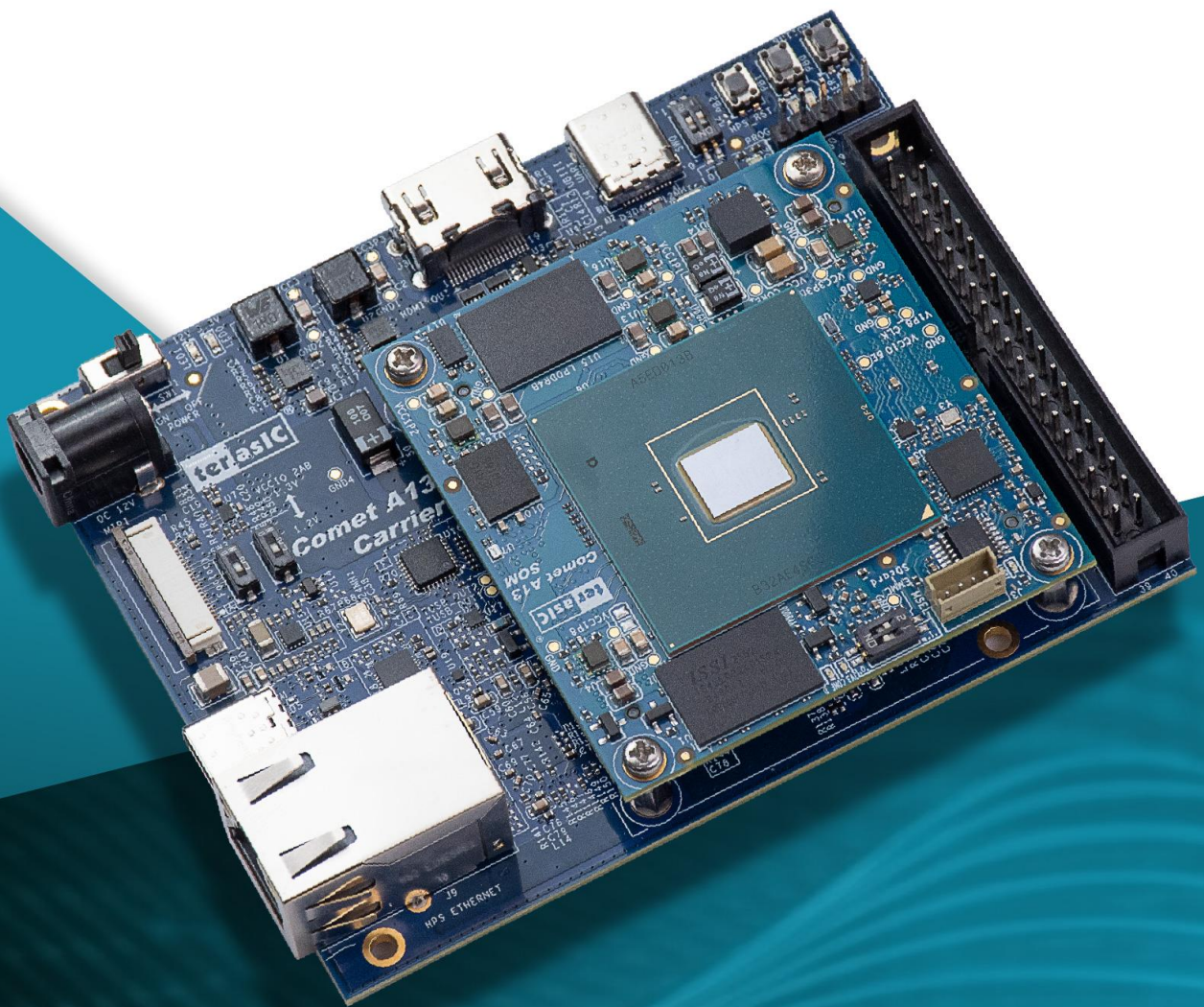


Comet-A13 Evaluation Kit



Linux Booting Started Guide

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Chapter 1

Linux Booting on the board

1.1 Introduction

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

1.2 Required Hardware

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

- Comet A13 Evaluation Kit (EVK)
- USB Type A to Type-C Cable
- MicroSD Card (At least 4GB capacity)

1.3 Install the MicroSD Card

This section describes how to create a bootable Linux MicroSD card and install it into the EVK. It also explains how to download the Linux image for the board and write it to the MicroSD card.

■ Download Linux image file

If users want to copy or reprogram the MicroSD card, they can download the Linux image file. (Find “*Linux BSP (Board Support Package): MicroSD Card Image*”) by referring to the link below:

<http://comet-a13.terasic.com/cd>

The downloaded image file is in ZIP format. Users need to extract the file before writing it to the SD

card.

