

# LM3S3748 EVALUATION KIT README FIRST

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## Stellaris® LM3S3748 Evaluation Kit

The Stellaris LM3S3748 Evaluation Kit provides a low-cost way to start designing applications with Stellaris microcontrollers on a compact and versatile evaluation platform. The evaluation kit design highlights the LM3S3748 microcontroller's key features including USB 2.0 full-speed (12 Mbps) controller, Analog-to-Digital Converter (ADC), and serial interfaces. The LM3S3748 Evaluation Board (EVB) includes connectors for both embedded USB Host and USB Device operation.

The LM3S3748 EVB can be used either as an evaluation platform or as a low-cost in-circuit debug interface (ICDI). In ICDI mode, the on-board microcontroller is bypassed, allowing programming or debugging of an external target.

Power to the EVB can be supplied through the DC jack, the USB Device connector, or the USB debug interface connector. A small switch controls whether the board is bus-powered using the USB Device connector or self-powered using the DC jack or USB debug interface connector.

**WARNING: Do not change the power mode switch while power is applied. Doing so may damage the switch contacts.**

## LM3S3748 Evaluation Board

### Requirements

- You have a PC with a USB port, running Microsoft® Windows 2000, XP, or Vista
- You have the Stellaris LM3S3748 Evaluation Kit Documentation and Software CD

### Initial Board Set-Up

The initial board set-up of the LM3S3748 EVB consists of powering the board and installing the FTDI drivers that are needed for debug communication.

### Powering the EVB

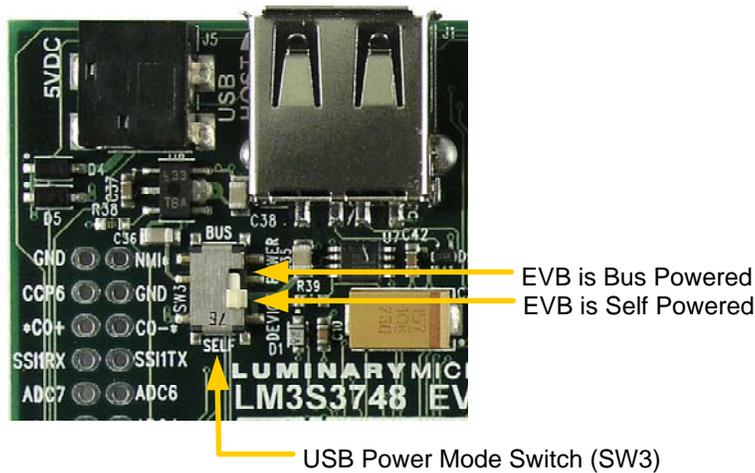
The first step for the initial board set-up is to power the EVB.

- 1) Move the USB power mode switch (SW3) to the “SELF” position (see the figure that follows).

**Note:** The switch must be placed in the “SELF” position for the initial board setup to work correctly.

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- 2) Using one of the USB cables provided in the kit, connect the mini-b (smaller) end of the USB cable to the USB debug interface connector labeled “DEBUG USB” on the EVB.

**Note:** If the USB cable is not plugged into the “DEBUG USB” connector, the board will not be powered and you will not be able to install the FTDI drivers in the next section.

- 3) Connect the other end (Type A) of the USB cable to a free USB port on your host PC.

The PC’s USB port is capable of sourcing up to 500 mA for each attached device, which is sufficient for the evaluation board. If connecting the board through a USB hub, it must be a powered hub.

## Installing the FTDI Drivers

The next step is to install the FTDI drivers for the board. Some customers with previous installations of the FTDI drivers may experience trouble when installing newer (2.02.04 and later) versions of the drivers. The problem only seems to affect users of Windows XP, and not Windows Vista. If you have any problems with the driver installation, see the <http://www.luminarymicro.com/ftdi-driver> web site for information.

