

Industrial PC

# EPC/PPC-CM3-101



PN: CS12800RA101

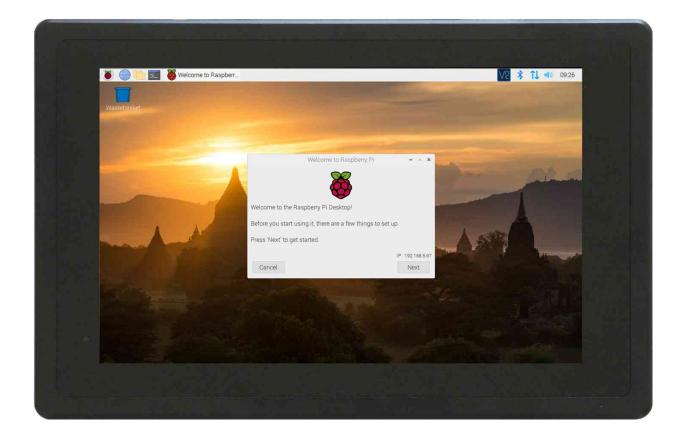
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# EPC/PPC-CM3-101

# Front View



# Rear View



# Front View (Embedded Variant)



# Rear View (Embedded Variant)



EPC/PPC-CM3-101 Product Overview

### **Product Overview**

The Cortex<sup>®</sup>-A53 Raspberry Pi<sup>®</sup> series EPC/PPC-CM3-101 (PN: CS12800RA101) is a high-quality industrial Pi PC. This single board computer features a 10.1" five-point capacitive a touch screen with a resolution of 1280 x 800 pixels and brightness of 500 cd/m<sup>2</sup> 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-CM3-101 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-CM3-101 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-CM3-101 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-CM3-101 Optional Features

### **Optional Features**

The EPC/PPC-CM3-101 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-CM3-101 Specifications

# **Specifications**

The EPC/PPC-CM3-101 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-CM3-101		
СРИ	Raspberry Pi <sup>®</sup> CM3, CM3 Lite; Raspberry Pi® CM3+, CM3+ Lite; 1.2GHZ	
Storage	2 TF Cards slots2	
RAM	1GB DDR	
еММС	8GB	
Display	10.1" IPS LCD, 1280 x 800 resolution px, brightness 500 cd/m <sup>2</sup>	
Touch	5-point capacitive touch	
USB	3 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	4 x RS232 (1 debug port)	
RS485	2 x RS485 (Optional 4 x RS485 at most)	
CAN	1 x CAN1	
GPIO	8 Channels, 4 Input, 4 Output	
WiFi/BT	Onboard WiFi/BT	
нрмі	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	7W Typical	
Working Temperature	From -20°C to +70°C	
OS	Debian	

EPC/PPC-CM3-101 Power Input

EPC/PPC-CM3-101		
	CS12800RA101E: 245 x 155 x 11mm	
Dimensions	CS12800RA101P: 280 x 185 x 27.5mm	
	CS12800RA101E: 600g	
Weight	CS12800RA101P: 1500g	

Table 415 Key Features

- 1 The CAN channel may be customized to to 2 CAN channels on request.
- 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.

### **Power Input**

The EPC/PPC-CM3-101 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 CS12800RA101P version, as well as on the board itself of the CS12800RA101E version, as shown in the figures below.

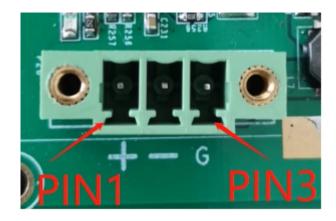




Figure 1037: Power Input (embedded/enclosed version)

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.

EPC/PPC-CM3-101 Power Input

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 416 Power Connector



The system ground " ${\bf G}$ " is connected to power negative "-" on board. The central pin is positive.

EPC/PPC-CM3-101 Touch Screen

### **Touch Screen**

The EPC/PPC-CM3-101 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**.

