StarFive 赛昉科技

JH-7110 DevKit Quick Start Guide

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Preface

About this guide and technical support information.

About this document

This document mainly provides the users with the necessary information about the StarFive JH-7110 DevKit, including board appearance, configuration basics, SDK quick start reference and some reference.

Revision History

Table 0-1 Revision History

Version	Released	Revision
1.3	2024/10/12	Updated the following part about the new SDK release: • Download the SDK *(on page 14)* • Run Debian System *(on page 17)*
1.2	2024/06/07	Update the relevant section about SDK repository.
1.1	2024/03/18	Updated the version in Getting Started *(on page 14)*.
1.0	2024/01/24	The First Official Release.

Notes and notices

The following notes and notices might appear in this guide:

- **Tip:**
  Suggests how to apply the information in a topic or step.
- **Note:**
  Explains a special case or expands on an important point.
- **Important:**
  Points out critical information concerning a topic or step.
- **CAUTION:**
  Indicates that an action or step can cause loss of data, security problems, or performance issues.
- **Warning:**
  Indicates that an action or step can result in physical harm or cause damage to hardware.

1. Introduction

This document mainly provides the users with the necessary information about the StarFive JH-7110 DevKit, including board appearance, configuration basics, SDK quick start reference and some references.

1.1. Board Appearance

The following figure displays the board appearance of JH-7110 DevKit.

Figure 1-1 Top View

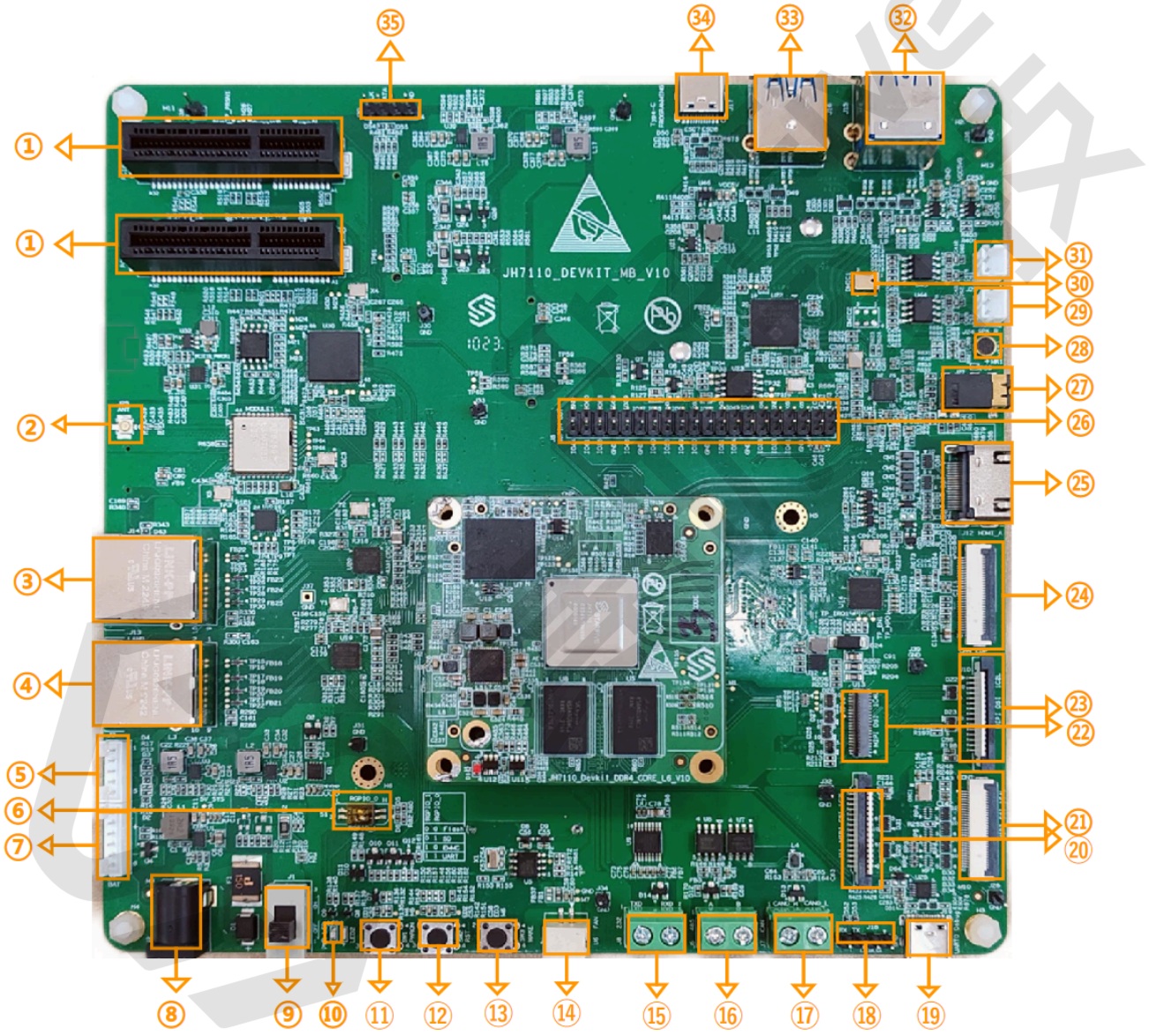


Table 1-1 Board Appearance Description - Top

NO.	Interface	Description
1	PCIE × 4 Connector	JH-7110 DevKit supports 2 PCIe × 4-lane connectors, but JH-7110 SoC only support 1 lane.
2	ANT Connector	It is used for connect ANT.

