Zoom™ DM3730 SOM-LV Development Kit

User Guide

Logic PD // Products
Published: July 2011

Revision History

REV	EDITOR	DESCRIPTION	APPROVAL	DATE
A	JCA	Initial release	JCA	07/20/11

Table of Contents

Table of Figures

Table of Tables

1 Introduction

This User Guide continues where the QuickStart Guide ended by providing additional hardware details about the Zoom DM3730 SOM-LV Development Kit. The purpose of this document is to present information that may be useful after you've unpacked your kit, run through the demo, and are ready to begin development work. This document also points you to other resources depending upon your specific development needs.

1.1 Scope of Document

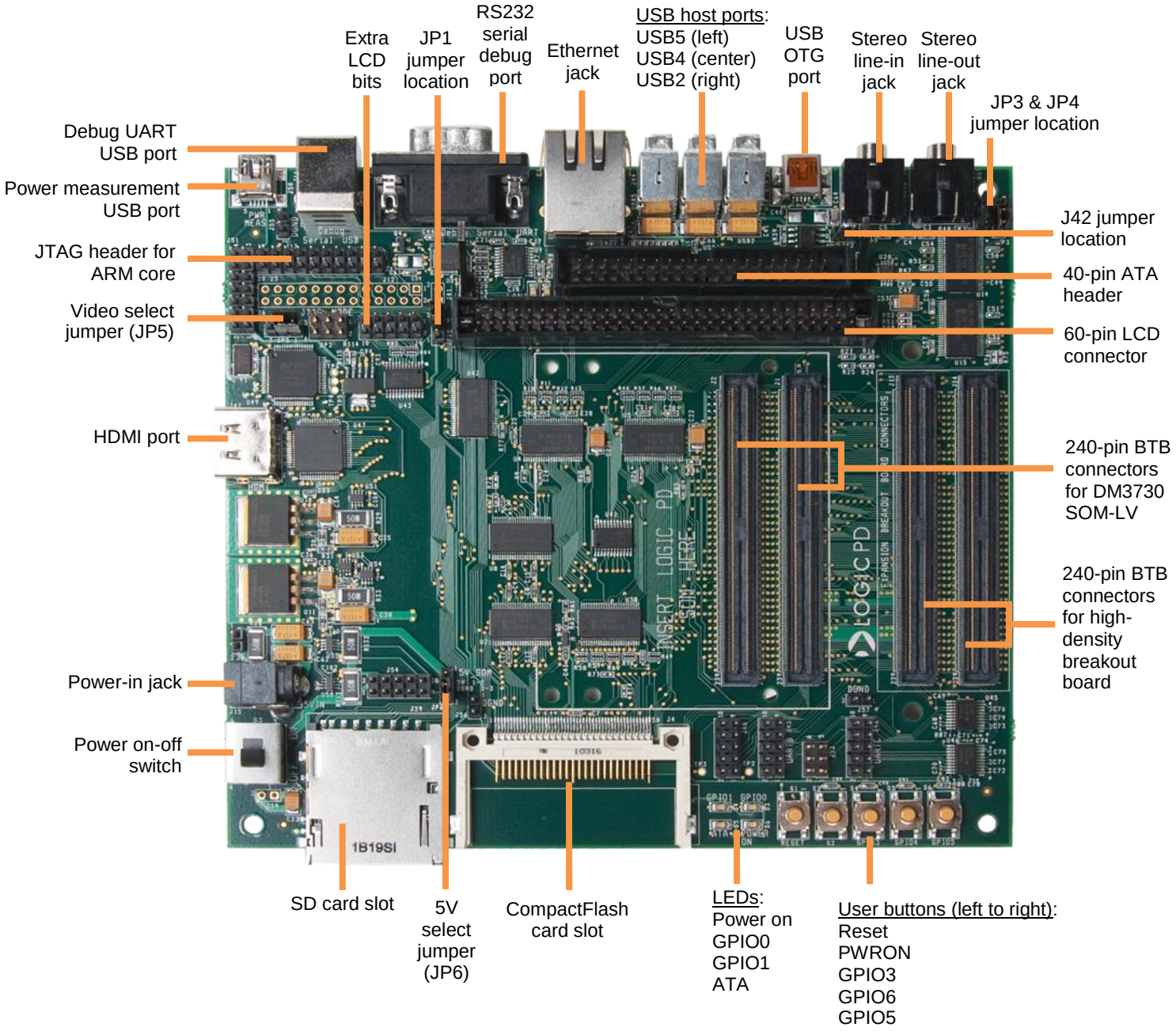
- This User Guide does not provide detailed instructions for the software included with the kit. Please refer to the specific User Guides for each respective software product for additional information. A list of additional documentation is available in Appendix A.

1.2 Requirements

- It is assumed that the QuickStart Guide has been read in its entirety. See Appendix A for a link to the QuickStart Guide.
- The following items will be needed for the procedures described in this document:
  - Zoom DM3730 SOM-LV Development Kit registered on Logic PD's website[1]
  - Host PC (the procedures in this document were tested using a Windows 7 host PC)
    - An available serial or USB port
  - SD card reader
  - SD card
  - Active Internet connection
  - Serial cable (included in development kit)
  - USB A to USB B cable (included in development kit)
  - USB A to USB mini-B cable (included in development kit)
  - Terminal emulation program (e.g., Tera Term as described in Section 2.3)

[1] http://support.logicpd.com/auth/register_product.php

1.3 Baseboard Features Diagram



2 Connect Development Kit to PC

In order to begin development work, the development kit needs to be connected to a host PC. You can use either a serial cable (Section 2.1) or a USB B cable (Section 2.2); both cables are included in the development kit.

2.1 Connect Using Serial Cable

1. Connect the null-modem serial cable to the serial port connector on the baseboard and to an empty COM port on your PC. See Figure 2.1.
2. Connect the regulated 5V power supply to the appropriate power adapter for the location in which you are using the development kit.
3. Plug the power adapter into an electrical outlet and the 5V line output connector into the power-in connector on the baseboard. See Figure 2.1.

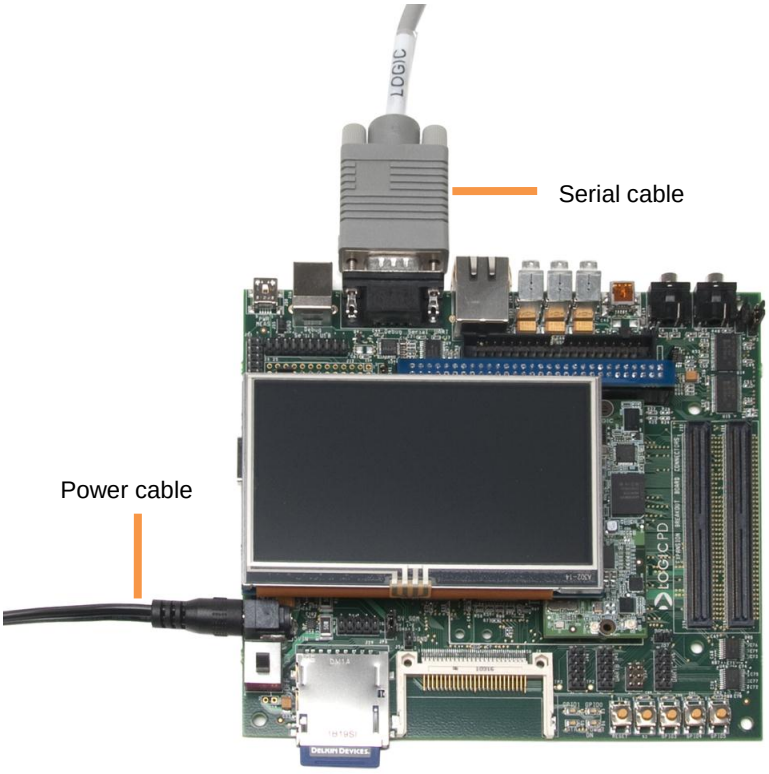


Figure 2.1: Connect Serial Cable

4. Before powering on your kit, you will have to install a terminal emulation program to communicate with the development kit. Please proceed to Section 2.3 for details.

