



# T-Head Yeying1520 **EVB Image Burning User Guide**

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# Revisions

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Rev	Description	Author(s)	Date
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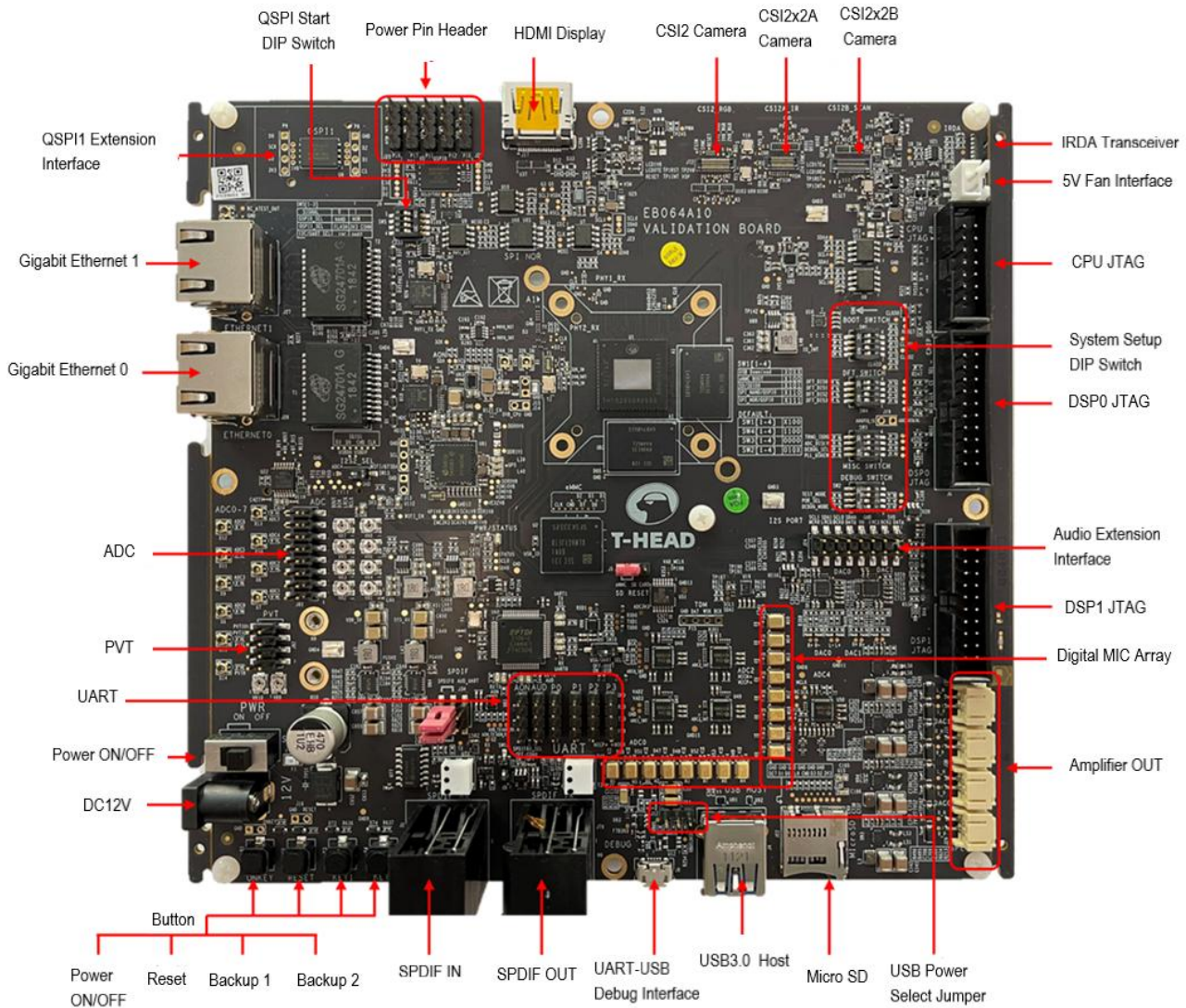
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## List of Abbreviations

Abbreviations	Full Spelling	Chinese Explanation

# 1 Overview

Yeying1520 EVB is a development board based on Yeying1520 speech-vision fusion chip, as shown in the figure below.

