CmRat

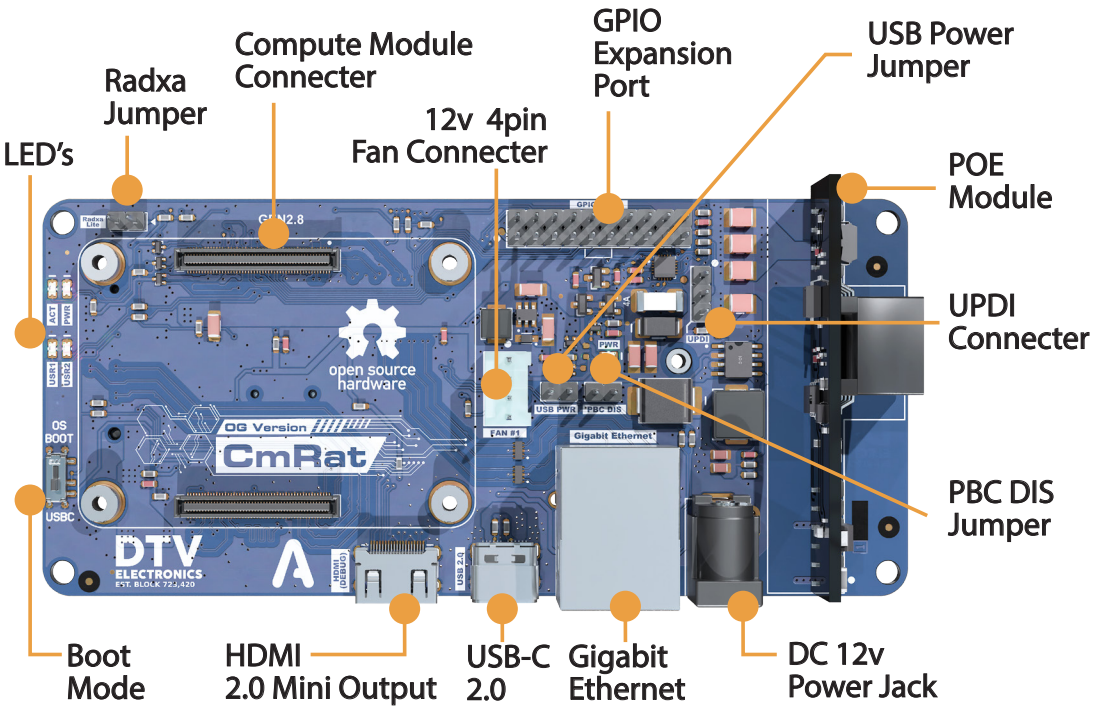
open source hardware

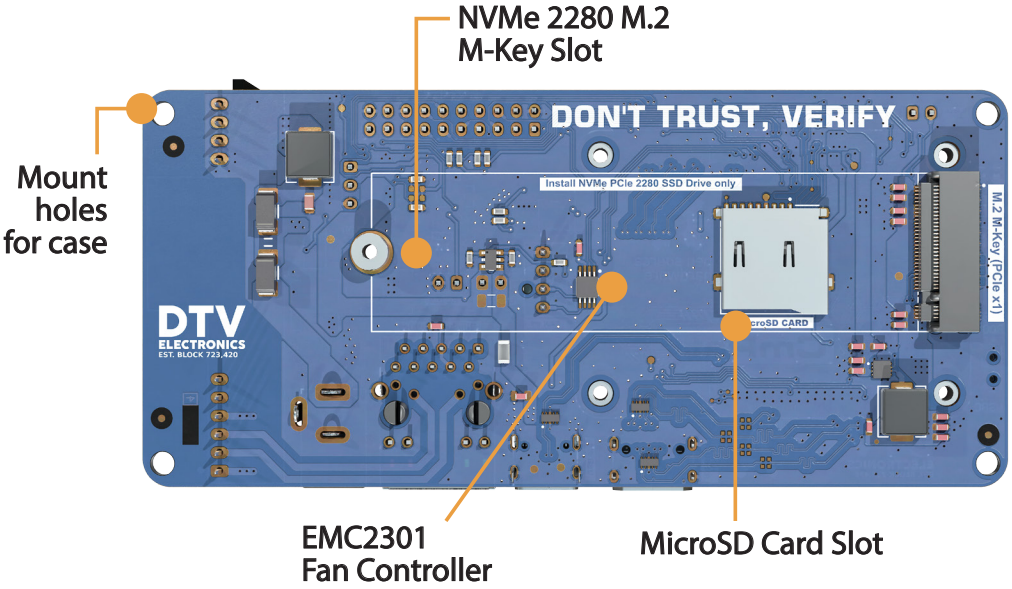
REFERENCE MANUAL V1.0

CmRat Introduction

A versatile & high-performance carrier board that supports a wide range of compute modules such as the Raspberry Pi CM4/CM5 and Radxa CM3/CM5.