2.2 Connect Using USB Cable

1. Connect the USB B cable to the debug UART USB B port on the baseboard and to an empty USB port on your PC. See Figure 2.2.

   NOTE: The baseboard is equipped with an FTDI virtual COM port (VCP) chip that causes the USB device to appear to your computer as an additional COM port. Settings for the terminal emulation program will remain the same; however, a driver must be installed on your

computer for proper operation. A link to the driver and instructions for using the USB-to-UART VCP chip can be found on Logic PD's website.[2]

2. Connect the regulated 5V power supply to the appropriate power adapter for the location in which you are using the development kit.
3. Plug the power adapter into an electrical outlet and the 5V line output connector into the power-in connector on the baseboard. See Figure 2.2.

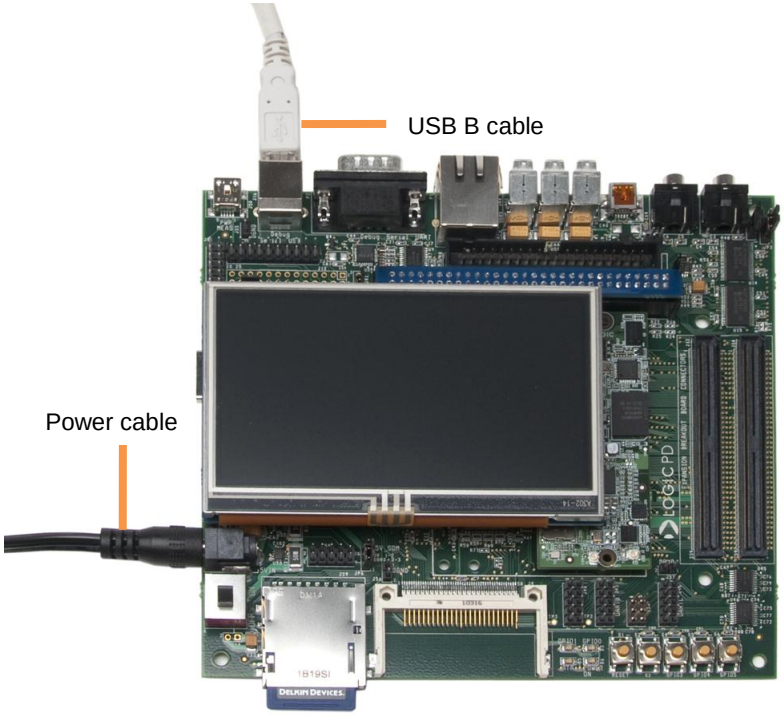


Figure 2.2: Connect USB B Cable

4. Before powering on your kit, you will have to install a terminal emulation program to communicate with the development kit. Please proceed to the next section for details.

2.3 Install Terminal Emulation Program

The Zoom DM3730 SOM-LV Development Kit is designed to communicate with terminal emulation programs using the included null-modem serial cable. The terminal emulation program must support binary transfers in order to download software to the kit. Although Logic PD does not support any particular terminal emulation program, we suggest using Tera Term for Windows (Tera Term is not available for Linux users). Tera Term can be downloaded for free from Logic PD's website. To install Tera Term:

1. Download the ZIP file[3] from Logic PD's website and extract the contents.
2. After extracting the contents, locate the *teraterm-x.xx.exe* file and double-click it.
3. Follow the on-screen instructions to install Tera Term.

2.3.1 Setup Tera Term

All Tera Term settings are controlled by an .ini file that you can modify as needed to make your time in Tera Term as efficient as possible (for example you can preset the port settings).

[2] http://support.logicpd.com/downloads/910/
[3] http://support.logicpd.com/downloads/240/

1. Start the Tera Term program
2. From the menu, select Setup > Serial port
3. Select the appropriate COM port for your workstation and then change the port settings to:
   a. Baud rate: **115200**
   b. Data: **8 bit**
   c. Parity: **None**
   d. Stop: **1 bit**
   e. Flow control: **None**

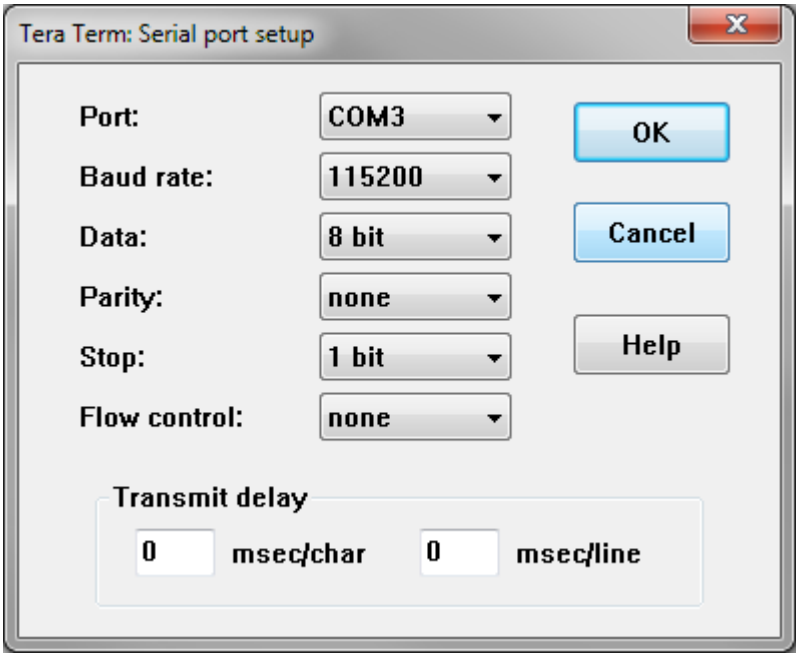


Figure 2.3: Tera Term Serial Port Settings

4. Click **OK**

2.4 Boot into LogicLoader

LogicLoader is a bootloader program created by Logic PD that provides the capability for loading operating systems and applications. In addition, it provides a full suite of commands for interfacing to the SOM. These commands load operating systems, configure hardware platforms, bring up hardware, customize applications, perform tests, and manage in-field devices.

1. Make sure the development kit is set up as described in Section 2.1 or Section 2.2.
2. Remove the pre-built OS image SD card from the baseboard if one is inserted. This step is important because LogicLoader boots from onboard flash.
3. Start the terminal emulation program on your host PC.
4. Verify that the serial port settings are correct (see Figure 2.3 in the previous section).
5. Move the power switch to the **ON** position to boot the development kit.
6. In your host PC's terminal emulation program, you should see a LogicLoader screen similar to that in Figure 2.4 (version numbers and other details may differ from what is shown).

