

BPC-iMX8MP-05 Industrial Computer User Guide

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Complied by: Polyhex Technology Company Limited (<http://www.polyhex.net/>)

BPC-iMX8MP-05 Industrial Computer is a ruggedized and protected computer. It is composed of a DEBIX SOM A (core board), a DEBIX SOM A I/O board (carrier board), two custom Interface Board and a steel and aluminum enclosure. It combines various types of harsh environment resistance features, including ruggedness, dustproof, anti-vibration, shock resistance, wide temperature, portability and other indicators.



Figure 1

REVISION HISTORY		
Rev.	Date	Description
1.0	2023.04.06	First edition

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1. Applicable objects

This product applies to all personnel who come into contact with BPC-iMX8MP-05 device, including but not limited to developers, maintenance technician, installation, repair, etc.



All users must read and fully understand contents of the manual.

2. Security

2.1. Safety Precaution

This document inform how to make each cable connection. In most cases, you will simply need to connect a standard cable.

Table 1 Terms and conventions

Symbol	Meaning
<p>Warning!</p> 	Always disconnect the power cord from the chassis whenever there is no workload required on it. Do not connect the power cable while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electricians should open the chassis.
<p>Caution!</p> 	Always ground yourself to remove any static electric charge before touching <i>BPC-iMX8MP-05</i> product. Modern electronic devices are very sensitive to electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.

2.2. Safety Instruction

To avoid malfunction or damage to this product please observe the following:

1. Disconnect the device from the DC power supply before cleaning. Use a damp cloth. Do not use liquid detergents or spray-on detergents.

2. Keep the device away from moisture.
3. During installation, set the device down on a reliable surface. Drops and bumps will lead to damage.
4. Before connecting the power supply, ensure that the voltage is in the required range, and the way of wiring is correct.
5. Carefully put the power cable in place to avoid stepping on it.
6. If the device is not used for a long time, power it off to avoid damage caused by sudden overvoltage.
7. Do not pour liquid into the venting holes of the enclosure, as this could cause fire or electric shock.
8. For safety reasons, the device can only be disassembled by professional personnel.
9. If one of the following situations occur, get the equipment checked by service personnel:
 - The terminal block is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well, or you cannot get it to work according to the user's manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.
10. Do not place the device in a place where the ambient temperature is below -20°C (-4°F) or above 70°C (158°F). This will damage the machine. It needs to be kept in an environment at controlled temperature.

DISCLAIMER: Polyhex disclaims all responsibility for the accuracy of any statement of this instructional document.

2.3. Technical Support

If you have any questions about the device, please go to DEBIX community for a more efficient service.

Discord Community (recommended): <https://discord.com/invite/adaHHaDkH2>

Website: <https://debix.io>

Email: info@polyhex.net

3. Introduction

3.1. Overview

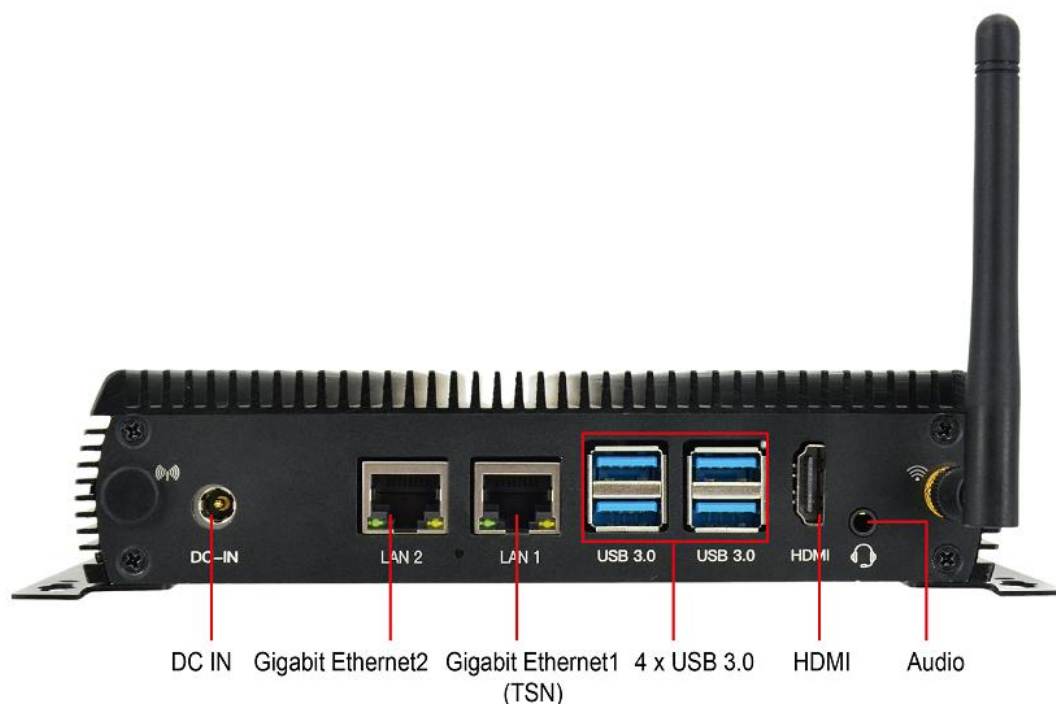


Figure 2 Interface above enclosure

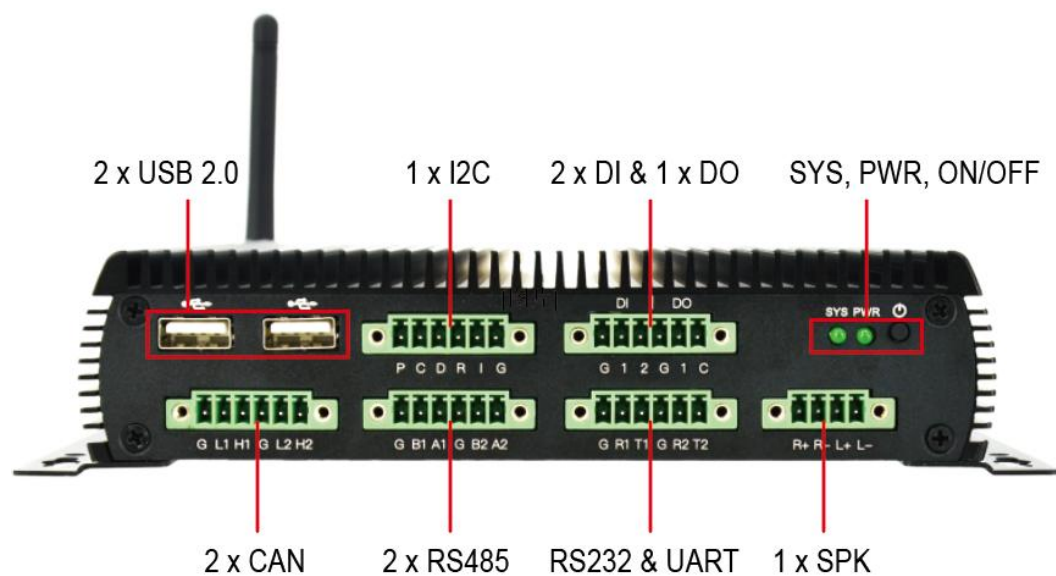


Figure 3 Interface under enclosure

BPC-iMX8MP-05 uses DEBIX SOM A, DEBIX SOM A I/O Board and custom Interface Board

as the main board, which supports dual Gigabit Ethernet, WiFi, Bluetooth and other functions, with dustproof, shock resistant, vibration resistant, etc. The data specifications are as follows:

Table 2 BPC-iMX8MP-05 specification

System	
Motherboard	DEBIX SOM A + I/O Board + 2 x custom Interface Board
Model	BPC-iMX8MP-05
Memory	2GB LPDDR4 (1GB/4GB/8GB optional)
Storage	Onboard 16GB eMMC (8GB/32GB/64GB/128GB/256GB optional)
OS	Ubuntu 20.04, Yocto-L5.10.72_2.2.0, Android 12.1
Boot Mode	1) Support eMMC boot (default) 2) Support Micro SD card boot 3) Support SPI Nor Flash boot (reserved)
Communication	
Gigabit Network	2 x Independent MAC RJ45 Gigabit Ethernet ports, both support POE power supply (need POE power device module)
Wi-Fi & Bluetooth	2.4GHz & 5GHz dual-band Wi-Fi, Bluetooth 5.0, external Wi-Fi SMA antenna interface
Video & Audio	
HDMI	1 x HDMI output, connector is Type A HDMI female
Audio	1) 1 x headphone output and microphone input combo interface, the connector is a 3.5mm socket 2) 1 x 4Pin/3.5mm L&R Speaker
I/O Interface	
DC Block	1 x DC socket, supports 5.5mm x 2.1mm plug
USB	1) 4 x USB 3.0 Host, the connector is double layer Type-A interface 2) 2 x USB 2.0 Host, the connector is Type-A interface
Serial Ports	1) 1 x I2C, 3.3V power supply

	2) 2 x physically isolated CAN 3) 2 x physically isolated RS485 4) 1 x physically isolated RS232, 1 x without physical isolation UART TTL 3.3V The connectors are 6pin/3.5mm Phoenix terminals
GPIO	1) 2 x physically isolated DI, supporting wet and dry nodes 2) 1 x physically isolated DO, support wet nodes, compatible with external relay dry nodes
LED & Key	1) 1 x SYS 2) 1 x PWR 3) 1 x ON/OFF key
Power Supply	
Power Input	Default DC 12V/2A power input, support DC 12V~36V wide voltage input
Temperature	
Operating Temp.	-20 °C to 70 °C
Mechanical & Environmental	
Enclosure Material	Steel and aluminum alloy
Dimension (W x D x H)	124mm x 169.42mm x 38.9mm
Weight	830g
Heat Dissipation	No fan, heat dissipation through the enclosure

3.2. Interface

3.2.1. Power Interface

There is one power connector (DC socket), with default DC 12V/2A power input. As shown in the figure below.

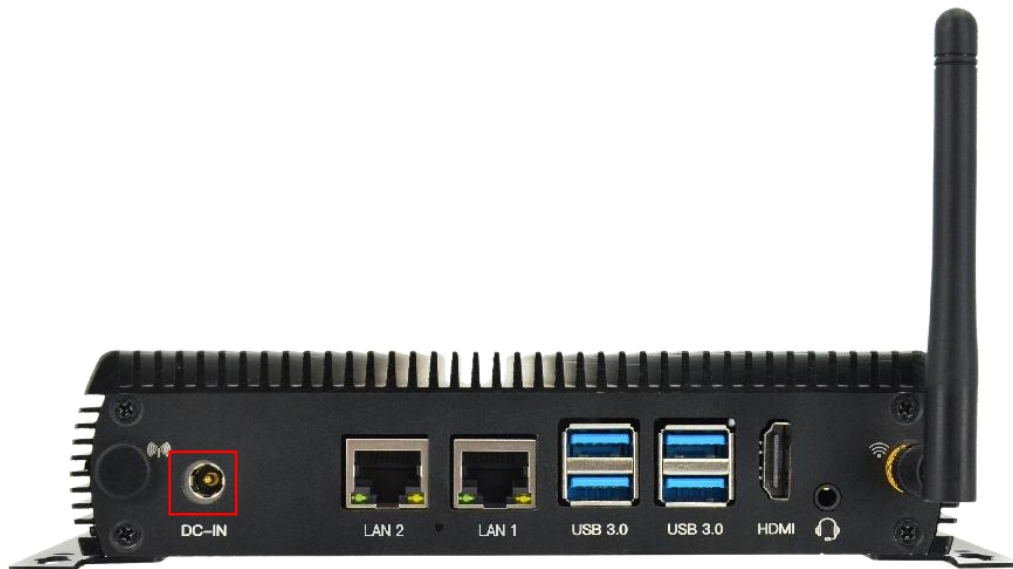


Figure 4 DC IN Interface

3.2.2. Ethernet Interface

Two independent MAC RJ45 Gigabit Ethernet ports (Network port 1: LAN1, Network port 2: LAN2), connect device to the network through the network cable of RJ45 connector; and a set of status indicators below the interface, one is Link, connection indicator, and the other is Active, signal transmission indicator.

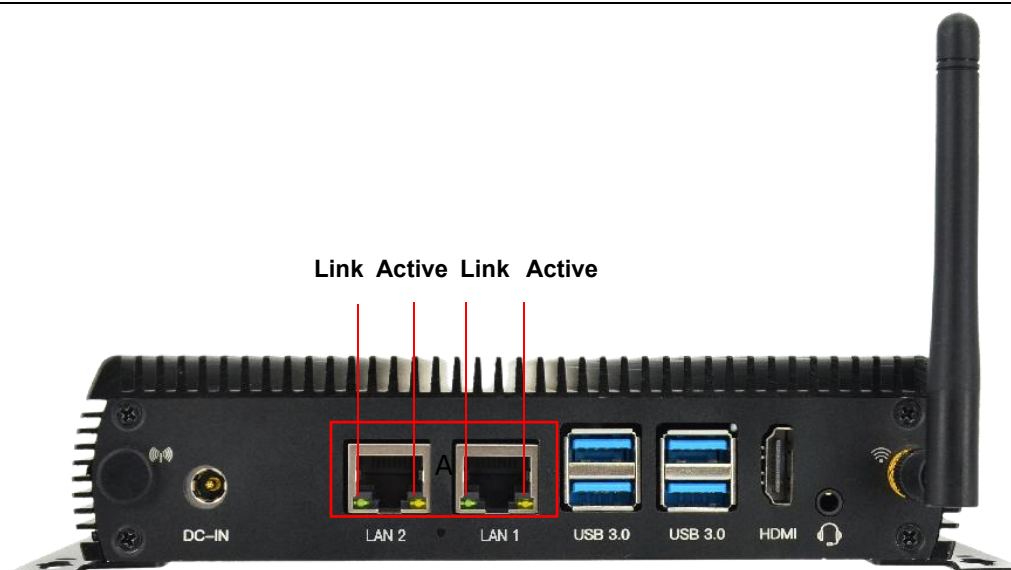


Figure 5 Ethernet Interface

Table 3 Description of RJ45 Port Status Indicator

LED	Color	Description
Link	Green	Light, the network cable is plugged in, network connection status is good
Active	Yellow	Blinking, network data is being transmitted

3.2.3. USB Interface

BPC-iMX8MP-05 Industrial Computer has two USB controllers and PHY, supports USB 3.0 and 2.0. There are four USB 3.0 interfaces with dual-layer Type-A connectors and another two USB 2.0 interfaces with Type-A connectors. As shown in the figure below.