Table 1-1 Board Appearance Description - Top (continued)

NO.	Interface	Description
3	Ethernet Ports LAN1	The Ethernet port is for network data connection.
4	Ethernet Ports LAN0	The Ethernet port is for network data connection.
5	Charger I2C	Power supply for I2C.
6	Boot Mode Pins	It is provided to determine the boot mode before JH-7110 Dev-Kit is powered up.
7	Battery	-
8	PWR In	Power input. It is used to connect to the power supply.
9	PWR Switch	Power switch. It is used to power on/off the board.
12	Power LED	Power indicator light.
11	Power On	The button to turn on/off the power of the board, usually by pressing the button.
12	Reset	-
13	Wake	-
14	FAN	It is used to connect to the fan.
15	RS232	It is used for serial communication between devices.
16	RS485	It is used for serial communication between devices.
17	CAN	It is used for data communication and data monitor.
18	UART0 Debug	-
19	Type-C Debug	-
20	MIPI CSI 1C2L	-
21	MIPI CSI 1C4L	-
22	MIPI DSI 1C4L	-
23	MIPI DSI 1C2L	-
24	eDP	The port for eDP screen.
25	HDMI A	HDMI A port.
26	40Pin Out	40-pin output.
27	3.5mm Audio Jack	3.5mm audio jack for audio output.
28	MIC[1]	Microphone, which is used for audio input.
29	SPK_R	Right speaker.
30	DMIC1	Digital Monolithic Integrated Circuit.
31	SPK_L	Left speaker.
32	USB3.0 Type-A × 2 Connector	2 × USB3.0 Type-A Connector
33	USB3.0 Type-A Connector	-
34	Type-C Programming	USB2.0 device for programming via Type-C port.

Table 1-1 Board Appearance Description - Top (continued)

NO.	Interface	Description
35	I2C Header	-

Figure 1-2 Bottom View

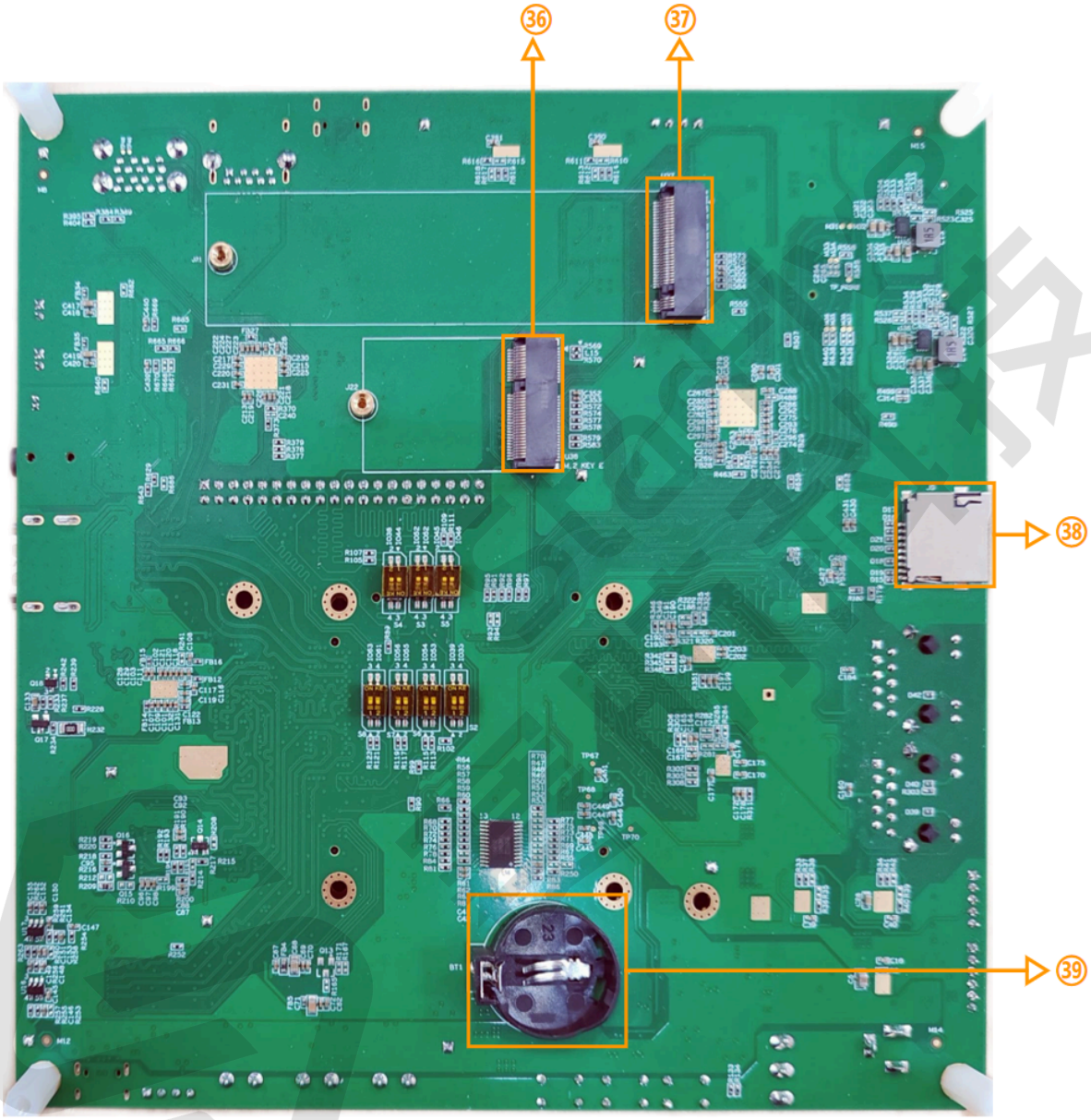


Table 1-2 Board Appearance Description - Bottom

NO.	Interface	Description
36	M.2 Key E	-
37	M.2 Key M	-
38	TF Card Connector	TF Card slot.
39	CR2023 Battery Connector	CR2023 button battery connector.

2. JH-7110 DevKit Configuration Basics

The chapter provides basics information on JH-7110 DevKit configuration.

2.1. Power on and power off

This section provides the methods to power on and power off the JH-7110 DevKit.

Power on

1. Connect the 12V power supply to ⑧ port in Top View *(on page 7)* of the Block diagram.
2. Then turn the ⑨ to ON in Top View *(on page 7)* of the Block diagram.
3. Finally, press the ⑪ button in Top View *(on page 7)* of the Block diagram for **1** second until the red indicator light on the Core Board lights up, which means the JH-7110 DevKit is powered on.

Power off

The following provides two methods to power off the JH-7110 DevKit.

- Press the ⑪ button for **6** seconds until the red indicator light on the Core Board turns off.
- Turn the ⑨ to OFF directly to power off the JH-7110 DevKit.

2.2. Boot Mode Settings

JH-7110 DevKit provides 4 methods to determine the boot mode before it is powered up. The following are the available boot modes and details. You can select the boot mode by using dip switch.

- eMMC boot
- SD Card boot
- QSPI Flash boot
- UART boot

The following tables show all the supported boot modes.