Linux BSP (Board Support Package): MicroSD Card Image

Title	Version	Size	Date	Download
Linux Console boot from sdcard (Ubuntu 22.04.03 + kernel 6.12.33-lts; revA Board)	1.0		2026-02-10	 
Linux Console boot from eMMC (Ubuntu 22.04.03 + kernel 6.12.33-lts; revA Board)	1.0		2026-02-10	 

Figure 1-1 BSP Download site

■ Download the programming tool

To program a MicroSD card Linux image you can use a free tool such as [Rufus](#) or [win32diskimager](#).

■ 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.

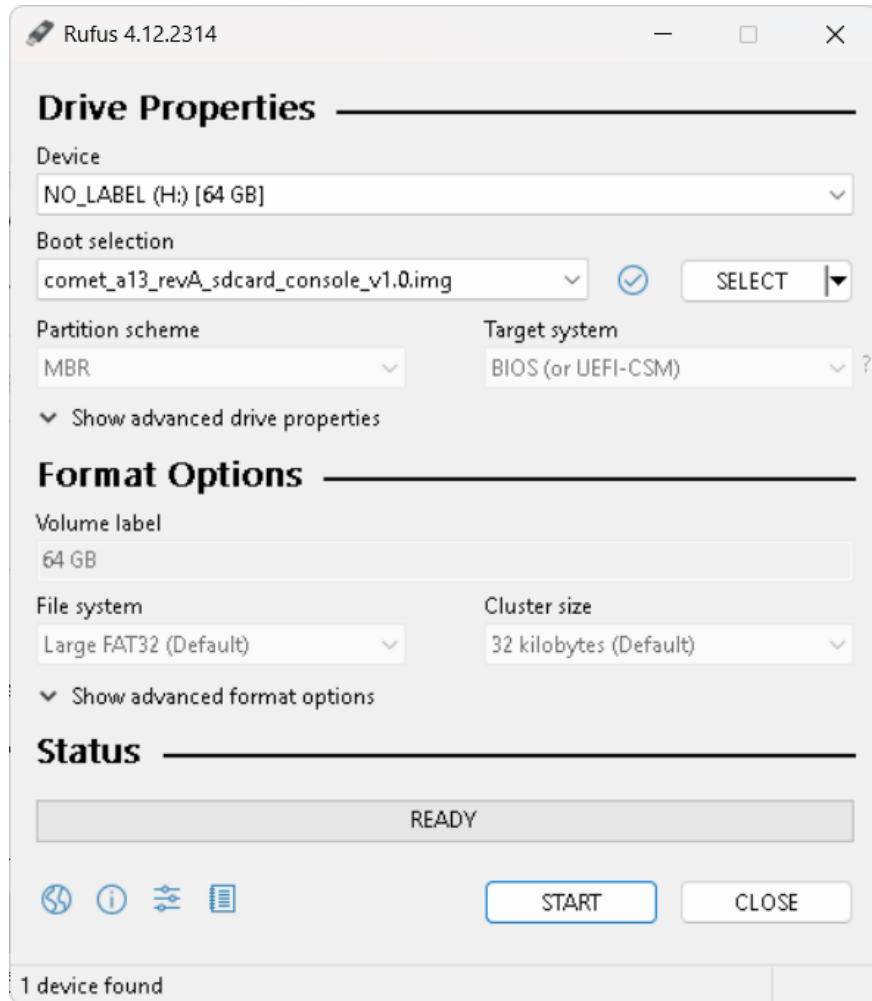


Figure 1-2 Rufus tool

■ Install the MicroSD Card to the Board

Users can install the Micro SD Card on the board by referring to [Figure 1-3](#).

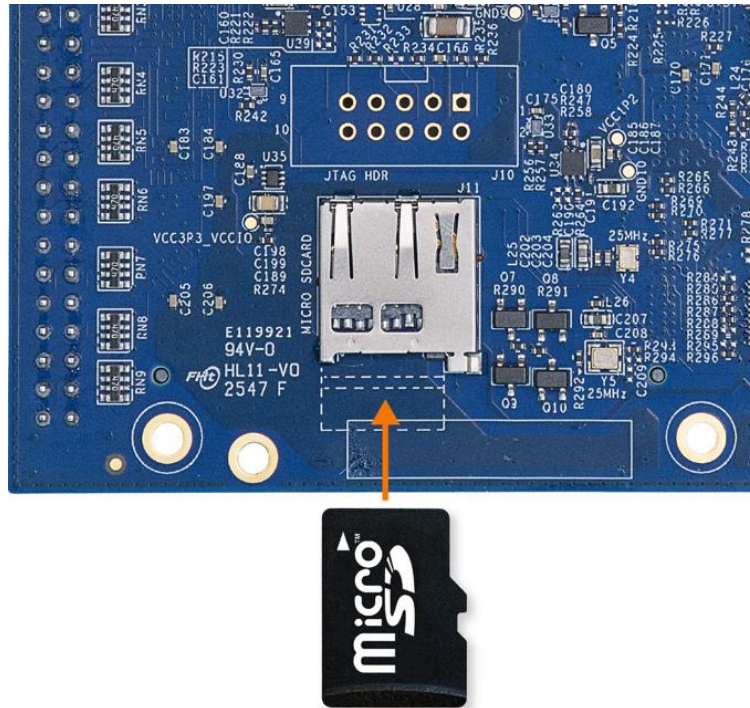


Figure 1-3 Installing MicroSD card

1.4 Boot Media Selection and Hardware Switch Setup (SD Card / eMMC)

This part explains how to configure the onboard physical switches to select your preferred boot device and FPGA configuration mode.

