

Edgelogix-1145 User Manual

V1.0

Industrial Edge controller for IIoT



Edgelogix-1145 User Manual

Revision History

Revision	Date	Changes
1.0	21-05-2025	Initial

Explanation of symbols used

The following symbols are used in these instructions:



NOTE

NOTE indicates tips, recommendations and useful information on specific actions and facts.



NOTICE

NOTICE indicates a situation which may lead to property damage if not avoided.



CAUTION

CAUTION indicates a dangerous situation of risk

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1. Introduction

The EdgeLogix, modular, open-architecture edge controllers manage complex interfaces across assets and devices or into the cloud directly, with legacy and next generation industry control system. EdgeLogix 1140 series provide performance and scalability for a wide range of industrial applications, including motion control, networking, IO and IIoT in a compact model, as well as the advantages of traditional IEC-61131-3 programming with the flexibility of Linux.

The EdgeLogix provides logistics control, supervision, data logging, alarming, scheduling and network management. It streams data and rich graphical displays to a single controller via an Ethernet or other interfaces, or remotely over the internet. Industrial IoT (Internet of Things) as well as PLC and web services are integrated in a single controller, creating many benefits for the integration of industries with Comprehensive I/O for connecting a wide range of devices. This flexible design allows IT developers and OT programmers to seamlessly implement automation solutions.

This flexible device for ultra-reliable measurement and control of industry users the customized logic and control needed to meet application requirements. Industry-leading configurability and programmability fulfill standard to complex requirements while secure, built-in flow measurement calculations make it easier than ever to prove compliance. In addition, cloud-enabled functionality for licensing simplifies day-to-day operations. Digitally transform your operation by streamlining complex processes with the agile, intuitive EdgeLogix.

This new controller is also part of OpenEmbed's next-generation EdgeLogix Series measurement and control platform that offers a common set of configuration tools, to expedite setup and facilitate commonly performed tasks. End users and OEMs are inventing ways to collect data from machines and turning it into valuable information closer to the plant floor. This ability to make decisions at the machine level helps to enable our Connected Enterprise Level.

1.1 Features

- Rugged, reduced-maintenance hardware
- High isolation, surge, and short circuit protection
- Open architecture support custom programming
- Ethernet, I/O, 4G/LTE, and Modbus bridging
- Native support Modbus & Modbus/TCP Protocols
- Cloud Connectivity to IIoT Cloud Platforms
- IEC 61131-3 compliant programs support (under developing)
- Flexibility of local BUS extension
- Wide power supply from 9 to 36V DC

These features make the EdgeLogix designed as a cost-effective controller that provides the functions required for a variety of field automation applications. The EdgeLogix monitors, measures, and controls equipment in a remote environment. It is ideal for applications requiring flow computation; Proportional,

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Integral, and Derivative (PID) control loops; logic sequencing control; and a gateway with flexible wireless and field sensors expansion.

1.2 Interfaces summary

EdgeLogix product family consists of the CPU and each function module. These can be configured to fulfill different application requirements.

The EdgeLogix product family includes:

1. EdgeLogix 11xx series: Basic CPU module
2. L- series IO module: Right side extension modules .

The EdgeLogix CPU module s a fully functional Embedded controller without a fan and internal cable.

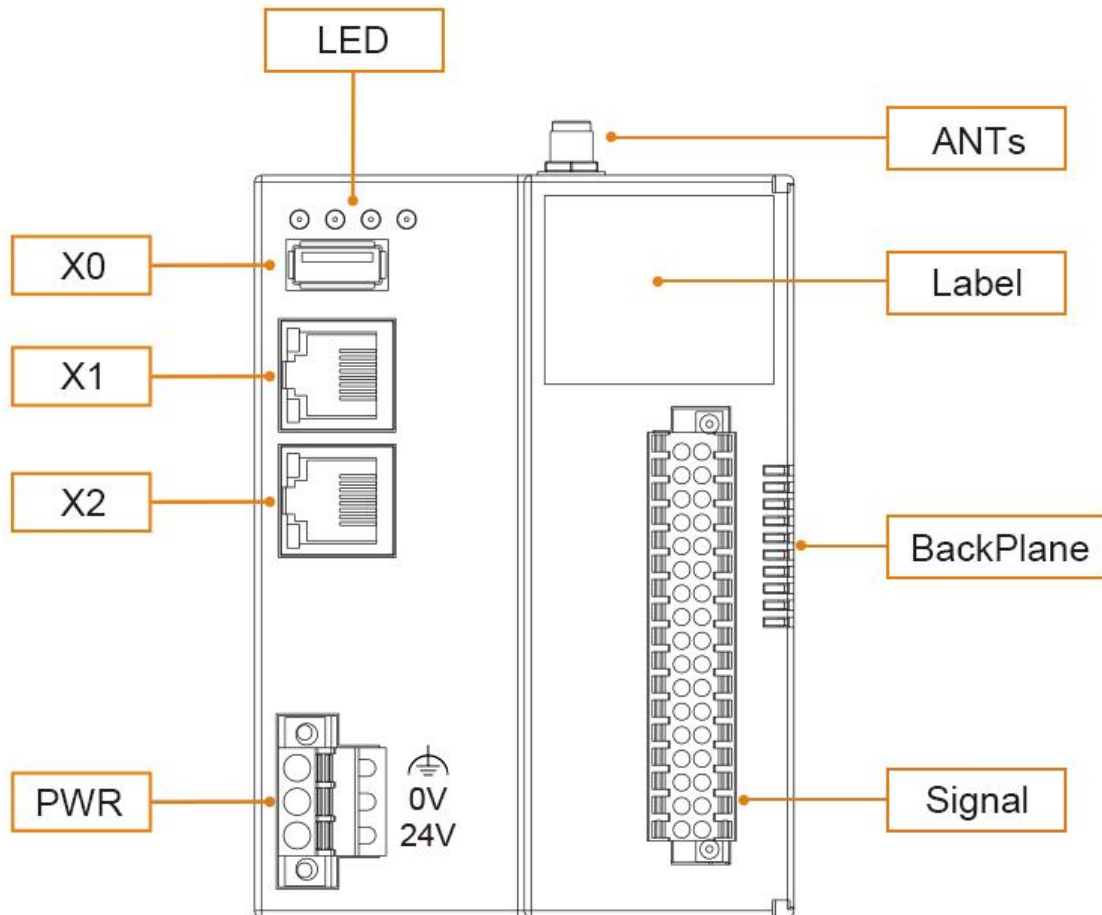
- 2 x independent GbE interfaces
- USB 3.0 interfaces
- HDMI display
- 3 x serial COM port (RS-232/RS-485/RS-422)

The EdgeLogix CPU module is equipped with a backplane function extension on the right hand side. It features the slice I/O extension. This can be distributed and centralized using the Openembed network topology. This extension supports various I/O functions, including digital input/output, voltage/current analog input and output, thermal couple, RTD, and counter/encoder.

The operating system is installed on a reliable industrial grade eMMC. The OS options available are Linux with a option of real-time capability and preinstalled in the factory before shipment.

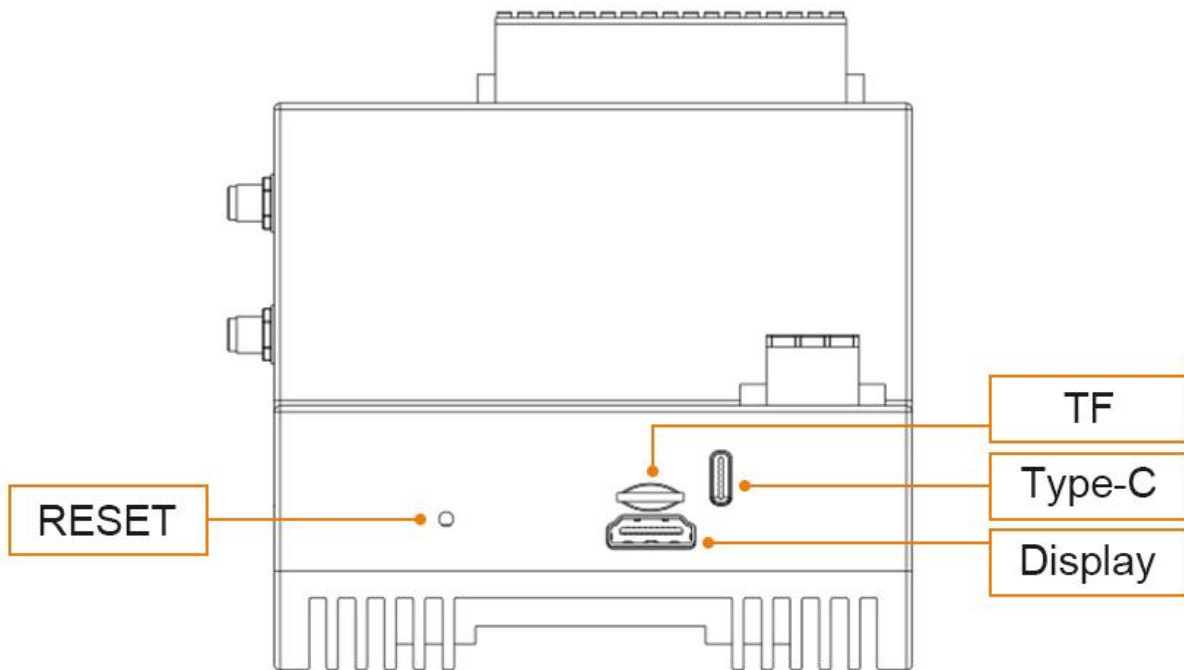
The 8MB FLASHROM (NVRAM, Non-Volatile) is an option on the EdgeLogix CPU module. It can be installed in the internal PCIe-mini card slot. In the event of a power failure, the data in the MRAM will be kept and available for used after a CPU restart.

1.2.1 Front view



- X0: USB 3.0 connector
X1: Gigabit Ethernet interface
X2: Gigabit Ethernet interface
PWR: 24V main power supplier
LED: LEDs of PWR,RUN,ERR and Wireless
ANTs: The 2 antennas for Wi-Fi or other wireless signal
Label: The main product label of EdgeLogix-1145
Backplane: The connector for external IO module
Signal: The connector of external signal board

1.2.2 Left view



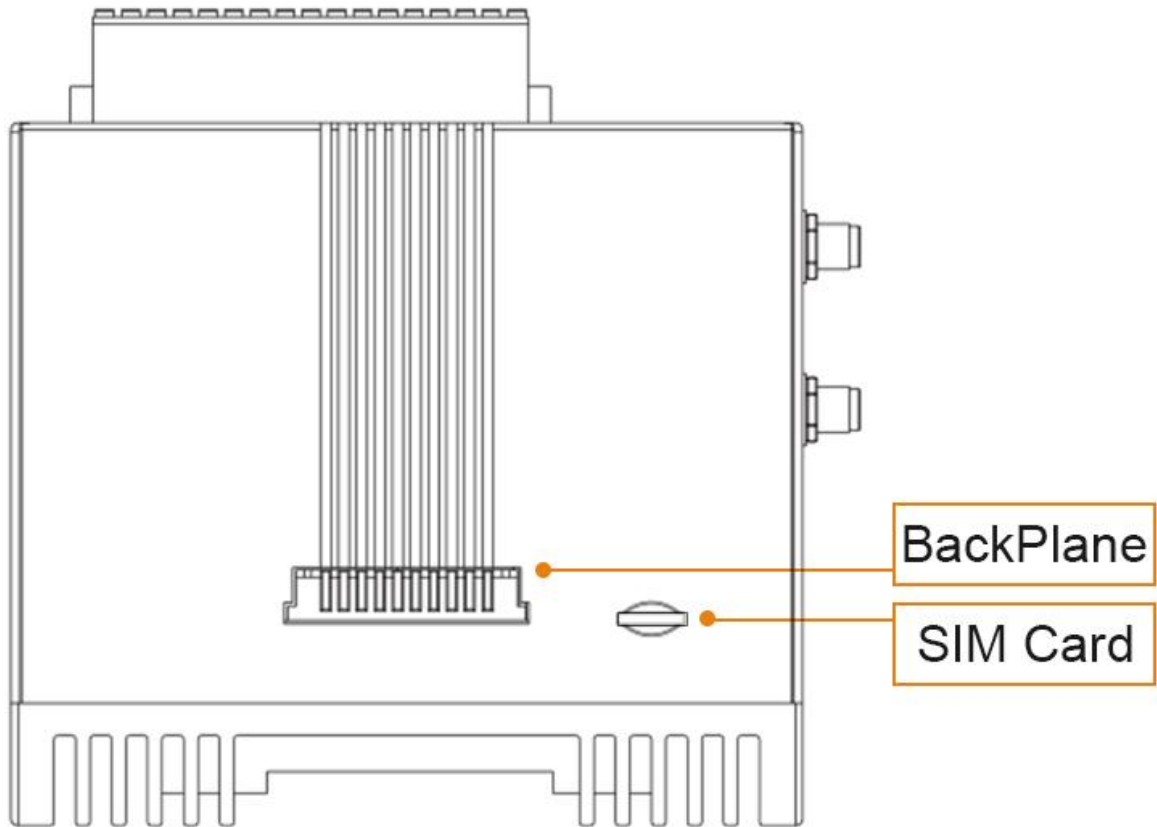
RESET: The GPIO reset button for user

TF : Optional TF card slot

Type-C : The Type-C USB connector for console

Display: HDMI port of display

1.2.3 Right view

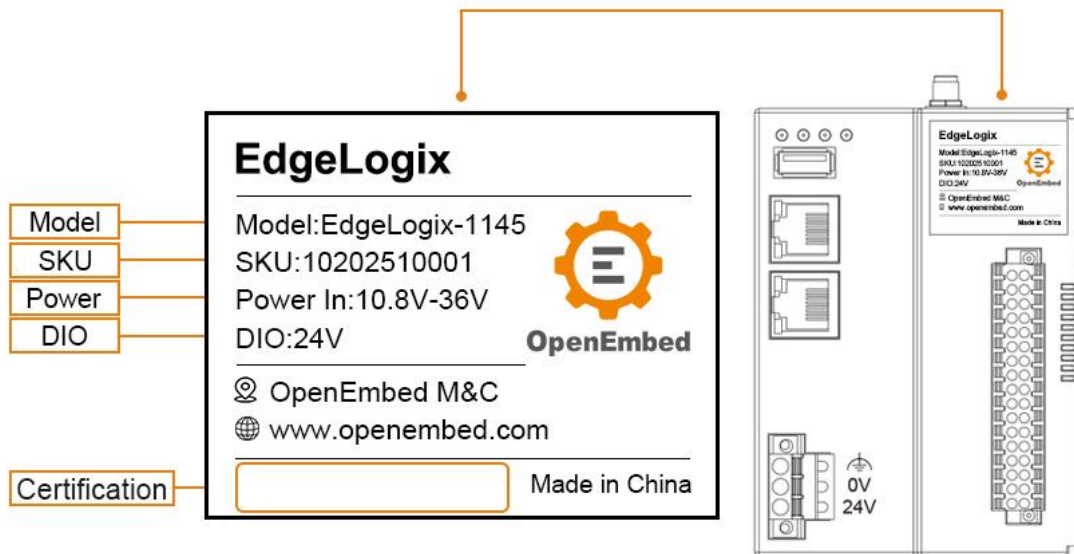


Backplane: The connector for external IO module

SIM Card: Optional NANO sim card slot for internal 4G/LTE module

1.3 Product label

The photo shows the position of product label.

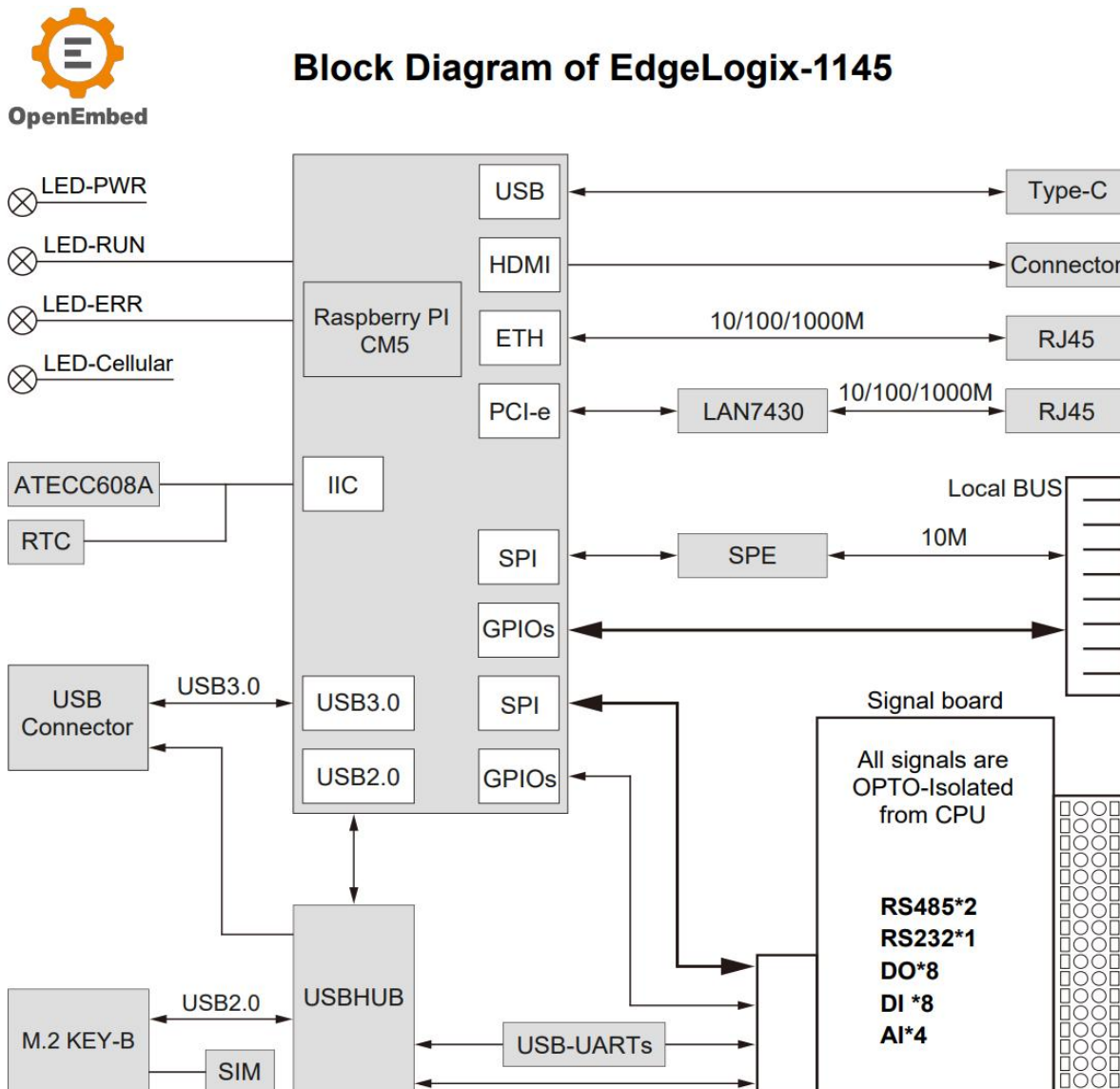


Notice:

1. The SKU includes serial number.
2. Certification maybe includes CE,FCC,or UKCA.
3. The normal operate power voltage is DC 24V .

1.4 Block Diagram

The processing core of the Edgelogix-1145 is a Raspberry CM5 board. An OpenEmbed specific base board implements the specific features. Refer to next figure for the block diagram.



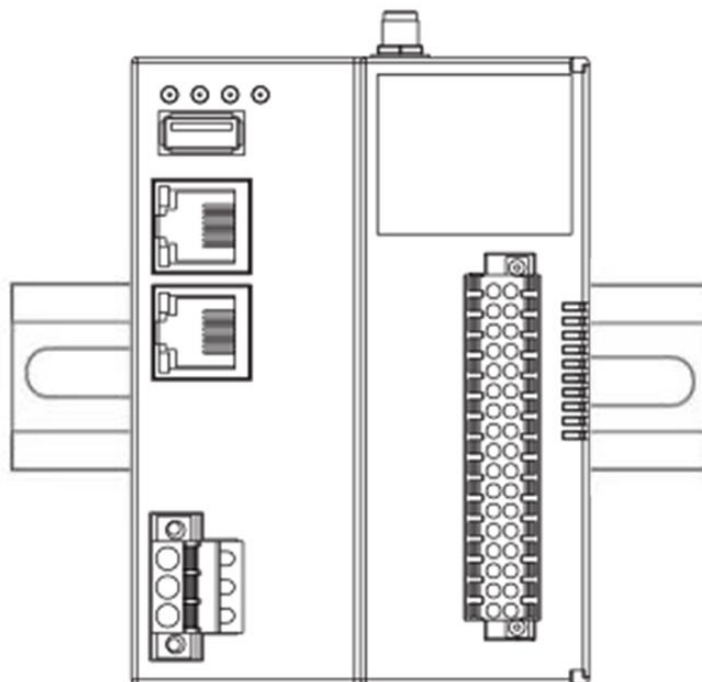
2. Installation and Wiring

2.1 Mounting and Assembling

The 35mm DIN-rail mount is the primary method. In normal cases, the 1145 is accompanied with some signal modules. They are assembled together with a 35 mm DIN-rail.



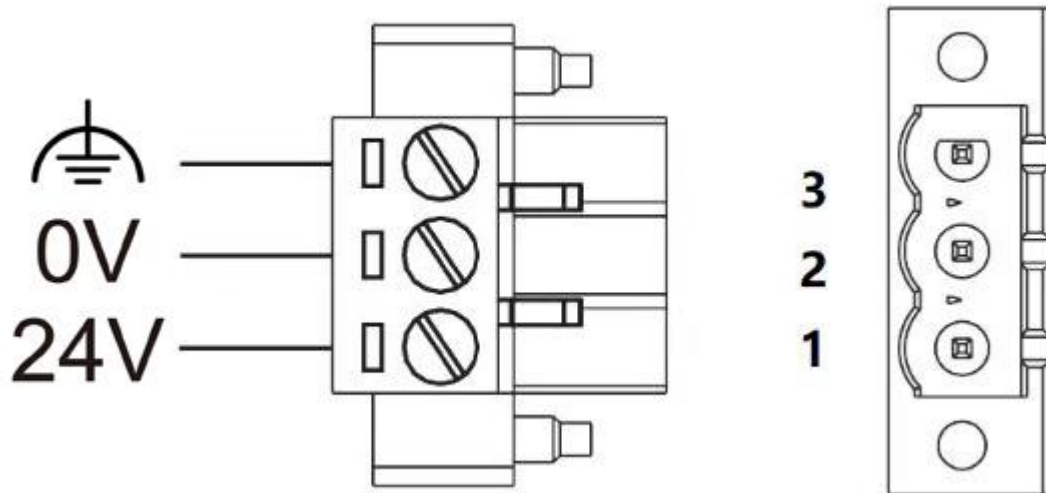
- The entire power supply must be disconnected and electrostatic discharge must take place on the housing or ground connection before removing any covers or components from the device and installing or removing any accessories, hardware or cables.
- Remove the power cable from the device.
- All covers and components, accessories, hardware and cables must be installed .



2.2 Connectors and Interfaces

2.2.1 Power supply

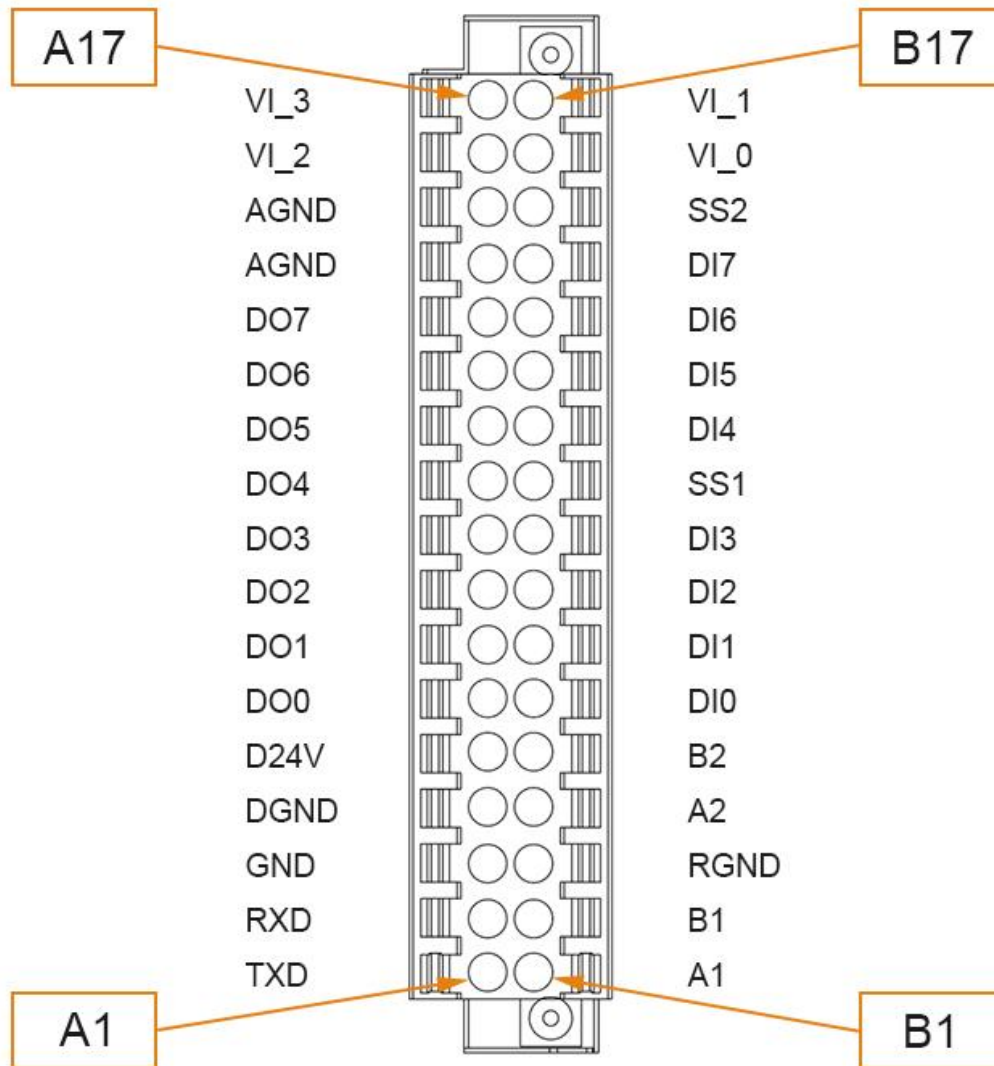
Connect the device to the voltage supply according to the following figure.



1. 24V, main power supply +
2. 0V , main power supply -
3. EARTH, connect to earth

2.2.2 Connector of signal board

The connector of signal board is a Multi-Func phoenix connector .



NOTE 1: 24awg to 16awg cable are suggested.

NOTE 2: All RS485 signals are isolated with other signals.

NOTE 3: All DO and DI signals are isolated.

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Pin#	Signal of terminal	PIN Level of active	PIN of GPIO	Function
A1	RS232_TXD			
A2	RS232_RXD			
A3	RS232_GND			
A4	DGND			Necessary and isolated from CPU
A5	D24V			Necessary and isolated from CPU
A6	DO0			
A7	DO1			
A8	DO2			
A9	DO3			
A10	DO4			
A11	DO5			
A12	DO6			
A13	DO7			
A14	AGND			The 4 channel of AI shared
A15	AGND			The 4 channel of AI shared
A16	VI_2			Analog input channel
A17	VI_3			Analog input channel

Pin#	Signal of terminal	PIN Level of active	PIN of GPIO	NOTE
B1	RS485_A1			The terminal 120 OHM resistor is installed before shipping.
B2	RS485_B1			
B3	RS485_GND			The 2 channel of RS485 shared
B4	RS485_A2			The terminal 120 OHM resistor is installed before shipping.
B5	RS485_B2			
B6	DI0			
B7	DI1			
B8	DI2			
B9	DI3			
B10	SS1			Common line for DI0 to DI3
B11	DI4			
B12	DI5			
B13	DI6			
B14	DI7			
B15	SS2			Common line for DI4 to DI7

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B16	VI_0			Analog input channel
B17	VI_1			Analog input channel

NOTE 1: The 4 AI channels are 0-10V input default, 4-20ma input optional.

Characteristics of Isolated RS485 Interface

- Can used as Modbus/RTU Master or Modbus/RTU Extension .
- Supported Function Codes: #01, #02, #03, #04, #05, #06, #07, #0F, #10 .
- Maximum 32 devices on bus (1 master and 31 extensions) .
- Built-in asymmetrical protection against transient voltages resulting from electro-static discharge (ESD), electrical fast transients (EFT), and lightning.
- Terminal resistor of 120 OHM has been installed default.

Characteristics of RS232 Interface

The RS-232 serial interface communication standard has been in use for many years. It is one of the most widely used connections for serial data transmitting because it is simple and reliable.

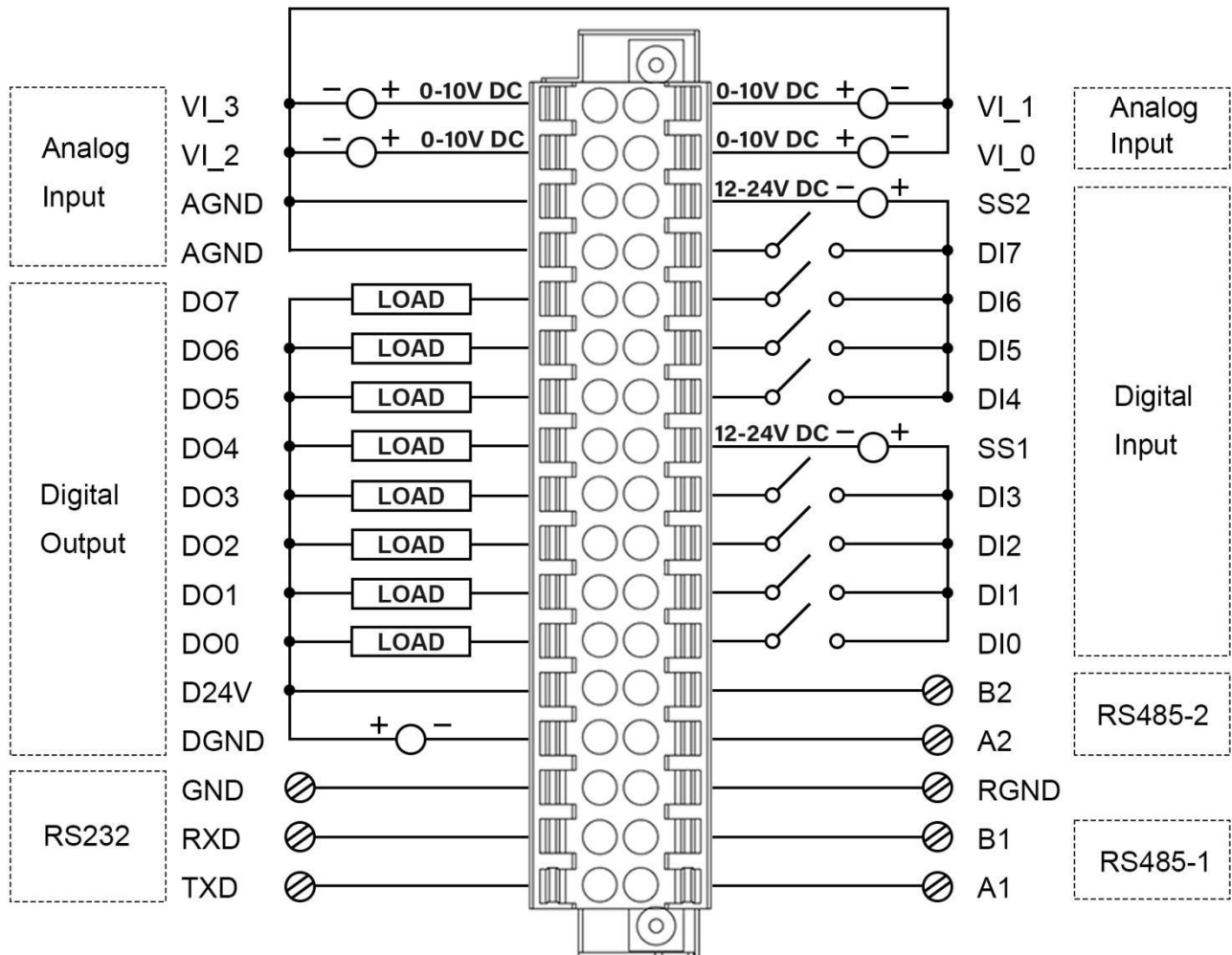
The RS232 serial interface standard still retains its popularity and remains in widespread use. It is still found on some computers and many interfaces, often being used for applications ranging from data acquisition to supply a serial data communications facility in general computing environments.

The interfaces intended to operate over distances of up to 15 meters.

Characteristics of I/O Interface

- DC voltage for input is 24V(+/- 10%).
- DC voltage for output should be under 60V ,the current capacity is 500ma.
- Channel 0-3 of input share the common line SS1
- Channel 4-7 of input share the common line SS2

2.2.3 Wires of signal board



2.2.4 Connectors of Backplane

The backplane port is used to connect signal modules. It contains the power supply for signal module, communicate lines as well as some handshake signals. The main functions include:

1. Detect the signal modules when system power up.
2. Verify the signal modules with software defined by user.
3. Allocate different address to every module on the back plane.
4. Read/write data from/to signal modules by CPU module.
5. The CPU module diagnostics system situation.
6. Measure the whole power consume of the whole back plane.

2.2.5 HDMI

The Raspberry PI CM5 features a native HDMI interface from Raspberry PI CM5, supporting up to 4K @ 60 fps video output

It is directly connected to the Raspberry PI CM5 board with TVS array. The default display in Edgelogix-1145 conforms to the HDMI standard.

2.2.6 Ethernet

There are 2 RJ45 Gigabit Ethernet on carrier board supported 10/100/1000M. X1 is the native Ethernet port, and the other one X2 is converted from PCIe. Twisted pair cable or shielded twisted pair cable can be used to connect to these ports.

2.2.6 USB HOST

There are one USB interfaces at the connector panel. The ports share the same electronic fuse.

NOTE: Max current for the port is limited to 800ma.

2.2.7 Console(USB TYPEC)

The design of console used a USB-UART converter, most OS of the computer have the driver, if not, the link below may be useful:

<http://www.wch-ic.com/products/CH9102.html>

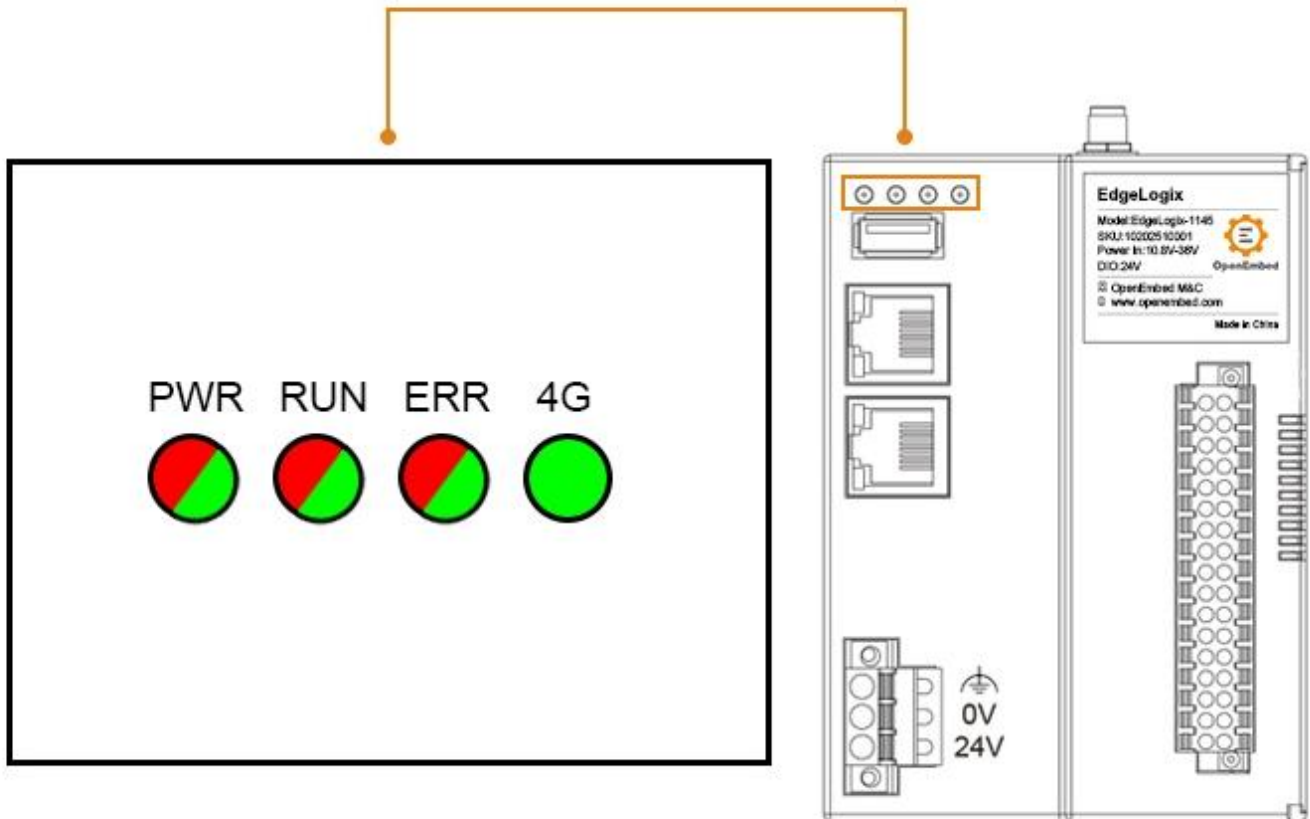
This port is used as a Linux console default. You can log into the OS use the settings of 115200, 8n1 (Bits: 8, Parity: None, Stop Bits: 1, Flow Control: None). A terminal program such as putty is needed, too.

The default user name is pi and password is raspberry.

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2.2.8 LED

Edgelogix-1145 use 4 individual green/red dual colour LED as outside indicators.



LED	GREEN	RED	Note
PWR	Power led	Direct connected to PIN 95 of CM5	
RUN	GPIO 4 of CM5		Low active
ERR	GPIO 5 of CM5	GPIO 13 of CM5	Low active
4G	ACTIVE of 4G or other wireless		

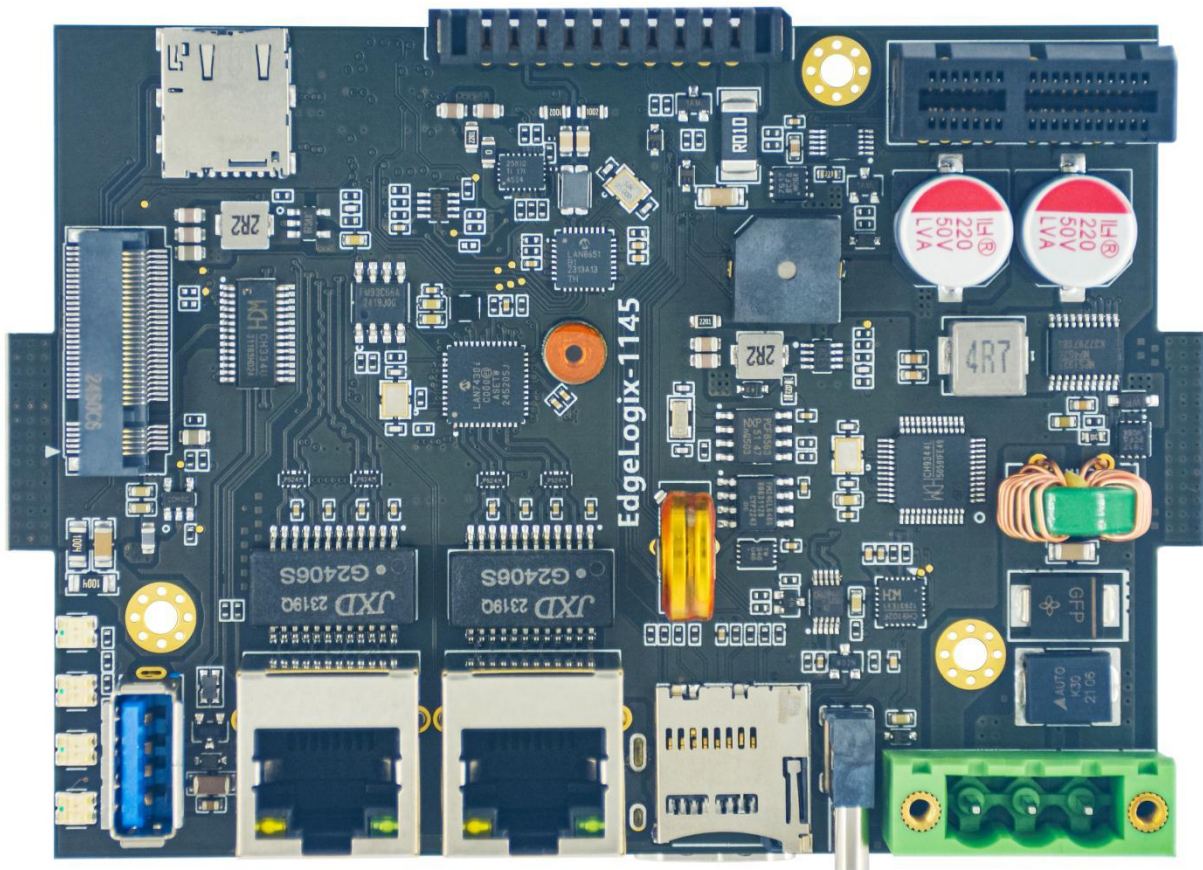
2.3 GPIO Multiplex

Overview of the GPIO usage from CM5, most of the GPIO have the fixed function as list.

Name	IO	Type	Function
	GPIO 0	Output	Handshake signal for Backplane
	GPIO 1	Input	Handshake signal for Backplane
I2C_SDA	GPIO 2		
I2C_SCL	GPIO 3		
DIO_LED	GPIO 4	Output low active	Green LED of LED2
DIO_LED	GPIO 5	Output, low active	Green LED of LED3
M2_RST	GPIO 6	Output, high active	M.2 card reset
USB_SWITCH	GPIO 7		
SPI0_CS0#	GPIO 8		SPI0
SPI0_MISO	GPIO 9		
SPI0_MOSI	GPIO 10		
SPI0_SCK	GPIO 11		
BUS_PWR	GPIO 12	Output, High active	Open the power supply for Backplane
ERR_LED	GPIO 13	LOW active	RED LED of LED3
Uart0_tx for debug	GPIO 14		NOT used
Uart0_rx for debug	GPIO 15		
BEEP	GPIO 16	Output high active	
GPIO_D0	GPIO 17		Gpio to signal board
SPI1_CS0#	GPIO 18		SPI1
SPI1_MISO	GPIO 19		
SPI1_MOSI	GPIO 20		
SPI1_SCK	GPIO 21		
GPIO_BT0	GPIO 22	Input, low active	Button for user in left of the Enclosure, mostly used for software system reset
GPIO_D2	GPIO 23	High active	Gpio to signal board
GPIO_D3	GPIO 24	High active	Gpio to signal board
WDT_DO	GPIO 25		Gpio for watch dog timer
SPI0_INT#	GPIO 26	Input	#INT signal for SPI0
GPIO_D1	GPIO 27		Gpio to signal board

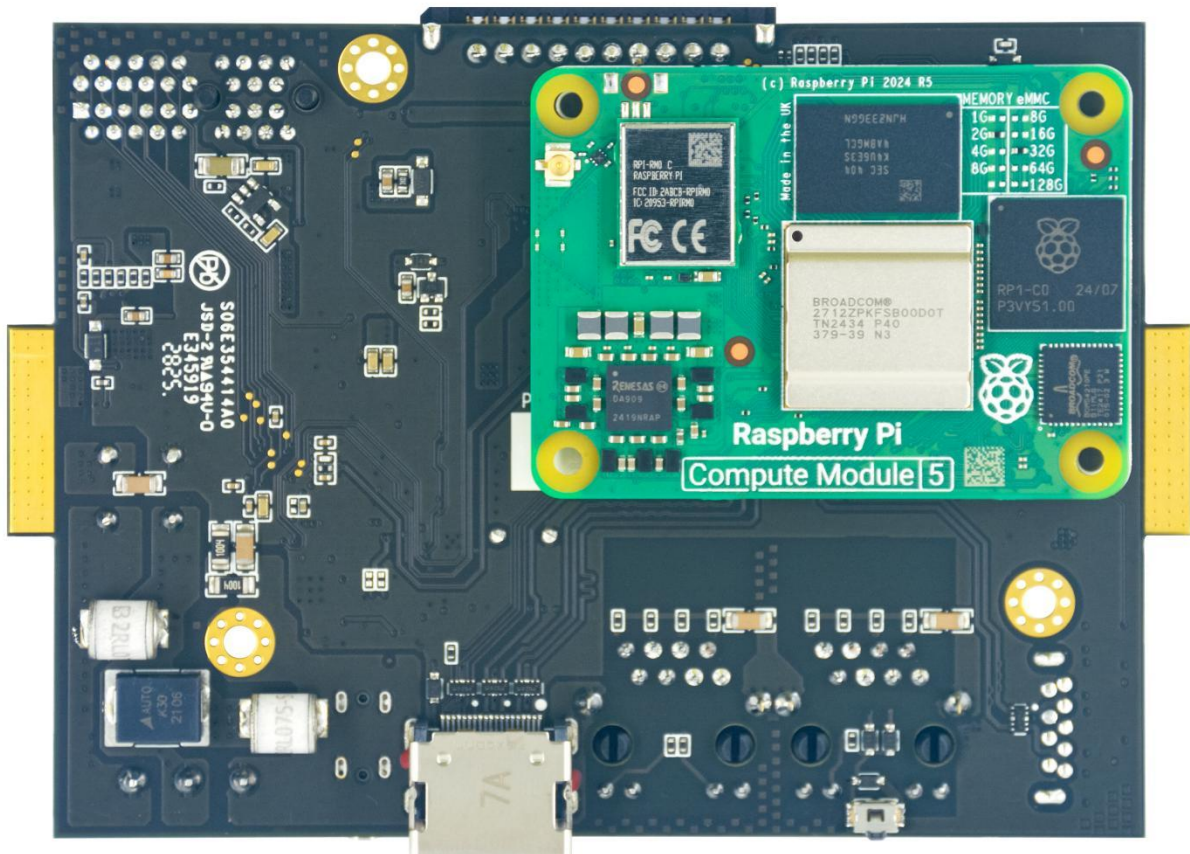
2.4 Main board

The Main board spans the inner width of the device and has outward-facing ports on frond and up sides. It is mounted to the heat sink with three M3x6 pan head screws.



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TOP of the Main PCB board



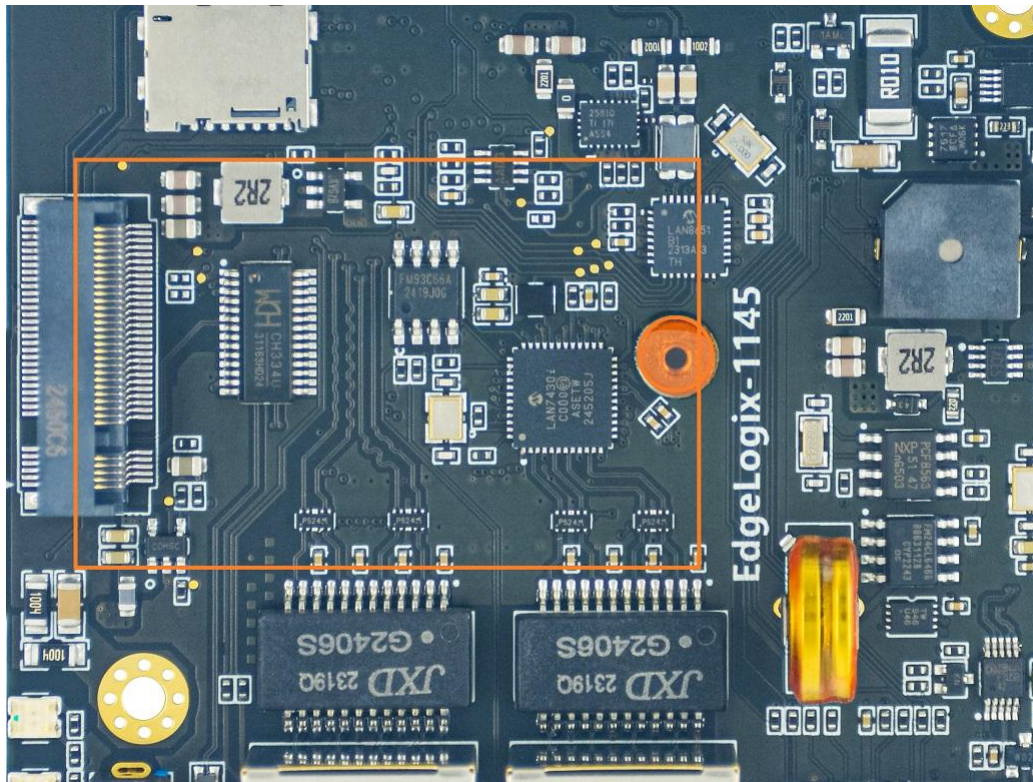
Bottom of the Main PCB board

2.4.1 M.2 socket

EdgeLogix-1145 itself has a KEY-B cad slot, one for 4G/LTE with SIM cad support and the other has SPI signals.

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The orange area is the rough add-on card position, only one M2x5 screw is needed.



The table below show all the signals.

Signals of M.2 slot:

Signal	PIN#	PIN#	Signal
	1	2	PWR
GND	3	4	PWR
GND	5	6	
USB_DP	7	8	
USB_DM	9	10	LED#
GND	11	12	
	21	22	
	23	24	
	25	26	GND
GND	27	28	
	29	30	USIM_RESET
	31	32	USIM_CLK
GND	33	34	USIM_DATA

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	35	36	USIM_PWR
	37	38	
GND	39	40	GND
	41	42	
	43	44	
GND	45	46	
	47	48	
	49	50	GND
GND	51	52	
	53	54	
	55	56	
GND	57	58	
	59	60	
	61	62	UART_PCIE_TXD
	63	64	UART_PCIE_TXD
	65	66	
PERST#	67	68	
	69	70	PWR
GND	71	72	PWR
GND	73	74	PWR
	75		

NOTE 1: All blank signals are NC(no connect).

NOTE 2: PWR is the individual power supply for the card .

NOTE 3:LED signal is connected to 4G internally.

3. Drivers and Programming

TBD

3.9 Update the system image



All the data in the CM5 will be flushed after this instructions!

✓ Step 1: Prepare the USB boot drive

1. On your x86 host PC using Win32DiskImager:
 - Insert the USB drive
 - Select the prepared `.img`` file
 - Write the image to the USB driver

✓ Step 2: Boot Raspberry Pi from USB

1. Make sure the Raspberry Pi EEPROM supports USB boot (use Raspberry Pi Imager to update if needed)
2. Copy your target ``mysystem.img`` to the USB driver
- 3 . Insert the USB and power on the Raspberry Pi
 - System will boot from USB, login via SSH if needed

✓ Step 3: Upload `.img`` file to Pi

1. Connect via SSH or UART to the running Pi
2. Upload the target ``mysystem.img`` file using ``scp``:

```
bash
scp mysystem.img pi@<raspberrypi-ip>:/home/pi/
```

✓ Step 4: Flash image to eMMC

1. Use ``lsblk`` to confirm eMMC path, typically ``/dev/mmcblk0``
2. Flash using ``dd``:

```
bash
sudo dd if=/home/pi/`.img` of=/dev/mmcblk0 bs=4M status=progress conv=fsync
```

✓ Step 5: Reboot from eMMC

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1. After flashing, shutdown the Pi: ``sudo poweroff``
2. Remove the USB drive and power on again → Pi boots from eMMC

✔ Step 6: Verify eMMC boot

1. After booting, check with:

```
``bash
lsblk
df -h /
cat /proc/cmdline
``
```

2. Confirm root is ``/dev/mmcblk0p2``

NOTES:

- Ensure the ``.img`` includes both boot and root partitions
- Add empty ``.ssh`` file to ``/boot`` to enable SSH
- Test ``.img`` by USB or SD boot before flashing to eMMC
- Use ``raspi-config`` for locale, hostname, network config after boot

4.Electrical specifications

4.1 Power consumption

The power consumption of the EdgeLogix-1145 strongly depends on the application, the mode of operation and the peripheral devices connected. The given values have to be seen as approximate values. The following table shows power consumption parameters of the EdgeLogix-1145

Note: On condition of power supply 24V, no add-on card in sockets and no USB devices.

Mode of operation	Current(ma)	Power	Remark
Idle	300		
Stress test	480		stress -c 4 -t 10m -v &

5.Mechanical

5.1 Dimensions

5.2 Disassemble and components

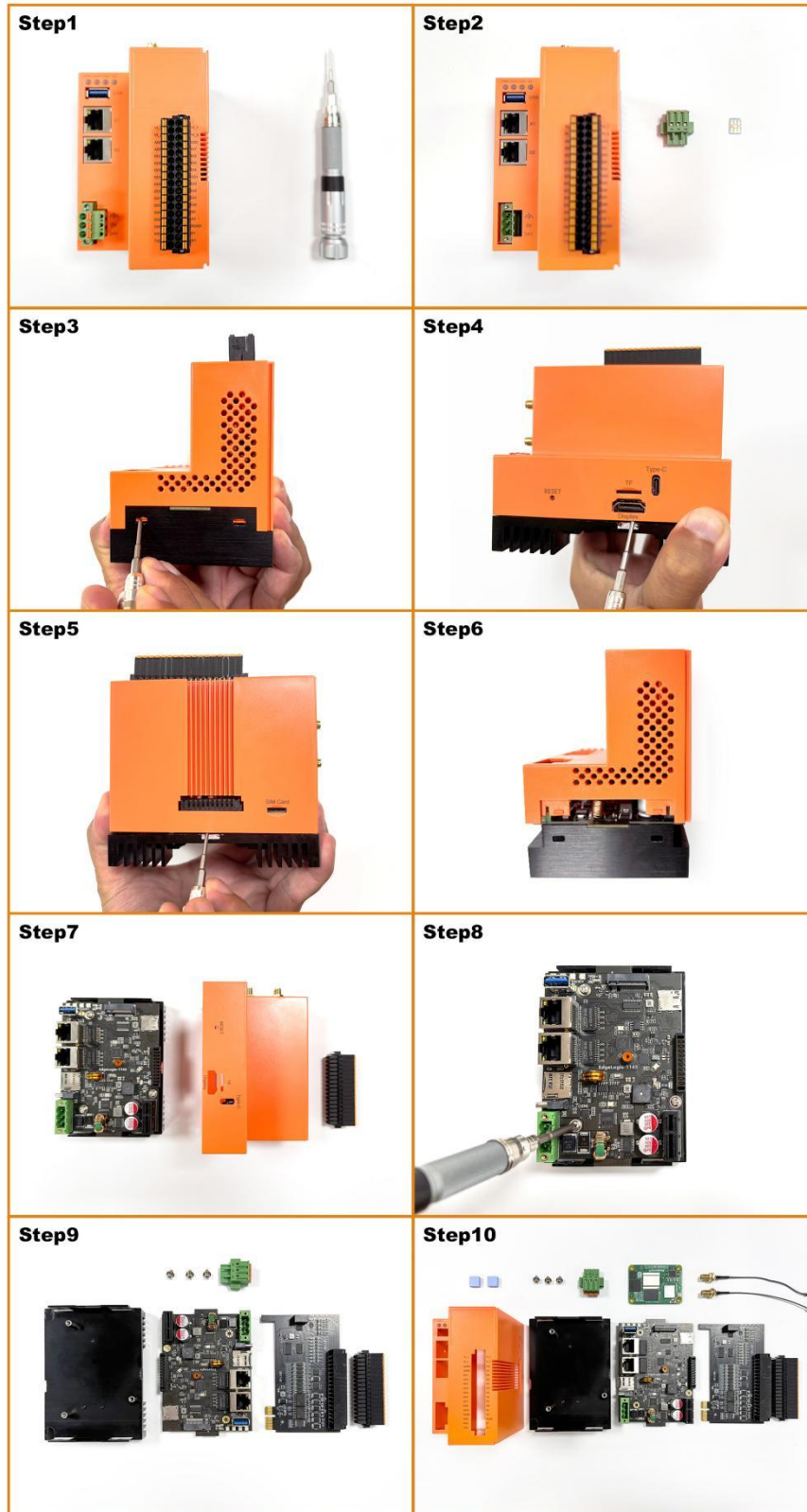
In this chapter, you will learn how to disassemble the housing parts from a EdgeLogix-1145. The installation steps contain important information and are described below and are illustrated with pictures.

If you have purchased a EdgeLogix-1145 and no need to install a M.2 card, you can skip this chapter because all the components have already been pre-installed before shipping.

5.2.1 Steps to disassemble the EdgeLogix-1145

Follow these steps to disassemble the EdgeLogix-1145.

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NOTE 1: In step2,remove the POWER connector and NANO sim card before all the steps.

NOTE 2: There are 3 screws to remove.

NOTE 3: This the full family of the components.