Table 2-1 Boot Mode

Boot Mode	Value	Boot Selection	
		RGPIO_1	RGPIO_0
eMMC boot	0×0	1 (H)	0 (L)
SD Card boot	0×1	0 (L)	1 (H)
QSPI Flash boot	0×2	0 (L)	0 (L)
UART boot	0×3	1 (H)	1 (H)

Note:
StarFive does not recommend that you boot from SD Card directly. It is recommend that JH-7110 DevKit use the following boot mode:

- QSPI Flash + SD Card
- QSPI Flash + eMMC

The following figure shows the dip switch locations for all the supported boot modes (⑥) in Top View *(on page 7)*.

Figure 2-1 Boot Mode Dip Switch Location

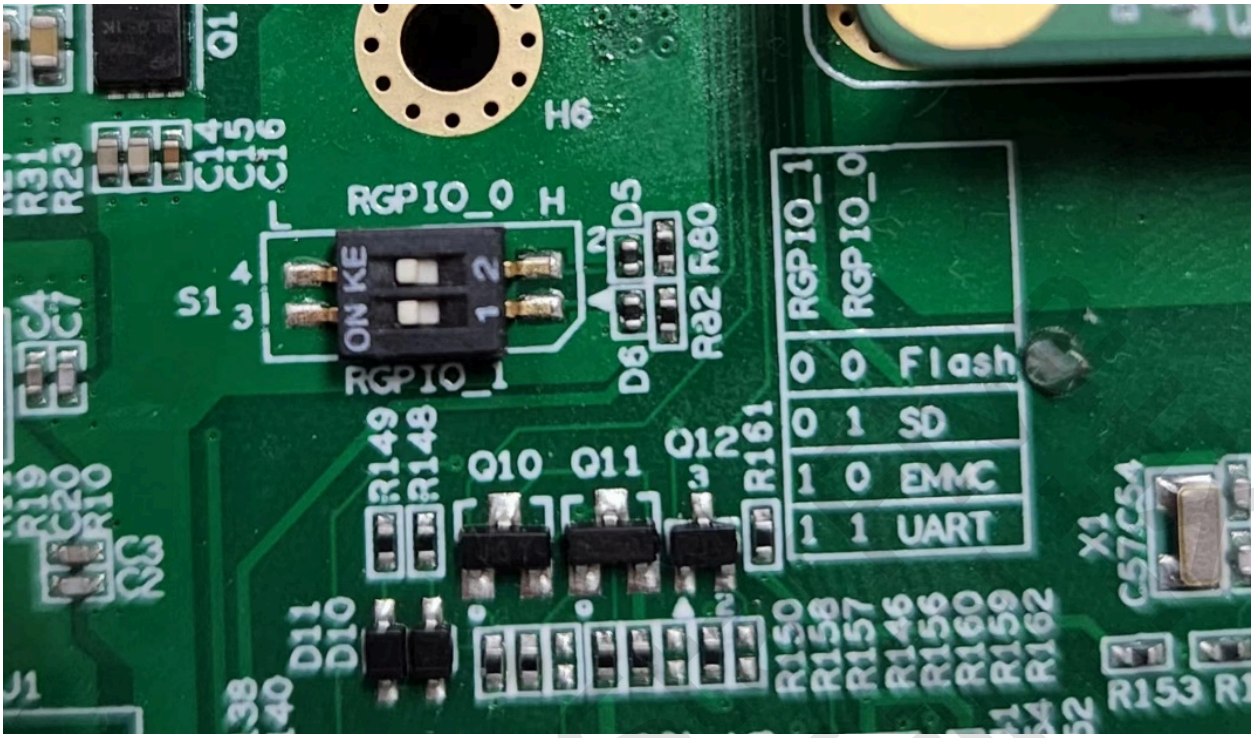
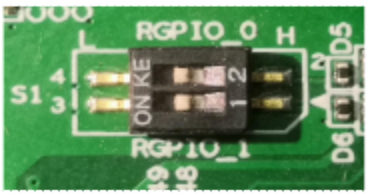
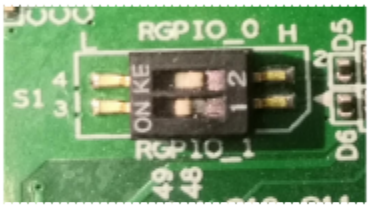


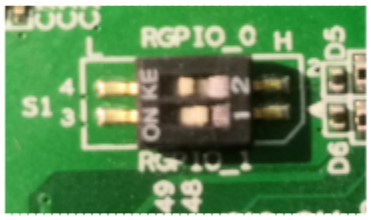
Figure 2-2 Boot Mode Settings



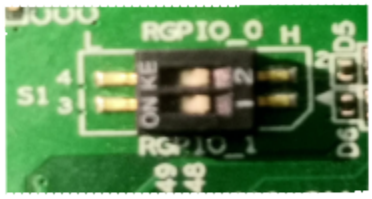
Flash
RGPIO_1: 0 (L)
RGPIO_0: 0 (L)



SD Card
RGPIO_1: 0 (L)
RGPIO_0: 1 (H)



eMMC
RGPIO_1: 1 (H)
RGPIO_0: 0 (L)



UART
RGPIO_1: 1 (H)
RGPIO_0: 1 (H)

Note: H for high level; L for low level.

2.3. GPIO Dip Switch Settings

You need to perform certain dip switch settings before connection peripherals to the JH-7110 DevKit.

The following table shows the required GPIO dip switch settings.

