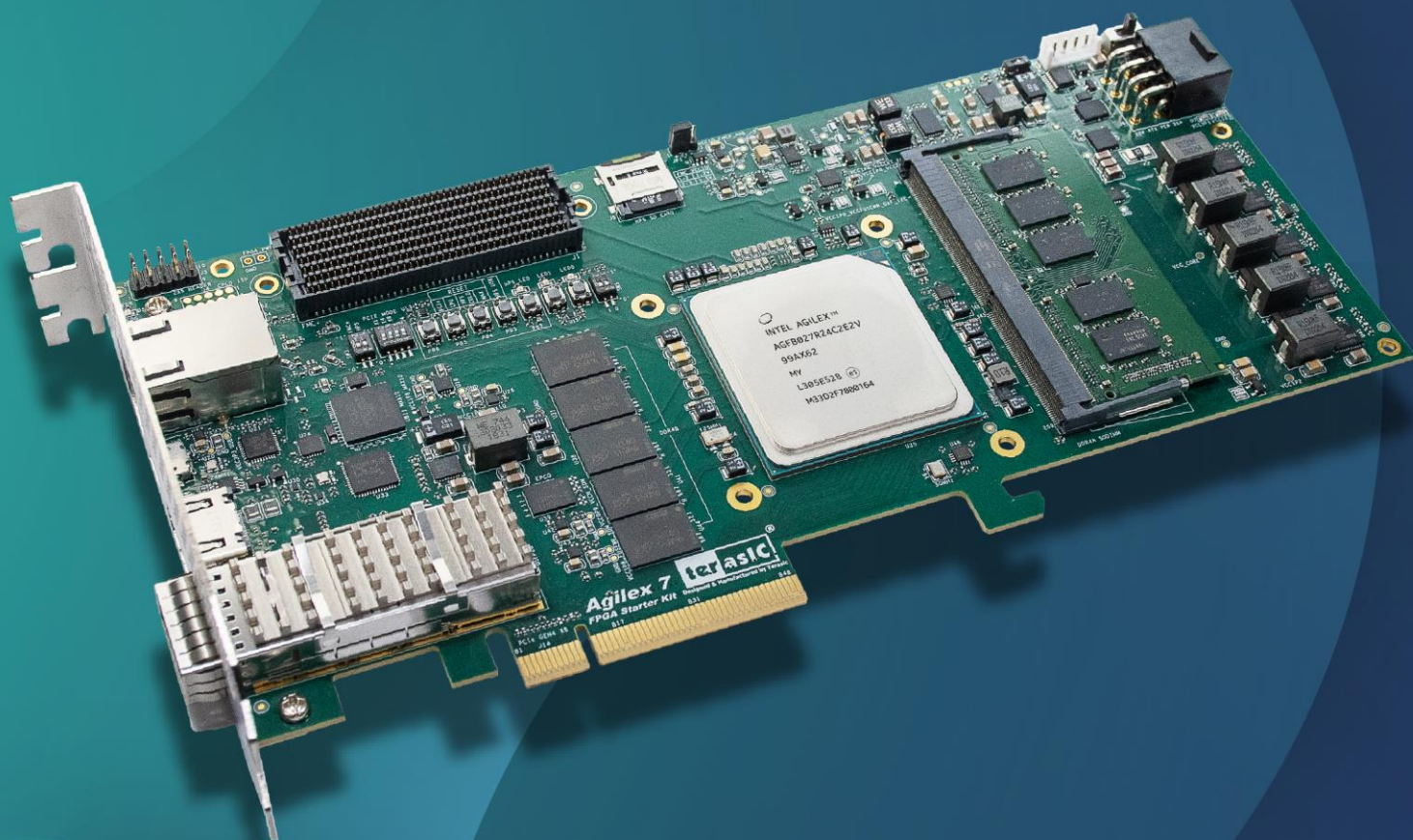




Agilex 7 FPGA Starter Kit

Linux Booting Started Guide



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Chapter 1

Linux Booting on the A7SK

1.1 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.

