Chipsee

Industrial PC

# PPC-A53-101

PN: CS12800-IMX8MP-101P

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# PPC-A53-101

## Front View

# Rear View

Chipsee
Type:CS12800-IMX8MP-101P
Rev:C111
OS: Yocto Linux Qt6.3
SN: 2024051411000370
https://chipsee.com
Origin:Made in China
RS485/RS232
AUDIO
TF Card
SIM Card
Type-C HDMI
USB 3.0
USB 2.0
LAN
PROG LED
+ - G
DC 12-36V

# Side View 1

Chipsee
GPIO
RS485/RS232
AUDIO
TF Card
SIM Card
Type-C
HDMI
USB
3.0
USB
2.0
LAN
PROG
LED
DC 12~36V

# Side View 2

# Product Overview

The Cortex®-A53 series PPC-A53-101 (PN: CS12800-IMX8MP-101P) is a high-quality industrial panel PC. This single board computer features a 10.1” 10-point capacitive touch screen with a resolution of 1280 x 800 pixels and a brightness of 400 cd/$m^2$.

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 hosed in an aluminum casing with bezels.

The PPC-A53-101 Industrial Panel PC is based around the powerful i.MX8MP System on Chip (SoC), powered by the NXP i.MX8MP low-power processor which integrates a quad-core Cortex®-A53 1.6GHz processor.

The i.MX8MP supports multi-format video decoders and has a high-performance LPDDR4 4GB 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-A53-101 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.

- Android 12
- Yocto Linux Qt 6.3

> **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

Does not include the 4G/LTE 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-A53-101 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-A53-101 | |
|---|---|
| **CPU** | NXP i.MX8MP, Quad(4)-core Cortex-A53 (1.6GHz) |
| **RAM** | LPDDR4 4GB |
| **eMMC** | 32GB |
| **SSD** | Not supported |
| **Storage** | TF Card, Supports up to 128GB SDHC |
| **HDMI** | 1 x HDMI OUT |
| **Display** | 10.1" LCD, 1280 x 800, High Brightness: 400 cd/$m^2$ |
| **Touch** | 10-point capacitive touch screen |
| **USB** | 1 x USB 2.0 HOST, 1 x USB 3.0 HOST, 1 x USB Type-C1 |
| **LAN** | 1 x RJ45, GbE **(default)**, Power over Ethernet(PoE) *(optional)* |
| **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 *(optional)*. |
| **RS232** | Default 2 x RS232 (Optional 6 x RS232 at most, include 1 debug port)2 |
| **RS485** | Default to 2 x RS485. Optionally, these 2 x RS485 can be configured to RS232.2 |
| **CAN** | Default to 2 x CAN. Optionally, these 2 x CAN 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 12V to 36V |
| **Current** | Max brightness, max CPU load: 0.97A at 12V; Min brightness, idle: 0.58A at 12V. |
| **Power Consumption** | Max brightness, max CPU load: 11.64W; Min brightness, idle: 6.96W. |
| **Working Temperature** | From -20°C to +70°C |
| **OS** | Android 12, Yocto Linux Qt 6.3 |

| PPC-A53-101 | |
|---|---|
| **Dimensions** | PPC-A53-101 (PN: CS12800-IMX8MP-101P): 275.5 x 193.5 x 46.0mm |
| **Weight** | PPC-A53-101 (PN: CS12800-IMX8MP-101P): 1300g |
| **Mounting** | PPC-A53-101 (PN: CS12800-IMX8MP-101P): Panel, VESA |

