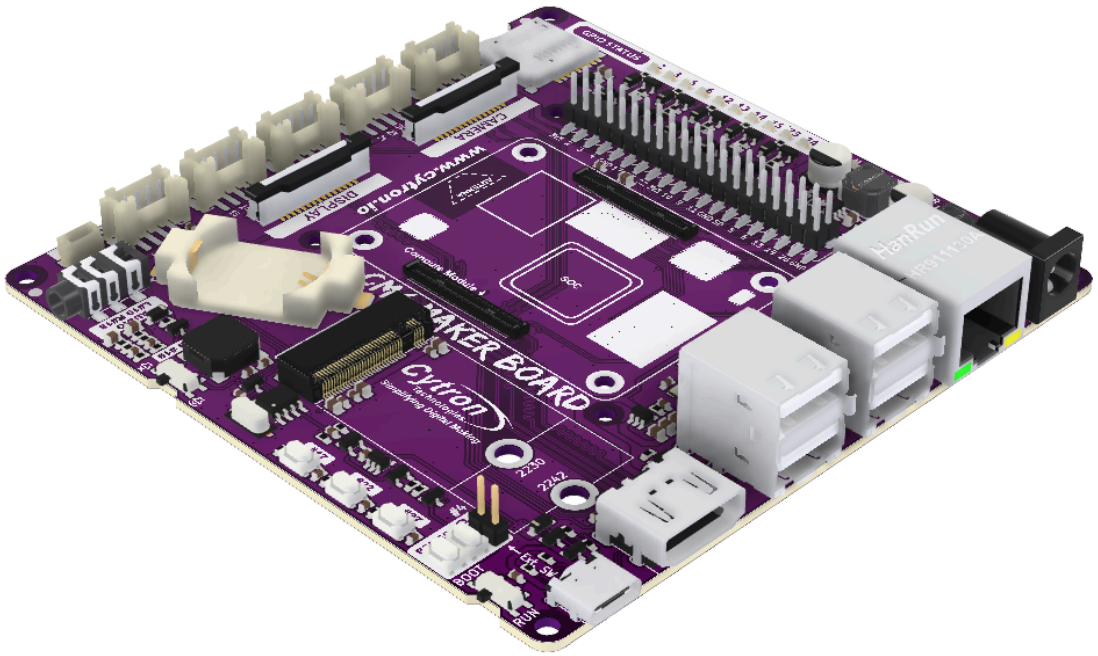
CM4 Maker Board

Maker's Carrier Board for Raspberry Pi CM4



Datasheet

Rev 1.2
October 2023

Information in this publication regarding device applications and the like is intended through suggestion only and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. No representation or warranty is given and no liability is assumed by Cytron Technologies Incorporated with respect to the accuracy or use of such information or infringement of patents or other intellectual property rights arising from such use or otherwise. Use of Cytron Technologies's products as critical components in life support systems is not authorized except with express written approval by Cytron Technologies. No licenses are conveyed, implicitly or otherwise, under any intellectual property rights.

