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Banana pi BPI-M2

Banana PI BPI-M2 is the open source hardware platform,Banana PI BPI-M2 is an quad core version of Banana Pi ,Banana PI BPI-M2 is the quad core more better than the Banana Pi BPI-M1,it support WIFI on board. use Alliwnner A31S chip on board.

Banana Pi BPI-M2 series run Android,Debian linux,Ubuntu linux, Raspberry Pi image and others image. Banana PI PBI-M2 hardware: 1Ghz ARM7 quad-core processor, 1GB DDR3 SDRAM,

Banana PI BPI-M2 with Gigabit ethernet port, It can run with Android 4.4 smoothly. The size of Banana PI BPI-M2 same as banana pi M1, it can easily run with the game it support 1080P high definition video output, the GPIO compatible with Raspberry Pi B+ and can support raspbian Image

Note: Banana Pi BPI-M2 not support sata port, so you need use USB for hardisk

forum: http://www.banana-pi.org

forum: http://www.bananapi.com

produce: http://www.banana-pi.com

BPI-M2 hardware interface:

40 Pins Header   Earphone   2xUSB2.0

Power&Reset Button

Camera Interface

1GB DDR3

USB OTG

IR

2xUSB2.0

10/100/1000Mbps
Enternet Interface

LVDS/RGB
Display Interface

Power Supply
(5V/2A DC)

HDMI

Debug TTL UART

Front Side

Allwinner A31S SOC
ARM Cortex A7 Quad-core

Boot Button

MicroSD Card Slot

WiFi Antenna

SDIO WiFi

Rear Side
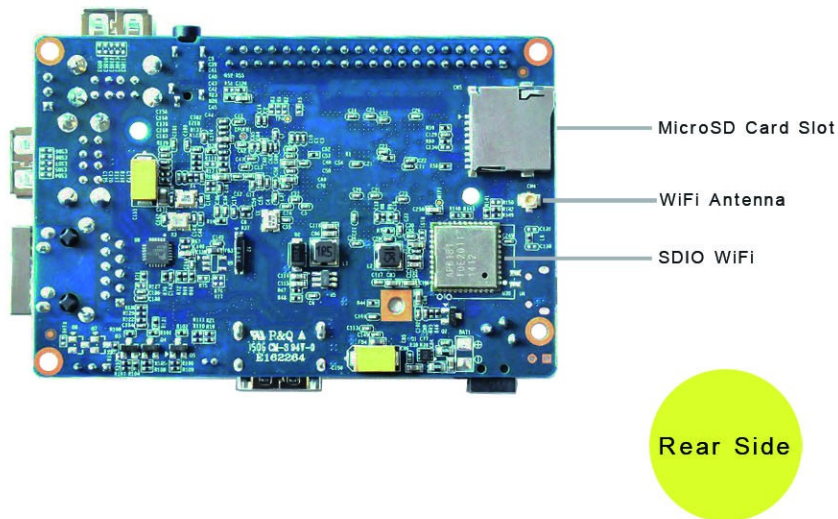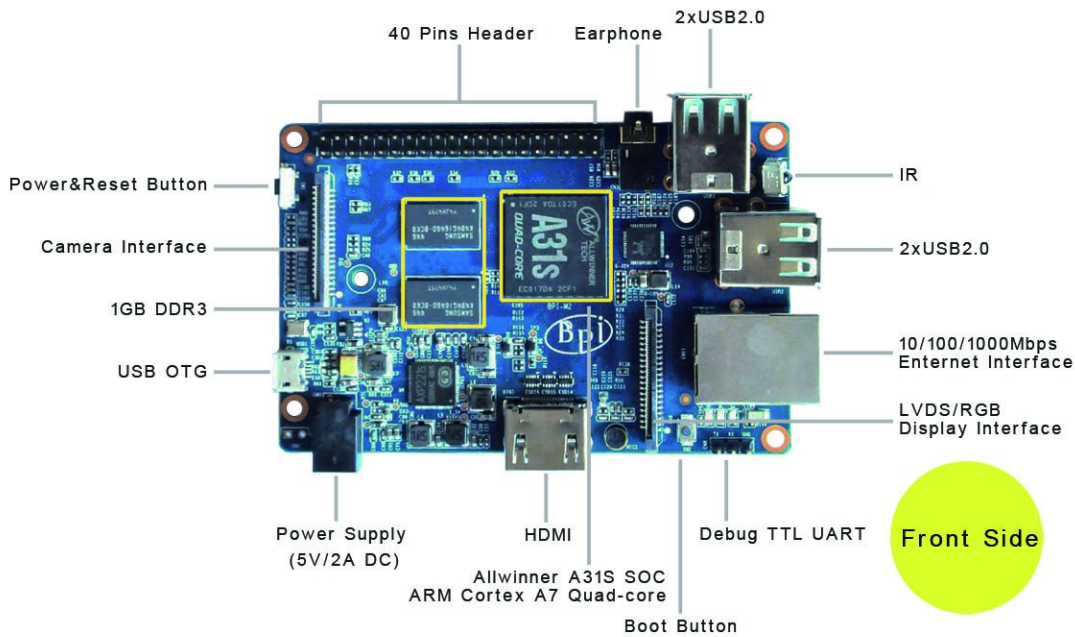
BPI-M2 hardware spec:

Hardware Specification of Banana pi BPI-M2	
Soc	A31S ARM Cortex-A7
CPU	A31S ARM Cortex-A7 quad-core,256 KB L1 cache 1 MB L2 cache
GPU	PowerVR SGX544MP2 · Comply with OpenGL ES 2.0, OpenCL 1.x, DX 9_3
SDRAM	1GB DDR3 (shared with GPU)
Power	5V @ 2A via DC power and/or MicroUSB (OTG)
Features	
Low-level perpherials	40 Pins Header,28×GPIO, some of which can be used for specific functions including UART, I2C, SPI, PWM, CAN, I2S, SPDIF, LRADC, ADC, LINE-IN,FM-IN,HP-IN.
On board Network	10/100/1000Mbps ethernet (Realtek RTL8211E/D)
Wifi Module	WiFi 802.11 b/g/n (AP 6181 module on board)
Bluetooth	Optional
On board Storage	MicroSD (TF) card，Not SATA support
Display	Supports multi-channel HD display: HDMI 1.4 (Type A - full) LVDS/RGB/CPU display interface (DSI) for raw LCD panels Composite video (PAL and NTSC) (via 3.5 mm TRRS jack shared with audio out) 11 HDMI resolutions from 640×480 to 1920×1080 plus various PAL and NTSC standards
Video	HD H.264 2160p video decoding Mutil-format FHD video decoding, including Mpeg1/2, Mpeg4, H.263, H.264, etc H.264 high profile 1080p@30fps or 720p@60fps encoding
Audio outputs	HDMI,analog audio (via 3.5 mm TRRS jack shared with composite video out),I2S audio (also potentially for audio input)
Camera	Parallel 8-bit camera interface
Audio input	On board micphone
USB	4 USB 2.0 host, 1 USB 2.0 OTG
Buttons	Reset button Power button&U-boot button
Leds	Power status Led and RJ45 Led
Other	IR reciever
Interface definition	
Sizes	92 mm × 60mm
Weight	45g

BPI-M2 GPIO Pin define

Banana Pi has a 40-pin GPIO header that matches that of the Model B+ Raspberry Pi. Following is the Banana Pi GPIO Pinout:
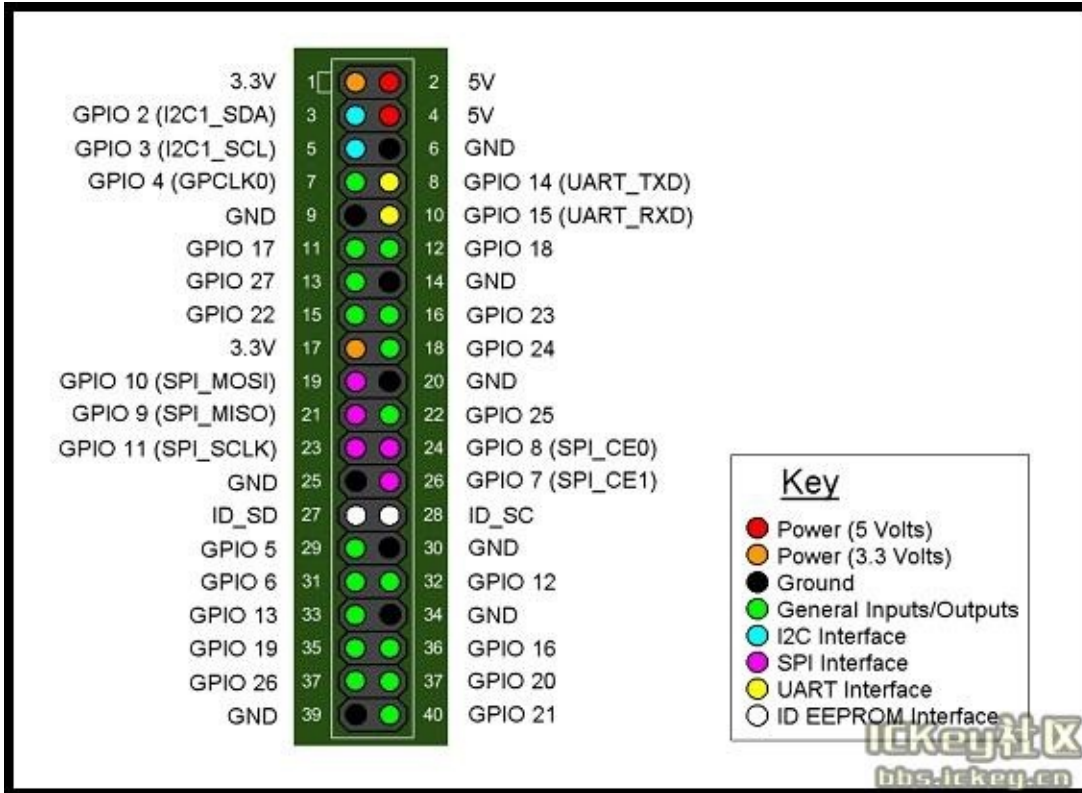
GPIO Pin Name	Default Function	Function2：GPIO
CN7-P01	VCC-3V3	
CN7-P02	VCC-DC	
CN7-P03	TWI2-SDA	PH19
CN7-P04	VCC-DC	
CN7-P05	TWI2-SCK	PH18
CN7-P06	GND	
CN7-P07	PWM1-P	PH9
CN7-P08	UART5_TX	PE4
CN7-P09	GND	
CN7-P10	UART5_RX	PE5
CN7-P11	UART2_RX	PG7
CN7-P12	PWM1-N	PH10
CN7-P13	UART2_TX	PG6
CN7-P14	GND	
CN7-P15	UART2_CTS	PG9
CN7-P16	PWM2-P	PH11