■ Selecting the Boot Media (MicroSD Card or eMMC)

The HPS on the Comet A13 EVK supports two primary storage and boot devices: a MicroSD card (via the carrier board socket) and an onboard 8GB eMMC flash. Choosing which device to boot Linux from depends on the SW1 switch on the SoM module (See **Figure 1-4**). The settings are as follows:

- SD Card Boot Mode: Set SW1[1] to the "ON" position.
- eMMC Boot Mode: Set SW1[1] to the "OFF" position.

Therefore, if you want to use a MicroSD card as the boot source, please set SW1[1] to the "ON" position.

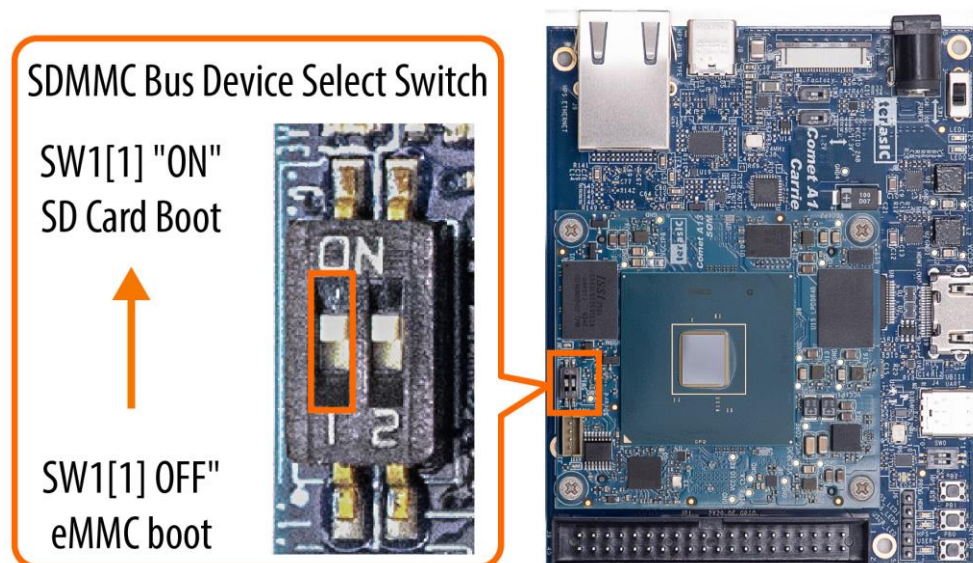


Figure 1-4 Position of slide switches SW1[1]

■ Selecting FPGA Configuration Mode

The Comet A13 SoM uses the "FPGA Boot First" mode by default. In AS mode, the SDM first reads the configuration from the QSPI flash to complete the initialization, and then loads the FSBL from the QSPI flash into the on-chip RAM of the HPS.

Therefore, users need to set the FPGA Configuration Mode to AS mode. As shown in the figure below, please set SW1[0] on the SoM module to the "ON" position.

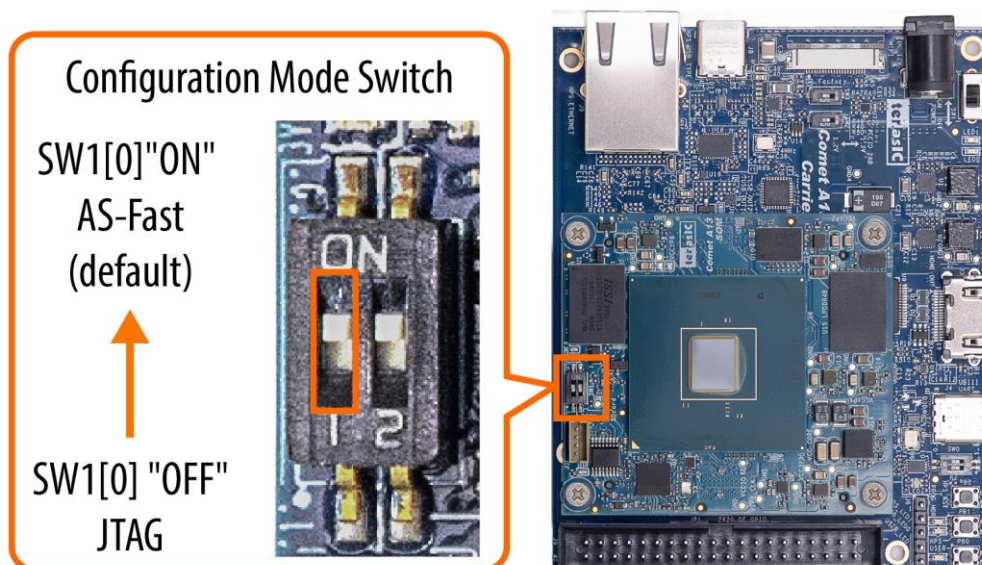


Figure 1-5 Position of slide switches SW1[0]

