Sulfur-Mini Development Kit
Getting Started Guide

Ver.1.0

Kondo Electronics Industry Co., Ltd.

Introduction

Thank you for purchasing a KEIm product.

Before using this product, please carefully read this manual and related documents, and use this product correctly while observing all precautions.

CAUTION

- The contents of this manual are subject to change without prior notice. Please contact Kondo Electronics Industry or refer to its website for the latest information before using the product.
- This product uses components intended for general electronic equipment. Do not use it in applications requiring extremely high reliability, such as aerospace, nuclear control systems, or life-support medical equipment.
- This product has been developed and manufactured for use in Japan. If this product, or any product incorporating it, is exported, the customer is responsible for complying with the Foreign Exchange and Foreign Trade Act and all other applicable export laws and regulations, and for completing all necessary procedures.
- Always turn off the power before connecting or disconnecting cables to connectors other than LAN and USB.
- Do not use this product in environments with high levels of water, humidity, dust, or oil smoke.
- Unauthorized use or reproduction, in whole or in part, of this product's related documents is prohibited.
- All company and product names mentioned in these manual and related documents are trademarks or registered trademarks of their respective companies.

Contact Information

- For inquiries about this product, please contact us at the email address below:

keim-support@kd-group.co.jp

Table of contents

1. Overview

This document describes the procedure for operating the Agilex™ 5 SoC FPGA on the Sulfur-Mini Development Kit (hereafter referred to as “Sulfur-Mini”) using a prebuild image file.
The procedure includes FPGA fabric configuration, as well as booting the Arm processor embedded in the Hard Processor System (HPS) and starting Linux.

This document covers the following.

- Sulfur-Mini hardware setup
- Creating and SD boot disk
- Performing FPGA configuration (downloading a .sof file)
- Booting the Arm processor and starting Linux

1.1. Requirements

To perform the procedures described in this document, prepare the following items:

- Sulfur-Mini Development Kit
- USB Power Delivery-compatible AC adapter
  Output: 45 W or higher (15 V / 3 A)
  Recommended model: ACDC-PD8445BK (ELECOM)
- microSD card
  Capacity: 32GB or larger recommended
  Recommended model: KLMEA032G (KIOXIA)
- Altera FPGA Download Cable II or III
  Recommended model: PL-USB2-BLASTER or PL-UB3-CABLE
- UART terminal cable
  Specification: USB Type-A to Type-C
  Recommended model: U2C-AC10BK
- PC
  Quartus Prime Pro 25.3.1 or later is used as the development tool.
  For system requirements of the PC, refer to the official Altera website.

2. **Setup of the Sulfur-Mini**

Follow the steps below to connect the equipment and configure the switches.

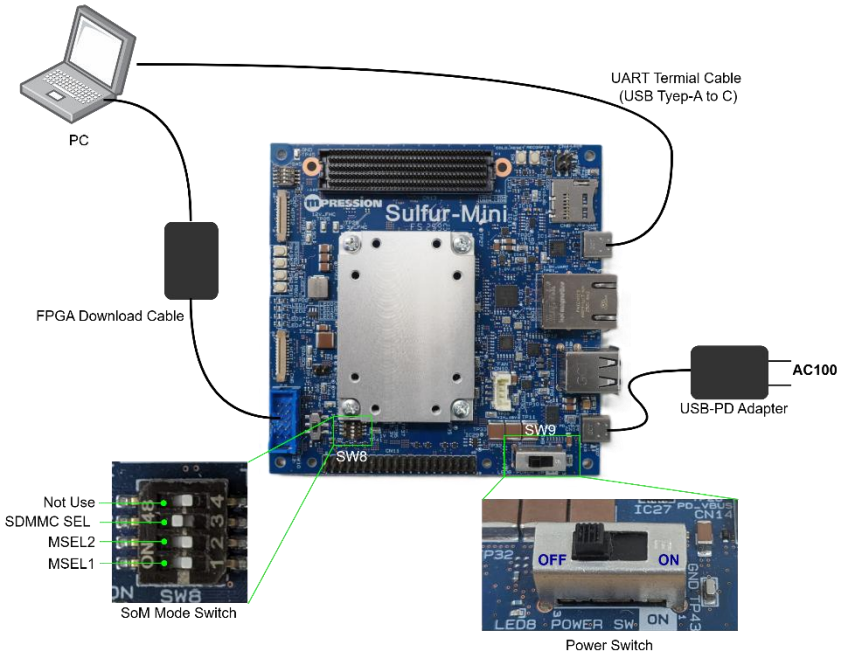


Figure 2-1 Equipment Connections

2.1.1. **SoM Mode Switch Settings**

The functions of the DIP switches for configuring the SoM mode are shown below.

