Chipsee

Industrial PC

CS-BOX-A53

PN: CS-BOX-IMX8MP

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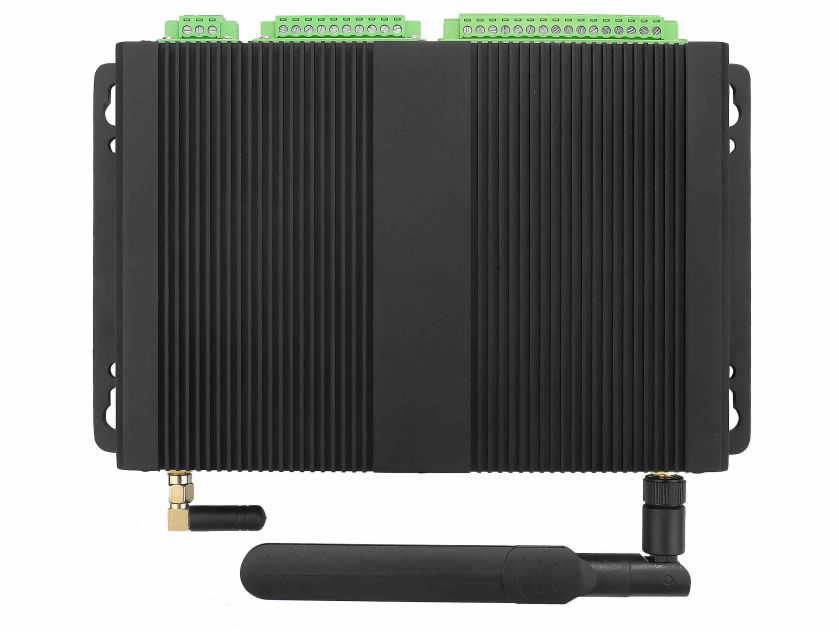
CS-BOX-A53



Front View

Rear View

Side View 1

Side View 2

Product Overview

The fanless embedded PC CS-BOX-A53 (PN: CS-BOX-IMX8MP) is a Cortex®-A53 series high-quality industrial PC. Thanks to the fanless design, it is stable and reliable in client terminal, multimedia and other industry applications.

Key Applications

- Industrial Automation
- Process Control
- Smart Grid Management

- CNC Manufacturing
- Environmental Monitoring
- Predictive Maintenance

The offered CPU consumes very little power, around 5.25W (max). From the ground-up, the CPU is built for low power consumption. As such, it is best suited for mobile and power-constrained industrial or field applications. A specially designed aluminum alloy housing with fins for increased heat dissipation serves as a passive cooler, eliminating the need for built-in fans. The fanless design reduces noise, as well as the maintenance costs and efforts, leading to increased reliability at the same time.

The CS-BOX-A53 Industrial 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 CS-BOX-A53 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

The CS-BOX-A53 Industrial PC 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 CS-BOX-A53 Industrial 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.

CS-BOX-A53	
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-D(Micro HDMI) OUT
Display	N/A
Touch	N/A
USB	1 x USB 2.0 HOST, 1 x USB 3.0 HOST, 1 x USB Type-C1
LAN	2 x RJ45, GbE, including **1 x optional** Power over Ethernet (PoE) port
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 3 x RS485 at most2
CAN	default 2 x CAN (1 x CAN can be configured to RS232 optionally)
GPIO	8 Channels Isolated IO, 4 x Input and 4 x Output
WiFi/BT	Integrated WiFi/BT Module
4G/LTE	Supported, Optional

CS-BOX-A53	
Power Input	From 6V to 36V
Current	350mA (max) at 15V
Power Consumption	5.25W (max)
Working Temperature	From 0°C to +60°C
OS	Android 12, Yocto Linux Qt 6.3
Dimensions	CS-BOX-A53 (PN: CS-BOX-IMX8MP): N/A
Weight	CS-BOX-A53 (PN: CS-BOX-IMX8MP): N/A
Mounting	CS-BOX-A53 (PN: CS-BOX-IMX8MP): Rear, VESA