CN7-P17	VCC-3V3	
CN7-P18	PWM2-N	PH12
CN7-P19	SPI1_MOSI	PG15
CN7-P20	GND	
CN7-P21	SPI1_MISO	PG16
CN7-P22	UART2_RTS	PG8
CN7-P23	SPI1_CLK	PG14
CN7-P24	SPI1_CS0	PG13
CN7-P25	GND	
CN7-P26	SPI1_CS1	PG12
CN7-P27	TWI3-SDA	PB6
CN7-P28	TWI3-SCK	PB5
CN7-P29	I2S-MCLK	PB0
CN7-P30	GND	
CN7-P31	I2S-BCLK	PB1
CN7-P32	I2S-DI	PB7
CN7-P33	I2S-LRCK	PB2
CN7-P34	GND	
CN7-P35	I2S-DO0	PB3
CN7-P36	UART5_RTS	PE6
CN7-P37	I2S-DO1	PB4
CN7-P38	UART5_CTS	PE7
CN7-P39	GND	
CN7-P40	1WIRE	PM2

CSI Camera Connector Pin specification:

the CSI Camera Connector is a 40-pin FPC connector which can connect external camera module with proper signal pin mappings. The pin definitions of the CSI interface are shown as below. This is marked on the Banana Pi board as "CN6″.

CSI Pin Name	Default Function	Function2：GPIO
CN6-P01	LINEINL	
CN6-P02	LINEINR	
CN6-P03	VCC-CSI	
CN6-P04	AVDD-CSI	
CN6-P05	GND	
CN6-P06	VDD-CSI	
CN6-P07	MIC2P	
CN6-P08	VCC-CSI	
CN6-P09	MIC2N	

CN6-P10	AFVCC-CSI	
CN6-P11	GND	
CN6-P12	CSI-IO0	PM0
CN6-P13	LRADC0	
CN6-P14	TWI0-SDA	PH15
CN6-P15	MIC-MBIAS	
CN6-P16	TWI0-SCK	PH14
CN6-P17	CSI-D4	PE8
CN6-P18	CSI0-STBY-EN	PH27
CN6-P19	CSI-D5	PE9
CN6-P20	CSI-PCLK	PE0
CN6-P21	CSI-D6	PE10
CN6-P22	CSI0-PWR-EN	PG18
CN6-P23	CSI-D7	PE11
CN6-P24	CSI-MCLK	PE1
CN6-P25	CSI-D8	PE12
CN6-P26	CSI0-RESET#	PH26
CN6-P27	CSI-D9	PE13
CN6-P28	CSI-VSYNC	PE3
CN6-P29	CSI-D10	PE14
CN6-P30	CSI-HSYNC	PE2
CN6-P31	CSI-D11	PE15
CN6-P32	CSI1-STBY-EN	PH25
CN6-P33	AP-RESET#	
CN6-P34	CSI1-RESET#	PH24
CN6-P35	CSI-IO1	PM1
CN6-P36	HPR	
CN6-P37	HPL	
CN6-P38	IPSOUT	
CN6-P39	GND	
CN6-P40	IPSOUT	

LVDS Pin specification

LVDS (LCD display interface)

The LVDS Connector is a 40-pin FPC connector which can connect external LCD panel (LVDS) and touch screen (I2C) module as well. The pin definitions of this connector are shown as below. This is marked on the Banana Pi board as "CN9".

DSI Pin Name	Default Function	Function2：GPIO
CN9-P01	IPSOUT	

CN9-P02	TWI1-SDA	PH15
CN9-P03	IPSOUT	
CN9-P04	TWI1-SCK	PH16
CN9-P05	GND	
CN9-P06	TP-INT	PG0
CN9-P07	LCD-PWR-EN	PG4
CN9-P08	TP-RST	PG1
CN9-P09	LCD0-D00	PD0
CN9-P10	LCD0-PWM	PH13
CN9-P11	LCD0-D01	PD1
CN9-P12	LCD0-BL-EN	PG3
CN9-P13	LCD0-D02	PD2
CN9-P14	LCD0-DE	PD25
CN9-P15	LCD0-D03	PD3
CN9-P16	LCD0-VSYNC	PD27
CN9-P17	LCD0-D04	PD4
CN9-P18	LCD0-HSYNC	PD26
CN9-P19	LCD0-D05	PD5
CN9-P20	LCD0-CS	PG2
CN9-P21	LCD0-D06	PD6
CN9-P22	LCD0-CLK	PD24
CN9-P23	LCD0-D07	PD7
CN9-P24	GND	
CN9-P25	LCD0-D08	PD8
CN9-P26	LCD0-D23	PD23
CN9-P27	LCD0-D09	PD9
CN9-P28	LCD0-D22	PD22
CN9-P29	LCD0-D10	PD10
CN9-P30	LCD0-D21	PD21
CN9-P31	LCD0-D11	PD11
CN9-P32	LCD0-D20	PD20
CN9-P33	LCD0-D12	PD12
CN9-P34	LCD0-D19	PD19
CN9-P35	LCD0-D13	PD13
CN9-P36	LCD0-D18	PD18
CN9-P37	LCD0-D14	PD14
CN9-P38	LCD0-D17	PD17
CN9-P39	LCD0-D15	PD15

CN9-P40	LCD0-D16	PD16

UART Pin specification:

The header CON4 is the UART interface. For developers of Banana Pi, this is an easy way to get the UART console output to check the system status and log message.

CN8 Pin Name	Default Function	GPIO
CN8 P03	UART0-TXD	PH20
CN8 P02	UART0-RXD	PH21
CN8 P01	GND	

BPI-M2 micro SD card slot

BPI-M1+ have support a TF card slot. you can burn image to TF card ,and use it boot BPI-M1+ same as raspberry pi.

Note:

- support 8G 16G 32G 64G
- please choose class 10 TF card for banana pi.

BPI-M2 GigE LAN

Banana PI BPI-M2 with one Gigabit ethernet port,use RTL8211E chip on board.

BPI-M2 WIFI interface

BPI-M2 support AP6181 wifi module on board. it support 802.11/b/g/n wifi.

use SDIO interface ,not connect with USB

BPI-M2 wifi antenna slot

banana pi BPI-M2 have support ap6212 wifi&BT module onboard

BPI-M2 have wifi antenna slot on board

wifi extend antenna slot spec:

so you can use 3DB/5DB wifi antenna on BPI-M2

BPI-M2 USB interface

BPI-M2 have 4 USB 2.0 interface on board.so you can connect Keyboard,mouse, USB camera and ... on BPI-M2

BPI-M2 HDMI interface

BPI-M2 has a standard HDMI 1.4 interface. so We can use HDMI-to-HDMI cable to connect BPI-M2 to the display monitor that has HDMI interface.

But If the display monitor doesn't have HDMI interface,only VGA or DVI port. We should use HDMI-to-VGA or HDMI-to-DVI cable to connect the BPI-M2 to the display monitor.

Note: if the HDMI-to-VGA/DVI cable is a bad quality cable,it will go wrong on the monitor display. please choose a good quality cable for BPI-M2

BPI-M2 Camera interface

BPI-M2 CSI Camera Connector is a 40-pin FPC connector which can connect external camera module with proper signal pin mappings. The pin definitions of the CSI interface are shown as below. This is marked on the Banana Pi board as "CSI".

CSI pin define:

please see: BPI-M2 GPIO pine define

BPI-M2 CSI camera accessories

https://bananapi.gitbooks.io/bpi-accessories/content/bpim1m1+m2camera.html

BPI-M2 RGB DSI interface

RGB DSI (Display Serial Interface)：

The display Connector is a 40-pin FPC connector which can connect external LCD panel (RGB DSI) and touch screen (I2C) module as well. The pin definitions of this connector are shown as below. This is marked on the Banana Pi board as "DSI".

DSI pin define:

please see: BPI-M2 GPIO pine define

BPI-M2 LCD touch panel accessories

https://bananapi.gitbooks.io/bpi-accessories/content/bpi70lcdtouchpanel.html

- note:the touch panel accessories support RGB interface and MIPI interface ,when you use BPI-M1, please choose RGB interface.

BPI-M2 IR interface

BPI-M2 support IR interface on board. you can use it as remote control.

BPI-M2 OTG interface

banana pi BPI-M2 have 1 OTG port on board.

Note:

you also can use OTG port power BPI-M2

BPI-M2 CE FCC RoHS Certification

BPI-M2 CE Certification

BPI-M2 FCC Certification

Certificate of Conformity

Certificate No.:	YRT201506208C
Applicant:	SINOVOIP CO., LIMITED
Address:	5/F, Comprehensive Building of Zhongxing Industry City, Chuangye Road, Nanshan District, Shenzhen, Guangdong, China
Manufacturer:	SINOVOIP CO., LIMITED
Address:	5/F, Comprehensive Building of Zhongxing Industry City, Chuangye Road, Nanshan District, Shenzhen, Guangdong, China
Product:	Banana Pi
Model:	Banana pi 2 (BPI-M2)
Brand Name:	N/A

The submitted products have been tested by us with listed standards and found in compliance with the following FCC Rules and Regulations:

The FCC Standard:
FCC CFR 47 PART 15 C(15.247): 2014

The test were performed in normal operation mode. The test results apply only to the particular sample tested and to the specific tests carried out. This certificate applies specifically to the sample investigated in our test reference number only.

The FCC marking as shown below can be affixed on the product after preparation of necessary technical documentation.
Other relevant Directives have to be observed.