1.2 Required Hardware

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

- A7SK board
- Micro USB Cable
- Micro SD Card (At least 4GB capacity)

1.3 Install the MicroSD Card

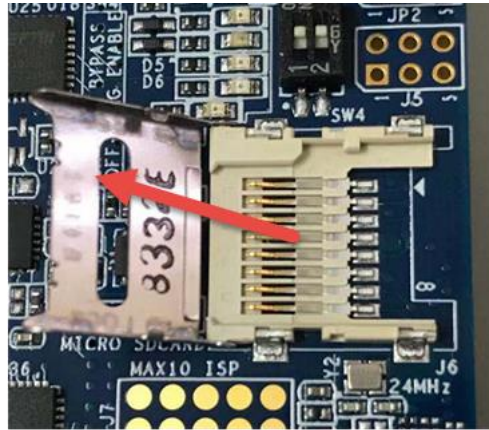
This section will show you how to how to install it into the Board. In addition, if user want to recover the factory image file to the MicroSD Card. It will show how to download the Linux image file for the Board and how to write it into the MicroSD Card.

■ 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 1-1**.



- 1** Toggle left the cover to unlock the Micro SD card socket



- 2** Pull up the cover



- 3** Insert the Micro SD card



- 4** Pull down the cover



- 5** Toggle right the cover to lock the Micro SD card socket

Figure 1-1 Steps for 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://a7sk.terasic.com/cd>



| Title | Version | Size | Date | Download |
|---|---------|------|------------|---|
| Linux Console (Kernel 5.15.50-lts; rev. B Hardware) | 1.2.0 | | 2023-07-24 |  |
| Linux Console (Kernel 5.15.50-lts; rev. A Hardware) | 1.0.0 | | 2023-04-18 |  |

Figure 1-2 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

Win32DiskImager.exe.

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.

