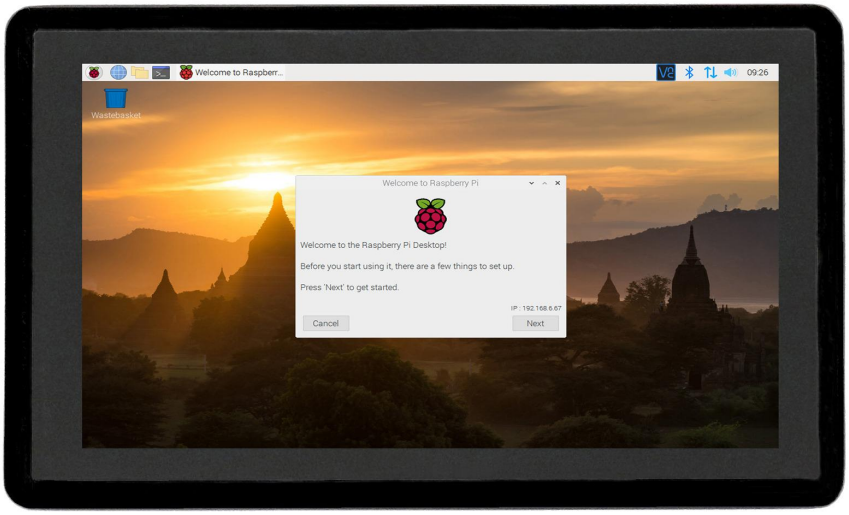
Industrial PC

# EPC/PPC-CM4-050




PN: CS12720RA4050

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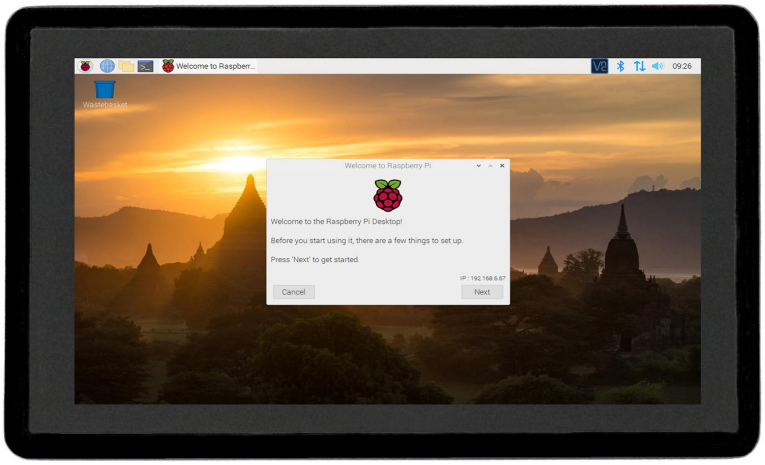
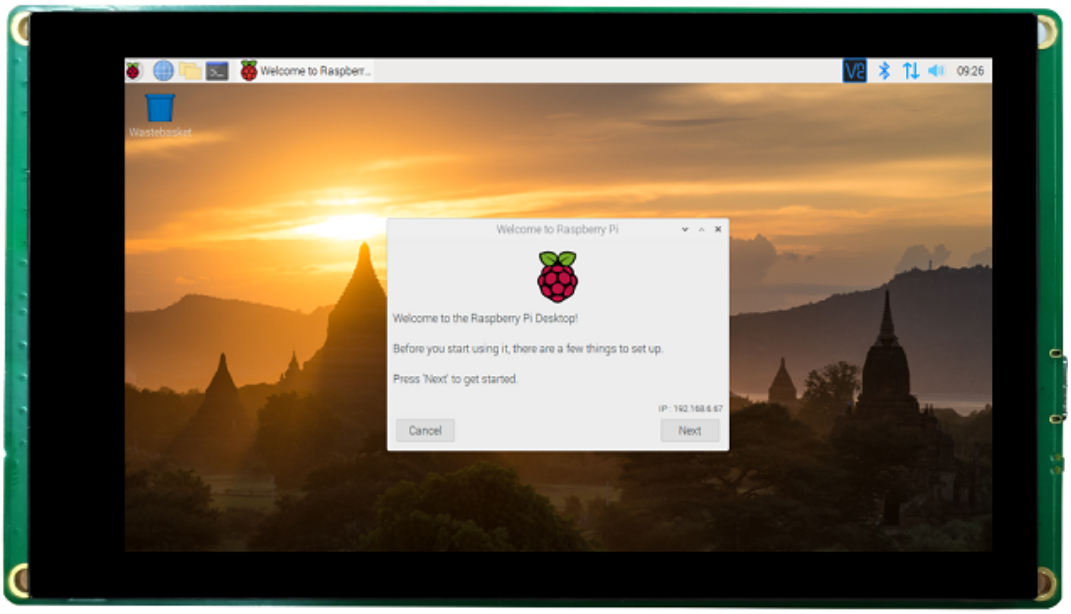
# EPC/PPC-CM4-050

