VEEK-MT2S

Getting Started Guide

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Chapter 1

About this Guide

The VEEK-MT2S Getting Started Guide contains a quick overview of the hardware and software setup including step-by-step procedures from installing the necessary software tools to using the VEEK-MT2S board. The main topics that this guide covers are listed below:

- Software Installation: Installing Quartus II and SoC EDS
- Development Board Setup: Powering on the VEEK-MT2S
- Perform FPGA System Test: Downloading a FPGA SRAM Object File (.sof)
- Running Linux on VEEK-MT2S Board

The VEEK-MT2S is composed of **DE10-Stanard** mainboard and **MTLC2** (Multi-Touch LCD with Camera, second edition) module. In the following statement, DE10-Stanard keyword word will be used to specify the peripheral location in DE10-Standard mainboard.

Note, in the VEEK-MT2S System CD, only the MTLC2 relative reference design and document is included. For DE10-Standard mainboard relative reference design and document, please refer to the DE10-Standard System CD which is available in the web: http://de10-standard.terasic.com/cd.

Chapter 2

Software Installation

2.1 Introduction

This section explains how to install the following software:

- Altera Quartus II software
- Altera SoC Embedded Design Suite

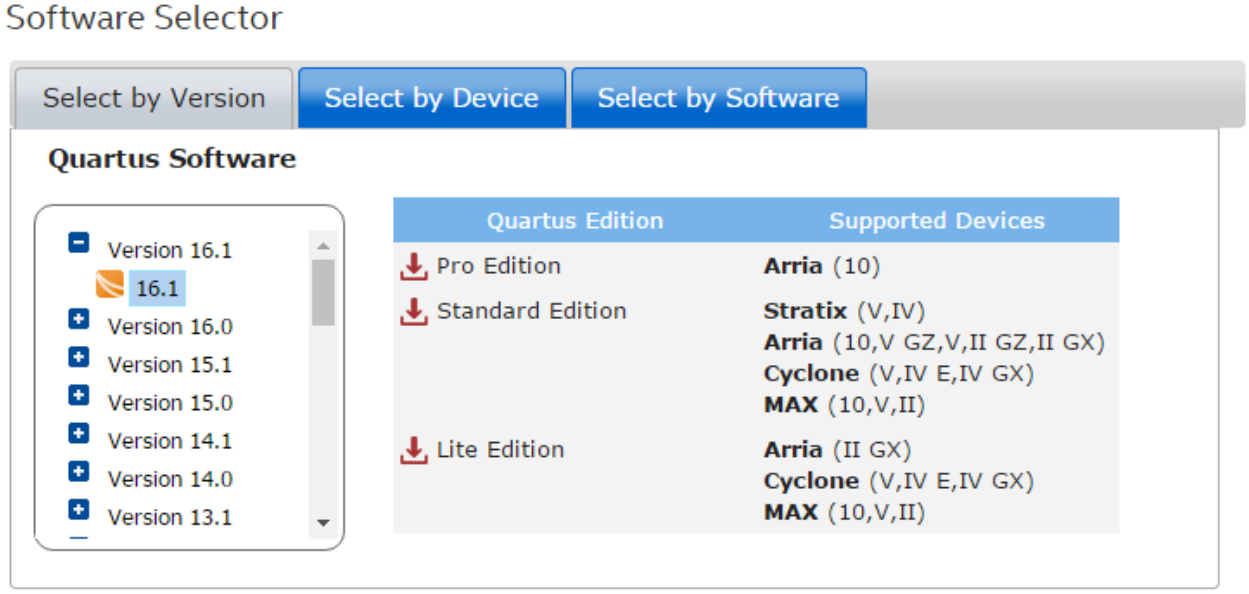
Note: 64-bit OS required

2.2 Installing Quartus II software

The Altera Complete Design Suite provides the necessary tools used for developing hardware and software solutions for Altera FPGAs. The Quartus II software is the primary FPGA development tool used to create reference designs along with the NIOS II soft-core embedded processor integrated development environment

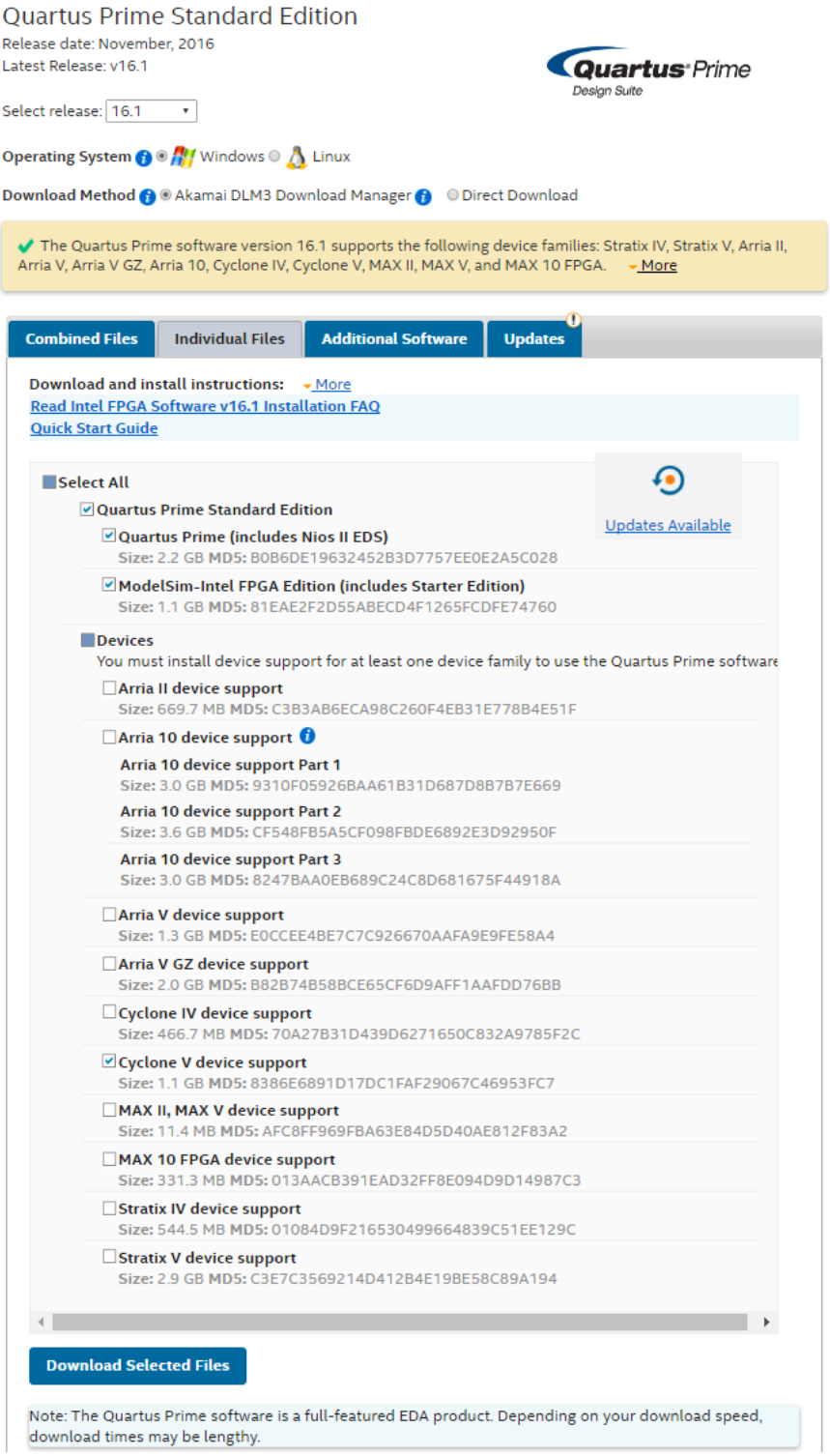
User can download the latest software from:

https://www.altera.com/downloads/download-center.html



- If you choose to install the Standard Edition, please note that a purchased license will be required. Please go to the following link for more information on the Standard Edition: https://www.altera.com/support/support-resources/download/licensing.html

- Download files from **Standard** or **Lite** edition page. You must download the Quartus II Software (includes NIOS II EDS) and Cyclone V device support (includes all variations).