Table 2-2 GPIO dip Switch Settings

GPIO Group	GPIO	Dip Switch for Function		Remarks
		Dip Switch	Function	
1	GPIO33	S2pin1: ON*	MIPI_EDP_BL	
2	GPIO39	S2pin2: ON	PA_EN_H	
	GPIO41	S3pin2: ON	LT8911EXB_RST	
	GPIO52	S3pin1: ON	BT_EN_H	
	GPIO44	S4pin1: ON	I2S_DSDIN	
	GPIO38	S4pin2: ON	I2S_SCLK	
	GPIO45	S5pin2: ON	UART_TXD_232	
	GPIO46	S5pin1: ON	UART_RXD_232	

Table 2-2 GPIO dip Switch Settings (continued)

GPIO Group	GPIO	Dip Switch for Function		Remarks
		Dip Switch	Function	
	GPIO53	S6pin2: ON	BT_UART_TXD	
	GPIO54	S6pin1: ON	BT_UART_RXD	
	GPIO55	S7pin2: ON	BT_UART_RTS	
	GPIO56	S7pin1: ON	BT_UART_CTS	
	GPIO61	S8pin2: ON	I2S_ASDOUT	
	GPIO63	S8pin1: ON	I2S_LRCK	
EXT	P0_5	S10pin2: ON	SDIO1_SEL_H	1*
	P0_7	S10pin1: ON	MIPI_SEL_H	
		S9pin2: ON	BT_DIS_N	2*
		S9pin1: ON	WL_DIS_N	3*

Note:

- *: ON means connected, otherwise means disconnected.
- 1*: It means you have selected the SD card mode. Otherwise, it means you have selected the WiFi mode.
- 2*: WIFI switch for M.2 KEY E module, ON by default.
- 3*: Bluetooth switch for M.2 KEY E module, ON by default.

3. Getting Started

This chapter provides steps to get started with JH-7110 DevKit. It builds U-Boot SPL, U-Boot and a flattened image tree (FIT) image with a Opensbi binary, linux kernel, device tree, ramdisk image and rootfs image for the JH-7110 DevKit board.

The SDK of JH-7110 DevKit contains the following part:

- Pre-build images
- U-Boot Binaries
- Source Code

Table 3-1 Pre-build Image and Binaries

File	Description
`Image.fit`	FIT image (kernel/dtb/initramfs)
`Image.gz`	Kernel compressed image file
`initramfs.cpio.gz`	Root filesystem based on ram
`devkits_fw_payload.img`	OpenSBI binaries with u-boot as payload
`u-boot-spl.bin.normal.out`	SPL binary
`sdcard.img`	SD card/eMMC image including SPL/U-Boot/Kernel/FS
`dtb files`	Device tree binary

Table 3-2 Source Code with Tags

Deliverable	Version	Source	Tags
DevKit	v5.13.1	glab	JH7110_DVK_v5.13.1
Linux Kernel	5.15.0 & 6.6.20		
OpenSBI	v1.2		
U-Boot	2021.10		
Buildroot	2021.11		

3.1. Download the SDK

Click to download the StarFive JH-7110 DevKit SDK.

Note:
The download process may take some time, please be patient.

3.2. Run SDK on JH-7110 DevKit

Perform the following steps to run SDK on JH-7110 DevKit:

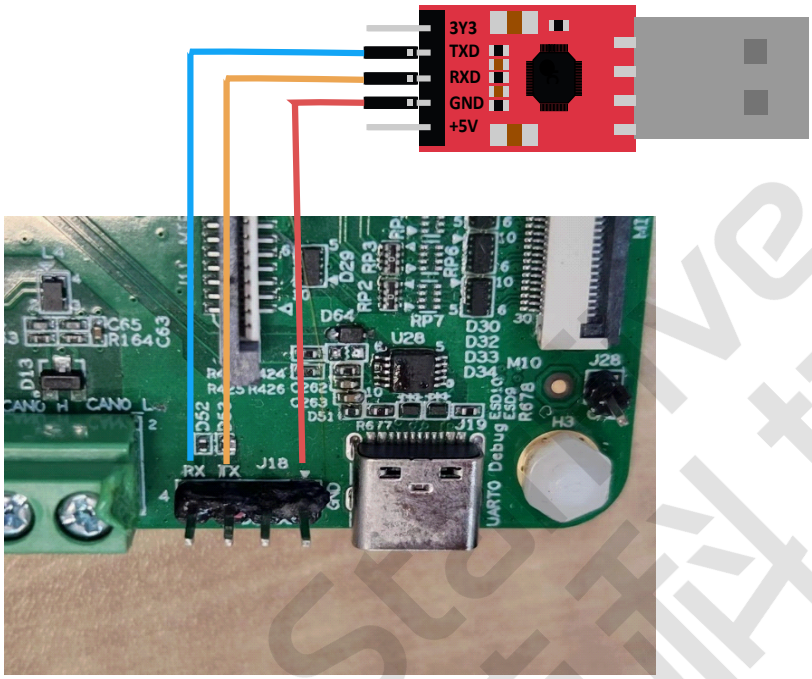
1. Connect your JH-7110 DevKit to network as described in Connect JH-7110 DevKit to Network *(on page 14)*.
2. Boot JH-7110 DevKit.

3.2.1. Connect JH-7110 DevKit to Network

This section provides steps to connect JH-7110 DevKit to network and enter U-Boot terminal.

1. Connect the jumper wires between the USB-to-Serial converter and the UART0 Debug *(on page 7)* pins of JH-7110 DevKit debug header. The following figure is an example:

   Figure 3-1 Connecting to the UART0 Debug Pins of JH-7110 DevKit



   Tip:
   You can also use the USB-to-Serial converter of Type-C port to connect Type-C debug port directly.

