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1. Basic features of Orange Pi 3B

1.1. What is Orange Pi 3B

Orange Pi 3B adopts Rockchip RK3566 quad-core 64-bit Cortex-A55 processor, adopts 22nm process, the main frequency can reach up to 1.8GHz, integrates ARM Mali-G52 GPU, embedded high-performance 2D image acceleration module, built-in 1 The AI accelerator NPU of Tops computing power can choose 2GB, 4GB or 8GB memory, and has up to 4K display processing capability.

Orange Pi 3B brings out quite a lot of interfaces, including HDMI output, M.2 PCIe2.0x1, Gigabit Ethernet port, USB2.0, USB3.0 interface and 40pin expansion pin header, etc. It can be widely used in high-end tablet, edge computing, artificial intelligence, cloud computing, AR/VR, smart security, smart home and other fields, covering various AIoT industries.

Orange Pi 3B supports Android11, Ubuntu22.04, Ubuntu20.04, Debian11, Debian12, OpenHarmony 4.0 Beta1, Orange Pi OS (Arch), Orange Pi OS (OH) based on OpenHarmony and other operating systems.

1.2. Purpose of Orange Pi 3B

We can use it to achieve:

- A Linux desktop computer
- A Linux web server
- Android tablet
- Android game console, etc.

Of course, there are more functions. Relying on a powerful ecosystem and a variety of expansion accessories, Orange Pi can help users easily realize the delivery from idea to prototype to mass production. It is a maker, dreamer, hobby The ideal creative platform for readers.

1. 3. Hardware Features of Orange Pi 3B

	Introduction to hardware features
Master chip	Rockchip RK3566
CPU	Quad-core 64-bit Cortex-A55 processor, 22nm advanced technology, main frequency up to 1.8GHz
GPU	 ARM Mali G52 2EE graphics processor Support OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1 Embedded high-performance 2D acceleration hardware
NPU	 Integrated RKNN NPU AI accelerator, 0.8Tops@INT8 performance Supports one-click conversion of Caffe/TensorFlow/TFLite/ONNX/PyTorch/Keras/Darknet architecture models
VPU	 4K@60fps H.265/H.264/VP9 video decoding 1080P@100fps H.265 video encoding 1080P@60fpsH.264 video encoding
PMU	Rockchip RK809-5
Memory	2GB/4GB/8GB (LPDDR4/4x)
storage	 Support eMMC module: 16GB/32GB/64GB/128GB/256GB SPI Flash: 16MB/32MB M.2 M-KEY slot: SATA3 or PCIe2.0 NVME SSD TF card slot
Wi-Fi+Bluetooth	Wi-Fi 5+BT 5.0, BLE
ethernet transceiver	10/100/1000Mbps Ethernet (onboard PHY chip: YT8531C)
show	 1x HDMI TX 2.0, maximum support 4K@60FPS 1xMIPI DSI 2 Lane eDP1.3

Camera	1xMIPI CSI 2 Lane camera interface			
	1xUSB 2.0 supports Device or HOST mode			
USB	• 1xUSB 3.0 HOST			
	• 2xUSB 2.0 HOST			
Audio	3.5mm headphone jack audio input/output			
Button	1x MaskROM key, 1xRESET key, 1 xPOWER key			
FAN	2Pin 1.25mm 5V fan interface			
RTC	2Pin 1.25mm backup battery interface			
400.	40Pin function expansion interface, supports the following			
40Pin	Interface types: GPIO_UART_I2C_SPI_PWM			
Power Supply	Type-C 5V3A			
	Android11, Ubuntu22.04, Ubuntu20.04, Debian11, Debian12,			
Supported OS	OpenHarmony 4.0 Beta1, Orange Pi OS (Arch), Orange Pi OS			
	(OH) based on OpenHarmony and other operating systems.			
Ir	Introduction of Appearance Specifications			
PCB size	89mm x 56mm x 17mm			
weight	52g			
range Pi [™] is a registered trademark of Shenzhen Xunlong Software Co., Ltd.				

1.4. Top and Bottom Views of Orange Pi 3B

1. 4. 1. Top and Bottom Views of Orange Pi 3B (v1.1.1) Top view:



Bottom view:



1. 4. 2. Top and Bottom Views of Orange Pi 3B (v2.1) Top view:



Bottom view:



1.5. Interface details diagram of Range Pi 3B

1.5.1. Orange Pi 3B (v1.1.1)



Product display



The diameter of the four positioning holes is 2.7mm, and the diameter of the M.2 PICE device fixing hole is 2.9mm.

1. 5. 2. Interface details diagram of Orange Pi 3B (v2.1)





The diameter of the four positioning holes is 2.7mm.

2. Introduction to the use of the development board

2.1. Prepare the required accessories

1) TF card, **class 10** or above high-speed SanDisk card with a minimum capacity of 16GB (recommended 32GB or above)



2) TF card reader, used to burn the image into the TF card



3) Display with HDMI interface



4) HDMI to HDMI cable, used to connect the development board to an HDMI monitor or TV for display



Note, if you want to connect a 4K monitor, please make sure that the HDMI cable supports 4K video output.

5) Power adapter, Orange Pi 3B is recommended to use 5V/3A Type-C power supply for power supply



6) The mouse and keyboard of the USB interface, as long as the mouse and keyboard of the standard USB interface are acceptable, the mouse and keyboard can be used to control the Orange Pi development board



7) USB camera



8) PCIe NVMe SSD. The Orange Pi 3B v1.1.1 development board supports SSD of M.2 2230 and M.2 2242 specifications, and M.2 2280 is also supported, but cannot be fixed with screws. The Orange Pi 3B v2.1 development board supports fixed M.2 2280 SSD.

9) 5V cooling fan. As shown in the figure below, there is an interface on the development board for connecting the cooling fan, with a specification of **2pin 1.25mm spacing**

The fan on the development board can be adjusted for speed and on/off through PWM.



10) 100M or 1000M network cable, used to connect the development board to the Internet



11) USB2.0 male-to-male data cable, used to burn images to eMMC, NVMe SSD and other functions



12) **3.3V** USB to TTL module and DuPont line, when using serial port debugging function, need USB to TTL module and DuPont line to connect the development board and computer





13) A personal computer with Ubuntu and Windows operating systems installed

1	Ubuntu22.04 PC	Optional, used to compile Linux source code
2	Windows PC	For burning Android and Linux images

2.2. Download the image of the development board and related materials

1) The website for downloading the English version of materials is:

http://www.orangepi.org/html/hardWare/computerAndMicrocontrollers/service-and -support/Orange-Pi-3B.html



- 2) The information mainly includes
 - a. Android source code: saved on Google Cloud Disk
 - b. Linux source code: saved on Github
 - c. User manual and schematic diagram: saved on Google Cloud Disk
 - d. **Official tools:** mainly include the software that needs to be used during the use of the development board
 - e. Android image: saved on Google Cloud Disk
 - f. Ubuntu image: saved on Google Cloud Disk
 - g. Debian image: saved on Google Cloud Disk

- h. Orange Pi OS Arch image: saved on Google Cloud Disk
- i. Orange Pi OS OH image: saved on Google Cloud Disk
- j. **OpenWRT image:** saved on Google Cloud Disk

2.3. Method of burning Linux image to TF card based on Windows PC

Note that the Linux image mentioned here specifically refers to the images of Linux distributions such as Debian, Ubuntu, OpenWRT or OPi OS Arch downloaded from the Orange Pi data download page.

2. 3. 1. How to use balenaEtcher to burn Linux image

1) First prepare a TF card with a capacity of 16GB or more. The transmission speed of the TF card must be **class 10** or above. It is recommended to use a TF card of SanDisk and other brands

2) Then use the card reader to insert the TF card into the computer

3) Download the Linux operating system image file compression package that you want to burn from the **Orange Pi data download page**, and then use the decompression software to decompress it. Among the decompressed files, the file ending with "**.img**" is the image file of the operating system. The size is generally above 2GB.

4) Then download the burning software of Linux image—balenaEtcher, the download address is:

https://www.balena.io/etcher/

5) After entering the balenaEtcher download page, click the green download button to jump to the place where the software is downloaded



6) Then you can choose to download the Portable version of balenaEtcher software. The Portable version does not need to be installed, and you can use it by double-clicking to open it

DOWNLOAD			
Download Etc	her		
ASSET ETCHER FOR WINDOWS (X86 X64) (INSTALLER)	OS WINDOWS	ARCH X86 X64	Download
ETCHER FOR WINDOWS (X86 X64) (PORTABLE)	WINDOWS	X86 X64	Download
ETCHER FOR WINDOWS (LEGACY 32 BIT) (X86 X64) (PORTABLE)	WINDOWS	X86 X64	Download
ETCHER FOR MACOS	MACOS	X64	Download
ETCHER FOR LINUX X64 (64-BIT) (APPIMAGE)	LINUX	X64	Download
ETCHER FOR LINUX (LEGACY 32 BIT) (APPIMAGE)	LINUX	X86	Download
ooking for Debian (.deb) packages or Red Hat (.rpm) packages?		🔹 OSS	hosting by cloudsmith

7) If the downloaded version of balenaEtcher needs to be installed, please install it before using it. If you downloaded the Portable version of balenaEtcher, just double-click to open it. The balenaEtcher interface after opening is shown in the figure below:



When opening balenaEtcher, if the following error is prompted:

 range Pi User Manual
 Copyright reserved by Shenzhen Xunlong Software Co., Ltd

 Attention
 Something went wrong. If it is a compressed image, please check that the archive is not corrupted.

