University of Texas, Dallas
Department of Electrical and Computer Engineering

CE/EEDG 6325: VLSI Design

CELL LIBRARY

Submitted by
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1) INVERTER

a) Layout :

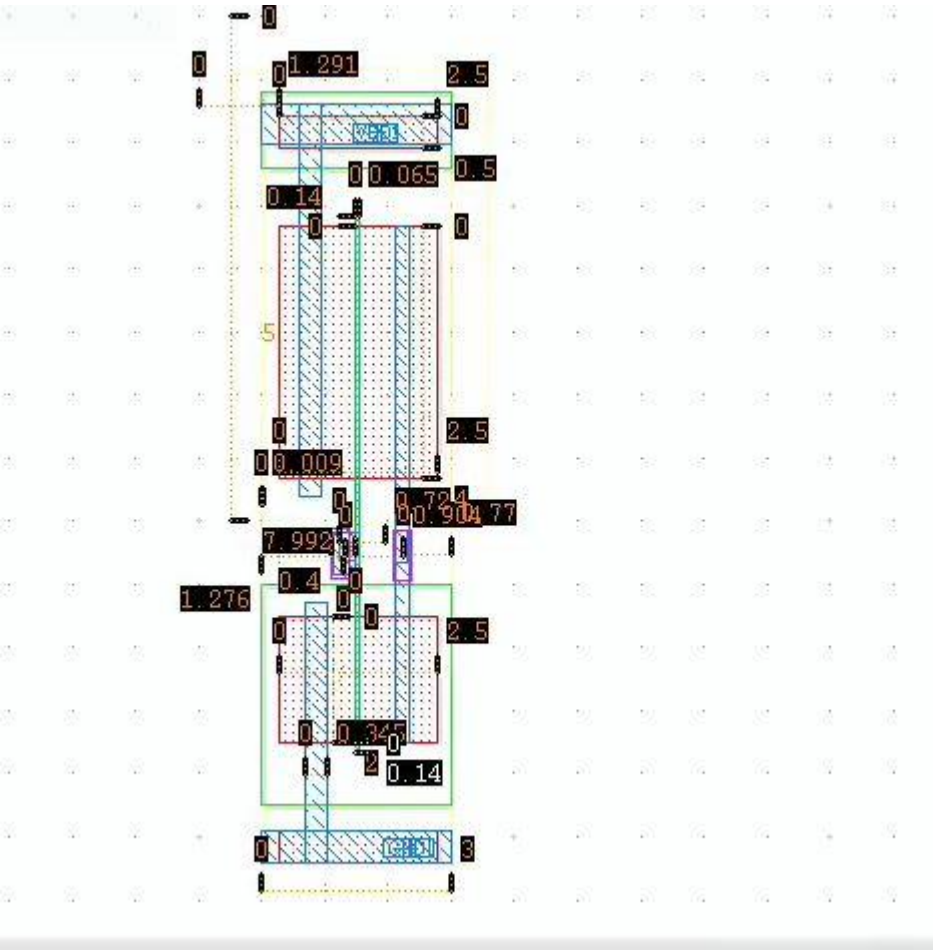

Fig 1.1 Layout View of Inverter indicating dimensions of the cell

b) Pin pitching:

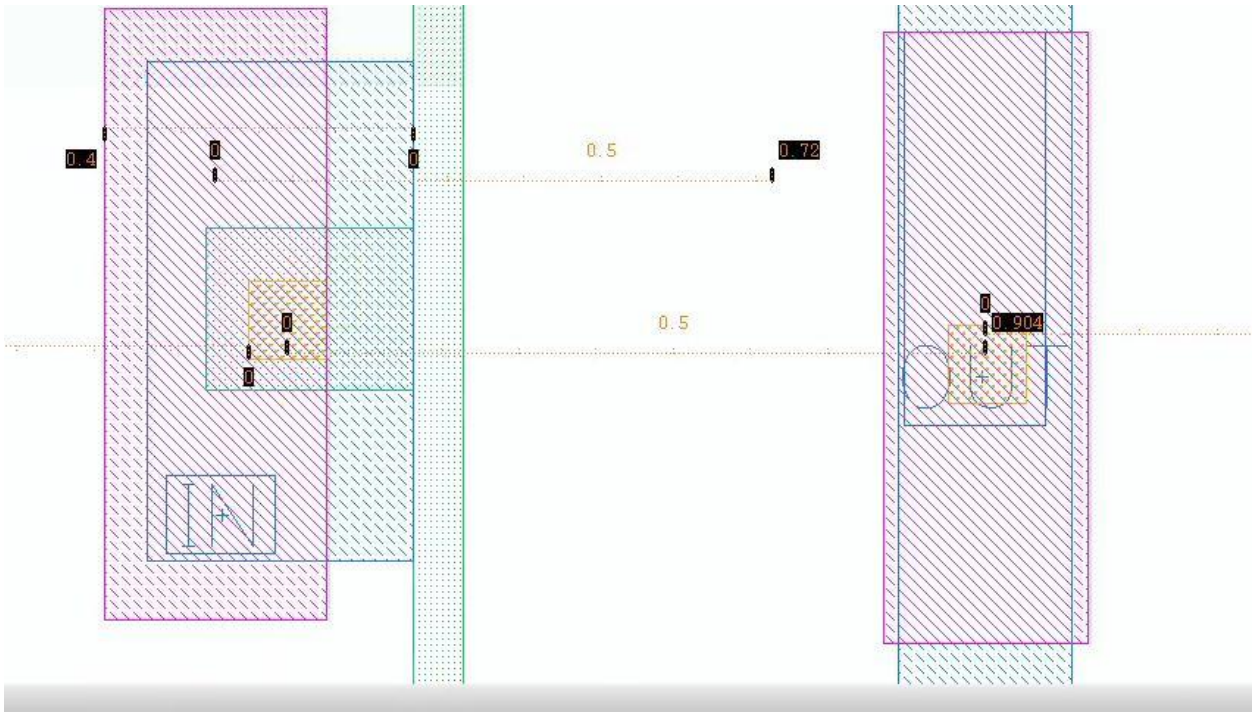

Fig 1.2: Distance between pins **in** and **out**

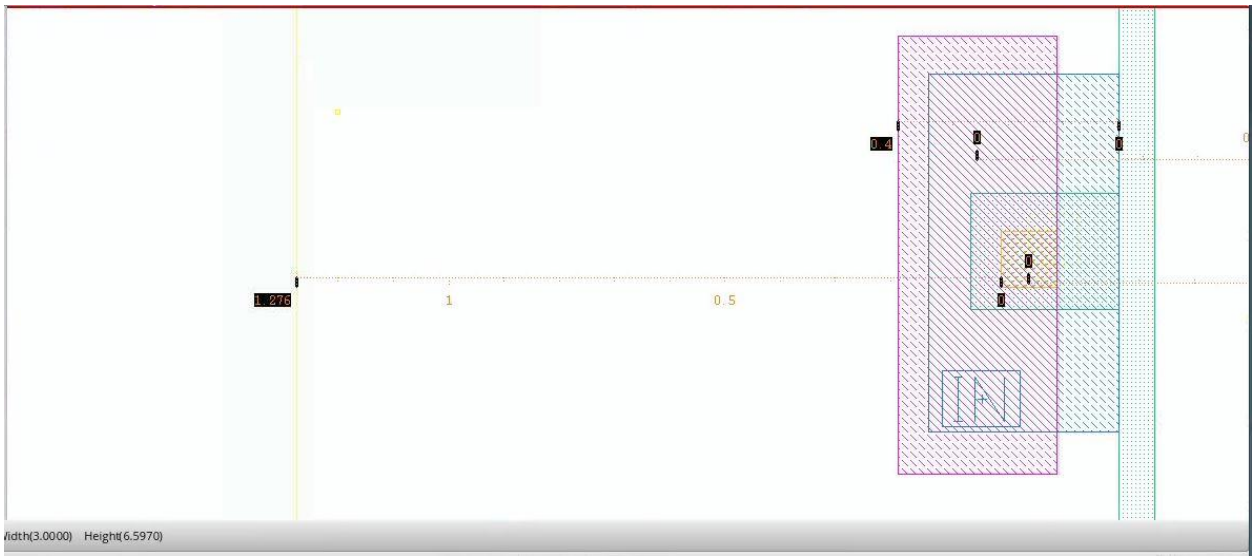

Fig 1.3: Pitch Offset - Distance from pin center to JZ

c) Schematic:

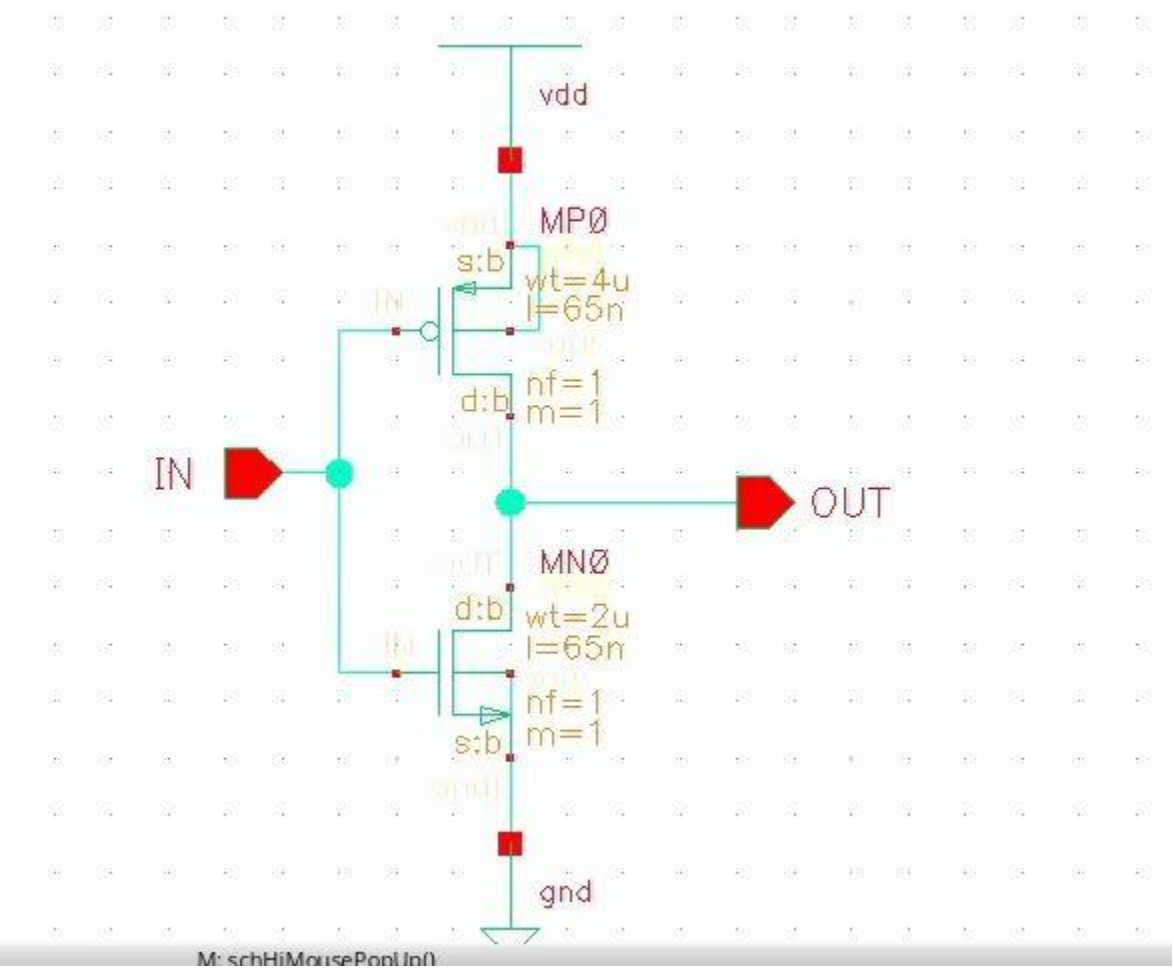

Fig: 1.4 Schematic view of Inverter

d) Output waveform :

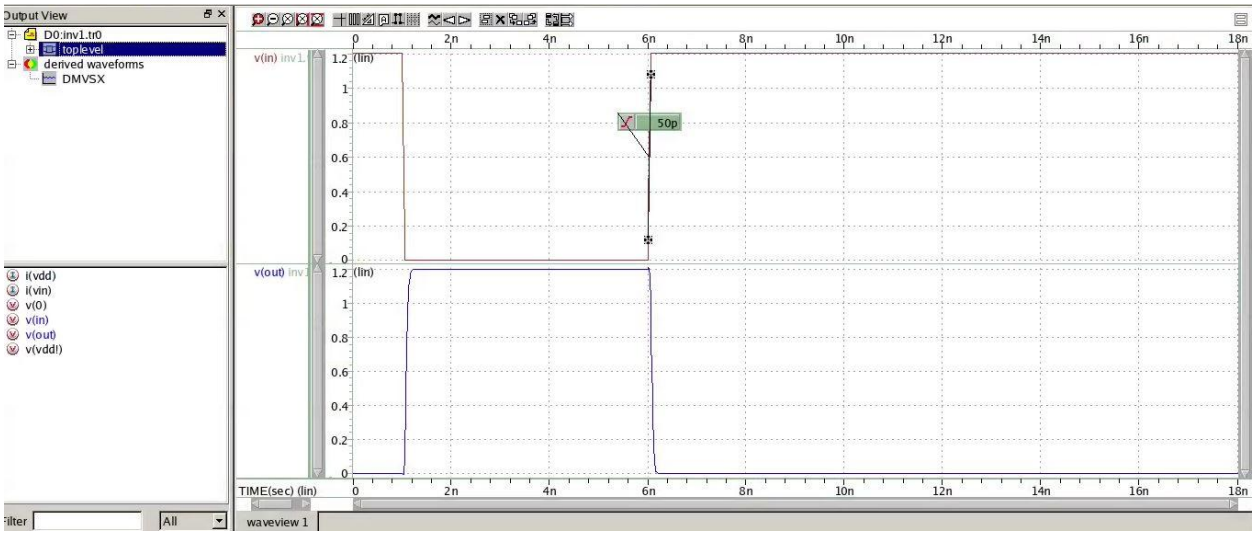

Fig 1.5 Simulated output waveform of Inverter.

e) Abstract View

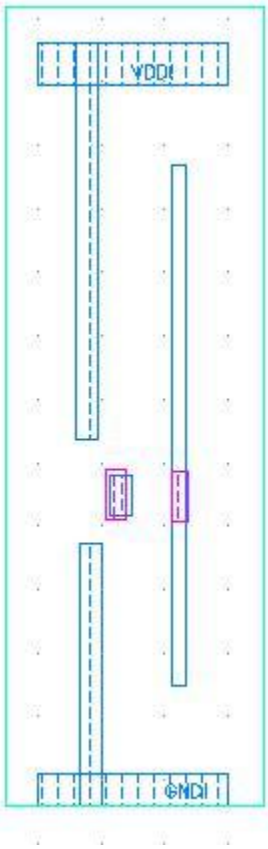

Fig 1.6 : Abstract view of Inverter

Out = ~(in)

in	out
0	1
1	0

Table 1.1: Truth Table showing Inverter output data

2) NAND2 :

a) Layout

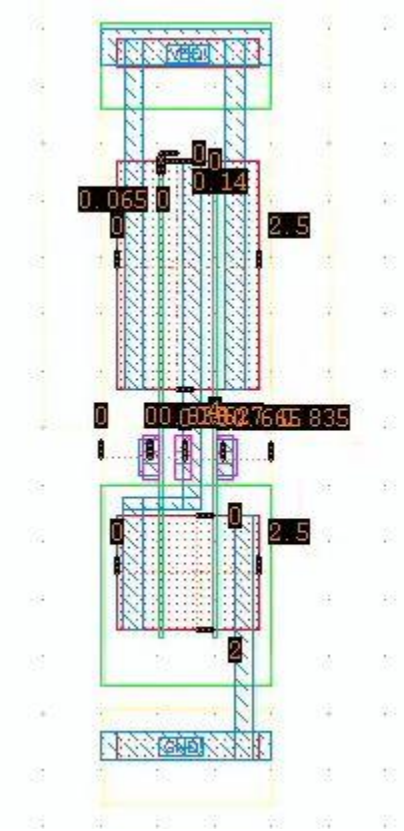

Fig: 2.1 Layout view of NAND2 indicating dimensions of the cell

b) Pin pitching:

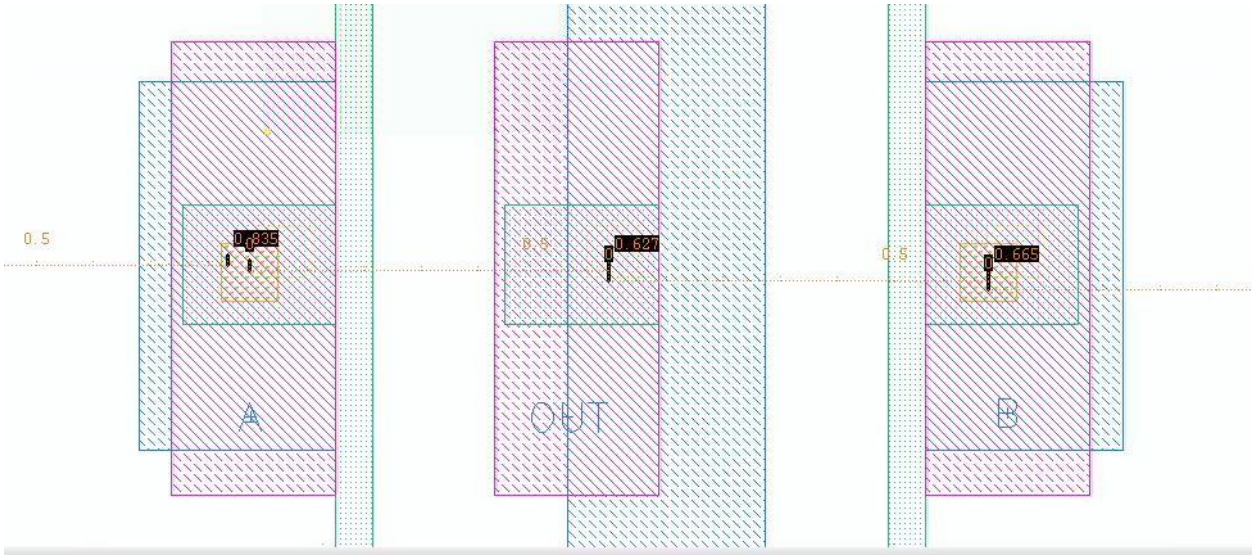

Fig 2.2: Distance between pins a, b and out

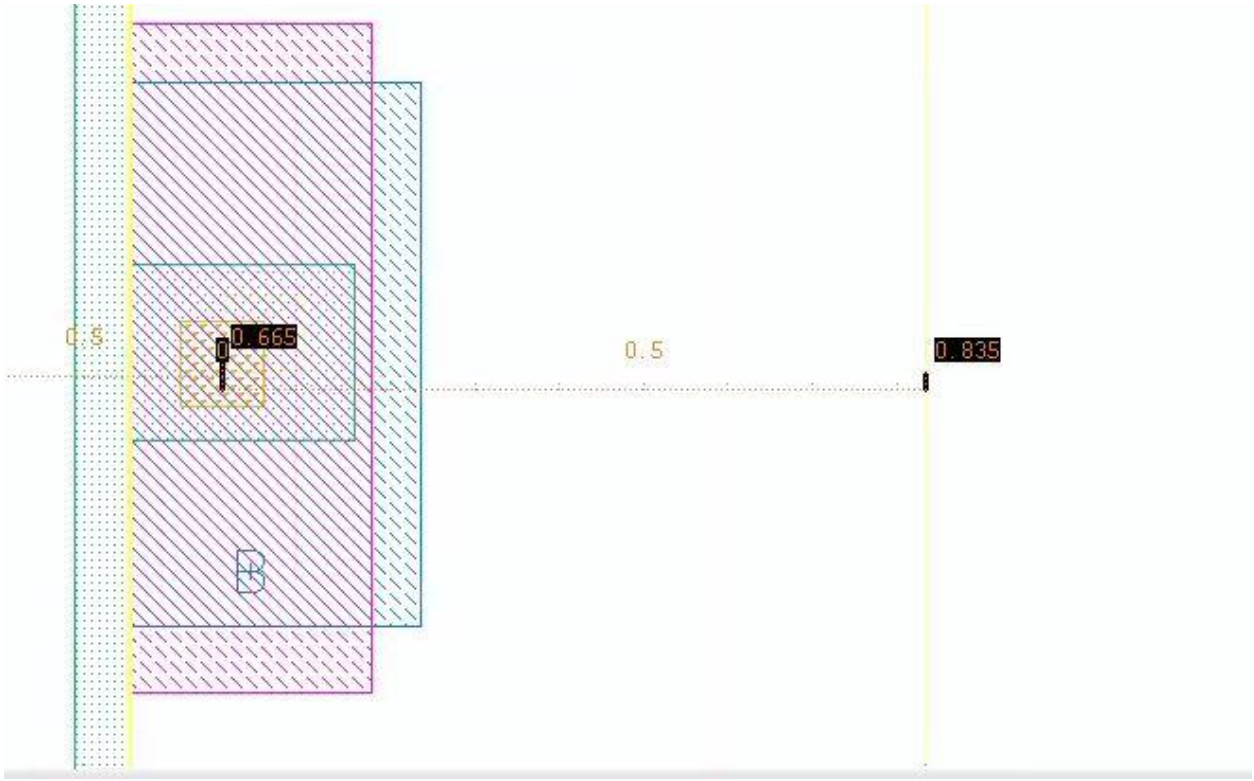

Fig 2.3: Distance from pin center of B to JZ(Right offset)

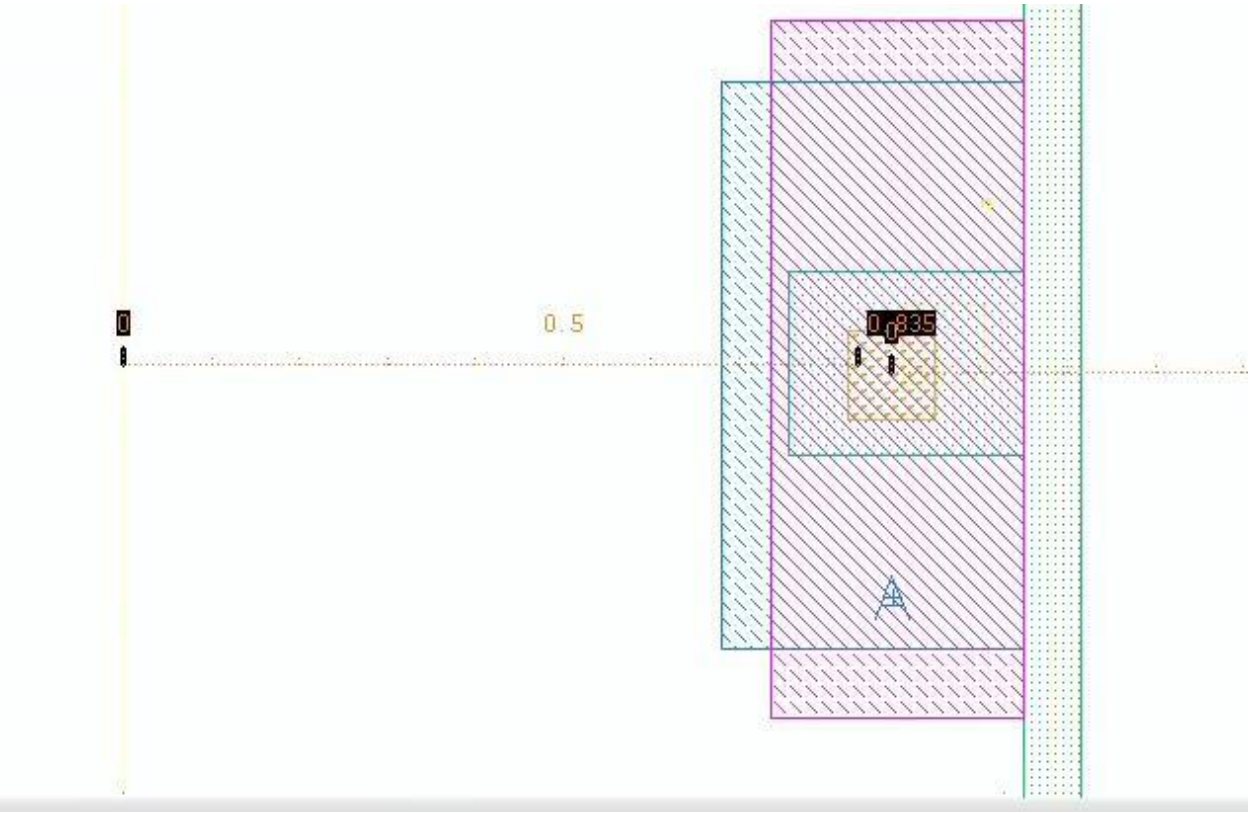

Fig 2.4: Distance from pin center A to JZ(left offset)

c) Schematic:

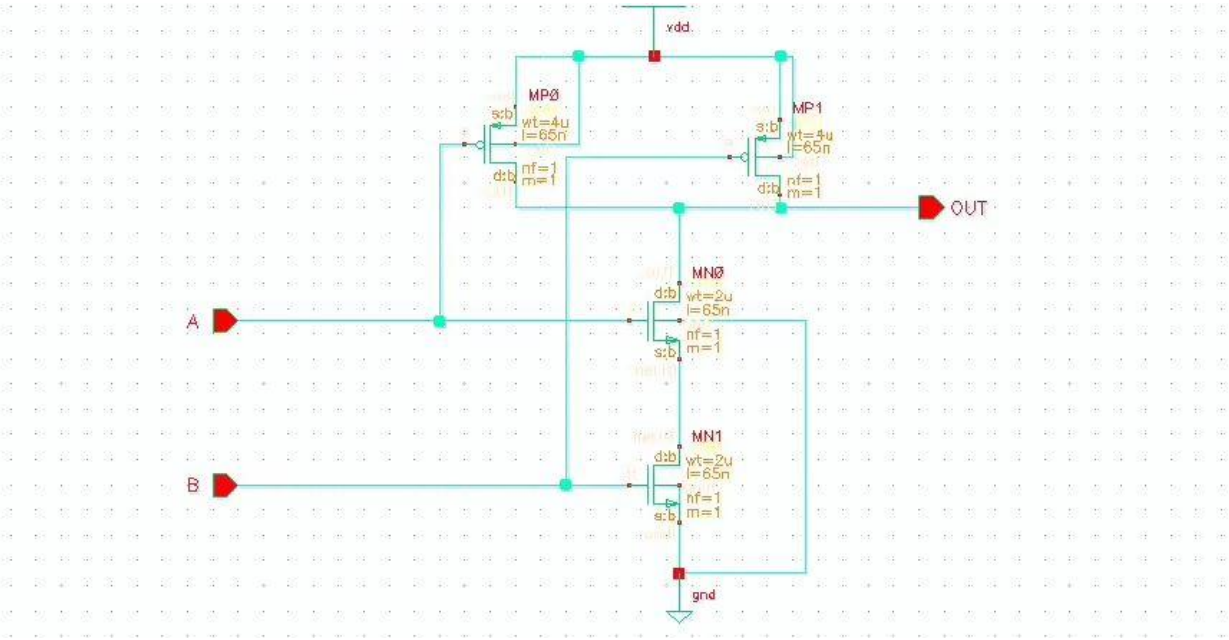

Fig 2.5: Schematic view of NAND2

d) Output Waveforms:

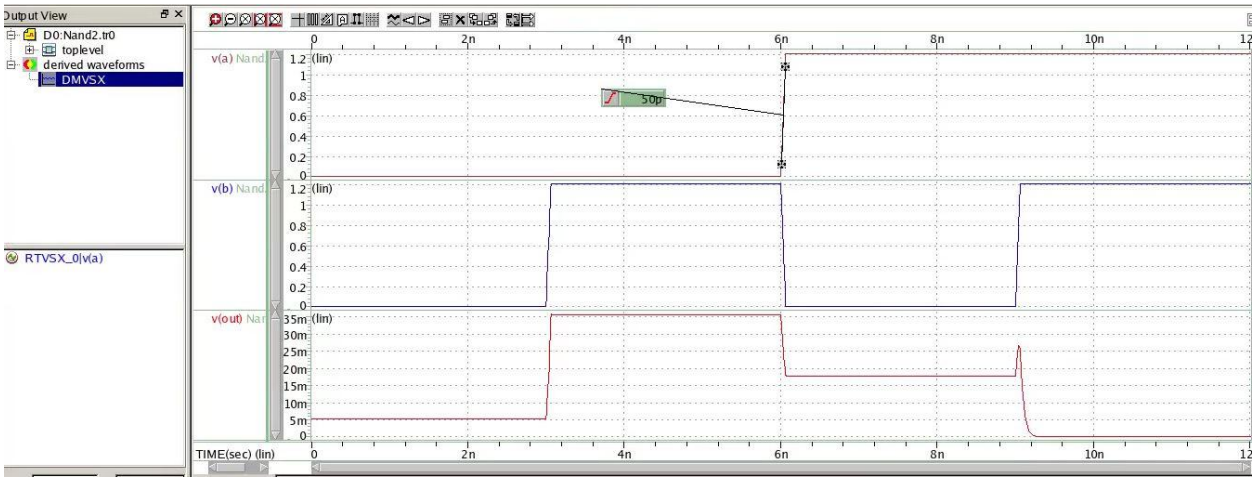

Fig 2.6: Simulated output waveform of NAND2

e) Abstract View:

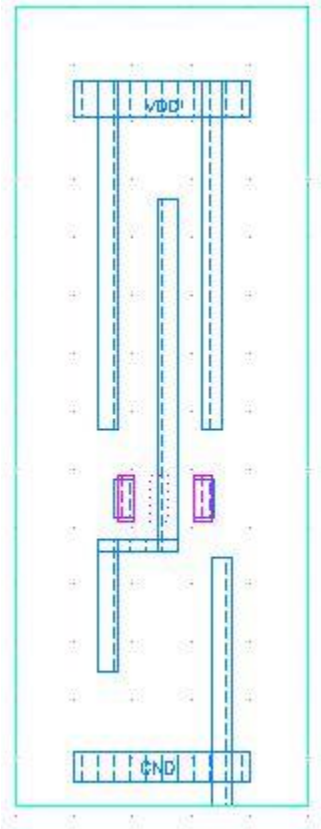

Fig 2.7: Abstract View of NAND2

out = `~(a*b)

a	**b**	**out**
0	0	1
0	1	1
1	0	1
1	1	0

Table 2.1: Truth Table showing NAND-2 output data

3) NOR2

a) Layout :