- 1) When you power the EVB using the “DEBUG USB” connector for the first time, Windows starts the Found New Hardware Wizard and asks if Windows can connect to Windows Update to search for software. Select “No, not this time” and then click Next.

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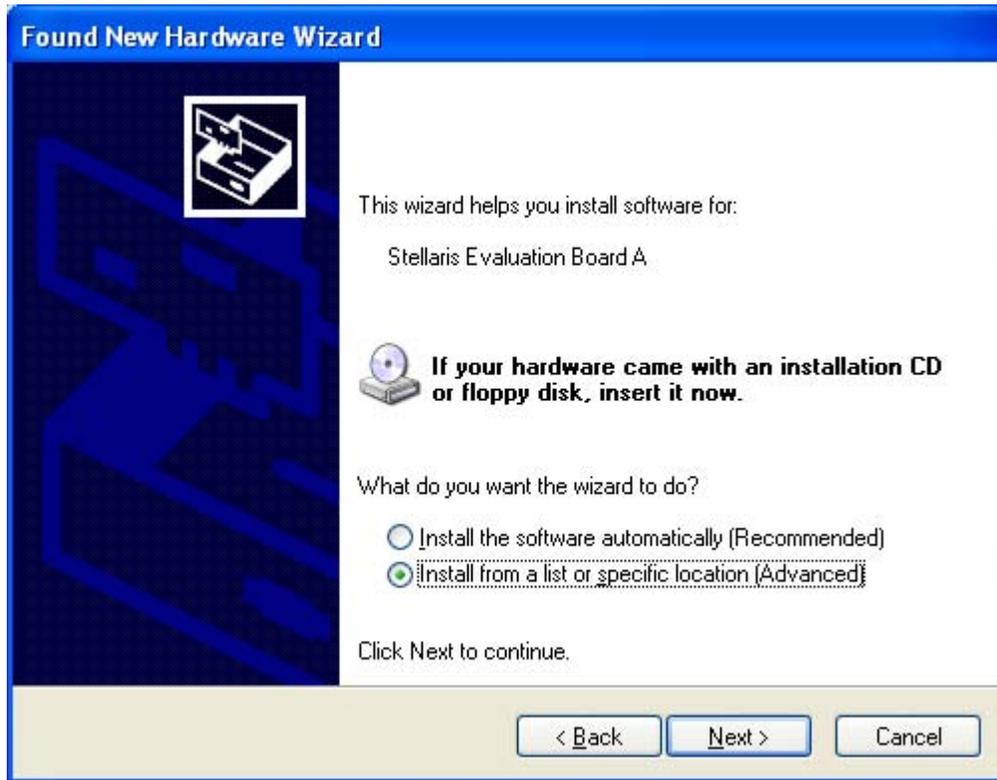
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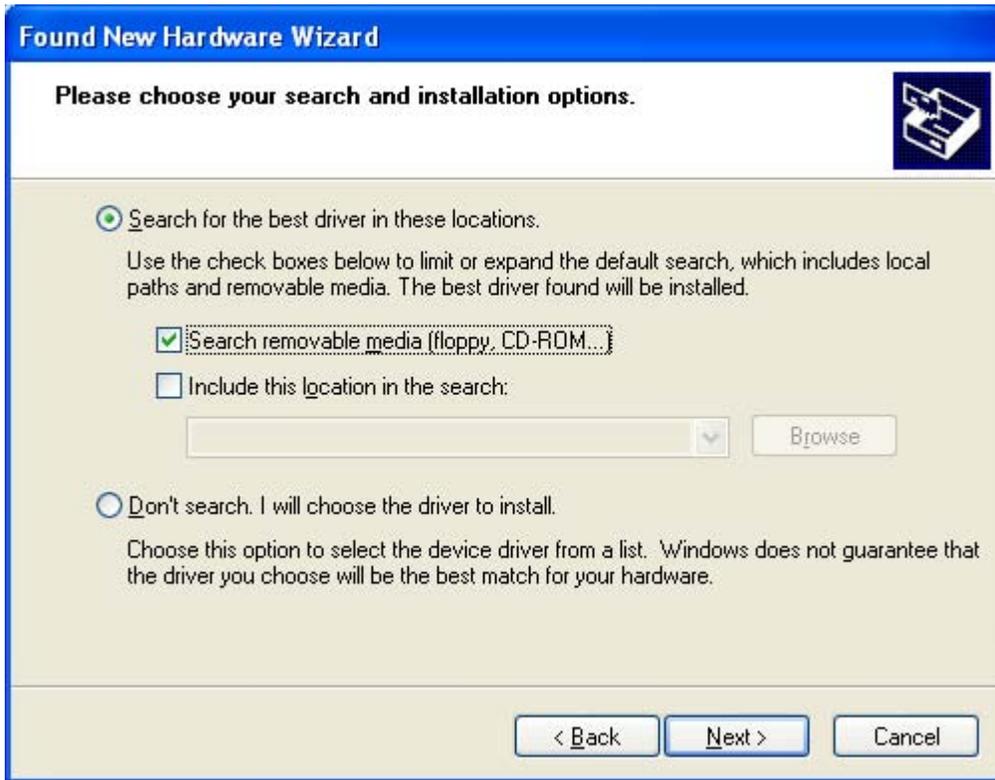
- 2) Next, the Found New Hardware Wizard asks you from where to install the software. Select “Install from a list or specific location (Advanced)” and click Next.



