

## VLSI DESIGN: Course Project

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Adders play an important role in digital circuits. This being the major part in functioning of components like ALU, this project discusses the design of a 4 bit full adder. The 4 bit full adder is not a ripple adder but a carry look-ahead one which plays an important role in giving fast results unlike the former. This project majorly focuses on the design element, approach of the 4 bit full adder, the area constraints and the time delays for the adder made.

### Proposed Structure of Adder

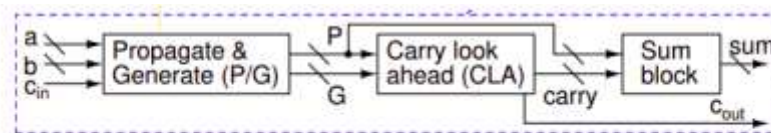


Figure 1: Different blocks in Adder

The standard carry look-ahead adder structure was followed in this project as well where the complete circuit contains three blocks which are the Propagate and Generate block which generates  $P_i$  and  $G_i$ , The carry block which generates the carry  $C_1, C_2, C_3$  and  $C_4$  and finally the sum block which generates the sum  $S_0, S_1, S_2, S_3$ . The following will be performed in each of the blocks for generating the required outputs

### Blocks

Propagate and Generate Generator Block:

$$P_i = A_i \oplus B_i \quad \text{and} \quad G_i = A_i \cdot B_i$$

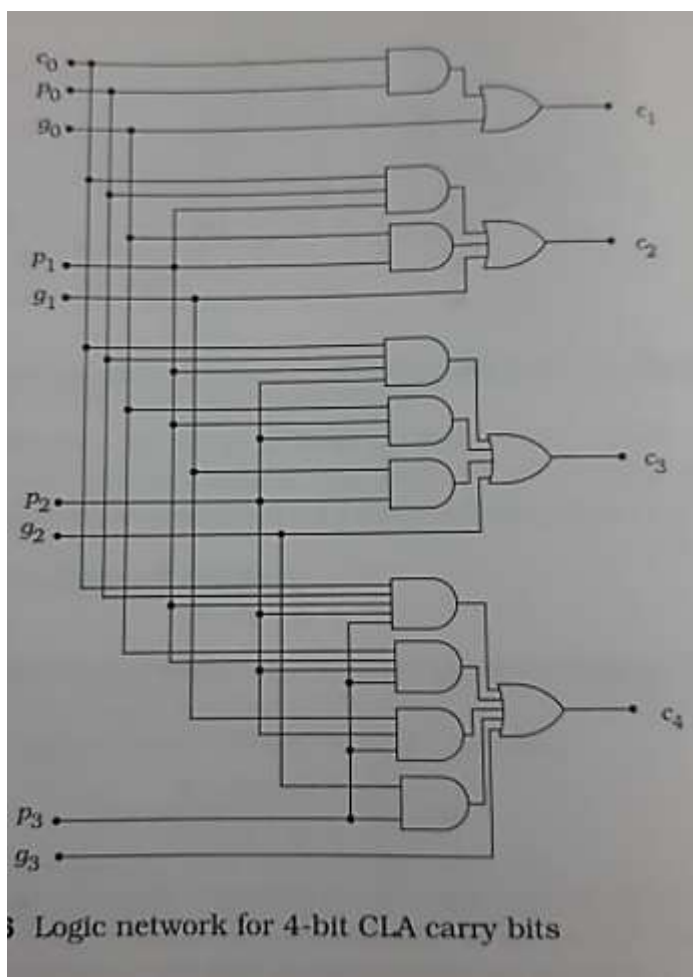
Carry Generator Block:

$$C_1 = P_0 C_0 + G_0$$

$$C_2 = P_1 P_0 C_0 + P_1 G_0 + G_1$$

$$C_3 = P_2 P_1 P_0 C_0 + P_2 P_1 G_0 + P_2 G_1 + G_2$$

$$C_4 = P_3 P_2 P_1 P_0 C_0 + P_3 P_2 P_1 G_0 + P_3 P_2 G_1 + P_3 G_2 + G_3$$



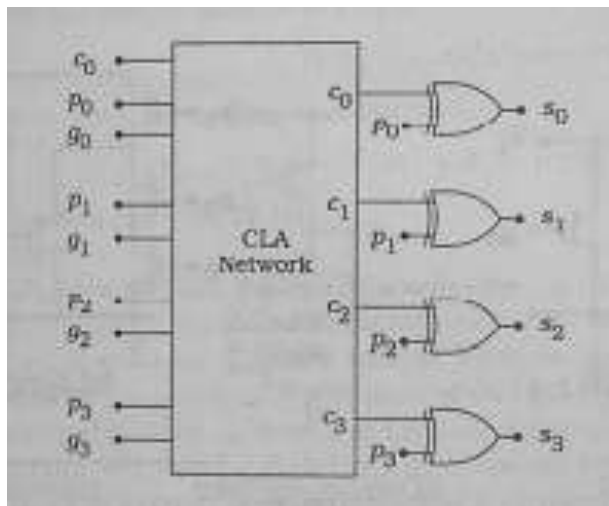
Sum Generator Block:

$$S_0 = P_0 \oplus G_0.$$

$$S_1 = P_1 \oplus G_1.$$

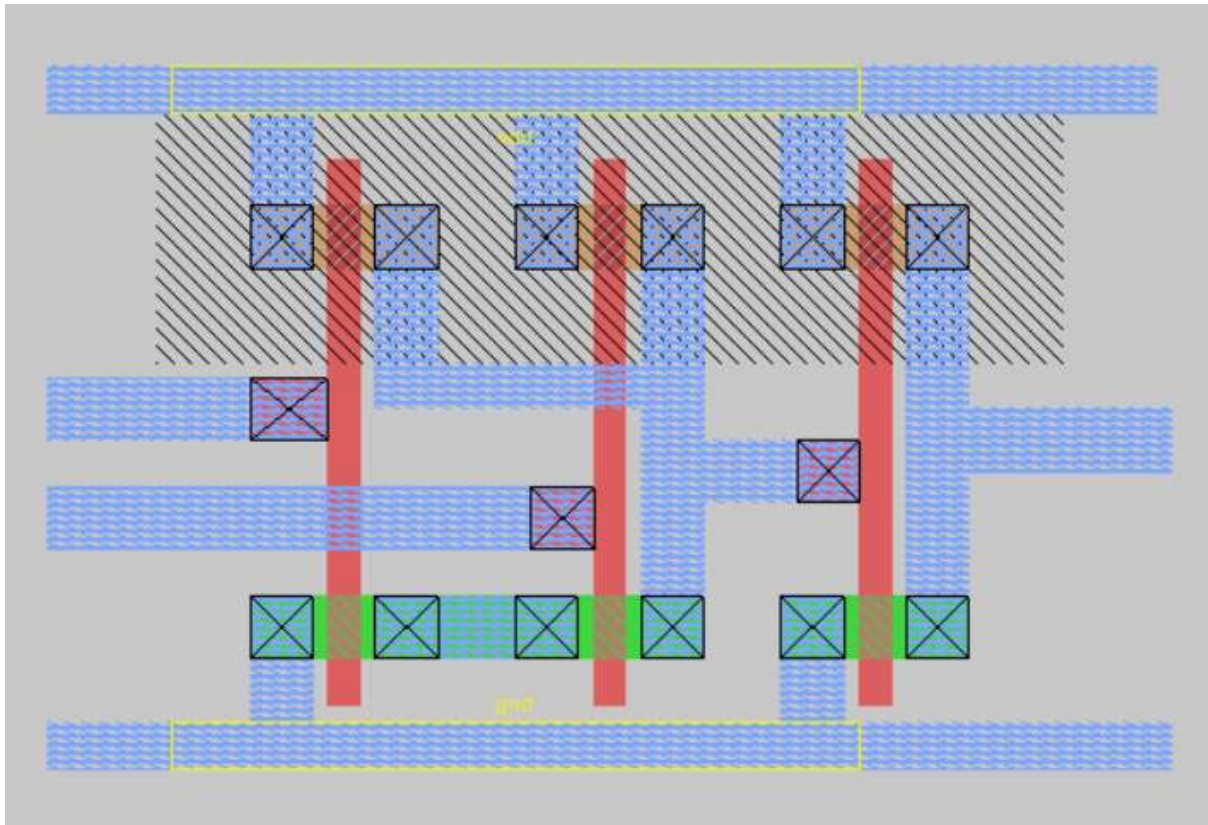
$$S_2 = P_2 \oplus G_2.$$

$$S_3 = P_3 \oplus G_3.$$



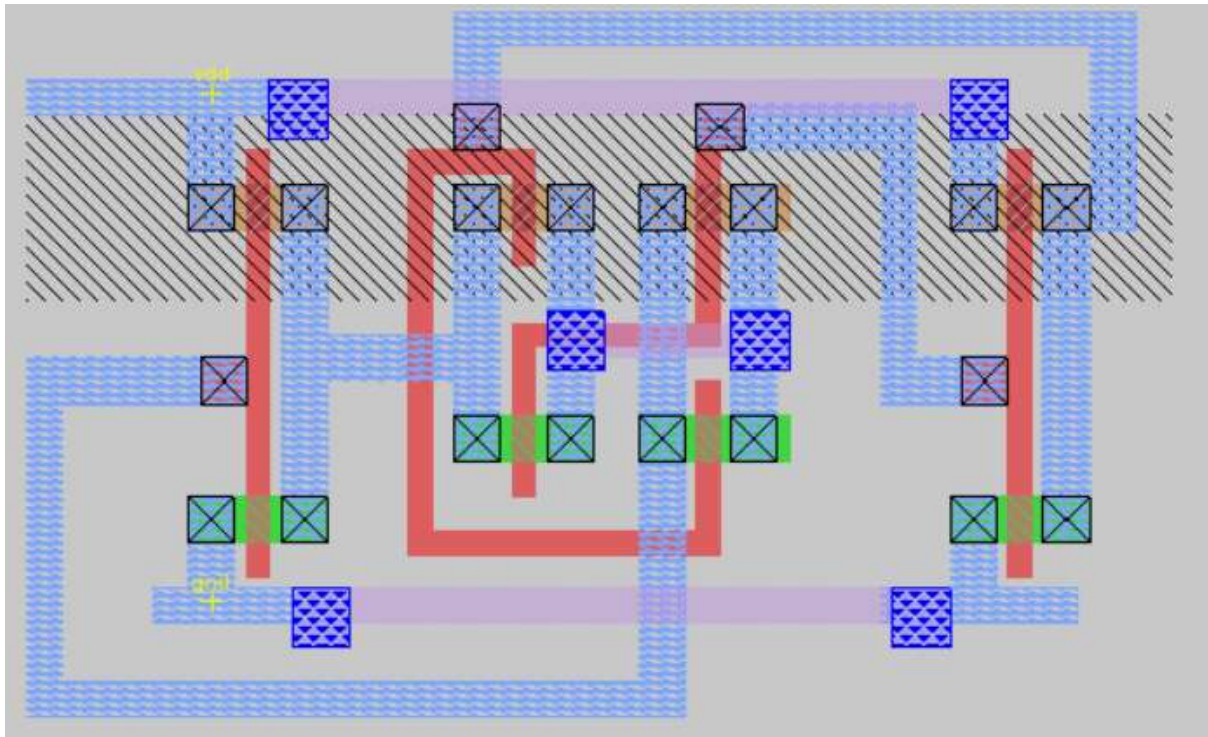
As we can see, we will be needing 2 input, 3 input, 4 input and 5 input AND and OR gates and EXOR gates for completing the circuit. This structure will be the one following for the whole project( Just the in the final circuit shown, A0 and B0 are at the bottom but the layout I will be using have them at the start)

## Generator – 2 input And Gate



	Width*Height	Area
<b>Microns</b>	<b>6.48 x 4.05</b>	<b>26.24</b>
<b>Lambda</b>	<b>72 x 45</b>	<b>3240</b>

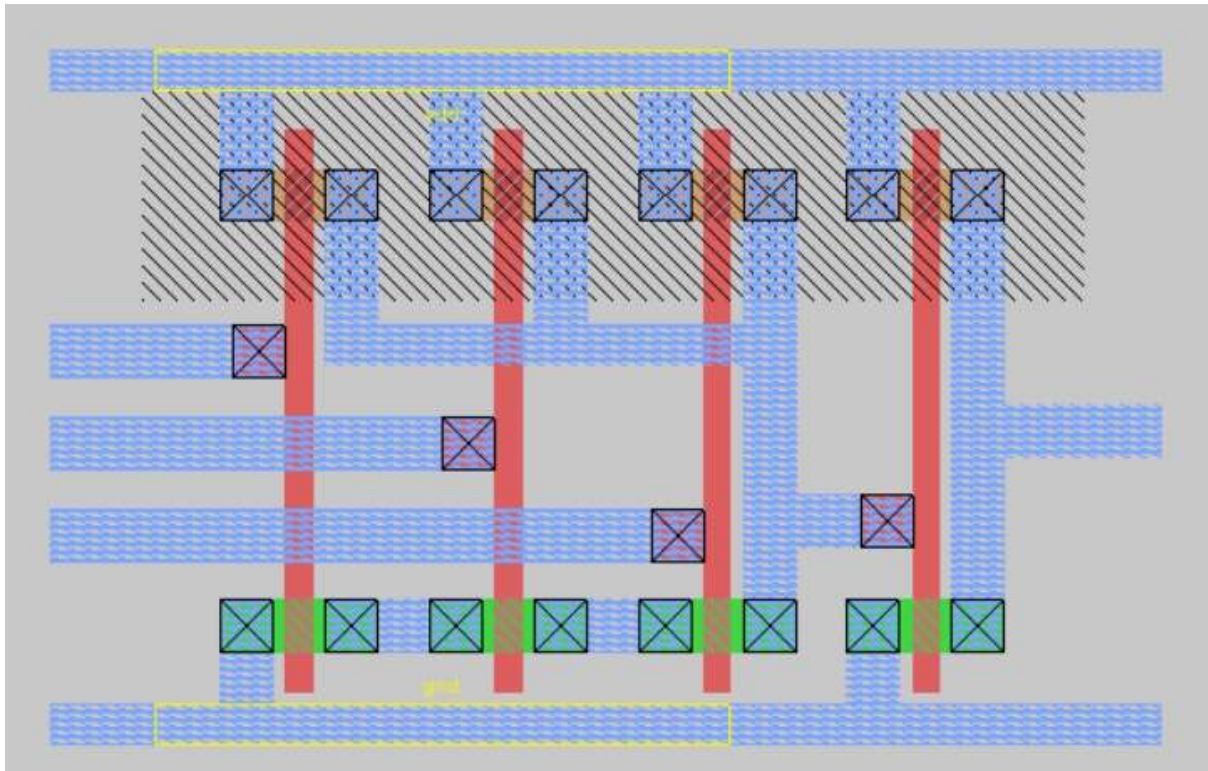
**Propagator – 2 input Xor Gate**



	Width*Height	Area
Microns	8.91 x 5.49	48.92
Lambda	99 x 61	6039

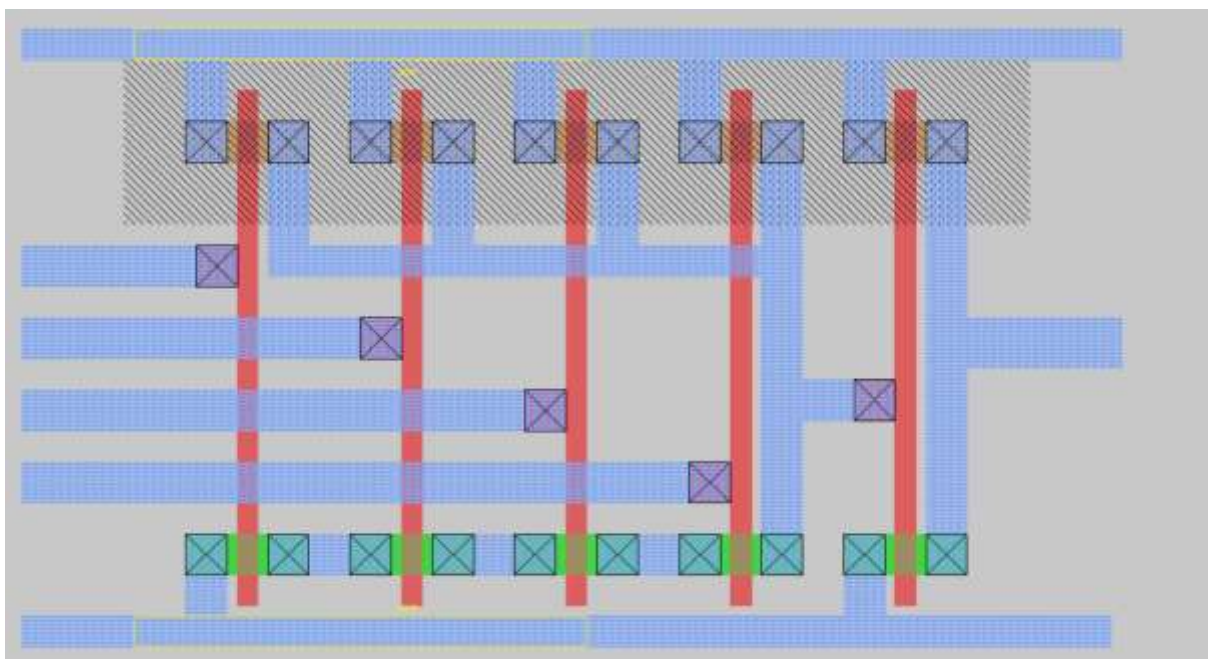
**3 input And Gate**





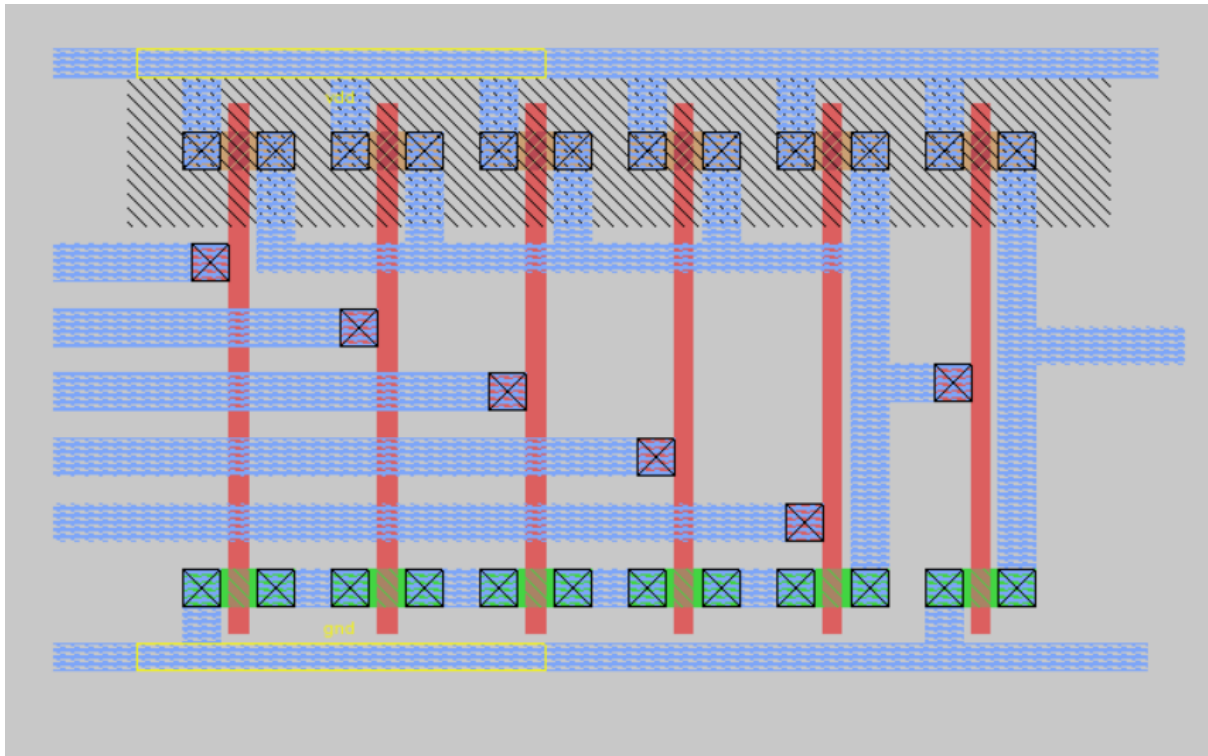
	Width*Height	Area
<b>Microns</b>	<b>7.65 x 4.77</b>	<b>36.49</b>
<b>Lambda</b>	<b>85 x 53</b>	<b>4505</b>

### 4 input And Gate



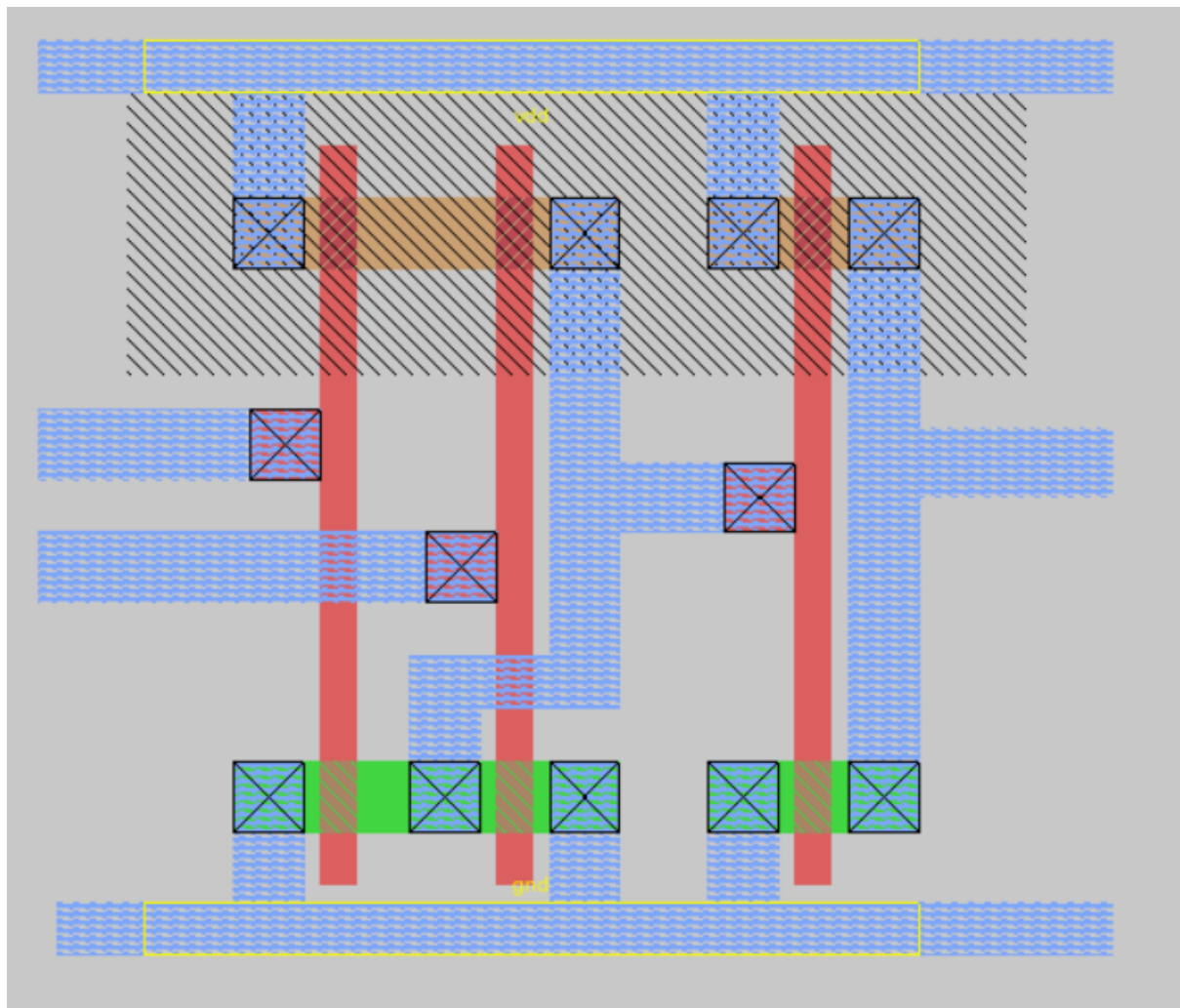
	Width*Height	Area
<b>Microns</b>	<b>6.48 x 4.05</b>	<b>26.24</b>
<b>Lambda</b>	<b>72 x 45</b>	<b>3240</b>

## 5 input And Gate



	Width*Height	Area
<b>Microns</b>	<b>9.63 x 5.40</b>	<b>52</b>
<b>Lambda</b>	<b>107 x 60</b>	<b>6420</b>

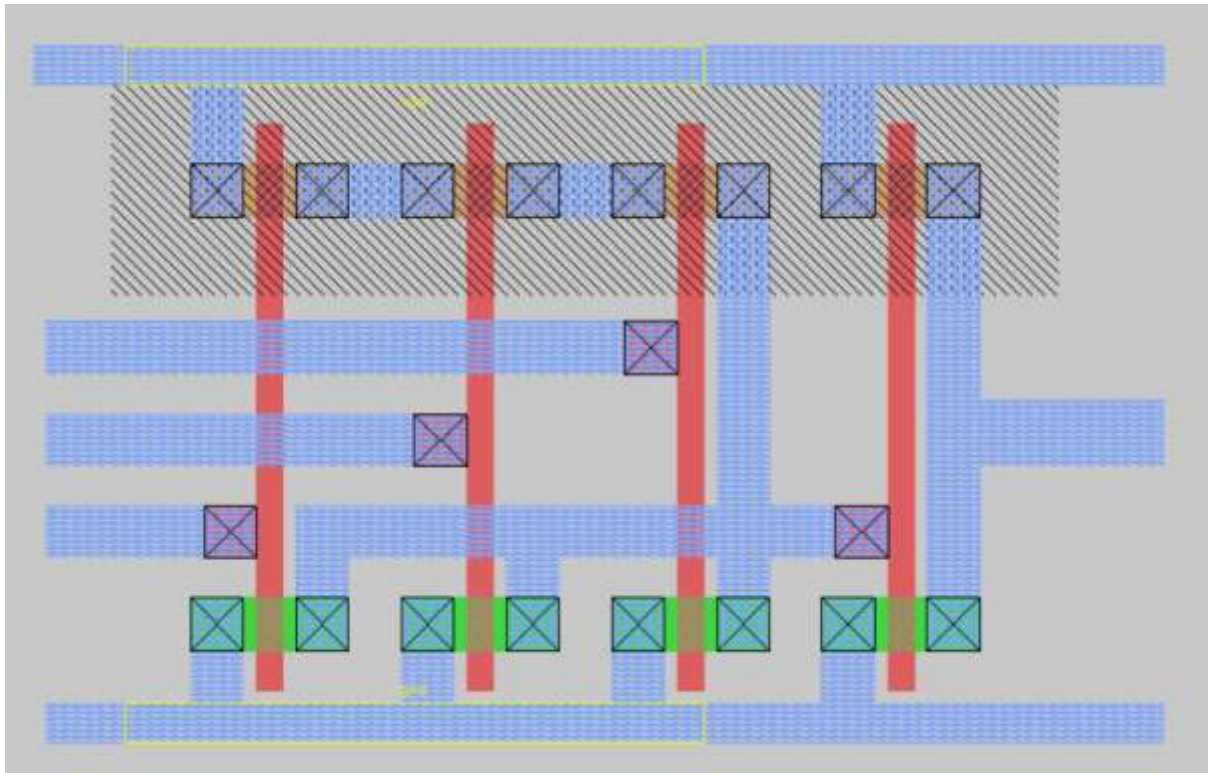
## 2 input Or Gate



	Width*Height	Area
<b>Microns</b>	<b>5.49 x 4.68</b>	<b>25.69</b>
<b>Lambda</b>	<b>61 x 52</b>	<b>3172</b>

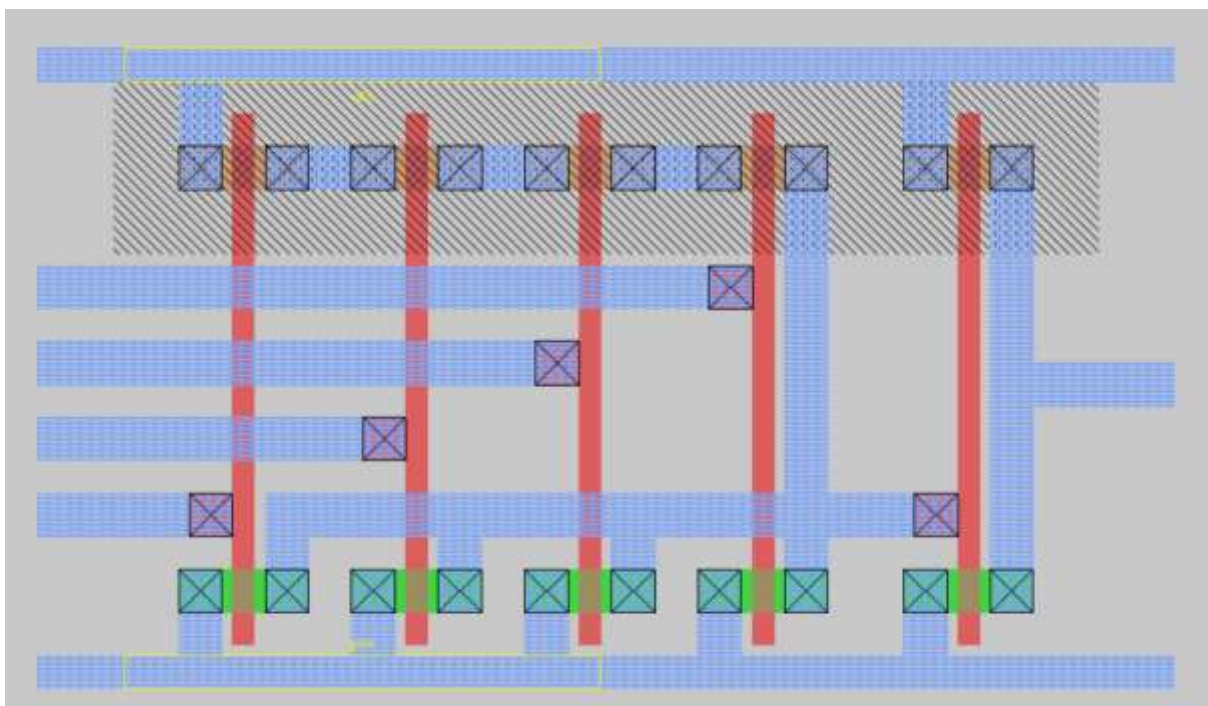
**3 input Or Gate**





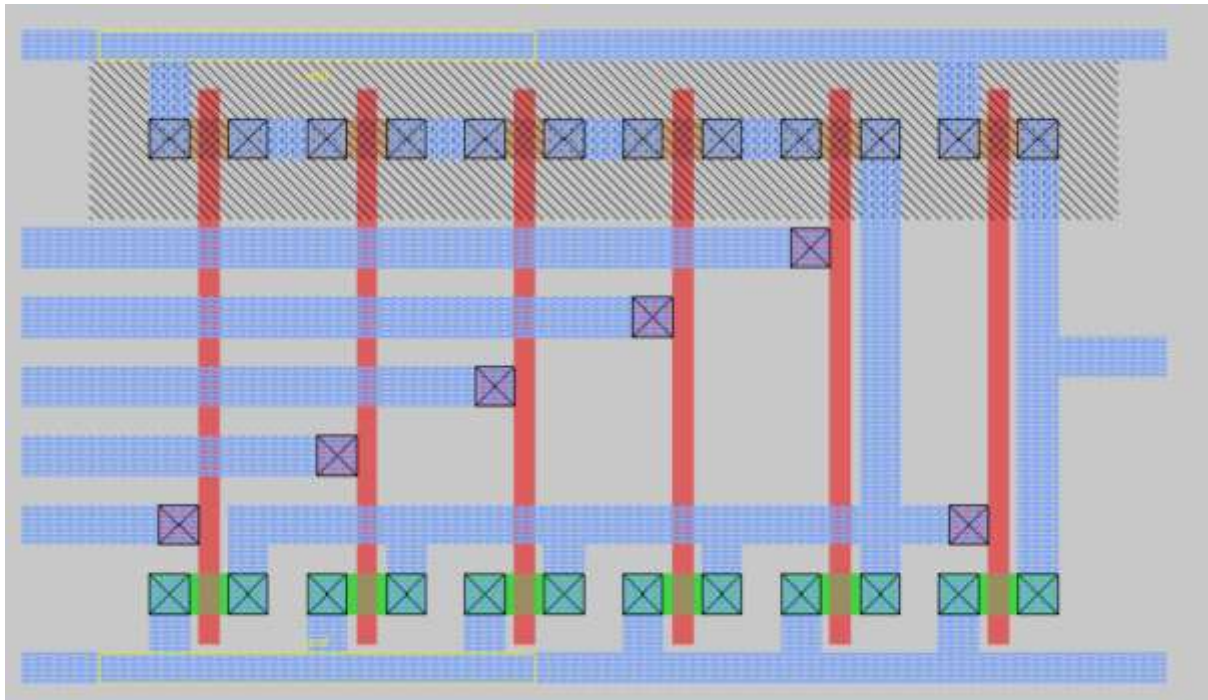
	Width*Height	Area
<b>Microns</b>	<b>7.74 x 4.77</b>	<b>36.92</b>
<b>Lambda</b>	<b>86 x 53</b>	<b>4558</b>

### 4 input Or Gate



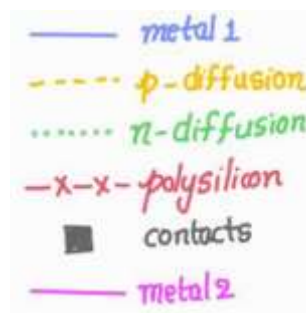
	Width*Height	Area
Microns	9.45 x 5.31	50.18
Lambda	105 x 59	6195

