BPC-iMX8MP-01 Industrial Computer User Guide

Version: V1.0（2023-03）

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

BPC-iMX8MP-01 Industrial Computer is a ruggedized and protected computer. It is composed of a DEBIX Model A/B and a aluminum alloy 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	2023.03.24	First edition

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Chapter 1 Security

1.1. 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
Warning! 	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.
Caution! 	Always ground yourself to remove any static electric charge before touching *BPC-iMX8MP-01* 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.

1.2. 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 power cord or plug 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 -45°C (-49°F) or above 85°C (185°F). This will damage the machine. It needs to be kept in an environment at controlled temperature.

11. Due to the sensitive nature of the equipment, it must be stored in a restricted access location, only accessible by qualified engineer.

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

1.3. Technical Support

1. Visit DEBIX website https://www.debix.io/ where you can find the latest information about the product.
2. Contact your distributor, sales representative or Polyhex's customer service center for technical support if you need additional assistance. Please have the following info ready before you call:

- Product name and memory size
- Description of your peripheral attachments
- Description of your software(operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

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

Email: *info@polyhex.net*

Chapter 2 BPC-iMX8MP-01 Industrial Computer Introduction

BPC-iMX8MP-01 Industrial Computer is a compact, durable and high heat dissipation computer, which can be widely used in industry 4.0, IoT, smart city, advanced multimedia etc..

Main features:

- It is compatible with a DEBIX Model A or a DEBIX Model B
- Support Gigabit Ethernet, 4 x USB 3.0 to bring an efficient data transmission speed
- Support for Ubuntu, Android, Yocto, Windows 10 IoT

2.1. Overview of Industrial Computer

Figure 2

BPC-iMX8MP-01 Industrial Computer uses DEBIX Model A or DEBIX Model B as the main board, the data specifications are as follows.

Table 2 BPC-iMX8MP-01 Industrial Computer specification

System	
Main Board	DEBIX Model A/B
Type	BPC-iMX8MP-01
Boot Mode	1) DEBIX Model A: ● Boot from Micro SD Card 2) DEBIX Model B: ● Boot from Micro SD Card ● Boot from eMMC (default)
CPU	i.MX 8M Plus, MIMX8ML8CVNKZAB, 4 x Cortex-A53, industrial-grade processor clocked at 1.6GHz, with C520L 3D GPU andGC7000UltraLite 3D GPU

Memory	2GB LPDDR4 (4GB/8GB optional)
Storage	1) Micro SD card (The Micro SD card should be prepared by the users themselves, the capacity can be 8GB/16GB/32GB/64GB/128GB/256GB) 2) Onboard 16GB eMMC (8GB/32GB/64GB/128GB/256GB optional)
OS	Ubuntu 20.04, Android 11, Yocto-L5.10.72_2.2.0, Windows 10 IoT Enterprise
I/O Interface	
Gigabit Ethernet	1 x RJ45 Gigabit Ethernet port
Wi-Fi & Bluetooth	2.4GHz & 5GHz dual-band Wi-Fi, Bluetooth 5.0
USB	1) 1 x USB 2.0 Type-C for DC 5V power input 2) 1 x USB 2.0 OTG Type-C 3) 4 x USB 3.0 Host Type-A
HDMI	1 x HDMI output, connector is Type A HDMI female
Audio	1 x headphone output and microphone input combo interface, the connector is a 3.5mm socket
Key	1) 1 x Reset key 2) 1 x ON/OFF key
Power Supply	
Power Input	DC 5V/3A Type-C
Mechanical & Environmental	
Enclosure Material	Aluminum alloy
Size (L x W x H)	93mm x 72mm x 30mm
Gross Weight	190g
Heat Dissipation	No fan, heat dissipation through the enclosure
CPU Temperature	-40 °C to 85 °C

2.2. Composition of Industrial Computer

Figure 3

BPC-iMX8MP-01 Industrial Computer assembly consists of these main components: DEBIX Model A/B, enclosure and power adapter.

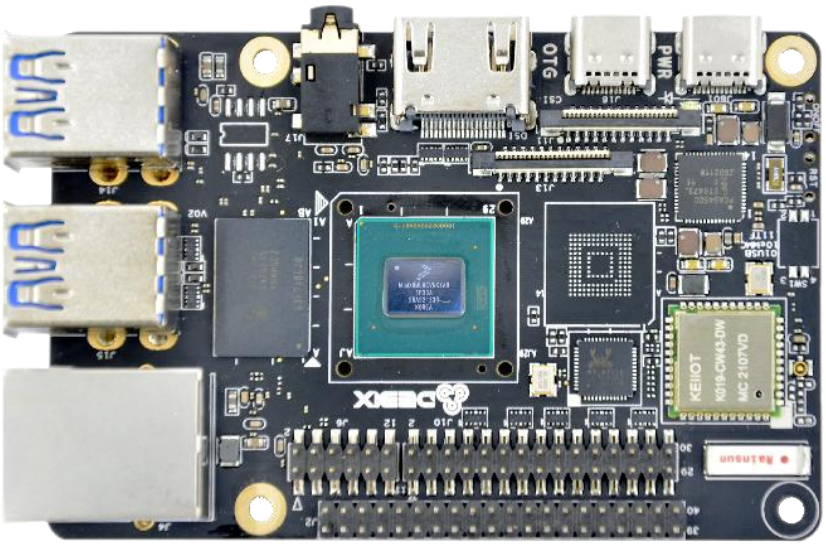


Figure 4 DEBIX

Figure 5 Enclosure

Figure 6 Power adapter

2.3. External Interface of Industrial Computer

2.3.1. Power Interface

BPC-iMX8MP-01 Industrial Computer provides one power interface with a Type-C connector, which supports DC 5V power supply. As shown in the figure below.

Figure 7

2.3.2. OTG Interface

BPC-iMX8MP-01 Industrial Computer provides an OTG interface with a Type-C connector, which can be used for programming, system updating, or USB drive & hard disk connecting etc. to facilitate data exchange. As shown in the figure above.

2.3.3. HDMI Interface

BPC-iMX8MP-01 Industrial Computer provides 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. As shown in the figure below.

Figure 8

2.3.4. Audio Interface

BPC-iMX8MP-01 Industrial Computer provides a combined headphone and microphone input interface. The connector is a 3.5mm socket, compatible with the built-in needle socket design, has audio input/output functions, and supports rated voltage 1.5V MIC audio input. As shown in the right side of Figure 8.

