CM4 IO Case

For Raspberry Pi Compute Module 4 IO

Data Sheet

CM4 IO BOARD

2022-9-19

EDA TECHNOLOGY CO.,LTD



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Revision History

Date	Version	Description	Note
2021-11-11	Draft	Initial release.	
2022-09-19	1.1.0	Modify some descriptions about fans	

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Chapter 1 Introduction

The Raspberry Pi Compute Module 4 IO Board (CM4IO) is designed to assist in the development of products that make use of Raspberry Pi Compute Module 4. The Raspberry Pi Compute Module 4 IO Board contains many of the interfaces that Raspberry Pi 4 Model B has, and for general usage you should refer to the Raspberry Pi 4 Model B documentation. The significant difference between CM4IO and Raspberry Pi 4 Model B is the addition of a single PCIe socket. The CM4IO has been designed as both a reference design for CM4 or to be used directly as a product with the possible addition of PCIe Cards and Raspberry Pi HATs.

1.1 Features

- External power connector (+12V, +5V)
- 2 x full-size HDMI 2.0 connectors
- 2 x USB 2.0 connectors, with header for two additional connectors
- Gigabit Ethernet RJ45 with PoE support
- Micro USB socket for updating Compute Module 4
- MicroSD card socket for Compute Module 4 Lite (without eMMC) variants
- PCIe Gen 2 x1 socket
- Standard fan connector
- 2 x MIPI DSI display FPC connectors (22-pin 0.5 mm pitch cable)
- 2 x MIPI CSI-2 camera FPC connectors (22-pin 0.5 mm pitch cable)
- Standard Raspberry Pi HAT connectors
- Real-time clock with battery socket and ability to wake Compute Module 4
- Various jumpers to disable specific features, e.g. wireless connectivity, EEPROM writing

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Chapter 2 Hardware

2.1 One-Click Switch

One-click switch is to control the system power on and shut off by GPIO3 on 40pin connector & the software running on Compute Module 4, unlike traditional switches which just control the power supply of the board by cutting off or powering on the hardware. Cutting off the power during Compute Module 4 operation may damage the file system and cause the system to crash.

2.2 PSU input

The main PSU input (J19) is a 2.1mm DC tip positive +12V input. There is an on-board +12V to +5V DC-DC converter to power the CM4. There is also an on-board +12V to +3.3V DC-DC converter PSU which is only used for the PCIe slot. The +12V input feeds the +12V PCIe slot, the external PSU connector and the fan connector directly. If these aren't being used then a wider input supply is possible (+7.5V to +28V). With a +12V supply via the DC barrel jack, the external PSU connector (J20 with +5V and +12V) is ideal to connect to PCIe cards that require an external PSU. You should ensure that the PSUs aren't overloaded. The J20 mating connector is known as "Berg" connector, part number AMP/TE Connectivity 171822-4 or similar. The exact current required from the +12V PSU is dependent on the application and on what is connected to the Raspberry Pi Compute Module 4 IO Board. We recommend budgeting 9W for CM4. If you want to supply an external +5V supply to the board, e.g. via J20 or via PoE J9, then we recommend that L5 be removed. Removing L5 will prevent the on-board +5V and +3.3V supplies from starting up and +5V coming out of the DC jack socket (J19).

2.3 Dual full-size HDMI 2.0 connectors

CM4 does most of the interfacing required for the HDMI interface so that most signals are directly connected to the Raspberry Pi Compute Module 4 IO Board 2.1. CM4 module connectors 4 CM4 board. HDMI connectors require a +5V supply, which is provided on the Raspberry Pi Compute Module 4 IO Board via a current-limited switch

2.4 Gigabit Ethernet RJ45

The Raspberry Pi Compute Module 4 IO Board uses a standard 1:1 Ethernet magjack, which supports PoE as well. Additional ESD protection is provided on the Raspberry Pi Compute Module 4 IO Board as it is typically needed in PoE applications. The PoE signals from the RJ45 connector are connected to J5. Typically a PoE HAT will supply +5V to the Raspberry Pi Compute Module 4 IO Board. As a typical PoE HAT doesn't generate a +12V power rail, PCIe expansion cards and the fan will not function

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2.5 USB 2.0 hub

The Raspberry Pi Compute Module 4 IO Board has an on-board USB 2.0 hub. This connects to the CM4 USB 2.0 port. Two ports from the hub are connected to a connector. The other two ports are connected to a header; this header can be used to provide two extra internal ports. There is an internal current limit switch to provide VBUS to the USB connectors. The current limit is set to approximately 1.2A.

