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Titan S10 SOM Evaluation Kit

Getting Start Guide

Contents

Chapter 1

Overview

This manual serves as a quick start guide for the Titan S10 SOM Evaluation Kit, outlining the essential hardware setup, software installation, and basic knowledge required for initial operation.

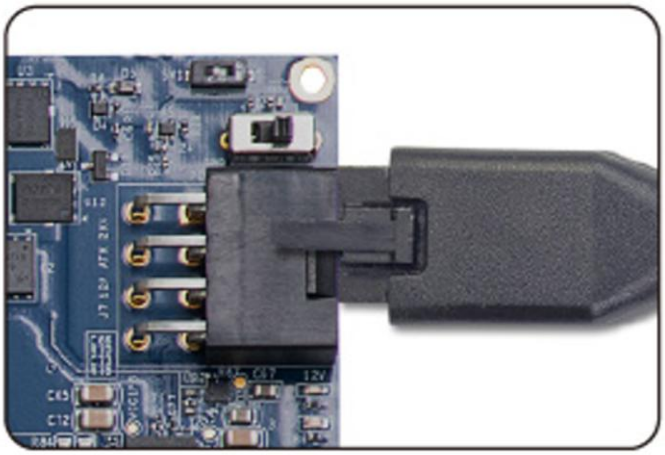
This guide includes the following topics:

- Powering on the board
- Using USB Blaster III on Windows/Linux
- Installing the UART driver
- Programming the FPGA configuration into QSPI flash

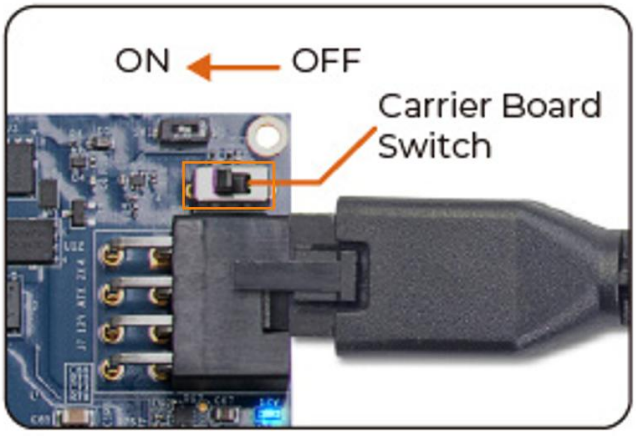
Chapter 2

Power On the Board

1. Connect the power adapter to the 2x4 power connector on the board.



2. Power on the kit by turning the power switch on the carrier board to **ON** position



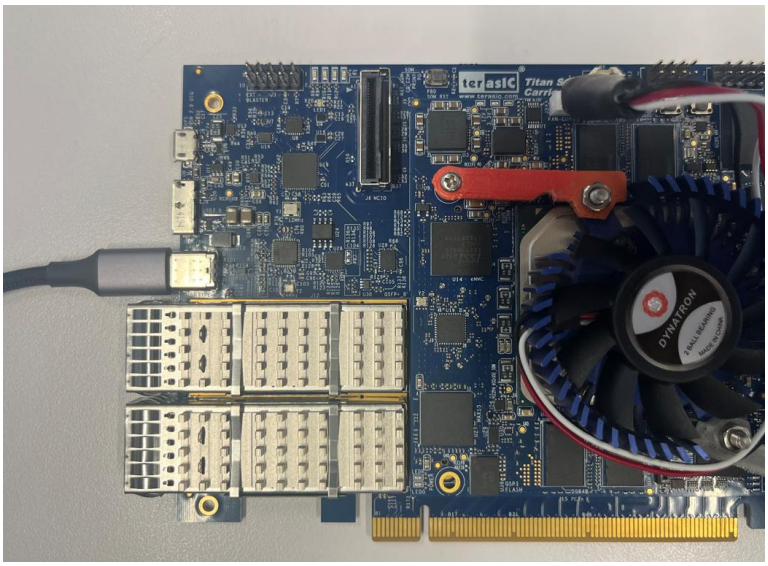
Chapter 3

Using the USB Blaster III Under Windows

The Titan S10 Evaluation Kit includes Altera's latest **USB Blaster III** circuitry. This guide explains how to enable and use this feature..

3.1 Hardware Connection

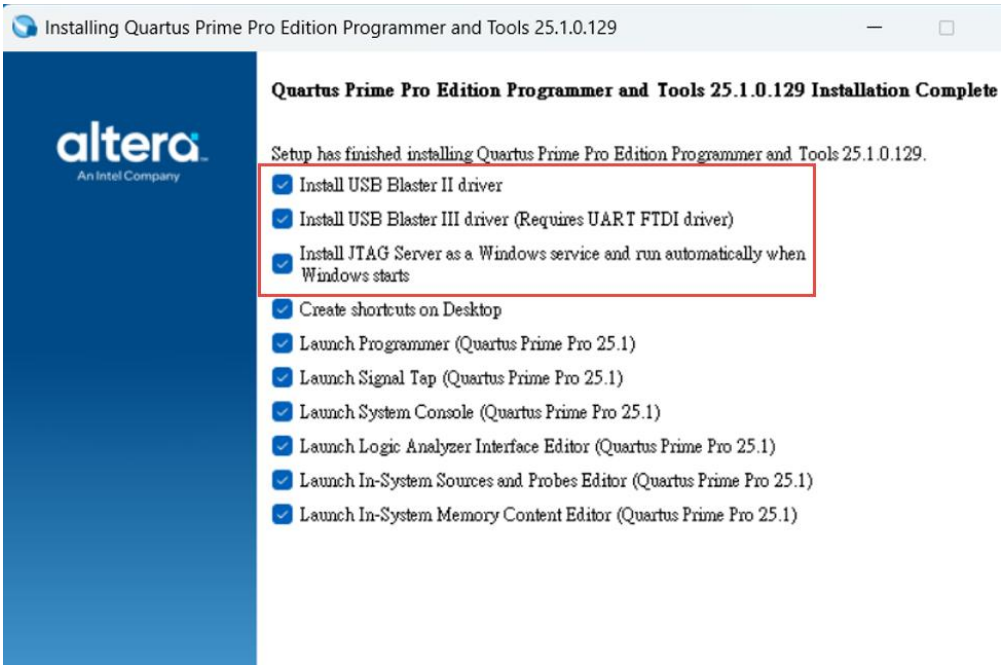
Connect the **Type-C port** on the Titan S10 Evaluation Kit to your **host PC** using a USB cable, then power on the board.



