Waveshare CM5104032

Waveshare CM5 Raspberry Pi Compute Module 5 (CM5104032) User Manual

Model: CM5104032 (4GB RAM, 32GB eMMC Flash, Wireless)

1. Introduction

The Waveshare CM5 Raspberry Pi Compute Module 5 (CM5104032) is a compact System on Module (SoM) that integrates the powerful hardware of the Raspberry Pi 5. This module features a quad-core Arm Cortex-A76 processor, 4GB of RAM, and 32GB of eMMC Flash storage, along with wireless connectivity. It is designed for embedded applications, allowing users to leverage Raspberry Pi 5's capabilities in custom systems and form factors. This manual provides essential information for setting up, operating, and maintaining your CM5 module.

2. Package Contents

Verify that all items listed below are included in your package. If any components are missing or damaged, please contact your vendor.

- 1x Waveshare CM5 Raspberry Pi Compute Module 5 (CM5104032)
- 1x Heatsink
- 1x Antenna Kit

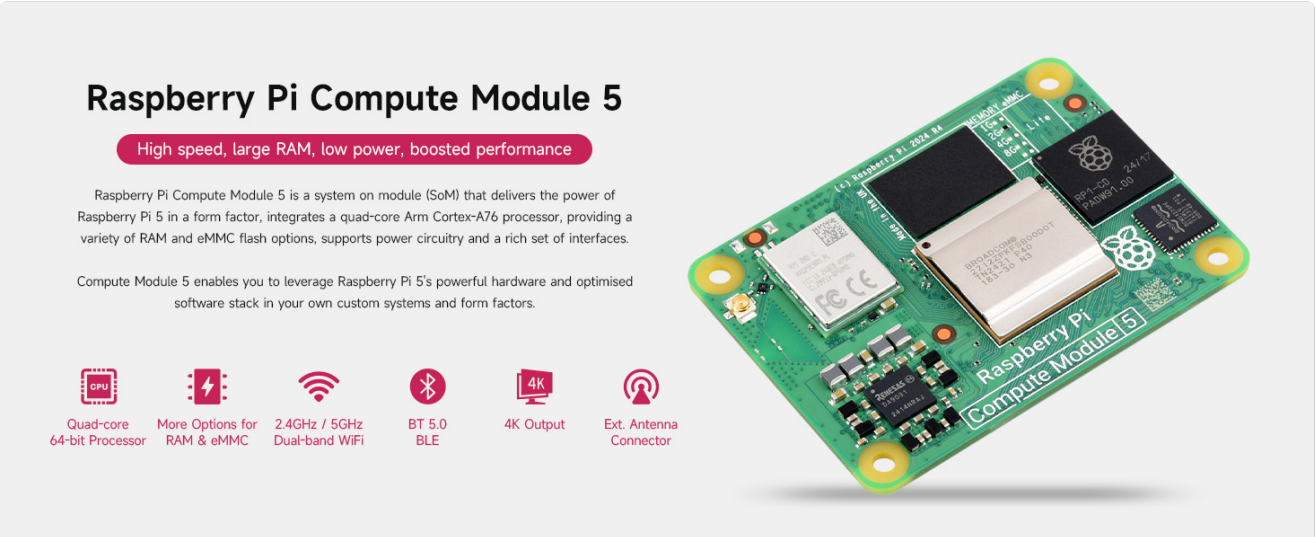

Image: The package includes the CM5104032 module (with Wi-Fi, 4GB RAM, 32GB eMMC Flash), a heatsink, and an antenna kit.

3. Key Features

The CM5104032 module offers several advanced features:

- **Processor:** Upgraded Broadcom BCM2712, quad-core Cortex-A76 64-bit SoC for enhanced performance.
- **Memory:** 4GB LPDDR4 RAM.
- **Storage:** 32GB eMMC Flash storage with up to 200 Mbps data rate.
- **Wireless Connectivity:** Dual-band Wi-Fi (2.4GHz / 5GHz) and Bluetooth 5.0 BLE.
- **Antenna Support:** Supports either PCB trace antenna or external antenna for industrial applications.
- **Ethernet:** Onboard Gigabit Ethernet PHY supporting IEEE1588.
- **PCIe:** Onboard PCIe Gen 2 x1 interface for connecting additional modules.
- **Compatibility:** Adopts B to B connectors, compatible with Compute Module 4 carrier boards.