Table 84 Key Features

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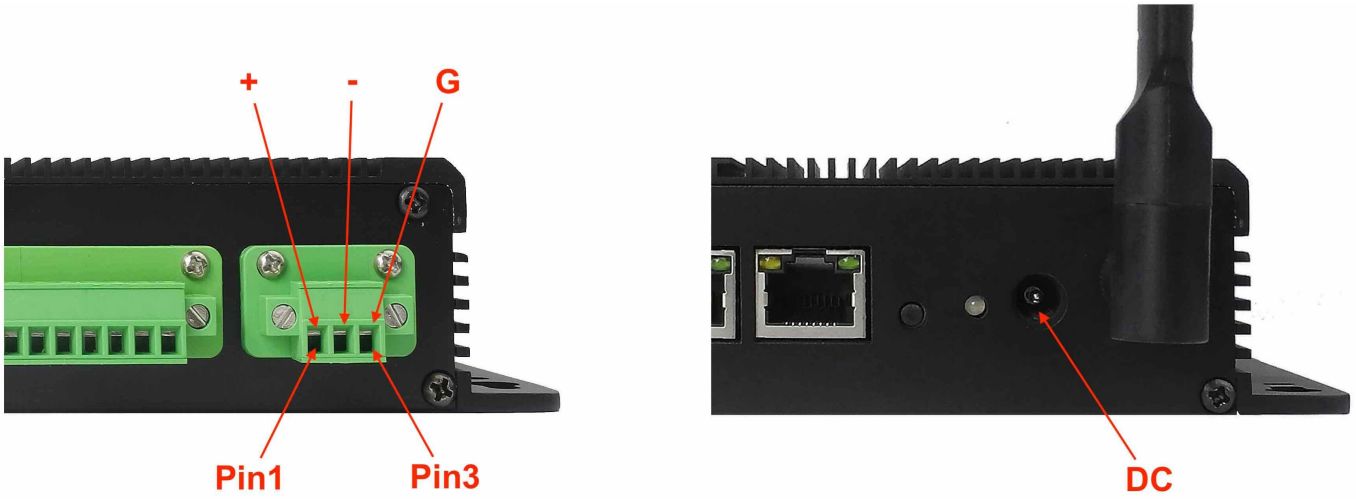
1 USB3.0 port and USB-C port share one node and cannot be used together. In Linux USB3.0 HOST is enabled by default; in Android USB-C OTG is enabled by default. You can change this config by software in the operating systems, e.g.: disable USB3.0 HOST then enable USB-C OTG in Linux, or vice versa in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

2(1,2)This product has 3 x CPU UART, 2 x USB UART by default, 6 x UART channels at most. The default configuration is 2 x RS232 and 3 x RS485, including 1 RS232 debug port. There is 1 x CAN that 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 CS-BOX-A53 Industrial PC can be powered by a wide range of input voltages: From 6V 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