1. Board Layout & Function

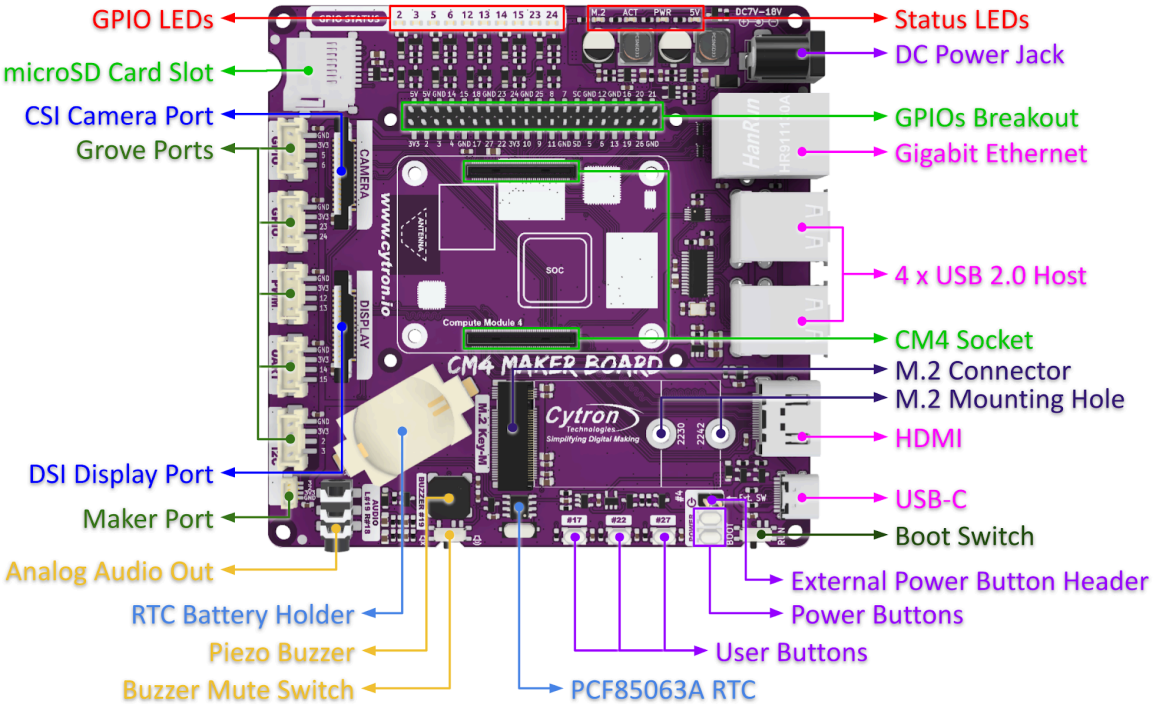


Figure 1: MAKER-CM4 Board Functions

Function	Description
GPIO LED	LED indicator for digital IO. Turn on when the IO state is high.
microSD Card Slot	microSD Card slot for Raspberry Pi CM4 Lite. **Not accessible by Raspberry Pi CM4 with EMMC.*
CSI Camera Port	15-pin 2 Lanes MIPI CSI Camera Interface. Compatible with Raspberry Pi Camera Module. Connected to CAM 1 of Raspberry Pi CM4.
DSI Display Port	15-pin 2 Lanes MIPI DSI Display Interface. Connected to DSI 1 of Raspberry Pi CM4.
Grove Ports	For external Grove modules. ● 2x GPIO Ports (GPIO 5, 6 & 23, 24) ● 1x PWM Port (GPIO 12, 13) ● 1x UART Port (GPIO 14, 15) ● 1x I2C Port (GPIO 2, 3)
Maker Port	I2C port for external modules. Compatible with QWIIC / Stemma QT / Grove (with conversion cable). * *The pins are shared with the Grove I2C port (GPIO 2, 3).*
Analog Audio Out	Analog line level output. Connect to external speaker or earphone. ● Left Channel - GPIO 19 ● Right Channel - GPIO 18
Piezo Buzzer	Passive piezo buzzer which is able to play tone or melody. * *Connected to GPIO 19 which is shared with Analog Audio Out.*

Buzzer Mute Switch	Turn off the piezo buzzer when not in use (or when using the analog audio out).
RTC Battery Holder	CR2032 coin cell holder for the RTC.
PCF85063A RTC	PCF85063A RTC IC.
User Buttons	User Programmable Buttons. GPIO 17, 22, 27
Power Buttons	The power buttons are connected in series and both of them need to be pressed together to turn ON/OFF the Raspberry Pi CM4. They're connected to GLOBAL_EN & GPIO 4 of the CM4.
External Power Button Header	Header for external power button. It's connected in parallel with the onboard power buttons. * *The pin header is not soldered by default.*
Boot Switch	Select either RUN or BOOT mode. Boot mode allows us to load the OS image to the EMMC on Raspberry Pi CM4 via the USB-C port.
M.2 Connector	M.2 Key-M Connector for PCIE modules. Support NVME SSD size 2230 & 2242 (Bootable). * *M.2 SATA SSD is not supported.*
M.2 Mounting Hole	Mounting hole for 2230 & 2242 M.2 PCIE modules.
USB-C*	5V power supply input for the CM4 Maker Board. Also used to program the OS image to the EMMC on Raspberry Pi CM4.
HDMI	Full size HDMI port supporting up to 4K resolution. Connected to HDMI 0 of Raspberry Pi CM4.
USB 2.0 Host	4x USB 2.0 Host for external USB peripherals.
Gigabit Ethernet	1Gbps Gigabit Ethernet Port.
CM4 Socket	Plug in the Raspberry Pi CM4 here. * *Make sure the orientation is correct.*
GPIOs Breakout	GPIOs breakout of Raspberry Pi CM4. The pinout is exactly the same as Raspberry Pi 4.
DC Power Jack*	7V - 18V power supply input.
Status LEDs	Status LEDs: • **M.2** - Indicator for M.2 activity. • **ACT** - Indicator for the Raspberry Pi CM4 activity. Similar to ACT LED on Raspberry Pi 4. • **PWR** - Turn on when the Raspberry Pi CM4 is running. Similar to PWR LED on Raspberry Pi 4. • **5V** - Turn on when there is 5V on the CM4 Maker Board. This should be always on as long as the power supply is connected.

