15T_hs__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00401 | 0.00371 | 0.00363 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00368 | 0.00339 | 0.00328 |

**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 | 0.00707 | 0.00685 | 0.00640 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00730 | 0.00732 | 0.00691 |
| sky130_osu_sc_15T_hs__addh_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00653 | 0.00624 | 0.00596 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00687 | 0.00682 | 0.00654 |

**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 | 0.00461 | 0.00438 | 0.00419 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00619 | 0.00612 | 0.00608 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00428 | 0.00405 | 0.00412 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00675 | 0.00669 | 0.00654 |
| sky130_osu_sc_15T_hs__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00400 | 0.00369 | 0.00361 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00588 | 0.00580 | 0.00576 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00368 | 0.00338 | 0.00325 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00642 | 0.00633 | 0.00626 |

**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 | 0.00707 | 0.00688 | 0.00668 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00092 | 0.00089 | 0.00072 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00731 | 0.00731 | 0.00715 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00158 | 0.00149 | 0.00138 |
| sky130_osu_sc_15T_hs__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00653 | 0.00625 | 0.00602 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00037 | 0.00034 | 0.00014 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00687 | 0.00682 | 0.00661 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00105 | 0.00094 | 0.00081 |

**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 | 0.00708 | 0.00686 | 0.00659 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00092 | 0.00094 | 0.00083 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00731 | 0.00732 | 0.00717 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00160 | 0.00152 | 0.00133 |
| sky130_osu_sc_15T_hs__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00654 | 0.00626 | 0.00612 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00037 | 0.00038 | 0.00028 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00687 | 0.00682 | 0.00675 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00107 | 0.00097 | 0.00090 |

**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 | 0.00462 | 0.00438 | 0.00415 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00618 | 0.00617 | 0.00613 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00429 | 0.00406 | 0.00378 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00675 | 0.00674 | 0.00665 |
| sky130_osu_sc_15T_hs__addh_l | A | B | 0.00000 | 0.00000 | 0.00000 |
| | A | B | 0.00401 | 0.00370 | 0.00359 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00587 | 0.00582 | 0.00578 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00368 | 0.00338 | 0.00330 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00641 | 0.00635 | 0.00630 |

# SKY130_OSU_SC_15T_HS__AND2x

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00380 | 0.00390 | 0.89140 |
| sky130_osu_sc_15T_hs__and2_2 | 0.00379 | 0.00389 | 1.76452 |
| sky130_osu_sc_15T_hs__and2_4 | 0.00380 | 0.00390 | 3.41873 |
| sky130_osu_sc_15T_hs__and2_6 | 0.00383 | 0.00389 | 4.99401 |
| sky130_osu_sc_15T_hs__and2_8 | 0.00381 | 0.00390 | 6.62724 |
| sky130_osu_sc_15T_hs__and2_l | 0.00296 | 0.00307 | 0.56166 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__and2_1** | 0.00000 | 0.00026 | 0.00038 |
| **sky130_osu_sc_15T_hs__and2_2** | 0.00000 | 0.00040 | 0.00043 |
| **sky130_osu_sc_15T_hs__and2_4** | 0.00000 | 0.00067 | 0.00073 |
| **sky130_osu_sc_15T_hs__and2_6** | 0.00000 | 0.00093 | 0.00106 |
| **sky130_osu_sc_15T_hs__and2_8** | 0.00000 | 0.00120 | 0.00138 |
| **sky130_osu_sc_15T_hs__and2_l** | 0.00000 | 0.00036 | 0.00053 |

# 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) | 0.11400 | 0.85843 | 7.67024 |
| | B->Y (RR) | 0.11916 | 0.86096 | 7.81361 |
| sky130_osu_sc_15T_hs__and2_2 | A->Y (RR) | 0.12591 | 0.77371 | 7.92879 |
| | B->Y (RR) | 0.13078 | 0.76989 | 8.02426 |
| sky130_osu_sc_15T_hs__and2_4 | A->Y (RR) | 0.17813 | 0.78100 | 8.37372 |
| | B->Y (RR) | 0.18313 | 0.77045 | 8.42802 |
| sky130_osu_sc_15T_hs__and2_6 | A->Y (RR) | 0.22669 | 0.81596 | 8.61043 |
| | B->Y (RR) | 0.23167 | 0.80055 | 8.64559 |
| sky130_osu_sc_15T_hs__and2_8 | A->Y (RR) | 0.27452 | 0.86454 | 8.97649 |
| | B->Y (RR) | 0.27940 | 0.84698 | 8.99922 |
| sky130_osu_sc_15T_hs__and2_1 | A->Y (RR) | 0.13114 | 0.99659 | 7.83025 |
| | B->Y (RR) | 0.13625 | 0.99419 | 7.95399 |

**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)** | 0.11229 | 0.73938 | 6.60713 |
| | **B->Y (FF)** | 0.11946 | 0.75399 | 6.71980 |
| **sky130_osu_sc_15T_hs__and2_2** | **A->Y (FF)** | 0.13472 | 0.72314 | 6.78029 |
| | **B->Y (FF)** | 0.14221 | 0.73486 | 6.86315 |
| **sky130_osu_sc_15T_hs__and2_4** | **A->Y (FF)** | 0.19756 | 0.78069 | 7.41963 |
| | **B->Y (FF)** | 0.20444 | 0.79010 | 7.47650 |
| **sky130_osu_sc_15T_hs__and2_6** | **A->Y (FF)** | 0.26171 | 0.84236 | 7.73325 |
| | **B->Y (FF)** | 0.26768 | 0.85027 | 7.78469 |
| **sky130_osu_sc_15T_hs__and2_8** | **A->Y (FF)** | 0.32222 | 0.90504 | 8.00881 |
| | **B->Y (FF)** | 0.32821 | 0.91349 | 8.06909 |
| **sky130_osu_sc_15T_hs__and2_1** | **A->Y (FF)** | 0.12880 | 0.74522 | 6.03004 |
| | **B->Y (FF)** | 0.14057 | 0.76533 | 6.15110 |

# 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 | 0.00335 | 0.00286 | 0.00287 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00342 | 0.00290 | 0.00285 |
| sky130_osu_sc_15T_hs__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00658 | 0.00637 | 0.00643 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00665 | 0.00645 | 0.00642 |
| sky130_osu_sc_15T_hs__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01365 | 0.01379 | 0.01714 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01370 | 0.01395 | 0.01385 |
| sky130_osu_sc_15T_hs__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02065 | 0.02126 | 0.02137 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02073 | 0.02134 | 0.02158 |
| sky130_osu_sc_15T_hs__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02764 | 0.02849 | 0.02947 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02771 | 0.02879 | 0.02925 |
| sky130_osu_sc_15T_hs__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00252 | 0.00220 | 0.00217 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00258 | 0.00226 | 0.00217 |

**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 | 0.00833 | 0.00817 | 0.00827 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00920 | 0.00901 | 0.00909 |
| sky130_osu_sc_15T_hs__and2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01025 | 0.01059 | 0.01071 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01114 | 0.01144 | 0.01150 |
| sky130_osu_sc_15T_hs__and2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01529 | 0.01651 | 0.01687 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01618 | 0.01730 | 0.01758 |
| sky130_osu_sc_15T_hs__and2_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02040 | 0.02252 | 0.02318 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02126 | 0.02321 | 0.02375 |
| sky130_osu_sc_15T_hs__and2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02521 | 0.02824 | 0.02933 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02613 | 0.02889 | 0.02977 |
| sky130_osu_sc_15T_hs__and2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00653 | 0.00631 | 0.00633 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00726 | 0.00704 | 0.00703 |

**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) | -0.00313 | -0.00316 | -0.00315 |
| sky130_osu_sc_15T_hs__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00311 | -0.00315 | -0.00315 |
| sky130_osu_sc_15T_hs__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00312 | -0.00315 | -0.00315 |
| sky130_osu_sc_15T_hs__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00314 | -0.00317 | -0.00317 |
| sky130_osu_sc_15T_hs__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00312 | -0.00314 | -0.00315 |
| sky130_osu_sc_15T_hs__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | -0.00220 | -0.00221 | -0.00221 |

**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) | 0.00314 | 0.00316 | 0.00316 |
| sky130_osu_sc_15T_hs__and2_2 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00313 | 0.00315 | 0.00315 |
| sky130_osu_sc_15T_hs__and2_4 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00314 | 0.00323 | 0.00316 |
| sky130_osu_sc_15T_hs__and2_6 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00316 | 0.00325 | 0.00318 |
| sky130_osu_sc_15T_hs__and2_8 | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00314 | 0.00322 | 0.00316 |
| sky130_osu_sc_15T_hs__and2_l | (!B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * !Y) | 0.00220 | 0.00222 | 0.00222 |

**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) | -0.00300 | -0.00303 | -0.00301 |
| sky130_osu_sc_15T_hs__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00299 | -0.00302 | -0.00301 |
| sky130_osu_sc_15T_hs__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00300 | -0.00303 | -0.00301 |
| sky130_osu_sc_15T_hs__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00300 | -0.00303 | -0.00301 |
| sky130_osu_sc_15T_hs__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00300 | -0.00300 | -0.00301 |
| sky130_osu_sc_15T_hs__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | -0.00210 | -0.00211 | -0.00210 |

**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) | 0.00301 | 0.00305 | 0.00302 |
| sky130_osu_sc_15T_hs__and2_2 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00300 | 0.00305 | 0.00301 |
| sky130_osu_sc_15T_hs__and2_4 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00301 | 0.00303 | 0.00302 |
| sky130_osu_sc_15T_hs__and2_6 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00301 | 0.00303 | 0.00302 |
| sky130_osu_sc_15T_hs__and2_8 | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00301 | 0.00303 | 0.00302 |
| sky130_osu_sc_15T_hs__and2_l | (!A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * !Y) | 0.00210 | 0.00213 | 0.00211 |

# SKY130_OSU_SC_15T_HS__AOI21

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00354 | 0.00371 | 0.00378 | 0.38920 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__aoi21_l | 0.00000 | 0.00014 | 0.00016 |

# 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) | 0.16224 | 1.35269 | 12.87500 |
| | A1->Y (FR) | 0.13901 | 1.29121 | 12.55700 |
| | B0->Y (FR) | 0.12451 | 1.28562 | 12.68420 |

**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) | 0.05347 | 0.55368 | 5.71117 |
| | A1->Y (RF) | 0.04881 | 0.56889 | 6.01859 |
| | B0->Y (RF) | 0.03165 | 0.51333 | 5.66815 |

# 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 | 0.00672 | 0.00664 | 0.00661 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00581 | 0.00571 | 0.00567 |
| | B0 | 0.00553 | 0.00537 | 0.00533 |

**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 | 0.00109 | 0.00087 | 0.00074 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00111 | 0.00085 | 0.00075 |
| | B0 | -0.00073 | -0.00072 | -0.00083 |

**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) | -0.00263 | -0.00271 | -0.00271 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | -0.00277 | -0.00278 | -0.00278 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00277 | -0.00278 | -0.00278 |

**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) | 0.00269 | 0.00271 | 0.00271 |
| | (!A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !Y) | 0.00277 | 0.00278 | 0.00279 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00278 | 0.00278 | 0.00279 |

**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) | -0.00258 | -0.00267 | -0.00267 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | -0.00272 | -0.00275 | -0.00273 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00292 | -0.00296 | -0.00295 |