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- 3) Make sure the “Documentation and Software” CD that came with the evaluation kit is in your CD-ROM drive. Select “Search for the best driver in these locations,” and check the “Search removable media (floppy, CD-ROM...)” option. Click Next.



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- 4) A warning may pop up during the Hardware Installation like the one below; click Continue Anyway.



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- 5) Windows finishes installing the drivers for “Stellaris Evaluation Board A.” When the driver install is finished, the Found New Hardware Wizard window appears like the one below. Click Finish to close the dialog box.



You have just installed the drivers for “Stellaris Evaluation Board A.” The USB device built into the EVB is a composite USB device. After you click Finish, Windows automatically installs a driver for the “Stellaris Evaluation Board B” part of the composite USB device. Follow the same instructions as above to install the drivers for this device.

The Found New Hardware Wizard appears one last time. This is to install the drivers for the “Stellaris Virtual COM Port.” Again, follow the same instructions to install the drivers for this device.

Now all of the FTDI drivers for the LM3S3748 Evaluation Board have been installed. These drivers give the debugger access to the JTAG interface and the host PC access to the Virtual COM Port.

With the drivers installed, Windows automatically detects any new Stellaris boards that you attach, and install the drivers for you.

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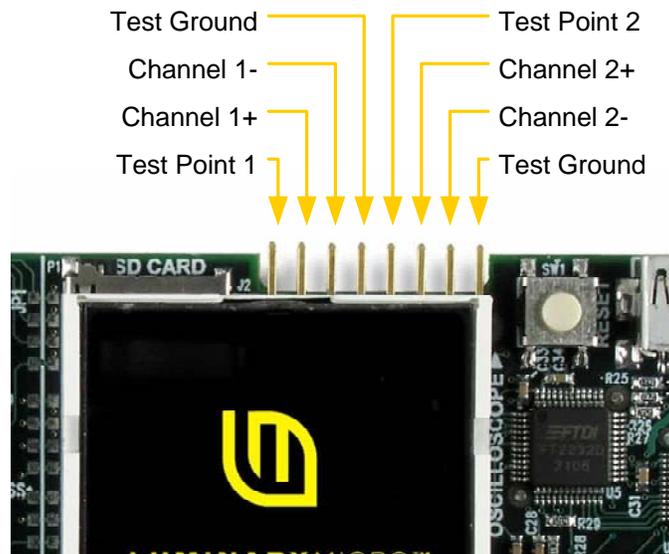
## Quickstart Application

The LM3S3748 Evaluation Board comes preprogrammed with a quickstart application. Once you have powered the board, this application runs automatically. You have probably already noticed this running as you installed the drivers. A splash screen appears on the LCD for a few seconds before the application begins.

