

SRT-IMX8P

Gateway & Expansion Board

User's Manual 2nd Ed

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Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
● SRT-IMX8P	1

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. All cables and adapters supplied by AAEON are certified and in accordance with the material safety laws and regulations of the country of sale. Do not use any cables or adapters not supplied by AAEON to prevent system malfunction or fires.
3. Make sure the power source matches the power rating of the device.
4. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
5. Always completely disconnect the power before working on the system's hardware.
6. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
7. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
8. Always disconnect this device from any AC supply before cleaning.
9. While cleaning, use a damp cloth instead of liquid or spray detergents.
10. Make sure the device is installed near a power outlet and is easily accessible.
11. Keep this device away from humidity.
12. Place the device on a solid surface during installation to prevent falls
13. Do not cover the openings on the device to ensure optimal heat dissipation.
14. Watch out for high temperatures when the system is running.
15. Do not touch the heat sink or heat spreader when the system is running
16. Never pour any liquid into the openings. This could cause fire or electric shock.

17. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.
18. If any of the following situations arises, please the contact our service personnel:
 - i. Damaged power cord or plug
 - ii. Liquid intrusion to the device
 - iii. Exposure to moisture
 - iv. Device is not working as expected or in a manner as described in this manual
 - v. The device is dropped or damaged
 - vi. Any obvious signs of damage displayed on the device
19. **DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WITH TEMPERATURES BEYOND THE DEVICE'S PERMITTED STORAGE TEMPERATURES (SEE CHAPTER 1) TO PREVENT DAMAGE.**

Warning!



This device complies with Part 15 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte. Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur. Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	X	X	○	○	○	○
外部信号 连接器及线材	X	X	○	○	○	○
<p>○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。</p> <p>X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。</p> <p>备注：此产品所标示之环保使用期限，系指在一般正常使用状况下。</p>						

China RoHS Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products

AAEON Main Board/ Daughter Board/ Backplane

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	X	X	○	○	○	○
Wires & Connectors for External Connections	X	X	○	○	○	○
<p>○: The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.</p> <p>X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.</p> <p>Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only</p>						

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Chapter 1

Product Specifications

1.1 Specifications

System

Processor	Quad-Core i.MX 8M Plus–Arm® Cortex® -A53, 1.6 GHz Processor (NPU Optional)
Memory	Onboard LPDDR4, 2GB (Optional 4GB)
Storage	eMMC 5.1, 16GB (Optional 32GB)
Real Time Clock	RTC x 1, with 3V CR2032H Lithium Battery
Security	TPM 2.0
Indicators	Programmable LED Control x 7
Cellular	Mini PCIe Connector x 1 (USB signal)
Wi-Fi & Bluetooth	Mini PCIe Connector x 1 (USB signal)
Operating System	Debian 11 (Default, GUI is optional) Android™ 13 Windows® 10 IoT Yocto
Support Protocol	—

I/O

Serial Port	RS-232/422/485 Switchable x 2 Phoenix Connector
Ethernet	RJ-45 GbE x 2
USB	USB 3.0 (Type-A) x 2
CANBus	CAN-FD x 2 CH Phoenix Connector
Display	HDMI 2.0a x 1
Power Connector	2-Pin 3.81mm Pitch Phoenix Connector

I/O

Debug Port	Micro USB x 1
Expansion Slot	SIM Card Slot x 1 MicroSD Slot x 1

Power Supply

Power Requirement	DC 9V ~ 36V
Power Consumption	9.36W (Full Loading)
MTBF (Hours)	479,374

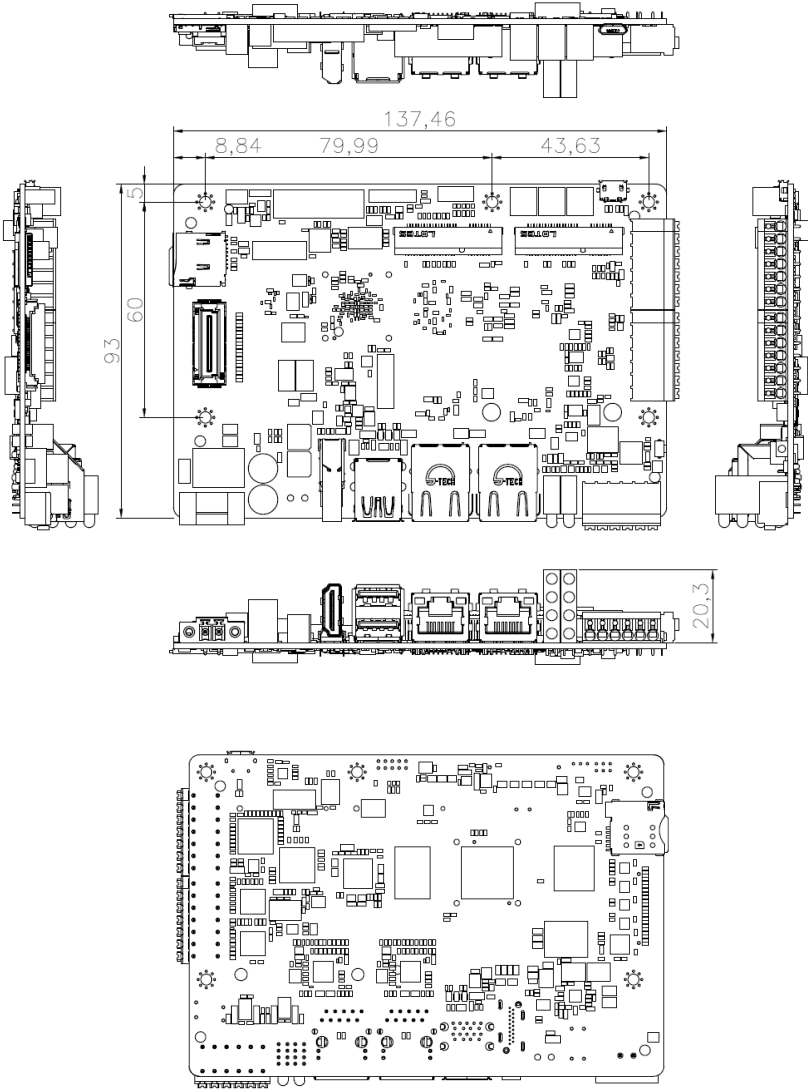
Environmental

Dimension	3.66" x 5.43" (93mm x 138mm)
Weight	0.7 lb. (0.35Kg)
Mount Options	—
Operation Temperature	-4°F ~ 158°F (-20°C ~ 70°C)
Storage Temperature	-40°F ~ 176°F (-40°C ~ 80°C)
Operation Humidity	10% ~ 95% relative humidity, non-condensing
Certification	CE/FCC Class A UL61010/IEC61000-6-2/IEC61000-6-4/IEC61131-2

Chapter 2

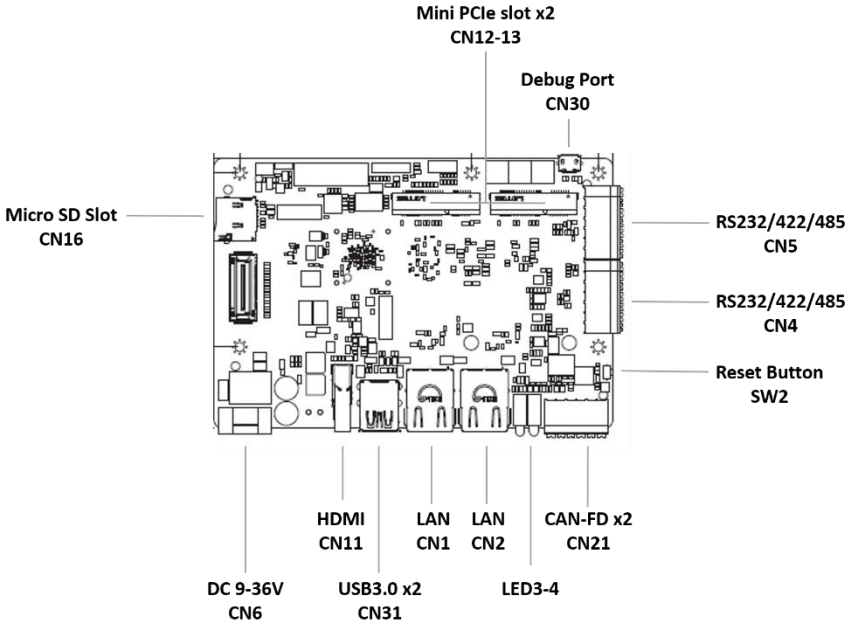
Hardware Information

2.1 Dimensions

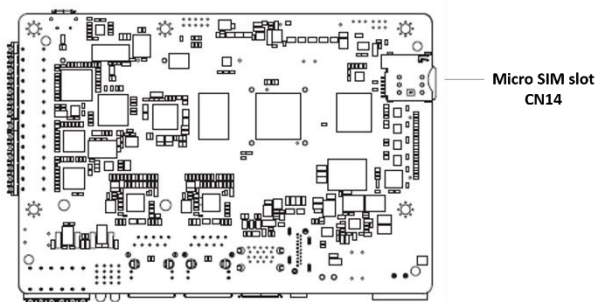


2.2 I/O Location

Top



Bottom

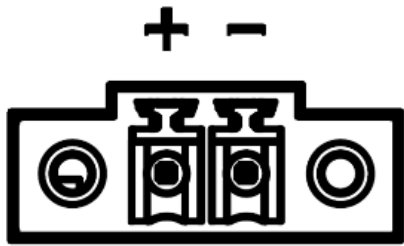


2.3 List of Connectors

The SRT-IMX8P features several connectors which can be configured for your application. This section details those connections and their specifications.

