



Chapter 1	<i>About this Guide</i>	3
Chapter 2	<i>Software Installation</i>	4
2.1	Introduction	4
2.2	Installing Quartus Prime software	4
2.3	Free No-Cost Licenses for Agilex™ 5 Devices	7
Chapter 3	<i>Development Board Setup</i>	8
3.1	Introduction	8
3.2	MSEL Settings	8
3.3	DE25-Nano board Configuration Mode	9
3.4	USB Blaster III and Power Input	9
Chapter 4	<i>Performing a FPGA System Test</i>	10
4.1	Introduction	10
4.2	Downloading a FPGA SRAM Object File	10
Chapter 5	<i>Linux Booting on the board</i>	16
5.1	Introduction	16
5.2	Required Hardware	16
5.3	Install the MicroSD Card	16
5.4	Set the MSEL	18
5.5	Power On the Board	19
5.6	Setting up HPS UART Terminal	20
5.7	Appendix	23
	<i>Additional Information</i>	25

Chapter 1

About this Guide

The DE25-Nano 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 use the board.

The main topics that this guide covers are listed below:

- Software Installation: Installing Quartus Pro v25.1.1 and Ashling RiscFree IDE
- Development Board Setup: Powering on the DE25-Nano
- Perform FPGA System Test: Downloading a FPGA SRAM Object File (.sof)
- Running Linux on DE25-Nano Board via UART terminal

Software Installation

2.1 Introduction

The DE25-Nano board is equipped with an integrated Altera USB Blaster III circuit. To ensure proper operation, you must install the correct driver. The necessary driver is included with Quartus Prime 25.1.1 Pro and later versions. We recommend installing Quartus Prime 25.1.1 or a newer version to ensure the on-board USB Blaster III is recognized and functions correctly for programming and debugging.

This section explains how to install the following software:

- Intel Quartus Prime Pro v25.1.1 software
- Ashling* RiscFree* IDE for Altera

Note: 64-bit OS required

2.2 Installing Quartus Prime software

For a more efficient and customized installation experience, we strongly recommend using the Intel® Quartus® Prime Installer (online installer) to install the Quartus Prime Design Suite.

Unlike downloading a single, large file containing all components, the online installer is a lightweight tool that allows you to precisely select only the components you need during the installation process.

You can download the Intel® Quartus® Prime Installer from the following URL (see **Figure 2-1**):

[Intel® Quartus® Prime Pro Edition Design Software Version 25.1.1 for Windows](#)

Figure 2-2 shows the Quartus Prime Installer. Please make sure to check the following options:

- Quartus Prime Pro Edition Software
- Agilex 5 device support
- Ashling RiscFree IDE for Altera

Also, confirm the installation directory. In the "After-install actions" section, check the following:

- Install UART FTDI driver: This installs the HPS UART interface driver for the DE25-Nano
- Install USB Blaster III driver: This enables proper use of the JTAG interface on the DE25-Nano

Downloads

Installer (Recommended)

Individual Files

Copyright Licensed Source

Intel® Quartus® Prime Installer (Recommended)

Intel® Quartus® Prime Pro Edition Installer (SFX)

Download

qinst-windows-25.1.1-125.exe

Size: 29.5 MB

SHA1: 86ca1ef9e9b6491e48f0be1a2a43182749e3506d

If any problems occur, you can still download the necessary files and install them manually.

Figure 2-1 Download Quartus Installer

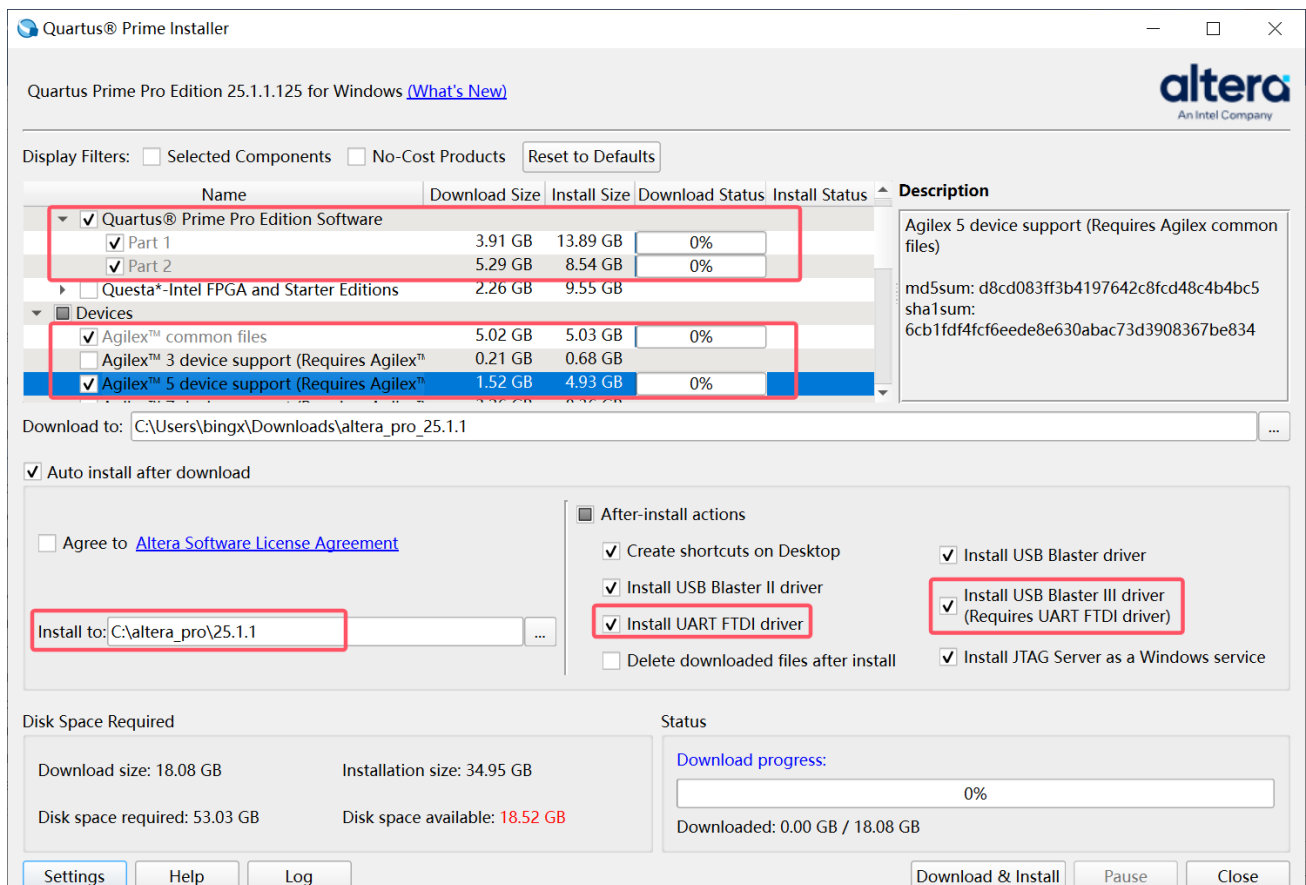


Figure 2-2 Quartus Installer

After Quartus has been downloaded and installed, an installation completion window will appear, as shown in **Figure 2-3**.

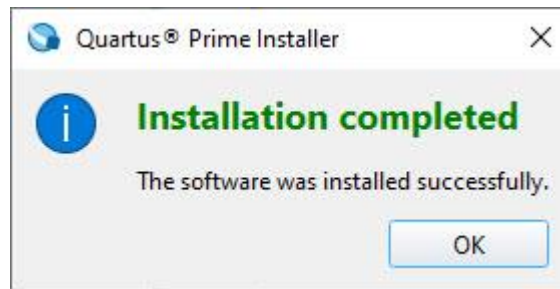


Figure 2-3 Quartus install completed

Next, the Quartus installer will then prompt you to install several necessary drivers.