 User did not grant permission.
 User did not grant permission.

 Please select balenaEtcher, right-click, and select Run as administrator.

 Image Subscription

 Usergig Mozir(A)

- 8) The specific steps to use balenaEtcher to burn the Linux image are as follows
 - a. First select the path of the Linux image file to be burned
 - b. Then select the drive letter of the TF card
 - c. Finally click Flash to start burning the Linux image to the TF card



9) The interface displayed in the process of burning the Linux image by balenaEtcher is shown in the figure below, and the progress bar displays purple, indicating that the Linux image is being burned into the TF card



10) After burning the Linux image, balenaEtcher will also verify the image burned into the TF card by default to ensure that there is no problem in the burning process. As shown in the figure below, a green progress bar indicates that the image has been burnt, and balenaEtcher is verifying the burnt image



11) After successful burning, the display interface of balenaEtcher is as shown in the figure below. If a green indicator icon is displayed, it means that the image burning is successful. At this time, you can exit balenaEtcher, and then pull out the TF card and insert it into the TF card slot of the development board for use.



2. 3. 2. How to use RKDevTool to burn Linux image to TF card

1) First, you need to prepare a good quality USB2.0 male-to-male data cable



2) You also need to prepare a 16GB or larger capacity TF card. The transmission speed of the TF card must be **class** 10 or above. It is recommended to use a TF card of SanDisk and other brands

3) Then download the Rockchip driver **DriverAssitant_v5.12.zip** and **MiniLoader** and the burning tool **RKDevTool_Release_v3.15.zip** from the **Orange Pi data download page**

a. On the data download page of Orange Pi, first select the **official tool**, and then enter the following folder



b. Then download all the files below



Note that the "MiniLoader-things needed to burn the Linux image" folder is hereinafter referred to as the MiniLoader folder.

4) Then download the Linux operating system image file compression package that you want to burn from the **Orange Pi data download page**, and then use the decompression software to decompress it. Among the decompressed files, the file ending with "**.img**" is the image file of the operating system , the size is generally more than 2GB

5) Then use the decompression software to decompress **DriverAssitant_v5.12.zip**, and then find the **DriverInstall.exe** executable file in the decompressed folder and open it

6) After opening **DriverInstall.exe**, the steps to install the Rockchip driver are as follows

a. Click the "Driver Installation" button

	驱动安装	驱动卸载
--	------	------

b. After waiting for a period of time, a pop-up window will prompt "The driver is installed successfully", and then click the "OK" button.



7) Then decompress **RKDevTool_Release_v3.15.zip**, this software does not need to be installed, just find **RKDevTool** in the decompressed folder and open it

名称 ^	修改日期	类型	大小
📑 bin	2022/12/1 15:07	文件夹	
Language	2022/12/1 15:07	文件夹	
🗋 config.cfg	2022/3/23 9:11	CFG 文件	7 KB
📓 config	2021/11/30 11:04	配置设置	2 KB
revision	2022/5/27 9:09	文本文档	3 KB
🔀 RKDevTool	2022/5/27 9:06	应用程序	1,212 KB
☑ 开发工具使用文档_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

8) After opening the **RKDevTool** burning tool, because the computer has not connected to the development board through the USB2.0 male-to-male data cable at this time, the lower left corner will prompt "**No device found**"

		存储地	ht	名字	路径	
1	Г	0x0	0000000	Loader		
2	Г	0x0	00000000	Parameter		
3		0x0	00000000	Uboot		
4		0x0	00000000	trust		
5		0x0	00000000	Misc		
6		0x0	00000000	Resource		
7		0x0	00000000	Kernel		
8		0x0	00000000	Boot		
9		0x0	00000000	Recovery		
10		0x0	00000000	System		
11		0x0	0000000	Backup		
Load	ler :	执行	Ĵ	切換	设备分区表 清空	

- 9) Then start burning the Linux image to the TF card
 - a. First, connect the development board to the Windows computer through the USB2.0 male-to-male data cable. The position of the USB2.0 programming port of the development board is shown in the figure below



- b. Make sure the TF card slot is not inserted into the TF card
- c. Then press and hold the MaskROM button on the development board, the position of the MaskROM button on the development board is shown in the figure below:



d. Then connect the power supply of the Type-C interface to the development board, and power on, and then release the MaskROM button



e. If the previous steps are successful, the development board will enter the **MASKROM** mode at this time, and the interface of the burning tool will prompt "found a MASKROM device"

	口存储	地址	名字	路径	 -			
	-	0x00000000	Loader					
	-	0x0000000	lihoot					
	i i i	0x00000000	trust					
	Г	0x00000000	Misc		1			
		0x00000000	Resource					
	Г	0x00000000	Kernel					
	Г	0x00000000	Boot					
	Г	0x00000000	Recovery					
)	Г	0x00000000	System					
1	Г	0x00000000	Backup					
ad	ler:	执行	切换	设备分互表 清空				

f. At this time, please insert the TF card into the TF card slot

载镜	像	升级固件 和	高級功能				
		存储	地址	名字	路径		
1			0x00000000	Loader			
2	Г		0x00000000	Parameter			
3			0x000000000	Uboot			
4	Г		0x00000000	trust			
5			0x00000000	Misc			
6	Г		0x00000000	Resource			
7	Г		0x00000000	Kernel			
8	Г		0x00000000	Boot	-		
9	Г		0x00000000	Recovery			
10	Г		0x00000000	System			
11			0x00000000	Backup			
.oad	er:	1	执行 □强制按地址写	切换	设备分区表 清空]	Place the mouse cursor in this are

g. Then place the mouse cursor in the area below

h. Then click the right mouse button and the selection interface shown in the figure below will pop up

日本田市町 Far an et ar □ 0x00000000 Resource ■動除项 □ 0x00000000 Kernal □ 0x00000000 Resource					-14-17"	IN IT		1.1.1			
I 0x00000000 Far unster I 0x00000000 Wboot I 0x00000000 Hiso I 0x00000000 Kiso I 0x00000000 Resource I 0x000000000 Resource I 0x00000000 Resource I 0x00000000 Resource				0x00000000	Loader						
L Dex00000000 Uboot Counter Counter	8			0x00000000	Parameter	_					
L Dx00000000 trut 添加項 のののののの Miss 動除項 のののののの Miss 動除項 ののののののの Kernal 清空所有項 のののののの Resource ひかのののののの Resource ひかのののののの Resource ひかのののののの Resource ひかのののののの Resource ひかのののののの Resource 兄弟をある ひかのののののの Resource 兄弟をある ころも 兄弟をある 兄弟をある ころも 兄弟をある ころも ころも ころも ころも ころも ころも				0x00000000	Uboot	-					
C 0x00000000 Ni so C 0x0000000 Resorce 割除項 C 0x0000000 Resorce 割除項 C 0x0000000 Resorce 1 法等 C 0x0000000 Boot 上移 C 0x0000000 System 下移 C 0x0000000 System 早齢				0x00000000	trust	-	添加项				
C xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx				0x00000000	Misc		ADIED TH				
○ Ox00000000 Kernel. 清空所有项 ○ 0x00000000 Boot 上移 ○ 0x00000000 Recoverry 下移 ○ 0x00000000 System 下移 ○ 0x00000000 Backrup 最入配備			-	0x00000000	Resource		剧标坝				
I 0x00000000 Boot 上修 C 0x00000000 Recovery 下修 C 0x00000000 System 下修 C 0x00000000 System F核 F SABE				0x00000000	Kernel		清空所有项				
○ Ox/00000000 Recovery □ Ox/00000000 System □ Ox/00000000 Backrup □ Ox/00000000 Backrup				0x00000000	Boot	-	上移				
□ 0x0000000 System 下梦 □ 0x0000000 Backup 导入配置				0x00000000	Recovery		T#2				
0x00000000 Backup 导入配置	0			0x00000000	System		বয়শ				
	1	Г		0x00000000	Backup		导入配置				
导出配置							导出配置				
						- L					

i. Then select the import configuration option

#		存储	地址	名字	路径					
	-		0:00000000	Loader						
3	1		0+0000000	1 ar ameter						
4	i'r		0x0000000	trust		SE HOTE				
;	Ē		0x00000000	Misc		19KULAN				
6			0x00000000	Resource		删除项				
7	Г		0x00000000	Kernel		清空所有项				
8	Г		0x00000000	Boot		上移				
9			0x00000000	Recovery		THE				
10			0x00000000	System		1115				
11			0x00000000	Backup		导入配置				
.0 84	ler :	[执行	切换	设备分区	る山山直				

j. Then select the **rk356x_linux_tfcard.cfg** configuration file in the **MiniLoader** folder downloaded earlier, and click **Open**

(打开					×
5	🛿 > orangepi > Mi	niLoader-烧录Linux镜像才需要用到的东西	5 × C 在	MiniLoader-烧录Li	nux P
组织 ▼ 新建文件夹				≣ ▼	
> 🔷 WPS云盘	1	名称 ^	修改日期	类型	大小
↑ 主文件夹		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
OneDrive		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	
		rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	â
三 夏面	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	3
业 下载	*				
■ 文档	*				
💌 图片	*				
🚯 音乐	*				
文件名(N): rl	<356x_linux_tfcard.cfg		~ C	onfigFile(*.cfg)	~
				打开(0)	取消

k. Then click **OK**

· 载镇情	8K 7		哥级功能			
#		存储	地址	名字	路径	
1	~		0x00000000	Loader	C \Users\Administrator\Desktop\	
2	~	SD	0x00000000	linux	C:\Users\Administrator\Desktop\	
					(] 导入配置成功.	