2.6 Micro USB connector

The micro USB connector is designed to enable CM4 to be updated via rpiboot. When a micro USB cable is plugged in the USB hub is automatically disabled, so the CM4 USB 2.0 port becomes a USB device.

2.7 microSD card socket

For use only with CM4Lite modules

The microSD card socket is a push-push socket. To release the microSD card, a gentle push on the card will enable it to be removed.

2.8 PCIe Gen 2 x1 socket

The PCIe socket is designed to take standard PC PCIe cards. You should ensure that there is a suitable OS driver for your card. The PCIe link on the Raspberry Pi 4 Model B is used for the USB 3.0 interface via the VLI805 XHCI controller. If the application requires USB 3.0 interface then an external XHCI controller is required like the VLI805. The PCIe link has been successfully used with an NVMe drive via a passive PCIe adaptor.

Booting isn't supported via a PCIe switch.

If the application uses a standard PCIe card then it might be useful to have a small PCIe adapter to rotate the PCIe card 90degress to enable a more compact case.

The PCIe interface doesn't support MSI-X. Typically PCIe devices will fall back to MSI.

2.9 Fan connector

This connector supports standard +12V fans with PWM drive and tacho output. An EMC2301 controls the fan via I2C. The mating connector part number is Molex 47054-1000 or similar. The +12V power for the fan comes from the +12V input and isn't regulated.

To enable the I2C bus to the fan controller, you will need *dtparam=i2c_vc=on* set in config.txt. The fan controller will then be on i2c-10 address 0x2f (7-bit address)

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2.10 Others

If you want to get more information about CM4 IO Board, please refer to the document(Raspberry Pi Compute Module 4 IO Board)