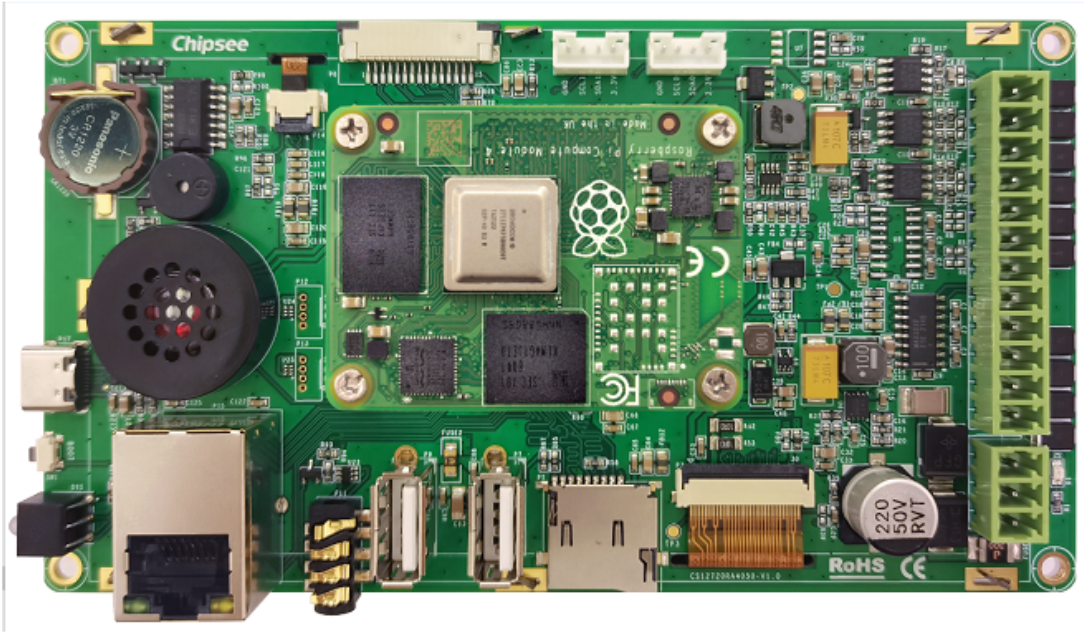



Front View

Rear View




Front View (Embedded Variant)




Rear View (Embedded Variant)

# Product Overview

The Cortex®-A72 Raspberry Pi® series EPC/PPC-CM4-050 (PN: CS12720RA4050) is a high-quality industrial Pi PC. It features a 5” five-point capacitive touch screen with a resolution of 1280 x 720 pixels and brightness of 400 cd/$m^2$.

Key Applications

- Human Machine Interface  HMI
- Process Control
- Process Monitoring

- HMI
- IIoT node
- Environmental Monitoring
- PLC
- Automotive applications
- ATM...

It is available both as an embedded solution and as a device hosed in a casing with bezels, thus facilitating different installation options:

- Installation on an industrial cabinet
- Integration with the existing equipment

The EPC/PPC-CM4-050 industrial Pi PC is based around the powerful Raspberry Pi® Compute Module 4, powered by the Quad Cortex®-A72 processor with a processor speed of 1.5GHz.

# Ordering Options

Chipsee products can be customized during the ordering process. The product will be shipped with the pre-installed factory defaults if no extra requirements are specified. The table in the Specifications section provides information about the default options bundled with the product.

> **Note**
>
> You can order EPC/PPC-CM4-050 from the official Chipsee Store or from your nearest distributor.

## Pi® CM4 Module

The Pi® Compute Module 4 appears in different versions depending on the size of the DDR4 and eMMC.
The EPC/PPC-CM4-050 industrial Pi PC does not include the CM4 Raspberry Pi® module by default. If you would like to purchase it with a CM4, you can select it at the Chipsee store during the ordering process.

## Operating System

This product comes with a pre-installed Debian OS. Chipsee software engineers have created all the drivers, so every hardware feature is readily available for any standard development tool.

If your project requires a different OS, please **Contact us**, and we'll make a customized version that suits your needs.