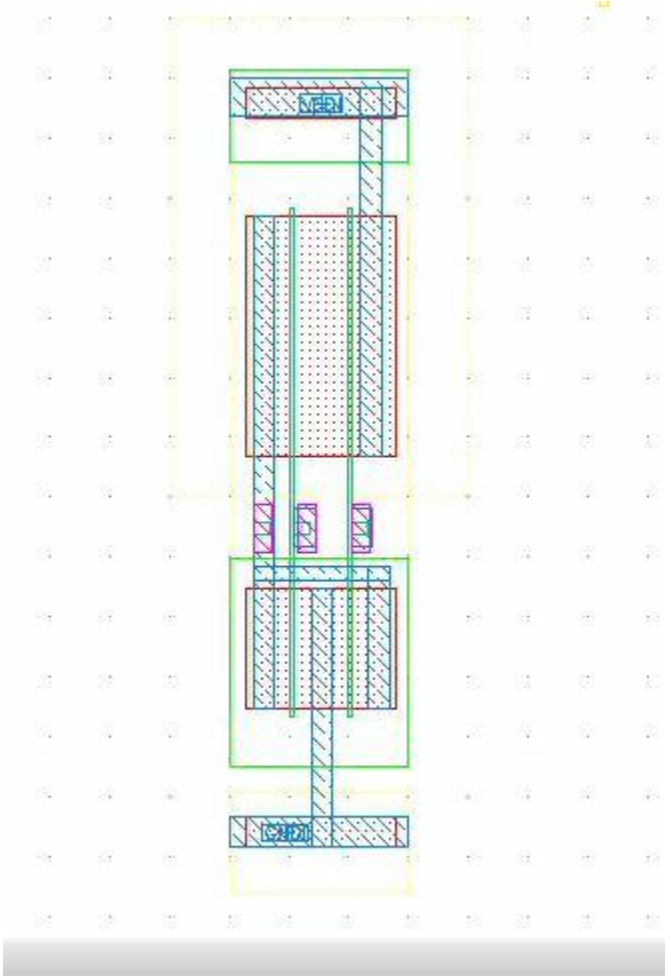

Fig 3.1: Layout view of NOR2 indicating dimensions of the cell

b) Pin pitching:

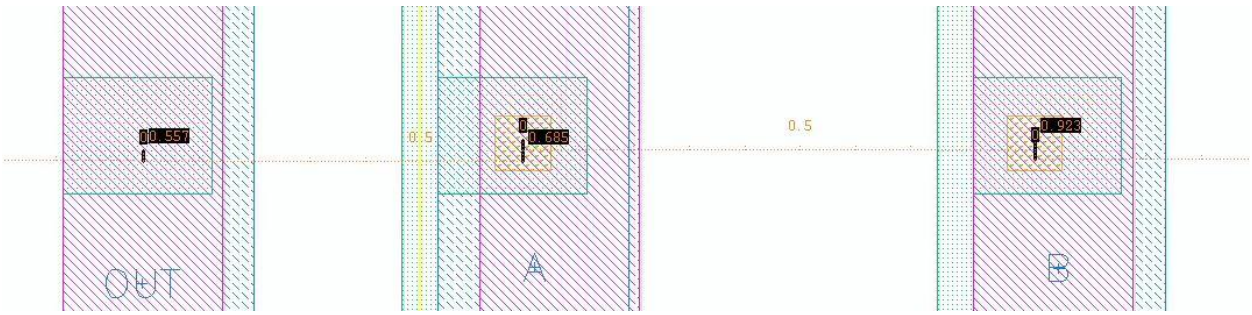

Fig: 3.2 : Distance between a,b and out.

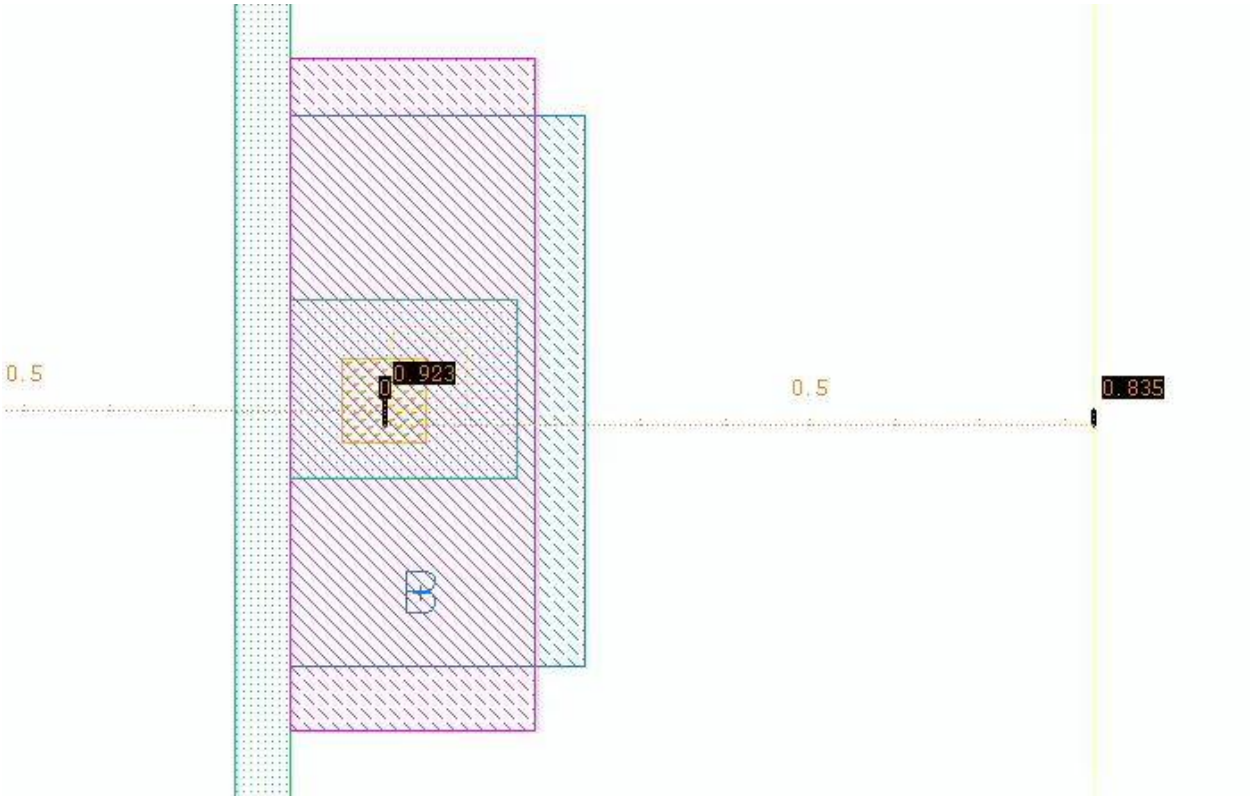

Fig 3.3: Distance between pins **b** and JZ(right offset)

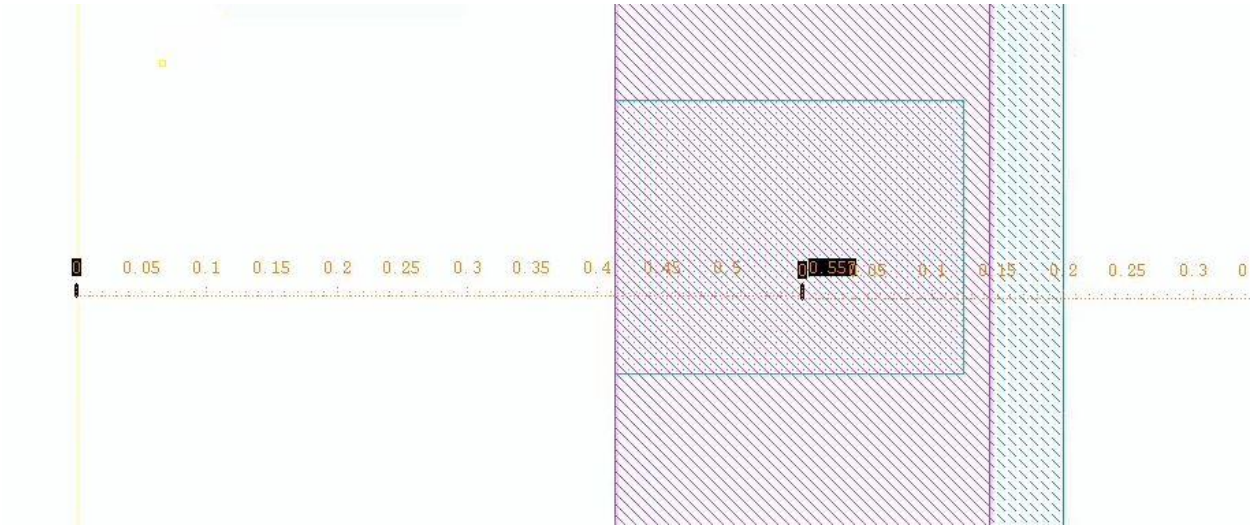

Fig 3.4: Distance between pin and left offset

c) Schematic :

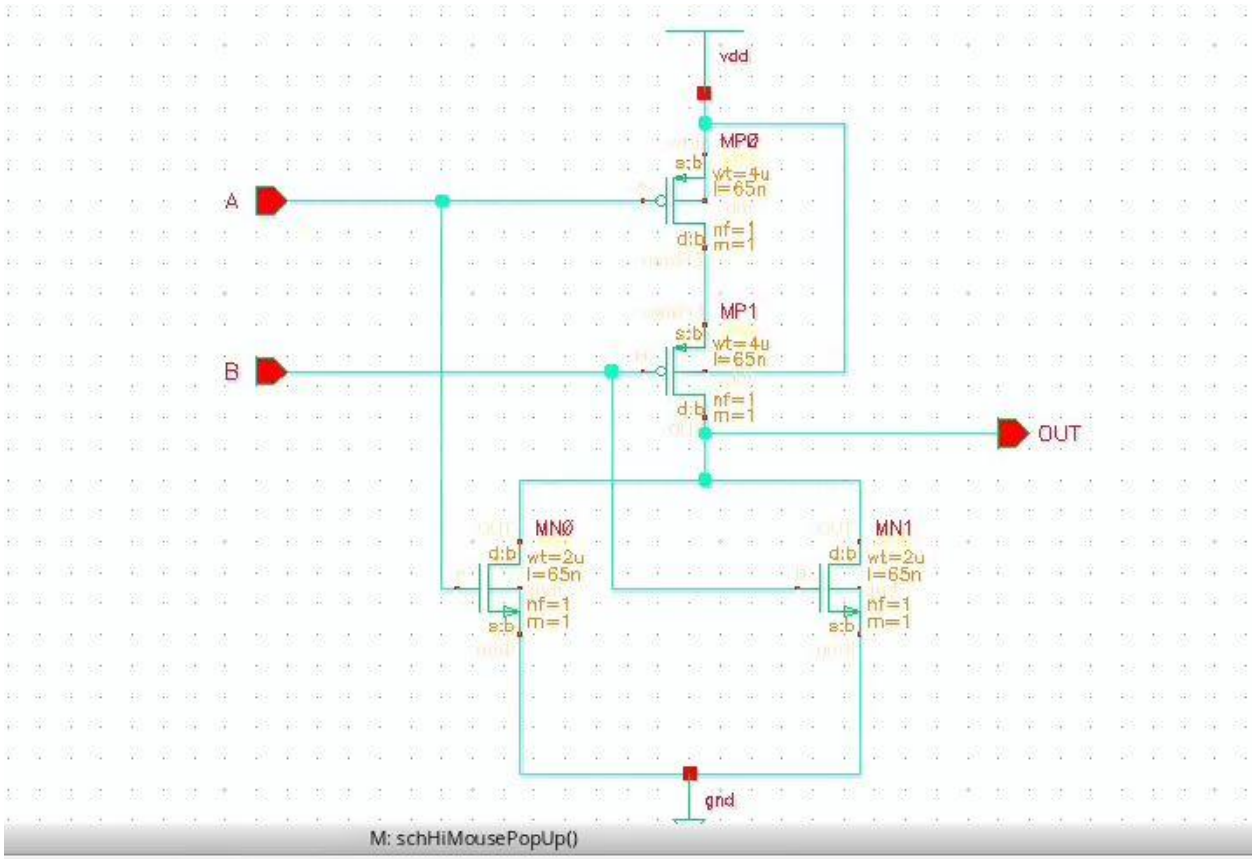

Fig 3.5 : Schematic view of NOR2

d) Output Waveforms:

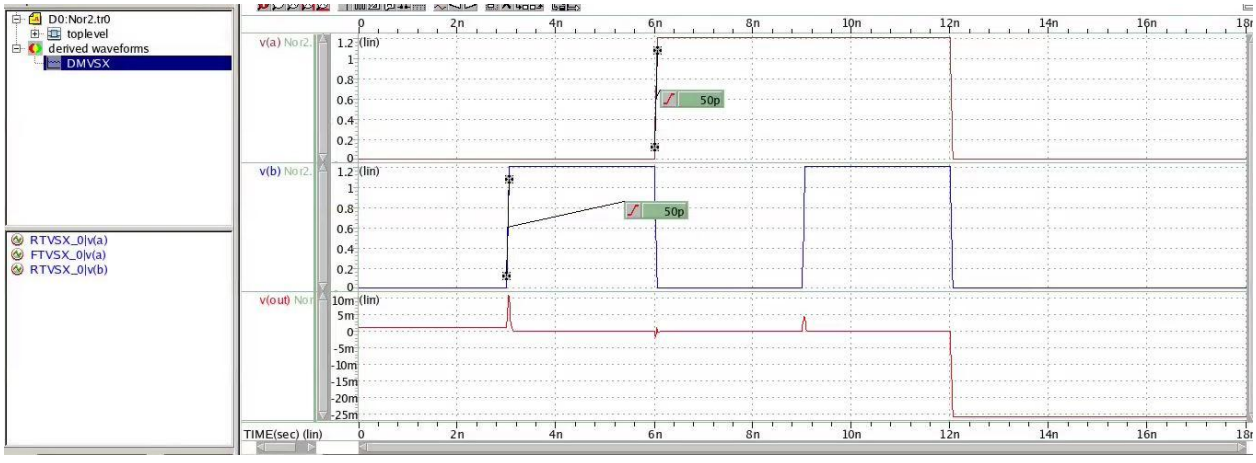

Fig: 3.6: Simulated output waveform of NOR2

e) Abstract View

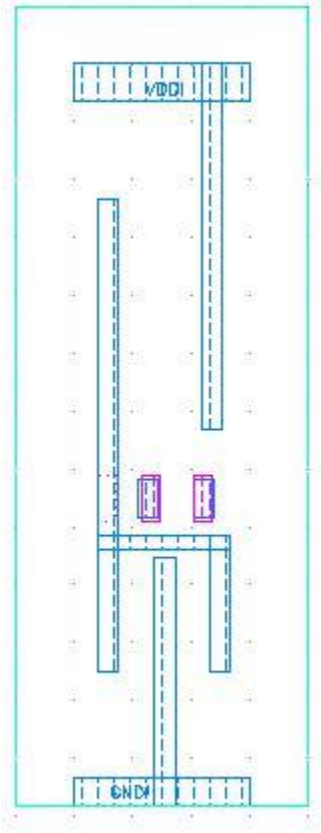

Fig 3.7: Abstract View of NOR2

Out =~(a + b)

a	**b**	**out**
0	0	0
0	1	1
1	0	1
1	1	1

Table 3.1: Truth Table showing NOR2 output data

4) XOR2

a) Layout :