2. Configure the serial port baud rate settings to `115200` bps.
3. Connect JH-7110 DevKit to the network cable and power cord.
4. Turn on JH-7110 DevKit and you will see the start-up information as follows:

```
U-Boot SPL 2021.10 (Apr 27 2023 - 01:11:58 +0800)
DDR version: 5129c280.
Trying to boot from SPI

OpenSBI v1.2
   ____                    _____ ____ _____
  / __ \                  / ____|  _ \_   _|
 | |  | |_ __   ___ _ __ | (___ | |_) || |
 | |  | | '_ \ / _ \ '_ \ \___ \|  _ < | |
 | |__| | |_) |  __/ | | |____) | |_) || |_
  \____/| .__/ \___|_| |_|_____/|___/_____|
        | |
        |_|

Platform Name             : StarFive JH7110 DevKits
Platform Features         : medeleg
Platform HART Count       : 5
Platform IPI Device       : aclint-mswi
Platform Timer Device     : aclint-mtimer @ 4000000Hz
Platform Console Device   : uart8250
Platform HSM Device       : ---
Platform PMU Device       : ---
Platform Reboot Device    : pm-reset
Platform Shutdown Device  : pm-reset
Platform Suspend Device   : ---
Firmware Base             : 0x40000000
Firmware Size             : 392 KB
Firmware RW Offset        : 0x40000
```

```
Runtime SBI Version       : 1.0

Domain0 Name              : root
Domain0 Boot HART         : 1
Domain0 HARTs             : 0*,1*,2*,3*,4*
Domain0 Region00          : 0x0000000002000000-0x000000000200ffff M: (I,R,W) S/U: ()
Domain0 Region01          : 0x0000000040000000-0x000000004003ffff M: (R,X) S/U: ()
Domain0 Region02          : 0x0000000040040000-0x000000004007ffff M: (R,W) S/U: ()
Domain0 Region03          : 0x0000000000000000-0xffffffffffffffff M: (R,W,X) S/U: (R,W,X)
Domain0 Next Address      : 0x0000000040200000
Domain0 Next Arg1         : 0x0000000042200000
Domain0 Next Mode         : S-mode
Domain0 SysReset          : yes
Domain0 SysSuspend        : yes

Boot HART ID              : 1
Boot HART Domain          : root
Boot HART Priv Version    : v1.11
Boot HART Base ISA        : rv64imafdcbx
Boot HART ISA Extensions  : none
Boot HART PMP Count       : 8
Boot HART PMP Granularity : 4096
Boot HART PMP Address Bits: 34
Boot HART MHPM Count      : 2
Boot HART MIDELEG         : 0x0000000000000222
Boot HART MEDELEG         : 0x000000000000b109


U-Boot 2021.10 (Apr 27 2023 - 01:11:58 +0800), Build: jenkins-Devkits_515_Branch_Customer_Build-3

CPU:   rv64imacu
Model: StarFive JH7110 DevKits
DRAM:  4 GiB
MMC:   sdio0@16010000: 0, sdio1@16020000: 1
Loading Environment from SPIFlash... SF: Detected gd25lq128 with page size 256 Bytes, erase size 4 KiB,
 total 16 MiB
OK
In:    serial
Out:   serial
Err:   serial
Model: StarFive JH7110 DevKits
Net:   eth0: ethernet@16030000, eth1: ethernet@16040000
Hit any key to stop autoboot:  0
StarFive #
```

5. Press any key to stop and enter the U-Boot terminal.

3.2.2. Boot JH-7110 DevKit

There are two ways to boot the JH-7110 DevKit.

- Run the Default DTB with image.fit *(on page 16)*
- Run the Other DTB Files with the Image.gz and initramfs.cpio.gz *(on page 17)*
- Run Debian System *(on page 17)*

3.2.2.1. Run the Default DTB with `image.fit`

This section provides steps to transfer `image.fit` through TFTP and run `image.fit` with the default DTB: `jh7110-devkits-v2.dtb`.

1. Run the following command to set environment parameters:

```
setenv ipaddr 192.168.xxx.xxx; setenv serverip 192.168.xxx.xxx;
```

2. Upload the image file to DDR:

```
tftpboot ${loadaddr} image.fit;
```

3. Load and execute the file by running:

```
bootm start ${loadaddr};bootm loados ${loadaddr};run chipa_set_linux;run cpu_vol_set; booti
 ${kernel_addr_r} ${ramdisk_addr_r}:${filesize} ${fdt_addr_r};
```

4. Login with the following credentials:

```
buildroot login:root
Password: starfive
```

Result:

The launch is successful!

3.2.2.2. Run the Other DTB Files with the `Image.gz` and `initramfs.cpio.gz`

If you want to load the other DTBs, for example, `jh7110-devkits-wifi.dtb`, follow the steps below.

1. Set the environment parameter:

```
setenv ipaddr 192.168.xxx.xxx; setenv serverip 192.168.xxx.xxx;
```

2. Upload files to DDR:

```
tftpboot ${fdt_addr_r} jh7110-devkits-wifi.dtb;
tftpboot ${kernel_addr_r} Image.gz;
tftpboot ${ramdisk_addr_r} initramfs.cpio.gz;
run chipa_set_linux;run cpu_vol_set;
```

3. Load and execute:

```
booti ${kernel_addr_r} ${ramdisk_addr_r}:${filesize} ${fdt_addr_r}
```

4. Login with the following credentials:

```
buildroot login:root
Password: starfive
```

Result:

The launch is successful!

3.2.2.3. Run Debian System

Flashing OS to eMMC Flash

Now we need to burn Debian (which is a Linux distribution) to eMMC Flash so that it can run on the JH-7110 DevKit. Follow the steps below.

1. Download Debian image from Releases and extract the `.bz2` file.
2. Download USB Flash Tool from Releases and extract the `.7z` file.
3. Please refer to the *USBFLASHTOOL-V3.0 User Guide.pdf* and flash Debian image into eMMC Flash.

Note:
Please consult your StarFive support for this document.

Logging into Debian

For this preview release, we will only be releasing QSPI boot version.

- **QSPI + eMMC boot**: starfive-jh7110-JH7110_DVK_v5.13.1-39-eMMC-minimal-desktop-wayland.img.bz2
- **QSPI + SD boot**: starfive-jh7110-JH7110_DVK_v5.13.1-39-SD-minimal-desktop-wayland.img.bz2

The following are 2 ways to log in to Debian:

1. **Using Desktop over HDMI**: After flashing Debian, you can log in to Debian OS on JH-7110 DevKit using desktop over HDMI.
    a. After the HDMI of the display screen is connected,power on the JH-7110 DevKit.
    b. After the desktop login system is displayed, you can use the keyboard and mouse on JH-7110 DevKit.
    c. Enter the credentials as follows:
        - Username: user
        - Password: starfive
2. **Using a USB to Serial Converter**: After flashing Debian,you can log in to Debian OS on JH-7110 DevKit using USB to Serial converter.
    a. Connect the USB to Serial converter to J18 or J19,power on the JH-7110 DevKit.
    b. Enter the credentials as follows:

    You can use either ***user*** or ***root*** account to login. The following example use ***root*** to login:
        - Username: root
        - Password: starfive

4. Reference

4.1. GPIO Allocation

The following table shows the specific GPIO allocation of JH-7110 DevKit.