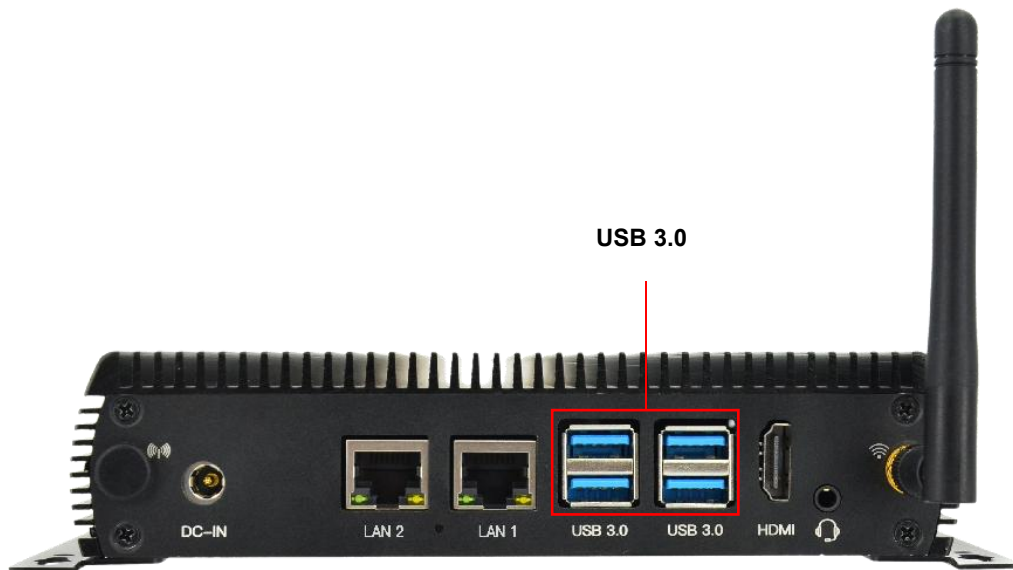


Figure 6 USB 3.0 Interface

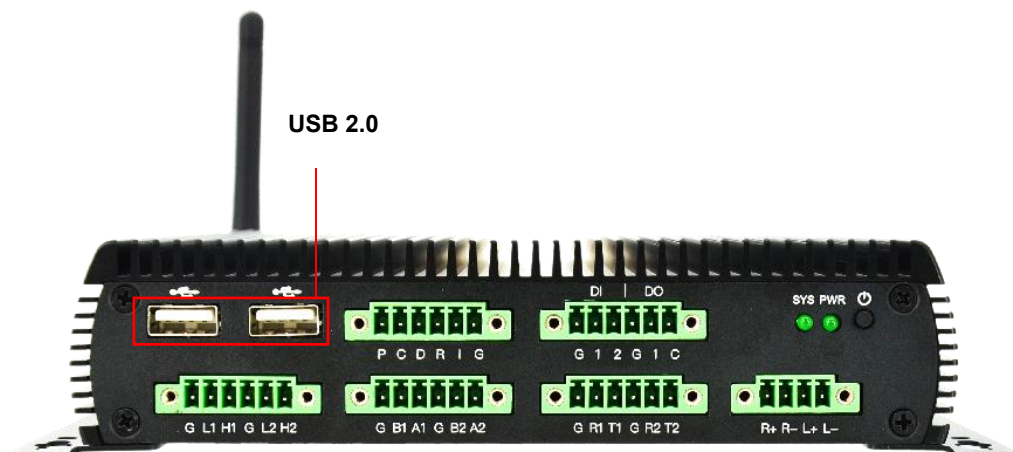


Figure 7 USB 2.0 Interface

3.2.4. HDMI Interface

There is an HDMI interface, and the connector is an A-type HDMI female socket, which is used to connect a monitor, TV or projector. HDMI resolution up to 3840x2160p30.

Audio supports 32 channel audio output and supports 1 S/PDIF audio eARC input.

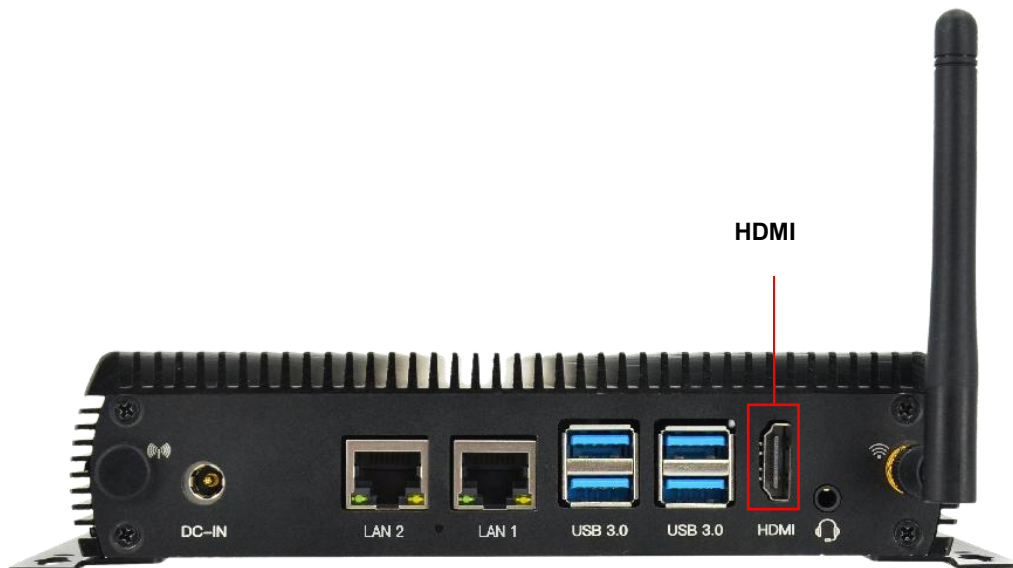


Figure 8 HDMI Interface

3.2.5. Audio Interface

There are two Audio interface:

- A combined headphone and microphone input interface. The connector is a 3.5mm socket, has audio input/output functions, and supports rated voltage 1.5V MIC audio input.
- A set of 4pin L&R Speaker interface with a 3.5mm pitch Phoenix terminals.
 - Support dual audio channel
 - Support 4Ω 3w or 8Ω 1.7W speaker



Figure 9 Audio Interface

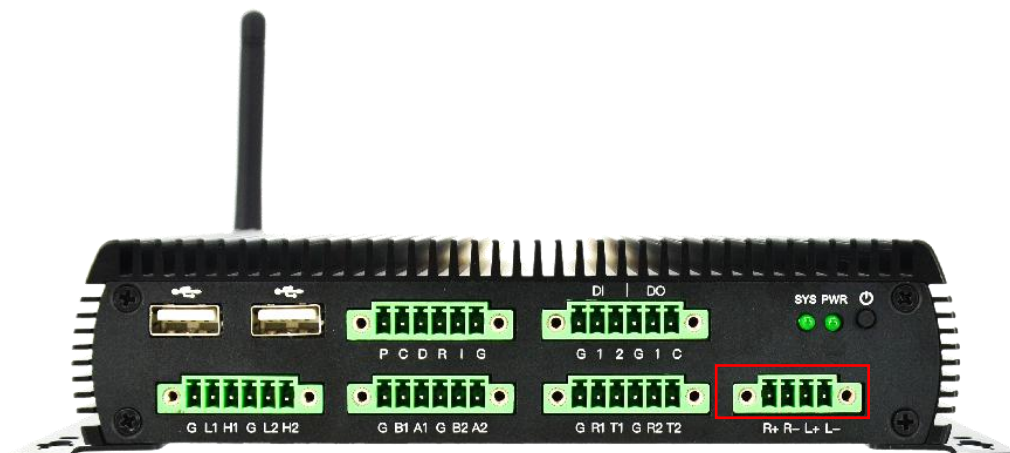


Figure 10 L&R Speaker Interface

The SPK interface is defined as follows:

Table 4 Pin definition of SPK

Function	Pin	Definition	Description
SPK	R+	Speaker Rout+	Right channel speak positive output
	R-	Speaker Rout-	Right channel speak negative output
	L+	Speaker Lout+	Left channel speak positive output
	L-	Speaker Lout-	Left channel speak negative output

3.2.6. I2C Interface

BPC-iMX8MP-05 has a set of 6pin I2C bus interface with a 3.5mm pitch Phoenix terminals and 3.3V power supply by default. As shown in the figure below:

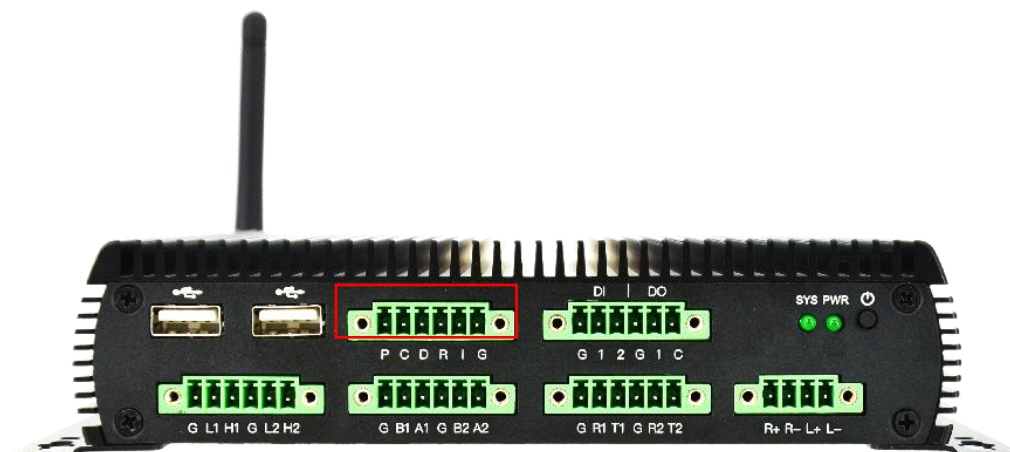


Figure 11 I2C Interface

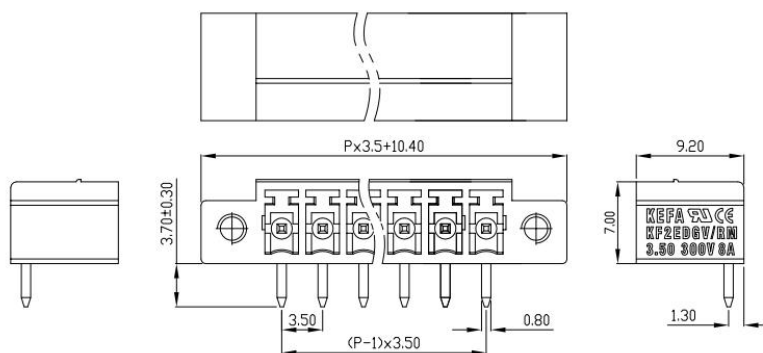


Figure 12 6pin Phoenix terminal

The I2C interface is defined as follows:

Table 5 Pin definition of I2C

Function	Pin	Definition	Description
I2C	P	I2C-3.3V	I2C bus power, Output 300mA power supply
	C	I2C-SCL	Serial clock output I2C bus line, CMOS 3.3V voltage level
	D	I2C-SDA	Serial data output I2C bus line, CMOS 3.3V voltage level
	R	I2C-RESET	Reset signal output I2C bus line, default pull-up voltage level is 3.3V
	I	I2C-nINT	Interrupt signal input I2C bus line, default pull-up voltage level is 3.3V
	G	I2C-GND	I2C bus Ground

3.2.7. DI & DO Interface

There are 2 x DI & 1 x DO interfaces with isolated type (from left to right, DI interface, DO

interface), physically isolated DI, supports dry node input and wet node input; physically isolated DO, supports wet node, and is compatible with external relay dry nodes. As shown in the figure below:

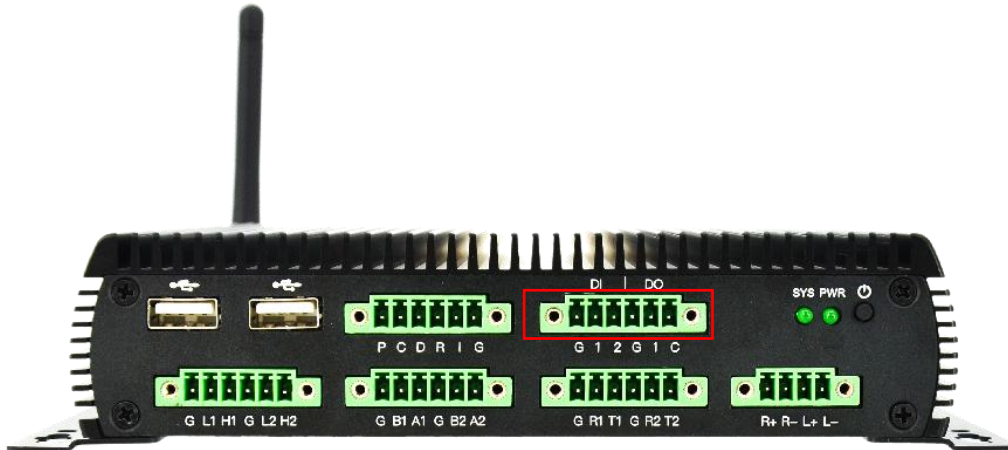


Figure 13 DI & DO Interface

The interface is defined as follows:

Table 6 Pin definition of DI & DO

Function	Pin	Definition	Description	Device node
DI	G	DI-GND	Digital isolation input Ground	
	1	DI-1#	Digital isolation input channel 1#	DIN1
	2	DI-2#	Digital isolation input channel 2#	DIN2
DO	G	DO-GND	Digital isolation output Ground	
	1	DO-1#	Digital isolation output channel 1#	
	C	DO-PCOM	Digital isolation power input	

DI electrical parameters:

- Wet contact:
 - When the signal input voltage is 0~3V DC, the corresponding device signal is low level;
 - When the signal input voltage is 5~30V DC, the corresponding device signal is high level.
- Dry contact:

- Open state: high level
- Short state with GND: low level

DO electrical parameters:

- Node DO-PCOM supports a voltage range of 5~30V DC;
- When the device signal is low, the corresponding DO signal output voltage follows the node DO-PCOM, the higher the node DO-PCOM voltage, the higher the DO signal output voltage (compared with the node DO-PCOM, there is a 1~3V voltage drop);
- When the device signal is high level, the corresponding DO signal output voltage is 0.

3.2.8. CAN Interface

BPC-iMX8MP-05 Industrial Computer supports 2 x CAN bus interfaces with physical isolation.

As shown in the following figure:

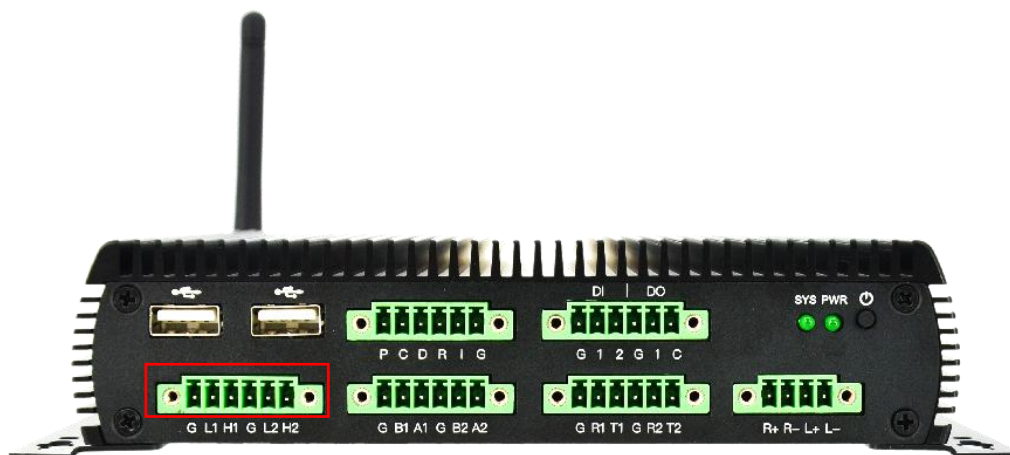


Figure 14 CAN Interface

The CAN interface is defined as follows:

Table 7 Pin definition of CAN

Function	Pin	Definition	Description	Device node
CAN	G	CAN-1#-GND	CAN bus 1# Ground for reserved	can0
	L1	CAN-1#-L	LOW-level CAN bus 1# line	
	H1	CAN-1#-H	HIGH-level CAN bus 1# line	
	G	CAN-2#-GND	CAN bus 2# Ground for reserved	can1

	L2	CAN-2#-L	LOW-level CAN bus 2# line	
	H2	CAN-2#-H	HIGH-level CAN bus 2# line	

3.2.9. RS485 Interface

BPC-iMX8MP-05 Industrial Computer supports 2 x RS485 interfaces with physical isolation.

As shown in the following figure:

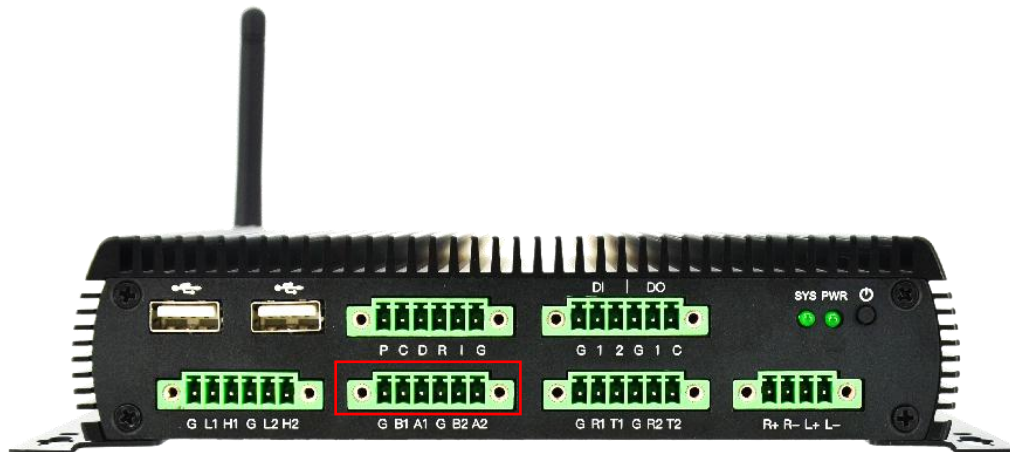


Figure 15 RS485 Interface

The RS485 interface is defined as follows:

Table 8 Pin definition of RS485

Function	Pin	Definition	Description	Device node
RS485	G	RS485-1#-GND	RS485 bus 1# Ground for reserved	/dev/ttyWCH0
	B1	RS485-1#-B	Inverting RS485 bus 1# line	
	A1	RS485-1#-A	Noninverting RS485 bus 1# line	
	G	RS485-2#-GND	RS485 bus 2# Ground for reserved	/dev/ttyWCH1
	B2	RS485-2#-B	Inverting RS485 bus 2# line	
	A2	RS485-2#-A	Noninverting RS485 bus 2# line	

3.2.10. RS232 & UART Interface

BPC-iMX8MP-05 Industrial Computer supports a set of RS232 with physical isolation and UART without physical isolation interfaces. As shown in the figure below:

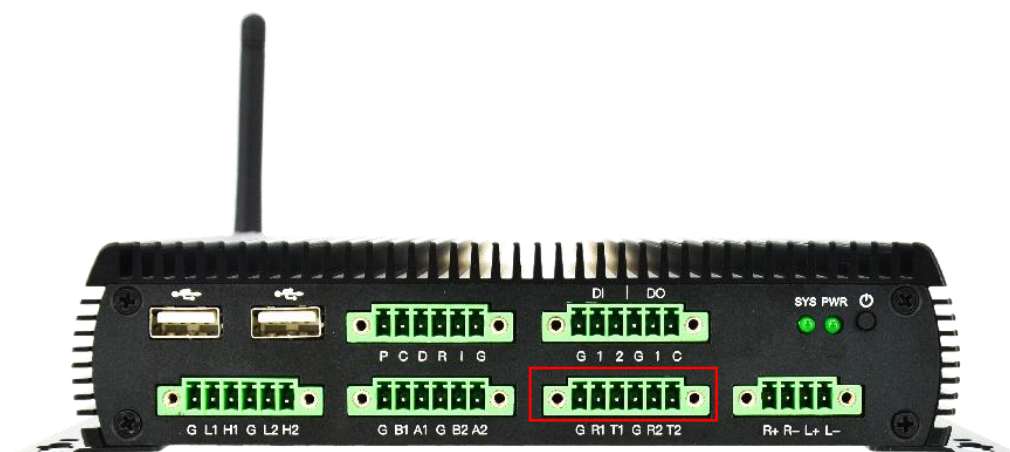


Figure 16 RS232 & UART Interface

The interface is defined as follows:

Table 9 Pin definition of RS232 & UART

Function	Pin	Definition	Description	Device node
RS232	G	RS232-1#-GND	RS232 bus 1# Ground	/dev/ttyWCH2
	R1	RS232-1#-RXD	Receiver input RS232 bus 1# line	
	T1	RS232-1#-TXD	Transmitter output RS232 bus 1# line	
UART	G	UART-2#-GND	UART bus 2# Ground	/dev/ttyWCH3
	R2	UART-2#-RXD	Receiver input UART bus 1# line, CMOS 3.3V voltage level	
	T2	UART-2#-TXD	Transmitter output UART bus 1# line, CMOS 3.3V voltage level	

3.2.11. LED & Key

There are two LED indicators and a power ON/OFF key, as shown in the figure below.

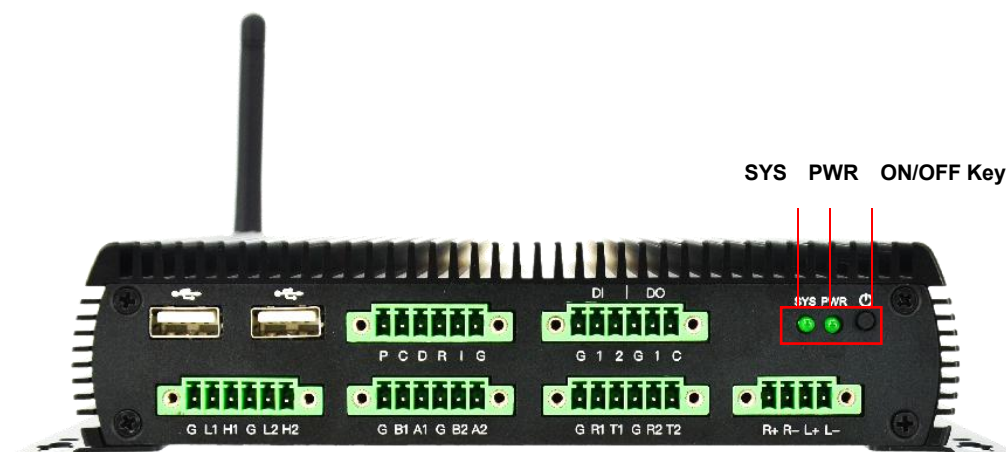


Figure 17 LED & Key

Table 10 Description of LED & Key

LED & Key	Status	Description
SYS	Lighting	Device works normally
	off	Device works abnormally
PWR	Lighting	Power is on
	off	Power is off
ON/OFF key	Short press	Hibernation/wake up
	Long press	Power off/on

3.3. Packing List

- ✓ 1 x WiFi external antenna
- ✓ 4 x M3-5 Black screw
- ✓ 2 x Wall bracket
- ✓ 1 x BPC-IMX8MP-05 box

4. Installation Guide

4.1. Software Installation

- **System Image Flash**

BPC-iMX8MP-05 is shipped with the latest Ubuntu 20.04 system burned into eMMC, and the system will boot from eMMC. Connect the monitor and power on, and it will boot up and work normally.

- **System Upgrade**

Copy the upgrade file to the system using a U disk or SSH, and type the command to upgrade.

Here are the steps to upgrade the device tree file imx8mp-evk.dtb as an example:

1. Copy the upgrade file to a U disk (FAT32 format) and insert the U disk into device's USB port.
2. Query the disk letter on the device terminal, mount the U disk and perform the upgrade replacement.

```
sudo su (password: debix)
fdisk -l
mount /dev/sda1 /mnt
cd /mnt
cp imx8mp-evk.dtb /boot/.
sync
reboot
```

```
debix@imx8mpevk:~$ sudo su
[sudo] password for debix:
root@imx8mpevk:/home/debix# fdisk -l
Disk /dev/mtdblock0: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/mmcbk2: 14.57 GiB, 15634268160 bytes, 30535680 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x75617b81

Device            Boot   Start       End   Sectors   Size Id Type
/dev/mmcbk2p1          20480   1024000   1003521    490M 83 Linux
/dev/mmcbk2p2     1228800  30535679  29306880    14G 83 Linux

Disk /dev/sda: 28.69 GiB, 30784094208 bytes, 60125184 sectors
Disk model: SanDisk 3.2Gen1
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x5b0f827a

Device    Boot Start      End  Sectors  Size Id Type
/dev/sda1 *    2048 60125183 60123136 28.7G  c W95 FAT32 (LBA)

root@imx8mpevk:/home/debix# mount /dev/sda1 /mnt/
root@imx8mpevk:/home/debix# cd /mnt/
root@imx8mpevk:/mnt# ls
imx8mp-evk.dtb
root@imx8mpevk:/mnt# cp imx8mp-evk.dtb /boot/.
root@imx8mpevk:/mnt# sync
root@imx8mpevk:/mnt# reboot
```

4.2. Hardware Installation

NOTE

The factory default boot mode of BPC-IMX8MP-05 Industrial Computer is eMCC boot.

If you need to change to other boot modes, please contact our engineer for modification before leaving the factory, and do not disassemble the machine by yourself.

After receiving the product, install the accessories as follows.