## Specifications

The EPC/PPC-CM4-050 industrial Pi PC offers a broad range of performance and connectivity options for scalable integration, providing expandability according to future needs. Some of the key features are listed in the table below.

| EPC/PPC-CM4-050 | |
|---|---|
| **CPU** | Raspberry Pi® CM4, CM4 Lite; Quad Cortex-A72 at 1.5GHz |
| **Storage** | 1 TF Cards slots3 |
| **RAM** | Based on CM4 |
| **eMMC** | Based on CM4 |
| **Display** | 5" IPS LCD, 1280 x 720 resolution px, brightness 400 cd/$m^2$ |
| **Touch** | 5-point capacitive touch with 1mm Armored Glass |
| **USB** | 2 x USB 2.0 Host, 1 x Type-C |
| **LAN** | 1 x Channel Giga LAN |
| **Audio** | 3.5mm Audio Out Connector, 2W Speaker Internal |
| **Buzzer** | Onboard Buzzer, driven by GPIO |
| **RTC** | Yes, High Accuracy RTC with Lithium Button Coin battery (lithium battery not included) |
| **RS232** | 2 x RS232 |
| **RS485** | 2 x RS4851 |
| **CAN** | 1 x CAN-BUS |
| **GPIO** | Not Supported |
| **WiFi/BT** | Supported but depending on the CM4 selected2 |
| **HDMI** | Not Supported |
| **3G/4G/LTE** | Not Supported |
| **I2C** | Support I2C0 I2C1 for CS12720RA4050E |
| **Camera** | Yes, not mounted by default |
| **Power Input** | From 9V to 36V |
| **Current at 12V** | 500mA Max |
| **Power Consumption** | 6W Typical |
| **Working Temperature** | From 0°C to +60°C |
| **OS** | Debian |

| EPC/PPC-CM4-050 | |
|---|---|
| **Dimensions** | CS12720RA4050E: 141.2 x 77.6 x 25.8mm |
| | CS12720RA4050P: 139 x 85 x 28mm |
| **Weight** | CS12720RA4050E: 200g |
| | CS12720RA4050P: 310g |

Table 314 Key Features

1. The RS485 circuit controls the Input and Output direction automatically, there's no need to control it from within the software.
2. The default product without the CM4 does not include a Wi-Fi/BT module. You can include a CM4 that has the Wi-Fi/BT module at the Chipsee store during the ordering process.
3. Chipsee designed TF card slots for storage expansion, as the TF card for storage expansion use same pins with WiFi, it can't be used with WiFi at same time

**Attention**

Chipsee does not install a lithium battery by default, as we cannot ship products with batteries. We recommend you buy it locally and install it by yourself. The lithium battery part number is CR1220. Please **Contact us** if you need help.

## Power Input

The EPC/PPC-CM4-050 industrial Pi PC can be powered by a wide range of input voltages: From 9V to 36V DC. It is a **3 Pin, 3.81mm screw terminal** connector. The polarity and the pinout is clearly marked on the housing of the CS12720RA4050P version, as shown in the figures below.

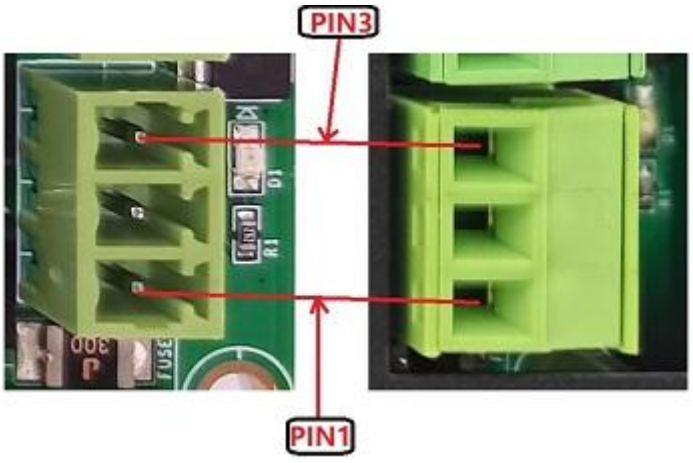



Figure 964: *Power Input*

Note that the "**+**" sign represents the positive power input, and it is printed both at the casing and as a silk-screen on the board of the embedded version. The "**-**" terminal is shorted to the ground.

| Power Input Definition | | |
|---|---|---|
| **Pin Number** | **Definition** | **Description** |
| Pin 1 | Positive Input | DC Power **Positive Terminal** |
| Pin 2 | Negative Input | DC Power **Negative Terminal** |
| Pin 3 | Ground | **Power System Ground** |