Approved by:
Department Manager
June 15, 2015

SHENZHEN YARUI TESTING CO., LTD.
Address: No. 620 HuaYuan Commercial Center, No. 347 XiXiang Road, XiXiang Town, Bao'An District, ShenZhen City
Tel.: +86-755-27912080   Fax.: +86-755-27916936   Website: www.yarui-lab.com

BPI-M2 RoHS Certification

Certificate of Conformity

Certificate No.:	YRT201506207C
Applicant:	SINOVOIP CO., LIMITED
Address:	5/F, Comprehensive Building of Zhongxing Industry City, Chuangye Road, Nanshan District, Shenzhen, Guangdong, China
Manufacturer:	SINOVOIP CO., LIMITED
Address:	5/F, Comprehensive Building of Zhongxing Industry City, Chuangye Road, Nanshan District, Shenzhen, Guangdong, China
Product:	Banana Pi
Model:	Banana pi 2 (BPI-M2)
Brand Name:	N/A

The submitted products have been tested by us with listed standards and found in compliance with the following European Directives:

The RoHS Directive 2011/65/EU:
IEC62321-4: 2013;
IEC62321-5: 2013;
IEC62321:2008;
EN 14372:2004;
EPA 3540C:1996

The test were performed in normal operation mode. The test results apply only to the particular sample tested and to the specific tests carried out. This certificate applies specifically to the sample investigated in our test reference number only.

The RoHS marking as shown below can be affixed on the product after preparation of necessary technical documentation.

Other relevant Directives have to be observed.
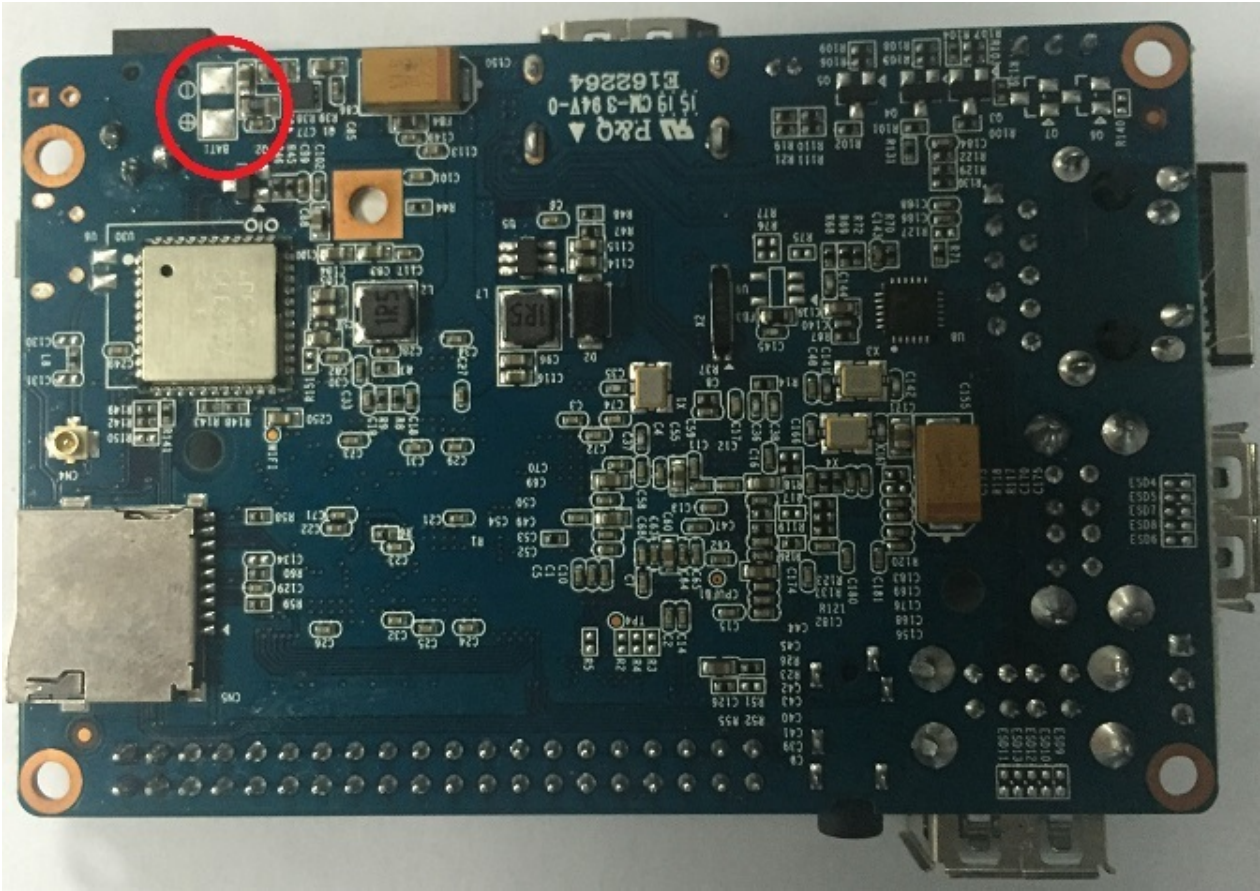
RoHS

Approved by: _____

Department Manager
June 15, 2015

SHENZHEN YARUI TESTING CO., LTD.
Address: No. 620 HuaYuan Commercial Center, No. 347 XiXiang Road, XiXiang Town, Bao'An District, ShenZhen City
Tel.: +86-755-27912080   Fax: +86-755-27916936   Website: www.yarui-lab.com

CERTIFICATE ◆ ZERTIFIKAT ◆ YARUITESTING ◆ CERTIFICADO ◆ CERTIFICAT ◆ CERTIFICAT

BPI-M2 3.7V lithium battery interface

1,Battery interface of BPI-M2:

use way same as BPI-M3.

https://bananapi.gitbooks.io/bpi-m3/content/bpim3lithiumbatteryinterface.html
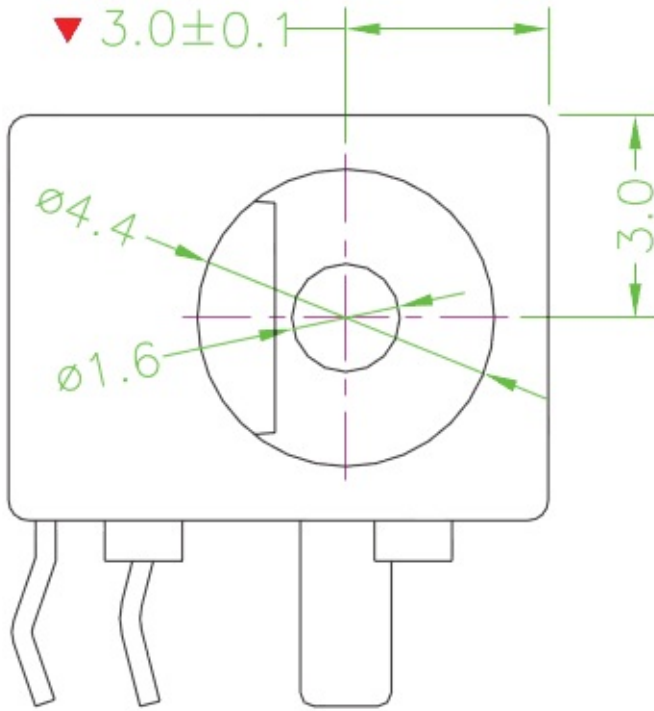
BPI-M2 DC Power interface

BPI-M2 DC power port, you need use 5V/2A DC power adapter.

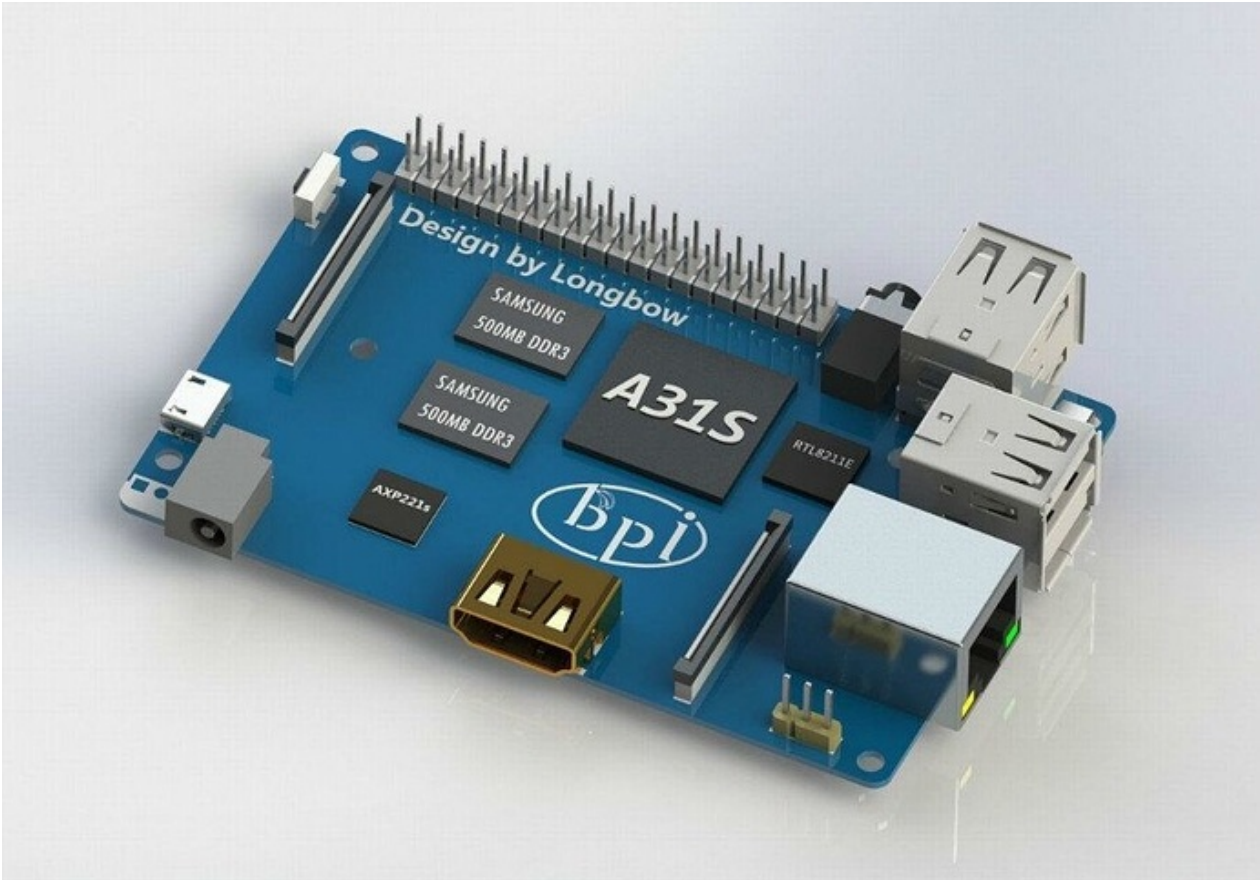Dc power size:

BPI-M2 schematic diagram

You can refer to the contents of our forum from this link:

Google driver

File name :BPI-M2-V3_1 20150123.pdf

BPI-M2 DXF and 3D design

banana pi BPI-M2 have public DXF file and 3D design file ,so user can DIY case by theyself.