1. If you need to hang the device on the wall, use 4 black screws to fix 2 wall brackets on the enclosure, and then fix the device on the wall.
2. Install the WiFi external antenna to the WiFi antenna connection port, as shown below:

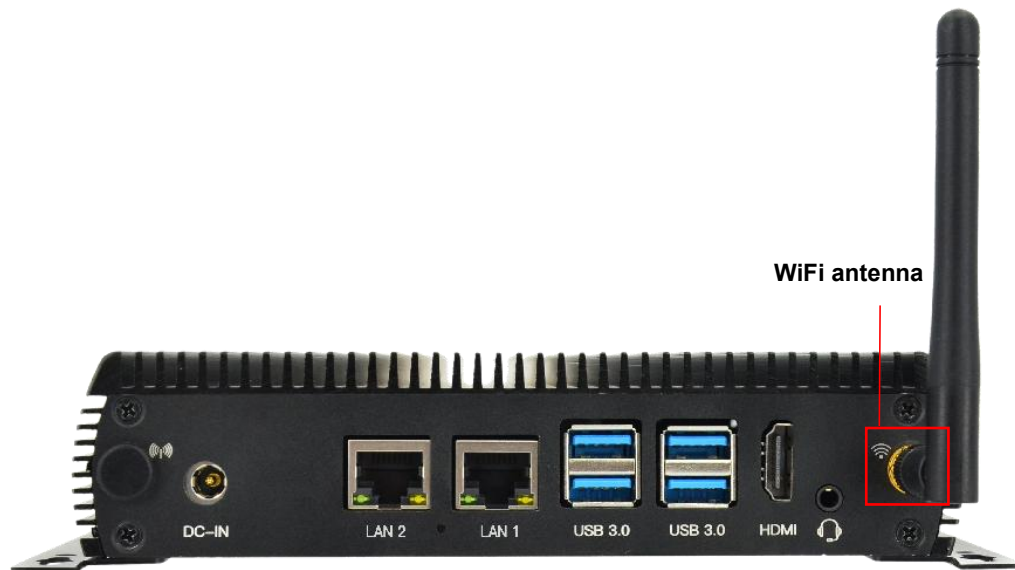


Figure 18

3. Connect the power adapter to the DC connector of enclosure (DC-IN connector as shown above). When the SYS and PWR LED are on, it proves that the Industrial Computer is powered on.

5. Operation Instructions

5.1. Usage of Ethernet

1. Query ip command.

```
ip a
```

```
debix@imx8mpevk:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens34: <NO-CARRIER,BROADCAST,MULTICAST,DYNAMIC,UP> mtu 1500 qdisc mq state DOWN group default qlen 1000
    link/ether 10:07:23:6d:da:96 brd ff:ff:ff:ff:ff:ff
3: ens33: <BROADCAST,MULTICAST,DYNAMIC,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 10:07:23:6d:da:93 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.18/24 brd 192.168.1.255 scope global dynamic ens33
        valid_lft 78101sec preferred_lft 78101sec
    inet6 240e:36d:df5:2b00:404c:2d31:25d7:c18c/64 scope global temporary dynamic
        valid_lft 223060sec preferred_lft 77756sec
    inet6 240e:36d:df5:2b00:5d2a:4da2:a828:f1a3/64 scope global dynamic mngtmpadr noprefixroute
        valid_lft 223060sec preferred_lft 136660sec
    inet6 fe80::fd5e:df65:73dc:d698/64 scope link noprefixroute
```

As shown above: eth33 network card corresponds to the network port of the device silkscreen "LAN1" (Figure 5, right side);

eth34 network card corresponds to the network port of the device silkscreen

"LAN2" (Figure 5, left side).

2. Apply ping command.

```
ping 192.168.1.18
```

```
debix@imx8mpevk:~$ ping 192.168.1.18
PING 192.168.1.18 (192.168.1.18) 56(84) bytes of data.
64 bytes from 192.168.1.18: icmp_seq=1 ttl=64 time=0.073 ms
64 bytes from 192.168.1.18: icmp_seq=2 ttl=64 time=0.077 ms
64 bytes from 192.168.1.18: icmp_seq=3 ttl=64 time=0.081 ms
64 bytes from 192.168.1.18: icmp_seq=4 ttl=64 time=0.079 ms
64 bytes from 192.168.1.18: icmp_seq=5 ttl=64 time=0.079 ms
64 bytes from 192.168.1.18: icmp_seq=6 ttl=64 time=0.075 ms
64 bytes from 192.168.1.18: icmp_seq=7 ttl=64 time=0.071 ms
64 bytes from 192.168.1.18: icmp_seq=8 ttl=64 time=0.075 ms
64 bytes from 192.168.1.18: icmp_seq=9 ttl=64 time=0.078 ms
64 bytes from 192.168.1.18: icmp_seq=10 ttl=64 time=0.077 ms
```

3. Query the speed of the network port.

```
sudo ethtool ens33
```

```
debix@imx8mpevk:~$ sudo ethtool ens33
Settings for ens33:
    Supported ports: [ TP MII ]
    Supported link modes:   10baseT/Half 10baseT/Full
                           100baseT/Half 100baseT/Full
                           1000baseT/Full
    Supported pause frame use: Symmetric Receive-only
    Supports auto-negotiation: Yes
    Supported FEC modes: Not reported
    Advertised link modes:  10baseT/Half 10baseT/Full
                           100baseT/Half 100baseT/Full
                           1000baseT/Full
    Advertised pause frame use: Symmetric Receive-only
    Advertised auto-negotiation: Yes
    Advertised FEC modes: Not reported
    Link partner advertised link modes:  10baseT/Half 10baseT/Full
                                         100baseT/Half 100baseT/Full
                                         1000baseT/Full
    Link partner advertised pause frame use: Symmetric
    Link partner advertised auto-negotiation: Yes
    Link partner advertised FEC modes: Not reported
    Speed: 1000Mb/s
    Duplex: Full
    Port: Twisted Pair
```

5.2. Usage of WiFi

- Unplug the network cable, device connect WiFi (polyhex_mi), query the WiFi network port via `ifconfig wlan0`.

```
debix@imx8mpevk:~$ ifconfig wlan0
wlan0: flags=-28605<UP,BROADCAST,RUNNING,MULTICAST,DYNAMIC> mtu 1500
    inet 192.168.1.21 netmask 255.255.255.0 broadcast 192.168.1.255
    inet6 fe80::48dd:f5:95c:e1a3 prefixlen 64 scopeid 0x20<link>
    inet6 240e:36d:df5:2b00:3656:9509:ddfb:e51c prefixlen 64 scopeid 0x0<g
lobal>
    inet6 240e:36d:df5:2b00:fb79:bb47:ef3f:f209 prefixlen 64 scopeid 0x0<g
lobal>
    ether ac:6a:a3:1f:b4:a7 txqueuelen 1000 (Ethernet)
    RX packets 7459 bytes 3793417 (3.7 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 8909 bytes 1261738 (1.2 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

- Apply ping command to check the network connection status.