- After the file is downloaded on the computer, select the *.exe file, and install the software. All of the defaults are to be used.

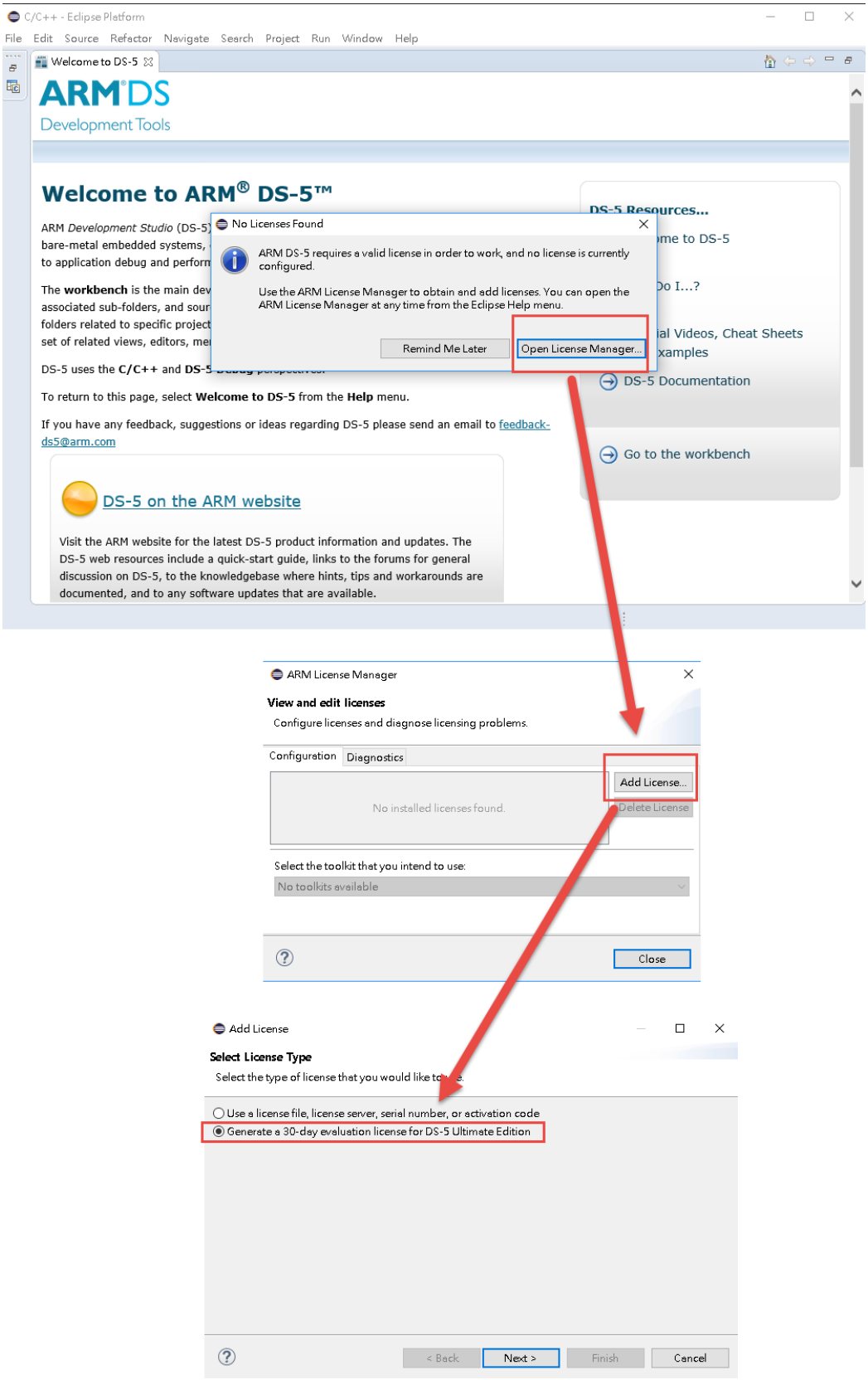
2.3 Installing Altera SoC Embedded Design Suite

The Altera SoC Embedded Design Suite (EDS) contains development tools, utility programs, run-time software, and application examples to enable embedded development on the Altera SoC hardware platform. User can use the Altera SoC EDS to develop firmware and application software. Users can download the software from the Altera webpage: http://dl.altera.com/soceds/

After you have installed the SoC Embedded Design Suite (EDS), you can start the ARM® Development Studio 5 (DS-5™) Altera Edition software. If this is your first time using the DS-5, a popup dialog will automatically ask if you wish to open the license manager.

For the free SoC EDS **Lite Edition**, you will be able to use DS-5 perpetually to debug Linux applications over an Ethernet conn. If you have purchased the SoC EDS **Standard Edition**, you would have received an ARM license serial number. This is a 15-character alphanumeric string with two dashes in between. Please enter this serial number into the input field to get full capabilities for the DS-5 Altera Edition software. This license includes one-year Support & Maintenance from ARM starting at the date of purchase or renewal.

After success installing the DS-5, user can select the "Generate a 30-day evaluation license for DS-5 Ultimate Edition" as below image and follow the procedure.


C/C++ - Eclipse Platform
File Edit Source Refactor Navigate Search Project Run Window Help
Welcome to DS-5
ARM DS
Development Tools
Welcome to ARM® DS-5™
No Licenses Found
ARM DS-5 requires a valid license in order to work, and no license is currently configured.
Use the ARM License Manager to obtain and add licenses. You can open the ARM License Manager at any time from the Eclipse Help menu.
Remind Me Later
Open License Manager...
DS-5 Documentation
Go to the workbench
To return to this page, select Welcome to DS-5 from the Help menu.
If you have any feedback, suggestions or ideas regarding DS-5 please send an email to feedback-ds5@arm.com
DS-5 on the ARM website
Visit the ARM website for the latest DS-5 product information and updates. The DS-5 web resources include a quick-start guide, links to the forums for general discussion on DS-5, to the knowledgebase where hints, tips and workarounds are documented, and to any software updates that are available.
ARM License Manager
View and edit licenses
Configure licenses and diagnose licensing problems.
Configuration
Diagnostics
Add License...
Delete License
No installed licenses found.
Select the toolkit that you intend to use:
No toolkits available
Close
Add License
Select License Type
Use a license file, license server, serial number, or activation code
Generate a 30-day evaluation license for DS-5 Ultimate Edition
< Back
Next >
Finish
Cancel

Chapter 3

Development Board Setup

3.1 Introduction

The instructions in this section explain how to set up the VEEK-MT2S development board. The following pictures show the board overview of VEEK-MT2S board.