BPI-M2 DXF file download link:

Google driver

BPI-M2 3D design file download link:

Google driver

BPI-M2 software

BPI-M2 quick start

Step 1: Get what you need

First time to enjoy your Banana Pi, you need at least the accessories in the table below.

No.	Item	Minimum recommended specification & notes
1	MicroSD card	SD card is optional. If need to boot form SD card, Minimum size 8GB, class 10 (the class indicates how fast the card is). We recommend using branded SD cards as they are more reliable.
2	avHDMI(Full sized) to HDMI / DVI lead	HDMI to HDMI lead (for HD TVs and monitors with HDMI input).OR HDMI to DVI lead (for monitors with DVI input).
3	Keyboard and mouse	Any standard USB keyboard and mouse should work. keyboards or mice that take a lot of power from the USB ports, however, may need a powered USB hub. This may include some wireless devices.
4	Ethernet cable	Networking is optional, although it makes updating and getting new software for your Banana Pi much easier.
5	Micro USB power adapter	A good quality, USB Power supply that can provide at least 5V/2A is essential.OTG also can power the board, but it is not recommended.
6	Audio lead (Optional)	You can choose a 3.5mm jack audio led to connect to audio port to get stereo audio.
7	Mobile Hard disk (Optional)	You can choose to connect a mobile hard disk to USB port to store more files.

Base you need below:

HDMI to HDMI lead

HDMI to DVI lead

MicroSD card

USB power adapter

Step 2: Download the relevant Image file:

Please visit our webmaster: www.banana-pi.org to download image, banana pi all image can be download form this web.

Step3: Prepare your SD card for the Banana Pi

In order to enjoy your Banana Pi BPI-M3, you will need to install an Operating System (OS) onto an SD card or eMMC Flash. Instructions below will teach you how to write an OS image to your SD card or eMMC Flash under Windows and Linux.

1.Insert your SD card into your computer. The size of SD should be larger than the OS image size, generally 8GB or greater.

2.Format the SD card.

Format your SD under Windows os :

Download the a SD card format tool such as SD Formatter from
https://www.sdcard.org/downloads/formatter_4/eula_windows/

*Unzip the download file and run the setup.exe to install the tool on your machine.

*In the "Options" menu, set "FORMAT TYPE" option to QUICK, "FORMAT SIZE ADJUSTMENT" option to "ON".
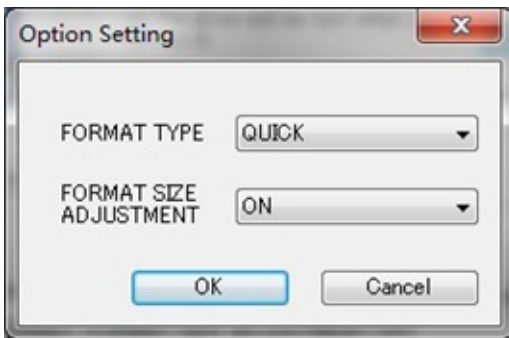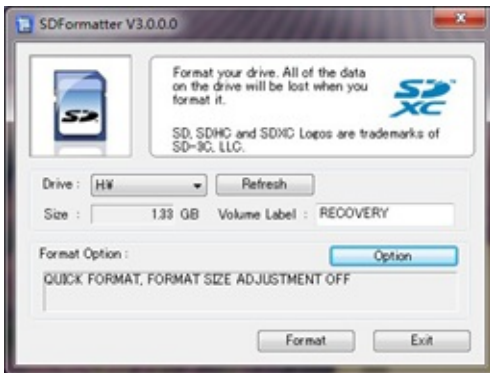
*Check that the SD card you inserted matches the one selected by the Tool.

*Click the "Format" button.

Format your SD under Linux os :

*Run fdisk –l command to check the SD card node.

*Run sudo fdisk /dev/sdx command to delete all partition of SD card.

*Run mkfs –t vfat /dev/sdx command to format the entire SD card as FAT. (x should be replaced according to your SD card node)

3,Download the OS image from Download district(http://www.banana-pi.org)

4.Unzip the download file to get the OS image.

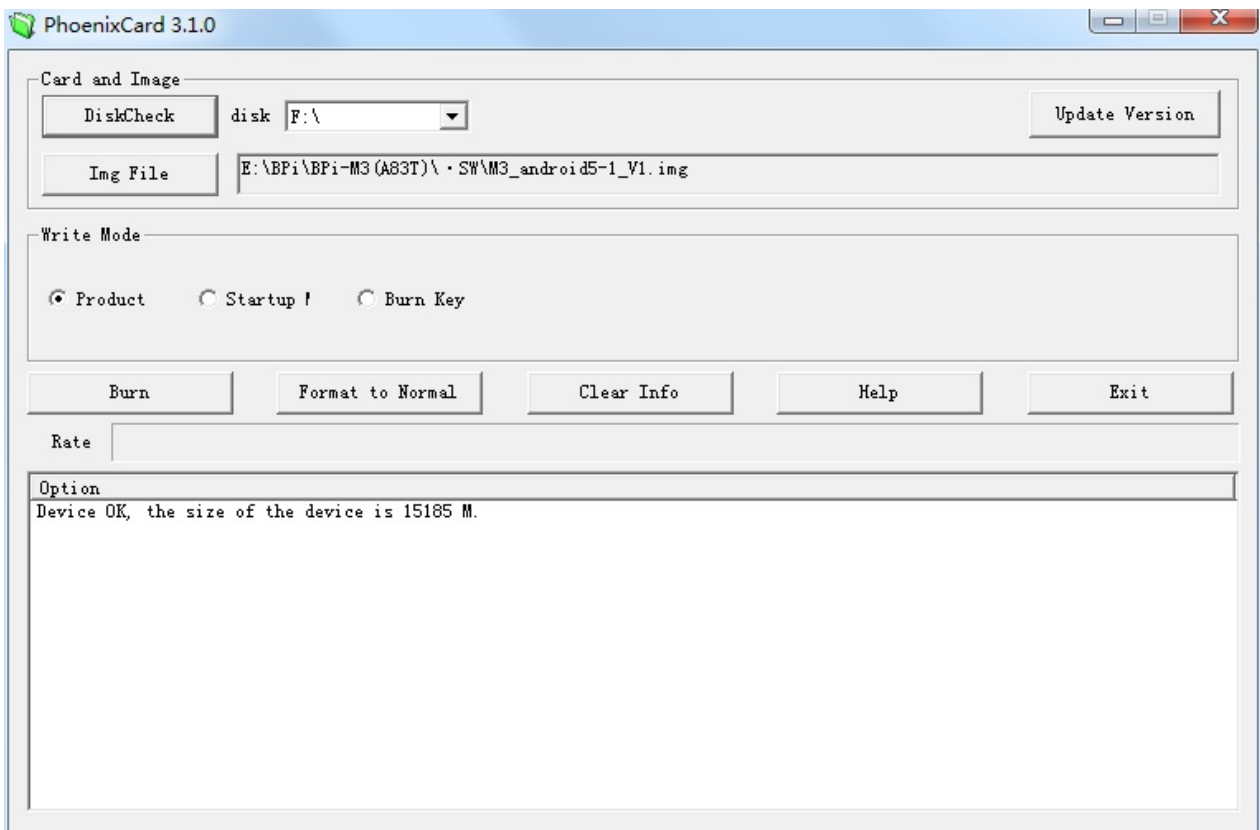Windows: Right click on the file and choose "Extract all".

Linux: Run unzip [downloaded filename] command.

5.Write the image file to the SD card.