**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) | 0.00265 | 0.00267 | 0.00267 |
| | (!A0 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !Y) | 0.00273 | 0.00276 | 0.00274 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00294 | 0.00297 | 0.00295 |

**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) | -0.00159 | -0.00162 | -0.00159 |

**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) | 0.00171 | 0.00172 | 0.00163 |

# SKY130_OSU_SC_15T_HS__AOI22

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00353 | 0.00368 | 0.00386 | 0.00366 | 0.39289 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__aoi22_l | 0.00000 | 0.00019 | 0.00032 |

# 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) | 0.19914 | 1.38656 | 12.85760 |
| | A1->Y (FR) | 0.17919 | 1.35536 | 12.78530 |
| | B0->Y (FR) | 0.12659 | 1.26987 | 12.55780 |
| | B1->Y (FR) | 0.14641 | 1.30085 | 12.67550 |

**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) | 0.06878 | 0.57284 | 5.76003 |
| | A1->Y (RF) | 0.06420 | 0.58824 | 6.07082 |
| | B0->Y (RF) | 0.04036 | 0.55743 | 6.02958 |
| | B1->Y (RF) | 0.04470 | 0.54186 | 5.72088 |

# 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 | 0.00810 | 0.00800 | 0.00755 |
| | A1 | 0.00720 | 0.00707 | 0.00702 |
| | B0 | 0.00586 | 0.00566 | 0.00561 |
| | B1 | 0.00670 | 0.00654 | 0.00651 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__aoi22_l | A0 | 0.00250 | 0.00230 | 0.00213 |
| | A1 | 0.00252 | 0.00231 | 0.00213 |
| | B0 | -0.00048 | -0.00049 | -0.00059 |
| | B1 | -0.00046 | -0.00047 | -0.00057 |

**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) | -0.00263 | -0.00273 | -0.00271 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | -0.00277 | -0.00279 | -0.00278 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | -0.00277 | -0.00277 | -0.00278 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00277 | -0.00277 | -0.00278 |

**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) | 0.00269 | 0.00273 | 0.00271 |
| | (!A1 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * B1 * !Y) | 0.00278 | 0.00281 | 0.00279 |
| | (!A1 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * B0 * !B1 * Y) | 0.00278 | 0.00277 | 0.00279 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00278 | 0.00277 | 0.00279 |

**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) | -0.00259 | -0.00268 | -0.00267 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | -0.00272 | -0.00275 | -0.00273 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | -0.00291 | -0.00294 | -0.00294 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00291 | -0.00295 | -0.00294 |

**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) | 0.00265 | 0.00268 | 0.00267 |
| | (!A0 * B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * B1 * !Y) | 0.00273 | 0.00275 | 0.00274 |
| | (!A0 * B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * B0 * !B1 * Y) | 0.00293 | 0.00295 | 0.00294 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00293 | 0.00295 | 0.00294 |

**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) | -0.00159 | -0.00160 | -0.00160 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | -0.00159 | -0.00161 | -0.00160 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | -0.00302 | -0.00304 | -0.00305 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | -0.00302 | -0.00304 | -0.00305 |

**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) | 0.00177 | 0.00177 | 0.00164 |
| | (A0 * A1 * !B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B1 * !Y) | 0.00159 | 0.00161 | 0.00160 |
| | (!A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B1 * Y) | 0.00304 | 0.00307 | 0.00305 |
| | (!A0 * A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B1 * Y) | 0.00304 | 0.00307 | 0.00305 |

**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) | -0.00160 | -0.00164 | -0.00161 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | -0.00160 | -0.00160 | -0.00161 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00283 | -0.00285 | -0.00284 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | -0.00283 | -0.00285 | -0.00284 |

**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) | 0.00178 | 0.00178 | 0.00165 |
| | (A0 * A1 * !B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * A1 * !B0 * !Y) | 0.00160 | 0.00160 | 0.00161 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00283 | 0.00285 | 0.00284 |
| | (!A0 * A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * A1 * !B0 * Y) | 0.00283 | 0.00285 | 0.00284 |

# SKY130_OSU_SC_15T_HS__BUFx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00392 | 0.87954 |
| sky130_osu_sc_15T_hs__buf_2 | 0.00392 | 1.74525 |
| sky130_osu_sc_15T_hs__buf_4 | 0.00392 | 3.43975 |
| sky130_osu_sc_15T_hs__buf_6 | 0.00091 | 1.80000 |
| sky130_osu_sc_15T_hs__buf_8 | 0.00392 | 6.67535 |
| sky130_osu_sc_15T_hs__buf_l | 0.00310 | 0.56308 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__buf_1** | 0.00000 | 0.00022 | 0.00022 |
| **sky130_osu_sc_15T_hs__buf_2** | 0.00000 | 0.00032 | 0.00038 |
| **sky130_osu_sc_15T_hs__buf_4** | 0.00000 | 0.00054 | 0.00070 |
| **sky130_osu_sc_15T_hs__buf_6** | 0.00000 | 0.00000 | 0.00000 |
| **sky130_osu_sc_15T_hs__buf_8** | 0.00000 | 0.00097 | 0.00135 |
| **sky130_osu_sc_15T_hs__buf_l** | 0.00000 | 0.00029 | 0.00029 |

# 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) | 0.08832 | 0.82012 | 7.57335 |
| sky130_osu_sc_15T_hs__buf_2 | A->Y (RR) | 0.09470 | 0.72600 | 7.77686 |
| sky130_osu_sc_15T_hs__buf_4 | A->Y (RR) | 0.12797 | 0.71192 | 8.24390 |
| sky130_osu_sc_15T_hs__buf_8 | A->Y (RR) | 0.19370 | 0.75868 | 8.75804 |
| sky130_osu_sc_15T_hs__buf_l | A->Y (RR) | 0.10144 | 0.95055 | 7.74260 |

**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) | 0.10718 | 0.72569 | 6.51083 |
| sky130_osu_sc_15T_hs__buf_2 | A->Y (FF) | 0.13111 | 0.72409 | 6.85743 |
| sky130_osu_sc_15T_hs__buf_4 | A->Y (FF) | 0.19312 | 0.77599 | 7.40912 |
| sky130_osu_sc_15T_hs__buf_8 | A->Y (FF) | 0.31838 | 0.90232 | 8.01336 |
| sky130_osu_sc_15T_hs__buf_l | A->Y (FF) | 0.12459 | 0.73851 | 5.98369 |

# 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 | 0.00315 | 0.00257 | 0.00259 |
| sky130_osu_sc_15T_hs__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00638 | 0.00599 | 0.00608 |
| sky130_osu_sc_15T_hs__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01347 | 0.01353 | 0.01356 |
| sky130_osu_sc_15T_hs__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02746 | 0.02842 | 0.02855 |
| sky130_osu_sc_15T_hs__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00247 | 0.00206 | 0.00204 |

**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 | 0.00815 | 0.00792 | 0.00802 |
| sky130_osu_sc_15T_hs__buf_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01008 | 0.01028 | 0.01038 |
| sky130_osu_sc_15T_hs__buf_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01510 | 0.01618 | 0.01645 |
| sky130_osu_sc_15T_hs__buf_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02513 | 0.02785 | 0.02874 |
| sky130_osu_sc_15T_hs__buf_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00642 | 0.00615 | 0.00617 |

**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 |
| | -0.00055 | -0.00056 | -0.00055 |

**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 |
| | 0.00055 | 0.00056 | 0.00055 |

# SKY130_OSU_SC_15T_HS__DFFRx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00364 | 0.00367 | 0.01110 | 0.84552 | 0.83299 |
| sky130_osu_sc_15T_hs__dffr_l | 0.00364 | 0.00367 | 0.01110 | 0.56954 | 0.55946 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__dffr_1 | 0.00000 | 0.00112 | 0.00122 |
| sky130_osu_sc_15T_hs__dffr_l | 0.00000 | 0.00120 | 0.00129 |

# 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) | 0.58598 | 1.85011 | 13.88930 |
| | QN->Q (FR) | 0.05594 | 1.09123 | 13.80280 |
| sky130_osu_sc_15T_hs__dffr_l | CK->Q (RR) | 0.57222 | 2.02582 | 14.19780 |
| | QN->Q (FR) | 0.06500 | 1.19594 | 13.72090 |

**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) | 0.52242 | 1.91508 | 15.93140 |
| | QN->Q (RF) | 0.02965 | 0.62890 | 8.13051 |
| | RN->Q (FF) | 0.37156 | 1.94740 | 18.44480 |
| sky130_osu_sc_15T_hs__dffr_l | CK->Q (RF) | 0.53796 | 2.14541 | 16.14220 |
| | QN->Q (RF) | 0.03257 | 0.66087 | 7.93365 |
| | RN->Q (FF) | 0.38765 | 2.17827 | 18.63930 |

**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) | 0.46712 | 1.23218 | 8.13549 |
| | RN->QN (FR) | 0.31533 | 1.26468 | 10.64570 |
| sky130_osu_sc_15T_hs__dffr_l | CK->QN (RR) | 0.47246 | 1.34245 | 8.26599 |
| | RN->QN (FR) | 0.32132 | 1.37531 | 10.76840 |

**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)** | 0.49708 | 0.98695 | 4.17690 |
| **sky130_osu_sc_15T_hs__dffr_l** | **CK->QN (RF)** | 0.47014 | 0.98747 | 4.12120 |

# 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) | -0.08409 | -0.10656 | -0.53389 |
| | setup | CK (R) | 0.45179 | 0.45900 | 1.59795 |
| sky130_osu_sc_15T_hs__dffr_l | hold | CK (R) | -0.08336 | -0.10705 | -0.53063 |
| | setup | CK (R) | 0.45160 | 0.45900 | 1.59748 |

**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) | -0.23680 | -0.57466 | -7.07332 |
| | setup | CK (R) | 0.27681 | 0.58978 | 7.13142 |
| sky130_osu_sc_15T_hs__dffr_l | hold | CK (R) | -0.23741 | -0.57239 | -7.07192 |
| | setup | CK (R) | 0.27681 | 0.58978 | 7.13141 |

**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) | -0.08409 | -0.10656 | -0.53389 |
| | setup | CK (R) | 0.45179 | 0.45900 | 1.59795 |
| sky130_osu_sc_15T_hs__dffr_l | hold | CK (R) | -0.08336 | -0.10705 | -0.53063 |
| | setup | CK (R) | 0.45160 | 0.45900 | 1.59748 |

**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) | -0.23680 | -0.57466 | -7.07332 |
| | setup | CK (R) | 0.27681 | 0.58978 | 7.13142 |
| sky130_osu_sc_15T_hs__dffr_l | hold | CK (R) | -0.23741 | -0.57239 | -7.07192 |
| | setup | CK (R) | 0.27681 | 0.58978 | 7.13141 |

**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) | 0.41168 | 0.41963 | 1.37611 |
| | removal | CK (R) | -0.09068 | -0.10633 | -0.12556 |
| sky130_osu_sc_15T_hs__dffr_l | recovery | CK (R) | 0.41145 | 0.41839 | 1.38002 |
| | removal | CK (R) | -0.09068 | -0.10633 | -0.12556 |

**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) | 0.41168 | 0.41963 | 1.37611 |
| | removal | CK (R) | -0.09068 | -0.10633 | -0.12556 |
| sky130_osu_sc_15T_hs__dffr_l | recovery | CK (R) | 0.41145 | 0.41839 | 1.38002 |
| | removal | CK (R) | -0.09068 | -0.10633 | -0.12556 |