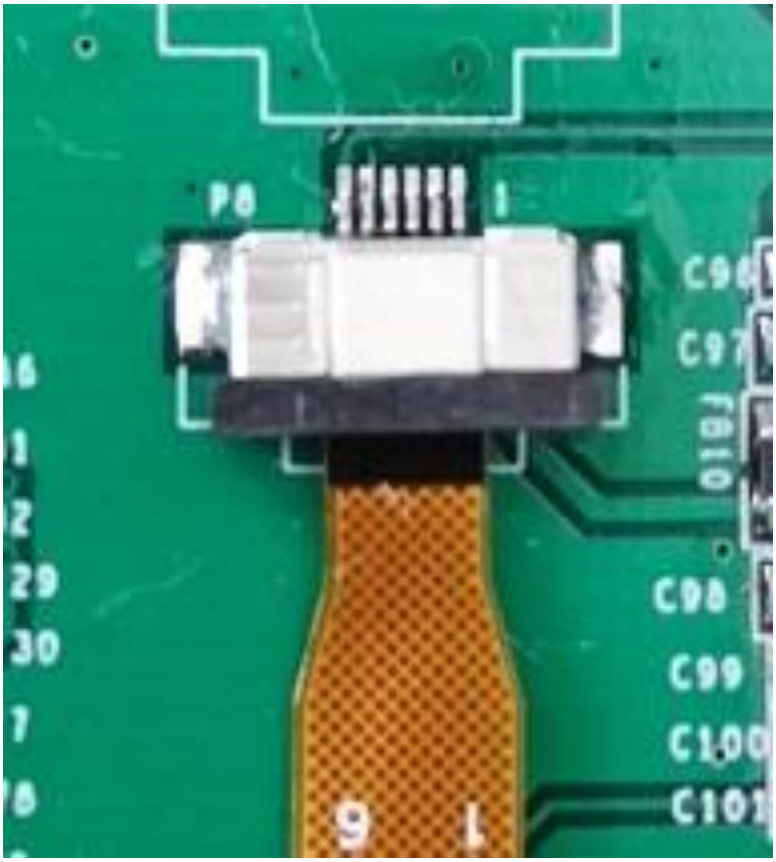
Table 315 Power Connector

**Note**

The system ground "**G**" is connected to power negative "**-**" on board.
The central pin is positive.

## Touch Screen

The EPC/PPC-CM4-050 industrial Pi PC uses a 5-point capacitive touch screen. However, the Debian OS supports only One-Point touch.
The figure below shows the capacitive touch screen connected to the motherboard via the FPC connector.




*Capacitive Touch Connector*

**Attention**

A capacitive touch screen is susceptible to power noise and Electromagnetic Radiation (EMR). It may cause LCD ripples or even capacitive touch malfunction. If using a capacitive multi-touch test application, you might notice the touch points float erratically across the display. There are several solutions to this problem:

1. Use a high-quality Power Adapter Unit (PSU) with low EMR. You can also provide power from a battery.
2. Make sure that the EPC/PPC-CM4-050 Power Input connector (pin 3) is properly connected to the Power System Ground to provide sufficient EMI shielding and eliminate the problem entirely.
3. Bad GND problems can also be confirmed by touching pin 3 of the Power Input connector with one hand while operating the capacitive touch screen with the other hand. In this case, the operator's body acts as the Power System Ground.

# Connectivity

There are many connectivity options available on the EPC/PPC-CM4-050 industrial Pi PC. It has 2 x USB 2.0 Host, 1 x Type-C, 1 x Channel Giga LAN (RJ45) Ethernet connector supporting up to 1 Gbps, and 4 x UART terminals (RS232/RS485/CAN).

## RS232/RS485/CAN

The serial communication interfaces (RS485, RS232, and CAN) are routed to a **12-pin 3.81mm terminal**, as illustrated on the figure below.

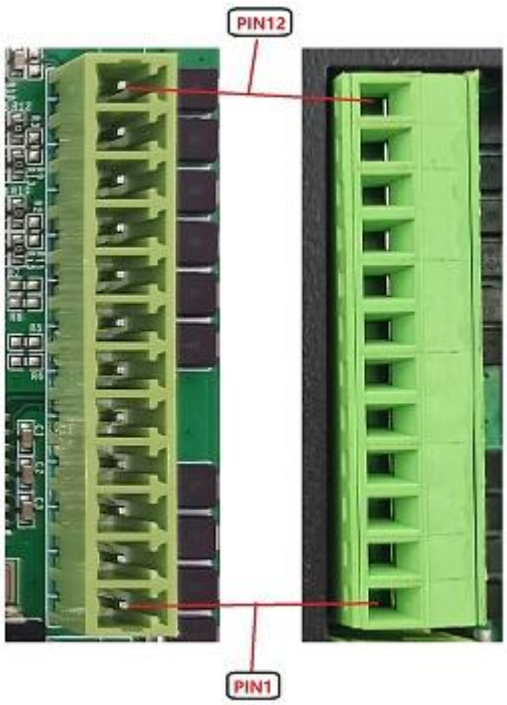



Figure 965: *Relation between serial pins on embedded vs. enclosed version of the* EPC/PPC-CM4-050 *Industrial PC*