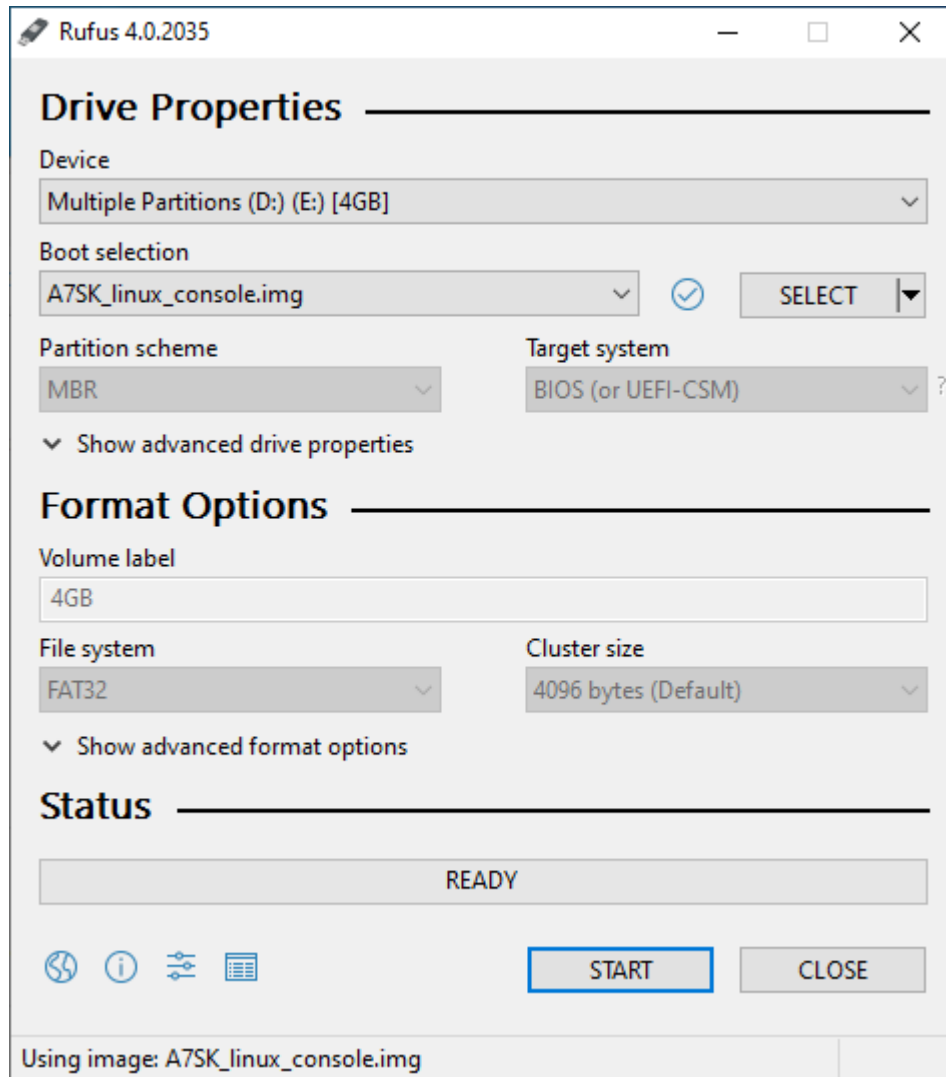


Figure 1-3 Rufus tool

1.4 Set the MSEL

Make sure the Configure mode switch is set to AS mode, please set MSEL[2:0] to "001".

