

Industrial PC

# EPC/PPC-CM3-070



PN: CS10600RA070

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# **EPC/PPC-CM3-070**

# Front View



# Rear View





# Front View (Embedded Variant)



# Rear View (Embedded Variant)



EPC/PPC-CM3-070 Product Overview

### **Product Overview**

The Cortex<sup>®</sup>-A53 Raspberry Pi<sup>®</sup> series EPC/PPC-CM3-070 (PN: CS10600RA070) is a high-quality industrial Pi PC. This single board computer features a 7.0" five-point capacitive touch screen with a resolution of  $1024 \times 600$  pixels and brightness of  $500 \text{ cd/m}^2$  Raspberry Pi Display.

#### **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-CM3-070 industrial Pi PC is based around the powerful Raspberry Pi<sup>®</sup> Compute Module 3, powered by the BCM2837 processor with a processor speed of 1.2GHz and a 1GB RAM.

EPC/PPC-CM3-070 Ordering Options

## **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.



You can order EPC/PPC-CM3-070 from the official Chipsee Store or from your nearest distributor.

#### **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.

EPC/PPC-CM3-070 Optional Features

### **Optional Features**

The EPC/PPC-CM3-070 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.

EPC/PPC-CM3-070 Specifications

# **Specifications**

The EPC/PPC-CM3-070 industrial Pi PC offers a board 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-CM3-070        |  |  |
|------------------------|--|--|
| СРИ                    | Raspberry Pi <sup>®</sup> CM3, CM3 Lite;<br>Raspberry Pi® CM3+, CM3+ Lite; 1.2GHZ      |  |
| Storage                | 2 TF Cards slots2  |  |
| RAM                    | 1GB DDR  |  |
| еММС                   | 8GB  |  |
| Display                | 7.0" IPS LCD, 1024 x 600 resolution px, brightness 500 cd/m <sup>2</sup>               |  |
| Touch                  | 5-point capacitive touch   |  |
| USB                    | 2 x USB 2.0 Host   |  |
| LAN                    | 1 x Channel 100M LAN   |  |
| Audio                  | 3.5mm Audio Out Connector, 2W Speaker Internal   |  |
| Buzzer                 | Yes  |  |
| RTC                    | Yes, High Accuracy RTC with Lithium Button Coin battery (lithium battery not included) |  |
| RS232                  | 2 x RS232  |  |
| RS485                  | 1 x RS4851   |  |
| GPIO                   | 8 Channels, 4 Input, 4 Output  |  |
| WiFi/BT                | Onboard WiFi/BT  |  |
| НДМІ                   | 1 Channel  |  |
| SATA II                | 1 Channel  |  |
| 3G/4G/LTE              | Supported, not mounted by default  |  |
| Camera                 | Yes, not mounted by default  |  |
| Power Input            | From 6V to 36V   |  |
| Current at 12V         | 700mA Max  |  |
| Power Consumption      | 8.4W Typical   |  |
| Working<br>Temperature | From -20°C to +70°C  |  |
| OS                     | Debian   |  |
| Dimensions             | CS10600RA070E: 190 x 107.8 x 27.7mm  |  |

EPC/PPC-CM3-070 Specifications

| EPC/PPC-CM3-070 |                                   |  |
|-----------------|-----------------------------------|--|
|                 | CS10600RA070P: 206 x 135 x 30.1mm |  |
| Weight          | CS10600RA070E: 400g               |  |
|                 | CS10600RA070P: 700g               |  |

Table 421 Key Features

- 1 The RS485 multiplexes with the RS232\_1, which means that you cannot use RS232\_1 and RS485 at the same time.
- 2 Chipsee designed one of the TF card slots for Lite version but it does not have an eMMC. We designed the other one for storage expansion.



#### 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.

EPC/PPC-CM3-070 Power Input

## **Power Input**

The EPC/PPC-CM3-070 industrial Pi PC can be powered by a wide range of input voltages: From 6V 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**. The polarity and the pinout is clearly marked on the housing of the CS10600RA070P version, as well as on the board itself of the CS10600RA070E version, as shown in the figures below.

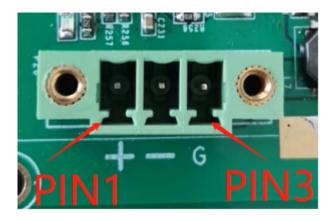




Figure 1020: Power Input (embedded/enclosed version)

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 <b>Positive Terminal</b> |  |
| Pin 2                  | Negative Input | DC Power <b>Negative Terminal</b> |  |
| Pin 3                  | Ground         | Power System Ground               |  |

Table 422 Power Connector



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

EPC/PPC-CM3-070 Touch Screen

### **Touch Screen**

The EPC/PPC-CM3-070 industrial Pi PC uses a 5-point capacitive touch screen. The figure below shows the capacitive touch screen connected to the motherboard via the **FPC connector**.



