Zoom™ OMAP-L138 EVM User Guide

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Revision History

REV	EDITOR	DESCRIPTION	APPROVAL	DATE
A	JCA	Initial release	KJH	11/22/10
B	JCA	Added Section 3.6: NOR Flash	NJK	12/01/10

Table of Contents

1 Introduction

This User Guide continues where the QuickStart Guide documentation ended by providing additional hardware details about the Zoom OMAP-L138 EVM, as well as introductory instructions for using Code Composer Studio and the included Board Support Library (BSL) files.

1.1 Scope of Document

- This User Guide references specific connectors on the application baseboard and User Interface (UI) board. However, the discussion is limited to special use instructions; detailed information about the connectors should be referenced on the respective schematic and Bill of Material (BOM) documents. See Appendix A for links to these documents.

- This User Guide does not provide detailed instructions for the software included with the kits. Please refer to the specific User Guides for each respective software product for additional information. A list of additional documentation is available in Appendix A.

1.2 Requirements

- It is assumed that the QuickStart Guide has been read in its entirety. See Appendix A for link to the QuickStart Guide.

- A development PC with CD/DVD drive, USB port, and at least 2 GB of hard drive space.

2 Application Baseboard

2.1 Application Baseboard Features Diagram

SD card slot
(on bottom of baseboard)

RS232 serial debug
port

Line-in stereo 3.5 mm jack (left)
Line-out stereo 3.5 mm jack (right)

60-pin LCD header

Emulation USB
port

USB OTG port

USB host port

Ethernet jack
(for use with
MII PHY only)

JTAG header for
ARM emulator

Expansion board
connector

Power-in jack

JTAG header for
TI emulator

Power switch

Expansion
board connector

Expansion board
connector

General
purpose user
DIP switches
(S2)

Boot mode /
FET mux DIP
switches (S7)

Expansion
board
connector

SATA
connector

System user button (left)
System reset button (right)
Above buttons:
User LED1 (left)
User LED2 (center)
Power LED (right)

2.2 Application Baseboard Ethernet Jack

The Ethernet jack located on the application baseboard is to only be used with the MII PHY; whereas the Ethernet jack located on the UI board is to be used only with the RMII PHY. The Ethernet controller on the CPU can only talk to one Ethernet PHY at a time. Which Ethernet PHY is being used is entirely controlled through software.

2.3 DIP Switches

There are two 8-position DIP switches located on the application baseboard at reference designators S2 and S7. By default, all of the switches are set to the "OFF" position.

The S2 DIP switch is reserved for user application general purpose. The S7 DIP switch controls the processor's boot mode and several FET muxes on the baseboard. Table 2.1 describes the function of each switch.

Table 2.1: S7 DIP Switch Functions

Switch	OFF Position	ON Position
S7:1*	Baseboard LCD drive enabled.	Baseboard LCD drive disabled.
S7:2	Baseboard audio enabled. Associated McASP lines connect to baseboard audio only.	Baseboard audio disabled. Associated McASP lines are available on audio expansion connector.
S7:3	OMAP-L138 I/O runs at 3.3V	OMAP-L138 I/O runs at 1.8V
S7:4	No connection	
S7:5	BOOT[1]	
S7:6	BOOT[2]	
S7:7	BOOT[3]	
S7:8	BOOT[4]	

*Note: S7:1 indicates slide 1 on the S7 DIP switch, S7:2 indicates slide 2 on the S7 DIP switch, and so on.

A default boot mode has been defined by pulling all boot pins (BOOT[0:7]) to a default state on the SOM. The default boot mode is SPI1 Flash; all available boot modes are described in Table 2.2.

Table 2.2: S7 DIP Switch Boot Modes

	Boot Mode	DIP Switch Setting—S7[5:8]			
		BOOT[4]	BOOT[3]	BOOT[2]	BOOT[1]
		S7:8	S7:7	S7:6	S7:5
	NOR EMIFA	OFF	ON	ON	ON
	NAND-8 EMIFA	OFF	OFF	OFF	ON
Default	SPI1 Flash	OFF	OFF	OFF	OFF
	UART2	ON	ON	OFF	OFF
	EMU Debug	ON	OFF	OFF	ON

3   User Interface (UI) Board

3.1   UI Board Features Diagram

User interface buttons

Composite video output jack

Digital-to-Analog SMA connector

S-Video output connector

Camera headboard connector

Composite video input jack

Analog-to-Digital SMA connector

S-Video input connector

Ethernet jack (for use with RMII PHY only)