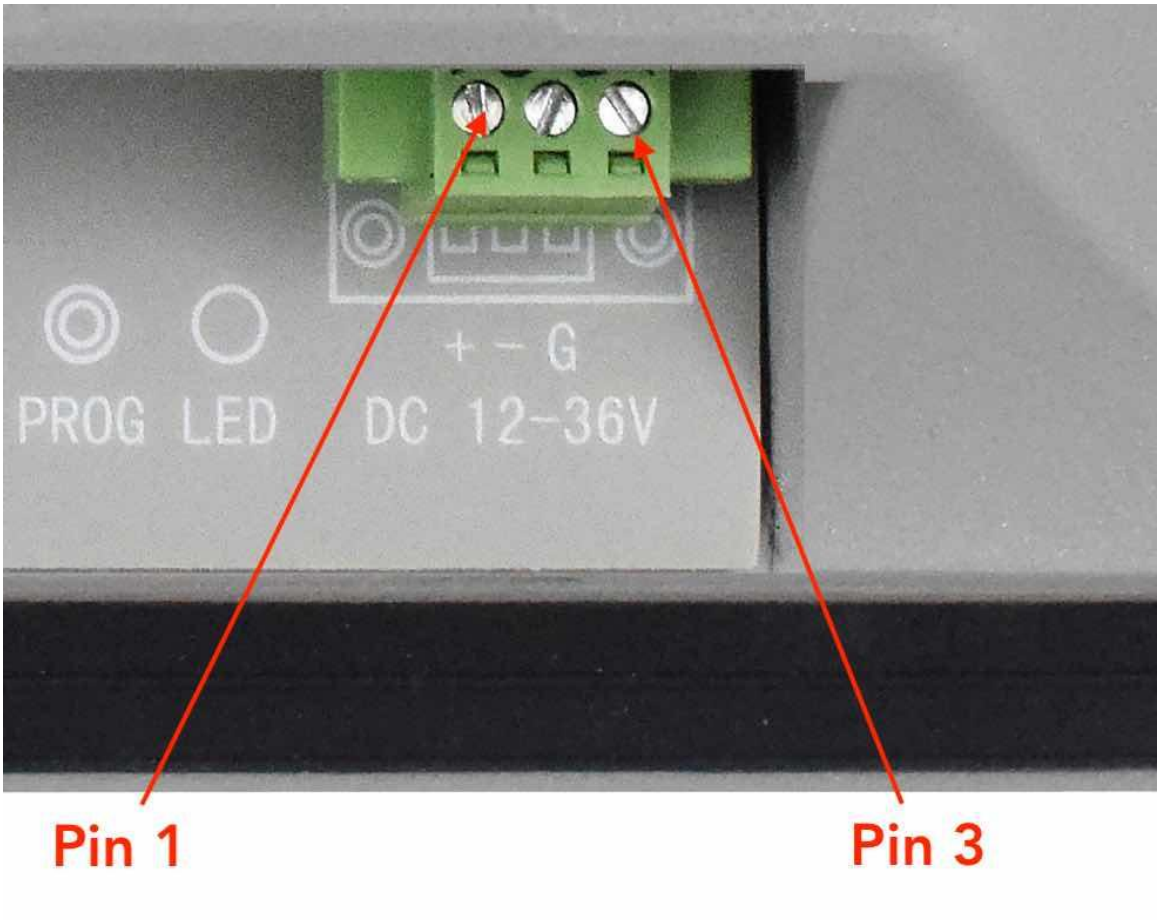
Table 87 Key Features

1 USB3.0 port and USB-C port share one node and cannot be used together. In Linux USB3.0 HOST is enabled by default; in Android USB-C OTG is enabled by default. You can change this config by software in the operating systems, e.g.: disable USB3.0 HOST then enable USB-C OTG in Linux, or vice versa in Android.

2(1,2)This product has 3 x CPU UART, 1 x USB UART by default, and 6 x UART terminals (RS232/RS485) at most. The default configuration is 2 x RS232 and 2 x RS485, including 1 RS232 debug port. This product has 2 x CAN by default, all of them can be configured to RS232 (USB UART). UART can be swapped between RS232 and RS485 modes easily, if you need a different RS232/RS485/CAN configuration, please get in touch with the Chipsee Technical Support at **support@chipsee.com** when placing an order.

# Power Input

The PPC-A53-101 Industrial Panel PC can be powered by a wide range of input voltages: From 12V to 36V DC. The power input connector is a **3-pin, 3.81mm terminal**. The polarity and the pinout is shown in the figure below.




*Power Input*

Note that the "**+**" sign represents the positive power input, it is printed at the casing and as a silk-screen on a PCB 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 88 Power Connector

**Note**

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

# Touch Screen

The PPC-A53-101 Industrial Panel PC uses a 10-point capacitive touch screen. The touch layer is connected through I2C.