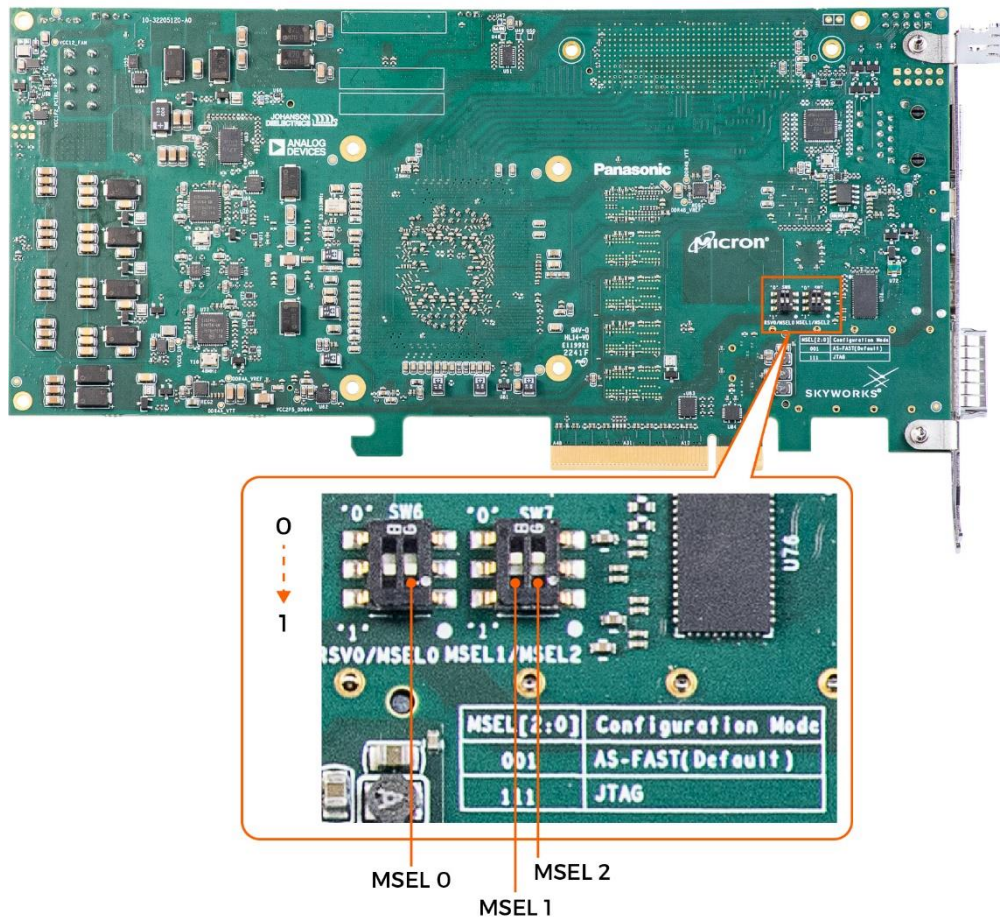


Figure 1-4 Position of slide switches SW6 and SW7 for Configuration Mode

1.5 Power On the Board

To power up the Board in stand-alone mode, user need to connect a 2x4 PCIe power connector on the Board to the external 12V DC power supply, then turn on the power switch SW2 on the board to power on the board (See **Figure 1-5**).

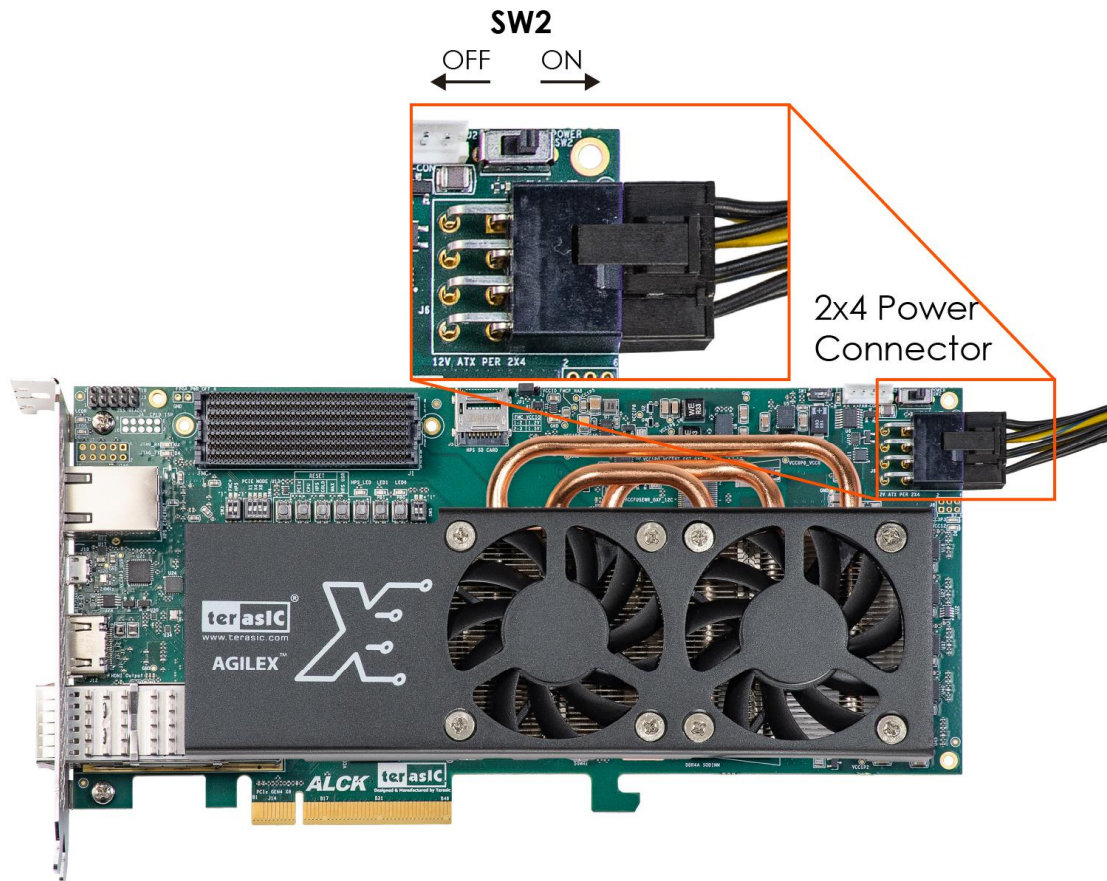


Figure 1-5 Power on the board from external Power

1.6 Setting Up UART Terminal

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

■ Installing the Driver

1. Connect your computer to the development board by plugging the USB cable into the micro USB connector of the board. (Connection setup is shown in **Figure 1-5**)



Figure 1-6 Connect the Micro USB cable to the board

2. Please refer to the section 3.1 (Install driver for CP2105) of the *User Manual* to install the USB to UART driver for HPS fabric.