1. Then click the position shown in the figure below

\$芯待	如开发	È工具 v3.15	=/n-1-4/			
# 1 2		开级回日 R 存储 SD	新祝功用E 地址 0x00000000 0x00000000	名字 Loader linux	路径 C. Visers VAdministrator (Desk top) C: Visers VAdministrator (Desk top)	
2		SD	0x00000000	linux	C:\Users\Administrator\Desktop\	

m. Then select MiniLoaderAll.bin in the MiniLoader folder downloaded earlier, and click to open

		≣ ▼ 🔲	0
名称	修改日期	类型	大小
🔮 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	455
rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	1
rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	2
rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	2
rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	14
rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,096
	全称 MiniLoaderAll.bin rk356x_linux_ermmc.cfg rk356x_linux_pcie.cfg rk356x_linux_pcie.cfg rk356x_linux_spiflash.cfg rk356x_linux_tfeard.cfg rkspi_loader.img	全称 修改日期 ④ MiniLoaderAll.bin 2023/8/18 11:17 □ rk356x_linux_emmc.cfg 2023/8/18 11:17 □ rk356x_linux_pcie.cfg 2023/8/18 11:17 □ rk356x_linux_spiflash.cfg 2023/8/18 11:17 □ rk356x_linux_tfcard.cfg 2023/8/18 11:17 □ rkspi_loader.img 2023/8/18 11:17	

n. Then click the position shown in the figure below

		+=++	1441-L		99.47	
#		仔陌	1611	治子	简位	
2		SD	0x00000000	linux	C:\Users\Administrator\Desktop\	
Load	er Ve	r:1.11	执行	切换	设备分区表 清空	

o. Then select the path of the Linux image you want to burn, and then click Open

Before burning the image, it is recommended to rename the Linux image to be burned to orangepi.img or other shorter names, so that you can see the percentage value of the burning progress when burning the image.

貪像 🔀 打开	×
← → ◇ ↑ 📴 > 此电脑 > 桌面 > orangepi >	✓ O A corangepi 中搜索
● 组织 ▼ 新建文件夹	BB - 🛄 📀
■ 此电脑 ③ 3D 対象 圖 视频 圖 型片 圖 文档 ↓ 下號 〕 音乐 ■ 桌面	
under ¹⁰ → ¹¹ → ¹² → ¹² → ¹²	All 51-78 40
文件名(N): orangepi	V All File(.)

p. Then please check the mandatory write by address option

载镜	138- 3						
	_		is.	La A			
#		存储	地址	名字	路径		
1	Y	a 10	0x00000000	Loader	C:\Users\Lee\Desktop\Android#L		
2	M	SU	0x0000000	Linux	C:\Users\Lee\Desktop\orangepi\o		

q. Click the execute button again to start burning the Linux image to the tf card of the development board

190001 1019	A-230G						
存储	地址	名字	路径				
SD	0x00000000	linux	C:\Users\Lee\Desktop\android\L C:\Users\lee\Desktop\orangepi\o				
	SD	1700 2400 10800000000 SD 0x00000000 SD 0x00000000	TP00 P200 P37 0x0000000 Loader SD 0x0000000 Linux	IPDM IPDM IPTM IPTM 0x00000000 Lowder C:\Users\Lee\Desktop\orangepi\o SD 0x00000000 linux C:\Users\Lee\Desktop\orangepi\o	TPDM Debug FFF FMTL FTT D00000000 Loader C. Uisers\lee\Desktop\orangepi\o FTT SD 0x00000000 linux C. Uisers\lee\Desktop\orangepi\o	TPDM 2424 Definition Definition	TPDM ASUL Content Cont

r. The display log after burning the Linux image is shown in the figure below

-		Tarrow V Page			 下载Boot成功 等待期。harmanté
#	口存储	地址	名字	路径	等行Maskrom成功
1		0x00000000	Loader	Desktop\orangepi\orangepi\MiniL	测试设备开始
					12.420-7734 按验芯片成功 获取F1=aLnfc6历始 获取F1=aLnfc6成功 准备TDB成功 下载TDB开始 等待Maskros开始 等待Maskros成功 则it设备开始 则it设备成功 开始切换存储型SD
.oad	er Ver:1.11	执行	切换	设备分区表 清空	正在下载 or angepi (100%) 下载字式

s. After burning the Linux image to the TF card, the Linux system will start automatically.

2. 3. 3. How to use Win32Diskimager to burn Linux image

1) First prepare a TF card with a capacity of 16GB or more. The transmission speed of the TF card must be **class 10** or above. It is recommended to use a TF card of SanDisk and other brands

2) Then use the card reader to insert the TF card into the computer

- 3) Then format the TF card
 - a. **SD Card Formatter** can be used to format the TF card. The download address is:

https://www.sdcard.org/downloads/formatter/eula_windows/SDCardFormatterv5_WinEN.zip

b. After downloading, unzip and install directly, and then open the software
c. If only a TF card is inserted into the computer, the drive letter of the TF card will be displayed in the "Select card" column. If multiple USB storage devices are inserted into the computer, you can select the corresponding drive letter of the TF card through the drop-down box

Select card		
F:\		~
		Refresh
Card information	ie	
Туре	SDHC	52
Capacity	14.84 GB	
Formatting optio	ns	
Quick format		
Overwrite for	mat	
CHS format si	ze adjustment	
Volume label		

d. Then click "Format", a warning box will pop up before formatting, and formatting will start after selecting "Yes (Y)"



e. After formatting the TF card, the information shown in the figure below will pop up, click OK



4) Download the Linux operating system image file compression package that you want to burn from the Orange Pi data download page, and then use the decompression software to decompress it. Among the decompressed files, the file ending with ".img" is the image file of the operating system. The size is generally more than 2GB

5) Use Win32Diskimager to burn the Linux image to the TF card

a. The download page of Win32Diskimager is

http://sourceforge.net/projects/win32diskimager/files/Archive/

- b. After downloading, install it directly. The interface of Win32Diskimager is as follows
 - a) First select the path of the image file
 - b) Then confirm that the drive letter of the TF card is consistent with that displayed in the "**Device**" column
 - c) Finally click "Write" to start burning



c. After the image writing is completed, click the "**Exit**" button to exit, and then you can pull out the TF card and insert it into the development board to start

2.4. Method of burning Linux image to TF card based on Ubuntu PC

Note that the Linux image mentioned here specifically refers to the images of Linux distributions such as Debian, Ubuntu, OpenWRT or OPi OS Arch downloaded from the Orange Pi data download page, and the Ubuntu PC refers to the personal computer with the Ubuntu system installed.

1) First prepare a TF card with a capacity of 16GB or more. The transmission speed of the TF card must be **class 10** or above. It is recommended to use a TF card of SanDisk and other brands

2) Then use the card reader to insert the TF card into the computer

3) Download the balenaEtcher software, the download address is https://www.balena.io/etcher/

4) After entering the balenaEtcher download page, click the green download button to jump to the place where the software is downloaded



5) Then choose to download the Linux version of the software

Download Etc	ner		
ASSET	os	ARCH	
ETCHER FOR WINDOWS (X86 X64) (INSTALLER)	WINDOWS	X86 X64	Download
ETCHER FOR WINDOWS (X86 X64) (PORTABLE)	WINDOWS	X86 X64	Download
ETCHER FOR WINDOWS (LEGACY 32 BIT) (X86 X64) (PORTABLE)	WINDOWS	X86 X64	Download
ETCHER FOR MACOS	MACOS	X64	Download
ETCHER FOR LINUX X64 (64-BIT) (APPIMAGE)	LINUX	X64	Download
ETCHER FOR LINUX (LEGACY 32 BIT) (APPIMAGE)	LINUX	X86	Download

DOWNLOAD

Looking for Debian (.deb) packages or Red Hat (.rpm) packages?