Label	Function
CN6	DC 9 ~ 36V Power Input
CN11	HDMI Port
CN31	USB 3.0 Port
CN1/2	Giga LAN Port
LED3/4	Indicators Light
CN21	CAN-FD Port
SW2	Reset Button
CN4/5	RS-232/422/485 Connector
CN14	Micro SIM Slot
CN16	Micro SD Slot
CN12/13	Mini PCIe Slot
CN30	Debug Port

2.3.1 DC Power (CN6)



DC IN 9V~36V

The gateway can accept DC 9-36V input through a 2-pin phoenix connector.

Note: Input connector should be secured by 18-24mm AWG wire and torque value of 2kg lb.-in.

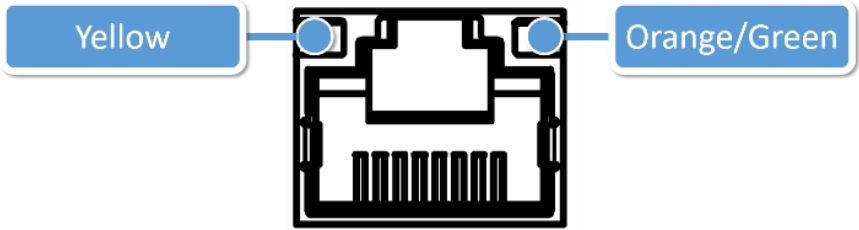
2.3.2 HDMI Port (CN11)

The HDMI support port enables video output to an external display.

2.3.3 USB 3.0 Port (CN31)

The USB 3.0 is a Type-A connector, and can also support USB mass storage.

2.3.4 Giga LAN Port (CN1/CN2)



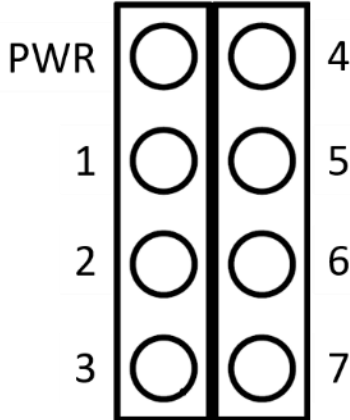
The standard RJ-45 port provides connection to the Local Area Network (LAN).

LED	Function	Status
Yellow	Active status	ON: LAN link is established. OFF: LAN link is not established. Blink: Data received and transmitted.
Orange/Green	Link Speed status	Green on: 100Mbps. Orange on: 1000Mbps.

2.3.5 Indicators Light (LED3/LED4)

User can control the 7 LED via the GPIO.

The control command for LED 1:



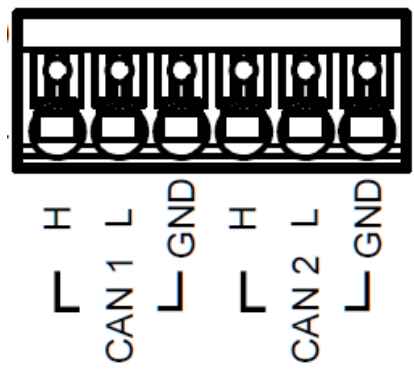
Control Command

Turn On	<code>m0cli -c 0 -i 1 -v 1</code>
Turn Off	<code>m0cli -c 0 -i 1 -v 0</code>

Note: i: LED number.

2.3.6 CAN-FD Port (CN21)

The board provides two phoenix CANbus ports for external device connection.



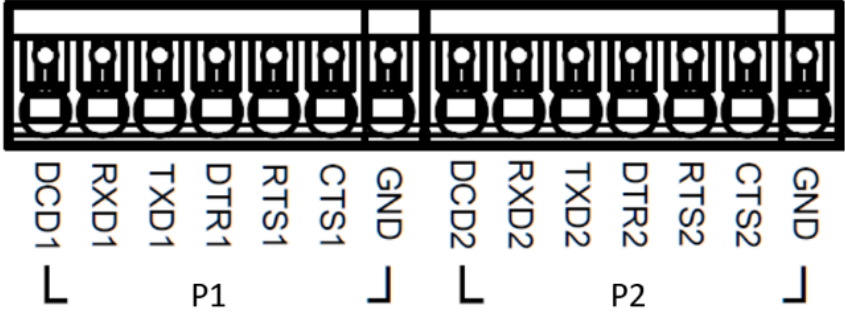
See Chapter 3 for more information.

2.3.7 Reset Button (SW2)

Press the button to reboot the OS.

2.3.8 RS-232/422/485 Connector (CN4/CN5)

Provides two phoenix connectors for RS-232/422/485 interface.



Check chapter 3 for more information.

2.3.9 Micro SIM Slot (CN14)

User can insert the micro SIM card into the slot when using an LTE module via the mini card slot.

2.3.10 Micro SD Slot (CN16)

User can increase the available storage by insert the microSD card.

2.3.11 Mini PCIe slot (CN12/CN13)

The two slots support Wi-Fi or 4G LTE modules.

2.3.12 Debug Port (CN30)

Log into the gateway's Linux OS via SSH by debug port (Micro USB type).

Serial Port Settings

Baud rate	115200 bps
Parity	None
Data bits	8
Stop bits	1
Flow Control	None

See Chapter 3 for further information.

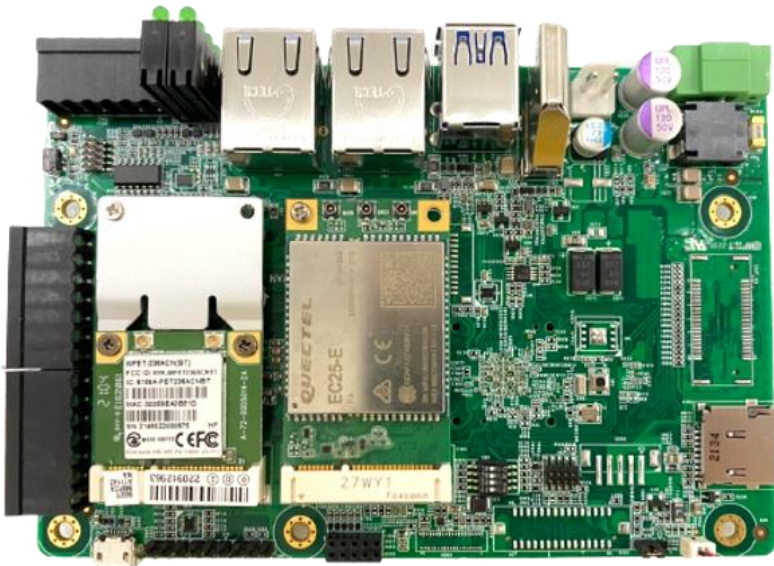
2.4 Wireless Hardware Setup


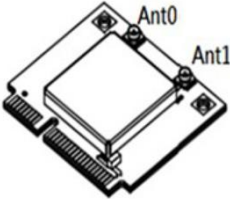


SRT-IMX8P features mini PCIe slots and a Micro SIM card slot for connecting to wireless networks such as 4G LTE and WiFi. This section details how to install a SIM Card, 4G/LTE module, and WiFi module.

2.4.1 Mini Card Installation

Insert the 4G/LTE, or Wi-Fi/BT module into the slot and connect the RF coaxial cable to the module.