3.2 MSEL Settings

■ FPPx32 Mode(Default)

The FPGA Configuration Mode Switch (MSEL) shown in **Figure 3-1** is by default set to **01010** (MSEL[4:0] = 01010). The setting corresponds to FPGA configured from HPS software (in the SD Card) in FPPx32 mode. **If users want to boot with Linux LXDE desktop, please setting MSEL switch in this mode**.

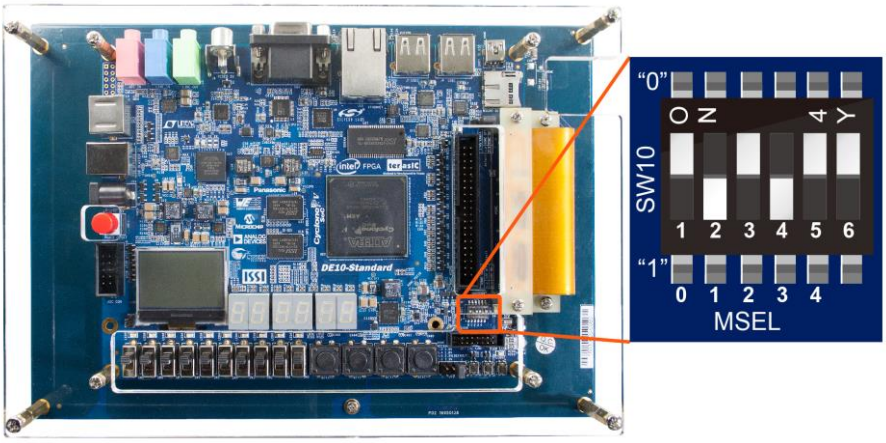


Figure 3-1 FPGA Configuration Mode Switch set in FPPx32 Mode

■ AS Mode

When the board is powered on and MSEL[4:0] set to "10010" (See **Figure 3-2**), the FPGA is configured from EPCS.

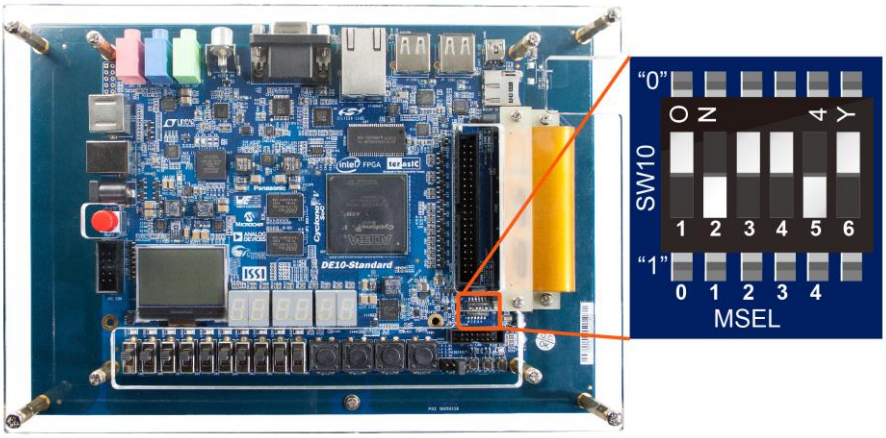


Figure 3-2 FPGA Configuration Mode Switch set in AS Mode

3.3 USB and Power Cables

Cable connections are shown in **Figure 3-3** as below:

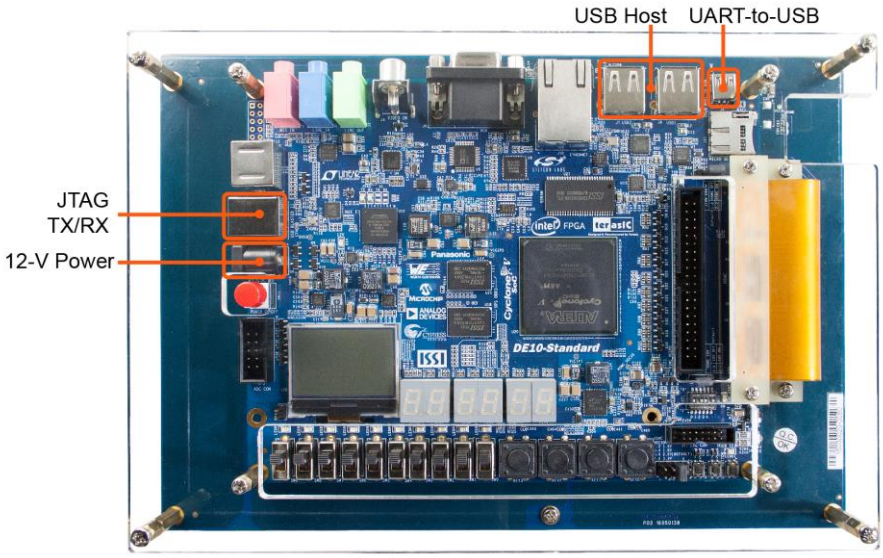


Figure 3-3 USB and Power Cables

3.4 Power up the VEEK-MT2S with LXDE Desktop

To power-up the board and run the LXDE desktop, please refer to **Figure 3-4** to perform the following setup steps:

1. Make sure MSEL[4:0] set to **01010**.
2. Connect the provided power cord to the power supply and plug the cord into a power outlet.
3. Make sure the microSD card for the LXDE Desktop, which came with VEEK-MT2S, is inserted into the microSD Socket (J11) on the DE10-Standard. If you are missing the microSD card, please follow the descriptions in chapter 5 to build a bootable SD card with LXDE image.
4. Connect the supplied VEEK-MT2S power adapter to the power connector (J14) on the DE10-Standard. At this point, you should see the 12V indicator LED (D14) turned on.
5. It will take about 35 seconds to boot Linux. Finally, the screen will enter LXDE desktop on the LCD. Now, user can use mouse/keyboard or touch screen on the LEXD desktop.

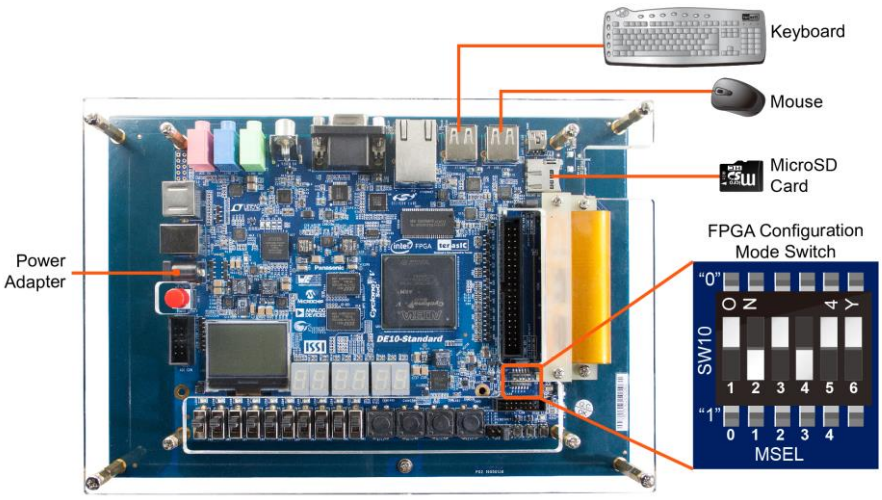


Figure 3-4 Setup for LXDE Desktop

Chapter 4

Performing a FPGA System Test

4.1 Introduction

This chapter shows how to install the USB-Blaster II driver and download a FPGA SRAM Object (.sof) file to your FPGA board.

4.2 Installing the USB-Blaster II Driver

The steps below outline how to install the USB-Blaster II driver.