3.2 For Quartus Pro 25.1 Users

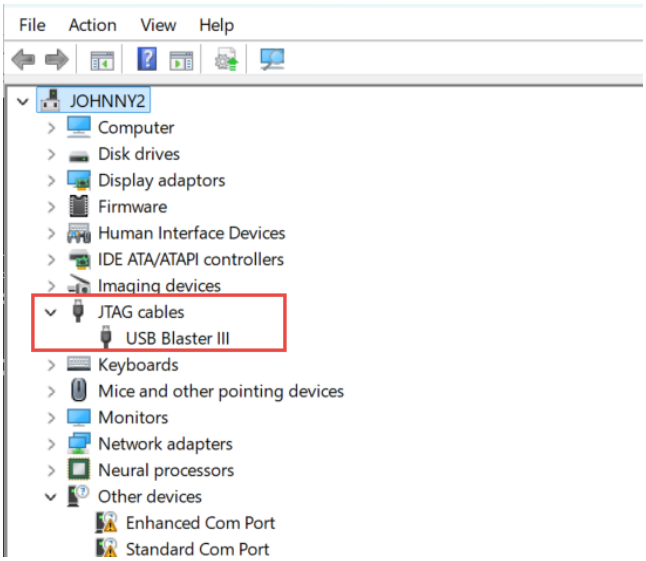
Starting with Quartus Pro 25.1, **USB Blaster III** is supported. When installing Quartus, ensure the following options are selected:

- Install USB Blaster III driver
- Install USB Blaster III driver (Requires UART FTDI driver)
- Install JTAG server as a Windows service and run automatically when windows starts

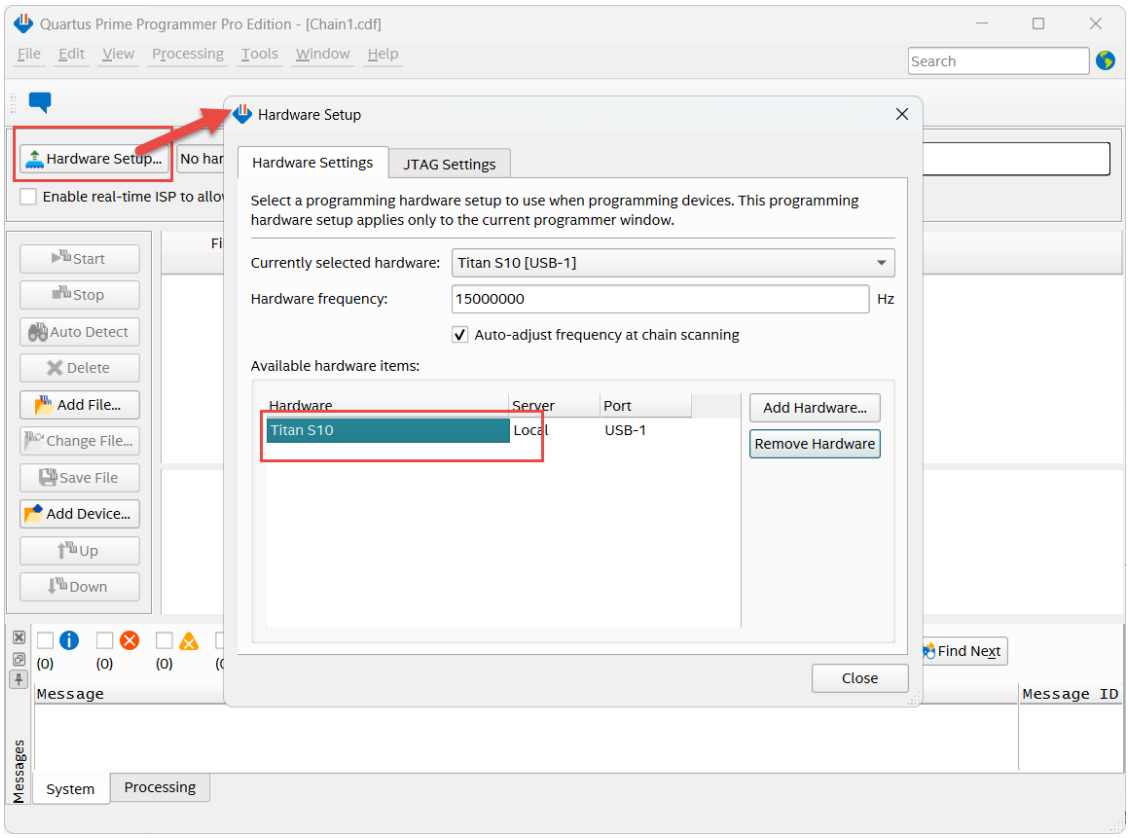


After installation:

- **Device Manager** should display USB Blaster III in JTAG cables tab.



- Quartus Programmer 25.1 should list USB Blaster III as an available option



3.3 For Non-Quartus Pro 25.1 Users (e.g., Quartus 24.3)

If you are using a version earlier than 25.1, follow these steps:

i. Install Quartus Pro 25.1 Programmer

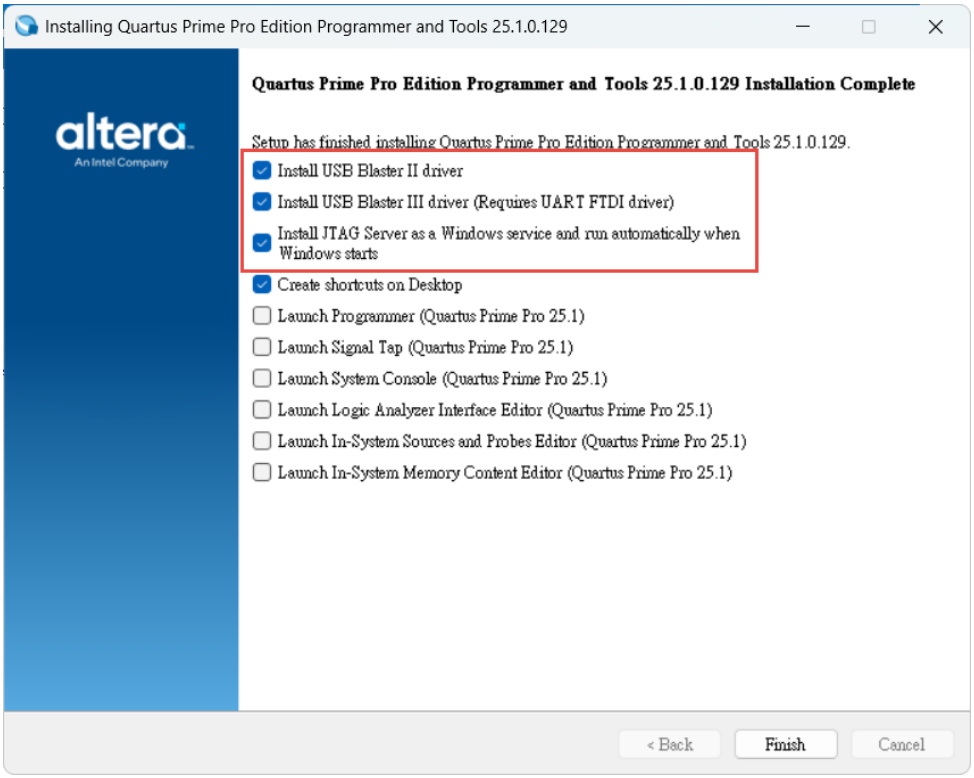
- Download from the link below:

  Intel Quartus Pro 25.1 Programmer Download

  - Go to the Individual Files tab, find **Quartus® Prime Pro Edition Programmer and Tools**, and download it.