6) Download the Linux operating system image file compression package that you want to burn from the Orange Pi data download page, and then use the decompression software to decompress it. Among the decompressed files, the file ending with ".img" is the image file of the operating system. The size is generally more than 2GB

The decompression command for the compressed package ending in 7z is as follows test@test:~\$ 7z x Orangepi3b_1.0.0_debian_bullseye_desktop_xfce_Linux5.10.160.7z test@test:~\$ ls Orangepi3b_1.0.0_debian_bullseye_desktop_xfce_Linux5.10.160.* Orangepi3b_1.0.0_debian_bullseye_desktop_xfce_Linux5.10.160.7z Orangepi3b_1.0.0_debian_bullseye_desktop_xfce_Linux5.10.160.sha #checksum file Orangepi3b_1.0.0_debian_bullseye_desktop_xfce_Linux5.10.160.img #mirror file

7) After decompressing the image, you can first use the **sha256sum -c *.sha** command to calculate whether the checksum is correct. If the prompt is successful, it means that the downloaded image is **correct**, and you can safely burn it to the TF card. If it prompts that the **checksum does not match**, it means There is a problem with the downloaded image, please try to download again

test@test:~\$ **sha256sum -c *.sha** Orangepi3b_1.0.0_debian_bullseye_desktop_xfce_Linux5.10.160.img: OK

8) Then double-click **balenaEtcher-1.5.109-x64.AppImage** on the graphical interface of Ubuntu PC to open balenaEtcher (no installation required), and the interface after balenaEtcher is opened is shown in the figure below



- 9) The specific steps of using balenaEtcher to burn the Linux image are as follows
 - a. First select the path of the Linux image file to be burned
 - b. Then select the drive letter of the TF card
 - c. Finally, click Flash to start burning the Linux image to the TF card



10) The interface displayed in the process of burning the Linux image by balenaEtcher is shown in the figure below, and the progress bar displays purple, indicating that the Linux image is being burned into the TF card



11) After burning the Linux image, balenaEtcher will also verify the image burned into the TF card by default to ensure that there is no problem in the burning process. As shown in the figure below, a green progress bar indicates that the image has been burnt, and balenaEtcher is verifying the burnt image



12) After successful burning, the display interface of balenaEtcher is as shown in the figure below. If a green indicator icon is displayed, it means that the image burning is successful. At this time, you can exit balenaEtcher, and then pull out the TF card and insert it into the TF card slot of the development board for use.



2.5. How to burn Linux image to eMMC

2. 5. 1. Using RKDevTool to burn the Linux image into eMMC

Note that all the following operations are performed on a Windows computer.

Note that the Linux image mentioned here specifically refers to the images of Linux distributions such as Debian, Ubuntu, OpenWRT or OPi OS Arch and Ubuntu downloaded from the Orange Pi data download page.

1) The development board reserves the expansion interface of the eMMC module.

Before burning the system to the eMMC, you first need to purchase an eMMC module that matches the eMMC interface of the development board. Then install the eMMC module to the development board. The eMMC module and the method of plugging into the development board are as follows:



2) You also need to prepare a good quality USB2.0 male-to-male data cable



3) Then download the Rockchip driver **DriverAssitant_v5.12.zip** and **MiniLoader** and the burning tool **RKDevTool_Release_v3.15.zip** from the **Orange Pi data download page**

a. On the data download page of Orange Pi, first select the official tool, and then enter the following folder



b. Then download all the files below



Note that the "MiniLoader-things needed to burn the Linux image" folder is hereinafter referred to as the MiniLoader folder.

4) Then download the Linux operating system image file compression package that you want to burn from the **Orange Pi data download page**, and then use the decompression software to decompress it. Among the decompressed files, the file ending with "**.img**" is the image file of the operating system , the size is generally more than 2GB

5) Then use the decompression software to decompress **DriverAssitant_v5.12.zip**, and then find the **DriverInstall.exe** executable file in the decompressed folder and open it

修改日期	类型	大小
2022/12/1 15:07	文件夹	
2022/12/1 15:07	文件夹	
2022/12/1 15:07	文件夹	
2014/6/3 15:38	配置设置	1 KB
2022/2/28 14:11	应用程序	491 KB
2018/1/31 17:44	文本文档	1 KB
2022/2/28 14:14	文本文档	1 KB
	修改日期 2022/12/1 15:07 2022/12/1 15:07 2022/12/1 15:07 2014/6/3 15:38 2022/2/28 14:11 2018/1/31 17:44 2022/2/28 14:14	修改日期类型2022/12/1 15:07文件夹2022/12/1 15:07文件夹2022/12/1 15:07文件夹2014/6/3 15:38配置设置2022/2/28 14:11应用程序2018/1/31 17:44文本文档2022/2/28 14:14文本文档

6) After opening **DriverInstall.exe**, the steps to install the Rockchip driver are as follows

a. Click the "Driver Installation" button

吸动安装	吸云力在日本市	

b. After waiting for a period of time, a pop-up window will prompt "The driver is installed successfully", and then click the "OK" button.



7) Then decompress **RKDevTool_Release_v3.15.zip**, this software does not need to be installed, just find **RKDevTool** in the decompressed folder and open it

名称	<u>^</u>	修改日期	类型	大小
bin bin		2022/12/1 15:07	文件夹	
Language		2022/12/1 15:07	文件夹	
Config.cfg		2022/3/23 9:11	CFG 文件	7 KB
🔄 config		2021/11/30 11:04	配置设置	2 KB
revision		2022/5/27 9:09	文本文档	3 KB
KRKDevTool		2022/5/27 9:06	应用程序	1,212 KB
6 开发工具使用文档	í_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

8) After opening the **RKDevTool** burning tool, because the computer has not connected to the development board through the USB2.0 male-to-male data cable at this time, the lower left corner will prompt "**No device found**"

0x000000000 0x00000000 0x00000000	Loader Parameter											
0x00000000 0x00000000	Parameter											
0x000000x0												
	Uboot											
0x00000000	trust											
0x00000000	Misc											
0x00000000	Resource											
0x00000000	Kernel											
0x00000000	Boot				-							
0x00000000	Recovery											
0x00000000	System											
0x00000000	Backup											
	0x0000000 0x0000000 0x0000000 0x0000000 0x000000	0x0000000 Misc 0x0000000 Resource 0x0000000 Boot 0x0000000 Boot 0x0000000 System 0x0000000 System	0x0000000 Mixe 0x0000000 Resource 0x0000000 Resource 0x0000000 Bect 0x0000000 Recovery 0x0000000 System 0x0000000 Beckep	0x00000000 Kiso 0x00000000 Resource 0x00000000 Best 0x00000000 Bost 0x00000000 System 0x00000000 System	0x00000000 Mise 0x00000000 Reserve 0x00000000 Resrel 0x00000000 Beet 0x00000000 Beet 0x00000000 Beetvery 0x00000000 Beetvery 0x00000000 Beetvery	0x00000000 Mise 0x00000000 Resurce 0x00000000 Resrel 0x00000000 Beet 0x00000000 Beet 0x00000000 Beet 0x00000000 Beets 0x00000000 System 0x00000000 Backup	0x0000000 Misc 0x0000000 Resurce 0x0000000 Rernal 0x0000000 Boot 0x0000000 Boot 0x00000000 Boot 0x00000000 Boot 0x00000000 System 0x00000000 Baokup	0x00000000 Misc 0x00000000 Resurce 0x00000000 Resral 0x00000000 Best 0x00000000 Best 0x00000000 System 0x00000000 System 0x00000000 Bester	0x00000000 Misc 0x000000000 Resource 0x00000000 Resource 0x00000000 Boot 0x00000000 Boot 0x000000000 System 0x000000000 System 0x00000000 Backup	0x00000000 Miss 0x00000000 Resource 0x00000000 Rernal 0x00000000 Best 0x00000000 Best 0x00000000 Best 0x00000000 System 0x00000000 Backup	0x00000000 Miss 0x00000000 Resource 0x00000000 Resrel 0x00000000 Best 0x00000000 Best 0x00000000 System 0x00000000 Backup	0x0000000 Kiss 0x0000000 Resource 0x0000000 Resource 0x0000000 Boot 0x00000000 Recovery 0x00000000 System 0x0000000 System

- 9) Then start burning the Linux image into eMMC
 - a. First, connect the development board to the Windows computer through the USB2.0 male-to-male data cable. The position of the USB2.0 programming port of the development board is shown in the figure below



- b. Make sure that the development board is not inserted into the TF card and not connected to the power supply
- c. Then press and hold the MaskROM button on the development board, the position of the MaskROM button on the development board is shown in the figure below:



d. Then connect the power supply of the Type-C interface to the development board, and power on, and then release the MaskROM button



e. If the previous steps are successful, the development board will enter the **MASKROM** mode at this time, and the interface of the burning tool will prompt "found a MASKROM device"

1		存储	地址	名字	路径	
			0x00000000	Loader		
2			0x00000000	Parameter		
3			0x00000000	Uboot		
1			0x00000000	trust		
5			0x00000000	Misc		
6			0x00000000	Resource		
7			0x00000000	Kernel		
3			0x00000000	Boot		
3	Г		0x00000000	Recovery		
10			0x00000000	System		
1	Г		0x00000000	Backup		
-	ler :		执行	切换	设备分配表 清空	

f. Then place the mouse cursor in the area below

		存储	地址	名字	路径			
	Г		0±00000000	Loader				
			0x00000000	Parameter				
			0x00000000	Uboot				
			0x00000000	trust				
			0x00000000	Misc				
			0x00000000	Resource				
	Г		0x00000000	Kernel	-			
			0x00000000	Boot				
			0x00000000	Recovery			Place the mouse cursor	
0			0x0000000x0	System			over this area	
1			0x00000000	Backup			over this area	
oad	er:		执行	切换	设备分区表	清空		

g. Then click the right mouse button and the selection interface shown in the figure below will pop up