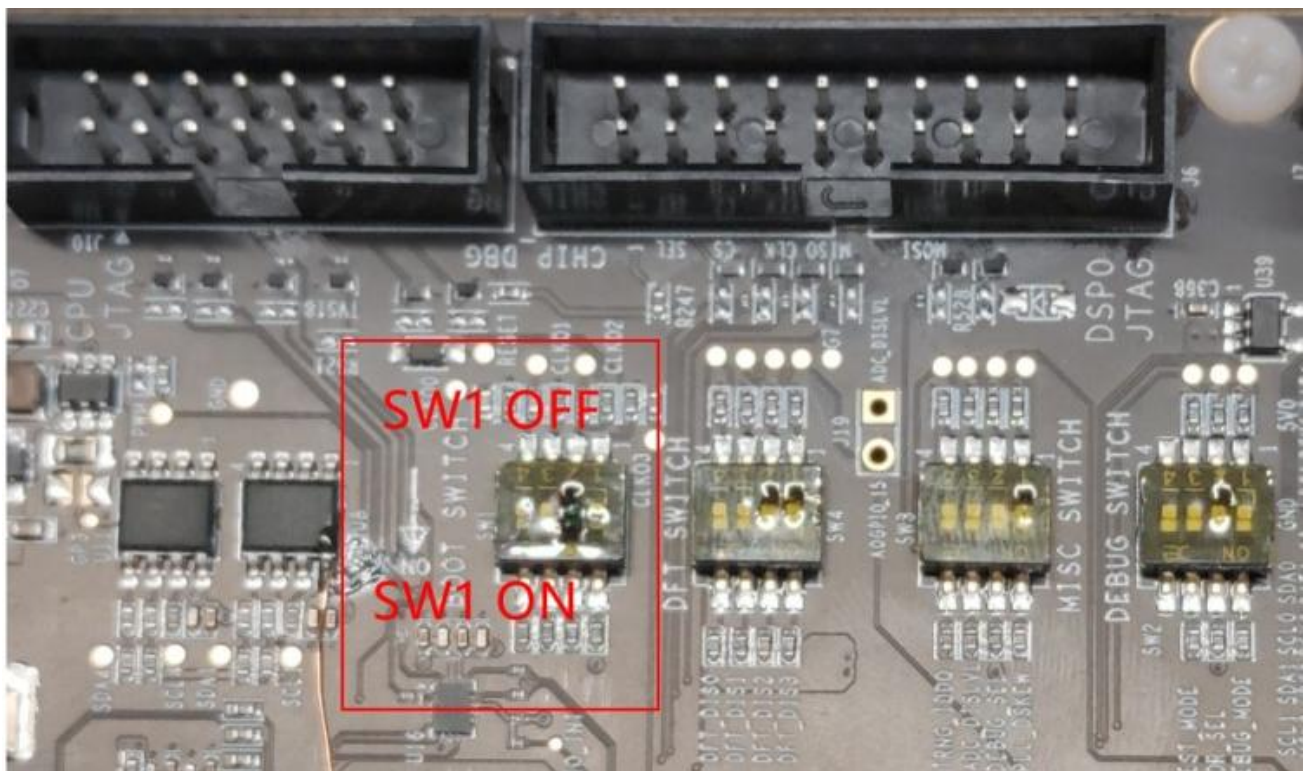


Yeying1520 EVB supports a wide range of ports and can be used to support verification and development of different MUX modes through jumpers and analog switches. For details, please refer to *Yeying1520 EVB User Guide.docx*.

# Boot Mode Setting

BOOT_SEL3 SW1 [1]	BOOT_SEL2 SW1 [2]	BOOT_SEL1 SW1 [3]	BOOT_SEL0 SW1 [4]	Boot Mode Setting SW1 [1-4]
X	0	X	X	USB Download
X	1	0	0	<i>eMMC Boot</i>
X	1	0	1	SD Boot, SDIO0
X	1	1	0	SPI NAND boot, QSPI0, CS0
X	1	1	1	SPI NOR Boot, QSPI0, CS0

Boot jumper SW1, needs to be dialed to the OFF position, set to fastboot mode.



When you are ready, plug in the 12V DC power supply, turn on the power switch and press the power button to start.

- PWR switch SW7 jumps to the ON position
- Press the power J11 button ONKEY to power up the board



## 2 Install Driver

If it is a MAC computer, you only need to install the serial port tool and the android debug tool.

1. Install the serial port tool, such as minicom brew install minicom

How to use:

minicom -D /dev/<serial port number> e.g. minicom -D /dev/tty.usbserial-142202

2. Download the MAC version of android platform tools at <https://developer.android.google.cn/studio/releases/platform-tools>

If it is a Windows computer, you need to install the serial driver, as described below.

### 2.1 Serial Driver

□ Serial driver:

Download the latest VCP serial driver from FTDI official website and install it. There are Windows, Linux, and Mac OS versions. The link is <https://www.ftdichip.com/Drivers/VCP.htm>.

Operating System	Release Date	Processor Architecture							Comments
		X86 (32-Bit)	X64 (64-Bit)	PPC	ARM	MIPSII	MIPSIV	SH4	
Windows (Desktop)*	2021-07-15	<a href="#">2.12.36.4</a>	<a href="#">2.12.36.4</a>	–	–	–	–	–	WHQL Certified. Includes VCP and D2XX. Available as a <a href="#">setup executable</a> . Please read the <a href="#">Release Notes</a> and <a href="#">Installation Guides</a> .
Windows (Universal)***	2021-11-12	<a href="#">2.12.36.4U</a>	<a href="#">2.12.36.4U</a>	–	–	–	–	–	WHQL Certified. Includes VCP and D2XX.

After the driver is installed, there should be four serial ports:



The four serial ports correspond to the following subsystems in turn:

- E902
- C906
- C910 TEE
- C910 REE

Usually we open the third serial port which is C910 TEE. After the serial port is opened, the board is reset by RESET KEY and the serial port will print the BROM message.