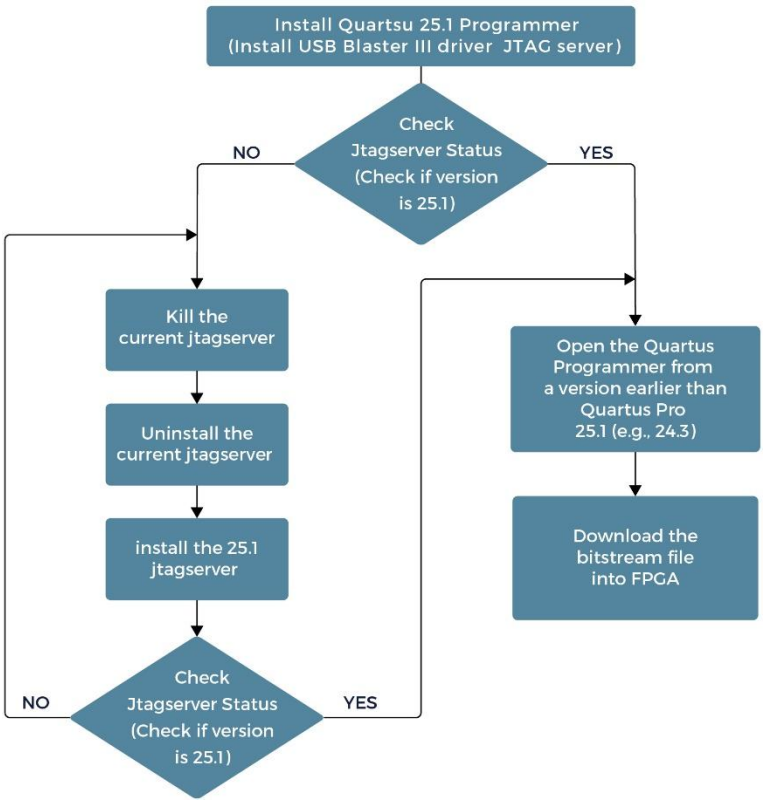
- During installation, ensure the following are selected:

  - Install USB Blaster III driver
  - Install USB Blaster III driver (Requires UART FTDI driver)
  - Install JTAG server as a Windows service and run automatically when windows starts



ii. Workflow for setting USB blaster III

- After completing Step i, follow the flow shown in the figure below.



To allow Quartus 24.3 Programmer to recognize the USB Blaster III circuit, the user must ensure that **the JTAG Server running on the host is version 25.1**.

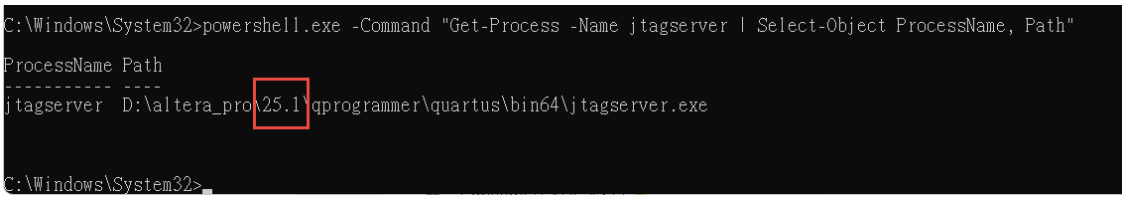
- If the running JTAG Server is version 25.1, Quartus 24.3 Programmer should be able to detect and use the USB Blaster III directly.
- If the running JTAG Server is **not** version 25.1, some additional commands are required to switch it to version 25.1.

iii. Check Running JTAG Server Version

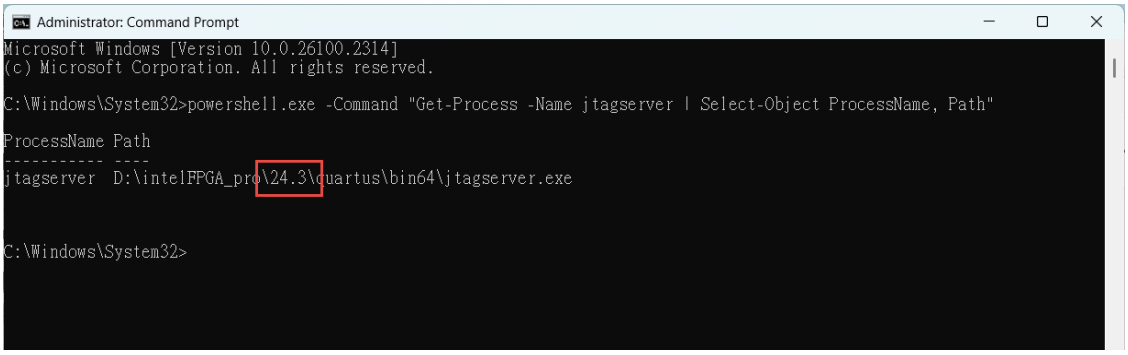
1. Open Command Prompt as **Administrator**.
2. Run the following command:

```
powershell.exe -Command "Get-Process -Name jtagserver | Select-Object ProcessName, Path"
```

- If the path points to Quartus 25.1 Programmer, the correct version is running. Proceed to **Step v**.



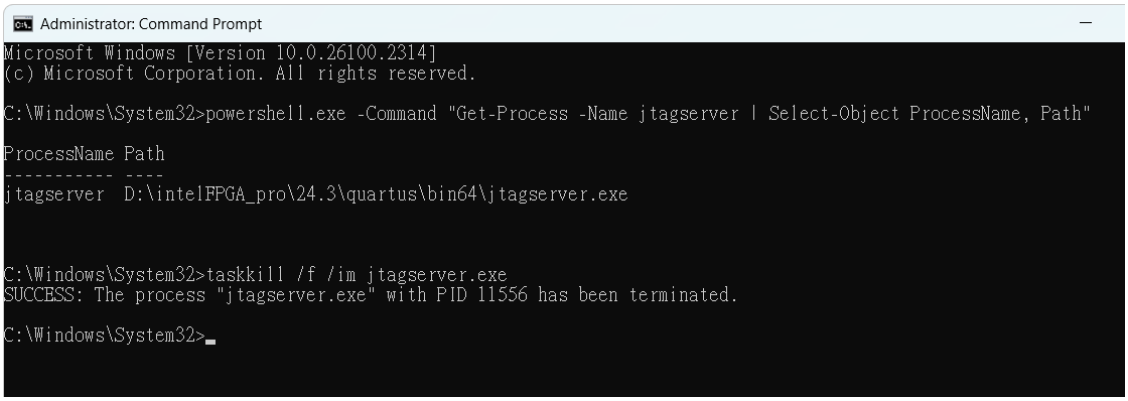
- If it shows Quartus 24.3, continue to **Step iv** to switch the version of the JTAG Server.



