Chipsee

Industrial PC

# EPC/PPC-CM4-070

PN: CS10600RA4070

**Revision 1.1**

**www.chipsee.com**

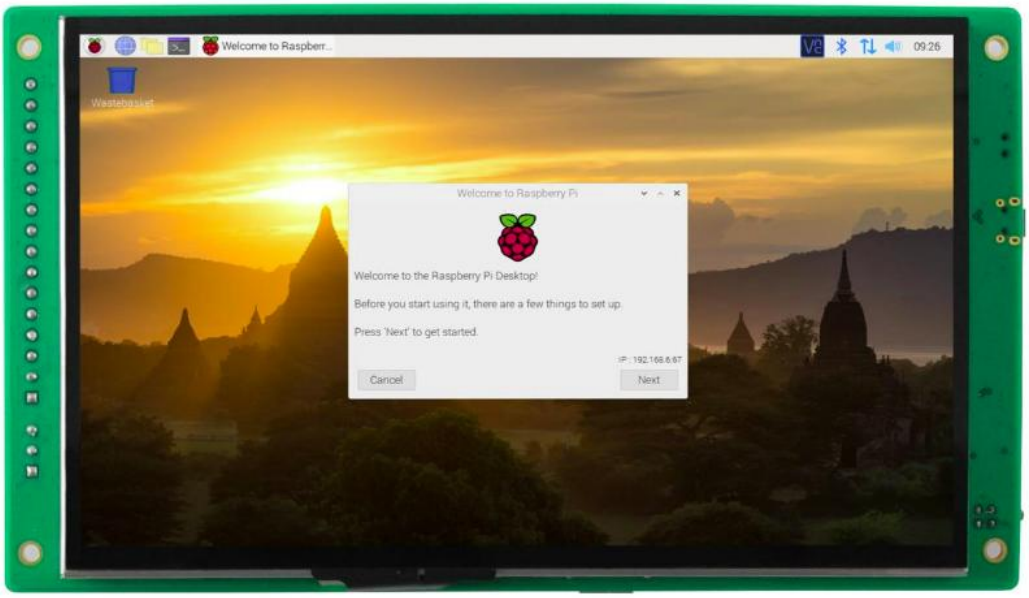
# Contents


1. EPC/PPC-CM4-070 3
   1.1. Product Overview 5
   1.2. Ordering Options 6
      1.2.1. Pi® CM4 Module 6
      1.2.2. Operating System 6
      1.2.3. Optional Features 6
   1.3. 7 inch CM4 Products Comparision 6
   1.4. Specifications 8
   1.5. Power Input 10
   1.6. Touch Screen 11
   1.7. Connectivity 12
      1.7.1. RS232/RS485/CAN 12
      1.7.2. GPIO Port 13
      1.7.3. USB Connectors 15
      1.7.4. LAN Connectors 16
      1.7.5. WiFi & BT Module 17
      1.7.6. 3G/4G/LTE Module 17
      1.7.7. Zigbee Module 18
      1.7.8. Camera Connector 19
   1.8. TF Card Slot 21
   1.9. Audio Connectors 22
   1.10. PROG Button 23
   1.11. Mounting Procedure 24
      1.11.1. CS10600RA4070E 24
      1.11.2. CS10600RA4070P 24
   1.12. Mechanical Specifications 25
      1.12.1. CS10600RA4070P 25
      1.12.2. CS10600RA4070E 25
   1.13. Disclaimer 26
   1.14. Technical Support 26

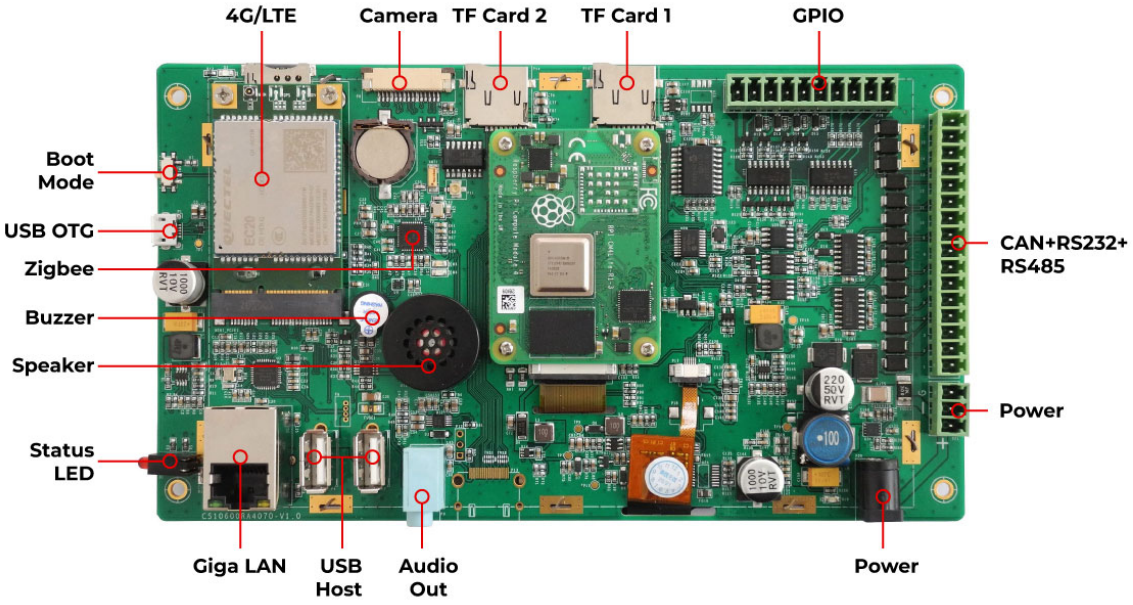
# EPC/PPC-CM4-070

Front View

Rear View




Front View (Embedded Variant)




Rear View (Embedded Variant)

# Product Overview

The Cortex®-A72 Raspberry Pi® series EPC/PPC-CM4-070 (PN: CS10600RA4070) is a high-quality industrial Pi PC. It features a 7” five-point capacitive touch screen with a resolution of 1024 x 600 pixels and brightness of 500 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-CM4-070 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-CM4-070 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-CM4-070 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.