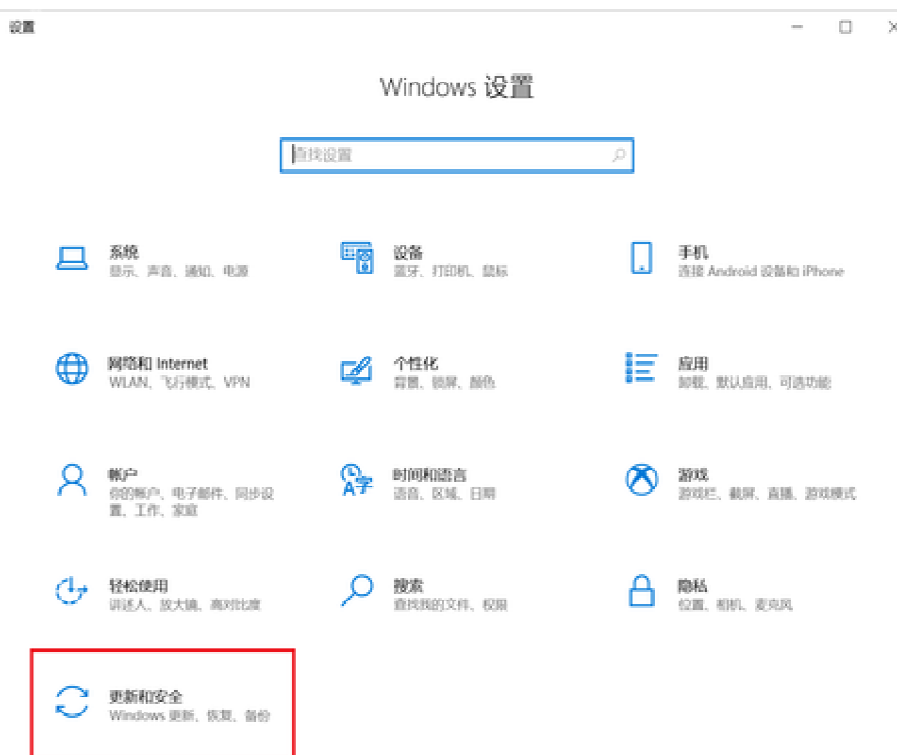
```
brom_ver 7
[APP][E] protocol_connect failed, exit.
brom_ver 7
```

If there is no BROM message, check the connection cable, jumper and power-up indicator. If there is still no such message, it is possible that the board is damaged.

## 2.2 Fastboot Driver

win10 needs to disable mandatory driver signature. The specific steps are as follows:

1. Find the settings of win10 and click “Settings”.



2. Click the last “Update and Security” and then click “Restore”.



- After clicking “Restore”, click “Restart” under Advanced Setup on the right, the computer will restart at this time. If there are other programs running, please be careful.



4. Several options will appear after restarting, click the option “Troubleshooting”.

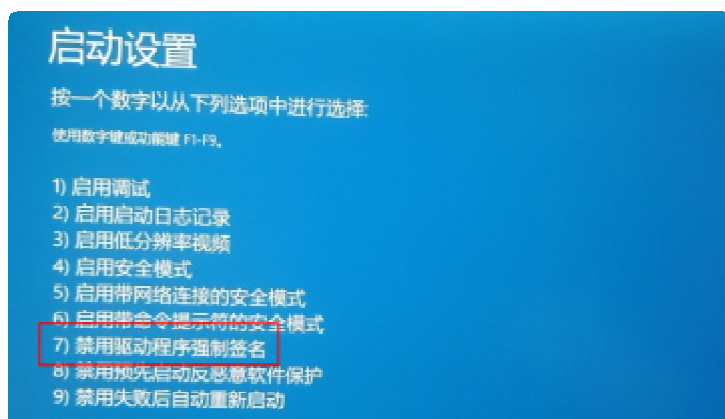


5. Click “Advanced->Start Setup->Restart”.





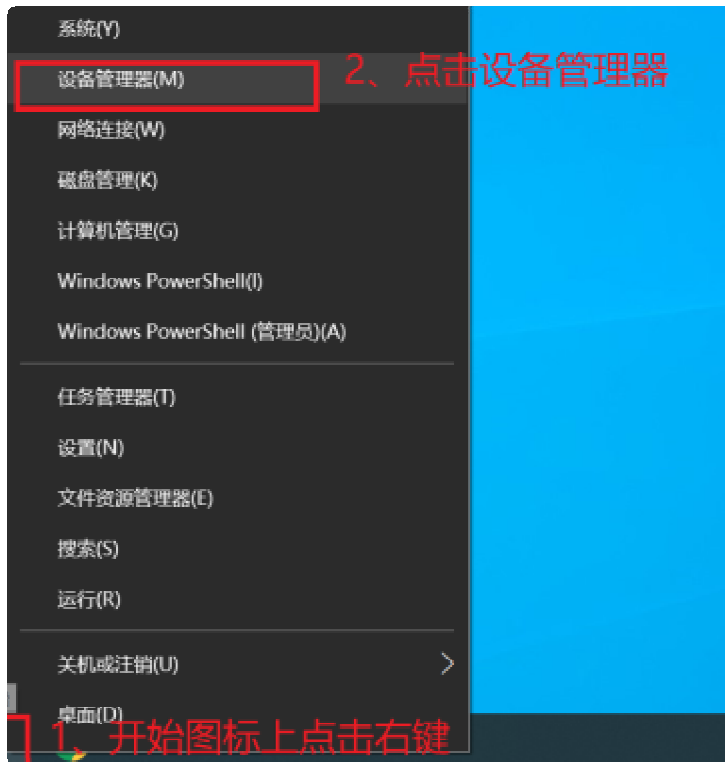
6. After this restart, a list will pop up with options such as Secure Mode, including “Disable Mandatory Driver Signature” that we care about here.