#		存储	地址	名字	路径					
8	÷		0×00000000	Persmeter						
	i'r		0x00000000	Uboot						
	1 F		0x00000000	trust	Г	1771	1			
	Г		0x00000000	Misc		漆加坝				
	Г		0x00000000	Resource		删除项				
	Г		0x00000000	Kernel		清空所有项				
	Г		0x00000000	Boot		上段				
	Г		0x00000000	Recovery		115				
0	Г		0x00000000	System		ト移				
1	Г		0x00000000	Backup		导入配置				
08	ler:		执行	切换	设备分区	守山山直 ズ表 清空	-			

h. Then select the import configuration option

#		存储	地址	名字	路径			_		
1			0x00000000	Loader			1.00			
2	1		0x00000000	Parameter						
3	1		0x0000000	Uboot	-					
4	1		0x00000000	trust		添加项				
•			0x0000000	Misc		删除项				
5	늗		020000000	Kesource		法容所有顶				
<u>(</u>	1		0x0000000	Kernel		肩王所有极				
2	1		020000000	Boot		上移				
2	1		0=00000000	Sustan	-	下移				
11	1		0=00000000	Bealum	-	导入配置				
.oad	ler:		执行	切换	设备分[导出配置 区表 清空				

i. Then select the **rk356x_linux_emmc.cfg** configuration file in the **MiniLoader** folder downloaded earlier, and click **Open**

range Pi User Manual

🗙 打开				
← → ∽ ↑ 😑 → 桌面	> orangepi > MiniLoader-烧录Linux镜像才需要用到	的东西 🗸 🕑	在 MiniLoader-烧录L	inux P
组织 ▼ 新建文件夹			≣ •	
> 🔷 WPS云盘	名称 ^	修改日期	类型	大小
↑ 主文件夹	rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
> 📥 OneDrive	rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	
	rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	
🧾 桌面	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	
业 下载	*			
■ 文档	*			
🗾 图片	*			
🕑 音乐	*			
文件名(N): rk3	56x_linux_emmc.cfg	~	ConfigFile(*.cfg)	~
			打开(0)	取消

j. Then click OK

		存储	地址	名字	路径	
1	-		0x00000000	Loader	C:\Users\Administrator\Desktop\	
2		EMMC	0x00000000	Linux	C:\Users\Administrator\Desktop\	
					RKDevTool X	
					● 身入配置成功.	
					9人配置成功.	
					● 身入配置成功.	
					●入意图成功.	
					书入配图成功. 接至 ²⁰	
					每入配置成功.	
					每人配置成功.	
					●入配置成功.	
			11.42	17162	●入配图成功. 通定	
oade	er Ve	r:1.11	执行	切换	 导入配置成功. 通定 设备分区表 清空 	

k. Then click the position shown in the figure below

	故开发	设工具 v3.1	5			-
截镜	像	升级固件	高级功能			
ŧ		存储	地址	名字	路径	
2	2	EMMC	0x00000000 0x00000000	Loader linux	C:\Users\Administrator\Desktop\ C:\Users\Administrator\Desktop\	
oad	er V	er:1.11	执行	切换	设备分区表 清空	
oad	er V.	er:1.11	执行 □强制按地址写	切换	设备分区表 清空	

1. Then select **MiniLoaderAll.bin** in the **MiniLoader** folder downloaded earlier, and then click to **open**

range Pi User Manual

← → ∽ ↑ 📁 > 桌面 >	orangepi >	MiniLoader-烧录Linux镜像才需要用到的东西	~ C 在	MiniLoader-烧录Linux	Q
组织 ▼ 新建文件夹				≣ • □	0
→ 🖕 WPS云盘	1	名称	修改日期	类型	大小
↑ 主文件夹		🔮 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	45
OneDrive		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	
直 桌面	*	rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	
业 下载	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	
■ 文档	*	rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,09
🔀 國片	*				
④ 音乐	*	4			

m. Then click the position shown in the figure below

職債像	升级固件 高	級功能				
	存储	地址	名字	路径 ·····		
	EMMC	0x00000000	linux	C:\Users\ieeUesktop\orangepivt.		

n. Then select the path of the Linux image you want to burn, and then click Open

Before burning the image, it is recommended to rename the Linux image to be burned to orangepi.img or other shorter names, so that you can see the percentage value of the burning progress when burning the image.

载镜像	< 打开			×
	← → < ↑ 📙 > 此电脑 > 桌面 > orangepi >	ٽ ~		
# L 1 V 2 V	组织 ▼ 新建文件夹		## • 🔲	0
	 ■ 此电脑 ③ 3D 对象 ■ 视频 ■ 図片 ● 文档 ◆ 下載 ● 資面 			
oader	- 本地磁盘 (C:) - 本地磁盘 (C:)			_

o. Then please check the option to force writing by address

#		存储	地址	名字	路径		
1	2		0x00000000	Loader	C.\Users\lee\Desktop\orangepi\M.		
2	V	EMMC	0x00000000	linux	C:\Users\lee\Desktop\orangepi\o		
.oad	er Ve	r:1.11	执行	切换	设备分区表 唐空		

p. Click the execute button again to start burning the Linux image to the eMMC of the development board

治芯彼	如开发工具	v3.15			-	
载镜	像升级国	同件 高级功能				
#	口存储	í 地址	名字	路径		
1 2	I✓ EMM	0x00000000 0x00000000	Loader linux	C:\Users\lee\Desktop\orangepi\M C:\Users\lee\Desktop\orangepi\o		
load	er Ver:1.	11 执行	切换	设备分区表 清空		
		✓ 强制按地址写				
	发现	一个MASKRO	W设备	2-2 :MASKROM		
	~	. ,			 	

q. The log displayed after burning the Linux image is shown in the figure below

	ACCENT NO.2029/186				下载Boot成功
# □ 存	储 地址	名字	路径		等待Maskrom开始 等待Maskrom成功
2 v en	0 <u>x0000</u>	linux	C:\Users\hh177\Desktop\ora		测试设备开始 测试设备成功 构验芯片开始 构验芯片成功 获取FlashInfo开始 获取FlashInfo开始 准备TDB所均 准备TDB所均 下载IDB所均 等得Taskron开始 等得Taskron开始 等得Taskron开始
.oader Ver	:1.11 执行	切掛	4 设备分区表	清空	测试设备开始 测试设备成功 开始切换存储到Emmc 开始「载orangepi

r. After burning the Linux image into the eMMC, the Linux system will start automatically.

Note, after burning the image into eMMC, if the test finds that it cannot be started, please clear the SPIFlash and try again. For the method of clearing SPIFlash, please refer to the method of using RKDevTool to clear SPIFlash.

2. 5. 2. Use the dd command to burn the Linux image into eMMC

Note that the Linux image mentioned here specifically refers to the image of Linux distributions such as Debian, Ubuntu, OpenWRT or OPi OS Arch downloaded from the Orange Pi data download page.

1) The development board reserves the expansion interface of the eMMC module. Before burning the system to the eMMC, you first need to purchase an eMMC module that matches the eMMC interface of the development board. Then install the eMMC module to the development board. The eMMC module and the method of plugging into the development board are as follows:



2) Using the dd command to burn the Linux image to eMMC needs to be completed with the help of a TF card, so first you need to burn the Linux image to the TF card, and then use the TF card to start the development board to enter the Linux system. For the method of burning the Linux image to the TF card, please refer to the instructions in the two sections of the method of burning the Linux image to the TF card based on the Windows PC and the method of burning the Linux image to the TF card based on the Ubuntu PC.

3) After using the TF card to start the Linux system, we first upload the decompressed Linux image file (Debian, Ubuntu image, OpenWRT or OPi Arch image downloaded from the official website) to the TF card. For the method of uploading the Linux image

file to the development board, please refer to the description in the section of **the method of uploading files to the development board Linux system**.

4) After uploading the image to the Linux system of the development board, we enter the storage path of the image file in the command line of the Linux system of the development board. For example, I store the Linux image of the development board in the **/home/orangepi/Desktop** directory Download it, and then enter the **/home/orangepi/Desktop** directory to see the uploaded image file.

orangepi@orangepi:~\$ cd /home/orangepi/Desktop

orangepi@orangepi:~/Desktop\$ ls

Orangepi3b_x.x.x_debian_bullseye_desktop_xfce_Linux5.10.160.img

How to enter the command line of the development board Linux system? 1. For the method of using the serial port to log in to the terminal, please refer to the instructions in the section on how to use the debugging serial port.

2. Use ssh to remotely log in to the Linux system, please refer to the instructions in the section of SSH remote login to the development board.

3. If HDMI, LCD and other display screens are connected, you can open a command line terminal on the desktop.

5) Next, we first use the following command to confirm the device node of eMMC orangepi@orangepi:~/Desktop\$ ls /dev/mmcblk*boot0 | cut -c1-12 /dev/mmcblk0

6) Then we can use the dd command to clear the eMMC. Note that after the **of**= parameter, please fill in the output result of the above command

orangepi@orangepi:~/Desktop\$ sudo dd bs=1M if=/dev/zero of=/dev/mmcblk0 count=1000 status=progress orangepi@orangepi:~/Desktop\$ sudo sync

7) Then you can use the dd command to burn the Linux image of the development board into the eMMC

a. In the following command, the if= parameter is followed by the full path where the Linux image is stored + the name of the Linux image (such as the name of /home/orangepi/Desktop/Linux image). Because we have entered the path of the Linux image above, we only need to fill in the name of the Linux image.

b. Please do not copy the Linux image name in the following command, but replace it with the actual image name (because the version number of the image may be updated).

sudo dd bs=1M if=Orangepi3b_x.x.x_debian_bullseye_desktop_xfce_Linux5.10.160.img of=/<mark>dev/mmcblk0</mark> status=progress

sudo sync

Note, if you upload a .7z or .xz Linux image compressed file, please remember to decompress it before using the dd command to burn.