The quickstart application provides a simple two channel oscilloscope sampling at up to 1M samples per second. The two oscilloscope channels are differential measurement channels which provide waveform acquisition using the LM3S3748 microcontroller's Analog-to-Digital Converter (ADC). The evaluation board includes an oscilloscope header that contains the two channel differential inputs, two test point pins, and two test ground pins.

Test Point 1 is connected to the speaker input on the EVB and allows the signal for the keyboard click to be viewed. Note that waveform capture is typically not taking place while the keyboard is being serviced so the click may not be seen on the waveform display for every keypress.

Test Point 2 is connected to the output of a PWM generator set to drive a 1KHz square wave.



The EVB has a four-way navigation switch with press-to-select functionality that is used to configure the oscilloscope. The navigation switch is labeled “NAVIGATE” on the board. Rocking the control in the desired direction sends “up,” “down,” “left,” or “right” messages to the application and pressing on the center sends the “select” message.

Controls and settings are arranged into groups by function such as display settings, trigger settings, file operations, and setup choices. These groups are accessed by pressing “select” to

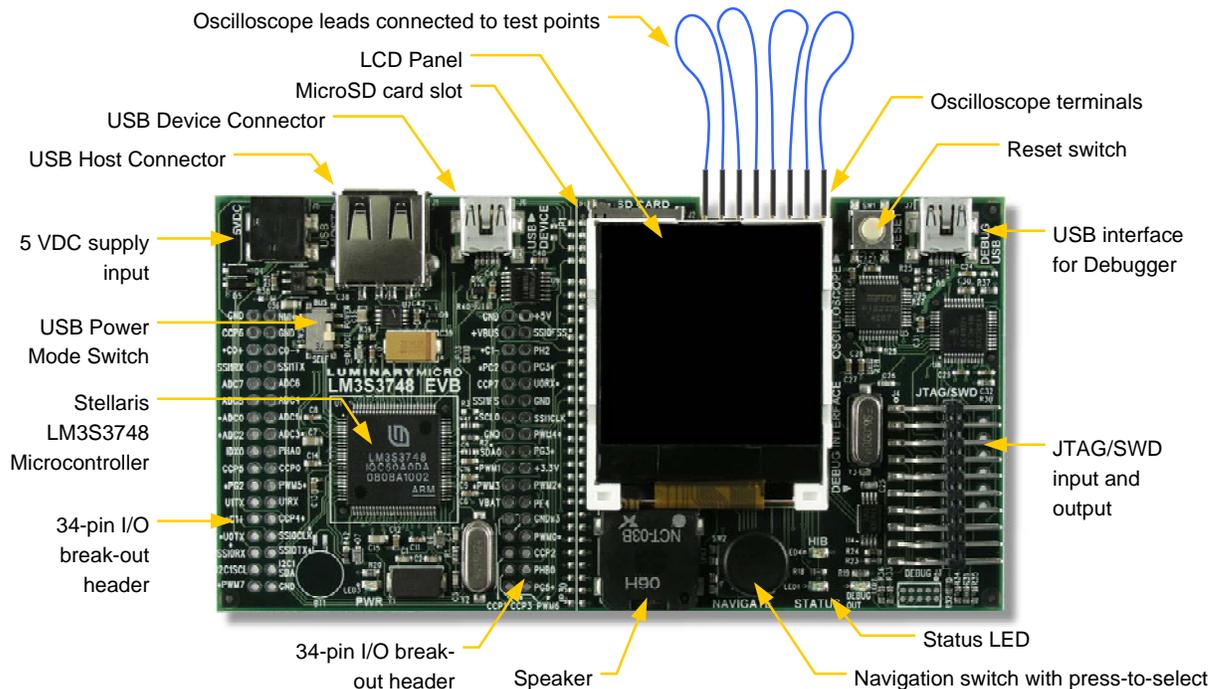
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display the main menu. With the menu displayed, use “up” and “down” to select between the available groups. When the desired group is highlighted, press “select” once again to dismiss the menu.