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Chapter 3 Production Image

3.1 Front Panel of The Case



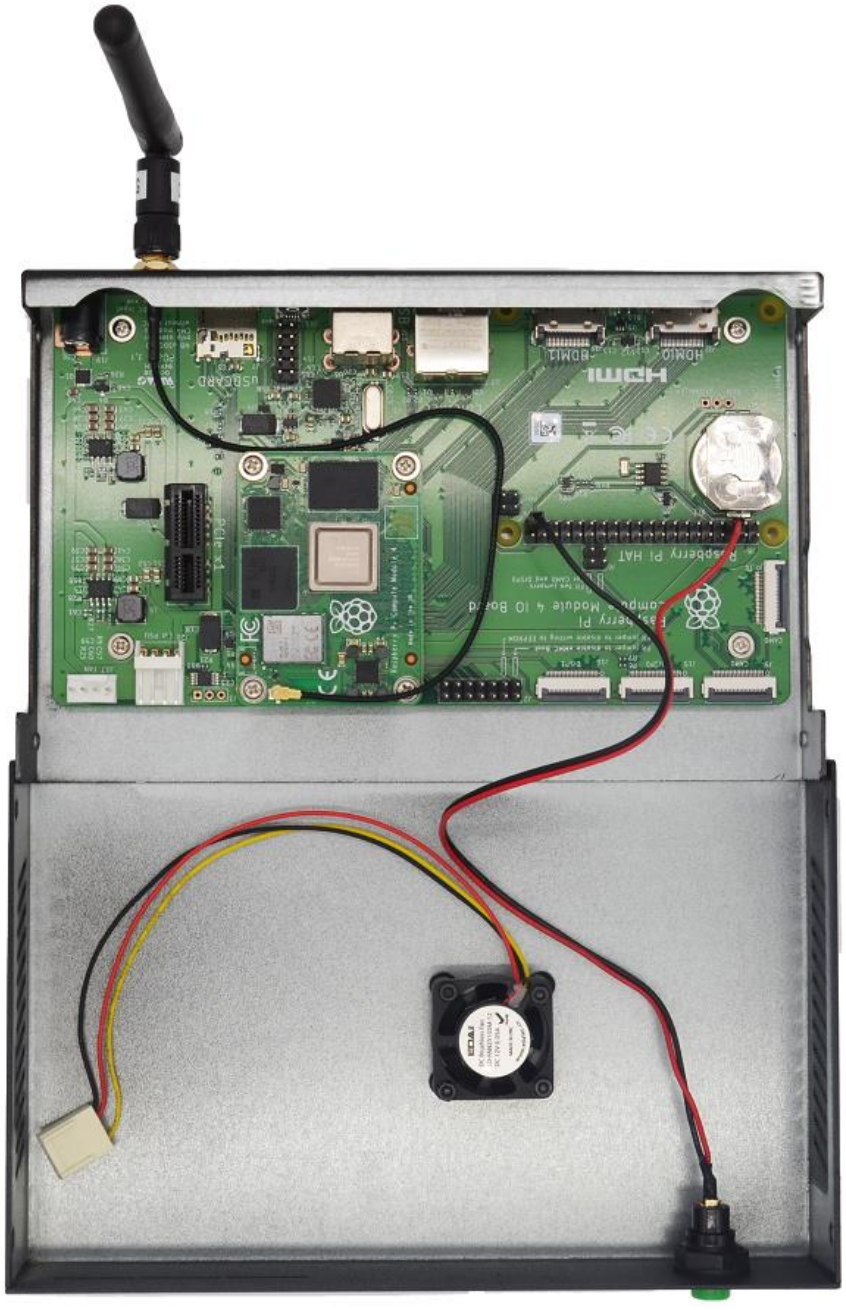
3.2 Rear Panel of The Case





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3.3 Internal Structure

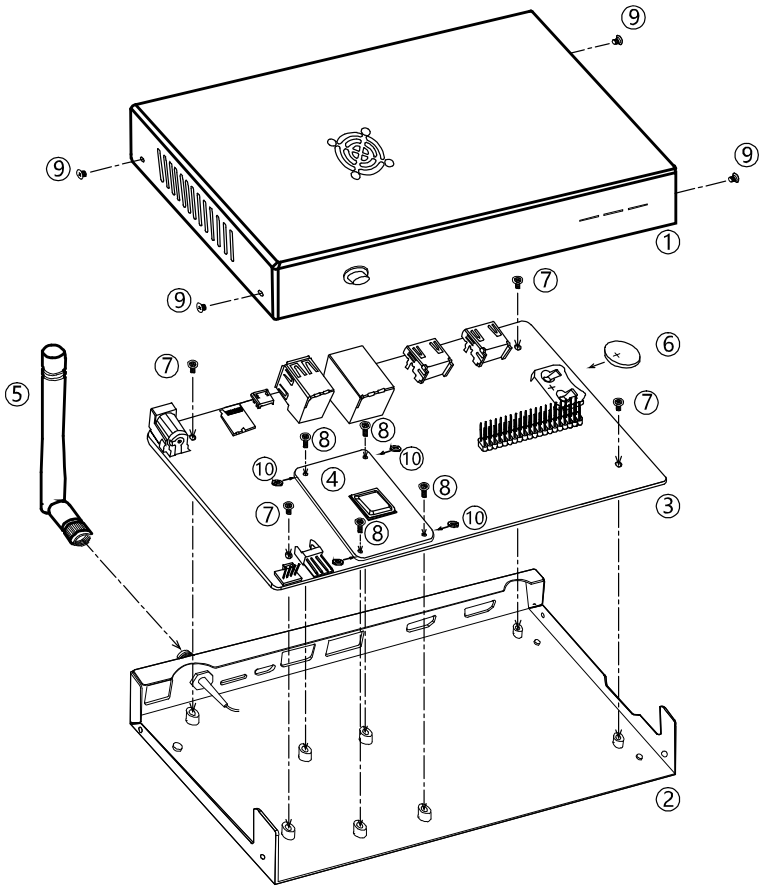


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3.4 Install

Part list in the package:

NO.	Part List	Quantity (PCS)
①	Upper Case	1
②	Bottom Case	1
③	CM4 IO board (Not provided)	1
④	CM4 module (Not provided)	1
⑤	Antenna	1
⑥	Coin Battery	1
⑦	Screws M2.5*4mm	4
⑧	Screws M2.5*6mm	4
⑨	Screws M3*4mm	4
⑩	Nylon washers 6mm*1.5mm	4