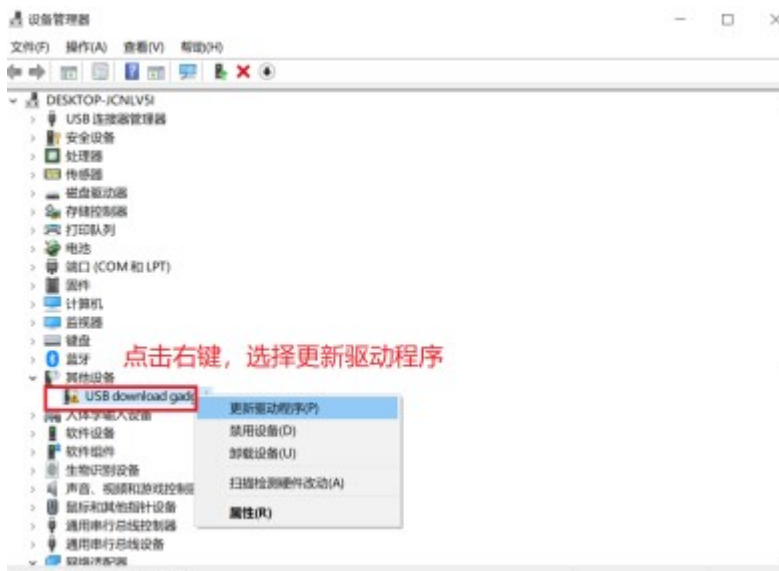
7. Select “Disable Mandatory Driver Signature”, press the corresponding number, and the computer will restart.
8. After rebooting, the driver will be successfully installed. If prompted, click to continue the installation.

The specific steps of fastboot driver installation are as follows:

1. Connect the development board to the computer via USB.
2. Open “Device Management” and “USB download gadget” device appears.



3. Right-click to install the driver and select “Browse my computer for the driver”.



4. Select the usb\_driver directory under fastboot\_driver and click “Next”.

更新驱动程序 - USB download gadget

你要如何搜索驱动程序?

→ 自动搜索更新的驱动程序软件(S)

Windows 将搜索你的计算机和 Internet 以获取适合你设备的最新驱动程序软件，除非你已在设备安装设置中禁用此功能。

→ 浏览我的计算机以查找驱动程序软件(R)

手动查找并安装驱动程序软件。

×

更新驱动程序 - USB download gadget

浏览计算机上的驱动程序

在以下位置搜索驱动程序:

ux SDK v0.5.1\tools\windows\fastboot\_driver\usb\_driver-fullmask

浏览(R)...

☑ 包括子文件夹

→ 让我从计算机上的可用驱动程序列表中选择(L)

此列表将显示与该设备兼容的可用驱动程序，以及与该设备属于同一类别的所有驱动程序。

下一步(N)

取消

5. Select “Always install this driver software”.

更新驱动程序 - USB download gadget

Windows 安全中心

Windows 无法验证此驱动程序软件的发布者

→ 不安装此驱动程序软件(N)

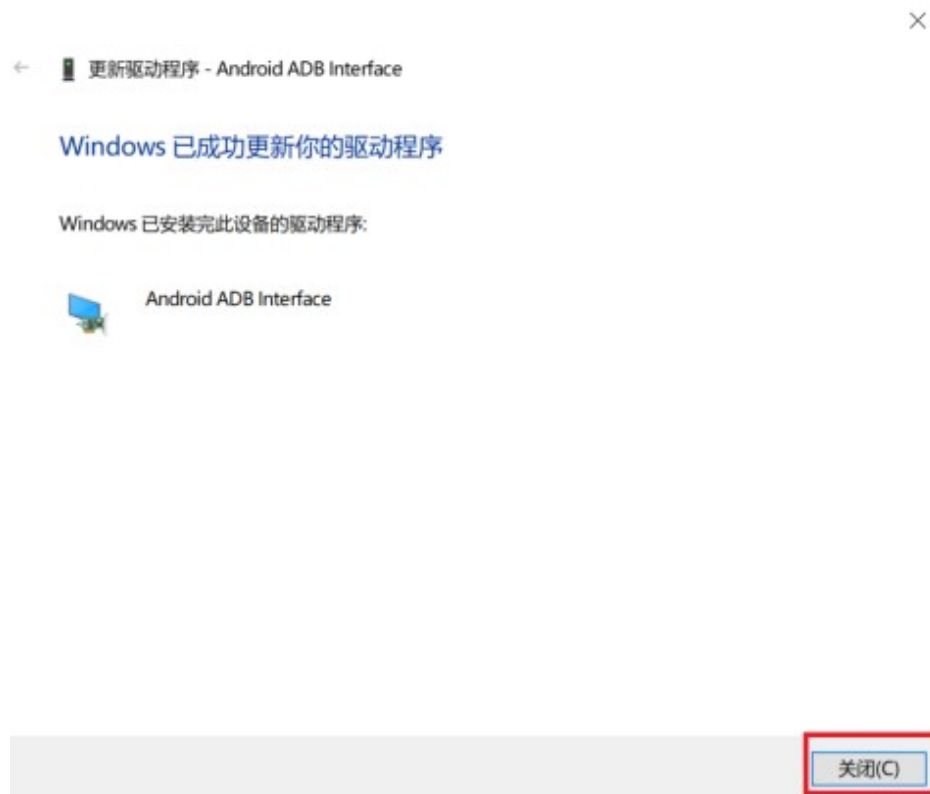
应查看制造商的网站，获得设备的更新驱动程序软件。

→ 始终安装此驱动程序软件(I)