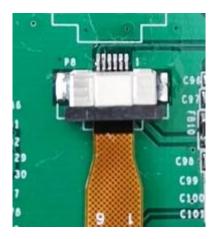


Figure 1038: Capacitive Touch Connector



#### **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-CM3-101 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 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-CM3-101 Connectivity

# **Connectivity**

There are many connectivity options available on the EPC/PPC-CM3-101 industrial Pi PC. It has 3 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 5 x UART terminals (RS232/RS485).

### 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.

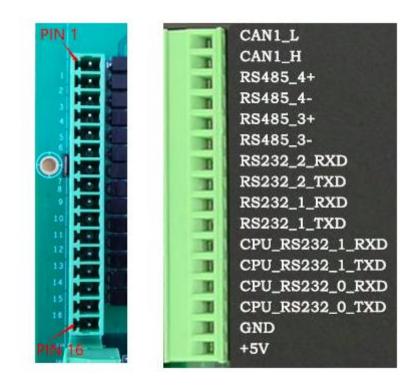


Figure 1039: Relation between serial pins on embedded vs. enclosed version of the EPC/PPC-CM3-101 Industrial PC

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

RS232 / RS485 / CAN Pin Definition:		
Pin Number	Definition	Description
Pin 1	CAN1_L	USB CAN Channel 1L signal
Pin 2	CAN1_H	USB CAN Channel 1H signal
Pin 3	RS485_4+	USB UART4, RS485 +(A) signal
Pin 4	RS485_4-	USB UART4, RS485 -(B) signal
Pin 5	RS485_3+	USB UART3, RS485 +(A) signal
Pin 6	RS485_3-	USB UART3, RS485 -(B) signal

EPC/PPC-CM3-101 RS232/RS485/CAN

RS232 / RS485 / CAN Pin Definition:		
Pin 7	RS232_2_RXD	USB UART2, RS232 RXD signal
Pin 8	RS232_2_TXD	USB UART2, RS232 TXD signal
Pin 9	RS232_1_RXD	USB UART1, RS232 RXD signal
Pin 10	RS232_1_TXD	USB UART1, RS232 TXD signal
Pin 11	CPU_RS232_1_RXD	CPU UART1, CPU RS232 RXD signal
Pin 12	CPU_RS232_1_TXD	CPU UART1, CPU RS232 TXD signal
Pin 13	CPU_RS232_0_RXD	CPU UART0, CPU RS232 RXD signal
Pin 14	CPU_RS232_0_TXD	CPU UARTO, CPU RS232 TXD signal
Pin 15	GND	System Ground
Pin 16	+5V	System +5V Power Output, No more than 1A Current output

Table 417 Connectivity Section

EPC/PPC-CM3-101 GPIO Port

#### **GPIO Port**

The EPC/PPC-CM3-101 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.

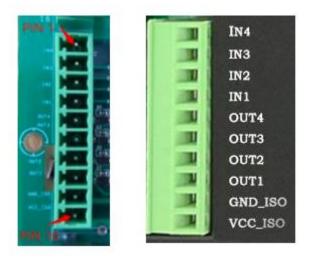


Figure 1040: GPIO Connector



Isolated GPIO reduced schematic

EPC/PPC-CM3-101 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 418 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-CM3-101 USB Connectors

#### **USB Connectors**

There are 3 x Type A **USB HOST connectors** onboard, as shown on the figure below.



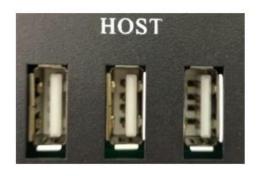


Figure 1041: USB HOST Connectors (embedded/enclosed PC version)

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 1042: 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-CM3-101 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.

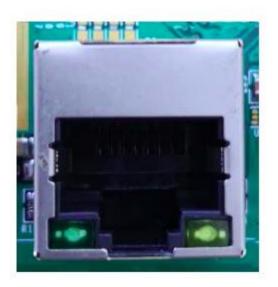




Figure 1043: RJ45 LAN Connectors (embedded/enclosed PC version)



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

EPC/PPC-CM3-101 WiFi & BT Module

#### WiFi & BT Module

The EPC/PPC-CM3-101 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 1044: RTL8273 WiFi/BT Module

The enclosed (CS12800RA101P) variant of the product also includes an SMA connector for an external WiFi/BT antenna, as illustrated in the figure below.



