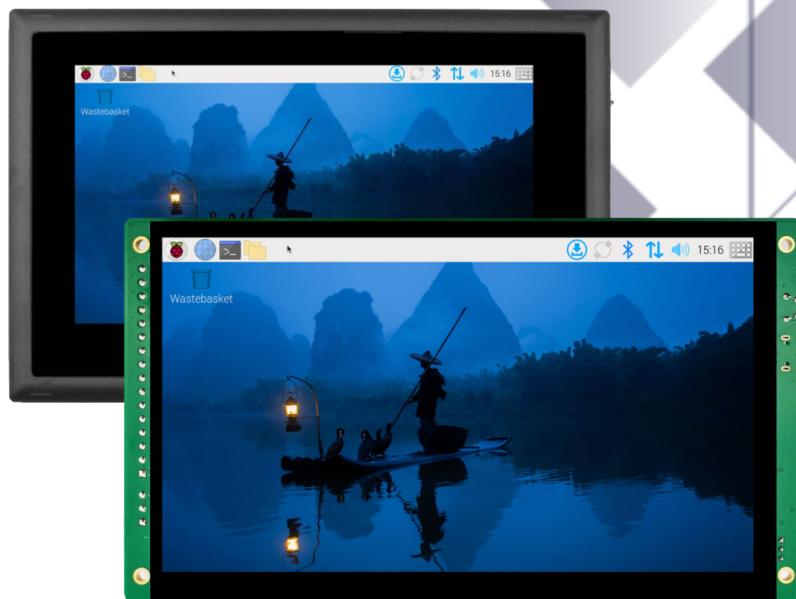




Industrial PC

# EPC/PPC-CM5-070



PN: CS10600RA5070

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# Contents

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EPC/PPC-CM5-070	4
1. Product Overview	8
2. Ordering Options	9
2.1. Pi® CM5 Module	9
2.2. Operating System	9
2.3. Optional Features	10
3. Specifications	11
4. Power Input	13
5. Touch Screen	15
6. Connectivity	17
6.1. RS232/RS485/CAN	17
6.2. GPIO Port	20
6.3. USB Connectors	22
6.4. LAN	24
6.5. WiFi & BT Module	25
6.6. 3G/4G/LTE Module	26
6.7. M.2 Module	27
6.8. Camera Connector	28
7. TF Card Slot	30
8. Audio Connectors	31
9. HDMI Connector	32
10. PROG Button	33
11. Cooling	34
12. Mounting Procedure	35
12.1. CS10600RA5070P	35
12.2. CS10600RA5070E	36
13. Mechanical Specifications	37
13.1. CS10600RA5070P	37
13.2. CS10600RA5070E	37
14. Disclaimer	39



# EPC/PPC-CM5-070

## Front View



## Rear View



# Side View 1



## Rear View (Embedded Variant)



## Product Overview

The Cortex®-A76 Raspberry Pi® series EPC/PPC-CM5-070 (PN: CS10600RA5070) is a high-quality industrial Pi PC. This single board computer features a 7" five-point capacitive touch screen with a resolution of 1024 x 600 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 as a device housed in a casing with bezels, thus facilitating different installation options:

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

The EPC/PPC-CM5-070 industrial Pi PC is based around the powerful Raspberry Pi® Compute Module 5, powered by the Quad Cortex®-A76 processor with a processor speed of 2.4GHz.

# 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.



## Note

You can order [PPC-CM5-070](#) from the official [Chipsee Store](#) or from your nearest distributor.

## Pi® CM5 Module

The Pi® Compute Module 5 appears in different versions (different RAM size: 2GB, 4GB, or 8GB SDRAM based on CM5 and different eMMC size: 0GB, 16GB, 32GB, or 64GB based on CM5).

The EPC/PPC-CM5-070 industrial Pi PC does not include the CM5 Raspberry Pi® module by default.

If you would like to purchase it with a CM5, you can select it at the Chipsee store during the ordering process.

## Operating System

This product comes with a pre-installed Raspberry Pi OS ([Software Documentation](#)). 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.

## Optional Features

The EPC/PPC-CM5-070 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.