Table 4-1 GPIO Allocation

sys	dts	GPIO Num	Pin Name	Pin Num	Pin Num	Pin Name	GPIO Num	dts	sys
		N/A	+3.3V	1	2	+5V	N/A		
i2c0-4	i2c0-4	58	GPIO58 (I2C SDA)	3	4	+5V	N/A		
i2c0-4	i2c0-4	57	GPIO57 (I2C SCL)	5	6	GND	N/A		
ttyS1	Uart1	55	GPIO55* (UART CTS)	7	8	GPIO41 (UART RTS)	41	uart4/5	ttyS4/5
		N/A	GND	9	10	GPIO33* (MIPI_EDP_BL)	33	pwm-gpio	33
Spidev1.0-7.0	SPI0-6	42	GPIO42 (SPI TX)	11	12	GPIO38* (I2C SCLK)	38	i2srx_3ch	38
Spidev1.0-7.0	SPI0-6	43	GPIO43 (SPI RX)	13	14	GND	N/A		
Spidev1.0-7.0	SPI0-6	47	GPIO47 (SPI CLK)	15	16	GPIO54* (UART TX)	54	uart1	ttyS5
		N/A	+3.3V	17	18	GPIO51 (UART CTS)	51	uart4/5	ttyS4/5
	52	52	GPIO52	19	20	GND	N/A		
ttyS3	Uart3	53	GPIO53* (UART TX)	21	22	GPIO50 (UART RX)	50	uart4/5	ttyS4/5
Spidev1.0-7.0	SPI0-6	48	GPIO48 (SPI CS)	23	24	GPIO49 (UART TX)	49	uart4/5	ttyS4/5
		N/A	GND	25	26	GPIO56* (UART CTS)	56	uart1	ttyS1
ttyS2	Uart2	45	GPIO45* (UART TX)	27	28	GPIO40	40		40
	ptc	37	GPIO37 (PWM CH3)	29	30	GND	N/A		
	papower-gpio	39	GPIO39* (PA_EN_H)	31	32	GPIO46* (UART RX)	46	uart2	ttyS2
	ptc	59	GPIO59 (PWM CH2)	33	34	GND	N/A		
	i2srx_3ch	63	GPIO63* (I2S LRCLK)	35	36	GPIO36 (PWM CH0)	36	ptc	
	ptc	60	GPIO60 (PWM CH1)	37	38	GPIO61* (I2S RX)	61	i2srx_3ch	
		N/A	GND	39	40	GPIO44* (I2S TX)	44	i2stx_4ch1	

Note:
The pin name with "*" means that you can set the different dip switch methods to realize the multiplexing function, refer to GPIO Dip Switch Settings *(on page 12)*.

4.2. Generating Booting TF Card

If you don't use a local TFTP server, then you may want to make the TF card target.

Important:
The operation will overwrite all existing data on the target TF card.

The default size is 16 GB. The GPT Partition Table for the TF card is recommended.

Perform the following steps to generate the booting SD card:

1. Execute the following commands to generate `sdcard.img` file.

   ```
   $ make -j$(nproc)
   $ make buildroot_rootfs -j$(nproc)
   $ make img
   ```

   Result:

   The output file `work/sdcard.img` will be generated.

   Tip:
   The image file can be burned into a TF card by:

   - executing the following `dd` command:

     ```
     $ sudo dd if=work/sdcard.img of=/dev/sdX bs=4096
     $ sync
     ```

   - or using `rpi-imager` or `balenaEtcher` tool.

2. (Optional) Extend the partition if needed. The following methods are both applicable:

   - Option 1: On the Ubuntu host:

     a. Install the package by running the following command on the Ubuntu host:

     ```
     $ sudo apt install cloud-guest-utils e2fsprogs
     ```

     b. Insert the TF card to the Ubuntu host.

     c. Execute the following command to extend partition.

     Note:
     `/dev/sdX` is the TF card device name. Change this variable according to the actual situation.

     ```
     $ sudo growpart /dev/sdX 4  # extend partition 4
     $ sudo e2fsck -f /dev/sdX4
     $ sudo resize2fs /dev/sdX4  # extend filesystem
     $ sudo fsck.ext4 /dev/sdX4
     ```

   - Option 2: Run the `fdisk` and `resize2fs` commands on the JH-7110 DevKit:

     ```
     # fdisk /dev/mmcblk1
     Welcome to fdisk (util-linux 2.37.2).
     Changes will remain in memory only, until you decide to write them.
     Be careful before using the write command.
     This disk is currently in use - repartitioning is probably a bad idea.
     It's recommended to umount all file systems, and swapoff all swap
     ```

```
partitions on this disk.
Command (m for help): d
Partition number (1-4, default 4): 4
Partition 4 has been deleted.
Command (m for help): n
Partition number (4-128, default 4): 4
First sector (614400-62333918, default 614400):
): t sector, +/-sectors or +/-size{K,M,G,T,P} (614400-62333918, default 62333918)
Created a new partition 4 of type 'Linux filesystem' and of size 29.4 GiB.
Partition #4 contains a ext4 signature.
Do you want to remove the signature? [Y]es/[N]o: N
Command (m for help): w
The partition table has been altered.
Syncing disks.

# resize2fs /dev/mmcblk1p4
resize2fs 1.46.4 (18-Aug-2021)
Filesystem at /d[
111.756178] EXT4-fs (mmcblk1p4): resizing filesystem from 512000
to 30859756 blocks
ev/mmcblk1p4 is [
111.765203] EXT4-fs (mmcblk1p4): resizing filesystem from 512000
to 30859265 blocks
mounted on /; on-line resizing required
old_desc_blocks = 2, new_desc_blocks = 118
[ 112.141953] random: crng init done
[ 112.145369] random: 7 urandom warning(s) missed due to ratelimiting
[ 115.474184] EXT4-fs (mmcblk1p4): resized filesystem to 30859265
The filesystem on /dev/mmcblk1p4 is now 30859756 (1k) blocks long.
```

If you need to add a new partition, such as a swap partition (here we do set the rest of disk space to swap partition, but normally swap partition size should be the same as DDR size or double of DDR size), you can use the following shell script after the image running on board:

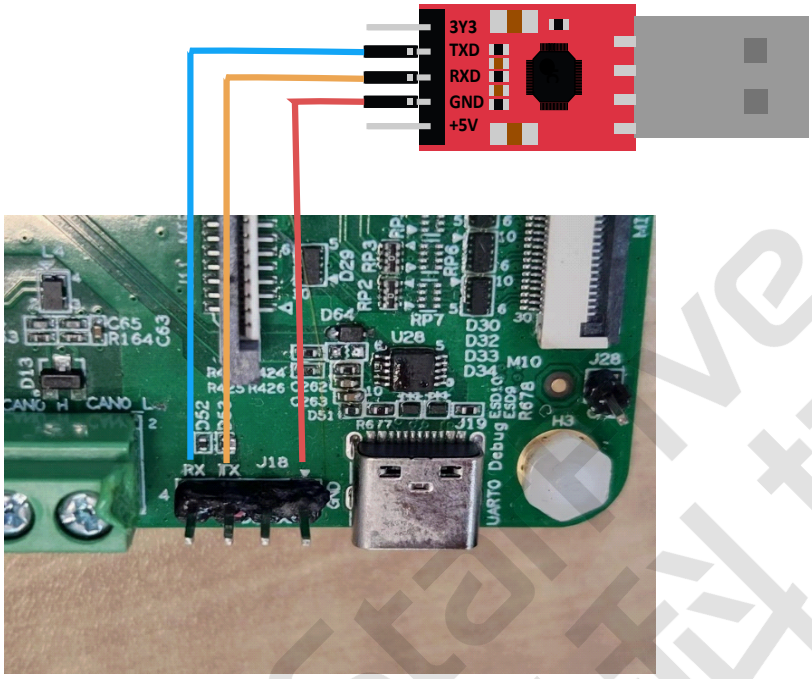
```
#!bin/sh
sgdisk -e /dev/mmcblk0
disk=/dev/mmcblk0
gdisk $disk << EOF
p
n
5


8200
p
c
5
hibernation
w
y
EOF

mkswap /dev/mmcblk0p5
swapoff -a
swapon /dev/mmcblk0p5
```

4.3. Recovering the Bootloader

The SPL and U-Boot are stored inside the SPI flash of your board. There may be situations where you accidentally empty the flash or if the flash is damaged on your board. In these situations, it's better to recover the bootloader.

1. Connect the jumper wires between the USB-to-Serial converter and the UART0 Debug *(on page 7)* pins of JH-7110 DevKit debug header. The following figure is an example:

Figure 4-1 Connecting to the UART0 Debug Pins of JH-7110 DevKit



Tip:
You can also use the USB-to-Serial converter of Type-C port to connect Type-C debug port directly.

2. Before you recover the bootloader, double check the boot mode jumpers (Switch_2) on your board has already been switched to UART mode (RGPIO_1,RGPIO_0: 1,1).

Tip:
For more information, refer to Boot Mode Settings *(on page 10)*.

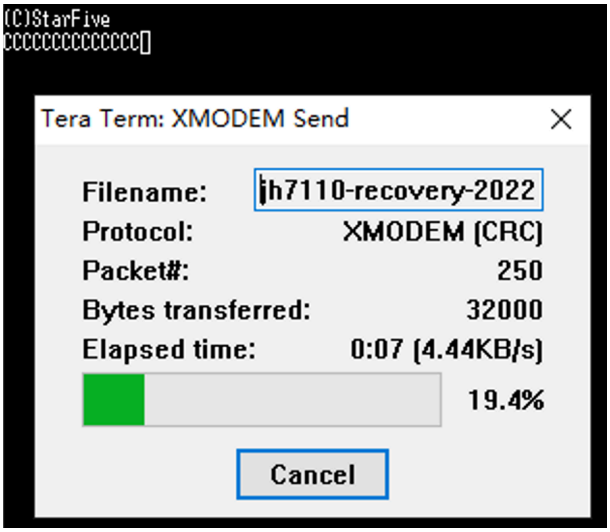
3. Configure the serial port baud rate settings to `115200` bps.
4. Power up, you will see an output like this:

```
CCCCCCCCCCCCCCCCCCCC
```

5. Transfer the latest recovery binary (`jh7110-recovery-<Version>.bin`) by XMODEM. The recovery binary is located at: https://github.com/starfive-tech/Tools/tree/master/recovery.

Tip:
<Version> indicates the version number of the recovery file. Make sure you use the latest version.

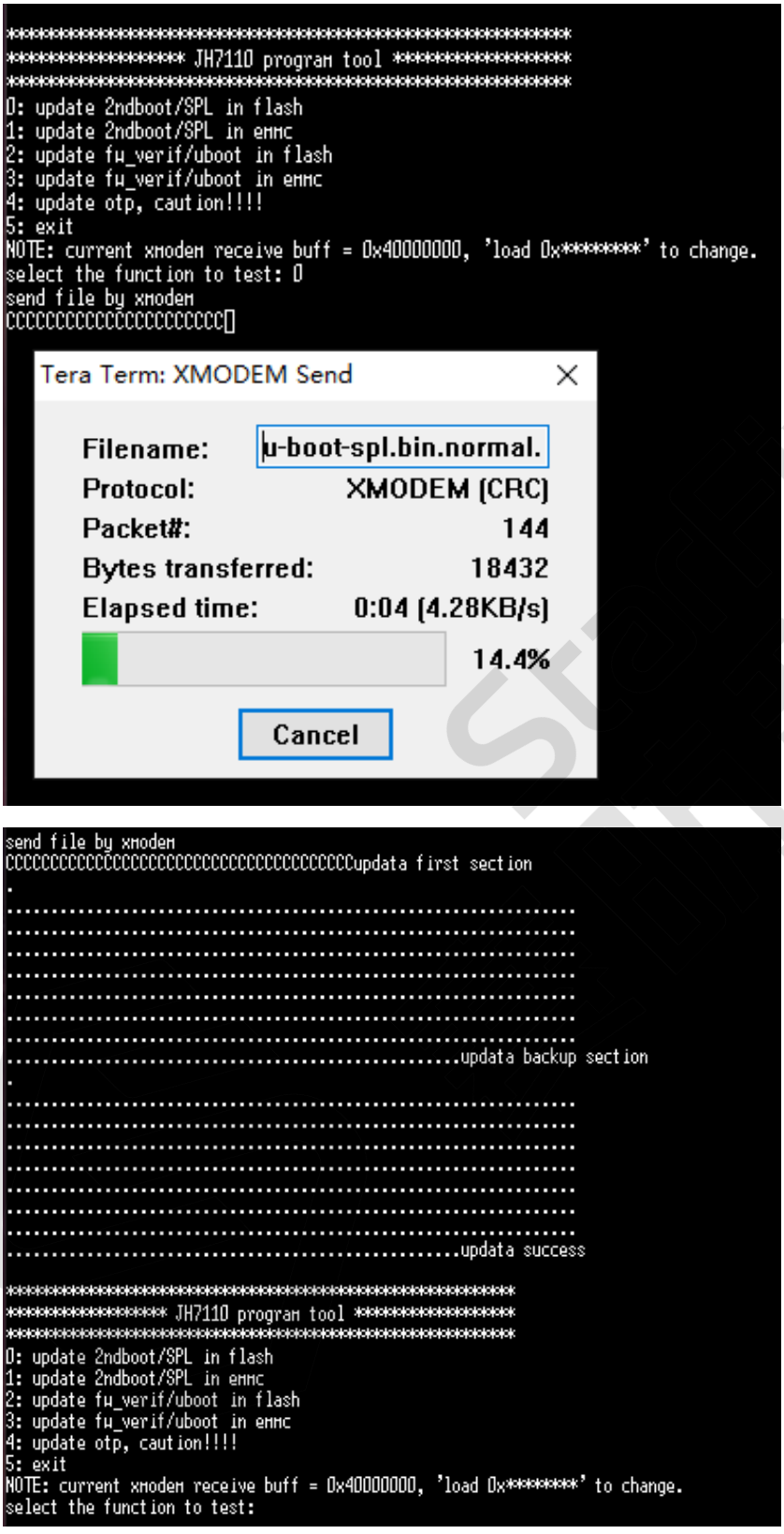
Figure 4-2 Example Output




```
(C)StarFive
CCCCCCCCCCCC
JH7110 secondboot version: 221205-74596a9
CPU freq: 1250MHz
idcode: 0x1860C8
CSD:0xd00f0032 0x8f5903ff 0xffffffef 0x8a404023
mmc_send_ext_csd err 0
Device: EMMC
Manufacturer ID: 45
OEM: 100
Name: DG4D3
Tran Speed: 25000000
Rd Block Len: 512
MMC version 4.0
High Capacity: Yes
Capacity: 29.1 GiB
Bus Width: 8-bit
Erase Group Size: 0x80000
ddr 0x00000000, 4M test
ddr 0x00400000, 8M test
DDR clk 2133M, size 8GB

**************************************************
****************** JH7110 program tool ******************
**************************************************
0: update 2ndboot/SPL in flash
1: update 2ndboot/SPL in emmc
2: update fw_verif/uboot in flash
3: update fw_verif/uboot in emmc
4: update otp, caution!!!!
5: exit
NOTE: current xmodem receive buff = 0x40000000, 'load 0x********' to change.
select the function to test:
```