Controls from the currently selected group are shown in the bottom portion of the LCD. Use “up” and “down” to cycle through the controls in the group and “left” and “right” to change the value of, or select the action associated with, the control which is currently displayed.

Using the oscilloscope to view Test Point 1 and Test Point 2:

- 1) Connect Test Point 1 to Channel 1+.
- 2) Connect Test Ground to Channel 1-.
- 3) Connect Test Point 2 to Channel 2+.
- 4) Connect Test Ground to Channel 2-. The connections should look like the graphic below.



- 5) The test point signals should now be visible on the LCD. To modify the volts per division and time per division options, follow the additional steps below.
- 6) Press “select” to bring up the main menu, navigate to highlight the “Display” group, and press “select” again. The “Display” group will be displayed at the bottom of the LCD.

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**Note:** The “Display” group is the default active group after power-up.

- 7) Press “up” or “down” until the “Timebase” option is selected and then press “left” or “right” to modify the amount of time per division.
- 8) Press “up” or “down” until the “Ch1 Scale” or “Ch2 Scale” option is selected and then press “left” or “right” to modify the number of volts per division for that channel.

### USB Device Mode

The quickstart oscilloscope application can connect to a Windows host machine via USB where a companion application running on the PC can be used to control the oscilloscope and display and save the waveforms. In this mode, the LM3S3748 EVB will be operating in USB device mode.

The first step is to install the necessary USB drivers on the PC.

- 1) Disconnect the USB cable from the USB connector labeled “DEBUG USB” if connected.
- 2) Move the USB power mode switch (SW3) to the “BUS” position.
- 3) Connect the mini-b (smaller) end of the USB cable to the USB device connector labeled “USB DEVICE” on the EVB. Connect the other end (Type A) to a free USB port on your host PC.
- 4) Windows starts the Found New Hardware Wizard and asks if Windows can connect to Windows Update to search for software. Select “No, not this time” and then click Next.

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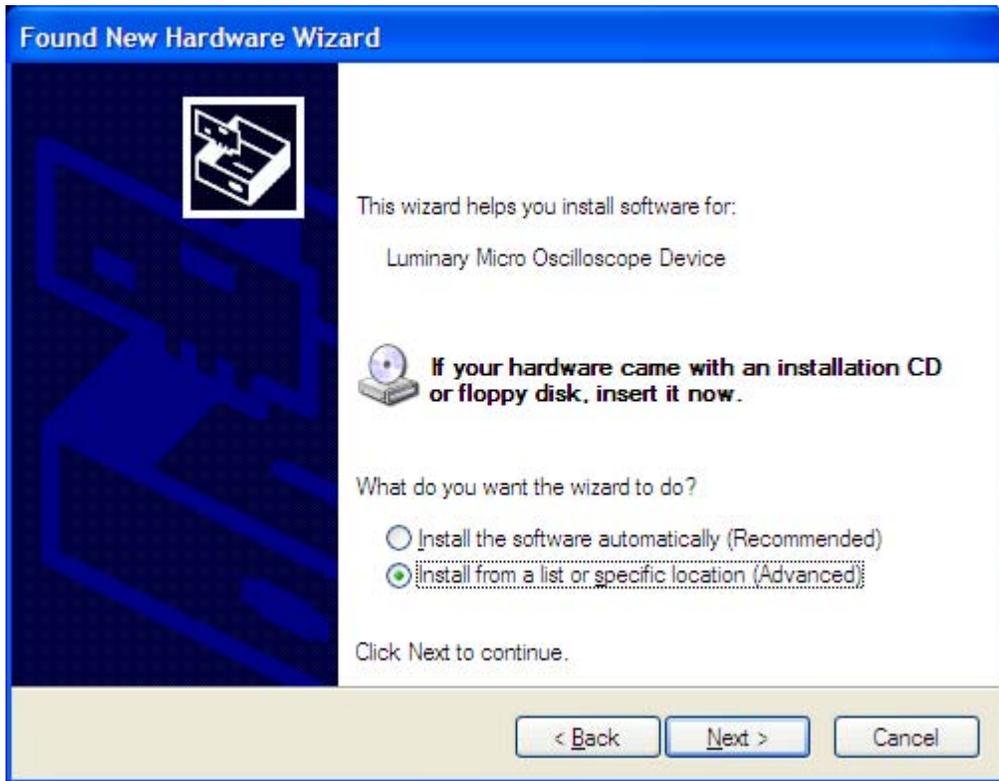
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- 5) Next, the Found New Hardware Wizard asks you from where to install the software. Select “Install from a list or specific location (Advanced)” and click Next.

