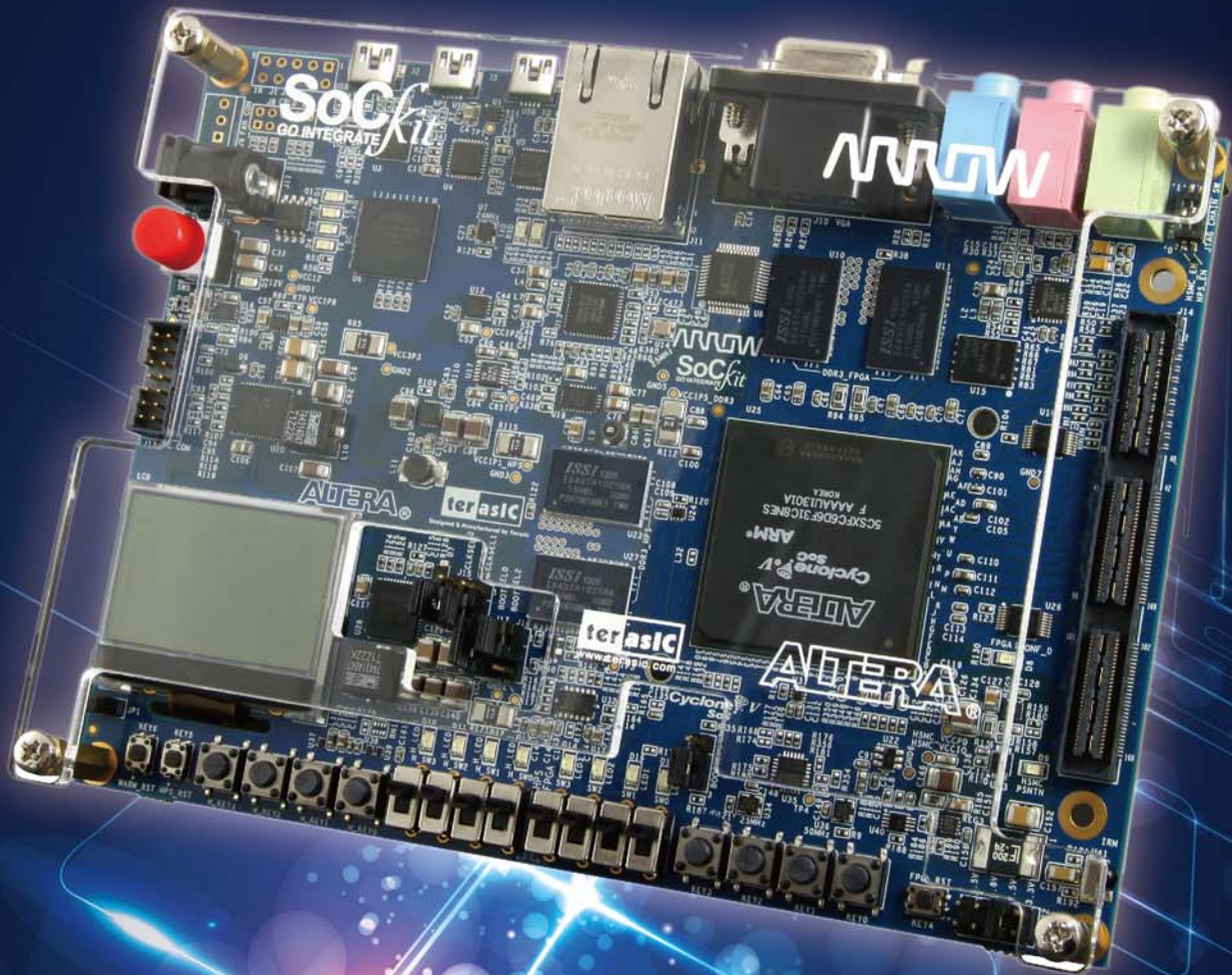


SoCKit

FPGA Development Kit

Getting Started Guide



WOW

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ALTERA

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Chapter 1

About this Guide

The SoCKit 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 SoCKit 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 SoCKit
- Perform FPGA System Test: Downloading an FPGA SRAM Objective File (.sof)
- Running Linux on SoCKit Board

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/download/dnl-index.jsp>



Quartus II Subscription Package 13.0

Paid license required

Package includes Quartus II, ModelSim-Altera Starter Edition, and support for all Altera device families.

Free 30 day trial!

[Subscription Package](#)

Quartus II Web Package 13.0

FREE, no license required

Package includes Quartus II, ModelSim-Altera Starter Edition and support for most low-cost and mid-range Altera FPGAs.

IP available for purchase

[Free Web Package](#)

[What's new in Quartus II v13.0](#)

[Compare Quartus II Web and Subscription Edition](#)

[Compare ModelSim-Altera and ModelSim-Altera Starter Edition](#)

Software Selector

[Select by Version](#) | [Select by Device](#) | [Select by Software](#) | [University Software](#)

Quartus Software

Version 13.0

13.0

Version 12.1

Version 12.0

Version 11.1

Version 11.0

Version 10.1

Version 10.0

Version 9.1

Version 9.0

Version 8.1

Quartus II Edition	Supported Devices
Subscription Edition	Stratix (V,IV,III,II GX,II,GX,I) Arria (V,II,GX) Cyclone (V,IV,III,II,I) MAX (V,II,7000,3000A) HardCopy (IV,III,II)
Web Edition	Arria (II) Cyclone (V,IV,III,II) MAX (V,II,7000,3000A)

- If you choose to install the Subscription Edition, please note that a purchased license will be required. Please go to the following link for more information on the Subscription Edition:
<http://www.altera.com/products/software/quartus-ii/subscription-edition/qts-se-index.html>
- Select the latest software version for Subscription Edition or web Edition will into "myAltera Account Sign-In" page

myAltera Account Sign-In

Home > Support > mySupport > myAltera Account Sign-In

User Name

Password

☐ Remember me

[Sign In](#)

[Forgot Your User Name or Password?](#)

Don't have an account?

☒ **Create Your myAltera Account**
Your myAltera account allows you to file a service request, register for a class, download software, and more.
Enter your email address.

(If your email address already exists in our system we will retrieve the associated information.)
[Create Account](#)

☐ **Get One-Time Access**
One-time guest access can be used to access the download center without creating an myAltera account. However, you must complete this form on each return visit.
Enter your email address.

☐ Yes, I'd like to receive product announcement and update emails from Altera.
[Get One-Time Access](#)

- Use your existing login, or get one-time Access.



- Download files from subscription or web edition page.

Combined FilesIndividual FilesDVD .iso Files

Download and install instructions:

1. Download Quartus II software, and any other software products you want to install, into a temporary directory.

2. Download device support files into the same directory as the Quartus II software installation file.

3. Run the **QuartusSetup-13.0.0.156.exe** file.

All software and components downloaded into the same temporary directory are automatically installed; however, stand-alone software must be installed separately.

[Read Altera Software v13.0 Installation FAQ](#)

[Quick Start Guide](#)

☒ Quartus II Subscription Edition

☒ Quartus II Software (includes Nios II EDS)
Size: 1.7 GB MD5: 3365B1A96722FFE047A9B4A91A6A2E5E

☒ ModelSim-Altera Edition (includes Starter Edition)
Size: 779.4 MB MD5: D083E6256A5BA98419FF7E7F68EFB2D9

☒ DSP Builder
Size: 76.3 MB MD5: 4FFD88C5B32B71D23BB912BDB23BFFA3

☒ Devices

You must install device support for at least one device family to use the Quartus II software.

☒ Arria GX, Arria II device support (includes all variations)
Size: 619.1 MB MD5: 6767EE42820E7729F301E87F09A05F09

☒ Arria V device support
Size: 1.4 GB MD5: F77459A9266C970E09B4509ABFAE43F4

☒ Arria V GZ device support
Size: 1.4 GB MD5: 69CE4CE66EEA3EB0A4574EC13594089B

☒ Cyclone, Cyclone II, Cyclone III, Cyclone IV device support (includes all variations)
Size: 573.5 MB MD5: 822C895B61A897A2A6A29D2D759BE71A

☒ Cyclone V device support (includes all variations)
Size: 700.7 MB MD5: A9EB7719925306C1DBED812C8C098069

☒ MAX II, MAX V, MAX 3000, MAX 7000 device support
Size: 6.8 MB MD5: 28EB455C9069A875C6B50571060DFA9

☒ Stratix, Stratix II, HardCopy II device support (includes all variations)
Size: 253.4 MB MD5: 576CE1E3B9A4E358053FA80A87D8041D

☒ Stratix III, Stratix IV, HardCopy III, HardCopy IV device support (includes all variations)
Size: 734.3 MB MD5: 7E20641EFDC71E5FE323F094624E7584

☒ Stratix V device support (includes all variations)
Size: 2.1 GB MD5: C02B16D43EFDC1F2A27A92FAFBBD4528

☒ Additional Software

☒ Quartus II Programmer and SignalTap II
Size: 129.7 MB MD5: 2708A8AD37F23828C6015F256AA14236

☒ Quartus II Help
Size: 355.7 MB MD5: 5513707B3BE573CEBFA11656EB05DACC

☒ SoC Embedded Design Suite (EDS)
Size: 1.0 GB MD5: 76F94B628BA25783CFEBF80E59448D8A

☒ Linux Support Package Binary File
Size: 387.0 MB MD5: 9CC7736BE69B51C318CEBC51A4B9553B

☒ Linux Support Package Source File
Size: 818.3 MB MD5: 58788F0DA87F549333E9432BE82681C3

Download Selected Files

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

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SoCKit Getting
Started Guide

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December 1, 2015



2.3 Installing the Altera SoC Embedded Design Suite

The [Altera SoC Embedded Design Suite](https://www.altera.com/download/software/soc-eds) (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:

<https://www.altera.com/download/software/soc-eds>

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 **Web Edition**, you will be able to use the DS-5 Altera Edition perpetually to debug Linux applications over an Ethernet connection. If you have purchased the SoC EDS **Subscription Edition**, you would have received an ARM license serial number. Or you can obtain a 30-day evaluation license. The following steps show how to obtain a web edition license or a 30-day evaluation license for subscription edition. [If the user does not need to design in the ARM DS-5, please skip below section.](#)

Obtain a Web Edition license or a 30-day evaluation license for Subscription Edition

In the section, we will introduce how to get a serial number from Altera website to active the ARM development Studio 5 (DS-5) Toolkit.

- Visit the website: Altera "SoC Embedded Design Suite" (<https://www.altera.com/download/software/soc-eds>)
- Browse the webpage to get the same information as the picture shows below, click the "activation code (Web Edition or 30-Day Evaluation) to link to the webpage: "DS-5 Community Edition".

Web Edition

For the free SoC EDS **Web Edition**, you will be able to use the DS-5 Altera Edition perpetually to debug Linux applications over an Ethernet connection. Please get your ARM license [activation code](#) and enter it into the input field.

30-Day Evaluation

If you want to evaluate the SoC EDS Subscription Edition, you can get a **30-Day Evaluation** [activation code](#) here. Please enter this ARM license activation code into the input field to get the full DS-5 Altera Edition software capabilities for a limited time.

- In this page, record the Activation code displayed on the right of the picture below, such as "AC+70616421313438".

2. License with Activation Code

Start ARM Development Studio 5 and open the license manager. If this is your first time using Development Studio, then a popup dialog will automatically ask you if you wish to open the license manager, otherwise it can be opened from the "Help" menu.

Choose "Add License...", and enter your Activation Code displayed on this page to obtain a license.

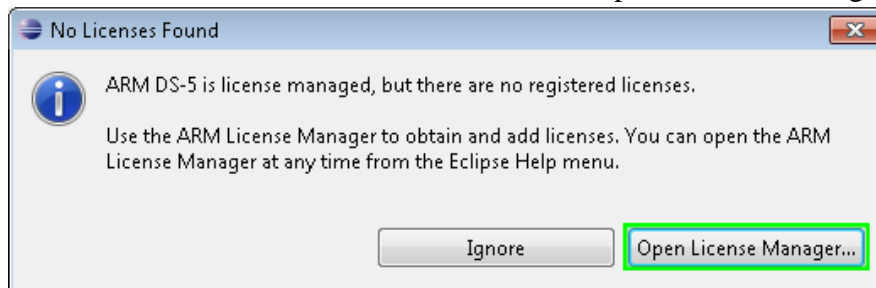
Work through the wizard to select the Host ID to lock your license to, and enter or create your ARM account details.

Once complete, the license manager can be closed as the product is ready to use.

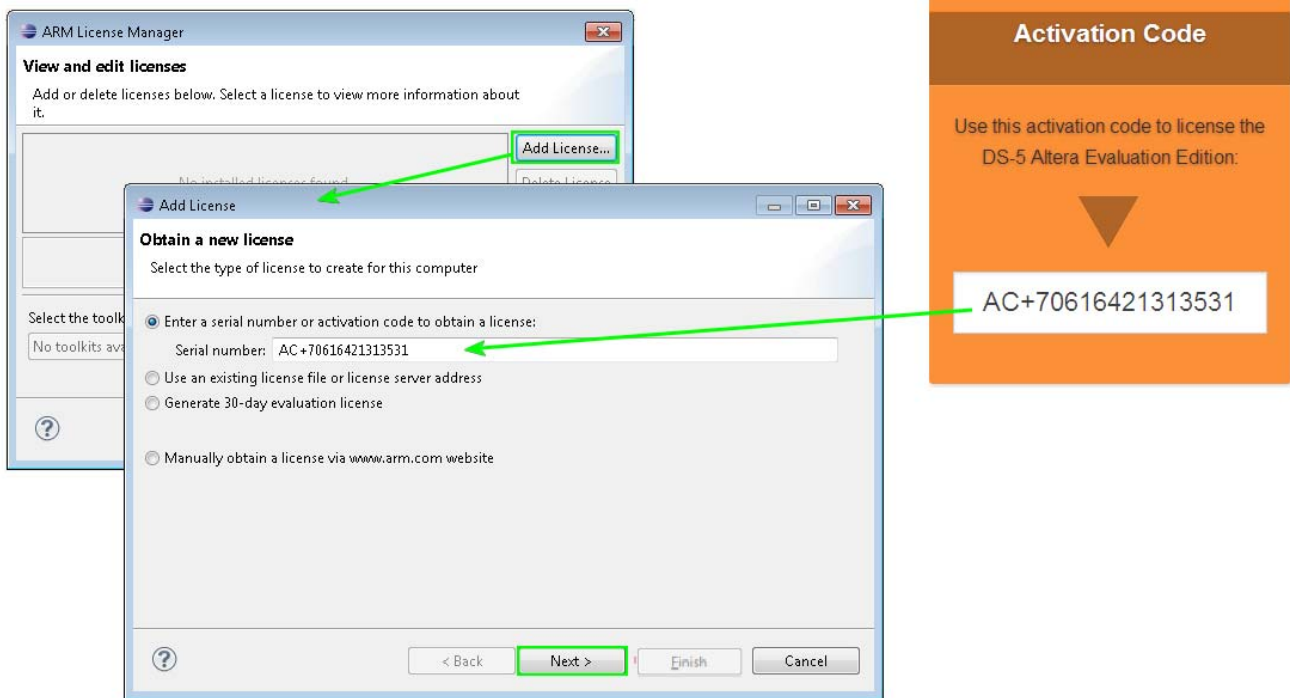


After recording this Activation code, we will continue to introduce how to active DS-5 by using this code. The steps are as follows:

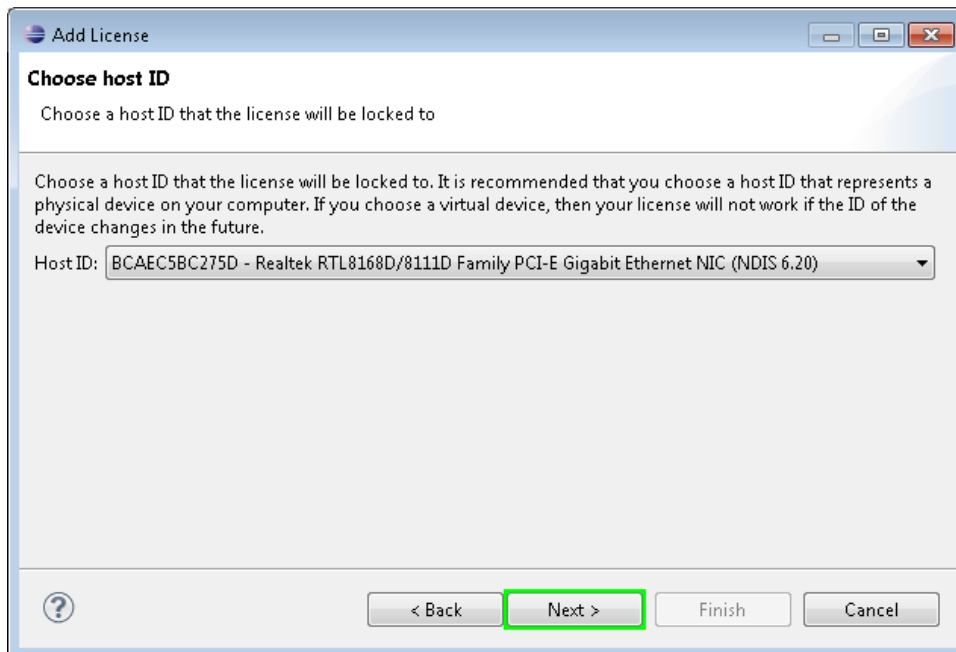
- Launch DS-5. Start --> All Programs --> ARM DS-5 --> Eclipse for DS-5
- A Workspace Launcher window will ask you to select a workspace.
- Press OK to select the default
- You will see a "No Licenses Found" Window. Select Open License Manager



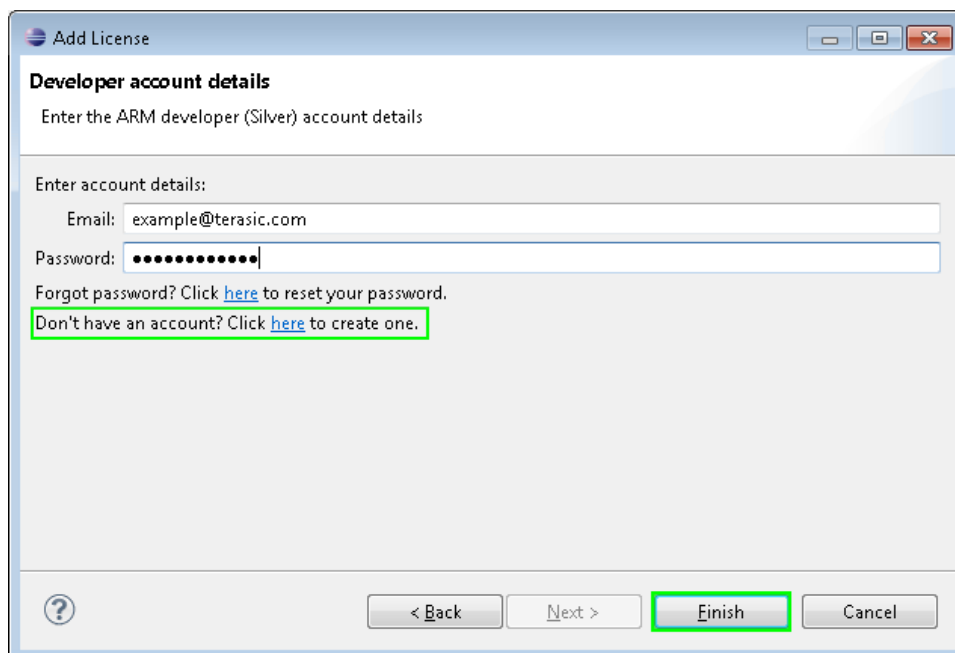
- Press the Add License Button in the ARM License Manager and Enter the activation code that you received earlier. Press the Next Button.



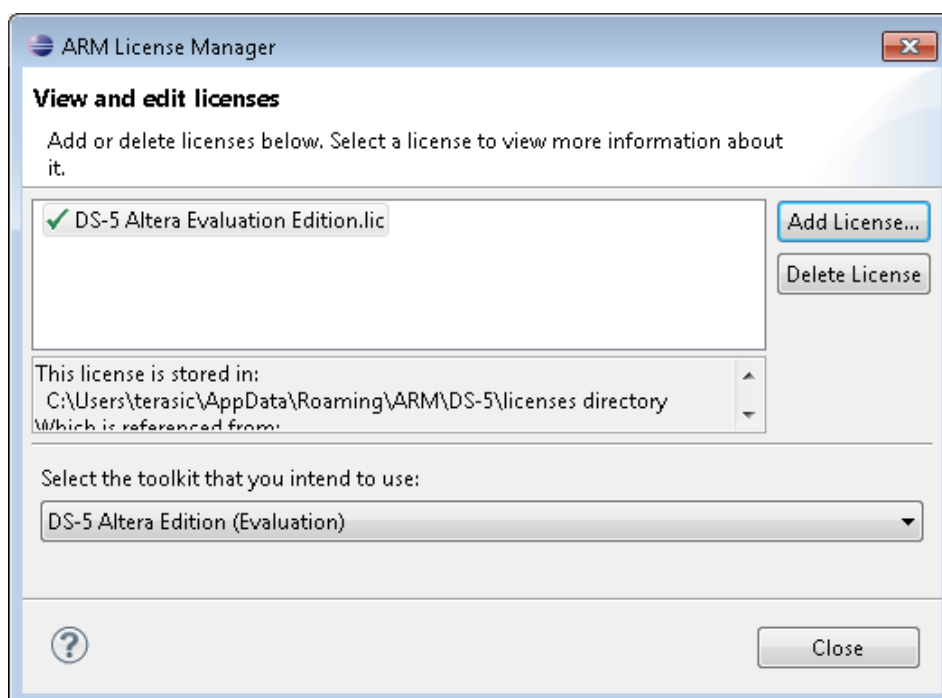
- Use the pull down menu to select a host ID. Press the Next button.



- Enter your ARM account email address and password.



- If you do not have an account then click on the link to create one.
- Press the Finish button.



- A web edition license or 30-day evaluation license for subscription edition had successfully installed.

Development Board Setup

3.1 Introduction

The instructions in this section explain how to setup the SoCKit development board. The following pictures show the board overview of SoCKit board.

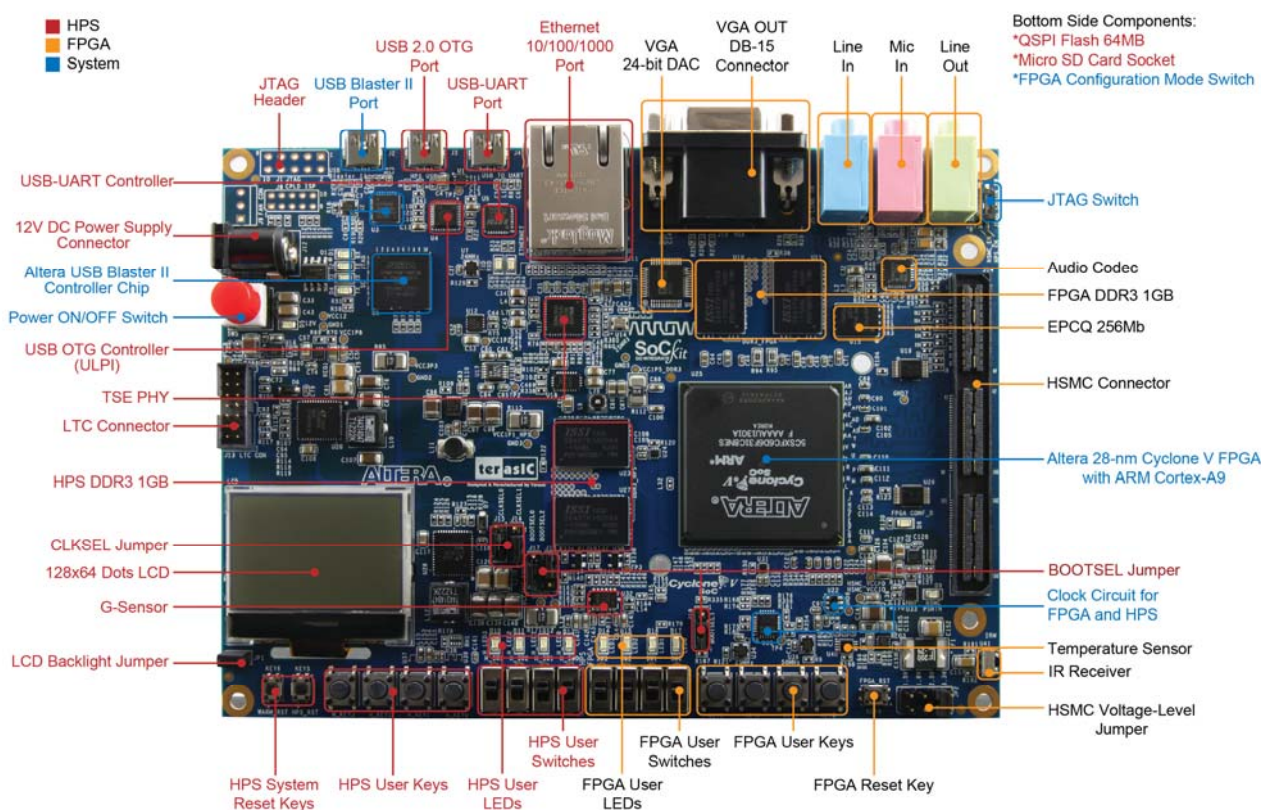


Figure 3-1 Board Top Overview

■ HPS
■ FPGA
■ System

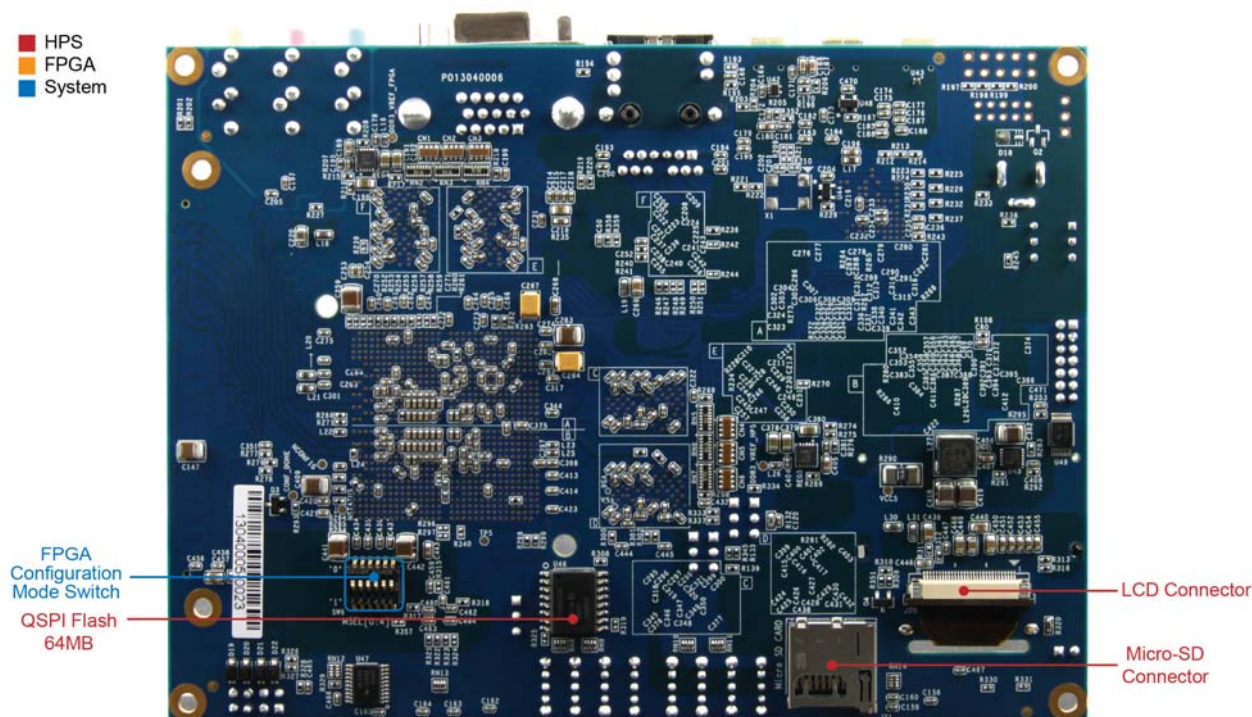


Figure 3-2 Board Bottom Overview

3.2 Default Switch/Header settings

This section describes the default settings of switches and headers on the SoCKit board. Please check the switches and set to positions describe below before moving on.

- J17~J19 BOOTSEL [2:0] = 101 represents HPS will boot from SD Card (See [Figure 3-3](#)).
- SW6 MSEL[4:0] = 10010 represents FPGA working in ASx4 mode(See [Figure 3-4](#)).
- Set SW4.1 to off and SW4.2 to on represent HPS in JTAG chain and bypass HSMC (See [Figure 3-5](#)).

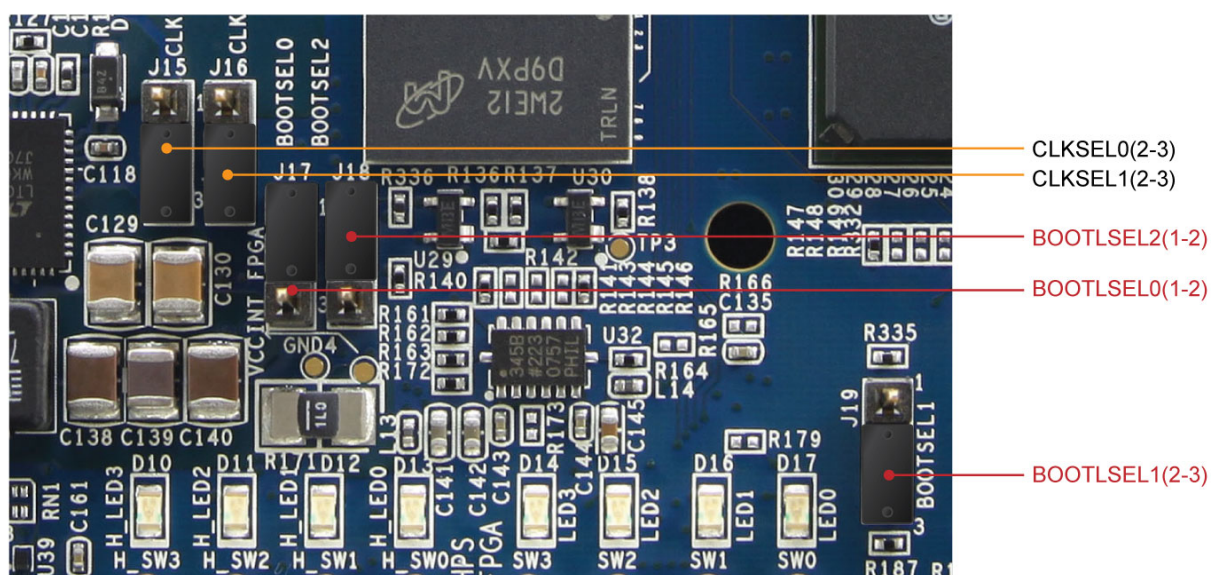


Figure 3-3 BOOTSEL and CLKSEL

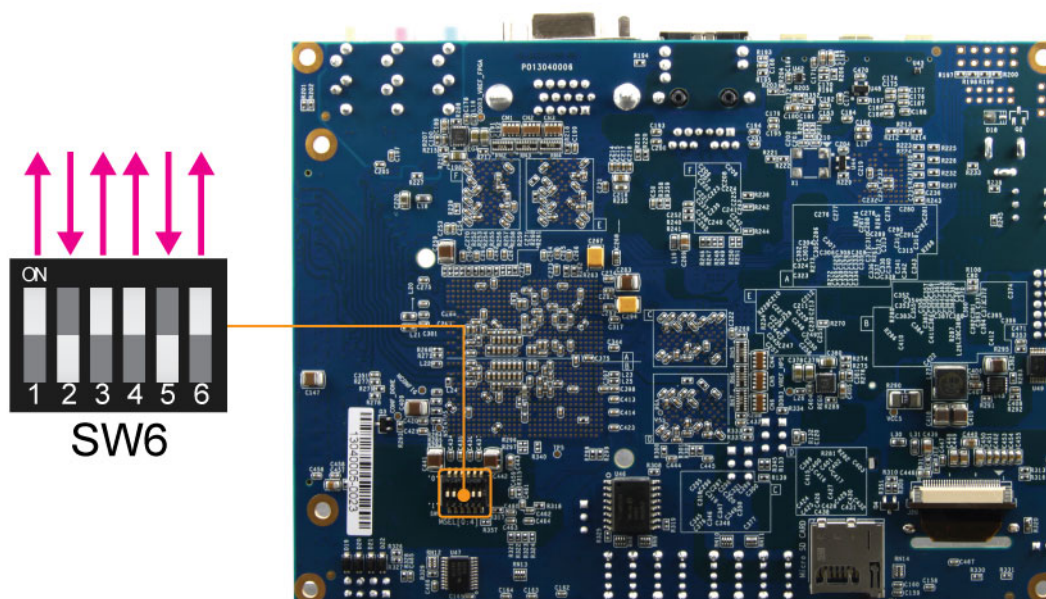


Figure 3-4 FPGA MSEL

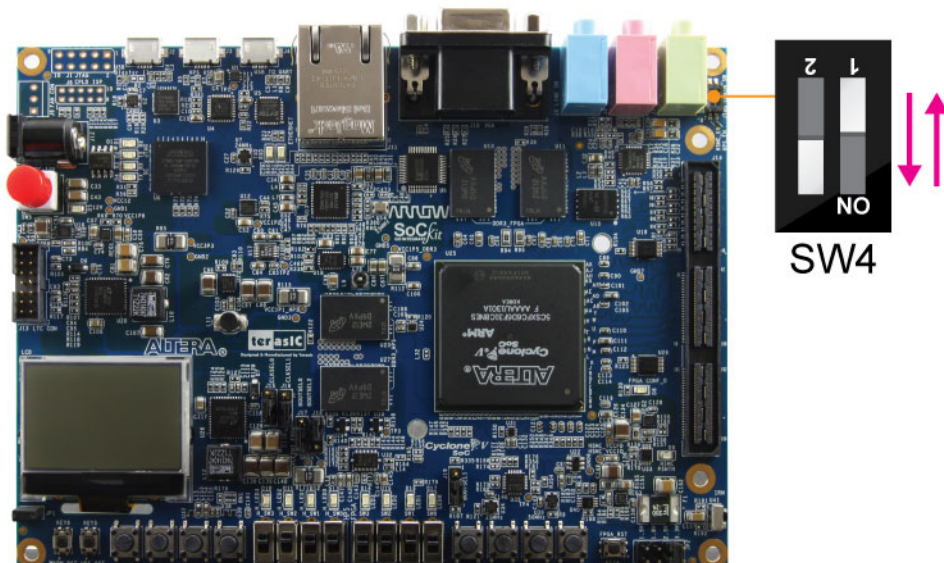


Figure 3-5 JTAG_EN

3.3 USB and Power Cables

Cable connections are shown in **Figure 3-6** as below:



Figure 3-6 USB and Power Cables



3.4 Powering up the SoCKit Board

To power-up the board, perform the following steps below:

1. Connect the provided power cord to the power supply and plug the cord into a power outlet (verify the voltage supplied is the same as the specification on the power supply).
2. Connect the supplied SoCKit power adapter to the power connector (J12) on the SoCKit board. Press the power button (SW5). At this point, you should see the 12V indicator LED (D5) turn on.

Performing an FPGA System Test

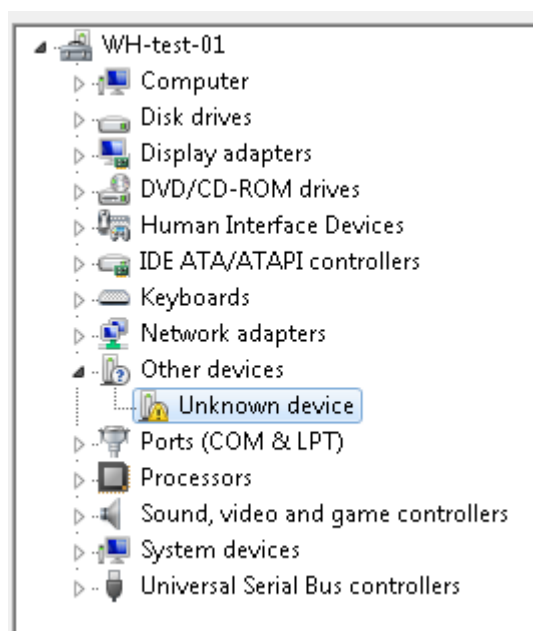
4.1 Introduction

This chapter shows how to install the USB-Blaster II driver and download an FPGA SRAM Objective (.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.

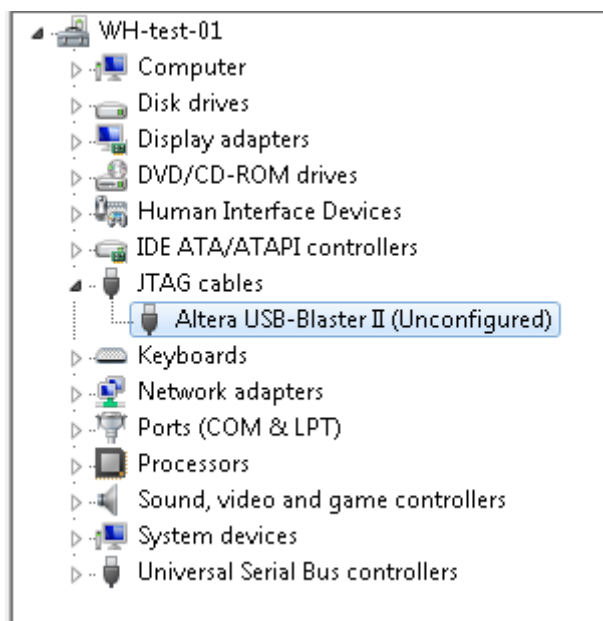
1. Connect your computer to the development board by plugging the USB cable into the USB connector (J2) of SoCKit (connection shown in [Figure 3-6](#))
2. Power up the board and open the device manager in Windows. You will find an unknown device.



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 installed correctly, the device is recognized as Altera USB-Blaster II as shown in following picture.

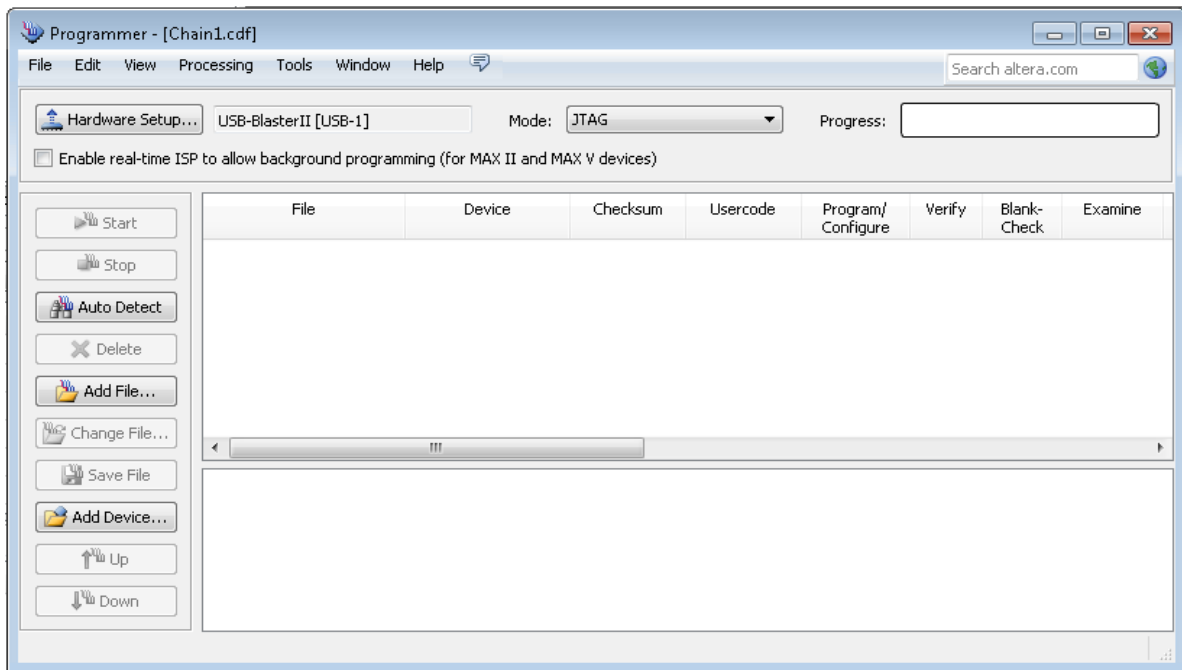


4.3 Downloading an FPGA SRAM Objective File

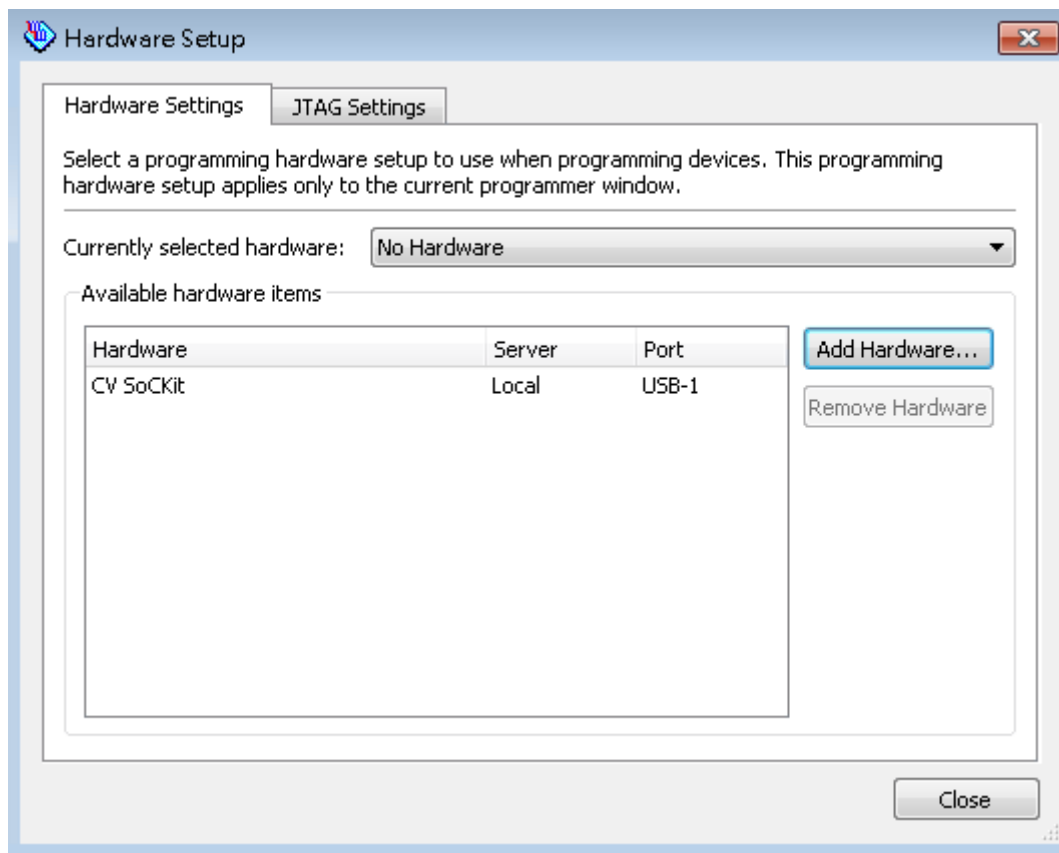
The Quartus II Programmer is used to configure the FPGA with a specific .sof file. Before configuring the FPGA, ensure that the Quartus II software and the USB-Blaster II driver are installed on the host computer.

If users would like to program their SRAM Object File (.sof) into the Cyclone V SOC FPGA device on the SoCKit board, execute the following steps:

1. Connect your computer to the SoCKit board by plugging the USB cable into the USB connector (J2) of SoCKit 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.



3. Click **Hardware Setup**.
4. If **CV SoCKit [USB-1]** does not appear under **Currently Selected Hardware**, select that option and click **Close** shown below.



If the USB-Blaster II does not appear under hardware options list, please confirm if the USB-Blaster

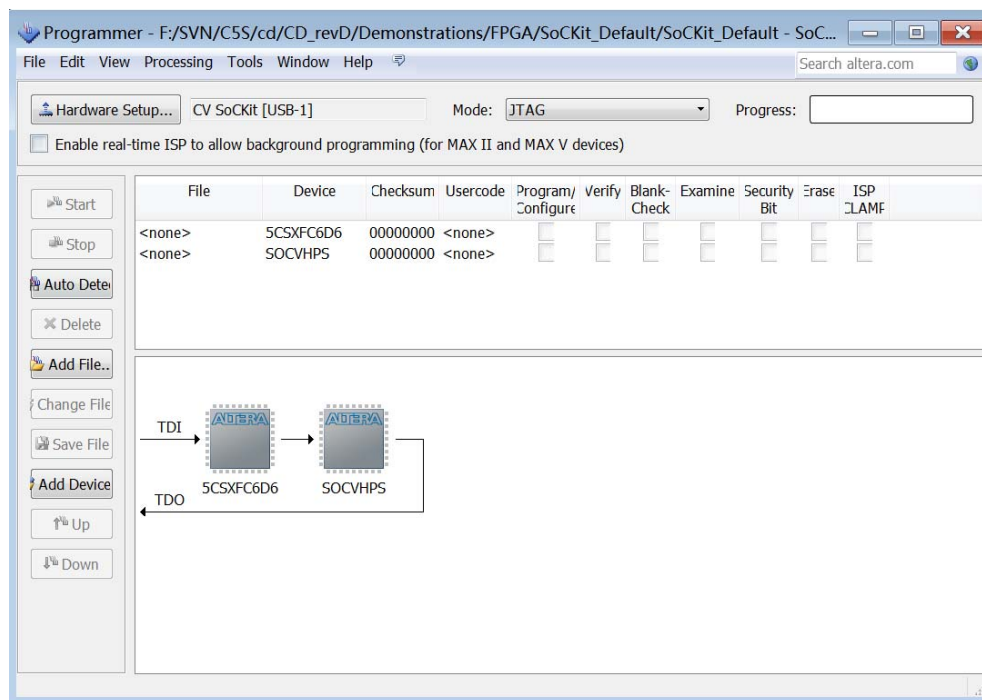


II driver has been correctly installed, and the USB cable has been properly connected between the SoCKit board and host computer.

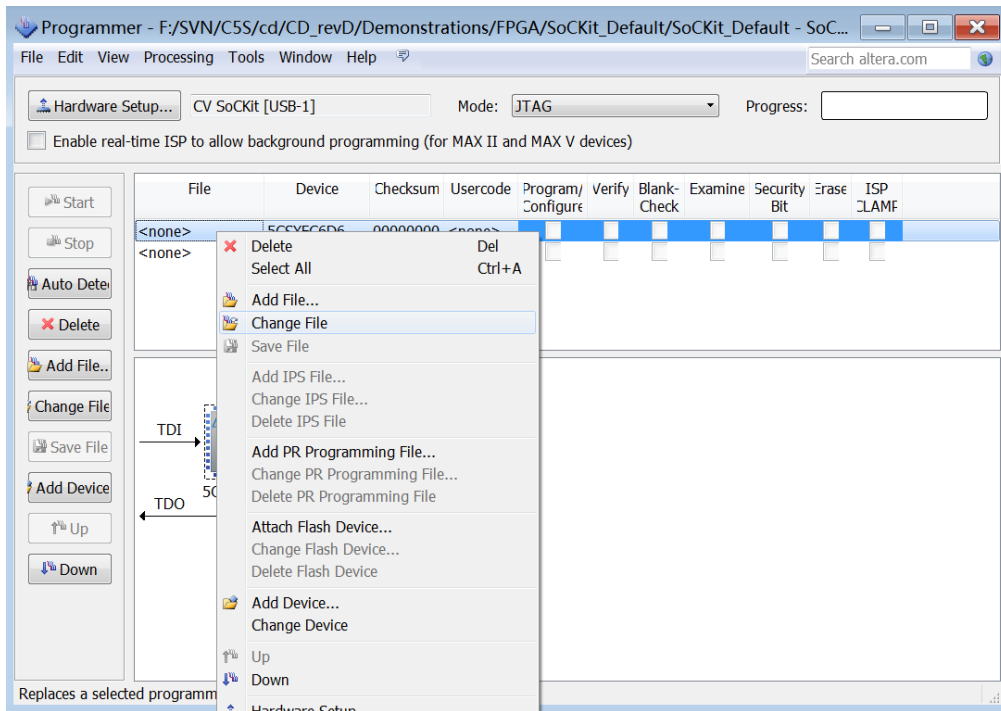
5. Click **Auto Detect** and choose 5CSXFC6D6 and click **OK**



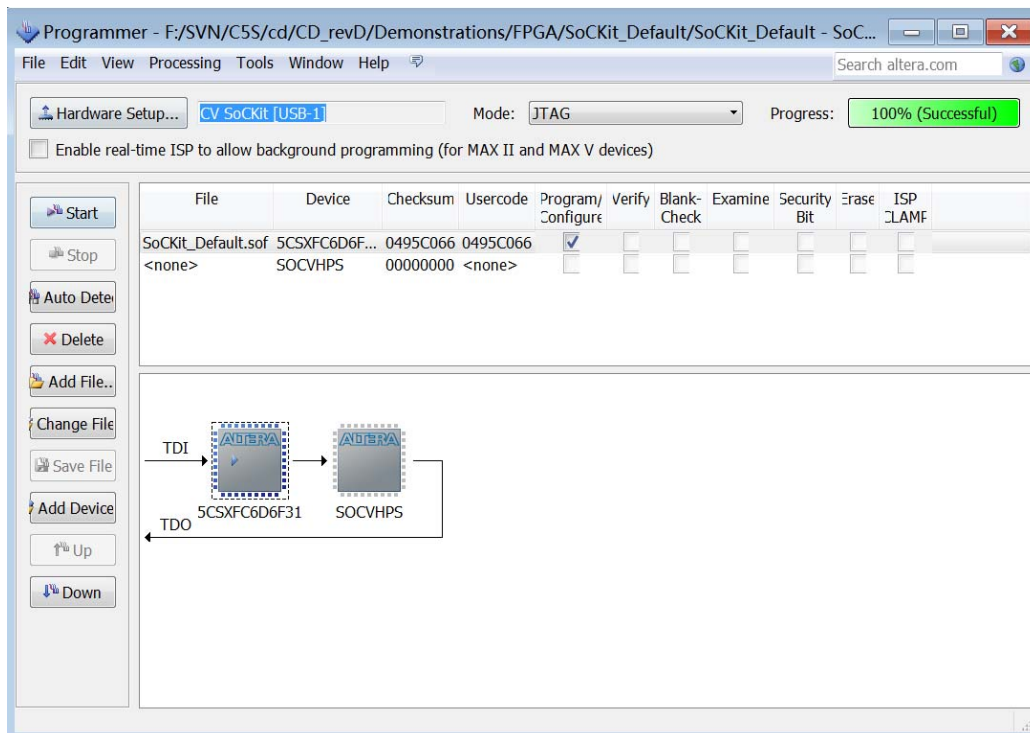
Two devices should be found.



6. Right click <none> of device 5CSXFC6D6, choose **Change File**, Select <CD directory>\Demonstration\ FPGA\SoCKit_Default\ SoCKit_Default.sof.



7. Turn on the **Program/Configure** option that corresponds to the .sof file and click **Start**, which will automatically download the file into the SoCKit board shown below.



8. After the downloading has been complete, you should be able to find that FPGA_LEDs flashing,



meaning that the .sof has been programmed successfully.

Running Linux on the SoCKit board

5.1 Introduction

This chapter demonstrates you how to create a microSD card image, set up a UART Terminal, and run Linux on SoCKit Board.

5.2 Creating 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. Win32DiskImager can also be found in \<CD directory>\Tools\ Win32DiskImager.

■ MicroSD Specification

- Capacity: 4GB minimum
- Speed: Class 4

■ Pre-built SD Card Image

The pre-built binaries are delivered as an archive named SoCKit_SD.img. This SD card image file contains all the items that are needed to run Linux on SoCKit board. (You can find this file in \<CD directory>\Tools\Factory_SD_image\SoCKit_SD.rar, and extract file to get the image file)

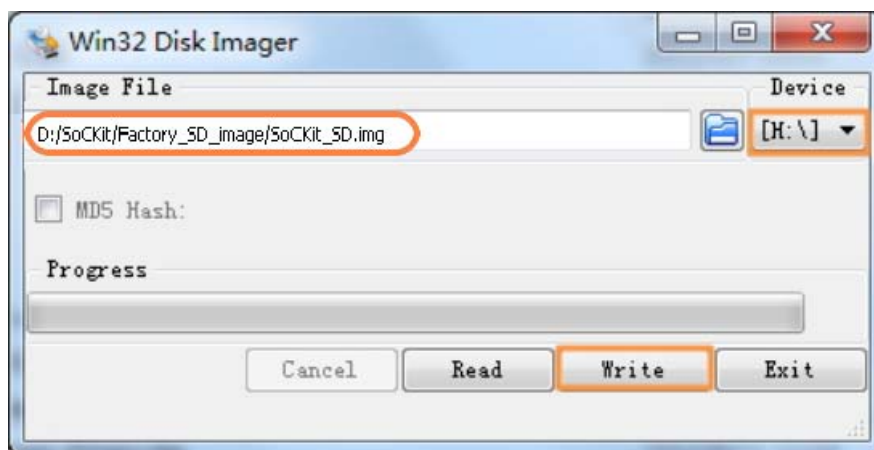
SPL Pre-loader

- 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



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

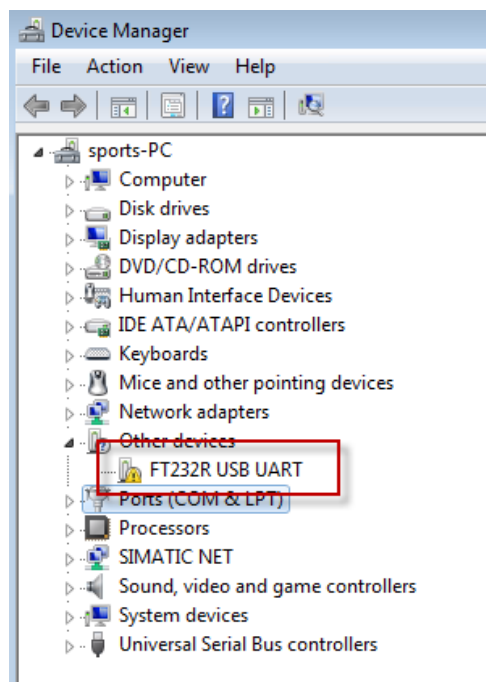
5.3 Setup UART Terminal

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

■ Installing the Driver

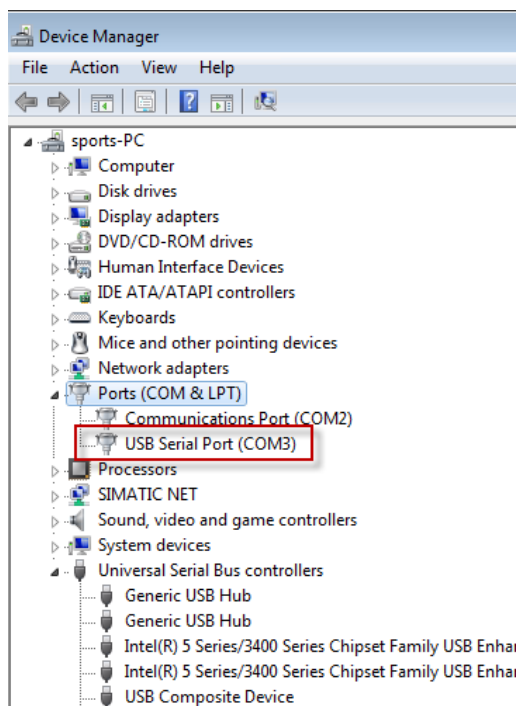
This section presents how to install the drivers for USB to UART communication. The necessary steps on Windows 7 are:

1. Connect your computer to the development board by plugging the USB cable into the mini USB connector (J4) of SoCKit (connection shown in [Figure 3-6](#))
2. Power on the board then open the computer device manager in Windows. You will find an unrecognized FT232R USB UART.



Select the FT232R USB UART to update the driver software. The driver can be downloaded from <http://www.ftdichip.com/Drivers/VCP.htm>, or found in \<CD directory>\Tools\ USB2UART_driver.

3. After the driver has installed correctly, the USB Serial Port is recognized as a port such as **COM3** (Open the device manager to know which COM port assigned in your computer)



4. Now you can power off the SoCKit board

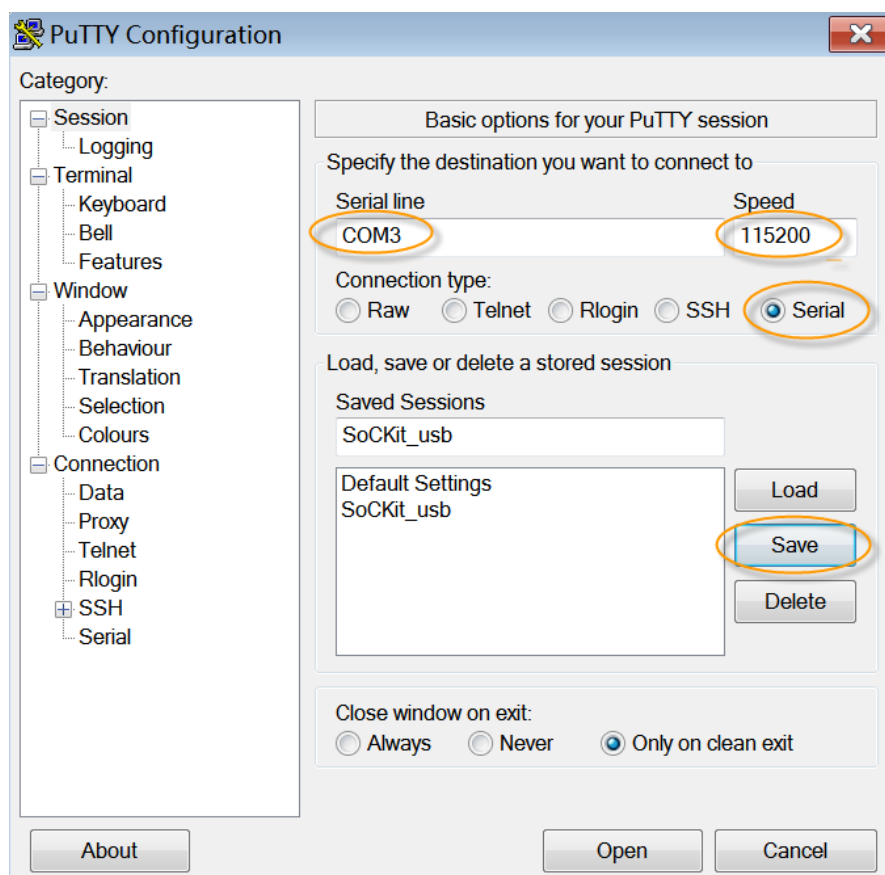
■ Configure UART terminal

UART terminal spec:

- 115200 baudrate
- no parity
- 1 stop bit
- no flow control settings

The following steps present how to configure a PuTTY terminal window (can be found in \<CD directory>\Tools\SSH.)

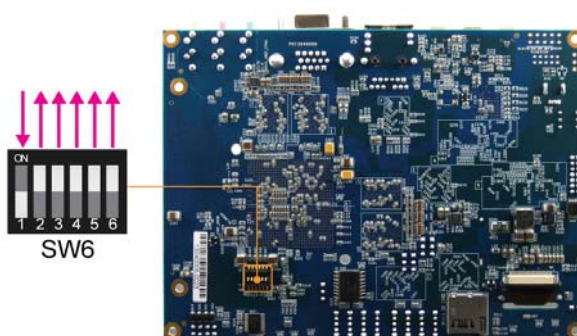
1. Open putty.exe, click **Serial** go to a serial configure interface.
2. Configure the window like the flowing picture and click save button to save the configuration.



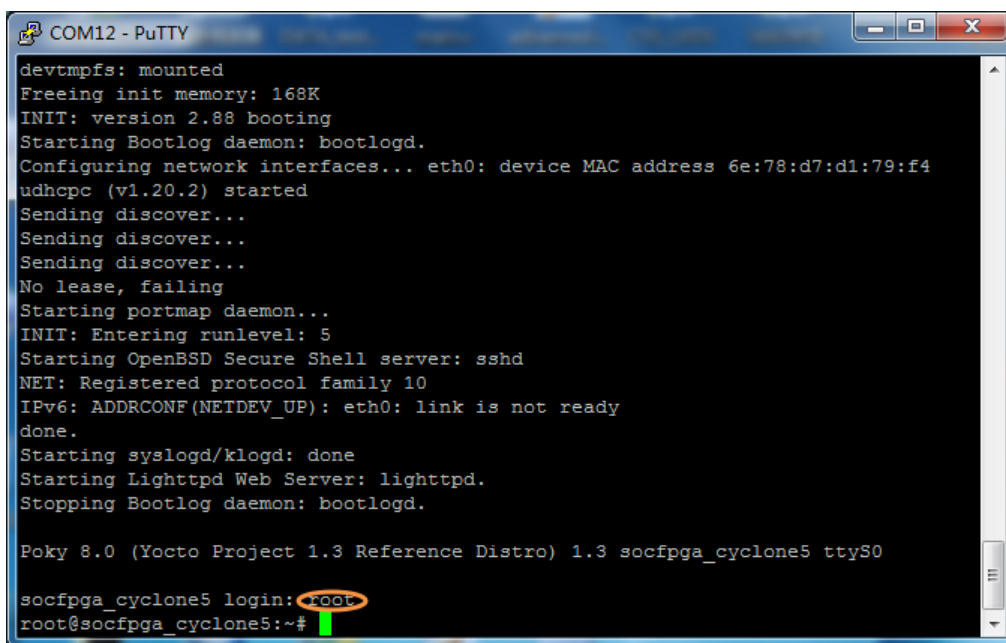
5.4 Running Linux on SoCKit board

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

1. Insert the microSD card with the pre-built image into the board (See Section 5.2 to prepare a microSD card)
2. Make sure HPS is set to boot from SD Card (BOOTSEL[2:0] = 101 , see Figure 3-3)
3. Set MSEL[4:0] (SW6) as shown in bellow



4. Press down the **SW5** button to Power up the board (See Chapter 3 for details)
5. Open putty.exe, select the saved configuration **SoCKit_usb** and click open button.
6. After a successful boot, the HPS LEDs will blink several times, and Linux will ask for the login name. Type **root** and press **Enter** to login to the system.



```
COM12 - PuTTY
devtmpfs: mounted
Freeing init memory: 168K
INIT: version 2.88 booting
Starting Bootlog daemon: bootlogd.
Configuring network interfaces... eth0: device MAC address 6e:78:d7:d1:79:f4
udhcpd (v1.20.2) started
Sending discover...
Sending discover...
Sending discover...
No lease, failing
Starting portmap daemon...
INIT: Entering runlevel: 5
Starting OpenBSD Secure Shell server: sshd
NET: Registered protocol family 10
IPv6: ADDRCONF(NETDEV_UP): eth0: link is not ready
done.
Starting syslogd/klogd: done
Starting Lighttpd Web Server: lighttpd.
Stopping Bootlog daemon: bootlogd.

Poky 8.0 (Yocto Project 1.3 Reference Distro) 1.3 socfpga_cyclone5 ttyS0
socfpga_cyclone5 login: root
root@socfpga_cyclone5:~#
```

Additional Information

Getting Help

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

- Terasic Technologies
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
2013.04	V1.0	First Version
2013.05.23	V1.1	Modify Section 5.4
2013.06.16	V1.2	Modify Chapter 2
2013.10.23	V1.3	Modify Section 4.3
2014.8.28	V1.4	Modify Usb Connector and baudrate