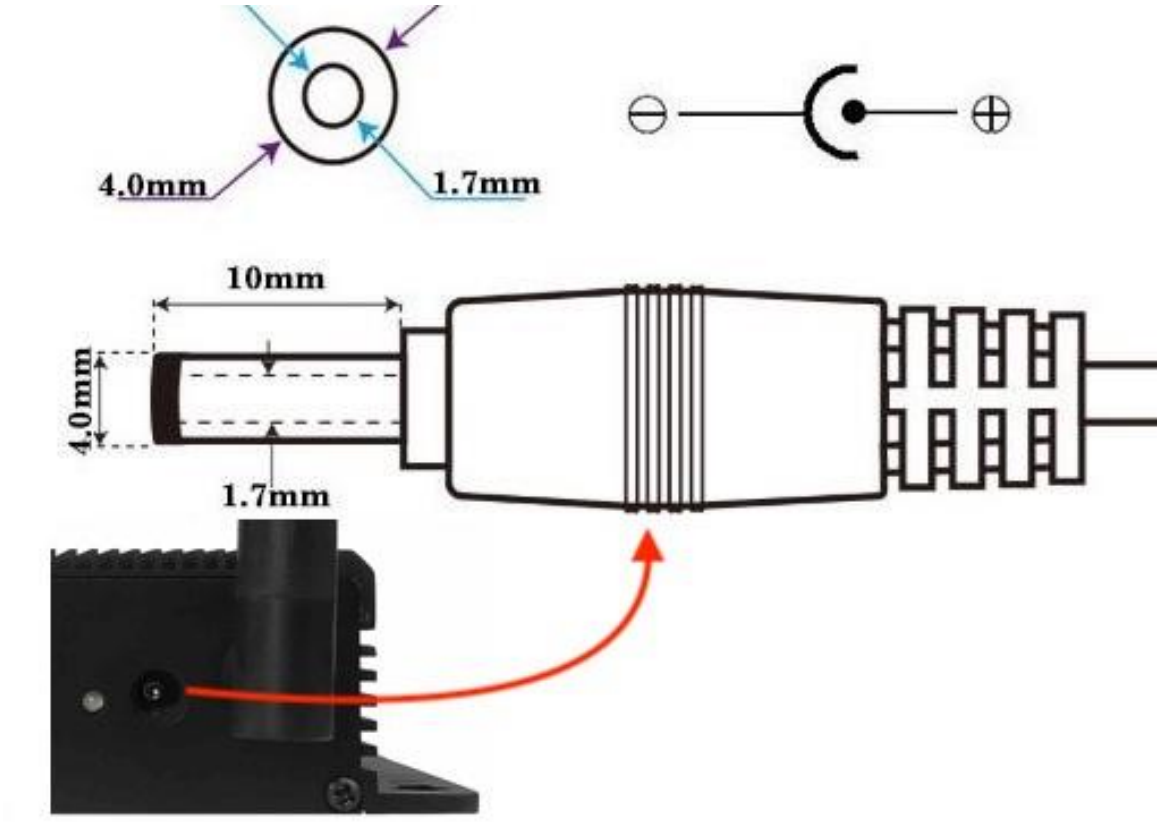
Note that the "**+**" sign represents the positive power input, it is printed at the casing and as a silk-screen on a PCB of the embedded version. The "**-**" terminal is shorted to the ground.

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 85 Power Connector

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

There is another power input port, it is a 2.1mm x 5.5mm x 9.5mm DC jack. For a proper DC power connector, refer to the figure below.



DC Jack

Connectivity

There are many connectivity options available on the CS-BOX-A53 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); 2 x RJ45, GbE, including **1 x optional** Power over Ethernet (PoE) port; 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 **16-pin 3.81mm terminal**, as illustrated on the figure below.

RS232, RS485 and CAN

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

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

RS232 / RS485 / CAN Pin Definition:		
Pin Number	**Definition**	**Description**
Pin 16	CAN1_H	CAN H signal
Pin 15	CAN1_L	CAN L signal
Pin 14	CAN0_H	CAN H signal, Can be configured to USB UART RS232
Pin 13	CAN0_L	CAN L signal, Can be configured to USB UART RS232

RS232 / RS485 / CAN Pin Definition:		
Pin 12	RS485_5-	USB UART2, RS485 –(B) signal
Pin 11	RS485_5+	USB UART2, RS485 +(A) signal
Pin 10	RS485_4-	USB UART1, RS485 –(B) signal
Pin 9	RS485_4+	USB UART1, RS485 +(A) signal
Pin 8	RS485_3-	CPU UART3, RS485 –(B) signal
Pin 7	RS485_3+	CPU UART3, RS485 +(A) signal
Pin 6	RS232_0_RXD	CPU UART4, RS232 RXD signal
Pin 5	RS232_0_TXD	CPU UART4, RS232 TXD signal
Pin 4	RS232_2_RXD	CPU UART2, RS232 RXD signal, Debug Port
Pin 3	RS232_2_TXD	CPU UART2, RS232 TXD signal Debug Port
Pin 2	GND	System Ground
Pin 1	+5V	System +5V Power Output, No more than 1A Current output