iv. Switch JTAG Server to Version 25.1

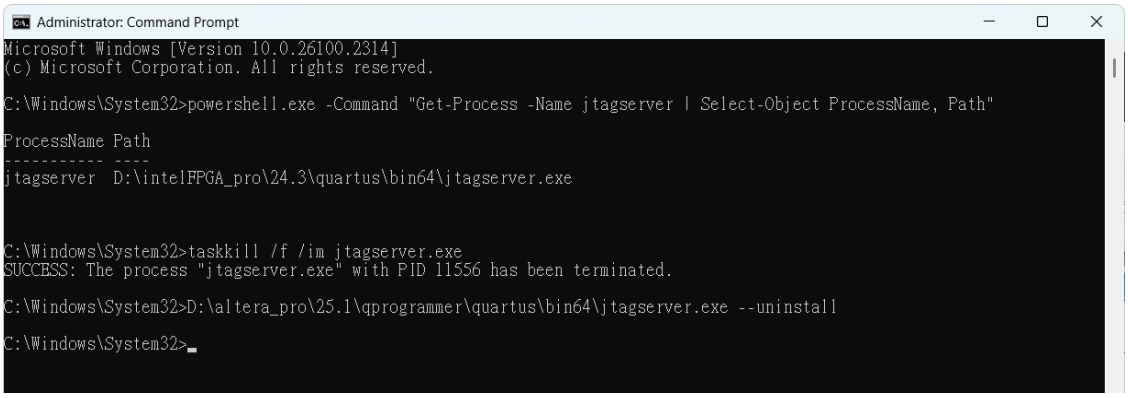
- Terminate the current JTAG Server process.

```
taskkill /f /im jtagserver.exe
```



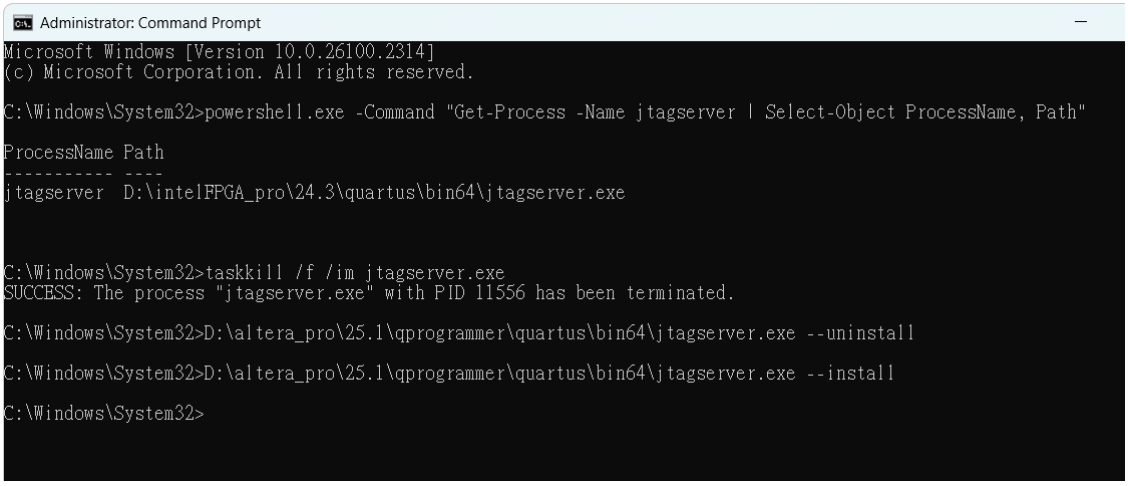
- Uninstall the current JTAG Server.

<Quartus 25.1 programmer install path>\quartus\bin64\jtagserver.exe --uninstall



- Install the 25.1 JTAG Server:

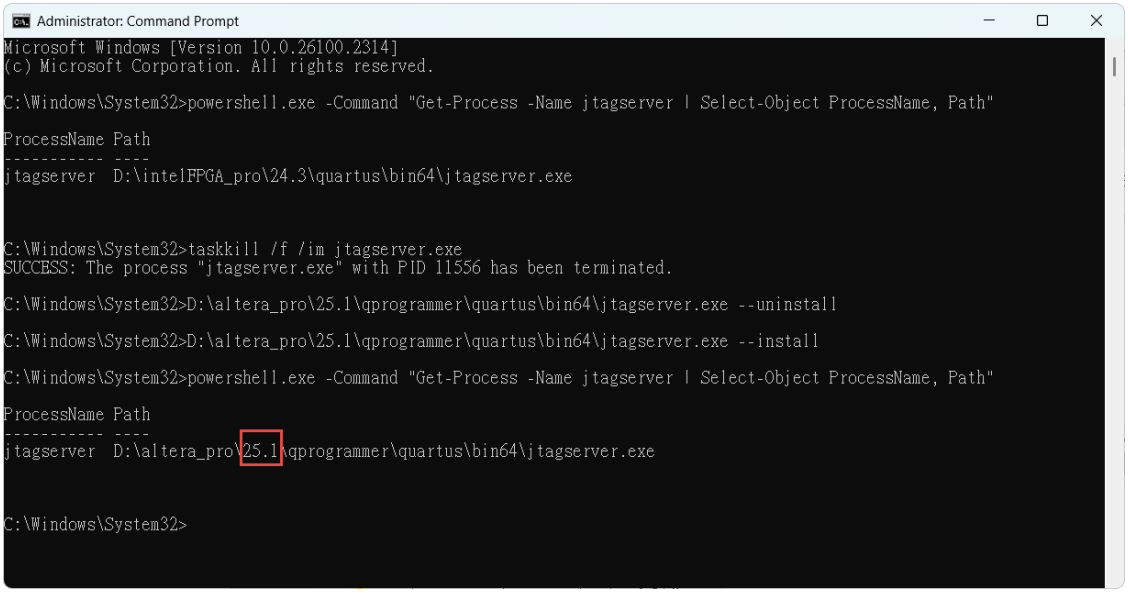
<Quartus 25.1 programmer install path>\quartus\bin64\jtagserver.exe --install



- Run the PowerShell command from Step iii again to verify the version is now 25.1.

powershell.exe -Command "Get-Process -Name jtagserver | Select-Object ProcessName, Path"