Figure 1021: 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-CM3-070 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 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.

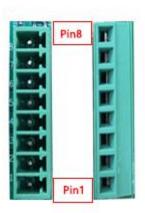
EPC/PPC-CM3-070 Connectivity

## **Connectivity**

There are many connectivity options available on the EPC/PPC-CM3-070 industrial Pi PC. It has 2 x USB 2.0 Host (can be customized to Host or OTG), 1 x Channel 100M LAN (RJ45) Ethernet connector supporting up to 1 Gbps, and 2 x UART terminals (RS232/RS485).

### RS232/RS485

The serial communication interfaces (RS485, RS232, and CAN) are routed to a **8-pin 3.81mm terminal**, as illustrated on the figure below.



**Figure 1022:** Relation between serial pins on embedded vs. enclosed version of the **EPC/PPC-CM3-070**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 8                               | RS485_1-    | CPU UART1, RS485 –(B) signal                            |
| Pin 7                               | RS485_1+    | CPU UART1, RS485 +(A) signal                            |
| Pin 6                               | RS232_1_RXD | CPU UART1, CPU RS232 RXD signal                         |
| Pin 5                               | RS232_1_TXD | CPU UART1, CPU RS232 TXD signal                         |
| Pin 4                               | RS232_0_RXD | CPU UARTO, CPU RS232 RXD signal                         |
| Pin 3                               | RS232_0_TXD | CPU UARTO, CPU RS232 TXD signal                         |
| Pin 2                               | GND         | System Ground   |
| Pin 1                               | +5V         | System +5V Power Output, No more than 1A Current output |

Table 423 Connectivity Section

EPC/PPC-CM3-070 RS232/RS485



#### **Attention**

RS485\_1 and RS232\_1 share the same channel (UART1) and therefore you cannot use RS232\_1 and RS485\_1 at the same time.

EPC/PPC-CM3-070 GPIO Port

#### **GPIO Port**

The EPC/PPC-CM3-070 industrial Pi PC has a 10 Pin 3.81mm **GPIO Connector**, as shown on the figure below. The table below gives details about the definition of every Pin.

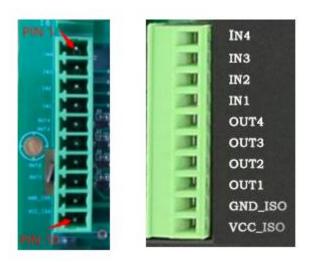


Figure 1023: GPIO Connector



Isolated GPIO reduced schematic

EPC/PPC-CM3-070 GPIO Port

| GPIO Connector Pin Definition: |            |                          |  |
|--------------------------------|------------|--------------------------|--|
| Pin Number                     | Definition | Description              |  |
| Pin 10                         | VCC        | Isolated Power +5V Input |  |
| Pin 9                          | GND        | 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 424 GPIO Connector Pin-out



#### Attention

- The GPIO has been Opt-Isolated and it uses the 5V Logic by default. You can use an external isolated power input but the power input range should be from 5V to 24V DC.
- The 4 output channels can drive at most 500mA current on each channel.

EPC/PPC-CM3-070 USB Connectors

#### **USB Connectors**

There are 2 x Type A **USB HOST connectors** onboard, as shown on the figure below.

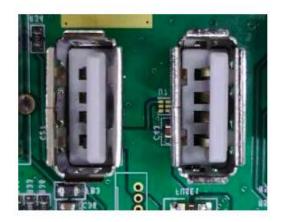




Figure 1024: USB HOST Connectors (embedded/enclosed PC version)

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 CM3/CM3+.







Figure 1025: USB OTG Connector



#### Warning

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

EPC/PPC-CM3-070 LAN Connectors

#### **LAN Connectors**

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





Figure 1026: RJ45 LAN Connectors (embedded/enclosed PC version)



Use CAT5 or better cables to achieve full data throughput over maximum distance defined by the 1000BASE-T standard (100m).

EPC/PPC-CM3-070 WiFi & BT Module

#### WiFi & BT Module

The EPC/PPC-CM3-070 industrial Pi PC is equipped with the popular **Realtek RTL8723 WiFi/BT module** that supports BT/BLE 4.0 (with backward compatibility), as well as 802.11bgn 2.4 GHz Wireless LAN (WLAN).



Figure 1027: RTL8273 WiFi/BT Module

The enclosed (CS10600RA070P) variant of the product also includes an SMA connector for an external WiFi/BT antenna, as illustrated in the figure below.