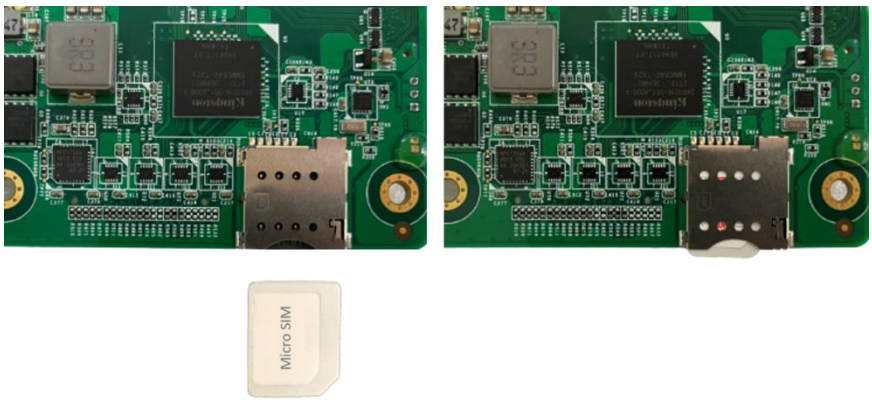
Note: The installation slots are the same as the below image.



Item	Module	Installation Location
Wi-Fi	 <p>WPET-236ACN(BT) module</p>	 <p>Install the RF cable to left conn. to support Wi-Fi signal. (ANT0 for WLAN only, ANT1 for WLAN+BT)</p>
4G/LTE	 <p>EG25-G module</p>	 <p>Install the RF cable to left conn. to support 4G/LTE signal.</p>

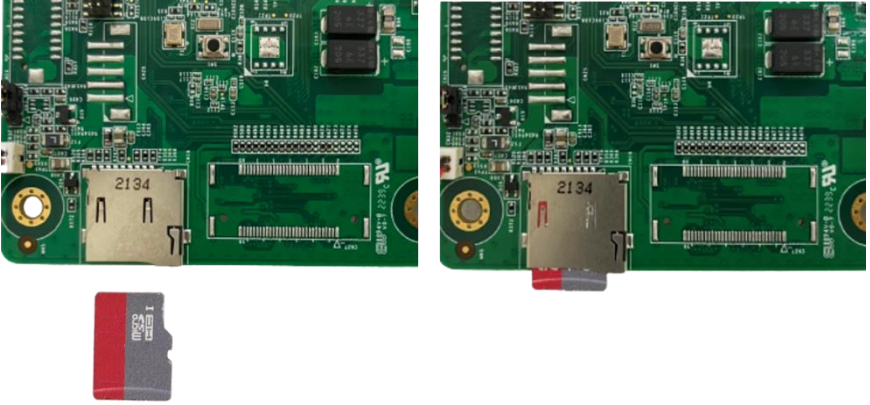
2.4.2 SIM Card Installation

To install a SIM Card (Micro SIM) simply insert the SIM Card into the slot as shown. Ensure the card is correctly oriented.



2.4.3 SD Card Installation

To install an SD Card, simply insert it into the slot as shown. Ensure the card is correctly oriented.



Chapter 3

Gateway Setup and Configuration

3.1 Connecting to the System

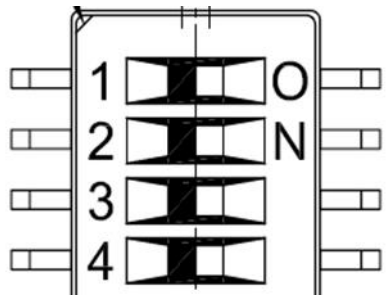
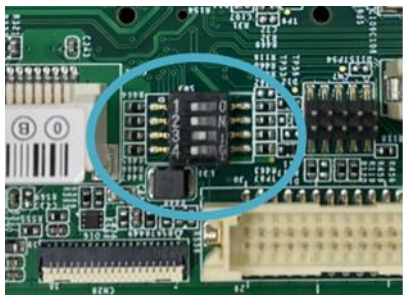
When connecting a PC or laptop to the SRG-IMX8P system, it is recommended to use PuTTY with Windows 10. Users can download the software from the PuTTY website.

Step 1: Download the PuTTY tools: <https://www.putty.org/>.

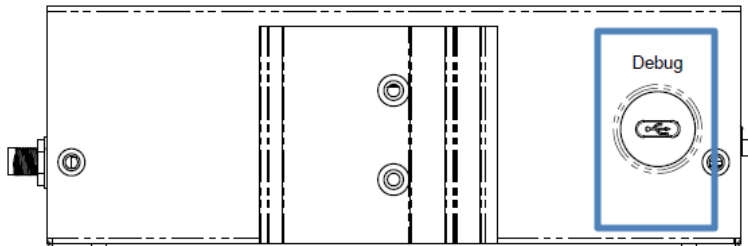
Step 2: Switch jumper (SW3) to 0010. (Factory default settings)

PIN 1, 2, 4 switch to OFF.

PIN 3 switch to ON.



Step 3: Connect the gateway via a USB cable. Connect your computer to the SRG-IMX8P using the Micro USB port (Debug port is same side as din rail mounting holes)

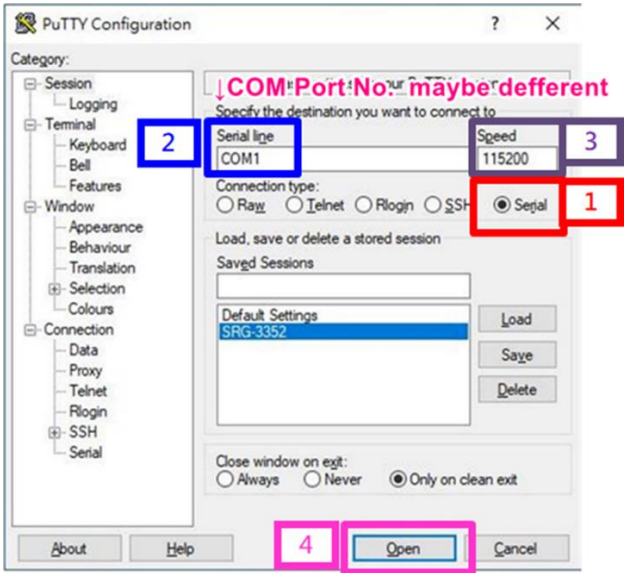


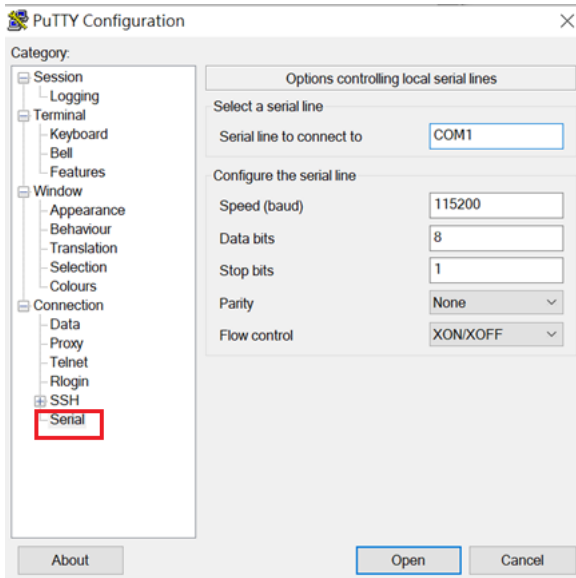
Step 4: Open Device Manager and locate Multifunction Composite Gadget. Double click on the device. A pop-up should appear, with a notice that the CDC Serial is unrecognized



Step 5: Setting the putty configuration.