In this document, follow the settings indicated by the blue cells in the table.

Table 2-1 SoM Mode Switches

Reference	Name	Description
SW8.1	MSEL1	Configuration mode selection Mode / MSEL2 / MSEL1 JTAG only mode / OFF / OFF AS Normal mode / ON / OFF AS Fast mode / ON / ON
SW8.2	MSEL2	
SW8.3	SDMMC_SEL	Storage device selection ON: SD mode OFF: eMMC mode
SW8.4	-	Not used (set to OFF)

3. Creating SD Boot Disk

This section describes the procedure for creating an SD boot disk for Sulfur-Mini by writing a prebuild SD card image to a microSD card.

Download the prebuild SD card image from the website below:

Download | KONDO ELECTRONICS INDUSTRY CO.,LTD.

To create an SD boot disk in a Windows environment, install and use Win32 Disk Imager.

Follow the steps below to write the image.

(1) Insert the microSD card into your PC.
(2) Launch Win32 Disk Imager.
(3) From the Device drop-down menu, select the drive corresponding to the microSD card.
(4) For Image File, select the extracted prebuild SD card image (img).
(5) Click Write.

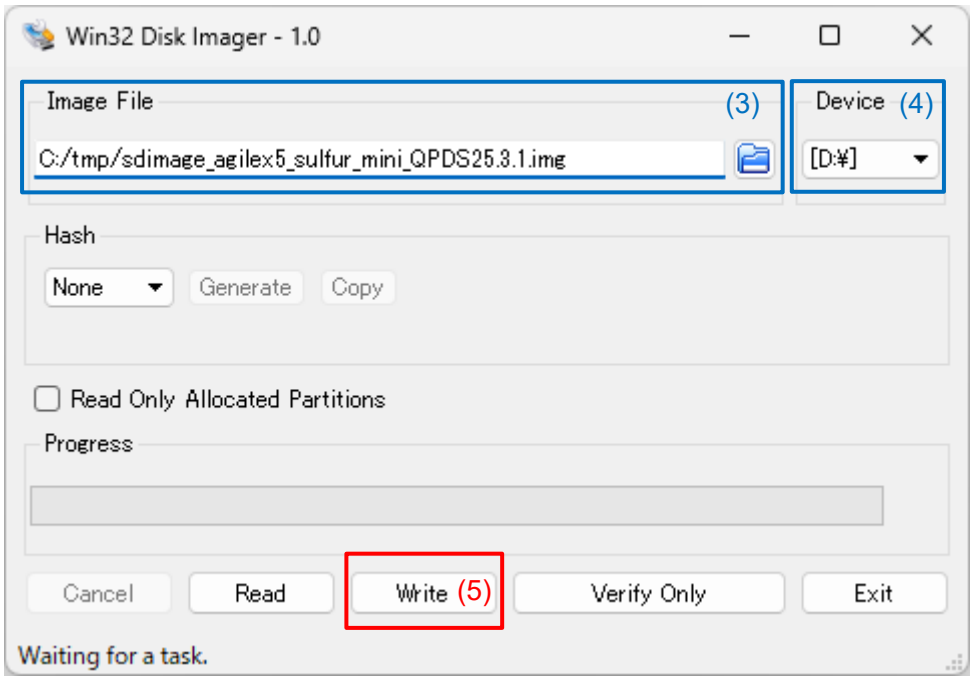


Figure 3-1 Writing the SD Card Image

Note:

If the target SD card contains partitions other than FAT, format the SD card in advance before writing the image.

Take special care when reusing an SD card that has previously been used to write a Linux image.

A formatting tool for Windows is available from the SD Association website.

