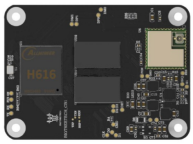

BIGTREETECH CB1 Single Board User Manual

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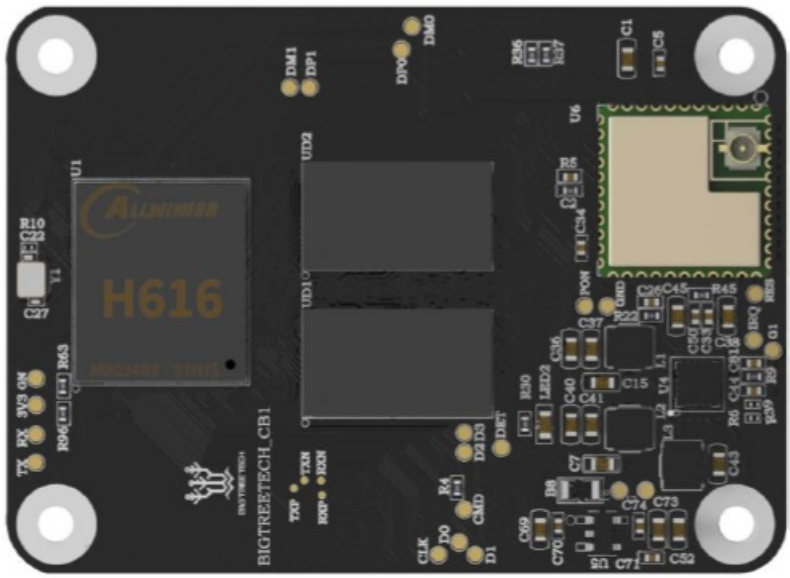
BIGTREETECH

BIGTREETECH CB1 Single Board



Product Information

The BIGTREETECH CB1 is a product launched by Shenzhen Big Tree Technology Co., Ltd. to provide a solution to the shortage of Raspberry Pi CM4. It has a quad-core Cortex-A53 CPU and Mali G31 MP2 GPU, supports OpenGL3.2, and has 512MB/1GB DDR3L SDRAM RAM. It is compatible with HDMI2.0A interface, supports 4K displays, and has USB2.0 interface. It supports 100M Ethernet + 100M WiFi and has the same BTB header as the Raspberry Pi CM4.

Feature Highlights

- CPU: ALLWINNER H616, Quad-core Cortex-A53 @1.5GHz
- GPU: Mali G31 MP2, Support OpenGL3.2
- RAM: 512MB/1GB DDR3L SDRAM
- Display: Compatible with HDMI2.0A Interface, Support 4K Displays
- Compatible with USB2.0 Interface
- Support 100M Ethernet + 100M WiFi
- Having the same BTB header as the Raspberry Pi CM4.

Specifications

- Dimensions: N/A
- Peripheral Port: Pin Connector

Revision History

- Version: 01.00
- Revisions: Original
- Date: 2022/09/20

Product Usage Instructions

The BIGTREETECH CB1 outputs signals to the motherboard via a fast and convenient two 100 pins micro BTB

connection header. It can be used to connect to a display, USB devices, Ethernet, and WiFi. Here are the steps to use the product:

1. Connect the BIGTREETECH CB1 to the motherboard using the two 100 pins micro BTB connection header.
2. Connect a display to the HDMI2.0A interface on the BIGTREETECH CB1.
3. Connect USB devices to the USB2.0 interface on the BIGTREETECH CB1.
4. Connect to the internet using either the 100M Ethernet or 100M WiFi on the BIGTREETECH CB1.

Revision History

Version	Revisions	Date
01.00	Original	2022/09/20

Product Profile

The BIGTREETECH CB1 is launched to provide a great solution to the insane shortage of Raspberry Pi CM4. It outputs signals to the motherboard via the fast and convenient two 100 pins micro BTB connection header, including 100M Ethernet, HDMI, etc. Also, onboard 2.4G WiFi.

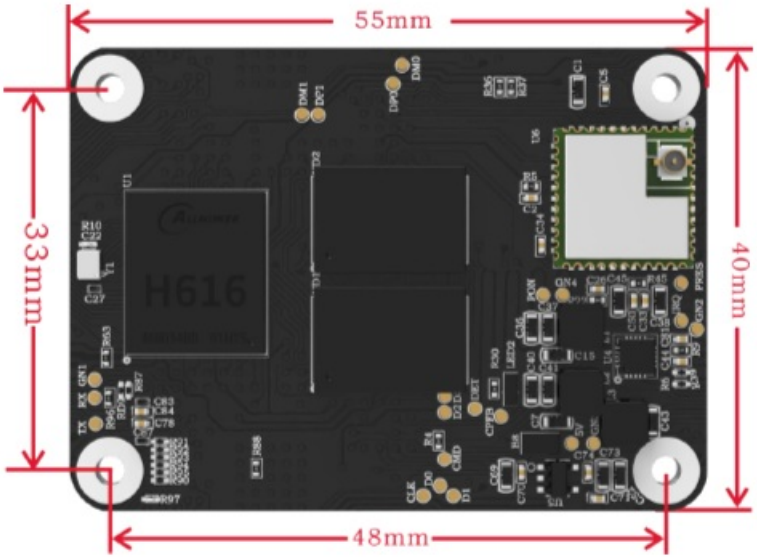
Feature Highlights

1. **CPU**: ALLWINNER H616, Quad-core Cortex-A53 @1.5GHz
2. **GPU**: Mali G31 MP2, Support OpenGL3.2
3. **RAM**: 512MB/1GB DDR3L SDRAM
4. **Display**: Compatible with HDMI2.0A Interface, Support 4K Displays
5. Compatible with USB2.0 Interface
6. Support 100M Ethernet + 100M WiFi
7. Having the same BTB header as the Raspberry Pi CM4.