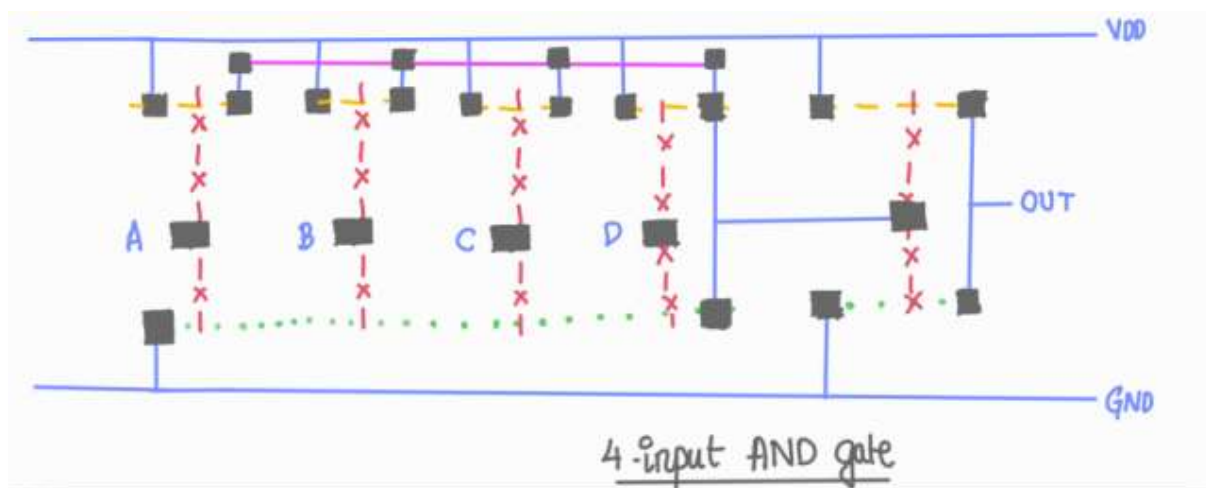
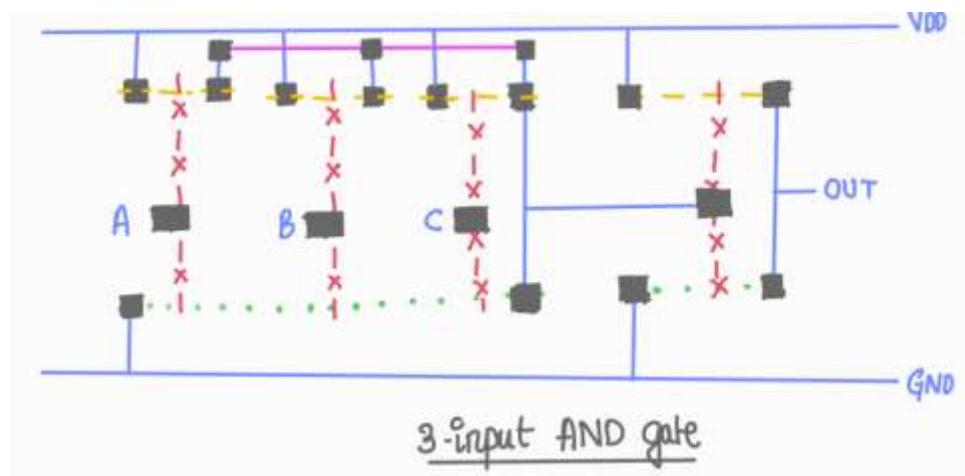
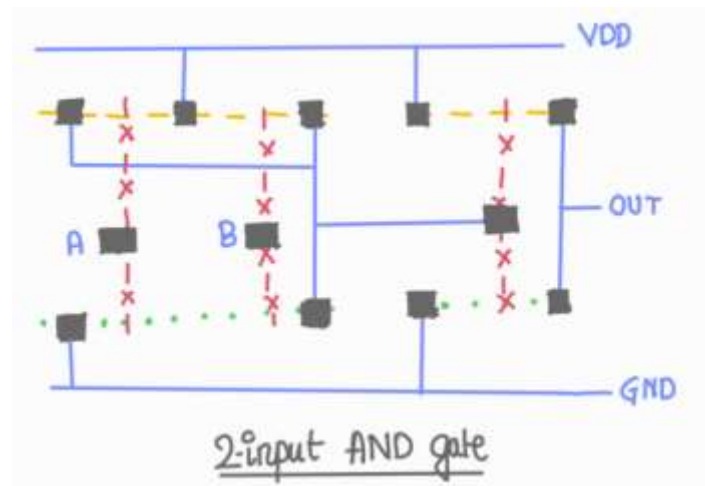
## 5 input Or Gate

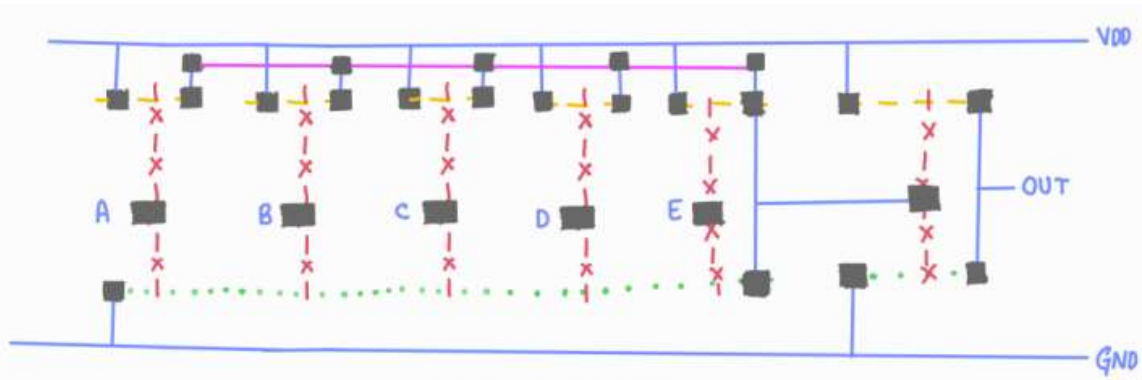


	Width*Height	Area
Microns	10.44 x 5.94	62.01
Lambda	116x 66	7656

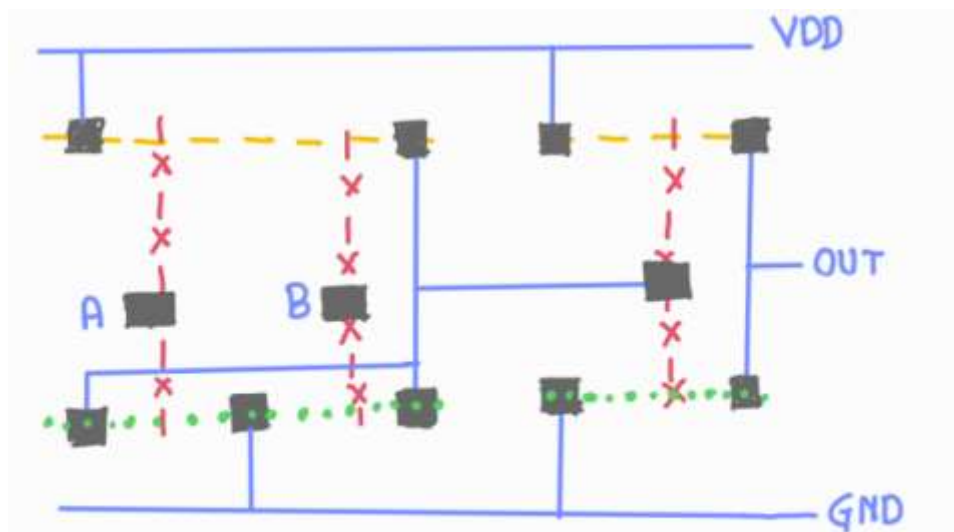
## Stick Digrams:



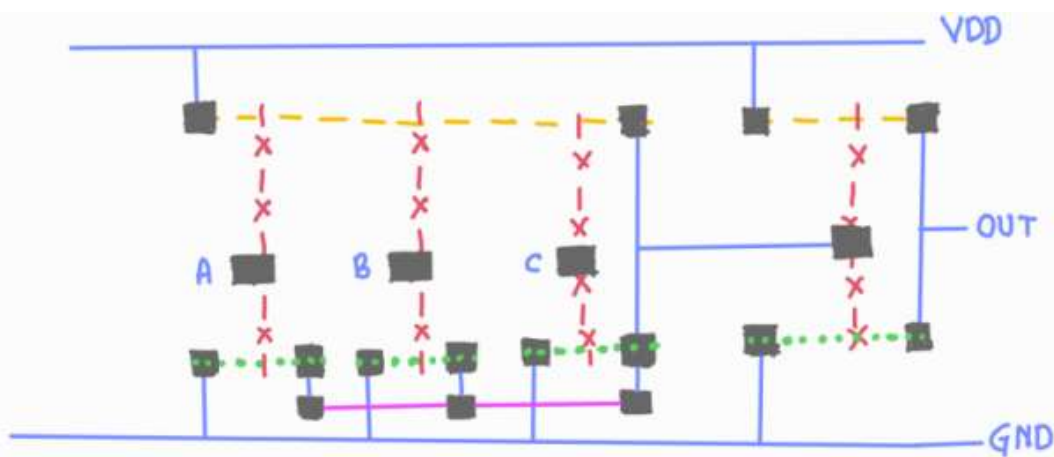




5-input AND gate

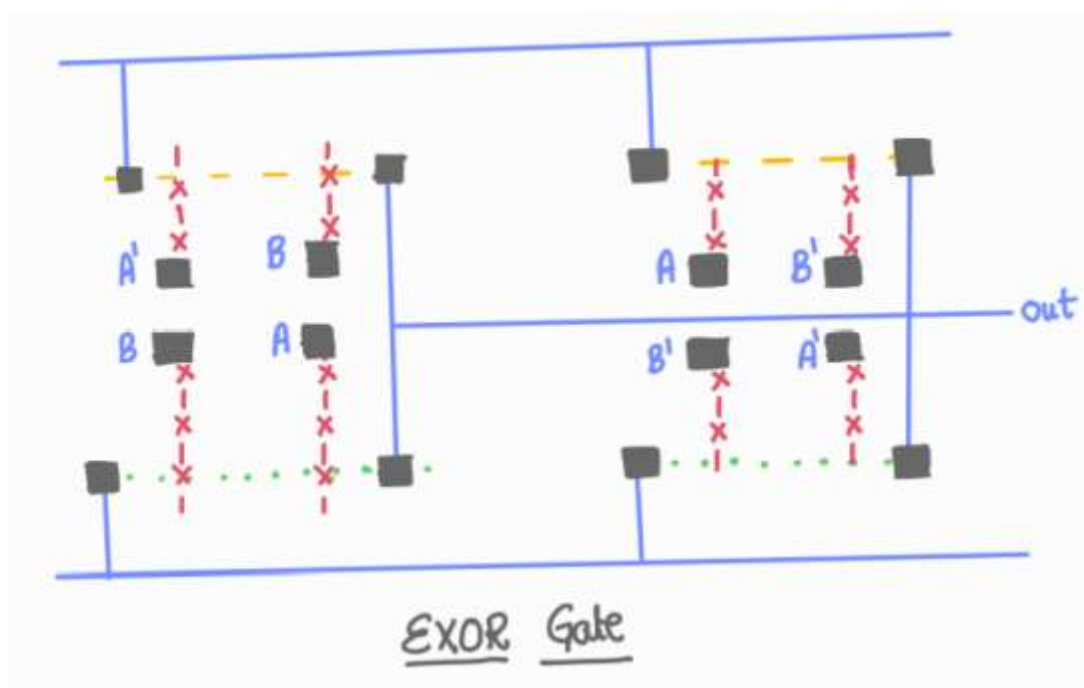
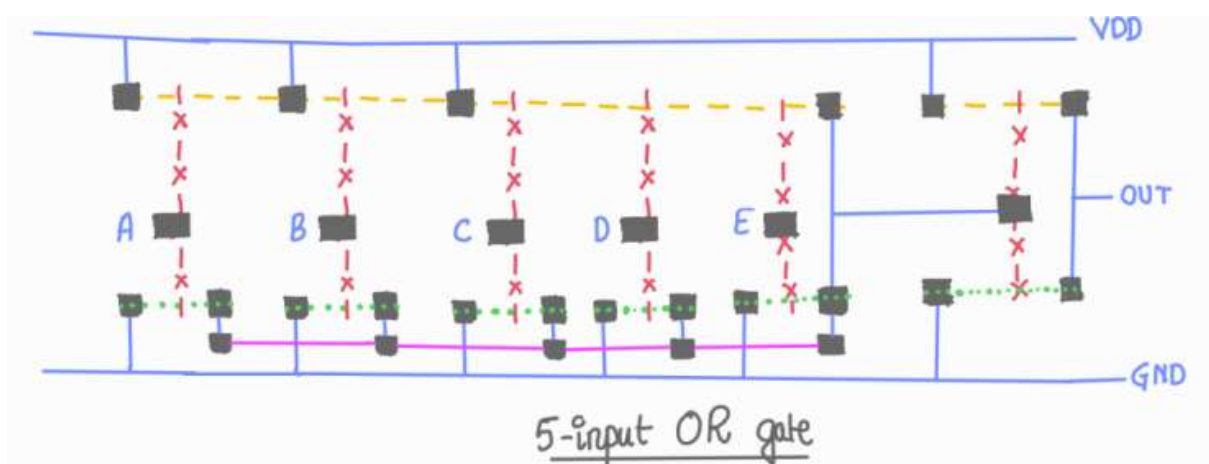
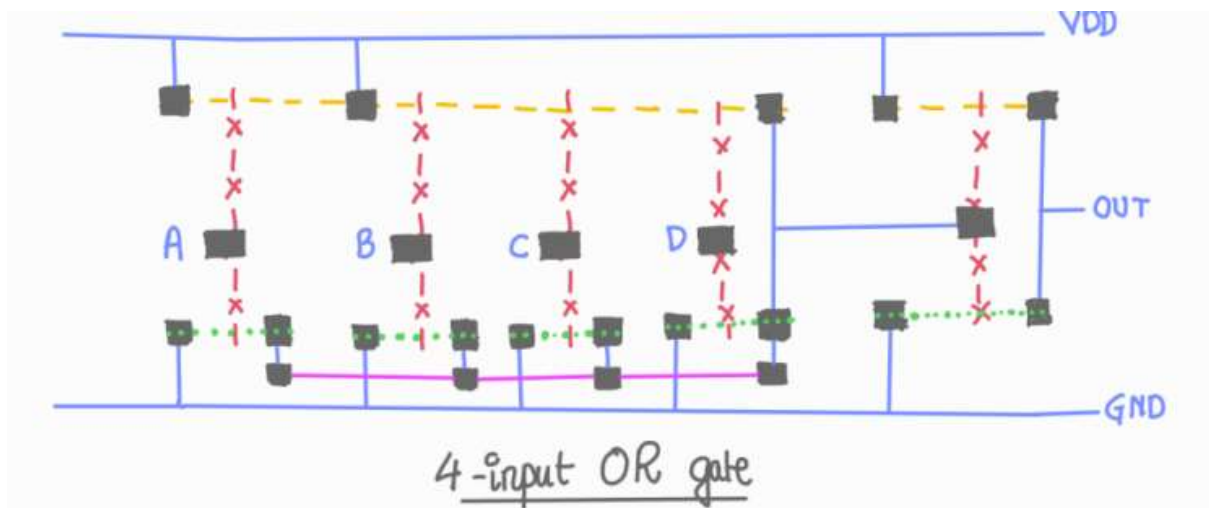


2-input OR gate



3-input OR gate

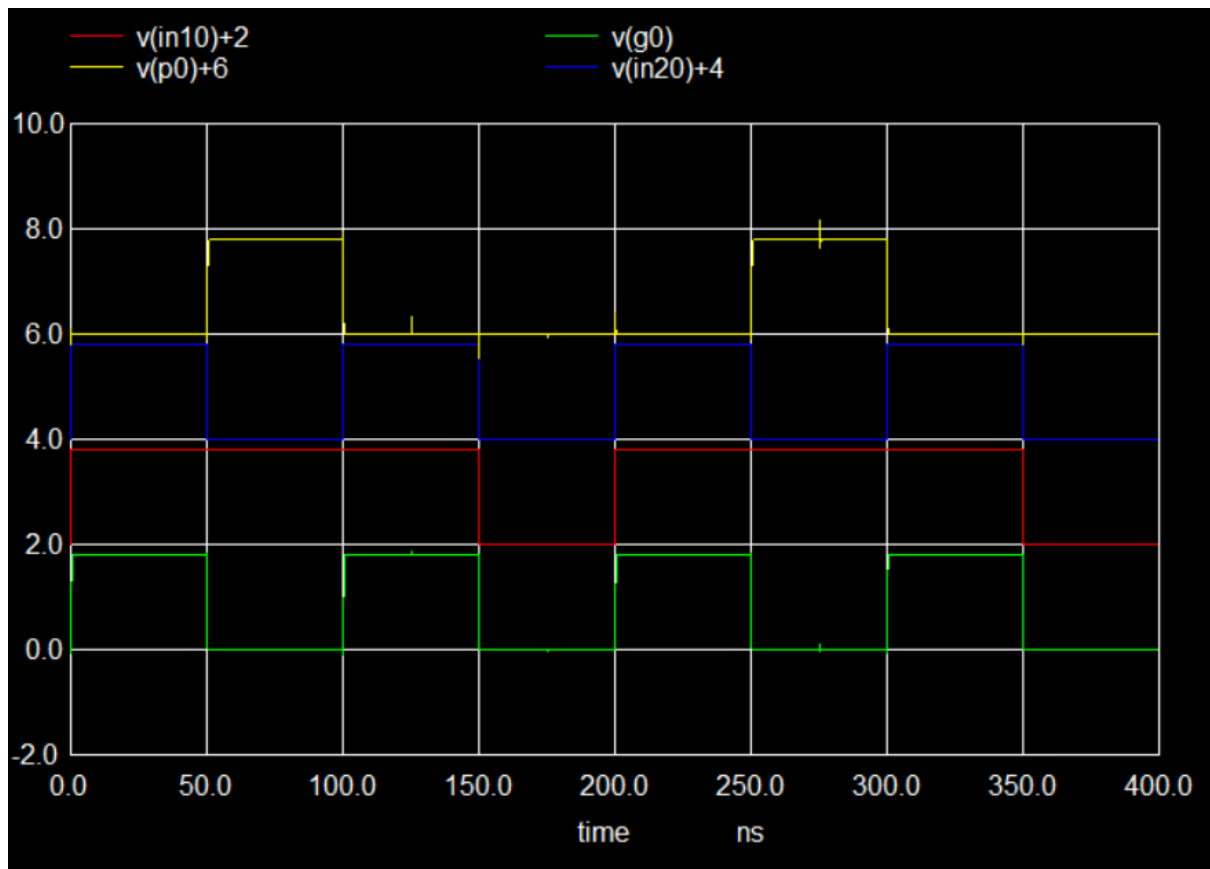


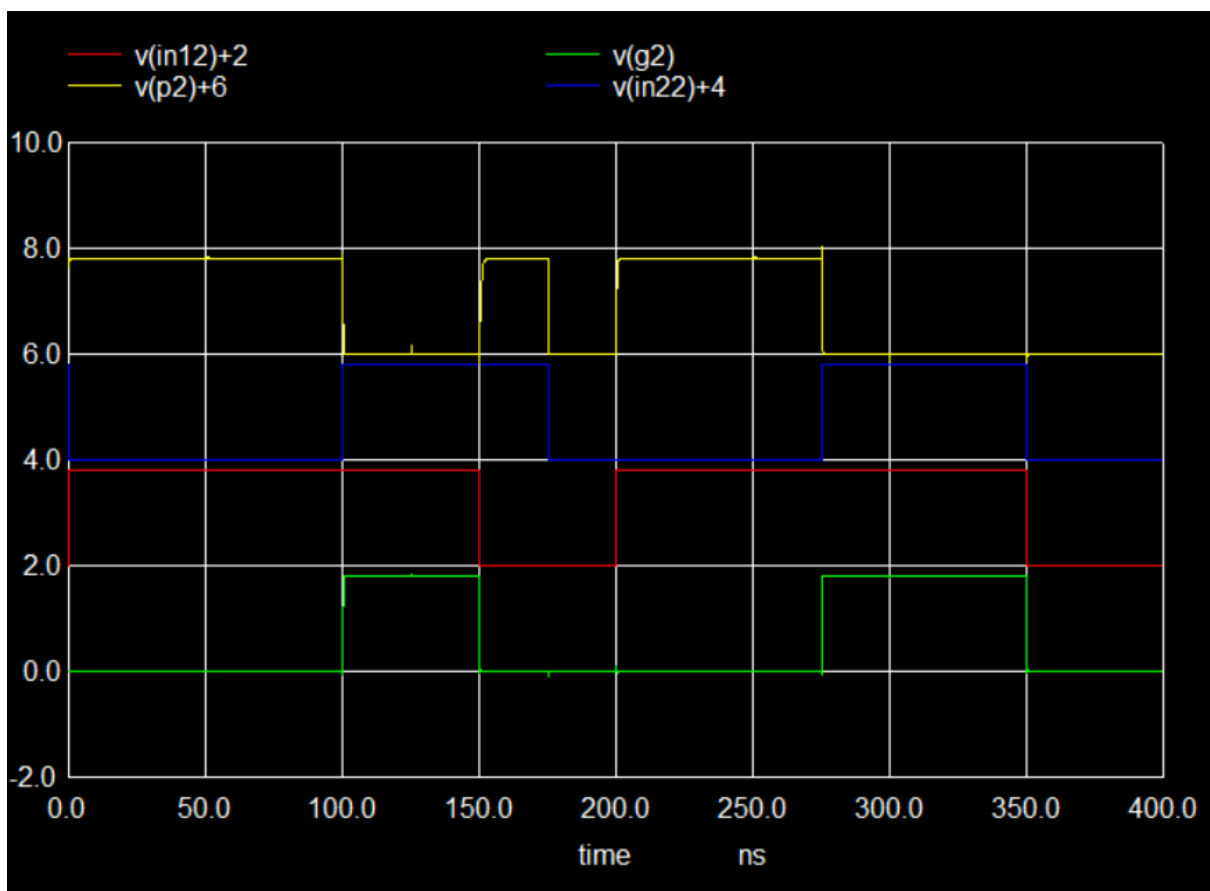
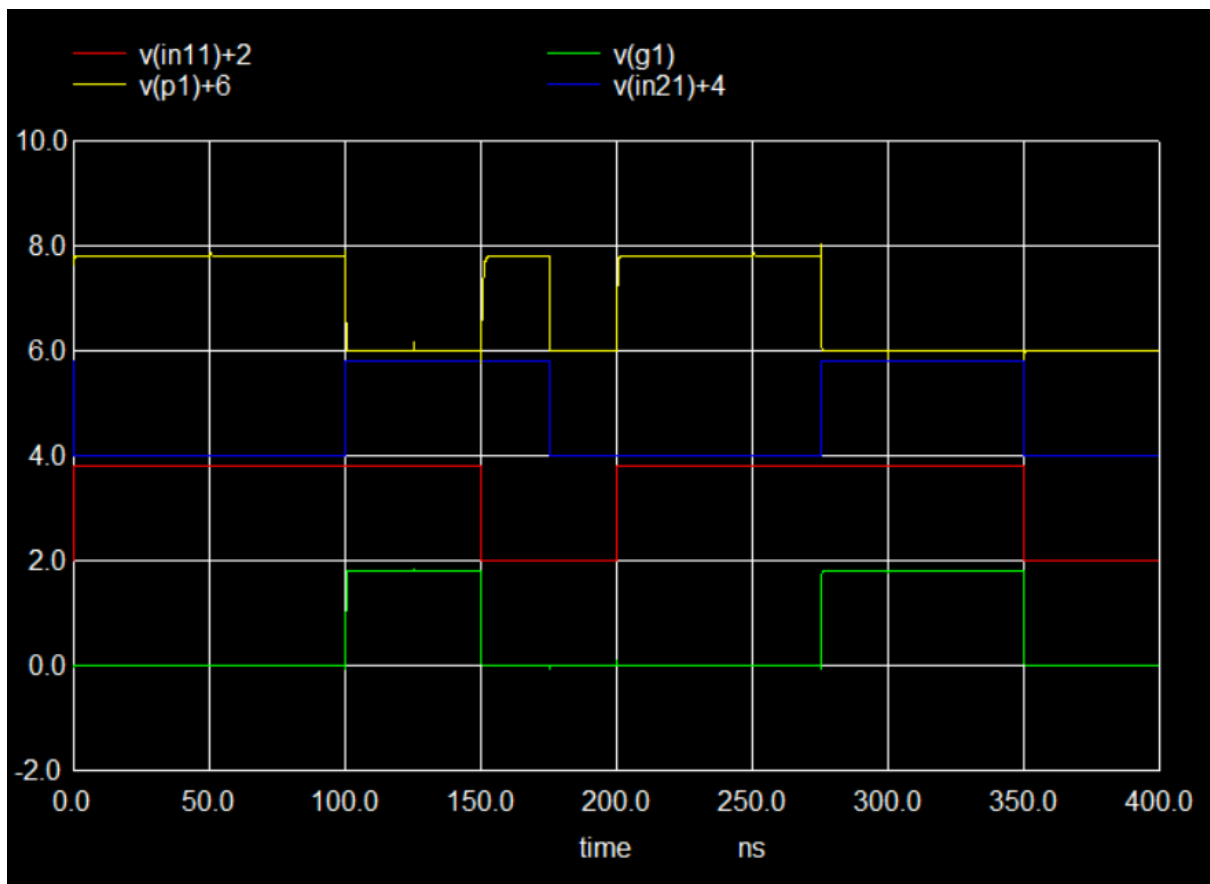


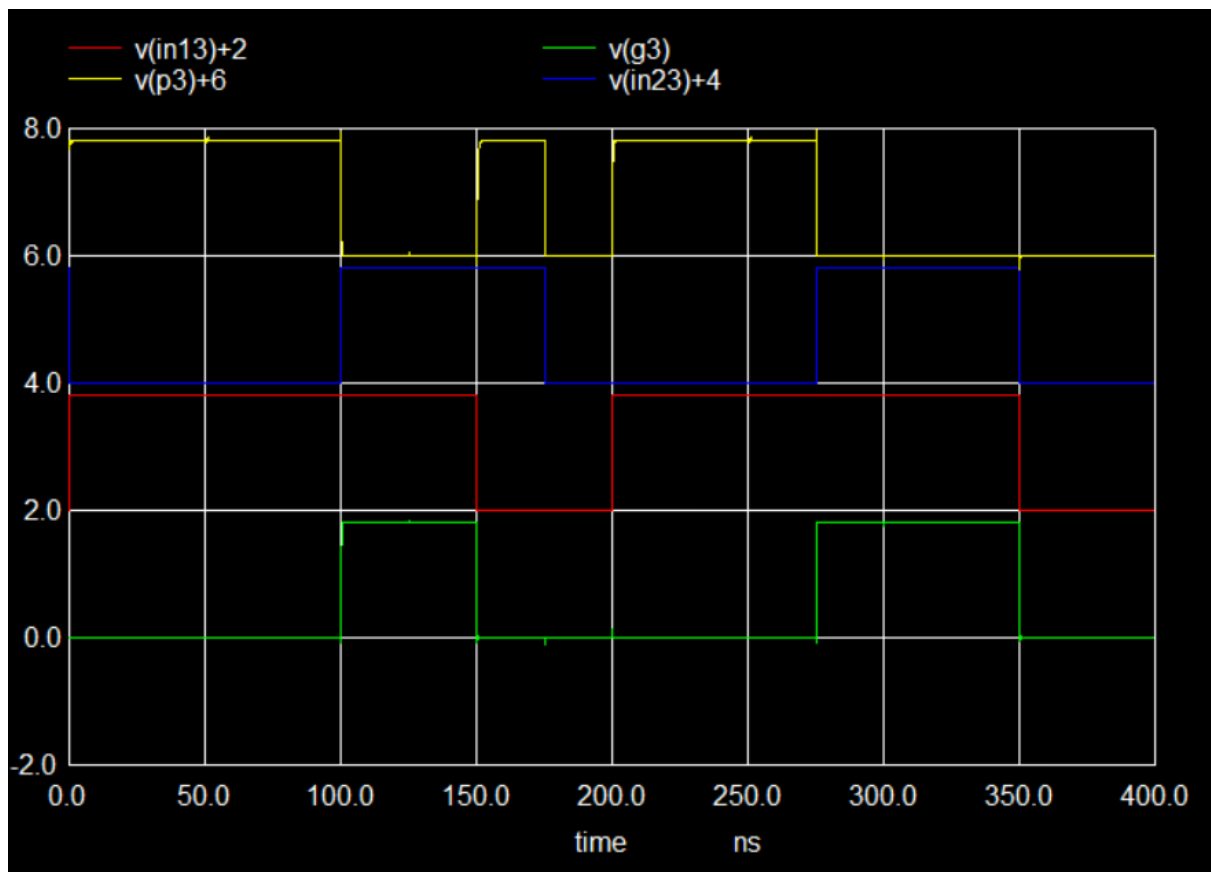


## NGSPICE Functionality:

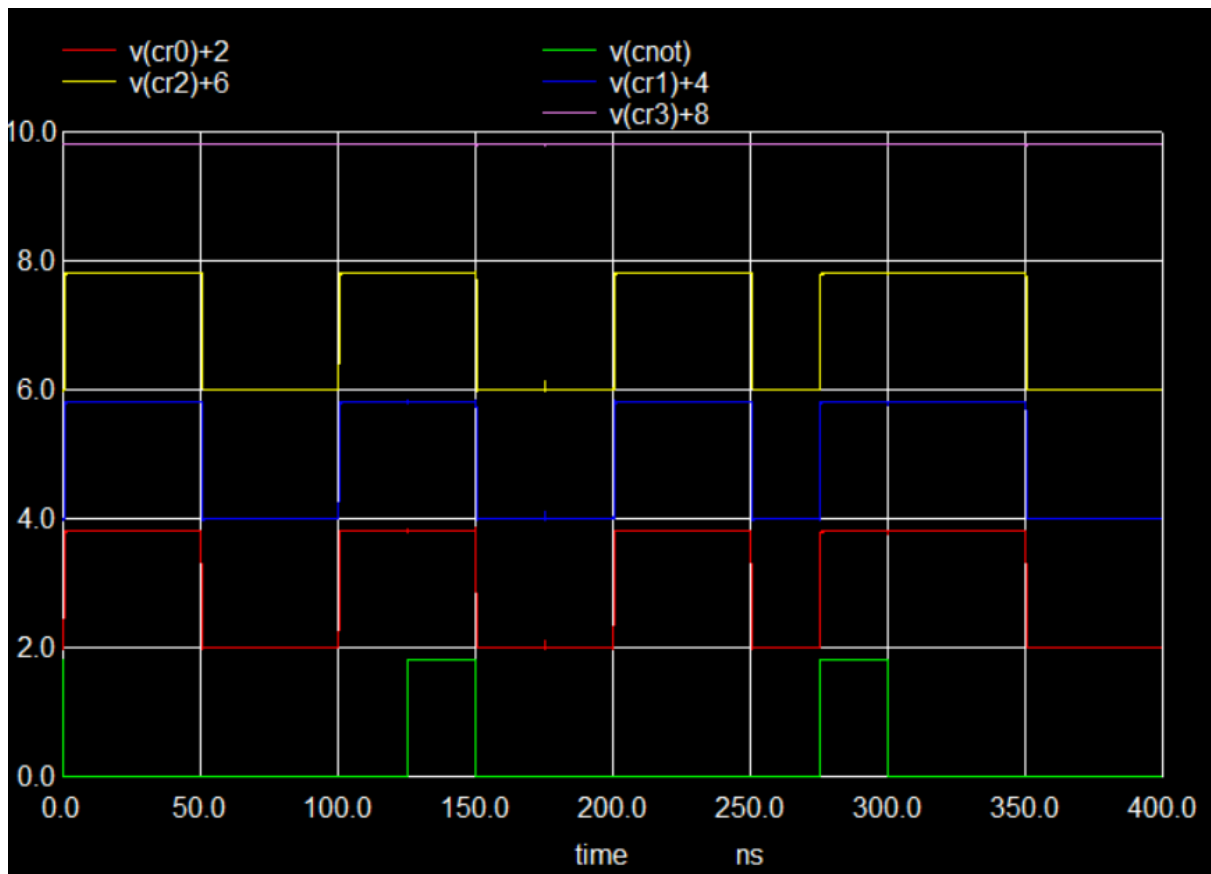
### Propagate and Generate Block:



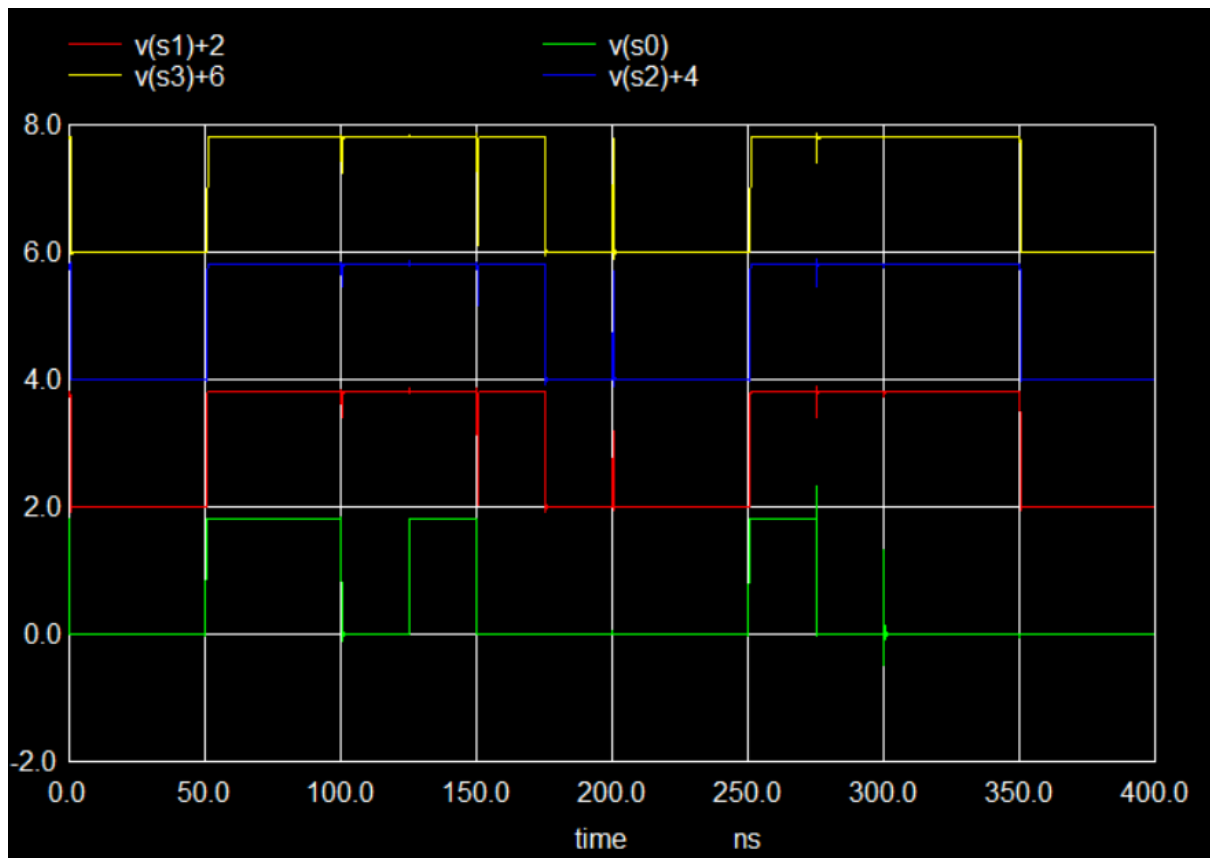




CLA:



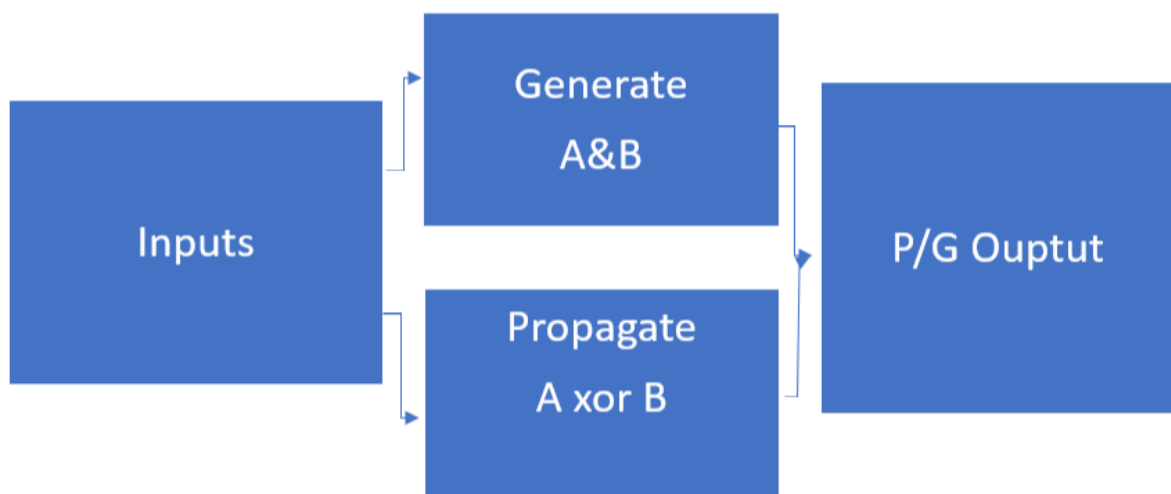
## Sum Block:

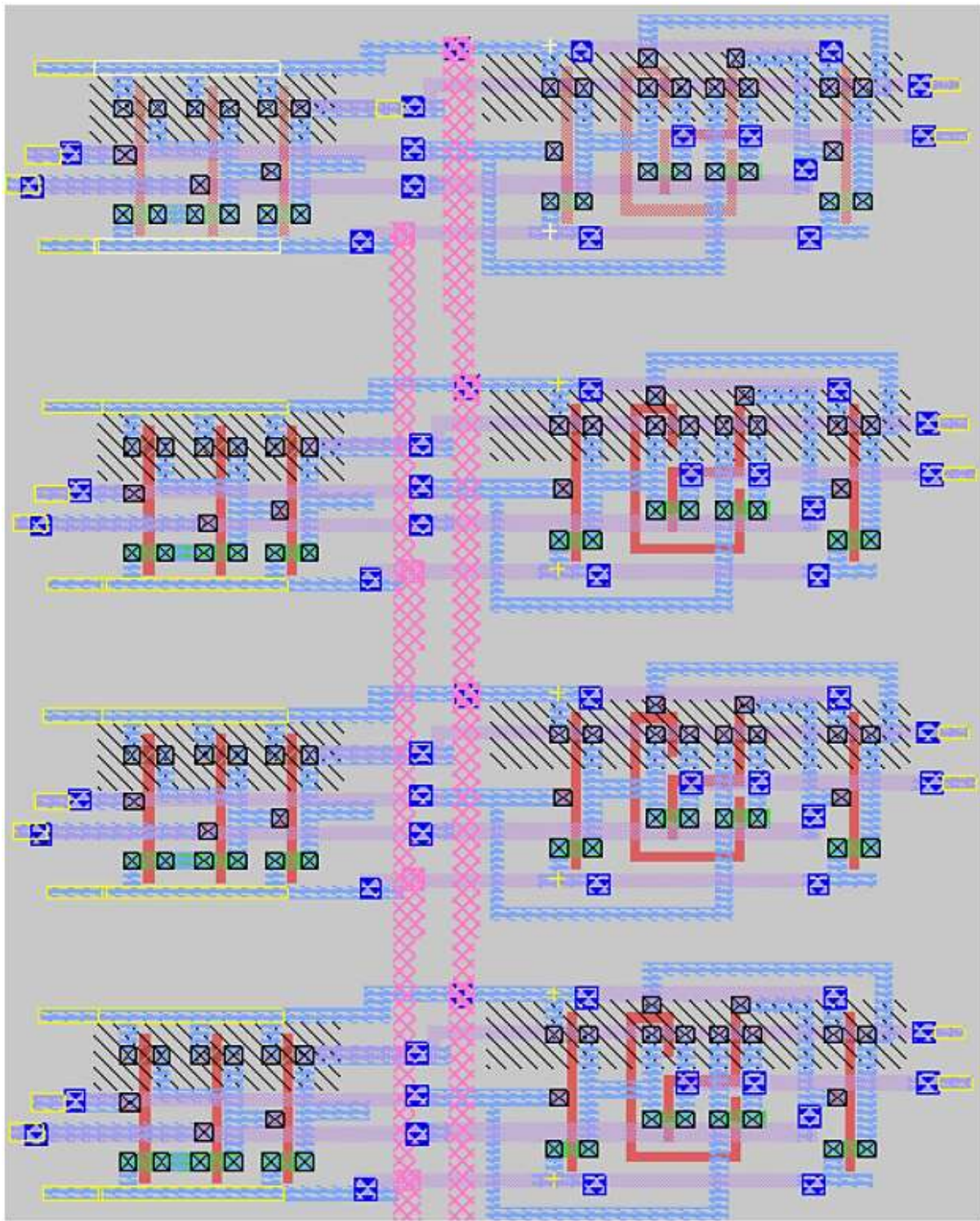


## Propagate and Generate Block:

$$p_i = a_i \oplus b_i$$

$$g_i = a_i \cdot b_i$$





	Width*Height	Area
Microns	20.43 x 26.19	535.06
Lambda	227 x 291	66057

**Subckt For Propagator and Generator:**



```

* SPICE3 file created from clatest.ext - technology: scmos
.subckt cla G0 P0 G1 P1 G2 P2 G3 P3 A0 B0 A1 B1 A2 B2 A3 B3

.include TSMC_180nm.txt
.param SUPPLY = 1.8
.param LAMBDA = 0.09u
.param width_P = 20*LAMBDA
.param width_N = 10*LAMBDA
Vdd vdd gnd 'SUPPLY'

.option scale=0.09u

M1000 xor_real_0/a_n47_n23# A0 vdd xor_real_0/w_n68_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=400 ps=360
M1001 xor_real_0/a_n47_n23# A0 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=320 ps=288
M1002 P0 m1_237_17# xor_real_0/a_n47_n23# xor_real_0/w_n68_n2# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1003 P0 B0 A0 xor_real_0/w_n68_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1004 m1_237_17# B0 vdd xor_real_0/w_n68_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1005 P0 B0 xor_real_0/a_n47_n23# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1006 P0 m1_237_17# A0 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1007 m1_237_17# B0 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1008 and_0/a_8_4# A0 vdd and_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1009 and_0/a_8_4# B0 vdd and_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1010 G0 and_0/a_8_4# vdd and_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1011 and_0/a_8_n21# A0 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1012 and_0/a_8_4# B0 and_0/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1013 G0 and_0/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1014 a_164_n91# A1 vdd w_143_n70# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1015 a_63_n69# A1 vdd w_50_n75# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1016 a_63_n69# B1 vdd w_50_n75# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1017 G1 a_63_n69# vdd w_50_n75# CMOSP w=4 l=2

```

```
+ ad=20 pd=18 as=0 ps=0
M1018 a_63_n94# A1 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1019 a_63_n69# B1 a_63_n94# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1020 G1 a_63_n69# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1021 a_164_n91# A1 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1022 P1 a_176_n92# a_164_n91# w_143_n70# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1023 P1 B1 A1 w_143_n70# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1024 a_176_n92# B1 vdd w_143_n70# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1025 P1 B1 a_164_n91# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1026 P1 a_176_n92# A1 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1027 a_176_n92# B1 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1028 a_164_n164# A2 vdd w_143_n143# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1029 a_63_n142# A2 vdd w_50_n148# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1030 a_63_n142# B2 vdd w_50_n148# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1031 G2 a_63_n142# vdd w_50_n148# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1032 a_63_n167# A2 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1033 a_63_n142# B2 a_63_n167# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1034 G2 a_63_n142# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1035 a_164_n164# A2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1036 P2 a_176_n165# a_164_n164# w_143_n143# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1037 P2 B2 A2 w_143_n143# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1038 a_176_n165# B2 vdd w_143_n143# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1039 P2 B2 a_164_n164# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1040 P2 a_176_n165# A2 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1041 a_176_n165# B2 gnd Gnd CMOSN w=4 l=2
```

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+ ad=20 pd=18 as=0 ps=0
M1042 a_163_n235# A3 vdd w_142_n214# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1043 a_62_n213# A3 vdd w_49_n219# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1044 a_62_n213# B3 vdd w_49_n219# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1045 G3 a_62_n213# vdd w_49_n219# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1046 a_62_n238# A3 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1047 a_62_n213# B3 a_62_n238# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1048 G3 a_62_n213# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1049 a_163_n235# A3 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1050 P3 a_175_n236# a_163_n235# w_142_n214# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1051 P3 B3 A3 w_142_n214# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1052 a_175_n236# B3 vdd w_142_n214# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1053 P3 B3 a_163_n235# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1054 P3 a_175_n236# A3 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1055 a_175_n236# B3 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
C0 a_63_n142# G2 0.05fF
C1 w_143_n143# B2 0.22fF
C2 and_0/a_8_4# G0 0.05fF
C3 B1 vdd 0.45fF
C4 and_0/a_8_n21# and_0/a_8_4# 0.04fF
C5 gnd A3 0.42fF
C6 vdd a_163_n235# 0.08fF
C7 gnd A2 0.41fF
C8 vdd a_164_n164# 0.08fF
C9 A0 G0 0.35fF
C10 B1 A1 0.99fF
C11 a_163_n235# G3 0.11fF
C12 A3 P3 0.59fF
C13 a_62_n213# a_62_n238# 0.04fF
C14 A0 xor_real_0/a_n47_n23# 0.05fF
C15 w_142_n214# a_175_n236# 0.24fF
C16 w_49_n219# B3 0.06fF
C17 B1 a_164_n91# 0.14fF
C18 a_176_n165# P2 0.07fF

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C19 a\_164\_n164# G2 0.11fF  
C20 a\_63\_n142# a\_63\_n167# 0.04fF  
C21 w\_143\_n143# A2 0.09fF  
C22 a\_176\_n92# P1 0.07fF  
C23 A1 vdd 0.09fF  
C24 w\_50\_n148# B2 0.06fF  
C25 gnd a\_62\_n213# 0.10fF  
C26 vdd G3 0.59fF  
C27 gnd a\_63\_n142# 0.10fF  
C28 vdd G2 0.59fF  
C29 gnd and\_0/a\_8\_4# 0.10fF  
C30 vdd G0 0.60fF  
C31 vdd a\_164\_n91# 0.08fF  
C32 B1 a\_63\_n69# 0.41fF  
C33 A0 gnd 0.31fF  
C34 vdd xor\_real\_0/a\_n47\_n23# 0.08fF  
C35 w\_142\_n214# B3 0.22fF  
C36 w\_49\_n219# A3 0.06fF  
C37 B1 G1 0.15fF  
C38 A1 a\_164\_n91# 0.05fF  
C39 xor\_real\_0/w\_n68\_n2# A0 0.09fF  
C40 B1 w\_50\_n75# 0.06fF  
C41 B2 P2 0.43fF  
C42 B1 gnd 0.21fF  
C43 a\_63\_n69# vdd 0.23fF  
C44 w\_50\_n148# A2 0.06fF  
C45 gnd a\_163\_n235# 0.08fF  
C46 gnd a\_164\_n164# 0.08fF  
C47 xor\_real\_0/a\_n47\_n23# G0 0.11fF  
C48 vdd G1 0.59fF  
C49 A1 a\_63\_n69# 0.29fF  
C50 vdd w\_50\_n75# 0.13fF  
C51 a\_163\_n235# P3 0.25fF  
C52 A0 P0 0.59fF  
C53 vdd gnd 0.67fF  
C54 a\_175\_n236# B3 0.30fF  
C55 w\_142\_n214# A3 0.09fF  
C56 w\_49\_n219# a\_62\_n213# 0.13fF  
C57 A1 G1 0.35fF  
C58 xor\_real\_0/w\_n68\_n2# vdd 0.32fF  
C59 m1\_237\_17# A0 0.08fF  
C60 A1 w\_50\_n75# 0.06fF  
C61 B1 w\_143\_n70# 0.22fF  
C62 A2 P2 0.59fF  
C63 w\_143\_n143# a\_164\_n164# 0.06fF  
C64 a\_176\_n165# B2 0.30fF  
C65 A1 gnd 0.41fF  
C66 w\_50\_n148# a\_63\_n142# 0.13fF

C67 gnd G3 0.21fF  
C68 a\_164\_n91# G1 0.11fF  
C69 and\_0/w\_n5\_n2# and\_0/a\_8\_4# 0.13fF  
C70 gnd G2 0.21fF  
C71 vdd w\_143\_n143# 0.32fF  
C72 gnd G0 0.08fF  
C73 gnd a\_164\_n91# 0.08fF  
C74 vdd w\_143\_n70# 0.32fF  
C75 xor\_real\_0/w\_n68\_n2# G0 0.57fF  
C76 gnd and\_0/a\_8\_n21# 0.18fF  
C77 B0 and\_0/a\_8\_4# 0.41fF  
C78 G3 P3 0.14fF  
C79 A0 and\_0/w\_n5\_n2# 0.06fF  
C80 xor\_real\_0/a\_n47\_n23# gnd 0.08fF  
C81 a\_175\_n236# A3 0.08fF  
C82 B1 a\_63\_n94# 0.18fF  
C83 a\_63\_n69# G1 0.05fF  
C84 m1\_237\_17# vdd 0.21fF  
C85 xor\_real\_0/w\_n68\_n2# xor\_real\_0/a\_n47\_n23# 0.06fF  
C86 B0 A0 0.99fF  
C87 A1 w\_143\_n70# 0.09fF  
C88 a\_63\_n69# w\_50\_n75# 0.13fF  
C89 w\_143\_n143# G2 0.62fF  
C90 a\_176\_n165# A2 0.08fF  
C91 a\_63\_n69# gnd 0.10fF  
C92 gnd a\_62\_n238# 0.18fF  
C93 w\_143\_n70# a\_164\_n91# 0.06fF  
C94 w\_50\_n75# G1 0.10fF  
C95 P0 G0 0.14fF  
C96 gnd a\_63\_n167# 0.18fF  
C97 vdd w\_49\_n219# 0.13fF  
C98 gnd G1 0.21fF  
C99 vdd w\_50\_n148# 0.13fF  
C100 m1\_237\_17# G0 0.16fF  
C101 vdd and\_0/w\_n5\_n2# 0.13fF  
C102 xor\_real\_0/a\_n47\_n23# P0 0.25fF  
C103 B3 A3 0.99fF  
C104 w\_142\_n214# a\_163\_n235# 0.06fF  
C105 w\_49\_n219# G3 0.10fF  
C106 B1 P1 0.43fF  
C107 B0 vdd 0.46fF  
C108 m1\_237\_17# xor\_real\_0/a\_n47\_n23# 0.13fF  
C109 a\_164\_n164# P2 0.25fF  
C110 B2 A2 0.99fF  
C111 w\_50\_n148# G2 0.10fF  
C112 w\_143\_n70# G1 0.62fF  
C113 and\_0/w\_n5\_n2# G0 0.10fF  
C114 vdd w\_142\_n214# 0.32fF



C115 B0 G0 0.14fF  
C116 B0 and\_0/a\_8\_n21# 0.18fF  
C117 B1 a\_176\_n92# 0.30fF  
C118 B3 a\_62\_n213# 0.41fF  
C119 a\_175\_n236# a\_163\_n235# 0.13fF  
C120 xor\_real\_0/w\_n68\_n2# P0 0.05fF  
C121 w\_142\_n214# G3 0.62fF  
C122 A1 P1 0.59fF  
C123 a\_63\_n69# a\_63\_n94# 0.04fF  
C124 B0 xor\_real\_0/a\_n47\_n23# 0.14fF  
C125 m1\_237\_17# gnd 0.07fF  
C126 G2 P2 0.14fF  
C127 xor\_real\_0/w\_n68\_n2# m1\_237\_17# 0.24fF  
C128 B2 a\_63\_n142# 0.41fF  
C129 a\_176\_n165# a\_164\_n164# 0.13fF  
C130 a\_164\_n91# P1 0.25fF  
C131 vdd a\_175\_n236# 0.21fF  
C132 vdd a\_176\_n92# 0.21fF  
C133 gnd a\_63\_n94# 0.18fF  
C134 vdd a\_176\_n165# 0.21fF  
C135 A1 a\_176\_n92# 0.08fF  
C136 a\_175\_n236# G3 0.16fF  
C137 B3 a\_163\_n235# 0.14fF  
C138 A3 a\_62\_n213# 0.29fF  
C139 m1\_237\_17# P0 0.07fF  
C140 B0 gnd 0.11fF  
C141 xor\_real\_0/w\_n68\_n2# B0 0.22fF  
C142 B2 a\_164\_n164# 0.14fF  
C143 A2 a\_63\_n142# 0.29fF  
C144 a\_176\_n165# G2 0.16fF  
C145 a\_176\_n92# a\_164\_n91# 0.13fF  
C146 G1 P1 0.14fF  
C147 vdd B3 0.45fF  
C148 vdd B2 0.45fF  
C149 A3 a\_163\_n235# 0.05fF  
C150 B3 G3 0.15fF  
C151 B0 P0 0.43fF  
C152 w\_142\_n214# P3 0.05fF  
C153 w\_143\_n143# P2 0.05fF  
C154 m1\_237\_17# B0 0.30fF  
C155 A2 a\_164\_n164# 0.05fF  
C156 B2 G2 0.15fF  
C157 a\_176\_n92# G1 0.16fF  
C158 w\_143\_n70# P1 0.05fF  
C159 vdd A3 0.09fF  
C160 gnd a\_175\_n236# 0.07fF  
C161 gnd a\_176\_n92# 0.07fF  
C162 gnd a\_176\_n165# 0.07fF

C163 vdd A2 0.09fF  
C164 A0 and\_0/a\_8\_4# 0.29fF  
C165 a\_175\_n236# P3 0.07fF  
C166 A3 G3 0.35fF  
C167 B3 a\_62\_n238# 0.18fF  
C168 B0 and\_0/w\_n5\_n2# 0.06fF  
C169 A2 G2 0.35fF  
C170 B2 a\_63\_n167# 0.18fF  
C171 w\_143\_n143# a\_176\_n165# 0.24fF  
C172 w\_143\_n70# a\_176\_n92# 0.24fF  
C173 gnd B3 0.22fF  
C174 vdd a\_62\_n213# 0.23fF  
C175 gnd B2 0.21fF  
C176 vdd a\_63\_n142# 0.23fF  
C177 vdd and\_0/a\_8\_4# 0.23fF  
C178 a\_62\_n213# G3 0.05fF  
C179 B3 P3 0.43fF  
C180 A0 vdd 0.10fF  
C181 P3 Gnd 0.69fF  
C182 a\_62\_n238# Gnd 0.03fF  
C183 G3 Gnd 0.73fF  
C184 a\_163\_n235# Gnd 0.13fF  
C185 a\_62\_n213# Gnd 0.25fF  
C186 A3 Gnd 0.64fF  
C187 B3 Gnd 0.68fF  
C188 a\_175\_n236# Gnd 0.63fF  
C189 P2 Gnd 0.69fF  
C190 a\_63\_n167# Gnd 0.03fF  
C191 G2 Gnd 0.73fF  
C192 a\_164\_n164# Gnd 0.13fF  
C193 a\_63\_n142# Gnd 0.05fF  
C194 A2 Gnd 0.56fF  
C195 B2 Gnd 0.64fF  
C196 a\_176\_n165# Gnd 0.63fF  
C197 P1 Gnd 0.69fF  
C198 a\_63\_n94# Gnd 0.03fF  
C199 G1 Gnd 0.73fF  
C200 a\_164\_n91# Gnd 0.13fF  
C201 a\_63\_n69# Gnd 0.16fF  
C202 A1 Gnd 0.64fF  
C203 B1 Gnd 0.68fF  
C204 a\_176\_n92# Gnd 0.63fF  
C205 w\_142\_n214# Gnd 1.59fF  
C206 w\_49\_n219# Gnd 0.74fF  
C207 w\_143\_n143# Gnd 1.59fF  
C208 w\_50\_n148# Gnd 0.72fF  
C209 w\_143\_n70# Gnd 1.59fF  
C210 w\_50\_n75# Gnd 0.72fF

```

C211 and_0/a_8_n21# Gnd 0.03fF
C212 G0 Gnd 0.45fF
C213 and_0/a_8_4# Gnd 0.16fF
C214 and_0/w_n5_n2# Gnd 0.93fF
C215 P0 Gnd 0.57fF
C216 gnd Gnd 1.16fF
C217 xor_real_0/a_n47_n23# Gnd 0.13fF
C218 vdd Gnd 0.65fF
C219 A0 Gnd 1.65fF
C220 B0 Gnd 1.65fF
C221 m1_237_17# Gnd 0.64fF
C222 xor_real_0/w_n68_n2# Gnd 1.59fF

.ends cla

```

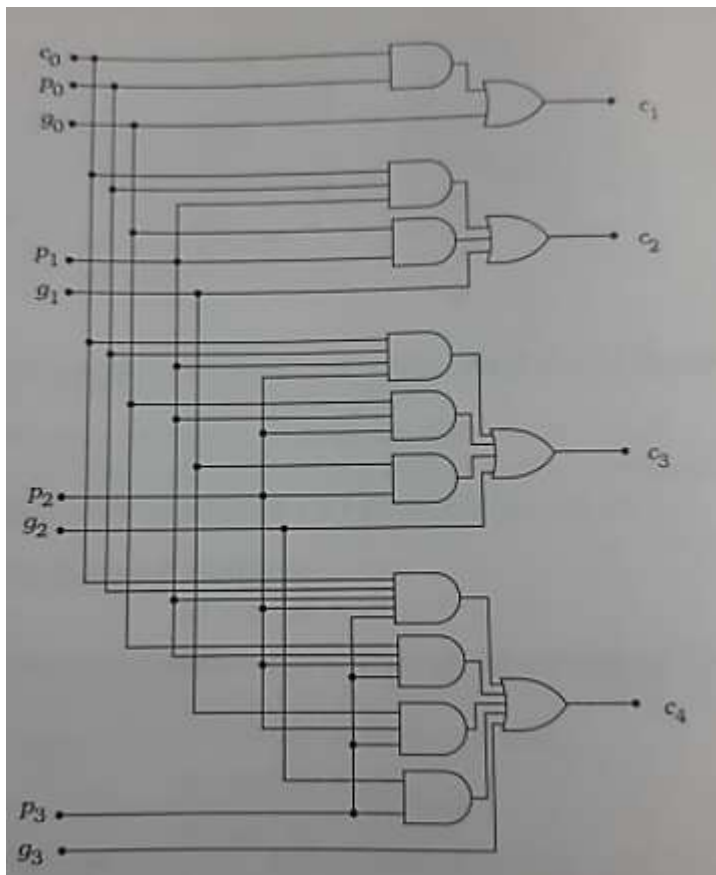
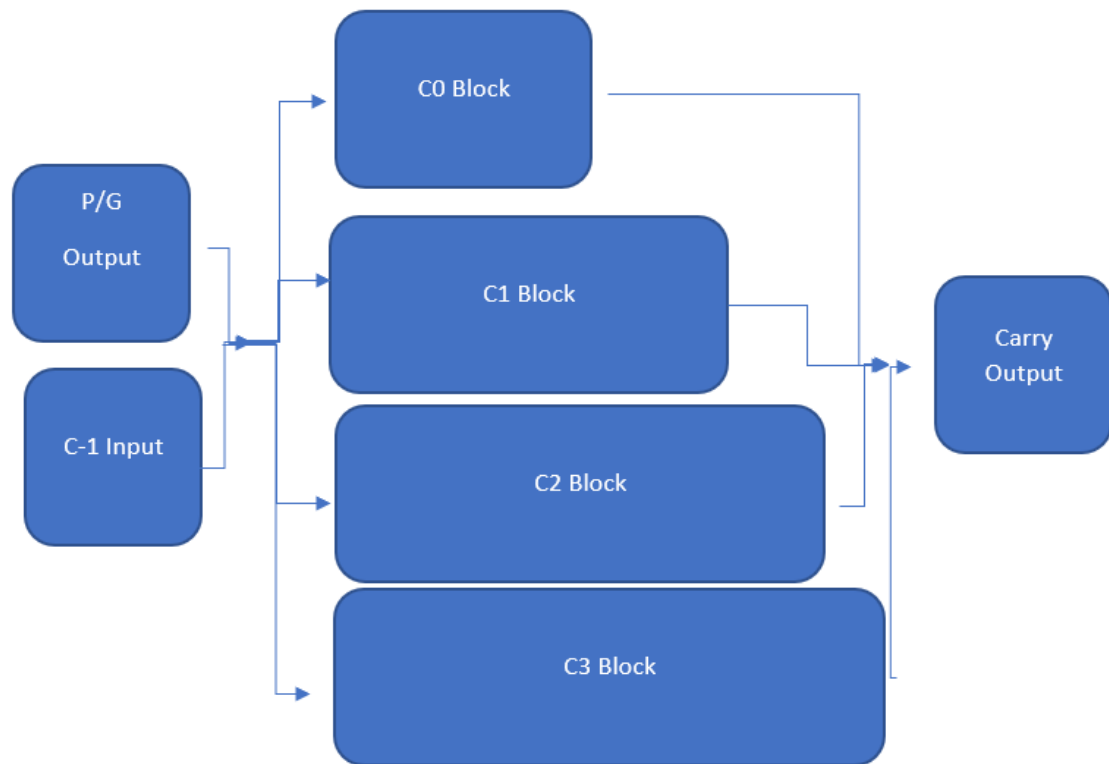
## Carry Look Ahead:

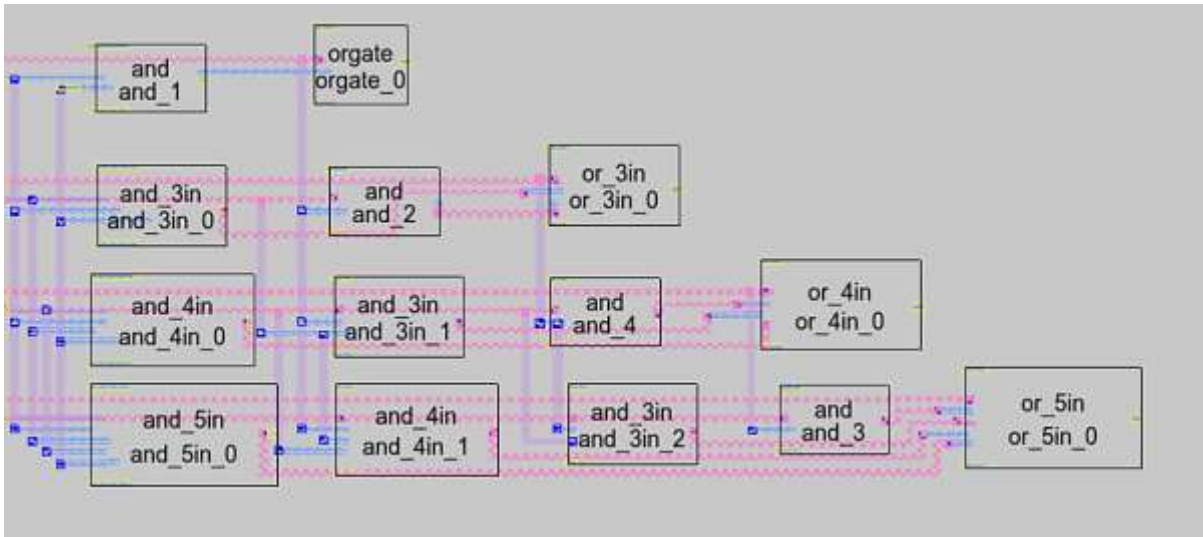
$$C_1 = P_0 C_0 + G_0$$

$$C_2 = P_1 P_0 C_0 + P_1 G_0 + G_1$$

$$C_3 = P_2 P_1 P_0 C_0 + P_2 P_1 G_0 + P_2 G_1 + G_2$$

$$C_4 = P_3 P_2 P_1 P_0 C_0 + P_3 P_2 P_1 G_0 + P_3 P_2 G_1 + P_3 G_2 + G_3$$





	Width*Height	Area
<b>Microns</b>	<b>67.05 x 27.54</b>	<b>1846.56</b>
<b>Lambda</b>	<b>745 x 306</b>	<b>227970</b>

## Subckt For CLA

```
* SPICE3 file created from clatest.ext - technology: scmos
.subckt cla Cr3 Cr2 Cr1 Cr0 G0 P0 G1 P1 G2 P2 G3 P3 A0 B0 A1 B1 A2 B2 A3 B3
Cnot

.include TSMC_180nm.txt
.param SUPPLY = 1.8
.param LAMBDA = 0.09u
.param width_P = 20*LAMBDA
.param width_N = 10*LAMBDA
Vdd vdd gnd 'SUPPLY'

.option scale=0.09u

M1000 or_5in_0/a_8_4# gnd vdd or_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=1302 ps=1168
M1001 or_5in_0/a_24_4# m1_574_n229# or_5in_0/a_8_4# or_5in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1002 or_5in_0/a_40_4# m1_706_n228# or_5in_0/a_24_4# or_5in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
```



```
M1003 or_5in_0/a_56_4# m1_832_n222# or_5in_0/a_40_4# or_5in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1004 or_5in_0/a_8_n42# G3 or_5in_0/a_56_4# or_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1005 Cr3 or_5in_0/a_8_n42# vdd or_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1006 or_5in_0/a_8_n42# gnd gnd Gnd CMOSN w=4 l=2
+ ad=100 pd=90 as=1020 ps=918
M1007 or_5in_0/a_8_n42# m1_574_n229# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1008 or_5in_0/a_8_n42# m1_706_n228# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1009 or_5in_0/a_8_n42# m1_832_n222# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1010 or_5in_0/a_8_n42# G3 gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1011 Cr3 or_5in_0/a_8_n42# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1012 and_3/a_8_4# P3 vdd and_3/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1013 and_3/a_8_4# G2 vdd and_3/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1014 m1_832_n222# and_3/a_8_4# vdd and_3/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1015 and_3/a_8_n21# P3 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1016 and_3/a_8_4# G2 and_3/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1017 m1_832_n222# and_3/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1018 and_3in_2/a_8_4# P3 vdd and_3in_2/w_n5_n2# CMOSP w=4 l=2
+ ad=60 pd=54 as=0 ps=0
M1019 and_3in_2/a_8_4# G1 vdd and_3in_2/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1020 and_3in_2/a_8_4# P2 vdd and_3in_2/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1021 m1_706_n228# and_3in_2/a_8_4# vdd and_3in_2/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1022 and_3in_2/a_8_n29# P3 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1023 and_3in_2/a_24_n29# G1 and_3in_2/a_8_n29# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1024 and_3in_2/a_8_4# P2 and_3in_2/a_24_n29# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1025 m1_706_n228# and_3in_2/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1026 and_4in_1/a_8_4# P3 vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
```

```

+ ad=80 pd=72 as=0 ps=0
M1027 and_4in_1/a_8_4# G0 vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1028 and_4in_1/a_8_4# P1 vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1029 and_4in_1/a_8_4# P2 vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1030 m1_574_n229# and_4in_1/a_8_4# vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1031 and_4in_1/a_8_n36# P3 and_4in_1/gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=40 ps=36
M1032 and_4in_1/a_24_n36# G0 and_4in_1/a_8_n36# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1033 and_4in_1/a_40_n36# P1 and_4in_1/a_24_n36# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1034 and_4in_1/a_8_4# P2 and_4in_1/a_40_n36# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1035 m1_574_n229# and_4in_1/a_8_4# and_4in_1/gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1036 and_5in_0/a_8_4# P3 vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=100 pd=90 as=0 ps=0
M1037 and_5in_0/a_8_4# P0 vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1038 and_5in_0/a_8_4# P1 vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1039 and_5in_0/a_8_4# P2 vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1040 and_5in_0/a_8_4# Cnot vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1041 gnd and_5in_0/a_8_4# vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1042 and_5in_0/a_8_n43# P3 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1043 and_5in_0/a_24_n43# P0 and_5in_0/a_8_n43# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1044 and_5in_0/a_40_n43# P1 and_5in_0/a_24_n43# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1045 and_5in_0/a_56_n43# P2 and_5in_0/a_40_n43# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1046 and_5in_0/a_8_4# Cnot and_5in_0/a_56_n43# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1047 gnd and_5in_0/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1048 or_4in_0/a_8_4# m1_412_n157# vdd or_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1049 or_4in_0/a_24_4# m1_552_n157# or_4in_0/a_8_4# or_4in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0