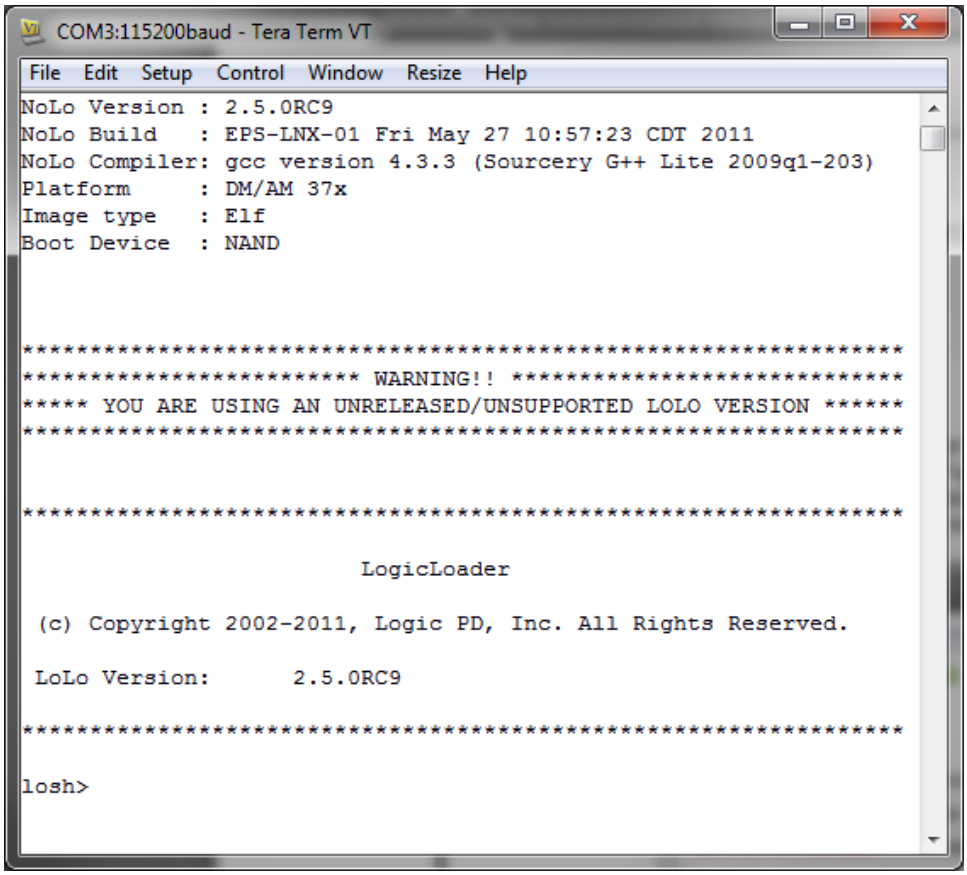


Figure 2.4: LogicLoader losh> Prompt

7. You are now ready to work with the DM3730 SOM-LV using LogicLoader. For more information on LogicLoader and its capabilities, please see the LogicLoader documentation provided by Logic PD. These documents are available on the Logic PD website and their download locations are referenced in Appendix A of this document.

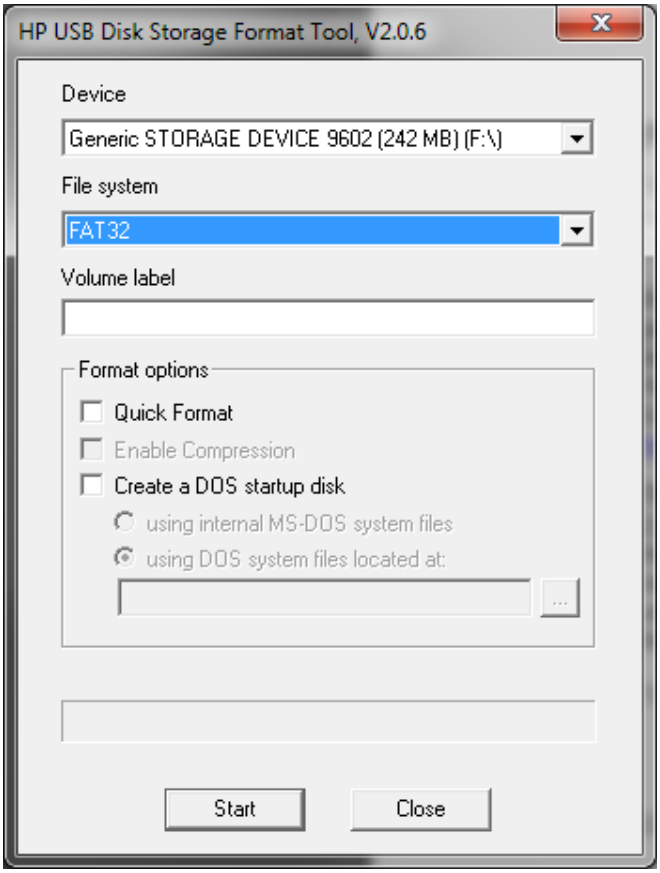
3 Format a Bootable SD Card

The DM3730 processor supports booting from SD and several procedures in this document walk you through a process using a bootable SD card. This section describes how to format an SD card so the Zoom DM3730 SOM-LV Development Kit will recognize it as a bootable device.

A requirement of the processor is that the SD card must be formatted without an extended partition to boot properly. The built-in Windows formatting tool is not always able to do this. It has been found that the HP USB Formatting Tool version 2.0.6 appears to be the best tool for formatting an SD card so it can be used to boot a processor based on OMAP3 technologies (e.g., DM3730, AM3703). **NOTE:** If you are using Linux or have access to a Linux box, you can find instructions on SD/MMC format for OMAP3 boot[4] on the Texas Instruments Embedded Processors Wiki.

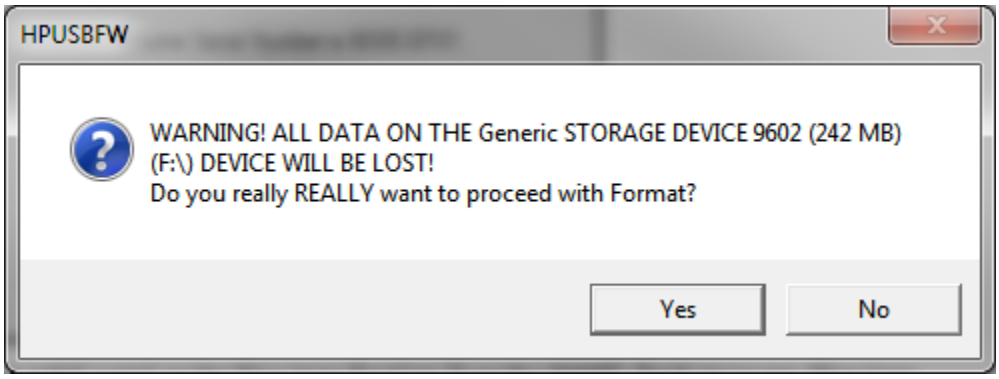
The most recent version of the tool available on HP's site doesn't seem to work as well as version 2.0.6. As such, the tool needs to be downloaded from any number of third-party websites. To find these websites, perform a Google search for **HP formatting tool 2.0.6**. **NOTE:** As with downloading anything from the Internet, use caution in what sites you visit and what you download. Logic PD has no association with any of these websites and makes no guarantees to their validity or the usability of downloads from their sites.