Specifications

1. Product Size: 40mm x 55mm
2. Mounting Size: 33mm x 48mm
3. Input Voltage: 5V±5%/2A
4. Output Voltage: 3.3V±2%/100mA
5. Output Voltage: 1.8V±2%/100mA
6. WiFi: 2.4G/802.11 b/g/n

Dimensions



Peripheral Port

Pin

PIN	Connector	Signal	Description
1	A connector_01	GND	
2	A connector_02	GND	
3	A connector_03	NC	
4	A connector_04	EPHY-TXP	Ethernet TX Positive
5	A connector_05	NC	
6	A connector_06	EPHY-TXN	Ethernet TX Negative
7	A connector_07	GND	
8	A connector_08	GND	
9	A connector_09	NC	
10	A connector_10	EPHY-RXP	Ethernet RX Positive
11	A connector_11	NC	
12	A connector_12	EPHY-RXN	Ethernet RX Negative
13	A connector_13	GND	
14	A connector_14	GND	
15	A connector_15	LINK_LED	Ethernet LED
16	A connector_16	NC	
17	A connector_17	SPD_LED	Ethernet LED
18	A connector_18	NC	

19	**A connector_19**	**NC**	
20	**A connector_20**	**NC**	
21	**A connector_21**	**SYS-LED**	System work light
22	**A connector_22**	**GND**	
23	**A connector_23**	**GND**	
24	**A connector_24**	**PC15**	3.3V IO(CB1 V2.1 is 1.8v)
25	**A connector_25**	**PC8**	3.3V IO(CB1 V2.1 is 1.8v)
26	**A connector_26**	**PC6**	3.3V IO(CB1 V2.1 is 1.8v)
27	**A connector_27**	**PH10**	3.3V IO
28	**A connector_28**	**NC**	
29	**A connector_29**	**NC**	
30	**A connector_30**	**PG6**	3.3V IO
31	**A connector_31**	**PG9**	3.3V IO
32	**A connector_32**	**GND**	
33	**A connector_33**	**GND**	
34	**A connector_34**	**NC**	
35	**A connector_35**	**PG7**	3.3V IO
36	**A connector_36**	**NC**	
37	**A connector_37**	**PG8**	3.3V IO
38	**A connector_38**	**PH6**	3.3V IO
39	**A connector_39**	**NC**	3.3V IO
40	**A connector_40**	**PH8**	3.3V IO
41	**A connector_41**	**NC**	
42	**A connector_42**	**GND**	
43	**A connector_43**	**GND**	
44	**A connector_44**	**PH7**	3.3V IO
45	**A connector_45**	**PC9**	3.3V IO(CB1 V2.1 is 1.8v)
46	**A connector_46**	**PC10**	3.3V IO(CB1 V2.1 is 1.8v)
47	**A connector_47**	**PC11**	3.3V IO(CB1 V2.1 is 1.8v)
48	**A connector_48**	**PC12**	3.3V IO(CB1 V2.1 is 1.8v)
49	**A connector_49**	**PC13**	3.3V IO(CB1 V2.1 is 1.8v)
50	**A connector_50**	**PC14**	3.3V IO(CB1 V2.1 is 1.8v)

51	**A connector_51**	**SoC_RX**	DEBUG UART
52	**A connector_52**	**GND**	
53	**A connector_53**	**GND**	
54	**A connector_54**	**PC7**	3.3V IO(CB1 V2.1 is 1.8v)
55	**A connector_55**	**SoC_TX**	DEBUG UART
56	**A connector_56**	**NC**	
57	**A connector_57**	**SDC0-CLK**	SDCARD Clock signal

58	**A connector_58**	**NC**	
59	**A connector_59**	**GND**	
60	**A connector_60**	**GND**	
61	**A connector_61**	**SDC0-D3**	SDCARD Data3 signal
62	**A connector_62**	**SDC0-CMD**	SDCARD CMD signal
63	**A connector_63**	**SDC0-D0**	SDCARD Data0 signal
64	**A connector_64**	**PG11**	3.3V IO
65	**A connector_65**	**GND**	
66	**A connector_66**	**GND**	
67	**A connector_67**	**SDC0-D1**	SDCARD Data1 signal
68	**A connector_68**	**PG12**	3.3V IO
69	**A connector_69**	**SDC0-D2**	SDCARD Data2 signal
70	**A connector_70**	**PG13**	3.3V IO
71	**A connector_71**	**GND**	
72	**A connector_72**	**PG14**	3.3V IO
73	**A connector_73**	**PG16**	3.3V IO
74	**A connector_74**	**GND**	
75	**A connector_75**	**NC**	
76	**A connector_76**	**SDC0-DET**	SDCARD detect
77	**A connector_77**	**VCC_5V**	5V IN /2A
78	**A connector_78**	**NC**	
79	**A connector_79**	**VCC_5V**	5V IN /2A
80	**A connector_80**	**NC**	
81	**A connector_81**	**VCC_5V**	5V IN /2A
82	**A connector_82**	**NC**	

83	**A connector_83**	**VCC_5V**	5V IN /2A
84	**A connector_84**	**3V3**	3.3V out /200mA
85	**A connector_85**	**VCC_5V**	5V IN /2A
86	**A connector_86**	**3V3**	3.3V out /200mA
87	**A connector_87**	**VCC_5V**	5V IN /2A
88	**A connector_88**	**1V8**	1.8V out /100mA
89	**A connector_89**	**NC**	
90	**A connector_90**	**1V8**	1.8V out /100mA
91	**A connector_91**	**NC**	
92	**A connector_92**	**PWRON**	Power switch (useless)
93	**A connector_93**	**FEL**	(useless)
94	**A connector_94**	**NC**	
95	**A connector_95**	**NC**	
96	**A connector_96**	**NC**	
97	**A connector_97**	**NC**	
98	**A connector_98**	**GND**	
99	**A connector_99**	**RECOVERY**	Program download (useless)
100	**A connector_100**	**AP-RESET**	power reset (useless)
101	**B connector_1**	**NC**	

102	**B connector_2**	**NC**	
103	**B connector_3**	**USB1-DM**	HOST USB1
104	**B connector_4**	**LINEOUTL**	
105	**B connector_5**	**USB1-DP**	HOST USB1
106	**B connector_6**	**LINEOUTR**	
107	**B connector_7**	**GND**	
108	**B connector_8**	**GND**	
109	**B connector_9**	**NC**	
110	**B connector_10**	**NC**	
111	**B connector_11**	**TV_OUT**	CVBS OUT
112	**B connector_12**	**NC**	
113	**B connector_13**	**GND**	
114	**B connector_14**	**GND**	