Additionally, there are two page images configured in the QSPI Flash (Factory Default Image and Application Image), and the FSBL image is located in the Application Image. As a result, users also need to set the SW3 switch on the carrier board to the "OFF" position to ensure that the FPGA correctly selects and loads the Application Image from the QSPI flash.

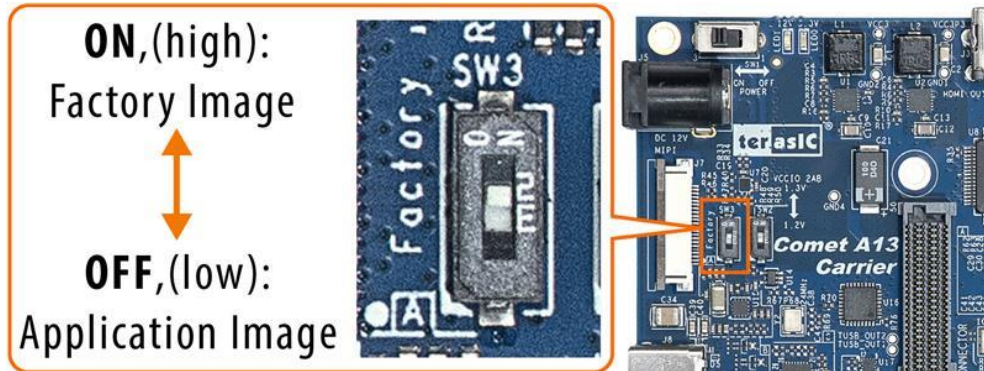


Figure 1-6 Boot Image Select Switch

1.5 Power On the Board

To power up the board, user need to connect a 12V DC power supply to the board, then turn on the power switch on the board to power on the board (See **Figure 1-7**).

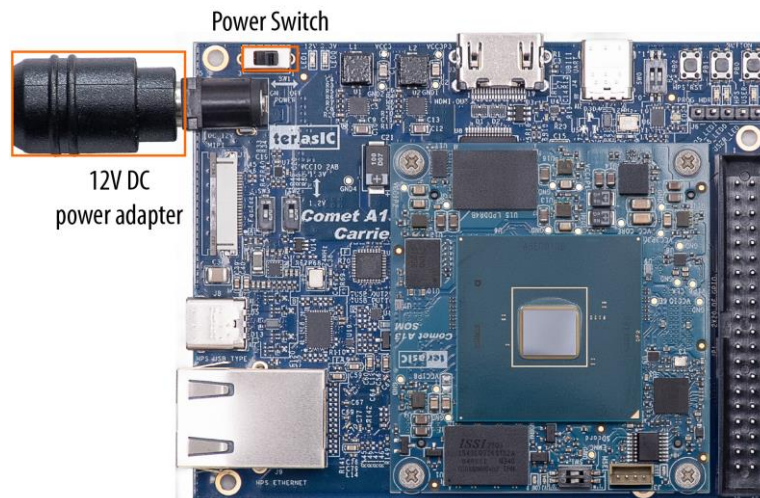


Figure 1-7 Power on the board

1.6 Setting Up UART Terminal

This section covers the initial hardware connections and the installation of necessary drivers to enable UART communication with the HPS.

The Comet A13 Carrier Board provides a UART interface primarily used for communicating with the HPS (Hard Processor System) on the SoM, allowing you to access the console, view boot messages, and execute Linux commands

■ Hardware Connection

Use a USB Type-C cable to connect the Type-C port (J4) on the Comet A13 carrier board to your host PC (See **Figure 1-8**). Once connected, this port enables both the USB Blaster III and HPS UART functionalities simultaneously