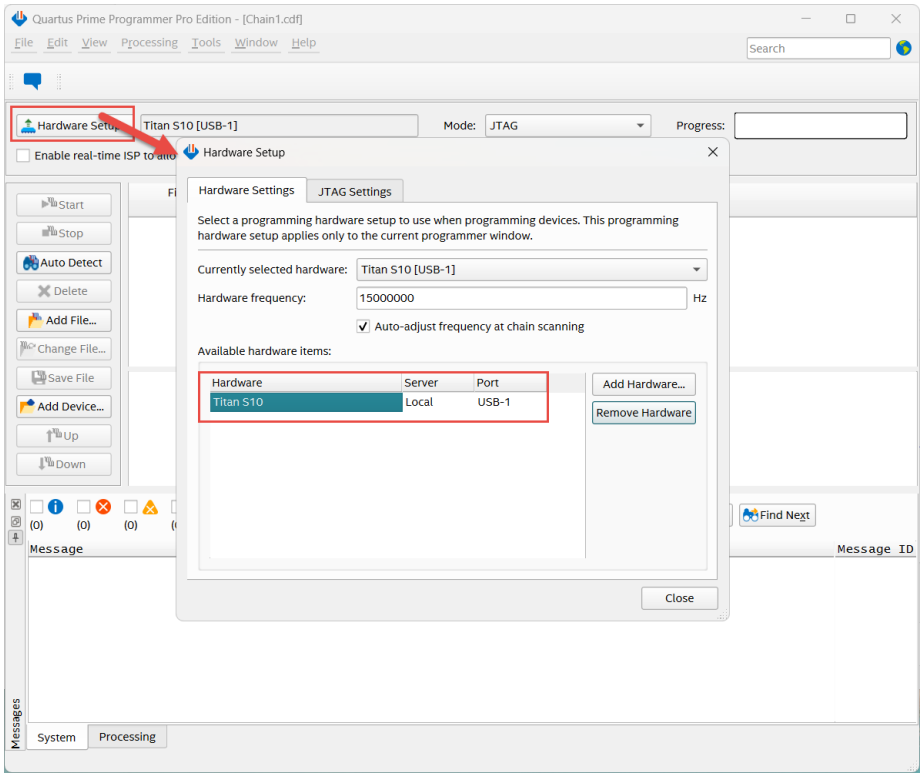
- If confirmed, proceed to Step v. If not, check previous steps for any omissions.



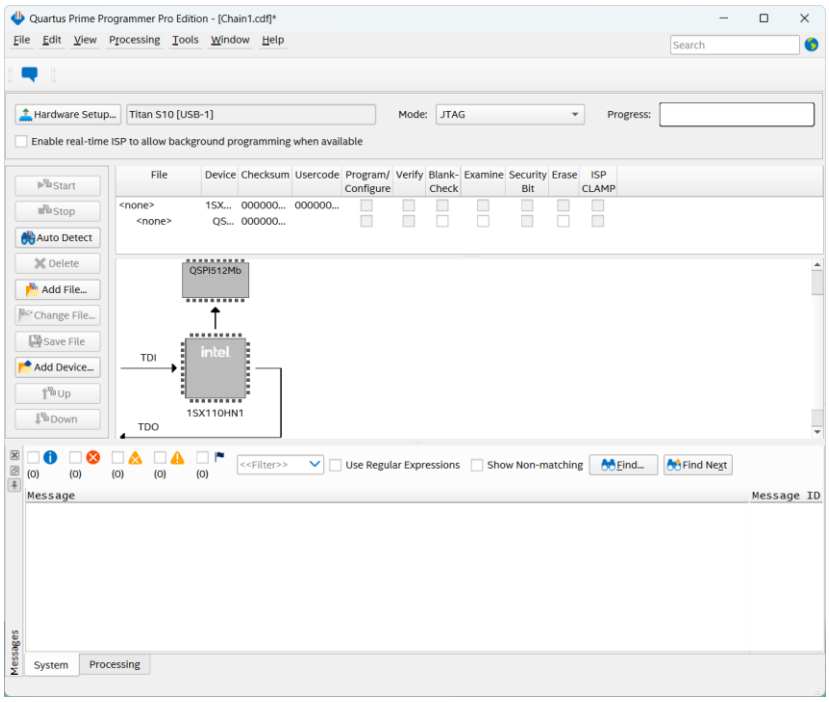
v. Configure Quartus Programmer

1. Launch Quartus 24.3 Programmer..

2. Select USB Blaster III as the programming hardware.



3. Click Auto Detect to ensure the FPGA is recognized.



Chapter 4

Using the USB Blaster III Under Linux

This chapter will explain how to use the **USB Blaster III** under a **Linux** environment.

4.1 Driver Setup

Add the following lines to the /etc/udev/rules.d/51-usbblaster.rules file in user's linux system.

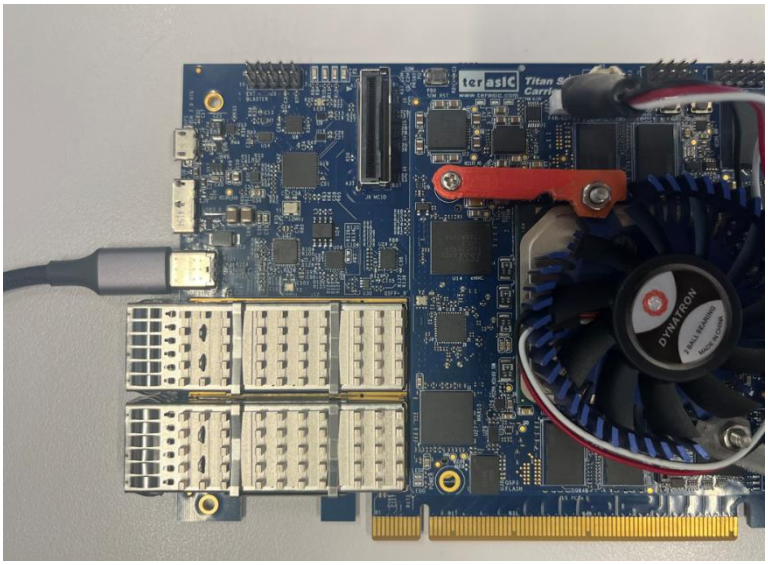
```
# USB-Blaster
SUBSYSTEM=="usb", ATTR{idVendor}=="09fb", ATTR{idProduct}=="6001", MODE="0666"
SUBSYSTEM=="usb", ATTR{idVendor}=="09fb", ATTR{idProduct}=="6002", MODE="0666"
SUBSYSTEM=="usb", ATTR{idVendor}=="09fb", ATTR{idProduct}=="6003", MODE="0666"

# USB-Blaster II
SUBSYSTEM=="usb", ATTR{idVendor}=="09fb", ATTR{idProduct}=="6010", MODE="0666"
SUBSYSTEM=="usb", ATTR{idVendor}=="09fb", ATTR{idProduct}=="6810", MODE="0666"

# USB-Blaster III
SUBSYSTEM=="usb", ATTR{idVendor}=="09fb", ATTR{idProduct}=="6020", MODE="0666"
```