```

```
M1050 or_4in_0/a_40_4# m1_682_n151# or_4in_0/a_24_4# or_4in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1051 or_4in_0/a_8_n35# G2 or_4in_0/a_40_4# or_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1052 Cr2 or_4in_0/a_8_n35# vdd or_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1053 or_4in_0/a_8_n35# m1_412_n157# gnd Gnd CMOSN w=4 l=2
+ ad=80 pd=72 as=0 ps=0
M1054 or_4in_0/a_8_n35# m1_552_n157# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1055 or_4in_0/a_8_n35# m1_682_n151# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1056 or_4in_0/a_8_n35# G2 gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1057 Cr2 or_4in_0/a_8_n35# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1058 and_4/a_8_4# P2 vdd and_4/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1059 and_4/a_8_4# G1 vdd and_4/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1060 m1_682_n151# and_4/a_8_4# vdd and_4/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1061 and_4/a_8_n21# P2 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1062 and_4/a_8_4# G1 and_4/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1063 m1_682_n151# and_4/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1064 and_3in_1/a_8_4# P2 vdd and_3in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=60 pd=54 as=0 ps=0
M1065 and_3in_1/a_8_4# G0 vdd and_3in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1066 and_3in_1/a_8_4# P1 vdd and_3in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1067 m1_552_n157# and_3in_1/a_8_4# vdd and_3in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1068 and_3in_1/a_8_n29# P2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1069 and_3in_1/a_24_n29# G0 and_3in_1/a_8_n29# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1070 and_3in_1/a_8_4# P1 and_3in_1/a_24_n29# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1071 m1_552_n157# and_3in_1/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1072 and_4in_0/a_8_4# P2 vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=80 pd=72 as=0 ps=0
M1073 and_4in_0/a_8_4# P0 vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
```

```

+ ad=0 pd=0 as=0 ps=0
M1074 and_4in_0/a_8_4# P1 vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1075 and_4in_0/a_8_4# Cnot vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1076 m1_412_n157# and_4in_0/a_8_4# vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1077 and_4in_0/a_8_n36# P2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1078 and_4in_0/a_24_n36# P0 and_4in_0/a_8_n36# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1079 and_4in_0/a_40_n36# P1 and_4in_0/a_24_n36# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1080 and_4in_0/a_8_4# Cnot and_4in_0/a_40_n36# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1081 m1_412_n157# and_4in_0/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1082 or_3in_0/a_8_4# m1_538_n85# vdd or_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1083 or_3in_0/a_24_4# m1_397_n84# or_3in_0/a_8_4# or_3in_0/w_n5_n2# CMOSP w=4
l=2
+ ad=40 pd=36 as=0 ps=0
M1084 or_3in_0/a_8_n29# G1 or_3in_0/a_24_4# or_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1085 Cr1 or_3in_0/a_8_n29# vdd or_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1086 or_3in_0/a_8_n29# m1_538_n85# gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=54 as=0 ps=0
M1087 or_3in_0/a_8_n29# m1_397_n84# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1088 or_3in_0/a_8_n29# G1 gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1089 Cr1 or_3in_0/a_8_n29# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1090 and_2/a_8_4# P1 vdd and_2/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1091 and_2/a_8_4# G0 vdd and_2/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1092 m1_538_n85# and_2/a_8_4# vdd and_2/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1093 and_2/a_8_n21# P1 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1094 and_2/a_8_4# G0 and_2/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1095 m1_538_n85# and_2/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1096 and_3in_0/a_8_4# P1 vdd and_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=60 pd=54 as=0 ps=0

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M1097 and_3in_0/a_8_4# P0 vdd and_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1098 and_3in_0/a_8_4# Cnot vdd and_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1099 m1_397_n84# and_3in_0/a_8_4# vdd and_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1100 and_3in_0/a_8_n29# P1 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1101 and_3in_0/a_24_n29# P0 and_3in_0/a_8_n29# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1102 and_3in_0/a_8_4# Cnot and_3in_0/a_24_n29# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1103 m1_397_n84# and_3in_0/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1104 orgate_0/a_8_4# G0 vdd orgate_0/w_n5_n2# CMOSP w=4 l=2
+ ad=32 pd=24 as=0 ps=0
M1105 orgate_0/a_8_n28# w1 orgate_0/a_8_4# orgate_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1106 Cr0 orgate_0/a_8_n28# vdd orgate_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1107 orgate_0/a_8_n28# G0 gnd Gnd CMOSN w=4 l=2
+ ad=32 pd=24 as=0 ps=0
M1108 gnd w1 orgate_0/a_8_n28# Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1109 Cr0 orgate_0/a_8_n28# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1110 and_1/a_8_4# P0 vdd and_1/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1111 and_1/a_8_4# Cnot vdd and_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1112 w1 and_1/a_8_4# vdd and_1/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1113 and_1/a_8_n21# P0 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1114 and_1/a_8_4# Cnot and_1/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1115 w1 and_1/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1116 xor_real_0/a_n47_n23# A0 vdd w_237_17# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1117 xor_real_0/a_n47_n23# A0 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1118 P0 xor_real_0/a_n35_n24# xor_real_0/a_n47_n23# w_237_17# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1119 P0 B0 A0 w_237_17# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1120 xor_real_0/a_n35_n24# B0 vdd w_237_17# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
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M1121 P0 B0 xor_real_0/a_n47_n23# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1122 P0 xor_real_0/a_n35_n24# A0 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1123 xor_real_0/a_n35_n24# B0 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1124 and_0/a_8_4# A0 vdd and_0/w_n5_n2# CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1125 and_0/a_8_4# B0 vdd and_0/w_n5_n2# CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1126 G0 and_0/a_8_4# vdd and_0/w_n5_n2# CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1127 and_0/a_8_n21# A0 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1128 and_0/a_8_4# B0 and_0/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1129 G0 and_0/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1130 a_164_n91# A1 vdd w_143_n70# CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1131 a_63_n69# A1 vdd w_50_n75# CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1132 a_63_n69# B1 vdd w_50_n75# CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1133 G1 a_63_n69# vdd w_50_n75# CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1134 a_63_n94# A1 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1135 a_63_n69# B1 a_63_n94# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1136 G1 a_63_n69# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1137 a_164_n91# A1 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1138 P1 a_176_n92# a_164_n91# w_143_n70# CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1139 P1 B1 A1 w_143_n70# CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1140 a_176_n92# B1 vdd w_143_n70# CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1141 P1 B1 a_164_n91# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1142 P1 a_176_n92# A1 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1143 a_176_n92# B1 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1144 a_164_n164# A2 vdd w_143_n143# CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
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M1145 a_63_n142# A2 vdd w_50_n148# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1146 a_63_n142# B2 vdd w_50_n148# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1147 G2 a_63_n142# vdd w_50_n148# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1148 a_63_n167# A2 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1149 a_63_n142# B2 a_63_n167# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1150 G2 a_63_n142# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1151 a_164_n164# A2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1152 P2 a_176_n165# a_164_n164# w_143_n143# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1153 P2 B2 A2 w_143_n143# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1154 a_176_n165# B2 vdd w_143_n143# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1155 P2 B2 a_164_n164# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1156 P2 a_176_n165# A2 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1157 a_176_n165# B2 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1158 a_163_n235# A3 vdd w_142_n214# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1159 a_62_n213# A3 vdd w_49_n219# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1160 a_62_n213# B3 vdd w_49_n219# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1161 G3 a_62_n213# vdd w_49_n219# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1162 a_62_n238# A3 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1163 a_62_n213# B3 a_62_n238# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1164 G3 a_62_n213# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1165 a_163_n235# A3 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1166 P3 a_175_n236# a_163_n235# w_142_n214# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1167 P3 B3 A3 w_142_n214# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1168 a_175_n236# B3 vdd w_142_n214# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
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M1169 P3 B3 a_163_n235# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1170 P3 a_175_n236# A3 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1171 a_175_n236# B3 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
C0 G0 xor_real_0/a_n35_n24# 0.27fF
C1 and_3/a_8_4# G3 0.08fF
C2 and_0/w_n5_n2# G0 0.10fF
C3 P1 and_3in_0/a_8_4# 0.13fF
C4 w_143_n143# G2 0.64fF
C5 m1_412_n157# and_4in_0/a_8_4# 0.05fF
C6 m1_397_n84# and_3in_0/a_8_4# 0.05fF
C7 P1 and_4in_0/w_n5_n2# 0.06fF
C8 w_142_n214# G3 0.64fF
C9 a_63_n69# gnd 0.10fF
C10 vdd or_3in_0/a_8_4# 0.12fF
C11 a_176_n92# w_143_n70# 0.24fF
C12 or_3in_0/a_8_n29# m1_538_n85# 0.05fF
C13 vdd or_5in_0/a_40_4# 0.08fF
C14 B2 P2 0.43fF
C15 G3 and_3/w_n5_n2# 0.02fF
C16 A1 w_143_n70# 0.09fF
C17 gnd m1_574_n229# 1.50fF
C18 or_3in_0/a_8_n29# m1_397_n84# 0.26fF
C19 w_142_n214# B3 0.22fF
C20 gnd m1_412_n157# 0.70fF
C21 G1 P3 0.42fF
C22 P0 and_3in_0/w_n5_n2# 0.06fF
C23 gnd and_5in_0/a_8_4# 0.14fF
C24 gnd and_3in_0/a_8_n29# 0.16fF
C25 vdd Cr0 0.07fF
C26 vdd P3 0.02fF
C27 and_4in_0/a_24_n36# and_4in_0/a_40_n36# 0.04fF
C28 a_63_n69# a_63_n94# 0.04fF
C29 vdd and_1/a_8_4# 0.23fF
C30 m1_552_n157# G2 0.20fF
C31 gnd orgate_0/a_8_n28# 0.16fF
C32 G3 or_5in_0/a_40_4# 0.07fF
C33 P0 xor_real_0/a_n35_n24# 0.07fF
C34 a_176_n92# a_164_n91# 0.13fF
C35 and_4/a_8_4# G2 0.08fF
C36 or_3in_0/a_8_4# or_3in_0/w_n5_n2# 0.03fF
C37 or_4in_0/a_40_4# vdd 0.08fF
C38 orgate_0/w_n5_n2# orgate_0/a_8_n28# 0.09fF
C39 G2 P2 0.15fF
C40 gnd B2 0.21fF
C41 and_5in_0/a_8_4# and_5in_0/w_n5_n2# 0.20fF
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C42 Cr1 gnd 0.08fF  
C43 A3 w\_49\_n219# 0.06fF  
C44 A1 a\_164\_n91# 0.05fF  
C45 or\_4in\_0/a\_8\_4# G2 0.07fF  
C46 Cr2 or\_4in\_0/w\_n5\_n2# 0.03fF  
C47 A0 G0 0.35fF  
C48 P3 G3 0.16fF  
C49 G2 and\_4in\_0/a\_8\_4# 0.19fF  
C50 m1\_832\_n222# gnd 0.16fF  
C51 P1 P2 2.99fF  
C52 a\_176\_n92# P1 0.11fF  
C53 vdd or\_5in\_0/w\_n5\_n2# 0.15fF  
C54 or\_3in\_0/a\_8\_n29# or\_3in\_0/a\_24\_4# 0.04fF  
C55 gnd and\_3in\_1/a\_8\_n29# 0.16fF  
C56 A1 P1 0.59fF  
C57 B3 P3 0.43fF  
C58 gnd a\_164\_n91# 0.08fF  
C59 and\_3in\_2/a\_8\_4# P2 0.12fF  
C60 P1 and\_4in\_0/a\_8\_4# 0.06fF  
C61 gnd G2 0.27fF  
C62 or\_4in\_0/a\_40\_4# or\_4in\_0/a\_24\_4# 0.04fF  
C63 A2 w\_50\_n148# 0.06fF  
C64 vdd G1 1.11fF  
C65 gnd m1\_538\_n85# 0.24fF  
C66 G3 or\_5in\_0/w\_n5\_n2# 0.06fF  
C67 vdd B0 0.46fF  
C68 P1 gnd 0.06fF  
C69 A0 P0 0.59fF  
C70 and\_4in\_0/a\_40\_n36# and\_4in\_0/a\_8\_4# 0.04fF  
C71 gnd m1\_397\_n84# 0.42fF  
C72 G0 P3 0.44fF  
C73 and\_3in\_0/w\_n5\_n2# and\_3in\_0/a\_8\_4# 0.15fF  
C74 and\_5in\_0/a\_8\_4# Cnot 0.12fF  
C75 gnd and\_3in\_1/a\_24\_n29# 0.12fF  
C76 a\_63\_n142# vdd 0.23fF  
C77 Cnot and\_3in\_0/a\_8\_n29# 0.16fF  
C78 and\_1/a\_8\_4# G0 0.07fF  
C79 and\_0/a\_8\_4# B0 0.41fF  
C80 and\_0/a\_8\_4# vdd 0.23fF  
C81 m1\_552\_n157# or\_4in\_0/w\_n5\_n2# 0.06fF  
C82 and\_3in\_2/a\_8\_4# gnd 0.12fF  
C83 G1 G3 0.09fF  
C84 and\_1/w\_n5\_n2# and\_1/a\_8\_4# 0.13fF  
C85 m1\_552\_n157# m1\_682\_n151# 0.86fF  
C86 gnd and\_4in\_0/a\_40\_n36# 0.12fF  
C87 and\_4/a\_8\_4# m1\_682\_n151# 0.05fF  
C88 P1 and\_5in\_0/w\_n5\_n2# 0.06fF  
C89 and\_3in\_2/w\_n5\_n2# P2 0.06fF

C90 vdd G3 1.42fF  
C91 xor\_real\_0/a\_n47\_n23# xor\_real\_0/a\_n35\_n24# 0.13fF  
C92 or\_4in\_0/a\_8\_4# or\_4in\_0/w\_n5\_n2# 0.03fF  
C93 or\_3in\_0/w\_n5\_n2# G1 0.06fF  
C94 A3 w\_142\_n214# 0.09fF  
C95 vdd or\_3in\_0/w\_n5\_n2# 0.12fF  
C96 and\_3in\_1/a\_8\_4# vdd 0.33fF  
C97 vdd or\_4in\_0/a\_24\_4# 0.08fF  
C98 vdd B3 0.45fF  
C99 A2 B2 0.99fF  
C100 gnd and\_5in\_0/a\_24\_n43# 0.12fF  
C101 and\_3in\_1/w\_n5\_n2# vdd 0.17fF  
C102 and\_4in\_1/gnd and\_4in\_1/a\_24\_n36# 0.12fF  
C103 P0 P3 1.07fF  
C104 and\_4in\_1/a\_8\_4# P3 0.09fF  
C105 P0 and\_1/a\_8\_4# 0.03fF  
C106 or\_4in\_0/a\_40\_4# or\_4in\_0/a\_8\_n35# 0.04fF  
C107 m1\_706\_n228# or\_5in\_0/a\_8\_n42# 0.08fF  
C108 G2 Cnot 0.08fF  
C109 gnd m1\_682\_n151# 0.08fF  
C110 G1 G0 0.08fF  
C111 B3 G3 0.15fF  
C112 B2 w\_50\_n148# 0.06fF  
C113 gnd and\_3/a\_8\_n21# 0.18fF  
C114 a\_176\_n165# w\_143\_n143# 0.24fF  
C115 B0 G0 0.14fF  
C116 vdd G0 0.74fF  
C117 A2 G2 0.35fF  
C118 and\_3in\_2/a\_24\_n29# and\_3in\_2/a\_8\_n29# 0.04fF  
C119 or\_5in\_0/a\_56\_4# or\_5in\_0/a\_40\_4# 0.04fF  
C120 vdd and\_1/w\_n5\_n2# 0.13fF  
C121 P1 Cnot 1.55fF  
C122 and\_4in\_1/w\_n5\_n2# P3 0.06fF  
C123 A1 w\_50\_n75# 0.06fF  
C124 A3 P3 0.59fF  
C125 and\_3in\_1/w\_n5\_n2# and\_3in\_1/a\_8\_4# 0.15fF  
C126 and\_2/a\_8\_4# G1 0.16fF  
C127 and\_0/a\_8\_4# G0 0.05fF  
C128 A0 xor\_real\_0/a\_n47\_n23# 0.05fF  
C129 and\_2/a\_8\_4# vdd 0.23fF  
C130 gnd a\_63\_n167# 0.18fF  
C131 G0 G3 0.08fF  
C132 G2 w\_50\_n148# 0.10fF  
C133 a\_163\_n235# w\_142\_n214# 0.06fF  
C134 a\_176\_n92# B1 0.30fF  
C135 w\_143\_n143# a\_164\_n164# 0.06fF  
C136 Cnot and\_4in\_0/a\_40\_n36# 0.16fF  
C137 and\_5in\_0/a\_56\_n43# gnd 0.12fF

C138 G1 and\_4/w\_n5\_n2# 0.06fF  
C139 m1\_832\_n222# m1\_574\_n229# 0.08fF  
C140 A1 B1 0.99fF  
C141 P0 G1 0.08fF  
C142 and\_3in\_1/a\_8\_4# G0 0.20fF  
C143 vdd and\_4/w\_n5\_n2# 0.13fF  
C144 vdd or\_4in\_0/a\_8\_n35# 0.05fF  
C145 a\_176\_n165# P2 0.11fF  
C146 and\_3in\_1/w\_n5\_n2# G0 0.06fF  
C147 P0 B0 0.43fF  
C148 vdd P0 0.02fF  
C149 m1\_412\_n157# and\_3in\_1/a\_8\_n29# 0.09fF  
C150 and\_4in\_1/a\_8\_4# vdd 0.44fF  
C151 gnd xor\_real\_0/a\_n35\_n24# 0.07fF  
C152 and\_5in\_0/a\_24\_n43# Cnot 0.16fF  
C153 w1 and\_1/a\_8\_4# 0.05fF  
C154 m1\_412\_n157# G2 0.20fF  
C155 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_56\_4# 0.03fF  
C156 gnd B1 0.21fF  
C157 w\_143\_n70# a\_164\_n91# 0.06fF  
C158 P0 G3 0.08fF  
C159 and\_4in\_1/a\_8\_4# G3 0.14fF  
C160 P1 m1\_412\_n157# 0.09fF  
C161 a\_164\_n164# P2 0.25fF  
C162 P1 and\_5in\_0/a\_8\_4# 0.06fF  
C163 gnd m1\_706\_n228# 0.25fF  
C164 and\_4in\_1/w\_n5\_n2# vdd 0.21fF  
C165 vdd A3 0.09fF  
C166 a\_163\_n235# P3 0.25fF  
C167 a\_176\_n165# gnd 0.07fF  
C168 G2 B2 0.15fF  
C169 and\_1/w\_n5\_n2# G0 0.02fF  
C170 and\_2/w\_n5\_n2# G1 0.04fF  
C171 m1\_412\_n157# and\_3in\_1/a\_24\_n29# 0.09fF  
C172 and\_3in\_2/a\_8\_4# m1\_574\_n229# 0.03fF  
C173 or\_5in\_0/a\_24\_4# or\_5in\_0/a\_40\_4# 0.04fF  
C174 vdd and\_2/w\_n5\_n2# 0.13fF  
C175 a\_63\_n94# B1 0.18fF  
C176 vdd or\_5in\_0/a\_56\_4# 0.08fF  
C177 P1 w\_143\_n70# 0.05fF  
C178 and\_2/a\_8\_4# G0 0.23fF  
C179 a\_62\_n213# w\_49\_n219# 0.13fF  
C180 and\_3/a\_8\_4# gnd 0.10fF  
C181 and\_4in\_1/w\_n5\_n2# G3 0.02fF  
C182 A3 G3 0.35fF  
C183 A0 gnd 0.31fF  
C184 gnd a\_164\_n164# 0.08fF  
C185 and\_5in\_0/a\_56\_n43# Cnot 0.16fF

C186 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_8\_n42# 0.09fF  
C187 G3 or\_5in\_0/a\_56\_4# 0.07fF  
C188 and\_3in\_0/w\_n5\_n2# Cnot 0.06fF  
C189 w1 vdd 0.07fF  
C190 P0 G0 0.13fF  
C191 G1 and\_3in\_0/a\_8\_4# 0.19fF  
C192 A3 B3 0.99fF  
C193 and\_4in\_1/a\_8\_4# G0 0.20fF  
C194 P1 and\_3in\_1/a\_8\_n29# 0.16fF  
C195 P3 P2 0.53fF  
C196 P1 a\_164\_n91# 0.25fF  
C197 and\_1/w\_n5\_n2# P0 0.06fF  
C198 vdd and\_3in\_0/a\_8\_4# 0.33fF  
C199 vdd Cr2 0.07fF  
C200 m1\_412\_n157# or\_4in\_0/w\_n5\_n2# 0.06fF  
C201 P1 G2 0.15fF  
C202 and\_1/a\_8\_4# and\_1/a\_8\_n21# 0.04fF  
C203 vdd and\_4in\_0/w\_n5\_n2# 0.21fF  
C204 and\_3in\_1/a\_8\_n29# and\_3in\_1/a\_24\_n29# 0.04fF  
C205 xor\_real\_0/a\_n47\_n23# B0 0.14fF  
C206 vdd xor\_real\_0/a\_n47\_n23# 0.08fF  
C207 or\_3in\_0/a\_8\_n29# G1 0.13fF  
C208 and\_4in\_1/a\_24\_n36# P2 0.16fF  
C209 m1\_412\_n157# m1\_682\_n151# 0.08fF  
C210 vdd or\_5in\_0/a\_8\_n42# 0.07fF  
C211 or\_5in\_0/a\_24\_4# or\_5in\_0/w\_n5\_n2# 0.03fF  
C212 or\_3in\_0/a\_8\_n29# vdd 0.07fF  
C213 w\_237\_17# xor\_real\_0/a\_n35\_n24# 0.24fF  
C214 a\_163\_n235# vdd 0.08fF  
C215 vdd w\_143\_n143# 0.32fF  
C216 and\_4in\_1/a\_8\_4# and\_4in\_1/gnd 0.08fF  
C217 and\_4in\_1/w\_n5\_n2# G0 0.06fF  
C218 m1\_397\_n84# m1\_538\_n85# 0.31fF  
C219 and\_4in\_1/a\_8\_n36# and\_4in\_1/a\_24\_n36# 0.04fF  
C220 P1 m1\_397\_n84# 0.13fF  
C221 and\_3in\_0/a\_24\_n29# and\_3in\_0/a\_8\_4# 0.04fF  
C222 P1 and\_3in\_1/a\_24\_n29# 0.16fF  
C223 gnd Cr0 0.08fF  
C224 gnd P3 0.06fF  
C225 a\_63\_n69# w\_50\_n75# 0.13fF  
C226 and\_2/w\_n5\_n2# G0 0.06fF  
C227 gnd and\_1/a\_8\_4# 0.10fF  
C228 orgate\_0/w\_n5\_n2# Cr0 0.03fF  
C229 G3 or\_5in\_0/a\_8\_n42# 0.13fF  
C230 or\_5in\_0/w\_n5\_n2# Cr3 0.03fF  
C231 or\_5in\_0/a\_24\_4# vdd 0.08fF  
C232 a\_163\_n235# G3 0.11fF  
C233 a\_176\_n165# A2 0.08fF



C234 m1\_552\_n157# G1 0.16fF  
C235 and\_5in\_0/a\_56\_n43# and\_5in\_0/a\_8\_4# 0.04fF  
C236 or\_3in\_0/a\_8\_n29# or\_3in\_0/w\_n5\_n2# 0.09fF  
C237 and\_4/a\_8\_4# G1 0.23fF  
C238 and\_2/a\_8\_4# and\_2/w\_n5\_n2# 0.13fF  
C239 vdd m1\_552\_n157# 0.07fF  
C240 and\_5in\_0/w\_n5\_n2# P3 0.06fF  
C241 G1 P2 1.01fF  
C242 a\_176\_n92# G1 0.27fF  
C243 G2 or\_4in\_0/w\_n5\_n2# 0.06fF  
C244 vdd and\_4/a\_8\_4# 0.23fF  
C245 a\_163\_n235# B3 0.14fF  
C246 a\_63\_n69# B1 0.41fF  
C247 w1 G0 0.45fF  
C248 vdd P2 0.02fF  
C249 a\_176\_n92# vdd 0.21fF  
C250 a\_63\_n167# B2 0.18fF  
C251 G2 m1\_682\_n151# 1.11fF  
C252 or\_5in\_0/a\_24\_4# G3 0.07fF  
C253 A1 G1 0.35fF  
C254 vdd Cr3 0.07fF  
C255 and\_4in\_1/a\_8\_4# and\_4in\_1/w\_n5\_n2# 0.18fF  
C256 w1 and\_1/w\_n5\_n2# 0.03fF  
C257 gnd or\_5in\_0/w\_n5\_n2# 0.06fF  
C258 and\_4/a\_8\_n21# G1 0.18fF  
C259 vdd or\_4in\_0/a\_8\_4# 0.12fF  
C260 G2 and\_3/a\_8\_n21# 0.18fF  
C261 A1 vdd 0.09fF  
C262 A2 a\_164\_n164# 0.05fF  
C263 A0 w\_237\_17# 0.09fF  
C264 xor\_real\_0/a\_n47\_n23# G0 0.11fF  
C265 vdd and\_4in\_0/a\_8\_4# 0.44fF  
C266 w\_142\_n214# a\_175\_n236# 0.24fF  
C267 and\_3in\_2/a\_24\_n29# P2 0.16fF  
C268 G3 P2 0.22fF  
C269 m1\_706\_n228# m1\_574\_n229# 0.97fF  
C270 gnd G1 0.36fF  
C271 and\_3in\_1/a\_8\_4# m1\_552\_n157# 0.05fF  
C272 and\_3in\_2/w\_n5\_n2# and\_3in\_2/a\_8\_4# 0.15fF  
C273 gnd B0 0.11fF  
C274 vdd gnd 0.74fF  
C275 w\_143\_n70# B1 0.22fF  
C276 and\_3in\_1/w\_n5\_n2# m1\_552\_n157# 0.03fF  
C277 and\_3in\_1/a\_8\_4# P2 0.07fF  
C278 vdd orgate\_0/w\_n5\_n2# 0.10fF  
C279 a\_63\_n142# gnd 0.10fF  
C280 and\_3in\_1/w\_n5\_n2# P2 0.06fF  
C281 and\_0/a\_8\_4# gnd 0.10fF

C282 B0 and\_0/a\_8\_n21# 0.18fF  
C283 Cnot P3 0.24fF  
C284 Cr2 or\_4in\_0/a\_8\_n35# 0.05fF  
C285 or\_4in\_0/a\_24\_4# or\_4in\_0/a\_8\_4# 0.04fF  
C286 and\_1/a\_8\_4# Cnot 0.23fF  
C287 P0 and\_3in\_0/a\_8\_4# 0.20fF  
C288 and\_4in\_1/a\_40\_n36# and\_4in\_1/a\_24\_n36# 0.04fF  
C289 gnd and\_3in\_2/a\_24\_n29# 0.12fF  
C290 P0 and\_4in\_0/w\_n5\_n2# 0.06fF  
C291 and\_3in\_2/a\_8\_n29# P2 0.16fF  
C292 P0 xor\_real\_0/a\_n47\_n23# 0.25fF  
C293 vdd and\_5in\_0/w\_n5\_n2# 0.25fF  
C294 a\_176\_n165# B2 0.30fF  
C295 and\_0/a\_8\_4# and\_0/a\_8\_n21# 0.04fF  
C296 gnd G3 0.32fF  
C297 P1 and\_3in\_0/w\_n5\_n2# 0.06fF  
C298 gnd and\_3in\_0/a\_24\_n29# 0.12fF  
C299 B1 a\_164\_n91# 0.14fF  
C300 P3 a\_175\_n236# 0.10fF  
C301 m1\_832\_n222# m1\_706\_n228# 0.94fF  
C302 m1\_397\_n84# and\_3in\_0/w\_n5\_n2# 0.03fF  
C303 and\_3in\_1/a\_8\_4# gnd 0.12fF  
C304 G0 P2 0.48fF  
C305 m1\_682\_n151# or\_4in\_0/w\_n5\_n2# 0.06fF  
C306 gnd B3 0.22fF  
C307 and\_5in\_0/w\_n5\_n2# G3 0.03fF  
C308 G2 m1\_706\_n228# 0.00fF  
C309 a\_62\_n238# B3 0.18fF  
C310 a\_176\_n165# G2 0.31fF  
C311 B2 a\_164\_n164# 0.14fF  
C312 P1 B1 0.43fF  
C313 m1\_832\_n222# and\_3/a\_8\_4# 0.05fF  
C314 gnd and\_3in\_2/a\_8\_n29# 0.16fF  
C315 gnd and\_5in\_0/a\_8\_n43# 0.16fF  
C316 and\_4in\_1/gnd P2 0.05fF  
C317 vdd a\_62\_n213# 0.23fF  
C318 gnd and\_5in\_0/a\_40\_n43# 0.12fF  
C319 a\_163\_n235# A3 0.05fF  
C320 m1\_552\_n157# or\_4in\_0/a\_8\_n35# 0.26fF  
C321 Cnot G1 0.08fF  
C322 gnd G0 0.14fF  
C323 and\_4/a\_8\_4# and\_4/w\_n5\_n2# 0.13fF  
C324 P3 m1\_574\_n229# 0.06fF  
C325 and\_3/a\_8\_4# G2 0.23fF  
C326 or\_5in\_0/a\_8\_n42# or\_5in\_0/a\_56\_4# 0.04fF  
C327 m1\_832\_n222# and\_3/w\_n5\_n2# 0.03fF  
C328 P2 and\_4/w\_n5\_n2# 0.06fF  
C329 orgate\_0/w\_n5\_n2# G0 0.06fF

C330 and\_5in\_0/a\_8\_4# P3 0.16fF  
C331 and\_4in\_1/gnd and\_4in\_1/a\_8\_n36# 0.16fF  
C332 P0 P2 1.36fF  
C333 and\_3in\_2/a\_8\_4# m1\_706\_n228# 0.05fF  
C334 and\_4in\_1/a\_8\_4# P2 0.12fF  
C335 G2 a\_164\_n164# 0.11fF  
C336 a\_62\_n213# G3 0.05fF  
C337 vdd A2 0.09fF  
C338 Cr0 orgate\_0/a\_8\_n28# 0.05fF  
C339 and\_2/a\_8\_4# gnd 0.10fF  
C340 B0 w\_237\_17# 0.22fF  
C341 vdd w\_237\_17# 0.32fF  
C342 G2 and\_3/w\_n5\_n2# 0.06fF  
C343 P0 and\_4in\_0/a\_8\_4# 0.20fF  
C344 gnd and\_4in\_1/gnd 0.36fF  
C345 a\_63\_n142# A2 0.29fF  
C346 vdd a\_175\_n236# 0.21fF  
C347 Cnot G3 0.08fF  
C348 B3 a\_62\_n213# 0.41fF  
C349 and\_3in\_0/a\_24\_n29# Cnot 0.16fF  
C350 m1\_574\_n229# or\_5in\_0/w\_n5\_n2# 0.06fF  
C351 and\_4in\_1/w\_n5\_n2# P2 0.06fF  
C352 gnd or\_4in\_0/a\_8\_n35# 0.70fF  
C353 and\_4in\_0/a\_24\_n36# and\_4in\_0/a\_8\_n36# 0.04fF  
C354 vdd w\_50\_n148# 0.13fF  
C355 a\_63\_n69# G1 0.05fF  
C356 and\_4in\_1/a\_8\_4# gnd 0.00fF  
C357 G3 a\_175\_n236# 0.31fF  
C358 a\_63\_n142# w\_50\_n148# 0.13fF  
C359 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_8\_4# 0.03fF  
C360 a\_63\_n69# vdd 0.23fF  
C361 and\_3in\_2/w\_n5\_n2# m1\_706\_n228# 0.03fF  
C362 G1 m1\_574\_n229# 0.00fF  
C363 G2 P3 0.39fF  
C364 m1\_412\_n157# G1 0.08fF  
C365 m1\_706\_n228# and\_3/a\_8\_n21# 0.09fF  
C366 P0 and\_5in\_0/w\_n5\_n2# 0.06fF  
C367 vdd m1\_574\_n229# 0.07fF  
C368 and\_5in\_0/a\_8\_n43# Cnot 0.16fF  
C369 B3 a\_175\_n236# 0.30fF  
C370 vdd m1\_412\_n157# 0.07fF  
C371 or\_4in\_0/a\_40\_4# G2 0.07fF  
C372 vdd and\_5in\_0/a\_8\_4# 0.55fF  
C373 and\_5in\_0/a\_40\_n43# Cnot 0.16fF  
C374 A3 gnd 0.42fF  
C375 Cnot G0 0.00fF  
C376 P1 P3 0.39fF  
C377 m1\_832\_n222# or\_5in\_0/w\_n5\_n2# 0.06fF

C378 vdd or\_5in\_0/a\_8\_4# 0.12fF  
C379 w\_143\_n70# G1 0.63fF  
C380 and\_3in\_2/a\_24\_n29# m1\_574\_n229# 0.08fF  
C381 and\_1/w\_n5\_n2# Cnot 0.06fF  
C382 vdd orgate\_0/a\_8\_n28# 0.06fF  
C383 and\_3/a\_8\_4# and\_3/a\_8\_n21# 0.04fF  
C384 w\_50\_n75# B1 0.06fF  
C385 vdd w\_143\_n70# 0.32fF  
C386 m1\_574\_n229# G3 0.11fF  
C387 G0 w\_237\_17# 0.59fF  
C388 and\_3in\_2/a\_8\_4# P3 0.13fF  
C389 and\_4in\_0/w\_n5\_n2# P2 0.06fF  
C390 vdd B2 0.45fF  
C391 and\_5in\_0/a\_8\_4# G3 0.17fF  
C392 vdd Cr1 0.07fF  
C393 and\_4in\_1/gnd and\_4in\_1/a\_40\_n36# 0.12fF  
C394 and\_2/a\_8\_n21# G0 0.18fF  
C395 a\_63\_n142# B2 0.41fF  
C396 and\_3in\_0/a\_24\_n29# and\_3in\_0/a\_8\_n29# 0.04fF  
C397 or\_5in\_0/a\_8\_n42# Cr3 0.05fF  
C398 G3 or\_5in\_0/a\_8\_4# 0.07fF  
C399 w\_143\_n143# P2 0.05fF  
C400 and\_4in\_0/w\_n5\_n2# and\_4in\_0/a\_8\_4# 0.18fF  
C401 or\_3in\_0/a\_24\_4# or\_3in\_0/a\_8\_4# 0.04fF  
C402 m1\_832\_n222# vdd 0.07fF  
C403 w1 gnd 0.08fF  
C404 G1 a\_164\_n91# 0.11fF  
C405 and\_4in\_1/a\_8\_4# and\_4in\_1/a\_40\_n36# 0.04fF  
C406 w1 orgate\_0/w\_n5\_n2# 0.06fF  
C407 G2 G1 0.08fF  
C408 and\_2/a\_8\_4# and\_2/a\_8\_n21# 0.04fF  
C409 vdd a\_164\_n91# 0.08fF  
C410 gnd and\_3in\_0/a\_8\_4# 0.12fF  
C411 gnd Cr2 0.08fF  
C412 P0 Cnot 1.92fF  
C413 and\_3in\_2/a\_8\_n29# m1\_574\_n229# 0.08fF  
C414 gnd and\_4in\_0/a\_8\_n36# 0.16fF  
C415 vdd G2 1.03fF  
C416 gnd xor\_real\_0/a\_n47\_n23# 0.08fF  
C417 m1\_538\_n85# G1 0.19fF  
C418 m1\_832\_n222# G3 1.08fF  
C419 Cr1 or\_3in\_0/w\_n5\_n2# 0.03fF  
C420 gnd and\_4in\_0/a\_24\_n36# 0.12fF  
C421 a\_63\_n142# G2 0.05fF  
C422 P0 w\_237\_17# 0.05fF  
C423 gnd or\_5in\_0/a\_8\_n42# 0.95fF  
C424 and\_3in\_2/w\_n5\_n2# P3 0.06fF  
C425 P1 G1 0.15fF

C426 or\_3in\_0/a\_8\_n29# gnd 0.54fF  
C427 A3 a\_62\_n213# 0.29fF  
C428 m1\_552\_n157# and\_4/a\_8\_4# 0.05fF  
C429 vdd m1\_538\_n85# 0.07fF  
C430 a\_163\_n235# gnd 0.08fF  
C431 m1\_412\_n157# G0 0.08fF  
C432 m1\_552\_n157# P2 0.13fF  
C433 m1\_397\_n84# G1 0.87fF  
C434 P1 vdd 0.02fF  
C435 or\_4in\_0/a\_40\_4# or\_4in\_0/w\_n5\_n2# 0.03fF  
C436 and\_4/a\_8\_4# P2 0.03fF  
C437 A0 xor\_real\_0/a\_n35\_n24# 0.08fF  
C438 vdd m1\_397\_n84# 0.07fF  
C439 and\_3in\_2/a\_8\_4# G1 0.20fF  
C440 G2 G3 0.07fF  
C441 A0 and\_0/w\_n5\_n2# 0.06fF  
C442 m1\_552\_n157# and\_4/a\_8\_n21# 0.10fF  
C443 and\_3in\_2/a\_8\_4# vdd 0.33fF  
C444 and\_4/a\_8\_4# and\_4/a\_8\_n21# 0.04fF  
C445 and\_3/a\_8\_4# m1\_706\_n228# 0.04fF  
C446 a\_176\_n92# A1 0.08fF  
C447 and\_4in\_1/gnd m1\_574\_n229# 0.08fF  
C448 and\_3in\_1/a\_8\_4# G2 0.06fF  
C449 P2 and\_4in\_0/a\_8\_4# 0.41fF  
C450 and\_4in\_1/a\_8\_n36# P2 0.16fF  
C451 or\_4in\_0/a\_24\_4# G2 0.07fF  
C452 P1 G3 0.15fF  
C453 and\_3in\_1/w\_n5\_n2# G2 0.02fF  
C454 A3 a\_175\_n236# 0.08fF  
C455 or\_3in\_0/w\_n5\_n2# m1\_538\_n85# 0.06fF  
C456 and\_3in\_2/a\_8\_4# and\_3in\_2/a\_24\_n29# 0.04fF  
C457 gnd m1\_552\_n157# 0.12fF  
C458 a\_176\_n165# a\_164\_n164# 0.13fF  
C459 and\_3in\_2/a\_8\_4# G3 0.11fF  
C460 and\_3in\_1/a\_8\_4# P1 0.12fF  
C461 gnd and\_4/a\_8\_4# 0.10fF  
C462 m1\_412\_n157# or\_4in\_0/a\_8\_n35# 0.05fF  
C463 and\_4in\_1/a\_8\_4# m1\_574\_n229# 0.05fF  
C464 gnd P2 0.12fF  
C465 or\_3in\_0/w\_n5\_n2# m1\_397\_n84# 0.06fF  
C466 a\_176\_n92# gnd 0.07fF  
C467 gnd and\_1/a\_8\_n21# 0.18fF  
C468 and\_3in\_1/w\_n5\_n2# P1 0.06fF  
C469 P0 and\_5in\_0/a\_8\_4# 0.20fF  
C470 and\_3in\_1/a\_8\_4# and\_3in\_1/a\_24\_n29# 0.04fF  
C471 gnd Cr3 0.08fF  
C472 and\_3in\_2/w\_n5\_n2# G1 0.06fF  
C473 A1 gnd 0.41fF

C474 G2 G0 0.08fF  
C475 vdd or\_4in\_0/w\_n5\_n2# 0.14fF  
C476 or\_3in\_0/a\_24\_4# vdd 0.08fF  
C477 gnd and\_4/a\_8\_n21# 0.18fF  
C478 gnd and\_4in\_0/a\_8\_4# 0.08fF  
C479 Cnot and\_3in\_0/a\_8\_4# 0.12fF  
C480 and\_3in\_2/w\_n5\_n2# vdd 0.17fF  
C481 and\_3/a\_8\_4# and\_3/w\_n5\_n2# 0.13fF  
C482 and\_4in\_0/a\_8\_n36# Cnot 0.16fF  
C483 vdd m1\_682\_n151# 0.07fF  
C484 Cnot and\_4in\_0/w\_n5\_n2# 0.06fF  
C485 and\_5in\_0/w\_n5\_n2# P2 0.06fF  
C486 and\_4in\_1/w\_n5\_n2# m1\_574\_n229# 0.03fF  
C487 and\_4in\_0/a\_24\_n36# Cnot 0.16fF  
C488 P1 G0 1.93fF  
C489 xor\_real\_0/a\_n47\_n23# w\_237\_17# 0.06fF  
C490 m1\_397\_n84# G0 0.07fF  
C491 P3 m1\_706\_n228# 0.06fF  
C492 and\_3in\_2/w\_n5\_n2# G3 0.02fF  
C493 and\_2/a\_8\_4# m1\_538\_n85# 0.05fF  
C494 A2 w\_143\_n143# 0.09fF  
C495 a\_62\_n238# gnd 0.18fF  
C496 gnd and\_0/a\_8\_n21# 0.18fF  
C497 P1 and\_2/a\_8\_4# 0.03fF  
C498 or\_3in\_0/a\_24\_4# or\_3in\_0/w\_n5\_n2# 0.03fF  
C499 G2 and\_4/w\_n5\_n2# 0.02fF  
C500 G2 or\_4in\_0/a\_8\_n35# 0.13fF  
C501 or\_4in\_0/a\_24\_4# or\_4in\_0/w\_n5\_n2# 0.03fF  
C502 a\_163\_n235# a\_175\_n236# 0.13fF  
C503 G1 w\_50\_n75# 0.10fF  
C504 and\_2/a\_8\_4# m1\_397\_n84# 0.18fF  
C505 P0 G2 0.08fF  
C506 and\_3in\_0/w\_n5\_n2# G1 0.05fF  
C507 gnd and\_5in\_0/w\_n5\_n2# 0.03fF  
C508 vdd w\_49\_n219# 0.13fF  
C509 a\_63\_n142# a\_63\_n167# 0.04fF  
C510 and\_3/a\_8\_4# P3 0.03fF  
C511 gnd a\_63\_n94# 0.18fF  
C512 vdd w\_50\_n75# 0.13fF  
C513 and\_5in\_0/a\_8\_n43# and\_5in\_0/a\_24\_n43# 0.04fF  
C514 vdd and\_3in\_0/w\_n5\_n2# 0.17fF  
C515 and\_5in\_0/a\_24\_n43# and\_5in\_0/a\_40\_n43# 0.04fF  
C516 w\_142\_n214# P3 0.05fF  
C517 and\_4in\_1/a\_40\_n36# P2 0.16fF  
C518 P1 P0 3.89fF  
C519 m1\_706\_n228# or\_5in\_0/w\_n5\_n2# 0.06fF  
C520 and\_4in\_1/a\_8\_4# P1 0.06fF  
C521 B0 xor\_real\_0/a\_n35\_n24# 0.30fF



C522 vdd xor\_real\_0/a\_n35\_n24# 0.21fF  
C523 Cnot P2 1.81fF  
C524 P3 and\_3/w\_n5\_n2# 0.06fF  
C525 and\_0/w\_n5\_n2# B0 0.06fF  
C526 vdd and\_0/w\_n5\_n2# 0.13fF  
C527 and\_1/a\_8\_n21# Cnot 0.18fF  
C528 G1 B1 0.15fF  
C529 G3 w\_49\_n219# 0.10fF  
C530 w1 orgate\_0/a\_8\_n28# 0.19fF  
C531 m1\_412\_n157# and\_4in\_0/w\_n5\_n2# 0.03fF  
C532 m1\_574\_n229# or\_5in\_0/a\_8\_n42# 0.26fF  
C533 vdd B1 0.45fF  
C534 A2 P2 0.59fF  
C535 and\_0/a\_8\_4# and\_0/w\_n5\_n2# 0.13fF  
C536 Cnot and\_4in\_0/a\_8\_4# 0.12fF  
C537 gnd a\_62\_n213# 0.10fF  
C538 B3 w\_49\_n219# 0.06fF  
C539 vdd m1\_706\_n228# 0.07fF  
C540 and\_4in\_1/w\_n5\_n2# P1 0.06fF  
C541 a\_176\_n165# vdd 0.21fF  
C542 a\_62\_n238# a\_62\_n213# 0.04fF  
C543 and\_2/w\_n5\_n2# m1\_538\_n85# 0.03fF  
C544 gnd Cnot 0.22fF  
C545 P1 and\_2/w\_n5\_n2# 0.06fF  
C546 and\_2/w\_n5\_n2# m1\_397\_n84# 0.01fF  
C547 or\_3in\_0/a\_8\_n29# Cr1 0.05fF  
C548 w\_143\_n143# B2 0.22fF  
C549 A2 gnd 0.41fF  
C550 or\_4in\_0/w\_n5\_n2# or\_4in\_0/a\_8\_n35# 0.09fF  
C551 and\_5in\_0/a\_56\_n43# and\_5in\_0/a\_40\_n43# 0.04fF  
C552 and\_3/a\_8\_4# vdd 0.23fF  
C553 m1\_706\_n228# G3 0.11fF  
C554 m1\_682\_n151# and\_4/w\_n5\_n2# 0.03fF  
C555 m1\_832\_n222# or\_5in\_0/a\_8\_n42# 0.08fF  
C556 m1\_682\_n151# or\_4in\_0/a\_8\_n35# 0.08fF  
C557 or\_5in\_0/a\_24\_4# or\_5in\_0/a\_8\_4# 0.04fF  
C558 gnd a\_175\_n236# 0.07fF  
C559 vdd w\_142\_n214# 0.32fF  
C560 m1\_552\_n157# m1\_412\_n157# 0.59fF  
C561 and\_2/a\_8\_n21# gnd 0.18fF  
C562 and\_5in\_0/w\_n5\_n2# Cnot 0.06fF  
C563 A1 a\_63\_n69# 0.29fF  
C564 vdd a\_164\_n164# 0.08fF  
C565 A0 vdd 0.10fF  
C566 A0 B0 0.99fF  
C567 m1\_574\_n229# P2 0.00fF  
C568 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_40\_4# 0.03fF  
C569 G2 and\_4in\_0/w\_n5\_n2# 0.02fF

C570 m1\_412\_n157# P2 0.20fF  
C571 and\_5in\_0/a\_8\_4# P2 0.06fF  
C572 vdd and\_3/w\_n5\_n2# 0.13fF  
C573 A0 and\_0/a\_8\_4# 0.29fF  
C574 a\_62\_n238# Gnd 0.03fF  
C575 a\_163\_n235# Gnd 0.13fF  
C576 a\_62\_n213# Gnd 0.25fF  
C577 A3 Gnd 0.64fF  
C578 B3 Gnd 0.68fF  
C579 a\_175\_n236# Gnd 0.63fF  
C580 a\_63\_n167# Gnd 0.03fF  
C581 a\_164\_n164# Gnd 0.13fF  
C582 a\_63\_n142# Gnd 0.15fF  
C583 A2 Gnd 0.60fF  
C584 B2 Gnd 0.66fF  
C585 a\_176\_n165# Gnd 0.63fF  
C586 a\_63\_n94# Gnd 0.03fF  
C587 a\_164\_n91# Gnd 0.13fF  
C588 a\_63\_n69# Gnd 0.26fF  
C589 A1 Gnd 0.75fF  
C590 B1 Gnd 0.67fF  
C591 a\_176\_n92# Gnd 0.63fF  
C592 w\_142\_n214# Gnd 1.59fF  
C593 w\_49\_n219# Gnd 0.74fF  
C594 w\_143\_n143# Gnd 1.59fF  
C595 w\_50\_n148# Gnd 0.72fF  
C596 w\_143\_n70# Gnd 1.59fF  
C597 w\_50\_n75# Gnd 0.93fF  
C598 and\_0/a\_8\_n21# Gnd 0.03fF  
C599 and\_0/a\_8\_4# Gnd 0.16fF  
C600 and\_0/w\_n5\_n2# Gnd 0.93fF  
C601 xor\_real\_0/a\_n47\_n23# Gnd 0.13fF  
C602 A0 Gnd 1.65fF  
C603 B0 Gnd 1.65fF  
C604 xor\_real\_0/a\_n35\_n24# Gnd 0.63fF  
C605 w\_237\_17# Gnd 1.59fF  
C606 and\_1/a\_8\_n21# Gnd 0.03fF  
C607 and\_1/a\_8\_4# Gnd 0.16fF  
C608 Cnot Gnd 0.52fF  
C609 P0 Gnd 1.69fF  
C610 and\_1/w\_n5\_n2# Gnd 0.93fF  
C611 gnd Gnd 4.09fF  
C612 Cr0 Gnd 0.12fF  
C613 orgate\_0/a\_8\_n28# Gnd 0.30fF  
C614 w1 Gnd 0.54fF  
C615 G0 Gnd 1.48fF  
C616 orgate\_0/w\_n5\_n2# Gnd 0.82fF  
C617 and\_3in\_0/a\_24\_n29# Gnd 0.03fF

C618 and\_3in\_0/a\_8\_n29# Gnd 0.03fF  
C619 and\_3in\_0/a\_8\_4# Gnd 0.09fF  
C620 and\_3in\_0/w\_n5\_n2# Gnd 1.16fF  
C621 and\_2/a\_8\_n21# Gnd 0.03fF  
C622 and\_2/a\_8\_4# Gnd 0.16fF  
C623 P1 Gnd 7.08fF  
C624 and\_2/w\_n5\_n2# Gnd 0.93fF  
C625 Cr1 Gnd 0.12fF  
C626 or\_3in\_0/a\_24\_4# Gnd 0.00fF  
C627 or\_3in\_0/a\_8\_4# Gnd 0.00fF  
C628 vdd Gnd 2.29fF  
C629 or\_3in\_0/a\_8\_n29# Gnd 0.12fF  
C630 G1 Gnd 4.06fF  
C631 m1\_397\_n84# Gnd 0.62fF  
C632 m1\_538\_n85# Gnd 0.64fF  
C633 or\_3in\_0/w\_n5\_n2# Gnd 1.16fF  
C634 and\_4in\_0/a\_40\_n36# Gnd 0.03fF  
C635 and\_4in\_0/a\_24\_n36# Gnd 0.03fF  
C636 and\_4in\_0/a\_8\_n36# Gnd 0.03fF  
C637 and\_4in\_0/a\_8\_4# Gnd 0.09fF  
C638 and\_4in\_0/w\_n5\_n2# Gnd 1.41fF  
C639 and\_3in\_1/a\_24\_n29# Gnd 0.03fF  
C640 and\_3in\_1/a\_8\_n29# Gnd 0.03fF  
C641 and\_3in\_1/a\_8\_4# Gnd 0.09fF  
C642 and\_3in\_1/w\_n5\_n2# Gnd 1.16fF  
C643 and\_4/a\_8\_n21# Gnd 0.03fF  
C644 and\_4/a\_8\_4# Gnd 0.16fF  
C645 P2 Gnd 7.03fF  
C646 and\_4/w\_n5\_n2# Gnd 0.93fF  
C647 Cr2 Gnd 0.18fF  
C648 or\_4in\_0/a\_40\_4# Gnd 0.00fF  
C649 or\_4in\_0/a\_24\_4# Gnd 0.00fF  
C650 or\_4in\_0/a\_8\_4# Gnd 0.00fF  
C651 or\_4in\_0/a\_8\_n35# Gnd 0.12fF  
C652 G2 Gnd 3.07fF  
C653 m1\_682\_n151# Gnd 0.68fF  
C654 m1\_552\_n157# Gnd 0.13fF  
C655 m1\_412\_n157# Gnd 0.06fF  
C656 or\_4in\_0/w\_n5\_n2# Gnd 1.46fF  
C657 and\_5in\_0/a\_56\_n43# Gnd 0.03fF  
C658 and\_5in\_0/a\_40\_n43# Gnd 0.03fF  
C659 and\_5in\_0/a\_24\_n43# Gnd 0.03fF  
C660 and\_5in\_0/a\_8\_n43# Gnd 0.03fF  
C661 and\_5in\_0/a\_8\_4# Gnd 0.09fF  
C662 and\_5in\_0/w\_n5\_n2# Gnd 1.70fF  
C663 and\_4in\_1/a\_40\_n36# Gnd 0.03fF  
C664 and\_4in\_1/a\_24\_n36# Gnd 0.03fF  
C665 and\_4in\_1/a\_8\_n36# Gnd 0.03fF