1. Connect your computer to the development board by plugging the USB cable into the USB connector (J13) of DE10-Standard (connection shown in **Figure 3-3**)
2. Power up the board and open the device manager in Windows. You will find an unknown device as shown in **Figure 4-1**.

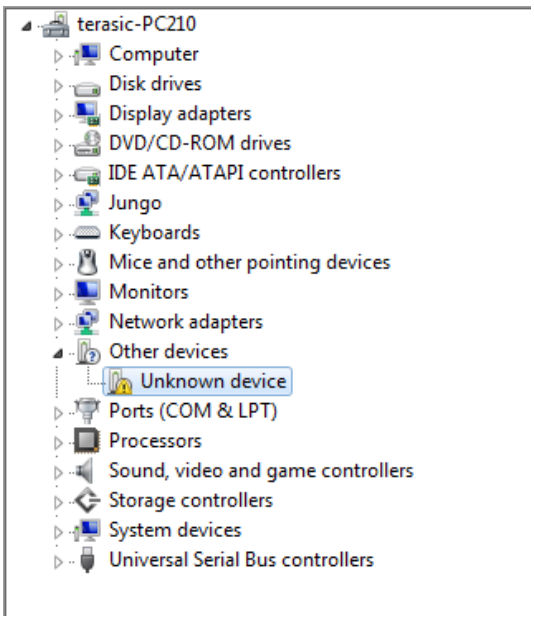


Figure 4-1 Unknown device on device manager

3. Select the unknown device to update the driver software. The driver file is in the \<Quartus II installation directory>\drivers\ usb-blaster-ii directory.

4. After the driver is installed correctly, the device is recognized as Altera USB-Blaster II as shown in **Figure 4-2**.

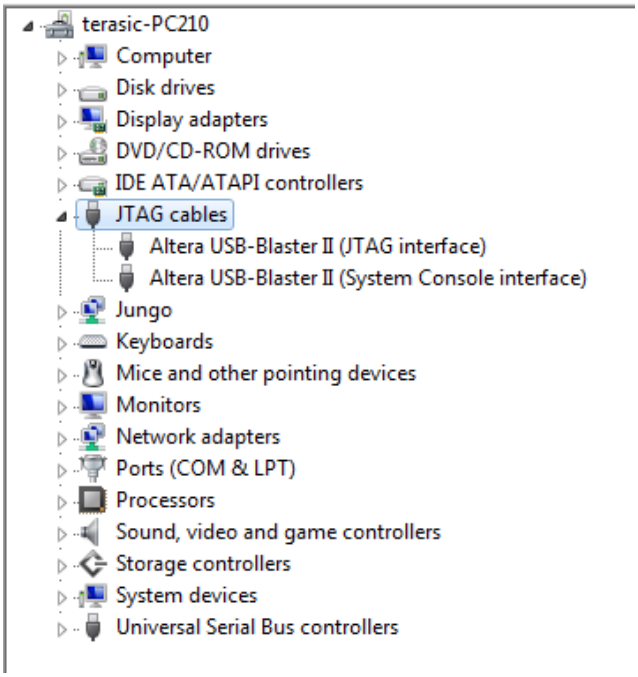


Figure 4-2 USB-Blaster II driver is installed correctly

4.3 Downloading a FPGA SRAM Object File

The Quartus II Programmer is used to configure the FPGA with a specific .sof file. Before configuring the FPGA, ensure that the Quartus II software and the USB-Blaster II driver are installed on the host computer.

If users would like to program their SRAM Object File (.sof) into the Cyclone V SOC FPGA device on the DE10-Standard board, There are two devices (FPGA and HPS) on the JTAG Chain, the configure flow is different from the one used with DE0-Nano. The following shows the programming flow with JTAG mode step by step.

1. Connect your computer to the DE10-Standard board by plugging the USB cable into the USB

connector (J13) of DE10-Standard and power up the board (details shown in **Chapter 3**)

2. Open the Quartus II software and select Tools > Programmer. The Programmer window will appear as shown in **Figure 4-3**.

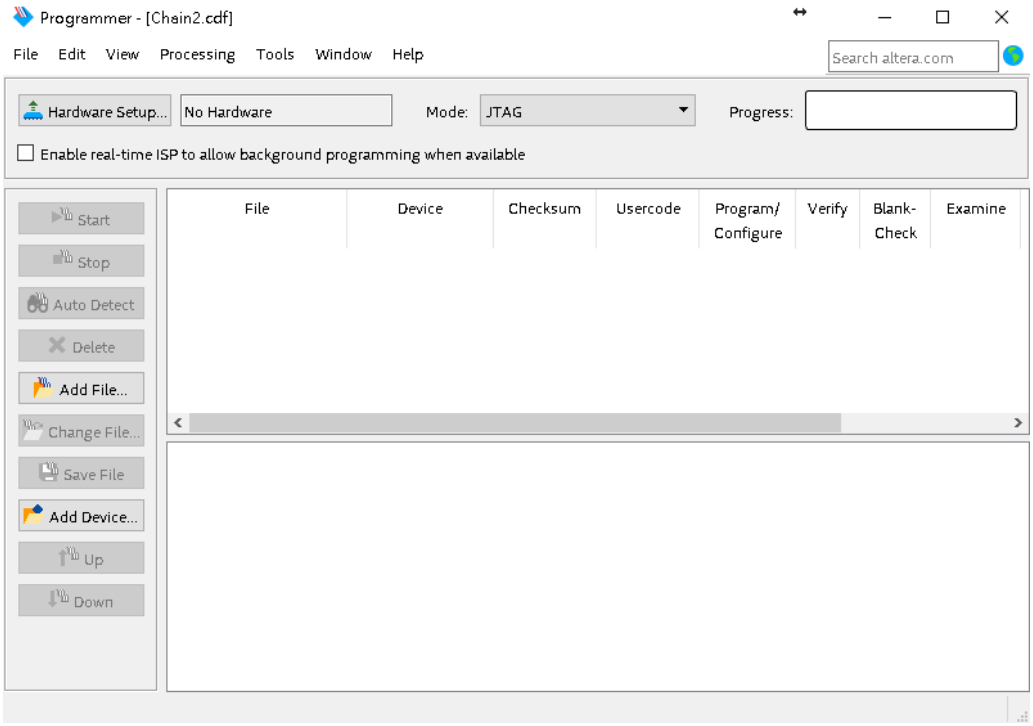


Figure 4-3 Quartus Programer

3. Click **Hardware Setup**.
4. If **DE-SoC [USB-1]** does not appear under **Currently Selected Hardware**, select that option and click **Close** as shown in **Figure 4-4**.