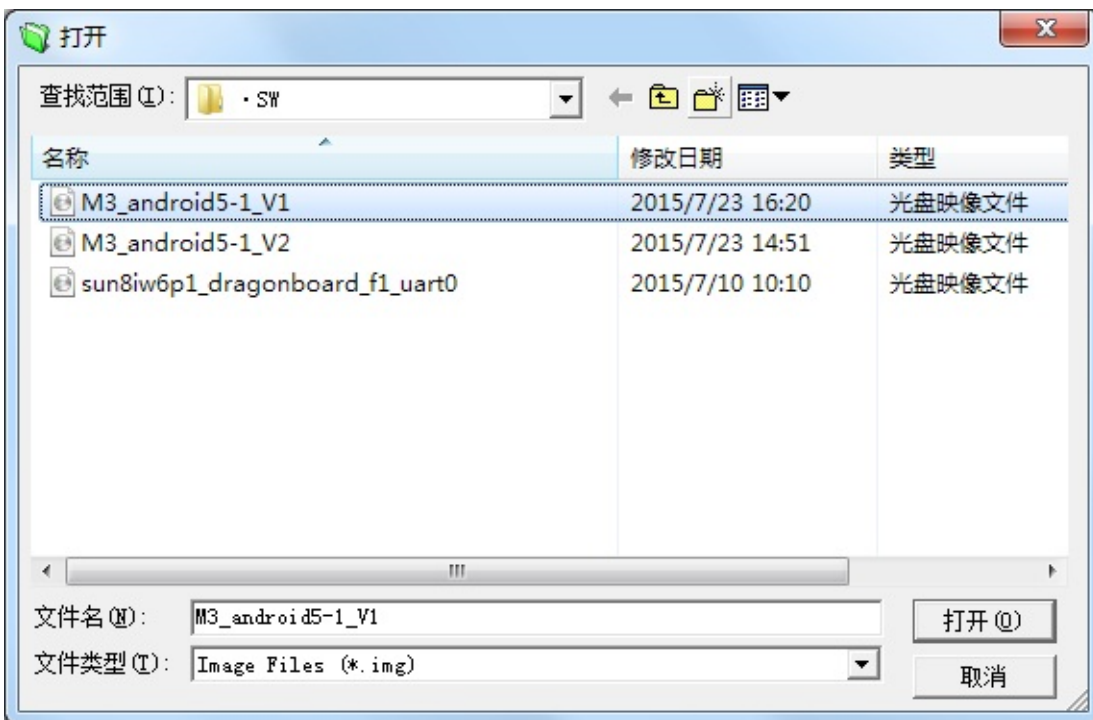**Android image**

5.1 You need to use Phoenix Card to make the SD card. Download the Phoenix Card from https://drive.google.com/open?id=0BzoTh3Vdt47ffi1ld0RuWXhUVzdYdjFjaHEtMlNQWVFTRmIxcC1OQnczSTV6OGRZWGplNU0
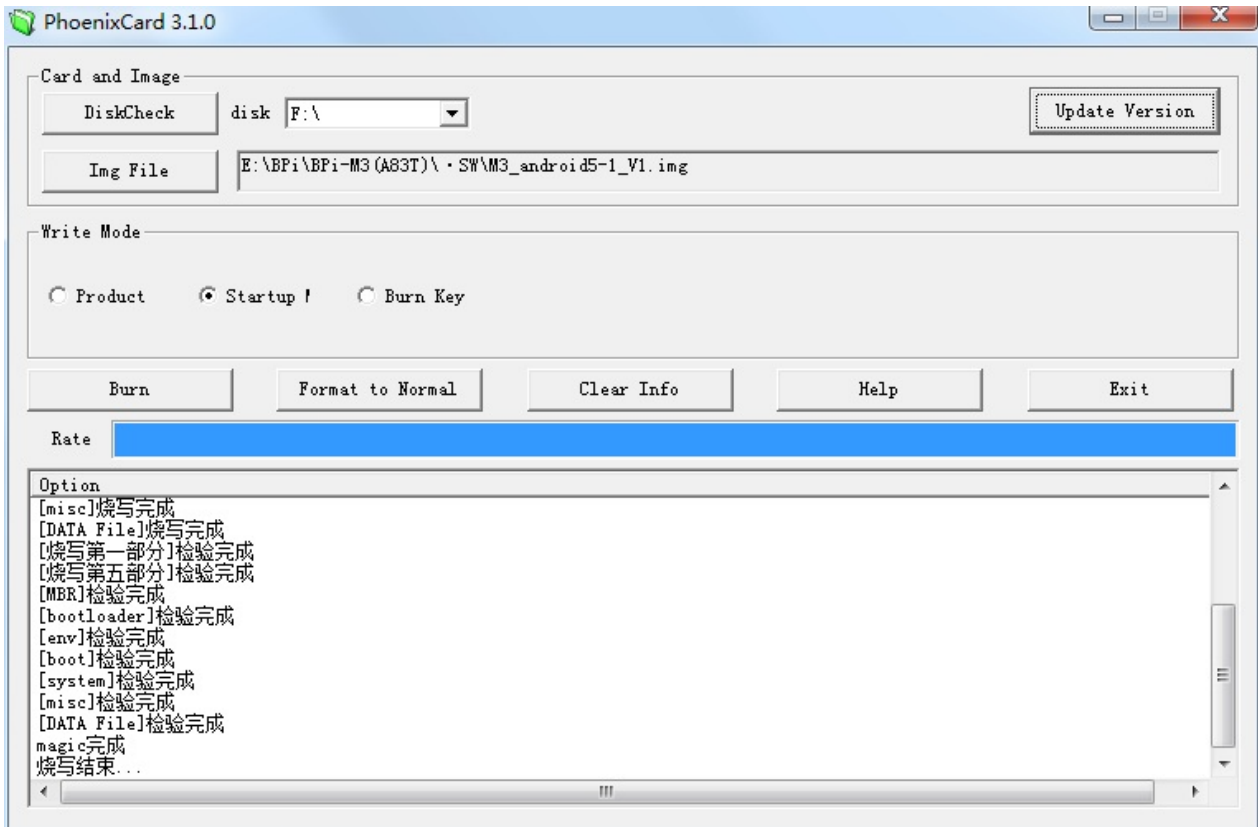
5.2 Run PhoenixCard.exe, Press "Disk Check" and select disk of SD Card.

5.3 Press "Image File" and Select system.img.

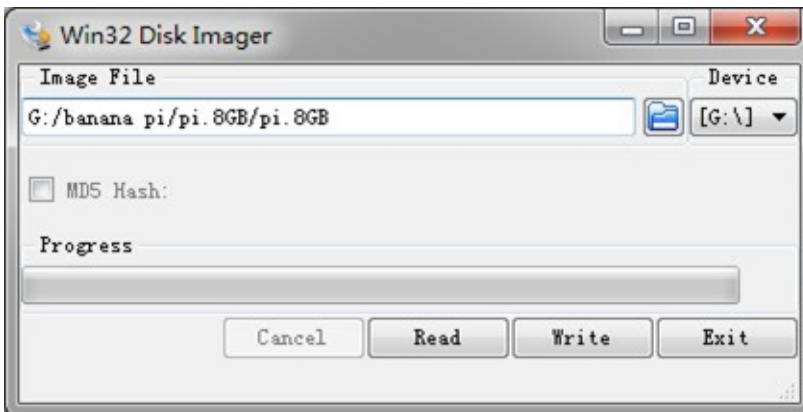5.4 Press "Burn" to start upgrading, Upgraded complete, Press "Exit".

Linux image:

5.6 burun Linux image under Windows os:

*Download a tool that can wirte image to SD card, such as Win32 Diskimager from:
http://sourceforge.net/projects/win32diskimager/files/Archive/

*Open the unzipped image file

*Click Write button. Wait patiently to successfully complete writing.

5.7 burun Linux image under Linux os:

*Run fdisk –l command to check the SD card node.

*Run dd if=[imagename] of=/dev/sdx command to write image file to SD card. Wait patiently to successfully complete writing.

Step4: Set up your Banana Pi M2

According to the set up diagram below, you can easily set up your Banana Pi.

1. Insert the written-image SD card that to the SD card spot on the left side edge of the underside of the board.

2. 2.On the bottom "edge" in the middle of the board is the HDMI Type A (Full sized) port.Just connect any HDMI cable from the board to your TV or HDMI Monitor.
3. Plug a USB keyboard and mouse into the USB slots located on the right edge.
4. Just under the USB ports on the right edge is the Ethernet connector for anyone who wants to plug the Banana Pi into a wired network.
5. 5.Finally, at the very left of the bottom edge is the USB power connector. Plug in a regulated power supply that is rated at 5V ±5% / 2000mA (or 2A). Any number bigger than 700 mA will also work. Avoid using the smaller chargers used for small GSM phones, as these are often unregulated, even if they claim "5V 1A", they may do "5V" and may do "1A", but not at the same time!

If all goes well, the Banana Pi will boot in a few minutes. The screen will display the OS GUI.

Step5: Shut down your Banana Pi

You can use the GUI to shut down the Banana Pi safely.

Also you can run the command in the terminal:

`sudo halt` or `sudo shutdown –h`

This will shut down the PI safely, (just use the power key to turn off might damage the SD-cards file system).After that you can press the power key for 5 seconds to turn it off.

If all is well ,so you can use banana pi M2 now.

Android software

Banana pi BPI-M2 support android 4.4.

Image download link:

http://www.banana-pi.org/download.html

How to build Android 4.4.2 Image for BPI-M2

1. Install the Linux system for building，'Ubuntu 12.04.x LTS'is recommended.
2. Install the needed software packages.

```
sudo apt-get install python-software-properties
sudo add-apt-repository ppa:webupd8team/java
sudo apt-get update
sudo apt-get install oracle-java6-installer
sudo apt-get install libglapi-mesa:i386
sudo apt-get install git gnupg flex bison gperf build-essential zip curl libc6-dev libncurses5-dev:i386 x11proto
-core-dev libx11-dev:i386 libreadline6-dev:i386 libgl1-mesa-glx:i386 libgl1-mesa-dev g++-multilib mingw32 tofrod
os python-markdown libxml2-utils xsltproc zlib1g-dev:i386
sudo ln -s /usr/lib/i386-linux-gnu/mesa/libGL.so.1 /usr/lib/i386-linux-gnu/libGL.so
sudo apt-get install uboot-mkimage
sudo apt-get install xserver-xorg
```

Do NOT reboot system during the process! (IMPORTANT!)
3. Download the latest source code pack from our developer website http://dev.banana-pi.org.cn .And unpack.

4.Building. Build for hdmi.

```
 Build for 7' LCD.

 ``` ./build_LCD.sh
```

If you have finished building one of versions(hdmi OR LCD).Please run following commmand before building another!
(IMPORTANT!)

```
./make_clean.sh
```

For more information of buileding,pleace view 'Build_Code_Command.txt' in code package.

discuss on forum:

http://forum.banana-pi.org/t/how-to-build-android-4-4-2-image-for-bpi-m2/467

ABD driver

banana pi Android ADB Drive download link

link;

baidu download link: http://pan.baidu.com/s/1sj3eDJn

google driver download link:

https://drive.google.com/file/d/0B4PAo2nW2KfnWXFzRGdWOC1fU2c/view?usp=sharing

Linux kernel 3.3

2016-07-19-edu-ubuntu-mate-1604-preview-bpi-m2.img.zip

2016-07-19-edu-ubuntu-mate-1604-preview-bpi-m2.img.zip

1. based on ubuntu 16.04 mate from bpi-m3-mate (http://opensource.ntpc.edu.tw/)
2. BPI-M2 kernel 3.3
3. username & password: pi/bananapi , root/bananapi
4. support HDMI 1080P & 720P(default)
5. support GMAC
6. support WIFI
7. support bpi-bootsel cmd can switch to (bpi-m3 & bpi-m2 & bpi-m2p)
8. support uEnv.txt to fatload script.bin & uImage
9. support uEnv.txt to set video 1080P & 720P & 480P ...
10. support nodejs
11. support node-red
12. included many apps for edu
13. support scratch 2 online with scratchx
14. special thanks to the team of http://opensource.ntpc.edu.tw/

info: need >= 16GB SD

Google Drive: https://drive.google.com/file/d/0B_YnvHgh2rwjUDhMaDctSDlkMU0/view?usp=sharing

MD5: ca175a9e2dc05f0c00f70d193d8cc020

Raspbian Jessie(debian 8) 2016-03-18 for BPI-M2 (20160408)

1. BPI-M2 kernel 3.3
2. username & password: pi/bananapi , root/bananapi
3. support HDMI 1080P & 720P(default)
4. support GMAC
5. support WIFI
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9. support node-red

Google Drive:

https://drive.google.com/file/d/0B_YnvHgh2rwjNk41T18zSERlcG8/view?usp=sharing

MD5: 31143d36e091e72e9e496d80c563efc7

more image ,please see:

http://www.banana-pi.org/m2-download.html

How to building a Minimal system for BPI-M2

1， Format microSD card

Prepare one Class 10 SD card,and cut into two parts; the first partition is FAT32、the second partition is EXT4;but SD card's front end should be reserve space more than 100MB which as Bootloader，Kernel storage area.we use Ubuntu provided by GParted tool to help us cut SD card.

Front end reserve 100MB，first part file system is FAT32，space is 50MB

Second partition file system is EXT4：size is remaining space from SD card

2,Install tool-chain