Reference: SD Memory Card Formatter for Windows/Mac - SD Association

4. FPGA Configuration and Linux Boot

This section describes the procedure for booting Linux using the created SD boot disk.

4.1. Setup of the USB-to-serial UART Interface

The Sulfur-Mini is equipped with a USB-to-serial UART interface using FTDI FT232RNQ.
This interface is used as the Linux console.
Install a terminal application (e.g., Tera Term) and the VCP driver of the FT232RNQ on your PC in advance.

4.1.1. Installing the VCP Driver

Install the Virtual COM Port (VCP) driver for the FT232R.
Download the appropriate file for your PC's operating system from the website below, and follow the installer instructions to complete the installation.

VCP Drivers - FTDI

4.1.2. Terminal Software Settings

Configure the serial port communication settings as follows:

- Baud Rate: 115200
- Data: 8 bits
- Parity: None
- Stop bits: 1 bit
- Flow control: None

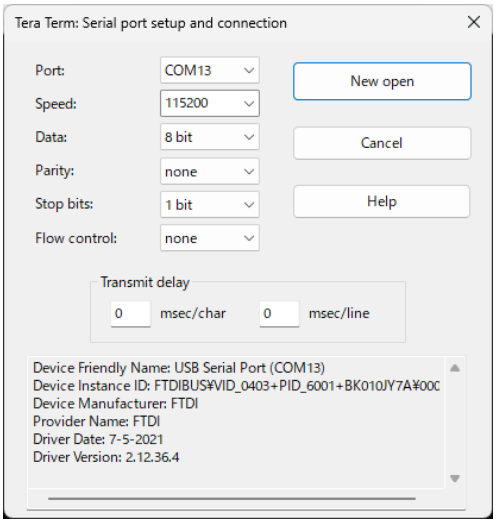


Figure 4-1 Terminal Software Settings Screen (Example: Tera Term)

4.2. **Inserting the microSD**

Insert the microSD card with the prebuilt SD card image written to it into the microSD card slot.

When inserting the microSD card, as shown in Figure (a) below, insert the card horizontally into the slot and push it in the direction of the arrow until it clicks into place.

When removing the microSD card, as shown in Figure (b) below, push the inserted card further in the direction of the arrow until it clicks. The card will pop out slightly; grasp it with your fingers and gently pull it out.

(a) Inserting the microSD Card

(b) Removing the microSD Card

Figure 4-2 Inserting and Removing the microSD Card

4.3. Powering On the Board

When 15 V is supplied from USB-PD, LED7 turns on. In this state, power is not supplied to the ICs on the board, including the SoM. When the power switch (SW9) is slid to the ON position, power is supplied to the board. While the board is powered, LED8 remains on.