## Optional Features

The EPC/PPC-CM4-070 industrial Pi PC does not include the 3G/4G/LTE modules by default. These modules are optional and can be selected at the Chipsee store during the ordering process.

> **Warning**
>
> Installation, repair, and maintenance tasks should be performed by trained personnel only.
> Chipsee does not bear any responsibility for damage caused by inadequate handling of the product.

# 7 inch CM4 Products Comparision

Chipsee provides two 7 inch Industrial Pi PCs, EPC/PPC-CM4-070 and PPC-CM4-070-D, here is the comparison:

| Product | EPC/PPC-CM4-070 | PPC-CM4-070-D |
|---|---|---|
| LAN | 1 x LAN | 2 x LAN |
| USB-A | 2 x USB 2.0 | 2 x USB 3.0 |
| GPIO | 8 x Optical Isolated GPIO | 6 x Raspberry Pi CPU GPIO (Compatible with Pi GPIO Software Libraries) or 8 x Optical Isolated GPIO |
| Connectors | Distributed on each side | Mostly on the bottom side |
| Dimension | 206 x 135 x 30mm | 188.05 x 123.11 x 33.20mm, new case, small and compact |

Table 237 Comparison Between the 7 inch CM4 Products

# Specifications

The EPC/PPC-CM4-070 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-CM4-070 | |
|---|---|
| **CPU** | Raspberry Pi® CM4, CM4 Lite; Quad Cortex-A72 at 1.5GHz |
| **Storage** | Support for 2 x TF Card3 |
| **RAM** | 2/4/8 GB, Based on CM4 |
| **eMMC** | 16/32 GB, Based on CM4 |
| **Display** | 7" IPS LCD, 1024 x 600 resolution px, brightness 500 cd/$m^2$ |
| **Touch** | 5-point capacitive touch with 1mm Armored Glass |
| **USB** | 2 x USB 2.0 Host, 1 x USB OTG |
| **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** | Default to 2 x RS232, up to 4 x RS232 |
| **RS485** | Default to 2 x RS4851, these 2 x RS485 can be configured as 2 x RS232 |
| **CAN** | 1 x CAN-BUS |
| **GPIO** | 8 Channels, 4 Input, 4 Output |
| **I2C** | Not Supported |
| **WiFi/BT** | Supported but depending on the CM4 selected2 |
| **ZIGBEE** | Onboard Zigbee module, not mounted by default |
| **HDMI** | Yes |
| **SATA II** | Not Supported |
| **3G/4G/LTE** | Supported, not mounted by default |
| **Camera** | Yes, not mounted by default |
| **Power Input** | From 9V to 36V |
| **Current at 12V** | 420mA Max |
| **Power Consumption** | 5W Typical |
| **Working Temperature** | From 0°C to +60°C |

| EPC/PPC-CM4-070 | |
|---|---|
| **OS** | Debian |
| **Dimensions** | CS10600RA4070E: 190 x 108 x 28mm; CS10600RA4070P: 206 x 135 x 30mm |
| **Weight** | CS10600RA4070E: 400g; CS10600RA4070P: 700g |

Table 238 Key Features

---

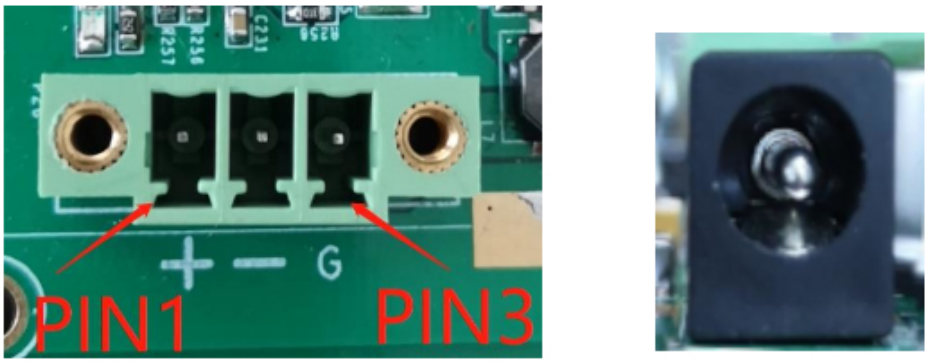
1. The RS485 circuit controls the Input and Output direction automatically, there's no need to control it from within the software.
2. The default product without the CM4 does not include a Wi-Fi/BT module. You can include a CM4 that has the Wi-Fi/BT module at the Chipsee store during the ordering process.
3. Chipsee designed one of the TF card slots for Lite version which have no eMMC. We designed the other one 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-CM4-070 industrial Pi PC can be powered by a wide range of input voltages: From 9V to 36V DC. There are two types of power input connectors. One is a **3 Pin, 3.81mm screw terminal** connector, and the other is a **2.1mm DC input head**. As shown in the figure below.




*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** |

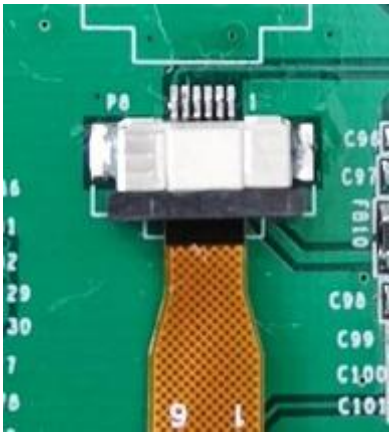
Table 239 Power Connector

**Note**

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

# Touch Screen

The EPC/PPC-CM4-070 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:

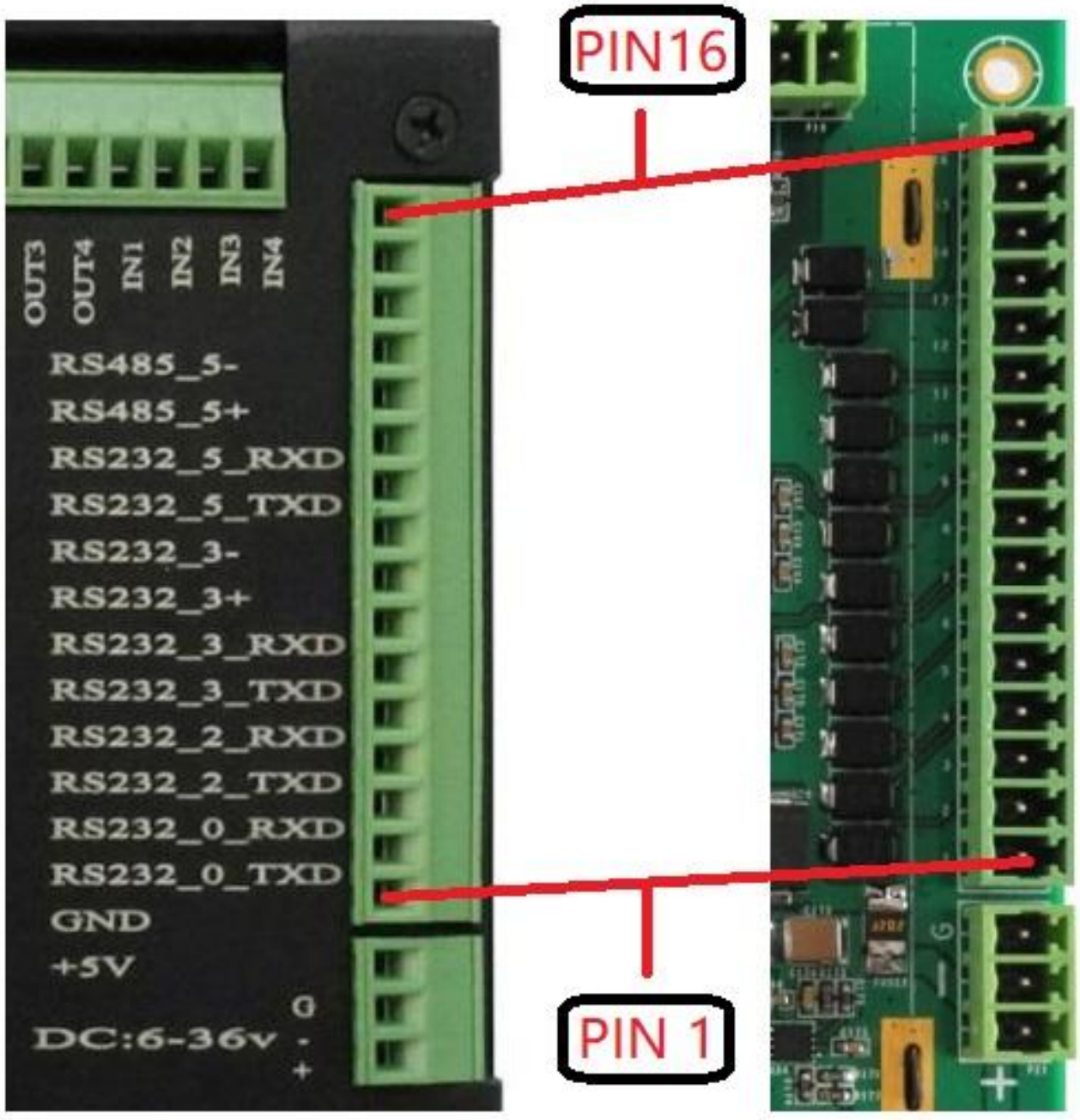
1. Use a high-quality Power Adapter Unit (PSU) with low EMR. You can also provide power from a battery.
2. Make sure that the EPC/PPC-CM4-070 Power Input connector (pin 3) is properly connected to the Power System Ground to provide sufficient EMI shielding and eliminate the problem entirely.
3. Bad GND 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-CM4-070 industrial Pi PC. It has 2 x USB 2.0 Host, 1 x USB OTG, 1 x Channel Giga LAN (RJ45) Ethernet connector supporting up to 1 Gbps, and 4 x UART and 1 x CAN terminals (RS232/RS485/CAN).

## RS232/RS485/CAN

The serial communication interfaces (RS485, RS232, and CAN) are routed to a 16-pin 3.81mm terminal, as illustrated in the figure below.




*RS232-RS485-CAN on the* EPC/PPC-CM4-070 *Industrial PC*

**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 RS485 is **already** mounted by default.
3. The 120Ω match resistor for CAN is **NOT** mounted by default. Be sure to mount the match resistor when testing CAN.
4. RS485_3 and RS232_3 share UART3 and can't work at the same time; RS485_5 and RS232_5 share UART5 and can't work at the same time. Meaning the product provides 4 x RS232 + 0 x RS485, or 2 x RS232 + 2 x RS485, or 3 x RS232 + 1 x RS485.

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

| **RS232 / RS485 / CAN Pin Definition:** | | |
|---|---|---|
| **Pin Number** | **Definition** | **Description** |
| Pin 16 | CAN_H | CAN BUS "H" signal |
| Pin 15 | CAN_L | CAN BUS "L" signal |
| Pin 14 | RS485_5- | CPU UART5, RS485 –(B) signal |
| Pin 13 | RS485_5+ | CPU UART5, RS485 +(A) signal |
| Pin 12 | RS232_5_RXD | CPU UART5, RS232 RXD signal |
| Pin 11 | RS232_5_TXD | CPU UART5, RS232 TXD signal |
| Pin 10 | RS485_3- | CPU UART3, RS485 –(B) signal |
| Pin 9 | RS485_3+ | CPU UART3, RS485 +(A) signal |
| Pin 8 | RS232_3_RXD | CPU UART3, RS232 RXD signal |
| Pin 7 | RS232_3_TXD | CPU UART3, RS232 TXD 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 |