48-character LCD panel potentiometer

48-character LCD panel

NAND flash SMT SOP socket
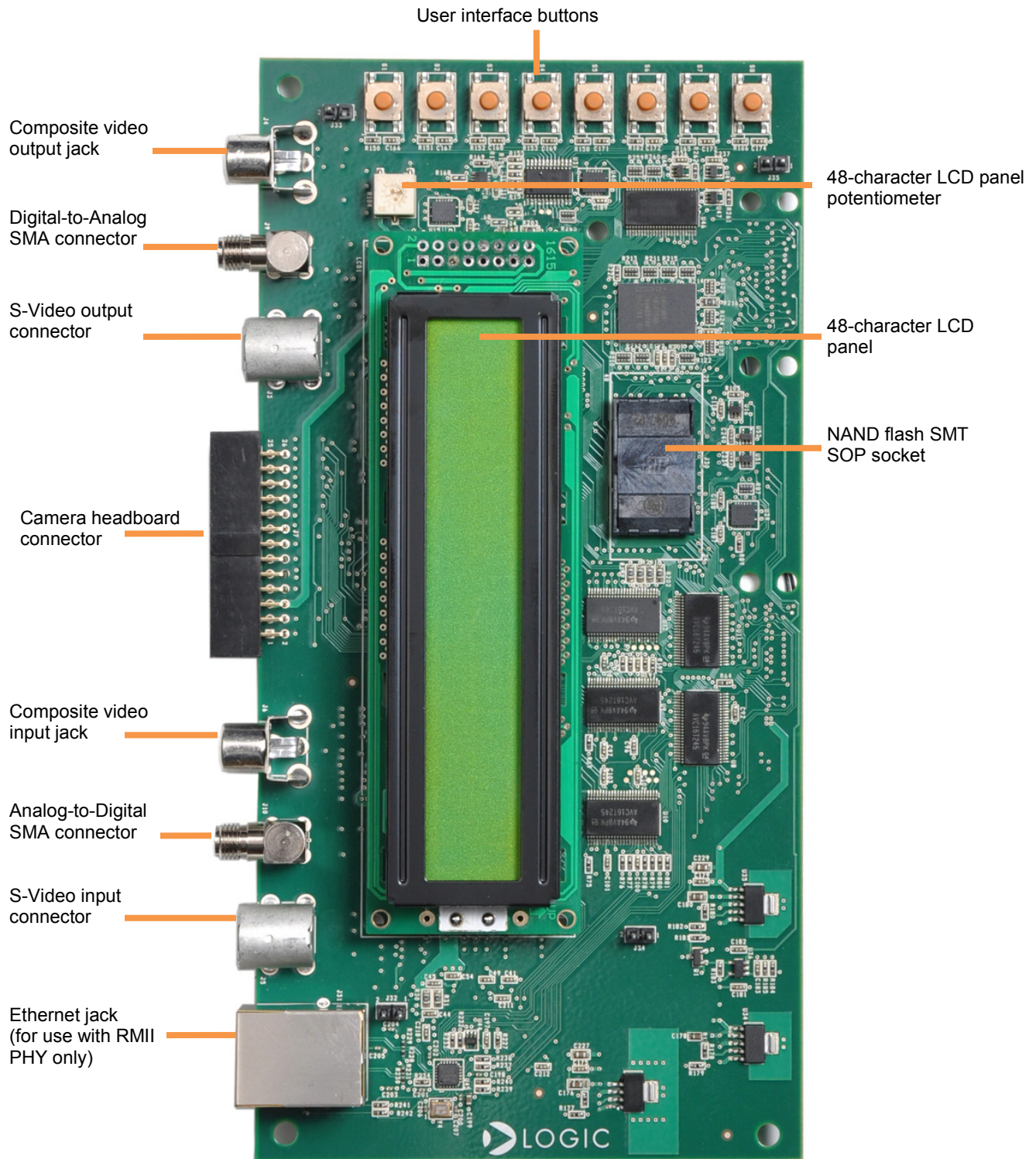
3.2   UI Board Feature Usage

The components on the UI board run off the same bus, so not every feature can be used at the same time. The following features are mutually exclusive of each other:

- 48-character LCD panel
- Analog-to-Digital Converter (ADC) and Digital-to-Analog Converter (DAC)
- Composite video and S-Video inputs
- Camera
- RMII Ethernet PHY

The ADC and DAC features may be used independently or at the same time as each other; however, they remain exclusive to the other features. Please refer to the UI board schematics for more information; a URL for where to download the schematics is available in Appendix A.

There are no hardware switches or jumpers that the user needs to interact with on the UI board; instead, the UI board features are controlled through software. This is something to take into consideration if intending to use the UI board with custom software for the SOM. The provided Board Support Library (BSL) files may be used as a reference for how software can control UI board features.

3.3   UI Board Ethernet Jack

The Ethernet jack located on the UI board is to be used only with the RMII PHY; whereas the Ethernet jack located on the application baseboard is to only be used with the MII PHY. The Ethernet controller on the CPU can only talk to one Ethernet PHY at a time. Which Ethernet PHY is being used is entirely controlled through software.

3.4   48-Character LCD Panel

The contrast of the 48-character LCD panel on the UI board is controlled through a potentiometer located at reference designator R104. This potentiometer is set for optimal viewing resolution during manufacture. However, if you are unable to view the readout on the LCD panel, try adjusting the potentiometer to set the desired contrast.

3.5   NAND Flash Socket

The UI board contains a NAND flash socket that allows for expandable flash memory and ships with a 512 MB chip already in the socket.

The Meritec SMT SOP socket must be opened and closed correctly to ensure that the NAND flash chip seats properly and that the socket doors do not break. Detailed instructions for opening and closing the socket are available on Meritec's website at the following URL: http://meritec.thomasnet.com/Asset/Application_Notes.pdf

3.6   NOR Flash

The UI board includes an onboard 8 MB NOR flash memory chip for customer use. This NOR flash is empty when the UI board ships.