**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-A53-101 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-A53-101 industrial PC. It has 1 x USB 2.0 HOST, 1 x USB 3.0 HOST, 1 x USB Type-C (USB3.0 and USB-C share one node); 1 x RJ45, GbE **(default)**, Power over Ethernet(PoE) *(optional)*; up to 6 x UART terminals (RS232/ RS485), up to 2 x CAN.

## RS232/RS485/CAN

The serial communication interfaces (RS485, RS232, and CAN) are routed to a **24-pin 3.81mm terminal**, as illustrated on the figure below.

| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CAN1_H | CAN1_L | IN4 | IN3 | IN2 | IN1 | OUT4 | OUT3 | OUT2 | OUT1 | GND_ISO | VDD_ISO |
| 1 | 3 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 21 | 23 |
| CAN0_H | CAN0_L | RS485_4- | RS485_4+ | RS485_3- | RS485_3+ | RS232_0_RXD | RS232_0_TXD | RS232_2_RXD | RS232_2_TXD | GND | VCC5V |

*RS232, RS485 and CAN*

This product has 3 x CPU UART, 1 x USB UART by default, and 6 x UART terminals (RS232/ RS485) at most. The default configuration is 2 x RS232 and 2 x RS485, including 1 RS232 debug port. This product has 2 x CAN by default, all of them can be configured to RS232 (USB UART).

| **RS232 / RS485 / CAN / GPIO Pin Definition:** | | |
|---|---|---|
| **Pin Number** | **Definition** | **Description** |
| Pin 1 | CAN0_H | CAN H signal |
| Pin 2 | CAN1_H | CAN H signal |
| Pin 3 | CAN0_L | CAN L signal |
| Pin 4 | CAN1_L | CAN L signal |
| Pin 5 | RS485_4- | USB UART1, RS485 -(B) signal |

| RS232 / RS485 / CAN / GPIO Pin Definition: | | |
|---|---|---|
| Pin 6 | IN4 | Isolated Input 4 |
| Pin 7 | RS485_4+ | USB UART1, RS485 +(A) signal |
| Pin 8 | IN3 | Isolated Input 3 |
| Pin 9 | RS485_3- | CPU UART3, RS485 -(B) signal |
| Pin 10 | IN2 | Isolated Input 2 |
| Pin 11 | RS485_3+ | CPU UART3, RS485 +(A) signal |
| Pin 12 | IN1 | Isolated Input 1 |
| Pin 13 | RS232_0_RXD | CPU UART4, RS232 RXD signal |
| Pin 14 | OUT4 | Isolated Output 4 |
| Pin 15 | RS232_0_TXD | CPU UART4, RS232 TXD signal |
| Pin 16 | OUT3 | Isolated Output 3 |
| Pin 17 | RS232_2_RXD | CPU UART2, Debug RXD signal |
| Pin 18 | OUT2 | Isolated Output 2 |
| Pin 19 | RS232_2_TXD | CPU UART2, Debug TXD signal |
| Pin 20 | OUT1 | Isolated Output 1 |
| Pin 21 | GND | System Ground |
| Pin 22 | GND_ISO | Isolated Ground |
| Pin 23 | VCC5V | System 5V output, up to 1A |
| Pin 24 | VDD_ISO | Isolated Power Input, supports 5V~24V |

Table 89 Connectivity Section

**Attention**

1. 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).
2. The GPIO has been optical isolated and it 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.
3. The 4 GPIO output channels can drive at most 500mA current on each channel.

**Attention**

1. RS485 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** is **already mounted** by default.
3. The 120Ω match resistor for the **CAN** bus is **NOT mounted** by default.

## 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.

USB3.0 port and USB-C port share one node and cannot be used together. In Linux USB3.0 HOST is enabled by default; in Android USB-C OTG is enabled by default. You can change this config by software in the operating systems, e.g.: disable USB3.0 HOST then enable USB-C OTG in Linux, or vice versa in Android.