Table 86 Connectivity Section

Attention

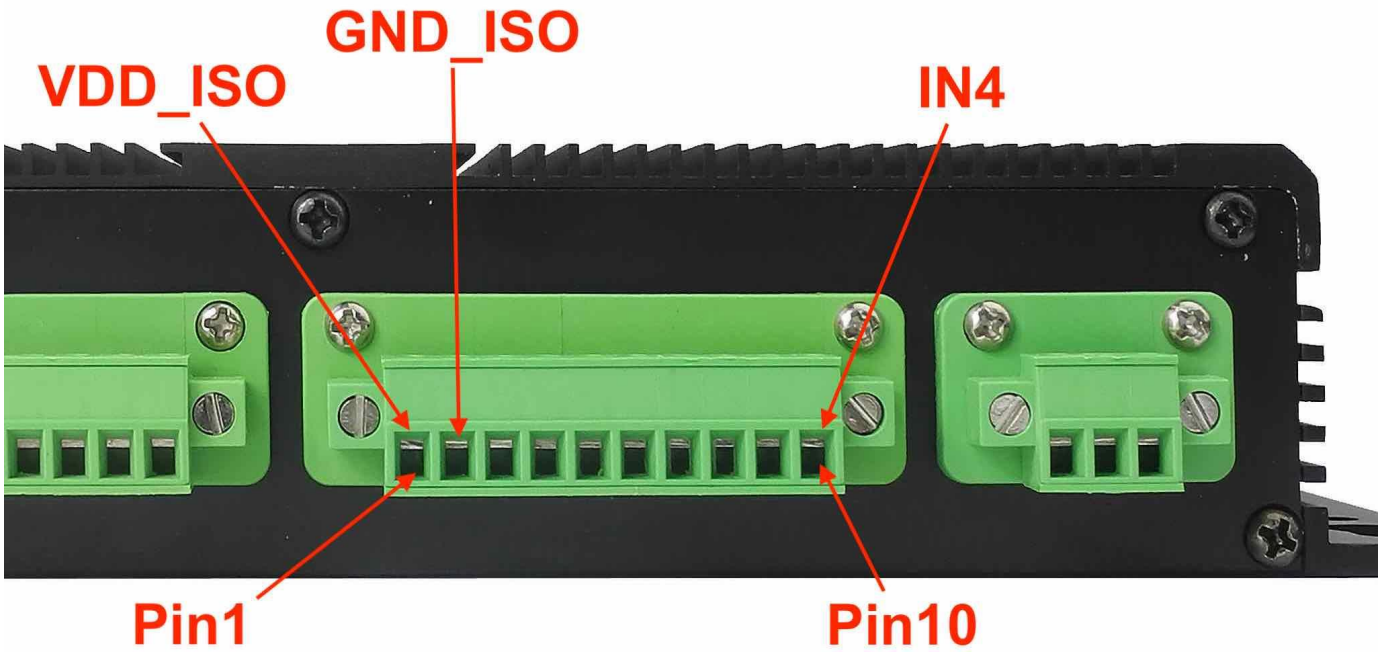
1. RS485_3,RS485_4 and RS485_5 can control the input and output direction automatically. There's no need to control it from within the software.
2. The 120Ω match resistor for the **RS485** is **already mounted** by default.
3. The 120Ω match resistor for the **CAN** bus is **NOT mounted** by default.

GPIO Port

The CS-BOX-A53 Industrial 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.

The VDD_ISO is an isolated power *input* pin, you should attach a 5~24V DC power input to this pin.

It is also possible to use the onboard 5V power supply. The 5V on board power supply can be re-routed to the *Isolated Power Input* pin by populating R236 and R239 PCB footprints with 0Ω resistors **in the factory**. In this case you don't need to provide a DC power supply unit to use the GPIO, and the *VDD_ISO* input will become a *5V OUTPUT* powered by the on board 5V.