2.3.5. Ethernet Interface

BPC-iMX8MP-01 Industrial Computer provides one independent MAC RJ45 Gigabit Ethernet port (Network port: LAN), support POE power supply (Additional POE power supply module is required), connect DEBIX to the network through the network cable of the RJ45 connector; and a set of status indicators below the interface to display the status signal, one is Link and the other is Active.

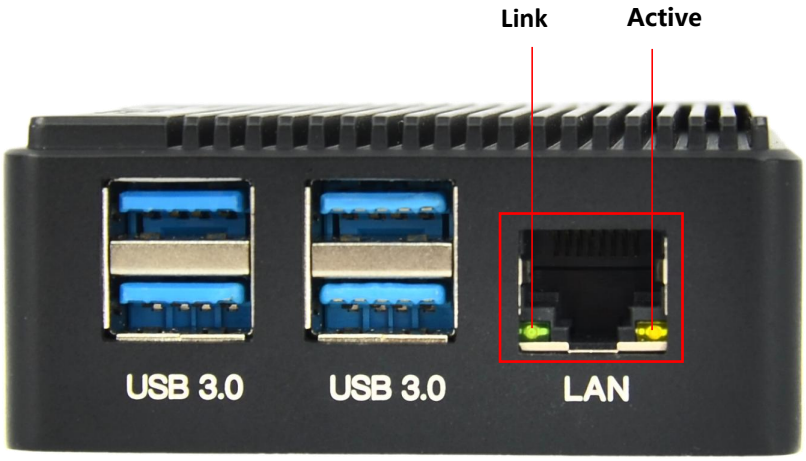


Figure 9

Table 3 Description of RJ45 Port Status Indicator

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

2.3.6. USB Interface

BPC-iMX8MP-01 Industrial Computer has six USB interfaces, supports USB 3.0 and 2.0. There are two USB 2.0 interfaces with Type-C connectors, one for DC 5V power input and one for OTG (Figure 7). And another four USB 3.0 interfaces with dual-layer Type-A connectors, as shown in the figure below.

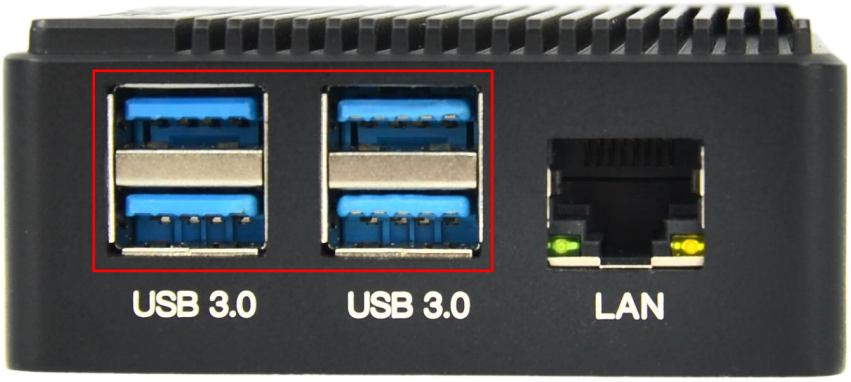


Figure 10

2.3.7. Key

Figure 11

- Reset button: short press to reset the system.
- ON/OFF button: short press to hibernate or wake up, long press to power off or on.

Chapter 3 DEBIX Installation Guide

A standalone DEBIX enclosure does not include DEBIX product and power adapter, If you install it by yourself, you need to purchase an additional DEBIX single board computer and power adapter.

3.1. Installation

The steps for DEBIX installation into the DEBIX enclosure are as follows:

1. First, paste the CPU thermal conductive rubber pad on the front of the DEBIX board, as shown in the figure below:

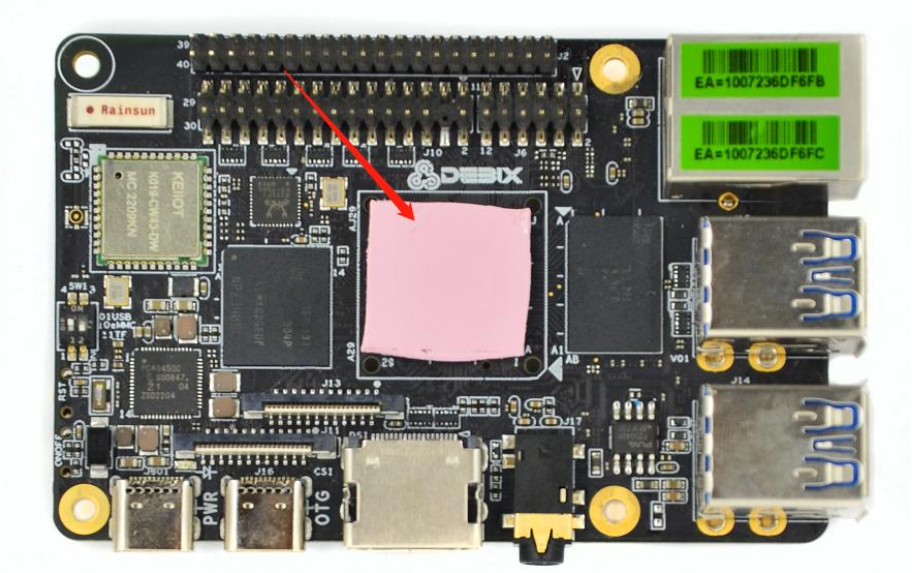


Figure 12

2. Align with the appropriate and corresponding mounting holes, place the single board computer into the enclosure, then fix in place with four PM2.5X6 screws, as shown in the figure below:

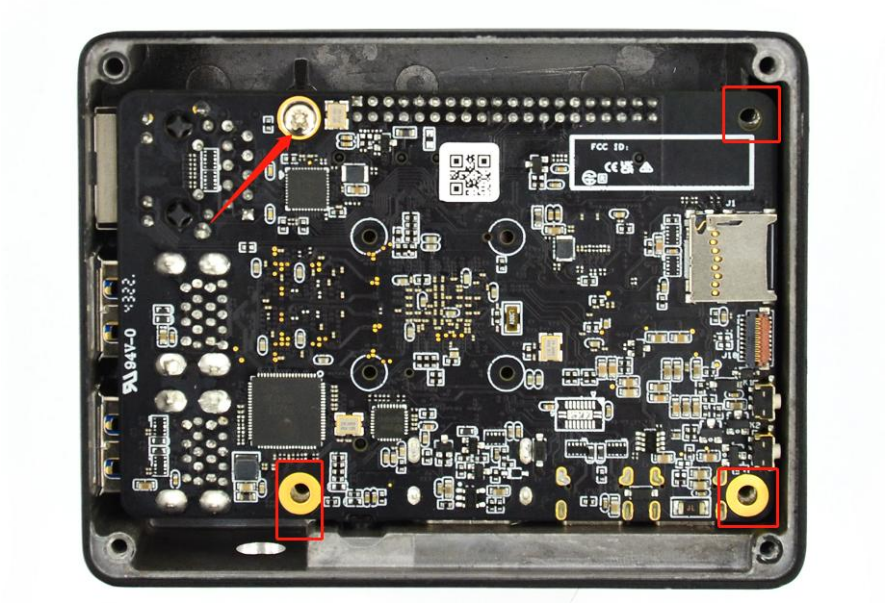


Figure 13

3. The PC sheet into the right side of the enclosure according to the corresponding hole position.
4. Install the back cover of the enclosure and fix it with 4 KM2.5X6 locking screws, as shown in the figure below:

Figure 14

Figure 15

5. Industrial Computer installation is complete.

3.2. Power on

NOTE

The factory default boot mode of BPC-iMX8MP-01 Industrial Computer is Micro SD card boot. If the main board for DEBIX Model B, 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.

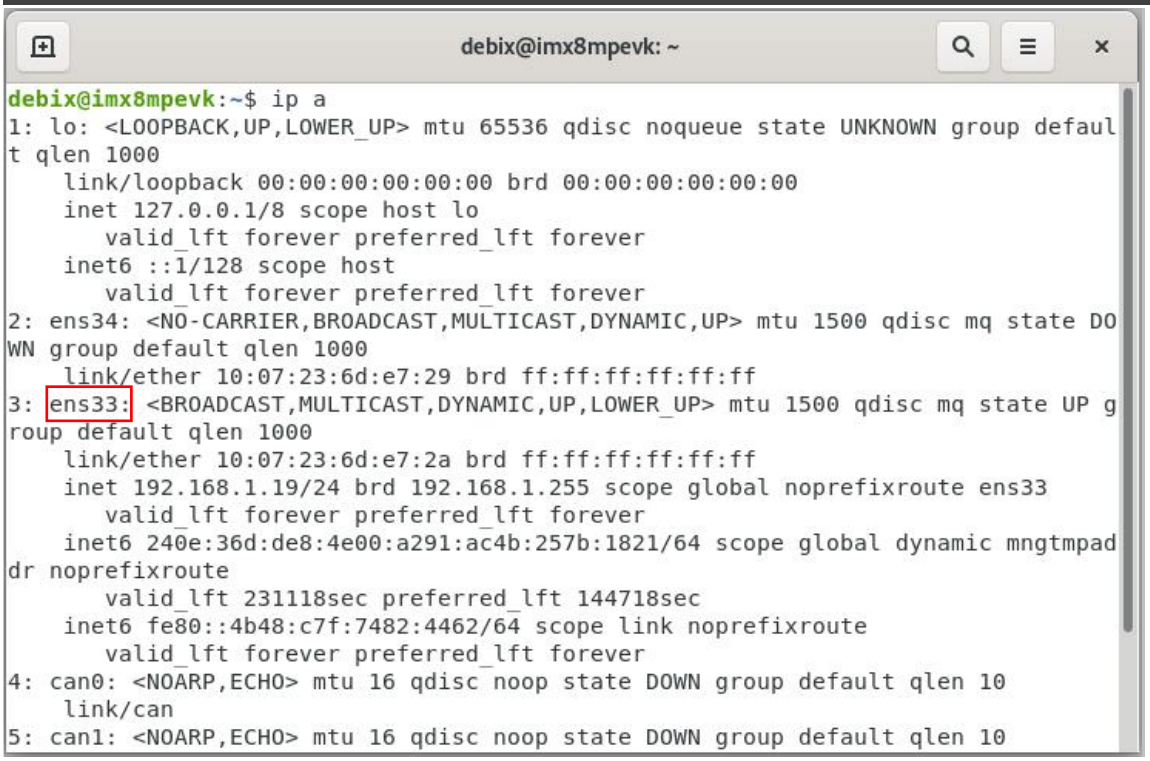
Please refer to section Getting started of DEBIX User Manual for the connection procedure. Insert the burned Micro SD card into the card slot on the BPC-iMX8MP-01 Industrial Computer, connect the display device and power on, then you can see the startup screen.

Chapter 4 Software Application Examples

4.1. Use of Ethernet

1. Query ip command.

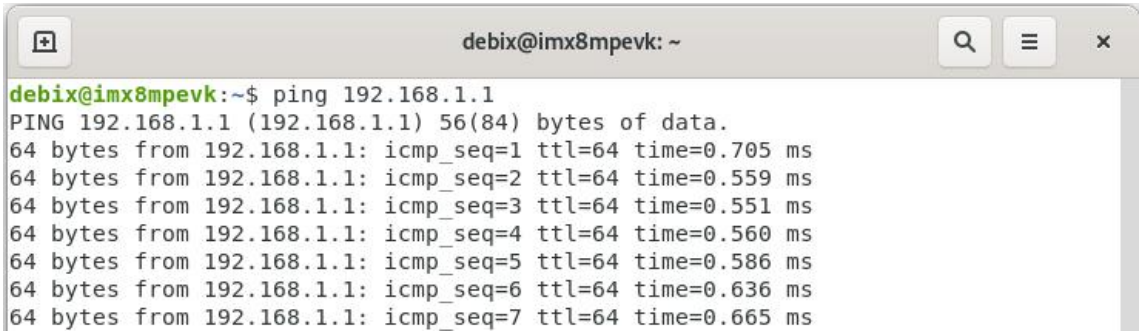
```
ip a
```



As shown above: eth33 network card corresponds to the network port of the device silkscreen "LAN" (Figure 9).