*USB 2.0 HOST Port*

*USB 3.0 HOST Port*

*USB Type-C Port*

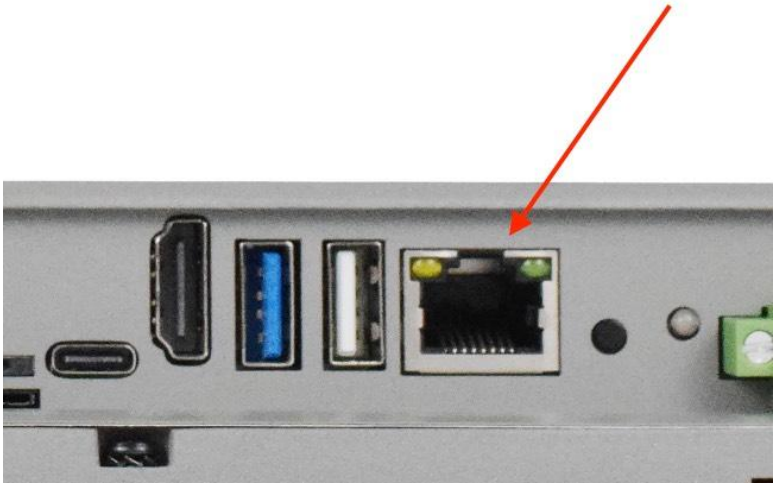
**Warning**

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

## LAN Connectors

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

The LAN port supports **optional** Power over Ethernet (PoE) feature.



*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-A53-101 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).

Figure 390: *RTL8821CS WiFi/BT Module*

The PPC-A53-101 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-A53-101 Industrial Panel PC is equipped with a **mini-PCIe connector** that can connect a 4G/LTE module. The customer will also need a SIM Card Holder and a 4G/LTE Antenna Connector to ensure 4G/LTE works on the PPC-A53-101. SIM card does **NOT** support hot plug. **Power off** before inserting or removing SIM card.

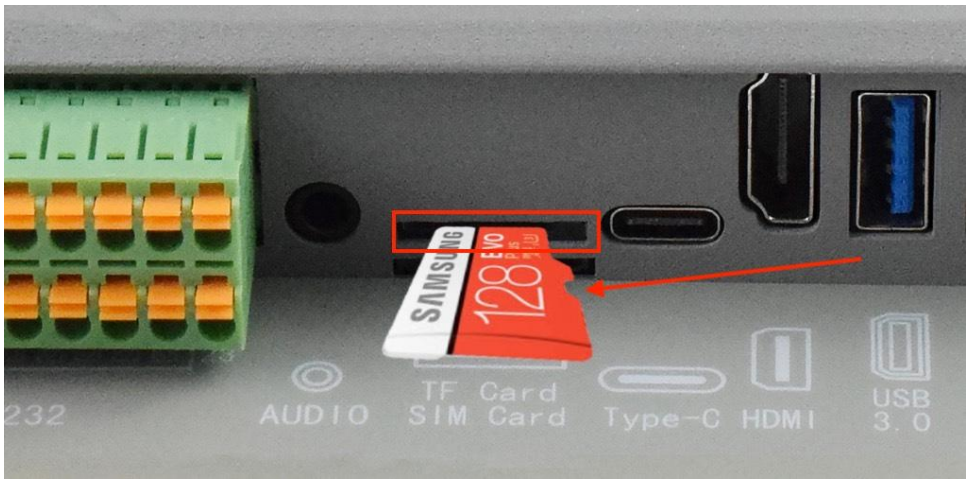
*mini-PCIe Connector & 4G/LTE Module*

*SIM Card Direction (Micro SIM Card)*

> **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.

# TF Card Slot

The PPC-A53-101 Industrial Panel PC features 1 x **TF Card (micro SD) slot**. TF Card can address up to 128GB of storage.