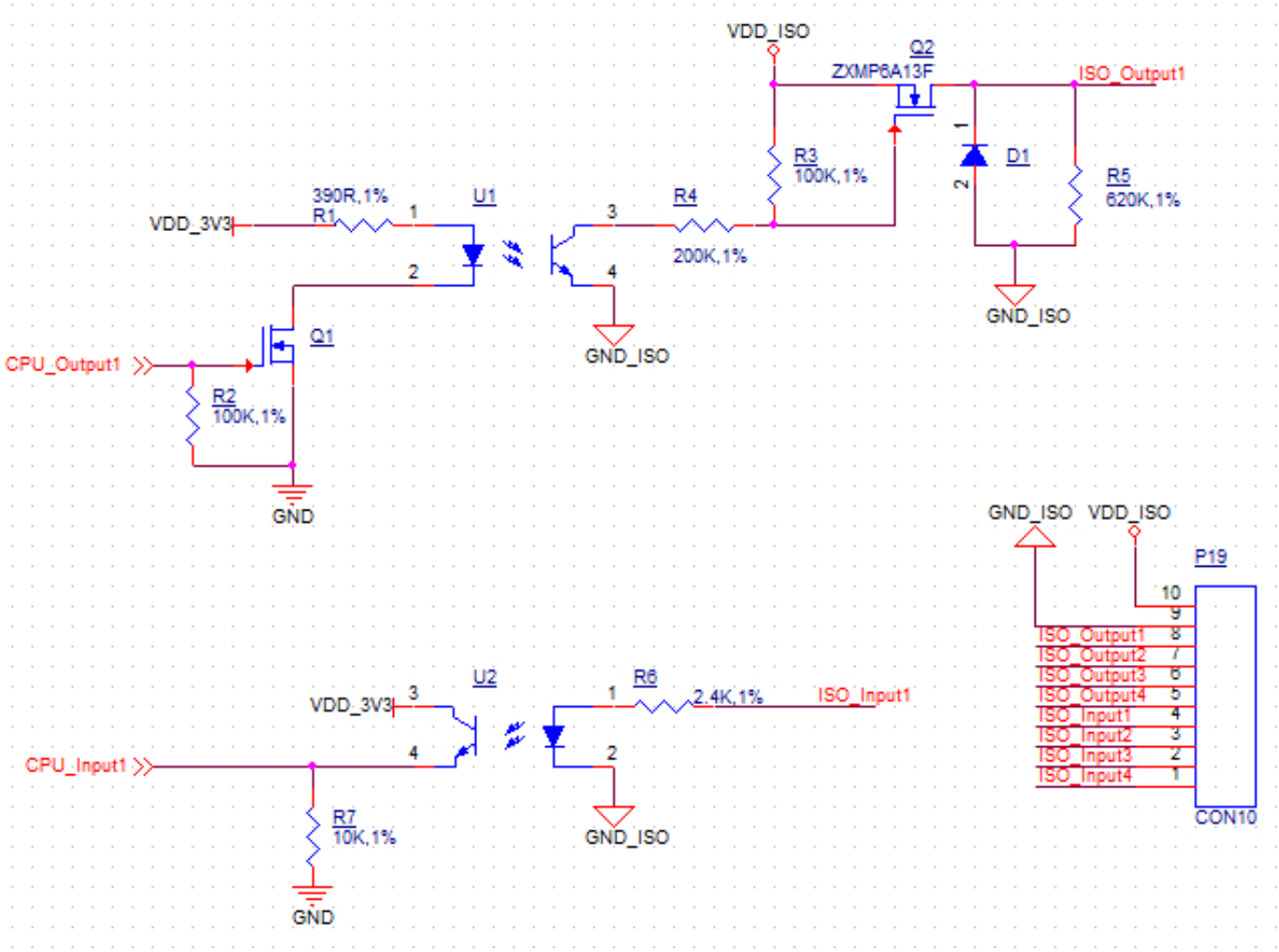
Table 240 Connectivity Section

## GPIO Port

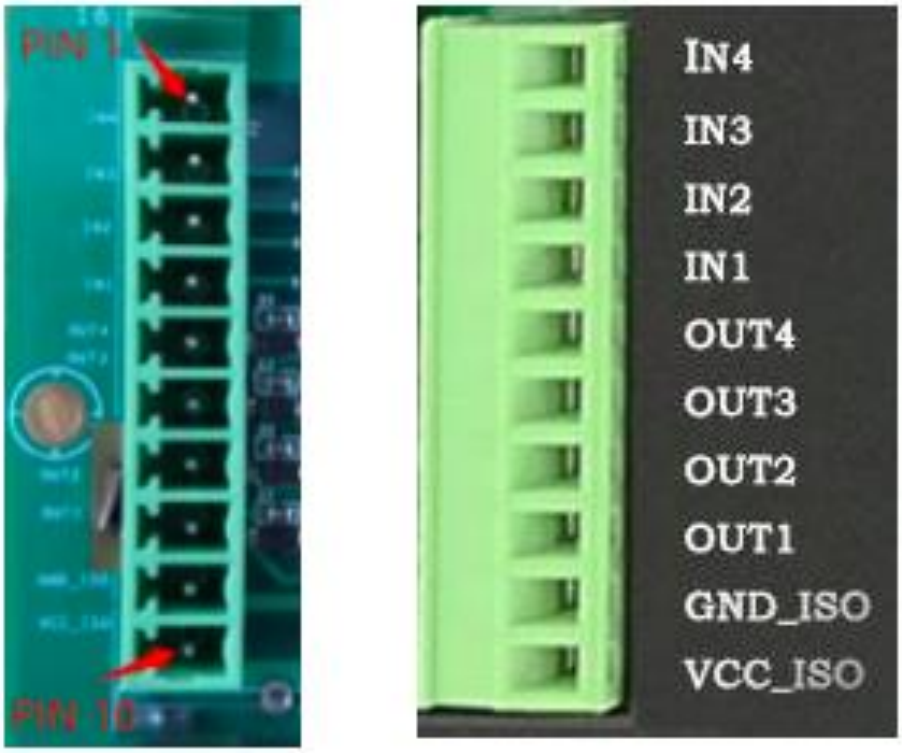
The EPC/PPC-CM4-070 industrial Pi PC has a 10 Pin 3.81mm **GPIO Connector**, as shown in the figure below. The table below gives details about the definition of every Pin.

**Attention**

1. In order to use the Isolated Output, you need to add an external Isolated Power to the VDD_ISO and GND_ISO. The power voltage should not exceed 24V.
2. The output current can achieve 500mA for every channel, but it also depends on the isolated power that is connected.
3. In order to use the Isolated Input, you need to add a signal to the ISO_InputX and GND_ISO. A 2.4KΩ resistor, as R6, can be added to limit the input current, as shown in the figure above. This resistor should work well for the 5-24V input signal. If your input signal is less than 5V, please change this input resistor.




*Isolated GPIO reduced schematic*




*GPIO Connector*

| GPIO Connector Pin Definition: | | |
|---|---|---|
| **Pin Number** | **Definition** | **Description** |
| Pin 10 | VDD_ISO | Isolated Power +5V ~ +24V Input |
| Pin 9 | GND_ISO | Isolated Ground |
| Pin 8 | OUT1 | Isolated Output 1 |
| Pin 7 | OUT2 | Isolated Output 2 |
| Pin 6 | OUT3 | Isolated Output 3 |
| Pin 5 | OUT4 | Isolated Output 4 |
| Pin 4 | IN1 | Isolated Input 1 |
| Pin 3 | IN2 | Isolated Input 2 |
| Pin 2 | IN3 | Isolated Input 3 |
| Pin 1 | IN4 | Isolated Input 4 |

Table 241 GPIO Connector Pin-out

## USB Connectors

There are 2 x USB 2.0 Host, 1 x USB OTG onboard, as shown in the figure below.

*USB HOST Connectors*

**Attention**

1. These two USB host connectors can drive 500mA for each channel at most.
2. These two USB host connectors, Zigbee and 4G/LTE come from the same USB HUB.
3. When you connect this product to the HOST PC through the Type-C port, the USB HUB will be disabled. As a result, the two USB host connectors, Zigbee and 4G/LTE will not work.

The product has one USB Type-C OTG 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.

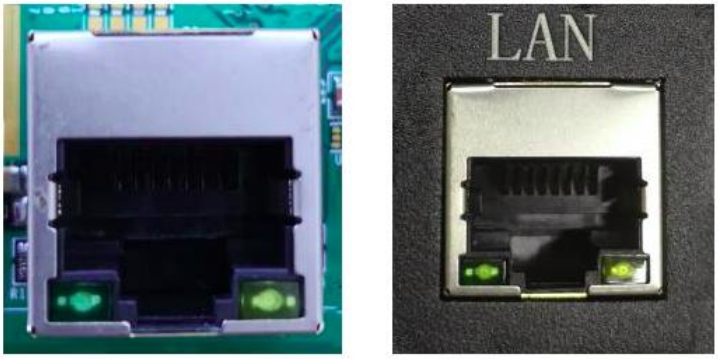
*USB Type-C OTG Connector*

**Warning**

1. Be careful not to touch surrounding electronic components accidentally while plugging in USB devices into the embedded Industrial PC version.
2. Remember to unplug the Type-C cable after flashing OS, otherwise the USB hosts won't work.

## 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.




*RJ45 LAN Connector*

**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-CM4-070 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 (CS10600RA4070P) 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.

## 3G/4G/LTE Module

The EPC/PPC-CM4-070 industrial Pi PC is equipped with a **mini-PCIe connector** that can connect to a 3G/4G/LTE module. The customer will also need a SIM Card Holder and a 3G/4G/LTE antenna to ensure 3G/4G/LTE works on the EPC/PPC-CM4-070. SIM card does **NOT** support hot plug. **Power off** before inserting or removing SIM card.

*SIM Card Direction*

Figure 909: *3G/4G/LTE Module*

Figure 910: *SIM Card Holder and 3G/4G/LTE Antenna*

**Attention**

The product does not come shipped with the 3G/4G/LTE module by default. If you need to use 3G/4G/LTE, you can contact us when placing an order, we can install the necessary hardware for you.

## Zigbee Module

The EPC/PPC-CM4-070 industrial Pi PC supports an onboard Zigbee module. The Zigbee controller is TI CC2531, and the Raspberry Pi forum supports it.

For CS10600RA4070P, there is a connector on the backside of the case that you can use to connect the external Zigbee antenna, as described in the figure below.