Please pay special attention to the UART FTDI driver (see **Figure 2-4**) and the Altera USB Blaster III driver (see **Figure 2-5**).

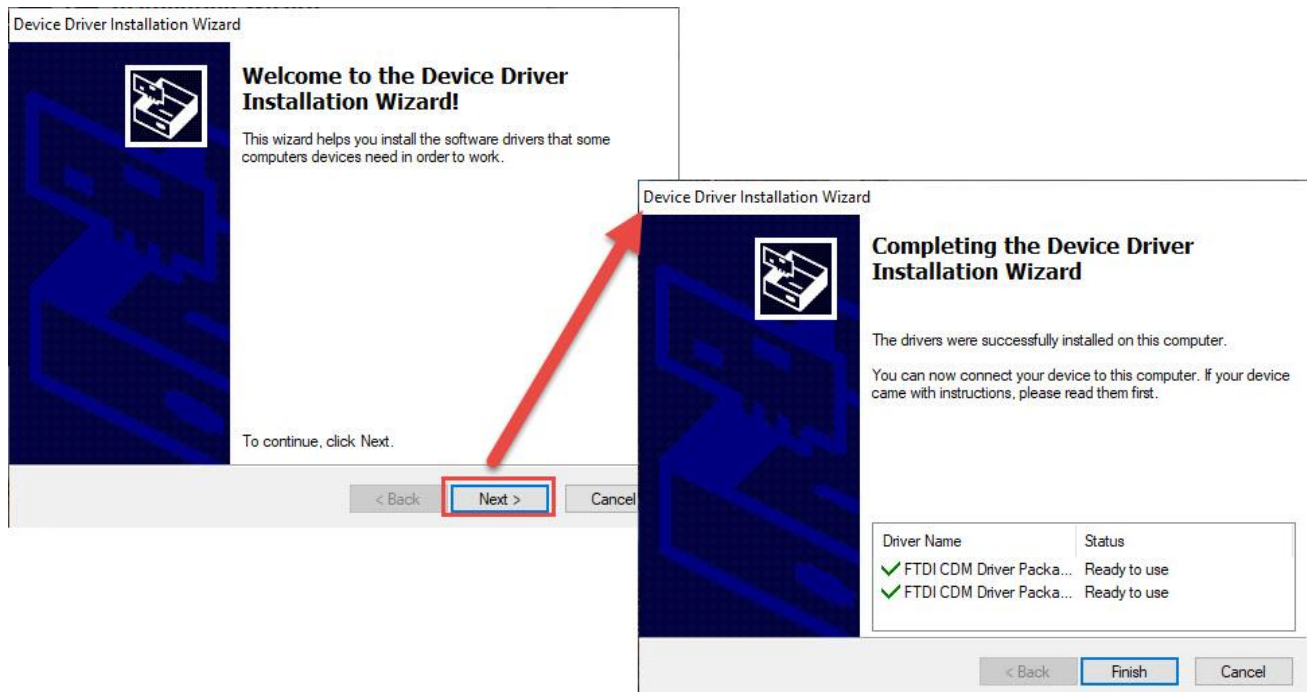


Figure 2-4 Install UART FTDI driver



Figure 2-5 Install Altera USB Blaster III driver

2.3 Free No-Cost Licenses for Agilex™ 5 Devices

The DE25-Nano, powered by Altera Agilex 5 FPGA, enables developers to access Intel Quartus Pro Edition software at no cost — no additional license purchase required. Developers can leverage full design and compilation capabilities of Quartus Pro without incurring licensing fees.

For details on how to acquire the free license, please refer to Intel's official guide: [Acquiring Free No-Cost Licenses for Intel® Agilex™ 5 Devices](#)

Development Board Setup

3.1 Introduction

The instructions in this section explain how to set up the DE25-Nano board. The following pictures show the board overview of the board.

3.2 MSEL Settings

■ AS Mode(Default)

The board hardware setting (SW5 MSEL[2:0]) is set as 001 (See **Figure 3-1**), the FPGA is configured from QSPI flash.

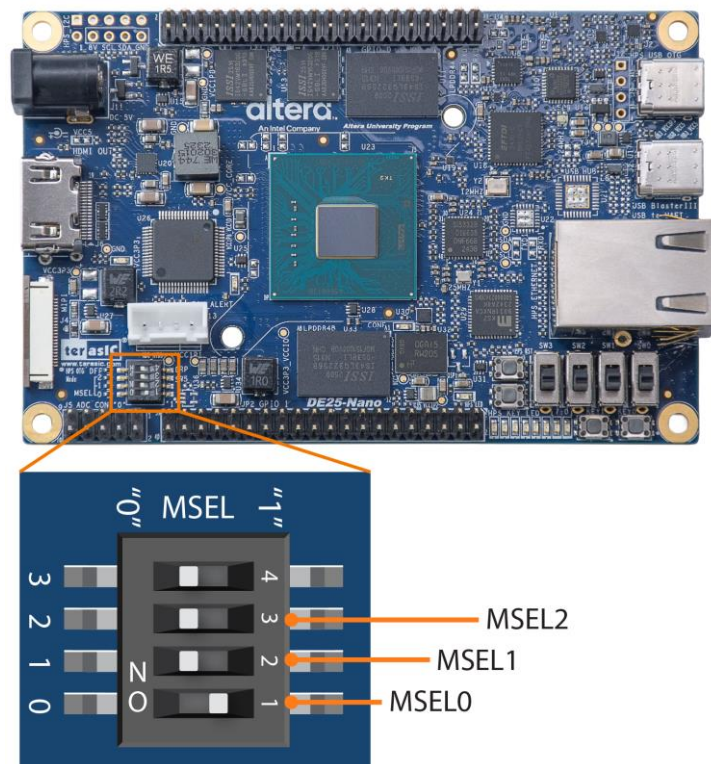


Figure 3-1 FPGA Configuration Mode Switch in AS Mode

3.3 DE25-Nano board Configuration Mode

DE25-Nano board supports two kinds of configuration modes:

1. **JTAG program:** in IEEE standard, JTAG is Joint Test Action Group, with this mode, the configuration bit stream is downloaded directly into the Agilex 5 FPGA. The FPGA will retain this configuration until its power is turned off.
2. **AS program:** Active Serial programming, the configuration bit stream is downloaded into the QSPI configuration device. The QSPI is non-volatile storage, the code is retained even when the power supply to the DE25-Nano board is turned off. When the board's power is turned on, the configuration data in the QSPI device is automatically loaded into the Agilex 5 FPGA.

3.4 USB Blaster III and Power Input

Figure 3-2 shows USB Blaster III and Power DC Jack on DE25-Nano board.



Figure 3-2 USB Blaster III and Power Jack on DE25-Nano board

Performing a FPGA System Test

4.1 Introduction

This chapter shows how to download a FPGA SRAM Object File(.sof) to DE25-Nano board.

4.2 Downloading a FPGA SRAM Object File

The Quartus Prime Programmer is used to configure the FPGA with a specific .sof file. Before configuring the FPGA, ensure that the Quartus Prime Pro v25.1.1 software and the USB-Blaster III driver are installed on the host computer. Normally you should see USB Blaster III in PC Device Manager, as shown in **Figure 4-1**.