115	**B connector_15**	**NC**	
116	**B connector_16**	**NC**	
117	**B connector_17**	**NC**	
118	**B connector_18**	**NC**	
119	**B connector_19**	**GND**	
120	**B connector_20**	**GND**	
121	**B connector_21**	**NC**	
122	**B connector_22**	**NC**	
123	**B connector_23**	**NC**	
124	**B connector_24**	**NC**	
125	**B connector_25**	**GND**	
126	**B connector_26**	**GND**	
127	**B connector_27**	**NC**	
128	**B connector_28**	**USB3-DM**	HOST USB3
129	**B connector_29**	**NC**	
130	**B connector_30**	**USB3-DP**	HOST USB3
131	**B connector_31**	**GND**	
132	**B connector_32**	**GND**	
133	**B connector_33**	**NC**	
134	**B connector_34**	**USB2-DM**	HOST USB2
135	**B connector_35**	**NC**	
136	**B connector_36**	**USB2-DP**	HOST USB2
137	**B connector_37**	**GND**	
138	**B connector_38**	**GND**	
139	**B connector_39**	**NC**	
140	**B connector_40**	**USB0-DM**	OTG USB
141	**B connector_41**	**NC**	
142	**B connector_42**	**USB0-DP**	OTG USB
143	**B connector_43**	**NC**	
144	**B connector_44**	**GND**	
145	**B connector_45**	**NC**	

146	**B connector_46**	**NC**	

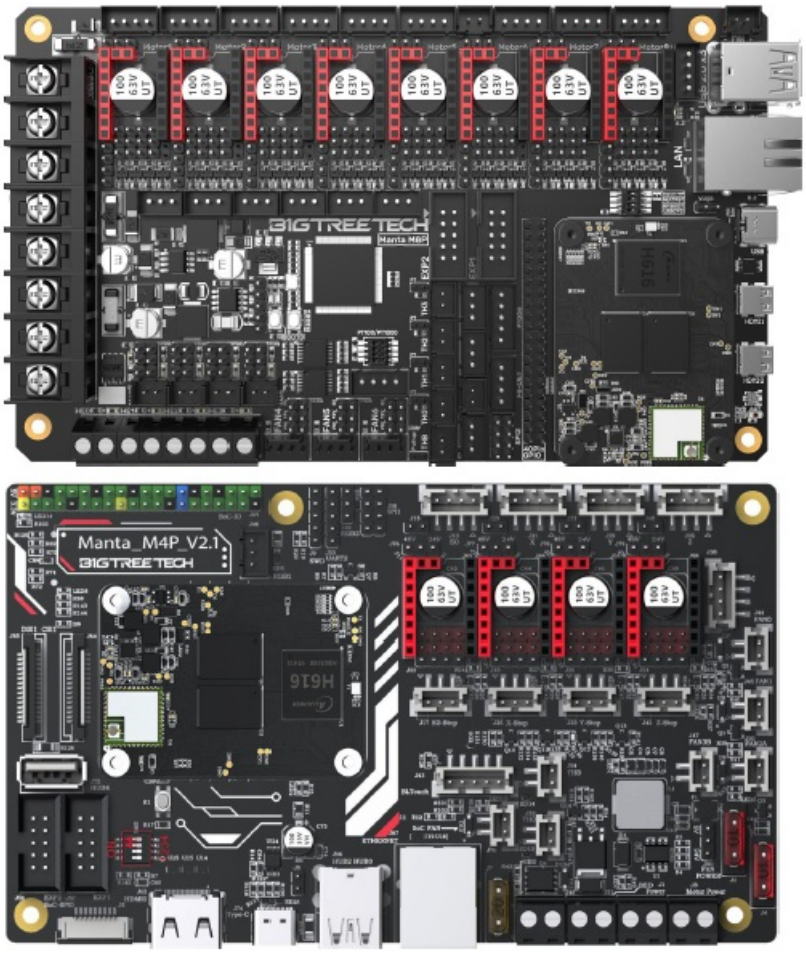
147	**B connector_47**	**NC**	
148	**B connector_48**	**NC**	
149	**B connector_49**	**NC**	
150	**B connector_50**	**GND**	
151	**B connector_51**	**HCEC**	HDMI CEC
152	**B connector_52**	**NC**	
153	**B connector_53**	**HHPD**	HDMI Hotplug
154	**B connector_54**	**NC**	
155	**B connector_55**	**GND**	
156	**B connector_56**	**GND**	
157	**B connector_57**	**NC**	
158	**B connector_58**	**NC**	
159	**B connector_59**	**NC**	
160	**B connector_60**	**NC**	
161	**B connector_61**	**GND**	
162	**B connector_62**	**GND**	
163	**B connector_63**	**NC**	
164	**B connector_64**	**NC**	
165	**B connector_65**	**NC**	
166	**B connector_66**	**NC**	
167	**B connector_67**	**GND**	
168	**B connector_68**	**GND**	
169	**B connector_69**	**NC**	
170	**B connector_70**	**HTX2P**	HDMI TX2 Positive.
171	**B connector_71**	**NC**	
172	**B connector_72**	**HTX2N**	HDMI TX2 Negative.
173	**B connector_73**	**GND**	
174	**B connector_74**	**GND**	
175	**B connector_75**	**NC**	
176	**B connector_76**	**HTX1P**	HDMI TX1 Positive.
177	**B connector_77**	**NC**	
178	**B connector_78**	**HTX1N**	HDMI TX1 Negative.

179	**B connector_79**	**GND**	
180	**B connector_80**	**GND**	
181	**B connector_81**	**NC**	
182	**B connector_82**	**HTX0P**	HDMI TX0 Positive.
183	**B connector_83**	**NC**	
184	**B connector_84**	**HTX0N**	HDMI TX0 Negative.
185	**B connector_85**	**GND**	
186	**B connector_86**	**GND**	
187	**B connector_87**	**NC**	
188	**B connector_88**	**HTXCP**	HDMI CLK Positive.
189	**B connector_89**	**NC**	

190	**B connector_90**	**HTXCN**	HDMI CLK Negative.
191	**B connector_91**	**GND**	
192	**B connector_92**	**GND**	
193	**B connector_93**	**NC**	
194	**B connector_94**	**NC**	
195	**B connector_95**	**NC**	
196	**B connector_96**	**NC**	
197	**B connector_97**	**GND**	
198	**B connector_98**	**GND**	
199	**B connector_99**	**HSDA**	HDMI I2C
200	**B connector_100**	**HSCL**	HDMI I2C