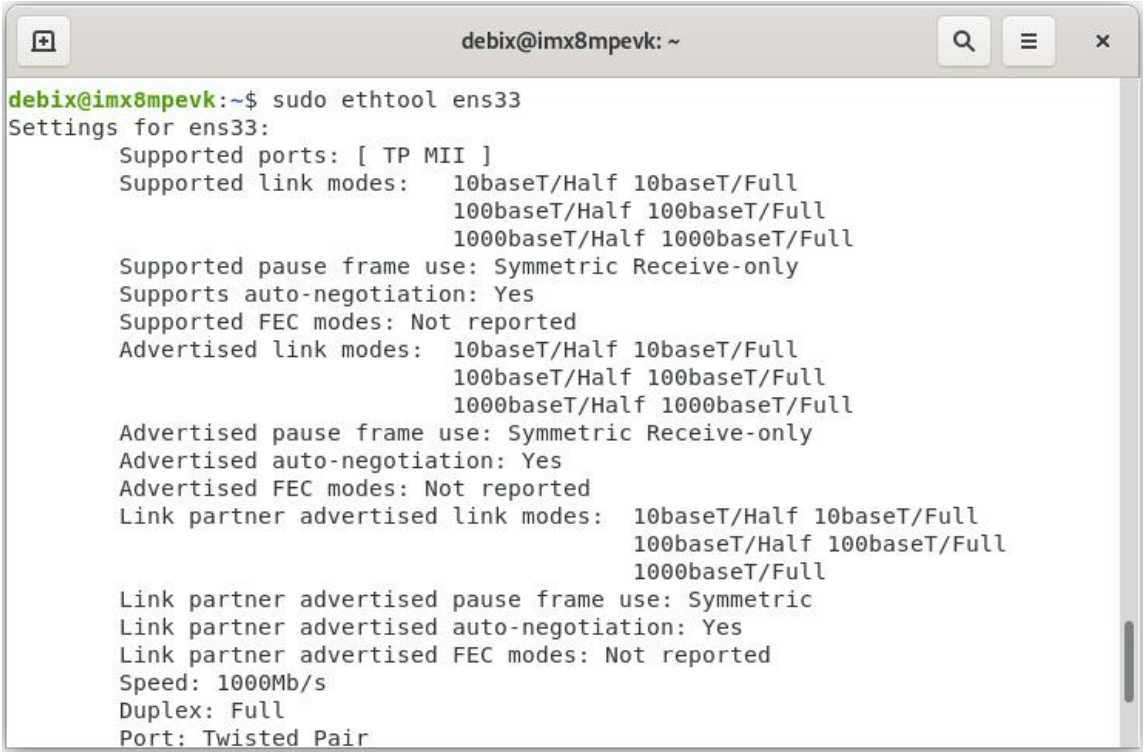
2. Apply ping command.

```
ping 192.168.1.1
```



3. Query the speed of the network port.

```
sudo ethtool ens33
```



The desktop settings of the BPC-iMX8MP-01 Industrial Computer Ethernet (Settings >> Network) are as follows.

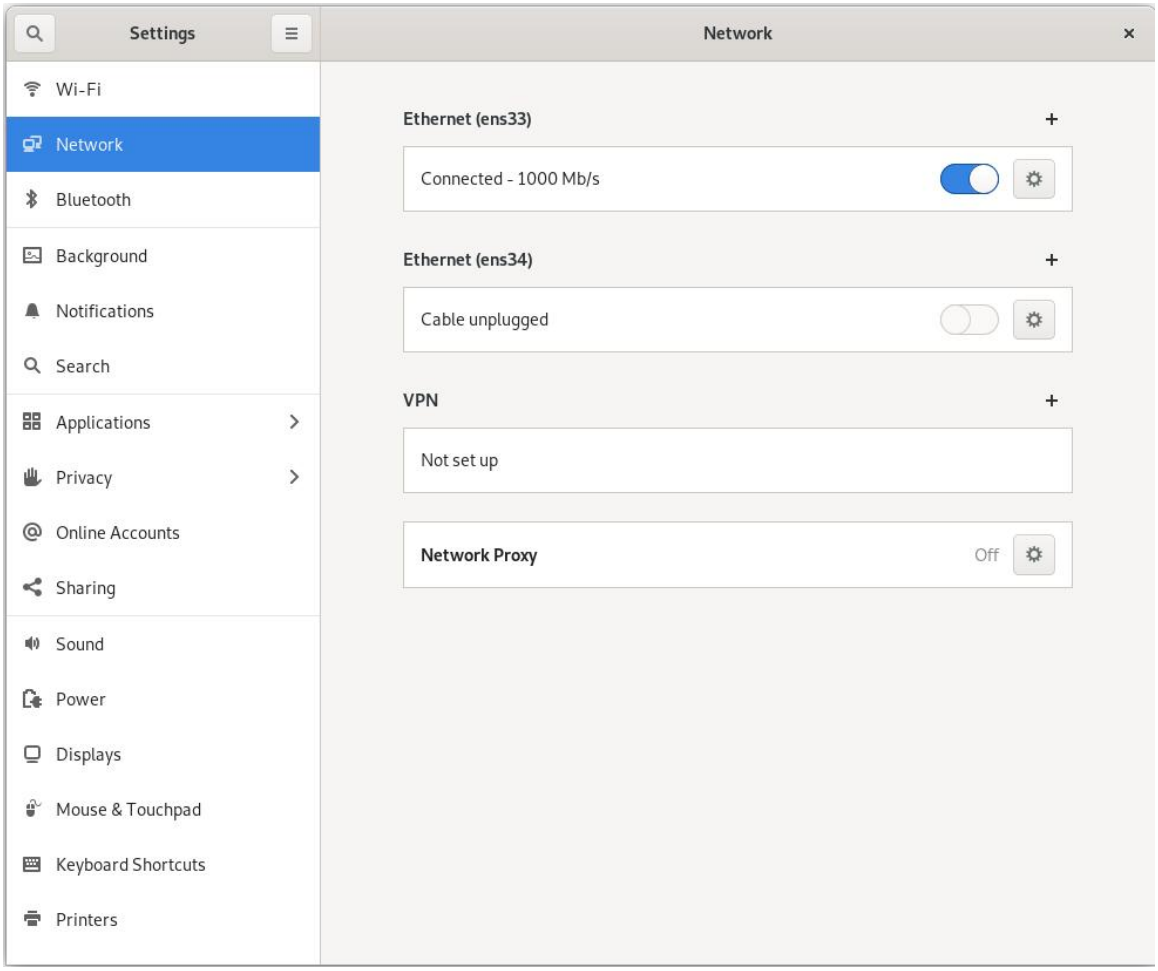
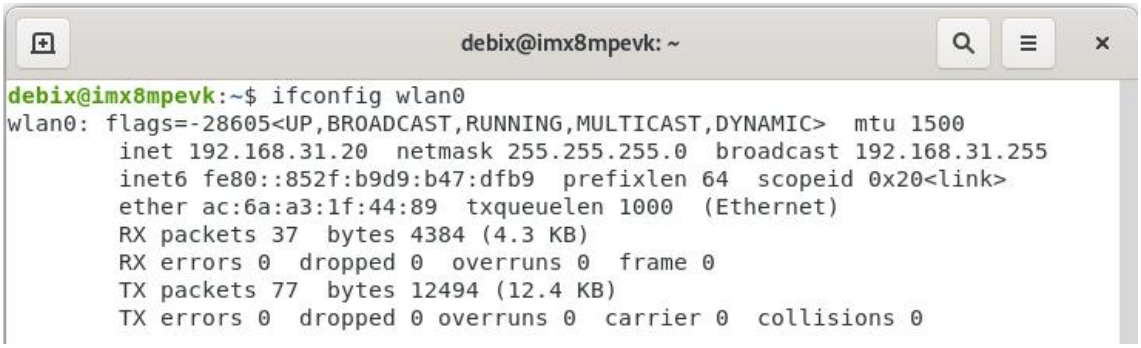