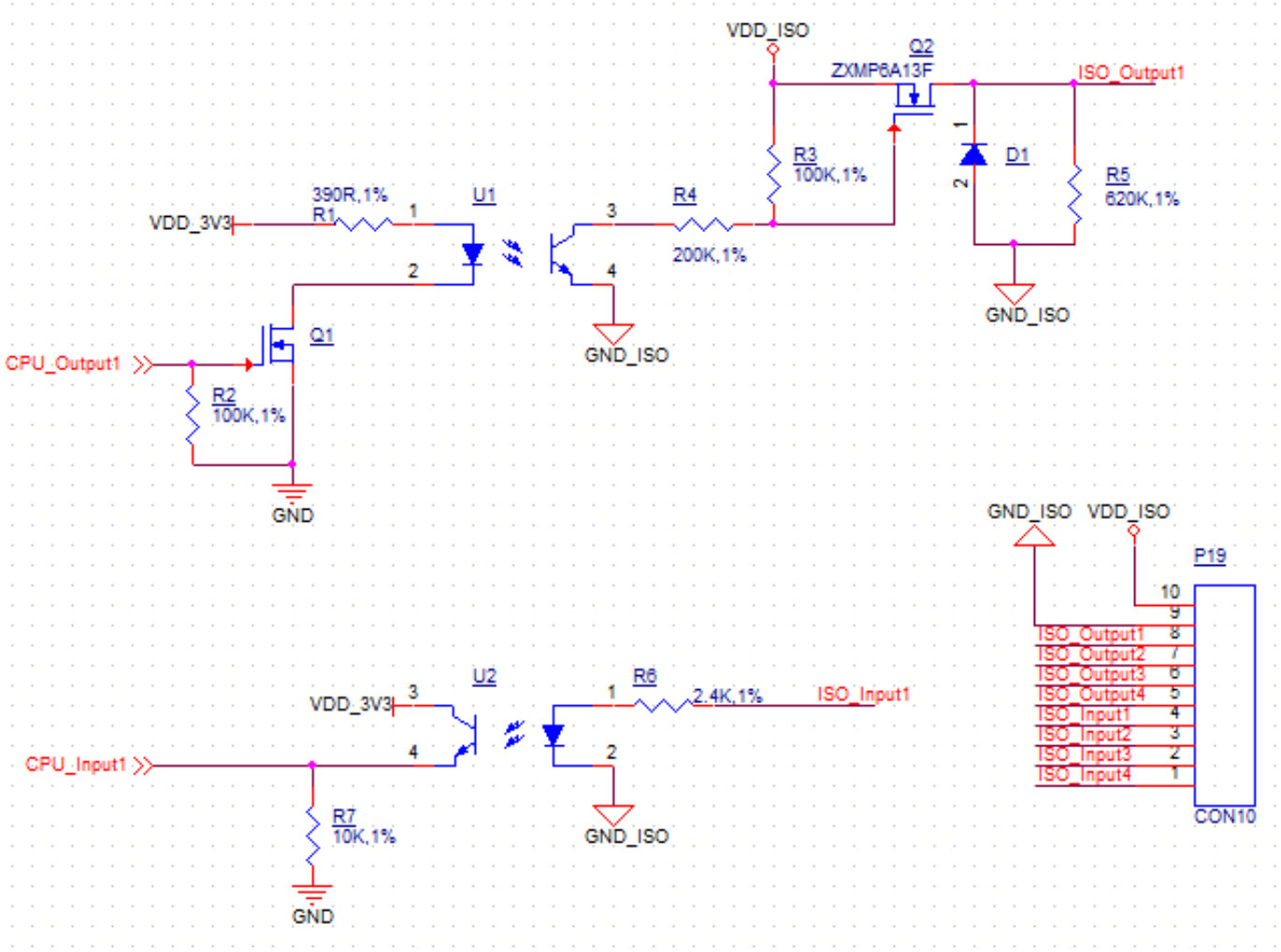


GPIO

GPIO Pin Definition:	
Pin Number	**Definition**
Pin 1	Isolated Power Input3
Pin 2	Isolated Ground Input
Pin 3	OUT1
Pin 4	OUT2
Pin 5	OUT3
Pin 6	OUT4
Pin 7	IN1
Pin 8	IN2
Pin 9	IN3
Pin 10	IN4

Table 87 GPIO Connector Pin-out

3 If the isolation is not a requirement, it is possible to use a non-isolated PSU instead.



Isolated GPIO reduced schematic

Attention

- The GPIO has been Opt-Isolated and it uses the 24V Logic by default.
- The 4 output channels can drive at most 500mA current on each channel.