Interface Introduction

Install via the BTB Connection

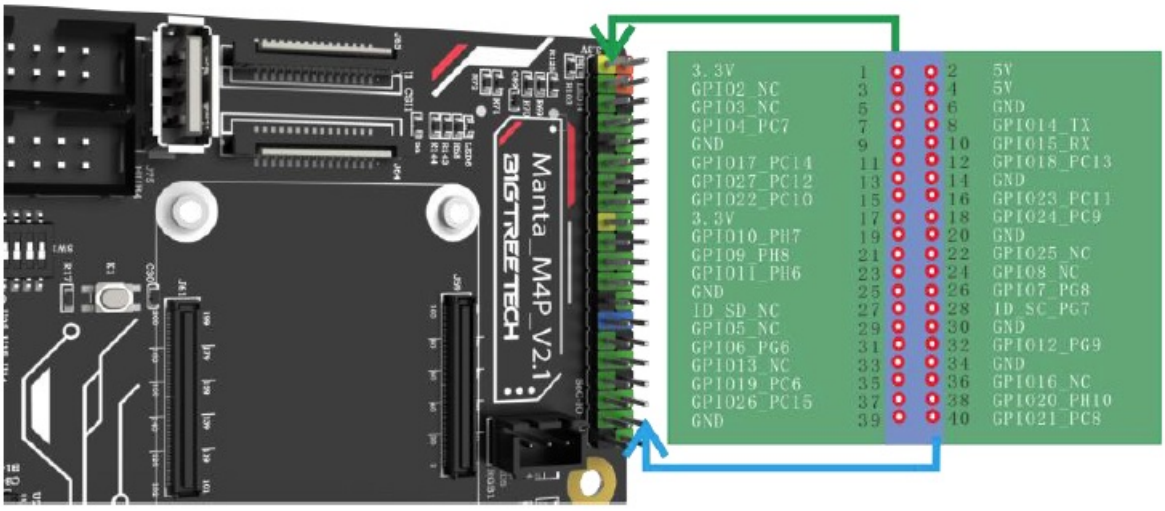


3.2 40 pins GPIO

When Manta series motherboard work with CB1, 40 pins GPIO is a custom IO arrangement, as shown in the figure below, Pin 7 is CB1's "PC7", and Pin 11 is CB1's "PC14". The GPIO number of CB1 corresponds to (Px–PA)*32 + Pin

For example:

- PC7 = (PC–PA)*32 + 7 = 2 * 32 + 7 = 71
- PH10 = (PH–PA)*32 + 10 = 7 * 32 + 10 = 234
- PC7 is numbered in Klipper as pin: host: gpio71, PH10 as pin: host: gpio234



Note: The logic voltage of PC ports in V2.1 version (PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15): 1.8V;
The logic voltage of PC ports in V2.2 version (PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15): 3.3V.

Write OS

Download the OS Image

Please download and install the OS image we provided:
https://github.com/bigtreetech/CB1/releases

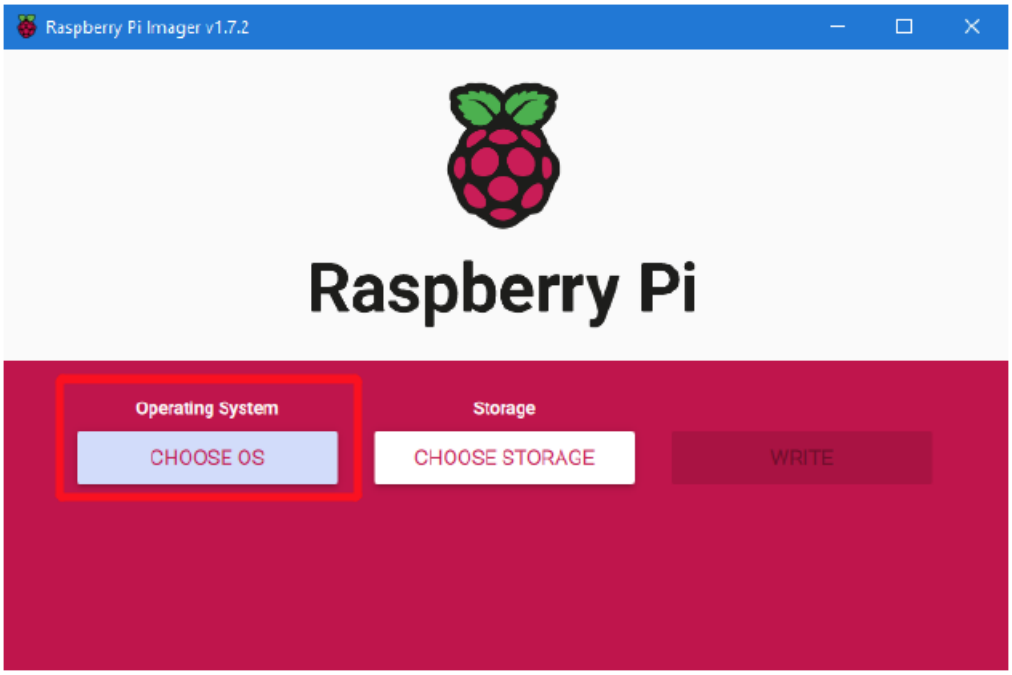
Download and Install Writing Software

The official Raspberry Pi Imager: https://www.raspberrypi.com/software/ balenaEtcher: https://www.balena.io/etcher/
Both of the above software can be used, just choose one to download and install.