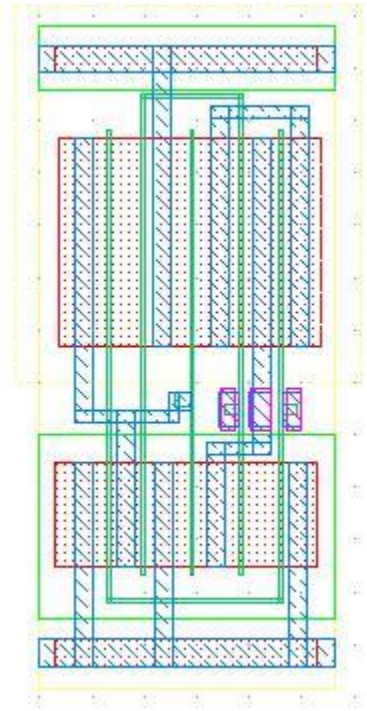

Fig 4.1: Layout of XOR indicating dimensions of the cell

b) Pin pitching :

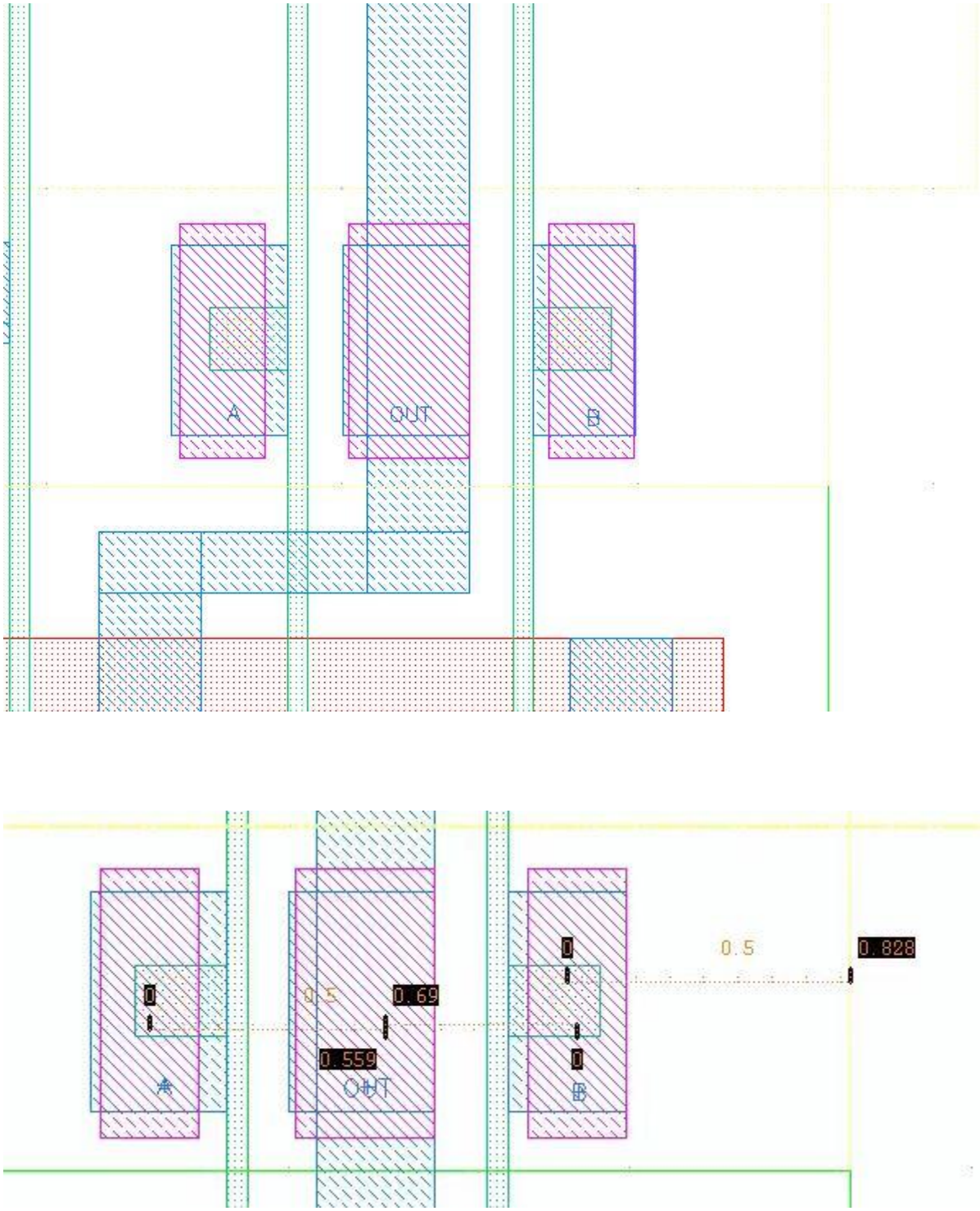

Fig 4.2: Distance between A,B and OUT

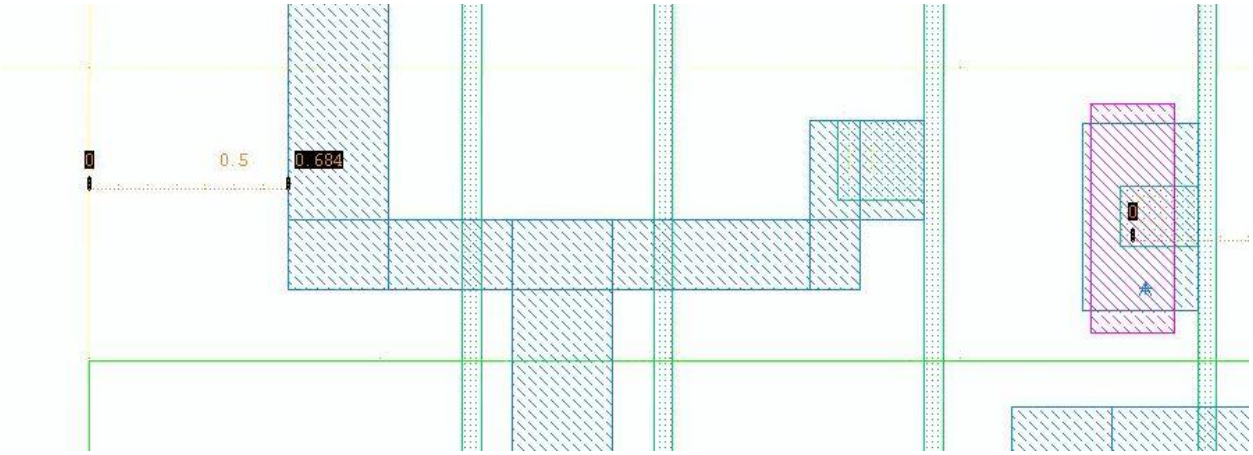

Fig 4.3: Distance between pins and JZ(left offset)

c) Schematic:

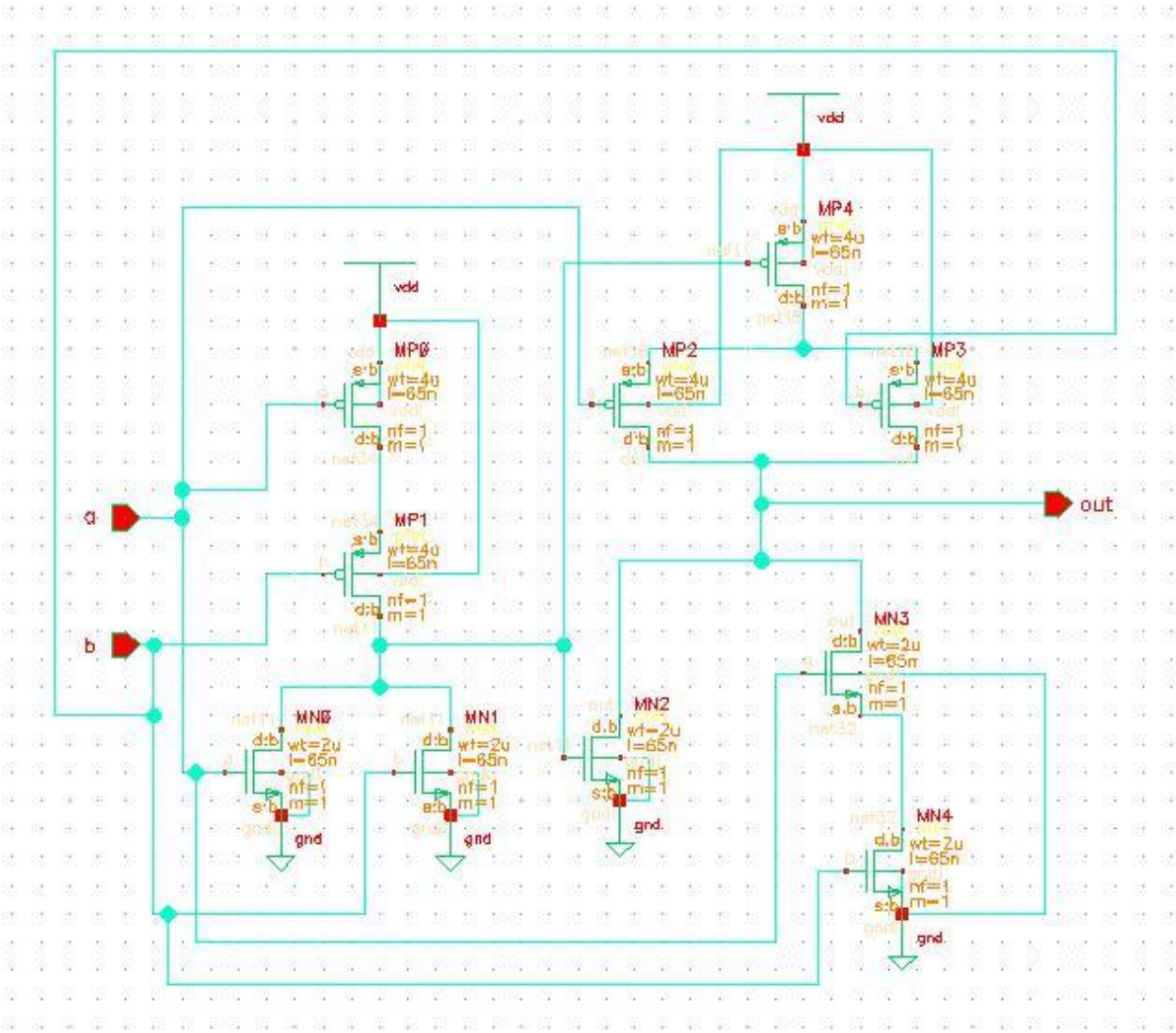

Fig 4.5 : Schematic view of XOR2

d) Abstract View :

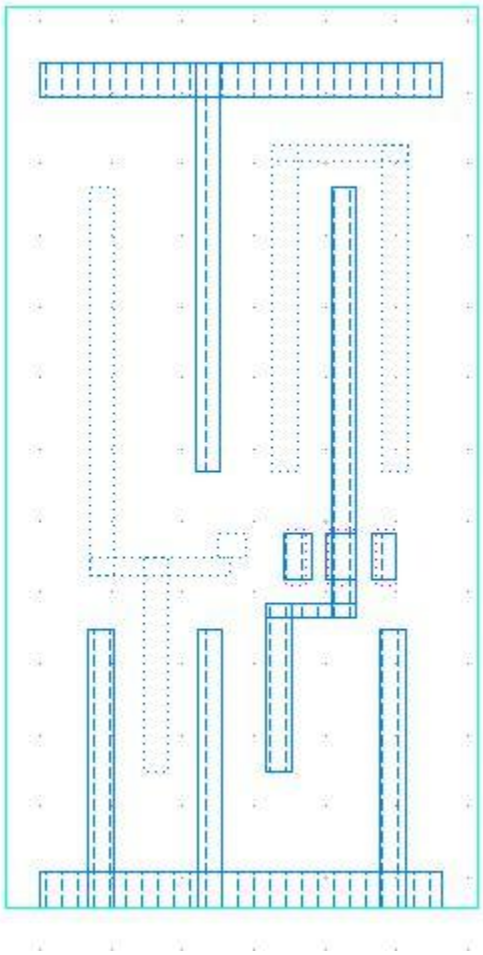

Fig : 4.6 : Abstract View of XOR2

e) Output Waveform:

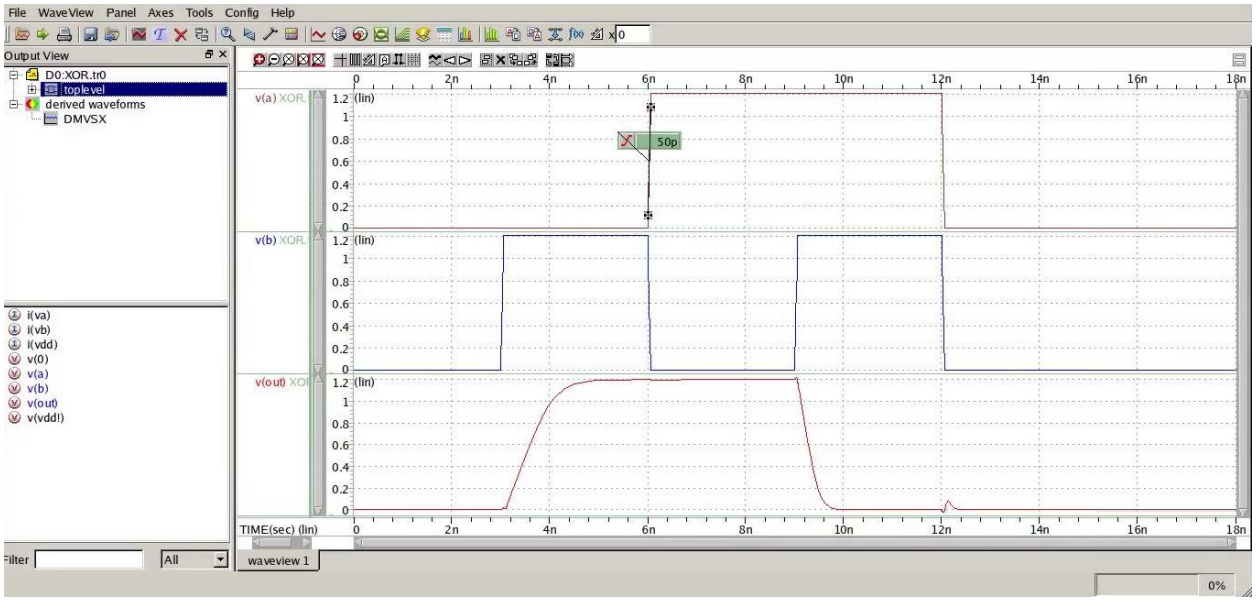

Fig 4.7 : Simulated output waveform of XOR2

$$out = a \oplus b$$

a	**b**	**out**
0	0	0
0	1	1
1	0	1
1	1	0

Table 4.1: Truth Table showing XOR2 output data

5) **AOI211**

a) Layout :