Figure 16

4.2. Use of WiFi

1. Unplug the network cable, DEBIX connect WiFi (polyhex_mi), query the WiFi network port via ifconfig wlan0.



2. 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=4.60 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=63 time=4.44 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=63 time=8.36 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=63 time=4.88 ms
64 bytes from 192.168.1.1: icmp_seq=5 ttl=63 time=4.49 ms
64 bytes from 192.168.1.1: icmp_seq=6 ttl=63 time=4.48 ms
64 bytes from 192.168.1.1: icmp_seq=7 ttl=63 time=66.9 ms
64 bytes from 192.168.1.1: icmp_seq=8 ttl=63 time=4.83 ms
64 bytes from 192.168.1.1: icmp_seq=9 ttl=63 time=5.29 ms
64 bytes from 192.168.1.1: icmp_seq=10 ttl=63 time=4.73 ms
64 bytes from 192.168.1.1: icmp_seq=11 ttl=63 time=19.2 ms
```

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

The desktop settings of the BPC-iMX8MP-01 Industrial Computer WIFI (Settings >> Wi-Fi) are as follows.

- Click the wifi enable button to turn on the Wi-Fi function, as shown in Figure 18.
- Click on the wifi network name, the "Authentication required" dialog box will pop up, enter the wifi network password, as shown in the figure below:

Figure 17

- Wait for a while, when you see the right side of the connected wifi name √, that is, the wifi

connection is successful, as shown in the following figure.

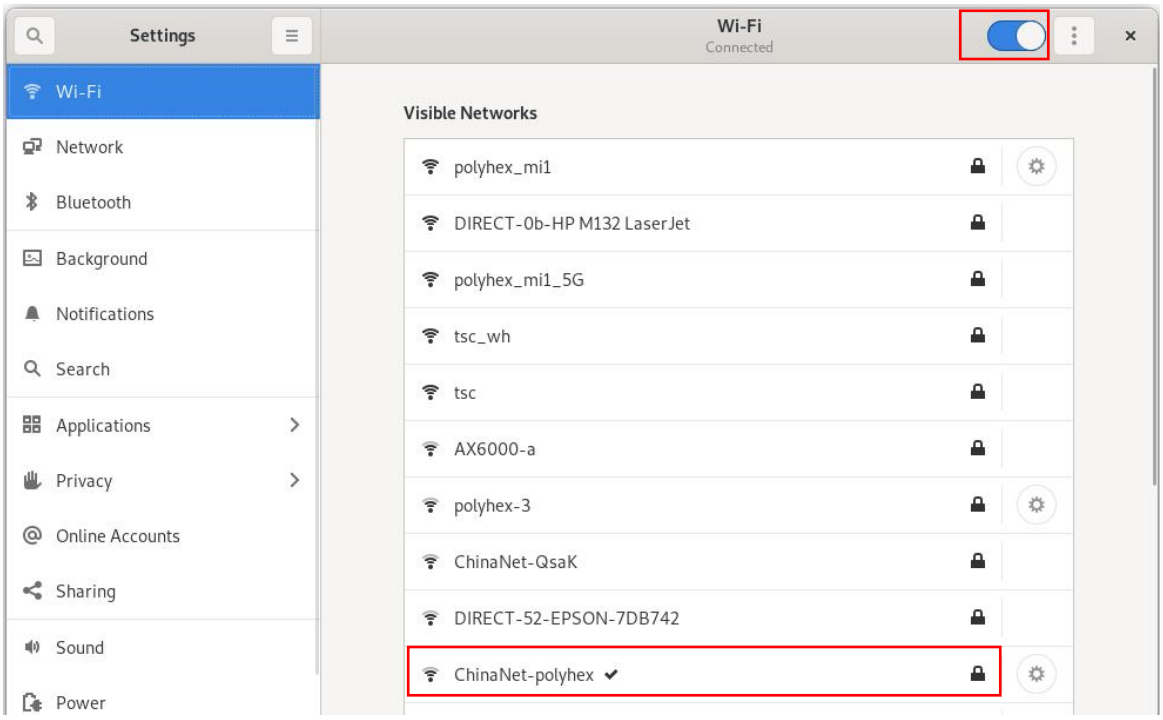


Figure 18

4.3. Use of Bluetooth

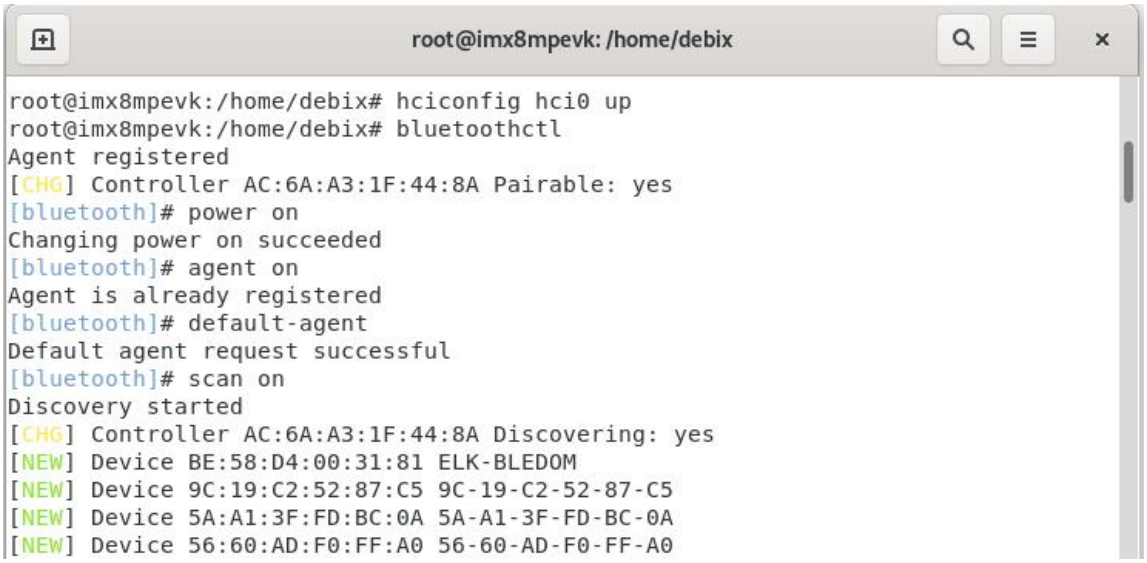
1. Query Bluetooth devices via the hciconfig command.

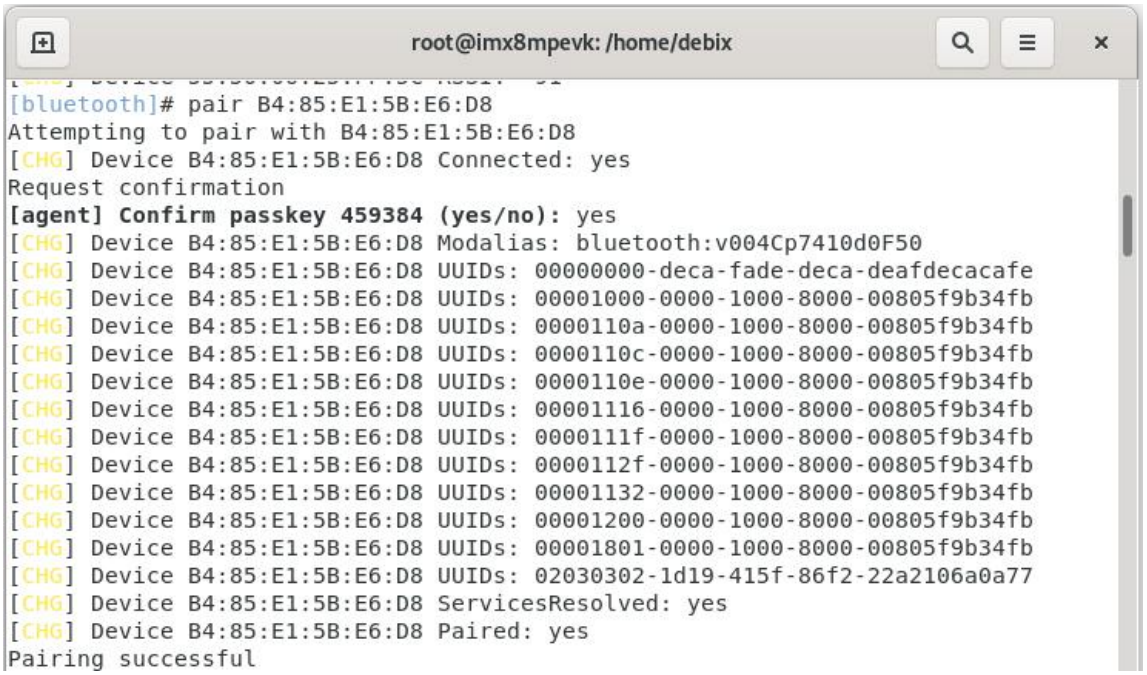
2. Switch to the root user.

```
sudo su
```

3. Start bluetooth and match bluetooth.

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





The desktop settings of the BPC-iMX8MP-01 Industrial Computer Bluetooth (Settings >> Bluetooth) are as follows.

Example: Turn on Bluetooth on both the phone and DEBIX, the phone Bluetooth can detect the DEBIX Bluetooth device, the DEBIX can detect the phone Bluetooth device, click on the Bluetooth device, connect, enter the key for pairing, as shown in the following figure.

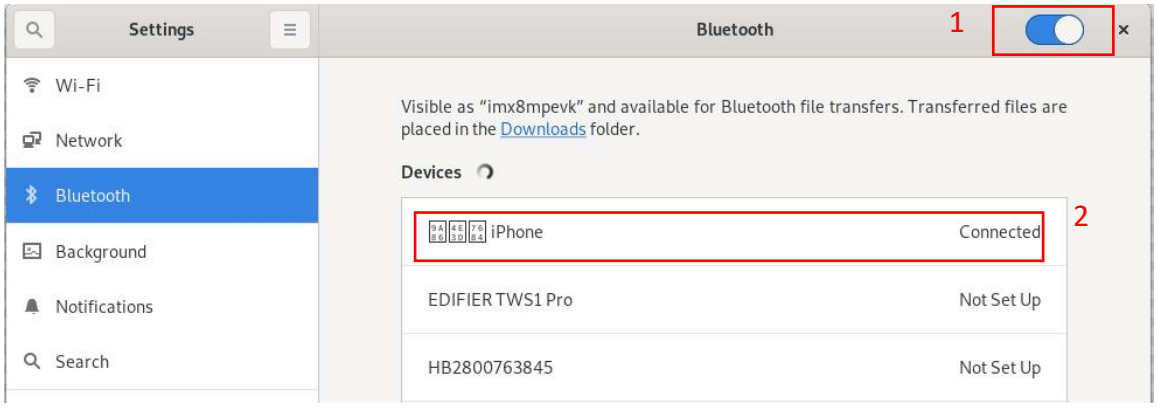


Figure 19

4.4. Use of USB

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