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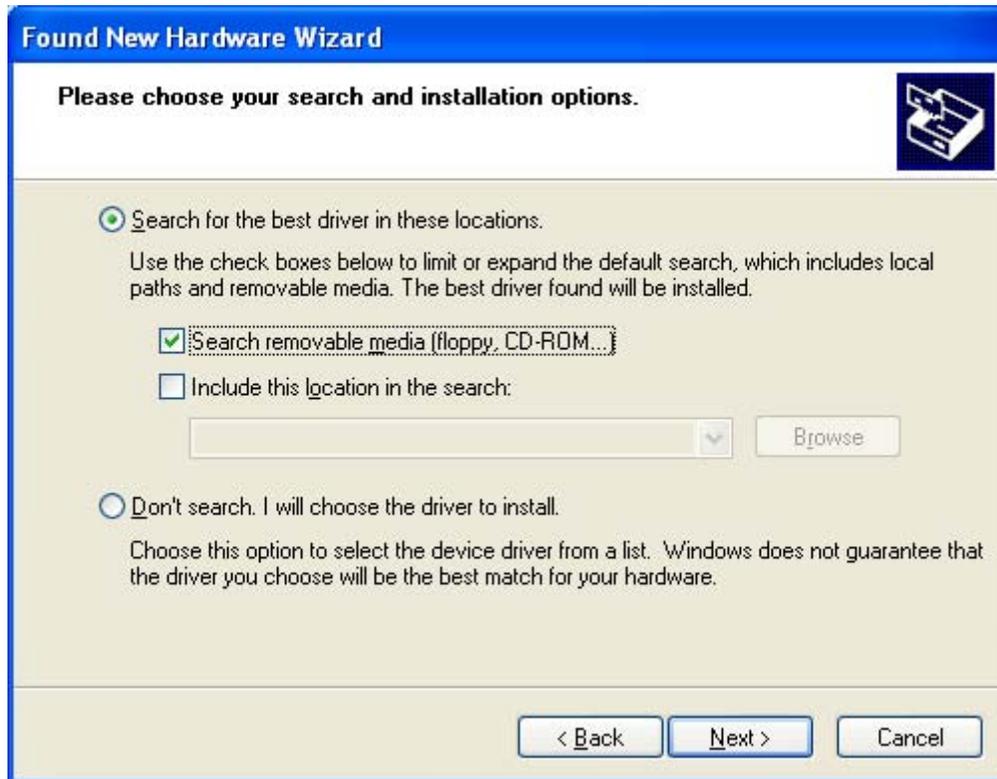
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- 6) Make sure the “Documentation and Software” CD that came with the evaluation kit is in your CD-ROM drive. Select “Search for the best driver in these locations,” and check the “Search removable media (floppy, CD-ROM...)” option. Click Next.

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- 7) Windows finishes installing the drivers for “Luminary Micro Oscilloscope Device.” When the driver install is finished, the Found New Hardware Wizard window appears like the one below. Click Finish to close the dialog box.

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The next step is to install the Windows application from the “Documentation and Software” CD.