The table below offers more detailed description of every pin and its definition:

| **RS232 / RS485 / CAN Pin Definition:** | | |
|---|---|---|
| **Pin Number** | **Definition** | **Description** |

| RS232 / RS485 / CAN Pin Definition: | | |
|---|---|---|
| Pin 12 | CAN1_H | CAN H signal |
| Pin 11 | CAN1_L | CAN L signal |
| Pin 10 | RS485_5- | CPU UART5, RS485 –(B) signal |
| Pin 9 | RS485_5+ | CPU UART5, RS485 +(A) signal |
| Pin 8 | RS485_3- | CPU UART3, RS485 –(B) signal |
| Pin 7 | RS485_3+ | CPU UART3, RS485 +(A) signal |
| Pin 6 | RS232_2_RXD | CPU UART2, RS232 RXD signal |
| Pin 5 | RS232_2_TXD | CPU UART2, RS232 TXD signal |
| Pin 4 | RS232_0_RXD | CPU UART0, RS232 RXD signal |
| Pin 3 | RS232_0_TXD | CPU UART0, RS232 TXD signal |
| Pin 2 | GND | System Ground |
| Pin 1 | +5V | System +5V Power Output, No more than 1A Current output |

Table 316 Connectivity Section

**Attention**

1. RS485_3 and RS485_5 can control the input and output direction automatically. There's no need to control it from within the software.
2. The 120Ω match resistor for the RS485 and CAN bus is NOT mounted by default.

## USB Connectors

There are 2 x Type A **USB HOST connectors** onboard, as shown on the figure below.

Figure 966: *USB HOST Connectors (embedded/enclosed PC version)*

**Attention**

1. These two USB host connectors can drive 500mA for each channel at most.

2. When you connect this product to the HOST PC by a USB Type-C cable, the USB HUB will be disabled. As a result, the 2 USB host connectors will not work.

The product has one USB Type-C connector that works as a slave by default. You can use it to establish a connection with the host PC and for downloading the system to the eMMC of CM4 module.

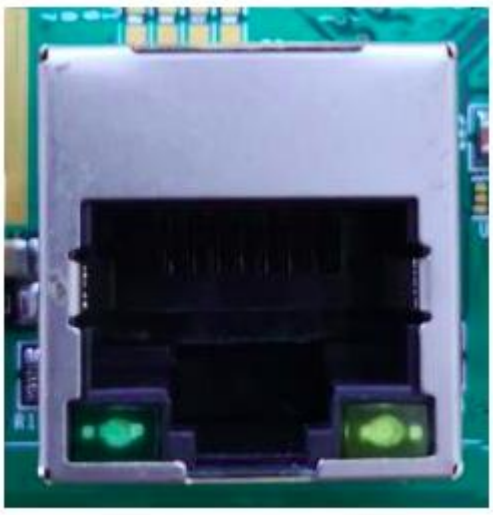
Figure 967: *USB OTG Connector*

**Warning**

Be careful not to touch surrounding electronic components accidentally while plugging in USB devices into the embedded Industrial PC version.

## LAN Connectors

**LAN (RJ45) connector** provides Ethernet connectivity over standardized Ethernet cables as shown in the figure below. The integrated Ethernet interface supports up to 1 Gbps data throughput. These Giga LAN signals come from the CM4 module directly.



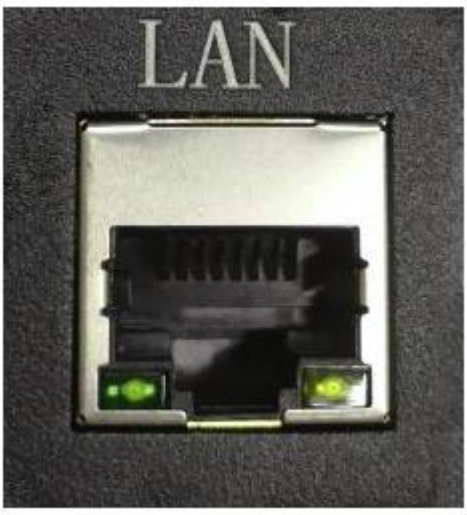


Figure 968: *RJ45 LAN Connectors (embedded/enclosed PC version)*

**Note**

Use CAT5 or better cables to achieve full data throughput over maximum distance defined by the 1000BASE-T standard (100m).

## WiFi & BT Module

The default EPC/PPC-CM4-050 without the CM4 does not include a Wi-Fi/BT module.
If you include a CM4 that has the Wi-Fi/BT module, the product will have Wi-Fi/BT feature.
The enclosed (CS12720RA4050P) variant of the product also includes an SMA connector for an external WiFi/BT antenna, as illustrated in the figure below.

*WiFi+BT Antenna*

**Attention**

The product does not come shipped with the Wi-Fi/BT module by default.