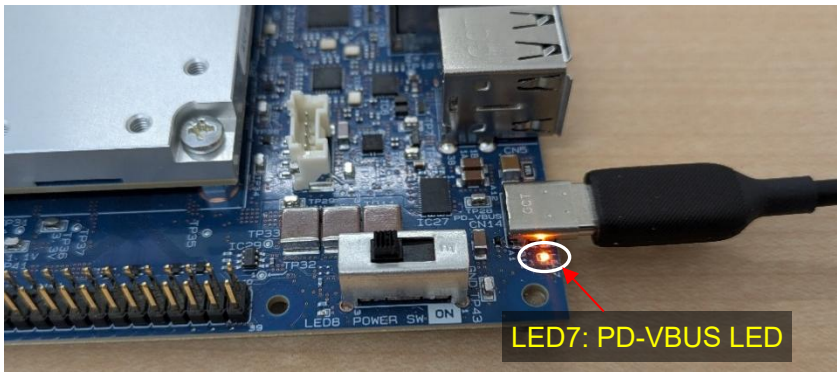


Figure 4-3 15 V (USB-PD) Applied / Power OFF State

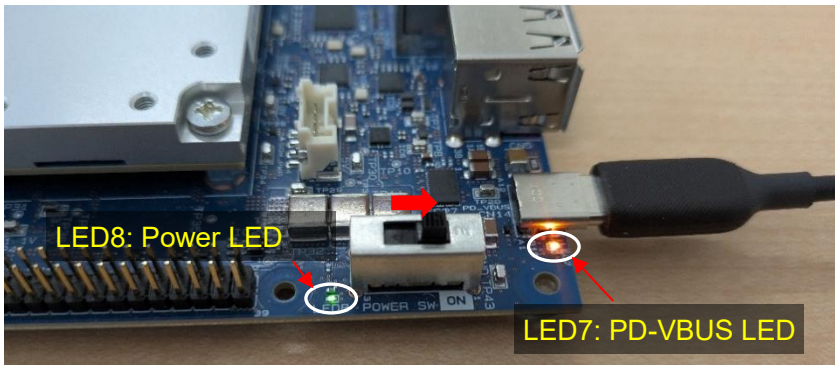


Figure 4-4 Power ON State

The power sequence is initiated by the power switch. **Do not power the board by plugging or unplugging the USB-PD cable while the power switch remains in the ON position.**
After use, disconnect the USB-PD cable and confirm that LED7 is off.

4.4. **FPGA Configuration**

This section describes how to download a .sof file using Quartus Programmer and configure the FPGA.

Download the .sof file from the website below:

[Download | KONDO ELECTRONICS INDUSTRY CO.,LTD.]

(1) Launch Quartus Programmer from the Windows menu.

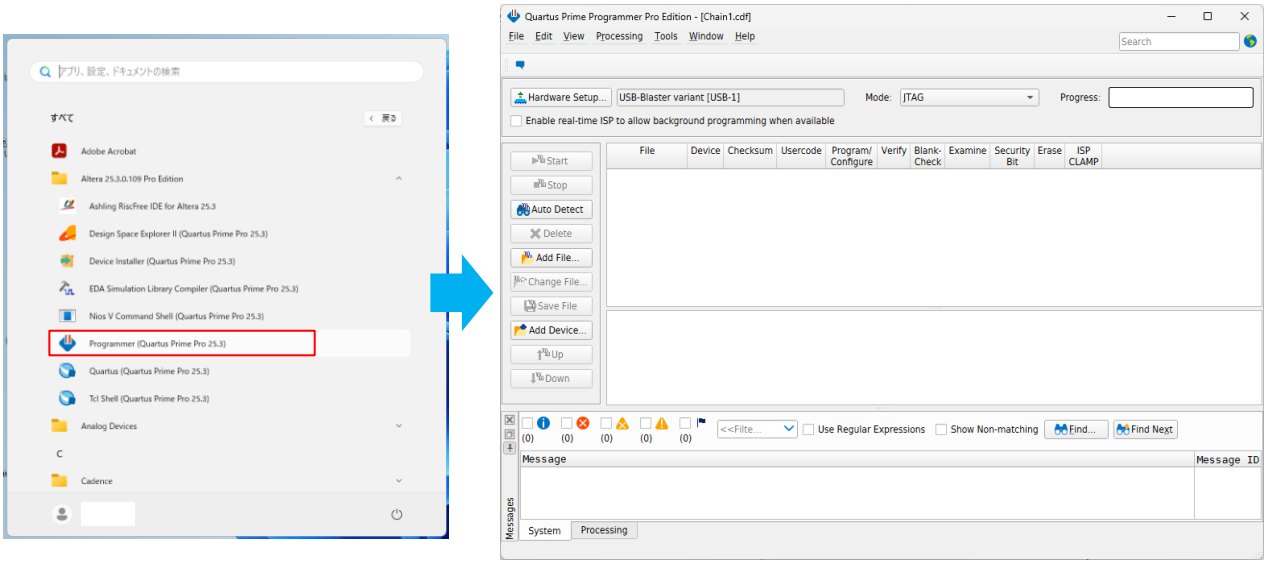


図 4-1 Launch Quartus Programmer

(2) Click **Hardware Setup** button, and select USB-Blaster II [USB-1] for **Currently selected hardware** and 24000000 for Hardware frequency.