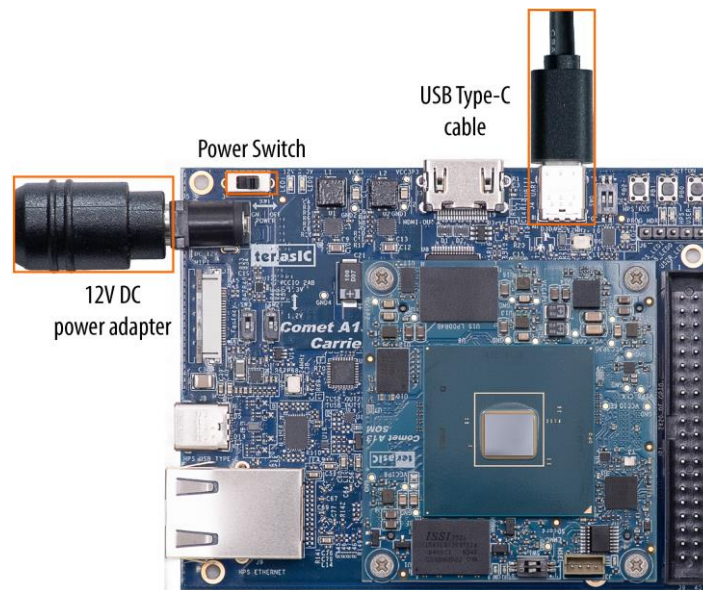


Figure 1-8 Connect USB Cable

■ Driver Installation

This interface is implemented via an onboard FT2232H chip. The required UART FTDI driver and Altera USB Blaster III driver are included in the Quartus Prime Pro (v25.1.0 or later) software installer.

During the Quartus Prime software installation, ensure you check "Install UART FTDI driver" and "Install USB Blaster III driver" in the "After-install actions" step. Please refer to the Figure 1.6.

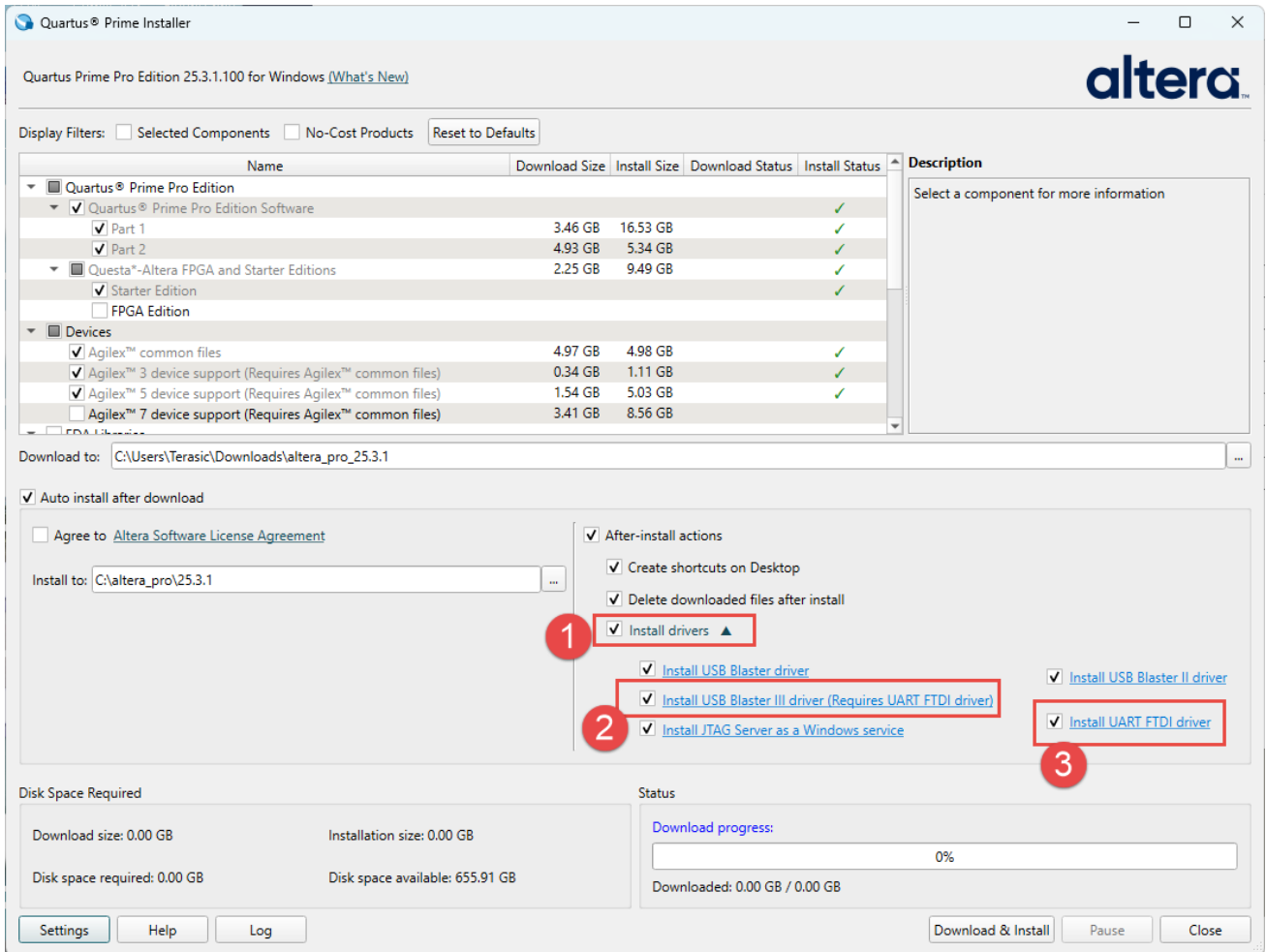


Figure 1-9 Install UART FTDI driver

■ Verify UART at Device Manager

After the installation is complete and the USB is connected, you can verify in your computer's Device Manager that the USB Blaster III and its corresponding COM port number are successfully displayed (see **Figure 1-10**).