1. After the HP USB Formatting Tool has been installed on your host PC, insert an SD card into your USB card reader and open the formatting tool. **IMPORTANT:** Remember that formatting an SD card will erase its entire contents; back-up the SD card's contents before continuing or select a card that doesn't contain vital information.
2. Select the SD card device and **FAT32** from the File System drop-down menu. Click **Start**.

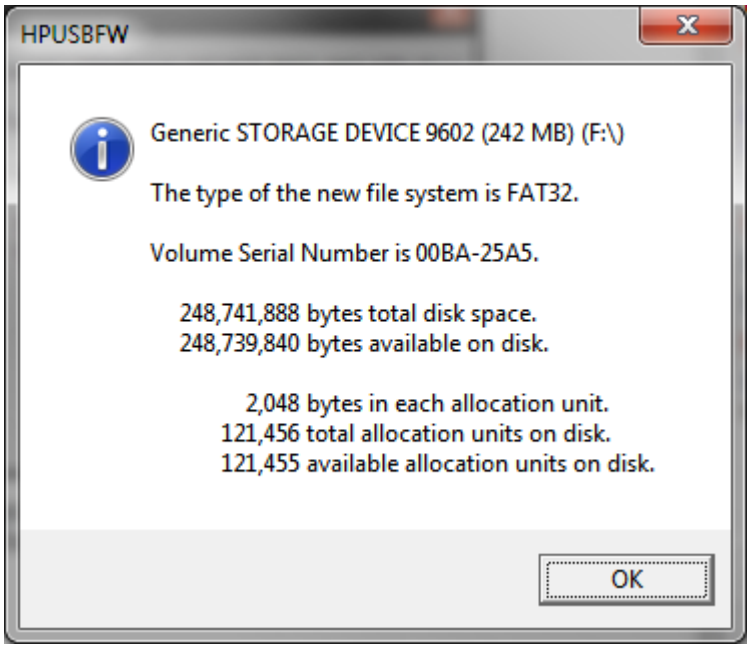


[4] http://processors.wiki.ti.com/index.php/MMC_Boot_Format

3. You will receive a warning that the contents of the card will be erased. Assuming you have backed-up the contents of the SD card, click **Yes**.



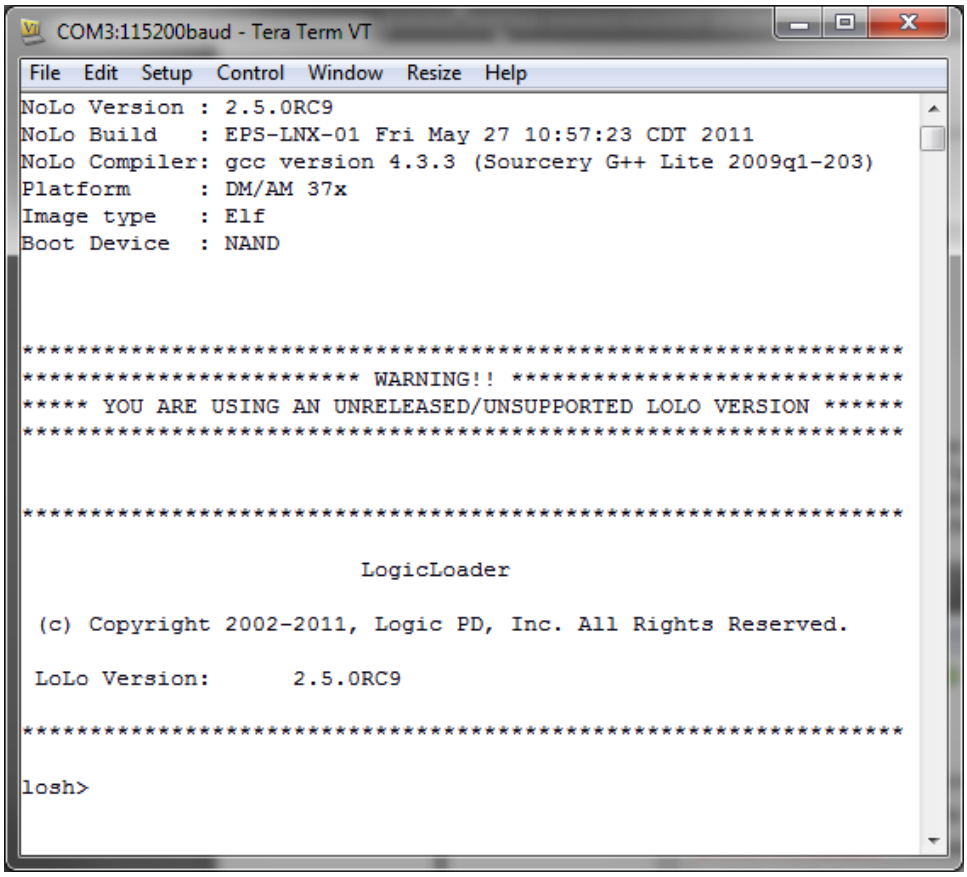
4. When formatting completes, you will receive a confirmation screen with the new file system type and the space allocation on the card similar to the window shown below.



You are now ready to add LogicLoader files (see Section 4) to the SD card and boot from SD.

4 Update LogicLoader

1. Power on your kit and hold down the **v** key on the keyboard. Doing this will provide specific boot information in the LogicLoader output. For instance, in the image below you see that the image type is Elf and it booted from the NAND device. This is a helpful trick to use to determine if your development kit is booting from the onboard NAND flash or the SD card.



2. Take note of what LogicLoader version number appears in this welcome prompt. This will help you know if you need to upgrade to a new version.

3. Power off your kit.

4.1 Download New Version of LogicLoader

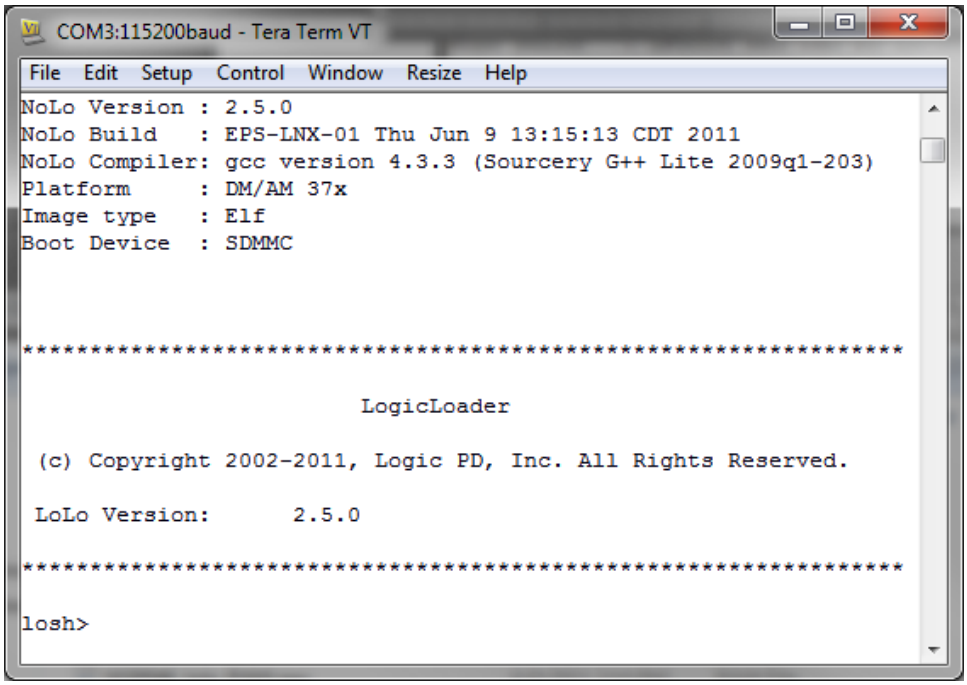
1. Log into Logic PD's download site[5] using your username and password.
2. Click on the **All Downloads** link for the *DM3730 SOM-LV Development Kit*.
3. Scroll down until you find the section header *LogicLoader Bootloader/Monitor*.
4. Click on the **+** icon next to **LogicLoader for DM3730 / AM3703 SOMs** link; this expands the list of all available LogicLoader versions. If the current version is newer than what is on your DM3730 SOM-LV, you should update.
5. Click on the version number marked *(current)* and save the file to your host PC.
6. After the ZIP file finishes downloading, extract all files of the folder to a location on your host PC that you can access later on.

