
Configuring The Raspberry Pi Compute Module 4

Raspberry Pi Ltd

2022-12-20: githash: 936b91a-clean

Colophon

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build-date: 2022-12-20

build-version: githash: 936b91a-clean

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Document version history

Release	Date	Description
1.0	7 September 2021	Initial release
1.1	27 April 2022	Copy edit, public release
1.2	17 December 2022	Clarification on HDMI blanking

Scope of document

This document applies to the following Raspberry Pi products:

Pi 0			Pi 1		Pi 2		Pi 3	Pi 4	Pi 400	CM 1	CM 3	CM 4	Pico
0	W	H	A	B	A	B	B	All	All	All	All	All	All
												*	

Introduction

The Raspberry Pi Compute Module 4 (CM 4) is available in a number of different hardware configurations. Sometimes it may be necessary to disable some of these features when they are not required. For example, if a particular configuration of the module is not available, you may have been supplied with one with extra features that must be disabled for your use case.

Disabling features also results in power saving, which can be important when CM 4 devices are used in battery environments or similar.

At the time of writing the Raspberry Pi CM 4 is available with or without wireless/Bluetooth; with 1, 2, 4, or 8GB of random-access memory (RAM); and with 0, 8, 16, or 32GB of on-board embedded Multi-Media Card (eMMC) flash storage, which means there are a total of 32 different combinations available.

This document describes how to disable various hardware interfaces, in both hardware and software, and how to reduce the amount of memory used by the Linux operating system (OS).

Usage chart

This chart shows which variants can be used to replace other variants using the appropriate modifications as described below. To read the chart, select the device you have from the top axis, and read down to determine which other devices this one can replace.

NOTE

It is not possible to use a Raspberry Pi CM 4 with eMMC on a carrier that is designed for use with off-board eMMC or a Secure Digital (SD) card. This is because the SD input/output pins used to connect to any SD card slot are used to connect the on-board eMMC.

CM4 variant	1GB	2GB	4GB	8GB	1GB+WLAN	2GB+WLAN	4GB+WLAN	8GB+WLAN
1GB	*	*	*	*	*	*	*	*
2GB		*	*	*		*	*	*
4GB			*	*			*	*
8GB				*				*
1GB+WLAN					*	*	*	*
2GB+WLAN						*	*	*
4GB+WLAN							*	*
8GB+WLAN								*

Configuration

Disabling wireless and Bluetooth

Disabling at the hardware level

If you are developing your own Raspberry Pi CM 4 carrier board then this configuration can be done at the hardware level by pulling certain pins to ground. This is the best approach, and also allows for switching the devices on and off via a mechanical switch, e.g. a key switch.

Full details of all the pins can be found in Chapter 4 of the Raspberry Pi CM 4 datasheet, but in brief:

Pin	Signal	Description
89	WL_nDisable	Can be left floating; if driven low the wireless interface will be disabled. Internally pulled up via 1.8K to CM4_3.3V
91	BT_nDisable	Can be left floating; if driven low the Bluetooth interface will be disabled. Internally pulled up via 1.8K to CM4_3.3V

NOTE

Disabling the wireless and Bluetooth interfaces will save a small amount of power, so can be useful in low-power situations.

Disabling using software overlays

You can also disable the wireless and Bluetooth interfaces at the software level. There are number of options here.

There are two device tree overlays that control Bluetooth and wireless. These are documented in full in the [/boot/overlays/README](#) file on any Raspberry Pi, but the important information is reproduced here. Add the appropriate **dtoverlay** options to the **config.txt** file in the boot folder.

Name	config.txt	Description
disable-wifi	dtoverlay=disable-wifi	Disable on-board wireless on Raspberry Pi 3B, 3B+, 3A+, 4B, Zero W, and CM 4
disable-bt	dtoverlay=disable-bt	Disable on-board Bluetooth on Raspberry Pi 3B, 3B+, 3A+, 4B, Zero W, and CM 4

Extra security for disabling in software

Although the wireless or Bluetooth interface will be turned off on boot when using the device tree overlay mechanism, in some circumstances, with the right access to the device (e.g. root access), it would be possible to turn these back on again.

One robust way to prevent any use of the wireless and Bluetooth interfaces is to remove from the system the firmware that is loaded to the wireless/Bluetooth combo chip. Without this firmware, the wireless and Bluetooth interfaces are entirely unable to start up.

The firmware for the Raspberry Pi CM 4 can be found in [/lib/firmware/brcm/brcmfmac43455-sdio](#). Simply deleting this file will prevent the wireless/Bluetooth chip from starting up.

Reducing the memory available to the OS

Although unlikely, there may be situations where you need to reduce the amount of RAM available to the OS, i.e. to make a 4GB device look like a 1GB device. This can be done by altering the Linux command line as follows:

- Edit the `cmdline.txt` file in the `boot` folder with an appropriate text editor
- Add `mem=nn[KMG]` to the end of the command line, where K=kilobytes, M=megabytes, and G=gigabytes

So, to set the maximum amount of memory available to the Linux kernel to 1GB, add `mem=1G` to the command line.

i NOTE

The kernel requires the command line to be one single line of text, so ensure you do not inadvertently add any carriage returns.

Disabling the High-Definition Multimedia Interface (HDMI)

Although the CM 4's power requirements are automatically reduced by simply not having anything attached to the HDMI ports, a very small additional saving can be made by ensuring that the HDMI PHY (physical layer) is not turned on.

Add the following to the `config.txt` file: `hdmi_blanking=2`

i NOTE

This option is only available when using the legacy or FKMS graphics stack. It is not available when using the KMS graphics driver.

Disabling the Universal Serial Bus (USB) interface

Depending on the software version, the USB interface can be enabled or disabled by default. To force the USB interface to off, add the following to the `config.txt` file: `otg_mode=0`



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