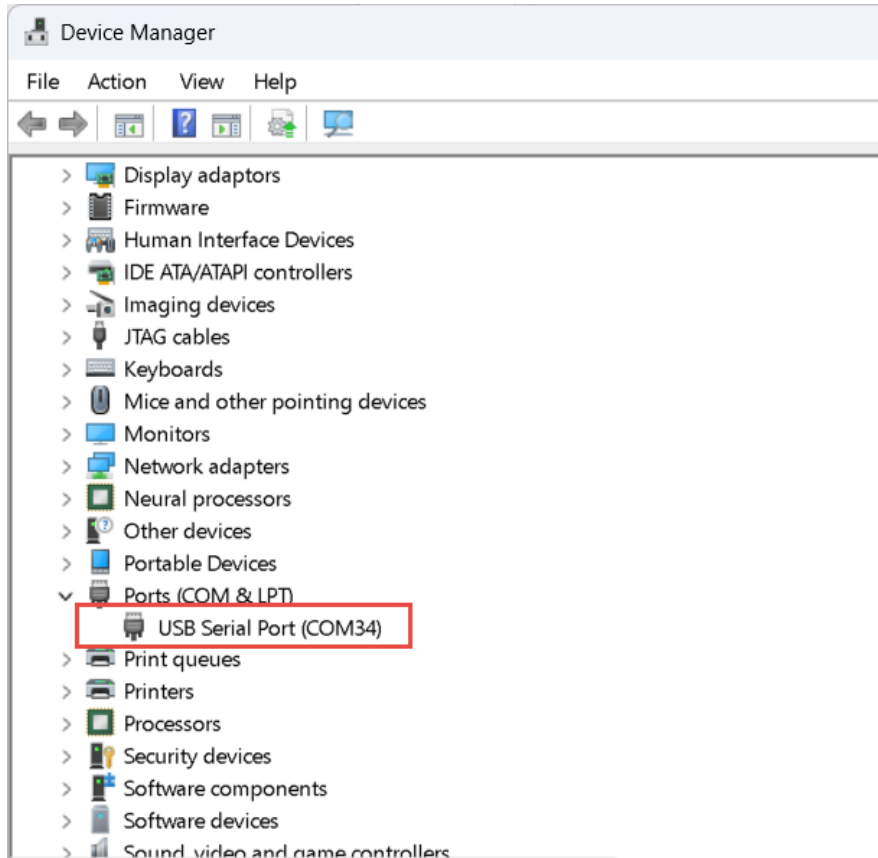


Figure 1-10 Device Manager

■ Configure UART terminal UART terminal spec

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. See **Figure 1-11**, the COM number of this Host is COM34. *Note that the “COM34” on the Serial Line column needs to be modified according to the actual com port on the user's computer.*
2. Open putty.exe, click Serial go to a serial configure interface.
3. Configure the window like the flowing picture and click “save” button to save the setting and click “Open” to open the terminal window. *Note that the “COM34” on the Serial Line column needs to be modified according to the actual com port on the user's computer.*