**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 () | 0.23046 | 0.54053 | 13.33370 |
| | min_pulse_width | RN () | 0.22842 | 0.54053 | 13.33370 |
| sky130_osu_sc_15T_hs__dffr_l | min_pulse_width | RN () | 0.22867 | 0.53612 | 13.33370 |
| | min_pulse_width | RN () | 0.22665 | 0.53612 | 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 () | 0.26048 | 0.48096 | 13.33370 |
| | min_pulse_width | CK () | 0.27493 | 0.48096 | 13.33370 |
| sky130_osu_sc_15T_hs__dffr_l | min_pulse_width | CK () | 0.23518 | 0.48096 | 13.33370 |
| | min_pulse_width | CK () | 0.26409 | 0.48096 | 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 () | 0.57759 | 0.65748 | 13.33370 |
| | min_pulse_width | CK () | 0.22659 | 0.50302 | 13.33370 |
| sky130_osu_sc_15T_hs__dffr_l | min_pulse_width | CK () | 0.57581 | 0.66410 | 13.33370 |
| | min_pulse_width | CK () | 0.22659 | 0.50302 | 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 | 0.00778 | 0.00646 | -0.00184 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00672 | 0.00567 | 0.00050 |

**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 | 0.00889 | 0.00807 | 0.00184 |
| | RN | -0.00109 | -0.04520 | -0.54113 |
| | RN | 0.02022 | 0.01951 | 0.01304 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00780 | 0.00717 | 0.00412 |
| | RN | -0.00109 | -0.03566 | -0.36450 |
| | RN | 0.01912 | 0.01860 | 0.01524 |

**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 | 0.00890 | 0.00808 | 0.00194 |
| | RN | -0.00109 | -0.04480 | -0.53311 |
| | RN | 0.02023 | 0.01952 | 0.01310 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00780 | 0.00718 | 0.00418 |
| | RN | -0.00109 | -0.03528 | -0.35805 |
| | RN | 0.01912 | 0.01860 | 0.01536 |

**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 | 0.00775 | 0.00644 | -0.00194 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00668 | 0.00564 | 0.00057 |

**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 | -0.00253 | -0.00270 | -0.00270 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00881 | 0.00835 | 0.00807 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00392 | 0.00350 | 0.00328 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00253 | -0.00270 | -0.00270 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00881 | 0.00835 | 0.00807 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00392 | 0.00350 | 0.00328 |

**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 | 0.00268 | 0.00271 | 0.00270 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01541 | 0.01518 | 0.01498 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00693 | 0.00676 | 0.00672 |
| sky130_osu_sc_15T_hs__dffr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00268 | 0.00271 | 0.00270 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * Q * !QN) + (!CK * RN * !Q * QN) | 0.01541 | 0.01518 | 0.01498 |
| | (!CK * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !Q * QN) | 0.00694 | 0.00676 | 0.00672 |

**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) | 0.00318 | 0.00264 | 0.00252 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.00845 | 0.00772 | 0.00741 |
| 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) | 0.00318 | 0.00264 | 0.00252 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.00845 | 0.00772 | 0.00741 |

**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) | 0.00733 | 0.00701 | 0.00710 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01585 | 0.01535 | 0.01509 |
| 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) | 0.00733 | 0.00701 | 0.00710 |
| | (!CK * D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !Q * QN) | 0.01585 | 0.01535 | 0.01509 |

**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) | -0.00059 | -0.00125 | -0.00144 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00399 | 0.00291 | 0.00239 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00090 | -0.00158 | -0.00172 |
| sky130_osu_sc_15T_hs__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00059 | -0.00123 | -0.00144 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.00399 | 0.00291 | 0.00239 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00090 | -0.00158 | -0.00173 |

**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) | 0.01234 | 0.01197 | 0.01189 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.02432 | 0.02354 | 0.02280 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.01901 | 0.01846 | 0.01797 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.02465 | 0.02390 | 0.02372 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01342 | 0.01304 | 0.01296 |
| sky130_osu_sc_15T_hs__dffr_l | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | 0.01234 | 0.01199 | 0.01189 |
| | (D * RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * !Q * QN) | 0.02432 | 0.02354 | 0.02280 |
| | (D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !Q * QN) | 0.01901 | 0.01846 | 0.01797 |
| | (!D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * Q * !QN) | 0.02465 | 0.02390 | 0.02372 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01342 | 0.01304 | 0.01296 |

# SKY130_OSU_SC_15T_HS__DFFSRx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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** | 0.00359 | 0.00367 | 0.00803 | 0.01130 | 0.90197 | 0.90158 |
| **sky130_osu_sc_15T_hs__dffsr_l** | 0.00359 | 0.00367 | 0.00801 | 0.01130 | 0.56493 | 0.56291 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | **Min.** | **Avg** | **Max.** |
| **sky130_osu_sc_15T_hs__dffsr_1** | 0.00000 | 0.00107 | 0.00129 |
| **sky130_osu_sc_15T_hs__dffsr_l** | 0.00000 | 0.00114 | 0.00137 |

# 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) | 0.55995 | 1.83534 | 14.35170 |
| | QN->Q (FR) | 0.04987 | 1.03844 | 13.27140 |
| | RN->Q (RR) | 0.45971 | 1.74409 | 14.39690 |
| | SN->Q (FR) | 0.44290 | 1.89480 | 17.69280 |
| sky130_osu_sc_15T_hs__dffsr_l | CK->Q (RR) | 0.56485 | 2.02034 | 14.18550 |
| | QN->Q (FR) | 0.06502 | 1.19064 | 13.64250 |
| | RN->Q (RR) | 0.46499 | 1.93031 | 14.21960 |
| | SN->Q (FR) | 0.44745 | 2.08236 | 17.47710 |

**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) | 0.57170 | 1.96227 | 16.28040 |
| | QN->Q (RF) | 0.02935 | 0.64124 | 8.38066 |
| | RN->Q (FF) | 0.39272 | 1.96749 | 18.86170 |
| sky130_osu_sc_15T_hs__dffsr_l | CK->Q (RF) | 0.59712 | 2.20094 | 16.08580 |
| | QN->Q (RF) | 0.03253 | 0.65802 | 7.90023 |
| | RN->Q (FF) | 0.41758 | 2.20571 | 18.65160 |

**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) | 0.51723 | 1.27765 | 8.28219 |
| | RN->QN (FR) | 0.33868 | 1.28128 | 10.85600 |
| sky130_osu_sc_15T_hs__dffsr_l | CK->QN (RR) | 0.53065 | 1.40908 | 8.37549 |
| | RN->QN (FR) | 0.35134 | 1.41200 | 10.94300 |

**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) | 0.47995 | 0.98577 | 4.51138 |
| | RN->QN (RF) | 0.37931 | 0.89670 | 4.54789 |
| | SN->QN (FF) | 0.36281 | 1.04771 | 7.83295 |
| sky130_osu_sc_15T_hs__dffsr_l | CK->QN (RF) | 0.46720 | 0.99159 | 4.23567 |
| | RN->QN (RF) | 0.36688 | 0.90339 | 4.27706 |
| | SN->QN (FF) | 0.34995 | 1.05511 | 7.52040 |

# 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) | -0.08792 | -0.11265 | -0.61738 |
| | setup | CK (R) | 0.42193 | 0.42353 | 1.57358 |
| sky130_osu_sc_15T_hs__dffsr_l | hold | CK (R) | -0.08895 | -0.11425 | -0.62057 |
| | setup | CK (R) | 0.41926 | 0.42434 | 1.56736 |

**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) | -0.26820 | -0.60104 | -7.29297 |
| | setup | CK (R) | 0.31306 | 0.61660 | 7.32802 |
| sky130_osu_sc_15T_hs__dffsr_l | hold | CK (R) | -0.26834 | -0.60208 | -7.29394 |
| | setup | CK (R) | 0.31194 | 0.61660 | 7.32802 |

**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) | -0.08792 | -0.11265 | -0.61738 |
| | setup | CK (R) | 0.42193 | 0.42353 | 1.57358 |
| sky130_osu_sc_15T_hs__dffsr_l | hold | CK (R) | -0.08895 | -0.11425 | -0.62057 |
| | setup | CK (R) | 0.41926 | 0.42434 | 1.56736 |

**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) | -0.26820 | -0.60104 | -7.29297 |
| | setup | CK (R) | 0.31306 | 0.61660 | 7.32802 |
| sky130_osu_sc_15T_hs__dffsr_l | hold | CK (R) | -0.26834 | -0.60208 | -7.29394 |
| | setup | CK (R) | 0.31194 | 0.61660 | 7.32802 |

**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) | 0.34537 | 0.35134 | 1.31046 |
| | removal | CK (R) | -0.04311 | -0.05174 | -0.09280 |
| | hold | SN (R) | -0.35825 | -0.57930 | -4.71085 |
| | setup | SN (R) | 0.38377 | 0.61921 | 6.57818 |
| sky130_osu_sc_15T_hs__dffsr_l | recovery | CK (R) | 0.34384 | 0.35089 | 1.31892 |
| | removal | CK (R) | -0.04235 | -0.05174 | -0.09280 |
| | hold | SN (R) | -0.34436 | -0.56339 | -4.62279 |
| | setup | SN (R) | 0.38231 | 0.60381 | 6.46713 |

**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) | 0.34537 | 0.35134 | 1.31046 |
| | removal | CK (R) | -0.04311 | -0.05174 | -0.09280 |
| | hold | SN (R) | -0.36028 | -0.57930 | -4.71085 |
| | hold | SN (R) | -0.35825 | -0.58171 | -4.72062 |
| | setup | SN (R) | 0.38377 | 0.61553 | 6.51836 |
| | setup | SN (R) | 0.38025 | 0.61921 | 6.57818 |
| sky130_osu_sc_15T_hs__dffsr_l | recovery | CK (R) | 0.34384 | 0.35089 | 1.31892 |
| | removal | CK (R) | -0.04235 | -0.05174 | -0.09280 |
| | hold | SN (R) | -0.34959 | -0.56378 | -4.62279 |
| | hold | SN (R) | -0.34436 | -0.56339 | -4.63733 |
| | setup | SN (R) | 0.38231 | 0.59742 | 6.37863 |
| | setup | SN (R) | 0.35711 | 0.60381 | 6.46713 |

**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 () | 0.26381 | 0.56481 | 13.33370 |
| | min_pulse_width | RN () | 0.27235 | 0.56481 | 13.33370 |
| sky130_osu_sc_15T_hs__dffsr_l | min_pulse_width | RN () | 0.26282 | 0.56260 | 13.33370 |
| | min_pulse_width | RN () | 0.26494 | 0.56260 | 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) | 0.05238 | 0.08116 | 2.15815 |
| | removal | CK (R) | -0.01586 | -0.05179 | -0.50817 |
| sky130_osu_sc_15T_hs__dffsr_l | recovery | CK (R) | 0.04794 | 0.08039 | 1.97504 |
| | removal | CK (R) | -0.01586 | -0.05179 | -0.50709 |

**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) | 0.05238 | 0.08116 | 2.15815 |
| | removal | CK (R) | -0.01586 | -0.05179 | -0.50817 |
| sky130_osu_sc_15T_hs__dffsr_l | recovery | CK (R) | 0.04794 | 0.08039 | 1.97504 |
| | removal | CK (R) | -0.01586 | -0.05179 | -0.50709 |