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 (embedded / enclosed PC version)

USB 3.0 HOST Port (embedded / enclosed PC version)

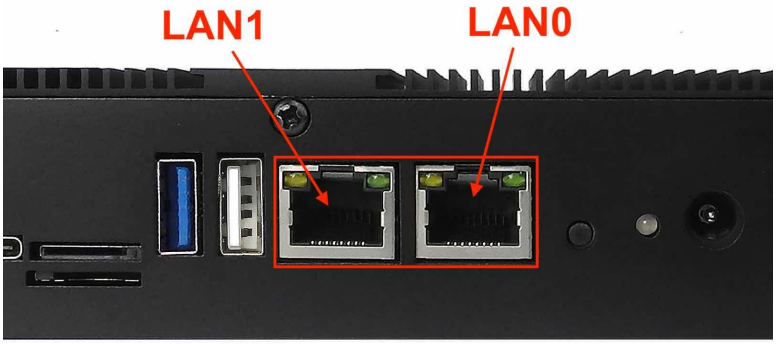
USB Type-C Port (embedded / enclosed PC version)

> **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 2 x RJ45, GbE, including **1 x optional** Power over Ethernet (PoE) port interface supports up to 1 Gbps data throughput.

The LAN0 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 CS-BOX-A53 Industrial 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 389: *RTL8821CS WiFi/BT Module*

The CS-BOX-A53 includes an SMA connector for an external WiFi/BT antenna, as illustrated in the figure below.

WiFi+BT Antenna SMA

4G/LTE Module

The CS-BOX-A53 Industrial 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 CS-BOX-A53. SIM card does **NOT** support hot plug. **Power off** before inserting or removing SIM card.

mini-PCIe Connector & 4G/LTE Module

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.

TF Card Slot

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

TF (micro SD) Card Slot

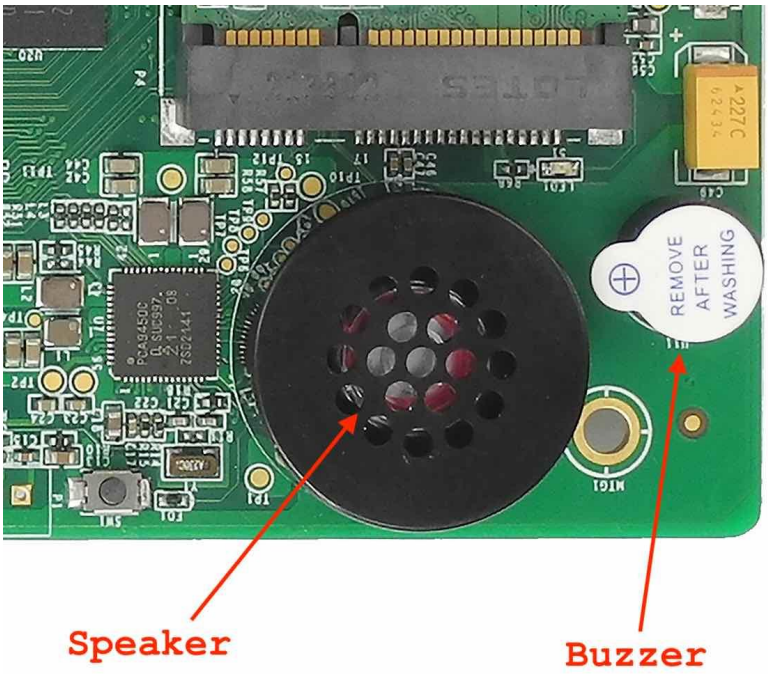
> **Note**
>
> The product does not come shipped with the TF Card by default.

Audio Connectors

The CS-BOX-A53 Industrial 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 (enclosed PC version)

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 CS-BOX-A53 Industrial PC is equipped with 1 x HDMI-D(Micro 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 CS-BOX-A53 Industrial 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 CS-BOX-A53 will boot normally from eMMC.

PROG Button

Mounting Procedure

You can mount CS-BOX-A53 with VESA mounting (guide): **75 x 75** mm, 4 x **M3** (6mm) screws.

You can also mount CS-BOX-A53 with rear mounting method (guide).

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

Mechanical Specifications

For CS-BOX-A53, the outer mechanical dimensions are N/A (W x L x H).

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