4.2 Hardware Connection

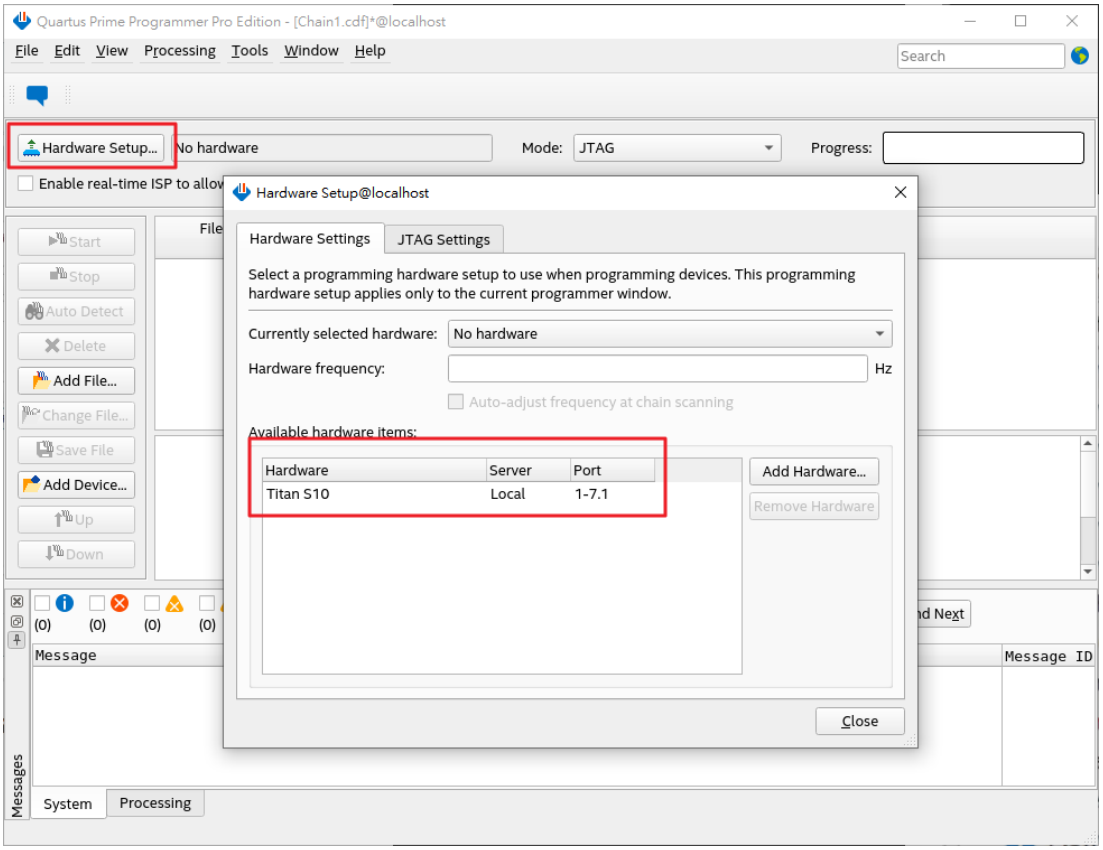
Connect the **Type-C port** on the Titan S10 Evaluation Kit to your **host PC** using a USB cable, then power on the board.



4.3 For Quartus Pro 25.1 Users

Starting with Quartus Pro 25.1, **USB Blaster III** is supported.

Please open the Quartus Programmer 25.1 and it should list USB Blaster III as an available option



4.4 For Non-Quartus Pro 25.1 Users (e.g., Quartus 24.3)

If you are using a version earlier than 25.1, follow these steps:

i. Install Quartus Pro 25.1 Programmer

- Download from the link below:

  Intel Quartus Pro 25.1 Programmer Download

  - Go to the Individual Files tab, find **Quartus® Prime Pro Edition Programmer and Tools**, and download it.

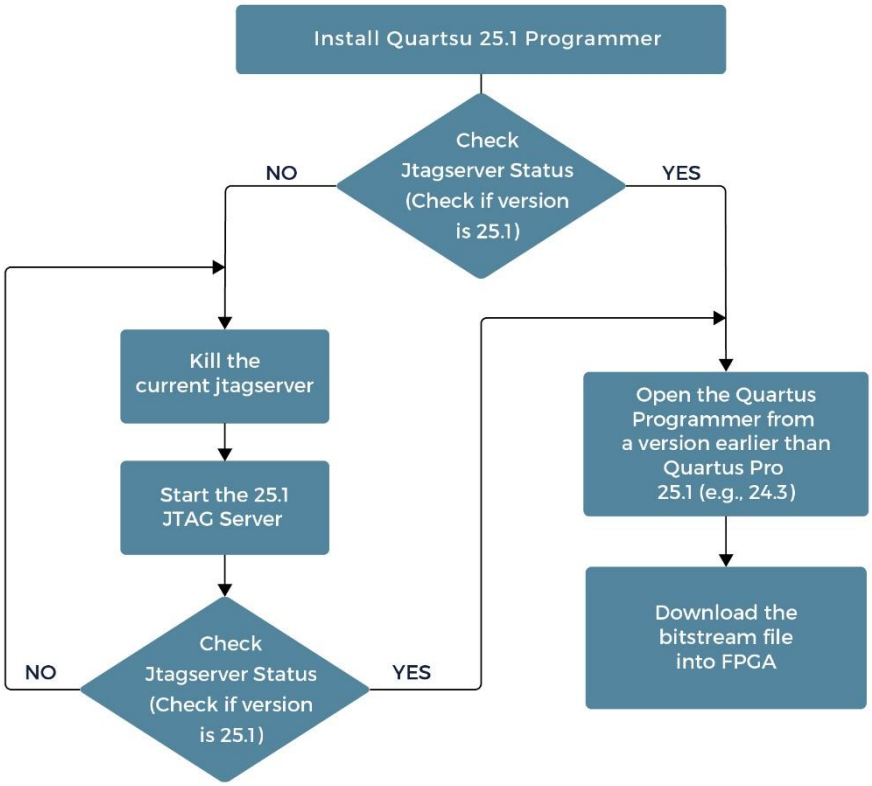
Quartus® Prime Pro Edition Programmer and Tools

Download
QuartusProProgrammerSetup-25.1.0.129-linux.run

Size: 1.5 GB
SHA1: a80f03fa51b274d2f439004f9f9120f1b867d2ac

ii. Workflow for setting USB blaster III

- After completing Step i, follow the flow shown in the figure below.



To allow Quartus 24.3 Programmer to recognize the USB Blaster III circuit, the user must ensure that **the JTAG Server running on the host is version 25.1**.

- If the running JTAG Server is version 25.1, Quartus 24.3 Programmer should be able to detect and use the USB Blaster III directly.
- If the running JTAG Server is **not** version 25.1, some additional commands are required to switch it to version 25.1.

iii. Check Running JTAG Server Version

1. Open Terminal
2. Run the following command:

```
lsof -p `pgrep jtagd || echo 0` | grep txt
```

```
user@localhost:~$ lsof -p `pgrep jtagd || echo 0` | grep txt
jtagd   4696 user  txt       REG   8,18  2007208 6601351 /home/user/altera_pro/25.1/qprogrammer/quartus/linux64/jtagd
user@localhost:~$
```

- If the path points to Quartus 25.1 Programmer, the correct version is running. Proceed to **Step v**.