Open the putty and use the settings to log into the system

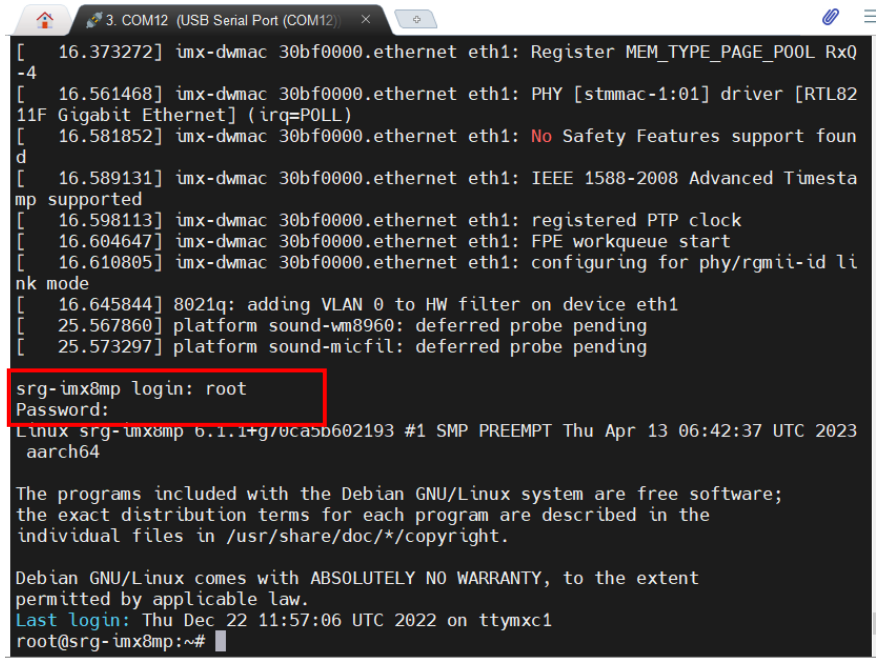




Step 6: Log into the system using the below credentials.

Login Settings	
Username	aaeon
Password	Pw#12345

You will see a welcome message when you have successfully connected to the gateway.



```
[ 16.373272] imx-dwmac 30bf0000.ethernet eth1: Register MEM_TYPE_PAGE_POOL RxQ
-4
[ 16.561468] imx-dwmac 30bf0000.ethernet eth1: PHY [stmmac-1:01] driver [RTL82
11F Gigabit Ethernet] (irq=POLL)
[ 16.581852] imx-dwmac 30bf0000.ethernet eth1: No Safety Features support foun
d
[ 16.589131] imx-dwmac 30bf0000.ethernet eth1: IEEE 1588-2008 Advanced Timesta
mp supported
[ 16.598113] imx-dwmac 30bf0000.ethernet eth1: registered PTP clock
[ 16.604647] imx-dwmac 30bf0000.ethernet eth1: FPE workqueue start
[ 16.610805] imx-dwmac 30bf0000.ethernet eth1: configuring for phy/rgmii-id li
nk mode
[ 16.645844] 8021q: adding VLAN 0 to HW filter on device eth1
[ 25.567860] platform sound-wm8960: deferred probe pending
[ 25.573297] platform sound-micfil: deferred probe pending

srg-imx8mp login: root
Password:
Linux srg-imx8mp 6.1.1+g0c5b602193 #1 SMP PREEMPT Thu Apr 13 06:42:37 UTC 2023
aarch64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Dec 22 11:57:06 UTC 2022 on ttyuxc1
root@srg-imx8mp:~#
```

3.2 User Account Management

This section will show you how to manage user accounts on this system.

3.2.1 Add User Account

Command:

```
$ sudo useradd USERACCOUNT
```

E.g. (USERACCOUNT: jonny)

```
$ sudo adduser jonny
```

When successful, output will display as below.

```

[  16.589131] imx-dwmac 30bf0000.ethernet eth1: IEEE 1588-2008 Advanced Timesta
mp supported
[  16.598113] imx-dwmac 30bf0000.ethernet eth1: registered PTP clock
[  16.604647] imx-dwmac 30bf0000.ethernet eth1: FPE workqueue start
[  16.610805] imx-dwmac 30bf0000.ethernet eth1: configuring for phy/rgmii-id li
nk mode
[  16.645844] 8021q: adding VLAN 0 to HW filter on device eth1
[  25.567860] platform sound-wm8960: deferred probe pending
[  25.573297] platform sound-micfil: deferred probe pending

srg-imx8mp login: root
Password:
Linux srg-imx8mp 6.1.1+g70ca5b602193 #1 SMP PREEMPT Thu Apr 13 06:42:37 UTC 2023
aarch64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Dec 22 11:57:06 UTC 2022 on ttyxmc1
root@srg-imx8mp:~# sudo adduser jonny
Adding user `jonny' ...
Adding new group `jonny' (1001) ...
Adding new user `jonny' (1001) with group `jonny' ...
Creating home directory `/home/jonny' ...
Copying files from `/etc/skel' ...
New password: █

```

3.2.2 Delete User Account

Command:

```
$ sudo userdel USERACCOUNT
```

E.g. (USERACCOUNT: jonny)

```
$ sudo userdel jonny
```

When successful, output will display as below.

```
root@srg- imx8mp:~# sudo userdel jonny
root@srg- imx8mp:~# █
```

3.3 I/O Management

This section will show you how to operate the I/O function.

Control GPIO

Command:

```
gpiowrite GPIO2_21
```

Set GPIO direction:

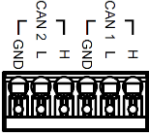
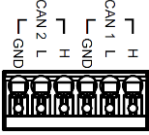
E.g.

```
gpioset 2 21=0 // set gpio value is 0
gpioset 2 21=1 // set gpio value is 1
```

When successful, output will display as below.

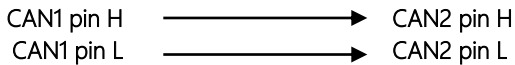
```
root@srg- imx8mp:~# gpioset 2 21=0
root@srg- imx8mp:~# gpioset 2 21=1
root@srg- imx8mp:~# █
```

3.4 CAN-FD Pin Definition

System Name	Position	Pin Definition	
		Pin	Definition
can0	 <p>CAN1</p>	1	H
		2	L
		3	GND
		Pin	Definition
can1	 <p>CAN2</p>	1	H
		2	L
		3	GND
		Pin	Definition

CANBus Read/Write

The two ports can be connected to each other, as below:



Command:

Run CANBus script:

```
ifconfig can0 down
ip link set can0 type can loopback off
ip link set can0 type can bitrate 1000000 triple-sampling on

ifconfig can1 down
ip link set can1 type can loopback off
ip link set can1 type can bitrate 1000000 triple-sampling on

ifconfig can0 up
ifconfig can1 up
```



When successful, output will display as below.

```
root@srg-ix8mp:/rootfs/test# cd
root@srg-ix8mp:~# cansend can0 111#1122334455667788
root@srg-ix8mp:~# cansend can1 111#8877665544332211
root@srg-ix8mp:~# ifconfig can0 down
ip link set can0 type can loopback off
ip link set can0 type can bitrate 1000000 triple-sampling on
root@srg-ix8mp:~# ifconfig can1 down
ip link set can1 type can loopback off
ip link set can1 type can bitrate 1000000 triple-sampling on
root@srg-ix8mp:~# ifconfig can0 up
root@srg-ix8mp:~# ifconfig can1 up
root@srg-ix8mp:~#
```

```
candump can0&
candump can1&
cansend can0 111#1122334455667788
cansend can1 111#8877665544332211
```

```
root@srg-ix8mp:~# candump can0&
[1] 1746
root@srg-ix8mp:~# candump can1&
[2] 1749
root@srg-ix8mp:~# cansend can0 111#1122334455667788
can1 111 [8] 11 22 33 44 55 66 77 88
can0 111 [8] 11 22 33 44 55 66 77 88
root@srg-ix8mp:~# cansend can1 111#8877665544332211
can0 111 [8] 88 77 66 55 44 33 22 11
can1 111 [8] 88 77 66 55 44 33 22 11
root@srg-ix8mp:~#
```

3.5 Pin Definition: RS-232/422/485

System Name	Position	RS232		RS422		RS485	
		Pin	Definition	Pin	Definition	Pin	Definition
/dev/tty xc0	 COM P1 (CN4)	1	-	1	DCD1	1	DCD1
		2	RXD1	2	RXD1	2	RXD1
		3	TXD1	3	TXD1	3	-
		4	-	4	DTR1	4	-
		5	-	5	-	5	-
		6	-	6	-	6	-
		7	GND	7	GND	7	GND
/dev/tty xc2	 COM P2 (CN5)	1	-	1	DCD2	1	DCD2
		2	RXD2	2	RXD2	2	RXD2
		3	TXD2	3	TXD2	3	-
		4	-	4	DTR2	4	-
		5	-	5	-	5	-
		6	-	6	-	6	-
		7	GND	7	GND	7	GND

Check/Switch RS-232/422/485 Mode

Command:

Check Current Mode:

COM P1 (CN4):

Mode 0 = GPIO85 signal inversion					
Mode 1 = GPIO86 signal inversion					
Switch Function	Mode 0	Mode 1	GPIO85	GPIO86	Function
Signal (High / Low)	1	0	0	1	RS232
Signal (High / Low)	0	1	1	0	RS485
Signal (High / Low)	1	1	0	0	RS485/RS422

COM P2 (CN5):

Mode 0 = GPIO87 signal inversion					
Mode 1 = GPIO12 signal inversion					
Switch Function	Mode 0	Mode 1	GPIO87	GPIO12	Function
Signal (High / Low)	1	0	0	1	RS232
Signal (High / Low)	0	1	1	0	RS485
Signal (High / Low)	1	1	0	0	RS485/RS422

RS-232 Mode GPIO control:

```
gpioset 2 21=0
gpioset 2 22=1
gpioset 2 23=0
gpioset 0 12=1
```

RS-485 Mode GPIO control:

```
gpioset 2 21=1
gpioset 2 22=0
gpioset 2 23=1
gpioset 0 12=0
```

RS-422 Mode GPIO control:

```
gpioset 2 21=0
gpioset 2 22=0
gpioset 2 23=0
gpioset 0 12=0
```

3.6 Network Settings

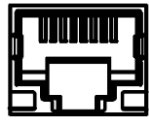
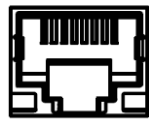
This section will show you how to check and setup the network settings.