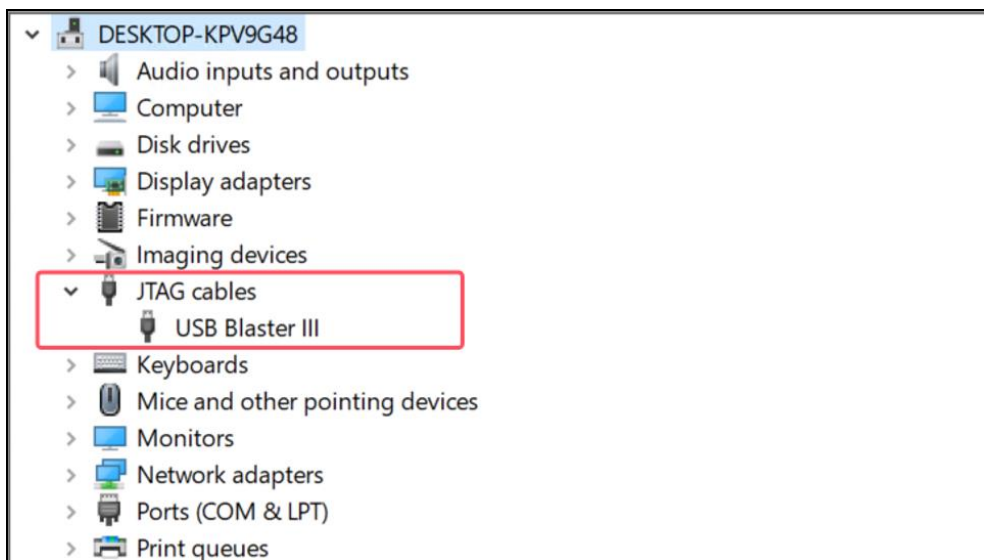


Figure 4-1 USB Blaster III shown in PC Device Manager

There is only one device (FPGA) on the JTAG Chain of DE25-Nano board, the following shows the programming flow with JTAG mode step by step.

1. Connect your computer to the DE25-Nano board by plugging the Type-C USB cable into the USB Blaster III connector of DE25-Nano and power up the board (details shown in section 3.4).
2. Open the Quartus Prime software and select Tools > Programmer. The Programmer window will appear as shown in **Figure 4-2**.

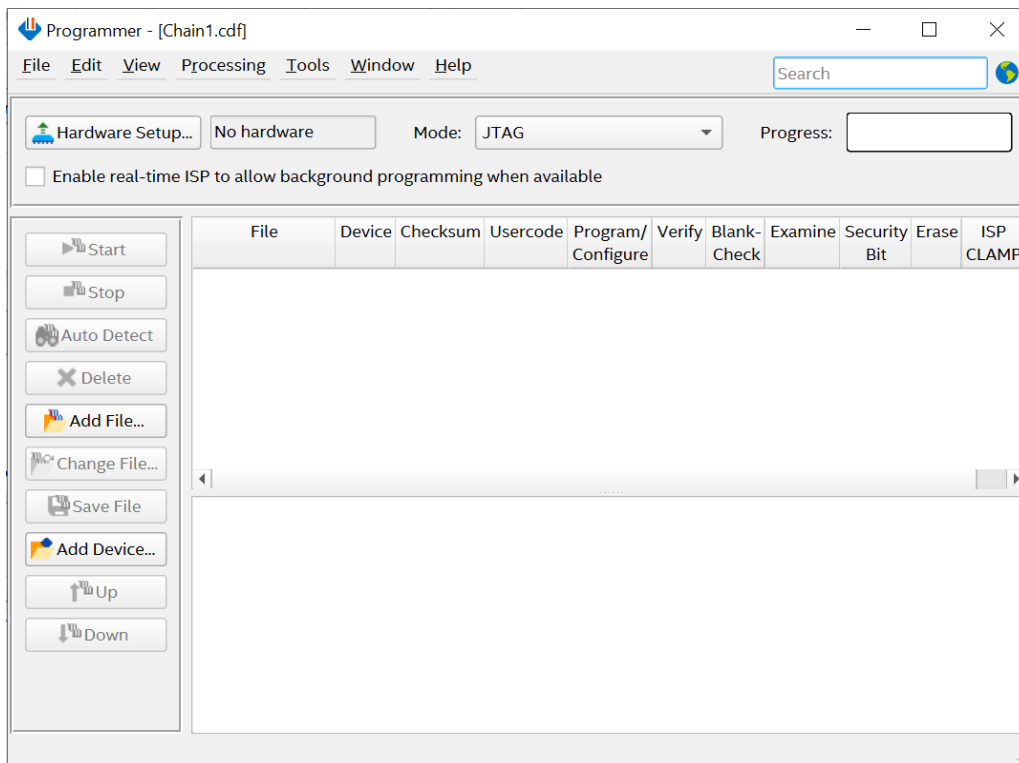


Figure 4-2 Quartus Programmer window

3. Click **Hardware Setup**.
4. Select **DE25-Nano[USB-1]** under **Currently selected hardware**, and click **Close** as shown in **Figure 4-3**.

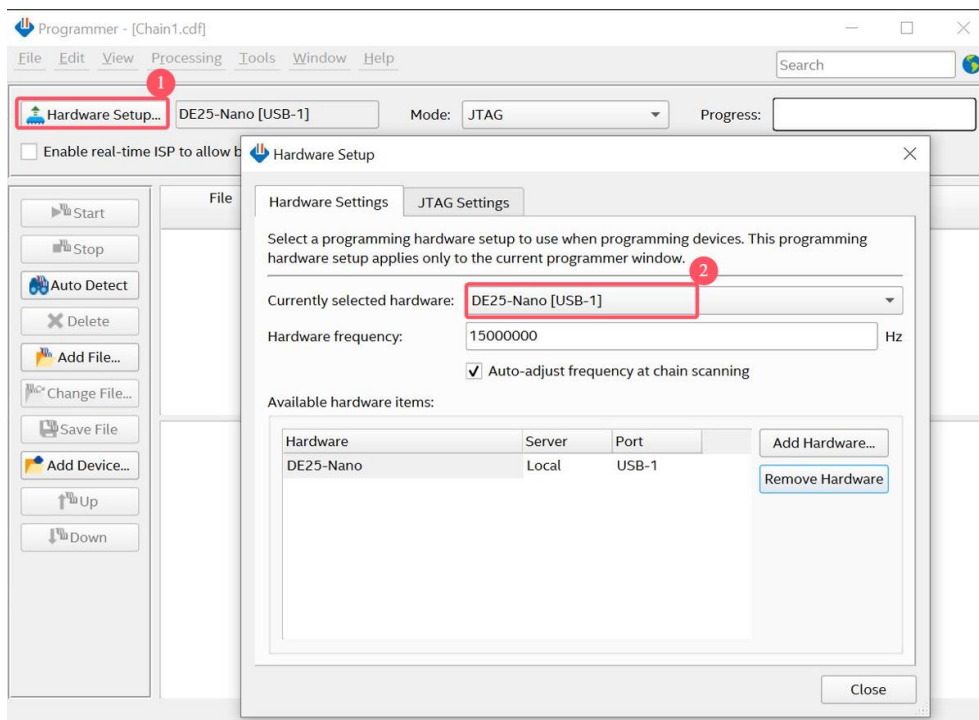


Figure 4-3 Hardware Setup

If the USB-Blaster III does not appear under hardware options list, please confirm if the USB-Blaster III driver has been correctly installed, and the Type-C USB cable has been properly connected between the DE25-Nano board and host computer.