**Note:** The Windows oscilloscope application only supports WindowsXP and Vista.

- 1) Insert the CD into the CD-ROM drive of your PC. If Autoplay is enabled on your PC, this automatically opens up the index.htm file in your default web browser. If not, use Windows Explorer to open it manually.
- 2) Click on the Tools button and then the link titled, “Luminary Micro Oscilloscope Application”. If the setup program does not start, use Windows Explorer to navigate to the Tools\LM\_Oscilloscope directory and run the installer, titled SW-USB-win-xxxx.msi, manually.
- 3) After the Oscilloscope has been installed, you can run the application by clicking on the shortcut placed in your “Start” menu at Start>Programs>Luminary Micro>EK-LM3S3748>LM Oscilloscope.
- 4) See the help file installed with the oscilloscope application for more details. You can view the help file by clicking on the shortcut placed in your “Start” menu at Start>Programs>Luminary Micro>EK-LM3S3748>LM Oscilloscope Help.

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## USB Host Mode

The quickstart oscilloscope application can also run in a USB Host mode. To run the application in USB Host mode, do the following:

- 1) Disconnect the USB cable from the USB connector labeled, “DEBUG DEVICE” if connected.
- 2) Move the USB power mode switch (SW3) to the “SELF” position.
- 3) Connect the mini-b (smaller) end of the USB cable to the USB debug interface connector labeled “USB DEBUG” on the EVB. Connect the other end (Type A) to a free USB port on your host PC.
- 4) Press “select” to bring up the main menu, navigate to highlight the “Setup” group, and press “select” again. The “Setup” group will be displayed at the bottom of the LCD.
- 5) Press “up” or “down” until the “USB Mode” option is selected and then press “left” or “right” to switch to “Host” mode.

In USB Host mode, the quickstart application can save waveforms to a USB flash memory stick or a Micro-SD card. The waveform files can be saved in bitmap (.bmp) or as comma separated value (.csv) formats. The LM3S3748 Evaluation Kit includes a USB flash memory stick, but a Micro-SD card is not included.

To save waveforms to the USB flash memory stick, do the following:

- 1) Plug the USB memory stick into the “USB HOST” connector. You should see a “USB drive detected” message on the LCD.
- 2) Press “select” to bring up the main menu, navigate to highlight the “File” group, and press “select” again. The “File” group will be displayed at the bottom of the LCD.
- 3) Press “up” or “down” until the “BMP on USB” option is selected, and then press “left” or “right” to save the bitmap waveform file to the USB memory stick.
- 4) Press “up” or “down” until the “CSV on USB” option is selected, and then press “left” or “right” to save the comma separated value waveform file to the USB memory stick.

## Where to Find More Information

For more information on the LM3S3748 Evaluation Kit, see the *Stellaris LM3S3748 Evaluation Kit User’s Manual*.

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For more information on the LM3S3748 Evaluation Kit Quickstart Oscilloscope Application, see the *StellarisWare® Driver Library User's Guide* in the LM3S3748 Evaluation Kit's Example Applications section.

The above mentioned documents can be found on the Stellaris LM3S3748 Evaluation Kit CD or at the [www.ti.com/stellaris](http://www.ti.com/stellaris) web site.

## Software Development Tools

The next step is to install and run the software development tools included in the evaluation kit. For more information, see the quickstart guides included on the Stellaris LM3S3748 Evaluation Kit CD. Additional tools may be available through the [www.ti.com/stellaris](http://www.ti.com/stellaris) web site.

## References

The following references are included on the Stellaris LM3S3748 Evaluation Kit Documentation and Software CD and are also available for download at [www.luminarymicro.com](http://www.luminarymicro.com):

- *Stellaris LM3S3748 Evaluation Kit User's Manual*
- StellarisWare Driver Library
- *StellarisWare Driver Library User's Guide*
- *Stellaris LM3S3748 Microcontroller Data Sheet*

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DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
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### Applications

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