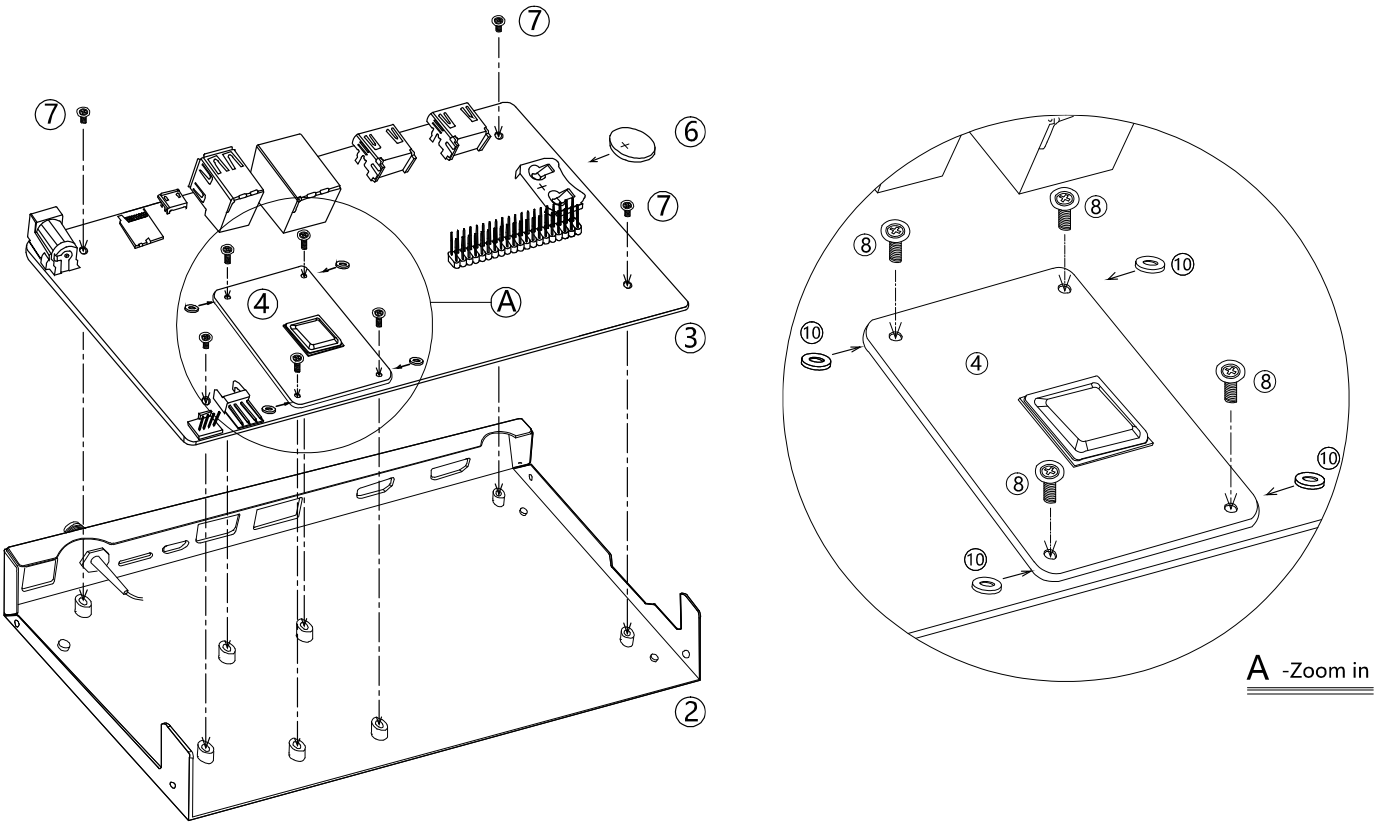


Assembly Chart

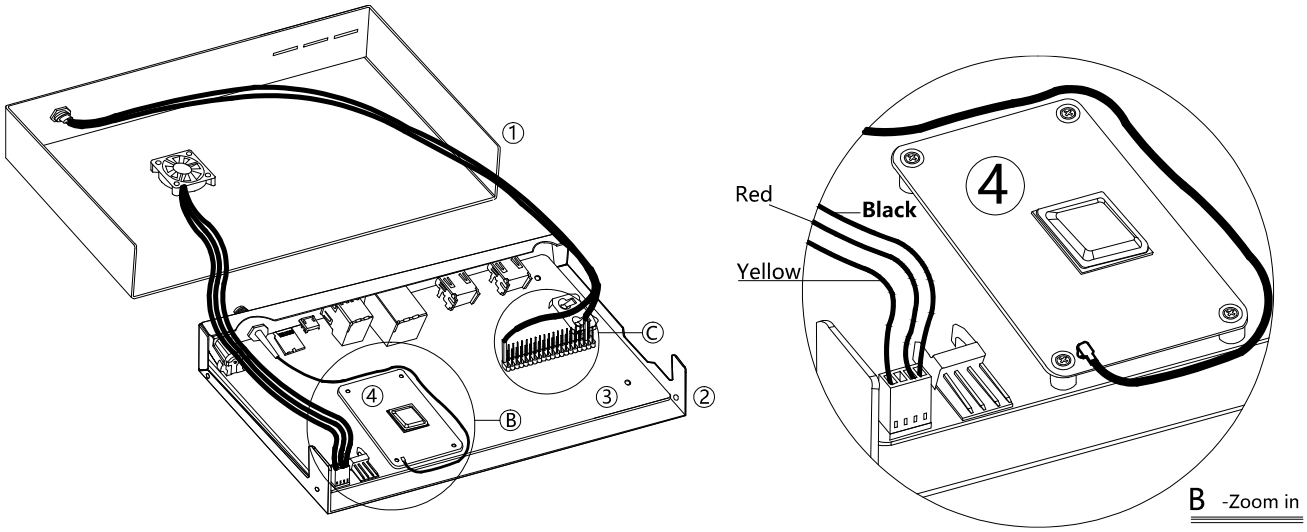
a). Insert the coin battery into the battery holder on Compute Module 4 IO Board, please make sure the positive