```
ping 192.168.1.1
```

```
debix@imx8mpevk:~$ ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=63 time=4.65 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=63 time=4.66 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=63 time=4.45 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=63 time=4.53 ms
64 bytes from 192.168.1.1: icmp_seq=5 ttl=63 time=18.6 ms
64 bytes from 192.168.1.1: icmp_seq=6 ttl=63 time=5.30 ms
64 bytes from 192.168.1.1: icmp_seq=7 ttl=63 time=4.82 ms
64 bytes from 192.168.1.1: icmp_seq=8 ttl=63 time=4.57 ms
64 bytes from 192.168.1.1: icmp_seq=9 ttl=63 time=4.47 ms
64 bytes from 192.168.1.1: icmp_seq=10 ttl=63 time=4.58 ms
64 bytes from 192.168.1.1: icmp_seq=11 ttl=63 time=5.12 ms
```

Reconnect to the new WiFi network (ChinaNet-polyhex), use the ping command, and the same screen appears as above.

5.3. Usage of Bluetooth

- Query Bluetooth devices via the `hciconfig` command.

```
debix@imx8mpevk:~$ hciconfig
hci0: Type: Primary Bus: UART
      BD Address: AC:6A:A3:1F:B4:A8 ACL MTU: 1021:8 SCO MTU: 64:1
      UP RUNNING PSCAN ISCAN
      RX bytes:669864 acl:167 sco:0 events:16682 errors:0
      TX bytes:11426 acl:156 sco:0 commands:464 errors:0
```

- Switch to the root user.

```
debix@imx8mpevk:~$ sudo su
root@imx8mpevk:/home/debix#
```

- Start bluetooth and match bluetooth.

```
hciconfig hci0 up
bluetoothctl
power on
agent on
default-agent
scan on
pair yourDeviceMAC      #Match the Bluetooth MAC address
```


5.4. Usage of USB

1. Switch to the root user.

```
debix@imx8mpevk:~$ sudo su
root@imx8mpevk:/home/debix#
```

2. Access the U disk in FAT32 format, the system will automatically mount it to the /mnt path.

```
df -h
```

```
root@imx8mpevk:/home/debix# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        29G   3.6G   24G   14% /
devtmpfs        494M     0   494M    0% /dev
tmpfs           975M    39M   937M    4% /dev/shm
tmpfs           195M    2.1M   193M    2% /run
tmpfs           5.0M    4.0K   5.0M    1% /run/lock
tmpfs           975M     0   975M    0% /sys/fs/cgroup
/dev/mmcblk1p1   500M    31M   470M    7% /boot
tmpfs           195M    44K   195M    1% /run/user/1000
/dev/sda1        253M    31M   222M   12% /media/debix/boot
/dev/sda2        15G   3.6G   11G   26% /media/debix/rootfs
```

- If the U disk is not mounted, you can mount the U disk with the following command:
 - Query the U disk letter:

```
fdisk -l
```

```
root@imx8mpevk:/home/debix# fdisk -l
Disk /dev/mtdblock0: 8 MiB, 8388608 bytes, 16384 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/mmcblk2: 14.57 GiB, 15634268160 bytes, 30535680 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0xfc26a6dc

Device      Boot    Start        End    Sectors    Size Id Type
/dev/mmcblk2p1      20480    1024000    1003521    490M 83 Linux
/dev/mmcblk2p2    1228800   30535679   29306880    14G 83 Linux

Disk /dev/mmcblk1: 29.74 GiB, 31914983424 bytes, 62333952 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
```

```
Disk identifier: 0x00dba0b

Device      Boot   Start     End  Sectors  Size Id Type
/dev/mmcblk1p1      20480  1044479  1024000  500M  c W95 FAT32 (LBA)
/dev/mmcblk1p2    1228800  62333951  61105152  29.1G  83 Linux

Disk /dev/sda: 14.86 GiB, 15931539456 bytes, 31116288 sectors
Disk model: STORAGE DEVICE
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x994d7a7d

Device      Boot   Start     End  Sectors  Size Id Type
/dev/sda1      8192     532479   524288  256M  c W95 FAT32 (LBA)
/dev/sda2    532480  31116287  30583808  14.6G  83 Linux
```

- Mounting the U disk:

```
mount /dev/sda1 /mnt
```

3. Enter the U disk directory:

```
cd /mnt
```

```
root@imx8mpevk:/home/debix# cd /mnt
root@imx8mpevk:/mnt# ls
COPYING.linux          bcm2711-rpi-cm4s.dtb  issue.txt
LICENCE.broadcom       bootcode.bin         kernel8.img
'System Volume Information' cmdline.txt          overlays
bcm2710-rpi-2-b.dtb    config.txt           start.elf
bcm2710-rpi-3-b-plus.dtb fixup.dat            start4.elf
bcm2710-rpi-3-b.dtb    fixup4.dat           start4cd.elf
bcm2710-rpi-cm3.dtb    fixup4cd.dat         start4db.elf
bcm2710-rpi-zero-2-w.dtb fixup4db.dat         start4x.elf
bcm2710-rpi-zero-2.dtb fixup4x.dat          start_cd.elf
bcm2711-rpi-4-b.dtb    fixup_cd.dat         start_db.elf
bcm2711-rpi-400.dtb    fixup_db.dat         start_x.elf
bcm2711-rpi-cm4.dtb    fixup_x.dat
```

4. Clear the cache, run before each read and write test command.

```
sh -c "sync && echo 3 > /proc/sys/vm/drop_caches"
```

```
root@imx8mpevk:/home/debix# mount /dev/sda1 /mnt/
root@imx8mpevk:/home/debix# cd /mnt/
root@imx8mpevk:/mnt# sh -c "sync && echo 3 > /proc/sys/vm/drop_caches"
```

5. Write speed test.

```
sh -c "sync && echo 3 > /proc/sys/vm/drop_caches" // clear cache

dd if=/dev/zero of=./test_write count=1 bs=1G
```

```
root@imx8mpevk:/mnt# dd if=/dev/zero of=./test_write count=1 bs=1G
1+0 records in
1+0 records out
1073741824 bytes (1.1 GB, 1.0 GiB) copied, 26.6288 s, 40.3 MB/s
root@imx8mpevk:/mnt# sh -c "sync && echo 3 > /proc/sys/vm/drop_caches"
```

6. Reading speed test.

```
sh -c "sync && echo 3 > /proc/sys/vm/drop_caches" // clear cache

dd if=./test_write of=/dev/null count=1 bs=1G
```

```
root@imx8mpevk:/mnt# sh -c "sync && echo 3 > /proc/sys/vm/drop_caches"
root@imx8mpevk:/mnt# dd if=./test_write of=/dev/null count=1 bs=1G
1+0 records in
1+0 records out
1073741824 bytes (1.1 GB, 1.0 GiB) copied, 43.7707 s, 24.5 MB/s
```

5.5. Usage of LED & Key

1. LED

- SYS is the system status indicator, the indicator is on when the Industrial Computer is running normally; otherwise, the indicator is off.
- PWR is the power status indicator, the indicator is on when power is applied; otherwise, the indicator is off when power is off.

2. Key

BPC-iMX8MP-05 Industrial Computer is automatically turned on when power is applied.

- Short press
 - SYS green light is off, the system enters into sleep.
 - Short press again, SYS green light is on to wake up the system.
- Long press
 - Press and hold until the green light turns off to shut down.
 - Press and hold again until the green light turns on to boot the system.