reTerminal DM
User Manual

10.1" Integrated Device Master

Document History

Version	Date	Description of Change
1.0	10-May-23	Initial release

Table of Contents

C1. Introduction

1.1 Overview

The reTerminal DM is a multi-functional industrial panel PC based on the Raspberry Pi CM4 platform. With its powerful computing performance, convenient touchscreen interface, various IOT gateway wireless connectivity options, rich peripheral interfaces, and strict industrial reliability design, the reTerminal DM is ideal for a wide range of applications and industries, including energy management, medical monitoring, commercial retail, home automation, and more.

In addition, the reTerminal DM offers flexible expandability and customization options. It can be easily and cost-effectively customized to meet the specific needs of different user scenarios.

1.2 Feature

- **Powerful performance**
  - Powered by Raspberry Pi CM4
  - Broadcom BCM2711 quad-core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz
  - Up to 8GB RAM and 32GB eMMC

- **Multi-OS support**
  - Raspbian OS
  - SenseCraft Edge Platform with seeedstudio device management

- **Perfect interaction**
  - 10.1 inch 1280*800 HMI
  - 10-point capacitive touch control
  - 400nit IPS display with 170/170° view angle

- **Rich wireless capabilities**
  - On-chip WiFi
  - On-chip BLE
  - Mini-PCIe for LoRaWAN® (optional)
  - Mini-PCIe for 4G LTE (optional)

- **Rich interface**
  - 1 x 1000M ethernet RJ45 port
  - 2 x USB2.0 Type A + 1 x USB2.0 Type C
  - 1x RS485
  - 1 x RS232
  - 1 x CAN FD
  - 4 x DO + 4 x DI
  - 40-pin GPIO

- **Rugged design for harsh environment**
  - IP65 front panel
  - Die-cast aluminum alloy housing
  - -10~50°C operating temperature
  - 10~95% RH operating humidity
  - Electrically isolated IOs and interface
  - Meets strict EMC testing standards

- **Others**
  - High accuracy RTC
  - 1~255 hardware Watchdog
  - ATECC608A security chip
  - 12~24V DC power supply
  - PoE (optional)
  - Panel, VESA, Din-Rail mount

*LoRaWAN® is a mark used under license from the LoRa Alliance®.

1.3 Specification

Parameter	Description
Basic	
CPU	CM4
	Quad-core Cortex-A72@ 1.5GHz
Memory	8GB RAM
Storage	32GB eMMC
	M.2 NVMe SSD Slot 2280-M Key(optional)
OS Support	Raspbian
	SenseCraft Edge Platform
Display	
Size	10.1"
Max. Resolution	1280 x 800
Max. Colors	16.7M (8-bit)
Luminance (nit)	400
Viewing Angle (H/V°)	170/170
Backlight Life (hrs)	30000
Touch Type	10-point Capacitive
Pencil Hardness	7H
Video&Audio	
Video	HDMI2.0
Audio	Microphone x 2
	Buzzer
	3.5mm Audio Jack
Camera	CSI(optional)
Interfaces	
Ethernet	1 x 10/100/1000 Mbps
	2 x 10/100/1000 Mbps(optional)
USB	2 x USB-A 2.0 Host
	2 x USB 3.0 (optional)
RS485	1 x RS-485 >Terminal Block
	1 xRS-485 > DB9(optional)
RS232	1 x RS-232 >Terminal Block
	1 xRS-232 > DB9(optional)
CAN	1 x CAN-BUS >Terminal BlockT
DI	4x DI >Terminal Block
DO	4x DO >Terminal Block
40pin GPIO	inside
Wireless Communication	
Wifi	On-chip Wifi
BLE	On-chip BLE
LoRa	Mini-PCIe for LoraWAN(optional)
Cellular	Mini-PCIe for 4G(optional)

* LoRaWAN® is a mark used under license from the LoRa Alliance®.

Parameter	Description
Power	
Input	2-pin Terminal Block
PoE	PoE(optional)
Power Range	12~24V DC
Power Consumption	4W Idle.
	9W Max.
Power Switch	NO
Reboot Switch	YES
Environment	
Ingress Protection	IP65 Front Panel
Operating Temperature	-10~50 °C
Storage Temperature	-20~70 °C
Humidity (Operating)	10~95% RH
Mechanical	
Dimension (W x H x D)	259.4x191x42.2mm
Enclosure	Die-cast aluminum alloy
Mounting	Panel, VESA，Din-Rail
Weight (Net)	1.8Kg
Certification	
	CE,FCC,UKCA
	RoHS
	Telec
	REACH
EMC	
ESD	EN61000-4-2, Level 3
EFT	EN61000-4-4, Level 2
Surge	EN61000-4-5, Level 2
Others	
RTC	High Accuracy RTC
Watchdog	1~255s
Security	ATECC608A
Warranty	2 years
Heat dissipation	Fanless