The product has an **optional** PCIe Gen 2 × 1 (5Gbps), M.2 M-Key 2230/2242 socket (PCIe 3.0 is possible but experimental for CM5), you can use it with your NVMe SSD or other modules that can fit in the slot and supports the protocol. By default the NVMe SSD is not mounted; by default M.2 slot is not mounted. Please contact us when placing an order if you need the M.2 slot.

### 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.

# Specifications

The EPC/PPC-CM5-070 industrial Pi 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.

EPC/PPC-CM5-070	
<b>CPU</b>	Raspberry Pi® CM5/CM5Lite; BCM2712 Quad(4) Core Cortex-A76 at 2.4GHz
<b>RAM</b>	2GB, 4GB, or 8GB SDRAM based on CM5
<b>eMMC</b>	0GB, 16GB, 32GB, or 64GB based on CM5
<b>Display</b>	7" IPS LCD, 1024 x 600 px, brightness 500 cd/m <sup>2</sup>
<b>Touch</b>	5-point capacitive touch with 1mm Armored Glass
<b>Storage</b>	Support for 1 x TF Card <sup>1</sup>
<b>PCIe</b>	PCIe Gen 2 × 1 (5Gbps), M.2 M-Key 2230/2242 socket ( <b>optional</b> )
<b>USB</b>	2 x USB 3.0 type-A Host, 1 x USB type-C OTG
<b>LAN</b>	1 x Giga LAN
<b>Audio</b>	3.5mm Audio Out Connector, 2W Speaker Internal
<b>Buzzer</b>	Onboard Buzzer, driven by GPIO
<b>RTC</b>	High accuracy RTC with farad capacitor, can work 1 week after power off
<b>RS232</b>	Default to 2 x RS232, up to 4 x RS232
<b>RS485</b>	Default to 2 x RS485 <sup>2</sup> , these 2 x RS485 can be configured as 2 x RS232
<b>CAN</b>	1 x CAN FD BUS, Arbitration Bit Rate up to 1Mbps, Data Bit Rate up to 8Mbps
<b>GPIO</b>	8 Channels, 4 Input, 4 Output
<b>I2C</b>	Not Supported
<b>WiFi/BT</b>	Optional (Depends on CM5) <sup>3</sup>
<b>ZIGBEE</b>	No
<b>HDMI</b>	1 x HDMI 2.0 out, can be driven up to 4K 60FPS
<b>3G/4G/LTE</b>	Supported, not mounted by default
<b>Camera</b>	Yes, not mounted by default. Available on the board in the embedded PC.
<b>Power Input</b>	9V to 30V
<b>Current</b>	950mA max at 12V, 500mA typical at 12V
<b>Power Consumption</b>	11.4W max, 6W typical
<b>Working Temperature</b>	From -10°C to +60°C
<b>OS</b>	Raspberry Pi OS

EPC/PPC-CM5-070	
<b>Dimensions</b>	CS10600RA5070E: 190 × 107.8 × 27.7 mm; CS10600RA5070P: 206 × 135 × 30mm
<b>Weight</b>	CS10600RA5070E: 400g; CS10600RA5070P: 700g
<b>Mounting Method</b>	CS10600RA5070E: Embedded; CS10600RA5070P: Panel, VESA

Table 322 Key Features

- 1 TF card slot, **only** used with CM5 Lite to boot system, **cannot** be used as external storage for CM5
- 2 The RS485 circuit controls the Input and Output direction automatically, there's no need to control it from within the software.
- 3 The default product without the CM5 does not include a Wi-Fi/BT module. You can include a CM5 that has the Wi-Fi/BT module at the Chipsee store during the ordering process.

## Power Input

The EPC/PPC-CM5-070 industrial Pi PC can be powered by a wide range of input voltages: 9V to 30V 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**. As shown in the figure below.



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

Table 323 Power Connector

### Note

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

For a proper 2.1mm x 5.5mm x 9.5mm DC power connector, refer to the figure below:



## Touch Screen

The EPC/PPC-CM5-070 industrial Pi PC uses a 5-point capacitive touch with 1mm Armored Glass screen. However, the Raspberry Pi OS supports only One-Point touch.

The figure below shows the capacitive touch screen connected to the motherboard via the FPC 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 EPC/PPC-CM5-070 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 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 EPC/PPC-CM5-070 industrial Pi PC. It has 2 x USB 3.0 type-A Host, 1 x USB type-C OTG, 1 x Giga LAN (RJ45) Ethernet connector supporting up to 1 Gbps, and 4 x UART and 1 x CAN FD terminals (RS232/RS485/CAN).

