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EEE333

Lab 2

### ALU Test Bench Waveform:



### ALU Test Bench Table:

Test Bench Tests							
#	Operation	aluin_a	aluin_b	Cin	alu_out	Cout	OF
1	add	0110	0011	0	1001	0	1
2	add with Cin	0111	0101	1	1101	0	1
3	sub b from a	0111	0101	0	0010	1	0
4	Bitwise NAND	0110	1111	0	1001	0	0
5	Bitwise NOR	0110	0001	0	1000	0	0
6	Bitwise XOR	0101	1111	0	1010	0	0
7	Bitwise NOT	1101	0000	0	0010	0	0
8	logical right shift	0101	0000	0	0010	0	0
result							
		aluin_a	aluin_b	Cin	Result	Carry out	Overflow
9	Function given	0110	0011	0	0000	0	1

## ALU Board Programming:

Programmer - C:/Users/Adan/Documents/Quartus333Lab2/ALU\_pv - ALU\_pv - [ALU\_pv.cdf]

File Edit View Processing Tools Window Help

Hardware Setup... USB-Blaster [USB-0] Mode: JTAG Progress: 100% (Successful)

☐ Enable real-time ISP to allow background programming when available

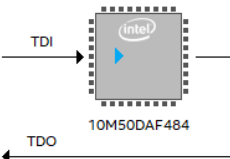
File	Device	Checksum	Usercode	Program/ Configure	Verify	Blank- Check	Examine	Security Bit	Erase	ISP CLAMP
output_files/ALU_pv.sof	10M50DAF484	00274541	00274541	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Start Stop Auto Detect Delete Add File... Change File... Save File Add Device... Up Down

TDI

10M50DAF484

TDO



The screenshot displays the Pin Planner tool for the MAX 10 - 10M50DAF484C7G device. The main window shows a top view of the device with a grid of pins. The pins are color-coded according to the Pin Legend:

- User I/O (White circle)
- User assigned I/O (Red circle)
- Fitter assigned I/O (Green circle)
- Unbonded pad (Grey circle)
- Reserved pin (Purple circle)
- Other configuration (Yellow circle)
- DEV\_OE (Red circle with 'E')
- DEV\_CLR (Red circle with 'R')
- DIFF\_n (Red circle with 'n')
- DIFF\_p (Red circle with 'p')
- DQ (Red circle with 'Q')
- DQS (Red circle with 'S')
- DQSB (Red circle with 'S')
- CLK\_n (Red circle with 'n')
- CLK\_p (Red circle with 'p')
- Other PLL (Red circle with 'L')
- Other dual purpose (Red circle with 'D')
- TDI (Red circle with 'I')
- TCK (Red circle with 'K')
- TMS (Red circle with 'S')
- TDO (Red circle with 'O')
- VREF (Red circle with 'V')
- VCCP/VCCR/V... (Red circle with 'P')
- VCCA (Red circle with 'A')
- VCCINT (Red circle with 'I')
- VCCIO (Red circle with 'O')
- GND (Red circle with 'G')
- No connect (Red circle with 'X')

The Pin Legend also includes a search bar and a list of pin types. The main window shows a top view of the device with a grid of pins. The pins are color-coded according to the Pin Legend. The tasks panel on the left shows the following tasks:

- Early Pin Planning
  - Early Pin Planning...
  - Run I/O Assignment Analysis
  - Export Pin Assignments...
- Highlight Pins
  - I/O Banks
  - VREF Groups
  - Edges
- Clock Pins
  - Clock
  - PLL/DLL Input
  - PLL/DLL Output
  - Clock Region Input

The table below shows the pin assignments for the device:

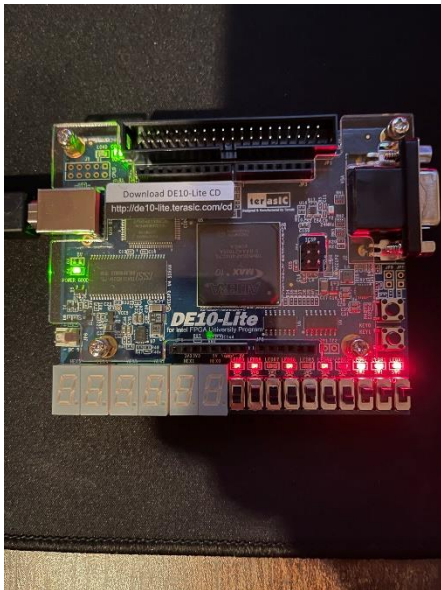
Node Name	Direction	Location	I/O Bank	VREF Group	Fitter Location	I/O Standard	Reserved	Current Strength	Slew Rate	Differential Pair	Strict Pres
A[3]	Input	PIN_A12	7	B7_NO	PIN_A12	2.5 V		12mA (default)			
A[2]	Input	PIN_C12	7	B7_NO	PIN_C12	2.5 V		12mA (default)			
A[1]	Input	PIN_D12	7	B7_NO	PIN_D12	2.5 V		12mA (default)			
A[0]	Input	PIN_C11	7	B7_NO	PIN_C11	2.5 V		12mA (default)			
Cin	Input	PIN_C10	7	B7_NO	PIN_C10	2.5 V		12mA (default)			
Cout	Output	PIN_C13	7	B7_NO	PIN_C13	2.5 V		12mA (default)	2 (default)		
OF	Output	PIN_D14	7	B7_NO	PIN_D14	2.5 V		12mA (default)	2 (default)		
OPCODE[3]	Input	PIN_B14	7	B7_NO	PIN_B14	2.5 V		12mA (default)			
OPCODE[2]	Input	PIN_A14	7	B7_NO	PIN_A14	2.5 V		12mA (default)			
OPCODE[1]	Input	PIN_A13	7	B7_NO	PIN_A13	2.5 V		12mA (default)			
OPCODE[0]	Input	PIN_B12	7	B7_NO	PIN_B12	2.5 V		12mA (default)			
Sum[3]	Output	PIN_B10	7	B7_NO	PIN_B10	2.5 V		12mA (default)	2 (default)		
Sum[2]	Output	PIN_A10	7	B7_NO	PIN_A10	2.5 V		12mA (default)	2 (default)		
Sum[1]	Output	PIN_A9	7	B7_NO	PIN_A9	2.5 V		12mA (default)	2 (default)		
Sum[0]	Output	PIN_A8	7	B7_NO	PIN_A8	2.5 V		12mA (default)	2 (default)		

### Physical Board Pics:

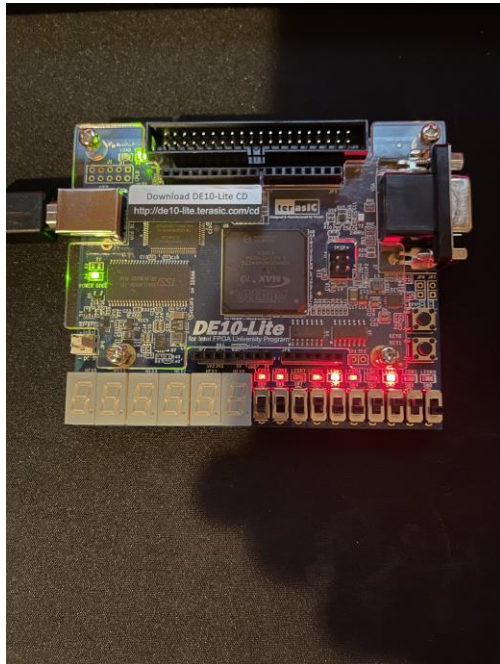
**#1 add:**



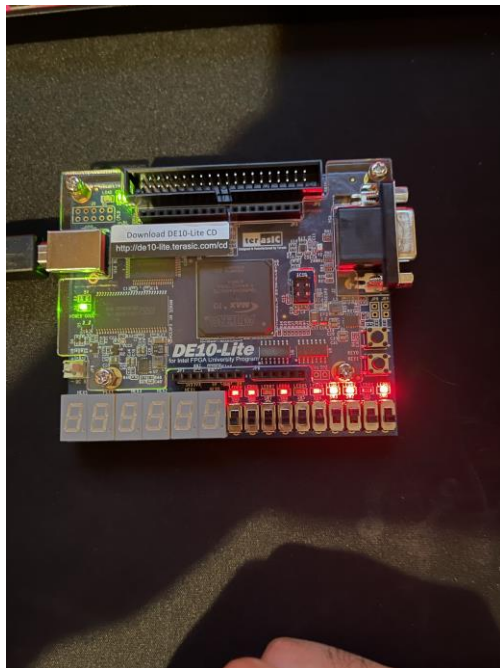
### #2 add with Cin:



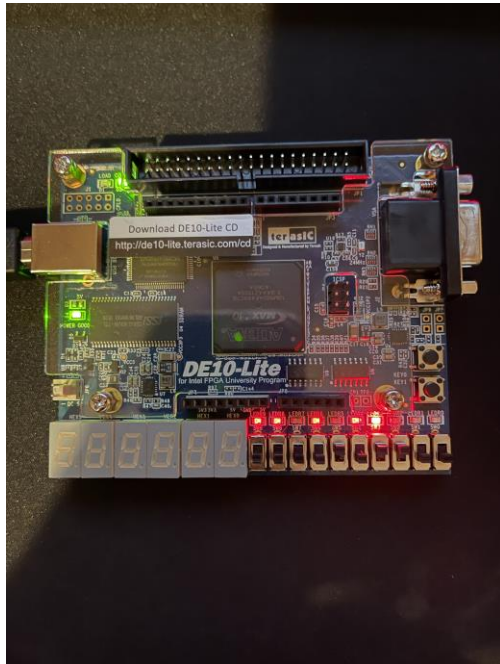
**#3 sub b from a:**



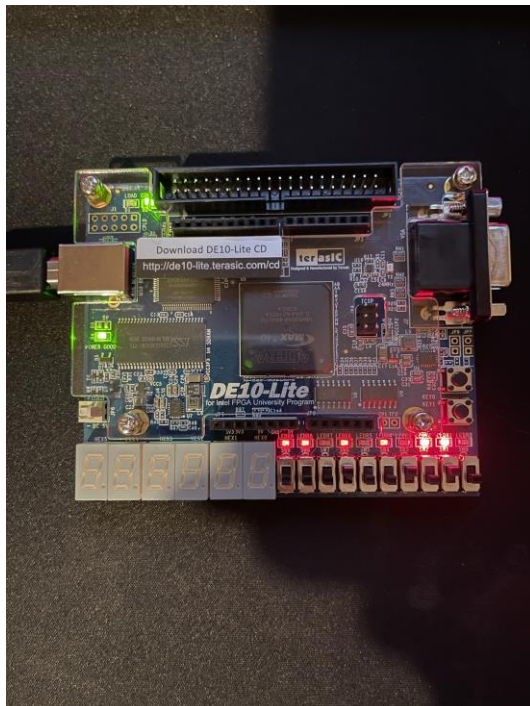
**#4 Bitwise NAND:**



## #5 Bitwise NOR:

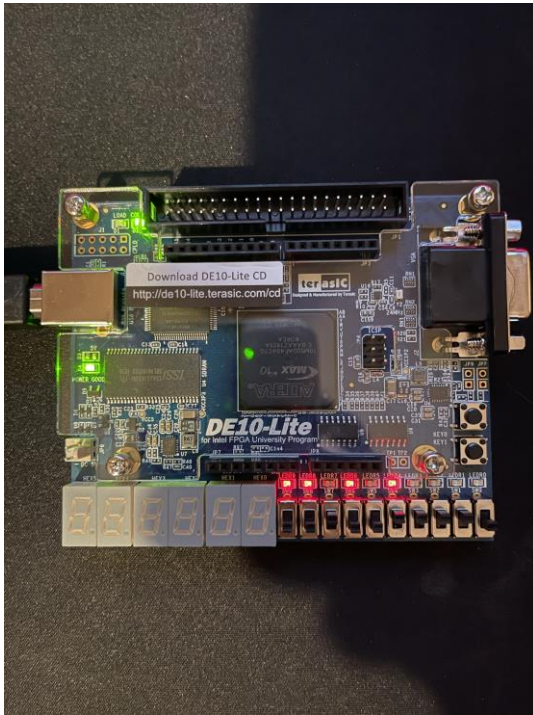


## #6 Bitwise XOR:

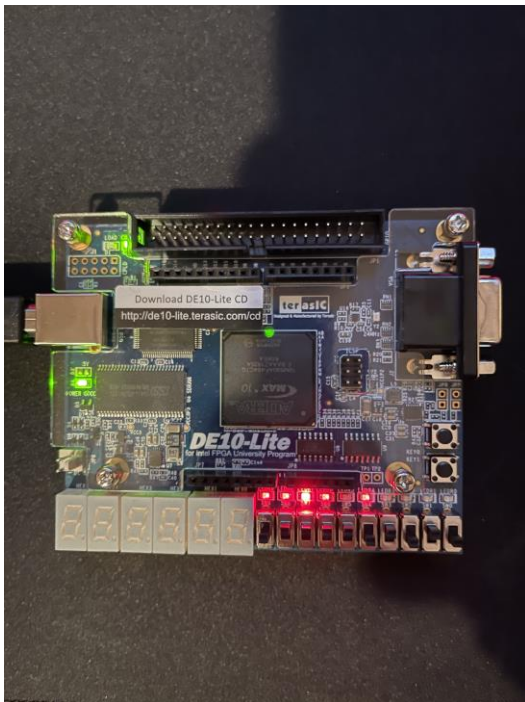




## #7 Bitwise NOT:



## #8 logical right shift:



### ALU Physical Board Demo Table:

## Demo

Take a snapshot showing the window that indicates your board is programmed (the progress bar should show 100% and include the full programming window in the image. And paste it into power point along with an image showing your pin assignments. Label each image and make sure it is clear.

[illegible]