**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 () | 0.36139 | 0.66410 | 13.33370 |
| | min_pulse_width | SN () | 0.36256 | 0.66631 | 13.33370 |
| sky130_osu_sc_15T_hs__dffsr_l | min_pulse_width | SN () | 0.35817 | 0.64424 | 13.33370 |
| | min_pulse_width | SN () | 0.34087 | 0.64866 | 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 () | 0.24241 | 0.48096 | 13.33370 |
| | min_pulse_width | CK () | 0.29301 | 0.48096 | 13.33370 |
| sky130_osu_sc_15T_hs__dffsr_l | min_pulse_width | CK () | 0.22795 | 0.48096 | 13.33370 |
| | min_pulse_width | CK () | 0.28939 | 0.48096 | 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 () | 0.54818 | 0.62659 | 13.33370 |
| | min_pulse_width | CK () | 0.26613 | 0.53833 | 13.33370 |
| sky130_osu_sc_15T_hs__dffsr_l | min_pulse_width | CK () | 0.54626 | 0.62438 | 13.33370 |
| | min_pulse_width | CK () | 0.26508 | 0.53612 | 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 | 0.00955 | 0.00818 | -0.00369 |
| | RN | 0.01828 | 0.01716 | 0.00500 |
| | SN | -0.00109 | -0.04699 | -0.57726 |
| | SN | 0.02000 | 0.01897 | 0.00686 |
| sky130_osu_sc_15T_hs__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00859 | 0.00759 | 0.00249 |
| | RN | 0.01731 | 0.01655 | 0.01129 |
| | SN | -0.00109 | -0.03549 | -0.36155 |
| | SN | 0.01902 | 0.01838 | 0.01303 |

**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 | 0.01025 | 0.00972 | 0.00589 |
| | RN | -0.00109 | -0.04699 | -0.57726 |
| | RN | 0.02121 | 0.02071 | 0.01666 |
| sky130_osu_sc_15T_hs__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00925 | 0.00868 | 0.00569 |
| | RN | -0.00109 | -0.03549 | -0.36155 |
| | RN | 0.02018 | 0.01963 | 0.01642 |

**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 | 0.01026 | 0.00973 | 0.00589 |
| | RN | -0.00109 | -0.04698 | -0.57701 |
| | RN | 0.02121 | 0.02071 | 0.01664 |
| sky130_osu_sc_15T_hs__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00926 | 0.00869 | 0.00572 |
| | RN | -0.00109 | -0.03541 | -0.36027 |
| | RN | 0.02018 | 0.01964 | 0.01642 |

**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 | 0.00952 | 0.00815 | -0.00392 |
| | RN | 0.01825 | 0.01712 | 0.00491 |
| | SN | -0.00109 | -0.04698 | -0.57697 |
| | SN | 0.01996 | 0.01895 | 0.00679 |
| sky130_osu_sc_15T_hs__dffsr_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00856 | 0.00756 | 0.00245 |
| | RN | 0.01728 | 0.01652 | 0.01124 |
| | SN | -0.00109 | -0.03541 | -0.36024 |
| | SN | 0.01898 | 0.01835 | 0.01313 |

**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 | -0.00261 | -0.00270 | -0.00270 |
| | (!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) | 0.01140 | 0.01099 | 0.01072 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00456 | 0.00418 | 0.00394 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00454 | 0.00415 | 0.00392 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00460 | 0.00422 | 0.00398 |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00261 | -0.00270 | -0.00270 |
| | (!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) | 0.01140 | 0.01099 | 0.01072 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00456 | 0.00418 | 0.00394 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00454 | 0.00415 | 0.00392 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00460 | 0.00422 | 0.00398 |

**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 | 0.00268 | 0.00271 | 0.00270 |
| | (!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) | 0.01772 | 0.01750 | 0.01716 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00756 | 0.00741 | 0.00737 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00758 | 0.00743 | 0.00738 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00752 | 0.00736 | 0.00732 |
| sky130_osu_sc_15T_hs__dffsr_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00268 | 0.00271 | 0.00270 |
| | (!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) | 0.01771 | 0.01749 | 0.01716 |
| | (!CK * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * RN * !SN * Q * !QN) | 0.00755 | 0.00740 | 0.00736 |
| | (!CK * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * SN * !Q * QN) | 0.00757 | 0.00742 | 0.00737 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !RN * !SN * !Q * QN) | 0.00751 | 0.00735 | 0.00731 |

**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) | 0.00326 | 0.00274 | 0.00252 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01048 | 0.00974 | 0.00937 |
| 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) | 0.00326 | 0.00274 | 0.00252 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01048 | 0.00975 | 0.00938 |

**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) | 0.00810 | 0.00779 | 0.00786 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01696 | 0.01637 | 0.01602 |
| 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) | 0.00809 | 0.00778 | 0.00784 |
| | (!CK * D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * SN * !Q * QN) | 0.01695 | 0.01636 | 0.01601 |

**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) | -0.00618 | -0.00623 | -0.00623 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00657 | -0.00669 | -0.00666 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00629 | -0.00633 | -0.00634 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00354 | 0.00307 | 0.00274 |
| 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) | -0.00618 | -0.00623 | -0.00623 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | -0.00655 | -0.00667 | -0.00664 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | -0.00629 | -0.00633 | -0.00633 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.00355 | 0.00310 | 0.00275 |

**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) | 0.00622 | 0.00623 | 0.00624 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00662 | 0.00670 | 0.00666 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00631 | 0.00633 | 0.00634 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01252 | 0.01226 | 0.01225 |
| 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) | 0.00622 | 0.00623 | 0.00624 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (CK * !RN * !Q * QN) + (!CK * !D * !RN * !Q * QN) | 0.00661 | 0.00669 | 0.00664 |
| | (!CK * D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * D * !RN * !Q * QN) | 0.00630 | 0.00633 | 0.00634 |
| | (!CK * !D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * RN * Q * !QN) | 0.01251 | 0.01225 | 0.01219 |

**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) | -0.00059 | -0.00121 | -0.00144 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00479 | 0.00376 | 0.00325 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00473 | 0.00372 | 0.00322 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00073 | -0.00142 | -0.00158 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00376 | 0.00261 | 0.00227 |
| sky130_osu_sc_15T_hs__dffsr_1 | (D * RN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * RN * Q * !QN) | -0.00059 | -0.00121 | -0.00144 |
| | (D * !RN * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * SN * !Q * QN) | 0.00478 | 0.00375 | 0.00324 |
| | (D * !RN * !SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !RN * !SN * !Q * QN) | 0.00472 | 0.00371 | 0.00319 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN) | -0.00073 | -0.00142 | -0.00158 |
| | (!D * RN * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * RN * !SN * Q * !QN) | 0.00376 | 0.00261 | 0.00227 |

**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)** | 0.02709 | 0.02633 | 0.02554 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01238 | 0.01205 | 0.01194 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.01946 | 0.01896 | 0.01848 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.01949 | 0.01907 | 0.01853 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.02688 | 0.02607 | 0.02575 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01329 | 0.01290 | 0.01291 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.01593 | 0.01522 | 0.01524 |
| **sky130_osu_sc_15T_hs__dffsr_l** | **(D * RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * SN * !Q * QN)** | 0.02708 | 0.02633 | 0.02559 |
| | **(D * RN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * RN * Q * !QN)** | 0.01238 | 0.01205 | 0.01194 |
| | **(D * !RN * SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * SN * !Q * QN)** | 0.01946 | 0.01896 | 0.01848 |
| | **(D * !RN * !SN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(D * !RN * !SN * !Q * QN)** | 0.01949 | 0.01907 | 0.01853 |
| | **(!D * RN * SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * Q * !QN)** | 0.02688 | 0.02606 | 0.02574 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * SN * !Q * QN) + (!D * !RN * !Q * QN)** | 0.01329 | 0.01290 | 0.01291 |
| | **(!D * RN * !SN * Q * !QN)** | 0.00000 | 0.00000 | 0.00000 |
| | **(!D * RN * !SN * Q * !QN)** | 0.01592 | 0.01521 | 0.01523 |

# SKY130_OSU_SC_15T_HS__DFFSx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00362 | 0.00630 | 0.01110 | 0.82869 | 0.84537 |
| sky130_osu_sc_15T_hs__dffs_l | 0.00362 | 0.00630 | 0.01110 | 0.56702 | 0.56865 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__dffs_1 | 0.00000 | 0.00111 | 0.00160 |
| sky130_osu_sc_15T_hs__dffs_l | 0.00000 | 0.00119 | 0.00167 |

# 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) | 0.39832 | 1.62109 | 13.41500 |
| | QN->Q (FR) | 0.05600 | 1.09000 | 13.59550 |
| | SN->Q (FR) | 0.33275 | 1.76473 | 16.68950 |
| sky130_osu_sc_15T_hs__dffs_l | CK->Q (RR) | 0.40054 | 1.82922 | 13.96190 |
| | QN->Q (FR) | 0.06506 | 1.19817 | 13.65370 |
| | SN->Q (FR) | 0.33343 | 1.97190 | 17.18230 |

**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) | 0.57783 | 1.95664 | 15.66650 |
| | QN->Q (RF) | 0.02950 | 0.62425 | 8.03824 |
| sky130_osu_sc_15T_hs__dffs_l | CK->Q (RF) | 0.59005 | 2.19417 | 16.10580 |
| | QN->Q (RF) | 0.03246 | 0.65747 | 7.90284 |

**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) | 0.52048 | 1.29506 | 8.27568 |
| sky130_osu_sc_15T_hs__dffs_l | CK->QN (RR) | 0.52293 | 1.40260 | 8.42069 |

**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) | 0.32124 | 0.78192 | 4.02648 |
| | SN->QN (FF) | 0.25420 | 0.92634 | 7.29520 |
| sky130_osu_sc_15T_hs__dffs_l | CK->QN (RF) | 0.30979 | 0.80311 | 3.99908 |
| | SN->QN (FF) | 0.24135 | 0.94760 | 7.21865 |

# 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) | -0.05857 | -0.08762 | -0.49786 |
| | setup | CK (R) | 0.28015 | 0.29398 | 1.53426 |
| sky130_osu_sc_15T_hs__dffs_l | hold | CK (R) | -0.06207 | -0.08777 | -0.50430 |
| | setup | CK (R) | 0.27933 | 0.29370 | 1.54295 |

**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) | -0.24001 | -0.57826 | -7.11037 |
| | setup | CK (R) | 0.30549 | 0.59721 | 7.17967 |
| sky130_osu_sc_15T_hs__dffs_l | hold | CK (R) | -0.23961 | -0.57834 | -7.11367 |
| | setup | CK (R) | 0.30497 | 0.59683 | 7.18386 |

**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) | -0.05857 | -0.08762 | -0.49786 |
| | setup | CK (R) | 0.28015 | 0.29398 | 1.53426 |
| sky130_osu_sc_15T_hs__dffs_l | hold | CK (R) | -0.06207 | -0.08777 | -0.50430 |
| | setup | CK (R) | 0.27933 | 0.29370 | 1.54295 |