仅安装来自制造商网站或光盘的驱动程序软件。其他来源的未签名软件可能会损坏你的计算机或窃取信息。

查看详细信息(D)

6. Complete the driver installation.



## 2.3 Set the Default Partition

Boot to U-Boot, press any key to enter command mode during the countdown phase.

Enter the following command to complete the secure partition setup.

```
▼ Bash | 复制代码
1  env default -a -f
2  saveenv
3  run gpt_partition
```

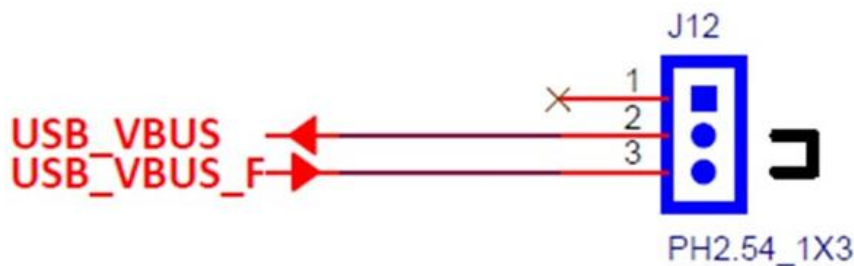


## 3 Power Up and Startup

### 3.1 Adjust Jumpers

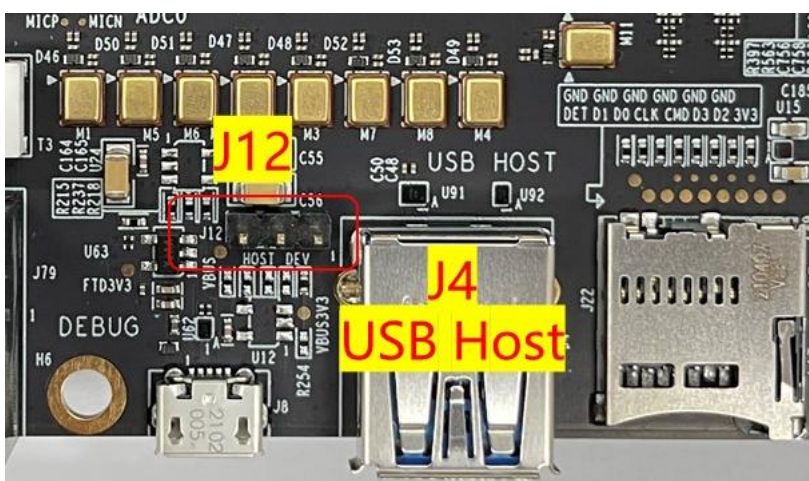
Yeying1520 needs to be used as a device during image burning and ADB debugging. Therefore, the design of selecting the VBUS power supply through jumpers is added to the Yeying1520 EVB. In the normal host mode, the J12 jumper is connected to 2-3, and the motherboard VBUS 5V supplies the USB connector. When used as a device, the jumper is connected to 2-1, or not connected.

**Note:** Jumper selection for VBUS power supply is a non-standard design, so be careful when using it to avoid burning out the motherboard!