```

C666 and_4in_1/gnd Gnd 0.21fF
C667 and_4in_1/a_8_4# Gnd 0.09fF
C668 and_4in_1/w_n5_n2# Gnd 1.41fF
C669 and_3in_2/a_24_n29# Gnd 0.03fF
C670 and_3in_2/a_8_n29# Gnd 0.03fF
C671 and_3in_2/a_8_4# Gnd 0.09fF
C672 and_3in_2/w_n5_n2# Gnd 1.16fF
C673 and_3/a_8_n21# Gnd 0.03fF
C674 and_3/a_8_4# Gnd 0.16fF
C675 P3 Gnd 2.60fF
C676 and_3/w_n5_n2# Gnd 0.93fF
C677 Cr3 Gnd 0.20fF
C678 or_5in_0/a_56_4# Gnd 0.00fF
C679 or_5in_0/a_40_4# Gnd 0.00fF
C680 or_5in_0/a_24_4# Gnd 0.00fF
C681 or_5in_0/a_8_4# Gnd 0.00fF
C682 or_5in_0/a_8_n42# Gnd 0.12fF
C683 G3 Gnd 1.93fF
C684 m1_832_n222# Gnd 0.62fF
C685 m1_706_n228# Gnd 0.74fF
C686 m1_574_n229# Gnd 0.76fF
C687 or_5in_0/w_n5_n2# Gnd 1.67fF

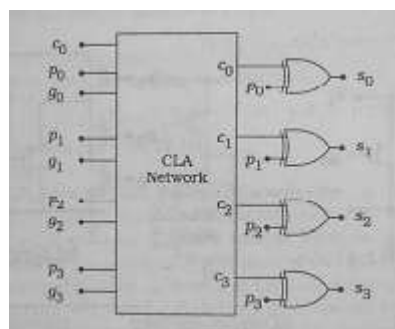
```

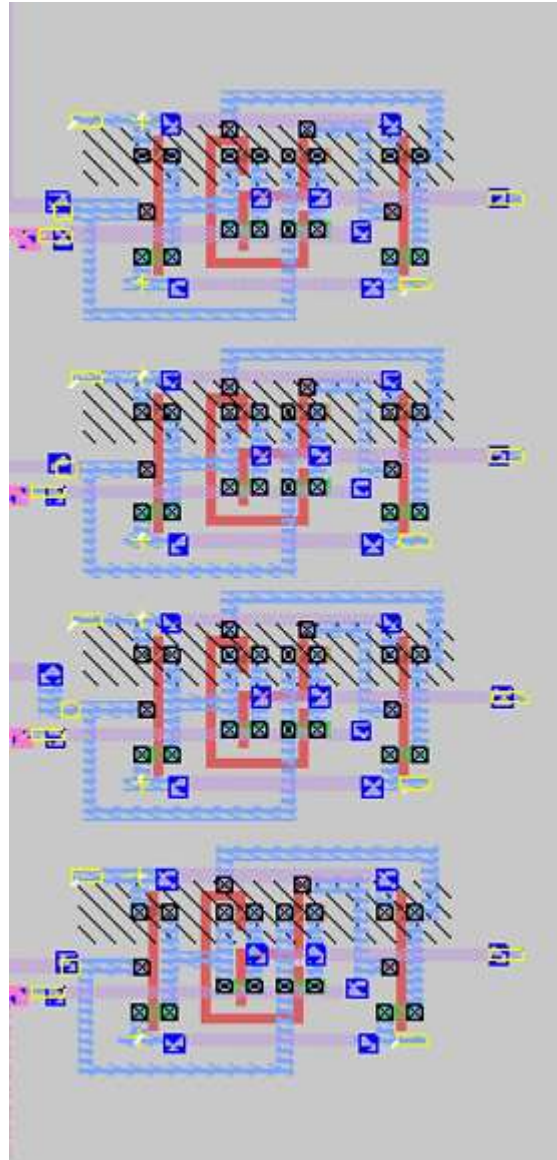
```

.ends cla

```

## Sum Block:





	Width*Height	Area
<b>Microns</b>	<b>12.24 x 24.39</b>	<b>298.53</b>
<b>Lambda</b>	<b>136 x 271</b>	<b>36856</b>

### Inputs for Sum Block:

```
.include clasum.sub
.include not_gate.sub
.include TSMC_180nm.txt
.param SUPPLY = 1.8

Vdd vdd gnd 'SUPPLY'

va In10 gnd pulse 0 1.8 0ns 0.01p 0.01p 10ns 20ns
```

```

vb In20 gnd pulse 0 1.8 0ns 0.01p 0.01p 20ns 40ns

vc In11 gnd pulse 0 1.8 0ns 0.01p 0.01p 10ns 20ns
vd In21 gnd pulse 0 1.8 0ns 0.01p 0.01p 20ns 40ns

ve In12 gnd pulse 0 1.8 0ns 0.01p 0.01p 5ns 20ns
vf In22 gnd pulse 0 1.8 0ns 0.01p 0.01p 25ns 40ns

vg In13 gnd pulse 0 1.8 0ns 0.01p 0.01p 30ns 20ns
vh In23 gnd pulse 0 1.8 0ns 0.01p 0.01p 15ns 40ns

vi Cnot gnd pulse 0 1.8 0ns 0.01p 0.01p 20ns 40ns

xG3 S0 S1 S2 S3 In10 In20 In11 In21 In12 In22 In13 In23 Cnot cla
*xG3 G0 P0 G1 P1 In10 In20 In11 In21 cla

C1 S0 gnd 5fF
C2 S1 gnd 5fF
C3 S2 gnd 5fF
C4 S3 gnd 5fF
.tran 0.1n 200n
.control

run
plot v(S0) v(In10)+2 v(Cnot)+4
plot v(S1) v(In20)+2 v(In23)+4
plot v(S2) v(In11)+2 v(In12)+4
plot v(S3) v(In21)+2 v(In22)+4
set hcopyscolor = 1
.endc

```

## Subckt For Sum Block:

```

.subckt cla S0 S1 S2 S3 P0 P1 P2 P3 Cr1 Cr2 Cr3 Cr0 Cnot

.include TSMC_180nm.txt
.param SUPPLY = 1.8
.param LAMBDA = 0.09u
.param width_P = 20*LAMBDA
.param width_N = 10*LAMBDA
Vdd vdd gnd 'SUPPLY'

.option scale=0.09u

M1000 xor_real_3/a_n47_n23# Cr2 vdd xor_real_3/w_n68_n2# CMOS w=4 l=2
+ ad=40 pd=36 as=160 ps=144

```



```
M1001 xor_real_3/a_n47_n23# Cr2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=160 ps=144
M1002 S3 xor_real_3/a_n35_n24# xor_real_3/a_n47_n23# xor_real_3/w_n68_n2#
CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1003 S3 P3 Cr2 xor_real_3/w_n68_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1004 xor_real_3/a_n35_n24# P3 vdd xor_real_3/w_n68_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1005 S3 P3 xor_real_3/a_n47_n23# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1006 S3 xor_real_3/a_n35_n24# Cr2 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1007 xor_real_3/a_n35_n24# P3 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1008 xor_real_2/a_n47_n23# Cr1 vdd xor_real_2/w_n68_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1009 xor_real_2/a_n47_n23# Cr1 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1010 S2 xor_real_2/a_n35_n24# xor_real_2/a_n47_n23# xor_real_2/w_n68_n2#
CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1011 S2 P2 Cr1 xor_real_2/w_n68_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1012 xor_real_2/a_n35_n24# P2 vdd xor_real_2/w_n68_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1013 S2 P2 xor_real_2/a_n47_n23# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1014 S2 xor_real_2/a_n35_n24# Cr1 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1015 xor_real_2/a_n35_n24# P2 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1016 xor_real_1/a_n47_n23# Cr0 vdd xor_real_1/w_n68_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1017 xor_real_1/a_n47_n23# Cr0 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1018 S1 xor_real_1/a_n35_n24# xor_real_1/a_n47_n23# xor_real_1/w_n68_n2#
CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1019 S1 P1 Cr0 xor_real_1/w_n68_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1020 xor_real_1/a_n35_n24# P1 vdd xor_real_1/w_n68_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1021 S1 P1 xor_real_1/a_n47_n23# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1022 S1 xor_real_1/a_n35_n24# Cr0 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1023 xor_real_1/a_n35_n24# P1 gnd Gnd CMOSN w=4 l=2
```

```
+ ad=20 pd=18 as=0 ps=0
M1024 xor_real_0/a_n47_n23# Cnot vdd xor_real_0/w_n68_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1025 xor_real_0/a_n47_n23# Cnot gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1026 S0 xor_real_0/a_n35_n24# xor_real_0/a_n47_n23# xor_real_0/w_n68_n2#
CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1027 S0 P0 Cnot xor_real_0/w_n68_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1028 xor_real_0/a_n35_n24# P0 vdd xor_real_0/w_n68_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1029 S0 P0 xor_real_0/a_n47_n23# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1030 S0 xor_real_0/a_n35_n24# Cnot Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1031 xor_real_0/a_n35_n24# P0 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
C0 Cr0 S1 0.59fF
C1 xor_real_2/w_n68_n2# vdd 0.32fF
C2 xor_real_3/a_n47_n23# Cr2 0.05fF
C3 xor_real_2/w_n68_n2# xor_real_2/a_n35_n24# 0.24fF
C4 xor_real_0/w_n68_n2# S0 0.05fF
C5 Cr2 gnd 0.24fF
C6 vdd P3 0.36fF
C7 vdd xor_real_0/w_n68_n2# 0.32fF
C8 Cr0 gnd 0.24fF
C9 xor_real_0/w_n68_n2# P0 0.22fF
C10 Cnot gnd 0.24fF
C11 xor_real_1/a_n35_n24# vdd 0.21fF
C12 xor_real_0/a_n47_n23# xor_real_0/a_n35_n24# 0.13fF
C13 P1 S1 0.50fF
C14 P2 vdd 0.36fF
C15 xor_real_2/a_n35_n24# Cr1 0.08fF
C16 P2 xor_real_2/a_n35_n24# 0.30fF
C17 xor_real_3/w_n68_n2# xor_real_3/a_n47_n23# 0.06fF
C18 xor_real_3/a_n35_n24# xor_real_3/a_n47_n23# 0.13fF
C19 Cr0 xor_real_1/a_n47_n23# 0.05fF
C20 xor_real_3/a_n35_n24# gnd 0.08fF
C21 xor_real_1/w_n68_n2# vdd 0.32fF
C22 xor_real_2/w_n68_n2# xor_real_2/a_n47_n23# 0.06fF
C23 xor_real_1/a_n35_n24# S1 0.07fF
C24 Cnot xor_real_0/a_n47_n23# 0.05fF
C25 xor_real_3/a_n47_n23# P3 0.14fF
C26 Cnot xor_real_0/a_n35_n24# 0.08fF
C27 P1 xor_real_1/a_n47_n23# 0.14fF
C28 xor_real_3/a_n47_n23# S3 0.25fF
C29 xor_real_1/a_n35_n24# gnd 0.08fF
```

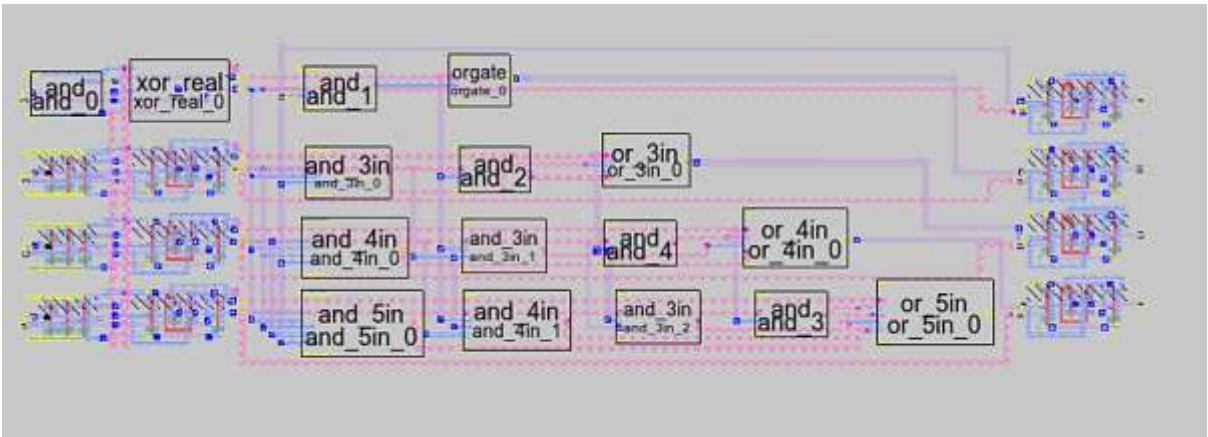
C30 Cr1 gnd 0.24fF  
C31 xor\_real\_2/a\_n47\_n23# Cr1 0.05fF  
C32 P2 xor\_real\_2/a\_n47\_n23# 0.14fF  
C33 xor\_real\_1/w\_n68\_n2# S1 0.05fF  
C34 xor\_real\_2/a\_n35\_n24# S2 0.07fF  
C35 xor\_real\_3/w\_n68\_n2# Cr2 0.09fF  
C36 xor\_real\_3/a\_n35\_n24# Cr2 0.08fF  
C37 xor\_real\_1/a\_n35\_n24# xor\_real\_1/a\_n47\_n23# 0.13fF  
C38 xor\_real\_0/a\_n47\_n23# xor\_real\_0/w\_n68\_n2# 0.06fF  
C39 xor\_real\_0/w\_n68\_n2# xor\_real\_0/a\_n35\_n24# 0.24fF  
C40 Cr0 P1 0.29fF  
C41 Cr2 P3 0.28fF  
C42 xor\_real\_1/w\_n68\_n2# xor\_real\_1/a\_n47\_n23# 0.06fF  
C43 Cr2 S3 0.59fF  
C44 xor\_real\_3/a\_n35\_n24# xor\_real\_3/w\_n68\_n2# 0.24fF  
C45 S0 P0 0.53fF  
C46 S2 xor\_real\_2/a\_n47\_n23# 0.25fF  
C47 Cnot xor\_real\_0/w\_n68\_n2# 0.09fF  
C48 Cr0 xor\_real\_1/a\_n35\_n24# 0.08fF  
C49 xor\_real\_2/a\_n35\_n24# vdd 0.21fF  
C50 vdd P0 0.36fF  
C51 Cnot xor\_real\_1/a\_n35\_n24# 0.27fF  
C52 xor\_real\_3/w\_n68\_n2# P3 0.22fF  
C53 xor\_real\_3/a\_n35\_n24# P3 0.30fF  
C54 xor\_real\_3/w\_n68\_n2# S3 0.05fF  
C55 xor\_real\_3/a\_n35\_n24# S3 0.07fF  
C56 xor\_real\_3/a\_n35\_n24# Cr1 0.22fF  
C57 P1 xor\_real\_1/a\_n35\_n24# 0.30fF  
C58 Cr0 xor\_real\_1/w\_n68\_n2# 0.09fF  
C59 xor\_real\_2/w\_n68\_n2# Cr1 0.09fF  
C60 xor\_real\_2/w\_n68\_n2# P2 0.22fF  
C61 P3 S3 0.50fF  
C62 vdd xor\_real\_3/a\_n47\_n23# 0.08fF  
C63 vdd xor\_real\_2/a\_n47\_n23# 0.08fF  
C64 xor\_real\_2/a\_n35\_n24# gnd 0.08fF  
C65 xor\_real\_2/a\_n35\_n24# xor\_real\_2/a\_n47\_n23# 0.13fF  
C66 P1 xor\_real\_1/w\_n68\_n2# 0.22fF  
C67 P2 Cr1 0.27fF  
C68 xor\_real\_0/a\_n47\_n23# S0 0.25fF  
C69 vdd xor\_real\_1/a\_n47\_n23# 0.08fF  
C70 xor\_real\_0/a\_n35\_n24# S0 0.07fF  
C71 vdd xor\_real\_0/a\_n47\_n23# 0.08fF  
C72 xor\_real\_1/a\_n35\_n24# xor\_real\_1/w\_n68\_n2# 0.24fF  
C73 xor\_real\_0/a\_n47\_n23# P0 0.16fF  
C74 vdd xor\_real\_0/a\_n35\_n24# 0.21fF  
C75 xor\_real\_2/w\_n68\_n2# S2 0.05fF  
C76 xor\_real\_0/a\_n35\_n24# P0 0.30fF  
C77 xor\_real\_3/a\_n47\_n23# gnd 0.08fF