[5] http://support.logicpd.com/auth/

Now that you have downloaded the latest version of LogicLoader to your computer, you can update LogicLoader on your development kit using a bootable SD card.

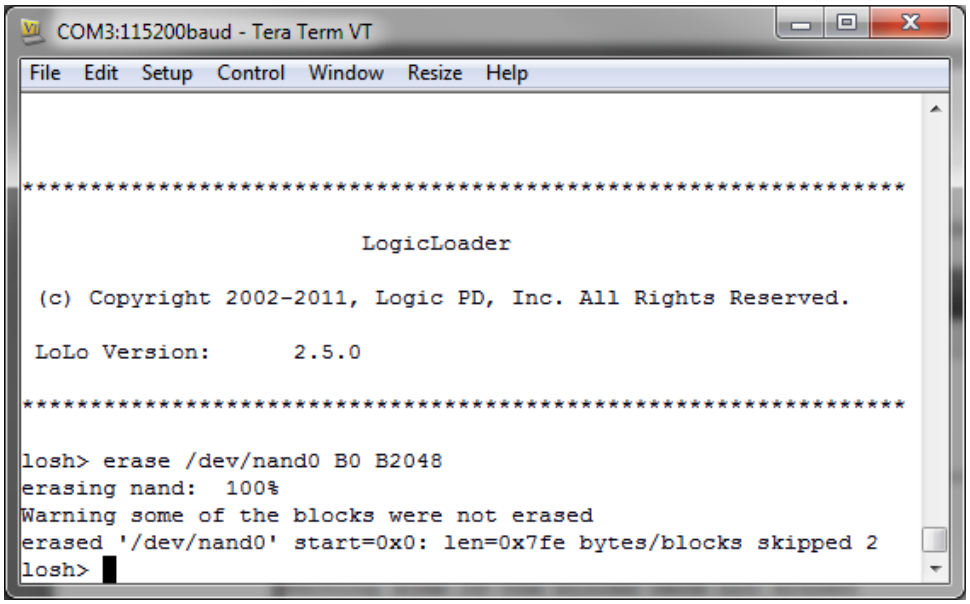
4.2 Update LogicLoader using a Bootable SD Card

1. Prepare a bootable SD card as described in Section 3.
2. Locate the LogicLoader files that you downloaded to your host PC (see Section 4.1).
3. Copy the *MLO* file from that folder to the SD card. **IMPORTANT: This file must be the first added to the SD card for the kit to boot properly.**
4. Next, copy the *lboot.elf* file to the SD card.
5. Remove the SD card from your USB card reader and insert it into the bootable SD card slot on your Zoom DM3730 SOM-LV Development Kit.
6. Slide the power switch to the **ON** position and you should see a screen similar to that shown below. **Hint:** You can hold down the **v** key on the keyboard during boot-up to verify the Boot Device is SDMMC, indicating the kit booted from the SD card.



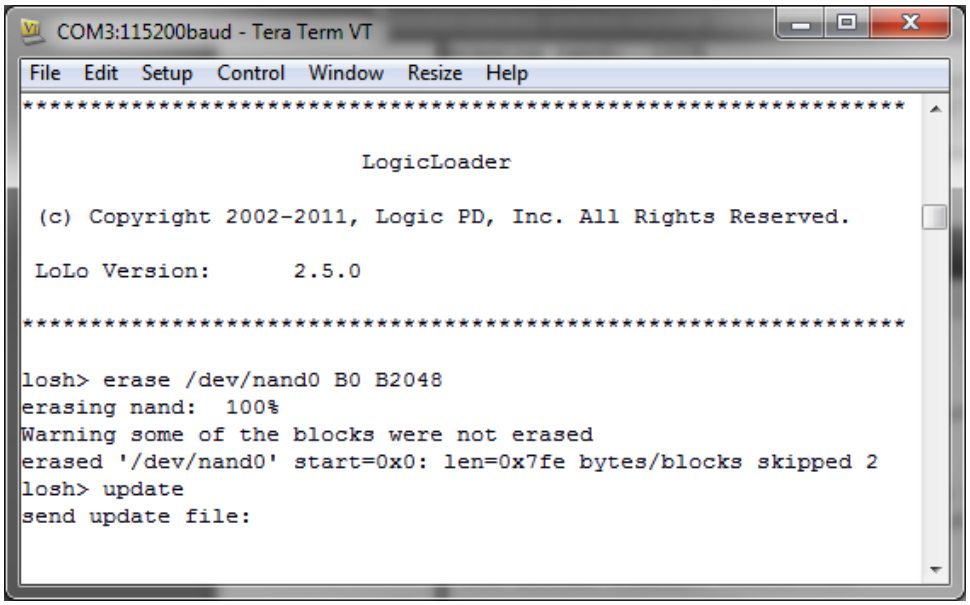
Notice that the LogicLoader Version number now shows the version you downloaded from the Logic PD website. This is because you have booted from the SD card containing that version.

7. Because NoLo and LogicLoader reside in NAND, it is necessary to erase the old LogicLoader before updating to a new one. Type **`erase /dev/nand0 B0 B2048`** and press Enter.

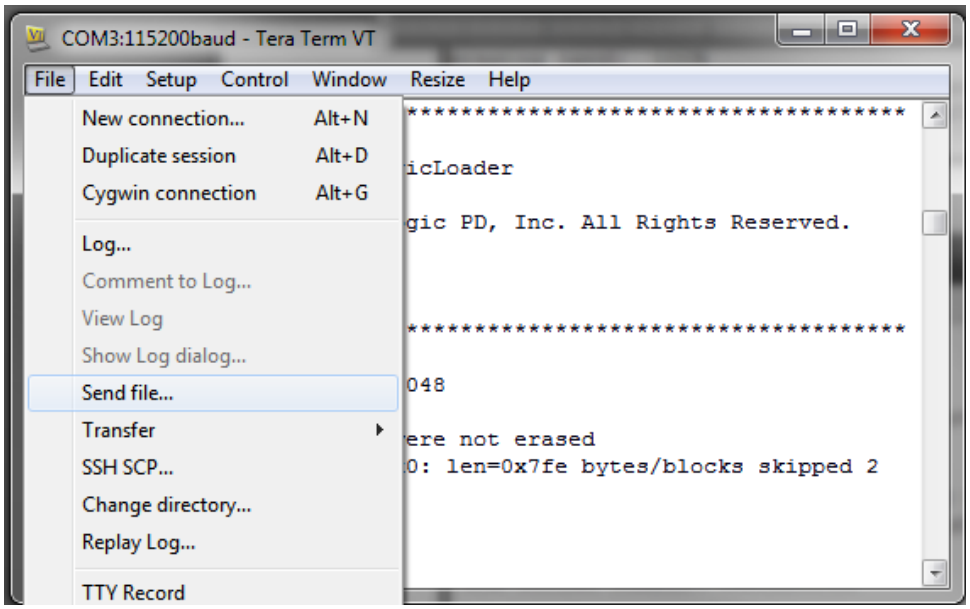


8. Because you booted the kit from SD, you will not be warned that you are erasing locked areas in NAND. You now have a blank flash device to update to.