1.4 Dimension

Unit: mm
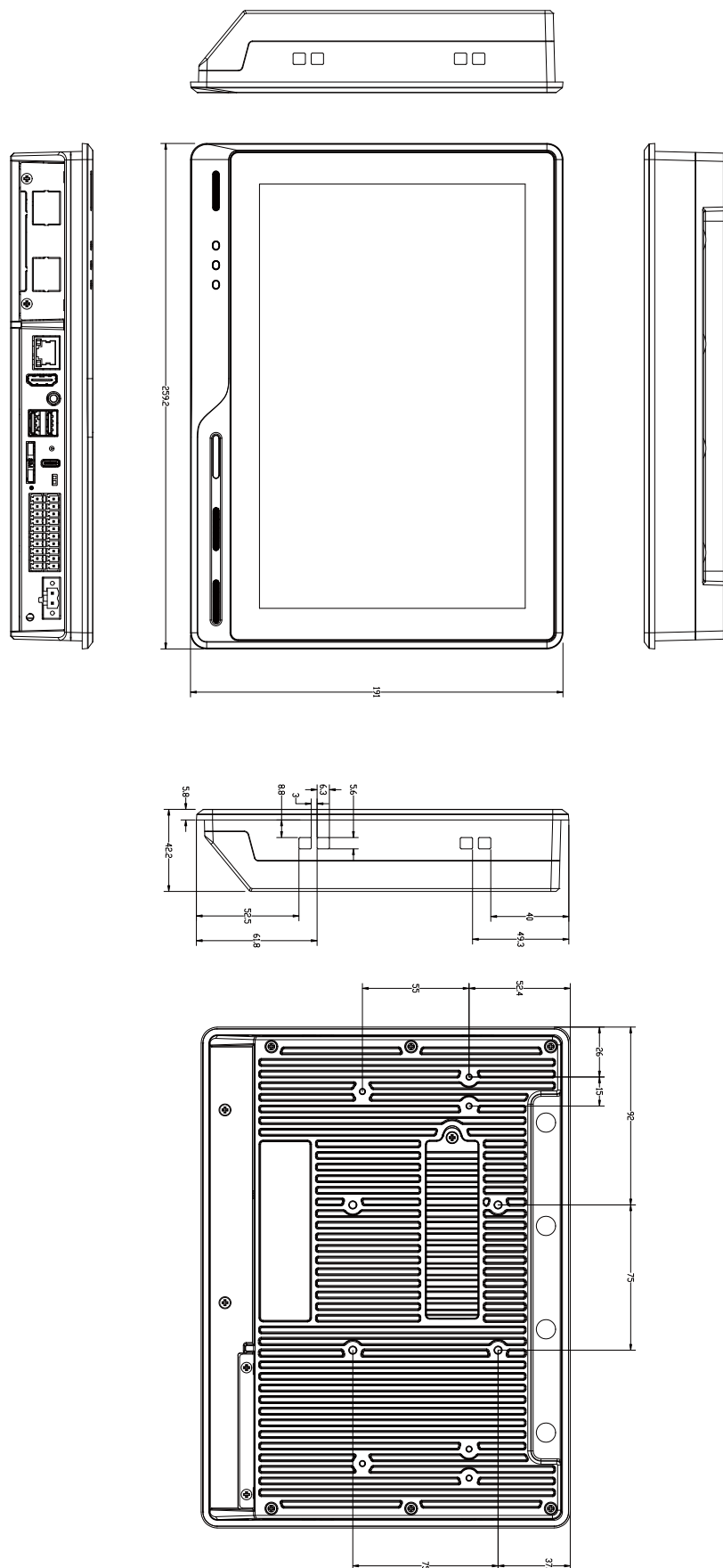
C2. Hardware Overview

2.1 System Overview

2.1.1 Interface Overview
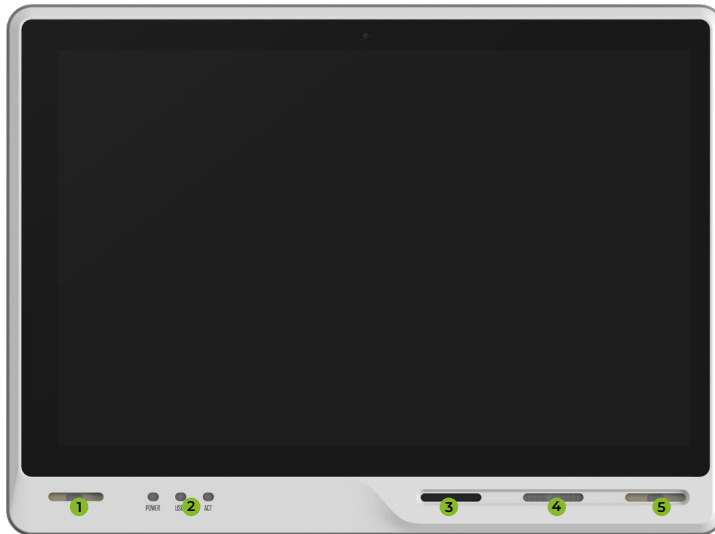
1	Microphone
2	LED Indicator
3	Light Sensor
4	Buzzer
5	Microphone
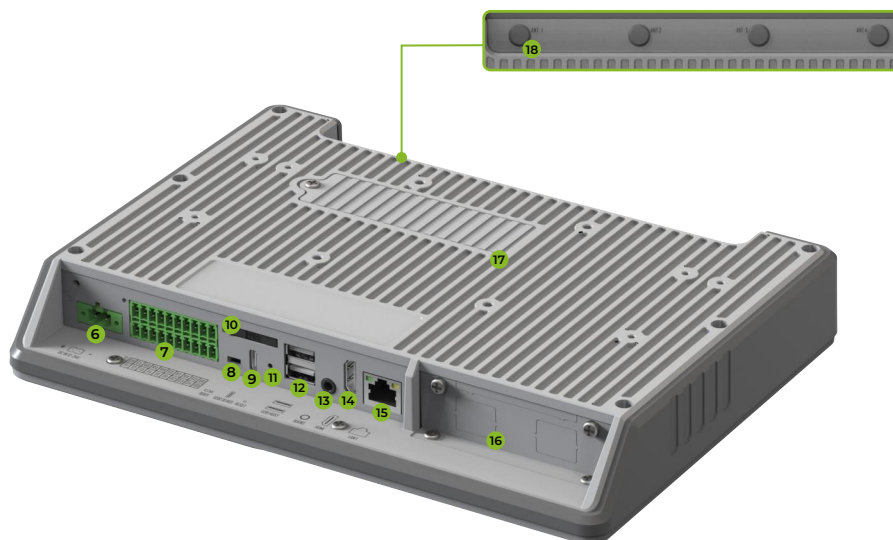
6	Power In	10	SIM Slot	14	HDMI	18	4 Reserved Antennas Ports for Wireless
7	RS485/232/DIO/CAN	11	Reset Hole	15	1000M Ethernet		
8	Boot Switch	12	USB Host	16	PCIe Extension Slot		
9	USB Device	13	Audio Out	17	SSD Solt		

2.1.2 Mainboard Overview
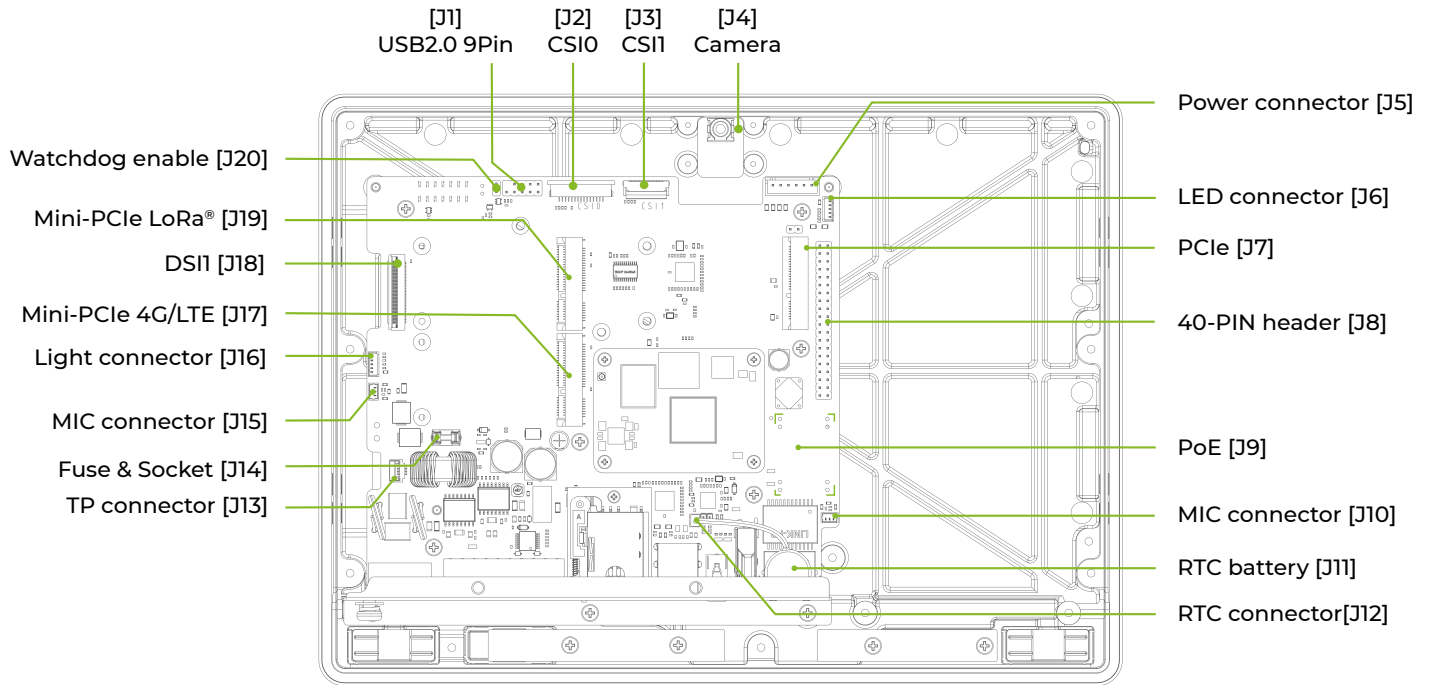
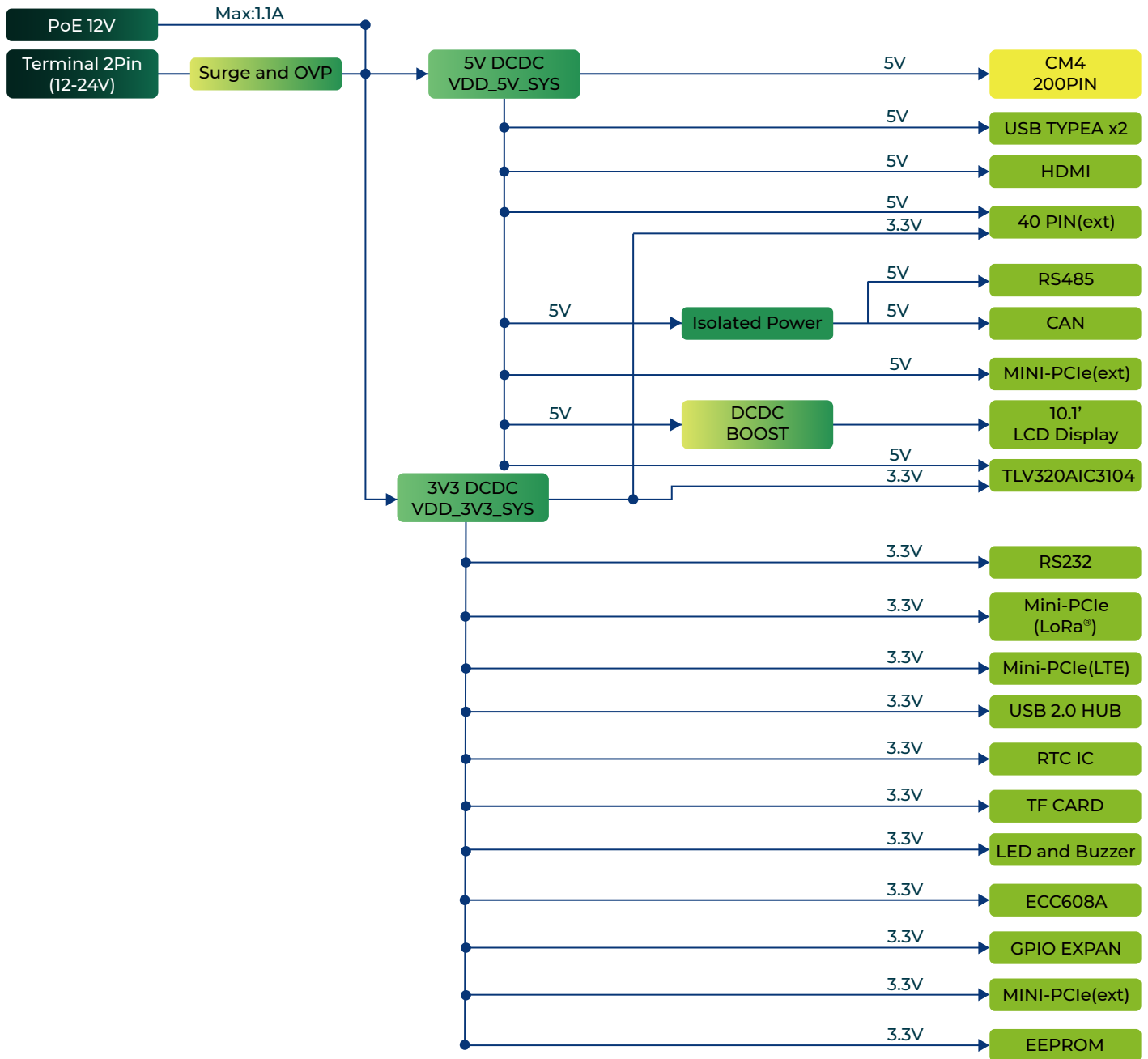| Lable	Description	Default Status
J1	9-pin USB2.0	Reserved
J2	15-pin 2 lane CSI0 FPC connector	Reserved
J3	22-pin 4 lane CSI1 FPC connector	Reserved
J4	Camera	Optional
J5	Power connector	Reserved
J6	Front panel LED PCBA connector	Occupied
J7	PCIe slot	Reserved
J8	40-pin header	Reserved
J9	PoE module welding hole	Reserved
J10	Microphone PCBA connector	Occupied
J11	RTC battery	Included
J12	RTC 2-pin connector	Occupied
J13	Touch panel connector	Occupied
J14	Fuse socket, fuse included	Occupied
J15	Microphone PCBA connector	Occupied
J16	Light sensor connector	Occupied
J17	Mini-PCIe slot for 4G/LTE module	Optional
J18	DSI1 connector for mipi display	Occupied
J19	Mini-PCIe slot for LoRa® module	Optional
J20	Watchdog hardware enable	Occupied