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pole of the battery on the top side.
Install Compute Module 4 on the IO Board, and crew the circuit board on the bottom case by 4pcs M2.5*4mm screws
Insert the four black nylon washers under CM4 Module from side, make sure 4 holes on Compute Module 4 and washers aligned then screw 4pcs M2.5*6mm screws to fix the Compute Module 4.

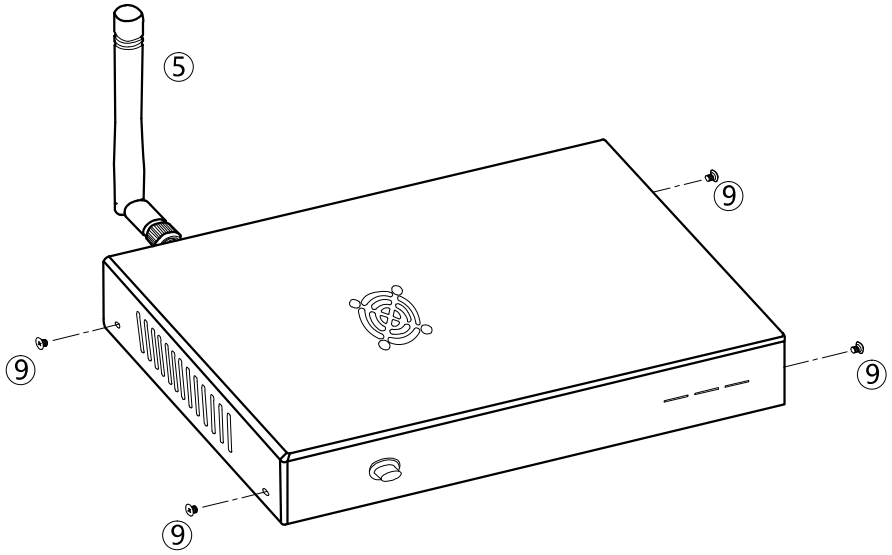


b).Plug the fan connector on connector-J17 of IO board, install the antenna plug on the RF connector of the Compute Module.
Plug the red and black cables of switch into the J8 - 40pin GPIO connector on the IO Board, red wire should be inserted into Pin 3, and black wire should be inserted into Pin39.



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c). Screw the enclosure and screw the external antenna to SMA RF connector on the case.



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Chapter 4 Quick Start Guide

4.1 Notice

a) Electrostatic discharge protection is necessary to prevent the electrostatic damage before assembling Compute Module 4 & IO Board.

b) Please do not plug the power supply into Compute Module 4 IO Board before assembly, otherwise it may damage the board or cause short circuit.

c) Please don't screw before you put 4 black nylon washers under the corners of Compute Module 4 to support it, otherwise it may cause deformation and damage of Compute Module 4.

d) The positive pole of the button battery should be on the top side when insert it into the battery holder on the IO Board.

e) Please make sure the air entrance of the fan is unblocked, otherwise it will impact the cooling performance even damage the fan.

f) On/Off switch requires software support. It needs to disable *dtparam=i2c_arm=on* and add *dtoverlay=gpio-shutdown* to the end of config.txt

4.2 List in The Package

1. [Optional] 1xUpper Case
2. [Optional] 1xBottom Case
3. 1xCM4 IO Board with CM4 Module
4. [Optional] 1xAntenna
5. [Optional] 1xCoin Battery

4.3 Install

1. Install the WiFi antenna
2. [If don't have eMMC] Insert the micro SD Card
3. Connect the Ethernet cable between CM4 IO and a router
4. Plug you keyboard and mouse to the USB ports
5. Make sure that your monitor is turned on, and that you have selected the right input
6. Then connect your HDMI cable from CM4 IO to your monitor

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4.4 Boot

CM4 IO Board will boot up once you plug the power supply.