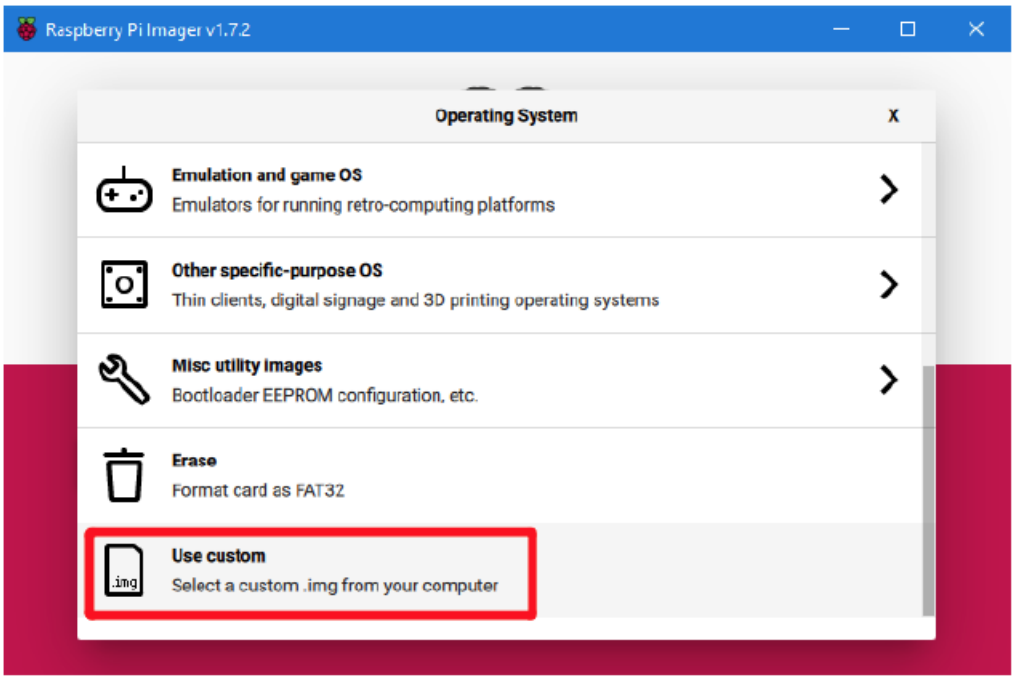
Write OS

For Raspberry Pi Imager

- Insert a MicroSD into your computer.
- Choose OS.

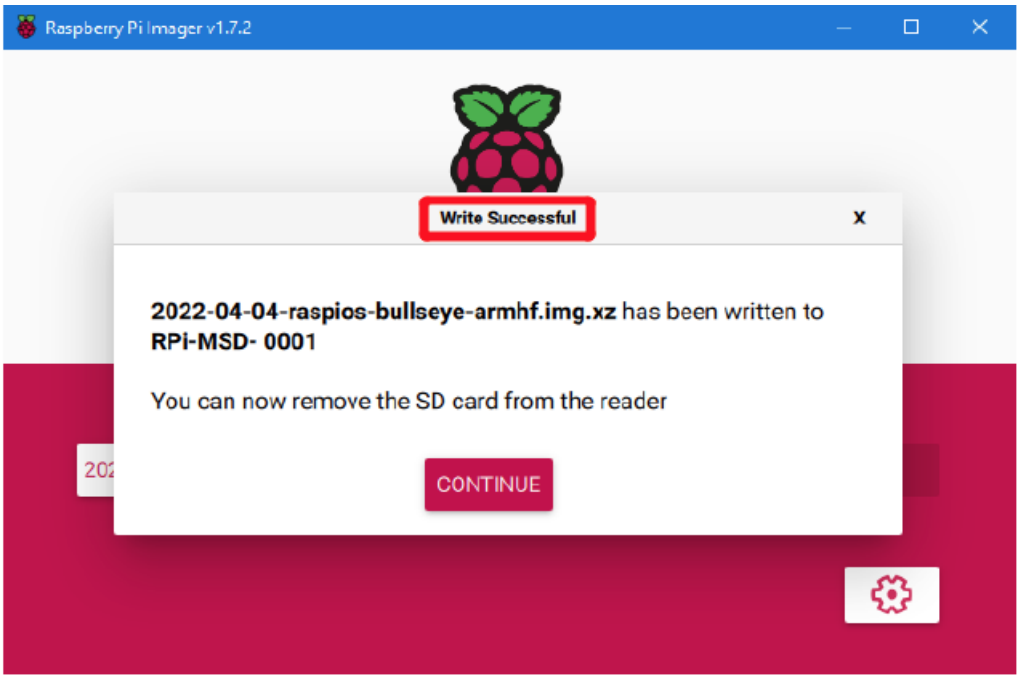


- Select “Use custom”, then select the image that you downloaded.



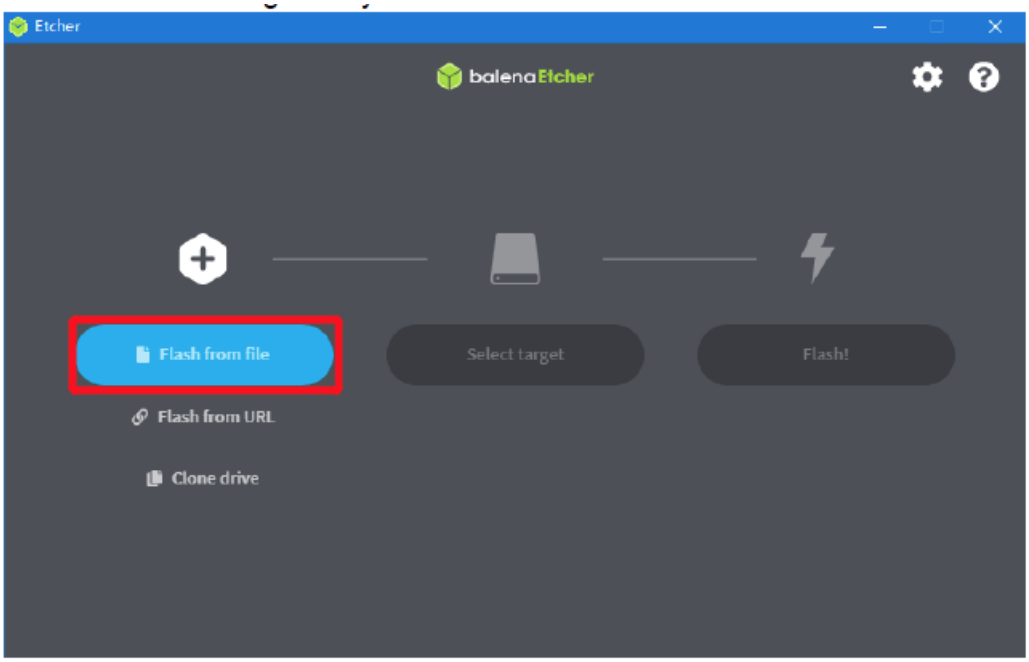
- Select the MicroSD card and click “WRITE” (WRITE the image will format the MicroSD card. Be careful not to select the wrong storage device, otherwise the data will be formatted.)

- Wait for the writing to finish.