2.1.3 Power Supply

Power Diagram

PoE 12V	Max:1.1A
Terminal 2Pin (12-24V)	Surge and OVP → 5V DCDC VDD_5V_SYS

5V DCDC VDD_5V_SYS:
- 5V → CM4 200PIN
- 5V → USB TYPEA x2
- 5V → HDMI
- 5V / 3.3V → 40 PIN(ext)
- 5V → Isolated Power → 5V → RS485 / 5V → CAN
- 5V → MINI-PCIe(ext)
- 5V → DCDC BOOST → 10.1' LCD Display
- 5V / 3.3V → TLV320AIC3104

3V3 DCDC VDD_3V3_SYS:
- 3.3V → RS232
- 3.3V → Mini-PCIe (LoRa®)
- 3.3V → Mini-PCIe(LTE)
- 3.3V → USB 2.0 HUB
- 3.3V → RTC IC
- 3.3V → TF CARD
- 3.3V → LED and Buzzer
- 3.3V → ECC608A
- 3.3V → GPIO EXPAN
- 3.3V → MINI-PCIe(ext)
- 3.3V → EEPROM
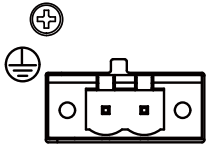
The reTerminal DM supports two power supply options: DC terminal and PoE port. By default, the reTerminal DM is powered through the DC terminal, while the PoE power supply is optional. This provides flexibility in power supply selection and allows for easy integration with various power sources.

2-pin power terminal

The reTerminal DM is supplied with a nominal voltage of 12~24 V. The power supply is connected via the 2-pin power terminal block connector. To ground the reTerminal DM, the ground wire can be secured to the screw located at the top left corner of the power terminal.

For instructions on how to ground the chassis, please refer to section 3.11 - Chassis Grounding Guide.

PoE
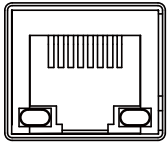
With the PoE module installed, the LAN1 port of reTerminal DM can support PoE power supply, providing a convenient and efficient way to power the device over Ethernet. This option simplifies the installation process and reduces the amount of cabling required, making it an ideal solution for applications with limited power sources or where power outlets are not readily available.

- PoE input: Range 44~57V; Tipical 48V
- PoE output: 12V, 1.1A Max.

> ⊙ **Note**
> It's worth noting that the PoE module provided with the reTerminal DM is compliant with the IEEE 802.3af standard and can provide a maximum power supply of 13W. Therefore, if there is a need to connect high-power peripherals such as mobile hard disks or 4G modules, the PoE power supply may not be sufficient. In this case, it's recommended to use the DC terminal for power supply instead to ensure stable and reliable operation of the device.

Power Consumption

Please refer to the table below for the tested power consumption of reTerminal DM in Seeed Studio's laboratory. Please note that this value is for reference only, as the test methods and environment can result in variations in the results.
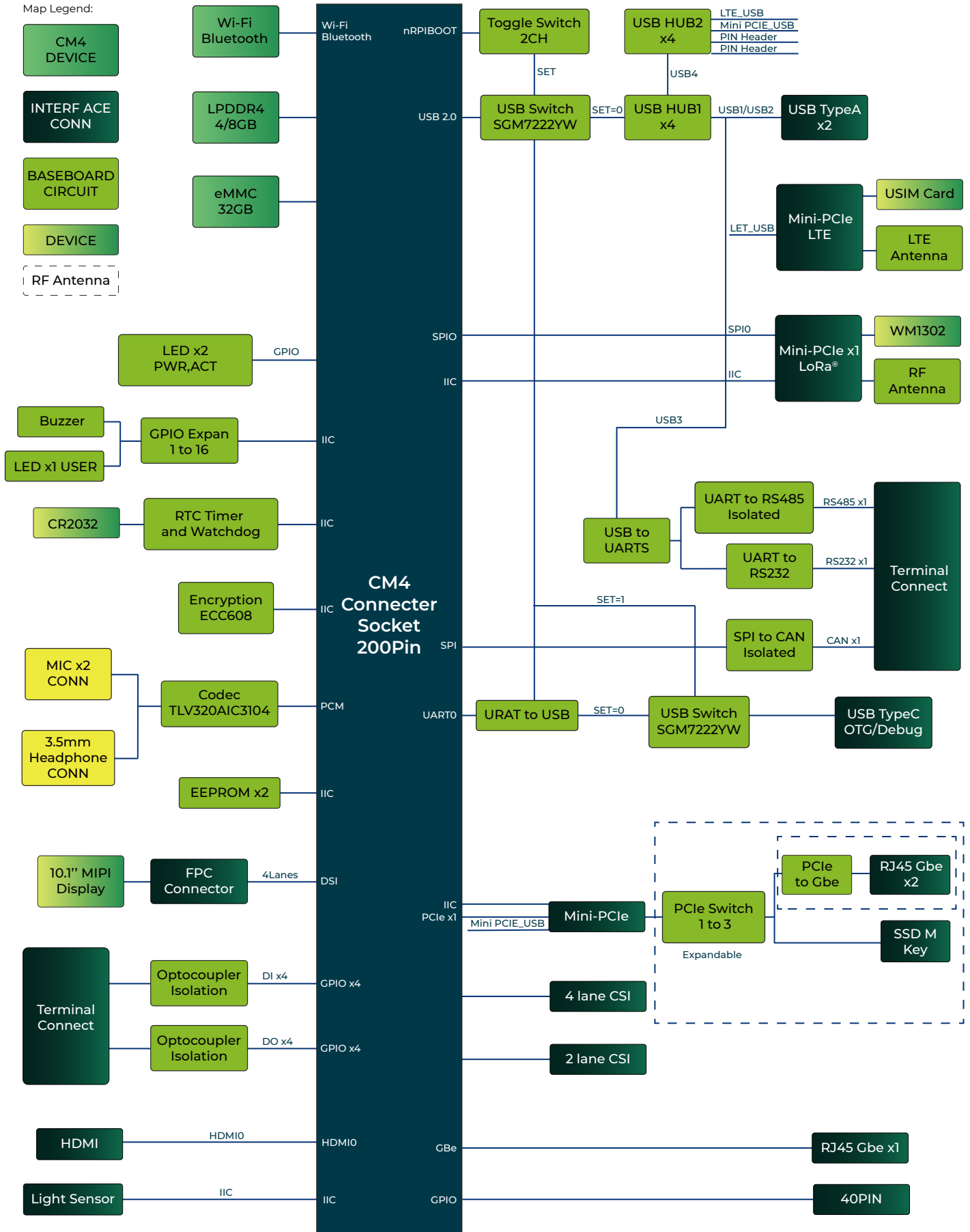
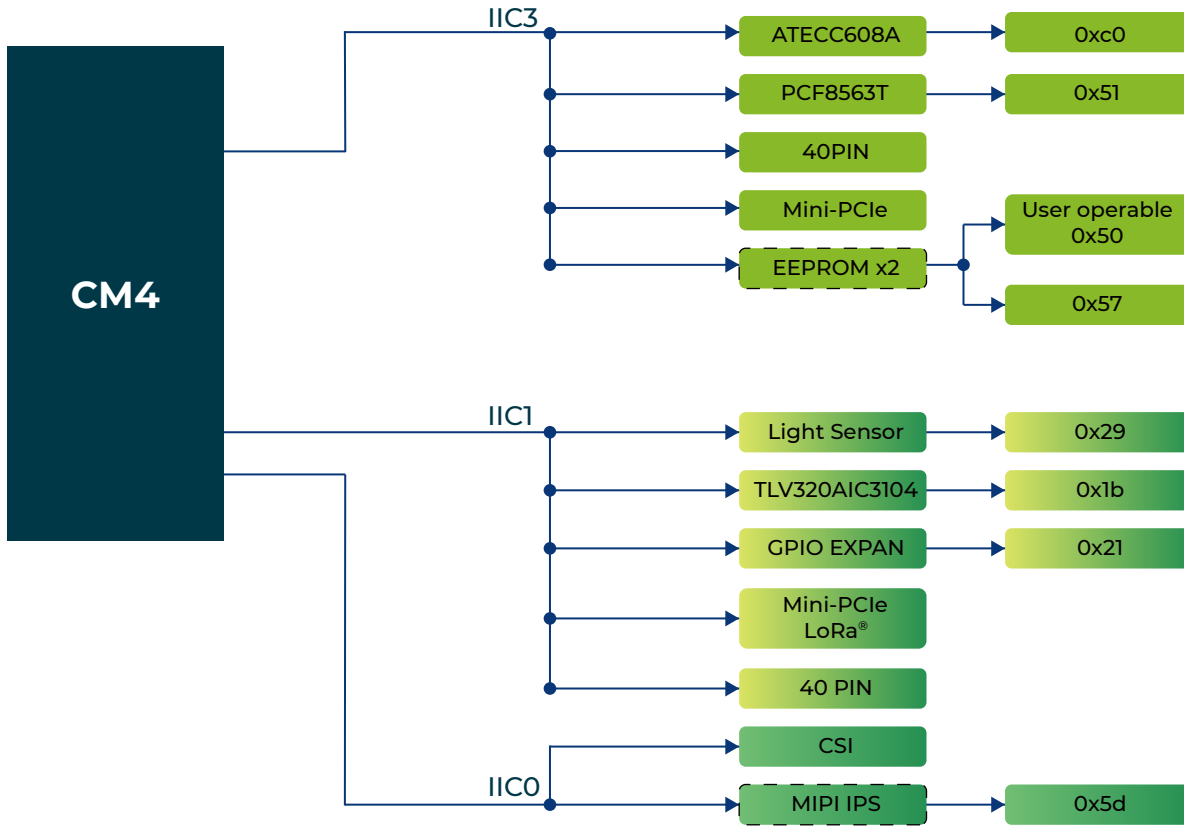| Status	Voltage	Current	Power Consumption	Description
Shutdown		0.6mA		Static power consumption test in shutdown and power-off state.
Idle	24V	0.165A	3.96W	To test the input current when supplying 24V power to the reTerminal DM device through the Terminal socket while running the default Seeed Studio system, without running any test programs.
Full Load	24V	0.37A	8.88W	Configure CPU to run at full load using the "stress -c 4" command, while playing a video and performing CAN & RS485 communication. No external devices connected.