```
udo apt-get install build-essential libncurses5-dev u-boot-tools qemu-user-static\ debootstrap git binfmt-support lib
usb-1.0-0-dev pkg-config
```

```
sudo apt-get install gcc-arm-linux-gnueabihf
```
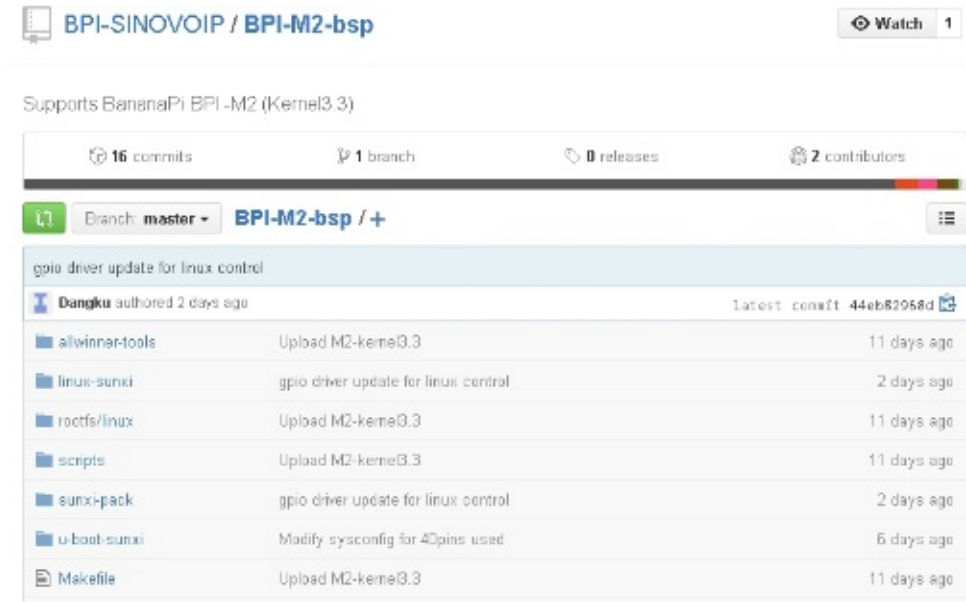

3,To BPI-GitHub https://github.com/BPI-SINOVOIP/BPI-M2-bsp


```
git clone https://github.com/BPI-SINOVOIP/BPI-M2-bsp.git
```


After running，please switch to BPI-M2-bsp directory，run ./build.sh order to know support what development board currently：

```
./build
```


can see BPI-M2 re-configuration profile; select the resolution what you want to compile the BPI-M2,it is assumed that BPI_M2_720P

Select model what you need compile(Here suggest choose (1) option when you compile first time)

```
BPI_M2_720P configured. Now run `make`
Configure success!

This tool support following building mode(s):
------------------------------------------------------
-----
       1. Build all, uboot and kernel and pack to download
       2. Build uboot only.
       3. Build kernel only.
       4. kernel configure.
       5. Build rootfs for linux, and copy target files to
              ROOTFS=/xxx/rootfs.tar.gz
              This is optinal, default using rootfs/linux,
ootfs.tar.gz.
       6. Pack the builds to target download image, this s
 after u-boot,
          kernel and rootfs build out
       7. Clean all build.
------------------------------------------------------
-----
Please choose a mode(1-6): ▮
```

4,After compilation，can see produce new download folder under /BPI-M2-bsp

5,Go to ArmHf official website

http://www.armhf.com/download/download Root File Systems-Debian Wheezy 7.5

6,Install Root File Systems

extract the files which was download compressed to SD second partition EXT4; please note that the decompressed instructions

```
sudo tar --strip-components=1 -pJxvf< file source > -C < Extract storage location >
```


7,Install BootLoader;please use order to see current SD card position

```
sudo fdisk -l
```

After run order，can see the example SD card's position in /dev/sdb


```
Disk /dev/sdb: 7948 MB, 7948206080 bytes
245 heads, 62 sectors/track, 1021 cylinders, total 15523840 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000b6907

   Device Boot      Start         End      Blocks   Id  System
/dev/sdb1           10240       75775       32768    b  W95 FAT32
/dev/sdb2           75776    15523839     7724032   83  Linux
```

Please refer to fourth tips，after compilation will have Bananapi folder;then youwill see bootload/ Kernel these file from download/BPI_M2_720P folder。Please write in former 100MB of SD card Individually。

```
sudo dd if=boot0_sdcard.fex        of=${card} bs=1k seek=8
sudo dd if=u-boot.fex          of=${card} bs=1kseek=19096
sudo dd if=sunxi_mbr.fex        of=${card} bs=1k seek=20480
sudo dd if=bootloader.fex          of=${card} bs=1k seek=36864
sudo dd if=env.fex          of=${card}bs=1k seek=69632
sudo dd if=boot.fex           of=${card} bs=1k seek=86016
```

Step 1: BPI-M2 we will use first partition FAT32 don't need to copy any file，for compatible with Kernel4.1.X in the near future

Step 2: Copy modules to Second partition EXT4 of lib catalog from /BPI-M2-bsp/download/BPI_M2_720P/lib directory
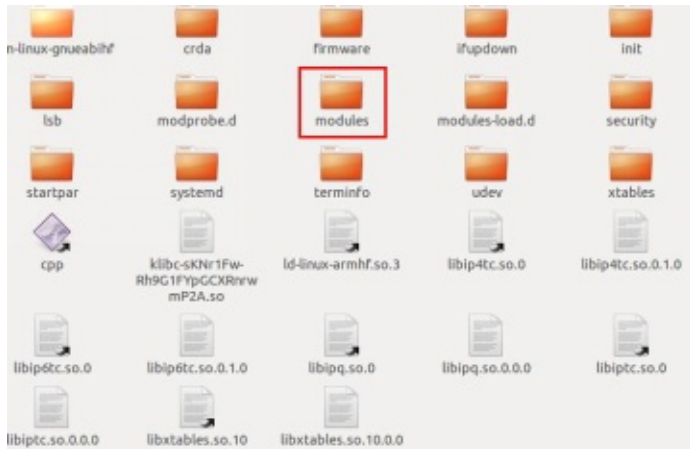
Step 3:Please building wifi-firmware read's directory (/system/vendor)and building Link from Second partition，because BPI-M2 loading bcmdhd.ko will go to relative path searching WiFi-firmware，so we need building one link：

```
$sudo mkdir system
```



```
$cd system
$sudo mkdir vendor
```
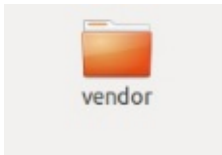
Go to system/vendor directory building relative link

```
$ sudo ln -s /lib/modules/3.11.0-15-generic/ modules
```


8.Finished above steps

please insert maked-SD card into Banana Pi，please try to Boot。

uboot

Patchwork [U-Boot,v2,2/2] sunxi: Add defconfig for the Sinovoip BPI-M2 boardlogin register mail settings

more message:

http://patchwork.ozlabs.org/patch/530737/

mainline kernel

mainline kernel

Armbian linux for BPI-M2

Armbian.org have image support BPI-M2

more please see:

http://www.armbian.com/banana-pi-m2/

Bananian linux

Bananian Linux is a pre-installed Debian 8 image optimized for Banana Pi/Pro. It uses the official Debian Jessie armhf repositories with a kernel and bootmanager (u-boot), customized for Banana Pi.

A Debian 7/Wheezy image (Bananian 15.04) is also available and maintained.

We support the Banana Pi (M1, M1+,M2), BPI-R1 with just one single image.

The main focus is to provide a lightweight headless platform for home servers, small webservers, ownCloud hosting, Linux based wifi access points, router, NAS systems, monitoring devices, etc.

Official web for image download and support:

https://www.bananian.org/bananapi-m2

OpenSuse for BPI-M2

Banana Pi M2, runs on A31s quad-core CPU and has 1G RAM, powerful enough to run openSUSE Tumbleweed with Xfce Desktop.

Here is how you can get openSUSE running on Banana Pi M2.

- Download the image https://sourceforge.net/projects/cyberorg-home/files/opensuse-arm/openSUSE-Tumbleweed-Bpi-M2-Xfce.tar.xz/download

- Extract the archive to get openSUSE-Tumbleweed-Bpi-M2-Xfce.img

- Dump openSUSE-Tumbleweed-Bpi-M2-Xfce.img on to a SD card

  (dd if=/path/to/openSUSE-Tumbleweed-Bpi-M2-Xfce.img of=/dev/sdX bs=4M; sync #replace /dev/sdX with your actual SD card device)

- In case you have a bigger SD card, use yast2 disk(partitioner) to "expand" the second partition. You can use yast's package manager to install more software. The default password for root is linux, you may want to change that first thing after booting.

Note: unable to get sound on this hardware, probably their kernel is missing sound related modules, if you figure out how to get sound working drop me a line so I can include it in next release.Everything else(wifi, hdmi out, USB ports etc) works well enough.

more please see this link:

https://lizards.opensuse.org/2015/12/03/banana-pi-m2-running-opensuse-tumbleweed/

OpenWRT

OpenWRT have support many allwinner chip . so easy to use it on banana pi

Allwinner Sun4i/5i/6i/7i/9i (sunxi) Various vendors are offering development boards / single-board computer based on the Allwinner SoCs. These are running various flavors of the A1x, A20, A31, and soon H3 SoCs, with different buildouts. The mach is called "sunxi".

For some specs rather see Allwinner_Technology#A-Series.

Supported Versions

Model Version	Launch Date	OpenWrt Version Supported	Model Specific Notes
A10	-	CC/trunk	Single Cortex-A8
A10s	-	CC/trunk	Single Cortex-A8
A13	-	CC/trunk	Single Cortex-A8
A20	-	CC/trunk	Dual Cortex-A7
A23	-	na	Dual Cortex-A7
A31	-	trunk	Quad Cortex-A7
A33	-	na	Quad Cortex-A7
A80	-	na	8-core big.LITTLE (4x A15 + 4x A7)
H3	-	trunk	Quad-core Cortex-A7
H8	-	na	8-core Cortex-A7

more please see:

https://wiki.openwrt.org/doc/hardware/soc/soc.allwinner.sunxi?s[]=banana&s[]=pi

BPI-M2 WiringPi

install BPI-M2 WiringPi:

1，Download WiringPi from github For BPI-M2