5. Click “Auto Detect”, as shown in **Figure 4-4**.

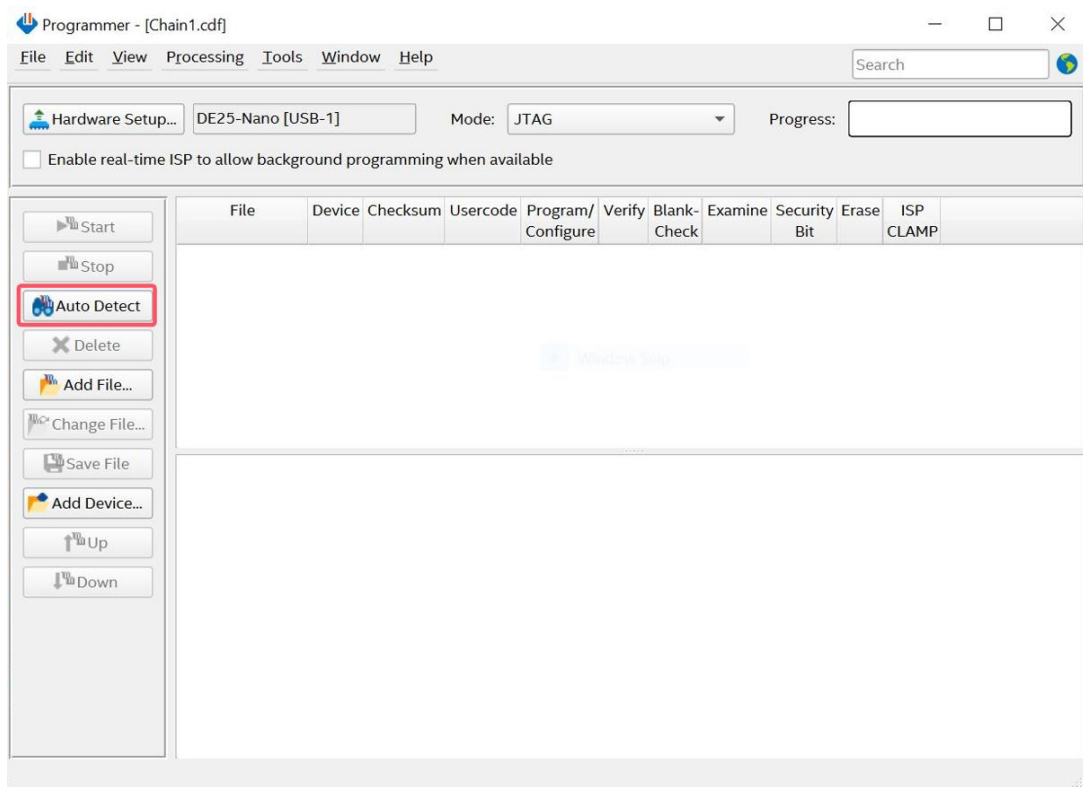


Figure 4-4 Auto detect FPGA device

6. The FPGA device and QSPI flash of DE25-Nano board are detected under Programmer, as shown in **Figure 4-5**. Note :The user will see the **QSPI flash** on the JTAG chain because the FPGA configuration mode is set to **AS** mode.

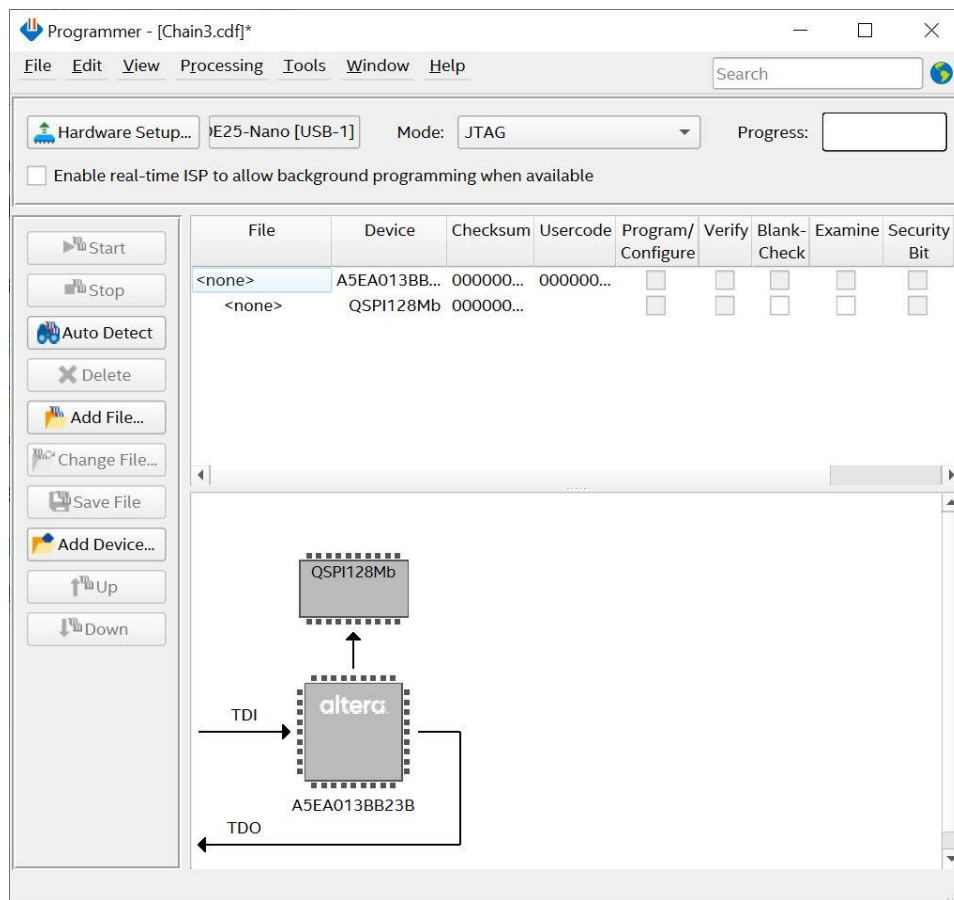


Figure 4-5 JTAG Chain on DE25-Nano board

7. Click the FPGA device, then click **Change File** button to open the **Select New Programming File** window. Browse to select golden_top.sof in the **Select New Programming File** window as shown in **Figure 4-6**.

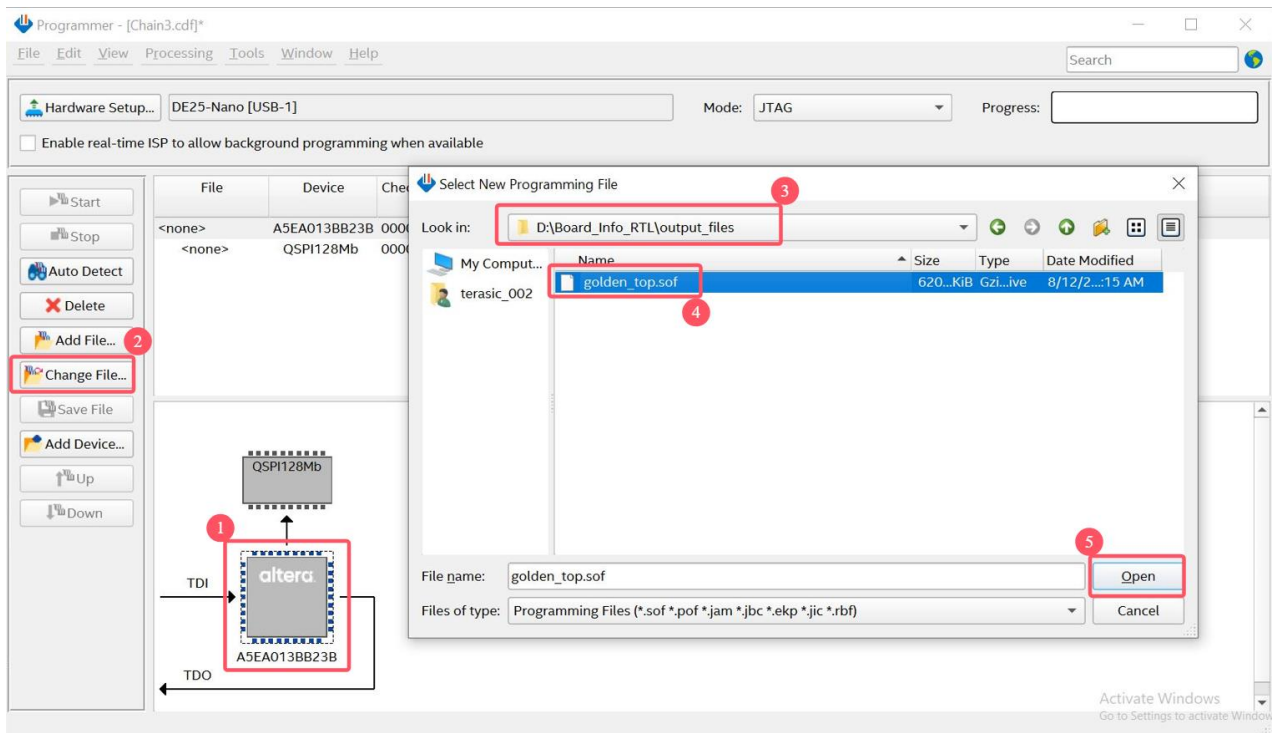


Figure 4-6 Select golden_top.sof file

8. Click “Program/Configure” check box, and then click “Start” button to download .sof file into FPGA, as shown in **Figure 4-7**.

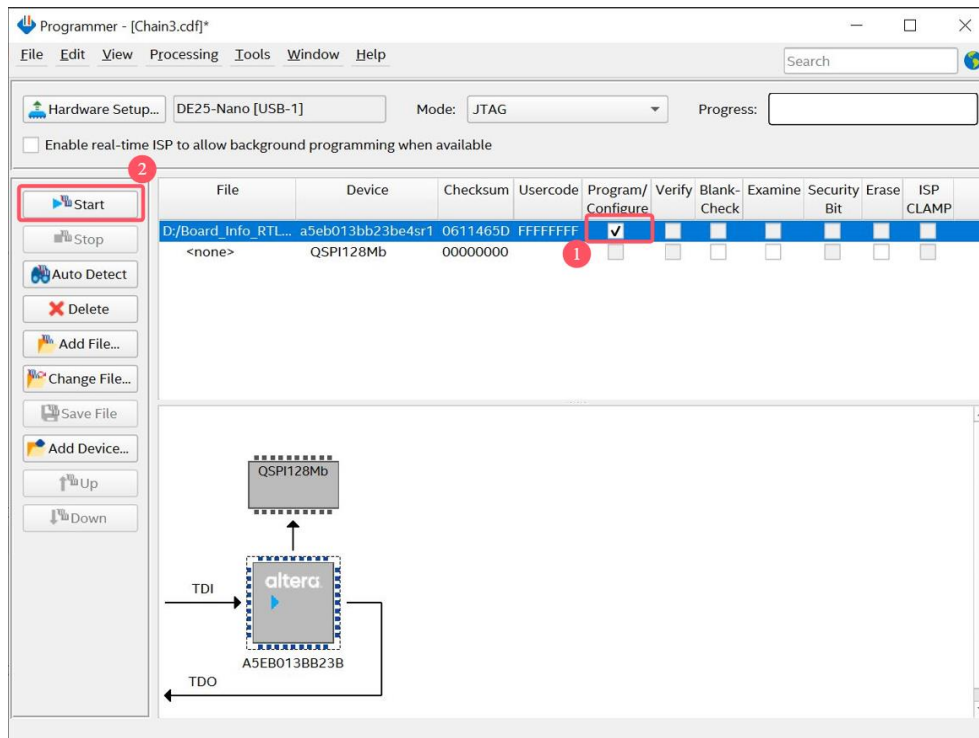


Figure 4-7 Download .sof file

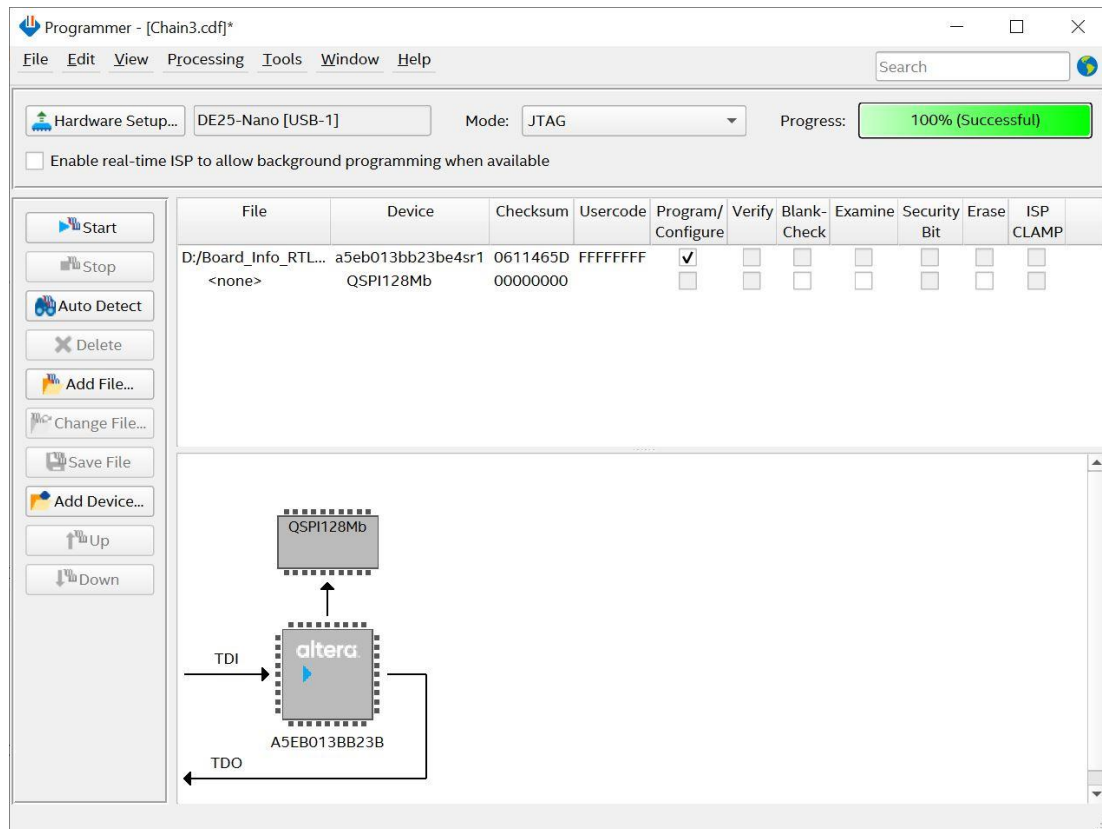


Figure 4-8 Download .sof successfully

Linux Booting on the board

5.1 Introduction

This guide describes how to boot the HPS on the board using the Micro SD Card with Linux image, and use the UART interface to allow the Host PC to communicate with the HPS of the board.

5.2 Required Hardware

To boot Linux on the board, the following hardware is required:

- DE25-Nano board
- USB Type A to Type-C Cable
- Micro SD Card (At least 8GB capacity)

5.3 Install the MicroSD Card

This section will show you how to install the MicroSD card into the board. In addition, if user want to recover the factory image file to the MicroSD Card. It will show how to download the Linux image file for the board and how to write it into the MicroSD Card.

■ Install the MicroSD Card to the Board

The board will be shipped with a MicroSD card that has been written with Linux image. Users can install the Micro SD Card on the board by referring to **Figure 5-1**.

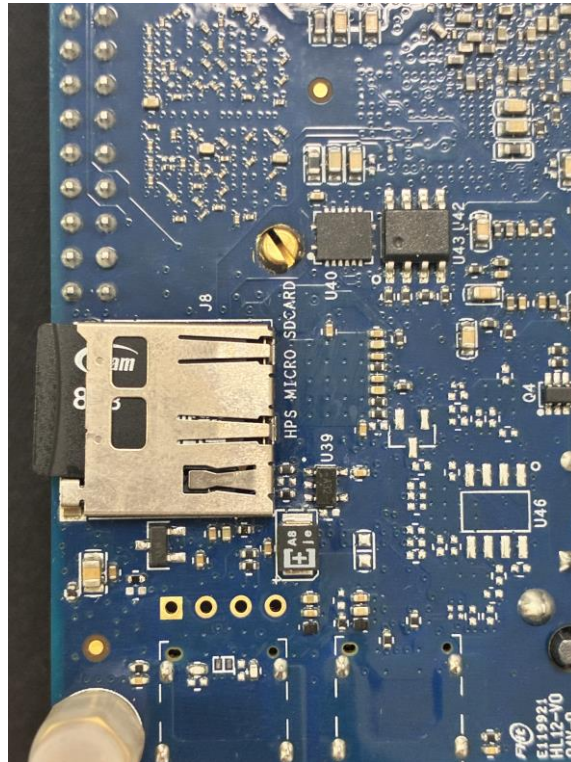


Figure 5-1 Installing MicroSD card

■ Download Linux image file

If the user wants to copy or re-program the MicroSD card, you can download the Linux image file (Find “*Linux BSP (Board Support Package): MicroSD Card Image*”) by referring to the link below:

<http://DE25-Nano.terasic.com/cd/>

Linux BSP (Board Support Package): MicroSD Card Image

Title	Version	Size	Date	Download
Linux Console (Kernel 6.1.68-lts; rev. A Hardware)	1.0.0		2024-06-12	 

Figure 5-2 Linux BSP Download site

■ Download the programming tool

To program a MicroSD card Linux image you can use a free tool such as [Rufus](#).

■ Program the MicroSD Card

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 Rufus.

1. Connect the MicroSD card to a Windows PC.
2. Execute **Rufus**.
3. Select the image file for MicroSD card.

4. Select the MicroSD card device.
5. Click “**START**” to start writing the image file to the MicroSD card. Wait until the image is successfully written.

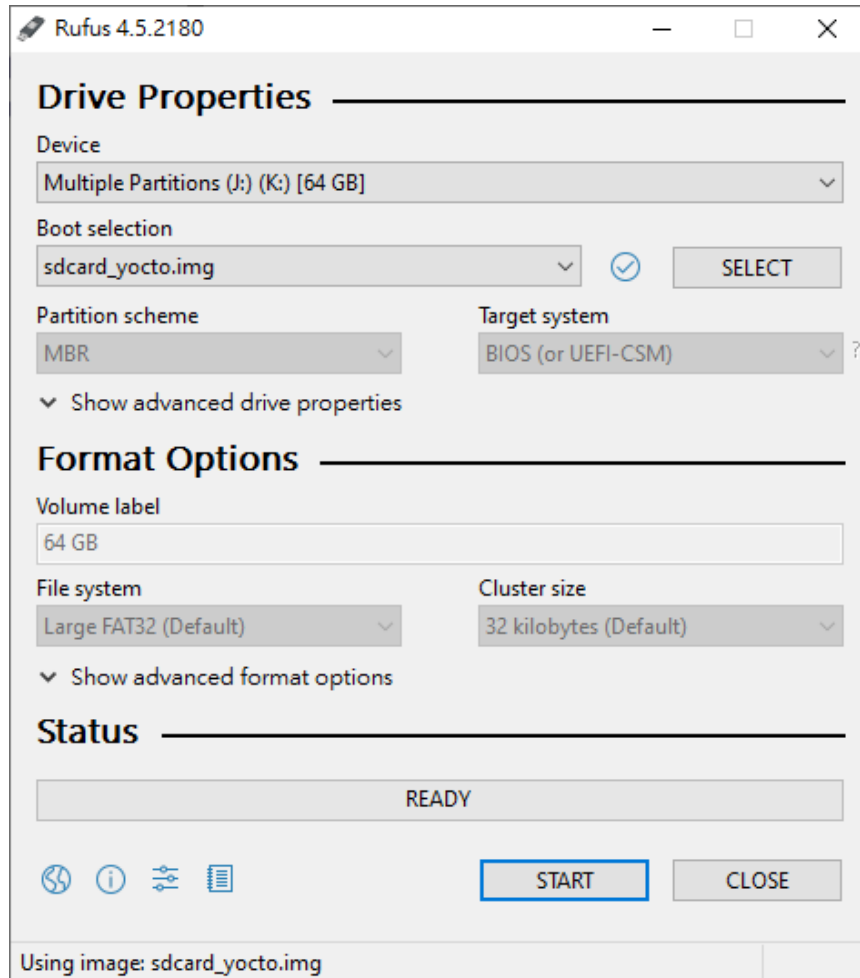


Figure 5-3 Rufus tool

5.4 Set the MSEL

Make sure the Configure mode switch is set to AS Fast mode. please set MSEL[2:0] to “001”.

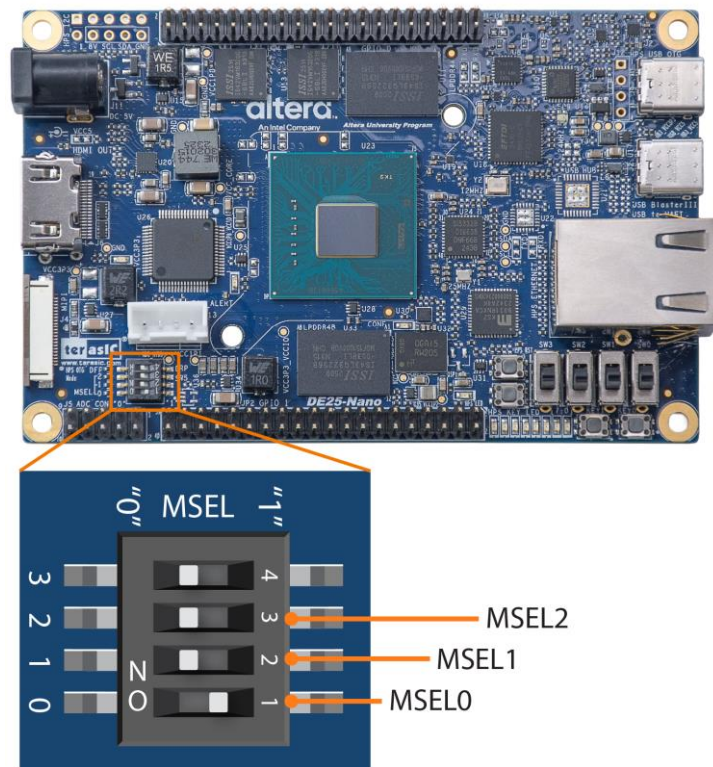


Figure 5-4 Position of slide switches SW5 for Configuration Mode

5.5 Power On the Board

To power up the board, user need to connect a 5V DC power supply to the board, see **Figure 5-5**.

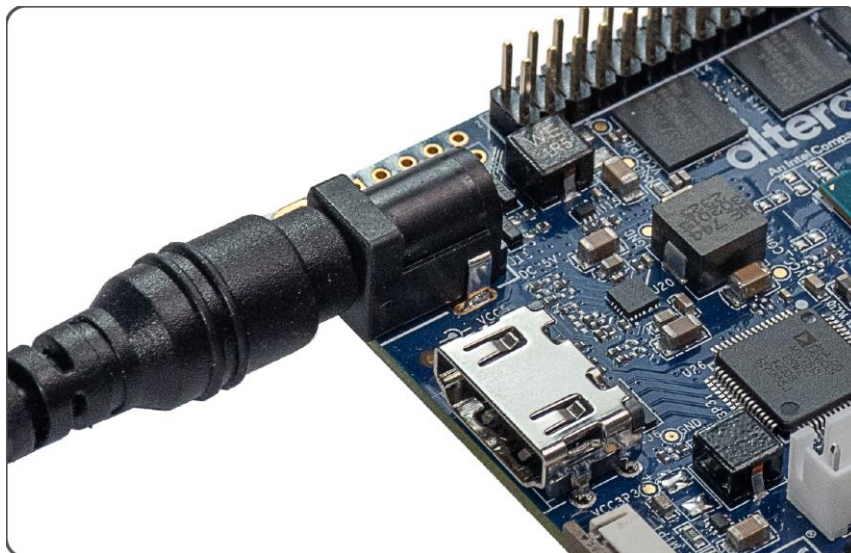


Figure 5-5 Power on the board from external Power

5.6 Setting up HPS UART Terminal

This section presents how to setup the HPS UART interface on your Host PC. The HPS UART on the DE25-Nano development board is implemented through the FTDI FT4232H chip, which is part of the onboard USB Blaster III circuit. This means the onboard USB Blaster III and the HPS UART interface share the same USB Type-C connector for their connection to the host.

■ Installing the Driver

The driver for this UART interface is installed automatically by simply checking the '**Install UART FTDI driver**' option during the Quartus 25.1.1 Pro setup.

If you missed this option during the Quartus installation or need to reinstall, you can manually install the driver from the source files located in the Quartus installation directory. The typical path is:

<Quartus 25.1.1 pro install path>\25.1.1\quartus\drivers\uart-ftdi

■ Hardware Setting

Connect your computer to the development board by plugging the USB cable into the USB Type-C connector of the board. (Connection setup is shown in **Figure 5-6**)

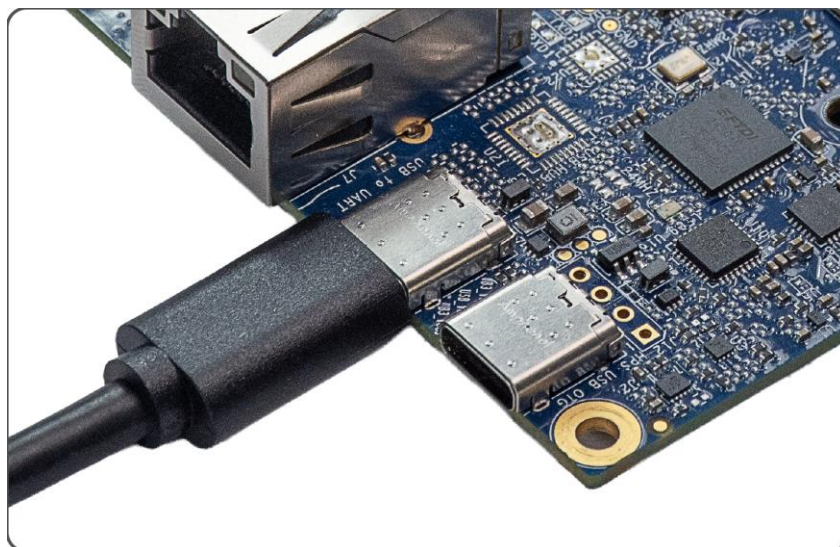


Figure 5-6 Connect the Type-C USB cable to the board

The following steps show 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 the **Device Manager** on your windows and check the **Port(COM&LPT)** tab. User may find the two **USB Serial Port(COM X)** on the list, the port shown on the top is for HPS, the bottom one is for FPGA. See **Figure 5-7**, the COM number of this host is COM7. *Note that the “COM7” on the Serial Line column needs to be modified according to the actual com port on the user's computer.*

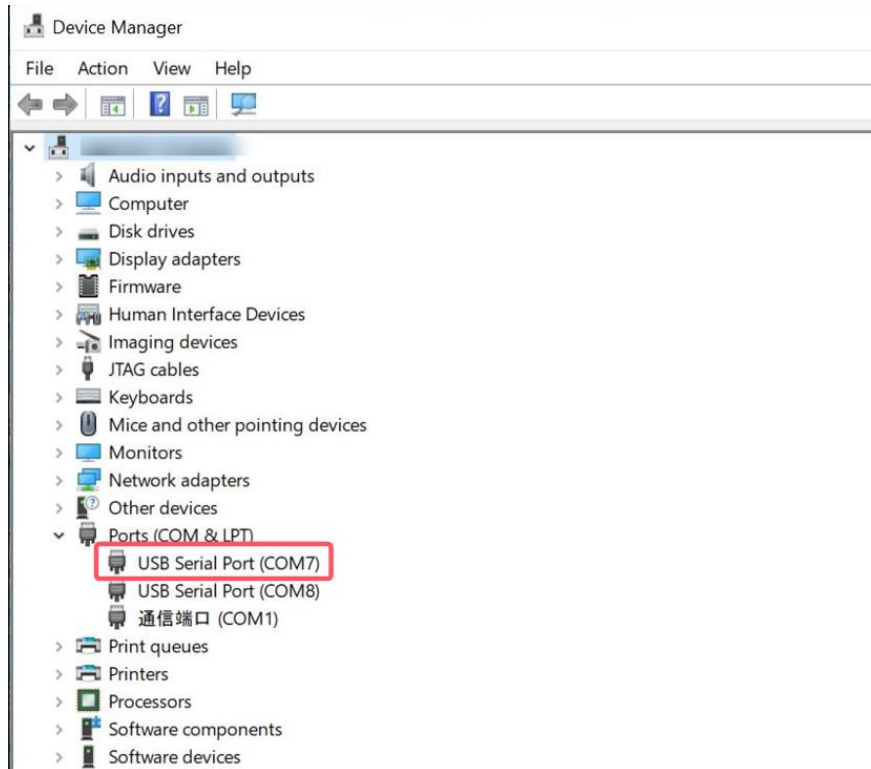


Figure 5-7 Device Manager

2. Open putty.exe, click Serial go to a serial configure interface.
3. Configure the window like the following picture and click “save” button to save the setting and click “Open” to open the terminal window. *Note that the “COM7” on the Serial Line column needs to be modified according to the actual com port on the user's computer.*

The main settings in PuTTY are as follows:

- Connection type: Serial
- Serial line: COMX
- Speed: 115200

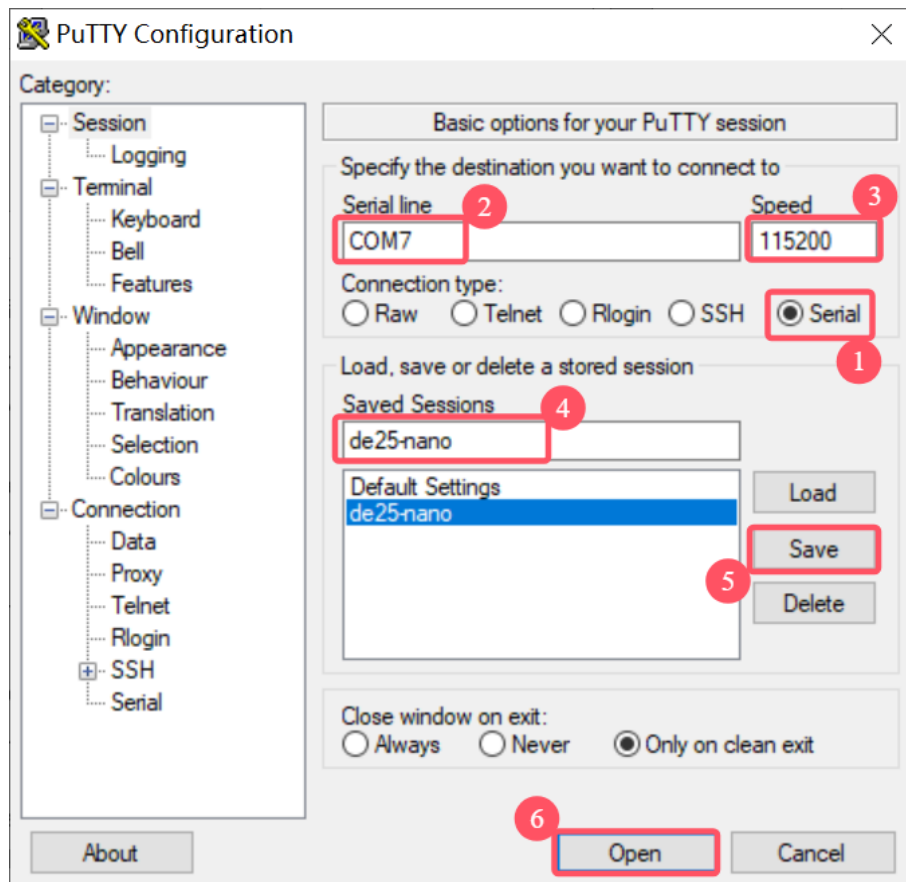


Figure 5-8 Putty Window

4. Please type **terasic** for account name and **123** for the password to login Ubuntu (See **Figure 5-9**).

Note : If the UART terminal does not respond, please refer to **5.7 Appendix** to troubleshoot the issue.

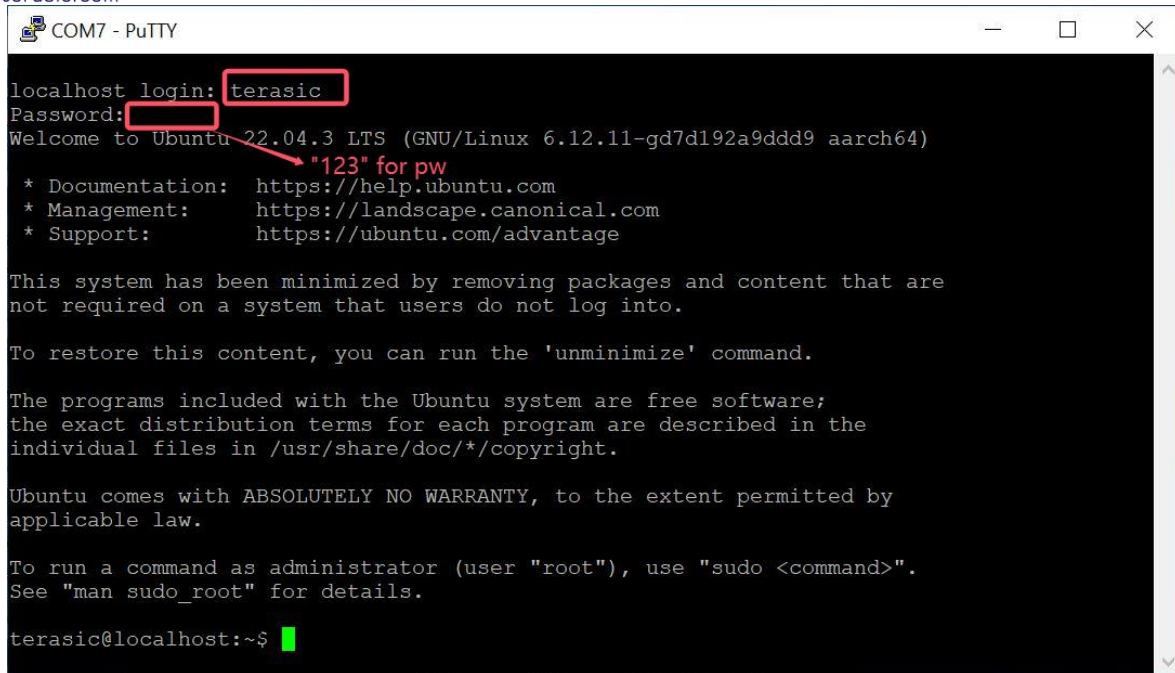


Figure 5-9 PuTTY Window

5.7 Appendix

This section describes troubleshooting steps to take if Linux fails to boot or if the PuTTY window is unresponsive.

1. Check if the USB Serial Port shows on the device manager on the computer.

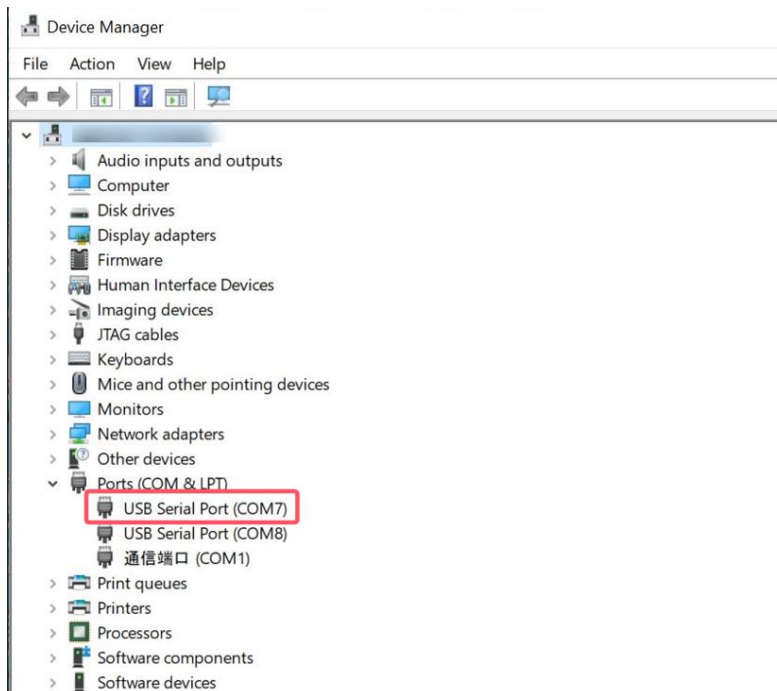


Figure 5-10 Hardware Setup for UART Terminal

2. Make sure the Configure mode switch is set to AS mode.

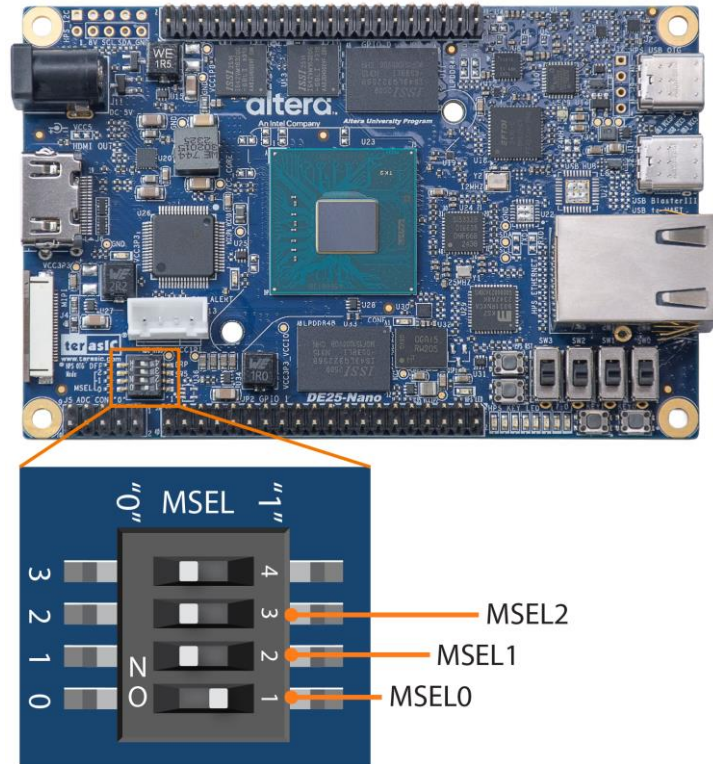


Figure 5-11 Position of slide switches SW5 for Configuration Mode

3. The QSPI flash on the Board had programmed the boot file when shipped. After power on, user can check if the user LED7 is flashing, and after 10 seconds of booting. If not, please refer to following steps to re-program the QSPI flash with the factory code.
 - Connect the USB cable to USB blaster III connector of the Board.
 - Copy the factory code from the path :
System CD\ Demonstration\SoC_FPGA\GHRD\output_files\program_qspi_flash\
 - Execute “flash_program.bat” to erase and program the QSPI flash.

Additional Information

Contact Terasic

Users can refer to the following table for technical support and more information of Terasic and our product:

Contact Method	Address
Email	support@terasic.com/sales@terasic.com
Tel	+886-3-575-0880
Website	www.terasic.com
Address	9F., No.176, Sec.2, Gongdao 5th Rd, East Dist, Hsinchu City, 30070. Taiwan, 30070

Revision History

Date	Version	Changes
2025.09	V1.0	First Version