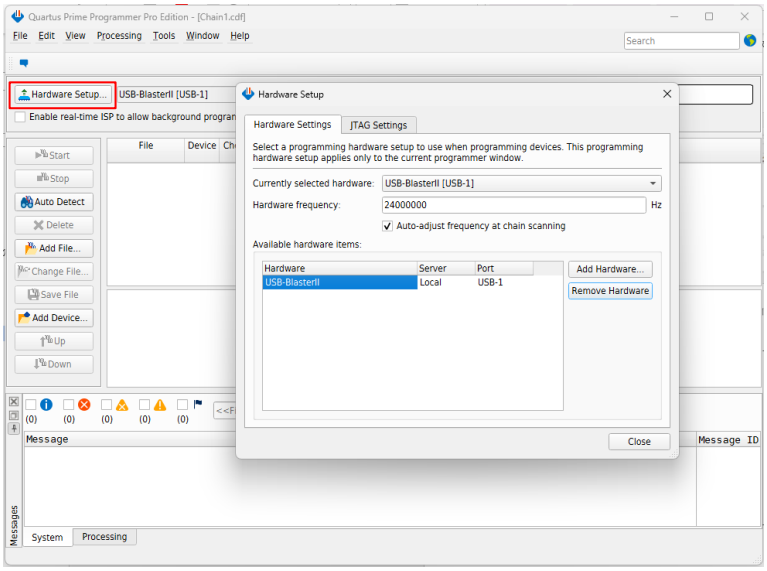


Figure 4-5 Hardware Setup

(3) From File > Open, select the target .sof file to be written.

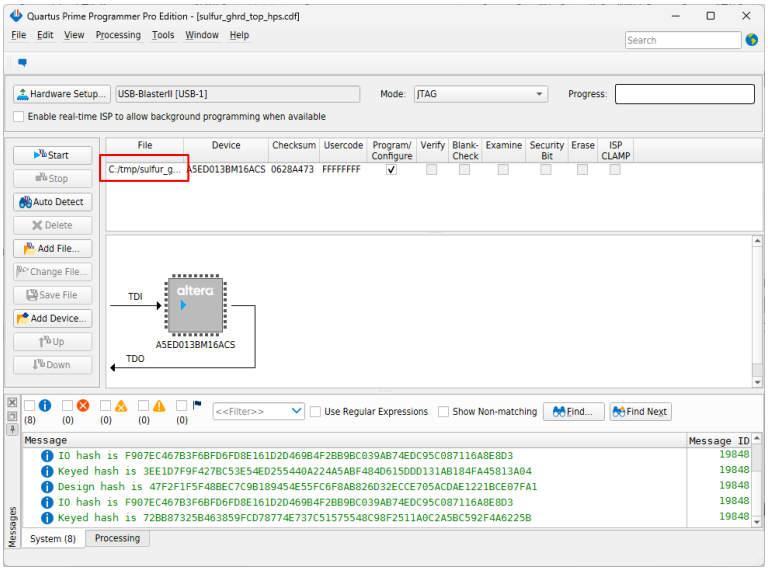


Figure 4-6 Selecting .sof File

(4) Click the Start button. When the write operation is successful, the screen will appear as shown on the right.