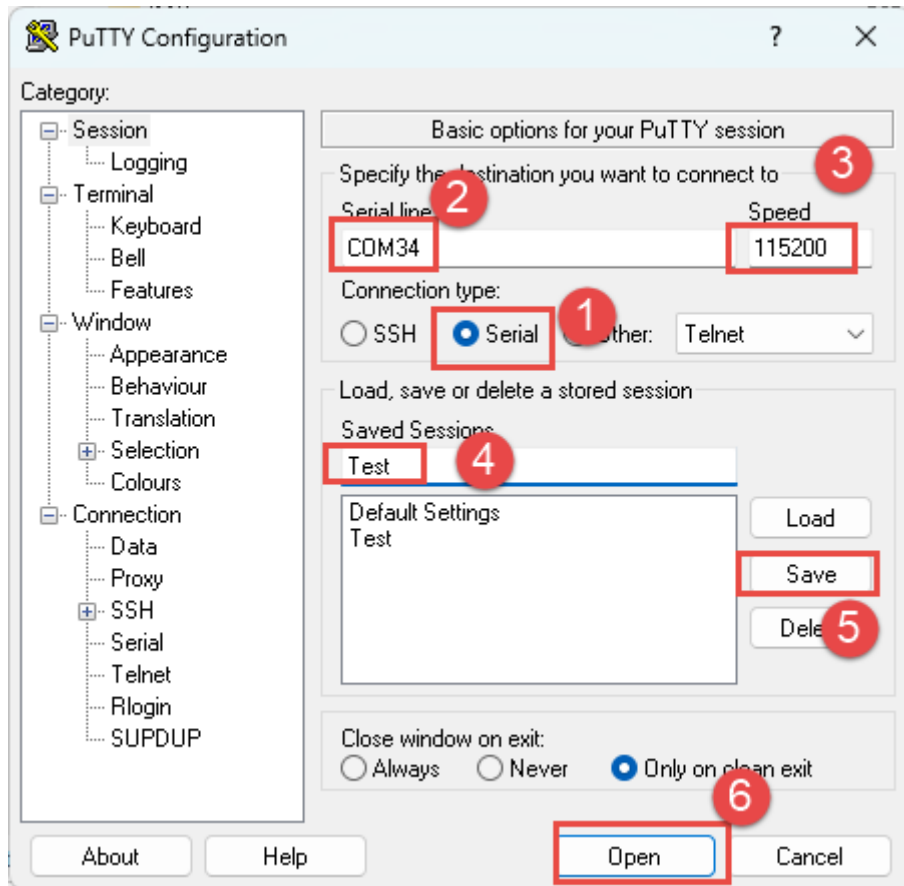
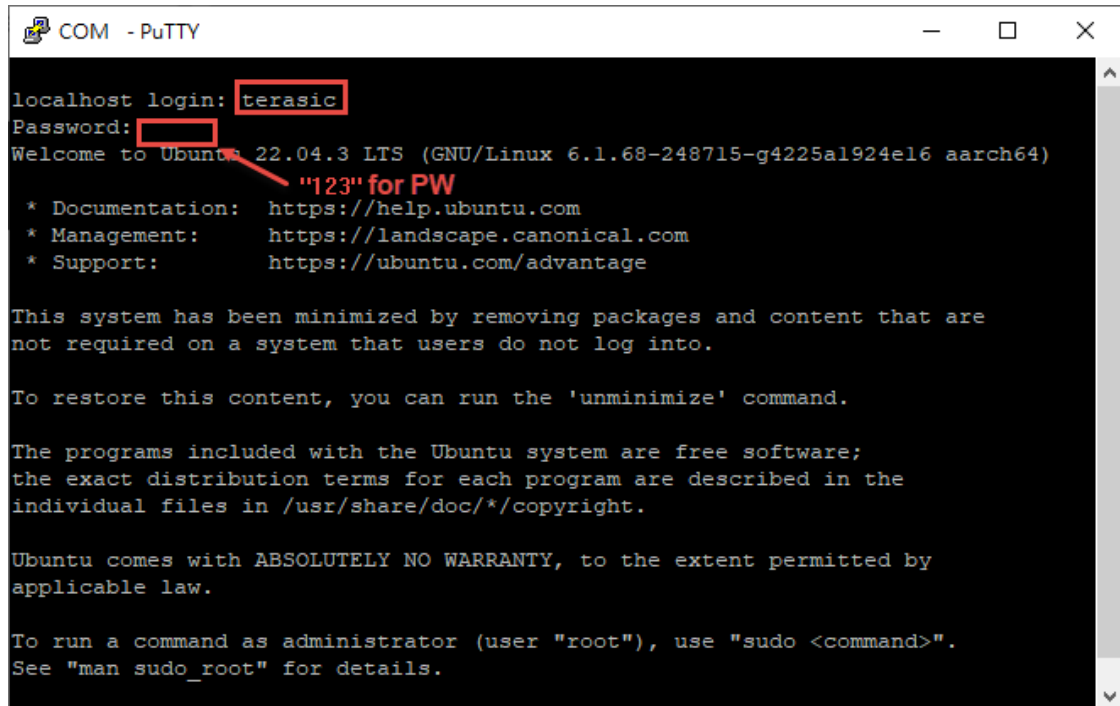


Figure 1-11 Putty Window

- After Linux has successfully completed the boot process, please type **"terasic"** for account name and "123" for the password to login Ubuntu (See **Figure 1-12**).