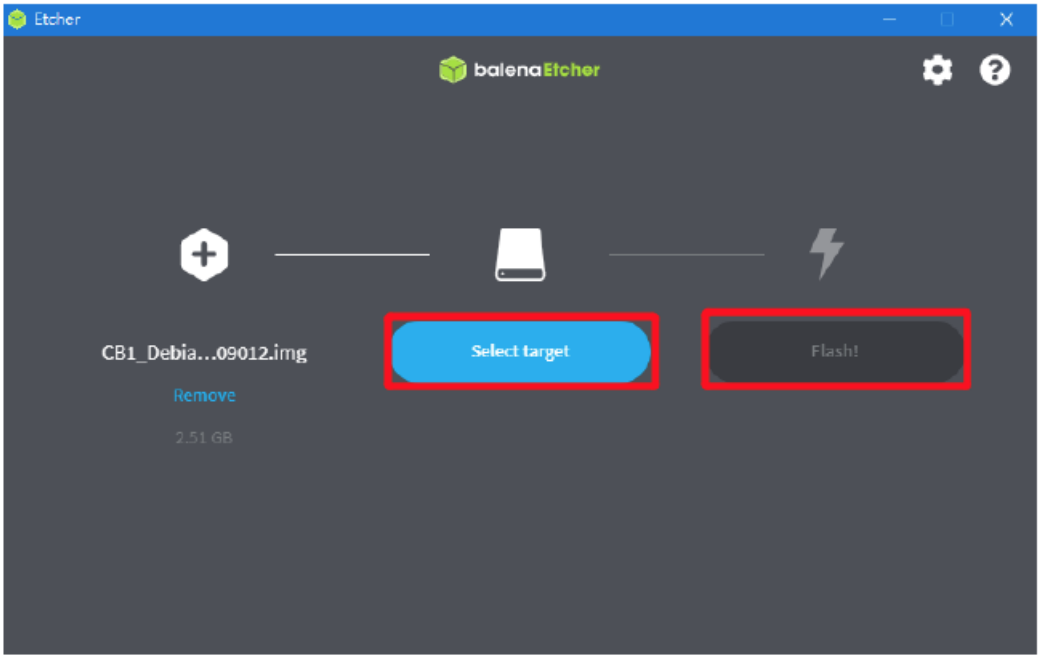


For balenaEtcher

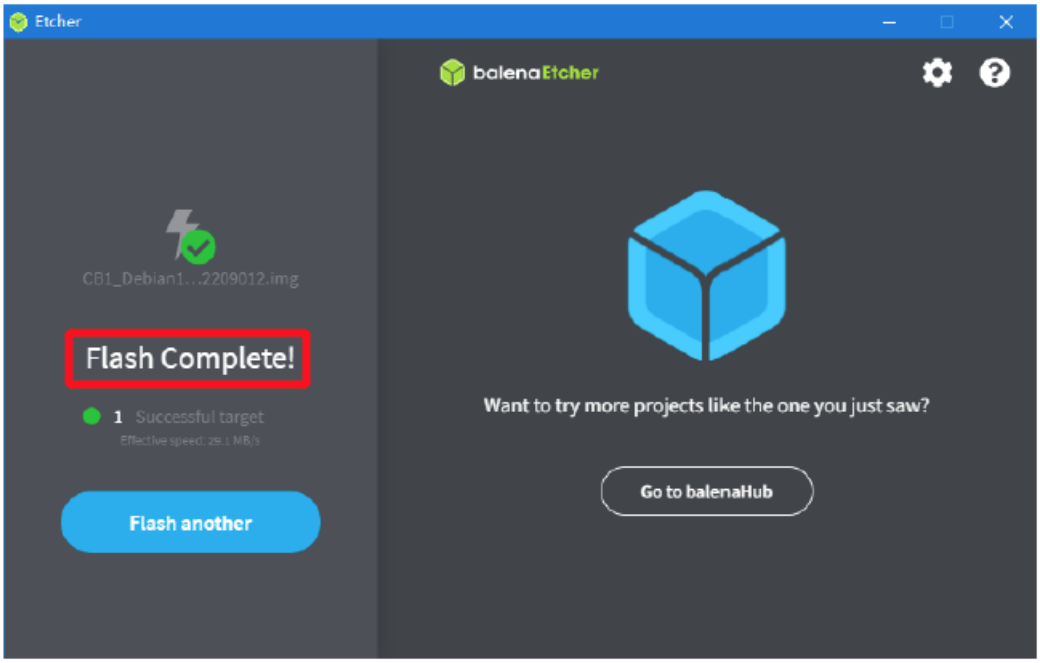
- Insert a MicroSD card to your computer through a card reader
- Select the image that you downloaded.



- Select the MicroSD card and click “WRITE” (WRITE the image will format the MicroSD card. Be careful not to select the wrong storage device, otherwise the data will be formatted.)



- Wait for the writing to finish.