■ Configure UART terminal UART terminal spec

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

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 Silcon UART device CP2105 on the list. Find the COM number of “**Enhanced COM port**”. It represents the HPS UART Port. See **Figure 1-7**, the COM number of this Host is COM9. *Note that the “**COM9**” on the Serial Line column needs to be modified according to the actual com port on the user's computer.*

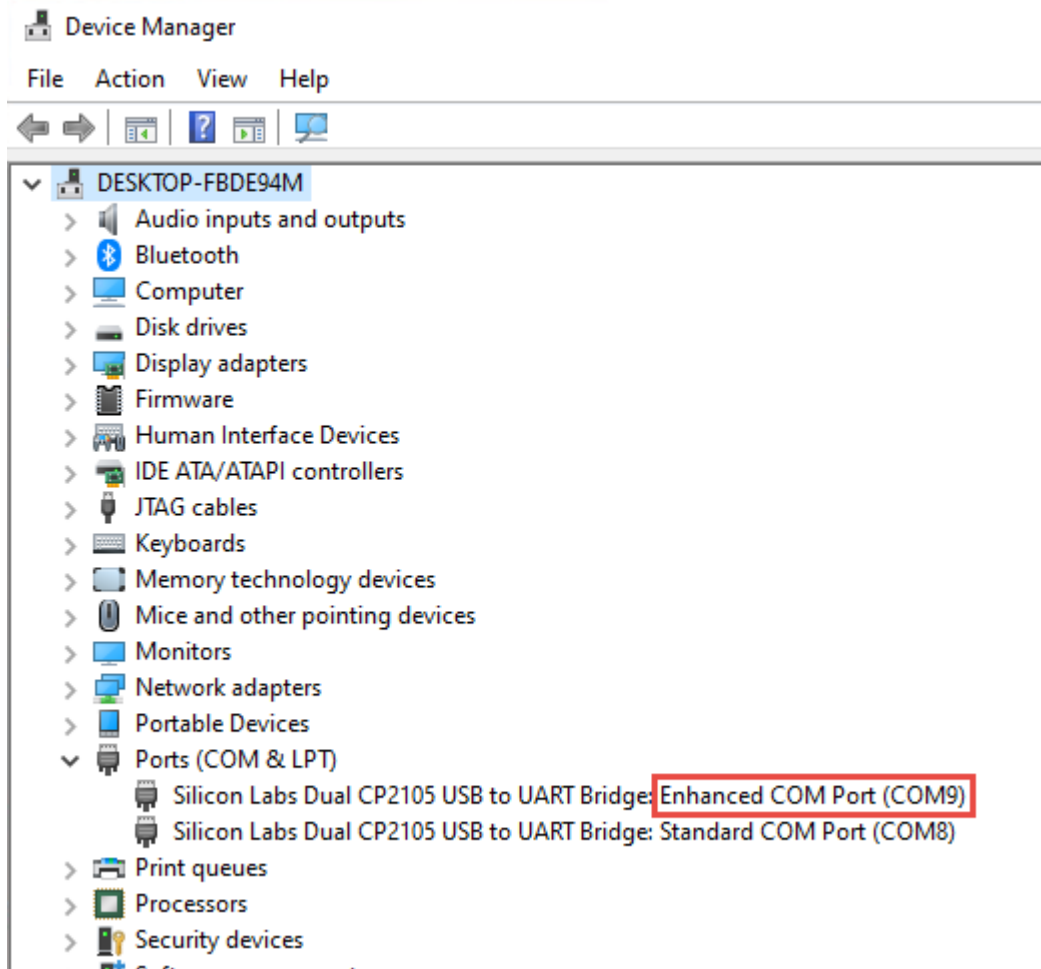


Figure 1-7 Device Manager

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 “COM9” on the Serial Line column needs to be modified according to the actual com port on the user's computer.*