```
C78 xor_real_2/a_n47_n23# gnd 0.08fF
C79 S1 xor_real_1/a_n47_n23# 0.25fF
C80 Cnot S0 0.59fF
C81 S2 Cr1 0.59fF
C82 xor_real_2/a_n35_n24# Cr0 0.21fF
C83 P2 S2 0.50fF
C84 gnd xor_real_1/a_n47_n23# 0.08fF
C85 Cnot P0 0.38fF
C86 xor_real_0/a_n47_n23# gnd 0.08fF
C87 vdd xor_real_3/w_n68_n2# 0.32fF
C88 vdd xor_real_3/a_n35_n24# 0.21fF
C89 xor_real_0/a_n35_n24# gnd 0.08fF
C90 P1 vdd 0.36fF
C91 S0 Gnd 0.59fF
C92 xor_real_0/a_n47_n23# Gnd 0.13fF
C93 vdd Gnd 1.80fF
C94 Cnot Gnd 0.59fF
C95 P0 Gnd 1.48fF
C96 xor_real_0/a_n35_n24# Gnd 0.63fF
C97 xor_real_0/w_n68_n2# Gnd 1.59fF
C98 S1 Gnd 0.59fF
C99 gnd Gnd 3.07fF
C100 xor_real_1/a_n47_n23# Gnd 0.13fF
C101 Cr0 Gnd 0.60fF
C102 P1 Gnd 1.49fF
C103 xor_real_1/a_n35_n24# Gnd 0.63fF
C104 xor_real_1/w_n68_n2# Gnd 1.59fF
C105 xor_real_2/a_n47_n23# Gnd 0.13fF
C106 Cr1 Gnd 0.49fF
C107 P2 Gnd 1.31fF
C108 xor_real_2/a_n35_n24# Gnd 0.63fF
C109 xor_real_2/w_n68_n2# Gnd 1.59fF
C110 S3 Gnd 0.60fF
C111 xor_real_3/a_n47_n23# Gnd 0.13fF
C112 Cr2 Gnd 0.60fF
C113 P3 Gnd 1.48fF
C114 xor_real_3/a_n35_n24# Gnd 0.63fF
C115 xor_real_3/w_n68_n2# Gnd 1.59fF

.ends cla
```

**Floor Plan:**

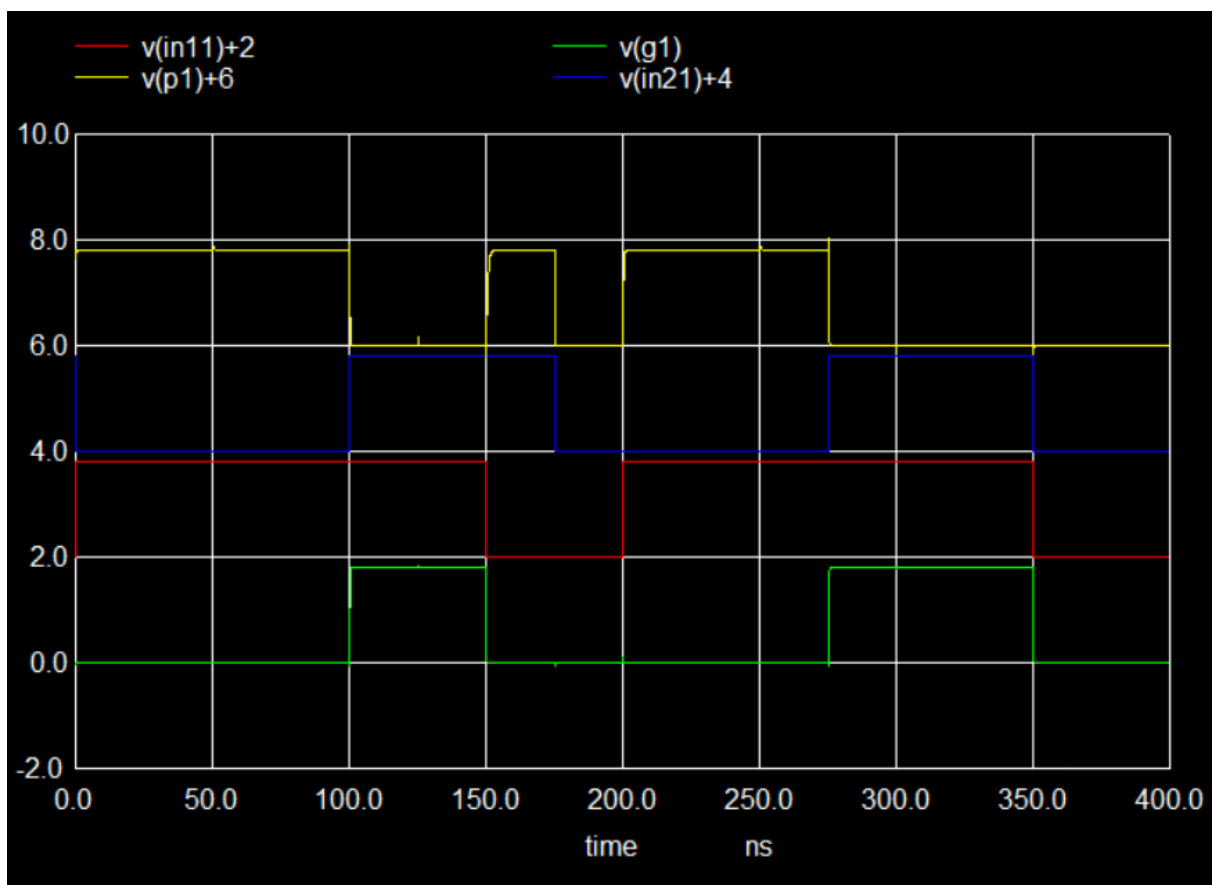
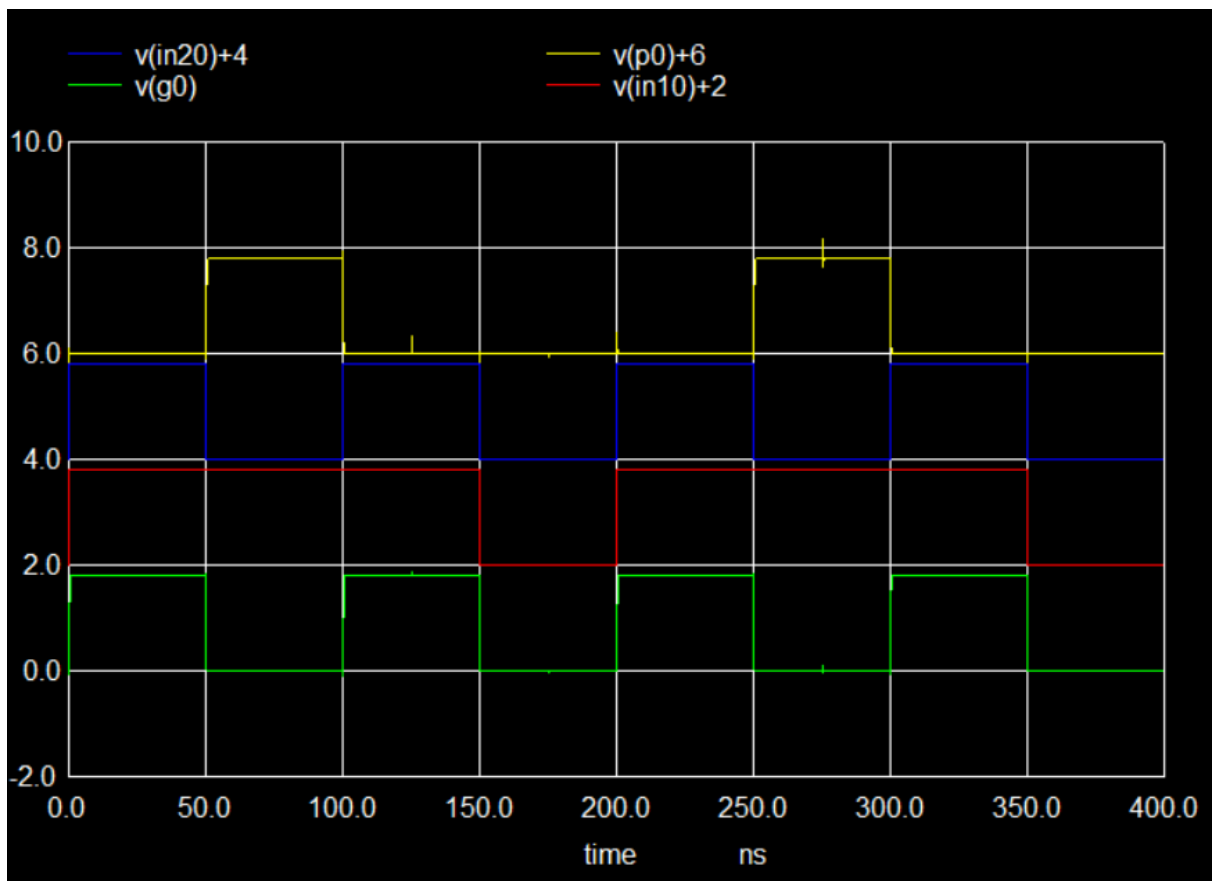
As stated in point 1, the floor plan of the circuit will follow the same one as that in the block diagram shown. It will be as follows with the specified dimensions including horizontal and vertical pitches.

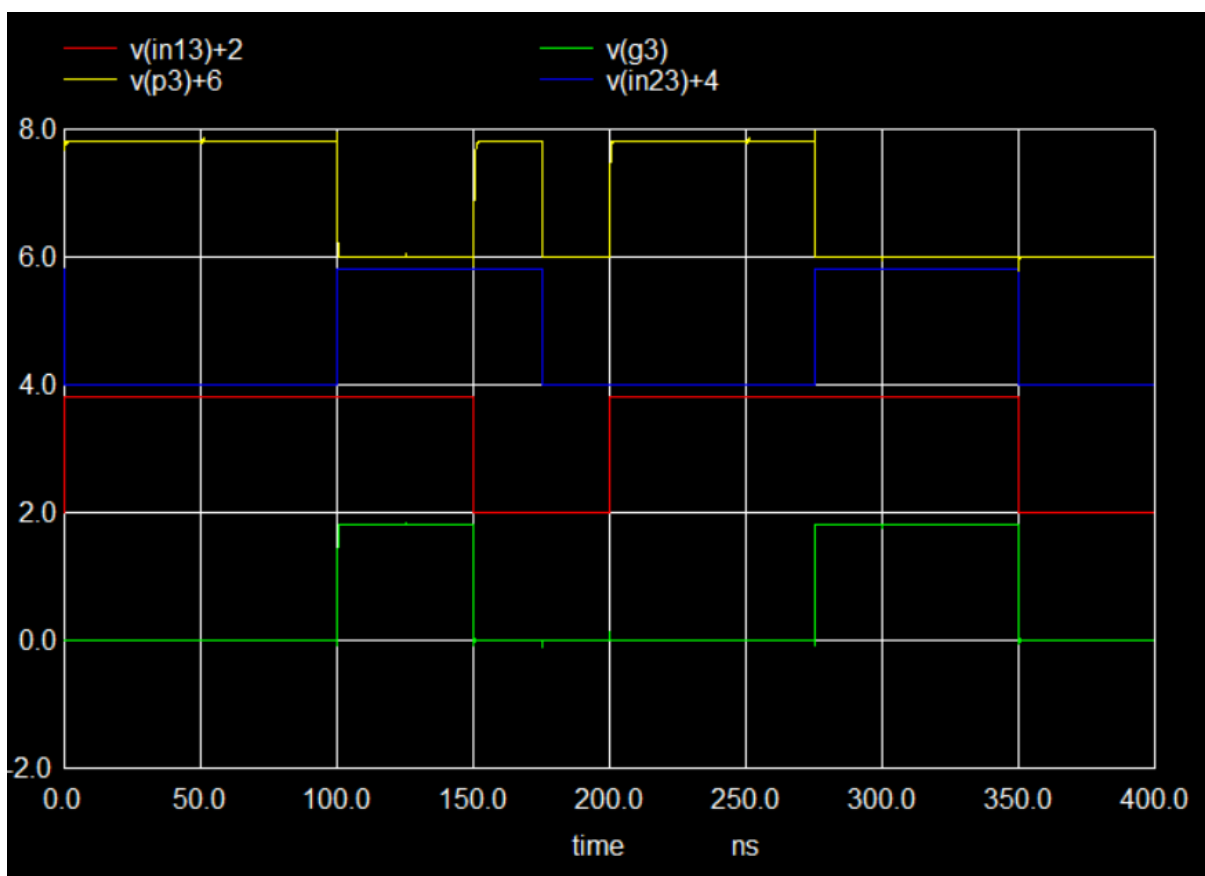
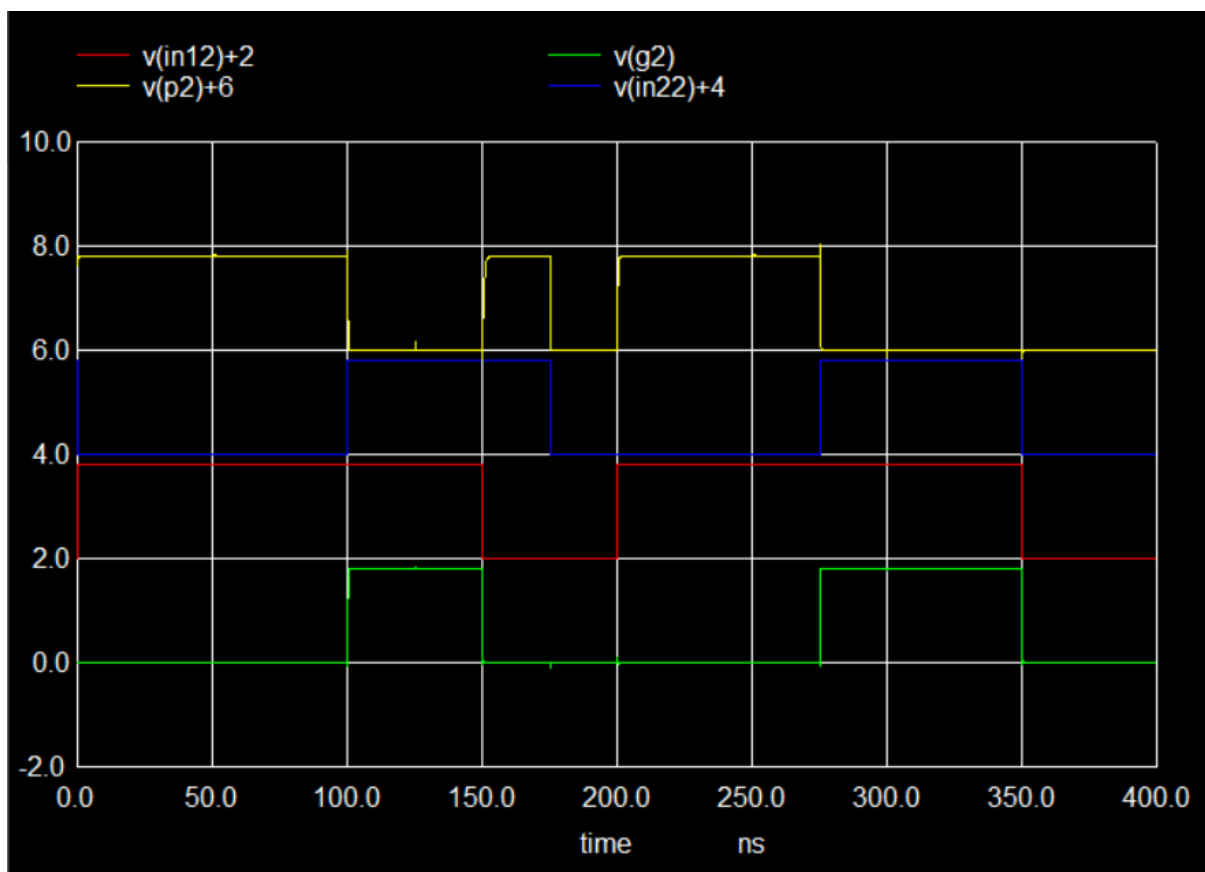


	Width*Height	Area
Microns	102.33 x 29.79	3048.1
Lambda	1137 x 331	376347

**Magic Functionality**

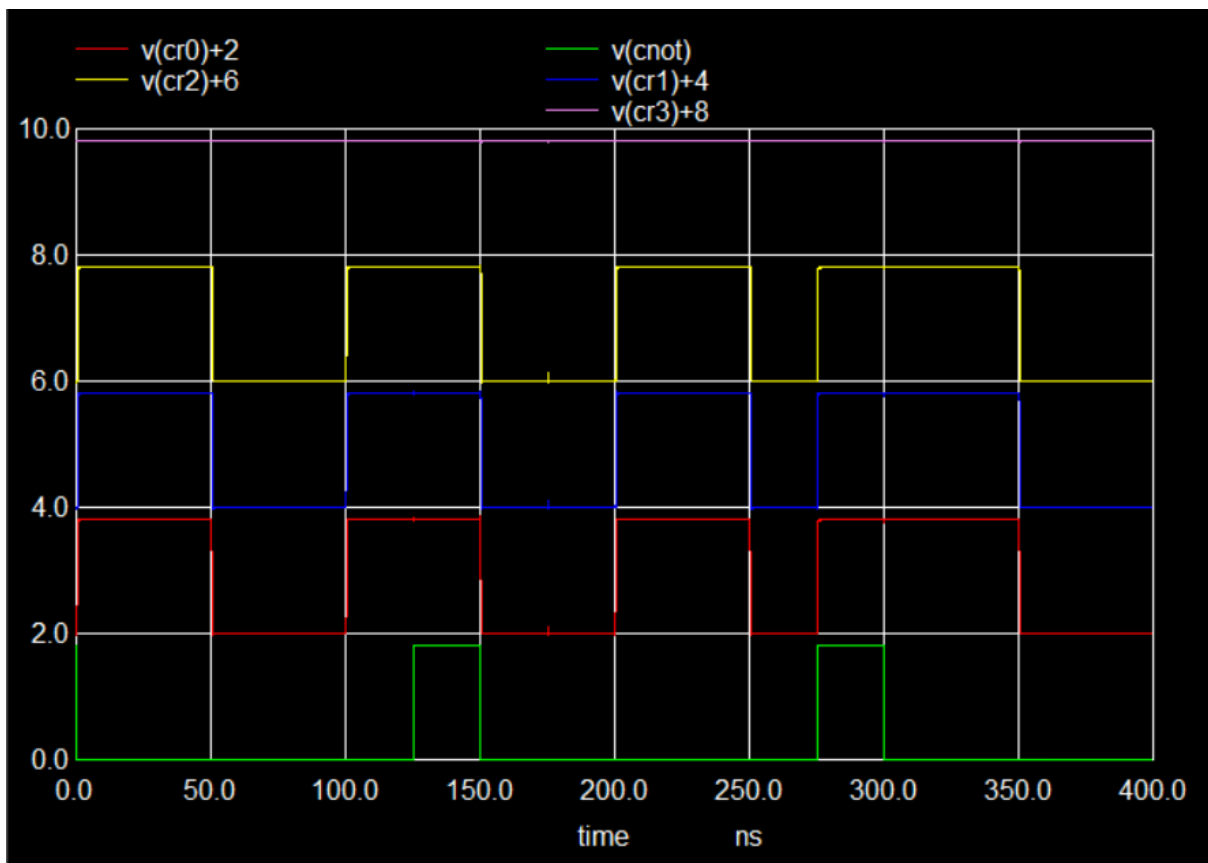
**Propagator and Genrator:**



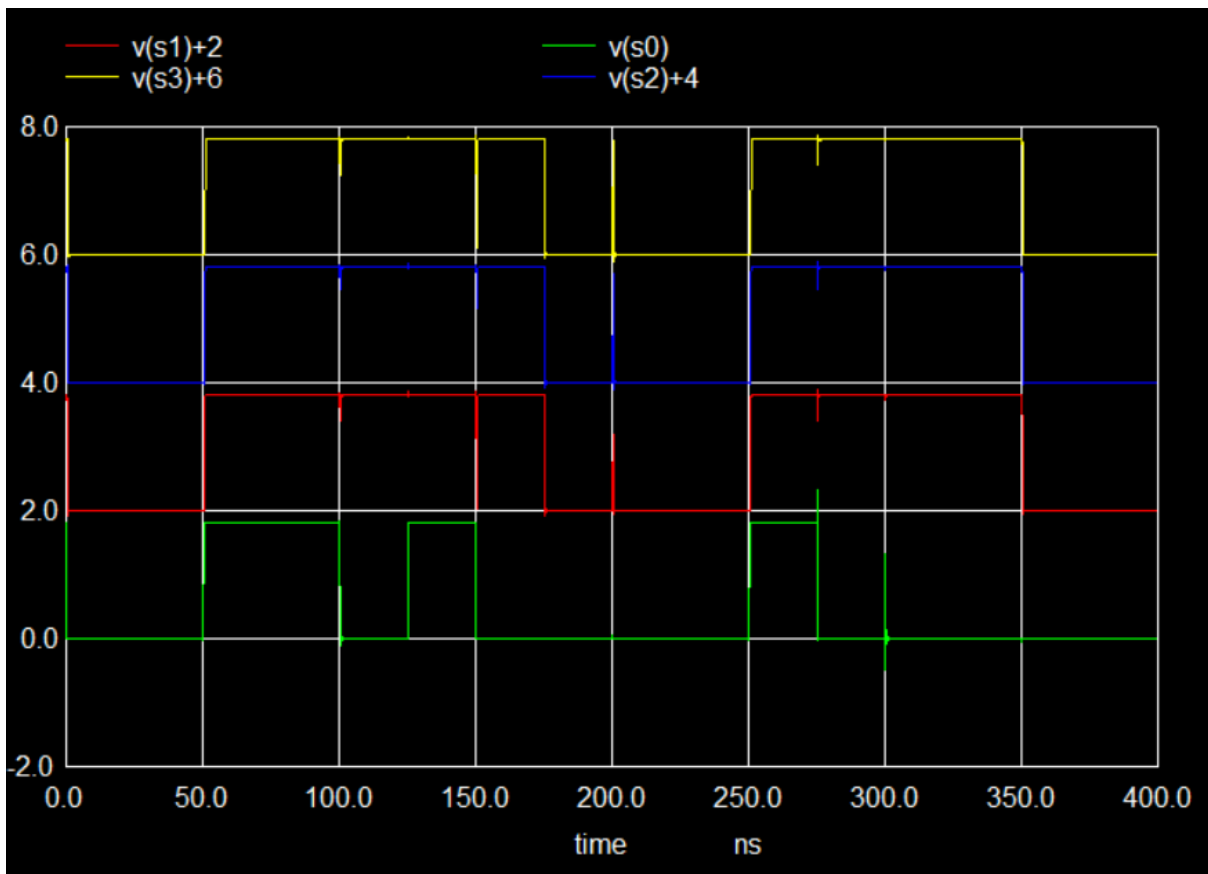


Carry:





## Sum Block:



## Inputs For testing:

```
.include cla_adder.sub
.include not_gate.sub
.include TSMC_180nm.txt
.param SUPPLY = 1.8

Vdd vdd gnd 'SUPPLY'

va In10 gnd pulse 0 1.8 0ns 0.01p 0.01p 150ns 200ns
vb In20 gnd pulse 0 1.8 0ns 0.01p 0.01p 50ns 100ns

vc In11 gnd pulse 0 1.8 0ns 0.01p 0.01p 150ns 200ns
vd In21 gnd pulse 1.8 0 0ns 0.01p 0.01p 100ns 175ns

ve In12 gnd pulse 0 1.8 0ns 0.01p 0.01p 150ns 200ns
vf In22 gnd pulse 1.8 0 0ns 0.01p 0.01p 100ns 175ns

vg In13 gnd pulse 0 1.8 0ns 0.01p 0.01p 150ns 200ns
vh In23 gnd pulse 1.8 0 0ns 0.01p 0.01p 100ns 175ns

vi Cnot gnd pulse 1.8 0 0ns 0.01p 0.01p 125ns 150ns

*xG3 Cr3 Cr2 Cr1 Cr0 G0 P0 G1 P1 G2 P2 G3 P3 In10 In20 In11 In21 In12 In22
In13 In23 Cnot cla
* xG3 G0 P0 G1 P1 In10 In20 In11 In21 cla
xG3 S0 S1 S2 S3 Cr3 Cr2 Cr1 Cr0 G0 P0 G1 P1 G2 P2 G3 P3 In10 In20 In11 In21
In12 In22 In13 In23 Cnot cla

Cout1 S0 gnd 5fF
Cout2 S1 gnd 50fF
Cout3 S2 gnd 50fF
Cout4 S3 gnd 50fF
Coutp0 P0 gnd 50fF
Coutg0 G0 gnd 50fF
Coutp1 P1 gnd 50fF
Coutg1 G1 gnd 50fF
Coutp2 P2 gnd 50fF
Coutg2 G2 gnd 50fF
Coutp3 P3 gnd 50fF
Coutg3 G3 gnd 50fF

.tran 0.1n 400n

.measure tran triseS0
+ TRIG v(In20) VAL = 'SUPPLY/2' FALL =1
+ TARG v(S0) VAL = 'SUPPLY/2' RISE =1
```

```

.measure tran tfallS0
+ TRIG v(In20) VAL = 'SUPPLY/2' RISE=2
+ TARG v(S0) VAL = 'SUPPLY/2' FALL=2

.measure tran tpdS0 param = '(triseS0 + tfallS0)/2' goal = 0

.measure tran triseS1
+ TRIG v(In20) VAL = 'SUPPLY/2' FALL =1
+ TARG v(S1) VAL = 'SUPPLY/2' RISE =1

.measure tran tfallS1
+ TRIG v(In21) VAL = 'SUPPLY/2' FALL=2
+ TARG v(S0) VAL = 'SUPPLY/2' FALL=2

.measure tran tpdS1 param = '(triseS1 + tfallS1)/2' goal = 0

.measure tran triseS2
+ TRIG v(In20) VAL = 'SUPPLY/2' FALL =1
+ TARG v(S2) VAL = 'SUPPLY/2' RISE =1

.measure tran tfallS2
+ TRIG v(In21) VAL = 'SUPPLY/2' FALL=2
+ TARG v(S0) VAL = 'SUPPLY/2' FALL=2

.measure tran tpdS2 param = '(triseS2 + tfallS2)/2' goal = 0

.measure tran triseS3
+ TRIG v(In20) VAL = 'SUPPLY/2' FALL =1
+ TARG v(S3) VAL = 'SUPPLY/2' RISE =1

.measure tran tfallS3
+ TRIG v(In21) VAL = 'SUPPLY/2' FALL=2
+ TARG v(S0) VAL = 'SUPPLY/2' FALL=2

.measure tran tpdS3 param = '(triseS3 + tfallS3)/2' goal = 0

.measure tran triseCr0
+ TRIG v(In20) VAL = 'SUPPLY/2' RISE =2
+ TARG v(Cr0) VAL = 'SUPPLY/2' RISE =2

.measure tran tfallCr0
+ TRIG v(In20) VAL = 'SUPPLY/2' FALL =1
+ TARG v(Cr0) VAL = 'SUPPLY/2' FALL=1

.measure tran tpdCr1 param = '(triseCr0 + tfallCr0)/2' goal = 0

```

```

.measure tran triseCr1
+ TRIG v(In20) VAL = 'SUPPLY/2' RISE =2
+ TARG v(Cr1) VAL = 'SUPPLY/2' RISE =2

.measure tran tfallCr1
+ TRIG v(In20) VAL = 'SUPPLY/2' FALL =1
+ TARG v(Cr1) VAL = 'SUPPLY/2' FALL=1

.measure tran tpdCr1 param = '(triseCr1 + tfallCr1)/2' goal = 0

.measure tran triseCr2
+ TRIG v(In20) VAL = 'SUPPLY/2' RISE =2
+ TARG v(Cr2) VAL = 'SUPPLY/2' RISE =2

.measure tran tfallCr2
+ TRIG v(In20) VAL = 'SUPPLY/2' FALL =1
+ TARG v(Cr2) VAL = 'SUPPLY/2' FALL=1

.measure tran tpdCr2 param = '(triseCr2 + tfallCr2)/2' goal = 0

.measure tran triseCr3
+ TRIG v(In10) VAL = 'SUPPLY/2' FALL =1
+ TARG v(S0) VAL = 'SUPPLY/2' RISE =1

.measure tran tfallCr3
+ TRIG v(In10) VAL = 'SUPPLY/2' FALL =1
+ TARG v(S0) VAL = 'SUPPLY/2' FALL=1

.measure tran tpdCr3 param = '(triseS0 + tfallS0)/2' goal = 0

.control

run

plot v(G0) v(In10)+2 v(In20)+4 v(P0)+6
plot v(G1) v(In11)+2 v(In21)+4 v(P1)+6
plot v(G2) v(In12)+2 v(In22)+4 v(P2)+6
plot v(G3) v(In13)+2 v(In23)+4 v(P3)+6

plot v(S0) v(P0)+2 v(Cnot)+4
plot v(S1) v(P1)+2 v(Cr0)+4
plot v(S2) v(P2)+2 v(Cr1)+4
plot v(S3) v(P3)+2 v(Cr2)+4

plot v(S0) v(S1)+2 v(S2)+4 v(S3)+6
plot v(Cnot) v(Cr0)+2 v(Cr1)+4 v(Cr2)+6 v(Cr3)+8
plot v(In10) v(In11)+2 v(In12)+4 v(In13)+6
plot v(In20) v(In21)+2 v(In22)+4 v(In23)+6

```

```
set hcopypscolor = 1
.endc
```

## CLA Subckt

```
.subckt cla S0 S1 S2 S3 Cr3 Cr2 Cr1 Cr0 G0 P0 G1 P1 G2 P2 G3 P3 A0 B0 A1 B1 A2
B2 A3 B3 Cnot

.include TSMC_180nm.txt
.param SUPPLY = 1.8
.param LAMBDA = 0.09u
.param width_P = 20*LAMBDA
.param width_N = 10*LAMBDA
Vdd vdd gnd 'SUPPLY'

.option scale=0.09u

M1000 or_5in_0/a_8_4# gnd vdd or_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=1344 ps=1202
M1001 or_5in_0/a_24_4# m1_574_n229# or_5in_0/a_8_4# or_5in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1002 or_5in_0/a_40_4# m1_706_n228# or_5in_0/a_24_4# or_5in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1003 or_5in_0/a_56_4# m1_832_n222# or_5in_0/a_40_4# or_5in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1004 or_5in_0/a_8_n42# G3 or_5in_0/a_56_4# or_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1005 Cr3 or_5in_0/a_8_n42# vdd or_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1006 or_5in_0/a_8_n42# gnd gnd Gnd CMOSN w=4 l=2
+ ad=100 pd=90 as=1020 ps=918
M1007 or_5in_0/a_8_n42# m1_574_n229# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1008 or_5in_0/a_8_n42# m1_706_n228# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1009 or_5in_0/a_8_n42# m1_832_n222# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1010 or_5in_0/a_8_n42# G3 gnd Gnd CMOSN w=4 l=2
```

```

+ ad=0 pd=0 as=0 ps=0
M1011 Cr3 or_5in_0/a_8_n42# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1012 and_3/a_8_4# P3 vdd and_3/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1013 and_3/a_8_4# G2 vdd and_3/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1014 m1_832_n222# and_3/a_8_4# vdd and_3/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1015 and_3/a_8_n21# P3 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1016 and_3/a_8_4# G2 and_3/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1017 m1_832_n222# and_3/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1018 and_3in_2/a_8_4# P3 vdd and_3in_2/w_n5_n2# CMOSP w=4 l=2
+ ad=60 pd=54 as=0 ps=0
M1019 and_3in_2/a_8_4# G1 vdd and_3in_2/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1020 and_3in_2/a_8_4# P2 vdd and_3in_2/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1021 m1_706_n228# and_3in_2/a_8_4# vdd and_3in_2/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1022 and_3in_2/a_8_n29# P3 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1023 and_3in_2/a_24_n29# G1 and_3in_2/a_8_n29# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1024 and_3in_2/a_8_4# P2 and_3in_2/a_24_n29# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1025 m1_706_n228# and_3in_2/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1026 and_4in_1/a_8_4# P3 vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=80 pd=72 as=0 ps=0
M1027 and_4in_1/a_8_4# G0 vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1028 and_4in_1/a_8_4# P1 vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1029 and_4in_1/a_8_4# P2 vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1030 m1_574_n229# and_4in_1/a_8_4# vdd and_4in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1031 and_4in_1/a_8_n36# P3 and_4in_1/gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=40 ps=36
M1032 and_4in_1/a_24_n36# G0 and_4in_1/a_8_n36# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1033 and_4in_1/a_40_n36# P1 and_4in_1/a_24_n36# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1034 and_4in_1/a_8_4# P2 and_4in_1/a_40_n36# Gnd CMOSN w=4 l=2

```