Table 1: MAKER-CM4 Board Functions

* *The CM4 Maker Board only needs to be powered from either the USB-C port (5V) or DC Power Jack (7V - 18V).*

2. Dimension

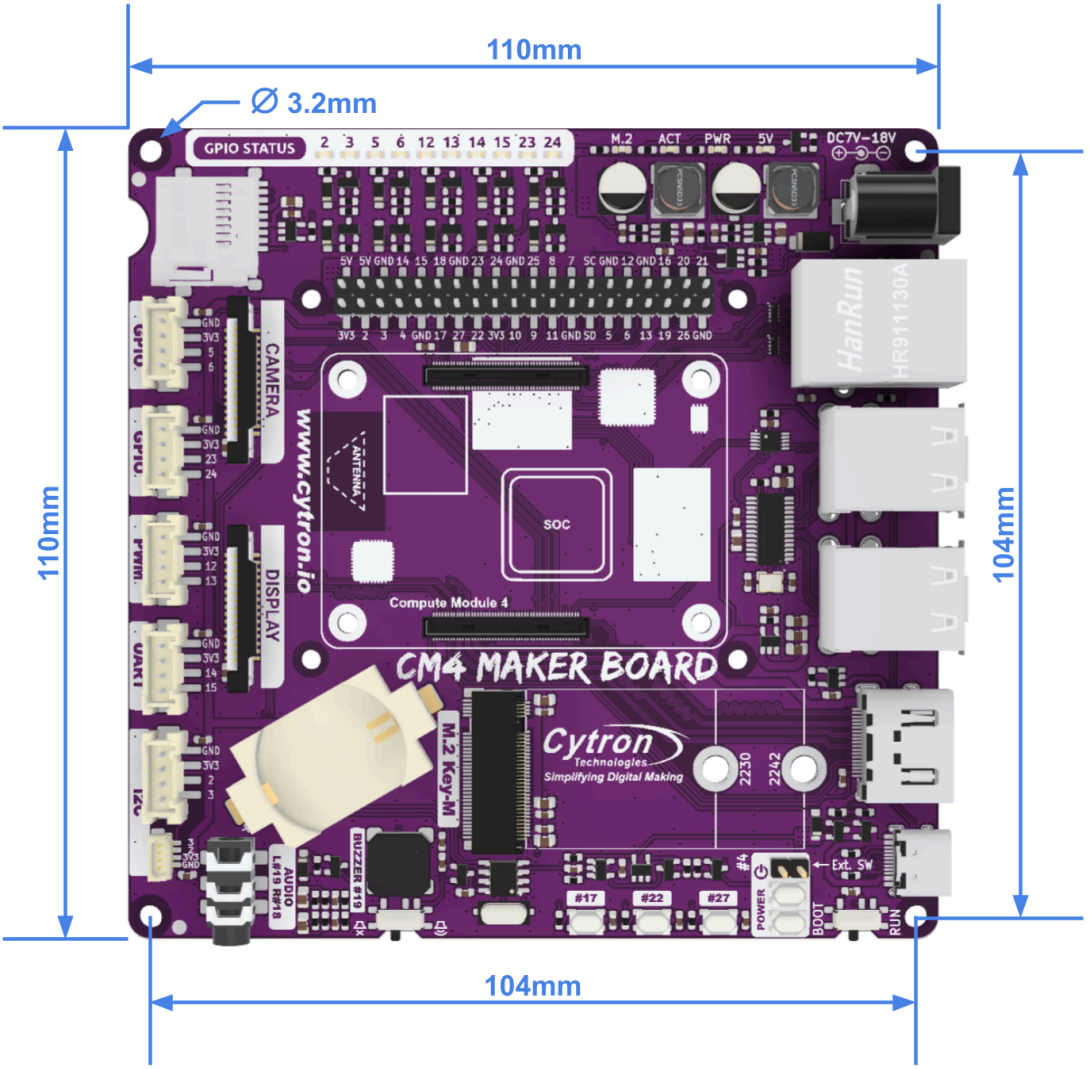


Figure 2: MAKER-CM4 Dimension

3. Configure the CM4 Maker Board

To fully utilize all the features on CM4 Maker Board, some configuration is needed as follow:

3.1 Run the CM4 Maker Board Setup Script

To make life easier, we've prepared a setup script for you.
(Only script for Raspberry Pi OS is available).

Boot into the Raspberry Pi OS, launch the terminal and run the following command. You may SSH into your pi and run the command too.

```
curl -L tinyurl.com/setup-maker-cm4 | sudo bash
```

Reboot the CM4 when done.

What does the script do?