The detailed description of all parameters of the dd command and more usage can be viewed by executing the man dd command in the Linux system.

8) After successfully burning the Linux image of the development board to the eMMC, you can use the **poweroff** command to shut down. Then please pull out the TF card, and then short press the power button to turn on, and then the Linux system in the eMMC will be started.

Note, after burning the image into eMMC, if the test finds that it cannot be started, please clear the SPIFlash and try again. For the method of clearing SPIFlash, please refer to the method of using RKDevTool to clear SPIFlash.

2. 6. How to write Linux image to SPIFlash+NVMe SSD

Note that the Linux image mentioned here specifically refers to the images of Linux distributions such as Debian, Ubuntu, OpenWRT or OPi OS Arch downloaded from the Orange Pi data download page.

Note that all the following operations are performed on a Windows computer.

2. 6. 1. Using **RKDevTool to burn**

1) Firstly, it is necessary to prepare an NVMe SSD solid state drive. The PCIe supported by the M.2 slot on the development board is PCIe 2.0x1, with a theoretical maximum speed of 500MB/s. PCIe 3.0 and PCIe 4.0 NVMe SSDs can also be used, but the highest speed is only PCIe 2.0x1.

2) Then insert the NVMe SSD into the M.2 PCIe interface of the development board and secure it. The Orange Pi 3B has two hardware versions, and the M.2 PCIe interface position for version 2.1 is shown in the following figure:



The position of the M.2 PCIe interface in v1.1.1 version is shown in the following figure



3) The position of the SPI Flash on the development board is shown in the figure below, no other settings are required before starting the programming



4) Then you need to prepare a good quality USB2.0 male-to-male data cable



5) Then download the Rockchip driver **DriverAssitant_v5.12.zip** and **MiniLoader** and the burning tool **RKDevTool_Release_v3.15.zip** from the Orange Pi data download page

a. On the data download page of Orange Pi, first select the **official tool**, and then enter the following folder

1	Android image writing tool-SDDiskTool
	Android APPs
	Android and Linux image writing tool-RKDevTool and driver

b. Then download all the files below



Note that the "MiniLoader-things needed to burn the Linux image" folder is hereinafter referred to as the MiniLoader folder.

6) Then download the Linux operating system image file compression package that you want to burn from the **Orange Pi data download page**, and then use the decompression software to decompress it. Among the decompressed files, the file ending with "**.img**" is the image file of the operating system , the size is generally more than 2GB

7) Then use the decompression software to decompress **DriverAssitant_v5.12.zip**, and then find the **DriverInstall.exe** executable file in the decompressed folder and open it

range Pi U	User Manual	Copyright reserved	by Shenzhen	Xunlong Software Co., Ltd
名称	0	修改日期	类型	大小
- A	DBDriver	2022/12/1 15:07	文件夹	
📙 E	oin	2022/12/1 15:07	文件夹	
	Driver	2022/12/1 15:07	文件夹	
a c	onfig	2014/6/3 15:38	配置设置	1 KB
<u>s</u> C	DriverInstall	2022/2/28 14:11	应用程序	491 KB
F	leadme	2018/1/31 17:44	文本文档	1 KB
i r	evison	2022/2/28 14:14	文本文档	1 KB

8) After opening **DriverInstall.exe**, the steps to install the Rockchip driver are as follows

a. Click the "Driver Installation" button

wish安装 wish卸载		驱动安装	with 如此
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b. After waiting for a period of time, a pop-up window will prompt "The driver is installed successfully", and then click the "OK" button.

	DriverInstall	×	
9. No. State		印载	
	安装驱动成功.		

9) Then decompress **RKDevTool_Release_v3.15.zip**, this software does not need to be installed, just find **RKDevTool** in the decompressed folder and open it

名称	修改日期	类型	大小
📕 bin	2022/12/1 15:07	文件夹	
Language	2022/12/1 15:07	文件夹	
🗋 config.cfg	2022/3/23 9:11	CFG 文件	7 KB
🔊 config	2021/11/30 11:04	配置设置	2 KB
revision	2022/5/27 9:09	文本文档	3 KB
😽 RKDevTool	2022/5/27 9:06	应用程序	1,212 KB
◎ 开发工具使用文档_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

10) After opening the **RKDevTool** burning tool, because the computer is not connected to the development board through the USB2.0 male-to-male data cable at this time, the lower left corner will prompt "**No device found**"

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		存储	地址	名字	路径					
	Г		0x00000000	Loader						
8	Г		0x00000000	Parameter						
			0x00000000	Uboot						
			0x000000x0	trust						
			0x000000x0	Misc						
			0x000000x0	Resource						
			0x000000x0	Kernel						
			0x00000000	Boot			-			
			0x00000000	Recovery						
0			0x00000000	System						
1			0x00000000	Backup						
ad	ler :		执行	切換	设备分区表	清空]			

- 11) Then start burning the Linux image to the SSD
 - a. First, connect the development board to the Windows computer through the USB2.0 male-to-male data cable. The position of the USB2.0 programming interface of the development board is shown in the figure below



- b. Make sure that the development board is not connected to the power supply and inserted into the TF card and eMMC
- c. Then press and hold the MaskROM button on the development board, the position of the MaskROM button on the development board is shown in the figure below:

AP861/18 7402 • 402	Real Sector	6415 40 A0C	usaz.px2
3 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 5 5 7207		<u>N</u>
		XWC	USB3_0+USB2_0*

d. Then connect the power supply of the Type-C interface to the development board, and power on, and then release the MaskROM button



e. If the previous steps are successful, the development board will enter the **MASKROM** mode at this time, and the interface of the burning tool will prompt "found a **MASKROM device**"

七七行	初开发	之工具 v3.15				>
载镜	像	升级固件 高	氯级功能			
#		存储	地址	名字	路径	
1	Г		0x00000000	Loader		
2	Г		0x00000000	Parameter		
3	Г		0x000000000	Uboot		
4			0x00000000	trust		
5			0x00000000	Misc		
6			0x00000000	Resource		
7	Г		0x00000000	Kernel		
8	Г		0x00000000	Boot		
9	Г		0x00000000	Recovery		
10	Г		0x00000000	System		
11			0x00000000	Backup		
0 1	er :		0x00000000 0x000000000 执行	System Backup 切換	设备分区表 有空	
		[] 强制按地址写	_		
	_					

f. Then place the mouse cursor in the area below

#		存储	地址	名字	路径			
1	Г		0x00000000	Loader				
2	Г		0x00000000	Parameter				
3	Γ		0x00000000	Uboot				
4			0x00000000	trust				
5			0x00000000	Misc				
6			0x00000000	Resource				
7	Г		0x00000000	Kernel	-			
8			0x00000000	Boot				
9			0x00000000	Recovery			Place the mouse cursor	
10			0x00000000	System			over this area	
11	Г		0x00000000	Backup			over this area	
Load	er:		执行 □强制按地址写	切换	设备分区表	清空		

g. Then click the right mouse button and the selection interface shown in the figure below will pop up

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		存储	地址	名字	路径				
-	-		0x00000000	Loader					
	÷		0×00000000	liboot					
	i'r		0×0000000	trust	-				
	ΪĒ		0x00000000	Misc		添加项			
	Ē		0x00000000	Resource		删除项			
	Г		0x00000000	Kernel		清空所有项			
	Г		0x00000000	Boot		L-107			
	Г		0x00000000	Recovery		1.19			
0	Г		0x00000000	System		下移			
1	Г		0x00000000	Backup		导入配置			
0 4 0	ler:		执行	切换	设备分区	导出配置 K K <			

h. Then select the **import configuration** option

_									
		存储	地址	名字	路径				
	Г		0x00000000	Loader					
	Г		0x00000000	Parameter	1				
	Г		0x00000000	Uboot					
			0x00000000	trust		添加项			
5			0x00000000	Misc	-	MILO YE			
3			0x00000000	Resource		画际 収			
2	Г		0x00000000	Kernel		清空所有项			
3	Г		0x00000000	Boot		上移			
3			0x00000000	Recovery		THE			
10	Г		0x00000000	System		1115			
11			0x00000000	Backup		导入配置			
.o a d	er :		执行 □强制按地址写	切换	设备分区	导出配置 表 清空			

i. i. Then enter the MiniLoader folder downloaded earlier, then select the rk356x_linux_pcie.cfg configuration file, and click Open

1 📩 , 桌面	> orangepi >	MiniLoader-烧录Linux镜像才需要用到的东西	5 × C 在	MiniLoader-烧录Li	inux P
组织 ▼ 新建文件夹				≣ •	
🖕 WPS云盘	1	名称 ^	修改日期	类型	大小
☆ 主文件夹		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	3
OneDrive		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	1
		rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	3
三 桌面	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	1
业 下载	*				
■ 文档	*				
▶ 图片	*				
🕖 音乐	*				

j. Then click **OK**

2 V SPINOR 0x0000000 Losder C \Userskimmistratorillesitop\ 3 V PCLE 0x00000000 uboot C:\Userskimmistratorillesitop\	
ST F FCIE 0x00000000 linux C: User\data test test.ts.t	
J IV ICLE UXUUUUUUUU IIIIUX C. USEISIKUU	
interaction of the second s	
() 导入配置成功.	
備定	

k. Then click the position shown in the figure below

#		存储	地址	名字	路径	
		CRIMOR	0x00000000	Loader	C: 10sers (Administrator (Desktop)	
-	5	PCTR	0x0000000	1:000	C: \Urer=\Administrator\Becktop\	