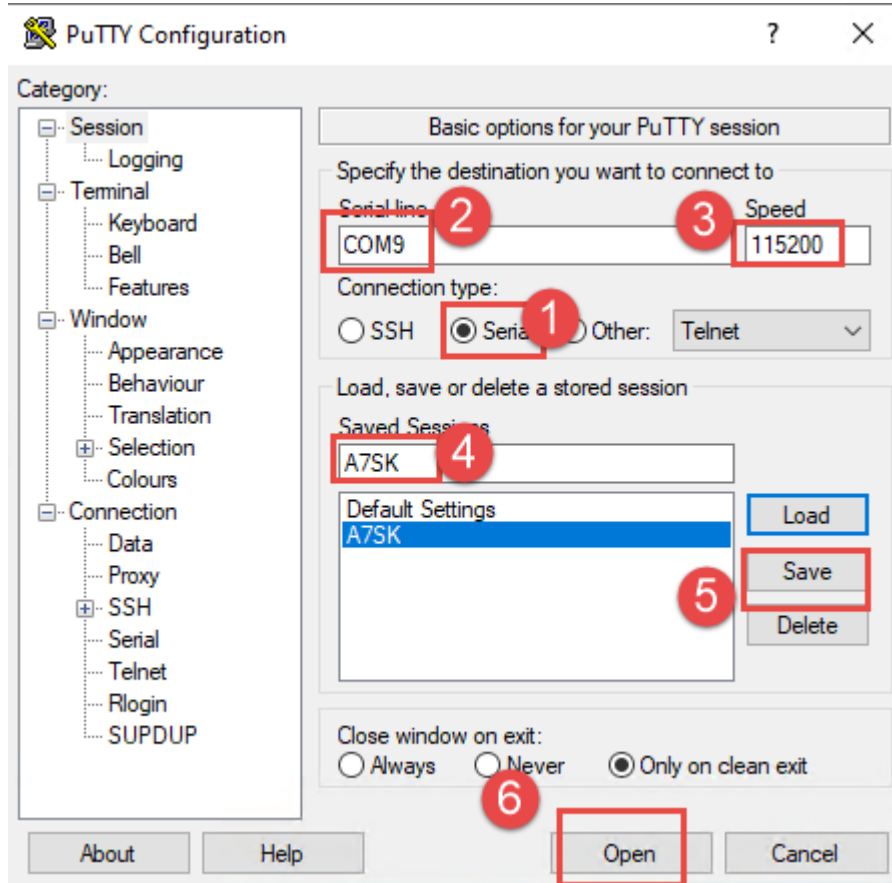


Figure 1-8 Putty Window

4. After the board is successfully booted, the Linux will ask for the login name. Type "**terasic**" for account name and type "123" for the password (See **Figure 1-9**).