3.7   User Interface Buttons

Eight user interface buttons are available on the UI board to interact with software. All of the buttons run through an I/O switch controlled by I2C.
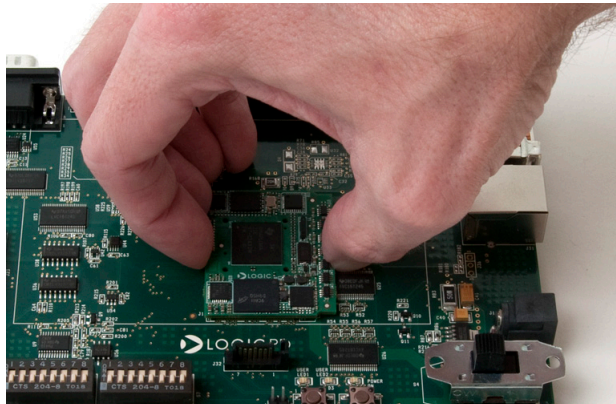
4   Connecting TMS320C6748 SOM-M1

If you would like to use the DSP-only TMS320C6748 SOM-M1 with your EVM, the following steps will walk you through the hardware setup.
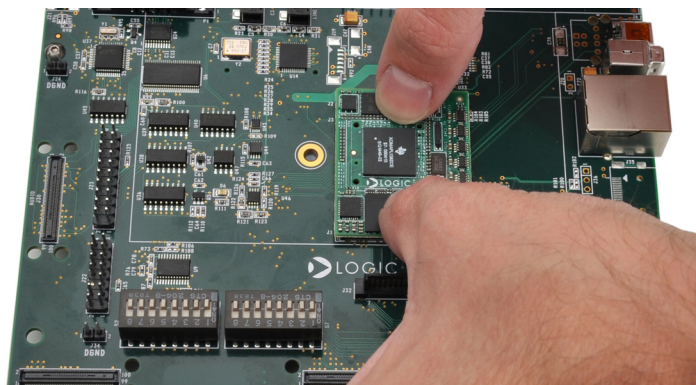
1. Eject the 4.3" LCD by pulling the LCD ejector levers away from the LCD. Remove the LCD from the baseboard and set aside.
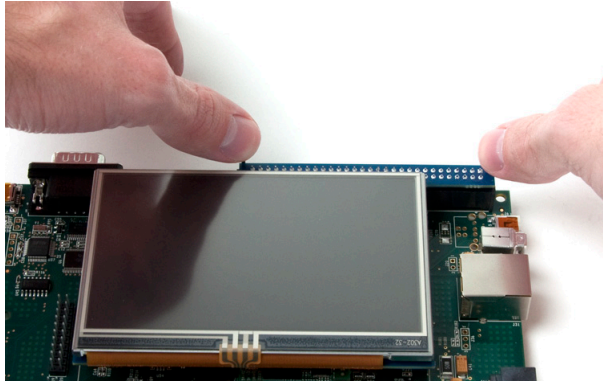

2. Taking care not to bend the PCB, remove the OMAP-L138 SOM-M1 by applying even pressure beneath the PCB edges and pulling up. Set aside OMAP-L138 SOM-M1.

3. Remove the TMS320C6748 SOM-M1 from its ESD protective bag.

4. Align the TMS320C6748 SOM-M1 over the three board-to-board connectors. Using even pressure, press straight down over the connectors to mate boards. Visually verify that all three connectors have fully mated.

5. Connect the 4.3" LCD by inserting into the baseboard LCD connector and pushing down over the connector until the LCD ejector levers move to a vertical position. **CAUTION:** The solder points on the LCD connector PCB may be sharp; use caution when connecting the LCD.
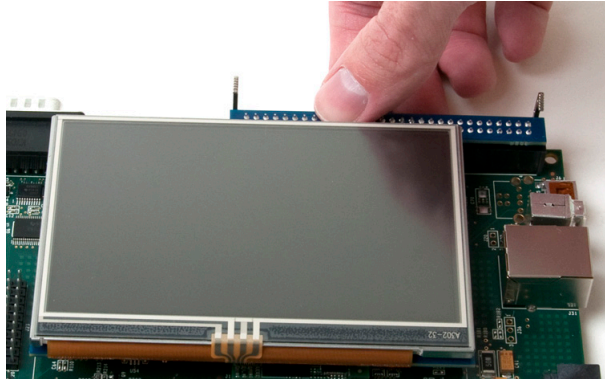
6. Place the OMAP-L138 SOM-M1 into the ESD protective bag that was used for the TMS320C6748 SOM-M1. Keep with EVM components for future use.

5 Installing Code Composer Studio

The Zoom OMAP-L138 EVM includes a software DVD containing Code Composer Studio (CCStudio).

1. Insert the Code Composer Studio v4 software DVD into your host PC.

2. Navigate to the DVD drive and open the files on the CCStudio DVD. Double-click on *setup_CCS_4.2.x.xxxxx.exe* and a splash screen similar to the image below will appear. Click the **Next** button.

3. Follow the on screen instructions until you arrive at the screen for Product Configuration, select **Platinum Edition**.

4. On the next screen, leave the default ISA items checked. Click the **Next** button.

5. Click the **Next** button to start copying files.

6. Wait for CCStudio to finish installing; this process can take some time, so please be patient.

7. Click the **Finish** button when the installation is complete. You may eject the CCStudio DVD at this time.

6 Running Board Support Library (BSL) Sample Programs

The BSL sample programs are included to test the different features of the development kit and diagnose any potential problems. In order to run these tests, you first have to connect your development kit to a PC.

6.1 Copy BSL Files to PC

Both SD cards included with the OMAP-L138 EVM contain the GEL and BSL files. These files need to be copied to your host PC.