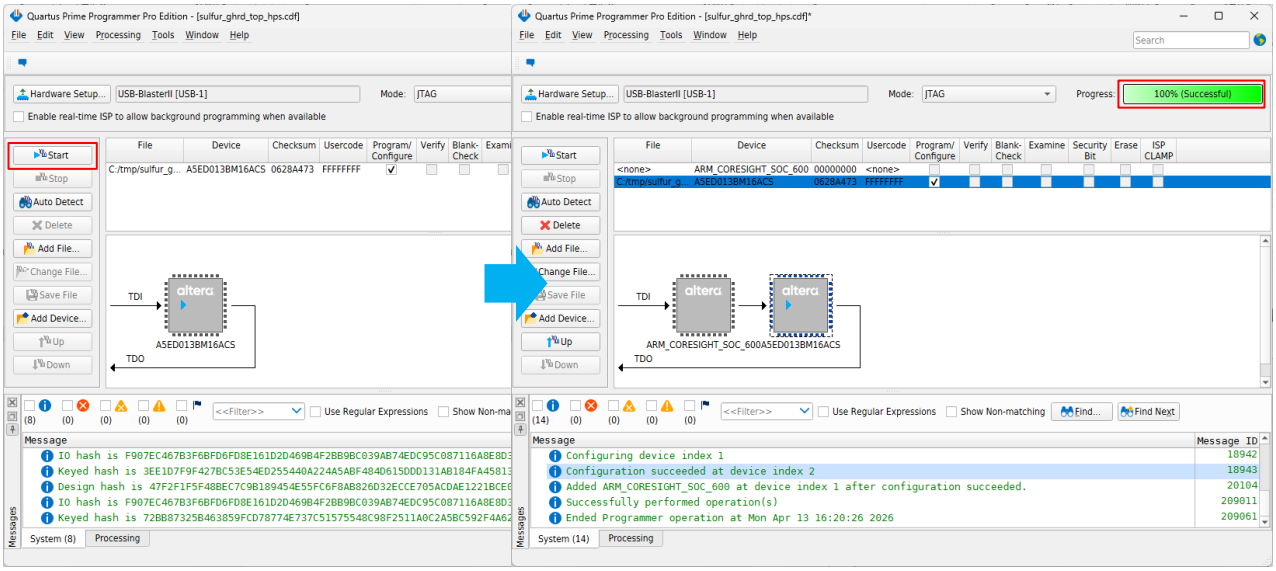


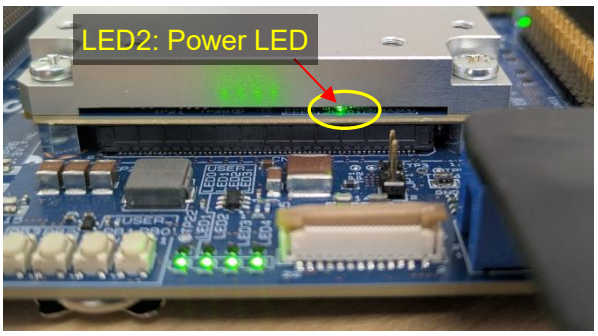
Figure 4-7 .sof Download

4.4.1. **SoM Status LEDs**

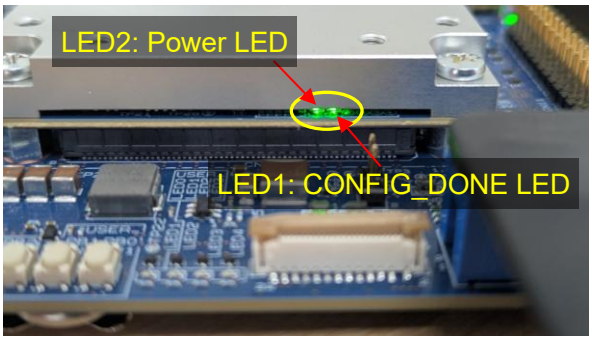
The SoM mounted on this product is equipped with status LEDs for monitoring its operation.

The functions of each LED are described below.

You can confirm that configuration is complete by checking LED1.



(a) Not configured



(b) Configuration complete

Table 4-1 SoM Status LEDs

Reference	Name	Description
SoM : LED1	CONF_DONE LED	Indicates the configuration status ON: Configuration completed OFF: Configuration not completed
SoM : LED2	Power LED	Indicates the power input status. This LED turns ON when power is supplied.

4.5. **Linux Boot**

This section describes the procedure for booting Linux after configuration.

Once the configuration described in the previous section is complete, logs will be displayed on the terminal.