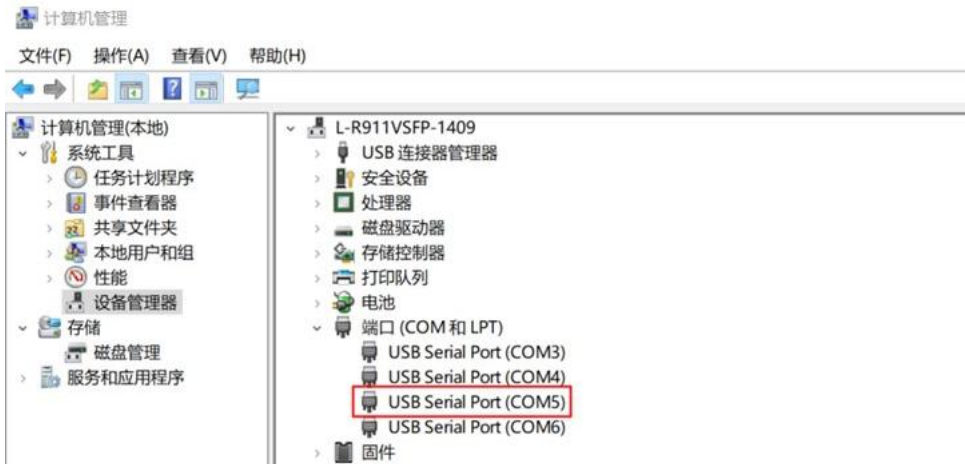
2-1, connected in device mode

2-3, connected in host mode, output power Default

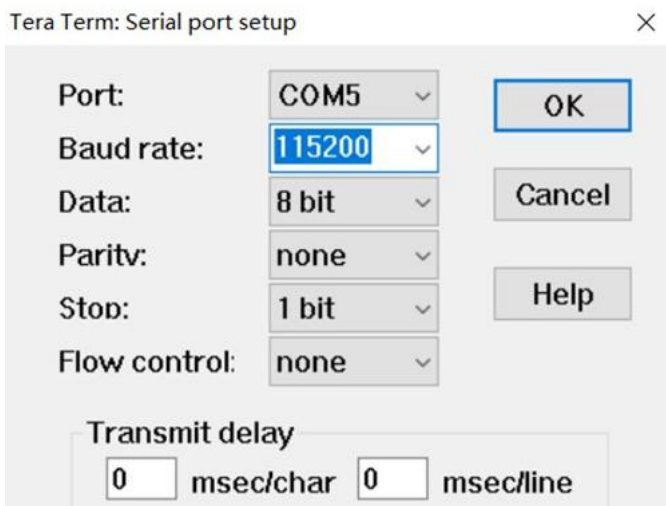


### 3.2 Connect the Serial Port

Plug one end of the USB MicroB cable into the computer and the other end into the verification board J8, you should see four USB serial ports on “Computer -> Computer Management->Ports”.

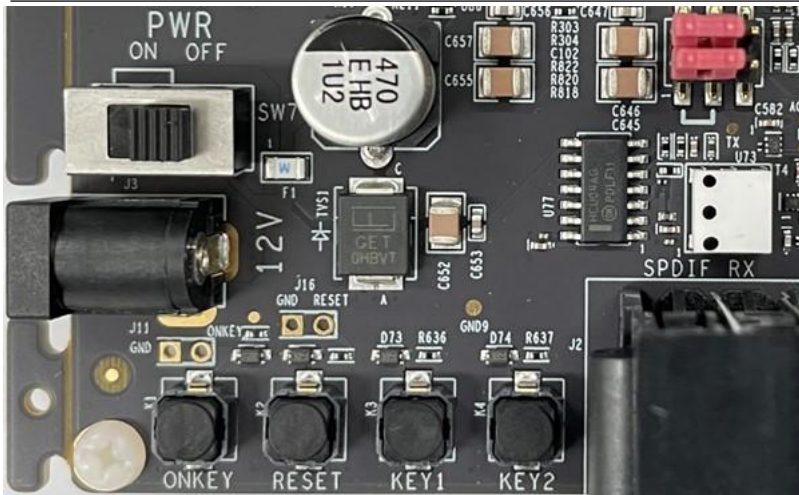


They are AON\_UART E902 debug interface, AUD\_UART C906 debug interface, UART0 C910 TEE debug interface and UART1 C910 REE interface. When burning, please select the third serial port and set the baud rate to 115200bps.



### 3.3 Power Up

Connect the input voltage DC12V, turn the SW7 power switch to the “ON” position, and press the ONKEY button to power up the board.



## 4 Image Burning

Set the DIP switch correctly, open the serial port, and then start the board. The serial port log is as follows:

```
brom_ver 7  
[APP][E] protocol_connect failed, exit.
```

### 4.1 Windows

The burn script will be released by default in the SDK. Enter the SDK directory, switch to the fastboot burn script directory windows\_script, and execute the script:

Script	Function
light_fm_ddr_fastboot.bat	Boot the system with one key without burning the eMMC
light_fm_single_rank_full_image.bat	Burn all images
light_fm_single_rank_uboot+kernel.bat	Burn U-Boot and Linux kernel
light_fm_single_rank_uboot.bat	Burn U-Boot

The script will burn the corresponding image to the eMMC, and the process takes about a few minutes to a dozen minutes, depending on the size of the image.

During the burning process, there will be log output from the serial port:

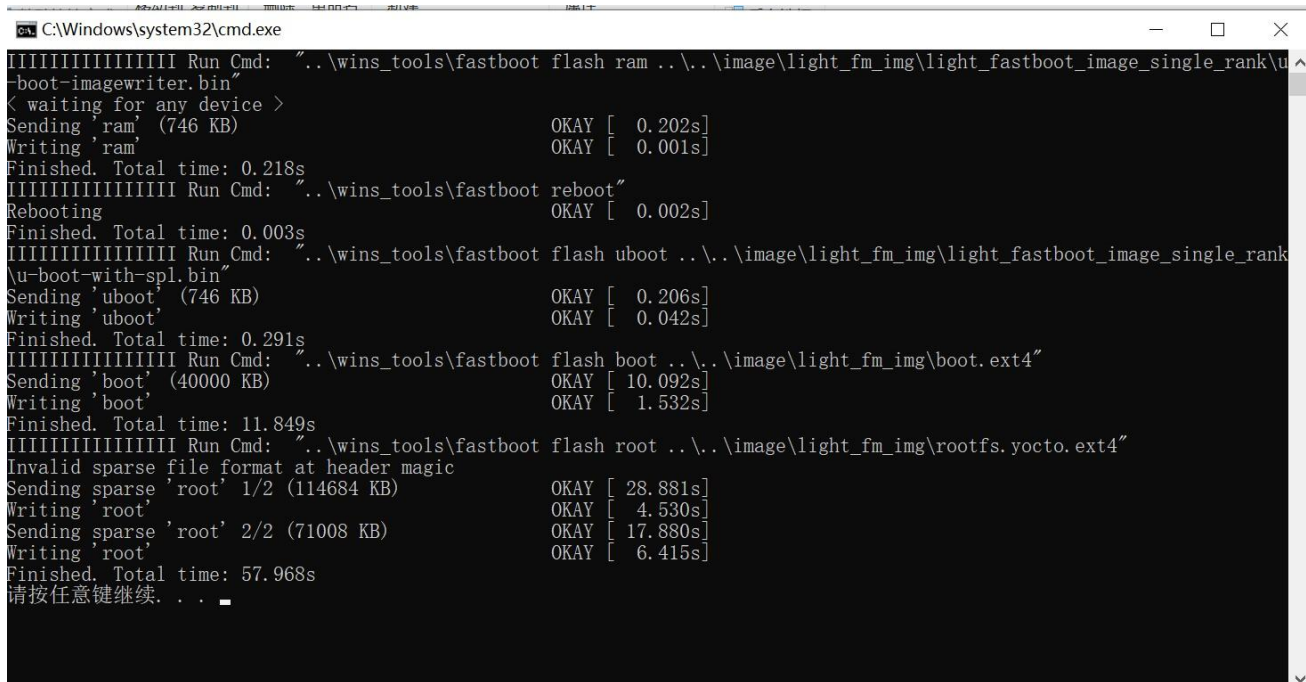
Plain Text | 复制代码

```

1  brom_ver 7
2  [APP][E] protocol_connect failed, exit.
3  Starting download of 764264 bytes
4
5  downloading of 764264 bytes finished
6
7  U-Boot SPL 2020.01-dirty (Jan 07 2022 - 15:13:43 +0800)
8  FM[1] lpddr4x singlerank freq=3733 64bit dbi_off=n sdram init
9  ddr initialized, jump to uboot
10 image has no header
11
12
13 U-Boot 2020.01-dirty (Jan 07 2022 - 15:13:43 +0800)
14
15 CPU:   rv64imafdcvsu
16 Model: T-HEAD c910 light

```

When the “Any key to continue” prompt appears, it indicates that the burning is complete:



```

C:\Windows\system32\cmd.exe
IIIIIIIIII Run Cmd: "..\wins_tools\fastboot flash ram ..\..\image\light_fm_img\light_fastboot_image_single_rank\u
-boot-imagewriter.bin"
< waiting for any device >
Sending 'ram' (746 KB)          OKAY [ 0.202s]
Writing 'ram'                  OKAY [ 0.001s]
Finished. Total time: 0.218s
IIIIIIIIII Run Cmd: "..\wins_tools\fastboot reboot"
Rebooting                      OKAY [ 0.002s]
Finished. Total time: 0.003s
IIIIIIIIII Run Cmd: "..\wins_tools\fastboot flash uboot ..\..\image\light_fm_img\light_fastboot_image_single_rank
\uboot-with-spl.bin"
Sending 'uboot' (746 KB)       OKAY [ 0.206s]
Writing 'uboot'               OKAY [ 0.042s]
Finished. Total time: 0.291s
IIIIIIIIII Run Cmd: "..\wins_tools\fastboot flash boot ..\..\image\light_fm_img\boot.ext4"
Sending 'boot' (40000 KB)      OKAY [ 10.092s]
Writing 'boot'                OKAY [ 1.532s]
Finished. Total time: 11.849s
IIIIIIIIII Run Cmd: "..\wins_tools\fastboot flash root ..\..\image\light_fm_img\rootfs.yocto.ext4"
Invalid sparse file format at header magic
Sending sparse 'root' 1/2 (114684 KB) OKAY [ 28.881s]
Writing 'root'                OKAY [ 4.530s]
Sending sparse 'root' 2/2 (71008 KB) OKAY [ 17.880s]
Writing 'root'                OKAY [ 6.415s]
Finished. Total time: 57.968s
请按任意键继续. . .

```

## 4.2 Linux

The burn script will be released by default in the SDK. Enter the SDK directory, switch to the fastboot burn script directory linux\_script, and execute the script:

1 `sudo ./light_fm_single_rank_full_image.sh`

The burning process is similar to that of Windows.

## 4.3 Fast Burning

The non-empty board (image has been burned) can be directly burned with the fastboot function of U-Boot without modifying the DIP switch. The specific methods are as follows:

1. Connect the USB-to-serial cable and use the serial port tool to open the third serial port on the PC for backup.
2. When the serial log shows that booting to U-Boot, press Enter on the PC to make U-Boot on the development board enter cmd mode.

```
U-Boot 2020.01-00009-gbe57a646da-dirty (Feb 22 2022 - 21:18:57 +0800)
CPU:   rv64imafdcvsu
Model: T-HEAD c910 light
DRAM:  1 GiB
C910 CPU FREQ: 1500MHZ
AHB2_CPUSYS_HCLK FREQ: 250MHZ
AHB3_CPUSYS_PCLK FREQ: 125MHZ
PERISYS_AHB_HCLK FREQ: 250MHZ
PERISYS_APB_PCLK FREQ: 62MHZ
GMAC PLL POSTDIV FREQ: 1000MHZ
DPU0 PLL POSTDIV FREQ: 1188MHZ
DPU1 PLL POSTDIV FREQ: 1188MHZ
MMC:   sdhci@ffe7080000: 0, sd@ffe7090000: 1
Loading Environment from MMC... OK
In:    serial@ffe7014000
Out:   serial@ffe7014000
Err:   serial@ffe7014000
Net:
warning: ethernet@ffe7070000 (eth0) using random MAC address - 7e:21:31:52:83:41
eth0: ethernet@ffe7070000ethernet@ffe7070000:0 is connected to ethernet@ffe7070000
warning: ethernet@ffe7060000 (eth1) using random MAC address - ee:94:f9:51:ab:f1
, eth1: ethernet@ffe7060000
Hit any key to stop autoboot:  0
C910 Light#
C910 Light# █
```

3. Enter the “fastboot usb 0” command in the serial port and U-Boot will enter the upgrade state after execution.
4. Run the script corresponding to the image name in the Tools directory of the SDK package on the PC, and you can upgrade the uboot, rootfs and other images separately.



C:\WINDOWS\system32\cmd.exe

```

IIIIIIIIIIIIIIIIII Run Cmd: ".\wins_tools\fastboot flash ram u-boot-imagewriter.bin"
Sending 'ram' (676 KB)          OKAY [ 0.181s]
Writing 'ram'                  OKAY [ 0.003s]
Finished. Total time: 0.203s
IIIIIIIIIIIIIIIIII Run Cmd: ".\wins_tools\fastboot reboot"
Rebooting                      OKAY [ 0.001s]
Finished. Total time: 0.004s
IIIIIIIIIIIIIIIIII Run Cmd: ".\wins_tools\fastboot flash uboot u-boot-with-spl.bin"
Sending 'uboot' (760 KB)       OKAY [ 0.211s]
Writing 'uboot'               OKAY [ 0.045s]
Finished. Total time: 0.297s
IIIIIIIIIIIIIIIIII Run Cmd: ".\wins_tools\fastboot flash tf trust_firmware.bin"
Sending 'tf' (79 KB)           OKAY [ 0.038s]
Writing 'tf'                  OKAY [ 0.006s]
Finished. Total time: 0.081s
IIIIIIIIIIIIIIIIII Run Cmd: ".\wins_tools\fastboot flash tee tee.bin"
Sending 'tee' (481 KB)         OKAY [ 0.139s]
Writing 'tee'                 OKAY [ 0.006s]
Finished. Total time: 0.184s
IIIIIIIIIIIIIIIIII Run Cmd: ".\wins_tools\fastboot flash boot boot.ext4"
^C终止批处理操作吗(Y/N)?

```

## 5. Reboot

Press the RESET button to reboot.

## 4.4 Secure Image Burning

The partition settings of secure images are different from those of non-secure images, as follows:

	Secure	Non-Secure	Remarks
uboot	√	√	Different images
boot	√	√	Same images
rootfs	√	√	Same images
tf	x	√	
tee	x	√	
stashtf	x	√	
stashtee	x	√	

The partition is implemented with the uboot command. When switching between secure and non-secure images, you have to reburn U-Boot and reboot it after burning to run the new U-Boot, and then burn images of other partitions.

The general steps to burn the image:

1. Power on and start up.
2. During the countdown phase of U-Boot, press any key to enter command mode.
3. Enter “fastboot usb 0” in the command line to enable the fastboot function.

The following describes the burning method on Windows. The burning method on Linux is similar to that of a non-secure image. You can find the script corresponding to the image to burn it, and will not go into details.

### 4.4.1 U-Boot Burning

The steps to burn U-Boot are as follows:

Run the `light_fm_single_rank_uboot.bat` script on the PC to burn the U-Boot image to upgrade.

```
▼ Plain Text | 复制代码
1  C910 Light# fastboot usb 0
2  request 00000000ffe7f5c0 was not queued to epln-bulk
3  request 00000000ffe7f5c0 was not queued to epln-bulk
4  request 00000000ffe7f5c0 was not queued to epln-bulk
5  Starting download of 782904 bytes
6  request 00000000ffe7f5c0 was not queued to epln-bulk
7  .....
8  downloading of 782904 bytes finished
9  request 00000000ffe7f5c0 was not queued to epln-bulk
10
11 MMC write: dev # 0, block # 0, count 1530 ... 1530 blocks written: OK
12 request 00000000ffe7f5c0 was not queued to epln-bulk
13
```

After burning is complete, reboot the board.

### 4.4.2 Set the Default Partition

Enter the following command to complete the secure partition setup.





Bash

 复制代码

```
1  env default -a -f
2  saveenv
3  run gpt_partition
```

### 4.4.3 TF Image Burning

Run `light_fm_single_rank_stashtf.bat` on the PC to burn the TF image.

### 4.4.4 TEE Image Burning

Run `light_fm_single_rank_stashtee.bat` on the PC to burn the TEE image.

### 4.4.5 Full Image Burning

Run `light_fm_single_rank_system.bat` on the PC to burn all images.

---

## 5 Boot from eMMC

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After burning is complete, jump SW1 jumper 2 to the ON position and select boot from eMMC.