```

+ ad=20 pd=18 as=0 ps=0
M1035 m1_574_n229# and_4in_1/a_8_4# and_4in_1/gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1036 and_5in_0/a_8_4# P3 vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=100 pd=90 as=0 ps=0
M1037 and_5in_0/a_8_4# P0 vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1038 and_5in_0/a_8_4# P1 vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1039 and_5in_0/a_8_4# P2 vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1040 and_5in_0/a_8_4# Cnot vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1041 gnd and_5in_0/a_8_4# vdd and_5in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1042 and_5in_0/a_8_n43# P3 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1043 and_5in_0/a_24_n43# P0 and_5in_0/a_8_n43# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1044 and_5in_0/a_40_n43# P1 and_5in_0/a_24_n43# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1045 and_5in_0/a_56_n43# P2 and_5in_0/a_40_n43# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1046 and_5in_0/a_8_4# Cnot and_5in_0/a_56_n43# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1047 gnd and_5in_0/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1048 or_4in_0/a_8_4# m1_412_n157# vdd or_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1049 or_4in_0/a_24_4# m1_552_n157# or_4in_0/a_8_4# or_4in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1050 or_4in_0/a_40_4# m1_682_n151# or_4in_0/a_24_4# or_4in_0/w_n5_n2# CMOSP
w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1051 or_4in_0/a_8_n35# G2 or_4in_0/a_40_4# or_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1052 Cr2 or_4in_0/a_8_n35# vdd or_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1053 or_4in_0/a_8_n35# m1_412_n157# gnd Gnd CMOSN w=4 l=2
+ ad=80 pd=72 as=0 ps=0
M1054 or_4in_0/a_8_n35# m1_552_n157# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1055 or_4in_0/a_8_n35# m1_682_n151# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1056 or_4in_0/a_8_n35# G2 gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1057 Cr2 or_4in_0/a_8_n35# gnd Gnd CMOSN w=4 l=2

```



```

+ ad=40 pd=36 as=0 ps=0
M1058 and_4/a_8_4# P2 vdd and_4/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1059 and_4/a_8_4# G1 vdd and_4/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1060 m1_682_n151# and_4/a_8_4# vdd and_4/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1061 and_4/a_8_n21# P2 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1062 and_4/a_8_4# G1 and_4/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1063 m1_682_n151# and_4/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1064 and_3in_1/a_8_4# P2 vdd and_3in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=60 pd=54 as=0 ps=0
M1065 and_3in_1/a_8_4# G0 vdd and_3in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1066 and_3in_1/a_8_4# P1 vdd and_3in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1067 m1_552_n157# and_3in_1/a_8_4# vdd and_3in_1/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1068 and_3in_1/a_8_n29# P2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1069 and_3in_1/a_24_n29# G0 and_3in_1/a_8_n29# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1070 and_3in_1/a_8_4# P1 and_3in_1/a_24_n29# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1071 m1_552_n157# and_3in_1/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1072 and_4in_0/a_8_4# P2 vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=80 pd=72 as=0 ps=0
M1073 and_4in_0/a_8_4# P0 vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1074 and_4in_0/a_8_4# P1 vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1075 and_4in_0/a_8_4# Cnot vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1076 m1_412_n157# and_4in_0/a_8_4# vdd and_4in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1077 and_4in_0/a_8_n36# P2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1078 and_4in_0/a_24_n36# P0 and_4in_0/a_8_n36# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1079 and_4in_0/a_40_n36# P1 and_4in_0/a_24_n36# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1080 and_4in_0/a_8_4# Cnot and_4in_0/a_40_n36# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1081 m1_412_n157# and_4in_0/a_8_4# gnd Gnd CMOSN w=4 l=2

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+ ad=20 pd=18 as=0 ps=0
M1082 or_3in_0/a_8_4# m1_538_n85# vdd or_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1083 or_3in_0/a_24_4# m1_397_n84# or_3in_0/a_8_4# or_3in_0/w_n5_n2# CMOSP w=4
l=2
+ ad=40 pd=36 as=0 ps=0
M1084 or_3in_0/a_8_n29# G1 or_3in_0/a_24_4# or_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1085 Cr1 or_3in_0/a_8_n29# vdd or_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1086 or_3in_0/a_8_n29# m1_538_n85# gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=54 as=0 ps=0
M1087 or_3in_0/a_8_n29# m1_397_n84# gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1088 or_3in_0/a_8_n29# G1 gnd Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1089 Cr1 or_3in_0/a_8_n29# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1090 and_2/a_8_4# P1 vdd and_2/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1091 and_2/a_8_4# G0 vdd and_2/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1092 m1_538_n85# and_2/a_8_4# vdd and_2/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1093 and_2/a_8_n21# P1 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1094 and_2/a_8_4# G0 and_2/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1095 m1_538_n85# and_2/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1096 and_3in_0/a_8_4# P1 vdd and_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=60 pd=54 as=0 ps=0
M1097 and_3in_0/a_8_4# P0 vdd and_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1098 and_3in_0/a_8_4# Cnot vdd and_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1099 m1_397_n84# and_3in_0/a_8_4# vdd and_3in_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1100 and_3in_0/a_8_n29# P1 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1101 and_3in_0/a_24_n29# P0 and_3in_0/a_8_n29# Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1102 and_3in_0/a_8_4# Cnot and_3in_0/a_24_n29# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1103 m1_397_n84# and_3in_0/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1104 orgate_0/a_8_4# G0 vdd orgate_0/w_n5_n2# CMOSP w=4 l=2
+ ad=32 pd=24 as=0 ps=0

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M1105 orgate_0/a_8_n28# w1 orgate_0/a_8_4# orgate_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1106 Cr0 orgate_0/a_8_n28# vdd orgate_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1107 orgate_0/a_8_n28# G0 gnd Gnd CMOSN w=4 l=2
+ ad=32 pd=24 as=0 ps=0
M1108 gnd w1 orgate_0/a_8_n28# Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1109 Cr0 orgate_0/a_8_n28# gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1110 and_1/a_8_4# P0 vdd and_1/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1111 and_1/a_8_4# Cnot vdd and_1/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1112 w1 and_1/a_8_4# vdd and_1/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1113 and_1/a_8_n21# P0 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1114 and_1/a_8_4# Cnot and_1/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1115 w1 and_1/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1116 xor_real_0/a_n47_n23# A0 vdd w_237_17# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1117 xor_real_0/a_n47_n23# A0 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1118 P0 xor_real_0/a_n35_n24# xor_real_0/a_n47_n23# w_237_17# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1119 P0 B0 A0 w_237_17# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1120 xor_real_0/a_n35_n24# B0 vdd w_237_17# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1121 P0 B0 xor_real_0/a_n47_n23# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1122 P0 xor_real_0/a_n35_n24# A0 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1123 xor_real_0/a_n35_n24# B0 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1124 and_0/a_8_4# A0 vdd and_0/w_n5_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1125 and_0/a_8_4# B0 vdd and_0/w_n5_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1126 G0 and_0/a_8_4# vdd and_0/w_n5_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1127 and_0/a_8_n21# A0 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1128 and_0/a_8_4# B0 and_0/a_8_n21# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
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M1129 G0 and_0/a_8_4# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1130 a_1059_n23# Cnot vdd w_1038_n2# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1131 a_1059_n23# Cnot gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1132 S0 a_1071_n24# a_1059_n23# w_1038_n2# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1133 S0 P0 Cnot w_1038_n2# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1134 a_1071_n24# P0 vdd w_1038_n2# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1135 S0 P0 a_1059_n23# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1136 S0 a_1071_n24# Cnot Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1137 a_1071_n24# P0 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1138 a_164_n91# A1 vdd w_143_n70# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1139 a_63_n69# A1 vdd w_50_n75# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1140 a_63_n69# B1 vdd w_50_n75# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1141 G1 a_63_n69# vdd w_50_n75# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1142 a_63_n94# A1 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1143 a_63_n69# B1 a_63_n94# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1144 G1 a_63_n69# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1145 a_164_n91# A1 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1146 P1 a_176_n92# a_164_n91# w_143_n70# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1147 P1 B1 A1 w_143_n70# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1148 a_176_n92# B1 vdd w_143_n70# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1149 P1 B1 a_164_n91# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1150 P1 a_176_n92# A1 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1151 a_1059_n92# Cr0 vdd w_1038_n71# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1152 a_176_n92# B1 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
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M1153 a_1059_n92# Cr0 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1154 S1 a_1071_n93# a_1059_n92# w_1038_n71# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1155 S1 P1 Cr0 w_1038_n71# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1156 a_1071_n93# P1 vdd w_1038_n71# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1157 S1 P1 a_1059_n92# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1158 S1 a_1071_n93# Cr0 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1159 a_1071_n93# P1 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1160 a_1059_n157# Cr1 vdd w_1038_n136# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1161 a_164_n164# A2 vdd w_143_n143# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1162 a_63_n142# A2 vdd w_50_n148# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1163 a_63_n142# B2 vdd w_50_n148# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1164 G2 a_63_n142# vdd w_50_n148# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1165 a_63_n167# A2 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1166 a_63_n142# B2 a_63_n167# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1167 G2 a_63_n142# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1168 a_164_n164# A2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1169 P2 a_176_n165# a_164_n164# w_143_n143# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1170 P2 B2 A2 w_143_n143# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1171 a_176_n165# B2 vdd w_143_n143# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1172 P2 B2 a_164_n164# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1173 P2 a_176_n165# A2 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1174 a_1059_n157# Cr1 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1175 S2 a_1071_n158# a_1059_n157# w_1038_n136# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1176 S2 P2 Cr1 w_1038_n136# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
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M1177 a_1071_n158# P2 vdd w_1038_n136# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1178 S2 P2 a_1059_n157# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1179 S2 a_1071_n158# Cr1 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1180 a_1071_n158# P2 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1181 a_176_n165# B2 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1182 a_1058_n226# Cr2 vdd w_1037_n205# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1183 a_163_n235# A3 vdd w_142_n214# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1184 a_62_n213# A3 vdd w_49_n219# CMOSP w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1185 a_62_n213# B3 vdd w_49_n219# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1186 G3 a_62_n213# vdd w_49_n219# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1187 a_62_n238# A3 gnd Gnd CMOSN w=4 l=2
+ ad=60 pd=38 as=0 ps=0
M1188 a_62_n213# B3 a_62_n238# Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1189 G3 a_62_n213# gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1190 a_163_n235# A3 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1191 P3 a_175_n236# a_163_n235# w_142_n214# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1192 P3 B3 A3 w_142_n214# CMOSP w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1193 a_175_n236# B3 vdd w_142_n214# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1194 P3 B3 a_163_n235# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1195 P3 a_175_n236# A3 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=20 ps=18
M1196 a_1058_n226# Cr2 gnd Gnd CMOSN w=4 l=2
+ ad=40 pd=36 as=0 ps=0
M1197 S3 a_1070_n227# a_1058_n226# w_1037_n205# CMOSP w=4 l=2
+ ad=44 pd=38 as=0 ps=0
M1198 S3 P3 Cr2 w_1037_n205# CMOSP w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1199 a_1070_n227# P3 vdd w_1037_n205# CMOSP w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1200 S3 P3 a_1058_n226# Gnd CMOSN w=4 l=2
+ ad=44 pd=38 as=0 ps=0
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M1201 S3 a_1070_n227# Cr2 Gnd CMOSN w=4 l=2
+ ad=0 pd=0 as=0 ps=0
M1202 a_1070_n227# P3 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
M1203 a_175_n236# B3 gnd Gnd CMOSN w=4 l=2
+ ad=20 pd=18 as=0 ps=0
C0 G1 a_63_n69# 0.05fF
C1 vdd B0 0.46fF
C2 B0 and_0/a_8_n21# 0.18fF
C3 G2 or_4in_0/a_8_n35# 0.13fF
C4 Cr2 Cr1 0.12fF
C5 m1_574_n229# P2 0.00fF
C6 G2 and_3in_1/w_n5_n2# 0.02fF
C7 gnd a_62_n213# 0.10fF
C8 m1_552_n157# gnd 0.12fF
C9 Cr1 a_1059_n157# 0.05fF
C10 vdd a_164_n164# 0.08fF
C11 A0 and_0/w_n5_n2# 0.06fF
C12 and_5in_0/a_8_4# vdd 0.55fF
C13 and_5in_0/w_n5_n2# P1 0.06fF
C14 B3 a_163_n235# 0.14fF
C15 w1 gnd 0.08fF
C16 m1_412_n157# m1_552_n157# 0.62fF
C17 and_5in_0/a_24_n43# gnd 0.12fF
C18 P1 a_1071_n93# 0.30fF
C19 P2 and_3in_1/w_n5_n2# 0.06fF
C20 or_3in_0/w_n5_n2# or_3in_0/a_8_n29# 0.09fF
C21 and_4in_0/a_8_4# P1 0.06fF
C22 orgate_0/w_n5_n2# orgate_0/a_8_n28# 0.09fF
C23 G0 w1 0.45fF
C24 and_3in_0/a_8_4# P0 0.20fF
C25 vdd w_142_n214# 0.32fF
C26 gnd and_1/a_8_4# 0.10fF
C27 G2 or_4in_0/a_40_4# 0.07fF
C28 gnd a_63_n142# 0.10fF
C29 P1 A1 0.59fF
C30 w_143_n70# a_164_n91# 0.06fF
C31 P3 and_4in_1/w_n5_n2# 0.06fF
C32 G2 B2 0.15fF
C33 and_5in_0/a_8_n43# and_5in_0/a_24_n43# 0.04fF
C34 P0 a_1071_n24# 0.30fF
C35 vdd w_143_n70# 0.32fF
C36 G0 and_1/a_8_4# 0.07fF
C37 or_5in_0/a_40_4# vdd 0.08fF
C38 G3 or_5in_0/a_8_4# 0.07fF
C39 G3 and_4in_1/w_n5_n2# 0.02fF
C40 and_4in_0/w_n5_n2# vdd 0.21fF
C41 and_3in_1/a_8_4# P1 0.12fF
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C42 and\_5in\_0/a\_24\_n43# Cnot 0.16fF  
C43 and\_2/a\_8\_4# gnd 0.10fF  
C44 P1 P0 3.97fF  
C45 P2 B2 0.43fF  
C46 or\_5in\_0/w\_n5\_n2# vdd 0.15fF  
C47 Cr0 a\_1071\_n93# 0.08fF  
C48 and\_3in\_1/a\_8\_n29# and\_3in\_1/a\_24\_n29# 0.04fF  
C49 or\_5in\_0/w\_n5\_n2# m1\_706\_n228# 0.06fF  
C50 G2 w\_50\_n148# 0.10fF  
C51 w\_142\_n214# B3 0.22fF  
C52 Cnot and\_1/a\_8\_4# 0.23fF  
C53 or\_4in\_0/a\_24\_4# or\_4in\_0/a\_40\_4# 0.04fF  
C54 A2 a\_63\_n142# 0.29fF  
C55 and\_2/a\_8\_4# G0 0.23fF  
C56 Cr1 gnd 0.32fF  
C57 and\_3in\_2/w\_n5\_n2# G1 0.06fF  
C58 and\_4in\_1/a\_8\_n36# P2 0.16fF  
C59 gnd B1 0.21fF  
C60 G2 vdd 1.03fF  
C61 m1\_706\_n228# G2 0.00fF  
C62 G1 and\_2/w\_n5\_n2# 0.02fF  
C63 a\_176\_n165# B2 0.30fF  
C64 m1\_397\_n84# gnd 0.42fF  
C65 or\_3in\_0/w\_n5\_n2# m1\_538\_n85# 0.06fF  
C66 Cr1 S2 0.59fF  
C67 and\_5in\_0/a\_8\_4# P1 0.06fF  
C68 and\_4in\_1/w\_n5\_n2# G0 0.06fF  
C69 Cr0 P0 0.11fF  
C70 G1 or\_3in\_0/a\_8\_n29# 0.13fF  
C71 P2 vdd 1.06fF  
C72 m1\_397\_n84# G0 0.07fF  
C73 m1\_574\_n229# G1 0.00fF  
C74 m1\_682\_n151# gnd 0.08fF  
C75 w\_1038\_n136# a\_1071\_n158# 0.24fF  
C76 P3 and\_5in\_0/w\_n5\_n2# 0.06fF  
C77 A3 a\_62\_n213# 0.29fF  
C78 G0 and\_1/w\_n5\_n2# 0.02fF  
C79 orgate\_0/a\_8\_n28# Cr0 0.05fF  
C80 or\_4in\_0/w\_n5\_n2# G2 0.06fF  
C81 m1\_412\_n157# m1\_682\_n151# 0.08fF  
C82 or\_4in\_0/a\_24\_4# vdd 0.08fF  
C83 a\_1071\_n93# S1 0.07fF  
C84 and\_4in\_1/a\_8\_4# and\_4in\_1/a\_40\_n36# 0.04fF  
C85 G2 and\_4/a\_8\_4# 0.08fF  
C86 gnd xor\_real\_0/a\_n35\_n24# 0.07fF  
C87 vdd a\_176\_n165# 0.21fF  
C88 xor\_real\_0/a\_n35\_n24# xor\_real\_0/a\_n47\_n23# 0.13fF  
C89 and\_4/a\_8\_4# and\_4/a\_8\_n21# 0.04fF

C90 G3 and\_5in\_0/w\_n5\_n2# 0.03fF  
C91 or\_3in\_0/w\_n5\_n2# vdd 0.12fF  
C92 P1 w\_143\_n70# 0.05fF  
C93 G0 xor\_real\_0/a\_n35\_n24# 0.27fF  
C94 and\_1/w\_n5\_n2# Cnot 0.06fF  
C95 G3 w\_49\_n219# 0.10fF  
C96 m1\_706\_n228# and\_3/a\_8\_n21# 0.09fF  
C97 P2 and\_4/a\_8\_4# 0.03fF  
C98 and\_4in\_0/w\_n5\_n2# P1 0.06fF  
C99 m1\_574\_n229# and\_4in\_1/gnd 0.08fF  
C100 or\_4in\_0/w\_n5\_n2# or\_4in\_0/a\_24\_4# 0.03fF  
C101 or\_5in\_0/a\_56\_4# vdd 0.08fF  
C102 and\_5in\_0/w\_n5\_n2# gnd 0.03fF  
C103 G3 or\_5in\_0/a\_24\_4# 0.07fF  
C104 and\_4in\_0/a\_40\_n36# gnd 0.12fF  
C105 vdd a\_63\_n69# 0.23fF  
C106 P3 P0 1.07fF  
C107 a\_176\_n92# B1 0.30fF  
C108 gnd a\_1071\_n93# 0.08fF  
C109 G2 P1 0.15fF  
C110 G1 m1\_538\_n85# 0.18fF  
C111 or\_5in\_0/w\_n5\_n2# m1\_832\_n222# 0.06fF  
C112 P3 a\_163\_n235# 0.25fF  
C113 and\_4in\_0/a\_8\_4# gnd 0.08fF  
C114 and\_3/w\_n5\_n2# G2 0.06fF  
C115 G3 P0 0.08fF  
C116 m1\_412\_n157# and\_4in\_0/a\_8\_4# 0.05fF  
C117 vdd and\_0/w\_n5\_n2# 0.13fF  
C118 P0 S0 0.54fF  
C119 gnd A1 0.41fF  
C120 G3 a\_163\_n235# 0.11fF  
C121 and\_5in\_0/w\_n5\_n2# Cnot 0.06fF  
C122 P2 P1 3.15fF  
C123 and\_4in\_0/a\_40\_n36# Cnot 0.16fF  
C124 G1 a\_164\_n91# 0.11fF  
C125 vdd A0 0.10fF  
C126 vdd a\_175\_n236# 0.21fF  
C127 w\_143\_n143# a\_164\_n164# 0.06fF  
C128 and\_3in\_1/a\_8\_4# gnd 0.12fF  
C129 P3 and\_5in\_0/a\_8\_4# 0.16fF  
C130 G1 vdd 0.92fF  
C131 and\_4in\_0/a\_8\_4# Cnot 0.12fF  
C132 P0 xor\_real\_0/a\_n47\_n23# 0.25fF  
C133 gnd a\_163\_n235# 0.08fF  
C134 and\_3in\_2/a\_8\_n29# P2 0.16fF  
C135 G3 and\_5in\_0/a\_8\_4# 0.17fF  
C136 m1\_538\_n85# and\_2/w\_n5\_n2# 0.03fF  
C137 and\_3in\_1/a\_8\_4# G0 0.20fF

C138 G0 P0 0.20fF  
C139 orgate\_0/a\_8\_n28# gnd 0.16fF  
C140 and\_4in\_1/gnd and\_4in\_1/a\_8\_n36# 0.16fF  
C141 gnd B0 0.11fF  
C142 P3 w\_142\_n214# 0.05fF  
C143 and\_5in\_0/a\_40\_n43# gnd 0.12fF  
C144 Cr1 a\_1071\_n158# 0.08fF  
C145 B0 xor\_real\_0/a\_n47\_n23# 0.14fF  
C146 w\_1038\_n71# a\_1059\_n92# 0.06fF  
C147 m1\_538\_n85# or\_3in\_0/a\_8\_n29# 0.05fF  
C148 a\_175\_n236# B3 0.30fF  
C149 and\_3in\_0/a\_8\_n29# gnd 0.16fF  
C150 m1\_397\_n84# and\_3in\_0/w\_n5\_n2# 0.03fF  
C151 Cr1 w\_1038\_n136# 0.09fF  
C152 vdd w\_1037\_n205# 0.32fF  
C153 G0 B0 0.14fF  
C154 or\_4in\_0/a\_8\_n35# or\_4in\_0/a\_40\_4# 0.04fF  
C155 P0 Cnot 2.50fF  
C156 and\_3in\_2/w\_n5\_n2# vdd 0.17fF  
C157 G3 w\_142\_n214# 0.64fF  
C158 gnd a\_164\_n164# 0.08fF  
C159 and\_5in\_0/a\_8\_4# gnd 0.14fF  
C160 m1\_706\_n228# and\_3in\_2/w\_n5\_n2# 0.03fF  
C161 w\_237\_17# xor\_real\_0/a\_n35\_n24# 0.24fF  
C162 G1 and\_4/a\_8\_4# 0.23fF  
C163 vdd and\_2/w\_n5\_n2# 0.13fF  
C164 and\_4in\_1/w\_n5\_n2# and\_4in\_1/a\_8\_4# 0.18fF  
C165 B1 a\_63\_n94# 0.18fF  
C166 vdd w\_1038\_n71# 0.32fF  
C167 w1 and\_1/a\_8\_4# 0.05fF  
C168 Cr3 vdd 0.07fF  
C169 G3 or\_5in\_0/a\_40\_4# 0.07fF  
C170 Cr2 P2 0.07fF  
C171 G1 and\_3in\_0/a\_8\_4# 0.11fF  
C172 and\_5in\_0/a\_40\_n43# Cnot 0.16fF  
C173 and\_3in\_0/a\_8\_4# and\_3in\_0/a\_24\_n29# 0.04fF  
C174 a\_176\_n92# A1 0.08fF  
C175 or\_3in\_0/a\_8\_n29# vdd 0.07fF  
C176 P2 a\_1059\_n157# 0.14fF  
C177 and\_3in\_0/a\_8\_n29# Cnot 0.16fF  
C178 m1\_574\_n229# vdd 0.07fF  
C179 or\_5in\_0/w\_n5\_n2# G3 0.06fF  
C180 m1\_574\_n229# m1\_706\_n228# 0.97fF  
C181 G2 w\_143\_n143# 0.64fF  
C182 w\_49\_n219# A3 0.06fF  
C183 P3 G2 0.39fF  
C184 and\_5in\_0/a\_8\_4# Cnot 0.12fF  
C185 A2 a\_164\_n164# 0.05fF

C186 P0 w\_1038\_n2# 0.22fF  
C187 and\_4in\_1/a\_24\_n36# P2 0.16fF  
C188 or\_4in\_0/a\_8\_n35# vdd 0.05fF  
C189 G3 G2 0.07fF  
C190 G1 P1 0.24fF  
C191 and\_3in\_1/w\_n5\_n2# vdd 0.17fF  
C192 P2 w\_143\_n143# 0.05fF  
C193 P3 P2 0.53fF  
C194 m1\_412\_n157# and\_4in\_0/w\_n5\_n2# 0.03fF  
C195 or\_5in\_0/w\_n5\_n2# gnd 0.06fF  
C196 G2 or\_4in\_0/a\_8\_4# 0.07fF  
C197 G3 P2 0.22fF  
C198 and\_4in\_0/a\_24\_n36# and\_4in\_0/a\_40\_n36# 0.04fF  
C199 G2 gnd 0.27fF  
C200 B0 and\_0/a\_8\_4# 0.41fF  
C201 w\_143\_n143# a\_176\_n165# 0.24fF  
C202 w\_50\_n148# B2 0.06fF  
C203 and\_4/a\_8\_n21# gnd 0.18fF  
C204 A3 a\_163\_n235# 0.05fF  
C205 B3 a\_62\_n238# 0.18fF  
C206 w1 and\_1/w\_n5\_n2# 0.03fF  
C207 or\_4in\_0/w\_n5\_n2# or\_4in\_0/a\_8\_n35# 0.09fF  
C208 m1\_552\_n157# m1\_682\_n151# 0.86fF  
C209 m1\_412\_n157# G2 0.20fF  
C210 or\_4in\_0/a\_40\_4# vdd 0.08fF  
C211 and\_4in\_0/w\_n5\_n2# Cnot 0.06fF  
C212 P0 w\_237\_17# 0.05fF  
C213 G2 G0 0.08fF  
C214 vdd B2 0.45fF  
C215 m1\_538\_n85# vdd 0.07fF  
C216 or\_3in\_0/w\_n5\_n2# or\_3in\_0/a\_8\_4# 0.03fF  
C217 P2 gnd 0.86fF  
C218 and\_2/w\_n5\_n2# P1 0.06fF  
C219 P1 w\_1038\_n71# 0.22fF  
C220 m1\_412\_n157# P2 0.20fF  
C221 and\_1/w\_n5\_n2# and\_1/a\_8\_4# 0.13fF  
C222 or\_4in\_0/a\_8\_4# or\_4in\_0/a\_24\_4# 0.04fF  
C223 vdd a\_1059\_n92# 0.08fF  
C224 w\_237\_17# B0 0.22fF  
C225 G2 Cnot 0.08fF  
C226 P2 G0 0.55fF  
C227 G2 A2 0.35fF  
C228 and\_3in\_0/w\_n5\_n2# P0 0.06fF  
C229 m1\_397\_n84# and\_2/a\_8\_4# 0.19fF  
C230 vdd w\_50\_n148# 0.13fF  
C231 P2 S2 0.51fF  
C232 or\_4in\_0/w\_n5\_n2# or\_4in\_0/a\_40\_4# 0.03fF  
C233 gnd a\_176\_n165# 0.07fF

C234 G3 or\_5in\_0/a\_56\_4# 0.07fF  
C235 w\_1037\_n205# S3 0.05fF  
C236 vdd a\_164\_n91# 0.08fF  
C237 w\_50\_n75# B1 0.06fF  
C238 w\_143\_n70# a\_176\_n92# 0.24fF  
C239 and\_3/a\_8\_n21# gnd 0.18fF  
C240 P2 Cnot 1.89fF  
C241 P2 A2 0.59fF  
C242 m1\_706\_n228# vdd 0.07fF  
C243 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_8\_n42# 0.09fF  
C244 m1\_574\_n229# m1\_832\_n222# 0.08fF  
C245 w\_142\_n214# A3 0.09fF  
C246 w\_1037\_n205# a\_1058\_n226# 0.06fF  
C247 w\_49\_n219# a\_62\_n213# 0.13fF  
C248 vdd a\_1059\_n23# 0.08fF  
C249 m1\_574\_n229# and\_3in\_2/a\_8\_n29# 0.08fF  
C250 and\_3in\_1/w\_n5\_n2# P1 0.06fF  
C251 B2 a\_63\_n167# 0.18fF  
C252 and\_3in\_2/a\_8\_4# P2 0.12fF  
C253 Cr0 w\_1038\_n71# 0.09fF  
C254 gnd a\_63\_n69# 0.10fF  
C255 and\_3in\_1/a\_8\_4# and\_3in\_1/a\_24\_n29# 0.04fF  
C256 P3 a\_175\_n236# 0.10fF  
C257 a\_176\_n165# A2 0.08fF  
C258 Cr2 w\_1037\_n205# 0.09fF  
C259 P3 G1 0.42fF  
C260 vdd B3 0.45fF  
C261 or\_4in\_0/w\_n5\_n2# vdd 0.14fF  
C262 G3 a\_175\_n236# 0.31fF  
C263 and\_4/a\_8\_4# vdd 0.23fF  
C264 G3 G1 0.09fF  
C265 vdd orgate\_0/w\_n5\_n2# 0.10fF  
C266 m1\_552\_n157# and\_3in\_1/a\_8\_4# 0.05fF  
C267 and\_3in\_2/a\_24\_n29# P2 0.16fF  
C268 w1 P0 0.14fF  
C269 vdd and\_3in\_0/a\_8\_4# 0.33fF  
C270 and\_4in\_1/gnd and\_4in\_1/a\_24\_n36# 0.12fF  
C271 G0 and\_0/w\_n5\_n2# 0.10fF  
C272 gnd A0 0.31fF  
C273 P3 w\_1037\_n205# 0.22fF  
C274 gnd a\_175\_n236# 0.07fF  
C275 and\_5in\_0/a\_56\_n43# gnd 0.12fF  
C276 P3 and\_3in\_2/w\_n5\_n2# 0.06fF  
C277 P1 a\_1059\_n92# 0.14fF  
C278 A0 xor\_real\_0/a\_n47\_n23# 0.05fF  
C279 w\_1038\_n71# S1 0.05fF  
C280 G1 gnd 0.36fF  
C281 w1 orgate\_0/a\_8\_n28# 0.19fF

C282 and\_3in\_0/a\_24\_n29# gnd 0.12fF  
C283 vdd a\_1071\_n24# 0.21fF  
C284 m1\_412\_n157# G1 0.08fF  
C285 G0 A0 0.35fF  
C286 P0 and\_1/a\_8\_4# 0.25fF  
C287 m1\_682\_n151# and\_4/w\_n5\_n2# 0.03fF  
C288 or\_4in\_0/a\_8\_n35# Cr2 0.05fF  
C289 G3 and\_3in\_2/w\_n5\_n2# 0.02fF  
C290 P1 a\_164\_n91# 0.25fF  
C291 a\_1071\_n24# a\_1059\_n23# 0.13fF  
C292 G1 G0 0.08fF  
C293 and\_5in\_0/a\_24\_n43# and\_5in\_0/a\_40\_n43# 0.04fF  
C294 vdd P1 0.38fF  
C295 and\_3/w\_n5\_n2# vdd 0.13fF  
C296 m1\_574\_n229# P3 0.06fF  
C297 or\_5in\_0/a\_8\_n42# or\_5in\_0/a\_56\_4# 0.04fF  
C298 or\_5in\_0/a\_8\_4# or\_5in\_0/a\_24\_4# 0.04fF  
C299 w\_50\_n75# A1 0.06fF  
C300 and\_5in\_0/a\_56\_n43# Cnot 0.16fF  
C301 B1 A1 0.99fF  
C302 G1 Cnot 0.08fF  
C303 and\_3in\_0/a\_24\_n29# Cnot 0.16fF  
C304 m1\_832\_n222# vdd 0.07fF  
C305 Cr0 a\_1059\_n92# 0.05fF  
C306 and\_4in\_1/gnd gnd 0.36fF  
C307 m1\_574\_n229# G3 0.11fF  
C308 m1\_706\_n228# m1\_832\_n222# 0.94fF  
C309 and\_3/a\_8\_4# G2 0.23fF  
C310 and\_3in\_2/a\_8\_4# G1 0.20fF  
C311 Cr3 gnd 0.08fF  
C312 P2 a\_1071\_n158# 0.30fF  
C313 and\_4in\_1/a\_40\_n36# P2 0.16fF  
C314 P2 w\_1038\_n136# 0.22fF  
C315 vdd Cr0 0.07fF  
C316 and\_2/w\_n5\_n2# G0 0.06fF  
C317 or\_3in\_0/a\_8\_n29# gnd 0.54fF  
C318 m1\_574\_n229# gnd 1.50fF  
C319 and\_4in\_1/a\_8\_4# P2 0.12fF  
C320 vdd a\_1058\_n226# 0.08fF  
C321 and\_0/w\_n5\_n2# and\_0/a\_8\_4# 0.13fF  
C322 and\_1/w\_n5\_n2# P0 0.06fF  
C323 P1 and\_3in\_0/a\_8\_4# 0.13fF  
C324 gnd a\_62\_n238# 0.18fF  
C325 or\_4in\_0/a\_8\_n35# gnd 0.70fF  
C326 and\_3in\_2/w\_n5\_n2# and\_3in\_2/a\_8\_4# 0.15fF  
C327 G1 a\_176\_n92# 0.27fF  
C328 A0 and\_0/a\_8\_4# 0.29fF  
C329 w\_143\_n143# B2 0.22fF