Figure 1045: WiFi+BT Antenna

EPC/PPC-CM3-101 3G/4G/LTE Module

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

The EPC/PPC-CM3-101 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-CM3-101.



Figure 1046: 3G/4G Module





Figure 1047: SIM Card Holder and 3G/4G Antenna Connector



#### **Attention**

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

EPC/PPC-CM3-101 TF Card Slot

## **TF Card Slot**

The EPC/PPC-CM3-101 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 1048: TF (micro SD) Card Slot



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

EPC/PPC-CM3-101 Audio Connectors

## **Audio Connectors**

The EPC/PPC-CM3-101 industrial Pi PC features some audio peripherals. It has 1 x **3.5mm audio output jack**.

Also, the EPC/PPC-CM3-101 industrial Pi PC has a miniature 2W internal speaker for audio reproduction, as well as a small buzzer for alarm/notification sounds.

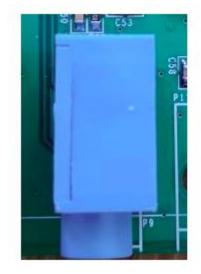




Figure 1049: Audio Connector (embedded/enclosed PC version)

EPC/PPC-CM3-101 Boot DIP Switch

### **Boot DIP Switch**

The EPC/PPC-CM3-101 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 1050: Boot DIP Switch

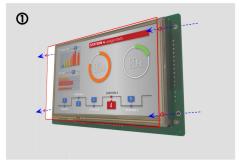
EPC/PPC-CM3-101 Mounting Procedure

# **Mounting Procedure**

The EPC/PPC-CM3-101 industrial Pi PC can be mounted with 4 x M4 screws, enabling simplified installation onto any standard mounting fixture.

#### CS12800RA101E

You can mount CS12800RA101E with the Embedded mounting method, as shown on the figure below.



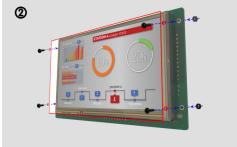




Figure 1051: Embedded mounting

#### CS12800RA101P

You can mount CS12800RA101P with the Vesa (75 x 75mm) and Panel mounting methods, as shown on the figure below.

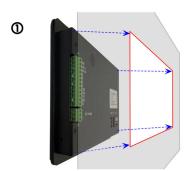






Figure 1052: Panel mounting



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-CM3-101 Mechanical Specifications

# **Mechanical Specifications**

#### CS12800RA101E

The outer mechanical dimensions of CS12800RA101E are  $245 \times 155 \times 11$ mm (W x L x H). Please refer to the technical drawing in the figure below for details related to the specific product measurements.

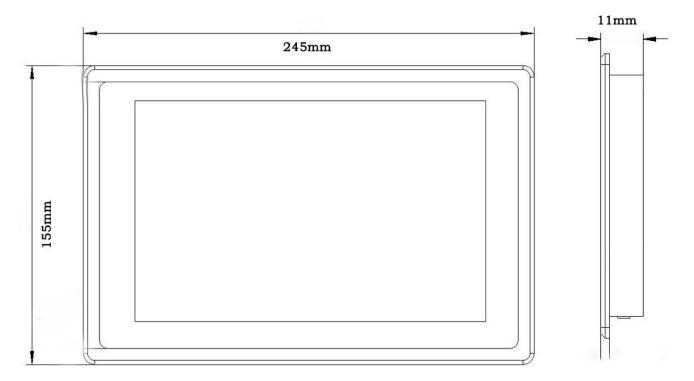


Figure 1053: CS12800RA101E Technical Drawing

#### CS12800RA101P

For CS12800RA101P, the outer mechanical dimensions are  $280 \times 185 \times 27.5 \text{mm}$  (W x L x H). Please refer to the technical drawing in the figure below for details related to the specific product measurements.

EPC/PPC-CM3-101 CS12800RA101P



Figure 1054: CS12800RA101P Technical Drawing

EPC/PPC-CM3-101 Disclaimer

### **Disclaimer**

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