1. Add the following settings to /boot/config.txt:
   a. Disable USB OTG by commenting out this line:
      `#otg_mode=1`

   b. By default, USB host on CM4 is disabled to save power. We need to turn it ON.
      `dtoverlay=dwc2,dr_mode=host`

   c. Enable I2C for RTC, CSI and DSI ports.
      `dtparam=i2c_vc=on`
      `dtoverlay=i2c-rtc,pcf85063a,i2c_csi_dsi`

   d. Remap the audio to Analog Audio Out (GPIO 18, 19).
      Please take note that this line needs to be commented out if you wish to use the hardware PWM function for piezo buzzer.
      `dtoverlay=audremap,pins_18_19`

   e. Enable shutdown on GPIO4 falling edge. This will shutdown the CM4 safely when the power buttons are pressed.
      `dtoverlay=gpio-shutdown,gpio_pin=4`

Created by *Cytron Technologies Sdn Bhd* – All Rights Reserved

3.2 Change the Settings in CM4 Bootloader

The bootloader settings in CM4 need to be changed for the power buttons to work correctly. Otherwise, the power buttons are unable to wake up the CM4 after shutdown.

Modifying the bootloader settings is quite challenging on CM4 as it's not as straightforward as on Raspberry Pi 4 Model B. But the good news is, pre-configured bootloader image is available and it can be flashed directly into the CM4.

Follow these steps to flash the CM4 Bootloader from Windows:

1. Download and install the rpiboot tool.

2. Download the pre-configured bootloader image from GitHub and extract it. You should get a **"recovery"** folder.

3. On the CM4 Maker Board, slide the Boot Switch to **BOOT**, connect the USB-C port to the PC.

4. Open the command prompt (Press the Windows key and type "cmd") and go to the "recovery" folder you just extracted.

5. Run this command to start flashing the bootloader to the EEPROM of CM4.
   `"C:\Program Files (x86)\Raspberry Pi\rpiboot.exe" -d ./`

6. The bootloader is flashed successfully if you see the following message. The ACT LED should be blinking continuously too.

```
RPIBOOT: build-date Jul 18 2022 version 20220718~085937 5a25e04b
Loading: recovery/bootcode4.bin
Waiting for BCM2835/6/7/2711...
Loading: recovery/bootcode4.bin
Sending bootcode.bin
Successful read 4 bytes
Waiting for BCM2835/6/7/2711...
Loading: recovery/bootcode4.bin
Second stage boot server
Loading: recovery/config.txt
File read: config.txt
Loading: recovery/pieeprom.bin
Loading: recovery/pieeprom.bin
Loading: recovery/pieeprom.sig
File read: pieeprom.sig
Loading: recovery/pieeprom.bin
File read: pieeprom.bin
Second stage boot server done
```

7. Set the Boot Switch to RUN and power cycle the board. The CM4 will be running with new bootloader settings.

What has changed?

- Disable **WAKE_ON_GPIO**
- Enable **POWER_OFF_ON_HALT**

The full settings of the bootloader is as follow:

```
[all]
BOOT_UART=0
WAKE_ON_GPIO=0
POWER_OFF_ON_HALT=1

# Boot Order Codes, from
# https://www.raspberrypi.com/documentation/computers/raspberry-pi.html#BOOT_ORDER
# Try SD first (1), followed by, USB PCIe, NVMe PCIe, USB SoC XHCI then network
BOOT_ORDER=0xf25641

# Set to 0 to prevent bootloader updates from USB/Network boot
# For remote units EEPROM hardware write protection should be used.
ENABLE_SELF_UPDATE=1
```

For more information about CM4 Bootloader settings, please refer to:
https://www.raspberrypi.com/documentation/computers/raspberry-pi.html#configuration-properties

4. Setting Up Official Raspberry Pi Camera Module & 7-Inch Display

To use the official Raspberry Pi Camera Module or 7-Inch Display, we need to download the corresponding blob file.

Run the following command from the terminal in order to use them.

- Using only the camera (CAM 1)
  `sudo wget https://datasheets.raspberrypi.com/cmio/dt-blob-cam1.bin -O /boot/dt-blob.bin`

- Using only the 7” display (DSI 1)
  `sudo wget https://datasheets.raspberrypi.com/cmio/dt-blob-disp1-only.bin -O /boot/dt-blob.bin`

- Using both the camera and 7” display (CAM 1 & DSI 1)
  `sudo wget https://datasheets.raspberrypi.com/cmio/dt-blob-disp1-cam1.bin -O /boot/dt-blob.bin`

Reboot the CM4 to load the new dt-blob.bin file.

** Please take note that this is only for the official Raspberry Pi Camera Module & 7-Inch Display.*

5. Disclaimer

The normal function of the product may be disturbed by electrostatic discharge (ESD). If so, simply reset the product to resume normal operation by power cycling the board.

Prepared by:

Cytron Technologies Sdn Bhd
www.cytron.io
No. 1, Lorong Industri Impian 1,
Taman Industri Impian,
14000 Bukit Mertajam,
Penang, Malaysia.

Tel: *+604 - 548 0668*
Fax: *+604 - 548 0669*

Email:
support@cytron.io
sales@cytron.io