3.6.1 Check the IP Setting

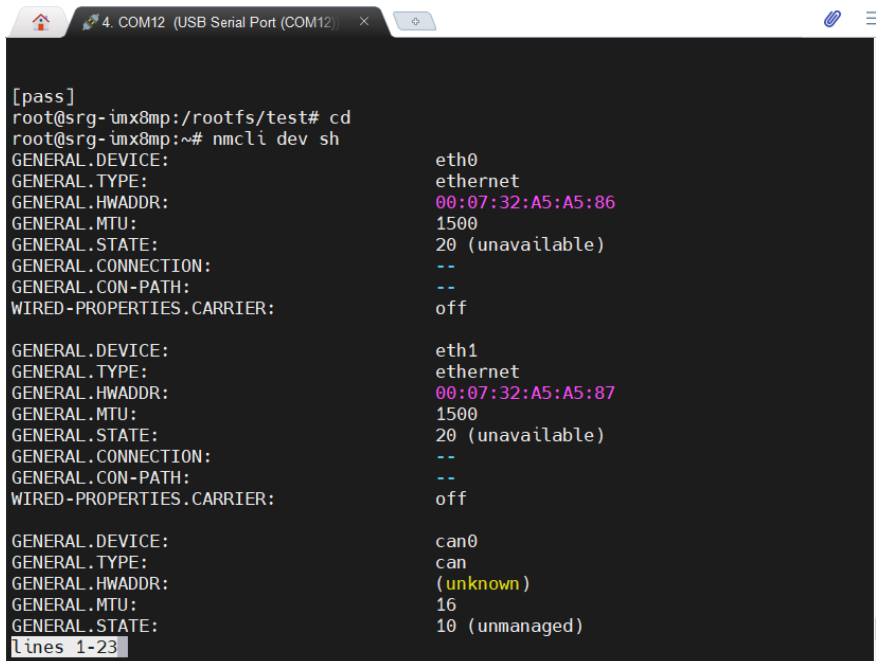
Command:

```
$ nmcli dev sh
```

NETWORKPROFILE ->It should be:

Profile	Support Hardware
LAN0	LAN 1 
LAN1	LAN 2 
Modem	4G LTE Module

When successful, output will display as below.



```
4. COM12 (USB Serial Port (COM12)) x
[pass]
root@srg-ix8mp:/rootfs/test# cd
root@srg-ix8mp:~# nmcli dev sh
GENERAL.DEVICE:                eth0
GENERAL.TYPE:                   ethernet
GENERAL.HWADDR:                 00:07:32:A5:A5:86
GENERAL.MTU:                    1500
GENERAL.STATE:                  20 (unavailable)
GENERAL.CONNECTION:             --
GENERAL.CON-PATH:               --
WIRED-PROPERTIES.CARRIER:     off

GENERAL.DEVICE:                eth1
GENERAL.TYPE:                   ethernet
GENERAL.HWADDR:                 00:07:32:A5:A5:87
GENERAL.MTU:                    1500
GENERAL.STATE:                  20 (unavailable)
GENERAL.CONNECTION:             --
GENERAL.CON-PATH:               --
WIRED-PROPERTIES.CARRIER:     off

GENERAL.DEVICE:                can0
GENERAL.TYPE:                   can
GENERAL.HWADDR:                 (unknown)
GENERAL.MTU:                    16
GENERAL.STATE:                  10 (unmanaged)
Lines 1-23
```

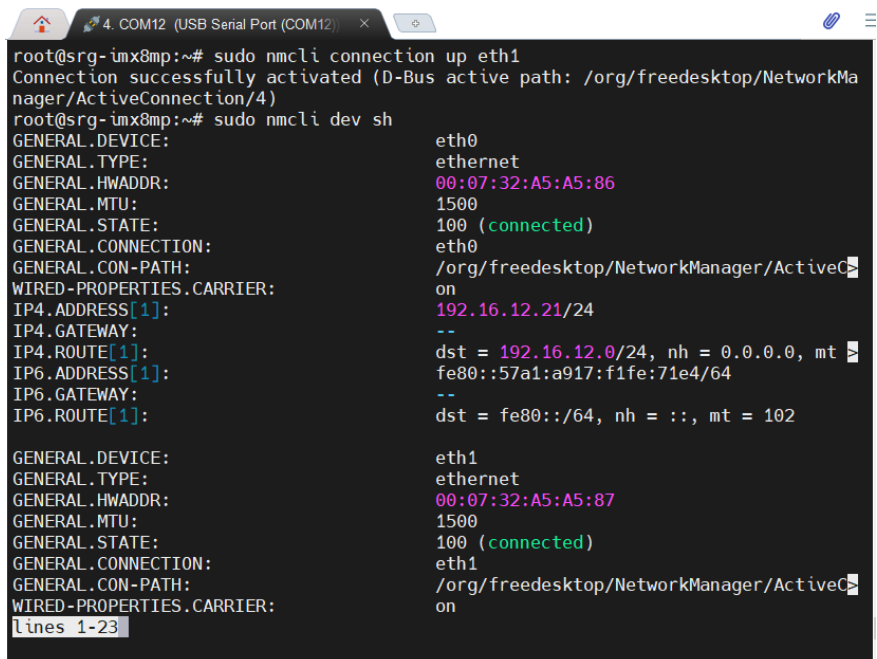
3.6.2 Set Static IP

Enter edit mode.

Command:

```
$ sudo nmcli connection add con-name eth0 type ethernet ifname eth0 ip4
192.16.12.21/24
$ sudo nmcli connection up eth0
$ sudo nmcli connection add con-name eth1 type ethernet ifname eth1 ip4
192.16.12.26/24
$ sudo nmcli connection up eth1
$ sudo nmcli dev sh
```

When successful, output will display as below.



```
root@srg-ix8mp:~# sudo nmcli connection up eth1
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkMa
nager/ActiveConnection/4)
root@srg-ix8mp:~# sudo nmcli dev sh
GENERAL.DEVICE:                eth0
GENERAL.TYPE:                  ethernet
GENERAL.HWADDR:                00:07:32:A5:A5:86
GENERAL.MTU:                   1500
GENERAL.STATE:                 100 (connected)
GENERAL.CONNECTION:           eth0
GENERAL.CON-PATH:              /org/freedesktop/NetworkManager/ActiveC
WIRED-PROPERTIES.CARRIER:    on
IP4.ADDRESS[1]:                192.16.12.21/24
IP4.GATEWAY:                   --
IP4.ROUTE[1]:                  dst = 192.16.12.0/24, nh = 0.0.0.0, mt
IP6.ADDRESS[1]:                fe80::57a1:a917:f1fe:71e4/64
IP6.GATEWAY:                   --
IP6.ROUTE[1]:                  dst = fe80::/64, nh = ::, mt = 102

GENERAL.DEVICE:                eth1
GENERAL.TYPE:                  ethernet
GENERAL.HWADDR:                00:07:32:A5:A5:87
GENERAL.MTU:                   1500
GENERAL.STATE:                 100 (connected)
GENERAL.CONNECTION:           eth1
GENERAL.CON-PATH:              /org/freedesktop/NetworkManager/ActiveC
WIRED-PROPERTIES.CARRIER:    on
lines 1-23
```

3.6.3 Set the Dynamic IP

Enter edit mode:

Command:

```
$ sudo nmcli connection mod eth0 ipv4.method auto
$ sudo nmcli con mod eth0 -ipv4.addresses "192.16.12.21/24"
$ sudo nmcli connection up eth0
```

```
root@srg-umx8mp:~# sudo nmcli connection mod eth0 ipv4.method auto
root@srg-umx8mp:~# sudo nmcli con mod eth0 -ipv4.addresses "192.16.12.21/24"
root@srg-umx8mp:~# sudo nmcli connection up eth0
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
root@srg-umx8mp:~# █
```

```
$ sudo nmcli connection mod eth1 ipv4.method auto
$ sudo nmcli con mod eth1 -ipv4.addresses "192.16.12.26/24"
$ sudo nmcli connection up eth1
```

```
root@srg-umx8mp:~# sudo nmcli connection mod eth1 ipv4.method auto
root@srg-umx8mp:~# sudo nmcli con mod eth1 -ipv4.addresses "192.16.12.26/24"
root@srg-umx8mp:~# sudo nmcli connection up eth1
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/6)
root@srg-umx8mp:~# █
```

When successful, output will display as below.

```
root@srg-imx8mp:~# sudo nmcli connection up eth1
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/6)
root@srg-imx8mp:~# sudo nmcli dev sh
GENERAL.DEVICE:                eth0
GENERAL.TYPE:                  ethernet
GENERAL.HWADDR:                00:07:32:A5:A5:86
GENERAL.MTU:                   1500
GENERAL.STATE:                 100 (connected)
GENERAL.CONNECTION:            eth0
GENERAL.CON-PATH:              /org/freedesktop/NetworkManager/ActiveConnection/6
WIRED-PROPERTIES.CARRIER:    on
IP4.ADDRESS[1]:                192.168.1.154/24
IP4.GATEWAY:                   192.168.1.1
IP4.ROUTE[1]:                  dst = 0.0.0.0/0, nh = 192.168.1.1, mt = 104
IP4.ROUTE[2]:                  dst = 192.168.1.0/24, nh = 0.0.0.0, mt = 104
IP4.DNS[1]:                    192.168.1.1
IP6.ADDRESS[1]:                fe80::57a1:a917:f1fe:71e4/64
IP6.GATEWAY:                   --
IP6.ROUTE[1]:                  dst = fe80::/64, nh = ::, mt = 104

GENERAL.DEVICE:                eth1
GENERAL.TYPE:                  ethernet
GENERAL.HWADDR:                00:07:32:A5:A5:87
GENERAL.MTU:                   1500
GENERAL.STATE:                 100 (connected)
GENERAL.CONNECTION:            eth1
lines 1-23
```

3.7 Cellular Network Settings (Optional)

This section will show you how to check and setup the cellular network setting.

3.7.1 Check the Cellular Module Status

Step 1: Leave Command:

```
$ minicom -s
```

```
root@srg-umx8mp:~# minicom -s
```

Step 3: Choose “Serial port setup”, then press “A” to go to settings.

```
+-----[configuration]-----+
| Filenames and paths          |
| File transfer protocols     |
| Serial port setup           |
| Modem and dialing           |
| Screen and keyboard         |
| Save setup as dfl           |
| Save setup as ..           |
| Exit                         |
| Exit from Minicom           |
+-----+
```

Step 4: Leave Command:

```
$ /dev/ttyUSB3
```

Finish setting configuration, then press “Enter”, as below.

```
+-----+
| A - Serial Device           : /dev/ttyUSB3 |
| B - Lockfile Location      : /var/lock   |
| C - Callin Program         :             |
| D - Callout Program        :             |
| E - Bps/Par/Bits           : 115200 8N1  |
| F - Hardware Flow Control   : Yes        |
| G - Software Flow Control   : No         |
| H - RS485 Enable           : No         |
| I - RS485 Rts On Send      : No         |
| J - RS485 Rts After Send   : No         |
| K - RS485 Rx During Tx    : No         |
| L - RS485 Terminate Bus    : No         |
| M - RS485 Delay Rts Before: 0          |
| N - RS485 Delay Rts After : 0          |
|                               |
| Change which setting?      |
+-----+
```

Step 5: Choose “Exit” to leave the dialog.

```
+-----[configuration]-----+
| Filenames and paths
| File transfer protocols
| Serial port setup
| Modem and dialing
| Screen and keyboard
| Save setup as dfl
| Save setup as...
| Exit
| EXIT FROM MINICOM
+-----+
```

3.7.2 Check Module Information in Minicom

Check if module is connected to the serial port:

Command:

```
$ AT
```

Check the SIM card status:

Command:

```
$ AT+CPIN?
```

Check module manufacturer information:

Command:

```
$ ATI
```

Check setting APN:

Command:

```
$ AT+CGDCONT=1,"IPV4V6","internet"
```

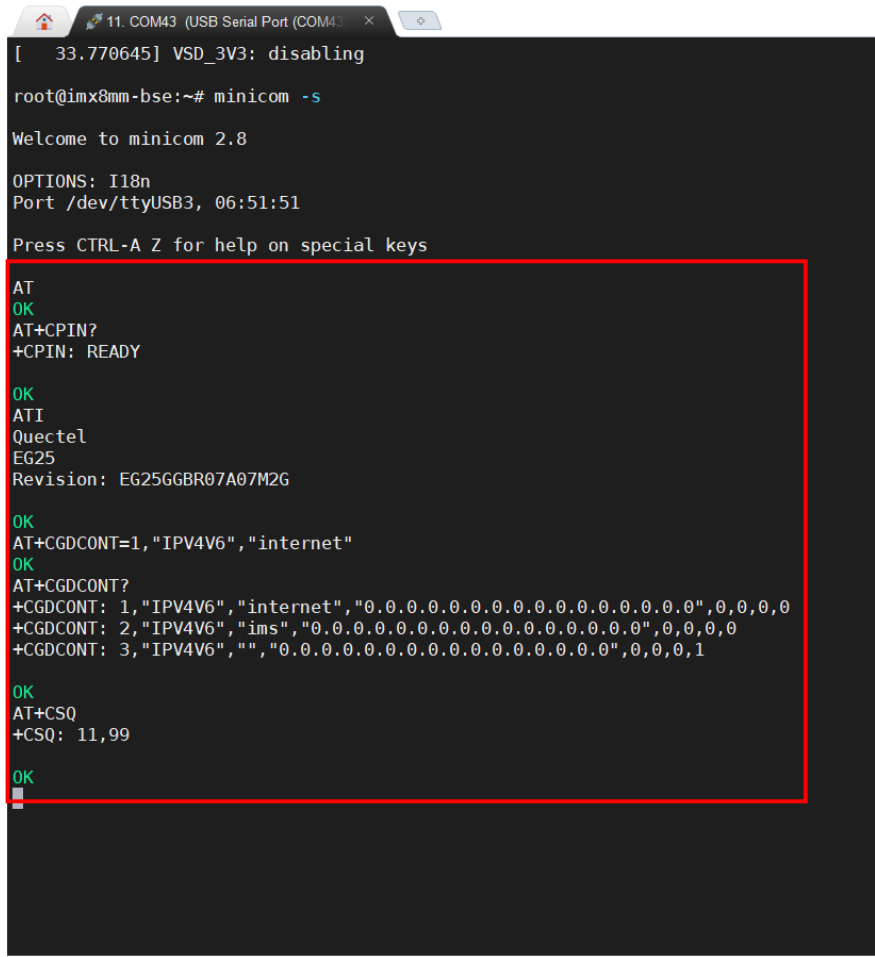
Check 4G signal quality:

Command:

```
$ AT+CGDCONT?
```

```
$ AT+CSQ
```

When successful, output will display as below.



```
[ 33.770645] VSD_3V3: disabling
root@imx8mm-bse:~# minicom -s
Welcome to minicom 2.8

OPTIONS: I18n
Port /dev/ttyUSB3, 06:51:51

Press CTRL-A Z for help on special keys

AT
OK
AT+CPIN?
+CPIN: READY

OK
ATI
Quectel
EG25
Revision: EG25GGBR07A07M2G

OK
AT+CGDCONT=1,"IPV4V6","internet"
OK
AT+CGDCONT?
+CGDCONT: 1,"IPV4V6","internet","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
+CGDCONT: 2,"IPV4V6","ims","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
+CGDCONT: 3,"IPV4V6","", "0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,1

OK
AT+CSQ
+CSQ: 11,99

OK
█
█
```


3.7.2.1 Leave Minicom

Step 1: Press "Ctrl +A".

```
Minicom Command Summary

Commands can be called by CTRL-A <key>

Main Functions                                Other Functions
-----
Dialing directory..D  run script (Go)...G  Clear Screen.....C
Send files.....S     Receive files.....R  cOnfigure Minicom..0
comm Parameters...P  Add linefeed.....A  Suspend minicom...J
Capture on/off....L  Hangup.....H        eXit and reset....X
send break.....F     initialize Modem...M  Quit with no reset.Q
Terminal settings..T  run Kermit.....K    Cursor key mode...I
lineWrap on/off...W  local Echo on/off..E  Help screen.....Z
Paste file.....Y     Timestamp toggle...N  scroll Back.....B
Add Carriage Ret...U

Select function or press Enter for none.
```

Step 2: Press "X".

Step 3: Choose "Yes" then select "Enter" to leave Minicom.

```
+-----+
|               |
|   Leave Minicom?   |
|   Yes             No  |
|               |
+-----+
```

3.7.3 Dial-up Cellular Module

Check the cellular module status

Command:

```
# systemctl enable ModemManager
# sudo systemctl start ModemManager
# mmcli --list-modems
```

```
root@srg-ix8mp:~# systemctl enable ModemManager
root@srg-ix8mp:~# sudo systemctl start ModemManager
root@srg-ix8mp:~# mmcli --list-modems
/org/freedesktop/ModemManager1/Modem/0 [Quectel] EG25
root@srg-ix8mp:~#
```

```
# mmcli -m 0
```

Result:

Cellular module will show "register" status when module is ready.

```
4. COM12 (USB Serial Port (COM12)) x
0000.usb/xhci-hcd.2.auto/usb3/3-1/3-1.4
|
|   drivers: option1
|   plugin: quectel
|   primary port: ttyUSB2
|   ports: ttyUSB0 (qcdm), ttyUSB1 (gps), ttyUSB2 (at),
ttyUSB3 (at)
|-----|
| Status | unlock retries: sim-pin (3), sim-puk (10), sim-pin2 (3), sim-
puk2 (10)
|
|   state: registered
|   power state: on
|   access tech: lte
|   signal quality: 80% (recent)
|-----|
| Modes  | supported: allowed: 2g, 3g, 4g; preferred: none
|         | current: allowed: 2g, 3g, 4g; preferred: none
|-----|
| IP     | supported: ipv4, ipv6, ipv4v6
|-----|
| 3GPP   | imei: 860195056711648
|         | operator id: 46601
|         | operator name: Far EastOne
|         | registration: home
|-----|
| 3GPP EPS | ue mode of operation: csps-2
|-----|
| SIM    | dbus path: /org/freedesktop/ModemManager1/SIM/0
root@srg-ix8mp:~#
```

Enable the cellular module

Command:

```
# mmcli -m 0 -e
```

Result:

```
root@srg-ix8mp:~# mmcli -m 0 -e
successfully enabled the modem
root@srg-ix8mp:~# █
```

Dial up the cellular module

Command:

```
# nmcli -a
```

```
root@srg-ix8mp:~# mmcli -m 0 -e
successfully enabled the modem
root@srg-ix8mp:~# nmcli -a
eth0: connected to eth0
"eth0"
  ethernet (fec), 00:07:32:A5:A5:86, hw, mtu 1500
  ip4 default
  inet4 192.168.1.154/24
  route4 0.0.0.0/0
  route4 192.168.1.0/24
  inet6 fe80::57a1:a917:f1fe:71e4/64
  route6 fe80::/64

wlan0: connected to Pixel 7
"Realtek Wi-Fi"
  wifi (rtl88x2bu), 00:0E:8E:A3:B5:09, hw, mtu 1500
  ip6 default
  inet4 192.168.199.253/24
  route4 0.0.0.0/0
  route4 192.168.199.0/24
  inet6 2001:b400:e200:bf5f:dbe8:85f:50ef:49e5/64
  inet6 fe80::1efe:8f38:33ba:fc47/64
  route6 2001:b400:e200:bf5f::/64
  route6 ::/0
  route6 fe80::/64

Lines 1-23
```

```
# nmcli c add con-name test type gsm ifname ttyUSB2 apn internet
```

Result:

```
root@srg-ix8mp:~# nmcli c add con-name test type gsm ifname ttyUSB2 apn internet
Connection 'test' (ec210f9d-d8c9-4743-880d-b661062414f3) successfully added.
root@srg-ix8mp:~# █
```

Check the cellular module connection:

Command:

```
#ifconfig
```

Result:

```
ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST> mtu 1500
    inet 10.25.12.205 netmask 255.255.255.255 destination 0.0.0.0
    ppp txqueueLen 3 (Point-to-Point Protocol)
    RX packets 9 bytes 108 (108.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 10 bytes 176 (176.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
# ping 8.8.8.8
```

```
root@srg-ix8mp:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=114 time=5.54 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=114 time=4.49 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=114 time=5.02 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=114 time=6.77 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=114 time=5.24 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=114 time=4.47 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=114 time=4.37 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=114 time=4.02 ms
64 bytes from 8.8.8.8: icmp_seq=9 ttl=114 time=5.31 ms
64 bytes from 8.8.8.8: icmp_seq=10 ttl=114 time=5.61 ms
64 bytes from 8.8.8.8: icmp_seq=11 ttl=114 time=4.77 ms
64 bytes from 8.8.8.8: icmp_seq=12 ttl=114 time=4.69 ms
64 bytes from 8.8.8.8: icmp_seq=13 ttl=114 time=4.77 ms
█
```

3.8 Wi-Fi Network Settings (Optional)

This section will show you how to check and setup the wireless network like Wi-Fi.

3.8.1 Scan Wi-Fi Access Point

Command:

```
# nmcli radio wifi on
# nmcli dev wifi
```

Result:

```
root@srg-ix8mp:~# nmcli radio wifi on
root@srg-ix8mp:~# nmcli dev wifi
IN-USE BSSID SSID MODE CHAN RATE
AC:22:0B:9A:40:08 ubuntu-cert-n-wpa Infra 11 195 Mbit/s
24:81:3B:2B:5D:4F AAE0N-Wireless-PEAP Infra 36 540 Mbit/s
24:81:3B:2B:5D:4E AAE0N-Wireless Infra 36 540 Mbit/s
E0:23:FF:B9:FC:C1 GW-0A Infra 6 130 Mbit/s
52:5F:08:44:86:9A -- Infra 1 270 Mbit/s
24:5E:BE:54:C3:99 2.4G_TS_TS_TS_TS Infra 11 540 Mbit/s
48:5F:08:44:86:9A 2.4G_DSD_ROOM Infra 1 270 Mbit/s
24:81:3B:2B:5D:40 AAE0N-Wireless-PEAP Infra 1 260 Mbit/s
E0:23:FF:B9:FC:C2 GW-User Infra 6 130 Mbit/s
24:81:3B:2B:5D:41 AAE0N-Wireless Infra 1 260 Mbit/s
24:5E:BE:54:C3:98 5G_TS_TS_TS_TS Infra 56 540 Mbit/s
2C:4D:54:6F:C9:AC HafrisonWu_5G Infra 157 270 Mbit/s
E0:23:FF:B9:FC:C0 GW-Guest Infra 6 130 Mbit/s
78:44:76:DF:67:38 TOTOLINK_N150RA S Infra 11 135 Mbit/s
4E:5F:08:44:86:9C -- Infra 44 270 Mbit/s
48:5F:08:44:86:9C 2.4G_DSD_ROOM Infra 44 270 Mbit/s
A8:5E:45:DB:4A:0C RMD_HW_5G Infra 161 270 Mbit/s
CC:32:E5:D6:A0:D6 XY5G Infra 157 270 Mbit/s
40:EE:15:49:56:10 TOTOLINK_A700R Infra 1 270 Mbit/s
38:2C:4A:65:5A:F0 Asus-RT-N18U Infra 6 195 Mbit/s
26:5A:4C:23:45:36 -- Infra 11 260 Mbit/s
A8:5E:45:DB:4A:08 RMD_HW_2.4G Infra 11 270 Mbit/s
lines 1-23
```

3.8.2 Connect Wi-Fi Access Point

Command:

```
# nmcli dev wifi connect 'SSID' password 'PASSWORD'
```

E.g.

```
# nmcli dev wifi connect 'AAEON-Wireless' password 'aaeonwireless'  
# wifi connect
```