**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) | -0.24001 | -0.57826 | -7.11037 |
| | setup | CK (R) | 0.30549 | 0.59721 | 7.17967 |
| sky130_osu_sc_15T_hs__dffs_l | hold | CK (R) | -0.23961 | -0.57834 | -7.11367 |
| | setup | CK (R) | 0.30497 | 0.59683 | 7.18386 |

**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) | 0.07330 | 0.10756 | 1.72991 |
| | removal | CK (R) | -0.02850 | -0.07204 | -0.60232 |
| sky130_osu_sc_15T_hs__dffs_l | recovery | CK (R) | 0.06992 | 0.10756 | 1.55195 |
| | removal | CK (R) | -0.02850 | -0.07204 | -0.60232 |

**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) | 0.07330 | 0.10756 | 1.72991 |
| | removal | CK (R) | -0.02850 | -0.07204 | -0.60232 |
| sky130_osu_sc_15T_hs__dffs_l | recovery | CK (R) | 0.06992 | 0.10756 | 1.55195 |
| | removal | CK (R) | -0.02850 | -0.07204 | -0.60232 |

**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 () | 0.23929 | 0.63321 | 13.33370 |
| | min_pulse_width | SN () | 0.24328 | 0.63100 | 13.33370 |
| sky130_osu_sc_15T_hs__dffs_l | min_pulse_width | SN () | 0.23215 | 0.61335 | 13.33370 |
| | min_pulse_width | SN () | 0.22437 | 0.61776 | 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 () | 0.15204 | 0.48096 | 13.33370 |
| | min_pulse_width | CK () | 0.28939 | 0.48096 | 13.33370 |
| sky130_osu_sc_15T_hs__dffs_l | min_pulse_width | CK () | 0.14120 | 0.48096 | 13.33370 |
| | min_pulse_width | CK () | 0.28216 | 0.48096 | 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 () | 0.40549 | 0.54274 | 13.33370 |
| | min_pulse_width | CK () | 0.26122 | 0.51185 | 13.33370 |
| sky130_osu_sc_15T_hs__dffs_l | min_pulse_width | CK () | 0.40549 | 0.54274 | 13.33370 |
| | min_pulse_width | CK () | 0.25737 | 0.51185 | 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 | 0.00782 | 0.00642 | -0.00214 |
| | SN | -0.00109 | -0.04466 | -0.53036 |
| | SN | 0.01697 | 0.01585 | 0.00483 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00673 | 0.00565 | 0.00063 |
| | SN | -0.00109 | -0.03557 | -0.36289 |
| | SN | 0.01588 | 0.01508 | 0.00991 |

**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 | 0.00885 | 0.00808 | 0.00214 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00777 | 0.00718 | 0.00421 |

**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 | 0.00885 | 0.00808 | 0.00200 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00777 | 0.00718 | 0.00421 |

**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 | 0.00779 | 0.00639 | -0.00200 |
| | SN | -0.00109 | -0.04520 | -0.54100 |
| | SN | 0.01695 | 0.01581 | 0.00479 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00670 | 0.00562 | 0.00060 |
| | SN | -0.00109 | -0.03563 | -0.36391 |
| | SN | 0.01584 | 0.01505 | 0.00977 |

**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 | -0.00265 | -0.00275 | -0.00274 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00851 | 0.00804 | 0.00767 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00383 | 0.00342 | 0.00319 |
| sky130_osu_sc_15T_hs__dffs_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00265 | -0.00275 | -0.00274 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00851 | 0.00804 | 0.00767 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00383 | 0.00342 | 0.00319 |

**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 | 0.00273 | 0.00275 | 0.00274 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01535 | 0.01509 | 0.01489 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00713 | 0.00695 | 0.00692 |
| sky130_osu_sc_15T_hs__dffs_1 | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00273 | 0.00275 | 0.00274 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * SN * Q * !QN) + (!CK * SN * !Q * QN) | 0.01535 | 0.01509 | 0.01489 |
| | (!CK * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !SN * Q * !QN) | 0.00713 | 0.00695 | 0.00692 |

**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) | -0.00442 | -0.00444 | -0.00445 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00346 | 0.00305 | 0.00291 |
| 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) | -0.00442 | -0.00444 | -0.00445 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00346 | 0.00306 | 0.00291 |

**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) | 0.00443 | 0.00448 | 0.00446 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00870 | 0.00835 | 0.00826 |
| 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) | 0.00442 | 0.00448 | 0.00446 |
| | (!CK * !D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * !D * Q * !QN) | 0.00871 | 0.00836 | 0.00830 |

**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) | -0.00061 | -0.00127 | -0.00146 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00086 | -0.00154 | -0.00169 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00304 | 0.00182 | 0.00152 |
| sky130_osu_sc_15T_hs__dffs_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00061 | -0.00127 | -0.00146 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | -0.00086 | -0.00154 | -0.00170 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.00304 | 0.00182 | 0.00152 |

**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) | 0.02409 | 0.02334 | 0.02256 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01235 | 0.01199 | 0.01191 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.02449 | 0.02364 | 0.02343 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01336 | 0.01294 | 0.01291 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.01543 | 0.01475 | 0.01475 |
| sky130_osu_sc_15T_hs__dffs_l | (D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * SN * !Q * QN) | 0.02409 | 0.02334 | 0.02256 |
| | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01235 | 0.01202 | 0.01191 |
| | (!D * SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * Q * !QN) | 0.02449 | 0.02364 | 0.02343 |
| | (!D * SN * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * SN * !Q * QN) | 0.01336 | 0.01294 | 0.01291 |
| | (!D * !SN * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !SN * Q * !QN) | 0.01543 | 0.01475 | 0.01475 |

# SKY130_OSU_SC_15T_HS__DFFx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00378 | 0.01105 | 0.89395 | 0.89858 |
| sky130_osu_sc_15T_hs__dff_l | 0.00378 | 0.01105 | 0.53356 | 0.53041 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__dff_1 | 0.00000 | 0.00091 | 0.00097 |
| sky130_osu_sc_15T_hs__dff_l | 0.00000 | 0.00098 | 0.00105 |

# 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) | 0.32135 | 1.55297 | 13.91730 |
| | QN->Q (FR) | 0.04957 | 1.03239 | 13.17620 |
| sky130_osu_sc_15T_hs__dff_l | CK->Q (RR) | 0.33415 | 1.65538 | 12.53540 |
| | QN->Q (FR) | 0.07415 | 1.26268 | 14.09920 |

**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) | 0.49582 | 1.87290 | 16.03090 |
| | QN->Q (RF) | 0.02927 | 0.63910 | 8.33291 |
| sky130_osu_sc_15T_hs__dff_l | CK->Q (RF) | 0.53077 | 2.06761 | 15.03160 |
| | QN->Q (RF) | 0.02908 | 0.59711 | 7.16607 |

**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) | 0.44272 | 1.19489 | 8.15165 |
| sky130_osu_sc_15T_hs__dff_l | CK->QN (RR) | 0.46736 | 1.35727 | 8.29705 |

**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) | 0.25252 | 0.71483 | 4.18920 |
| sky130_osu_sc_15T_hs__dff_l | CK->QN (RF) | 0.24499 | 0.66779 | 3.20098 |

# 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) | -0.05672 | -0.08611 | -0.53300 |
| | setup | CK (R) | 0.20398 | 0.22458 | 1.50076 |
| sky130_osu_sc_15T_hs__dff_l | hold | CK (R) | -0.05784 | -0.08632 | -0.53462 |
| | setup | CK (R) | 0.20112 | 0.22371 | 1.48822 |

**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) | -0.23382 | -0.58114 | -7.20283 |
| | setup | CK (R) | 0.27359 | 0.60348 | 7.28311 |
| sky130_osu_sc_15T_hs__dff_l | hold | CK (R) | -0.23286 | -0.58237 | -7.20367 |
| | setup | CK (R) | 0.27398 | 0.60232 | 7.28647 |

**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 () | 0.12313 | 0.48096 | 13.33370 |
| | min_pulse_width | CK () | 0.26409 | 0.48096 | 13.33370 |
| sky130_osu_sc_15T_hs__dff_l | min_pulse_width | CK () | 0.11951 | 0.48096 | 13.33370 |
| | min_pulse_width | CK () | 0.25686 | 0.48096 | 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 () | 0.33091 | 0.51847 | 13.33370 |
| | min_pulse_width | CK () | 0.22150 | 0.51847 | 13.33370 |
| sky130_osu_sc_15T_hs__dff_l | min_pulse_width | CK () | 0.32953 | 0.51626 | 13.33370 |
| | min_pulse_width | CK () | 0.21759 | 0.51847 | 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 | 0.00834 | 0.00677 | -0.00482 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00757 | 0.00637 | 0.00094 |

**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 | 0.00904 | 0.00853 | 0.00482 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00823 | 0.00753 | 0.00321 |

**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 | 0.00904 | 0.00853 | 0.00478 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00824 | 0.00753 | 0.00326 |

**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 | 0.00831 | 0.00674 | -0.00478 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00754 | 0.00633 | 0.00075 |

**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 | -0.00253 | -0.00270 | -0.00269 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00826 | 0.00787 | 0.00756 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | -0.00253 | -0.00270 | -0.00269 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00827 | 0.00787 | 0.00757 |

**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 | 0.00267 | 0.00270 | 0.00269 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01605 | 0.01573 | 0.01547 |
| sky130_osu_sc_15T_hs__dff_l | CK | 0.00000 | 0.00000 | 0.00000 |
| | CK | 0.00267 | 0.00270 | 0.00269 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!CK * Q * !QN) + (!CK * !Q * QN) | 0.01605 | 0.01573 | 0.01547 |

**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) | -0.00061 | -0.00125 | -0.00145 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00083 | -0.00152 | -0.00167 |
| sky130_osu_sc_15T_hs__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | -0.00061 | -0.00125 | -0.00145 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | -0.00083 | -0.00152 | -0.00167 |

**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) | 0.01229 | 0.01196 | 0.01184 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.02386 | 0.02312 | 0.02241 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.02500 | 0.02408 | 0.02387 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01329 | 0.01290 | 0.01284 |
| sky130_osu_sc_15T_hs__dff_l | (D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * Q * !QN) | 0.01229 | 0.01195 | 0.01184 |
| | (D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (D * !Q * QN) | 0.02387 | 0.02313 | 0.02242 |
| | (!D * Q * !QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * Q * !QN) | 0.02501 | 0.02408 | 0.02388 |
| | (!D * !Q * QN) | 0.00000 | 0.00000 | 0.00000 |
| | (!D * !Q * QN) | 0.01329 | 0.01290 | 0.01284 |

# SKY130_OSU_SC_15T_HS__INVx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00370 | 0.87535 |
| sky130_osu_sc_15T_hs__inv_10 | 0.03395 | 8.15836 |
| sky130_osu_sc_15T_hs__inv_2 | 0.00699 | 1.75634 |
| sky130_osu_sc_15T_hs__inv_3 | 0.01040 | 2.55915 |
| sky130_osu_sc_15T_hs__inv_4 | 0.01372 | 3.43944 |
| sky130_osu_sc_15T_hs__inv_6 | 0.02055 | 5.08183 |
| sky130_osu_sc_15T_hs__inv_8 | 0.02723 | 6.65443 |
| sky130_osu_sc_15T_hs__inv_l | 0.00286 | 0.53173 |

# Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__inv_1 | 0.00000 | 0.00011 | 0.00016 |
| sky130_osu_sc_15T_hs__inv_10 | 0.00000 | 0.00108 | 0.00162 |
| sky130_osu_sc_15T_hs__inv_2 | 0.00000 | 0.00022 | 0.00032 |
| sky130_osu_sc_15T_hs__inv_3 | 0.00000 | 0.00032 | 0.00048 |
| sky130_osu_sc_15T_hs__inv_4 | 0.00000 | 0.00043 | 0.00065 |
| sky130_osu_sc_15T_hs__inv_6 | 0.00000 | 0.00065 | 0.00097 |
| sky130_osu_sc_15T_hs__inv_8 | 0.00000 | 0.00086 | 0.00129 |
| sky130_osu_sc_15T_hs__inv_l | 0.00000 | 0.00014 | 0.00024 |

# 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)** | 0.04829 | 0.98796 | 12.53090 |
| **sky130_osu_sc_15T_hs__inv_10** | **A->Y (FR)** | 0.05897 | 0.66748 | 12.46210 |
| **sky130_osu_sc_15T_hs__inv_2** | **A->Y (FR)** | 0.03650 | 0.84445 | 12.53920 |
| **sky130_osu_sc_15T_hs__inv_3** | **A->Y (FR)** | 0.03951 | 0.79213 | 12.57480 |
| **sky130_osu_sc_15T_hs__inv_4** | **A->Y (FR)** | 0.03931 | 0.75058 | 12.56350 |
| **sky130_osu_sc_15T_hs__inv_6** | **A->Y (FR)** | 0.04260 | 0.70348 | 12.57070 |
| **sky130_osu_sc_15T_hs__inv_8** | **A->Y (FR)** | 0.05047 | 0.68100 | 12.48120 |
| **sky130_osu_sc_15T_hs__inv_l** | **A->Y (FR)** | 0.06652 | 1.14400 | 12.85940 |

**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)** | 0.02650 | 0.57673 | 7.48970 |
| **sky130_osu_sc_15T_hs__inv_10** | **A->Y (RF)** | 0.03616 | 0.39943 | 7.49303 |
| **sky130_osu_sc_15T_hs__inv_2** | **A->Y (RF)** | 0.02134 | 0.50840 | 7.51810 |
| **sky130_osu_sc_15T_hs__inv_3** | **A->Y (RF)** | 0.02299 | 0.48240 | 7.59581 |
| **sky130_osu_sc_15T_hs__inv_4** | **A->Y (RF)** | 0.02244 | 0.45736 | 7.58362 |
| **sky130_osu_sc_15T_hs__inv_6** | **A->Y (RF)** | 0.02648 | 0.42857 | 7.58400 |
| **sky130_osu_sc_15T_hs__inv_8** | **A->Y (RF)** | 0.03171 | 0.41141 | 7.54907 |
| **sky130_osu_sc_15T_hs__inv_l** | **A->Y (RF)** | 0.02664 | 0.55072 | 6.52015 |

# 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 | 0.00425 | 0.00419 | 0.00175 |
| sky130_osu_sc_15T_hs__inv_10 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.03619 | 0.03660 | 0.01538 |
| sky130_osu_sc_15T_hs__inv_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00755 | 0.00718 | 0.00316 |
| sky130_osu_sc_15T_hs__inv_3 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01159 | 0.01154 | 0.00536 |
| sky130_osu_sc_15T_hs__inv_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01491 | 0.01488 | 0.00658 |
| sky130_osu_sc_15T_hs__inv_6 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02213 | 0.02130 | 0.02265 |
| sky130_osu_sc_15T_hs__inv_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02914 | 0.02934 | 0.01223 |
| sky130_osu_sc_15T_hs__inv_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00325 | 0.00316 | 0.00312 |

**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** | -0.00084 | -0.00090 | -0.00092 |
| **sky130_osu_sc_15T_hs__inv_10** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.01475 | -0.01435 | -0.01309 |
| **sky130_osu_sc_15T_hs__inv_2** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00271 | -0.00276 | -0.00270 |
| **sky130_osu_sc_15T_hs__inv_3** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00358 | -0.00371 | -0.00350 |
| **sky130_osu_sc_15T_hs__inv_4** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00557 | -0.00553 | -0.00527 |
| **sky130_osu_sc_15T_hs__inv_6** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00844 | -0.00844 | -0.00786 |
| **sky130_osu_sc_15T_hs__inv_8** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.01153 | -0.01155 | -0.01045 |
| **sky130_osu_sc_15T_hs__inv_l** | **A** | 0.00000 | 0.00000 | 0.00000 |
| | **A** | -0.00052 | -0.00057 | -0.00060 |

# SKY130_OSU_SC_15T_HS__MUX2

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.58047 | 0.58318 | 0.00758 | 0.79207 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__mux2_1 | 0.00000 | 0.00035 | 0.00048 |

# 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) | - | 0.02237 | 0.56471 | 7.49526 |
| | A1->Y (RR) | - | 0.02636 | 0.57235 | 7.50472 |
| | S0->Y (RR) | (!A0 * A1) | 0.06756 | 0.65862 | 6.61382 |
| | S0->Y (FR) | (A0 * !A1) | 0.05808 | 0.77633 | 8.47257 |

**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) | - | 0.02251 | 0.50807 | 6.46979 |
| | A1->Y (FF) | - | 0.02021 | 0.50409 | 6.45078 |
| | S0->Y (FF) | (!A0 * A1) | 0.10894 | 0.69315 | 6.26377 |
| | S0->Y (RF) | (A0 * !A1) | 0.02947 | 0.54254 | 6.30494 |

# 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 | - | -0.00432 | -0.00432 | -0.00433 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | -0.00303 | -0.00303 | -0.00303 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00547 | 0.00511 | 0.00523 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | -0.00291 | -0.00351 | -0.00358 |

**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 | - | 0.00432 | 0.00432 | 0.00433 |
| | A1 | - | 0.00000 | 0.00000 | 0.00000 |
| | A1 | - | 0.00303 | 0.00303 | 0.00303 |
| | S0 | (A0 * !A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (A0 * !A1) | 0.00085 | 0.00027 | 0.00020 |
| | S0 | (!A0 * A1) | 0.00000 | 0.00000 | 0.00000 |
| | S0 | (!A0 * A1) | 0.01134 | 0.01097 | 0.01105 |

**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) | -0.00115 | -0.00114 | -0.00114 |

**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) | 0.00115 | 0.00114 | 0.00114 |

**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) | -0.00137 | -0.00137 | -0.00137 |

**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) | 0.00137 | 0.00137 | 0.00137 |

**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) | -0.00105 | -0.00162 | -0.00170 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | -0.00102 | -0.00163 | -0.00170 |

**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) | 0.00866 | 0.00831 | 0.00840 |
| | (!A0 * !A1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !Y) | 0.00814 | 0.00780 | 0.00792 |

# SKY130_OSU_SC_15T_HS__NAND2x

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

## 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 | 0.00370 | 0.00368 | 0.86780 |
| sky130_osu_sc_15T_hs__nand2_l | 0.00286 | 0.00285 | 0.53076 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__nand2_1 | 0.00000 | 0.00013 | 0.00032 |
| sky130_osu_sc_15T_hs__nand2_l | 0.00000 | 0.00016 | 0.00047 |

# 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) | 0.05056 | 0.98916 | 12.55200 |
| | B->Y (FR) | 0.05890 | 0.98841 | 12.41820 |
| sky130_osu_sc_15T_hs__nand2_l | A->Y (FR) | 0.06873 | 1.15171 | 12.87780 |
| | B->Y (FR) | 0.08170 | 1.16201 | 12.86490 |

**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) | 0.03857 | 0.70568 | 8.94490 |
| | B->Y (RF) | 0.04294 | 0.69188 | 8.61172 |
| sky130_osu_sc_15T_hs__nand2_l | A->Y (RF) | 0.04041 | 0.69382 | 7.97991 |
| | B->Y (RF) | 0.04446 | 0.66499 | 7.45271 |

# 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 | 0.00451 | 0.00444 | 0.00445 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00540 | 0.00531 | 0.00534 |
| sky130_osu_sc_15T_hs__nand2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00341 | 0.00333 | 0.00327 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00415 | 0.00406 | 0.00401 |

**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 | -0.00057 | -0.00065 | -0.00068 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00053 | -0.00061 | -0.00064 |
| sky130_osu_sc_15T_hs__nand2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00036 | -0.00043 | -0.00046 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00034 | -0.00039 | -0.00044 |

**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) | -0.00304 | -0.00307 | -0.00308 |
| sky130_osu_sc_15T_hs__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | -0.00210 | -0.00211 | -0.00212 |

**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) | 0.00306 | 0.00316 | 0.00308 |
| sky130_osu_sc_15T_hs__nand2_l | (!B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!B * Y) | 0.00211 | 0.00212 | 0.00212 |

**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) | -0.00287 | -0.00289 | -0.00288 |
| sky130_osu_sc_15T_hs__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00196 | -0.00197 | -0.00196 |

**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) | 0.00287 | 0.00290 | 0.00288 |
| sky130_osu_sc_15T_hs__nand2_l | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00196 | 0.00198 | 0.00197 |

# SKY130_OSU_SC_15T_HS__NOR2x

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00365 | 0.00397 | 0.41077 |
| sky130_osu_sc_15T_hs__nor2_l | 0.00274 | 0.00308 | 0.27420 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__nor2_1 | 0.00000 | 0.00013 | 0.00016 |
| sky130_osu_sc_15T_hs__nor2_l | 0.00000 | 0.00016 | 0.00024 |

# 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) | 0.12046 | 1.28191 | 12.79310 |
| | B->Y (FR) | 0.09847 | 1.23194 | 12.56230 |
| sky130_osu_sc_15T_hs__nor2_l | A->Y (FR) | 0.14626 | 1.45198 | 12.94180 |
| | B->Y (FR) | 0.12903 | 1.41168 | 12.82560 |

**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) | 0.03270 | 0.48170 | 5.25446 |
| | B->Y (RF) | 0.02770 | 0.47177 | 5.23629 |
| sky130_osu_sc_15T_hs__nor2_l | A->Y (RF) | 0.03078 | 0.47113 | 4.82252 |
| | B->Y (RF) | 0.02769 | 0.46339 | 4.80768 |

# 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 | 0.00560 | 0.00551 | 0.00550 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00455 | 0.00441 | 0.00440 |
| sky130_osu_sc_15T_hs__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00407 | 0.00400 | 0.00363 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00346 | 0.00331 | 0.00327 |

**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 | 0.00038 | 0.00015 | 0.00006 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00073 | -0.00075 | -0.00085 |
| sky130_osu_sc_15T_hs__nor2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00024 | 0.00010 | 0.00004 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | -0.00041 | -0.00043 | -0.00053 |

**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) | -0.00254 | -0.00270 | -0.00271 |
| sky130_osu_sc_15T_hs__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | -0.00169 | -0.00178 | -0.00177 |

**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) | 0.00270 | 0.00270 | 0.00271 |
| sky130_osu_sc_15T_hs__nor2_l | (B * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * !Y) | 0.00177 | 0.00178 | 0.00177 |

**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) | -0.00159 | -0.00163 | -0.00160 |
| sky130_osu_sc_15T_hs__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00102 | -0.00104 | -0.00103 |

**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) | 0.00166 | 0.00166 | 0.00162 |
| sky130_osu_sc_15T_hs__nor2_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00106 | 0.00106 | 0.00104 |