9. Type **`update`** and press Enter. Your screen should look similar to the figure below.

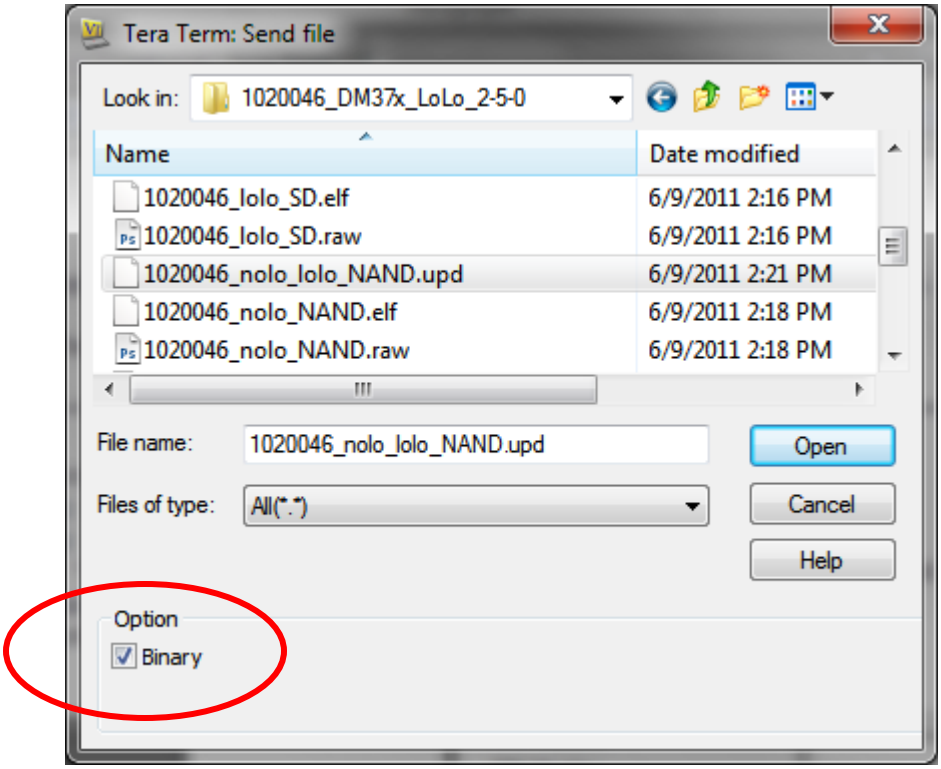


10. LogicLoader is waiting for you to send the new version over the serial port. From the menu toolbar, select File > Send file... to send the new LogicLoader version to your kit.

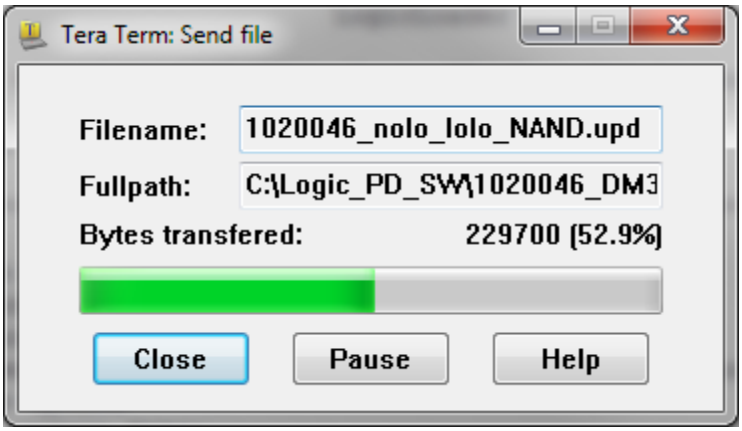


11. Navigate to the location where you extracted the LogicLoader files and select the file that includes *nolo_lolo_NAND.upd.* This file contains both NoLo and LogicLoader components necessary for updating LogicLoader. If you do not see a file that includes *nolo_lolo_NAND.upd*, please refer to the *Release_Notes.txt* included in the LogicLoader version download for special instructions.

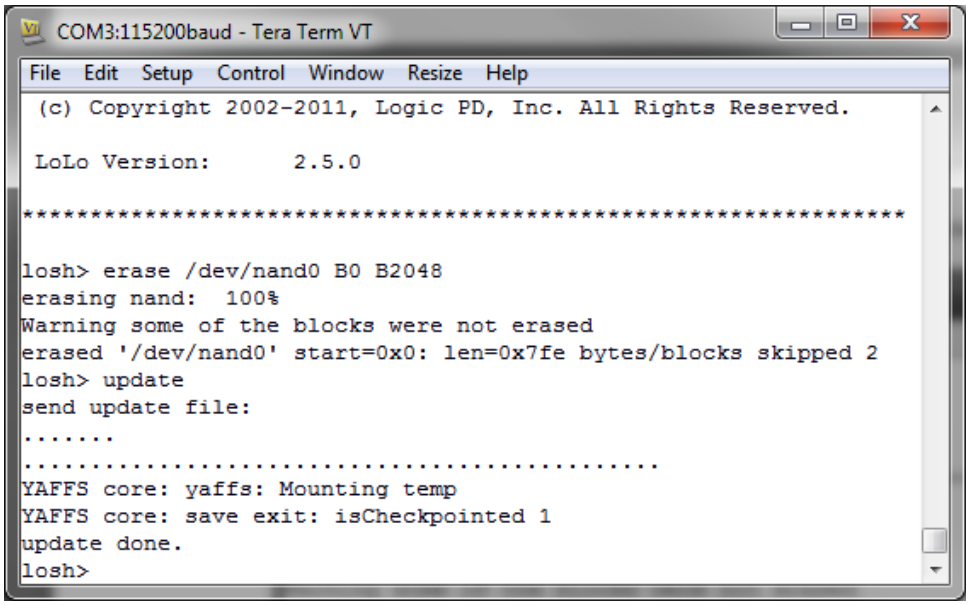
12. Verify that the “Binary” checkbox is checked. Click **Open**.