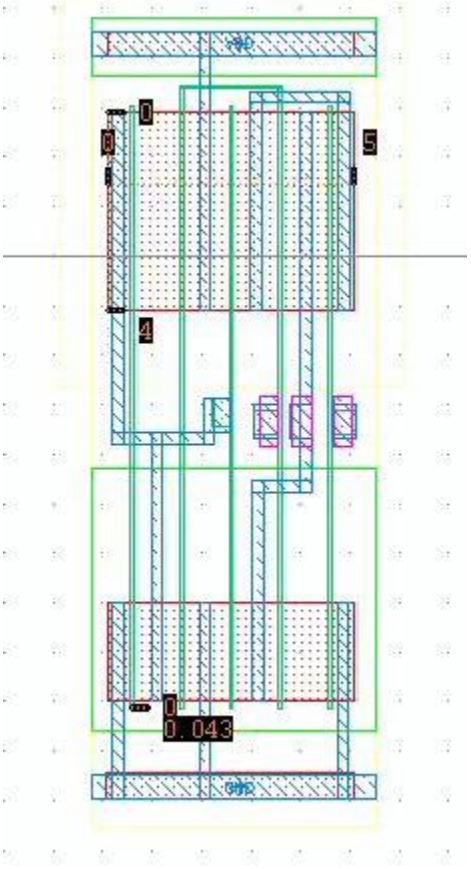

Fig 5.1 : Layout view of AOI211 indicating dimensions of the cell

b) Pin pitching :

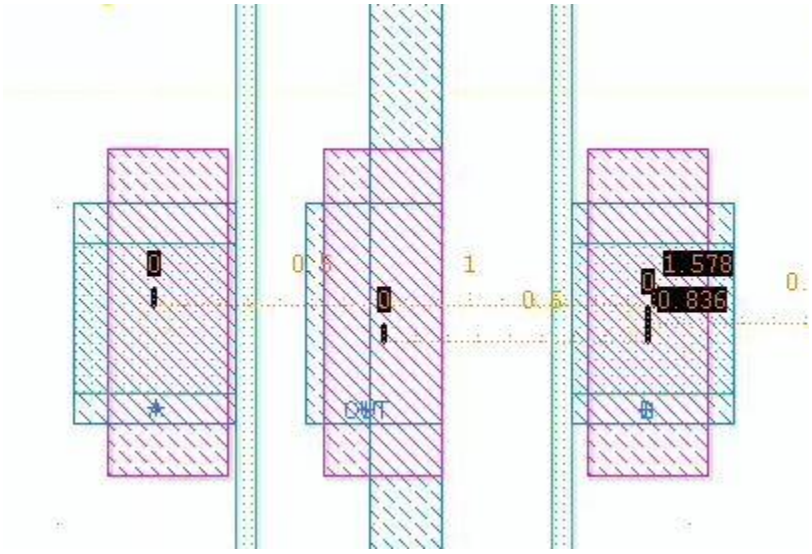

Fig 5.2: Distance between A, B and Out pins

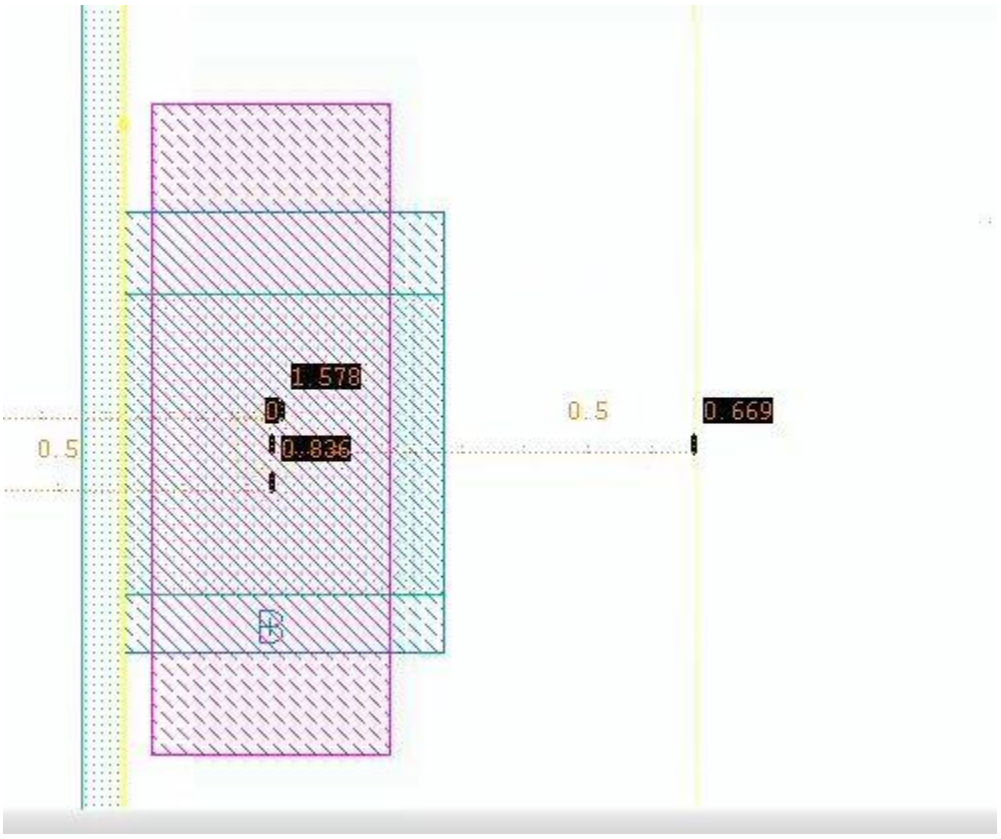

Fig 5.3 : Pitch offset - Distance from pin center of **b** to JZ(right offset)

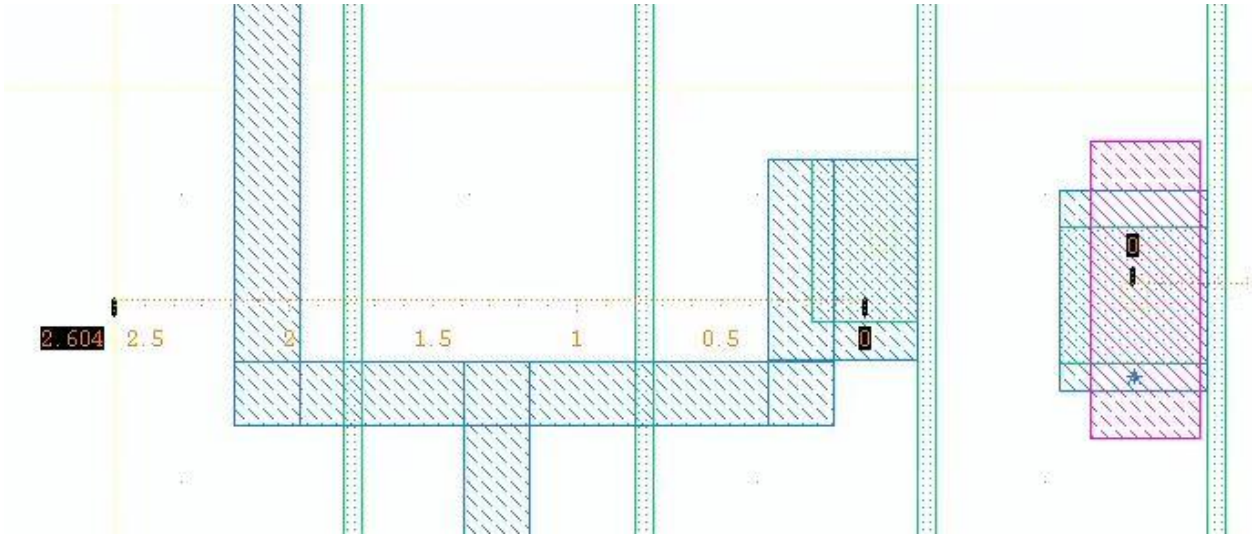

Fig 5.4 : Distance to left offset

c) Schematic:

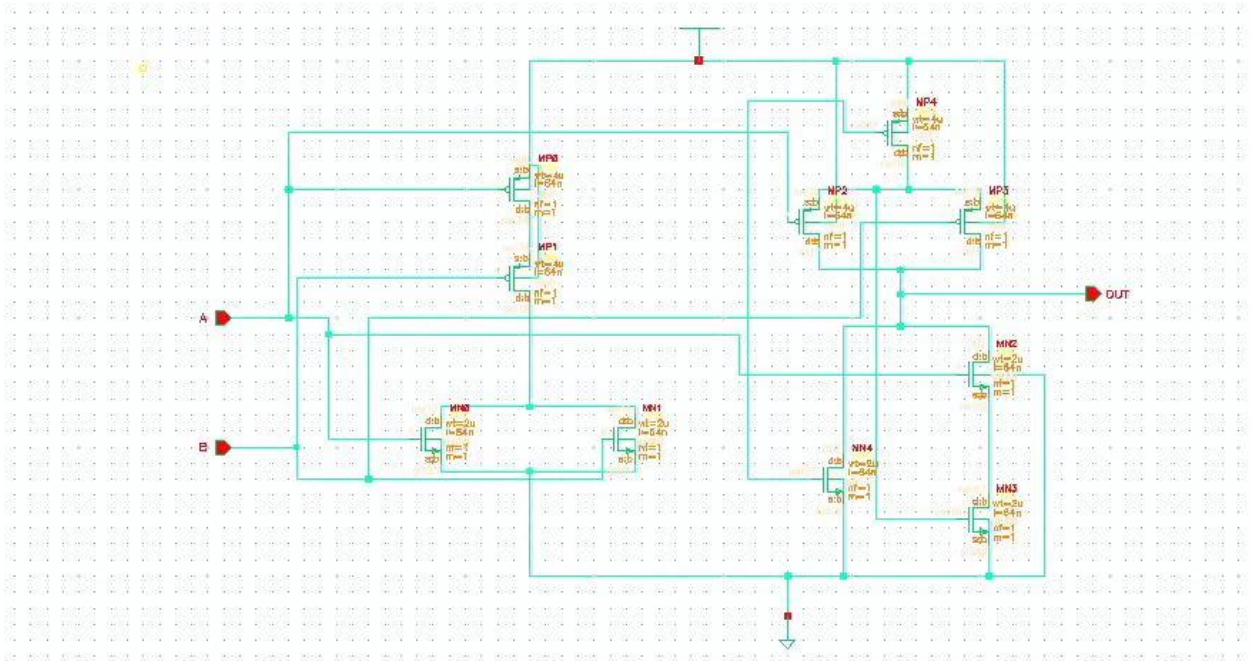

Fig 5.5 : Schematic view of AOI211

d) Abstract View

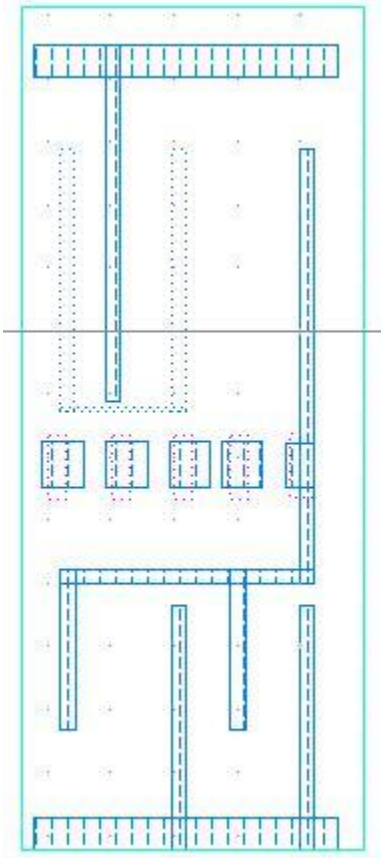

Fig 5.6 : Abstract view of AOI211

e) Output Waveform :

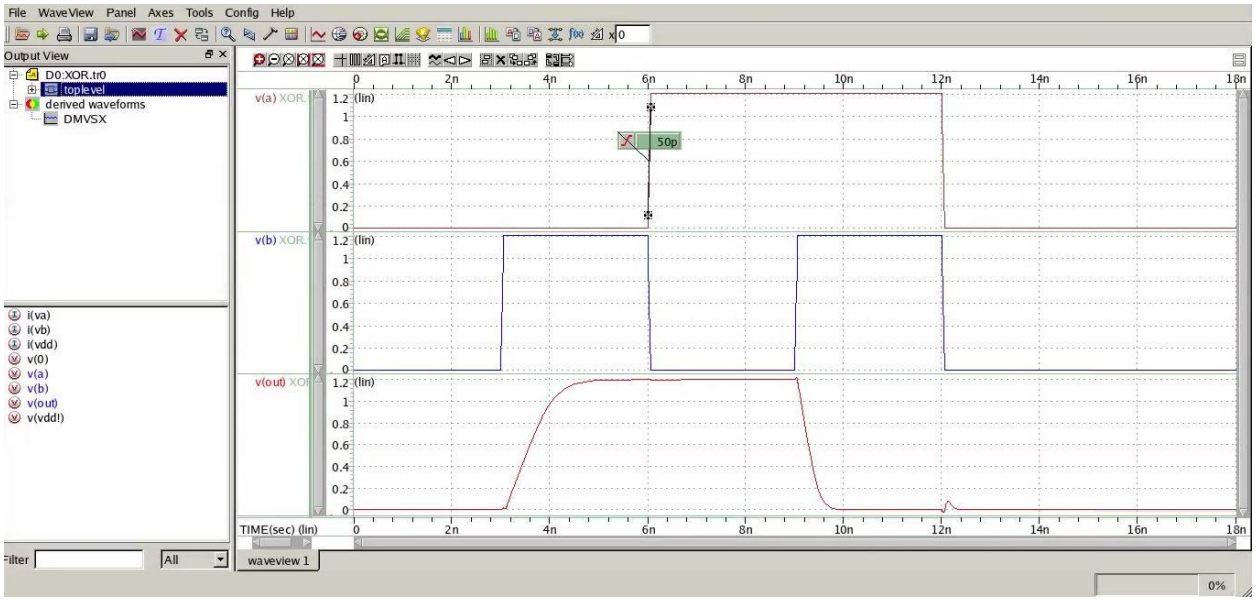

Fig 5.6 : Simulated waveform of AOI211

out =~(ab + c+ d)

a	**b**	**c**	**d**	**out**
0	0	0	0	1
0	0	1	0	0
1	1	0	1	0
0	1	1	0	0
1	0	1	1	0
0	1	0	0	1
1	1	1	1	0

Table 5.1: Truth Table showing AOI211 output data

6) OAI21

a) Layout

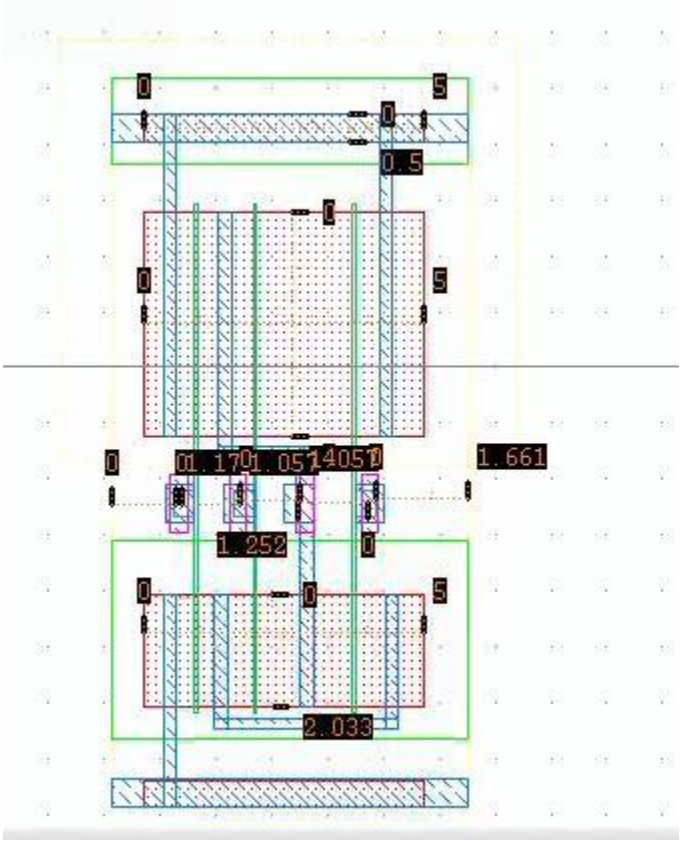

Fig 6.1 : Layout view of OAI21 indicating dimensions of the cell

b) Pin pitching:

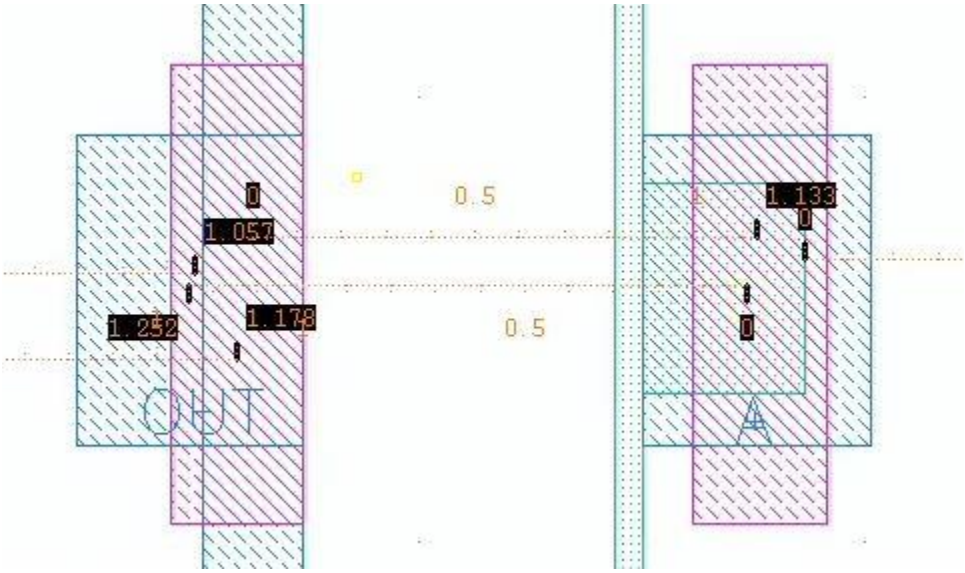

Fig 6.2 : Distance between pins **out** and **a**

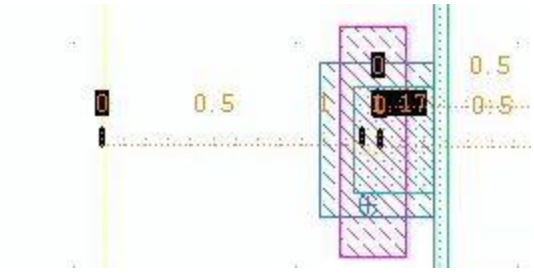

Fig 6.3 : Pitch offset - Distance from pin center of **c** to JZ(left offset)

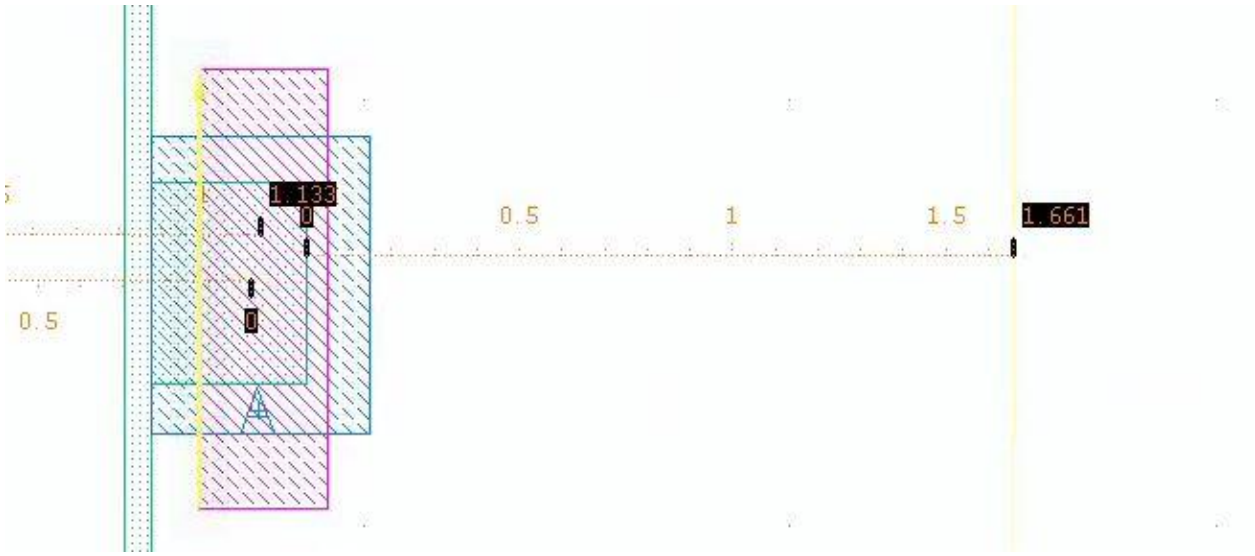

Fig 6.4 : Pitch offset - Distance from pin center of **a** to JZ(right offset)