## Camera Connector

The EPC/PPC-CM4-050 industrial Pi PC has a 15 Pin **Camera Connector**, as shown on the figure below. The camera signals come from CAM1. The table below gives details about the definition of every Pin.

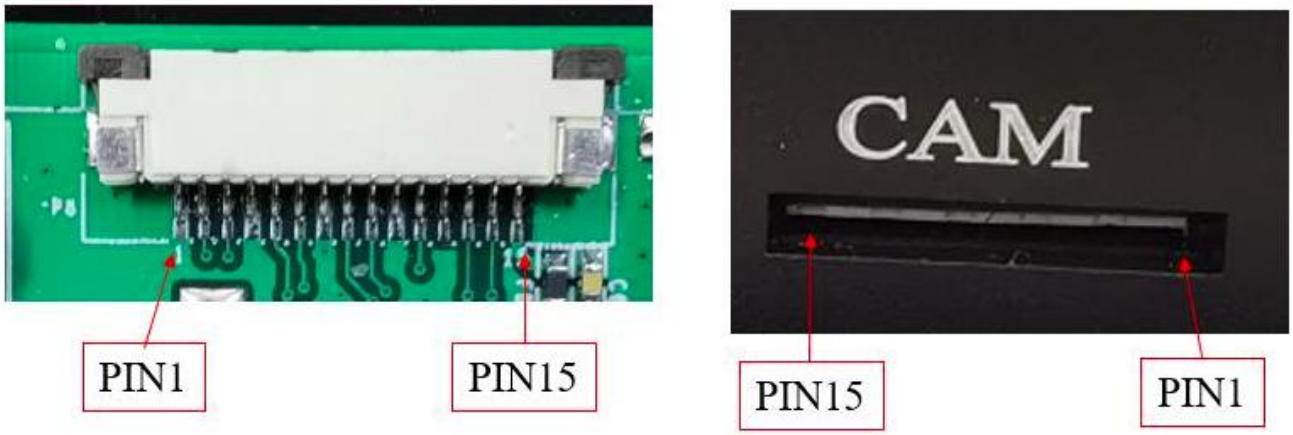



Figure 969: *Camera Connector*

| **Camera Connector Pin Definition:** | | |
|---|---|---|
| **Pin Number** | **Definition** | **Description** |
| Pin 1 | GND | Power Ground |
| Pin 2 | CAM1_DN0 | CAM1_DN0 |
| Pin 3 | CAM1_DP0 | CAM1_DP0 |
| Pin 4 | GND | Power Ground |
| Pin 5 | CAM1_DN1 | CAM1_DN1 |
| Pin 6 | CAM1_DP1 | CAM1_DP1 |
| Pin 7 | GND | Power Ground |
| Pin 8 | CAM1_CN | CAM1 Clock signal Negative |
| Pin 9 | CAM1_CP | CAM1 Clock signal Positive |
| Pin 10 | GND | Power Ground |
| Pin 11 | CAM GPIO | CAM GPIO, use for disable camera power and module |
| Pin 12 | NC | Not connected |
| Pin 13 | SCL0 | CPU I2C SCL0 signal |
| Pin 14 | SDA0 | CPU I2C SDA0 signal |
| Pin 15 | +3.3V | System +3.3V Power Output, No more than 500mA Current output |

Table 317 Camera Connector Pin-out

**Attention**

1. The camera is not mounted by default.

# TF Card Slot

The EPC/PPC-CM4-050 industrial Pi PC features 1 x **TF Card (micro SD) slot**: SD, TF slots can address up to 128GB of memory.

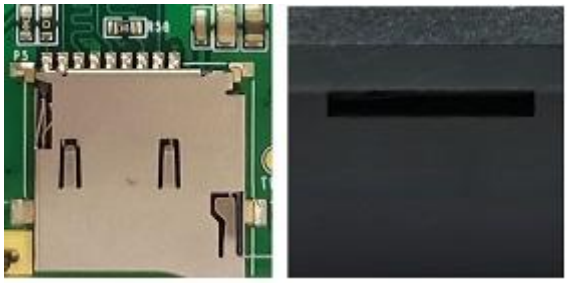


Figure 970: *TF (micro SD) Card Slot*

**Attention**

1. The SD is used for memory extension. It can't be used for system boot-up.
2. The product does not come shipped with the TF Card by default.

# Audio Connectors

The EPC/PPC-CM4-050 industrial Pi PC features some audio peripherals. It has 1 x **3.5mm audio output jack**.
Also, the EPC/PPC-CM4-050 industrial Pi PC has a miniature 2W internal speaker for audio reproduction, as well as a small buzzer for alarm/notification sounds.