```
df -h
```

```
root@imx8mpevk: /home/debix
debix@imx8mpevk:~$ sudo su
[sudo] password for debix:
root@imx8mpevk:/home/debix# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        14G  5.0G  8.5G  37% /
devtmpfs        949M     0  949M   0% /dev
tmpfs           967M     0  967M   0% /dev/shm
tmpfs           194M  1.8M  192M   1% /run
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
tmpfs           967M     0  967M   0% /sys/fs/cgroup
/dev/mmcblk1p1  500M   32M  469M   7% /boot
tmpfs           194M   44K  194M   1% /run/user/1000
root@imx8mpevk:/home/debix# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        14G  5.0G  8.5G  37% /
devtmpfs        949M     0  949M   0% /dev
tmpfs           967M     0  967M   0% /dev/shm
tmpfs           194M  1.9M  192M   1% /run
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
tmpfs           967M     0  967M   0% /sys/fs/cgroup
/dev/mmcblk1p1  500M   32M  469M   7% /boot
tmpfs           194M   48K  194M   1% /run/user/1000
/dev/sda1       500M   34M  467M   7% /media/debix/68BA-C562
/dev/sda2        29G  4.1G   24G  15% /media/debix/79de8ff0-265b-451f-be52-87356
```

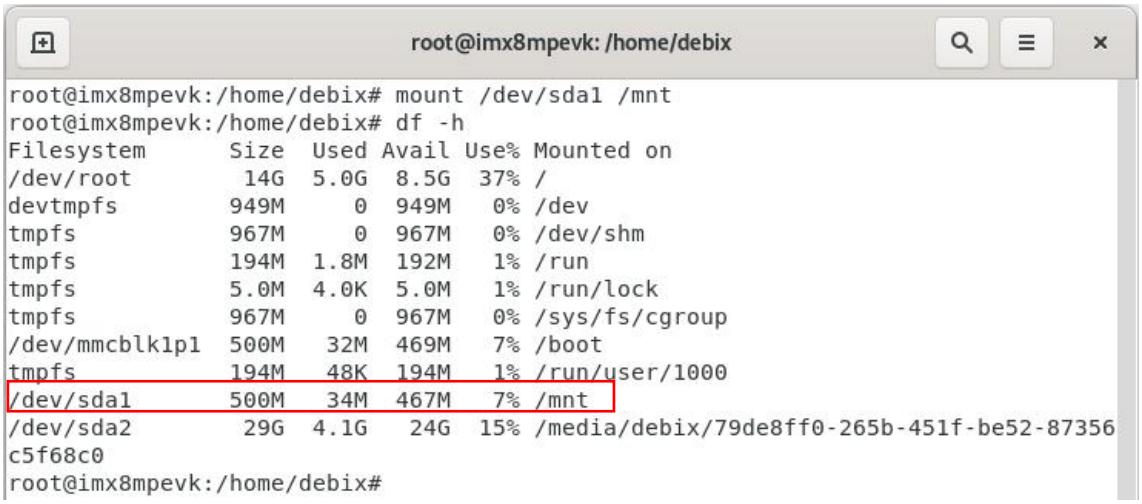
- If the U disk is not mounted, you can mount the U disk with the following command:
  - Query the U disk letter:

```
fdisk -l
```

```
root@imx8mpevk: /home/debix
root@imx8mpevk:/home/debix# fdisk -l
Disk /dev/mmcblk1: 14.86 GiB, 15931539456 bytes, 31116288 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: 0x000dba0b

Device         Boot   Start      End  Sectors  Size Id Type
/dev/mmcblk1p1         20480  1044479  1024000  500M  c W95 FAT32 (LBA)
/dev/mmcblk1p2       1228800 31116287 29887488 14.3G 83 Linux


Disk /dev/sda: 29.74 GiB, 31914983424 bytes, 62333952 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: 0x000dba0b

Device     Boot   Start      End  Sectors  Size Id Type
/dev/sda1          20480  1044479  1024000  500M  c W95 FAT32 (LBA)
/dev/sda2        1228800 62333951 61105152 29.1G 83 Linux
```

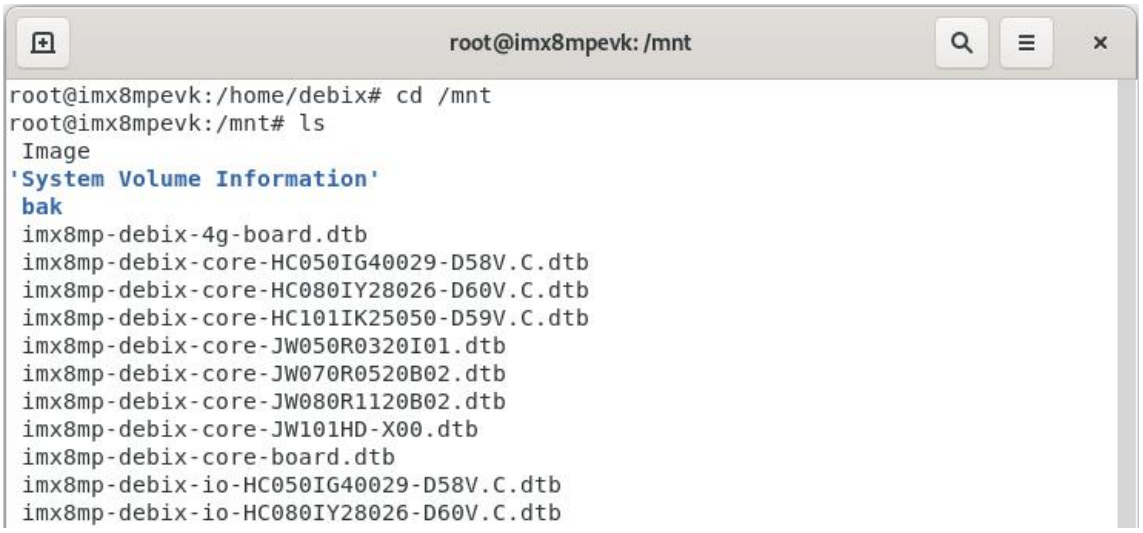
  - Mounting the U disk:

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



2. Enter the U disk directory:

```
cd /mnt
```

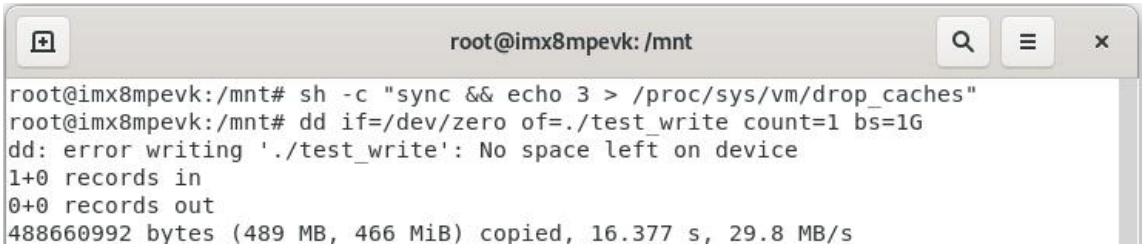


3. Clear the cache, run before each read and write test command.

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

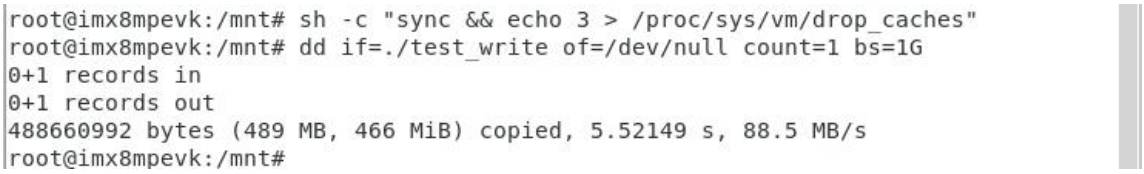
4. Write speed test.

```
sh -c "sync && echo 3 > /proc/sys/vm/drop_caches"       // clear cache
dd if=/dev/zero of=./test_write count=1 bs=1G
```



5. 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
```



4.5. Verification of RTC

The desktop settings of the BPC-iMX8MP-01 Industrial Computer RTC (Settings >> Date&Time) are as follows.

- Unlock "Date & Time" to turn on or off automatic time.
- Set "Time Zone" as local zone.
- Set "Time Format" to 24-hour.

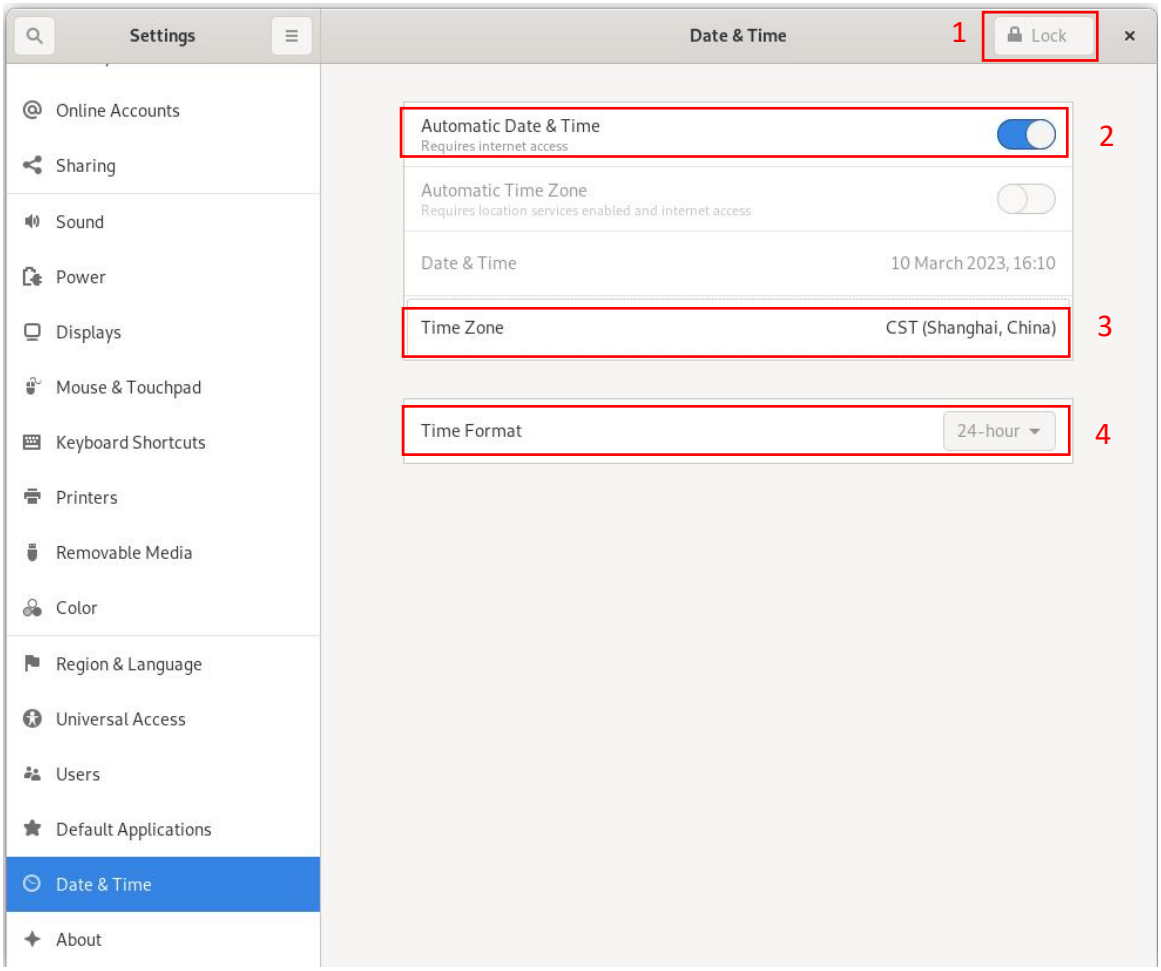


Figure 20

Read the RTC time of the Industrial Computer via hwclock -r command, as shown in the figure below.

```
root@imx8mpevk:/mnt# hwclock -r
2023-03-16 13:52:47.322857+08:00
root@imx8mpevk:/mnt#
```