1. Then select MiniLoaderAll.bin in the MiniLoader folder downloaded earlier, and then click to open

	orangepi →	MiniLoader-烧录Linux镜像才需要用到的东西	西 ~ C 在	MiniLoader-烧录Linux	Q
组织 ▼ 新建文件夹				≣ • □	0
> 🔷 WPS云盘	1	名称	修改日期	类型	大小
↑ 主文件夹		🔮 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	45
> 🔷 OneDrive		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	-
重 桌面	*	🗋 rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	
业 下载	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	
■ 文档	*	rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,09
🔀 图片	*				
🕖 音乐	*				

m. Then click the position shown in the figure below

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	□│存储	地址	名字	路径		
		0x00000000	Loader	C:\Users\Lee\Desktop\orangepiVM		
	✓ SPINOR	0x00000000	uboot	C:\Users\Administrator\Desktop\		
i ∙	▲ LCIE	0x00000000	Linux	C:\Users\Administrator\Desktop\		

n. Then enter the MiniLoader folder downloaded earlier, select **rkspi_loader.img**, and click **Open**

	面⇒ orangepi∷	MiniLoader-烧录Linux镜像才需要用到的东西	V C	午 MiniLoader-烧录Linux	P
组织 👻 新建文件夹				≣ • □	0
🖕 WPS云盘		名称	修改日期	类型	大小
↑ 主文件夹		ઇ MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	45
OneDrive		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	
▲ 桌面	\$	rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	
业 下载	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	
■ 文档	*	rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,09
▶ 图片	*				
🕑 音乐	*				2
文件名(N); r	kspi loader.img		~	All File(*.*)	~

o. Then click the position shown in the figure below

* 🗆	存储	地址	名字	路径		
1		0x00000000	Loader	C \Users\lee\Desktop\orangepi\M		
2 🔽	SPINO	0x00000000	uboot	C:\Vsers\lee\Desktop\orangepi\M		
3 🔽	PCIE	0x00000000	linux	C:\][sers\Administrator\]Deskton\		

p. Then select the path of the Linux image you want to burn, and then click Open

Before burning the image, it is recommended to rename the Linux image to be burned to orangepi.img or other shorter names, so that you can see the percentage value of the burning progress when burning the image.

象 → 打开	X
← → ✓ ↑ <mark></mark> → 此电脑 → 桌面 → or	prangepi > v ひ の在 orangepi 中搜索
▲ 组织 ▼ 新建文件夹	## - 🔟 🕐
■此电脑 ^ MiniLoader-#	- 烧录Linux镜像才需要用到的东西
■ 3D 対象	
皇面 皇面	
■ 桌面 ■ 本地磁盘 (C:)	
桌面 量 本地磁盘 (C:) ● CO NT + TR (C) ×	
■ 桌面	→ All File(*.*) →

q. Then please check the option to force writing by address

喘芯浴	数开发	工具 v3.15						;
载镜	像;	升级固件 高	級功能			A.		
#		存储	地址	名字	路径			
1	•		0x00000000	Loader	C \Users\lee\Desktop\orangepi\M			
2	V	SPINOR	0x00000000	uboot	C:\Users\lee\Desktop\orangepi\M			
3	1	PCIE	0x00000000	linux	C:\Users\lee\Desktop\orangepi\o			
Load	er Ve	r:1.11	执行	切换	设备分区表 清空			
	2	D. TEL A		-				

r. Click the Execute button again to start burning the Linux image to the SSD

ŧ [存储	地址	名字	路径	
	M		0x00000000	Loader	C:\Users\lee\Desktop\orangepi\M	
2 1	× :	SPINOR	0x00000000	uboot	C:\Users\Lee\Desktop\orangepi\M	
3 •	V :	PCIE	0x00000000	linux	C:\Urars\las\Darktan\aranganila	

s. The log displayed after burning the Linux image is shown in the figure below



If there is a problem with burning, please clear the SPIFlash first and then try burning again. For the method of clearing SPIFlash, please refer to the description of the method of using RKDevTool to clear SPIFlash.

t. After the image is burnt, it will automatically start the Linux system in SPIFlash+PCIe SSD. If it does not start normally, please power on and try again.

2. 6. 2. The method of using the dd command to burn

1) Firstly, it is necessary to prepare an NVMe SSD solid state drive. The PCIe supported by the M.2 slot on the development board is PCIe 2.0x1, with a theoretical maximum speed of 500MB/s. PCIe 3.0 and PCIe 4.0 NVMe SSDs can also be used, but the highest speed is only PCIe 2.0x1.

2) Then insert the NVMe SSD into the M.2 PCIe interface of the development board and secure it. The Orange Pi 3B has two hardware versions, and the M.2 PCIe interface position for version 2.1 is shown in the following figure:



The position of the M.2 PCIe interface in v1.1.1 version is shown in the following figure:



3) The position of SPI Flash on the development board is shown in the following figure, and no other settings are required before starting the burning process



4) Burning the Linux image to SPIFlash+NVMe SSD requires a TF card, so first you need to burn the Linux image to the TF card, and then use the TF card to start the development board to enter the Linux system. For the method of burning the Linux image to the TF card, please refer to the instructions in the two sections of Method of burning Linux image to TF card based on Windows PC and the method of burning the Linux image to the TF card based on the Ubuntu PC.

5) After using the TF card to start the Linux system, we first burn the u-boot image into the SPI Flash

a. Run nand-sata-install first, ordinary users remember to add sudo permission orangepi@orangepi:~\$ sudo nand-sata-install

b. Then select 7 Install/Update the bootloader on SPI Flash



c. Then select <Yes>



d. Then please wait patiently for the burning to complete. After the burning is completed, the display will be as follows (a **Done** will be displayed in the lower left corner):



6) Then upload the Linux image file (Debian or Ubuntu image downloaded from the official website) to the TF card. For the method of uploading the Linux image file to the development board, please refer to the description in the section of **the method of uploading files to the development board Linux system**.

7) After uploading the image to the Linux system of the development board, we enter the storage path of the image file in the command line of the Linux system of the development board. For example, I store the Linux image of the development board in

the **/home/orangepi/Desktop** directory Download it, and then enter the **/home/orangepi/Desktop** directory to see the uploaded image file.

orangepi@orangepi:~\$ cd /home/orangepi/Desktop

orangepi@orangepi:~/Desktop\$ ls

Orangepi3b_x.x.x_debian_bullseye_desktop_xfce_Linux5.10.160.img

How to enter the command line of the development board Linux system?

1. For the method of using the serial port to log in to the terminal, please refer to

the instructions in the section on how to use the debugging serial port.

2. Use ssh to remotely log in to the Linux system, please refer to the instructions in the section of SSH remote login to the development board.

3. If HDMI, LCD and other display screens are connected, you can open a command line terminal on the desktop.

8) Next, let's confirm that the NVMe SSD has been recognized by the development board's Linux. If the NVMe SSD is recognized normally, use the **sudo fdisk -l** command to see **nvme** related information

orangepi@orangepi:~/Desktop\$ **sudo fdisk -l | grep "nvme0n1"** Disk /dev/nvme0n1: 1.86 TiB, 2048408248320 bytes, 4000797360 sectors

Use the lspci command to see an NVMe-related PCI device

orangepi@orangepi:~/Desktop\$ lspci

00:00.0 PCI bridge: Fuzhou Rockchip Electronics Co., Ltd Device 3566 (rev 01)

01:00.0 Non-Volatile memory controller: Realtek Semiconductor Co., Ltd. Device 5765 (rev 01)

2) Then we can use the dd command to clear the NVMe SSD (optional)

orangepi@orangepi3b:~/Desktop\$ sudo dd bs=1M if=/dev/zero of=/dev/nvme0n1 count=2000 status=progress orangepi@orangepi3b:~/Desktop\$ sudo sync

3) Then you can use the dd command to burn the Linux image of the development board to the NVMe SSD

a. In the following command, the **if**= parameter is followed by the full path where the Linux image is stored + the name of the Linux image (such as **the name of** /home/orangepi/Desktop/Linux image). Because we have entered the path of the Linux image above, we only need to fill in the name of the Linux image. b. Please do not copy the Linux image name in the following command, but replace it with the actual image name (because the version number of the image may be updated).

sudo dd bs=1M if=Orangepi3b_x.x.x_debian_bullseye_desktop_xfce_Linux5.10.160.img of=/dev/nvme0n1 status=progress

sudo sync

Note, if you upload a .7z or .xz or .gz Linux image compressed file, please remember to decompress it before using the dd command to burn.

The detailed description of all parameters of the dd command and more usage can be viewed by executing the man dd command in the Linux system.

4) After successfully burning the Linux image of the development board to the NVMe SSD, you can use the poweroff command to shut down. Then please pull out the TF card, and then short press the power button to turn on, then the Linux system in SPIFlash+NVMe SSD will be started.