# SKY130_OSU_SC_15T_HS__OAI21

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00371 | 0.00376 | 0.00310 | 0.40670 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__oai21_l | 0.00000 | 0.00018 | 0.00040 |

# 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) | 0.13737 | 1.28073 | 12.66700 |
| | A1->Y (FR) | 0.16582 | 1.33890 | 12.88660 |
| | B0->Y (FR) | 0.08021 | 1.02154 | 10.92570 |

**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) | 0.05110 | 0.56326 | 5.87732 |
| | A1->Y (RF) | 0.05814 | 0.56277 | 5.83060 |
| | B0->Y (RF) | 0.04174 | 0.58717 | 6.40543 |

# 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 | 0.00592 | 0.00577 | 0.00574 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00702 | 0.00691 | 0.00640 |
| | B0 | 0.00481 | 0.00464 | 0.00463 |

**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 | 0.00009 | -0.00001 |
| | A1 | 0.00000 | 0.00000 | 0.00000 |
| | A1 | 0.00126 | 0.00105 | 0.00096 |
| | B0 | 0.00192 | 0.00183 | 0.00174 |

**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) | -0.00160 | -0.00164 | -0.00161 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | -0.00264 | -0.00274 | -0.00273 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | -0.00279 | -0.00279 | -0.00280 |

**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) | 0.00166 | 0.00169 | 0.00163 |
| | (A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * Y) | 0.00272 | 0.00274 | 0.00273 |
| | (!A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * Y) | 0.00279 | 0.00283 | 0.00280 |

**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) | -0.00248 | -0.00266 | -0.00265 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | -0.00261 | -0.00272 | -0.00271 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | -0.00275 | -0.00277 | -0.00276 |

**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) | 0.00264 | 0.00266 | 0.00265 |
| | (A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * Y) | 0.00269 | 0.00272 | 0.00271 |
| | (!A0 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * Y) | 0.00275 | 0.00282 | 0.00277 |

**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) | -0.00213 | -0.00216 | -0.00218 |

**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) | 0.00217 | 0.00219 | 0.00218 |

# SKY130_OSU_SC_15T_HS__OAI22

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

## Truth Table

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

## Footprint

| Cell Name | Area |
|---|---|
| sky130_osu_sc_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 | 0.00355 | 0.00380 | 0.00392 | 0.00379 | 0.41452 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__oai22_l | 0.00000 | 0.00021 | 0.00032 |

# 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) | 0.17862 | 1.34779 | 12.91030 |
| | A1->Y (FR) | 0.15493 | 1.29438 | 12.69620 |
| | B0->Y (FR) | 0.10834 | 1.24773 | 12.65430 |
| | B1->Y (FR) | 0.13370 | 1.30028 | 12.87600 |

**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) | 0.07793 | 0.60120 | 5.98809 |
| | A1->Y (RF) | 0.06439 | 0.58400 | 5.95442 |
| | B0->Y (RF) | 0.05547 | 0.60656 | 6.48905 |
| | B1->Y (RF) | 0.06960 | 0.62677 | 6.56053 |

# 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 | 0.00883 | 0.00873 | 0.00819 |
| | A1 | 0.00770 | 0.00754 | 0.00750 |
| | B0 | 0.00595 | 0.00579 | 0.00575 |
| | B1 | 0.00713 | 0.00700 | 0.00646 |

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

| Cell Name | Input | Power(pJ) | | |
|---|---|---|---|---|
| | | first | mid | last |
| sky130_osu_sc_15T_hs__oai22_l | A0 | 0.00195 | 0.00176 | 0.00163 |
| | A1 | 0.00091 | 0.00088 | 0.00073 |
| | B0 | 0.00092 | 0.00086 | 0.00072 |
| | B1 | 0.00198 | 0.00175 | 0.00163 |

**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) | -0.00253 | -0.00269 | -0.00270 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | -0.00253 | -0.00269 | -0.00270 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | -0.00262 | -0.00270 | -0.00271 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | -0.00276 | -0.00278 | -0.00277 |

**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) | 0.00270 | 0.00269 | 0.00270 |
| | (A1 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * B1 * !Y) | 0.00270 | 0.00269 | 0.00270 |
| | (A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A1 * !B0 * !B1 * Y) | 0.00270 | 0.00270 | 0.00271 |
| | (!A1 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A1 * !B0 * !B1 * Y) | 0.00276 | 0.00279 | 0.00278 |

**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) | -0.00159 | -0.00162 | -0.00159 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | -0.00158 | -0.00162 | -0.00159 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | -0.00260 | -0.00269 | -0.00268 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | -0.00274 | -0.00276 | -0.00275 |

**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) | 0.00165 | 0.00165 | 0.00161 |
| | (A0 * !B0 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * B1 * !Y) | 0.00165 | 0.00165 | 0.00161 |
| | (A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !B0 * !B1 * Y) | 0.00267 | 0.00269 | 0.00268 |
| | (!A0 * !B0 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !B0 * !B1 * Y) | 0.00274 | 0.00276 | 0.00275 |

**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) | -0.00157 | -0.00158 | -0.00158 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | -0.00157 | -0.00158 | -0.00158 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | -0.00287 | -0.00297 | -0.00296 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | -0.00296 | -0.00297 | -0.00303 |

**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) | 0.00164 | 0.00164 | 0.00160 |
| | (A0 * !A1 * B1 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B1 * !Y) | 0.00164 | 0.00165 | 0.00160 |
| | (!A0 * !A1 * B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B1 * Y) | 0.00296 | 0.00297 | 0.00296 |
| | (!A0 * !A1 * !B1 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B1 * Y) | 0.00302 | 0.00304 | 0.00303 |

**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) | -0.00249 | -0.00265 | -0.00265 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | -0.00249 | -0.00266 | -0.00265 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | -0.00294 | -0.00303 | -0.00303 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | -0.00302 | -0.00306 | -0.00308 |

**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) | 0.00265 | 0.00265 | 0.00265 |
| | (A0 * !A1 * B0 * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A0 * !A1 * B0 * !Y) | 0.00265 | 0.00266 | 0.00265 |
| | (!A0 * !A1 * B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * B0 * Y) | 0.00303 | 0.00303 | 0.00303 |
| | (!A0 * !A1 * !B0 * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A0 * !A1 * !B0 * Y) | 0.00308 | 0.00310 | 0.00309 |

# SKY130_OSU_SC_15T_HS__OR2x

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00400 | 0.00380 | 0.87565 |
| sky130_osu_sc_15T_hs__or2_2 | 0.00400 | 0.00380 | 1.73856 |
| sky130_osu_sc_15T_hs__or2_4 | 0.00399 | 0.00380 | 3.40720 |
| sky130_osu_sc_15T_hs__or2_8 | 0.00399 | 0.00380 | 6.59686 |
| sky130_osu_sc_15T_hs__or2_l | 0.00315 | 0.00291 | 0.52829 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| **sky130_osu_sc_15T_hs__or2_1** | 0.00000 | 0.00021 | 0.00027 |
| **sky130_osu_sc_15T_hs__or2_2** | 0.00000 | 0.00029 | 0.00043 |
| **sky130_osu_sc_15T_hs__or2_4** | 0.00000 | 0.00045 | 0.00075 |
| **sky130_osu_sc_15T_hs__or2_8** | 0.00000 | 0.00077 | 0.00140 |
| **sky130_osu_sc_15T_hs__or2_l** | 0.00000 | 0.00026 | 0.00034 |

# 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) | 0.09829 | 0.84818 | 7.71327 |
| | B->Y (RR) | 0.08998 | 0.82516 | 7.56210 |
| sky130_osu_sc_15T_hs__or2_2 | A->Y (RR) | 0.10555 | 0.75179 | 7.87861 |
| | B->Y (RR) | 0.09648 | 0.72873 | 7.76737 |
| sky130_osu_sc_15T_hs__or2_4 | A->Y (RR) | 0.13920 | 0.73146 | 8.30245 |
| | B->Y (RR) | 0.12989 | 0.71593 | 8.22469 |
| sky130_osu_sc_15T_hs__or2_8 | A->Y (RR) | 0.20475 | 0.77373 | 8.80310 |
| | B->Y (RR) | 0.19534 | 0.76183 | 8.74311 |
| sky130_osu_sc_15T_hs__or2_l | A->Y (RR) | 0.11243 | 0.99391 | 7.87379 |
| | B->Y (RR) | 0.10613 | 0.97458 | 7.73525 |

**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) | 0.22406 | 0.87720 | 7.27809 |
| | B->Y (FF) | 0.19137 | 0.82460 | 6.71173 |
| sky130_osu_sc_15T_hs__or2_2 | A->Y (FF) | 0.28231 | 0.90877 | 7.61246 |
| | B->Y (FF) | 0.24970 | 0.85417 | 7.10990 |
| sky130_osu_sc_15T_hs__or2_4 | A->Y (FF) | 0.41612 | 1.04034 | 8.19265 |
| | B->Y (FF) | 0.38340 | 0.98474 | 7.76883 |
| sky130_osu_sc_15T_hs__or2_8 | A->Y (FF) | 0.68395 | 1.33026 | 8.88669 |
| | B->Y (FF) | 0.65141 | 1.26771 | 8.58996 |
| sky130_osu_sc_15T_hs__or2_l | A->Y (FF) | 0.25991 | 0.88552 | 6.51752 |
| | B->Y (FF) | 0.22449 | 0.83492 | 6.05240 |

# 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 | 0.00439 | 0.00381 | 0.00369 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00334 | 0.00293 | 0.00292 |
| sky130_osu_sc_15T_hs__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00766 | 0.00726 | 0.00722 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00654 | 0.00642 | 0.00655 |
| sky130_osu_sc_15T_hs__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01476 | 0.01479 | 0.01460 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01364 | 0.01409 | 0.01417 |
| sky130_osu_sc_15T_hs__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02878 | 0.02962 | 0.03032 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02763 | 0.02912 | 0.02964 |
| sky130_osu_sc_15T_hs__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00326 | 0.00286 | 0.00275 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00260 | 0.00231 | 0.00226 |

**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 | 0.00945 | 0.00938 | 0.00935 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00808 | 0.00803 | 0.00817 |
| sky130_osu_sc_15T_hs__or2_2 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01138 | 0.01181 | 0.01181 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01001 | 0.01043 | 0.01059 |
| sky130_osu_sc_15T_hs__or2_4 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.01633 | 0.01765 | 0.01791 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.01495 | 0.01625 | 0.01659 |
| sky130_osu_sc_15T_hs__or2_8 | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.02635 | 0.02873 | 0.03016 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.02478 | 0.02726 | 0.02870 |
| sky130_osu_sc_15T_hs__or2_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00728 | 0.00706 | 0.00702 |
| | B | 0.00000 | 0.00000 | 0.00000 |
| | B | 0.00632 | 0.00618 | 0.00624 |

**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) | -0.00258 | -0.00272 | -0.00272 |
| sky130_osu_sc_15T_hs__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00258 | -0.00272 | -0.00272 |
| sky130_osu_sc_15T_hs__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00257 | -0.00272 | -0.00272 |
| sky130_osu_sc_15T_hs__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00257 | -0.00272 | -0.00272 |
| sky130_osu_sc_15T_hs__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | -0.00172 | -0.00180 | -0.00179 |