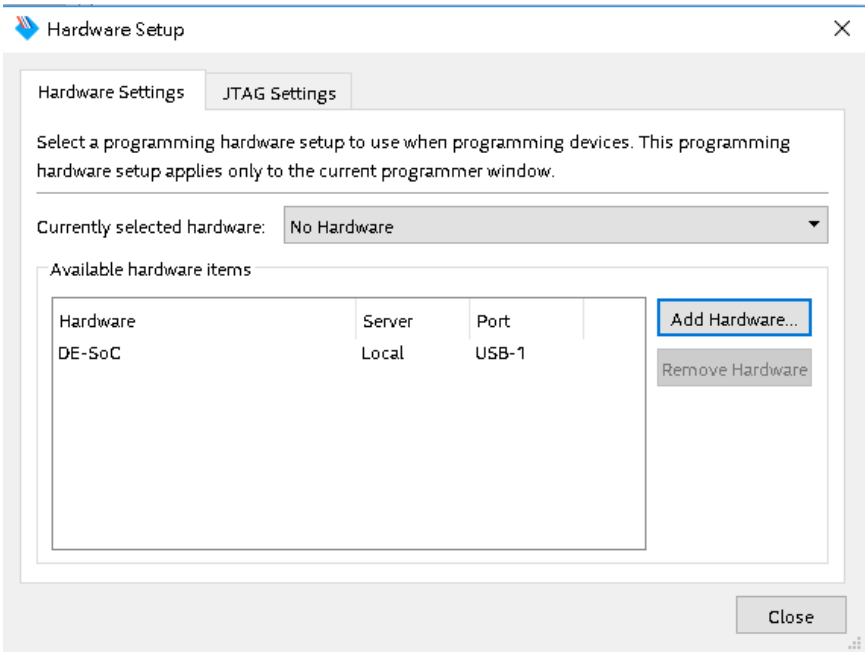


Figure 4-4 Hardware Setup

If the USB-Blaster II does not appear under hardware options list, please confirm if the USB-Blaster II driver has been correctly installed, and the USB cable has been properly connected between the DE10-Standard board and host computer.