1. Navigate into the SD card and locate the *BSL* directory.

2. Extract the ZIP archive and save the files to your host PC. (**NOTE:** The files may be placed anywhere on your host PC; however, the original file structure must remain intact.)

3. For the instructions in this User Guide, it is assumed the files were copied to the root C:\ drive. For example:

   C:\OMAP-L138_GEL_BSL_Files_v2.3
   C:\TMS320C6748_GEL_BSL_Files_v2.3

6.2 Connect EVM to Host PC

To communicate with the OMAP-L138 EVM using CCStudio, you will need to connect the included USB A to mini-B cable to the USB emulator port on the application baseboard and your host PC.
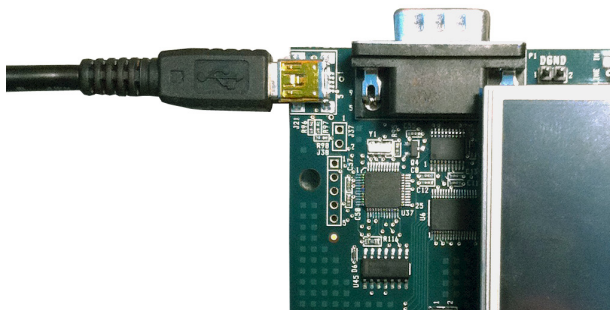

As soon as the USB cable connects to your host PC, Windows should automatically recognize that new hardware has been connected and install the necessary drivers. Power on your OMAP-L138 EVM and continue with the next section.

6.3 Launch Code Composer Studio

1. Launch Code Composer Studio by selecting **Start Menu > All Programs > Texas Instruments > Code Composer Studio v4.2.0 > Code Composer Studio v4**.

2. Select a workspace location and then click the **OK** button.
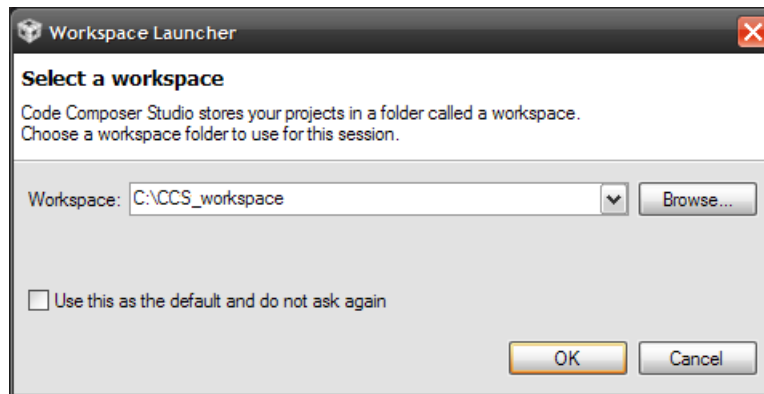
3. CCStudio will finish launching and a Welcome to Code Composer Studio window will open. (**NOTE:** If you do not have the latest Adobe Flash Player installed on your machine, you will be prompted to install. This is required for proper viewing of the Code Composer Studio Welcome screen.)

4. If you do not have a license, select the **Activate a License** option and click the **Use Free Limited License** button. (**NOTE:** If you do not have an active Internet connection, you can select to Evaluate Code Composer Studio for 30 days. At any time during that period, you can change to the Free Limited License by selecting **Help > License Options...** from the CCStudio menu bar and then following the onscreen instructions.)
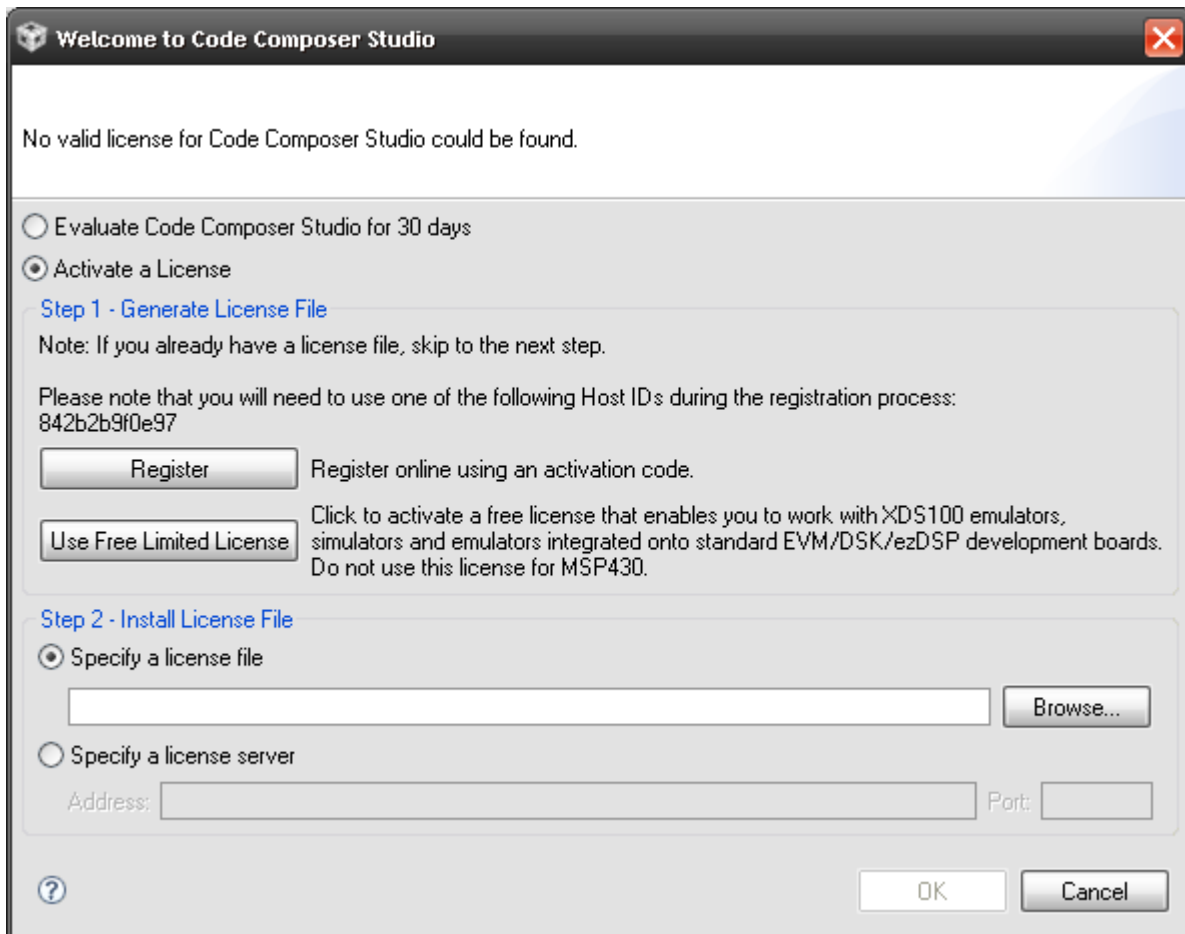
5. You will be redirected to TI's website to login in with your myTI.com account. Follow all the online instructions. After completing the online instructions, you will receive an email containing an attachment that is your license file.