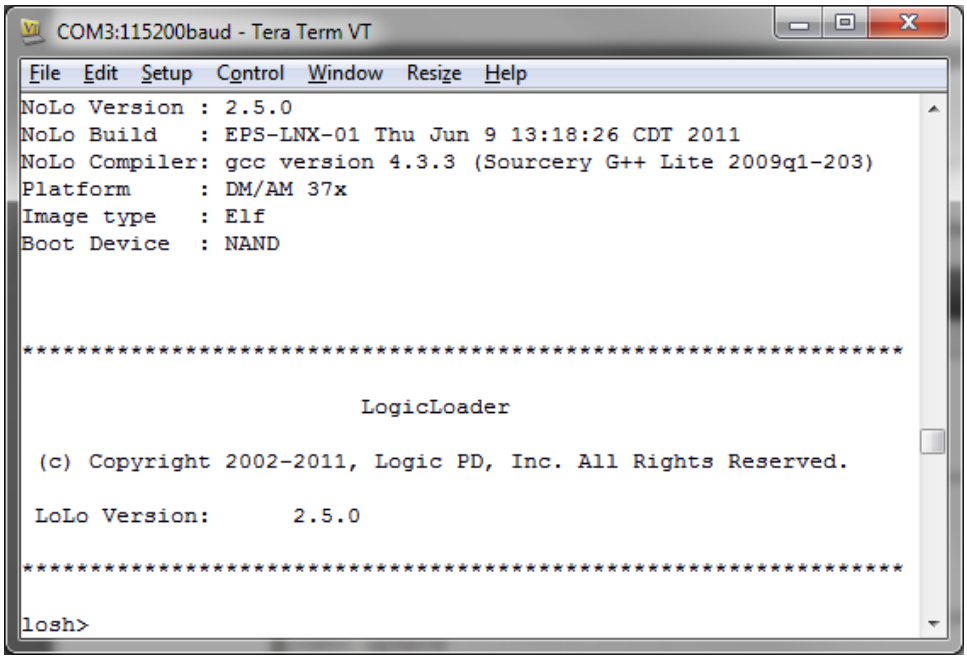
13. Tera Term will begin sending the file to the DM3730 SOM-LV.



14. Verify that the download was successful by waiting for an `update done` message to appear.



15. Remove the SD card from your development kit and press the RESET button on the baseboard.



16. If the new version number is displayed, you now have the latest and greatest version of LogicLoader installed on your kit.

    Note that the first section of the banner says the kit booted from **`Image type : Elf`** and **`Boot Device : NAND`**.

5 Wattson™

Wattson is a power measurement and performance monitoring application now standard on all Logic PD Zoom™ Development Kits.

The application delivers real-time graphical feedback and data logging capabilities without the need for external oscilloscopes and meters. Wattson guides you to the lowest power and highest performance software combination for your product.

Wattson is instrumental in helping you minimize power in run, idle, standby, suspend, and system-off states, maximizing battery life in the end application. Wattson is independent of the system, allowing power measurement even when the SOM is in deep sleep states like suspend and even off.

Wattson runs on Windows and Linux PCs, enabling software development on Windows CE and Linux based products, and can be downloaded from Logic PD's website described in the sections below.

5.1 How to Get Wattson

1. Wattson is available for download from Logic PD's website. The links below will launch the download for your specific operating system.
   - Wattson for Windows Installer[6] (ZIP file)
   - Wattson for Linux Installer[7] (tar.gz file, see below for how to extract a tar.gz file)
2. Extract the ZIP or tar.gz file. In the extracted folder you will find a *HOW TO INSTALL* document containing installation instructions.
3. Once Wattson is installed on your host PC, a *Wattson User Guide* is available from the Start > Logic PD > Wattson User Guide menu or within the Wattson application under the Help menu.

How to Extract a tar.gz File in Linux

The following command will extract the tar.gz file:

```
$ tar –xvf wattson_linux.tar.gz
```

5.2 Connect Kit to PC for Wattson

For Wattson to interact with the DM3730 SOM-LV Development Kit, use the included USB A to USB mini-B cable to connect the power measurement USB port on the baseboard to an available USB port on your host PC (see Figure 5.1).

[6] http://support.logicpd.com/downloads/1436/
[7] http://support.logicpd.com/downloads/1438/

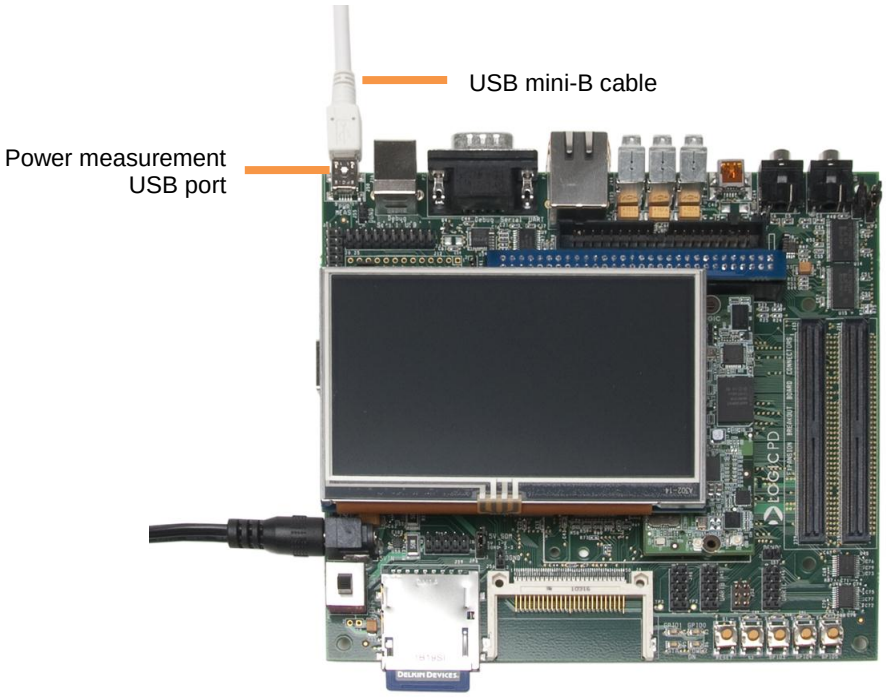


Figure 5.1: Connect USB mini-B Cable for Wattson

6 Baseboard Jumper Descriptions

The baseboard jumpers should be set according to the use case as described in Table 6.1.

Table 6.1: SDK2-APP-11 Baseboard Jumper Descriptions

Ref Des	Jumper Location	Description
JP1	Across pins 1-2	Connects LCD_VCC (I/O power rail for the LCD) to VREF_LCD.
	Across pins 2-3	Connects LCD_VCC to 3.3V_INT. Default setting for all Logic PD displays.
JP2	None	JTAG test configuration. Not used for the DM3730 SOM-LV.
JP3	Across pins 1-2	Connects ATA_VCC to VREF_ATA. Not used for DM3730 SOM-LV.
	Across pins 2-3	Connects ATA_VCC to 3.3V_INT. Not used for DM3730 SOM-LV. This is the default setting.
JP4	Across pins 1-2	Enables ATA signals. Not used for DM3730 SOM-LV. This is the default setting.
	Only on pin 1 or 2 (OFF)	Disables ATA signals. Not used for DM3730 SOM-LV.
JP5	Across pins 1-2	This sets the LCD connector (J11) as active. This is the default setting.
	Across pins 2-3	This sets the HDMI connector (J47) as active.
JP6	Across pins 1-2	Connects 5V_SOM (5V input to the SOM only) to 5V. This should only be used if battery charging is supported on the DM3730 SOM-LV. Note that the SDK2-APP-11 baseboard does not provide support for a battery.
	Across pins 2-3	Connects 5V_SOM to DGND. This is the default setting.
J42	Across pins 1-2	Connects an external 5V power supply to USB1_VBUS.
	Only on pin 1 or 2 (OFF)	Disconnects USB1_VBUS from the external 5V power supply. This is the default setting.

7 Connect Other Hardware Included with Kit

The DM3730 SOM-LV Development Kit includes two antennas; both antennas provide reception for 802.11 Ethernet or Bluetooth signals. Only connect the antennas if 802.11 Ethernet or Bluetooth is required for your demo or development efforts.