**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) | 0.00271 | 0.00272 | 0.00272 |
| sky130_osu_sc_15T_hs__or2_2 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00271 | 0.00272 | 0.00272 |
| sky130_osu_sc_15T_hs__or2_4 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00272 | 0.00272 | 0.00272 |
| sky130_osu_sc_15T_hs__or2_8 | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00272 | 0.00272 | 0.00272 |
| sky130_osu_sc_15T_hs__or2_l | (B * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (B * Y) | 0.00179 | 0.00180 | 0.00179 |

**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) | -0.00160 | -0.00164 | -0.00161 |
| sky130_osu_sc_15T_hs__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00160 | -0.00164 | -0.00161 |
| sky130_osu_sc_15T_hs__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00160 | -0.00164 | -0.00161 |
| sky130_osu_sc_15T_hs__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00160 | -0.00164 | -0.00161 |
| sky130_osu_sc_15T_hs__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | -0.00104 | -0.00107 | -0.00105 |

**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) | 0.00168 | 0.00169 | 0.00163 |
| sky130_osu_sc_15T_hs__or2_2 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00168 | 0.00170 | 0.00163 |
| sky130_osu_sc_15T_hs__or2_4 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00168 | 0.00170 | 0.00163 |
| sky130_osu_sc_15T_hs__or2_8 | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00168 | 0.00170 | 0.00163 |
| sky130_osu_sc_15T_hs__or2_l | (A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * Y) | 0.00109 | 0.00110 | 0.00106 |

# SKY130_OSU_SC_15T_HS__TBUFIx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00395 | 0.00492 | 0.41185 |
| sky130_osu_sc_15T_hs__tbufi_l | 0.00308 | 0.00397 | 0.27474 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__tbufi_1 | 0.00000 | 0.00015 | 0.00032 |
| sky130_osu_sc_15T_hs__tbufi_l | 0.00000 | 0.00018 | 0.00047 |

# 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) | 0.09395 | 1.22374 | 12.53500 |
| | OE->Y (FR) | 0.08175 | 0.43084 | 4.68848 |
| | OE->Y (RR) | 0.14293 | 1.08527 | 7.85386 |
| sky130_osu_sc_15T_hs__tbufi_l | A->Y (FR) | 0.12434 | 1.40673 | 12.81450 |
| | OE->Y (FR) | 0.09631 | 0.46157 | 4.68813 |
| | OE->Y (RR) | 0.16175 | 1.25238 | 8.05826 |

**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) | 0.03714 | 0.56124 | 6.16455 |
| | OE->Y (FF) | 0.08259 | 0.43391 | 4.68845 |
| | OE->Y (RF) | 0.03525 | 0.53950 | 5.84193 |
| sky130_osu_sc_15T_hs__tbufi_l | A->Y (RF) | 0.03977 | 0.56838 | 5.79200 |
| | OE->Y (FF) | 0.09675 | 0.46461 | 4.68830 |
| | OE->Y (RF) | 0.03778 | 0.53432 | 5.33232 |

# 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 | 0.00432 | 0.00418 | 0.00414 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00401 | 0.00345 | 0.00343 |
| sky130_osu_sc_15T_hs__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00327 | 0.00308 | 0.00239 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00288 | 0.00246 | 0.00240 |

**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 | -0.00073 | -0.00076 | -0.00085 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00296 | 0.00240 | 0.00235 |
| sky130_osu_sc_15T_hs__tbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00040 | -0.00043 | -0.00052 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00200 | 0.00158 | 0.00150 |

**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) | -0.00238 | -0.00240 | -0.00239 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00224 | -0.00226 | -0.00224 |
| sky130_osu_sc_15T_hs__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | -0.00167 | -0.00169 | -0.00168 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | -0.00158 | -0.00159 | -0.00158 |

**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) | 0.00238 | 0.00240 | 0.00239 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00228 | 0.00228 | 0.00226 |
| sky130_osu_sc_15T_hs__tbufi_l | (!OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * Y) | 0.00167 | 0.00169 | 0.00168 |
| | (!OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!OE * !Y) | 0.00160 | 0.00160 | 0.00159 |

**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) | 0.00170 | 0.00114 | 0.00108 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00153 | 0.00097 | 0.00091 |
| sky130_osu_sc_15T_hs__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00113 | 0.00071 | 0.00063 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00100 | 0.00058 | 0.00051 |

**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) | 0.00497 | 0.00456 | 0.00465 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00515 | 0.00473 | 0.00476 |
| sky130_osu_sc_15T_hs__tbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00393 | 0.00357 | 0.00358 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00405 | 0.00369 | 0.00366 |

# SKY130_OSU_SC_15T_HS__TNBUFIx

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00394 | 0.00613 | 0.41038 |
| sky130_osu_sc_15T_hs__tnbufi_l | 0.00307 | 0.00447 | 0.27587 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__tnbufi_1 | 0.00000 | 0.00018 | 0.00022 |
| sky130_osu_sc_15T_hs__tnbufi_l | 0.00000 | 0.00024 | 0.00029 |

# 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) | 0.09485 | 1.22187 | 12.51210 |
| | OE->Y (RR) | 0.03183 | 0.32953 | 4.68900 |
| | OE->Y (FR) | 0.11138 | 1.26754 | 12.72980 |
| sky130_osu_sc_15T_hs__tnbufi_l | A->Y (FR) | 0.12525 | 1.41041 | 12.84680 |
| | OE->Y (RR) | 0.03130 | 0.32949 | 4.68893 |
| | OE->Y (FR) | 0.13516 | 1.44716 | 12.98770 |

**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) | 0.03647 | 0.56043 | 6.15309 |
| | OE->Y (RF) | 0.03157 | 0.32952 | 4.68900 |
| | OE->Y (FF) | 0.08274 | 0.65182 | 5.22061 |
| sky130_osu_sc_15T_hs__tnbufi_l | A->Y (RF) | 0.03890 | 0.56865 | 5.80364 |
| | OE->Y (RF) | 0.03077 | 0.32948 | 4.68893 |
| | OE->Y (FF) | 0.09955 | 0.69202 | 5.13658 |

# 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 | 0.00445 | 0.00431 | 0.00427 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.01032 | 0.01007 | 0.01028 |
| sky130_osu_sc_15T_hs__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | 0.00341 | 0.00325 | 0.00257 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00766 | 0.00745 | 0.00718 |

**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 | -0.00090 | -0.00092 | -0.00102 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00940 | 0.00914 | 0.00932 |
| sky130_osu_sc_15T_hs__tnbufi_l | A | 0.00000 | 0.00000 | 0.00000 |
| | A | -0.00057 | -0.00060 | -0.00068 |
| | OE | 0.00000 | 0.00000 | 0.00000 |
| | OE | 0.00688 | 0.00665 | 0.00672 |

**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) | -0.00205 | -0.00207 | -0.00206 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00192 | -0.00193 | -0.00193 |
| sky130_osu_sc_15T_hs__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | -0.00136 | -0.00138 | -0.00136 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | -0.00128 | -0.00128 | -0.00127 |

**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) | 0.00205 | 0.00207 | 0.00206 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00195 | 0.00196 | 0.00194 |
| sky130_osu_sc_15T_hs__tnbufi_l | (OE * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * Y) | 0.00136 | 0.00138 | 0.00136 |
| | (OE * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (OE * !Y) | 0.00129 | 0.00130 | 0.00128 |

**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) | -0.00329 | -0.00402 | -0.00407 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00317 | -0.00395 | -0.00404 |
| sky130_osu_sc_15T_hs__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | -0.00207 | -0.00258 | -0.00265 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | -0.00197 | -0.00253 | -0.00262 |

**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) | 0.00802 | 0.00780 | 0.00797 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00788 | 0.00767 | 0.00780 |
| sky130_osu_sc_15T_hs__tnbufi_l | (A * !Y) | 0.00000 | 0.00000 | 0.00000 |
| | (A * !Y) | 0.00591 | 0.00568 | 0.00574 |
| | (!A * Y) | 0.00000 | 0.00000 | 0.00000 |
| | (!A * Y) | 0.00581 | 0.00559 | 0.00565 |

# SKY130_OSU_SC_15T_HS__XNOR2

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00781 | 0.00687 | 0.41470 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__xnor2_l | 0.00000 | 0.00041 | 0.00054 |

# 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 | 0.17985 | 1.13566 | 8.02298 |
| | A->Y (FR) | !B | 0.12282 | 1.25698 | 12.58290 |
| | B->Y (RR) | A | 0.14668 | 1.10037 | 7.94408 |
| | B->Y (FR) | !A | 0.15074 | 1.30763 | 12.78090 |

**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 | 0.14037 | 0.74685 | 5.66709 |
| | A->Y (RF) | !B | 0.05025 | 0.55309 | 5.86673 |
| | B->Y (FF) | A | 0.13062 | 0.73642 | 5.64611 |
| | B->Y (RF) | !A | 0.05792 | 0.56369 | 5.88055 |

# 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 | 0.00359 | 0.00298 | 0.00286 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01028 | 0.00978 | 0.00987 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00151 | 0.00100 | 0.00091 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01086 | 0.01048 | 0.01004 |

**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 | 0.01270 | 0.01212 | 0.01203 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00279 | 0.00219 | 0.00202 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01170 | 0.01154 | 0.01165 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00351 | 0.00278 | 0.00261 |

# SKY130_OSU_SC_15T_HS__XOR2

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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 | 0.00781 | 0.00692 | 0.41239 |

## Leakage Information

| Cell Name | Leakage(nW) | | |
|---|---|---|---|
| | Min. | Avg | Max. |
| sky130_osu_sc_15T_hs__xor2_1 | 0.00000 | 0.00041 | 0.00048 |

# 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 | 0.18195 | 1.13104 | 8.01318 |
| | A->Y (FR) | B | 0.14172 | 1.30165 | 12.82820 |
| | B->Y (RR) | !A | 0.15270 | 1.11307 | 8.00074 |
| | B->Y (FR) | A | 0.15348 | 1.31621 | 12.84720 |

**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 | 0.13498 | 0.74135 | 5.65657 |
| | A->Y (RF) | B | 0.04883 | 0.58080 | 6.19189 |
| | B->Y (FF) | !A | 0.12891 | 0.73620 | 5.64335 |
| | B->Y (RF) | A | 0.05637 | 0.56424 | 5.87206 |

# 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 | 0.01195 | 0.01150 | 0.01126 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.00189 | 0.00085 | 0.00068 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.01197 | 0.01162 | 0.01172 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.00133 | 0.00081 | 0.00072 |

**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 | 0.00234 | 0.00154 | 0.00132 |
| | A | !B | 0.00000 | 0.00000 | 0.00000 |
| | A | !B | 0.01323 | 0.01297 | 0.01307 |
| | B | A | 0.00000 | 0.00000 | 0.00000 |
| | B | A | 0.00235 | 0.00160 | 0.00141 |
| | B | !A | 0.00000 | 0.00000 | 0.00000 |
| | B | !A | 0.01193 | 0.01183 | 0.01193 |

# SKY130_OSU_SC_15T_HS_x

*sky130_osu_sc_15T_hs_ss_1P60_-40C.ccs*
*Cell Library: Process , Voltage 1.60, Temp -40.00*

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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** | 0.17630 |
| **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 | 93982.60000 | 187965.00000 |
| **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 |
| | -0.00259 | 0.01446 | 0.22962 |

**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 |
| | 1.63727 | 1.54824 | 0.30513 |