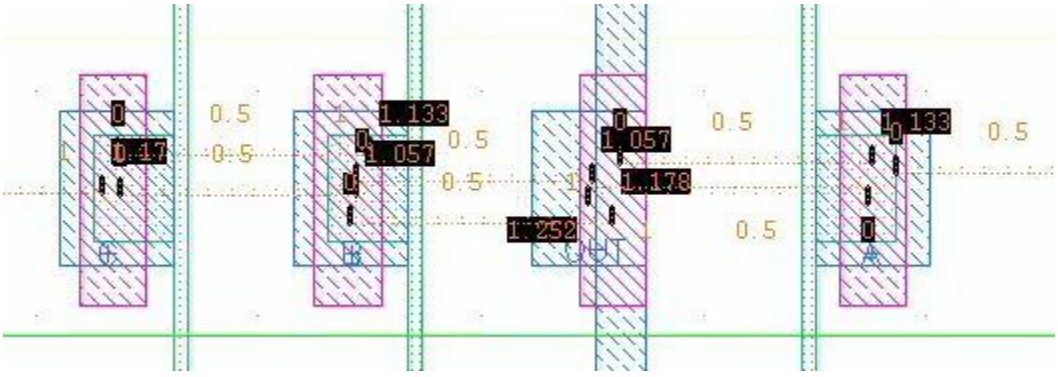

Fig 6.5 : Distance between pins c,b,out and a

c) Schematic View

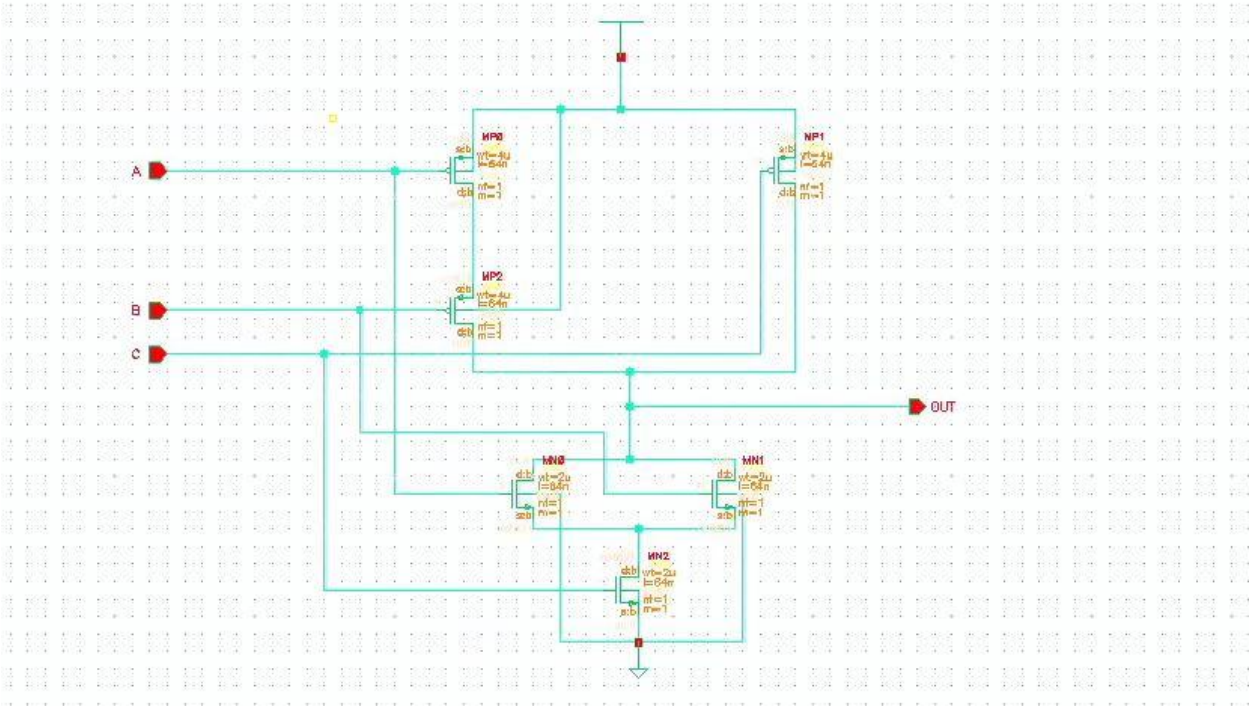

Fig 6.6 : Schematic view of OAI21

d) Output Waveform

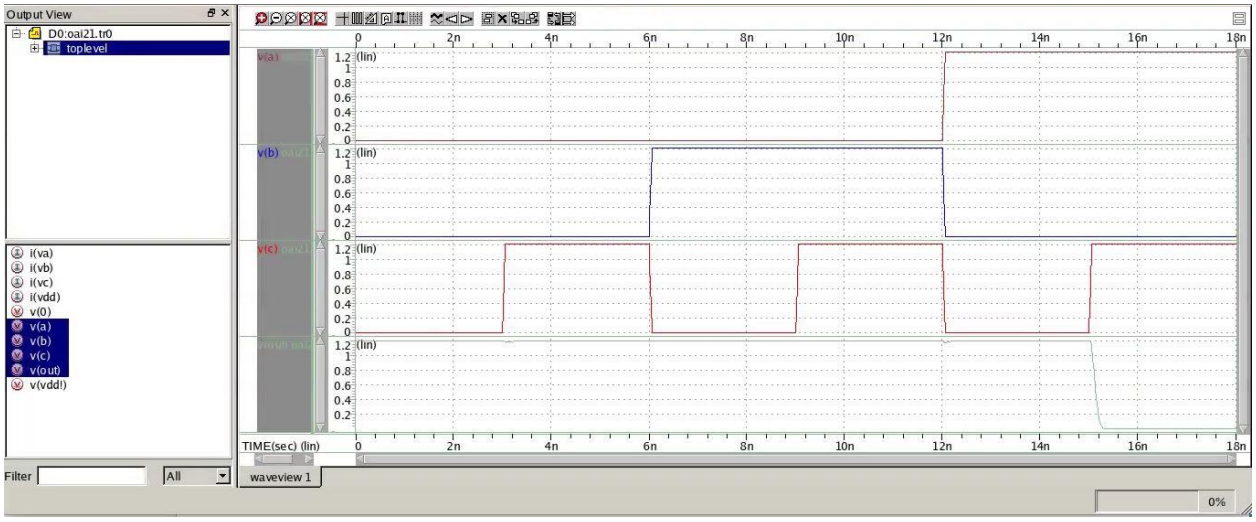

Fig 6.7 : Simulated waveform of OAI21

e) Abstract View

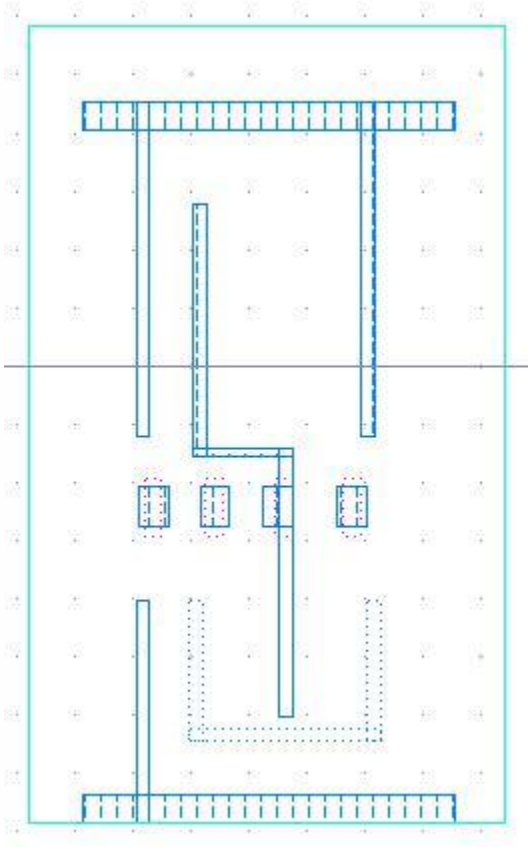

Fig 6.8 : Abstract view of OAI21

out = ~(a+b)c

a	**b**	**c**	**out**
0	0	0	1
0	0	1	1
1	1	0	1
0	1	1	0
1	0	1	0
0	1	0	1
1	1	1	0

Table 6.1: Truth Table showing OAI21 output data

7) AOI22

a) Layout

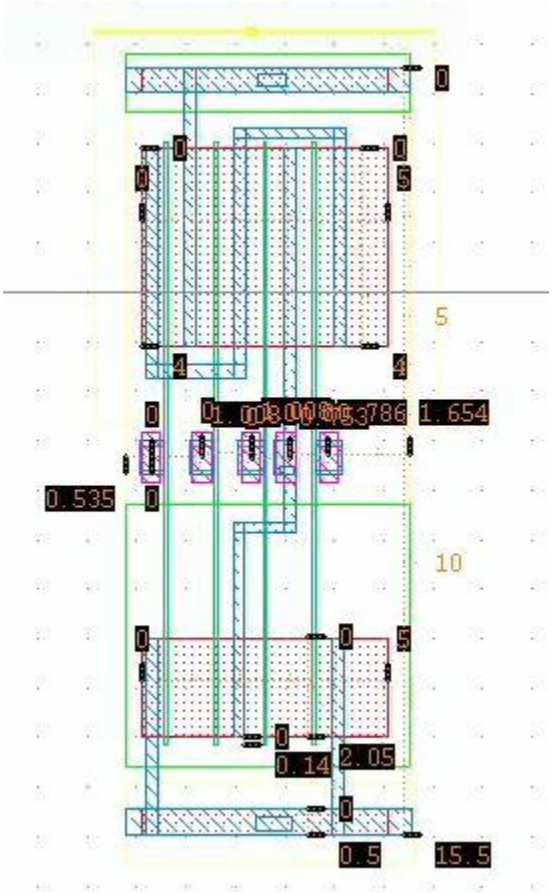

Fig 7.1: Layout view of AOI22 indicating dimensions of the cell

b) Pin pitching

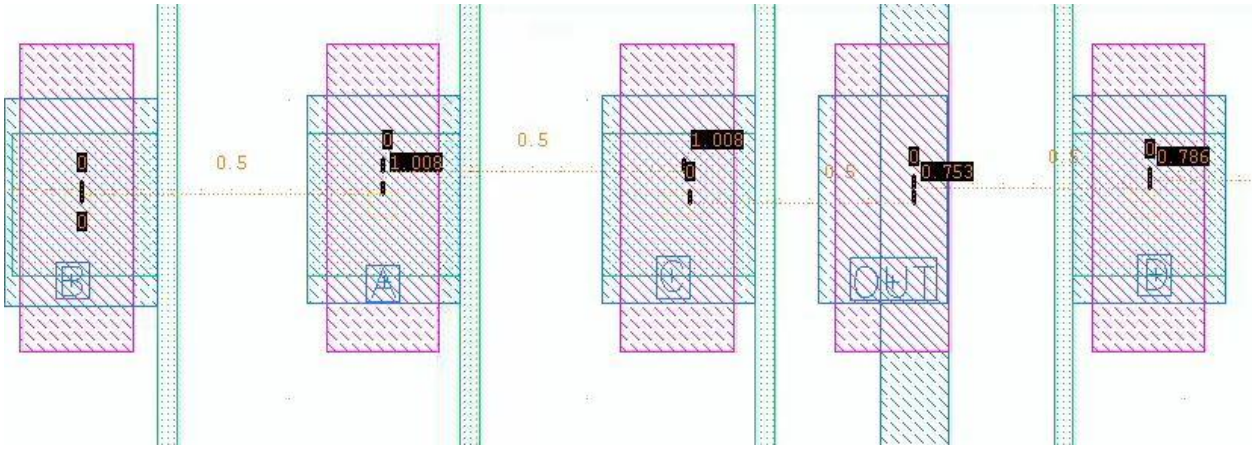

Fig 7.2 : Distance between pins b,a,c,out and d

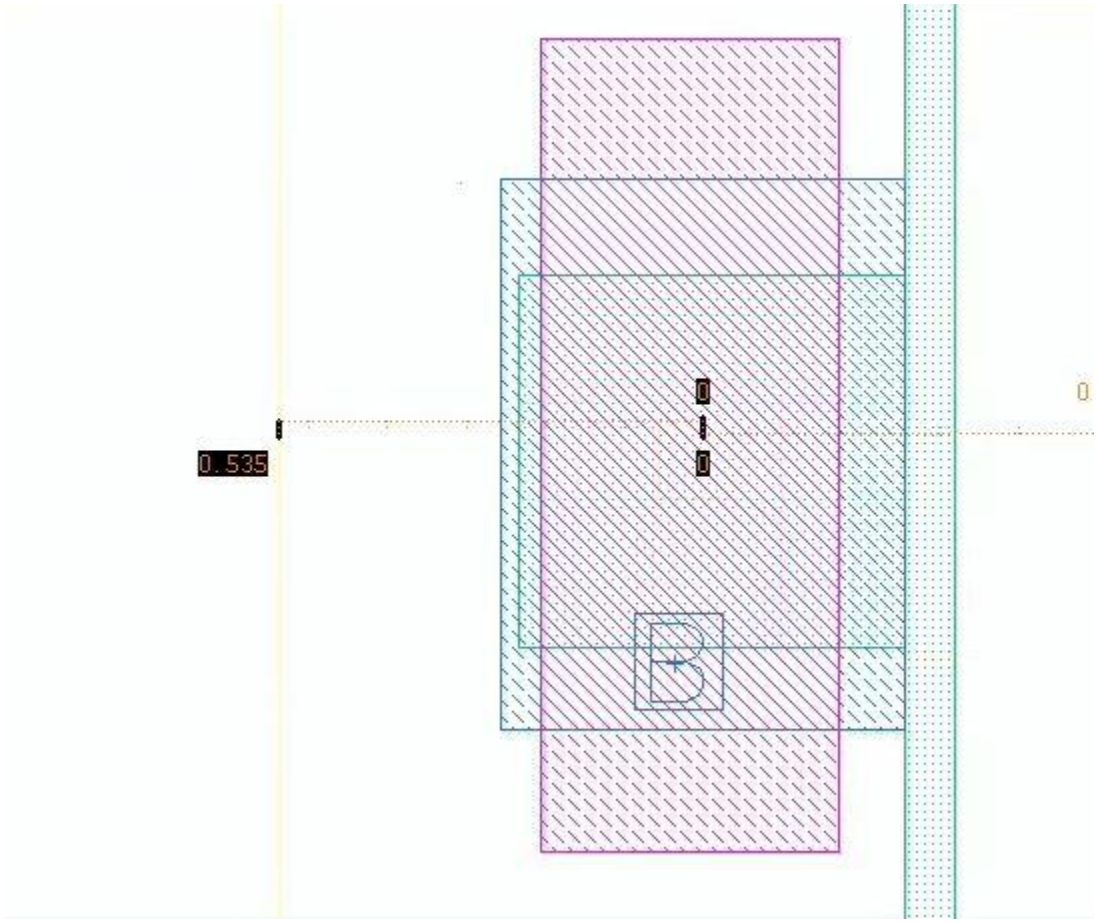

Fig 7.3 : Pitch offset - Distance from pin center of **b** to JZ(left offset)

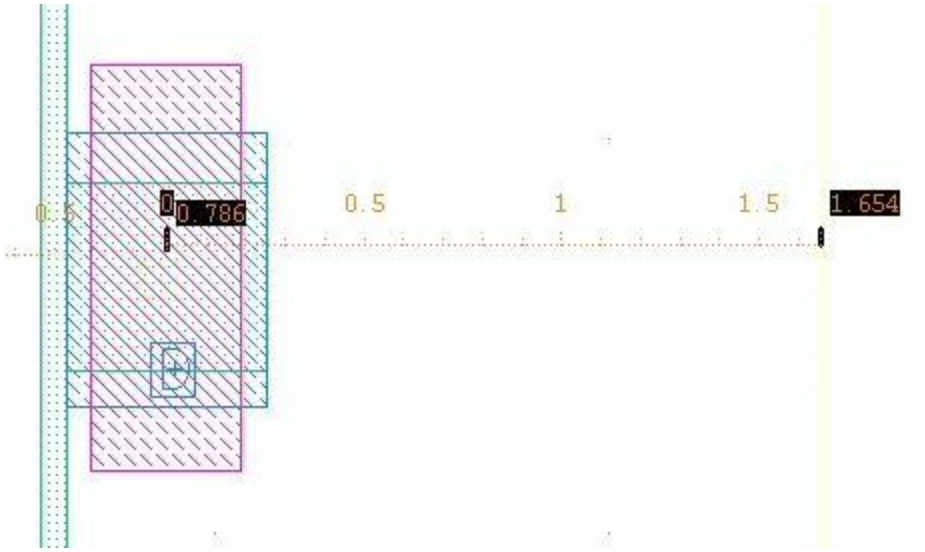

Fig 7.4 : Pitch offset - Distance from pin center of **d** to JZ(left offset)

c) Schematic :

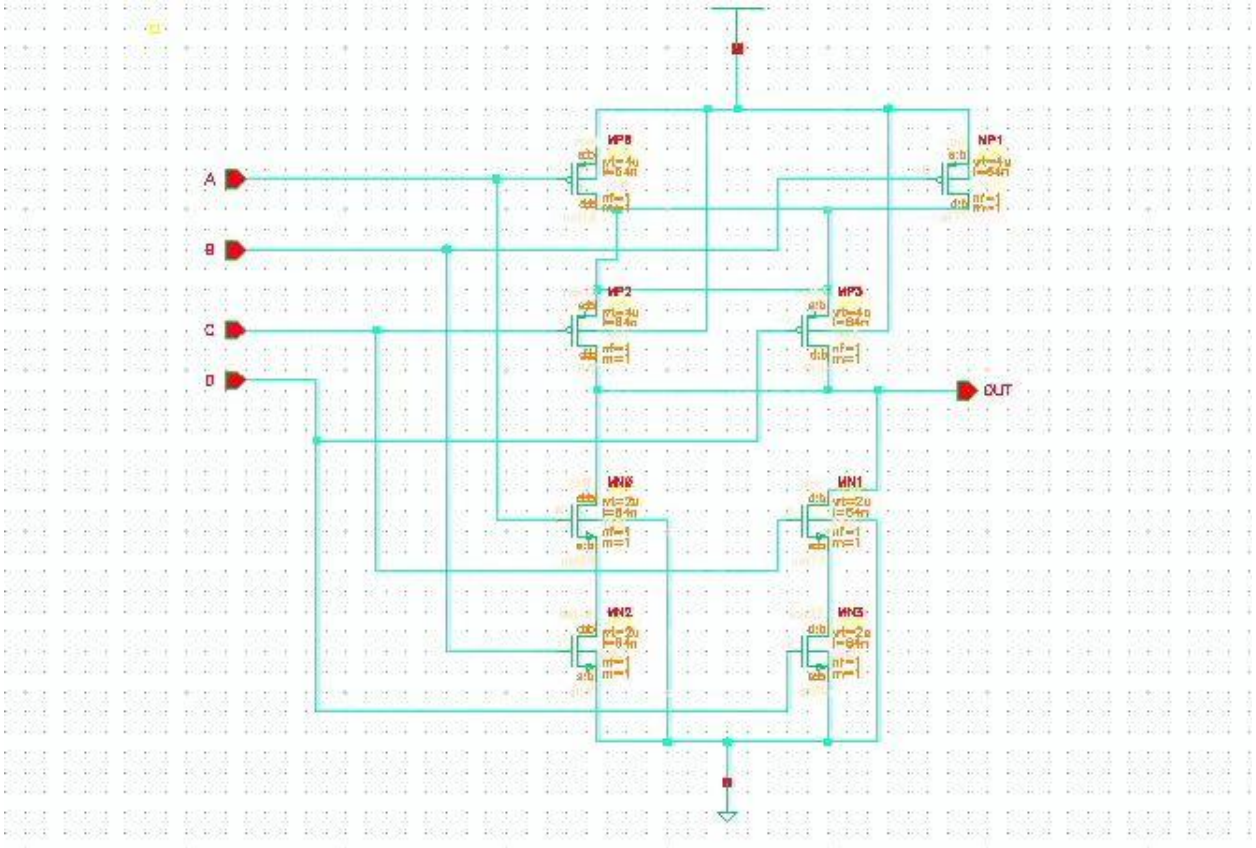

Fig 7.5 : Schematic view of AOI22

d) Output Waveform

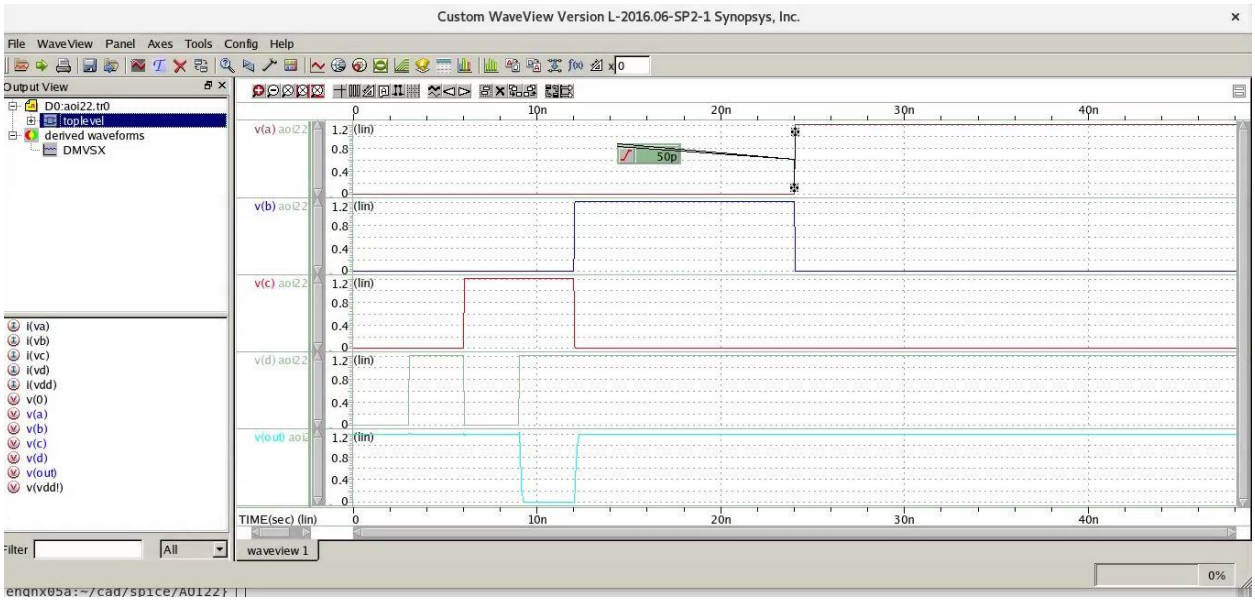

Fig 7.6 : Simulated output waveform of AOI22

e) Abstract view

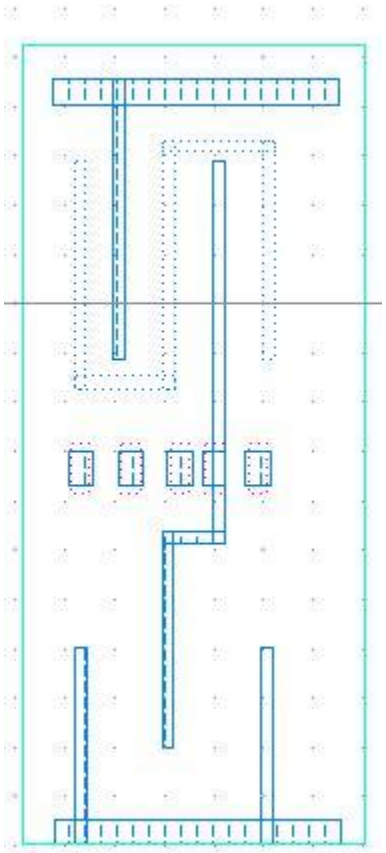

Fig 7.7 : Abstract view of AOI22

out = ~(ab + cd)

a	**b**	**c**	**d**	**out**
0	0	0	0	1
0	0	1	1	0
1	1	0	0	0
0	1	1	1	0
1	0	1	1	0
0	1	0	0	1
1	1	1	1	0

Table: 7.1: Truth Table showing AOI22 output data

8) MUX 2:1

a) Layout :