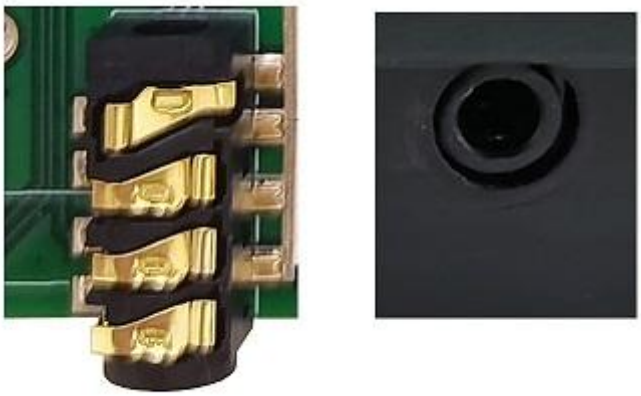


Figure 971: *Audio Connector (embedded/enclosed PC version)*

**Attention**

By plugging in the headphone cable, the internal speaker will be disabled automatically.

# Boot DIP Switch

The EPC/PPC-CM4-050 industrial Pi PC has one button on the board marked as SW1, shown in the figure below.
When button is pressed before power, the Raspberry Pi will boot from the USB connector. You can use this function to download the OS software to the internal eMMC.
When button is released before power, the Raspberry Pi will boot from internal eMMC.

There is no need to press the button during regular operation. However, if you need to reinstall the OS, please refer to the detailed information on how to re-flash the OS from the Software Documentation.

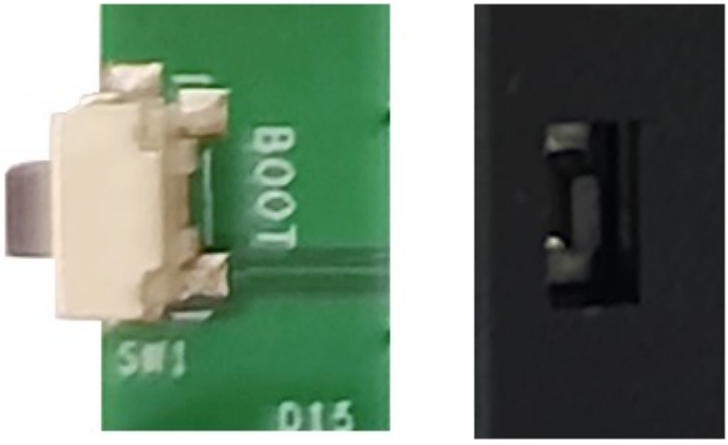



Figure 972: *Boot DIP Switch*

# Mounting Procedure

The EPC/PPC-CM4-050 industrial Pi PC can be mounted with 4 x M4 screws, enabling simplified installation onto any standard mounting fixture.

## CS12720RA4050E

You can mount CS12720RA4050E with the Embedded mounting method, as shown on the figure below.

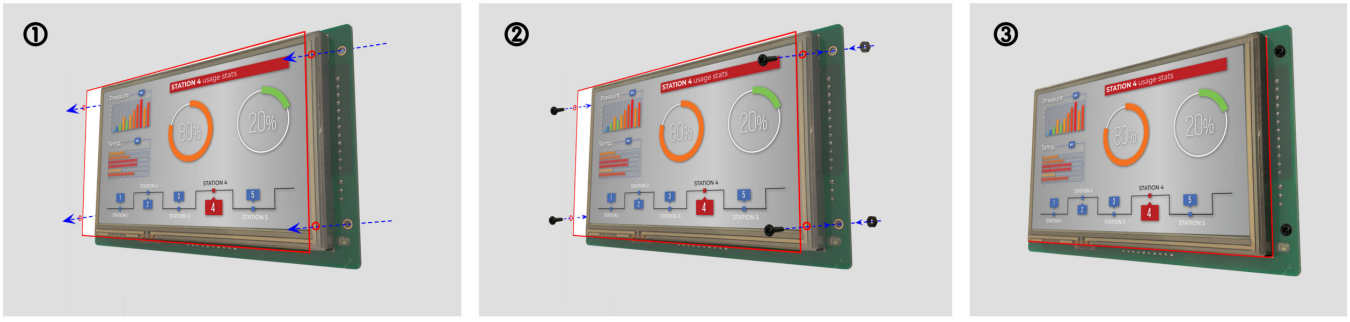



Figure 973: *Embedded mounting*

### CS12720RA4050P

You can mount CS12720RA4050P with the Vesa (75 x 75mm) and Panel mounting methods, as shown on the figure below.