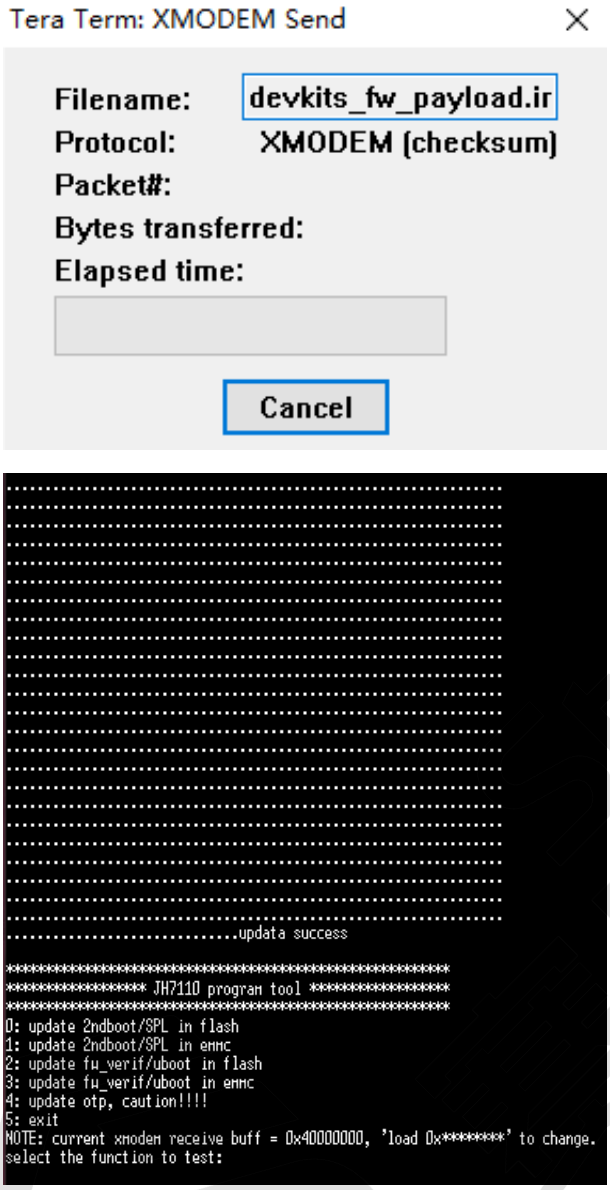
6. Type `0` and press **Enter** on your keyboard to update SPL binary <`u-boot-spl.bin.normal.out`>.

Figure 4-4 Example Output



7. Type 2 and press **Enter** on your keyboard to update U-Boot binary <devkits_fw_payload.img>.

Figure 4-6 Example Output



8. Power off and switch jumpers back to Flash mode (RGPIO_1,RGPIO_0: 0,0).

4.4. Updating SPL and U-Boot

To update SPL and U-Boot for JH-7110 DevKit, perform the following steps:

1. Prepare the TFTP server. The following is an example command for Ubuntu distribution.

```
sudo apt install tftpd-hpa
```

Note:
For instructions to deploy the TFTP server, refer to the step 2 to step 6 in Using Ethernet section of the *VisionFive Single Board Computer Quick Start Guide*.

2. Power on JH-7110 DevKit and wait until it enters the U-Boot command line interface.
3. Configure the environment variables by executing:

```
StarFive # setenv ipaddr 192.168.120.222;setenv serverip 192.168.120.99
```

4. Check the connectivity by pinging the host PC from JH-7110 DevKit.
5. Initialize SPI flash:

```
StarFive # sf probe
```

6. Update SPL binary:

```
StarFive # tftpboot 0xa0000000 ${serverip}:u-boot-spl.bin.normal.out
StarFive # sf update 0xa0000000 0x0 $filesize
```

7. Update U-Boot binary:

```
StarFive # tftpboot 0xa0000000 ${serverip}:devkits_fw_payload.img
StarFive # sf update 0xa0000000 0x100000 $filesize
```