```
git clone https://github.com/BPI-SINOVOIP/BPI-WiringPi.git -b BPI_M2
```

2，Installation：

```
cd BPI-WiringPi
```

```
chmod +x ./build
```

```
sudo ./build
```

3，test wiringPi is install success

```
gpio -v
```

```
pi@bananapi:~$ gpio -v
gpio version: 2.26
Copyright (c) 2012-2015 Gordon Henderson
This is free software with ABSOLUTELY NO WARRANTY.
For details type: gpio -warranty

Banana Pi Details:
  Type: Model BM, Revision: 1.2, Memory: 2048MB, Maker: BPI
pi@bananapi:~$
```

```
gpio readall
```

```
pi@bananapi:~$ gpio readall
+-----+-----+---------+------+---+---Pi ---+---+------+---------+-----+-----+
| CPU | wPi |   Name  | Mode | V | Physical | V | Mode |  Name   | wPi | CPU |
+-----+-----+---------+------+---+----++----+---+------+---------+-----+-----+
|     |     |   3.3v  |      |   | 1  || 2  |   |      | 5v      |     |     |
| 229 |   8 |  SDA.1  | ALT5 | 0 | 3  || 4  |   |      | 5V      |     |     |
| 228 |   9 |  SCL.1  | ALT5 | 0 | 5  || 6  |   |      | GND     |     |     |
| 362 |   7 |   GCLK  | ALT5 | 0 | 7  || 8  | 0 | ALT5 | TxD0    | 15  | 32  |
|     |     |    GND  |      |   | 9  || 10 | 0 | ALT5 | RxD0    | 16  | 33  |
|  68 |   0 |   GEN0  | ALT3 | 0 | 11 || 12 | 0 | ALT5 | GEN1    | 1   | 35  |
|  71 |   2 |   GEN2  | ALT3 | 0 | 13 || 14 |   |      | GND     |     |     |
|  81 |   3 |   GEN3  | ALT3 | 0 | 15 || 16 | 0 | ALT5 | GEN4    | 4   | 34  |
|     |     |   3.3v  |      |   | 17 || 18 | 0 | ALT3 | GEN5    | 5   | 360 |
|  64 |  12 |   MOSI  | ALT3 | 0 | 19 || 20 |   |      | GND     |     |     |
|  65 |  13 |   MISO  | ALT3 | 0 | 21 || 22 | 0 | OUT  | GEN6    | 6   | 361 |
|  66 |  14 |   SCLK  | ALT3 | 0 | 23 || 24 | 0 | ALT3 | CE0     | 10  | 67  |
|     |     |    GND  |      |   | 25 || 26 | 0 | ALT3 | CE1     | 11  | 234 |
| 227 |  30 |  SDA.0  | ALT5 | 0 | 27 || 28 | 0 | ALT5 | SCL.0   | 31  | 226 |
|  82 |  21 | GPIO.21 | ALT3 | 0 | 29 || 30 |   |      | GND     |     |     |
| 202 |  22 | GPIO.22 | ALT3 | 0 | 31 || 32 | 0 | ALT3 | GPIO.26 | 26  | 205 |
| 203 |  23 | GPIO.23 | ALT3 | 0 | 33 || 34 |   |      | GND     |     |     |
| 204 |  24 | GPIO.24 | ALT3 | 0 | 35 || 36 | 0 | ALT3 | GPIO.27 | 27  | 133 |
| 132 |  25 | GPIO.25 | ALT3 | 0 | 37 || 38 | 0 | ALT3 | GPIO.28 | 28  | 146 |
|     |     |    GND  |      |   | 39 || 40 | 0 | ALT3 | GPIO.29 | 29  | 147 |
+-----+-----+---------+------+---+----++----+---+------+---------+-----+-----+
| CPU | wPi |   Name  | Mode | V | Physical | V | Mode |  Name   | wPi | CPU |
+-----+-----+---------+------+---+---Pi ---+---+------+---------+-----+-----+
```

4，create new：blink.c

```
#include <wiringPi.h>
int main(void)
{
  wiringPiSetup() ;
  pinMode (0, OUTPUT) ;
  for(;;)
  {
    digitalWrite(0, HIGH) ; delay (500) ;
    digitalWrite(0,  LOW) ; delay (500) ;
  }
}
```

compile and run it:

```
gcc -Wall -o blink blink.c -lwiringPi
```

runing it:

```
sudo ./blink
```

BPI have many extend board support WiringPi. so you can free DIY by youself:

more about BPI extend board,please see:

https://bananapi.gitbooks.io/bpi-accessories/content/

BPI-M2 source code on github

All newest source code have update on this github site.

https://github.com/BPI-SINOVOIP/BPI-M2-bsp

How to setup docker env. to build github source code

how to setup docker env. to build banana pi github source code

step 1: install docker

https://docs.docker.com/engine/installation/linux/ubuntulinux/

step 2: docker run

https://hub.docker.com/r/sinovoip/bpi-build/

```
$ do cker run -d -p 2222:22 -v /media:/media sinovoip/bpi-build:ubuntu12.04
```

on your host

```
$ ssh -p 2222 root@127.0.0.1 //default passwd is root
```

or (with --privileged can use /dev/loop for create img)

```
$ docker run -d -p 3333:22 --privileged -v /media:/media sinovoip/bpi-build:ubuntu12.04

$ ssh -p 3333 root@127.0.0.1 //default passwd is root
```

step 3: git clone

```
# cd /media/XXX/your-source
# git clone https://github.com/BPI-SINOVOIP/BPI-M3-bsp.git
```

step 4: build