- Plug the 12V@2A power supply into a socket and connect it to the DC port marked '+12V DC' on CM4 IO Board
- You should see a red LED light up on the Raspberry Pi, which indicates that Raspberry Pi is connected to power. As it starts up (this is also called booting), you will see raspberries appear in the top left-hand corner of your screen
- After a few seconds the Raspberry Pi OS desktop will appear

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Chapter 5 Usage

This chapter introduces how to use some IO functions

5.1 Flash the CM4 eMMC

The Compute Module has an on-board eMMC device connected to the primary SD card interface. This guide explains how to write data to the eMMC storage using a CM4 IO Board.

Please also read the section in the Compute Module Datasheets

Ensure the Compute Module is fitted correctly installed on the IO board. It should lie flat on the IO board.

Make sure that nRPI_BOOT which is on J2 (disable eMMC Boot) on the IO board jumper is fitted

Use a micro USB cable to connect the micro USB slave port J11 on IO board to the host device.

Do not power up yet.

For Windows Users

Under Windows, an installer is available to install the required drivers and boot tool automatically. Alternatively, a user can compile and run it using Cygwin and/or install the drivers manually.

Windows Installer

For those who just want to enable the Compute Module eMMC as a mass storage device under Windows, the stand-alone installer is the recommended option. This installer has been tested on Windows 10 32-bit and 64-bit, and Windows XP 32-bit.

Please ensure you are not writing to any USB devices whilst the installer is running.

1. Download and run the rpiboot to install the drivers and boot tool.
2. Plug your host PC USB into the USB SLAVE port, making sure you have setup the board as described above.
3. Apply power to the board; Windows should now find the hardware and install the driver.
4. Once the driver installation is complete, run the *RPiBoot.exe* tool that was previously installed.
5. After a few seconds, the Compute Module eMMC will pop up under Windows as a disk (USB mass storage device).

Writing to the eMMC (Windows)

After rpiboot completes, a new USB mass storage drive will appear in Windows. We recommend using Raspberry Pi Image to write images to the drive.

Make sure J4 (USB SLAVE BOOT ENABLE) / J2 (nRPI_BOOT) is set to the disabled position and/or nothing is plugged into the USB slave port. Power cycling the IO board should now result in the Compute Module booting from eMMC.

If you want to flash eMMC on Linux, you can refer to the Flash eMMC documentation

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5.2 One-Click Switch

If you are using the image provided by us, you can use this function directly.

If you are using the Raspberry Pi native system and find that the power-on button cannot be used, please pay attention to the following points

1. When I2C-1 is enabled, the device cannot use the One-Click Switch function
2. Check the following configuration of EEPROM, If it is different from the configuration below, please refer to the manual(Raspberry Pi Documentation - Compute Module Hardware) to change configuration

   WAKE_ON_GPIO=1

   POWER_OFF_ON_HALT=0

3. Check whether the positive and negative poles of the buttons are connected to GPIO3 and GND

5.3 Fan

If you are using the image provided by us, you can use this function directly.

If you are using the Raspberry Pi native system, you should install package “ed-cm4io-fan”

```
curl -sS https://apt.edatec.cn/pubkey.gpg | sudo apt-key add -
echo "deb https://apt.edatec.cn/raspbian stable main" | sudo tee /etc/apt/sources.list.d/edatec.list
sudo apt update
sudo apt install ed-cm4io-fan
```

5.3.1 How to set the fan speed range

We provide a command to set the temperature range, below temperature_low the fan stops and above temperature_high the fan is at full speed.

```
set_fan_range -l [low]  -m [mid] -h [high]
```

5.3.2 How to manually control the fan speed

First stop fan control. service, then use the command fan manual to set the speed of the fan

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5.4 RTC

If you are using the image provided by us, you can use this function directly.

If you are using the Raspberry Pi native system, you should install package “ed-rtc”

sudo apt install ed-rtc

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Chapter 6 Support

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6.1 About EDATEC

EDA Technology Co.,Ltd is located in Shanghai, it is one of Raspberry Pi's Global Design Partners. Our vision is to offer the hardware solutions for IoT, Industrial Control, Automation, Green Energy & Artificial Intelligence solutions based on Raspberry Pi Technology platform.

We provide the standard hardware solution, custom design &manufacturing services that accelerate the electronic product development and time to market.

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