6. Save the license file to your host PC, then return to the Welcome to Code Composer Studio window and under *Step 2 - Install License File*, browse to where you saved the license file. Click the **OK** button.

7. You will then be presented with the Code Composer Studio Welcome screen. Click on the cube in the upper right-hand corner to go to the CCStudio workbench.
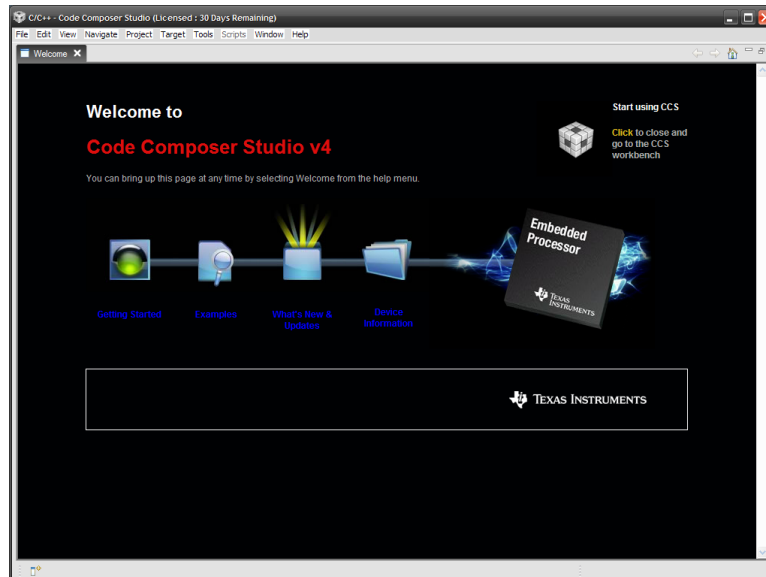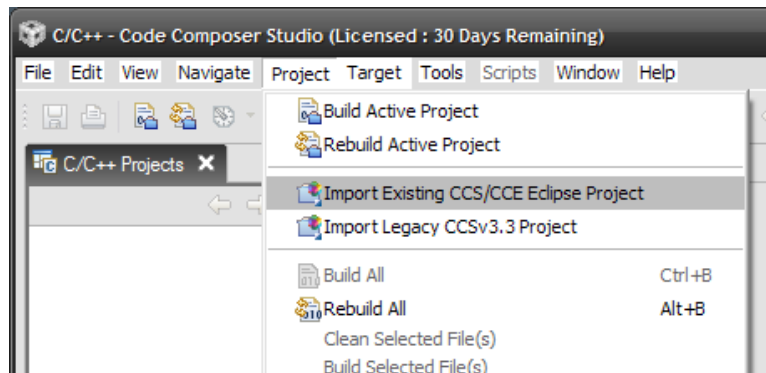