SSID->Which you want to connect

PASSWORD->Password for the chosen SSID

Result:

```
root@srg-ix8mp:~# nmcli dev wifi connect 'AAEON-Wireless' password 'aaeonwireless'  
[ 675.607331 IPV6: ADDRCONF(NETDEV_CHANGE): wlan0: link becomes ready  
Device 'wlan0' successfully activated with 'e2a7cfb3-4bfa-4c3e-993a-edb0b4fffc08'  
.  
root@srg-ix8mp:~# nmcli connect  
NAME                UUID                                TYPE      DEVICE  
AAEON-Wireless      e2a7cfb3-4bfa-4c3e-993a-edb0b4fffc08  wifi      wlan0  
test                 ec210f9d-d8c9-4743-880d-b661062414f3  gsm       ttyUSB2  
eth0                 e4dab538-150f-444e-b2e3-ae942dd4519a  ethernet  --  
eth1                 d66c7961-fda0-4b49-aed0-8135e73d01db  ethernet  --  
Pixel 7              48bcae82-140f-4083-8385-455b5181e4a8  wifi      --  
root@srg-ix8mp:~# █
```

3.8.3 Check Wi-Fi signal

Command:

```
# ping 8.8.8.8
```

Result:

```
root@srg-ïmx8mp:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=115 time=5.19 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=115 time=8.25 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=115 time=6.62 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=115 time=7.30 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=115 time=7.53 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=115 time=5.86 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=115 time=5.44 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=115 time=6.06 ms
64 bytes from 8.8.8.8: icmp_seq=9 ttl=115 time=7.84 ms
64 bytes from 8.8.8.8: icmp_seq=10 ttl=115 time=6.04 ms
64 bytes from 8.8.8.8: icmp_seq=11 ttl=115 time=4.79 ms
64 bytes from 8.8.8.8: icmp_seq=12 ttl=115 time=7.51 ms
64 bytes from 8.8.8.8: icmp_seq=13 ttl=115 time=5.48 ms
```

3.8.4 Disconnect Wi-Fi Access Point

Command:

```
# sudo nmcli con down id 'SSID'
```

E.g.

```
# sudo nmcli con down id 'AAEON-Wireless'
```

SSID->Which you want to disconnect

Result:

```
209 packets transmitted, 209 received, 0% packet loss, time 208396ms
rtt min/avg/max/mdev = 4.491/7.698/86.747/8.883 ms
root@srg-ïmx8mp:~# sudo nmcli con down id 'AAEON-Wireless'
Connection 'AAEON-Wireless' successfully deactivated (D-Bus active path: /org/fr
eedesktop/NetworkManager/ActiveConnection/8)
root@srg-ïmx8mp:~#
```

3.8.5 Check Wi-Fi Connection Status

Command:

```
# nmcli connect show -active
```

Result:

The disconnected Wi-Fi status is shown in the picture as below:

```
root@srg-ix8mp:~# nmcli connect show -active
NAME      UUID                                     TYPE  DEVICE
Pixel 7   48bcae82-140f-4083-8385-455b5181e4a8  wifi  wlan0
test      ec210f9d-d8c9-4743-880d-b661062414f3  gsm   ttyUSB2
root@srg-ix8mp:~#
```

```
# nmcli dev
```

Result:

```
root@srg-ix8mp:~# nmcli dev
DEVICE      TYPE      STATE      CONNECTION
wlan0       wifi      connected  Pixel 7
ttyUSB2     gsm       connected  test
ppp0        ppp       disconnected --
p2p-dev-wlan0 wifi-p2p  disconnected --
eth0        ethernet  unavailable --
eth1        ethernet  unavailable --
can0        can       unmanaged  --
can1        can       unmanaged  --
dummy0      dummy     unmanaged  --
tunl0      iptunnel  unmanaged  --
lo          loopback  unmanaged  --
ip_vti0     vti       unmanaged  --
root@srg-ix8mp:~#
```


3.9 System Management

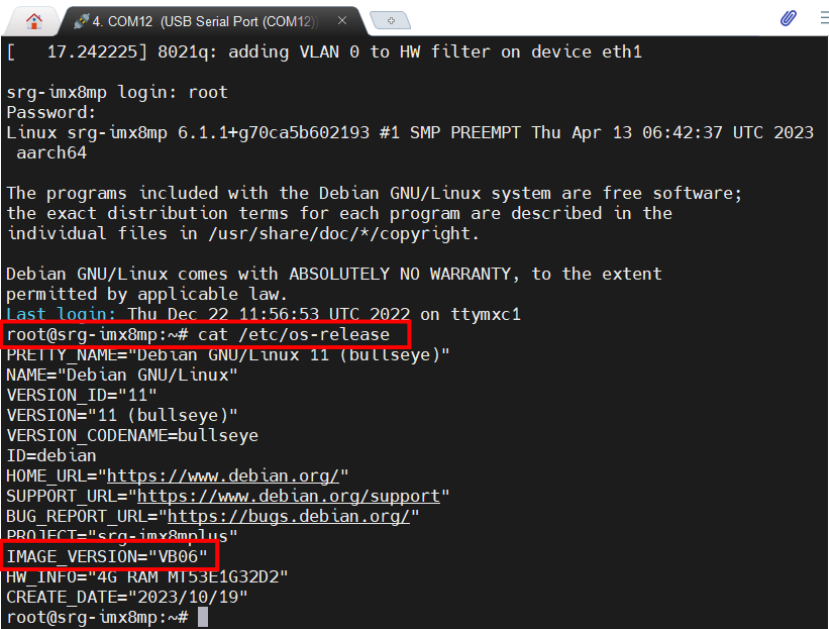
This section will show you how to check and setup system settings such as the OS version, RTC, etc.

3.9.1 Check OS version

Command:

```
$ cat /etc/os-release
```

Result:



```
[ 17.242225] 8021q: adding VLAN 0 to HW filter on device eth1
srg-ixm8mp login: root
Password:
Linux srg-ixm8mp 6.1.1+g70ca5b602193 #1 SMP PREEMPT Thu Apr 13 06:42:37 UTC 2023
aarch64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
last login: Thu Dec 22 11:56:53 UTC 2022 on ttyxc1
root@srg-ixm8mp:~# cat /etc/os-release
PRETTY_NAME="Debian GNU/Linux 11 (bullseye)"
NAME="Debian GNU/Linux"
VERSION_ID="11"
VERSION="11 (bullseye)"
VERSION_CODENAME=bullseye
ID=debian
HOME_URL="https://www.debian.org/"
SUPPORT_URL="https://www.debian.org/support"
BUG_REPORT_URL="https://bugs.debian.org/"
PROJECT="srg-ixm8mpplus"
IMAGE_VERSION="VB06"
HW_INFO="4G RAM MT53E1G32D2"
CREATE_DATE="2023/10/19"
root@srg-ixm8mp:~#
```

3.9.2 Check the Storage Status

Command:

```
$df-h
```

Result:

```
root@srg-imx8mp:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        29G   5.7G   22G   21% /
devtmpfs         1.2G     0   1.2G    0% /dev
tmpfs            1.7G     0   1.7G    0% /dev/shm
tmpfs            670M   1.6M   668M    1% /run
tmpfs            5.0M   4.0K   5.0M    1% /run/lock
tmpfs           335M   48K   335M    1% /run/user/0
root@srg-imx8mp:~#
```

Set the new date and time

Command:

```
$ date -s "YYYYMMDD hh:mm:ss"; hwclock -w
```

e.g.

```
$ date -s "20231020 11:30:00"; hwclock -w
```

- YYYY->Year
- MM->Month
- DD->Date
- hh->Hour
- mm->Minute
- ss->Second

```
root@srg-imx8mp:~# date -s "20231020 11:30:00"; hwclock -w
Fri 20 Oct 2023 11:30:00 AM UTC
root@srg-imx8mp:~#
```

Set date and time

Check the current date and time

Command:

```
$ hwclock
```

Result:

```
root@srg-imx8mp:~# hwclock
2023-10-20 11:31:43.093989+00:00
root@srg-imx8mp:~#
```

3.9.3 Shutdown the System

Command:

```
$ sudo shutdown now
```

Result:

```
root@srg-ïmx8mp:~# sudo shutdown now
[ OK ] Stopped User Manager for UID 0.
       Stopping User Runtime Directory /run/user/0...
[ OK ] Started Show Plymouth Power Off Screen.
[ OK ] Stopped Switcheroo Control Proxy service.
[ OK ] Unmounted /run/user/0.
[ OK ] Stopped User Runtime Directory /run/user/0.
[ OK ] Removed slice User Slice of UID 0.
       Stopping Permit User Sessions...
[ OK ] Stopped User Login Management.
[ OK ] Stopped Permit User Sessions.
[ OK ] Stopped target Network.
```