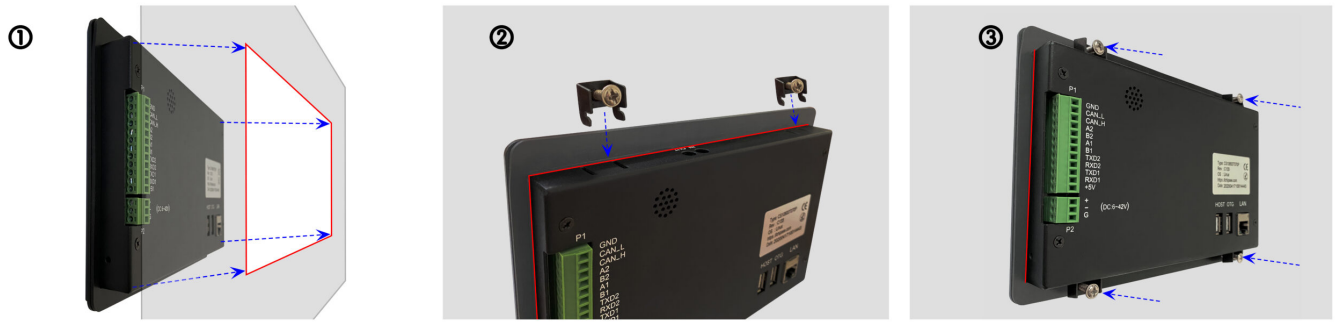



Figure 974: *Panel mounting*

> **Attention**
>
> Please make sure the display is not exposed to high pressure when mounting into an enclosure.

You can find detailed information about mounting in the Mount IPC Guide.

## Mechanical Specifications

### CS12720RA4050E

The outer mechanical dimensions of CS12720RA4050E are 141.2 x 77.6 x 25.8mm (W x L x H). Please refer to the technical drawing in the figure below for details related to the specific product measurements.

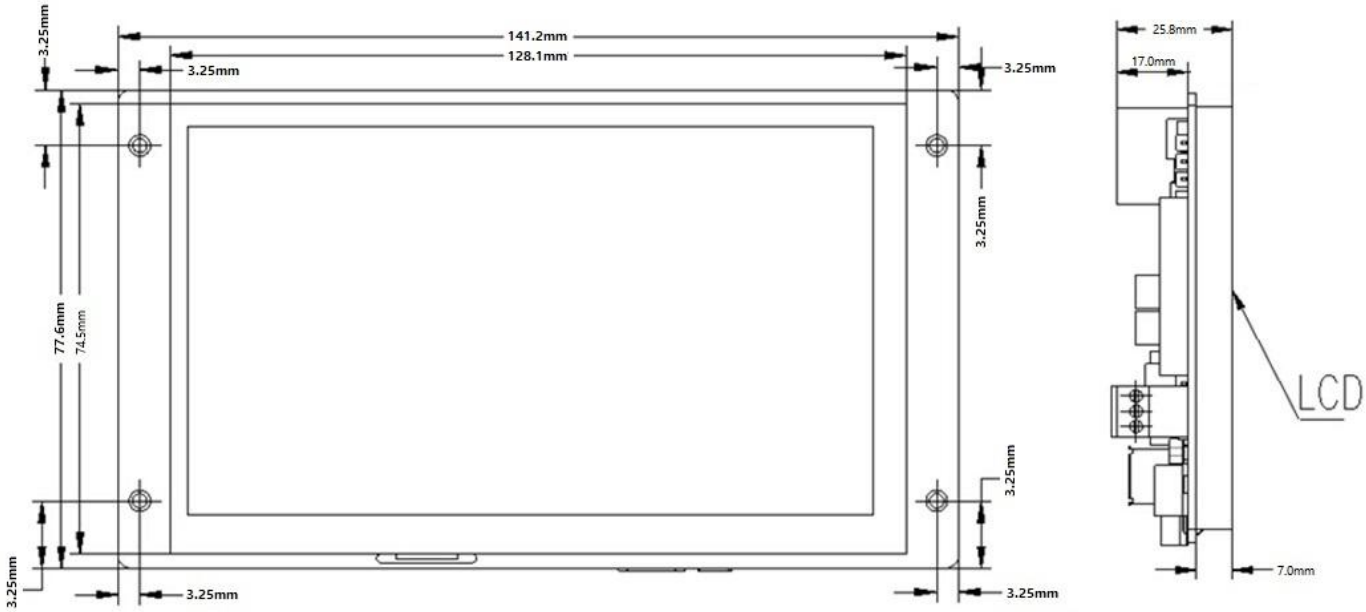



Figure 975: CS12720RA4050E *Technical Drawing*

### CS12720RA4050P

For CS12720RA4050P, the outer mechanical dimensions are 139 x 85 x 28mm (W x L x H).

## 3D Model

EPC/PPC-CM4-050 3D model can be viewed in the online doc in a web browser, if you are reading from the **PDF** version, please visit the online doc.

# Disclaimer

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