## RS232/RS485/CAN

The serial communication interfaces (RS485, RS232, and CAN) are routed to a 16-pin 3.81mm terminal, as illustrated in the figure below.



*RS232-RS485-CAN on the EPC/PPC-CM5-070 Industrial PC*

RS232 / RS485 / CAN Pin Definition:			
Pin Number	Definition	Description	OS Node
Pin 16	CAN_H	CPU SPI0, CAN BUS "H" signal	CANO
Pin 15	CAN_L	CPU SPI0, CAN BUS "L" signal	
Pin 14	RS485_5-	CPU UART5, RS485 -(B) signal	/dev/ttyAMA4
Pin 13	RS485_5+	CPU UART5, RS485 +(A) signal	
Pin 12	RS232_5_RXD	CPU UART5, RS232 RXD signal	/dev/ttyAMA4
Pin 11	RS232_5_TXD	CPU UART5, RS232 TXD signal	
Pin 10	RS485_3-	CPU UART3, RS485 -(B) signal	/dev/ttyAMA2
Pin 9	RS485_3+	CPU UART3, RS485 +(A) signal	
Pin 8	RS232_3_RXD	CPU UART3, RS232 RXD signal	/dev/ttyAMA2
Pin 7	RS232_3_TXD	CPU UART3, RS232 TXD signal	

<b>RS232 / RS485 / CAN Pin Definition:</b>			
Pin 6	RS232_2_RXD	CPU UART2, RS232 RXD signal	/dev/ ttyAMA1
Pin 5	RS232_2_TXD	CPU UART2, RS232 TXD signal	
Pin 4	RS232_0_RXD	CPU UART0, RS232 RXD signal, Debug Port	/dev/ ttyAMA0
Pin 3	RS232_0_TXD	CPU UART0, RS232 TXD signal, Debug Port	
Pin 2	GND	System Ground	
Pin 1	+5V	System +5V Power Output, No more than 1A Current output	

Table 324 RS232 / RS485 / CAN Pin Definition for 7 inch/Box products

 **Attention**

1. RS485\_3 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 RS485 is **NOT** mounted by default.
3. The 120Ω match resistor for CAN is **NOT** mounted by default. Be sure to mount the match resistor when testing CAN.
4. RS485\_3 and RS232\_3 share UART3 and can't work at the same time; RS485\_5 and RS232\_5 share UART5 and can't work at the same time. Meaning the product provides 4 x RS232 + 0 x RS485, or 2 x RS232 + 2 x RS485, or 3 x RS232 + 1 x RS485.

## GPIO Port

The EPC/PPC-CM5-070 industrial Pi 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.

### 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 achieve 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 ISO\_InputX and GND\_ISO. A 2.4KΩ resistor, as R6, 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.



Isolated GPIO reduced schematic



GPIO Connector

GPIO Connector Pin Definition:		
Pin Number	Definition	Description
Pin 10	VDD_ISO	Isolated Power +5V ~ +24V Input
Pin 9	GND_ISO	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 325 GPIO Connector Pin-out

## USB Connectors

There are 2 x USB 3.0 type-A Host, 1 x USB type-C OTG onboard, as shown in the figure below.



*USB HOST Connectors*

### ⚠ Attention

These two USB host connectors can drive 500mA for each channel at most.

The product has one USB Type-C 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 CM5 module.



*USB Type-C OTG Connector*

**⚠ Warning**

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

## LAN

The 1 x Giga LAN provides Ethernet connectivity over standardized Ethernet cables as shown in the figure below. The integrated Ethernet interface supports up to 1 Gbps data throughput. These Giga LAN signals come from the CM5 module directly.



*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 default EPC/PPC-CM5-070 without the CM5 does not include a Wi-Fi/BT module.

If you include a CM5 that has the Wi-Fi/BT module, the product will have Wi-Fi/BT feature.

The product also has an SMA connector for an external WiFi/BT antenna:



*WiFi+BT Antenna*

### ⚠ Attention

The product does not come shipped with the Wi-Fi/BT module by default.

## 3G/4G/LTE Module

The EPC/PPC-CM5-070 industrial Pi PC is equipped with a **mini-PCIe connector** that can connect to a 3G/4G/LTE module. The customer will also need a SIM Card Holder and a 3G/4G/LTE antenna to ensure 3G/4G/LTE works on the EPC/PPC-CM5-070. SIM card does **NOT** support hot plug. **Power off** before inserting or removing SIM card.



*SIM Card Direction*



*3G/4G/LTE Module*

### ⚠ Attention

The product does not come shipped with the 3G/4G/LTE module by default. If you need to use 3G/4G/LTE, you can contact us when placing an order, we can install the necessary hardware for you.

## M.2 Module

The EPC/PPC-CM5-070 industrial Pi PC has a an **optional** M.2 slot, it supports NVME m.2 SSD or other m.2 modules such as an AI compute module. It's PCIe Gen 2 × 1 (5Gbps), M.2 M-Key 2230/2242 socket. The modules are **not included** in the product **by default**. If you need the M.2 slot or M.2 devices please contact us before placing an order.



M.2 Connector

## Camera Connector

The EPC/PPC-CM5-070 industrial Pi PC has a 22 Pin **Camera Connector**. The camera signals come from CAM1. The table below gives details about the definition of every pin.



*Camera Connector*

Camera Connector Pin Definition:		
Pin Number	Definition	Description
Pin 1	GND	Power Ground
Pin 2	CAM1_DN0	CSI Negative Channel 0
Pin 3	CAM1_DP0	CSI Positive Channel 0
Pin 4	GND	Power Ground
Pin 5	CAM1_DN1	CSI Negative Channel 1
Pin 6	CAM1_DP1	CSI Positive Channel 1
Pin 7	GND	Power Ground
Pin 8	CAM1_CN	CSI Negative CLK
Pin 9	CAM1_CP	CSI Positive CLK
Pin 10	GND	Power Ground
Pin 11	CAM1_DN2	CSI Negative Channel 2
Pin 12	CAM1_DP2	CSI Positive Channel 2
Pin 13	GND	Power Ground
Pin 14	CAM1_DN3	CSI Negative Channel 3
Pin 15	CAM1_DP3	CSI Positive Channel 3
Pin 16	GND	Power Ground
Pin 17	CAM_GPIO0	CAM GPIO0, use for disable camera power and module
Pin 18	CAM_GPIO1	CAM GPIO1, use for disable camera power and module
Pin 19	GND	Power Ground
Pin 20	SCL0	CPU I2C SCL0 signal

Camera Connector Pin Definition:		
Pin 21	SDA0	CPU I2C SDA0 signal
Pin 22	+3.3V	System +3.3V Power Output, No more than 500mA Current output

Table 326 Camera Connector Pin-out

**⚠ Attention**

1. The camera connector is supported but not mounted by default. Please contact us when placing an order if you need to use camera on the EPC/PPC-CM5-070.

## TF Card Slot

The EPC/PPC-CM5-070 industrial Pi PC features 1 x **TF Card (micro SD) slot**. A slot can address up to 128GB of memory.



*TF (micro SD) Card Slot*

### **⚠ Attention**

1. The TF card cannot be used for memory extension. It is only used for system boot-up for CM5 LITE model.
2. The product does not come shipped with the TF card by default.

# Audio Connectors

The EPC/PPC-CM5-070 industrial Pi PC features some audio peripherals. It has 1 x **3.5mm audio output jack**.

Also, the EPC/PPC-CM5-070 industrial Pi PC has a miniature 2W internal speaker for audio reproduction, as well as a small buzzer for alarm/notification sounds.



**3.5mm Audio Jack**

*Audio Connector*

## ⚠ Attention

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

## HDMI Connector

The EPC/PPC-CM5-070 industrial Pi PC supports 1 x HDMI 2.0 out, can be driven up to 4K 60FPS.



*Micro HDMI Connector*

## PROG Button

The EPC/PPC-CM5-070 industrial Pi PC has one button for entering usb download mode, as shown in the figure below.

When booting **with** the button being pressed, the Raspberry Pi will boot from the USB connector. You can use this feature to download the OS software to the internal eMMC.

When booting **without pressing** the button, the Raspberry Pi will boot from the internal eMMC.

There is no need to press the button during regular operation. However, if you need to reinstall the OS, please refer to the detailed information on how to reflash the OS from the [Software Documentation](#).



*PROG Button*

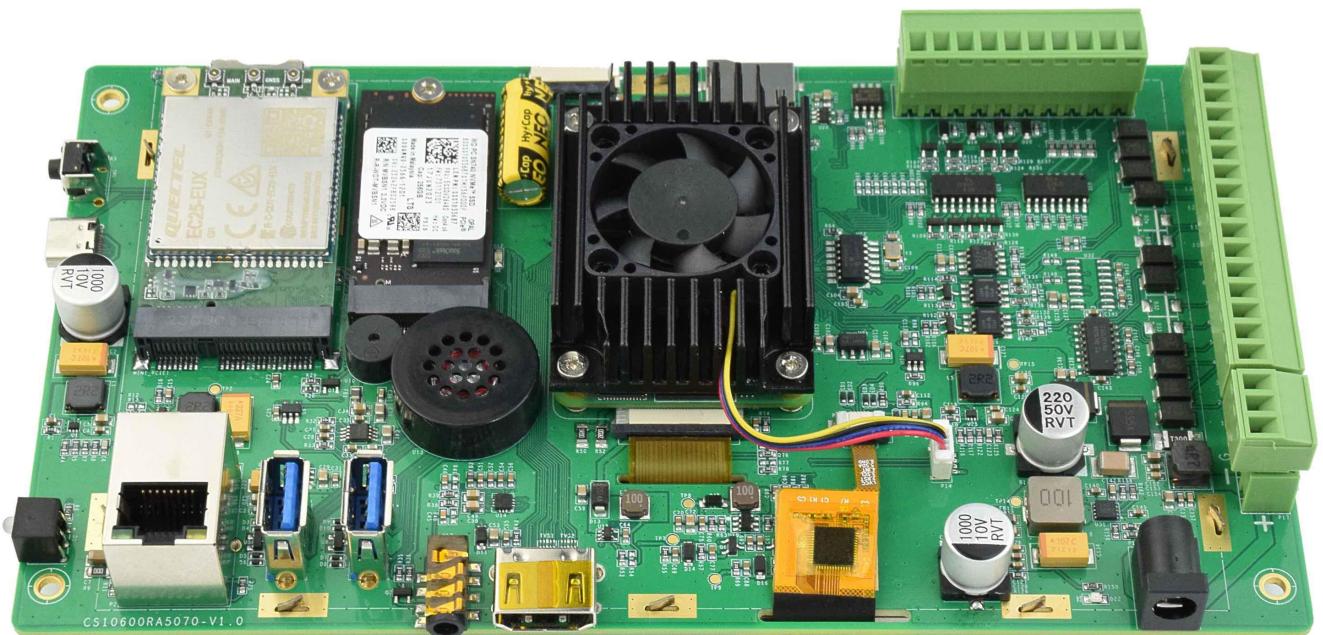
## Cooling

The enclosed version doesn't have fan inside, it takes advantage of the metal casing as a passive cooling medium.



*Passive Cooling with Metal Case*

The embedded PC version (without the metal casing) is active cooling with a small fan.



*Active Cooling with Fan*

## Mounting Procedure

The EPC/PPC-CM5-070 industrial Pi PC can be mounted with 4 x M4 screws, enabling simplified installation onto any standard mounting fixture.

### CS10600RA5070P

You can mount CS10600RA5070P with VESA mounting ([guide](#)): **75 x 75 mm**, 4 x **M4** (6mm) screws.

You can mount CS10600RA5070P with PANEL mounting ([guide](#)).



*Figure 887: Panel mounting*

## CS10600RA5070E

You can mount CS10600RA5070E with the Embedded mounting ([guide](#)) method, as shown in the figure below.



Figure 888: *Embedded mounting*

### ⚠ Attention

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](#).

# Mechanical Specifications

## CS10600RA5070P

For CS10600RA5070P, the outer mechanical dimensions are 206 x 135 x 30mm (W x L x H).



CS10600RA5070P Technical Drawing

## CS10600RA5070E

For CS10600RA5070E, the outer mechanical dimensions are 190 x 107.8 x 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.



CS10600RA5070E *Technical Drawing*

## Disclaimer

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