5. Click "Auto Detect" as shown in **Figure 4-5**.

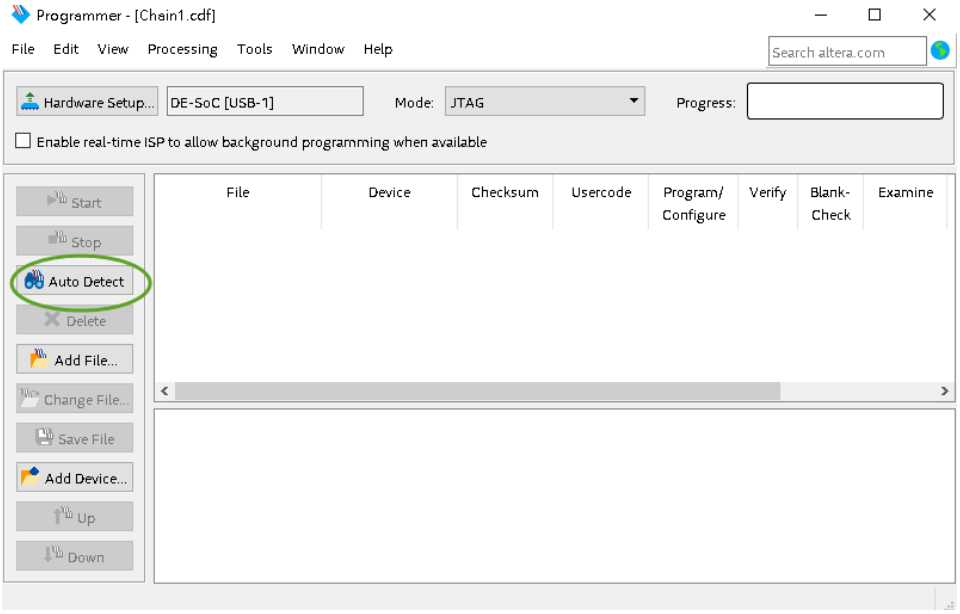


Figure 4-5 Auto detect FPGA device

6. Select the device associated with the board as shown in **Figure 4-6**.

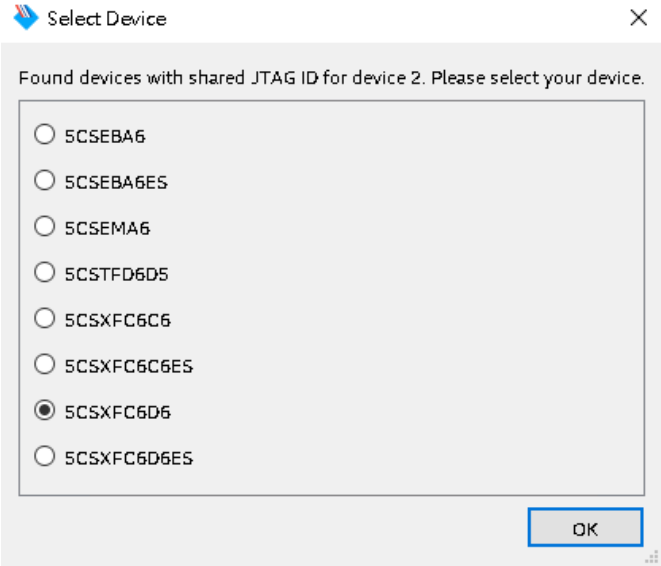


Figure 4-6 Select FPGA device

7. FPGA and HPS devices are all show in the JTAG chain as shown in **Figure 4-7**.

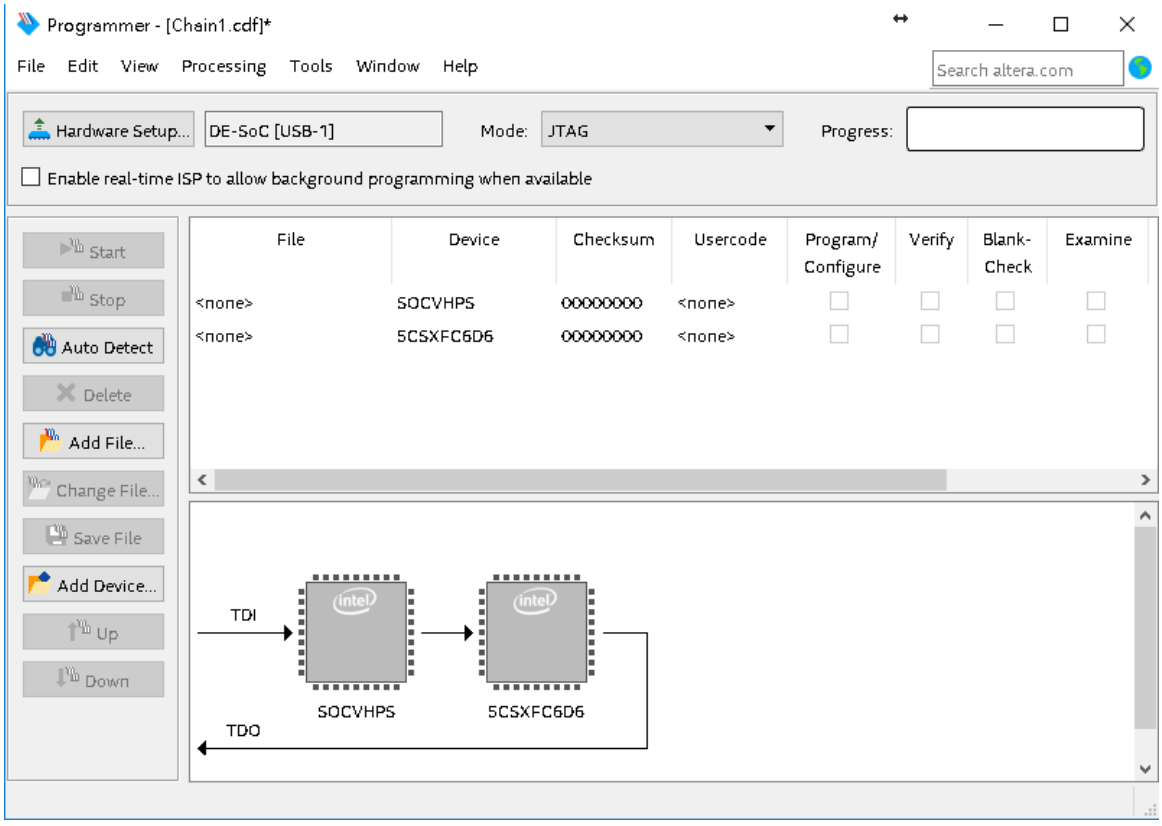


Figure 4-7 JTAG Chain on VEEK-MT2S board

8. Click the FPGA device, click “Change File..”, and then select .sof file for FPGA as shown in **Figure 4-8**.

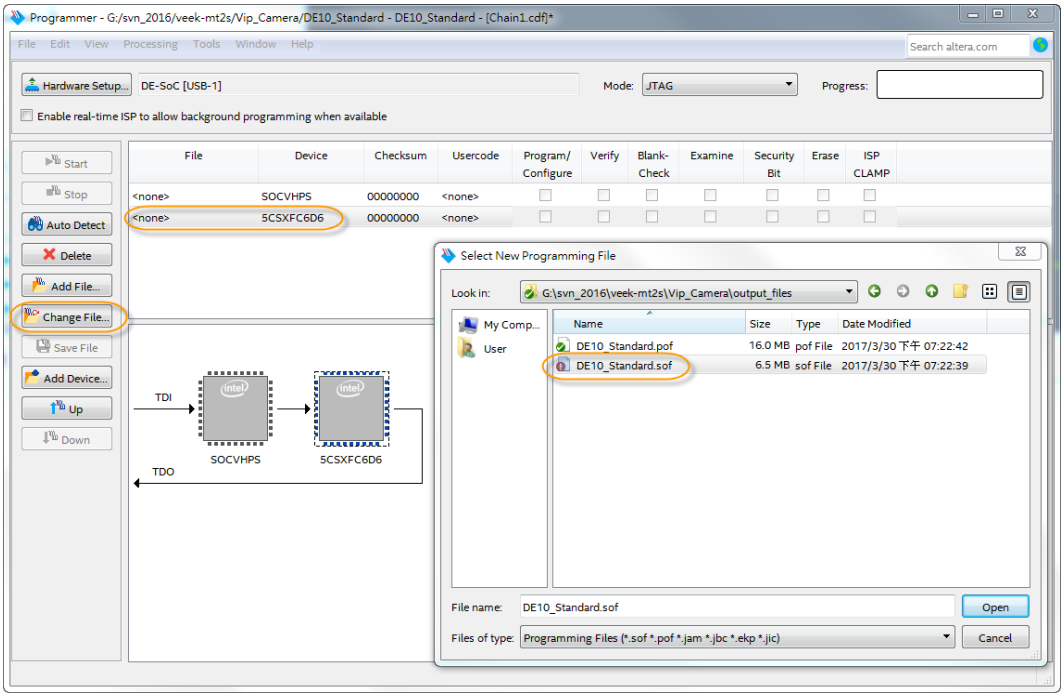


Figure 4-8 Add .sof file

9. Select \<CD directory>\Demonstration\FPGA\Camera\output_files\DE10_Stanard.sof.

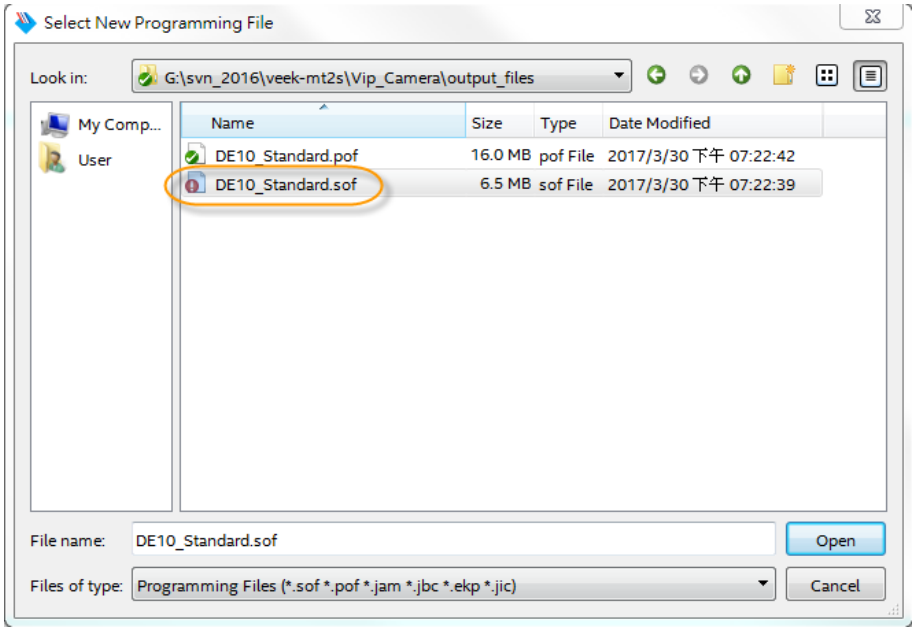


Figure 4-9 Select .sof file

10. Click “Program/Configure” check box, and then click “Start” button to download .sof file into FPGA

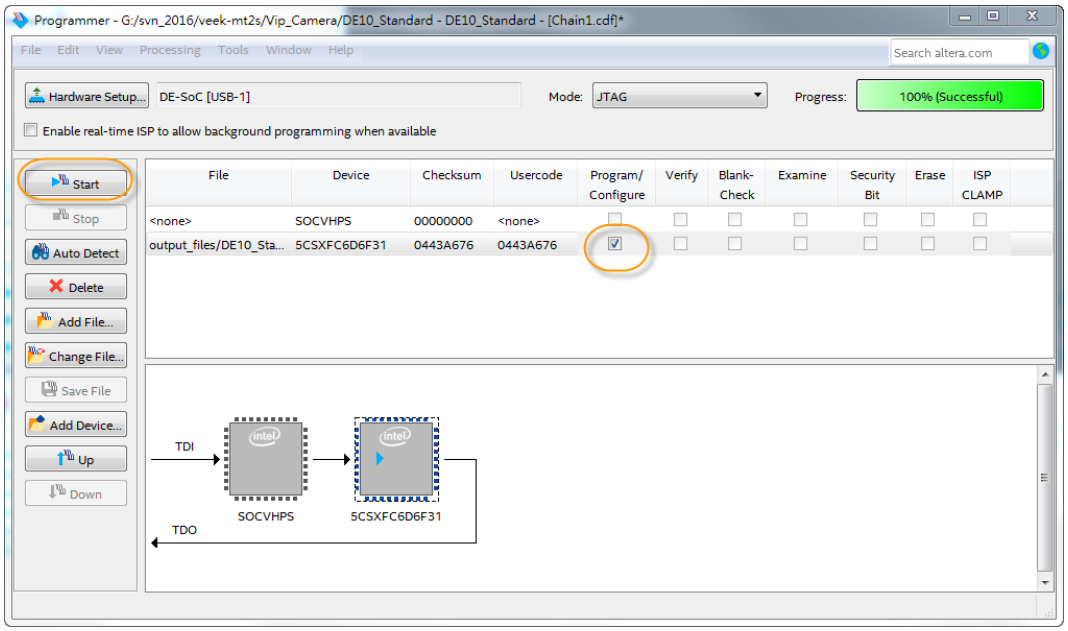


Figure 4-10 Downaload .sof file

Chapter 5

Running Linux on the VEEK-MT2S via UART Terminal

5.1 Introduction

This chapter demonstrates how to set up a UART Terminal, and connect to DE10-Standard Board running Linux. Also, we will show how to create a Micro SD card image for using another board support image (BSP) such us **Linux Console.** User can download the latest SD Card image file from Terasic's website: http://veek-mt2s.terasic.com/cd.