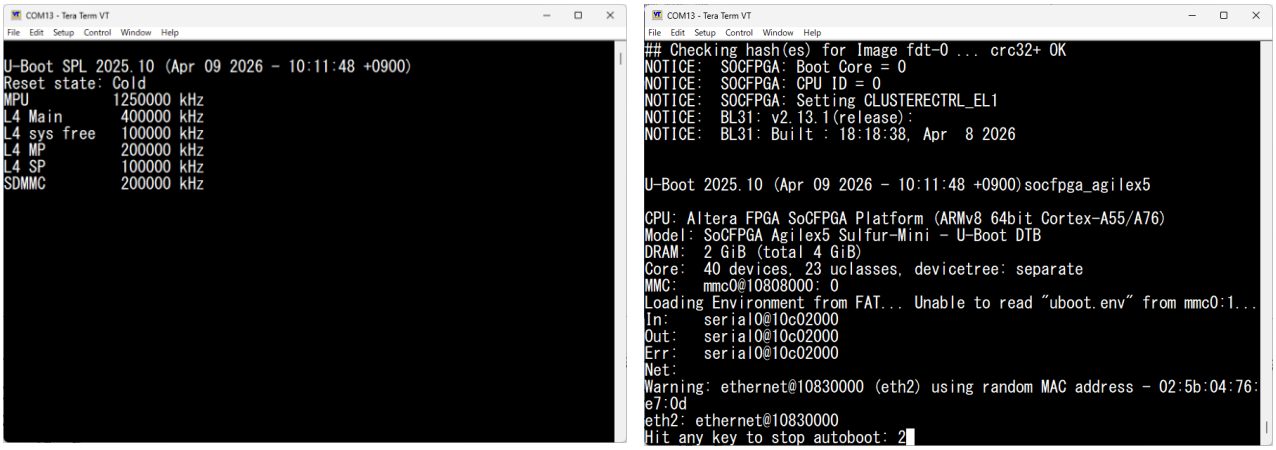


Figure 4-8 HPS Boot Log and U-Boot Boot Log

After waiting a short time in this state, the U-Boot countdown starts, followed by the Linux boot log.

Finally, a login prompt is displayed. Log in using the following credentials:

- Username: root
- Password: (none)

After logging in, you can operate Linux.

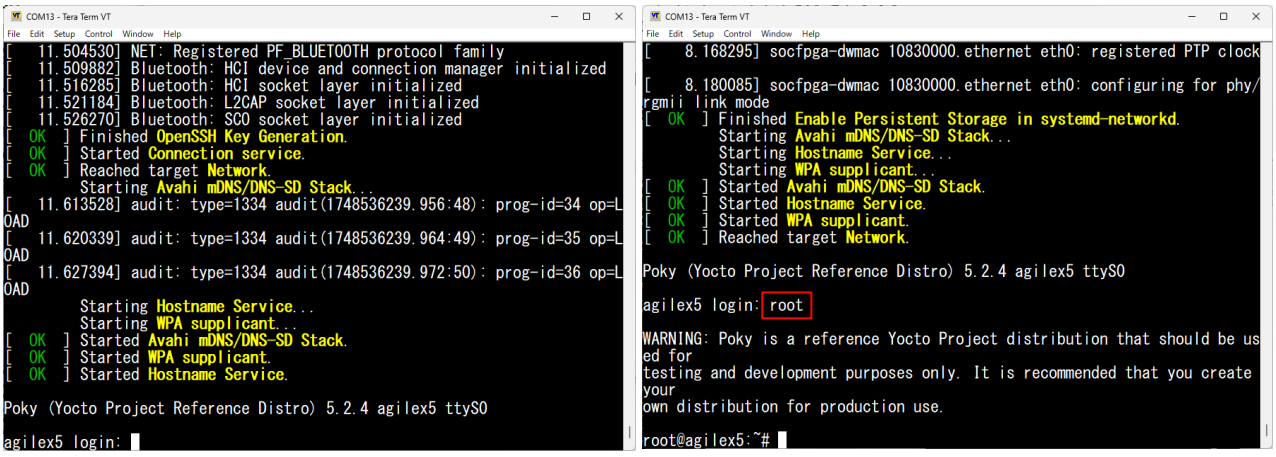


Figure 4-9 Linux Boot Log

This completes the procedure for running the reference design.

5. References

- Mpression Sulfur-Mini Development Kit by Macnica
  https://malt.zendesk.com/hc/en-us/articles/55719698520473-Sulfur-Mini-DevKit-for-Agilex-5-E-Series-013B
-
- KONDO ELECTRONICS INDUSTRY CO., LTD. KEIm-A5ESoM Mini
  https://kd-group.co.jp/product/keim-a5esom-mini/

- Altera Agilex™ 5 FPGA and SoC FPGA – Documentation
  Search Results • Altera Documentation and Resources Center

- Altera Agilex™ 5 GSRD User Guide
  Summary - Altera FPGA Developer Site

6. Revision History

Ver.	Date	Description
1.0	2026/05/11	Initial release