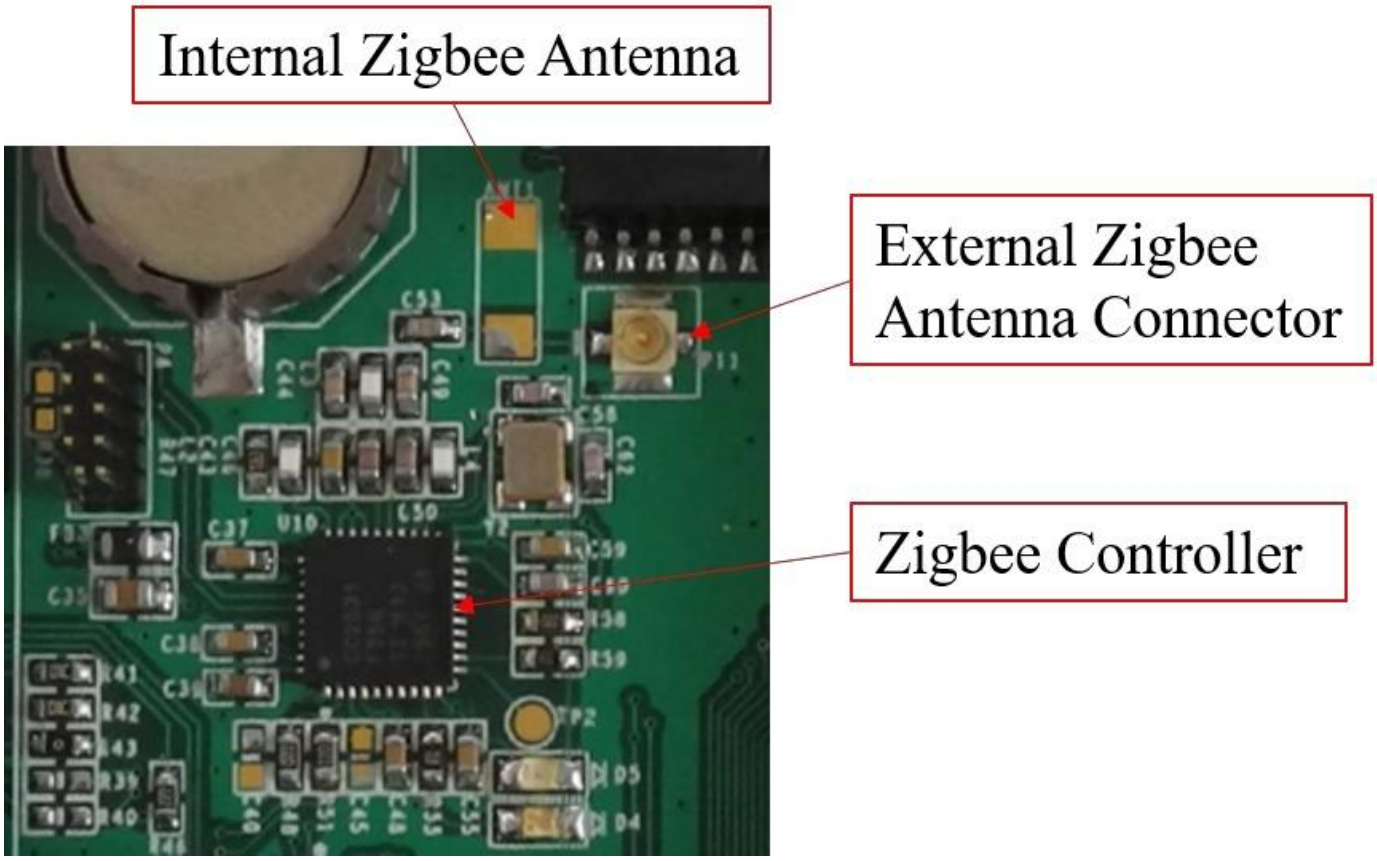
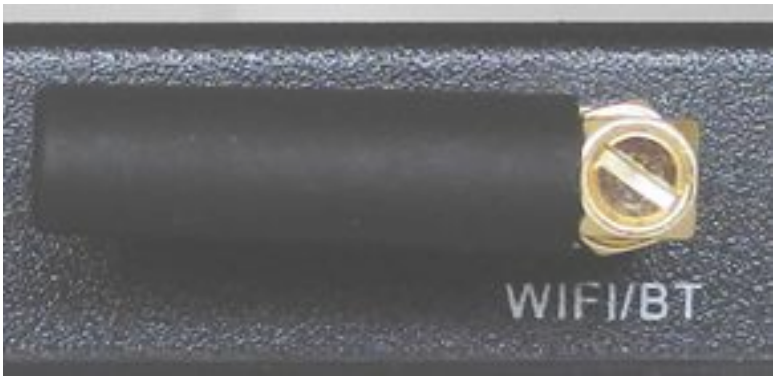



Figure 911: *Zigbee controller*



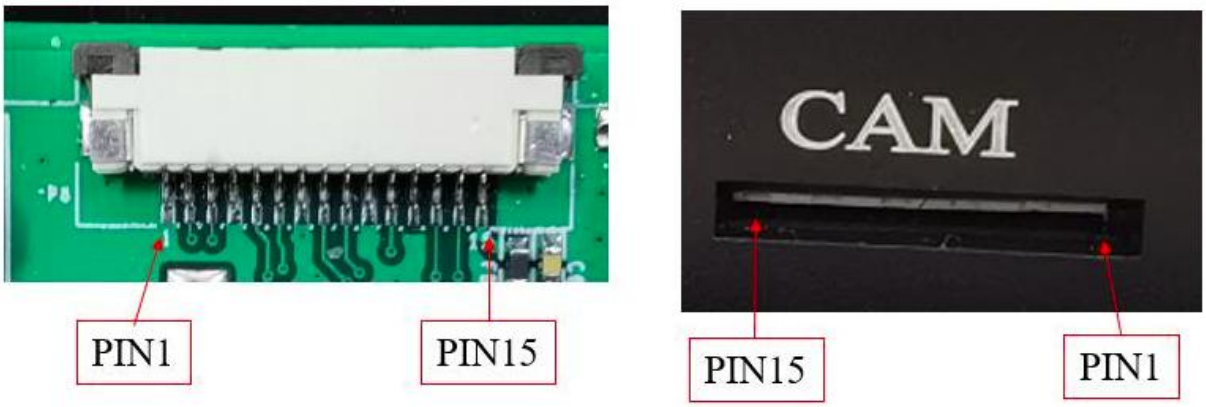

*Zigbee Antenna*

**Attention**

The product does not come with the Zigbee module by default.

## Camera Connector

The EPC/PPC-CM4-070 industrial Pi PC has a 15 Pin **Camera Connector**, as shown in the figure below. The camera signals come from CAM1. The table below gives details about the definition of every Pin.




