

# EE-313 Intro to Altera Quartus II Design Lab

Rev 01/18/2012

- 1. Purpose:** Introduce Altera Quartus II Design Software to simulate combinational logic using block diagrams and a hardware description language (VHDL).
- 2. Equipment:** Digital Electronics with Quartus II Book  
Computer with Altera Software  
Altera DE2 Board with power supply and USB cable
- 3. Procedure:**
  - a. Complete the Altera Tutorial located in Section 4-4 of the Digital Electronics with Quartus II Book. There will be some slight differences between the data entered per the book and your software. This is due to changes in the version of the software and the fact that you are using a newer board. The differences are listed below.

## *Initial Project Creation*

Device Family: Cyclone II  
Device: EP2C35F672C6  
EDA simulation Tool Name: Custom  
EDA Simulation Format: Verilog HDL

## *Vector Waveform File Creation*

Choose **File > New**

Choose **Vector Waveform File** from the **Verification/Debugging Files** section

Choose **OK**

If a warning dialog appears saying “Future versions of ... will not...” Choose **OK**.

You can also check the checkbox to prevent this dialog from coming back.

*Pin Numbers* – When assigning pin numbers, the Node Names may already be filled in. In the location block, type in the appropriate Pin Number from the following two tables. Output X should be assigned to Pin LEDR0.

Toggle Switch	Pin No.
SW 0	PIN_N25
SW 1	PIN_N26
SW 2	PIN_P25
SW 3	PIN_AE14

LED	Pin No.
LEDR 0	PIN_AE23
LEDR 1	PIN_AF23
LEDR 2	PIN_AB21
LEDR 3	PIN_AC22
LEDR 4	PIN_AD22

### **\*\*Input/Output Notes\*\***

**All LEDs are Active High (low turns them off, high turns them on)**

**For the toggle switches, up=high and down=low**

**For the pushbutton keys, up=high and down=low (passive high)**

**The seven segment displays are hardwired to Active Low**

# EE-313 Intro to Altera Quartus II Design Lab

Rev 01/18/2012

*No Wiring is required with the DE2 Board*

## *Programming the DE2 Board*

Always Recompile prior to programming.

Verify DE2 Board is connect to the PC and power cord.

Turn on the Power by pushing the Red Power Button.

Select **Tools > Programmer**.

Verify the **Program/Configure** Check Box is Checked.

Click the **Start** Button.

If the **Start** Button is not available

Click the **Hardware Setup** Button.

Select USB Blaster from the **Currently selected Hardware** Dropdown menu.

Click the **Close** button.

Click the **Start** button

b. Once the DE2 board has been programmed using block diagrams, demonstrate proper operation of the board to the instructor.

## 4. Deliverables

a. Lab notebook entry per course guidelines. Discussion should include how you would modify the two designs so that LEDR0 through LEDR3 display the inputs and LEDR4 displays the output X.

b. Successful demonstration of the implementation to the instructor.

c.