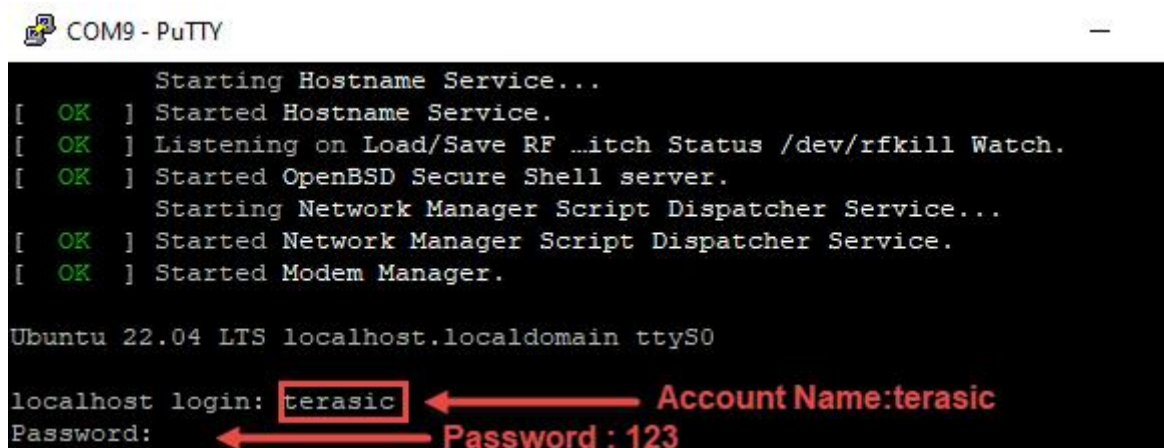


Figure 1-9 Putty Window

1.7 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.