5.2Creating a microSD Card Image

To program a microSD card Linux image you can use a free tool called **Win32DiskImager.exe** from http://sourceforge.net/projects/win32diskimager/ on a Windows machine.

■ MicroSD Specification

- Capacity: 8GB minimum
- Speed: Class 4 (at least)

■ Download LXDE SD Card Image

The VEEK-MT2S_LXDE.img file contains all the items that are needed to run Linux on VEEK-MT2S board. (You can download the compressed file from the link: http://www.terasic.com/downloads/cd-rom/de10-standard/Linux/DE10-Standard_LXDE.zip. And extract file to get the image file after downloading)

- SPL Pre-loader

- U-boot
- Device Tree Blob
- Linux Kernel
- Linux Root File system

The SD card image file needs to be programmed to a microSD card before it can be used. The steps below present how to create microSD card on a windows machine using Win32DiskImager.exe.

1. Connect the microSD card to a Windows PC
2. Execute Win32DiskImager.exe
3. Select the image file for microSD card
4. Select the microSD card device

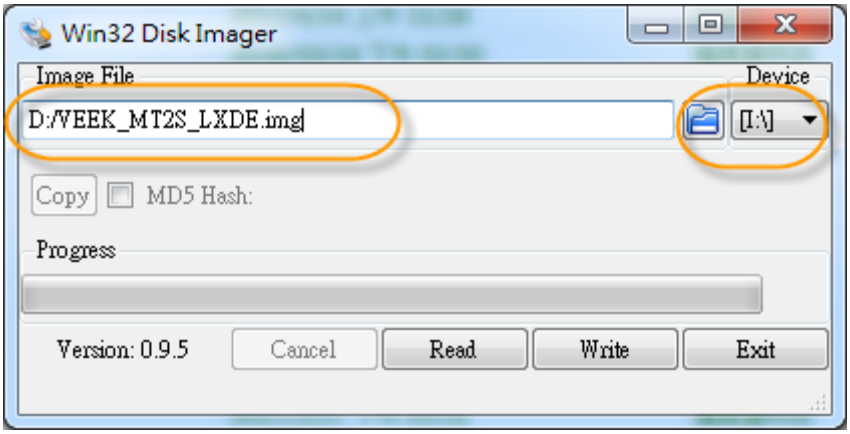


Figure 5-1 Win32 Disk Imager

5. Click “write” to start writing the image file to the microSD card. Wait until the image is written successfully.

5.3 Setting Up UART Terminal

This section presents how to install the drivers for the USB to UART chip on the DE10-Standard board and set up the UART terminal on your host PC. The DE10-Standard board communicates with the PC through the mini USB connector J4 on DE10-Standard.You should install the USB to UART driver and configure the UART terminal before you run Linux on the board.

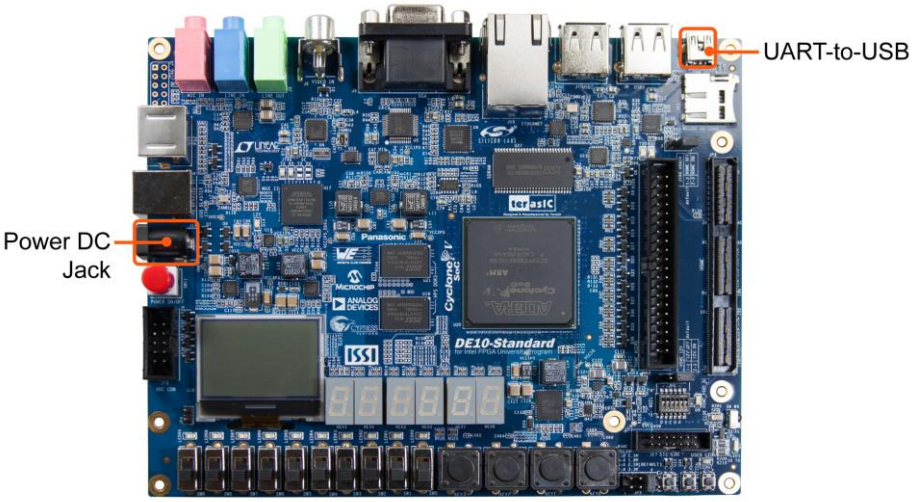


Figure 5-2 Hardware Setup for UART Terminal

■ Installing the USB to UART Driver

This section presents how to install the drivers for USB to UART communication. The necessary steps on Windows 7 are:

1. Connect your computer to the development board by plugging the USB cable into the **Mini USB connector** (J4) of DE10-Standard (connection shown in **Figure 3-3**)
2. Power on the board then open the computer device manager in Windows. You will find an unrecognized FT232R USB UART.

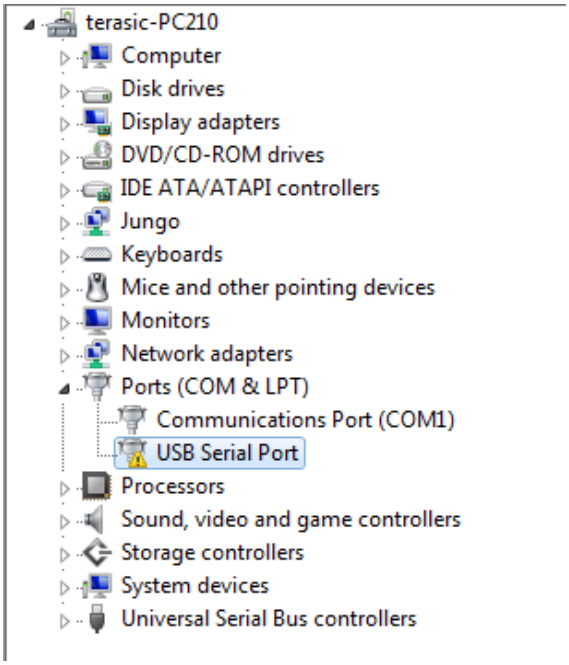


Figure 5-3 Unknown device on device manager

3. Select the FT232R USB UART to update the driver software. The driver can be downloaded from http://www.ftdichip.com/Drivers/VCP.htm.
4. After the driver has been installed correctly, the USB Serial Port is recognized as an **USB Serial Port** as shown in **Figure 5-4** . Remember the port number. In this case, the port number is **COM54**.

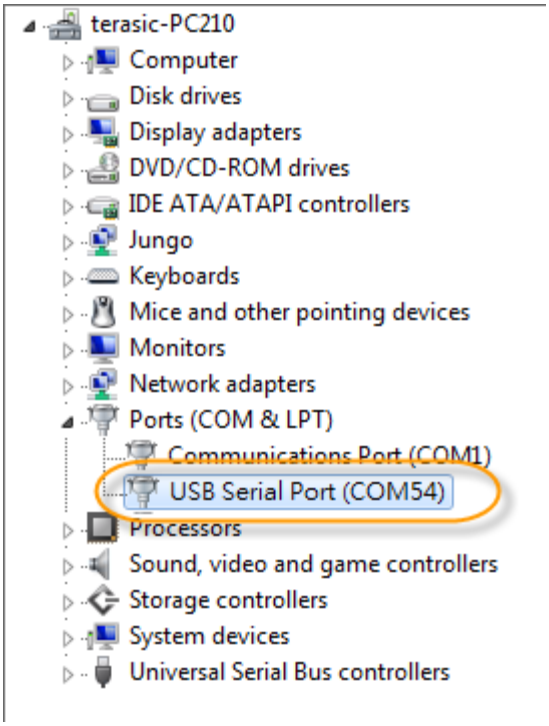


Figure 5-4 USB Serial Poet driver is installed correctly

5. Now you can power off the DE10-Standard board

■ Configure UART terminal UART terminal spec:

- 115200 baud rate
- no parity
- 1 stop bit
- no flow control settings

The following steps present how to configure a PuTTY terminal window (can be downloaded from the link: http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe)

1. Open putty.exe, click ***Serial*** go to a serial configure interface.
2. Configure the serial port settings (Serial line COM54, Speed 115200, Saved Sessions COM54) as shown in **Figure 5-5**. Then, click Save button to save the configuration.