5) After starting the system in the NVMe SSD, use the **df -h** command to see the actual hard disk capacity

a. 128GB NVMe SSD

orangepi@orangepi:~\$ df -h							
Filesystem	Size U	Jsed Ava	ail Use%	Mounted on			
udev	3.8G	8.0K	3.8G	1% /dev			
tmpfs	769M	1.4M	768M	1% /run			
/dev/nvme0n1p2	118G	5.8G	111G	5% /			
tmpfs	3.8G	0	3.8G	0% /dev/shm			
tmpfs	5.0M	4.0K	5.0M	1% /run/lock			
tmpfs	3.8G	16K	3.8G	1% /tmp			
/dev/nvme0n1p1	256M	90N	I 166N	1 36% /boot			
/dev/zram1	194M	9.9M	170M	6% /var/log			
tmpfs	769M	60K	769M	1% /run/user/1000			
tmpfs	769M	48K	769M	1% /run/user/0			

b. 2TB NVMe SSD

range Pi User Manual

orangepi@orangepi:~\$ df -h							
Filesystem	Size U	sed Av	ail Use%	Mounted on			
udev	3.8G	8.0K	3.8G	1% /dev			
tmpfs	769M	1.4M	768M	1% /run			
/dev/nvme0n1p2	1.9T	4.1G	1.8 T	1% /			
tmpfs	3.8G	0	3.8G	0% /dev/shm			
tmpfs	5.0M	4.0K	5.0M	1% /run/lock			
/dev/zram2	3.7G	76K	3.5G	1% /tmp			
/dev/nvme0n1p1	256M	90N	1 166N	1 36% /boot			
/dev/zram1	194M	15M	165M	9% /var/log			
tmpfs	769M	60K	769M	1% /run/user/1000			
tmpfs	769M	48K	769M	1% /run/user/0			

6) When the same system is programmed in the TF card and NVMe SSD, if both the TF card and NVMe SSD are inserted into the development board, then power on and start the development board, and u-boot will give priority to starting the system in the TF card. However, since the systems in the TF card and the NVMe SSD are exactly the same, the UUIDs of the /boot partition and the rootfs partition in the two storage devices are also the same, which may cause the partition in the NVMe SSD to be loaded when the TF card starts. Running the script below resolves this issue.

orangepi@orangepi:~\$ sudo fix_mmc_ssd.sh

Exactly the same system means that the image name is exactly the same. Even if they are all Debian11 systems, the versions are different.

2. 6. 3. How to use balenaEtcher software to burn

1) Firstly, it is necessary to prepare an NVMe SSD solid state drive. The PCIe supported by the M.2 slot on the development board is PCIe 2.0x1, with a theoretical maximum speed of 500MB/s. PCIe 3.0 and PCIe 4.0 NVMe SSDs can also be used, but the highest speed is only PCIe 2.0x1.

2) Then insert the NVMe SSD into the M.2 PCIe interface of the development board and secure it. The Orange Pi 3B has two hardware versions, and the M.2 PCIe interface position for version 2.1 is shown in the following figure:



The position of the M.2 PCIe interface in v1.1.1 version is shown in the following figure:



3) The position of SPI Flash on the development board is shown in the following figure, and no other settings are required before starting the burning process



4) Burning the Linux image to SPIFlash+NVMe SSD requires a TF card, so first you need to burn the Linux image to the TF card, and then use the TF card to start the development board to enter the Linux system. For the method of burning the Linux image to the TF card, please refer to the instructions in the two sections of the method of burning the Linux image to the TF card based on the Windows PC and the method of burning the Linux image to the TF card based on the Ubuntu PC.

5) After booting into the Linux system in the TF card, please confirm that the NVMe SSD has been properly recognized by the Linux of the development board. If the NVMe SSD is recognized normally, use the **sudo fdisk -l** command to see **nvme** related

range	Pi	User	Manual

information

orangepi@orangepi:~/Desktop\$ sudo fdisk -l | grep "nvme0n1" Disk /dev/nvme0n1: 1.86 TiB, 2048408248320 bytes, 4000797360 sectors

Use the **lspci** command to see an NVMe-related PCI device orangepi@orangepi:~/Desktop\$ **lspci** 00:00.0 PCI bridge: Fuzhou Rockchip Electronics Co., Ltd Device 3566 (rev 01) 01:00.0 Non-Volatile memory controller: Realtek Semiconductor Co., Ltd. Device 5765 (rev 01)

6) The balenaEtcher has been pre-installed in the Linux image, and the opening method is as follows:



If it is not pre-installed, for how to download and install the arm64 version of balenaEtcher, please refer to the instructions in the section on how to download and install the arm64 version of balenaEtcher.

7) The interface after balenaEtcher is opened is as follows:



8) The method of using balenaEtcher to burn u-boot to the SPI Flash of the development board is as follows:

a. First click on Flash from file



b. Then enter the /usr/lib/Linux-u-boot-legacy-orangepi3b_1.x.x_arm64 directory, select rkspi_loader.img, and click Open to open

Cancel		Q Dopen
🔿 Recent	usr lib linux-u-boot-legacy-orangepi5_1.0.2_arm64	
🔂 Home	Name	▼ Size Type Modified
B a due	🗋 idbloader.img	292.9 kB Raw disk image 13:16
Desktop	📔 rkspi_loader.img	16.8 MB Raw disk image 13:16
Documents		

c. The interface after opening **rkspi_loader.img** is as follows:



d. Then click Select target



e. Then click Show 2 hidden to open more options for storage devices

()		balenaEtc	her		*	- x
		🌍 bale	naEtcher		\$	8
Select ta	arget 3 found					
Nam	e	Size	Location			
(opi	boot, opi_root)	15.9 GB	/dev/mmcblk1	Source drive		
✓ Show 2 hie	dden					

f. Then select the device name of SPI Flash /dev/mtdblock0, and click Select


g. Then click Flash



h. Then click Yes, I'm sure



i. Then enter the password **orangepi** of the development board Linux system, and it will start burning the u-boot image into the SPI Flash



j. The display of the burning process is as follows:



k. The display after burning is as follows:



9) The method of burning the Linux system in the TF card to the NVMe SSD (this method is equivalent to cloning the system in the TF card to the NVMe SSD)



a. First click **Clone drive**

b. Then select the device name of the TF card /dev/mmcblk1

		😚 baler	\$ (
Select source	e 3 found			
Name		Size	Location	
🕢 (opi boot.o	pi root)	15.9 GB	/dev/mmcblk1 Source drive	
- Short & Highlen				

c. The interface after opening the TF card is as follows:

💡 balenaE	tcher 🔶	- x
balenaEtcher Edit View Window Help		
😝 ba	lenaEtcher 🔅	8
÷ !	- *	
(opi_boot, opi_root) Remove 15968	t target Flash!	

d. Then click Select target



e. Then click Show 2 hidden to open more options for storage devices



f. Then select the device name of the NVMe SSD /dev/nvme0n1, and click Select

٢		↑ - ×		
	Warning! Selecting	your system drive	is dangerous and will erase your drivel	¢ 0
Sele	ect target 3 found			
	Name	Size	Location	
	(opi_boot, opi_root)	15.9 GB	/dev/mmcblk1 Source drive	
	A	16.8 MB	/dev/mtdblock0 Too small	
	Fanxiang S500PRboot, opi_root)	2.05 TB	/dev/nvme0n1 System drive	
	Can	cel	Select (1)	

g. Then click Flash



h. Then click Yes, I'm sure



i. Then enter the password orangepi of the Linux system on the development board, and it will start burning the Linux image to the SSD



j. The display of the burning process is as follows:





k. The display after burning is as follows:

۲	balenaEtcher	+ - ×
	😭 balena Etcher	¢ 0
Flash Complete!		
Successful target Effective speed: 48.8 MB/s	Want to try more projects like the o	ne you just saw?
Flash another	Go to balenaHub	

- 1. Then you need to expand the capacity of the rootfs partition in the NVMe SSD. The steps are as follows:
 - a) Open **GParted** first, if the system does not have Gparted pre-installed, please use the apt command to install it



b) Then enter the password orangepi of the Linux system, and click **Authenticate**



c) Then click **Fix**

GParted Edit V	GParted				
Partition Name	e File System Mount Point Labe	l Size	Used	Unused	Flags
	Not all of the space availabl be used, you can fix the GPT extra 3969681072 blocks) or setting?	e to /dev/nvr to use all of continue wit	ne0n1 appea f the space (th the currer	ars to an nt	
Searching /dev/n	vme0n1 partitions		ignore		

d) Then select NVMe SSD

		/dev/r	nmcblk1 - GPar	ted			^ ·	- 🗆 x
GParted Edit View	w Device	Partition He	elp					
P 🛞 🕅		6 9	1		[/dev/mm	cblk1 (14	4.84 GiB)
			del su des ses el			/dev/nvm	ne0nl (1.	.86 TiB)
			/dev/mmci 14.41 GiB	ыктра				
Partition	Name	File System	Mount Point	Label	Size	Used	Unused	Flags
unallocated /dev/mmcblk1p1¤ /dev/mmcblk1p2¤	 bootfs 	unallocated fat16 ext4	/boot /, /var/log.hdd	opi_boot opi_root	30.00 MiB 256.00 MiB 14.41 GiB	90.22 MiB 4.91 GiB	165.78 MiB 9.50 GiB	bls_boot
unallocated		unallocated			153.50 MiB			

e) The display interface after selecting NVMe SSD is as follows: