



Industrial PC

PPC-RK3576-121



PN: CS10768-RK3576-121P

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PPC-RK3576-121

Front View



Rear View



Side View 1



Side View 2



Product Overview

The Cortex[®]-A72+ Cortex[®]-A53 series PPC-RK3576-121 (PN: CS10768-RK3576-121P) is a high-quality IP65-compliant industrial panel PC. This single board computer features a 12.1" ten-point capacitive touch screen with a resolution of 1024 x 768 pixels and a brightness of 350 cd/m².

Key Applications

- Human Machine Interface HMI
- Mobile Applications
- Video Processing
- Machine Learning
- Video Gaming
- Process Control
- Process Monitoring
- ATM...

It is available as a device housed in an aluminum casing with bezels, thus facilitating different installation options:

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

The PPC-RK3576-121 Industrial Panel PC is based around the powerful RK3576 System on Chip (SoC), powered by the Rockchip RK3576 low-power processor which integrates a Quad-core Cortex-A72(1.6GHz) + Quad-core Cortex-A53(1.4GHz) processor, and a 6 TOPS(Sparsity)@INT8 computing power NPU (neural processing unit).

The RK3576 supports multi-format video decoders and has a high-performance 4GB LPDDR5 RAM capable of sustaining demanding memory bandwidths. It also provides a complete set of peripheral interfaces.

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 [Hardware Features](#) section provides information about the default options bundled with the product.

Note

You can order the [PPC-RK3576-121](#) from the official [Chipsee Store](#) or from your nearest distributor.

Operating System

This product comes with a pre-installed OS of your choice. Please see the list below for the supported OSes, which can also be obtained from the [Software Documentation](#) section, along with the detailed installation instructions.

- Debian 12
- Buildroot Linux Qt 5.15

Warning

The [Software Documentation](#) section provides a detailed instruction on how to install different OSes on your own. However, bear in mind that Chipsee can't take the responsibility of inadequate installation procedure. If you "brick" your device, please contact Chipsee Technical Support at support@chipsee.com for further assistance

Optional Features

The PPC-RK3576-121 Industrial Panel PC does not include 4G/LTE module by default. The module is optional and can be selected at the Chipsee store during the ordering process.

The PPC-RK3576-121 Industrial Panel PC does not include M.2 NVMe SSD module by default. The module is optional and can be selected at the Chipsee store during the ordering process.

The PPC-RK3576-121 Industrial Panel PC does not include PoE(Power over Ethernet) module by default. The module is 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.

Hardware Features

The PPC-RK3576-121 Industrial Panel 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-RK3576-121 | |
|--------------------------|---|
| CPU | Rockchip RK3576J, Quad-core Cortex-A72 (1.6GHz) + Quad-core Cortex-A53 (1.4GHz) |
| RAM | 4GB LPDDR5 |
| NPU | 6 TOPS(Sparsity)@INT8 |
| eMMC | 64GB |
| Storage | TF Card, Supports up to 128GB SDHC |
| M.2 | Optional, supports M.2 M-Key 2230/2242/2260/2280 NVME SSD (PCI-E 3.0 x1) |
| Display | 12.1" LCD, 1024 x 768, High Brightness: 350 cd/m ² |
| HDMI | 1 x HDMI OUT |
| Touch | 10-point capacitive touch screen |
| USB | 1 x USB 2.0 HOST, 1 x USB 3.0 HOST, 1 x USB Type-C (USB3.0 port and USB-C port cannot be used at the same time) |
| LAN | 1 x RJ45, GbE |
| POE | Optional, Power Over Ethernet 802.3af/at |
| Audio | 3.5mm Audio In/Out Connector, 2W Internal Speaker |
| Buzzer | Yes |
| RTC | High accuracy RTC with farad capacitor, can work 1 week after power off (default) . High accuracy RTC with lithium coin battery, can work 3 years after power off <i>(optional)</i> . |
| RS232 | Default to 2 x RS232 (including 1 debug port). Up to 6 x RS232. ¹ |
| RS485 | Default to 2 x RS485. Optionally, these 2 x RS485 can be configured to RS232. ¹ |
| CAN | Default to 2 x CAN FD. Optionally, these 2 x CAN FD can be configured to RS232. |
| GPIO | 8 Channels Isolated IO, 4 x Input and 4 x Output |
| WiFi/BT | Integrated WiFi/BT Module |
| 4G/LTE | Supported, Optional |
| Power Input | From 15V to 30V |
| Current | 850mA Max at 15V |
| Power Consumption | 9W Typical |

| PPC-RK3576-121 | |
|---------------------|--|
| Working Temperature | From -20°C to +70°C |
| OS | Debian12, Buildroot Linux Qt 5.15 |
| Dimensions | PPC-RK3576-121 (PN: CS10768-RK3576-121P): 320 * 260 * 55.5mm |
| Weight | PPC-RK3576-121 (PN: CS10768-RK3576-121P): 3100g |
| Mounting | PPC-RK3576-121 (PN: CS10768-RK3576-121P): Panel, VESA |

Key Features

1(1,2)This product has 4 x UART by default, 6 x UART channels at most. The default configuration is 2 x RS232 and 2 x RS485, including 1 RS232 debug port. The 2 x CAN FD can be configured to RS232. UART can be swapped between RS232 and RS485 modes easily, if you need a different RS232/RS485 configuration, please get in touch with the Chipsee Technical Support at support@chipsee.com

Power Input

The PPC-RK3576-121 Industrial Panel PC can be powered by a wide range of input voltages: From 15V to 30V DC. The power input connector is a **3-pin, 3.81mm terminal**.




Power Input

Note that the “+” sign represents the positive power input. 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 |

Power Connector

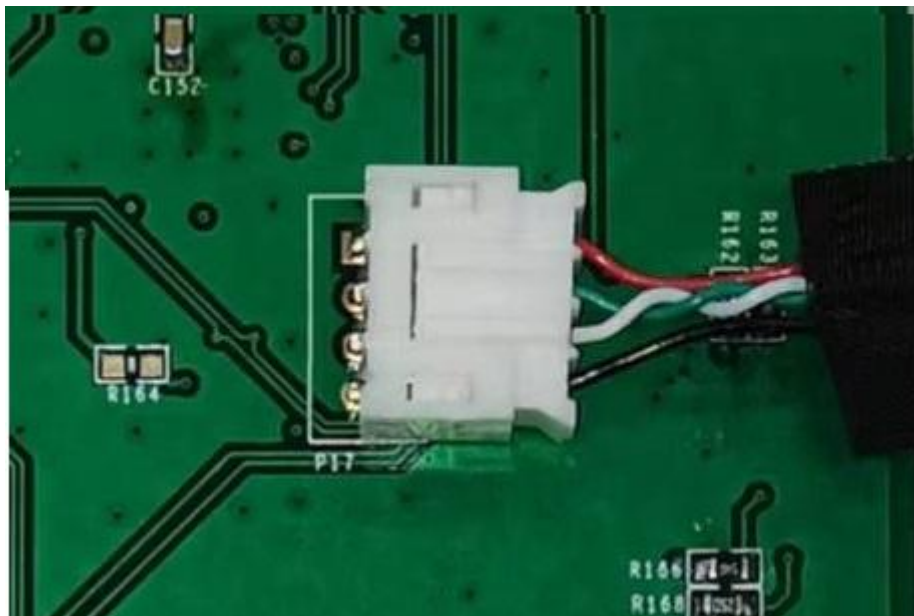
 **Note**

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

Touch Screen

The PPC-RK3576-121 Industrial Panel 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**.



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-RK3576-121 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 problem 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.

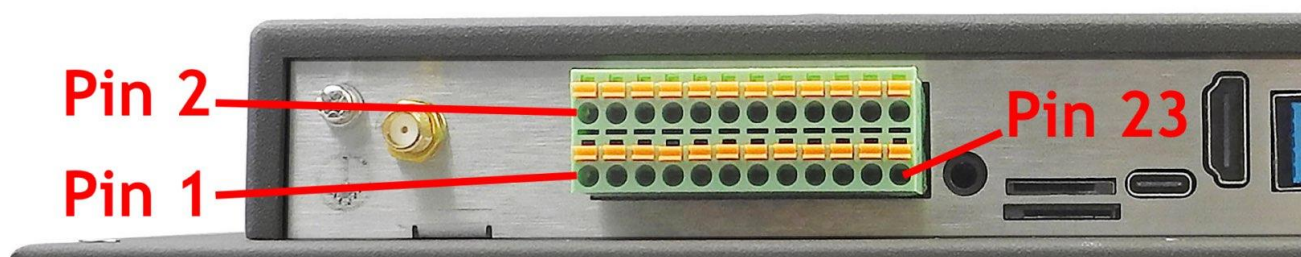
Connectivity

There are many connectivity options available on the PPC-RK3576-121 industrial PC. It has 1 x USB 2.0 HOST, 1 x USB 3.0 HOST, 1 x USB Type-C, 1 x network connector (RJ45) supporting up to 1 Gbps, 8 x GPIO, 2 x CAN FD and 4 x UART terminals (RS232/485).

RS232+RS485+CAN

The serial communication interfaces (RS485, RS232, and CAN FD) are routed to a **24-pin 3.81mm terminal**, as illustrated in the figure below. Serial communication on both RS485 and RS232 interfaces can reach up to 115200 kbps.

| | | | | | | | | | | | |
|--------|--------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-------|-------|
| PIN2 | PIN4 | | | | | | | | | | |
| CAN1_H | CAN1_L | | | | | | | | | | |
| PIN1 | PIN3 | PIN5 | PIN7 | PIN9 | PIN11 | PIN13 | PIN15 | PIN17 | PIN19 | PIN21 | PIN23 |
| CAN0_H | CAN0_L | RS485_5B | RS485_5A | RS485_3B | RS485_3A | RS232_2RX | RS232_2TX | RS232_0RX | RS232_0TX | GND | 5V |



⚠ Attention

- The 120Ω match resistor for **CAN** bus is **NOT mounted** by default.
- The 120Ω match resistor for **RS485** is **already mounted** by default.
- This product supports changing 2 x RS485 to 2 x RS232, supports changing 2 x CAN to 2 x RS232, providing up to 6 x RS232 (including one debug port).

The table below offers a detailed description of every pin:

| RS232 / RS485 / CAN | | | | |
|---------------------|------------|-------------------|---------|------------|
| Pin Number | Definition | Description | CPU | OS Node |
| Pin 1 | CAN0_H | CAN H signal | CAN0_M3 | CAN0 |
| Pin 3 | CAN0_L | CAN L signal | | |
| Pin 5 | RS485_5- | RS485 -(B) signal | UART5 | /dev/ttyS5 |
| Pin 7 | RS485_5+ | RS485 +(A) signal | | |
| Pin 9 | RS485_3- | RS485 -(B) signal | UART3 | /dev/ttyS3 |
| Pin 11 | RS485_3+ | RS485 +(A) signal | | |

| RS232 / RS485 / CAN | | | | |
|---------------------|-------------|----------------------------|---------|-------------|
| Pin 13 | RS232_2_RXD | RS232 RXD signal | UART2 | /dev/ttyS2 |
| Pin 15 | RS232_2_TXD | RS232 TXD signal | | |
| Pin 17 | RS232_0_RXD | Debug RXD signal | UART0 | /dev/ttyFIQ |
| Pin 19 | RS232_0_TXD | Debug TXD signal | | |
| Pin 21 | GND | System Ground | | |
| Pin 23 | 5V | System 5V output, up to 1A | | |
| Pin 2 | CAN1_H | CAN H signal | CAN1_M2 | CAN1 |
| Pin 4 | CAN1_L | CAN L signal | | |

RS232/RS485/CAN

GPIO

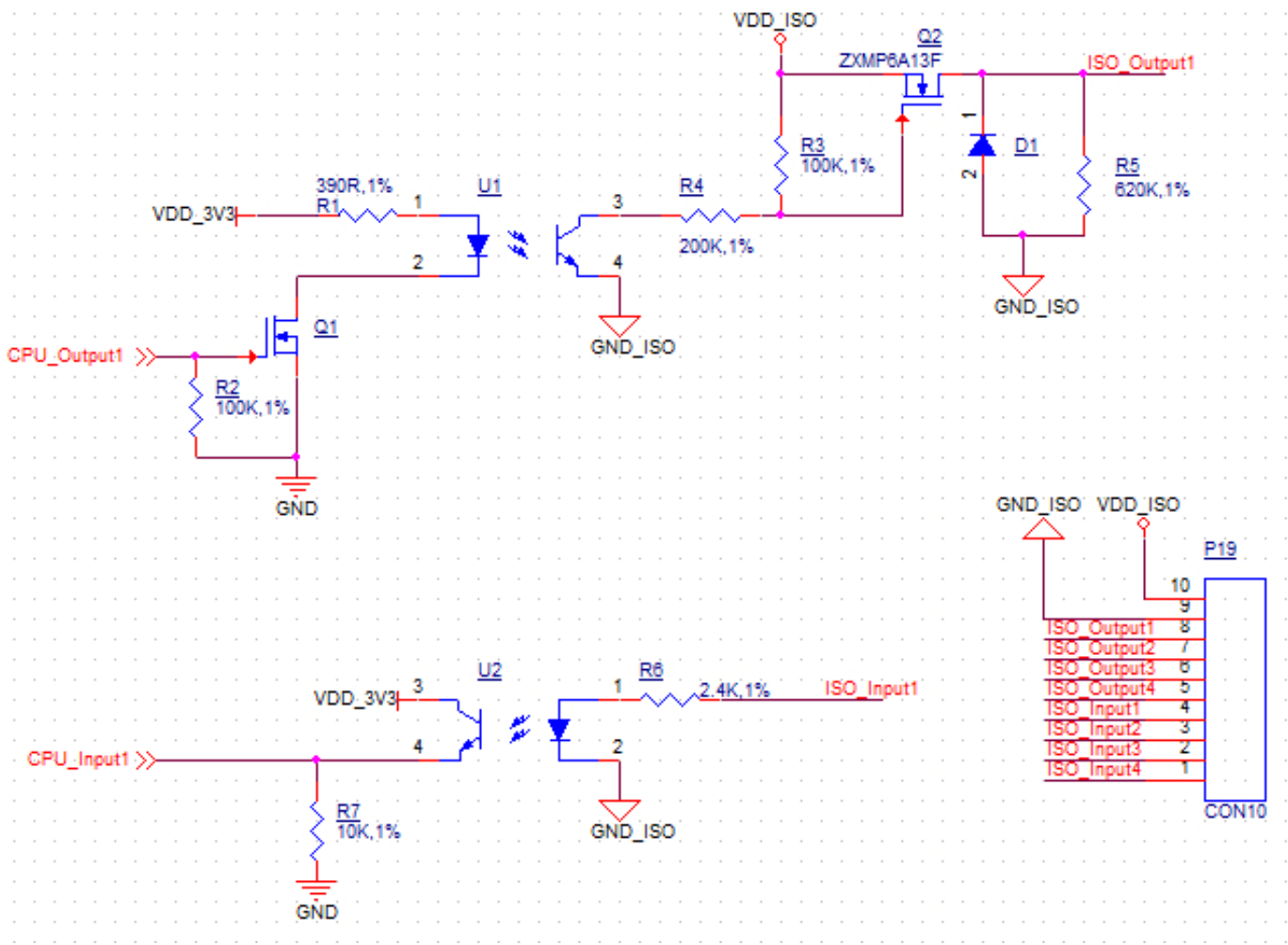
The PPC-RK3576-121 Industrial Panel PC features a **phoenix connector** that provides 8 x opto-isolated GPIO pins, of which 4 x are output, and 4 x are input pins.

The GPIO **HIGH** output level corresponds to the voltage connected at the isolated Power Input, while the GPIO **LOW** output level corresponds to the isolated Ground Input.

The GPIO uses the 24V logic by default. You can use an external isolated power input but the power input range should be from 5V to 24V DC.

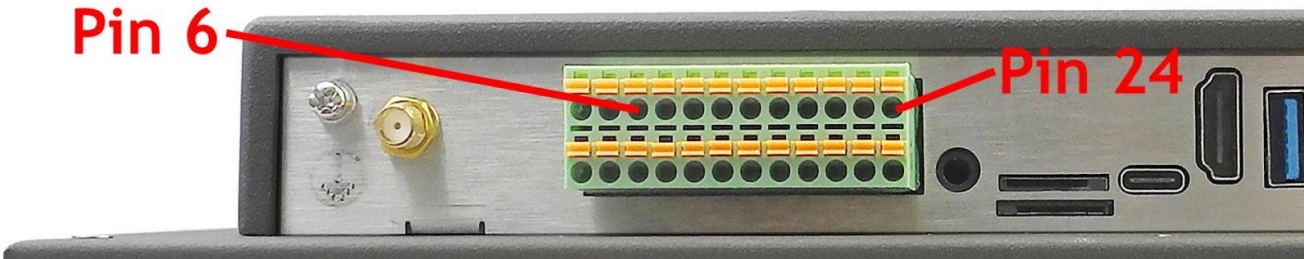
Attention

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 supply 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 InputX and GND_ISO. A 2.4K Ω resistor has been added to limit the input current, as shown in the figure below. This resistor should work well for the 5-24V input signal. If your input signal is less than 5V, please change this input resistor. The reduced schematic is for reference purpose, if you need the precise resistor schematic, please contact us.
4. If the isolation is not a requirement, it is possible to use a non-isolated PSU instead. It is also possible to use the onboard 5V power supply: it can be re-routed to the *Isolated Power Input* pin by populating two PCB resistor footprints with 0 Ω resistors. In this case, the *Isolated Power Input* pin will become an output for the onboard 5V power supply.



Isolated GPIO reduced schematic

| PIN6 | PIN8 | PIN10 | PIN12 | PIN14 | PIN16 | PIN18 | PIN20 | PIN22 | PIN24 |
|------|------|-------|-------|-------|-------|-------|-------|---------|---------|
| IN4 | IN3 | IN2 | IN1 | OUT4 | OUT3 | OUT2 | OUT1 | GND_ISO | VDD_24V |



GPIO Terminal

| Pin Number | Definition | GPIO | GPIOD Chip | GPIOD Line |
|------------|------------|----------|------------|------------|
| Pin 6 | IN4 | GPIO4_A2 | 4 | 2 |
| Pin 8 | IN3 | GPIO4_A3 | 4 | 3 |
| Pin 10 | IN2 | GPIO4_A5 | 4 | 5 |
| Pin 12 | IN1 | GPIO4_A7 | 4 | 7 |

| Pin Number | Definition | GPIO | GPIOD Chip | GPIOD Line |
|------------|------------|----------|------------|------------|
| Pin 14 | OUT4 | GPIO4_B2 | 4 | 10 |
| Pin 16 | OUT3 | GPIO4_B3 | 4 | 11 |
| Pin 18 | OUT2 | GPIO2_A6 | 2 | 6 |
| Pin 20 | OUT1 | GPIO2_A7 | 2 | 7 |
| Pin 22 | GND_ISO | | | |
| Pin 24 | VDD_24V | | | |

GPIO Pinout

USB Connectors

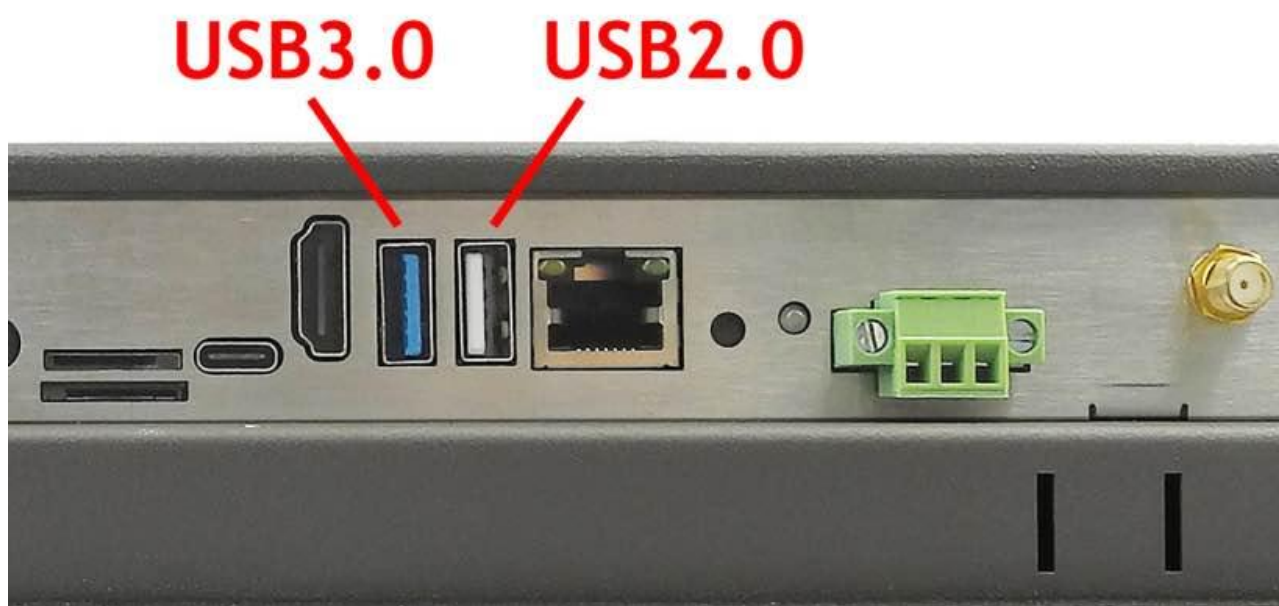
There are 2 x **USB HOST** and 1 x **USB DEVICE** (for flashing OS) ports onboard: 1 x USB 2.0 HOST, 1 x USB 3.0 HOST, 1 x USB Type-C, as shown in the figures below.

Warning

Please unplug **USB mouse/keyboard** from the USB3.0 port when flashing OS.

The USB3.0 type-A host and USB-C **can't be used** at the same time. Before boot into OS, USB-C is enabled for installing OS image; after boot into OS, USB-A is enabled but USB-C is disabled.

In Android, these can be configured, USB3.0 type A is enabled by default, but you can switch to using USB-C in the software for debugging; in Linux, these can't be configured.



USB HOST Ports

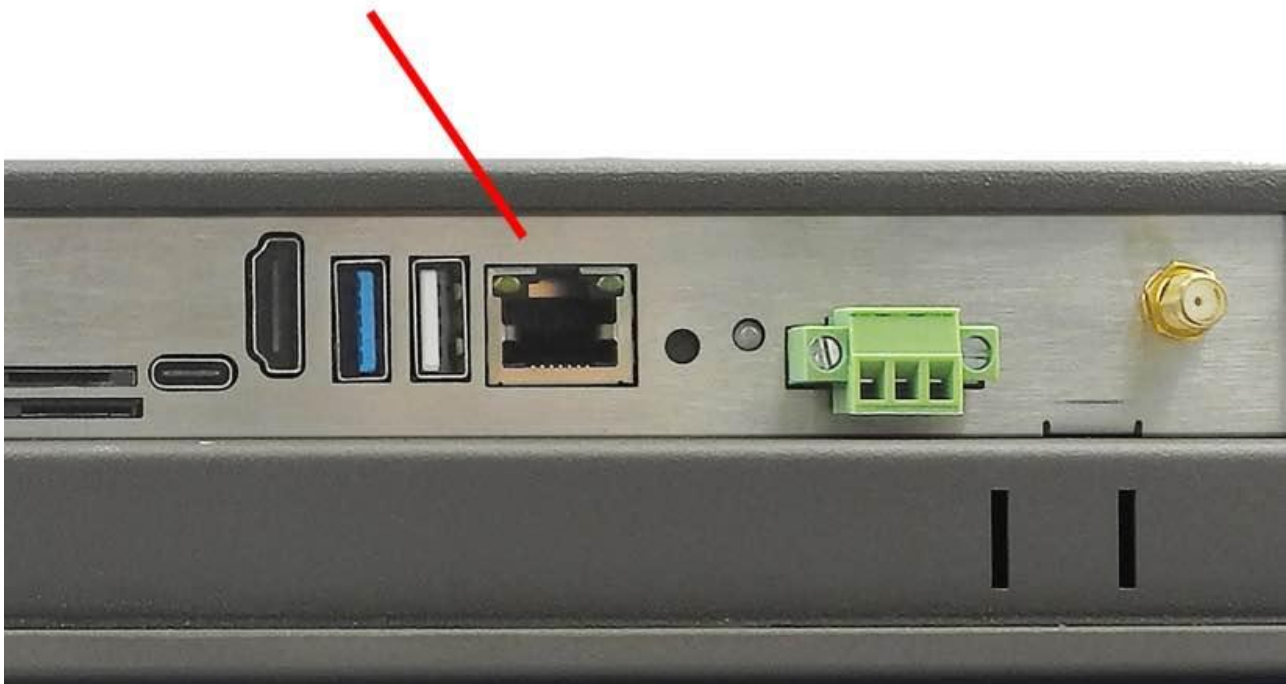


USB Type-C Port

LAN Connector

LAN (RJ45) connector provides 1 x RJ45 Ethernet connectivity over standardized Ethernet cables as shown in the figure below. The integrated Ethernet interface supports up to 1 Gbps data throughput.

This product also supports **optional** PoE(Power over Ethernet, 802.3af/at), it does not ship with PoE **by default**, if you need PoE, you can choose PoE in the official Chipsee store or contact us before placing an order.



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 PPC-RK3576-121 Industrial Panel PC is equipped with the popular **Realtek RTL8821CS WiFi/BT module** which supports BT/BLE 2.1/3.0/4.2, as well as 802.11ac/abgn 433Mbps 2.4/5.8 GHz Wireless LAN (WLAN).



RTL8821CS WiFi/BT Module

The PPC-RK3576-121 includes an SMA connector for an external WiFi/BT antenna, as illustrated in the figure below.



WiFi+BT Antenna SMA

4G/LTE Module

The PPC-RK3576-121 Industrial Panel PC is equipped with a mini-PCIe connector (through USB CPU lane) that can connect an optional 4G/LTE module. The customer will also need a SIM Card Holder and a 4G/LTE antenna connector to ensure 4G/LTE works. SIM card does NOT support hot plug. Power off before inserting or removing SIM card.



mini-PCIe Connector & 4G Module



4G/LTE Antenna



SIM Card Direction

⚠ Attention

The product does not come shipped with the 4G/LTE module by default. The customer can choose the 4G/LTE module option when placing an order, we will install all the necessary components.

M.2 SSD Slot

There is an **optional** M.2 slot on the PPC-RK3576-121 that allows an optional SSD. The M.2 slot is capable of holding a M.2 M-Key 2230/2242/2260/2280 NVME SSD (PCI-E 3.0 x1).

The PPC-RK3576-121 does not come shipped with an SSD nor the M.2 slot by default. If you need the M.2 slot or M.2 devices please contact us before placing an order.



M.2 2230/2242/2260/2280 Slot for PCI-E 3.0 x1 NVME SSD

TF Card Slot

The PPC-RK3576-121 Industrial Panel PC features 1 x **TF Card (micro SD) slot**. TF Card can address up to 128GB of storage.



TF (micro SD) Card Slot

Note

The product does not come shipped with the TF Card by default.

Audio Connectors

The PPC-RK3576-121 Industrial Panel PC features some audio peripherals. It has a **3.5mm audio input/output jack**, an **internal speaker**, as well as a small **buzzer**.



Audio Jack

The miniature 2W embedded speaker is handy for audio reproduction, the small buzzer can play alarm/notification sounds.



2W Micro Speaker and Buzzer

Attention

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

HDMI Connector

The PPC-RK3576-121 Industrial Panel PC is equipped with 1 x HDMI OUT port. The HDMI connector allows connecting an additional (external) monitor. HDMI output resolution can be configured by the software.



HDMI Connector

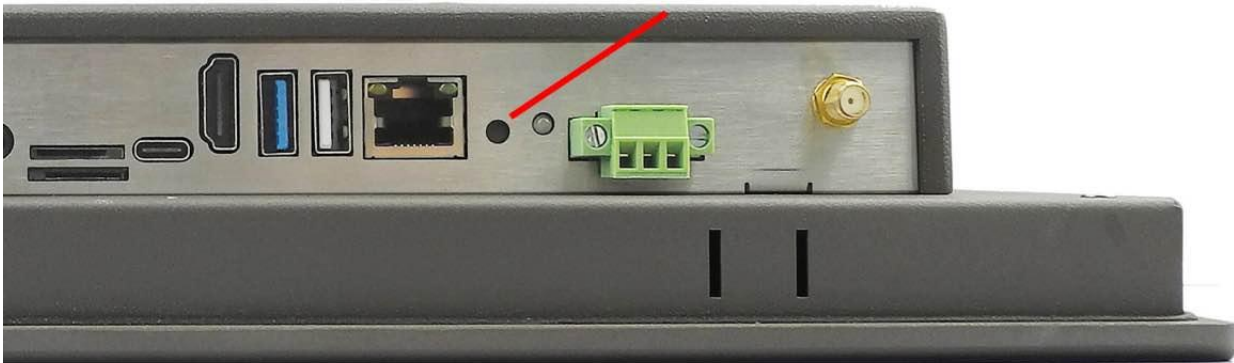
PROG Button

The PPC-RK3576-121 Industrial Panel PC has one button on the board marked as PROG, as shown in the figure below.

When the button is pressed before powering up, the PPC-RK3576-121 will enter LOADER mode. In this mode you can use a USB Type-C cable to upgrade its operating system. You can use this feature to flash another OS to the internal eMMC.

When the button is not pressed before and during power up, the PPC-RK3576-121 will boot normally.

There is no need to press the button during regular operation. However, if you need to flash the OS in MASKROM mode, the button will be used. Please refer to the [software documents](#) for more information.



PROG Button

Mounting Procedure

You can mount PPC-RK3576-121 with VESA mounting ([guide](#)): **100 x 100** mm, 4 x **M4** (6mm) screws.

You can mount PPC-RK3576-121 with PANEL mounting ([guide](#)).



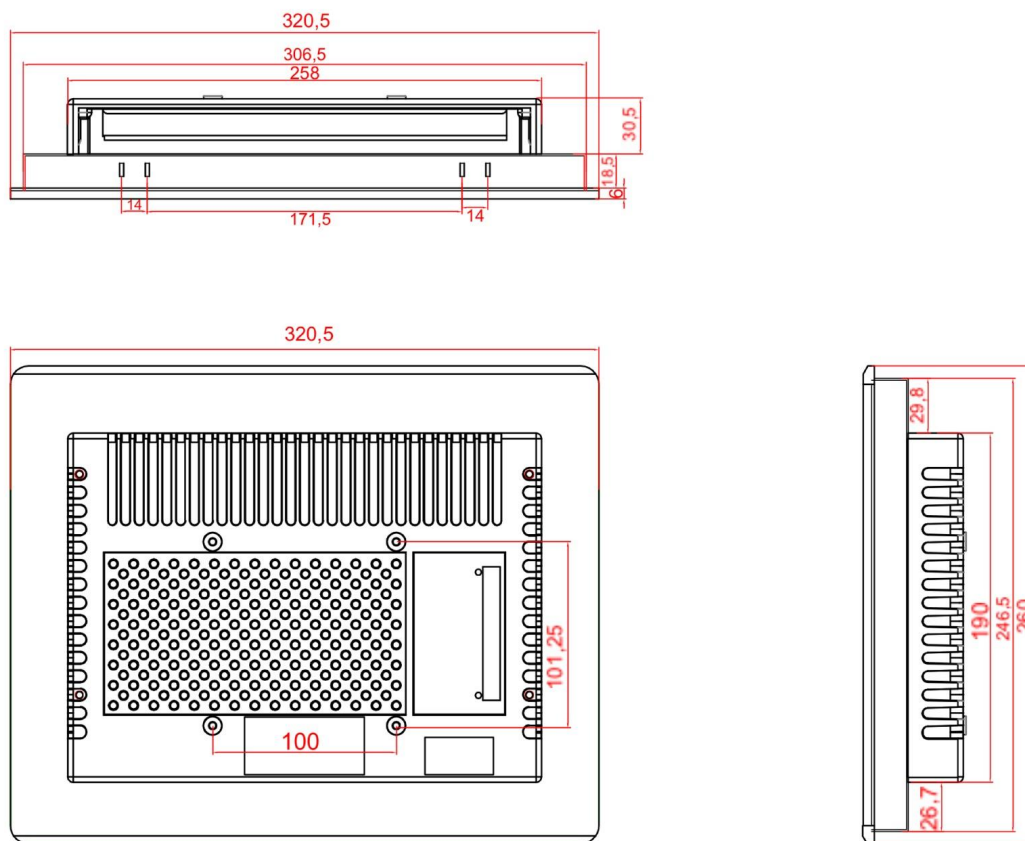
Attention

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

Mechanical Specifications

For PPC-RK3576-121, the outer mechanical dimensions are 320 * 260 * 55.5mm (W x L x H).

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



PPC-RK3576-121 *Technical Drawing*

Disclaimer

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