8. The CCStudio workbench will then appear.
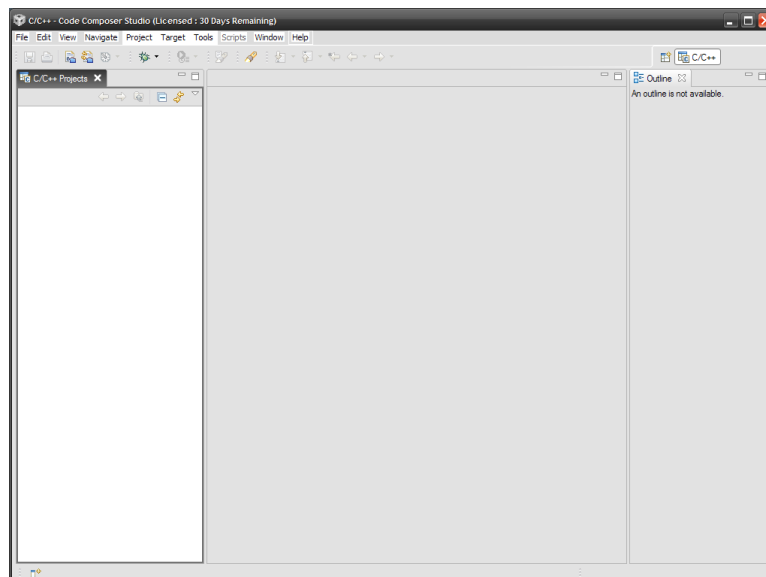
6.4   Run Sample Test

As an example, we will run one feature test. In order to run a test program, you will have to select the program, compile (or build) the program, and then load the compiled program. The following steps will walk you through that process.

1. From the menu bar, select **Project > Import Existing CCS/CCE Eclipse Project**.


2. Browse to the location where you saved the BSL files on your host PC and down to the *OMAP-L138_GEL_BSL_Files_v2.3\bsl* directory. Click the **OK** button. Verify the correct project exists in the *Discovered projects:* window and then click the **Finish** button.
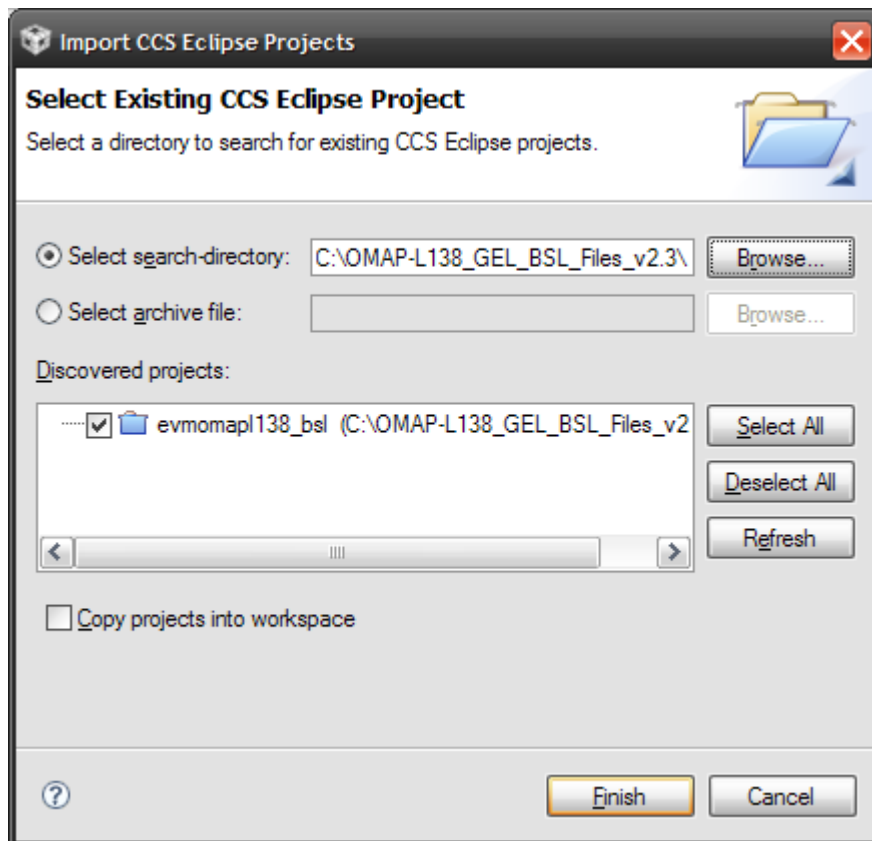
3. Once again, select **Project > Import Existing CCS/CCE Eclipse Project**. This time browse to the tests folder, *OMAP-L138_GEL_BSL_v2.3\tests*. Click the **OK** button. Verify the correct project exists in the *Discovered projects:* window and then click the **Finish** button.
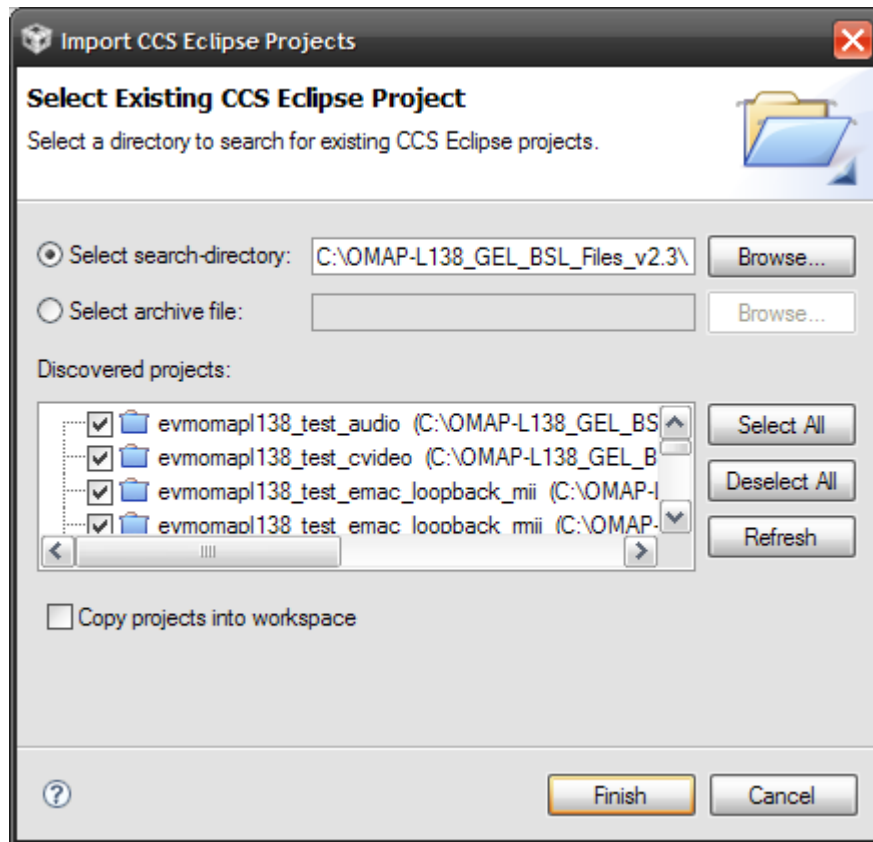