*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 |

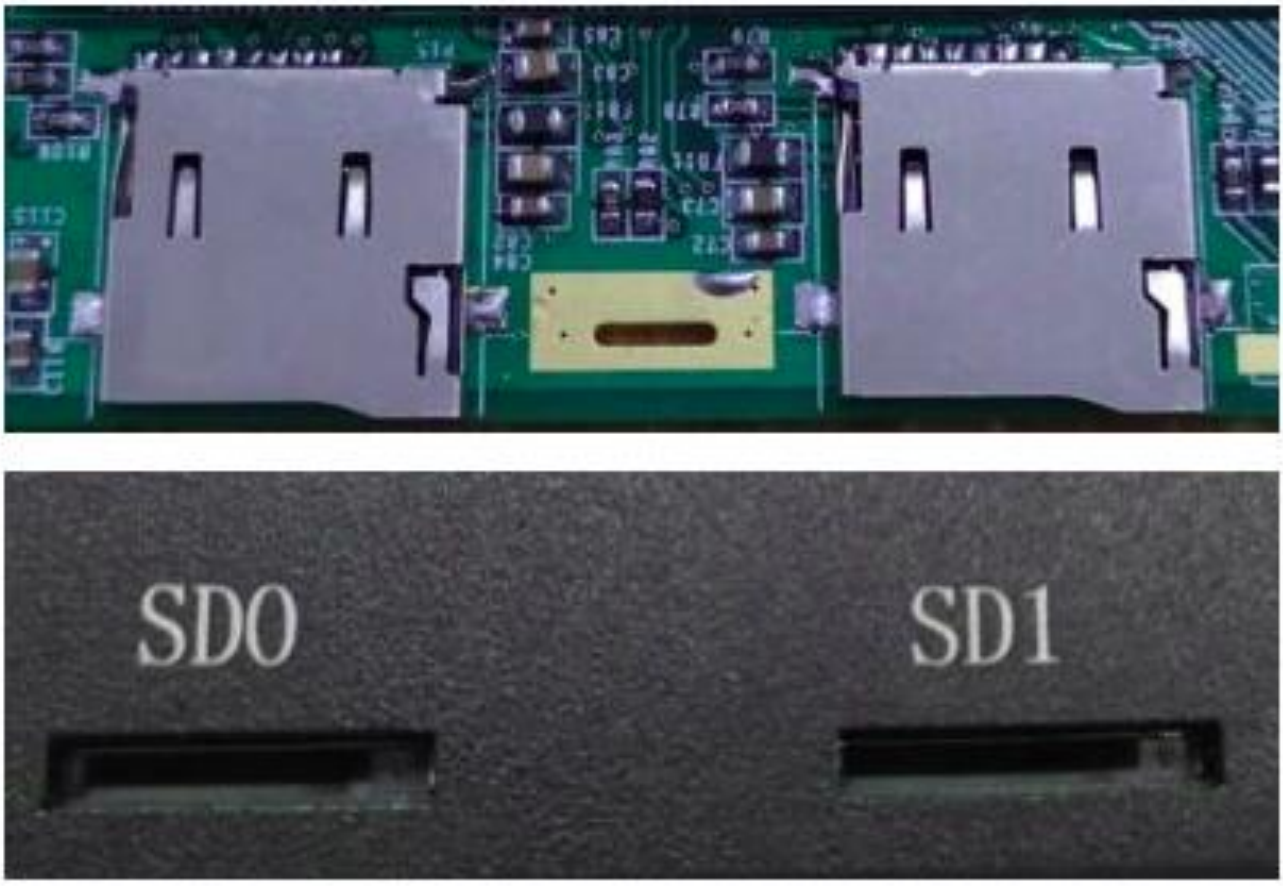
Table 242 Camera Connector Pin-out

**Attention**

1. The camera is not mounted by default.

# TF Card Slot

The EPC/PPC-CM4-070 industrial Pi PC features 2 x **TF Card (micro SD) slot**. A slot can address up to 128GB of memory.



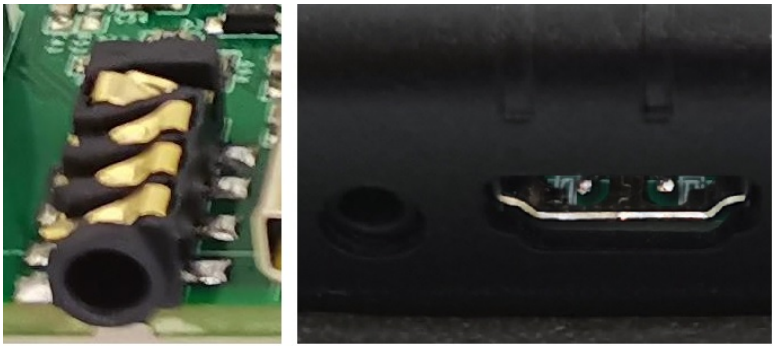

*TF (micro SD) Card Slot*

**Attention**

1. The **SD0** is used only for the Lite version of Compute Module 4 that has no internal eMMC. If you use CM4 with eMMC, this SD0 will be **disabled**. The **SD1** is used for storage extension, it **can't** be used for system boot-up.
2. This storage extension SD uses the same pins as WiFi on CM4. SD storage and WiFi **can't** be used at the same time.
3. The product does not come shipped with the TF card by default.

# Audio Connectors

The EPC/PPC-CM4-070 industrial Pi PC features some audio peripherals. It has 1 x **3.5mm audio output jack**.
Also, the EPC/PPC-CM4-070 industrial Pi PC has a miniature 2W internal speaker for audio reproduction, as well as a small buzzer for alarm/notification sounds.



*Audio Connector (enclosed PC version)*

**Attention**

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

# PROG Button

The EPC/PPC-CM4-070 industrial Pi PC has one button for entering usb download mode, as shown in the figure below.
When booting **with** the button being pressed, the Raspberry Pi will boot from the USB connector. You can use this feature to download the OS software to the internal eMMC.
When booting **without pressing** the button, the Raspberry Pi will boot from the 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 reflash the OS from the Software Documentation.

*PROG Button*

# Mounting Procedure

The EPC/PPC-CM4-070 industrial Pi PC can be mounted with 4 x M4 screws, enabling simplified installation onto any standard mounting fixture.

## CS10600RA4070E

You can mount CS10600RA4070E with the Embedded mounting method, as shown in the figure below.

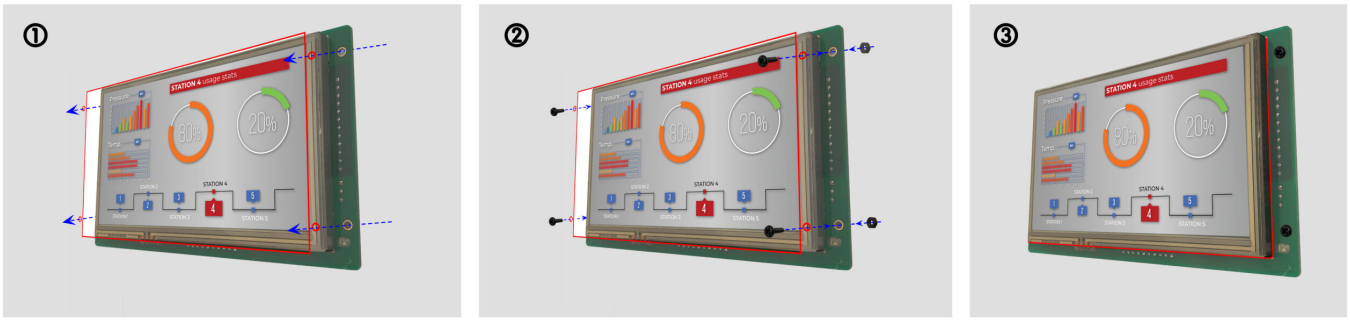



Figure 912: *Embedded mounting*

## CS10600RA4070P

You can mount CS10600RA4070P with the Vesa (75 x 75mm) and Panel mounting methods, as shown on the figure below.