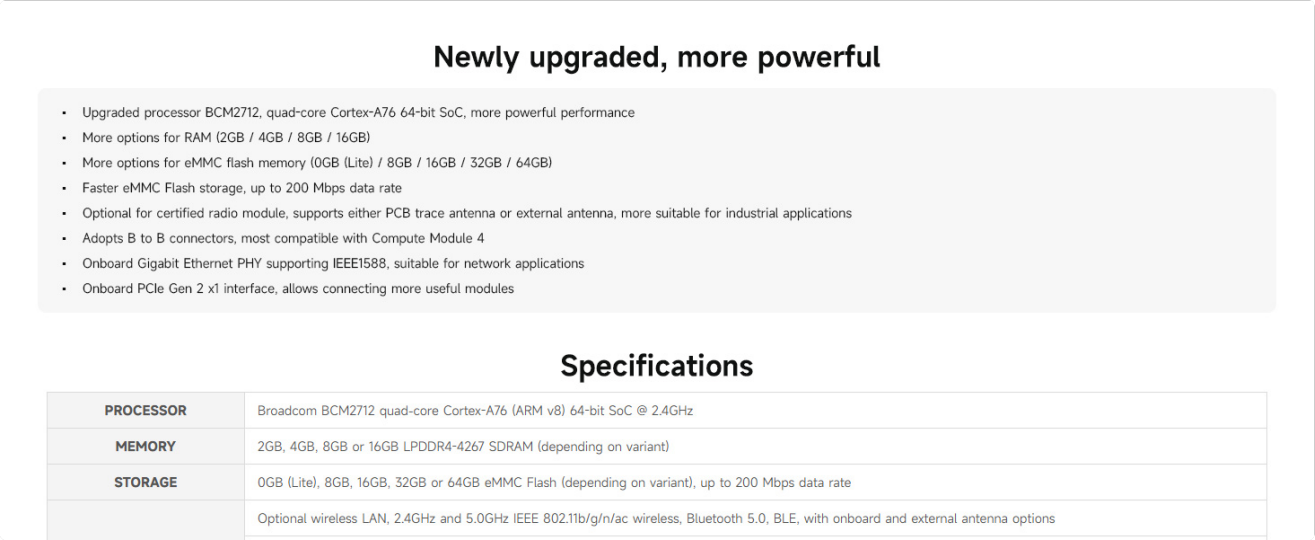

Image: Raspberry Pi Compute Module 5 overview, emphasizing its quad-core 64-bit processor, RAM/eMMC options, dual-band WiFi, BT 5.0 BLE, 4K output, and external antenna connector.

4. Setup Guide

4.1 Heatsink Installation

Proper heat management is crucial for the CM5's performance and longevity. The included heatsink helps dissipate heat from the processor.

1. Carefully align the heatsink with the processor on the CM5 module.
2. Secure the heatsink using the provided screws and risers. Ensure a firm but not overly tight fit to avoid damaging the board.

Note: Ensure the heatsink makes good contact with the processor. Incorrect installation can lead to overheating and performance throttling.

4.2 Antenna Connection

For wireless functionality, connect the external antenna.

1. Locate the antenna connector on the CM5 module.

2. Gently screw the antenna into the connector until it is finger-tight. Do not overtighten.

4.3 Connecting to a Carrier Board

The CM5 is designed to be integrated into a carrier board. Ensure your carrier board is compatible with the Compute Module 4 form factor, as the CM5 uses B to B connectors.

1. Align the CM5 module with the SODIMM-style connectors on your carrier board.
2. Gently press down on both sides of the module until it is fully seated in the connectors.
3. Secure the module to the carrier board using any provided mounting hardware.

4.4 Operating System Installation

Your CM5104032 module comes with 32GB eMMC Flash storage, which acts as the primary storage for the operating system. Raspberry Pi OS is the recommended operating system.