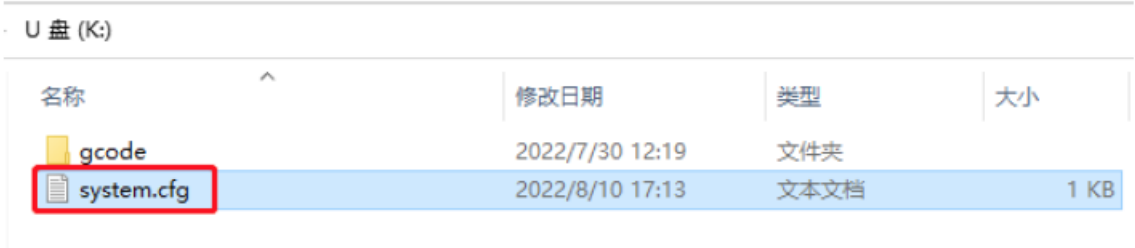
Configure Network

Ethernet

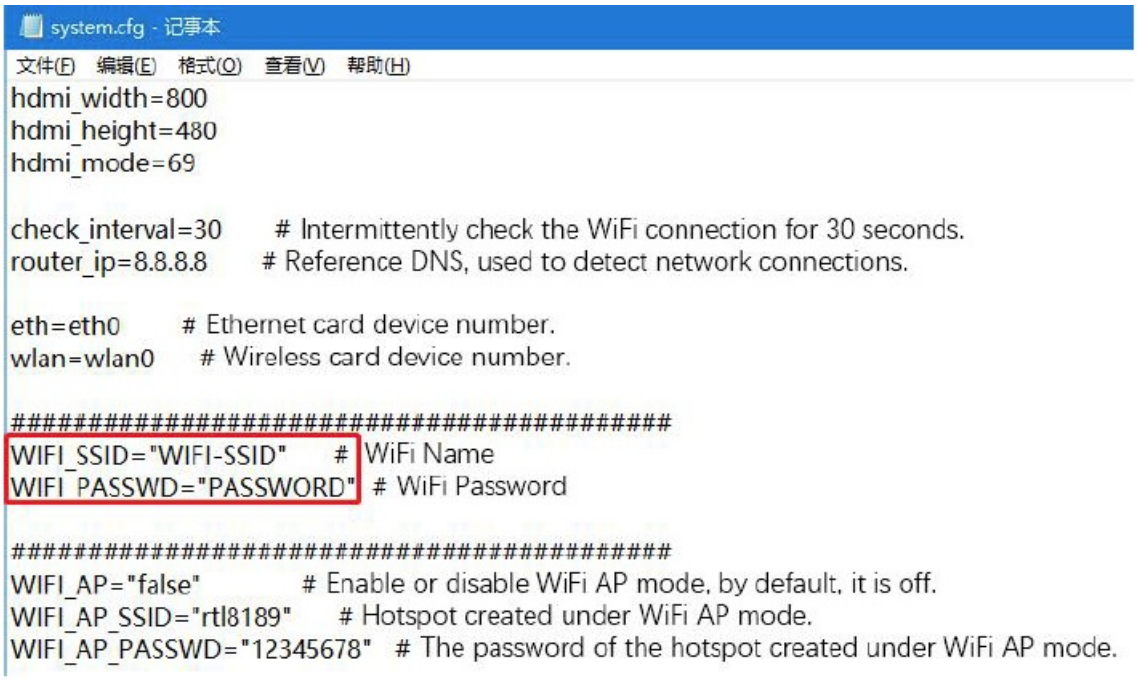
Plug-and-play with an Ethernet cable, no additional setup required.

WiFi Setting

After successfully writing the OS image, the MicroSD card will have a FAT32 partition recognized by the computer and a configuration file named “system.cfg” under this partition.



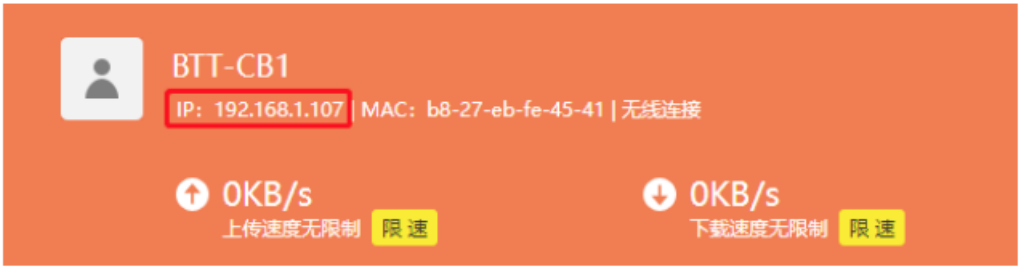
Open with Notepad, replace WIFI-SSID with your WiFi name, and PASSWORD with your password