Power On and Power Off

The reTerminal DM does not come with a power button by default, and the system will automatically start up once power is connected. When shutting down, please select the shutdown option in the operating system and wait for the system to fully shut down before cutting off power. To restart the system, simply reconnect the power

> ⊙ **Note**
> Please note that after shutting down, please wait for at least 10 seconds before restarting the system to allow for the internal capacitors to fully discharge.

2.1.4 Block Diagram

Map Legend:

- CM4 DEVICE
- INTERF ACE CONN
- BASEBOARD CIRCUIT
- DEVICE
- RF Antenna

2.1.5 IIC Tree

```
CM4 ──┬── IIC3 ──┬──→ ATECC608A ──→ 0xc0
      │          ├──→ PCF8563T ──→ 0x51
      │          ├──→ 40PIN
      │          ├──→ Mini-PCIe
      │          └──→ EEPROM x2 ──┬──→ User operable 0x50
      │                            └──→ 0x57
      │
      ├── IIC1 ──┬──→ Light Sensor ──→ 0x29
      │          ├──→ TLV320AIC3104 ──→ 0x1b
      │          ├──→ GPIO EXPAN ──→ 0x21
      │          ├──→ Mini-PCIe LoRa®
      │          └──→ 40 PIN
      │
      └── IIC0 ──┬──→ CSI
                 └──→ MIPI IPS ──→ 0x5d
```

2.2 Interface Description

2.2.1 Microphone

x2

The reTerminal DM is equipped with two MEMS microphones located on the left and right sides below the screen. These microphones can be configured as a dual microphone array, providing superior sound pickup capabilities.

The microphones communicate with the audio codec chip through the IIS interface, while the codec chip communicates with CM4 through the PCM interface. The audio codec chip selected for the reTerminal DM is the TI TLV320AIC3104 Low-Power Stereo Audio Codec.

> ⓘ **Note**
> It's important to note that in order to achieve an IP65 rating for the front panel, the microphone openings are covered with a waterproof acoustic membrane. Please avoid using sharp objects to touch the microphone openings.

2.2.2 LED Indicator

The reTerminal DM features three LED indicators that serve to signal the machine's operational status. Please refer to the table below for the specific functions and states of each LED:

LED pin assignment

Lable	Signal	Signal Source	Color	Description
PWR	LED_nPWR	CM4	Yellow	Used to indicate the power supply of CM4. When the CM4 is powered on normally, the LED will light up
USER		PCA9535 - GPIO	Red	User defined function
ACT	LED_nACT	CM4	Green	Used to indicate various states of the system. See the table below.

ACT Status table

Long flashes	Short flashes	Status
0	3	Generic failure to boot
0	4	start*.elf not found
0	7	Kernel image not found
0	8	SDRAM failure
0	9	Insufficient SDRAM
0	10	In HALT state
2	1	Partition not FAT
2	2	Failed to read from partition
2	3	Extended partition not FAT
2	4	File signature/hash mismatch - Pi 4
4	4	Unsupported board type
4	5	Fatal firmware error
4	6	Power failure type A
4	7	Power failure type B

if the ACT LED blinks in a regular four blink pattern, it cannot find bootcode (start.elf)

if the ACT LED blinks in an irregular pattern then booting has started.

If the ACT LED doesn't blink, then the EEPROM code might be corrupted, try again without anything connected to make sure.

For more detail please check the Raspberry Pi forum:

STICKY: Is your Pi not booting? (The Boot Problems Sticky) - Raspberry Pi Forums

For more detail please check the Raspberry Pi forum: https://forums.raspberrypi.com//viewtopic.php?f=28&t=58151
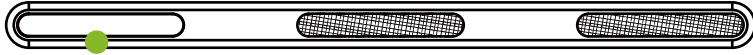
2.2.3 Light Sensor

The light sensor, located at the bottom right of the screen, is capable of detecting ambient light intensity and automatically adjusting screen brightness to provide an optimal viewing experience while conserving energy.
The light sensor communicates with the CM4 through IIC protocol. Additionally, the light sensor's IIC address and other relevant information can be found in the "2.1.4 IIC Tree" section.

2.2.4 Buzzer

The reTerminal DM features an active buzzer located at the bottom right corner of the screen, which can be used for various purposes such as alarm and event notifications. The buzzer is controlled through the PCA9535 GPIO expansion IC, which provides additional digital I/O channels for the device.

2.2.5 Multi-functional Terminals
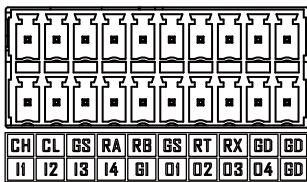
Terminal and signal comparison table

CANH	CANL	GND_ISO	RS485A	RS485B	GND_ISO	RS232_TX	RS232_RX	GND	GND
DI1	DI2	DI3	DI4	GND_DI	DO1	DO2	DO3	DO4	GND_DO

Terminal pin assignment table

| Pin	Silk-screen	Signal	Description
1	CH	CANH	Differential CAN signal high
2	CL	CANL	Differential CAN signal low
3	GS	GND_ISO	Isolated ground signal
4	RA	RS485A	Differential RS485 signal A
5	RB	RS485B	Differential RS485 signal B
6	GS	GND_ISO	Isolated ground signal
7	RT	RS232_TX	RS232 signal transmit end
8	RX	RS232_RX	RS232 signal receive end
9	GD	GND	Mainboard ground
10	GD	GND	Mainboard ground
11	I1	DI1	Digital input 1
12	I2	DI2	Digital input 2
13	I3	DI3	Digital input 3
14	I4	DI4	Digital input 4
15	GI	GND_DI	Input ground signal, connected with GND via 1M Ω
16	D1	DO1	Digital output 1
17	D2	DO2	Digital output 2
18	D3	DO3	Digital output 3
19	D4	DO4	Digital output 4
20	GO	GND_DO	Output ground signal,connected with GND via 0 Ω

2.2.6 DI/DO

The reTerminal DM supports 4 digital input and 4 digital output channels, all of which are optically isolated to effectively protect the mainboard from voltage spikes or other electrical disturbances.

Digital Input
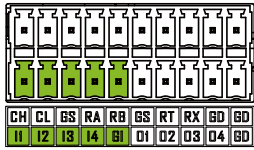
Digital Output
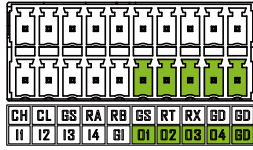
DI/DO pin assignment table

Pin	CM4 Signal	Typical Voltage Range	Max. Voltage	Rated Current Capacity
DI1	GPIO16	5-24V DC	30V DC	
DI2	GPIO17	5-24V DC	30V DC	
DI3	GPIO22	5-24V DC	30V DC	
DI4	GPIO23	5-24V DC	30V DC	
GND_DI				
DO1	GPIO24	5-24V DC	30V DC	500mA
DO2	GPIO25	5-24V DC	30V DC	500mA
DO3	GPIO26	5-24V DC	30V DC	500mA
DO4	GPIO6	5-24V DC	30V DC	500mA
GND_DO				

> **Note**
> The ground for the input signals is different from the ground for the output signals. The ground for the input signals should be connected to the GND_DI pin, while the ground for the output signals should be connected to the GND_DO pin.

The negative logic used for the digital inputs and outputs of reTerminal DM, the logic level relationship between Terminal IO and CM4 GPIO is shown in the table below.

Terminal Dightal Input	CM4 GPIO Detect Signal
Low	High
High	Low

CM4 GPIO Output	Terminal Digital Output
High	Low
Low	High

2.2.7 RS485
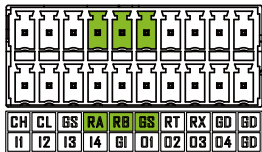
The reTerminal DM is equipped with an RS485 interface through its 20-pin connector, which is isolated for both signal and power to ensure safe and reliable operation in industrial and automation applications. The RS485A and RS485B signals are isolated using capacitive isolation, which provides excellent EMI immunity and meets the high-speed communication requirements of the RS485 interface.
A terminal resistor of 120Ω has been installed by default.
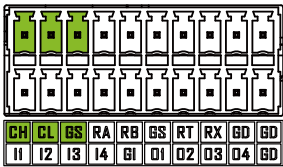
> **Note**
> The RS485 interface uses an isolated power supply, which means that the ground signal for external devices connected to the RS485 interface should be connected to the GND_ISO pin.

2.2.8 RS232
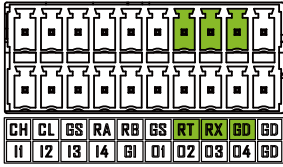
The reTerminal DM's 20-pin connector also includes an RS232 interface, which is not isolated. Because RS232 communication typically uses CMOS voltage levels and has short communication distances, making it less susceptible to electromagnetic interference from the environment.

2.2.9 CAN

The reTerminal DM features a CAN interface that supports the CAN FD (Controller Area Network Flexible Data-Rate) protocol. The CAN interface is isolated using capacitive isolation, which provides excellent EMI protection and ensures reliable communication in industrial and automation applications.
A terminal resistor of 120Ω has been installed by default.

> ⓘ **Note**
> The CAN interface uses an isolated power supply, which means that the ground signal for external devices connected to the RS485 interface should be connected to the GND_ISO pin.

2.2.10 Boot Switch

The Boot Switch of reTerminal DM is connected to the nRPI_BOOT pin of CM4. This switch allows users to select either eMMC or USB as the boot source. In normal operation, the boot switch should be set to the right position, and the system will boot from eMMC. If users need to flash the system image, they should set the boot switch to the left position, and the system can boot from Type-C USB.

Switch Position	Mode	Description	nRPI_BOOT
	Normal Mode	Boot from eMMC	Low
	Flash Mode	Boot from USB	High

2.2.11 USB
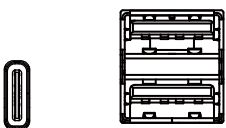
The reTerminal DM is equipped with one USB Type-C port and two USB Type-A ports. Please refer to the table below for their functions and descriptions.

Type	Quantity	Protocol	Function	Description
Type-C	*1	USB2.0	USB-Device	Used for serial port debugging, burning image, etc.
Type-A	*2	USB2.0	USB-HOST	Connect different USB devices such as flash drive, USB keyboard or mouse

2.2.12 SIM Slot

The reTerminal DM uses a standard-size SIM card slot commonly found in industrial applications, which requires a standard SIM card with dimensions of 25mm x 15mm.

> ⓘ **Note**
> Please note that the standard version of reTerminal DM does not come with a 4G module. If you require 4G functionality, an additional 4G module must be purchased separately. For more information, please refer to section "2.3.2 4G Module".

2.2.13 Reset Hole

There is a Mini Push Button Switch located in the reset hole of reTerminal DM. By pressing this button with a thin object, the CM4 can be reset. This button is connected to the RUN_PG pin of the CM4. This pin when high signals that the CM4 has started. Driving this pin low resets the module.

> ⓘ **Note**
> This should be done with caution, if files on a filesystem are open they will not be closed.

2.2.14 Audio Jack

The reTerminal DM has a 3.5mm headphone jack, which supports sound output, and can be connected to external headphones, speakers, etc. It should be noted that the headphone jack only supports sound output and does not support the microphone recording function.

2.2.15 HDMI

The reTerminal DM features a native HDMI interface from CM4, supporting up to 4K @ 60 fps video output. It is ideal for applications that require multiple displays, allowing users to output their content to external large screens.

2.2.16 Ethernet RJ45
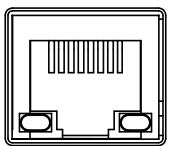
The reTerminal DM comes with a CM4 native Gigabit Ethernet interface that supports three different speeds: 10/100/1000 Mbit/s. An additional PoE module can be purchased to enable power-over-Ethernet (PoE) delivery through this interface, providing power to the reTerminal DM.

> ⓘ **Note**
> For more detail about PoE, please check section "2.1.2 Power Supply".

Furthermore, reTerminal DM can support up to three Gigabit Ethernet interfaces through a PCIe expansion module. This is particularly useful for industrial applications that require simultaneous connections to both IT and OT networks or for scenarios that require connecting to different subnets.

> ⓘ **Note**
> For more detail about PCIe expansion module, please check section "2.3.5 PCIe Expansion Card"

2.2.17 40-Pin GPIO

The classic Raspberry Pi 40-pin GPIO design is retained inside the reTerminal DM, and the pin definition remains the same as the Raspberry Pi 4B. Users need to open the back cover to use these GPIOs, please refer to section 3.1 for detailed steps. It should be noted that due to the limited resources of CM4 IO, the 40-pin GPIO and many peripheral interfaces are multiplexed, so you need to pay special attention to the conflict when using GPIOs. For detailed pin assignment information, please refer to the following table.

Description	Pin multiplexing				Pin multiplexing	Description
Pin 1		3V3		5V		
	IIC1_SDA	GPIO2		5V		
	IIC1_SCL	GPIO3		GND		
	IIC3_SDA	GPIO4		GPIO14	UART0_TXD	USB Type C
		GND		GPIO15	UART0_RXD	
Digital input via screw terminal	DI2	GPIO17		GPIO18	PCM_CLK	3.5mm audio jack
Interrupt pins for screen touch	TP_INT	GPIO27		GND		
Digital input via screw terminal	DI3	GPIO22		GPIO23	DI4	Digital input via screw terminal
		3V3		GPIO24	DO1	Digital output via screw terminal
CAN and LoRa® module	SPI0_MOSI	GPIO10	40PIN	GND		
	SPI0_MISO	GPIO9		GPIO25	DO2	Digital output via screw terminal
	SPI0_SCLK	GPIO11		GPIO8	SPI0_CE0	SPI enable pins for CAN
		GND		GPIO7	SPI0_CE1	SPI enable pins for LoRa®
		ID_SD		ID_SC		
	IIC3_SCL	GPIO5		GND		
Digital output via screw terminal	DO4	GPIO6		GPIO12	CAN_INT	Interrupt pins for CAN
LCD backlight control pins	LCD_PWM	GPIO13		GND		
3.5mm audio jack	PCM_FS	GPIO19		GPIO16	DI1	Digital input via screw terminal
Digital output via screw terminal	DO3	GPIO26		GPIO20	PCM_DIN	3.5mm audio jack
		GND		GPIO21	PCM_DOUT	3.5mm audio jack

2.2.18 RTC

The reTerminal DM features an RTC circuit that comes pre-installed with a CR2032 battery, enabling it to maintain timekeeping functionality even in the event of power loss.

> **Note**
> Please note that the reTerminal DM is shipped with an RTC battery, if you need to replace the battery please refer to section 3.9 RTC Battery Replacement.

2.2.19 Watchdog

The reTerminal DM comes equipped with an independent hardware watchdog circuit that ensures automatic system reboot in case of abnormal system crashes. The watchdog circuit is implemented through RTC and allows for flexible feeding times from 1 to 255 seconds.

2.3 Optional Interfaces and Modules

The reTerminal DM supports a rich selection of expansion modules and accessories, making it suitable for a wide range of scenarios and requirements. In addition, the reTerminal DM features an open PCIe bus of the CM4, providing support for a multitude of PCIe expansion modules, greatly facilitating customization needs. If you are interested in customizing the reTerminal DM, please contact odm@seeed.cc for more information.

Here are the accessories and optional modules list:

SKU	Product Name	Description
Communication Module		
113991134	LTE Cat 4 EC25-AFXGA-mini-PCIe	Quectel EC25 4G module for North America region
113991135	LTE Cat 4 EC25-EUX-mini-PCIe	Quectel EC25 4G module for Europe region
114992969	WM1302 LoRaWAN® Gateway Module (SPI) - US915	Seeed WM1302 LoRaWAN® module for North America region
114992549	WM1302 Long Range Gateway Module (SPI) - EU868	Seeed WM1302 LoRaWAN® module for Europe region
PCIe extension card		
114993111	reTerminal DM Dual DB9 extension	Expanding dual RS233/422/485 DB9 interface via the CM4 USB interface.
114993112	reTerminal DM Dual LAN and SSD extension	Expanding two Gigabit Ethernet interfaces and an NVMe ssd via the CM4 PCIe 2.0
114993113	reTerminal DM Dual USB3 extension	Expanding dual USB3.0 type A interfaces via the CM4 PCIe 2.0 interface.
Accessories		
112990247	512GB NVMe M.2 PCIe Gen3x4 2280 SSD	NVMe M.2 2280 SSD PCIe Gen 3
110061501	LoRa® Antenna Kit for reTerminal DM	LoRa® Antenna and IPEX to SMA male adapter cable
110061502	4G Antenna Kit for reTerminal DM	4G Antenna and IPEX to SMA male adapter cable
110061503	Panel mount Kit for reTerminal DM	Panel mount clips and screws
114070181	Sliding Block for Linear Guideway Rail	Din-Rail mount Kit, DM requires at least two of this kit
317990750	PoE module	PoE module for reTerminal DM

2.3.1 WiFi/BLE

The reTerminal DM is powered by the CM4 with an onboard WiFi/BLE version, providing the same WiFi/BLE parameters as the CM4. For detailed parameter information, please refer to the Raspberry Pi official website.

> ⓘ **Note**
> It is important to note that due to the reTerminal DM's metal casing, WiFi/BLE signals may have difficulty penetrating the metal exterior. If you require WiFi/BLE functionality, it is recommended to purchase an external antenna and follow the instructions in section 3.2 "Assemble WiFi/BLE Antenna".

2.3.2 4G Module

The reTerminal DM mainboard features two mini-PCIe slots, with one of them supporting a 4G module using the USB protocol. The EC25 4G module from Quectel has been fully tested to be compatible with the reTerminal DM.

> ⓘ **Note**
> Please note that if you require 4G functionality, it is necessary to purchase the corresponding 4G module and external antenna, and follow the instructions in section 3.3 "Assemble 4G Module and Antenna".

2.3.3 LoRa® Module

Another mini-PCIe slot supports a LoRa® module using the SPI protocol. The WM1302 module from Seeed Studio has been fully tested to be compatible with the reTerminal DM.
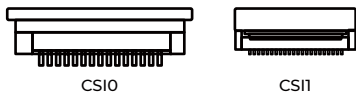
> ⓘ **Note**
> Please note that if you require LoRa® functionality, it is necessary to purchase the corresponding LoRa® module and external antenna, and follow the instructions in section 3.4 Assemble LoRa® Module and Antenna.

* LoRaWAN® is a mark used under license from the LoRa Alliance®.

2.3.4 Camera

CSI0   CSI1

The CSI camera interface is reserved on the reTerminal DM mainboard, which can be customized to support camera functions. Please note that due to the limited space on the front panel, only small-sized cameras can be used. The currently rigorously tested solution uses the Raspberry Pi camera V2.0 driver board + Seeed customized camera IMX219-77.

Please note that the mainboard has two CSI connectors, CSI0 and CSI1, and their details are as follows:

Connector	Connector Type	Pin Pitch	Lane	FPC Orientation
CSI0	15-pin FPC	1mm	2	Gold fingers facing downwards
CSI1	22-pin FPC	0.5mm	4	Gold fingers facing upwards

Standard Version

Camera Version

> **Note**
> Please note that the standard version of the reTerminal DM does not come with a camera opening on the front panel, therefore, the camera functionality is not available for the standard product. If you have a customized camera requirement, please contact odm@seeed.cc

2.3.5 PCIe Expansion Card

The reTerminal DM features a PCIe interface that is derived from the CM4, which supports PCIe 2.0 and theoretically provides a maximum transmission speed of 5Gbps. This allows for the expansion of various high-speed interfaces such as Gigabit Ethernet and NVMe SSD. We have developed multiple expansion cards based on PCIe, USB, and I2C interfaces to meet different scenario requirements. This also facilitates customization needs. For detailed information on the expansion cards, please refer to the table in section 2.3, "Optional Interfaces and Modules."

> **Note**
> Please note that the standard product does not include a PCIe expansion card by default. Seeed can provide assembly services for batch customization orders. If you are testing a sample, you will need to assemble the expansion card yourself. Please refer to section 3.5, "Assemble PCIe Extension Module," for instructions on how to do so.

2.3.6 PoE

The reTerminal DM can support the IEEE 802.3af PD(Powered Devices) standard by adding a PoE power supply module. For more detailed information about PoE power supply, please refer to section "2.3.6 PoE."

> **Note**
> The reTerminal DM supports PoE power supply, but the standard product does not include a PoE module by default. Seeed can provide PoE soldering and assembly services for batch customization orders. However, if a customer is testing a sample, they will need to solder and assemble the PoE module themselves. instructions on how to do so, please refer to section 3.8 "Assemble PoE Module."For detailed

2.3.7 SSD

The reTerminal DM supports 2280 NVMe SSD through the use of a PCIe expansion card. It is important to note that the CM4's PCIe is gen2.0 with a maximum theoretical speed of 5Gbps. If you are using a Gen3.0 or higher SSD, it may not be able to achieve the SSD's maximum speed. After testing, the reTerminal DM with installed SSD can achieve a maximum write speed of 210MB/s and a maximum read speed of 360MB/s. If you are unsure which SSDs are compatible, you can purchase the 112990247, 512GB NVMe M.2 PCIe Gen3x4 2280 SSD from Seeed's official website.

> **Note**
>
> Please note that：
> 1- The standard version of the reTerminal DM does not support SSD and requires the purchase of a PCIe expansion card to enable this feature. For more information, please refer to section 2.3 Optional Interfaces and Modules. Additionally, please refer to section 3.5 Assemble PCIe Extension Module and 3.6 Assemble SSD for instructions on installing the SSD and PCIe expansion card.
> 2- The speed test results may vary depending on the SSD model, testing method, and testing environment. The values provided here are for reference purposes only and were obtained in Seeed's laboratory.

C3. Assembly Guide

3.1 Disassembly Guide

Step 1: Place the reTerminal DM screen-down on a flat surface.
Step 2: Loosen the screws and remove the back cover.
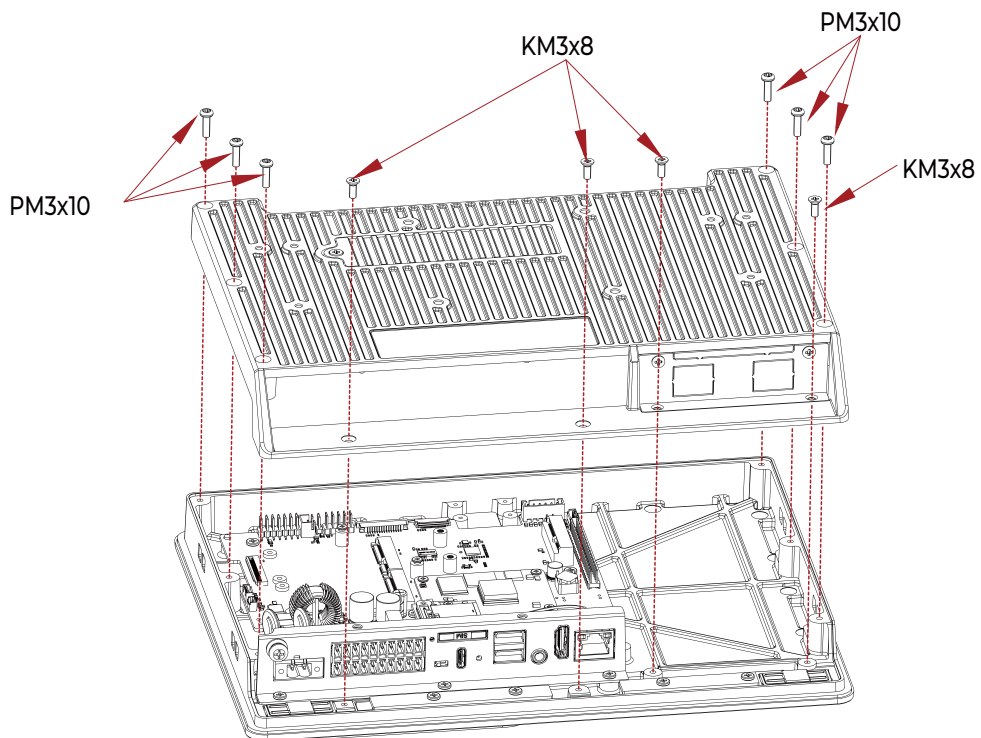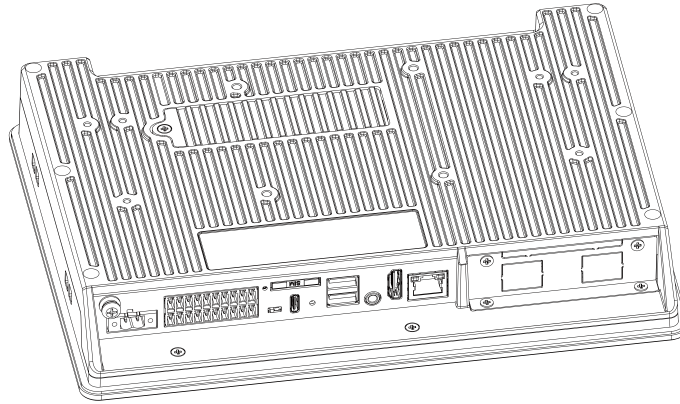
3.2 Assemble WiFi/BLE Antenna

Step 1: Remove the back cover, take out the silicone plug.
Step 2: Load the antenna SMA connector into the back cover, and screw the antenna into the SMA connector.
Step 3: Insert the other end of the antenna feeder (IPEX plug) into the IPEX socket of the CM4.
Step 4: Cover the back cover and lock the screws.
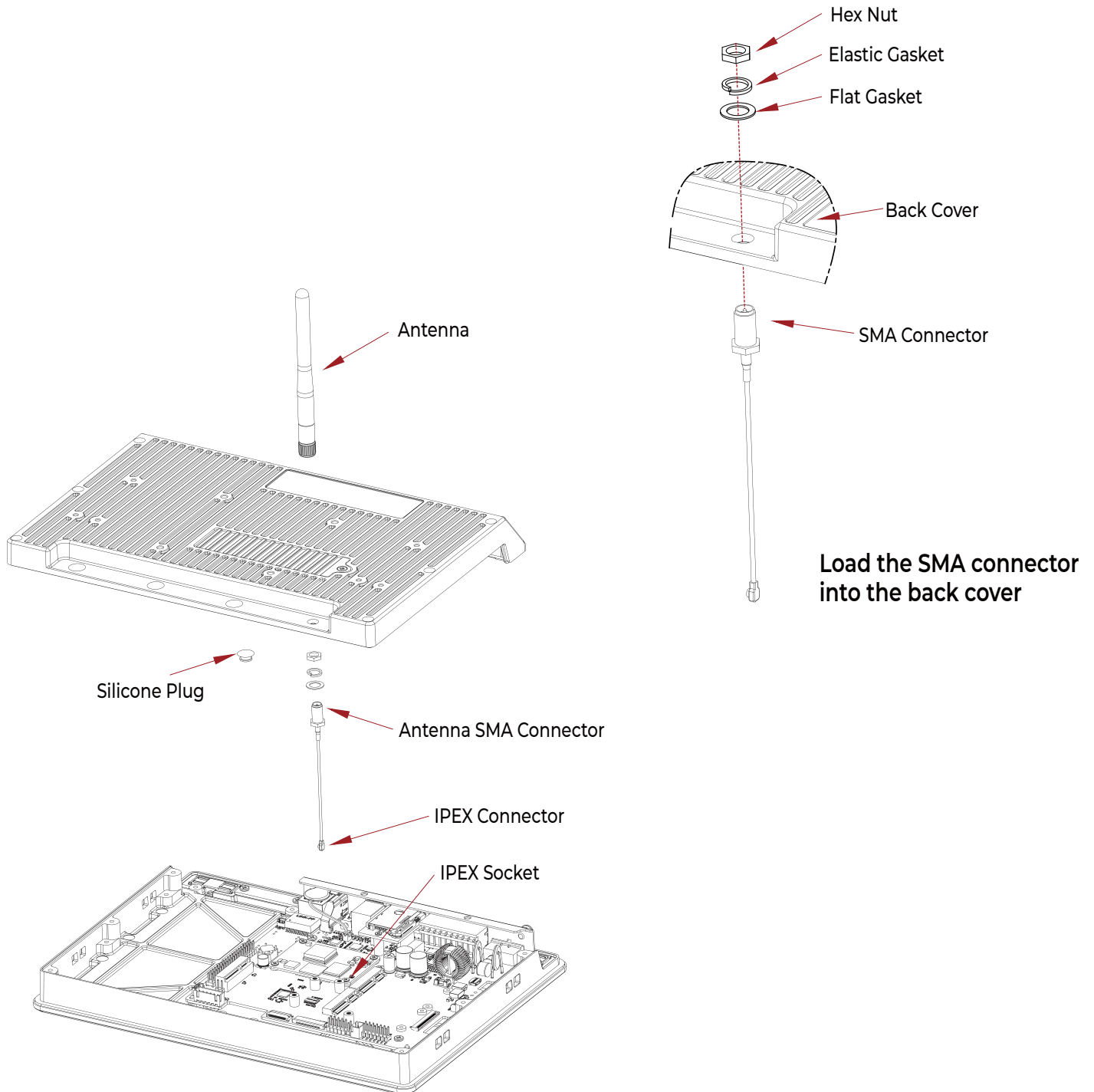
Hex Nut
Elastic Gasket
Flat Gasket

Back Cover

SMA Connector

Antenna

Load the SMA connector into the back cover

Silicone Plug

Antenna SMA Connector

IPEX Connector

IPEX Socket

3.3 Assemble 4G Module and Antenna

Step 1: Remove the back cover, take out the silicone plug.
Step 2: Load the antenna SMA connector into the back cover, and screw the antenna into the SMA connector.
Step 3: Insert the 4G module into the mainboard socket and lock the screws.
Step 4: Insert the other end of the antenna feeder (IPEX plug) into the IPEX socket of the 4G module.
Step 5: Cover the back cover and lock the screws.
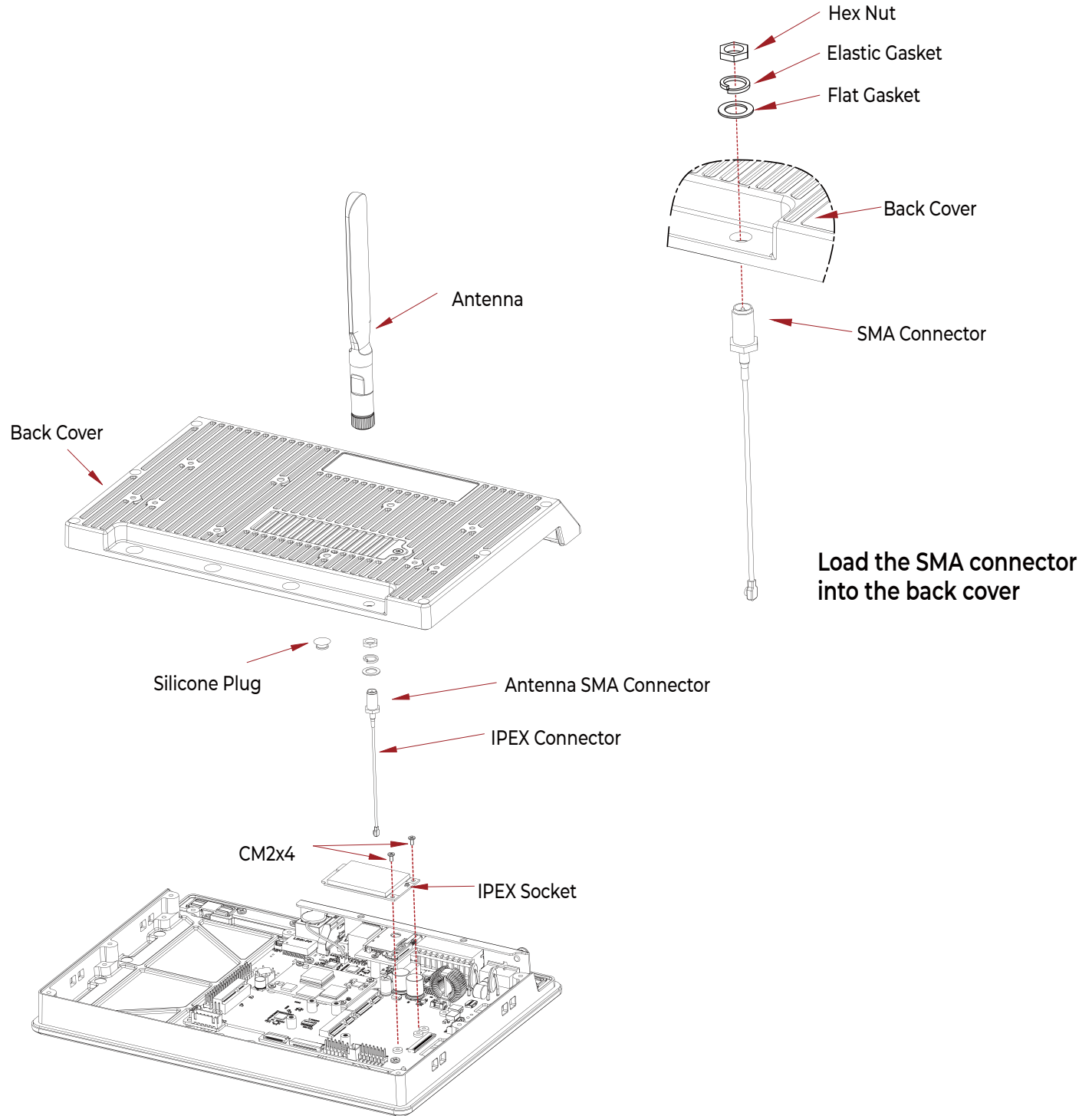
Hex Nut
Elastic Gasket
Flat Gasket
Back Cover
SMA Connector

Load the SMA connector into the back cover

Antenna
Back Cover
Silicone Plug
Antenna SMA Connector
IPEX Connector
CM2x4
IPEX Socket

3.4 Assemble LoRa® Module and Antenna

Step 1: Remove the back cover, take out the silicone plug.
Step 2: Load the antenna SMA connector into the back cover, and screw the antenna into the SMA connector.
Step 3: Insert the LoRa® module into the mainboard socket and lock the screws.
Step 4: Insert the other end of the antenna feeder (IPEX plug) into the IPEX socket of the LoRa® module.
Step 5: Cover the back cover and lock the screws.

Hex Nut
Elastic Gasket
Flat Gasket
Back Cover
SMA Connector

Antenna

Back Cover

Load the SMA connector into the back cover

Silicone Plug
Antenna SMA Connector
IPEX Connector
CM2x4
IPEX Socket
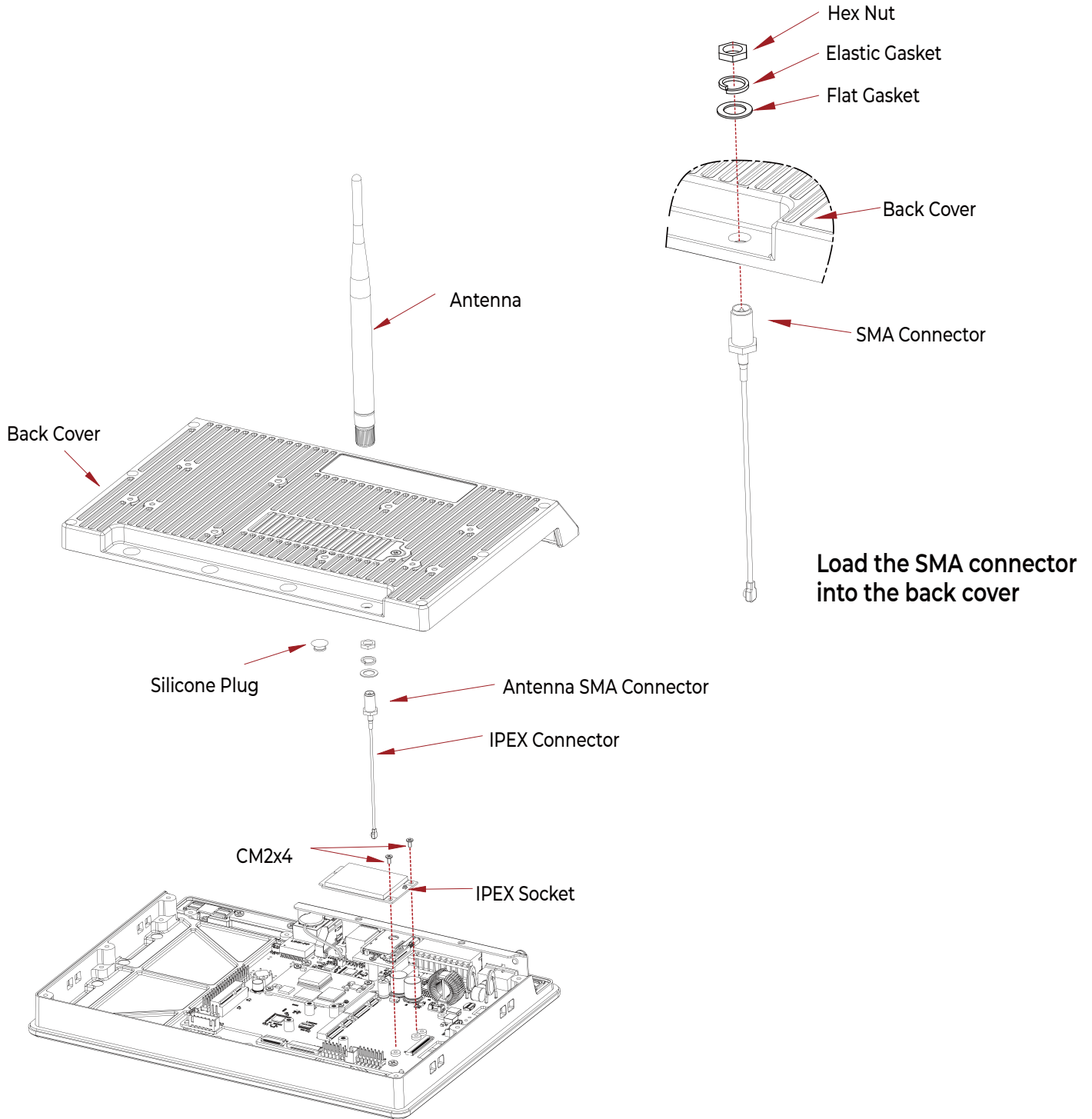
3.5 Assemble PCIe Extension Module