- If it shows Quartus 24.3, continue to **Step iv** to switch the version of the JTAG Server.

```
user@localhost:~$ lsof -p `pgrep jtagd || echo 0` | grep txt
jtagd   5070 user  txt       REG   8,18   689280 8268673 /home/user/intelFPGA_pro/24.3/qprogrammer/quartus/linux64/jtagd
user@localhost:~$
```

iv. Switch JTAG Server to Version 25.1

- Terminate the current JTAG Server process.

```
killall -9 jtagd
```

```
user@localhost:~$ killall -9 jtagd
user@localhost:~$
```

- Start the 25.1 JTAG Server:

```
<Quartus 25.1 programmer install path>/quartus/bin/jtagd
```

```
user@localhost:~$ /home/user/altera_pro/25.1/qprogrammer/quartus/linux64/jtagd
user@localhost:~$
```

- Run the command from Step iii again to verify the version is now 25.1.

```
lsof -p `pgrep jtagd || echo 0` | grep txt
```

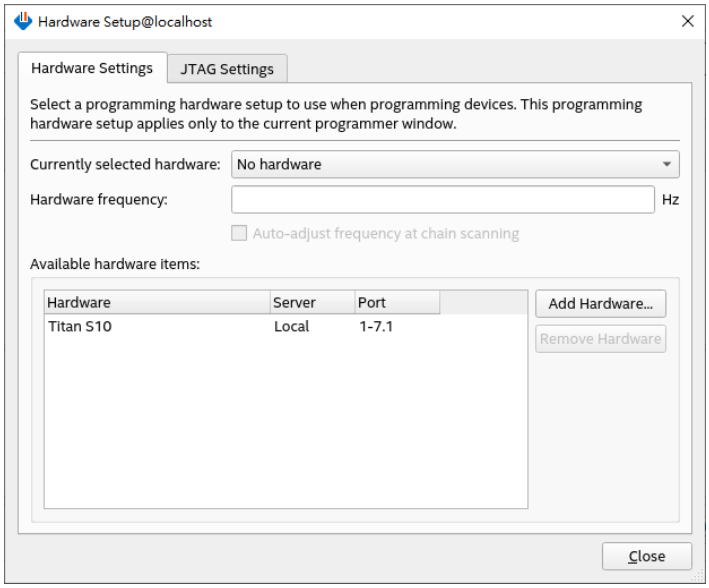
```
user@localhost:~$ lsof -p `pgrep jtagd || echo 0` | grep txt
jtagd   5083 user  txt       REG   8,18  2007208 6601351 /home/user/altera_pro/25.1/qprogrammer/quartus/linux64/jtagd
user@localhost:~$
```

- If confirmed, proceed to Step v. If not, check previous steps for any omissions.

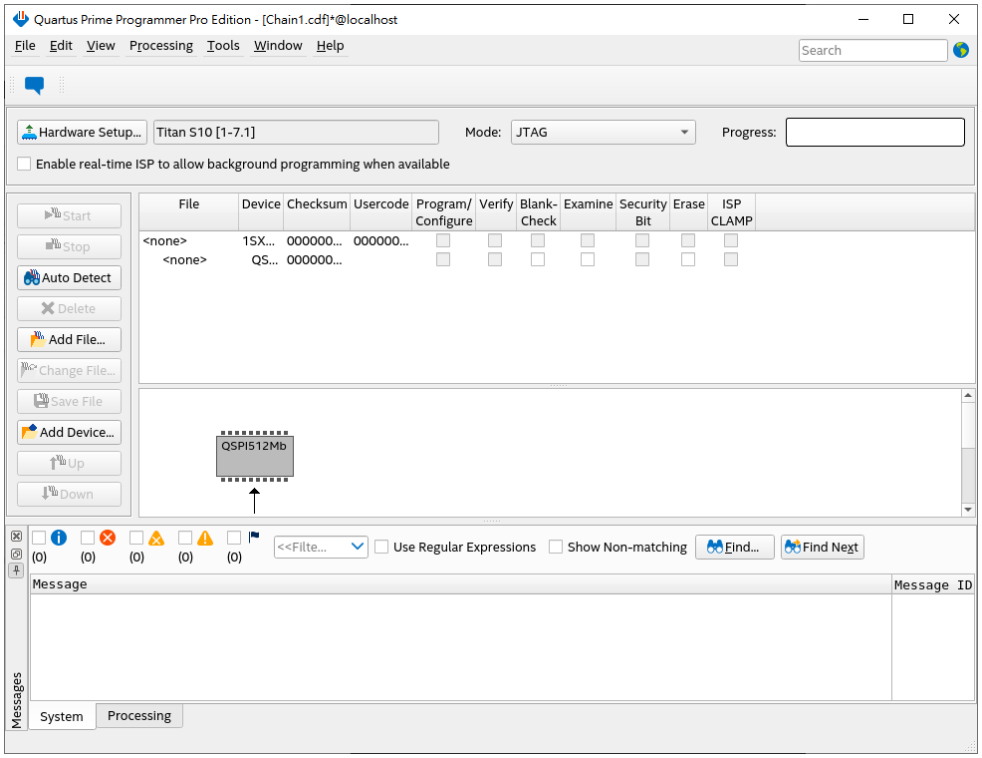
v. Configure Quartus Programmer

1. Launch Quartus 24.3 Programmer.

2. Select USB Blaster III as the programming hardware.



3. Click Auto Detect to ensure the FPGA is recognized.

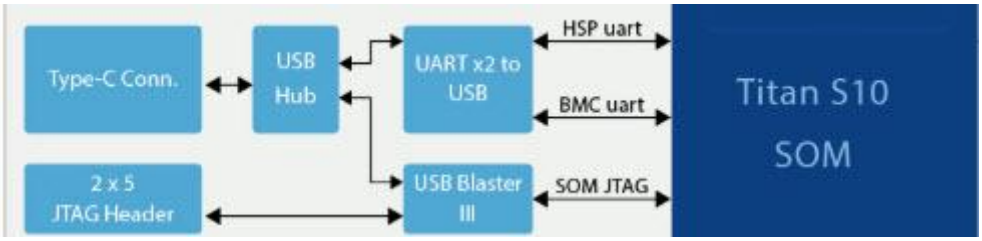


Chapter 5

Install UART Driver

This chpater explains how to install the UART interface driver for the Titan S10 EVK.

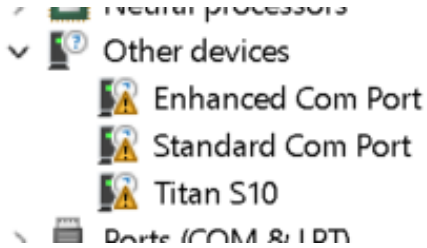
As shown in the diagram, the USB Type-C connector on the Titan S10 EVK supports three functions:



- USB Blaster III
- HPS UART
- BMC UART

For USB Blaster III driver installation, refer to Chapter 3.

The HPS and BMC UART interfaces are supported by a Silicon Labs CP2105 USB-to-Dual-UART Bridge Controller. When the USB Type-C connector is connected to the host PC, Windows Device Manager will detect three UART devices.



One is the USB Blaster III UART, which is currently unused and can be ignored.
The remaining two are the HPS and BMC UART ports. Please follow the link below

for the driver installation instructions : The CP2105 (USB to UART) Driver Installation Instructions
Once installed successfully, Device Manager should display the following:

- Enhanced Port corresponds to HPS UART
- Standard Port corresponds to BMC UART

Make sure to check the COM port numbers to match your intended connection (HPS or BMC).