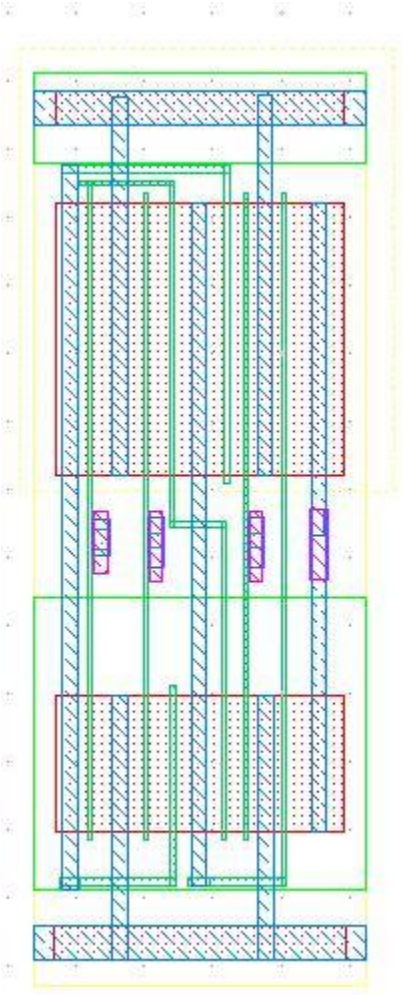

Fig 8.1: Layout view of MUX indicating dimensions of the cell

b) Pin pitching :

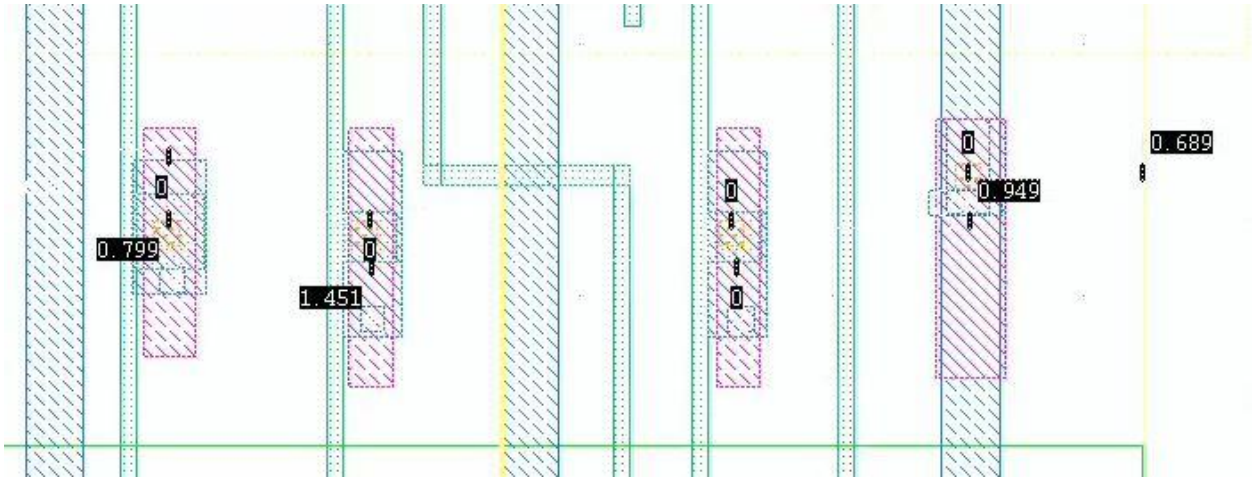

Fig 8.2 : Distance between pins s,a,b and out

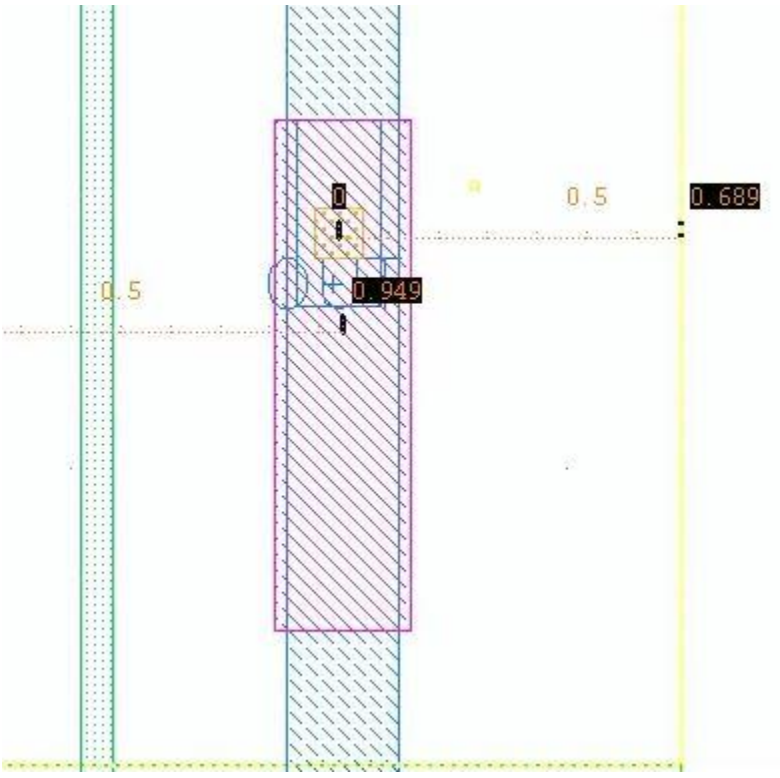

Fig 8.3 : Distance between pins out and JZ(right offset)

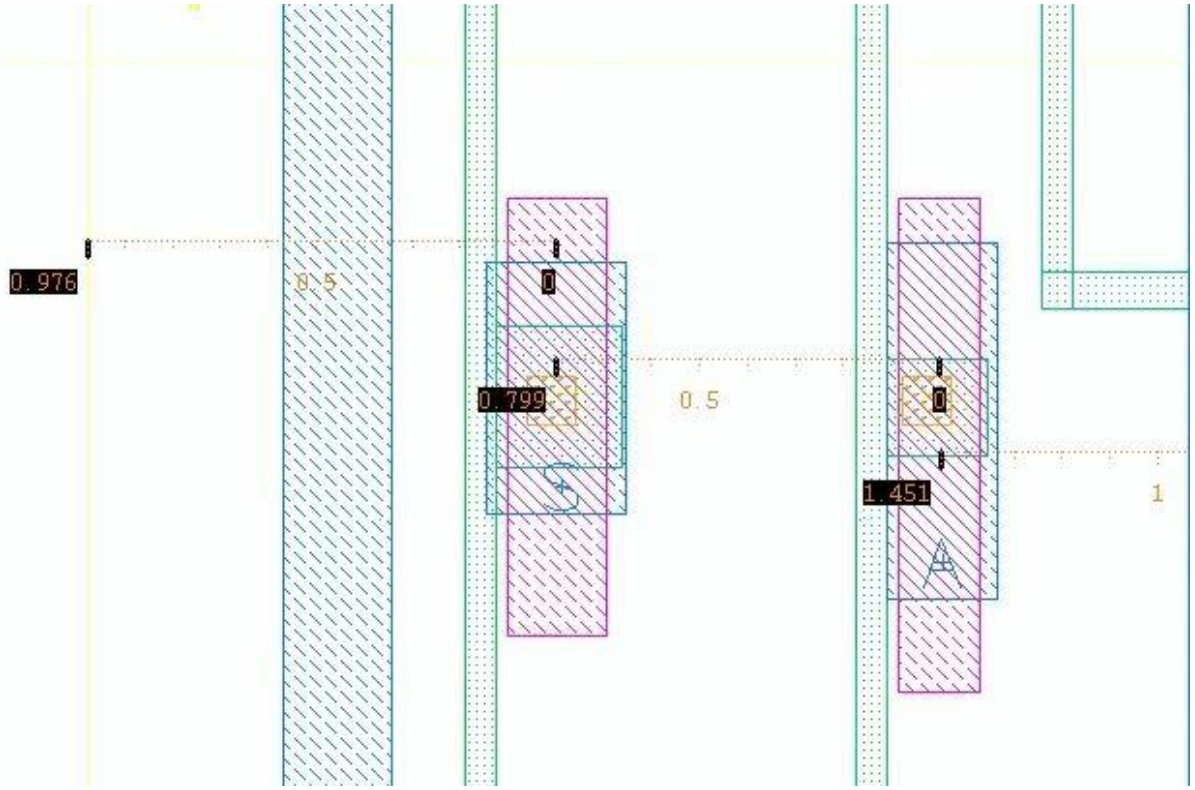

Fig 8.4 : Distance between pins s and JZ(left offset)

c) Schematic :

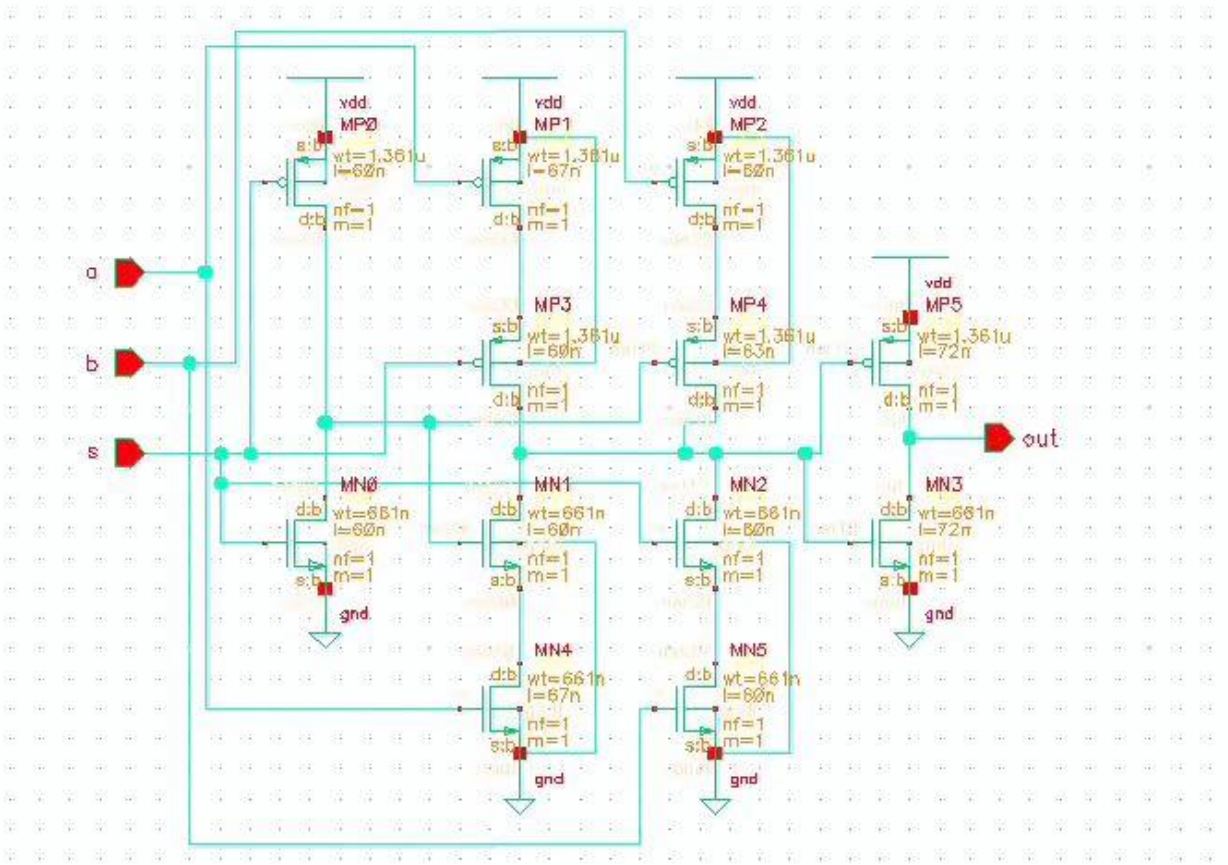

Fig 8.5 : Schematic view of MUX2:1

d) Output Waveform :

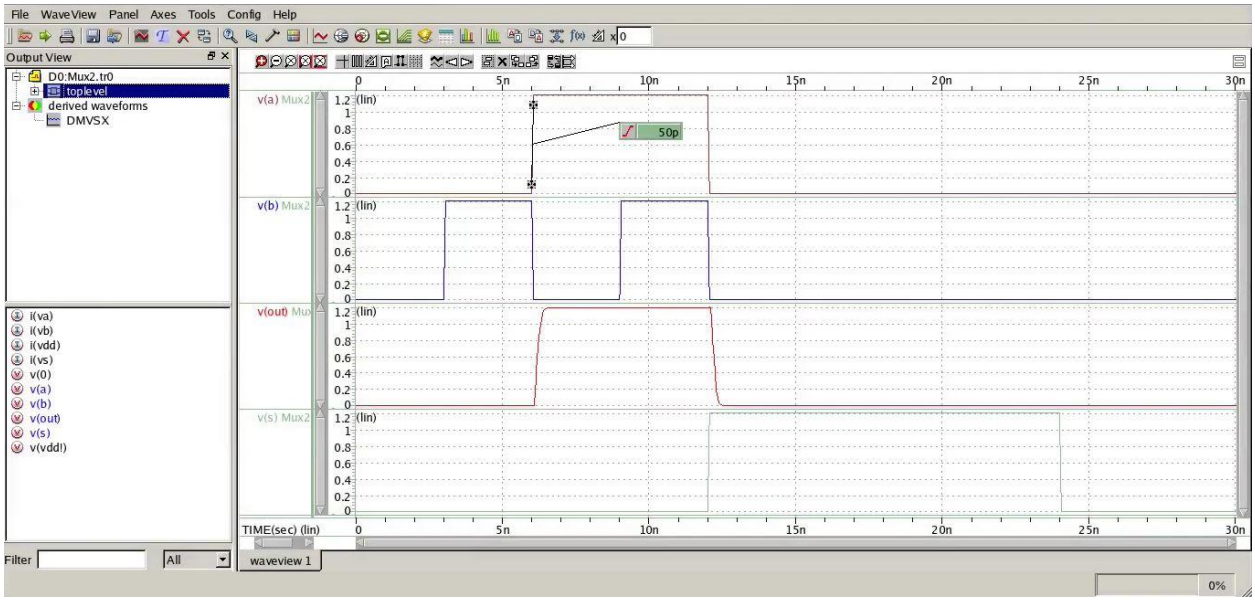

Fig 8.6 : Simulated output waveform of MUX2:1

e) Abstract View :

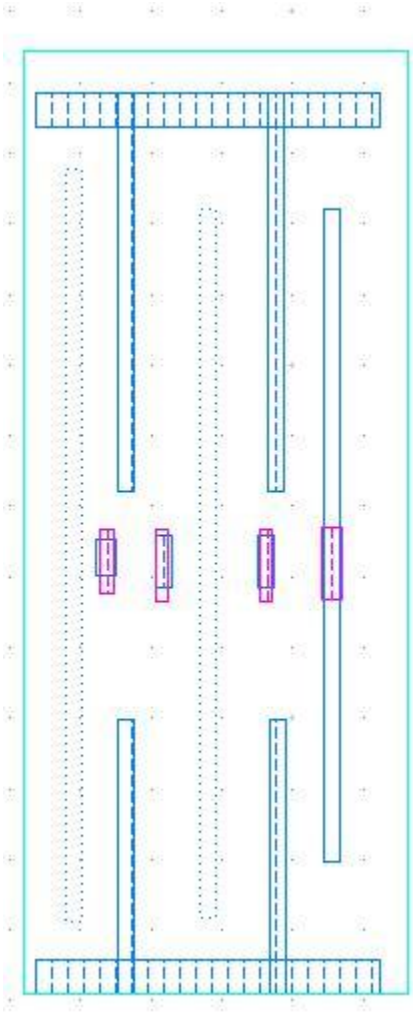

Fig 8.7 : Abstract view of MUX2:1

out = ~(as + bs)

s	out
0	b
1	a

Truth Table showing MUX2:1 output data

Final Layout :