1. Connect your carrier board (with the CM5 installed) to a host computer via USB for initial flashing, if supported by your carrier board.
2. Download the Raspberry Pi Imager tool from the official Raspberry Pi website.
3. Use the Raspberry Pi Imager to select the appropriate Raspberry Pi OS image and flash it to the CM5's eMMC storage. Follow the on-screen instructions provided by the imager.
4. After flashing, safely eject the device from your host computer.

Important: Unlike CM4, CM5 does not have a dedicated 'reboot' button for OS installation. The process relies on the carrier board's capabilities and the Raspberry Pi Imager tool. Ensure your carrier board supports eMMC flashing for CM5.

5. Operating Instructions

5.1 Initial Power-Up

Once the CM5 is securely installed on a carrier board and the OS is flashed:

1. Connect necessary peripherals (display, keyboard, mouse) to your carrier board.
2. Apply power to the carrier board. The CM5 should boot up.
3. Follow the initial setup wizard for Raspberry Pi OS, which may include setting up Wi-Fi, language, and user accounts.

5.2 Network Connectivity

- **Wi-Fi:** Configure Wi-Fi settings through the Raspberry Pi OS desktop environment or command line. Ensure your external antenna is connected for optimal performance.
- **Ethernet:** Connect an Ethernet cable to the Gigabit Ethernet port on your carrier board for wired network access.

5.3 Using PCIe

The onboard PCIe Gen 2 x1 interface allows for expansion with compatible PCIe devices. Refer to your carrier board's documentation for specific instructions on utilizing the PCIe slot.

6. Maintenance

To ensure optimal performance and longevity of your Waveshare CM5 module:

- **Keep it Clean:** Regularly clean the module and carrier board to prevent dust buildup, which can hinder cooling. Use compressed air or a soft brush.
- **Temperature Management:** Ensure adequate airflow around the module, especially when operating under heavy loads. The heatsink is crucial for thermal management. Avoid operating in environments exceeding the specified operating temperature range (-20°C to 85°C).
- **Software Updates:** Keep your Raspberry Pi OS and firmware updated to benefit from performance improvements, bug fixes, and security patches.
- **Power Supply:** Use a stable and appropriate power supply for your carrier board to prevent power-related issues.

7. Troubleshooting

This section addresses common issues you might encounter.

7.1 Module Not Booting

- **Power:** Verify that the carrier board is receiving adequate power and that the power supply is correctly connected.
- **Seating:** Ensure the CM5 module is correctly and fully seated in the carrier board's connectors.
- **OS Image:** Confirm that the Raspberry Pi OS image was successfully flashed to the eMMC. Try re-flashing if unsure.
- **Carrier Board:** Check your carrier board's documentation for specific boot requirements or jumpers.

7.2 Wi-Fi/Bluetooth Issues

- **Antenna:** Ensure the external antenna is securely connected.
- **Software:** Verify that Wi-Fi and Bluetooth drivers are installed and enabled in Raspberry Pi OS.
- **Region Settings:** Incorrect region settings can affect wireless performance. Ensure your country is correctly configured in Raspberry Pi OS.

7.3 Overheating

- **Heatsink:** Check that the heatsink is properly installed and making good contact with the processor.
- **Airflow:** Ensure the module has sufficient ventilation. Consider adding a fan to your carrier board if operating in high-temperature environments or under continuous heavy load.
- **Thermal Paste/Pads:** Verify that thermal interface material (if used) is correctly applied between the processor and heatsink.

7.4 Keyboard Layout Issues

If you experience unexpected character input (e.g., '@' instead of '|'), it might be due to an incorrect keyboard layout.

- **Configure Keyboard:** In Raspberry Pi OS, navigate to *Preferences > Raspberry Pi Configuration > Localisation > Set Keyboard* and select the correct layout (e.g., 'US' for a US keyboard).