C330 m1\_412\_n157# or\_4in\_0/a\_8\_n35# 0.05fF  
C331 m1\_552\_n157# G2 0.20fF  
C332 Cr2 vdd 0.07fF  
C333 a\_1059\_n92# S1 0.25fF  
C334 and\_4in\_1/a\_8\_n36# and\_4in\_1/a\_24\_n36# 0.04fF  
C335 m1\_552\_n157# and\_4/a\_8\_n21# 0.10fF  
C336 P0 xor\_real\_0/a\_n35\_n24# 0.07fF  
C337 and\_4in\_0/a\_8\_4# and\_4in\_0/a\_40\_n36# 0.04fF  
C338 and\_3/a\_8\_4# and\_3/a\_8\_n21# 0.04fF  
C339 vdd a\_1059\_n157# 0.08fF  
C340 or\_3in\_0/w\_n5\_n2# or\_3in\_0/a\_24\_4# 0.03fF  
C341 and\_3in\_1/w\_n5\_n2# G0 0.06fF  
C342 a\_175\_n236# A3 0.08fF  
C343 orgate\_0/w\_n5\_n2# Cr0 0.03fF  
C344 m1\_552\_n157# P2 0.13fF  
C345 m1\_574\_n229# and\_3in\_2/a\_8\_4# 0.03fF  
C346 w\_237\_17# A0 0.09fF  
C347 xor\_real\_0/a\_n35\_n24# B0 0.30fF  
C348 G2 a\_63\_n142# 0.05fF  
C349 a\_63\_n69# a\_63\_n94# 0.04fF  
C350 vdd w\_143\_n143# 0.32fF  
C351 or\_4in\_0/w\_n5\_n2# Cr2 0.03fF  
C352 P3 vdd 0.38fF  
C353 gnd B2 0.21fF  
C354 m1\_706\_n228# P3 0.06fF  
C355 and\_5in\_0/w\_n5\_n2# P0 0.06fF  
C356 m1\_832\_n222# and\_3/w\_n5\_n2# 0.03fF  
C357 or\_5in\_0/a\_8\_n42# Cr3 0.05fF  
C358 m1\_538\_n85# gnd 0.24fF  
C359 w\_143\_n70# B1 0.22fF  
C360 vdd or\_3in\_0/a\_8\_4# 0.12fF  
C361 G3 vdd 1.42fF  
C362 gnd a\_1059\_n92# 0.08fF  
C363 m1\_706\_n228# G3 0.11fF  
C364 m1\_574\_n229# or\_5in\_0/a\_8\_n42# 0.26fF  
C365 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_8\_4# 0.03fF  
C366 and\_4in\_0/a\_8\_4# P0 0.20fF  
C367 m1\_574\_n229# and\_3in\_2/a\_24\_n29# 0.08fF  
C368 G1 and\_3in\_0/w\_n5\_n2# 0.02fF  
C369 P1 Cr0 0.34fF  
C370 a\_1059\_n23# S0 0.25fF  
C371 gnd a\_164\_n91# 0.08fF  
C372 or\_4in\_0/a\_8\_4# vdd 0.12fF  
C373 w\_1037\_n205# a\_1070\_n227# 0.24fF  
C374 P3 B3 0.43fF  
C375 B2 A2 0.99fF  
C376 and\_5in\_0/w\_n5\_n2# and\_5in\_0/a\_8\_4# 0.20fF  
C377 vdd gnd 0.74fF



C378 gnd and\_0/a\_8\_n21# 0.18fF  
C379 m1\_706\_n228# gnd 0.25fF  
C380 vdd xor\_real\_0/a\_n47\_n23# 0.08fF  
C381 gnd a\_1059\_n23# 0.08fF  
C382 m1\_412\_n157# vdd 0.07fF  
C383 G3 B3 0.15fF  
C384 P2 Cr1 0.36fF  
C385 vdd G0 0.74fF  
C386 and\_4in\_1/w\_n5\_n2# P2 0.06fF  
C387 w\_50\_n148# A2 0.06fF  
C388 a\_1058\_n226# S3 0.25fF  
C389 orgate\_0/a\_8\_n28# P0 0.10fF  
C390 or\_4in\_0/w\_n5\_n2# or\_4in\_0/a\_8\_4# 0.03fF  
C391 m1\_682\_n151# G2 1.11fF  
C392 and\_4in\_1/gnd and\_4in\_1/a\_40\_n36# 0.12fF  
C393 P0 B0 0.43fF  
C394 gnd B3 0.22fF  
C395 P1 S1 0.51fF  
C396 vdd A2 0.09fF  
C397 or\_3in\_0/w\_n5\_n2# Cr1 0.03fF  
C398 and\_4/a\_8\_4# gnd 0.10fF  
C399 or\_4in\_0/w\_n5\_n2# m1\_412\_n157# 0.06fF  
C400 Cnot a\_1059\_n23# 0.06fF  
C401 and\_4in\_1/a\_8\_4# and\_4in\_1/gnd 0.08fF  
C402 Cr2 S3 0.59fF  
C403 G2 and\_4/w\_n5\_n2# 0.02fF  
C404 m1\_552\_n157# G1 0.16fF  
C405 gnd and\_1/a\_8\_n21# 0.18fF  
C406 P3 P1 0.39fF  
C407 and\_3in\_2/a\_8\_4# vdd 0.33fF  
C408 m1\_706\_n228# and\_3in\_2/a\_8\_4# 0.05fF  
C409 and\_3/w\_n5\_n2# P3 0.06fF  
C410 gnd a\_63\_n167# 0.18fF  
C411 and\_5in\_0/a\_8\_4# P0 0.20fF  
C412 a\_1071\_n24# S0 0.07fF  
C413 or\_3in\_0/w\_n5\_n2# m1\_397\_n84# 0.06fF  
C414 orgate\_0/w\_n5\_n2# G0 0.06fF  
C415 and\_3in\_0/a\_8\_4# gnd 0.12fF  
C416 Cr2 a\_1058\_n226# 0.05fF  
C417 G3 P1 0.15fF  
C418 G3 and\_3/w\_n5\_n2# 0.02fF  
C419 or\_5in\_0/a\_24\_4# or\_5in\_0/a\_40\_4# 0.04fF  
C420 and\_4in\_0/w\_n5\_n2# and\_4in\_0/a\_8\_4# 0.18fF  
C421 and\_4/w\_n5\_n2# P2 0.06fF  
C422 w\_50\_n75# a\_63\_n69# 0.13fF  
C423 w\_143\_n70# A1 0.09fF  
C424 m1\_574\_n229# and\_4in\_1/a\_8\_4# 0.05fF  
C425 and\_2/a\_8\_n21# gnd 0.18fF

C426 gnd a\_1071\_n24# 0.08fF  
C427 a\_176\_n92# a\_164\_n91# 0.13fF  
C428 B1 a\_63\_n69# 0.41fF  
C429 or\_3in\_0/a\_8\_n29# or\_3in\_0/a\_24\_4# 0.04fF  
C430 vdd w\_1038\_n2# 0.32fF  
C431 or\_5in\_0/a\_8\_n42# vdd 0.07fF  
C432 m1\_832\_n222# G3 1.08fF  
C433 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_24\_4# 0.03fF  
C434 m1\_706\_n228# or\_5in\_0/a\_8\_n42# 0.08fF  
C435 Cr0 S1 0.59fF  
C436 P3 S3 0.51fF  
C437 w\_142\_n214# a\_163\_n235# 0.06fF  
C438 vdd a\_176\_n92# 0.21fF  
C439 Cnot and\_1/a\_8\_n21# 0.18fF  
C440 w\_1038\_n2# a\_1059\_n23# 0.06fF  
C441 and\_2/a\_8\_n21# G0 0.18fF  
C442 P1 gnd 0.63fF  
C443 G2 and\_4in\_0/a\_8\_4# 0.19fF  
C444 vdd and\_0/a\_8\_4# 0.23fF  
C445 and\_3in\_0/a\_8\_4# Cnot 0.12fF  
C446 and\_5in\_0/w\_n5\_n2# P2 0.06fF  
C447 m1\_412\_n157# P1 0.09fF  
C448 and\_0/a\_8\_4# and\_0/a\_8\_n21# 0.04fF  
C449 P3 a\_1058\_n226# 0.14fF  
C450 and\_4in\_0/w\_n5\_n2# P0 0.06fF  
C451 G1 and\_2/a\_8\_4# 0.08fF  
C452 P1 G0 2.16fF  
C453 m1\_832\_n222# gnd 0.16fF  
C454 Cnot a\_1071\_n24# 0.08fF  
C455 vdd A3 0.09fF  
C456 P2 and\_4in\_0/a\_8\_4# 0.41fF  
C457 and\_3in\_2/a\_8\_n29# gnd 0.16fF  
C458 P3 Cr2 0.33fF  
C459 G1 w\_50\_n75# 0.10fF  
C460 G2 and\_3in\_1/a\_8\_4# 0.06fF  
C461 G2 P0 0.08fF  
C462 G1 B1 0.15fF  
C463 vdd w\_237\_17# 0.32fF  
C464 P1 Cnot 1.63fF  
C465 vdd a\_1070\_n227# 0.21fF  
C466 a\_62\_n213# a\_62\_n238# 0.04fF  
C467 Cr0 gnd 0.32fF  
C468 m1\_552\_n157# or\_4in\_0/a\_8\_n35# 0.26fF  
C469 G1 m1\_397\_n84# 0.82fF  
C470 m1\_552\_n157# and\_3in\_1/w\_n5\_n2# 0.03fF  
C471 gnd a\_1058\_n226# 0.08fF  
C472 P2 and\_3in\_1/a\_8\_4# 0.07fF  
C473 P2 P0 1.43fF

C474 B3 A3 0.99fF  
C475 vdd and\_3in\_0/w\_n5\_n2# 0.17fF  
C476 and\_2/w\_n5\_n2# and\_2/a\_8\_4# 0.13fF  
C477 w\_1038\_n2# a\_1071\_n24# 0.24fF  
C478 vdd a\_1071\_n158# 0.21fF  
C479 xor\_real\_0/a\_n35\_n24# A0 0.08fF  
C480 Cr2 gnd 0.32fF  
C481 G2 a\_164\_n164# 0.11fF  
C482 vdd w\_1038\_n136# 0.32fF  
C483 and\_3/a\_8\_4# vdd 0.23fF  
C484 m1\_706\_n228# and\_3/a\_8\_4# 0.04fF  
C485 G3 P3 0.16fF  
C486 gnd a\_1059\_n157# 0.08fF  
C487 P1 a\_176\_n92# 0.11fF  
C488 and\_4/w\_n5\_n2# G1 0.06fF  
C489 and\_4in\_1/a\_8\_4# vdd 0.44fF  
C490 and\_3in\_1/a\_8\_n29# P1 0.16fF  
C491 A1 a\_63\_n69# 0.29fF  
C492 m1\_397\_n84# and\_2/w\_n5\_n2# 0.02fF  
C493 vdd or\_3in\_0/a\_24\_4# 0.08fF  
C494 or\_3in\_0/a\_8\_n29# Cr1 0.05fF  
C495 P2 a\_164\_n164# 0.25fF  
C496 and\_5in\_0/a\_8\_4# P2 0.06fF  
C497 m1\_832\_n222# or\_5in\_0/a\_8\_n42# 0.08fF  
C498 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_40\_4# 0.03fF  
C499 and\_4in\_0/a\_8\_n36# gnd 0.16fF  
C500 m1\_574\_n229# and\_4in\_1/w\_n5\_n2# 0.03fF  
C501 a\_1059\_n157# S2 0.25fF  
C502 P3 gnd 0.06fF  
C503 m1\_397\_n84# or\_3in\_0/a\_8\_n29# 0.26fF  
C504 and\_3in\_2/a\_8\_n29# and\_3in\_2/a\_24\_n29# 0.04fF  
C505 B2 a\_63\_n142# 0.41fF  
C506 a\_176\_n165# a\_164\_n164# 0.13fF  
C507 and\_3in\_0/w\_n5\_n2# and\_3in\_0/a\_8\_4# 0.15fF  
C508 G2 and\_4in\_0/w\_n5\_n2# 0.02fF  
C509 P3 G0 0.44fF  
C510 G3 gnd 0.32fF  
C511 vdd a\_62\_n213# 0.23fF  
C512 m1\_552\_n157# vdd 0.07fF  
C513 vdd w1 0.07fF  
C514 and\_4in\_0/a\_8\_n36# Cnot 0.16fF  
C515 G3 G0 0.08fF  
C516 G1 A1 0.35fF  
C517 P2 and\_4in\_0/w\_n5\_n2# 0.06fF  
C518 P3 Cnot 0.24fF  
C519 w\_50\_n148# a\_63\_n142# 0.13fF  
C520 w\_143\_n143# A2 0.09fF  
C521 m1\_538\_n85# and\_2/a\_8\_4# 0.05fF

C522 m1\_682\_n151# or\_4in\_0/a\_8\_n35# 0.08fF  
C523 P1 and\_3in\_0/w\_n5\_n2# 0.06fF  
C524 P0 A0 0.59fF  
C525 gnd xor\_real\_0/a\_n47\_n23# 0.08fF  
C526 m1\_412\_n157# gnd 1.07fF  
C527 P3 and\_3in\_2/a\_8\_4# 0.13fF  
C528 vdd and\_1/a\_8\_4# 0.23fF  
C529 vdd a\_63\_n142# 0.23fF  
C530 G3 Cnot 0.08fF  
C531 B0 and\_0/w\_n5\_n2# 0.06fF  
C532 G1 P0 0.08fF  
C533 B3 a\_62\_n213# 0.41fF  
C534 a\_175\_n236# a\_163\_n235# 0.13fF  
C535 a\_1070\_n227# S3 0.07fF  
C536 G0 gnd 0.14fF  
C537 or\_4in\_0/w\_n5\_n2# m1\_552\_n157# 0.06fF  
C538 Cnot S0 0.59fF  
C539 m1\_552\_n157# and\_4/a\_8\_4# 0.05fF  
C540 G2 P2 0.21fF  
C541 G0 xor\_real\_0/a\_n47\_n23# 0.11fF  
C542 G3 and\_3in\_2/a\_8\_4# 0.11fF  
C543 m1\_412\_n157# G0 0.08fF  
C544 and\_5in\_0/a\_8\_n43# gnd 0.16fF  
C545 and\_3/w\_n5\_n2# and\_3/a\_8\_4# 0.13fF  
C546 B0 A0 0.99fF  
C547 and\_4in\_1/a\_8\_4# P1 0.06fF  
C548 w\_1038\_n71# a\_1071\_n93# 0.24fF  
C549 m1\_538\_n85# m1\_397\_n84# 0.29fF  
C550 a\_1070\_n227# a\_1058\_n226# 0.13fF  
C551 orgate\_0/w\_n5\_n2# w1 0.06fF  
C552 and\_5in\_0/a\_40\_n43# and\_5in\_0/a\_56\_n43# 0.04fF  
C553 vdd and\_2/a\_8\_4# 0.23fF  
C554 G2 or\_4in\_0/a\_24\_4# 0.07fF  
C555 gnd Cnot 0.46fF  
C556 gnd A2 0.41fF  
C557 m1\_832\_n222# and\_3/a\_8\_4# 0.05fF  
C558 or\_5in\_0/a\_40\_4# or\_5in\_0/a\_56\_4# 0.04fF  
C559 and\_3in\_1/a\_24\_n29# P1 0.16fF  
C560 G2 a\_176\_n165# 0.31fF  
C561 and\_3in\_0/a\_8\_n29# and\_3in\_0/a\_24\_n29# 0.04fF  
C562 and\_5in\_0/a\_8\_4# and\_5in\_0/a\_56\_n43# 0.04fF  
C563 and\_3in\_2/a\_8\_4# gnd 0.12fF  
C564 B1 a\_164\_n91# 0.14fF  
C565 vdd Cr1 0.07fF  
C566 Cr2 a\_1070\_n227# 0.08fF  
C567 vdd w\_50\_n75# 0.13fF  
C568 G0 Cnot 0.08fF  
C569 or\_5in\_0/a\_8\_4# vdd 0.12fF

C570 Cr0 a\_1071\_n158# 0.21fF  
C571 or\_5in\_0/w\_n5\_n2# or\_5in\_0/a\_56\_4# 0.03fF  
C572 G3 or\_5in\_0/a\_8\_n42# 0.13fF  
C573 and\_3/a\_8\_n21# G2 0.18fF  
C574 vdd B1 0.45fF  
C575 and\_1/a\_8\_4# and\_1/a\_8\_n21# 0.04fF  
C576 and\_4in\_1/w\_n5\_n2# vdd 0.21fF  
C577 w\_1038\_n2# S0 0.05fF  
C578 and\_5in\_0/a\_8\_n43# Cnot 0.16fF  
C579 a\_63\_n142# a\_63\_n167# 0.04fF  
C580 m1\_397\_n84# vdd 0.07fF  
C581 P2 a\_176\_n165# 0.11fF  
C582 P3 A3 0.59fF  
C583 w\_142\_n214# a\_175\_n236# 0.24fF  
C584 vdd and\_1/w\_n5\_n2# 0.13fF  
C585 or\_5in\_0/a\_8\_n42# gnd 0.95fF  
C586 gnd a\_176\_n92# 0.07fF  
C587 m1\_682\_n151# vdd 0.07fF  
C588 and\_3in\_2/a\_24\_n29# gnd 0.12fF  
C589 P3 a\_1070\_n227# 0.30fF  
C590 G3 A3 0.35fF  
C591 and\_3in\_1/a\_8\_n29# gnd 0.16fF  
C592 a\_1071\_n158# a\_1059\_n157# 0.13fF  
C593 G1 w\_143\_n70# 0.63fF  
C594 m1\_412\_n157# and\_3in\_1/a\_8\_n29# 0.17fF  
C595 gnd and\_0/a\_8\_4# 0.10fF  
C596 vdd xor\_real\_0/a\_n35\_n24# 0.21fF  
C597 and\_3in\_1/w\_n5\_n2# and\_3in\_1/a\_8\_4# 0.15fF  
C598 w\_1038\_n136# a\_1059\_n157# 0.06fF  
C599 and\_4/w\_n5\_n2# vdd 0.13fF  
C600 and\_2/a\_8\_4# and\_2/a\_8\_n21# 0.04fF  
C601 and\_4in\_1/a\_24\_n36# and\_4in\_1/a\_40\_n36# 0.04fF  
C602 G0 and\_0/a\_8\_4# 0.05fF  
C603 gnd A3 0.42fF  
C604 and\_4in\_0/a\_8\_n36# and\_4in\_0/a\_24\_n36# 0.04fF  
C605 Cnot w\_1038\_n2# 0.09fF  
C606 or\_4in\_0/w\_n5\_n2# m1\_682\_n151# 0.06fF  
C607 a\_1071\_n93# a\_1059\_n92# 0.13fF  
C608 m1\_397\_n84# and\_3in\_0/a\_8\_4# 0.05fF  
C609 P1 and\_2/a\_8\_4# 0.03fF  
C610 G2 G1 0.08fF  
C611 m1\_682\_n151# and\_4/a\_8\_4# 0.05fF  
C612 gnd a\_1070\_n227# 0.08fF  
C613 P3 and\_3/a\_8\_4# 0.03fF  
C614 w\_237\_17# xor\_real\_0/a\_n47\_n23# 0.06fF  
C615 G1 and\_4/a\_8\_n21# 0.18fF  
C616 and\_5in\_0/w\_n5\_n2# vdd 0.25fF  
C617 P3 and\_4in\_1/a\_8\_4# 0.09fF

C618 and\_3in\_2/a\_8\_4# and\_3in\_2/a\_24\_n29# 0.04fF  
C619 Cr1 P1 0.09fF  
C620 vdd w\_49\_n219# 0.13fF  
C621 G0 w\_237\_17# 0.59fF  
C622 G3 and\_3/a\_8\_4# 0.08fF  
C623 P1 B1 0.43fF  
C624 vdd a\_1071\_n93# 0.21fF  
C625 and\_4/w\_n5\_n2# and\_4/a\_8\_4# 0.13fF  
C626 and\_4in\_1/w\_n5\_n2# P1 0.06fF  
C627 P2 G1 1.09fF  
C628 G3 and\_4in\_1/a\_8\_4# 0.14fF  
C629 and\_4in\_0/a\_8\_4# vdd 0.44fF  
C630 A1 a\_164\_n91# 0.05fF  
C631 m1\_397\_n84# P1 0.36fF  
C632 or\_3in\_0/a\_8\_4# or\_3in\_0/a\_24\_4# 0.04fF  
C633 or\_5in\_0/a\_24\_4# vdd 0.08fF  
C634 gnd a\_1071\_n158# 0.08fF  
C635 or\_5in\_0/w\_n5\_n2# Cr3 0.03fF  
C636 and\_4in\_0/a\_24\_n36# gnd 0.12fF  
C637 vdd A1 0.09fF  
C638 and\_3/a\_8\_4# gnd 0.10fF  
C639 gnd a\_63\_n94# 0.18fF  
C640 and\_4in\_1/a\_8\_4# gnd 0.00fF  
C641 G1 or\_3in\_0/w\_n5\_n2# 0.06fF  
C642 or\_5in\_0/w\_n5\_n2# m1\_574\_n229# 0.06fF  
C643 w\_49\_n219# B3 0.06fF  
C644 and\_3in\_1/a\_8\_4# vdd 0.33fF  
C645 a\_1071\_n158# S2 0.07fF  
C646 B2 a\_164\_n164# 0.14fF  
C647 vdd P0 0.38fF  
C648 and\_3in\_2/w\_n5\_n2# P2 0.06fF  
C649 and\_3in\_0/w\_n5\_n2# Cnot 0.06fF  
C650 and\_4in\_1/gnd P2 0.05fF  
C651 vdd a\_163\_n235# 0.08fF  
C652 P0 a\_1059\_n23# 0.16fF  
C653 and\_4in\_1/a\_8\_4# G0 0.20fF  
C654 w\_1038\_n136# S2 0.05fF  
C655 G3 a\_62\_n213# 0.05fF  
C656 and\_3in\_1/a\_24\_n29# gnd 0.12fF  
C657 vdd orgate\_0/a\_8\_n28# 0.06fF  
C658 and\_4in\_0/a\_24\_n36# Cnot 0.16fF  
C659 m1\_412\_n157# and\_3in\_1/a\_24\_n29# 0.17fF  
C660 S3 Gnd 0.35fF  
C661 a\_62\_n238# Gnd 0.03fF  
C662 a\_163\_n235# Gnd 0.13fF  
C663 a\_62\_n213# Gnd 0.25fF  
C664 A3 Gnd 0.64fF  
C665 a\_1058\_n226# Gnd 0.13fF

C666 B3 Gnd 0.68fF  
C667 a\_175\_n236# Gnd 0.63fF  
C668 a\_1070\_n227# Gnd 0.37fF  
C669 S2 Gnd 0.35fF  
C670 a\_63\_n167# Gnd 0.03fF  
C671 a\_164\_n164# Gnd 0.13fF  
C672 a\_63\_n142# Gnd 0.15fF  
C673 A2 Gnd 0.60fF  
C674 a\_1059\_n157# Gnd 0.13fF  
C675 B2 Gnd 0.66fF  
C676 a\_176\_n165# Gnd 0.63fF  
C677 a\_1071\_n158# Gnd 0.55fF  
C678 S1 Gnd 0.07fF  
C679 a\_1059\_n92# Gnd 0.10fF  
C680 a\_1071\_n93# Gnd 0.31fF  
C681 a\_63\_n94# Gnd 0.03fF  
C682 a\_164\_n91# Gnd 0.13fF  
C683 a\_63\_n69# Gnd 0.26fF  
C684 A1 Gnd 0.75fF  
C685 B1 Gnd 0.67fF  
C686 a\_176\_n92# Gnd 0.63fF  
C687 S0 Gnd 0.35fF  
C688 a\_1059\_n23# Gnd 0.13fF  
C689 a\_1071\_n24# Gnd 0.37fF  
C690 w\_1037\_n205# Gnd 1.46fF  
C691 w\_142\_n214# Gnd 1.59fF  
C692 w\_49\_n219# Gnd 0.74fF  
C693 w\_1038\_n136# Gnd 1.45fF  
C694 w\_143\_n143# Gnd 1.59fF  
C695 w\_50\_n148# Gnd 0.72fF  
C696 w\_1038\_n71# Gnd 1.59fF  
C697 w\_143\_n70# Gnd 1.59fF  
C698 w\_50\_n75# Gnd 0.93fF  
C699 w\_1038\_n2# Gnd 1.45fF  
C700 and\_0/a\_8\_n21# Gnd 0.03fF  
C701 and\_0/a\_8\_4# Gnd 0.16fF  
C702 and\_0/w\_n5\_n2# Gnd 0.93fF  
C703 xor\_real\_0/a\_n47\_n23# Gnd 0.13fF  
C704 A0 Gnd 1.65fF  
C705 B0 Gnd 1.65fF  
C706 xor\_real\_0/a\_n35\_n24# Gnd 0.63fF  
C707 w\_237\_17# Gnd 1.59fF  
C708 and\_1/a\_8\_n21# Gnd 0.03fF  
C709 and\_1/a\_8\_4# Gnd 0.16fF  
C710 Cnot Gnd 2.17fF  
C711 P0 Gnd 2.50fF  
C712 and\_1/w\_n5\_n2# Gnd 0.93fF  
C713 gnd Gnd 6.99fF

C714 Cr0 Gnd 0.69fF  
C715 orgate\_0/a\_8\_n28# Gnd 0.30fF  
C716 w1 Gnd 0.54fF  
C717 G0 Gnd 1.48fF  
C718 orgate\_0/w\_n5\_n2# Gnd 0.82fF  
C719 and\_3in\_0/a\_24\_n29# Gnd 0.03fF  
C720 and\_3in\_0/a\_8\_n29# Gnd 0.03fF  
C721 and\_3in\_0/a\_8\_4# Gnd 0.09fF  
C722 and\_3in\_0/w\_n5\_n2# Gnd 1.16fF  
C723 and\_2/a\_8\_n21# Gnd 0.03fF  
C724 and\_2/a\_8\_4# Gnd 0.16fF  
C725 P1 Gnd 9.05fF  
C726 and\_2/w\_n5\_n2# Gnd 0.93fF  
C727 Cr1 Gnd 0.52fF  
C728 or\_3in\_0/a\_24\_4# Gnd 0.00fF  
C729 or\_3in\_0/a\_8\_4# Gnd 0.00fF  
C730 vdd Gnd 4.03fF  
C731 or\_3in\_0/a\_8\_n29# Gnd 0.12fF  
C732 m1\_397\_n84# Gnd 0.62fF  
C733 m1\_538\_n85# Gnd 0.64fF  
C734 or\_3in\_0/w\_n5\_n2# Gnd 1.16fF  
C735 and\_4in\_0/a\_40\_n36# Gnd 0.03fF  
C736 and\_4in\_0/a\_24\_n36# Gnd 0.03fF  
C737 and\_4in\_0/a\_8\_n36# Gnd 0.03fF  
C738 and\_4in\_0/a\_8\_4# Gnd 0.09fF  
C739 and\_4in\_0/w\_n5\_n2# Gnd 1.41fF  
C740 and\_3in\_1/a\_24\_n29# Gnd 0.03fF  
C741 and\_3in\_1/a\_8\_n29# Gnd 0.03fF  
C742 and\_3in\_1/a\_8\_4# Gnd 0.09fF  
C743 and\_3in\_1/w\_n5\_n2# Gnd 1.16fF  
C744 and\_4/a\_8\_n21# Gnd 0.03fF  
C745 and\_4/a\_8\_4# Gnd 0.16fF  
C746 G1 Gnd 4.06fF  
C747 P2 Gnd 8.91fF  
C748 and\_4/w\_n5\_n2# Gnd 0.93fF  
C749 Cr2 Gnd 0.56fF  
C750 or\_4in\_0/a\_40\_4# Gnd 0.00fF  
C751 or\_4in\_0/a\_24\_4# Gnd 0.00fF  
C752 or\_4in\_0/a\_8\_4# Gnd 0.00fF  
C753 or\_4in\_0/a\_8\_n35# Gnd 0.12fF  
C754 G2 Gnd 3.07fF  
C755 m1\_682\_n151# Gnd 0.69fF  
C756 m1\_552\_n157# Gnd 0.67fF  
C757 m1\_412\_n157# Gnd 0.61fF  
C758 or\_4in\_0/w\_n5\_n2# Gnd 1.46fF  
C759 and\_5in\_0/a\_56\_n43# Gnd 0.03fF  
C760 and\_5in\_0/a\_40\_n43# Gnd 0.03fF  
C761 and\_5in\_0/a\_24\_n43# Gnd 0.03fF



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C762 and_5in_0/a_8_n43# Gnd 0.03fF
C763 and_5in_0/a_8_4# Gnd 0.09fF
C764 and_5in_0/w_n5_n2# Gnd 1.70fF
C765 and_4in_1/a_40_n36# Gnd 0.03fF
C766 and_4in_1/a_24_n36# Gnd 0.03fF
C767 and_4in_1/a_8_n36# Gnd 0.03fF
C768 and_4in_1/gnd Gnd 0.21fF
C769 and_4in_1/a_8_4# Gnd 0.09fF
C770 and_4in_1/w_n5_n2# Gnd 1.41fF
C771 and_3in_2/a_24_n29# Gnd 0.03fF
C772 and_3in_2/a_8_n29# Gnd 0.03fF
C773 and_3in_2/a_8_4# Gnd 0.09fF
C774 and_3in_2/w_n5_n2# Gnd 1.16fF
C775 and_3/a_8_n21# Gnd 0.03fF
C776 and_3/a_8_4# Gnd 0.16fF
C777 P3 Gnd 4.65fF
C778 and_3/w_n5_n2# Gnd 0.93fF
C779 Cr3 Gnd 0.20fF
C780 or_5in_0/a_56_4# Gnd 0.00fF
C781 or_5in_0/a_40_4# Gnd 0.00fF
C782 or_5in_0/a_24_4# Gnd 0.00fF
C783 or_5in_0/a_8_4# Gnd 0.00fF
C784 or_5in_0/a_8_n42# Gnd 0.12fF
C785 G3 Gnd 1.93fF
C786 m1_832_n222# Gnd 0.62fF
C787 m1_706_n228# Gnd 0.74fF
C788 m1_574_n229# Gnd 0.76fF
C789 or_5in_0/w_n5_n2# Gnd 1.67fF

.ends cla

```

## Delay and max Clock

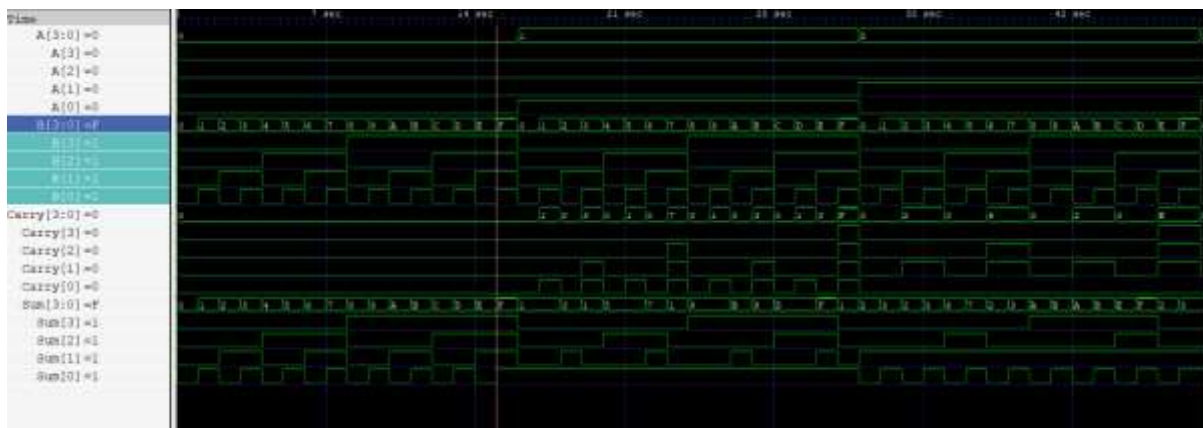
	Ngspice	Magic
<b>S0</b>	7.79152e-11	3.00282e-10
<b>S1</b>	1.49730e-10	3.71123e-08
<b>S2</b>	2.72440e-10	3.70006e-08
<b>S3</b>	3.12487e-10	3.69107e-08
<b>C0</b>	1.69053e-10	3.69107e-08
<b>C1</b>	2.23268e-10	4.81601e-10

<b>C2</b>	2.61289e-10	5.50827e-10
<b>C3</b>	3.06808e-10	4.79139e-10

The maximum clock frequency for the proper functioning of the circuit is determined the highest delay we get in MAGIC which in this case is S3 with delay of **5.50827e-10** sec and hence the max clock speed is 1/max delay which is 1.82 GHz.

## Verilog:

Verilog results are same as that obtained above for the above set of outputs observed. The following is the plot that is obtained on running the GTK wave from the Verilog code of a 4 bit CLA adder.



## Module Cla adder:

```
module CLA_adder (
input[3:0] B,
input[3:0] A,
input Cnot,
output [3:0] Sum,
output [3:0] Carry
);
wire [3:0] P,G,C;
```

```

xor(P[0],A[0],B[0]);
xor(P[1],A[1],B[1]);
xor(P[2], A[2], B[2]);
xor(P[3] ,A[3],B[3]);

xor(G[0],A[0],B[0]);
xor(G[1],A[1],B[1]);
xor(G[2], A[2],B[2]);
xor(G[3],A[3],B[3]);

and(t1,P[0],Cnot);
or(Carry[0], G[0],t1);

and(t2,P[1],G[0]);
and(t3,P[1], P[0], Cnot);
or(Carry[1],t2,t3 ,G[1]);

and(t4,P[2], P[1], P[0], Cnot);
and(t5,P[2], P[1], G[0]);
and(t6,P[2], G[1]);
or(Carry[2], G[2],t6,t5,t4);

and(t7,P[3], P[2], P[1], P[0], Cnot);
and(t8,P[3], P[2], P[1], G[0]);
and(t9,P[3], P[2], G[1]);
and(t10,P[3], G[2]);
or(Carry[3], G[3],t7,t8,t9,t10);

xor(Sum[0], P[0], Carry[0]);
xor(Sum[1], P[1], Carry[1]);
xor(Sum[2], P[2], Carry[2]);
xor(Sum[3], P[3], Carry[3]);

endmodule

```

**Testbench:**

```

module testbench;

    // Inputs
    reg[3:0] A,B;
    reg Cnot;

    wire[3:0] Sum,Carry;

    integer i; // Counter variable

    // Call to the adder module
    CLA_adder AD(A,B,Cnot, Sum, Carry);

    initial begin
        // Specify the dumpfile and dumpvariables to generate the gtkwave
        waveforms
        $dumpfile("Clap.vcd");
        $dumpvars(0, testbench);

        // For loop which generates all the binary numbers from 0 to 99 and
        gives them to input and displays the corresponding outputs using display
        statement
        for (i=0; i<100; i=i+1)
        begin
            {Cnot,A,B} = i; #1;
            $display("Time=%2d \t %b \t %b %b %b %b \t %b %b %b %b \t ->\t %b %b
            %b %b %b", $time, Cnot, A[3], A[2], A[1], A[0], B[3], B[2], B[1],
            B[0],Carry[3], Carry[2], Carry[1], Carry[0], Sum[0], Sum[1], Sum[2], Sum[3]);
        end
        #1 $finish;
    end

endmodule

```