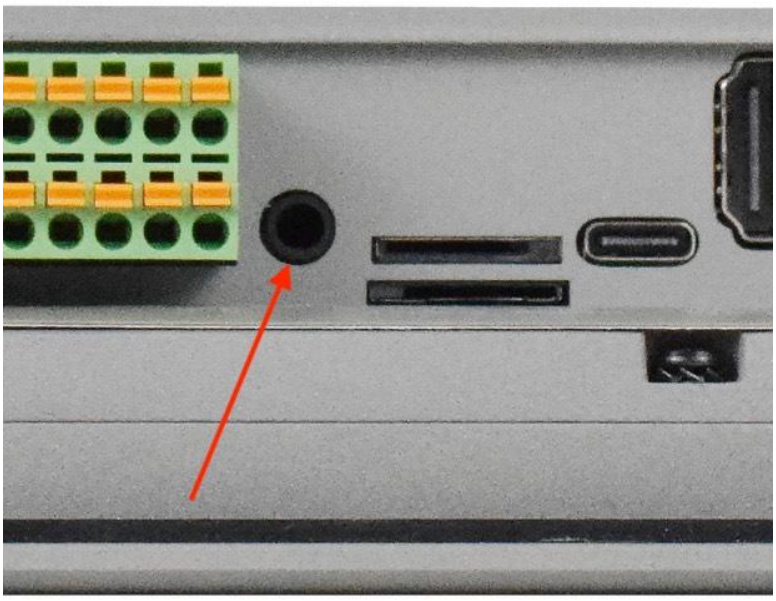

*TF (micro SD) Card Slot*

**Note**

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

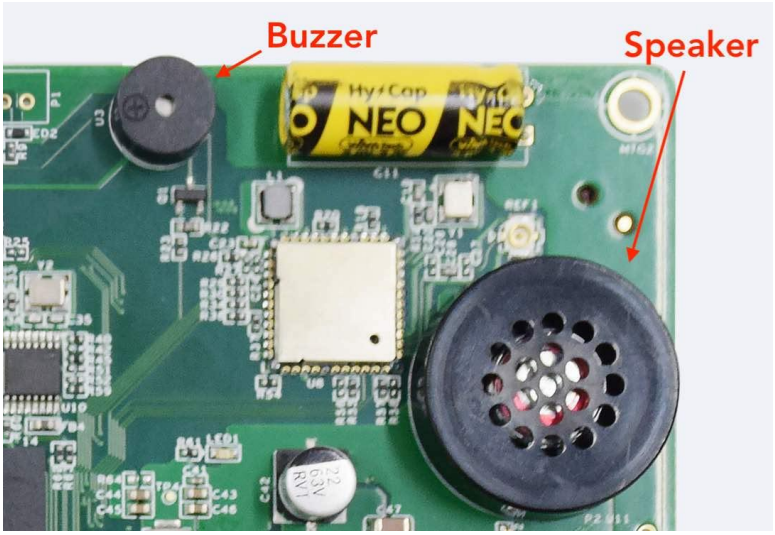
# Audio Connectors

The PPC-A53-101 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 Connector*

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-A53-101 Industrial Panel PC is equipped with 1 x HDMI OUT connector. The HDMI connector allows connecting an additional (external) monitor. HDMI output resolution can be configured by the software.

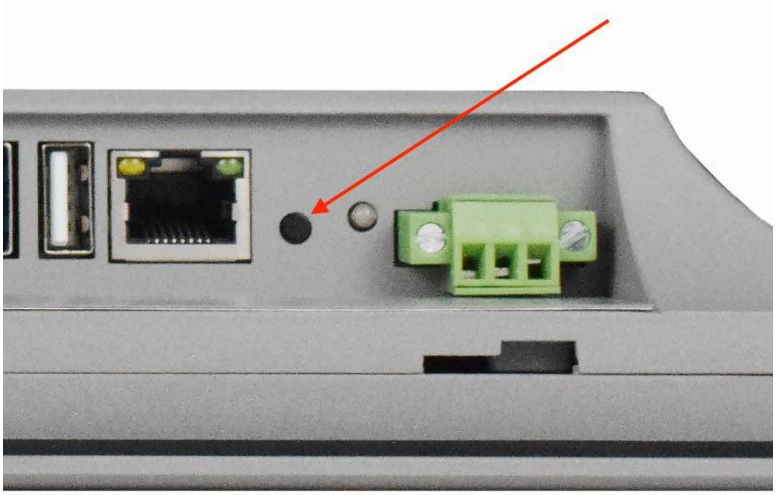
*HDMI Connector*

# PROG Button

The PPC-A53-101 Industrial Panel PC has one button on the board marked as PROG, as shown in the figure below. It controls how the device will be booted.

To boot from SD card, press and hold the PROG button, then connect the power supply, after a few seconds, you can see the system boot from SD card, then you may release the button.

When the button is not pressed while powering up, the PPC-A53-101 will boot normally from eMMC.