```
# ./build.sh
```

how to create your own env. to build the code

step 1: git clone https://github.com/BPI-SINOVOIP/bpi-build.git

step 2: vi Dockerfile

step 3. vi build.sh

step 4: ./build.sh

why use docker env. to build banana pi source code

1. allwinner tools needs ubuntu12.04 with ia32-libs ...
2. user maybe use ubuntu 12.04 or 14.04 and newer like 16.04, the docker env. the same, even other linux like fedora opensuse archlinux ...., or other os like macos , windows ...
3. build BPI-Mx-bsp env. than mainline kernel & uboot or android 4.X or android 5.X / 6.X not the same.

BPI-M2 Building a Minimal linux System

document

Google Download Link: https://drive.google.com/a/edu.52miku.tk/file/d/0B4l1r4Ltm446MFBvUkwtVU9lcmM/view

Baidu Download Link: http://pan.baidu.com/s/1ntrHIh7

Reference documents for BPI-M2

BPI-M2 linux-sunxi wiki

http://linux-sunxi.org/Banana_Pi_M2

A31 Manual build howto

This is currently a placeholder for an A31 specific rework of the Manual build howto.

This page describes the process to combine Allwinners binary boot0, an SDK U-Boot, an SDK linux kernel and other bits together to create a useful SD-card from scratch, the basis for further hacking.

This page is only suited for A31 and A31s based devices, please look under See also for other manual build howtos.

We of course do not build a whole distribution, we only build U-Boot, the kernel and a handful of tools, and then use an existing rootfs to get a useful system. Depending on the rootfs size, you might want to use a 2GB or larger SD Card. SD-card partitioning and formatting will be taken care of later.

link:

http://linux-sunxi.org/A31_Manual_build_howto

NetBSD/evbarm on Allwinner Technology SoCs

NetBSD is a free, fast, secure, and highly portable Unix-like Open Source operating system. It is available for a wide range of platforms, from large-scale servers and powerful desktop systems to handheld and embedded devices. Its clean design and advanced features make it excellent for use in both production and research environments, and the source code is freely available under a business-friendly license. NetBSD is developed and supported by a large and vivid international community. Many applications are readily available through pkgsrc, the NetBSD Packages Collection

NetBSD 7.0 has support for A20 and A31 SoCs. NetBSD -current adds support for A80 SoCs.

more please see:

https://wiki.netbsd.org/ports/evbarm/allwinner/#index1h1

Linux mainlining effort

The purpose of this page is to try and define sub-goals and milestones for the mainlining effort, containing goals and sub-goals with milestones for adding Allwinner support in the upstream mainline Linux Kernel.

It is very important to note that this is intended as a rough set of minimal goals - it is not meant to collide with the huge effort of rewriting major drivers!

more ,please see link:

http://linux-sunxi.org/Linux_mainlining_effort

Allwinner chip documents

allwinner chip online datasheet and documents:

Index of /

File Name ↓	File Size ↓	Date ↓
Parent directory/	–	–
A10/	–	27-Sep-2014 11:51
A10s/	–	27-Sep-2014 11:51
A13/	–	27-Sep-2014 11:51
A20/	–	13-Jan-2015 11:26
A23/	–	21-Aug-2014 07:56
A31/	–	27-Sep-2014 11:51
A31s/	–	27-Sep-2014 11:51
A33/	–	27-Jun-2015 14:11
A64/	–	16-Dec-2015 00:02
A80/	–	24-Sep-2014 08:18
A83T/	–	08-Jan-2015 21:24
AXP/	–	08-Jan-2015 21:28
F1C100/	–	12-Aug-2014 12:34
F20/	–	28-Mar-2014 15:41
H3/	–	02-Apr-2015 08:29
SDK/	–	27-Aug-2014 14:04
allwinner/	–	04-Mar-2013 14:49
chips/	–	19-May-2013 23:37
mali/	–	16-Oct-2012 21:22
nightly/	–	15-Nov-2013 18:58
rtlwifi/	–	25-Sep-2012 19:05
touchscreen/	–	22-Mar-2015 16:13
users/	–	19-Sep-2014 11:45
robots.txt	84	26-Aug-2014 10:22

http://dl.linux-sunxi.org/

All Banana Pi SBC Comparison

	Banana Pi (BPI) Series Comparison				
Model	**Banana Pi BPI-M1**	**Banana Pi BPI-M1+**	**Banana Pi BPI-M2+**	**Banana Pi BPI-M2**	**Banana Pi BPI-M3**
Photo					
CPU	A20 Cortex™-A7 Dual-Core		H3 Cortex™-A7 Quad-Core	A31S Cortex™-A7 Quad-Core	A83T Cortex™-A7 Octa-Core
GPU	ARM® Mali400MP2 Complies with OpenGL ES 2.0/1.1			PowerVR SGX544MP2 GPU Support OpenGL ES 2.0, OpenVG 1.1, OpenCL 1.1, and DX 9.3 standards	
SDRAM	1GB DDR3 (shared with GPU)				2GB LPDDR3 (shared with GPU)
Storage	SD (Max. 32GB)/MMC card slot, SATA 2.0 port	MicroSD (TF) card SATA 2.0 port	MicroSD (TF) card,eMMC 8GB	MicroSD (TF) card / MMC card slot	MicroSD (TF) card,eMMC 8GB SATA 2.0 port(via USB to SATA)
Network	10/100/1000 Ethernet				
RF	N/A	802.11b/g/n	802.11b/g/n & BT4.0	802.11b/g/n	802.11b/g/n & BT4.0
Display	HDMI, CVBS , LVDS/RGB		HDMI	HDMI, LVDS/RGB	HDMI, MIPI Display Serial Interface (DSI)
Camera	Parallel 8-bit camera interface				Parallel 8-bit camera interface MIPI Camera serial Interface(CSI)
Video Outputs	HDMI 1.4 transmitter with HDCP LVDS/Sync RGB/CPU LCD interface up to 1920x1200 Video decoding speed up to 1080p@60fps Video encoding H.264 HP up to 1080p@30fps		Support H.265 decode by 4K@30fps, HDMI 1.4 1080p@60fps Support H.264 video encoding up to 1080p@30fps	HDMI 1.4 1080p@60fps LVDS/RGB/CUP LCD interface 1280x800 Decoding up to 1920x1080@60fps Video encoding H.264 HP: speed up 1920x1080@30fps	Support 4-lane MIPI DSI up to 1920x1200@60Hz HDMI 1.4 output with HDCP 1.2 Support LVDS up to 1366x768@60Hz HEVC/H.265 decoder(SW), Main profile, 1080p@30fps H.264 video encoding up to 1080p@60fps, 720p@120fps
Audio Output	3.5 mm Jack and HDMI		HDMI	3.5 mm Jack and HDMI	
GPIO	26-PIN: GPIO, UART, I²C bus, SPI bus with two chip selects, CAN bus,PWM,+3.3 V, +5 V, ground	40-PIN: GPIO, UART, I²C bus,I²S bus,SPI bus with two chip selects, CAN bus, PWM,+3.3 V, +5 V, ground	40-PIN: PWM,GPIO,UART,I²C bus,I²S bus,SPI bus,+3.3v,+5v,ground.		
Power Source	5 volt via MicroUSB and/or MicroUSB (OTG)		5 volt via DC In and/or MicroUSB (OTG)		
USB 2.0 Ports	2 USB ports, 1 OTG microUSB port		4 USB 2.0 ports, 1 OTG microUSB port	2 USB 2.0 ports, 1 OTG microUSB port	
Buttons	Reset button, Power button, Uboot button		Power button, Uboot button	Reset button, Power button, Uboot button	
LED	Power LED (red), RJ45 LED (blue), user define LED (green)		Power LED (red,Can be defined by user)	User define LED (red/power, blue, green)	
Remote	IR reciever				
Board Size	92 mm × 60mm		65 x 65mm	92 mm × 60mm	92 mm × 60mm
Box Size	20 mm x 80mm x 105mm				
Weight	60g		48g	60g	
OS	Android 4.4 and Linux etc. OS				Android 5.1 & Linux OS

All banana pi product

- **banana pi BPI-M1 allwinner A20 dual core single board computer**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-m1/content/en/

- **banana pi BPI-M1+(BPI-M1+ plus) allwinner A20 dual core single board computer**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-m1-bpi-m1-plus-/content/en/

- **banana pi BPI-M2 allwinner A31s quad core single board computer**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-m2/content/en/

- **banana pi BPI-M2+（BPI-M2 Plus）allwinner H3 quad cord single board computer**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-m2-/content/en/

- **banana pi BPI-M2 Ultra allwinner R40 quad core single board computer**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-m2-ultra/content/

- **Banana pi BPI-M3 allwinner A83T (R58 H8) octa-core single board computer**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-m3/content/en/

- **banana pi BPI-M64 allwinner A64 64 bit single board computer**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-m64/content/en/

- **banana pi BPI-R1 allwinner A20 dual core smart router board**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-r1/content/en/

- **banana pi BPI-D1 open source IP camera board**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-d1/content/en/

- **banana pi BPI-G1 open source IoT development board**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-g1/content/en/

- **banana pi BPI Accessories**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-accessories/content/en/

- **BPI Open debugger burn development tool board**

  gitbook online datasheet:https://bananapi.gitbooks.io/bpi-open-debugger-burn-board/content/en/

BPI 4.0 customized Server

Having been doing R&D in embeded systems for more than 12 years. Our experienced teams are able to help you to carry out your dream. Whether you want to customize banana pi or want to design a computer from scratch, we got you covered. Also, our modern ISO factory spans over 10,000 square meters can help you mass manufacture products to hit the market

Our factory:Sinovoip In order to meet the companys development needs, and further production capacity and product quality. Sources Communication shareholders decided to invest in new plant to build their own, the new factory site is located in manholes and covers an area of more than 10000 square meters,equipped with full range of production equipment and high quality technical management personnel . We have complete SMT production lines, plug-ins production line, assembly line, production line testing.

- your Idea, we will help you optimize and design.
- your Design, we will help you bring it to live.
- your Product, we will help you mass produce it.

Customize Pi

If you want to tailor your Banana pi to your specific use or to minimize the cost for mass production purpose, you are coming the right place. We provide the customization service of banana pi such as remove/add headers or connectors,change component layout,add/remove components,change interfaces etc.

add peripheral converter
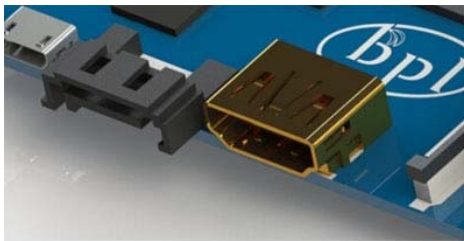
add/remove headers or connectors

2GB LPFlash AP6212 add/remove components

change headers

Start from scratch (ODM)

An idea flashes through your mind in your dreams or a solution bearing in your mind for a long time, which you think would turn out to be great gadget to hit the market, but you are worrying about how to start and realize it without R&D and manufacturing, now that's no longer a trouble to you. Taking advantage of our expertise,we provide full ODM service for you. We let you have your sample products from scratch within 45 days. Don't wait,come to realize your dreams.
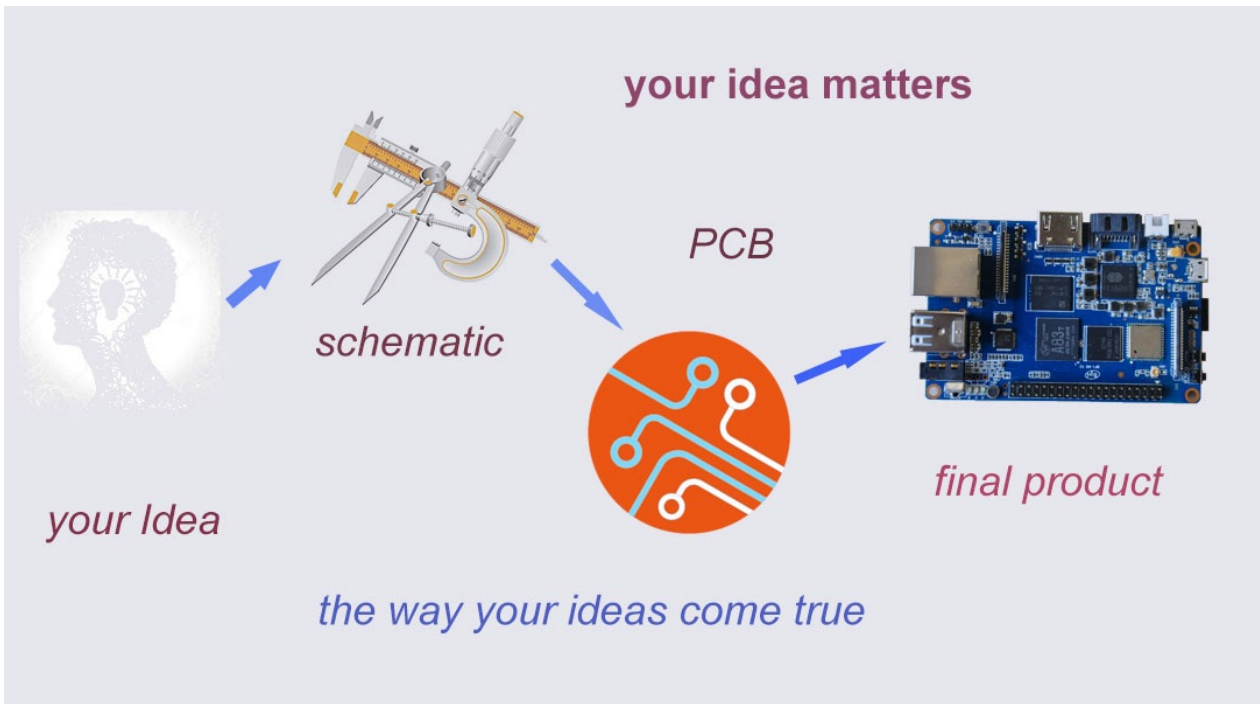
Have a prototype (OEM)

You are an expert, you designed a wonderful device that most people would want to have it, you knew it quite well that your success is just around the corner. The only last step is to produce it,but without manufactruing capability..., no problem, let us carry you through. Our 13 years of SCM experience and mass manufacturing facilities enable you free from quality issue,delivery...