4. In the Projects window on the left, expand the *evmomapl138_bsl* folder and verify the .ccxml file is set as Active/Default. If not, right-click on the .ccxml file name and select **Set as Active Target Configuration**, then repeat to also **Set as Default Target Configuration**.
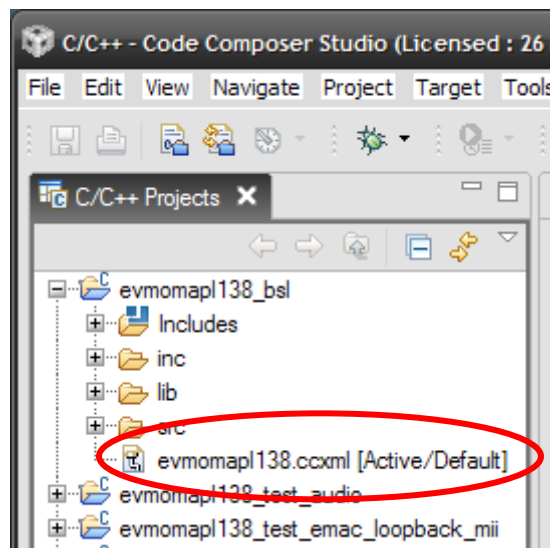
5. Once again in the Projects window on the left, expand the *evmomapl138_test_led_dip* project. Right-click on the file name and select **Set as Active Project**.
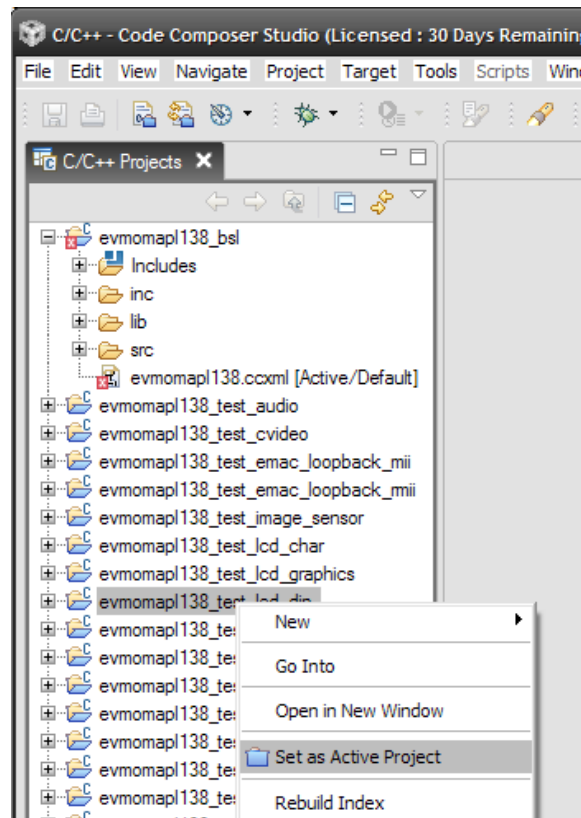