*PROG Button*

# Mounting Procedure

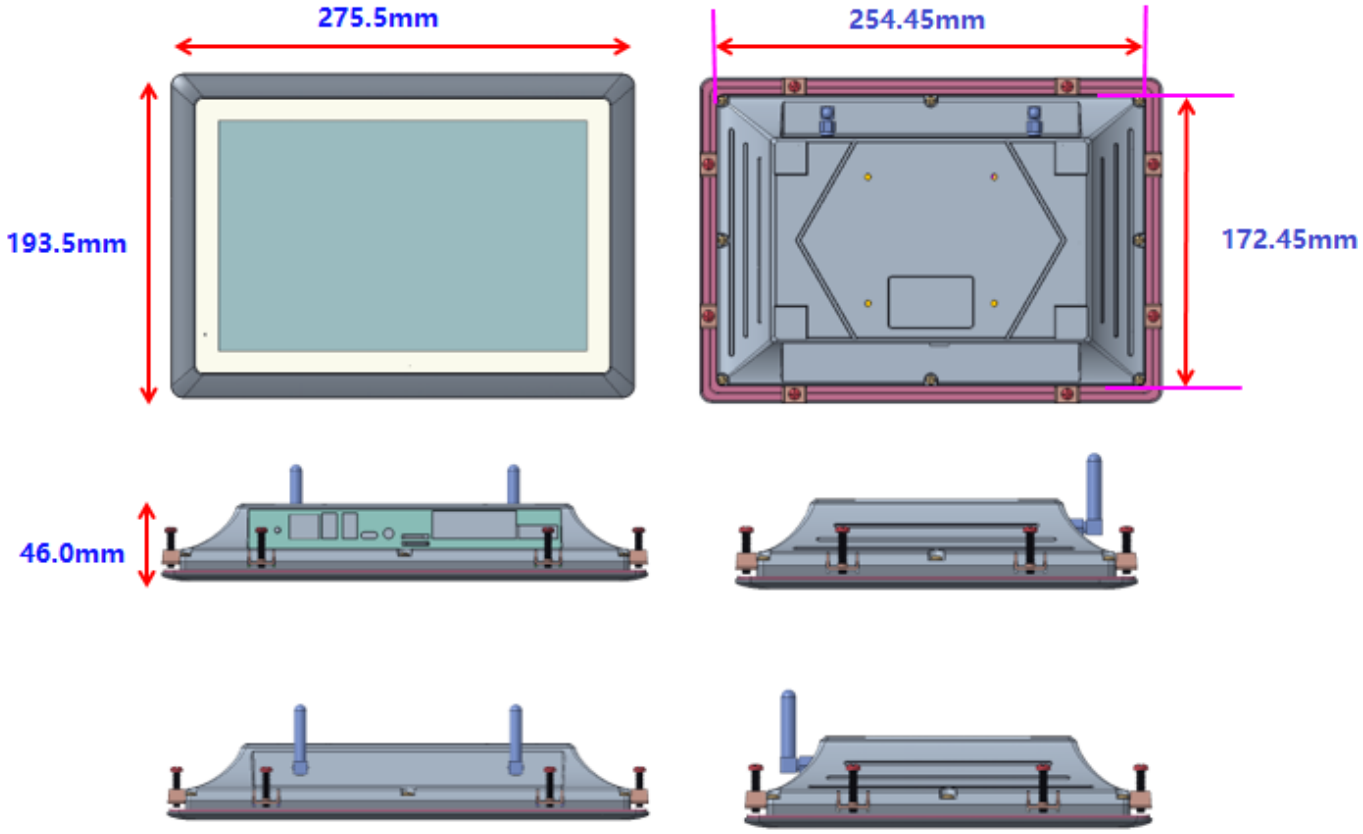
You can mount PPC-A53-101 with VESA mounting (guide): **100 x 100** mm, 4 x **M4** (6mm) screws, enabling simplified installation onto any standard mounting fixture.

You can also mount PPC-A53-101 with panel mounting method (guide).

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

# Mechanical Specifications

For PPC-A53-101, the outer mechanical dimensions are 275.5 x 193.5 x 46.0mm (W x L x H).




*Dimensions* (PPC-A53-101)

# Disclaimer

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