Table 7.1: Antennas Included in Development Kit

Ref Designator	Manufacturer	P/N
Antenna cable	Sunridge Corporation	MCBG-RH-54-080-SMAJB281
Antenna	Pulse Engineering	W1030
Flexible Antenna	Taoglas	FXP73.07.0100A

7.1 Connect Antennas

1. The non-flexible antenna requires assembly. Insert the RF cable into the antenna and tighten the screw nut.

Figure 7.1: Assemble Antenna

2. Connect the antenna to the SOM-LV reference designator J4 for 802.11 Ethernet reception or to reference designator J3 for Bluetooth reception. See Figure 7.2 for location of reference designators on the top of the SOM-LV.

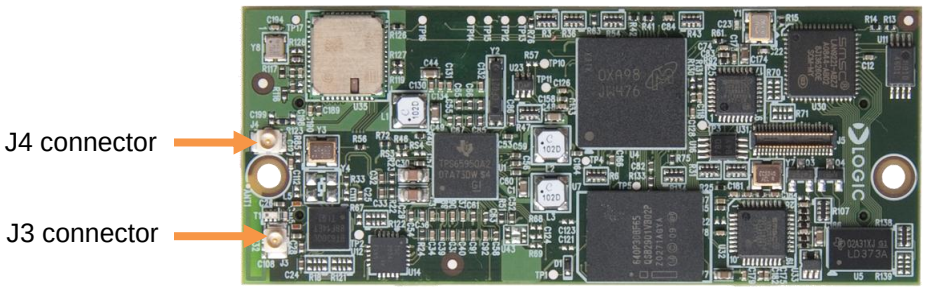


Figure 7.2: Antenna Connectors on SOM-LV

7.2 Connect the ETM Adapter Board to the SOM

The Embedded Trace Macrocell™ (ETM) adapter board provides debug and trace features for the ARM processor. Only connect the ETM adapter board if you need to debug the SOM-LV using an ETM interface external debug tool. **NOTE:** The 4.3” LCD cannot be attached to the baseboard when using the ETM adapter board.

1. Locate the ETM connector on the SOM-LV. See Figure 7.3.

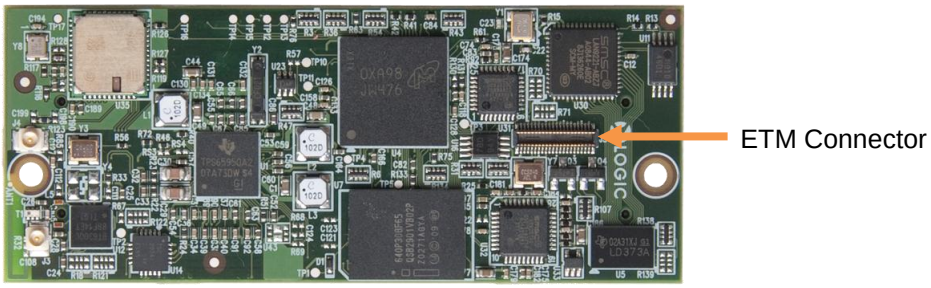


Figure 7.3: ETM Connector on SOM-LV

2. Position the ETM adapter board so that the Logic PD name on the adapter board is oriented the same way as the Logic PD name on the baseboard.
3. Make sure the connector on the bottom of the ETM adapter board aligns correctly with the connector on the SOM-LV.
4. Press straight down on the ETM adapter board directly over the connectors to mate the two boards. See Figure 7.4 for the final position of the connected ETM adapter board to the SOM-LV.

Figure 7.4: ETM Adapter Board Connected to SOM-LV

7.3 Connect High-Density Breakout Board

The high-density breakout board provides access to all of the SOM-LV signals.

1. Align the breakout board over the two BTB connectors closest to the baseboard edge. (There is an outline on the baseboard silkscreen that specifies the expansion breakout board connectors). When aligned correctly, the majority of the expansion board will overhang the side of the baseboard.

2. Press straight down on the breakout board, applying even pressure over the two baseboard BTB connectors. See Figure 7.5.

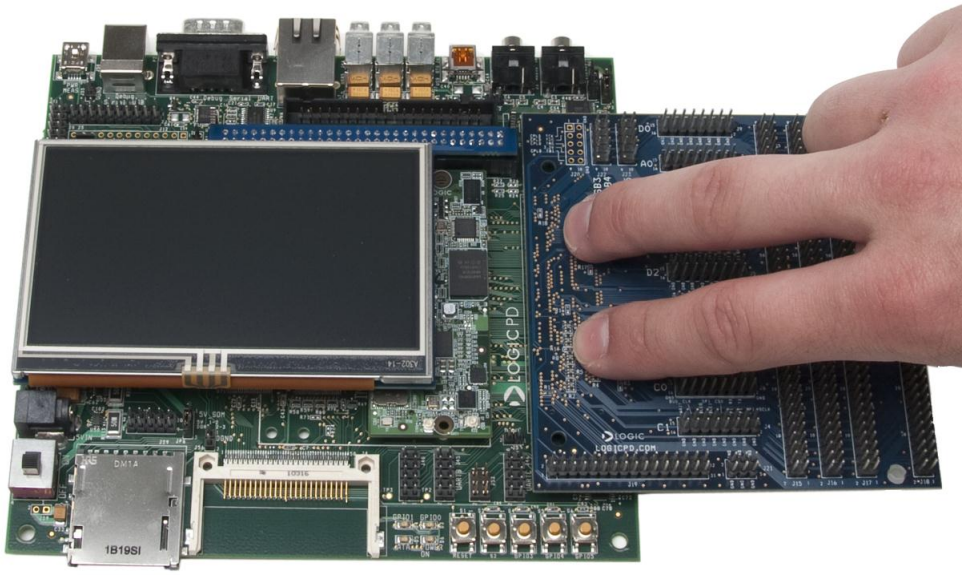


Figure 7.5: High-Density Breakout Board Connected to Baseboard

3. Visually verify that the BTB connectors on the breakout board and baseboard have mated correctly. To remove the breakout board, pull up on the board above the BTB connectors. Attempt to pull straight up and refrain from flexing the PCB to avoid damaging the breakout board.

Appendix A: Additional Documentation

Documentation Overview Flowchart

- *DM3730/AM3703 SOM-LV Documentation Overview*
  http://support.logicpd.com/downloads/1419/

Software Documentation

- *LogicLoader v2.5 User Guide*
  http://support.logicpd.com/downloads/1428/
- *LogicLoader v2.5 Command Description Manual*
  http://support.logicpd.com/downloads/1440/
- *DM3730 Android BSP User Guide*
  http://support.logicpd.com/downloads/1441/
- *DM3730 Linux BSP User Guide*
  http://support.logicpd.com/downloads/1431/
- *DM3730 Windows Embedded CE BSP User Guide*
  http://support.logicpd.com/downloads/1423/

Hardware Documentation

- *Zoom DM3730 SOM-LV Development Kit QuickStart Guide*
  http://support.logicpd.com/downloads/1421/
- Zoom DM3730 SOM-LV Development Kit Hardware Design Files (BOM, schematic, and layout files for all boards included in the kit)
  http://support.logicpd.com/downloads/1443/
- *DM3730 SOM-LV Hardware Specification*
  http://support.logicpd.com/downloads/1439/