This makes for an easy to build and use powerful PCB for flexible embedded systems and custom setups for a wide variety of use cases.





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FOSS
This is a Free & Open Source (FOSS) Project

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🔴 LED's

- **ACT –** Blinks to show activity on the board
- **PWR –** Shows that power is connected
- **USR1 / USR2 –** User-customizable LEDs

(behavior depends on OS and your configuration)

💡 **You can configure these LEDs through GPIO or OS-level scripts, depending on the system you use.**

🔌 Power & Cooling

12v Fan Connecter

Standard 4-pin header to connect a 12V fan for active cooling.

💡 **Useful when overclocking or running heavy workloads on CM's.**

DC Power Jack (12V)

Use a standard 12V DC adapter with a 2.1mm barrel plug.
Recommended: **12V @ 1A** (same as PoE power spec).

⚠️ **Avoid higher voltages or currents – it may damage your board!**

PoE Module

Optional module for **Power over Ethernet (PoE)**
Complies with IEEE802.3af (Class 0: 0.44W to 12.95W).

✅ **Saves you from using a separate power cable – power and Ethernet in one!**

🧠 Compute & Booting

Compute Module connecter

Two 100-pin mezzanine connecters for installing a Raspberry Pi CM5 module.

Boot Mode Switch

Choose the boot source:

- **'OS Boot'** – boots from storage on the Compute Module (eMMC, MicroSD, NVMe)
- **'USB-C'** – connect to a PC and flash the OS or access the CM5 directly

💾 Storage Options

MicroSD Card Slot

Alternative OS install method or extra storage.

✅ **Great for testing builds before committing to eMMC/NVMe.**

NVMe M.2 Slot (2280 M-Key)

Full-size NVMe SSD support.
Tested with **2TB**, should also work with larger (4/8TB) drives.

💡 **Make sure your OS supports NVMe boot if you're not using eMMC.**

🌐 Connectivity

Gigabit Ethernet

Standard RJ45 port for wired internet.

💡 **Combine with PoE to simplify wiring in enclosures.**

USB-C 2.0 Port

For USB devices (e.g. keyboards, storage) or power (see jumper config).

HDMI 2.0 Output

Connect a monitor or TV – if supported by your OS.

💡 **Great for debugging or graphical applications.**

🧩 Expansion & Add-ons

GPIO Expansion Header

20 pins exposed for connecting sensors, buttons, relays, etc.

💡 **Can also act as a serial/debug console depending on OS config.**

UPDI connecter

For programming the onboard ATtiny806 microcontroller (Microchip) using UPDI protocol.

💡 **Needed only if you're modifying the board-level firmware or using the ATtiny for automation. The board itself can also work independently if CM is meant to just run out of the box.**

EMC2301 Fan Controller

The I^2C fan speed controller and monitor.

✅ **Supports PWM fans and temperature-based speed profiles.**

🛠️ Jumpers (Optional Settings)

USB PWR Jumper

Allows powering the board from a 5V USB-C power adapter.

✅ **Perfect for development benches – no need for DC jack or PoE.**

PBC DIS Jumper

When enabled (default), the board powers on automatically once any power source is connected.

💡 **Remove this jumper if you want to control power manually via a switch or onboard microcontroller.**

Radxa Jumper

Enable only if you're using Radxa CM3 modules that boot from MicroSD.

⚠️ **Not needed for Raspberry Pi Compute Modules.**

🪛 Mounting

Mounting Holes

Standard mounting points for installing the board into an enclosure or custom case.

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Schematics / Technology/Assembly Cards

Please see GitHub for the latest documents.

BOM List

Please refer to the Github repository for an updated BOM list.

Source/Output Files

Please refer to the Github repository for source files.

Supporters/Contributors

Adam of 'Anlumen Technologies'
Mirek of 'PineBoards'
Leo of 'BuryRoadLabs'
Aaron Dewes - Master Developer

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