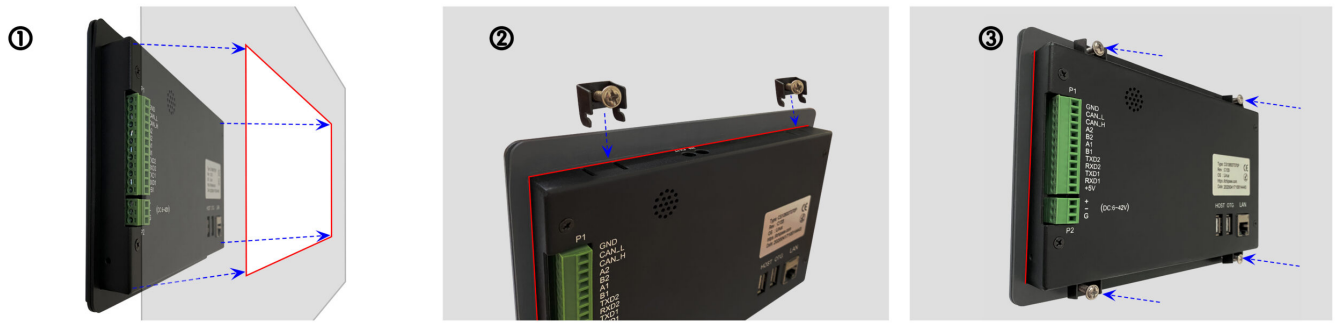



Figure 913: *Panel mounting*

**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

## CS10600RA4070P

For CS10600RA4070P, the outer mechanical dimensions are 206 x 135 x 30mm (W x L x H).

## CS10600RA4070E

For CS10600RA4070E, the outer mechanical dimensions are 190 x 108 x 28mm (W x L x H).

Please refer to the technical drawing in the figure below for details related to the specific product measurements.

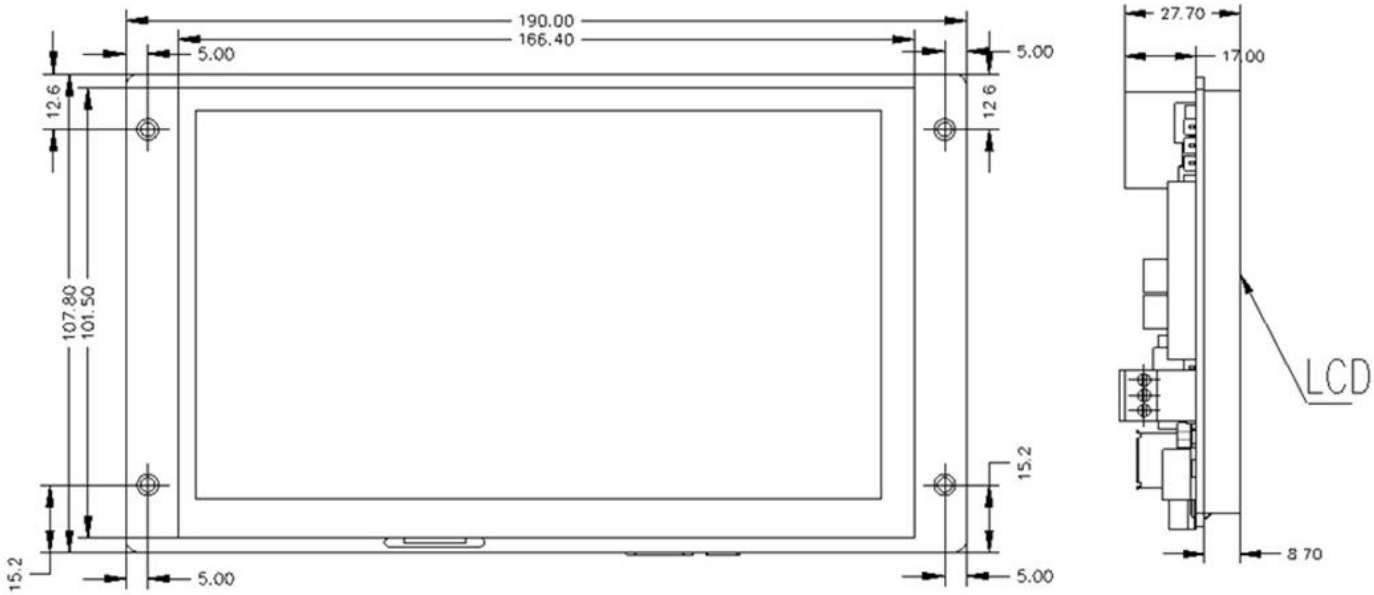



Figure 914: CS10600RA4070E *Technical Drawing*

# Disclaimer

**This document is provided strictly for informational purposes. Its contents are subject to change without notice. Chipsee assumes no responsibility for any errors that may occur in this document. Furthermore, Chipsee reserves the right to alter the hardware, software, and/or specifications set forth herein at any time without prior notice and undertakes no obligation to update the information contained in this document.**

**While every effort has been made to ensure the accuracy of the information contained herein, this document is not guaranteed to be error-free. Further, it does not offer any warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document, and no contractual obligations are formed either directly or indirectly by this document.**

**Despite our best efforts to maintain the accuracy of the information in this document, we assume no responsibility for errors or omissions, nor for damages resulting from the use of the information herein. Please note that Chipsee products are not authorized for use as critical components in life support devices or systems.**

# Technical Support

If you encounter any difficulties or have questions related to this document, we encourage you to refer to our other documentation for potential solutions. If you cannot find the solution you're looking for, feel free to contact us. Please email Chipsee Technical Support at **support@chipsee.com**, providing all relevant information. We value your queries and suggestions and are committed to providing you with the assistance you require.