6. The test must now be compiled; from the CCStudio menu bar select **Project > Build Active Project**.
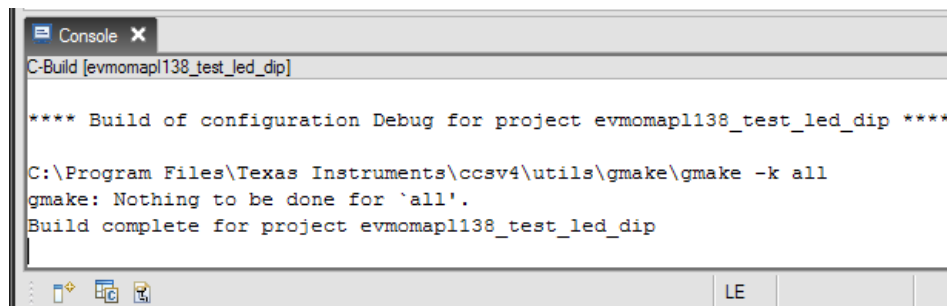
7. Once the Console window prints the message "Build Complete," select **Target > Debug Active Project** from the menu bar. (**NOTE:** If you receive a message stating "Error connecting to the target," press the reset button on the baseboard and then click **Retry**.)
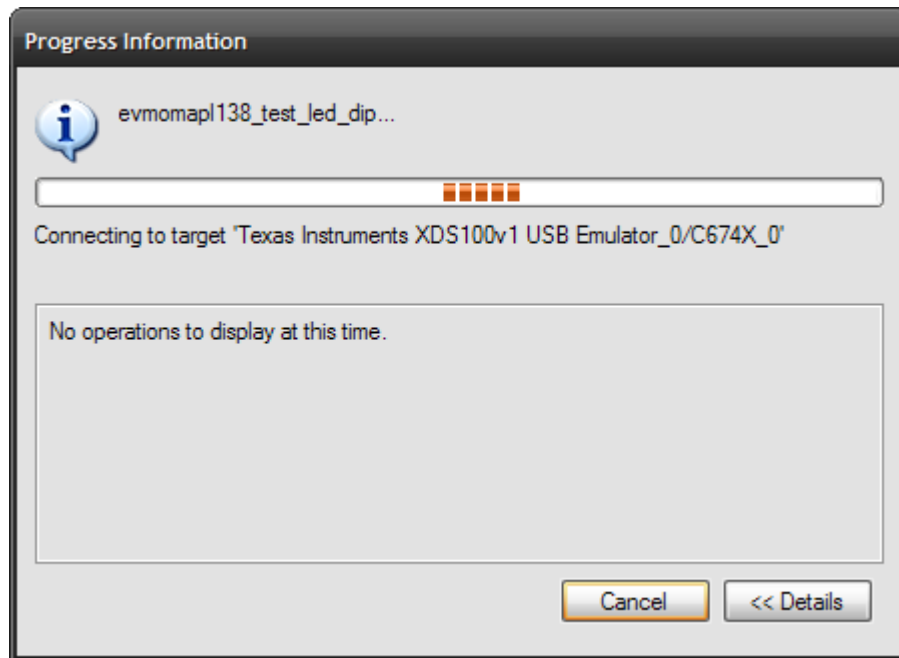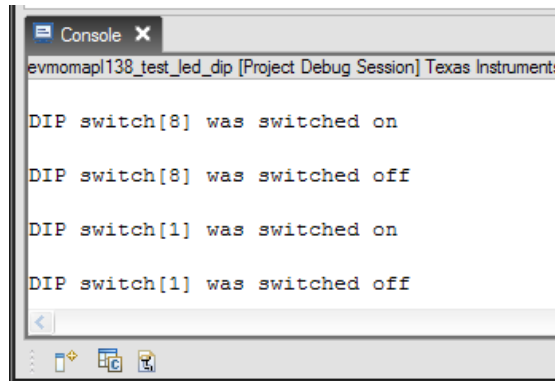

8. After the test finishes debugging, you will see a message in the Console window stating "DSP Wake Complete."
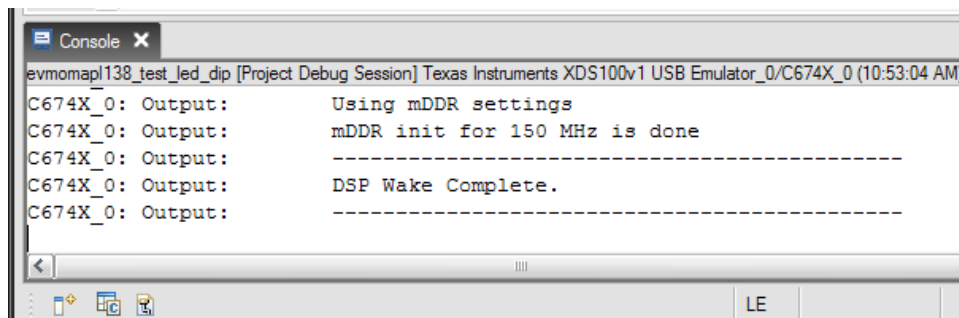
9. To run the program, select **Target > Run** from the menu bar.

10. The Console window provides a brief description of the test. If you move any of the S2 DIP switches, output text will print the switch that was moved and its new position (ON or OFF) and USER LED1 or USER LED2 will turn on or off in relation to the DIP switch position.

```
Console ✕

evmomapl138_test_led_dip [Project Debug Session] Texas Instruments

DIP switch[8] was switched on

DIP switch[8] was switched off

DIP switch[1] was switched on

DIP switch[1] was switched off
```

The steps in this section can be repeated to run any of the other tests for your EVM. (**NOTE:** All of the tests in the "experimenter" folder can be run on both the OMAP-L138 EVM and eXperimenter Kit; the tests in the "evm" folder can only be run on the OMAP-L138 EVM.)

Appendix A: Additional Documentation

Software Documentation

- The SD cards included with your OMAP-L138 eXperimenter Kit include Software Developer Guides for Linux and Windows CE. Please see the *setup.htm* files on each SD card for information.

- U-Boot documentation
http://www.denx.de/wiki/U-Boot/WebHome

- TI Code Composer Studio documentation
http://focus.ti.com/dsp/docs/dspsupportatn.tsp?sectionId=3&tabId=415&familyId=44&toolTypeId=30

Hardware Documentation

All of the following links are also available on your "My Account" page on the Logic PD website (http://support.logicpd.com/auth/).

- Logic PD *Zoom OMAP-L138 EVM QuickStart Guide*
http://support.logicpd.com/downloads/1230/

- Logic PD Zoom OMAP-L138 EVM Hardware Design Files (BOMs, Schematics, and Layout Files for all boards included in the EVM)
http://support.logicpd.com/downloads/1361/