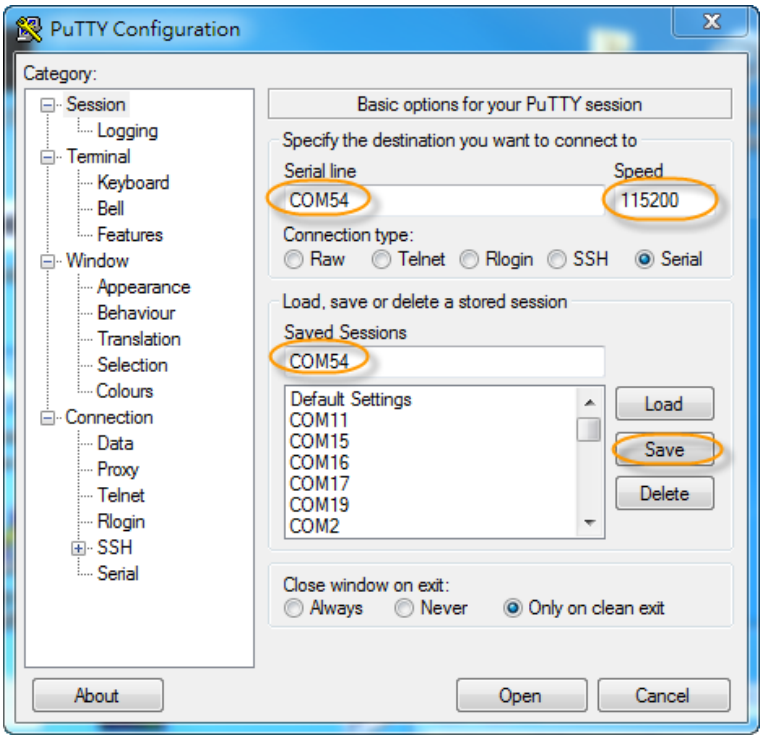


Figure 5-5 Putty Window

5.4 Running Linux on VEEK-MT2S board

This section presents how to run the pre-built Linux images on the VEEK-MT2S board. You can run the Linux by following the steps below:

1. Insert the factory microSD card with the pre-built image into the board (See Section 5.4 to prepare a microSD card)
2. Make sure the MSEL switch is set to "MSEL[4:0] = 01010"
3. Power up the board (See **Chapter 3** for details)
4. Open putty.exe, select and load the saved serial configuration (COM54 in this example), and click Open button to open COM Dialog as shown in **Figure 5-6**.
5. After a successful boot, the Linux will ask for the login name. Type "**root**" for user name to login LXDE Linux as shown in **Figure 5-7**. (no password is required; press ENTER in keyboard under password prompt)

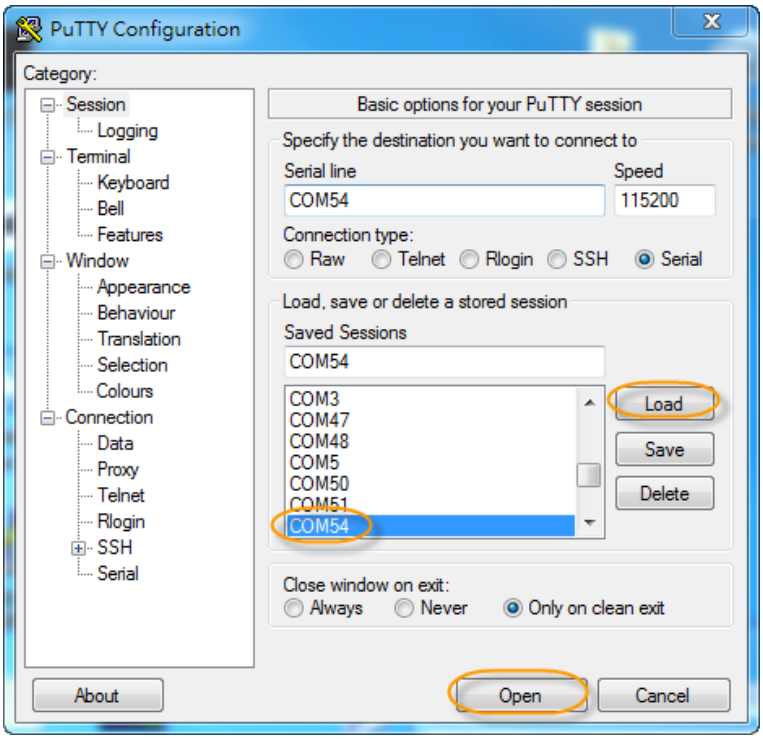


Figure 5-6 Open COM Port Session

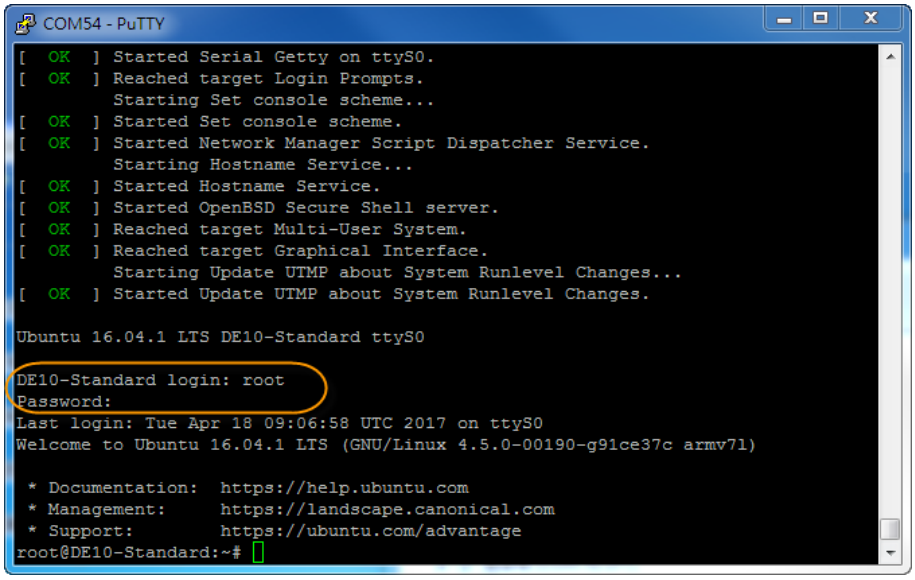


Figure 5-7 Perform login in the Putty Window

Getting Help

Here are the addresses where you can get help if you encounter problems:

- Terasic Inc.
  9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan, 30070
  Email: support@terasic.com
  Web: www.terasic.com

Revision History

Date	Version	Changes
2017.01	V1.0	First Version