Note: If the UART terminal does not respond, please refer to Appendix 1.7 to troubleshoot the issue.



```
COM - PuTTY
localhost login: terasic
Password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.1.68-248715-g4225a1924e16 aarch64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```

Figure 1-12 Putty Window

1.7 Programming eMMC with USB Flash Disk

For instructions on how to program the Comet A13 eMMC by booting the system from a USB flash disk and copying a prepared Linux image to the onboard eMMC storage, please refer to the link below for more details : [Programming eMMC with USB Flash Disk](#)

1.8 Build Linux image from scratch

For instructions on how to build a complete Linux boot image for the Comet A13 platform from scratch, covering the toolchain, bootloader, kernel, and root filesystem preparation, please refer to the link below : [Build Linux image from scratch](#)

1.9 Appendix

This section will introduce what check items can be done if Linux cannot be boot and the putty window does not print any messages.

1. Check if the USB Serial Port shows on the device manager on the computer and the UART-FTDI driver is installed.

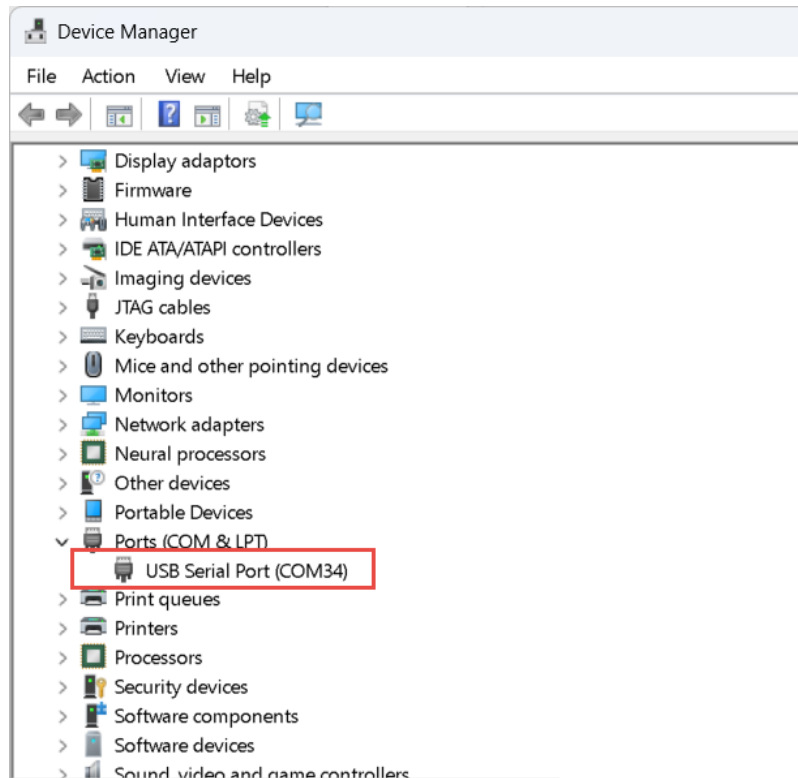


Figure 1-13 Hardware Setup for UART Terminal

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

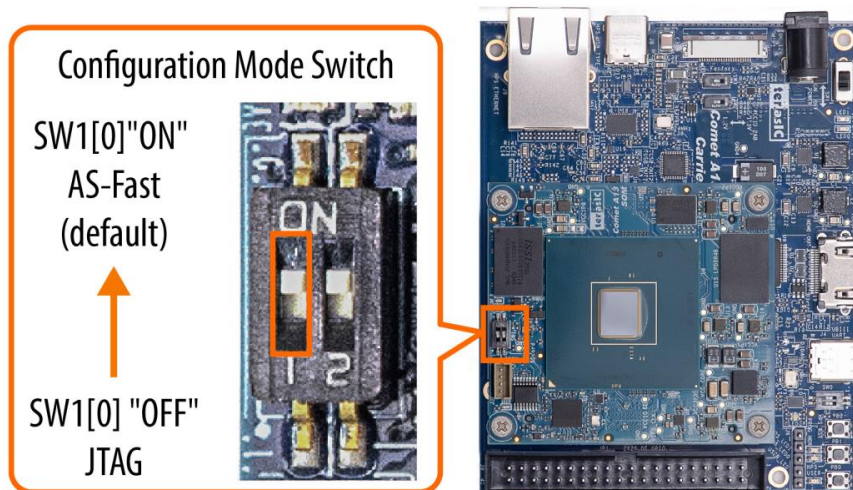


Figure 1-14 Position of slide switches SW1[0]

3. The QSPI flash on the Board had programmed the boot file when shipped.
After power on, user can check if the user LEDR 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 II connector of the Board.
 - Copy the factory code from the path:
Resource Package/Demonstration/SoC_FPGA/GHRD/output_files/program_qspi_flash/
 - Execute “flash_program.bat” to erase and program the QSPI flash.
4. Please also confirm which boot device you intend to use, either MicroSD card or eMMC. If you are booting from the MicroSD card, please ensure that SW1[1] on the SOM is set to the "ON" position.
 5. Please confirm that the Factory Image Switch on the EVK is set to the OFF position in order to boot from the **Application Image**.

Additional Information

Contact Terasic

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

■ Revision History

Date	Version	Changes
2026.01	First publication	
2026.07	V1.1	Change fan connector on SoM module from 3-pin to 4-pin