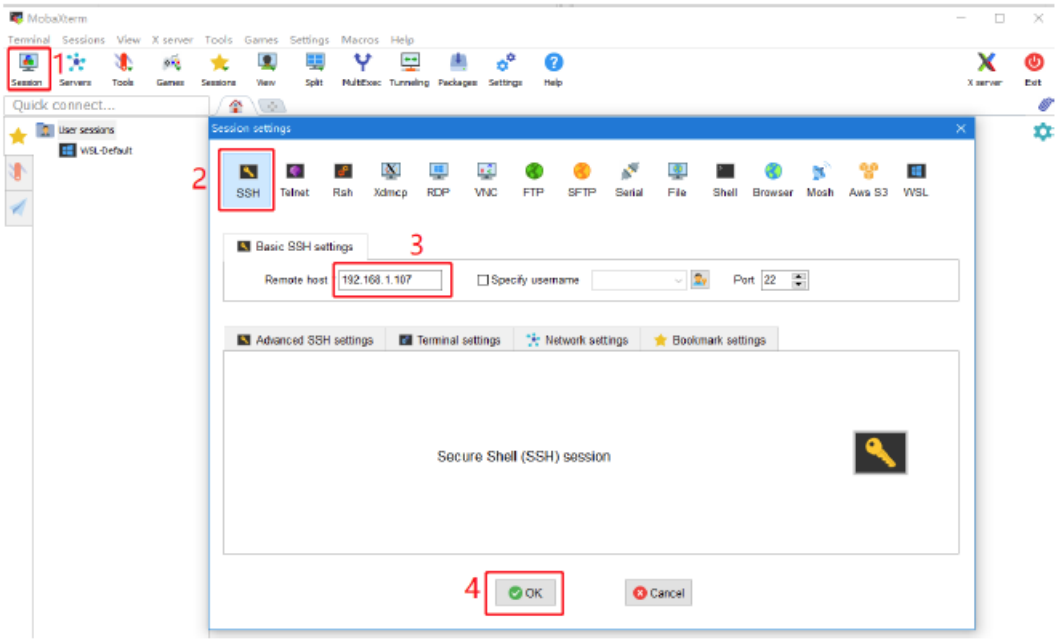
Configure Motherboard

SSH Connect to Device with CB1 Installed

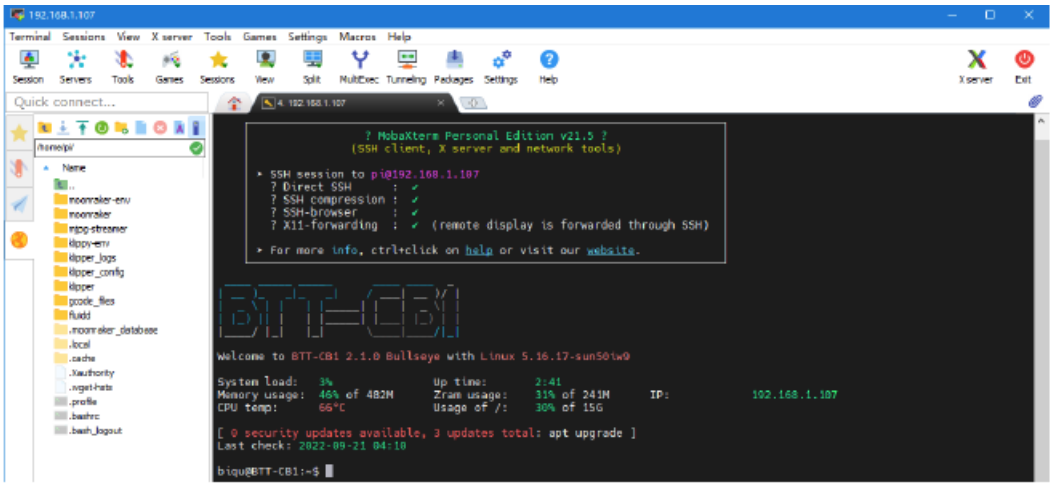
1. Install the SSH application Mobaxterm: https://mobaxterm.mobatek.net/download-home-edition.html
2. Insert the MicroSD card to the motherboard, and wait for the system to load after power on, approx. 1-2 minutes.
3. The device with CB1 installed will automatically be assigned an IP after being successfully connected to the network.
4. Find the IP address on your router page



5. Open Mobaxterm and click “Session”, and click “SSH”, enter the IP you got in step 3 into Remote host, and click “OK”. (Note: your computer and the printer needs to be in the same network.)

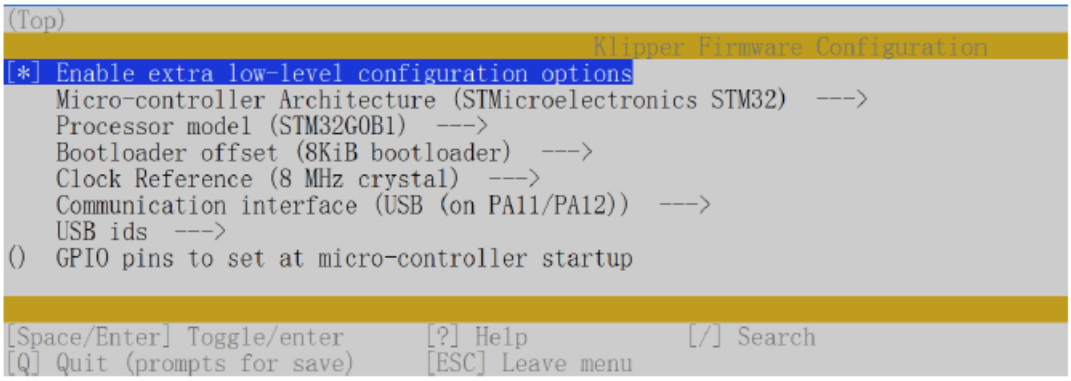


6. Login as: biqu, password: biqu.

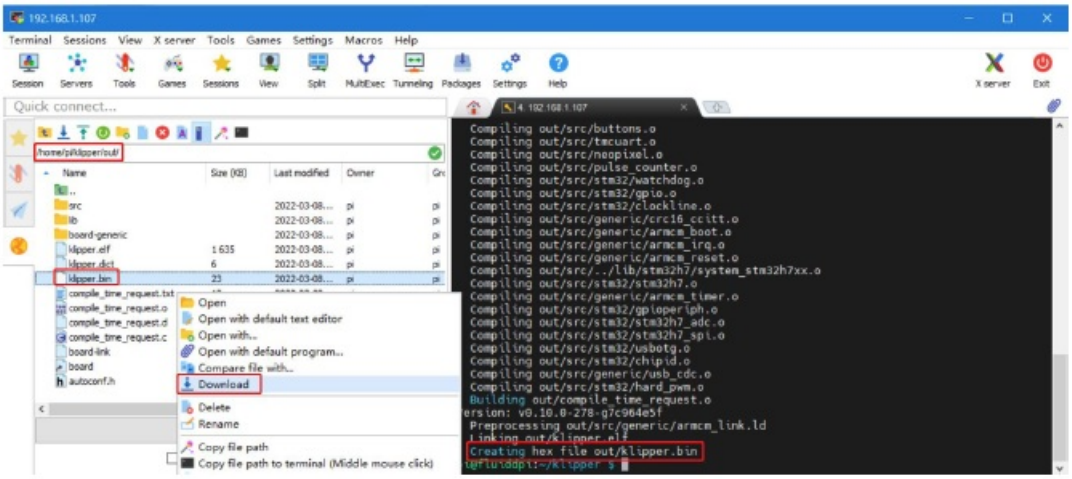


Compile MCU Firmware

1. After SSH is successfully connected to the device with CB1 installed, enter in the terminal: cd ~/klipper/ make menuconfig Compile the firmware with the corresponding motherboard configuration, here is the Manta M4P example:
    1. [*] Enable extra low-level configuration options
    2. Micro-controller Architecture (STMicroelectronics STM32) —>
    3. Processor model (STM32G0B1) —>
    4. Bootloader offset (8KiB bootloader) —>
    5. Clock Reference (8 MHz crystal) —>
    6. Communication interface (USB (on PA11/PA12)) —>



2. Press q to exit, and Yes when asked to save the configuration.
3. Run make to compile firmware, “klipper.bin” file will be generated in home/pi/klipper/out folder when make is finished, download it onto your computer using the SSH application



Cautions

- All unplugging and plugging operations should be performed under the condition of power off, except for HDMI, USB, and RJ45.
- Pay attention to the heat dissipation of CB1. If the running application consumes too many system resources, the CB1 will get hot quite seriously.

If you need other resources for this product, please visit https://github.com/bigtreetech/ and find them yourself.
If you cannot find the resources you need, you can contact our after-sales support.
If you encounter other problems during use, feel free to contact us, and we are answering them carefully; any good opinions or suggestions on our products are welcome, too and we will consider them carefully. Thank you for choosing BIGTREETECH. Your support means a lot to us!

Documents / Resources

	**BIGTREETECH CB1 Single Board** [pdf] User Manual H616, CB1, CB1 Single Board, CB1 Board, Single Board, Board

References

- bigtreetech (BIGTREETECH) · GitHub
- Releases · bigtreetech/CB1 · GitHub
- MobaXterm Xserver with SSH, telnet, RDP, VNC and X11 - Home Edition
- balenaEtcher - Flash OS images to SD cards & USB drives
- Raspberry Pi OS – Raspberry Pi