Chapter 6

Programming FPGA Configuration into QSPI Flash

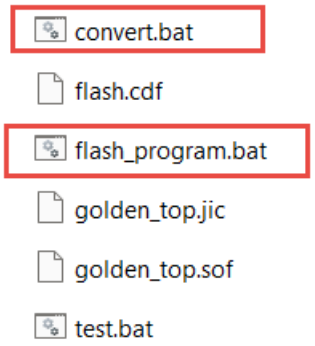
This chapter explains how to program the user's .sof file into QSPI flash, allowing users to boot the FPGA in AS Fast mode.

6.1 Programming .sof File into QSPI Flash

For FPGA-only designs, users can convert and program their .sof file into QSPI flash using the provided Terasic demo batch file. Follow these steps:

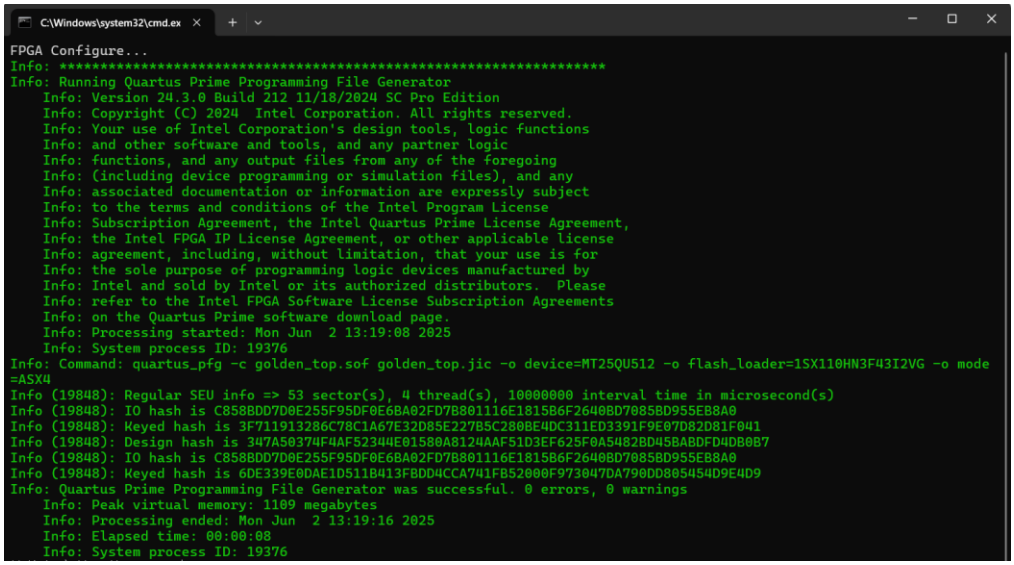
1. Download the Titan S10 SOM EVK CD-ROM to your host PC.

2. Navigate to the folder: /Demonstration/FPGA/LED_Blink/demo_batch/.



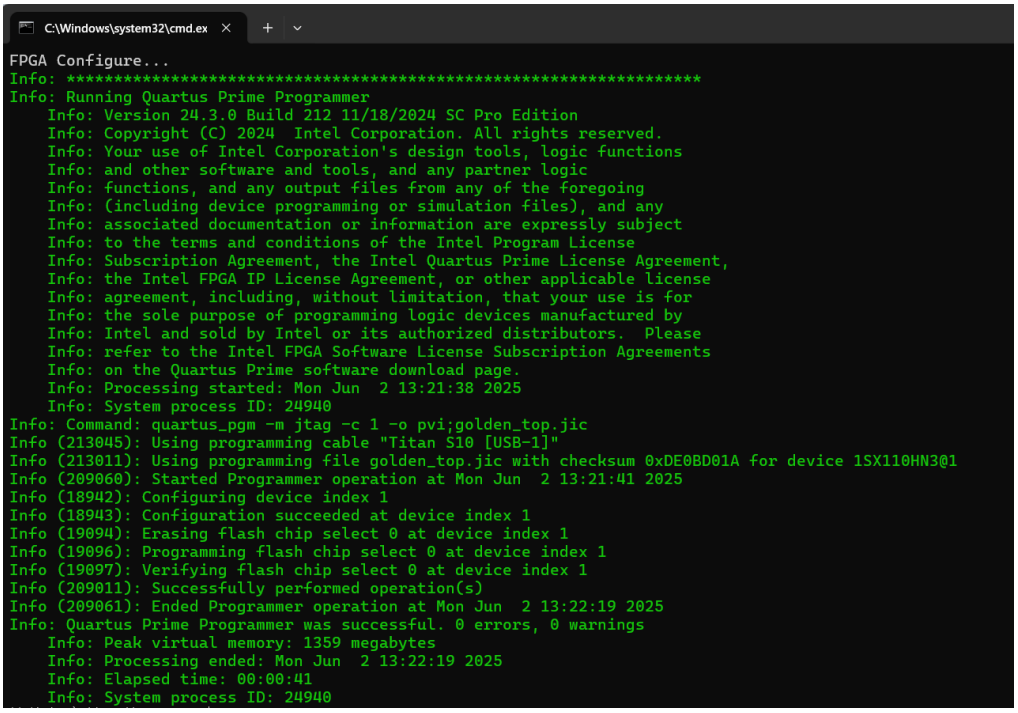
3. Rename your target .sof file to golden_top.sof, replacing the existing file in the above directory.

4. Execute convert.bat within the demo_batch folder to convert golden_top.sof into golden_top.jic.



5. Connect the Titan S10 SOM EVK board to your host PC using a USB Type-C cable and power on the board.

6. Run flash_program.bat to program golden_top.jic into the QSPI flash.



6.2 Restoring Factory Image into QSPI Flash

The Titan S10 SOM QSPI flash contains a factory image with the first-stage bootloader for HPS. The following steps restore the factory image to the QSPI flash:

1. Navigate to the folder: /Demonstration/SoC_FPGA/GHRD/output_files/program_qspi_flash/.
2. Connect the Titan S10 SOM EVK board to your host PC using a USB Type-C cable and power on the board.
3. Execute flash_erase_hps.bat to erase existing data from the flash.
4. Execute flash_program_hps.bat to program the factory image (golden_top_hps.hps.jic) located in the parent directory into the flash.

Chapter 7

Assembling and Disassembling the SOM and Carrier Board

This chapter explains how to assemble and disassemble the Titan S10 SOM and Terasic carrier board. Users can refer to the video below for step-by-step guidance, including the required tools for the process.
https://www.youtube.com/watch?v=RbhVenAc4ps

Chapter 8

Additional Information

8.1 Getting Help

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

Terasic Technologies

No.80, Fenggong Rd., Hukou Township, Hsinchu County 303035. Taiwan
Email: support@terasic.com
Web: www.terasic.com
Agilex 7 FPGA Starter Kit Web: A7SK.terasic.com

Revision History

Date	Version	Changes
2023.05	First publication	
2023.07	V1.1	Update section 2.4 and 2.5
2023.08	V1.2	Update PCIe demo path
2023.11	V1.3	Add Section 2.2 Clock controller
2024.04	V1.4	Add section 2.7 HDMI TX