Figure 1028: WiFi+BT Antenna

EPC/PPC-CM3-070 3G/4G/LTE Module

## **3G/4G/LTE Module**

The EPC/PPC-CM3-070 industrial Pi PC is equipped with a **mini-PCle 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 EPC/PPC-CM3-070.



Figure 1029: 3G/4G Module





Figure 1030: SIM Card Holder and 3G/4G Antenna Connector



#### **Attention**

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

EPC/PPC-CM3-070 TF Card Slot

## **TF Card Slot**

The EPC/PPC-CM3-070 industrial Pi PC features 2 x **TF Card (micro SD) slot**: SD0 and SD1. Both slots can address up to 32GB of memory.

The SD0 is used only for the Lite version of Compute Module that has no internal eMMC. The SD1 is used for external storage.



Figure 1031: TF (micro SD) Card Slot



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

EPC/PPC-CM3-070 Audio Connectors

## **Audio Connectors**

The EPC/PPC-CM3-070 industrial Pi PC features some audio peripherals. It has 1 x **3.5mm audio output jack**.

Also, the EPC/PPC-CM3-070 industrial Pi PC has a miniature 2W internal speaker for audio reproduction, as well as a small buzzer for alarm/notification sounds.



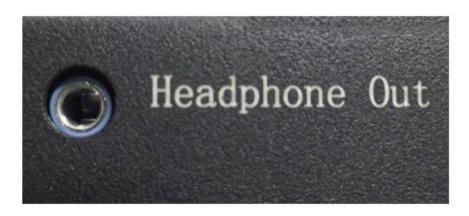


Figure 1032: Audio Connector (embedded/enclosed PC version)

EPC/PPC-CM3-070 Boot DIP Switch

## **Boot DIP Switch**

The EPC/PPC-CM3-070 industrial Pi PC has one switch on the board marked as SW1, shown in the figure below. It has two positions USB and eMMC.

When switch is in the USB position, the Raspberry Pi will boot from the USB connector. You can use this function to download the OS software to the internal eMMC.

When switch is in the eMMC position, the Raspberry Pi will boot from internal eMMC.

There is no need to alter the DIP switch settings during regular operation. However, if you need to reinstall the OS, please refer to the detailed information on how to re-flash the OS from the Software Documentation.





Figure 1033: Boot DIP Switch

EPC/PPC-CM3-070 Mounting Procedure

## **Mounting Procedure**

The EPC/PPC-CM3-070 industrial Pi PC can be mounted with 4 x M4 screws, enabling simplified installation onto any standard mounting fixture.

#### CS10600RA070E

You can mount CS10600RA070E with the Embedded mounting method, as shown on the figure below.

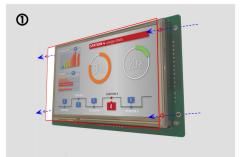






Figure 1034: Embedded mounting

#### CS10600RA070P

You can mount CS10600RA070P with the Vesa (75  $\times$  75mm) and Panel mounting methods, as shown on the figure below.

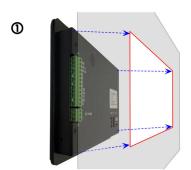






Figure 1035: Panel mounting



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.

EPC/PPC-CM3-070 Mechanical Specifications

## **Mechanical Specifications**

#### CS10600RA070E

The outer mechanical dimensions of CS10600RA070E are  $190 \times 107.8 \times 27.7$ mm (W x L x H). Please refer to the technical drawing in the figure below for details related to the specific product measurements.

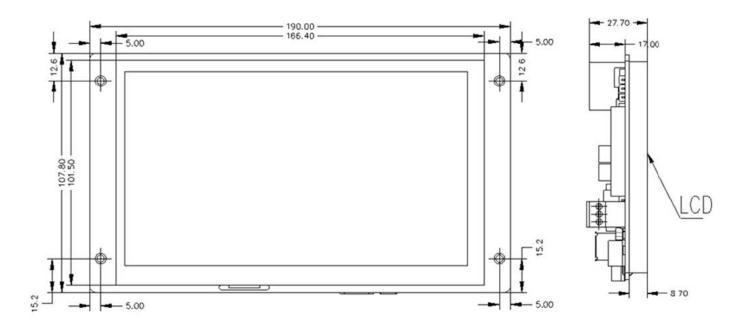


Figure 1036: CS10600RA070E Technical Drawing

#### CS10600RA070P

For CS10600RA070P, the outer mechanical dimensions are 206 x 135 x 30.1mm (W x L x H).

EPC/PPC-CM3-070 Disclaimer

## **Disclaimer**

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