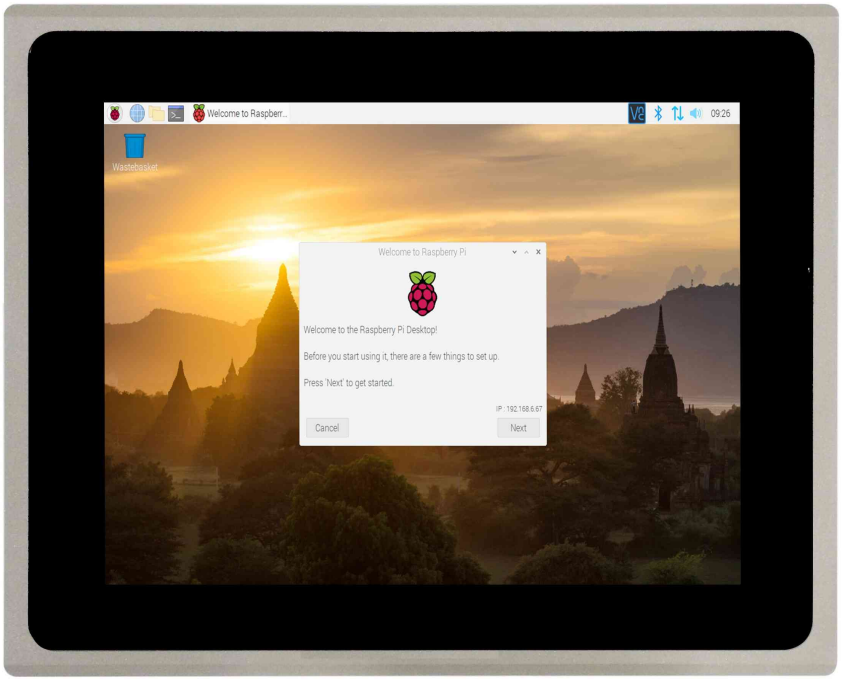
Chipsee

Industrial PC

PPC-CM4-121



PN: CS10768RA4121

Revision 1.1

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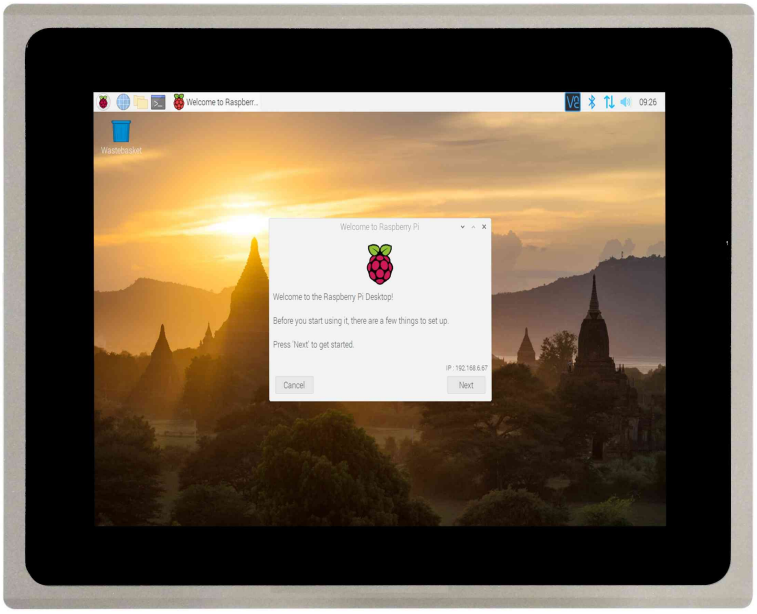
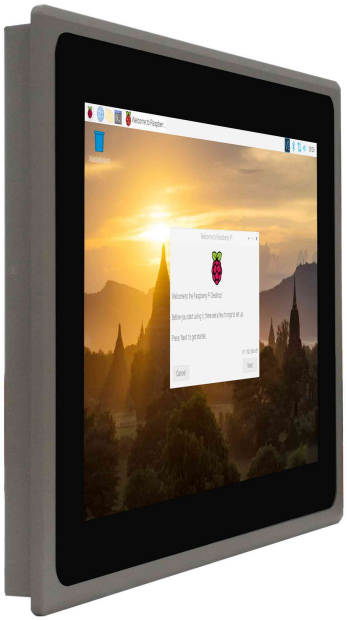
PPC-CM4-121



Front View

Rear View



Side View 1

Side View 2

Product Overview

The Cortex®-A72 Raspberry Pi® series PPC-CM4-121 (PN: CS10768RA4121) is a high-quality industrial Pi PC. It features a 12.1” Ten-point capacitive touch screen with a resolution of 1024 x 768 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 PPC-CM4-121 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 PPC-CM4-121 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 PPC-CM4-121 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 PPC-CM4-121 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.

Specifications

The PPC-CM4-121 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.

PPC-CM4-121	
CPU	Raspberry Pi® CM4, CM4 Lite; Quad Cortex-A72 at 1.5GHz
Storage	1 TF Cards slots3
RAM	2GB DDR
eMMC	16GB
Display	12.1" IPS LCD, 1024 x 768 resolution px, brightness 400 cd/m^2
Touch	10-point capacitive touch with 1mm Armored Glass
USB	2 x USB 3.0 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	2 x RS232
RS485	2 x RS4851
CAN	1 x CAN-BUS
GPIO	8 Channels, 4 Input, 4 Output
WiFi/BT	Supported but depending on the CM4 selected2
ZIGBEE	Onboard Zigbee module, not mounted by default
HDMI	Not Supported
SATA II	Not Supported
3G/4G/LTE	Supported, not mounted by default
Camera	No
Power Input	From 12V to 36V
Current at 12V	1100mA Max at 12V
Power Consumption	13.2W Typical
Working Temperature	From 0°C to +60°C

PPC-CM4-121	
OS	Debian
Dimensions	CS10768RA4121P: 320 x 260 x 51mm
Weight	CS10768RA4121P: 2800g

Table 226 Key Features

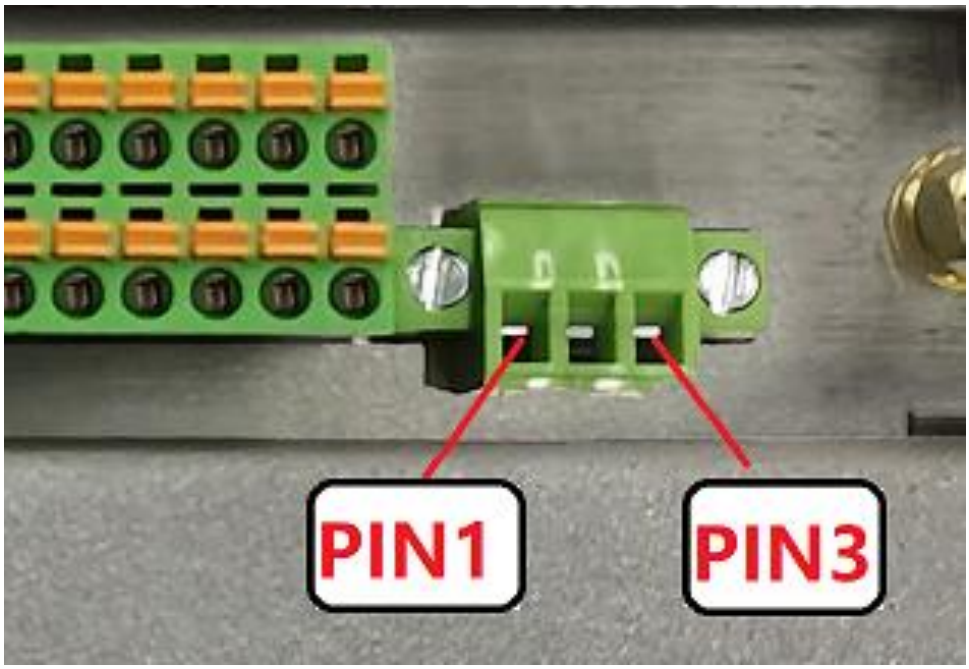
1 The RS485 circuit controls the Input and Output direction automatically, there's no need to control it from within the software.

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 This TF card is designed for storage expansion, as the TF card uses the same pins with WiFi, it can't be used with WiFi at the same time.

Power Input

The PPC-CM4-121 industrial Pi PC can be powered by a wide range of input voltages: From 12V 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 CS10768RA4121P version, as shown in the figures 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 227 Power Connector

Note

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

Touch Screen

The PPC-CM4-121 industrial Pi PC uses a 10-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 **USB connector**.

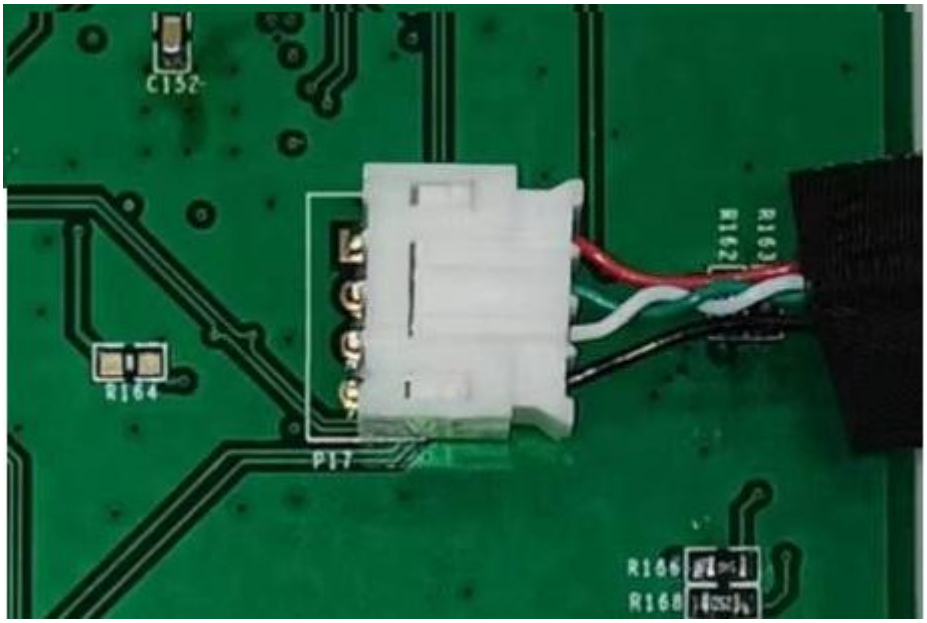


Figure 949: *Capacitive Touch Connector*

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 PPC-CM4-121 Power Input connector (pin 3) is properly connected to the Power System Ground to provide sufficient EMI shielding and eliminate the problem entirely.

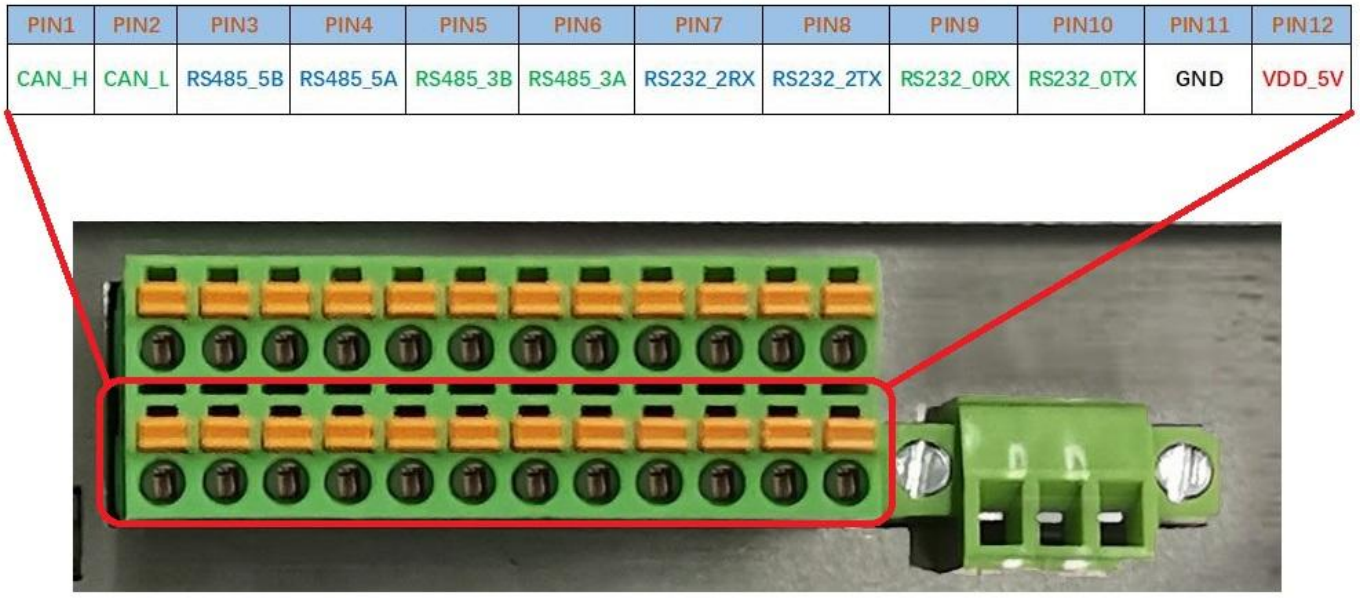
3. Bad GND problems can also be confirmed by touching pin 3 of the Power Input connector with one hand while operating the capacitive touch screen with the other hand. In this case, the operator's body acts as the Power System Ground.

Connectivity

There are many connectivity options available on the PPC-CM4-121 industrial Pi PC. It has 2 x USB 3.0 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 **12-pin 3.81mm terminal**, as illustrated on the figure below.



RS232-RS485-CAN on the PPC-CM4-121 *Industrial PC*

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

RS232 / RS485 / CAN Pin Definition:		
Pin Number	**Definition**	**Description**
Pin 1	CAN_H	CAN BUS "H" signal
Pin 2	CAN_L	CAN BUS "L" signal
Pin 3	RS485_5-	CPU UART5, RS485 –(B) signal
Pin 4	RS485_5+	CPU UART5, RS485 +(A) signal
Pin 5	RS485_3-	CPU UART3, RS485 –(B) signal
Pin 6	RS485_3+	CPU UART3, RS485 +(A) signal
Pin 7	RS232_2_RXD	CPU UART2, RS232 RXD signal

RS232 / RS485 / CAN Pin Definition:		
Pin 8	RS232_2_TXD	CPU UART2, RS232 TXD signal
Pin 9	RS232_0_RXD	CPU UART0, RS232 RXD signal
Pin 10	RS232_0_TXD	CPU UART0, RS232 TXD signal
Pin 11	GND	System Ground
Pin 12	+5V	System +5V Power Output, No more than 1A Current output

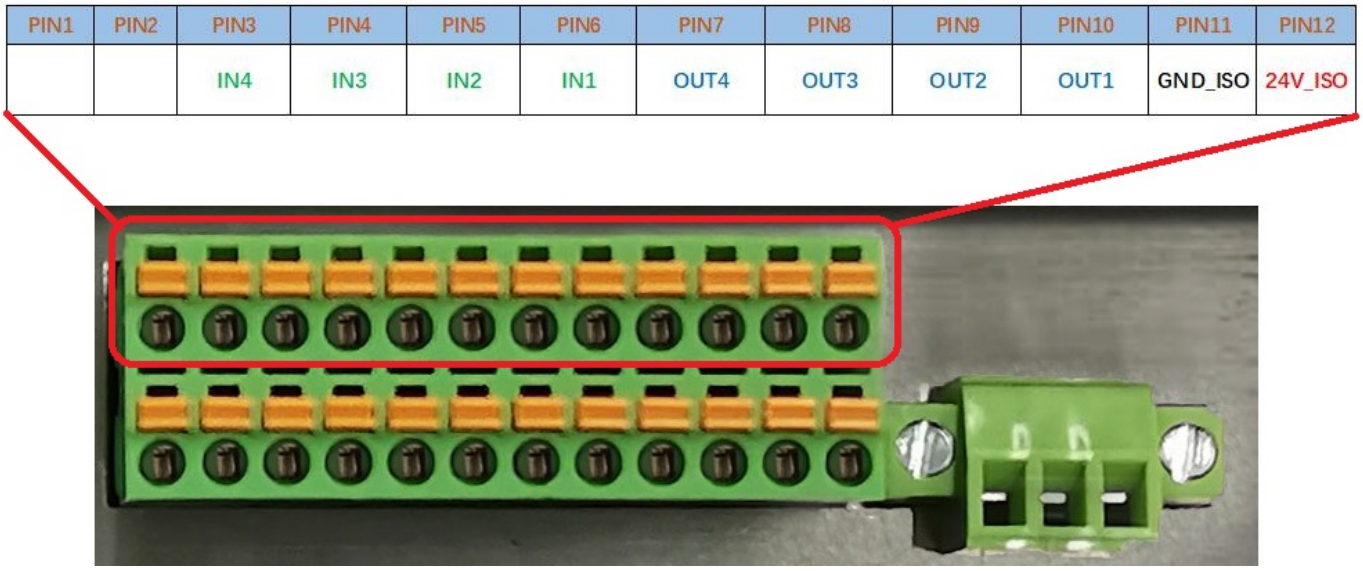
Table 228 Connectivity Section

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.

GPIO Port

The PPC-CM4-121 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.

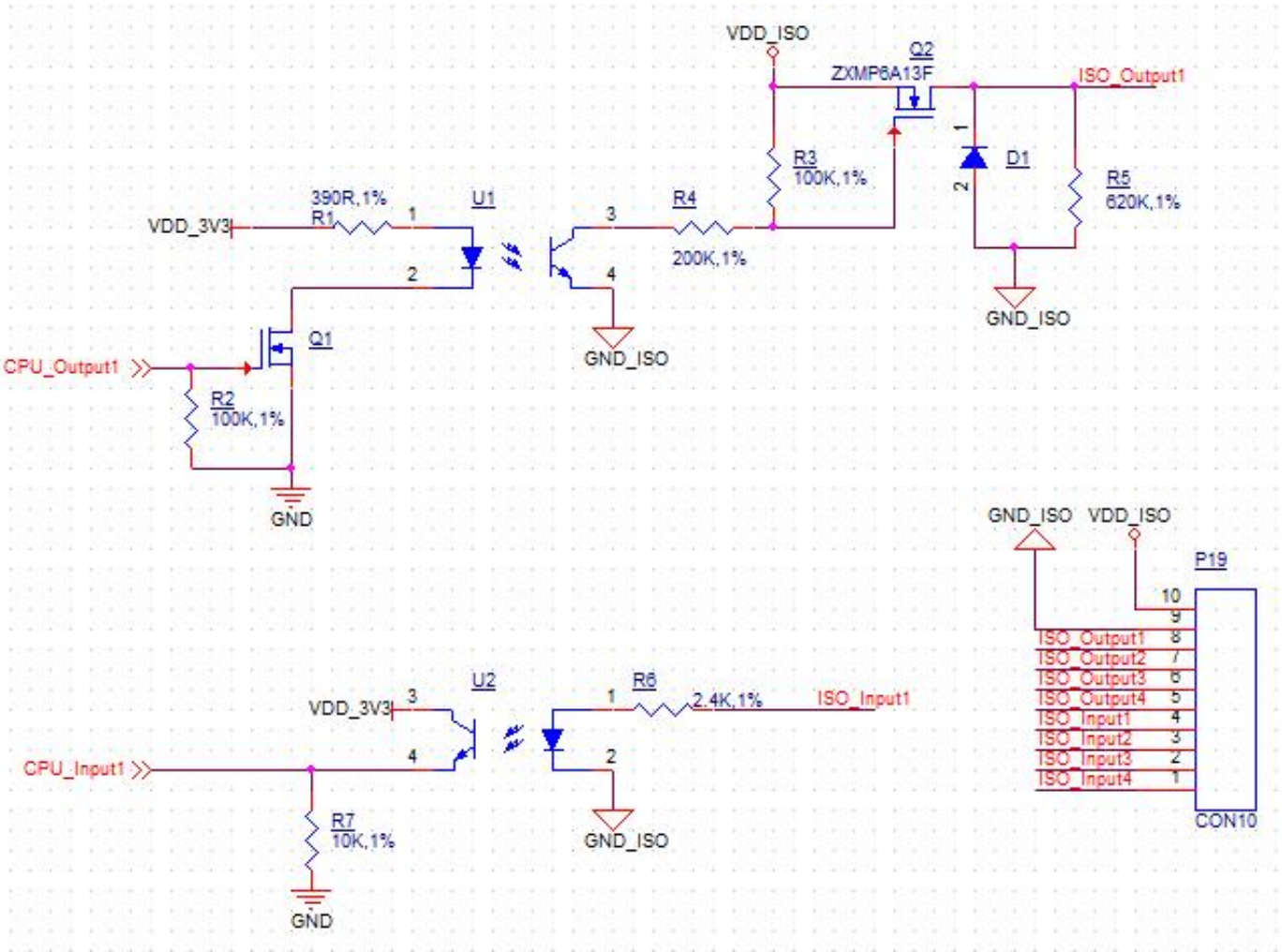


GPIO Connector

GPIO Connector Pin Definition:		
Pin Number	**Definition**	**Description**
Pin 12	24V_ISO	Isolated Power +24V Input
Pin 11	GND_ISO	Isolated Ground
Pin 10	OUT1	Isolated Output 1
Pin 9	OUT2	Isolated Output 2

GPIO Connector Pin Definition:		
Pin 8	OUT3	Isolated Output 3
Pin 7	OUT4	Isolated Output 4
Pin 6	IN1	Isolated Input 1
Pin 5	IN2	Isolated Input 2
Pin 4	IN3	Isolated Input 3
Pin 3	IN4	Isolated Input 4

Table 229 GPIO Connector Pin-out



Isolated GPIO reduced schematic

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.

USB Connectors

There are 2 x Type A **USB3.0 HOST connectors** onboard, as shown in the figure below.

USB HOST Connectors (enclosed PC version)

Attention

1. These two USB hosts come from the same USB HUB. The Zigbee and 4G/LTE signals come from the same USB HUB.
2. These two USB host connectors can drive 500mA for each channel at most.

The product has one USB 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 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 950: *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

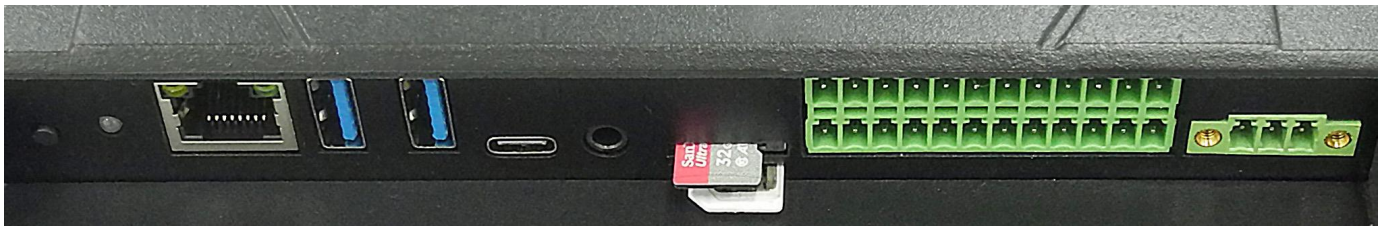
The default PPC-CM4-121 without the CM4 does not include a Wi-Fi/BT module.
If you include a CM4 that has the Wi-Fi/BT module, the product will have Wi-Fi/BT feature.
The enclosed (CS10768RA4121P) variant of the product also includes an SMA connector for an external WiFi/BT antenna, as illustrated in the figure below.

Figure 951: *WiFi+BT Antenna*

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

3G/4G/LTE Module

The PPC-CM4-121 industrial Pi PC is equipped with a **mini-PCIe connector** that can connect to a 3G/4G module. The customer will also need a SIM Card Holder and a 3G/4G Antenna Connector to ensure 3G/4G works on the PPC-CM4-121. SIM card does **NOT** support hot plug. **Power off** before inserting or removing SIM card.



SIM Card Direction

Figure 952: *3G/4G Module*

Figure 953: *SIM Card Holder and 3G/4G Antenna Connector*

> **Attention**
>
> The product does not come shipped with the 3G/4G module by default.

Zigbee Module

The PPC-CM4-121 industrial Pi PC supports an onboard Zigbee module. The Zigbee controller is TI CC2531, and the Raspberry Pi forum supports it.

For CS10768RA4121P, 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.

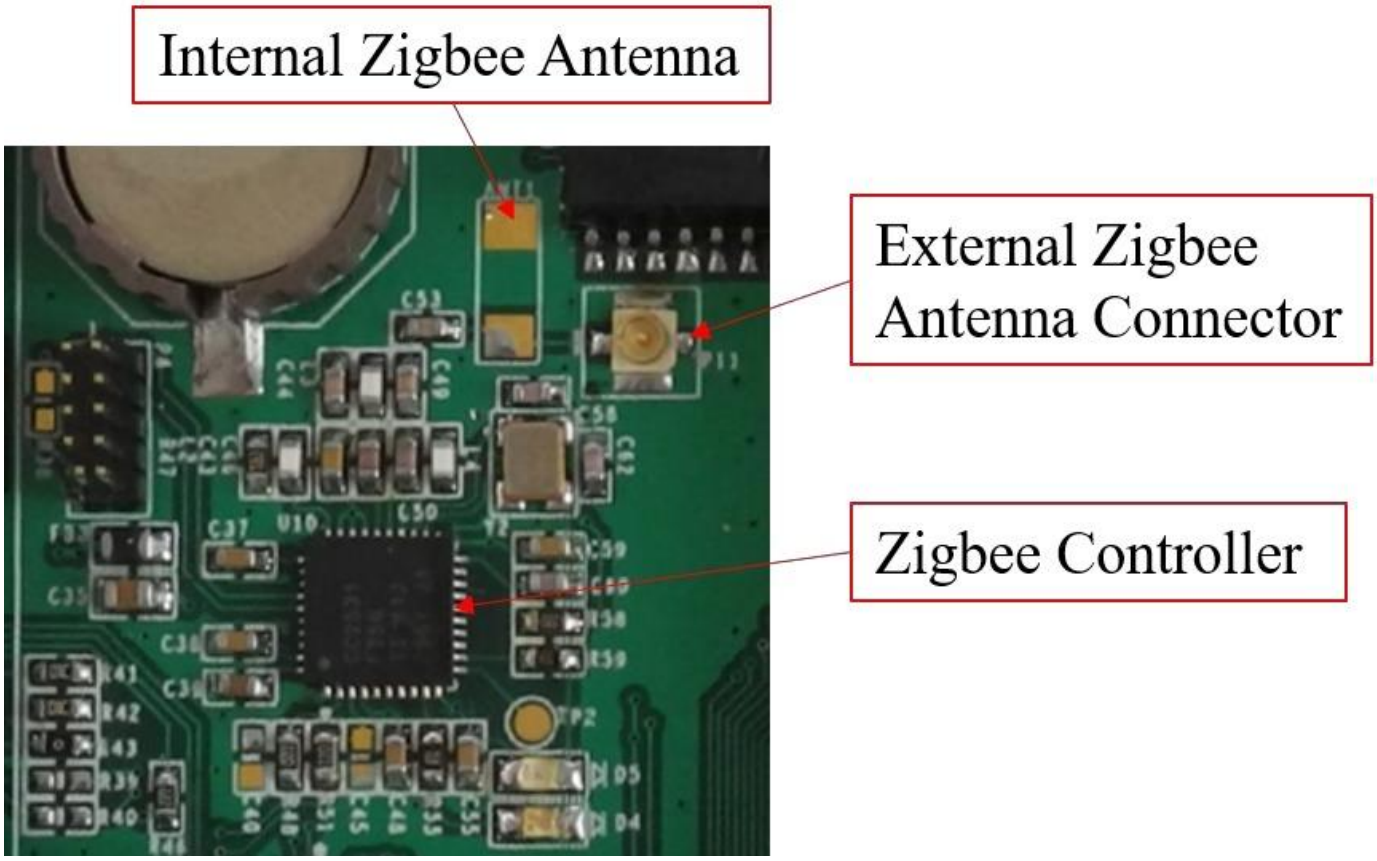


Figure 954: *Zigbee controller*

Figure 955: *Zigbee Antenna*

Attention

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

TF Card Slot

The PPC-CM4-121 industrial Pi PC features 1 x **TF Card (micro SD) slot**. It can address up to 32GB of memory.

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.
3. This SD uses the same pins with WiFi on CM4, they can't be used at the same time.

Audio Connectors

The PPC-CM4-121 industrial Pi PC features some audio peripherals. It has 1 x **3.5mm audio output jack**.
Also, the PPC-CM4-121 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.

Boot DIP Button

The PPC-CM4-121 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 alter the Boot DIP 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.

Boot DIP Button

Mounting Procedure

The PPC-CM4-121 industrial Pi PC can be mounted with 4 x **M4** (6mm) screws using the **VESA** (100x100mm or 75x75mm) mount.

The PPC-CM4-121 industrial Pi PC can be mounted with **panel mount** method, enabling simplified installation onto any standard mounting fixture.

> **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

CS10768RA4121P

For CS10768RA4121P, the outer mechanical dimensions are 320 x 260 x 51mm (W x L x H).

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