8. Specifications

Detailed technical specifications for the Waveshare CM5104032 module:

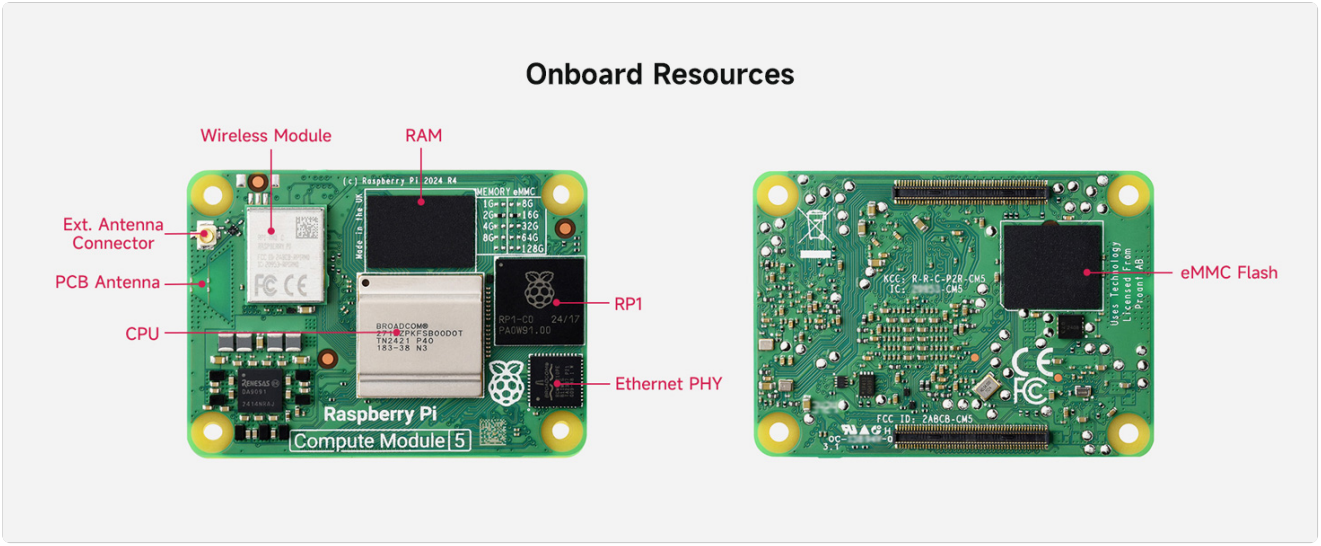

Image: A table detailing the specifications of the Raspberry Pi Compute Module 5, including processor, memory, storage, connectivity, video, multimedia, input power, RTC, operating voltage, and dimensions.

Category	Specification
Processor	Broadcom BCM2712, quad-core Cortex-A76 64-bit SoC @ 2.4GHz
Memory	4GB LPDDR4-4267 SDRAM
Storage	32GB eMMC Flash (up to 200 Mbps data rate)
Wireless LAN	2.4GHz and 5.0GHz IEEE 802.11b/g/n/ac wireless
Bluetooth	Bluetooth 5.0, BLE
Ethernet	Onboard Gigabit Ethernet PHY supporting IEEE1588
USB Interface	1 x USB 2.0 interface, 2 x USB 3.2 Gen1 interface
PCIe Interface	1 x PCIe Gen 2 x1 interface
GPIO Signals	28 GPIO signals
SD Card Interface	For SD card (for use only with Compute Module 5 variants without eMMC)
Video Output	2 x HDMI interface (up to 4Kp60 supported), 2 x 4-lane MIPI interface
Multimedia	4Kp60 HEVC decoder, OpenGL ES 3.1 graphics, Vulkan 1.3
Input Power	5V DC
RTC	Built-in Real-time clock (RTC), powered from external battery
Operating Voltage	-20°C ~ 85°C ambient
Dimensions	55 × 40 × 4.7mm
Item Weight	2.11 ounces

9. Warranty Information

Waveshare products are typically covered by a manufacturer's warranty against defects in materials and

workmanship. The specific terms and duration of the warranty may vary. Please retain your proof of purchase for any warranty claims. For detailed warranty information, refer to the official Waveshare website or contact their customer support.

10. Support and Resources

For further assistance, technical documentation, and community support, please refer to the following resources:

- **Waveshare Wiki:** Visit the official Waveshare Wiki for comprehensive documentation, tutorials, and examples related to their products, including the CM5. Waveshare Wiki
- **Raspberry Pi Documentation:** For general information about Raspberry Pi OS and Compute Modules, consult the official Raspberry Pi documentation. Raspberry Pi Documentation
- **Customer Support:** If you require direct technical support, please contact Waveshare customer service through their official website.