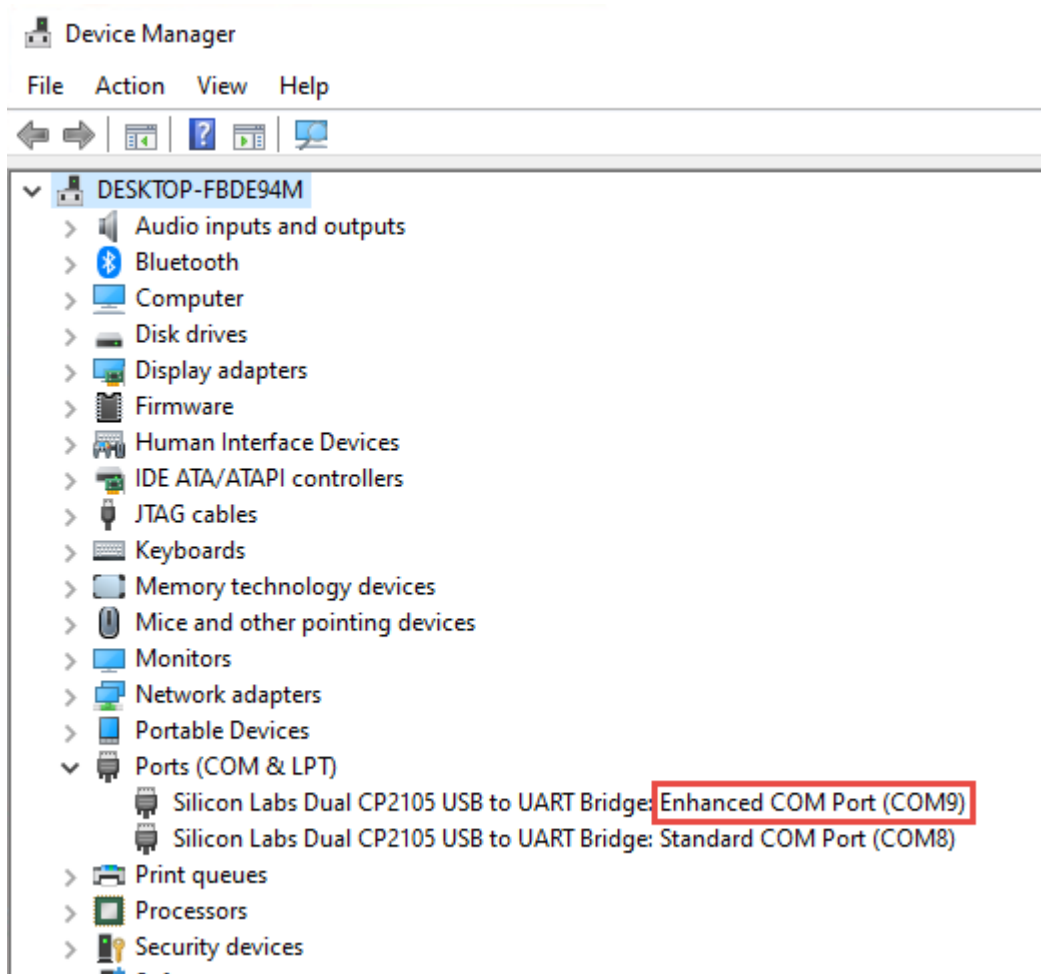


Figure 1-10 Hardware Setup for UART Terminal

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

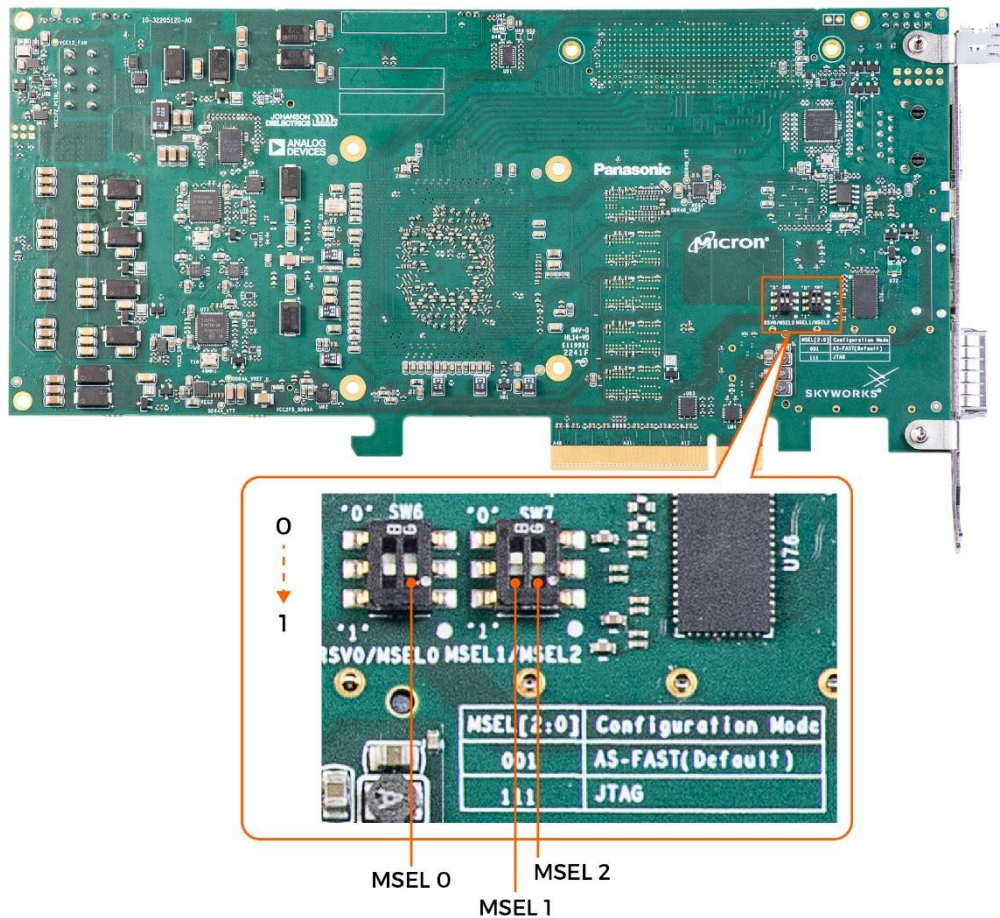


Figure 1-11 Position of slide switches SW6 and SW7 for Configuration Mode

3. The QSPI flash on the Board had programmed the boot file when shipped.
After power on, user can check if the user LED is flashing, and after 10 seconds of booting, the HPS LED has light on. If not, please refer to following steps to re-program the QSPI flash with the factory code.
 - Connect the Micro USB cable to USB blaster II 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

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

■ Terasic Technologies

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■ Revision History

| Date | Version | Changes |
|---------|-------------------|----------------|
| 2023.05 | First publication | |
| 2023.08 | V1.1 | For revB board |
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