Step 1: Remove the back cover.
Step 2: Insert two sets of 16pin cables into sockets on PCIe PCBA and dual network port PCBA.
Step 3: Load the PCIe PCBA into the mainboard and lock the screws.
Step 4: Put the dual network port PCBA into the DM front cover, and lock the screws.
Step 5: Poke off the network port cover of the expansion baffle.
Step 6: Cover the rear case and lock the screws.
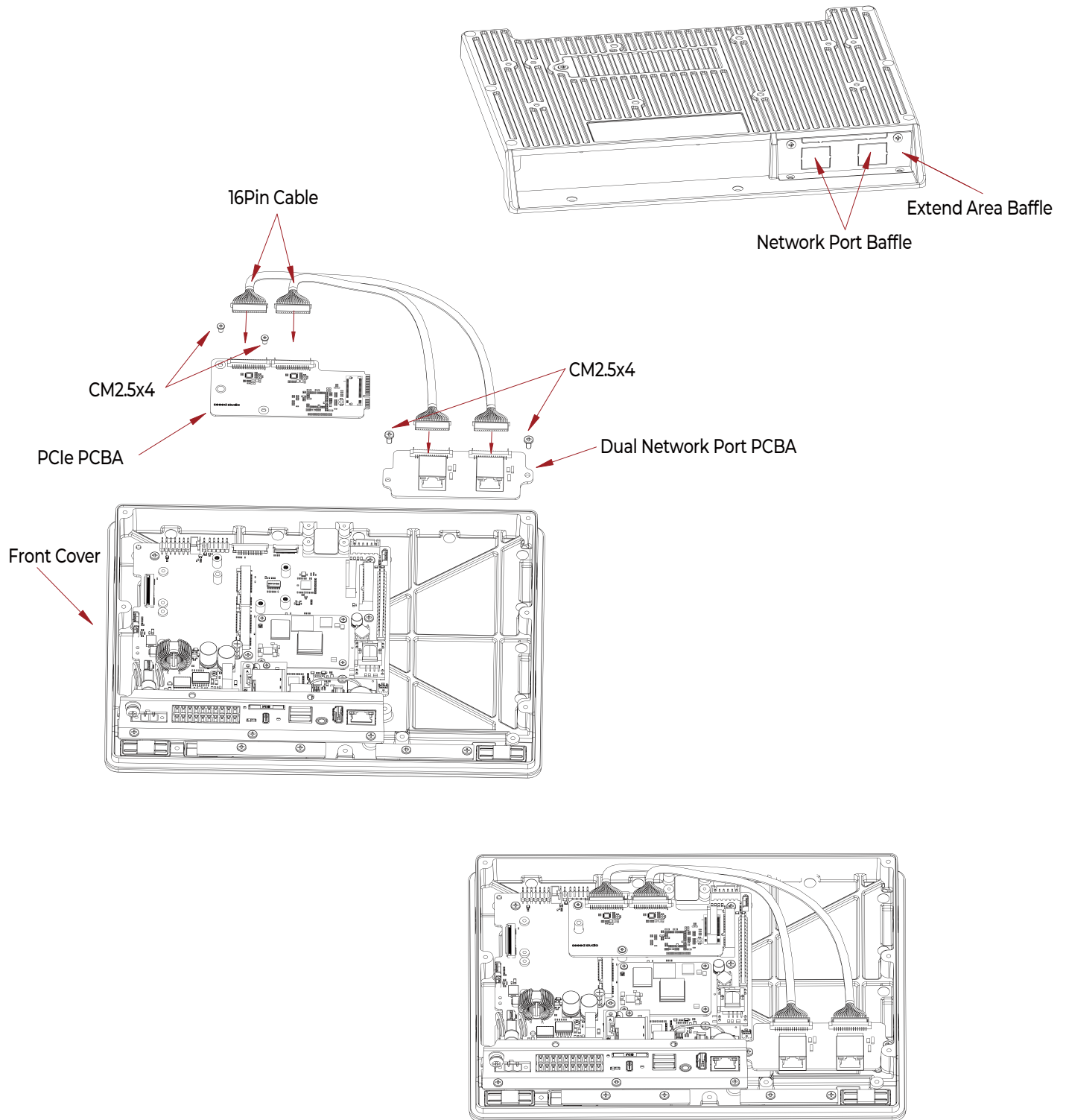
3.6 Assemble SSD

Step 1: Remove the back cover.
Step 2: Load the PCIe PCBA into the mainboard and lock the screws.
Step 3: Cover the rear case back and lock the screws.
Step 4: Unscrew the quick remove cover screw and take out the quick remove cover.
Step 5: Load the SSD into the M.2 socket and lock the screws.
Step 6: Put the quick remove cover back on and lock the screws.
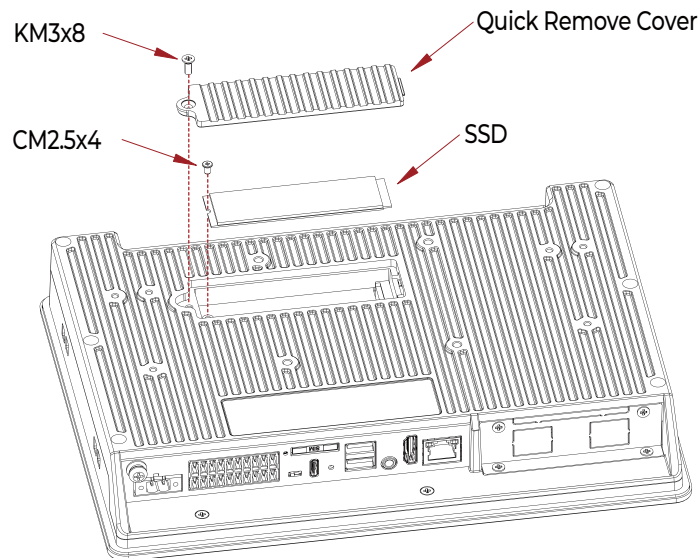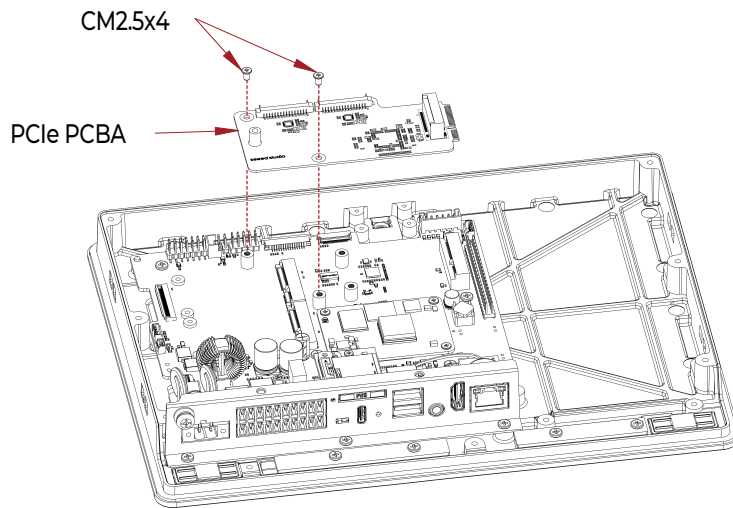
3.7 Assemble Camera

Step 1: Remove the back cover.
Step 2: Insert the camera into the camera bottom board.
Step 3: Insert the camera FPC cable into the socket of the camera bottom board.
Step 4: Install the camera into the front cover and attach a sticker to fix it.
Step 5: Assemble the camera module into the front cover, and lock the screws.
Step 6: Plug the FPC into the mainboard socket, cover the back cover back and lock the screws.

Notice the direction of the gold finger

Camera

Camera Bottom Board

CM2x4

Sticker

Camera FPC Cable

Install the camera and attach a sticker to fix it

Plug the FPC into the mainboard CSIO socket
(Notice the direction of the gold finger)
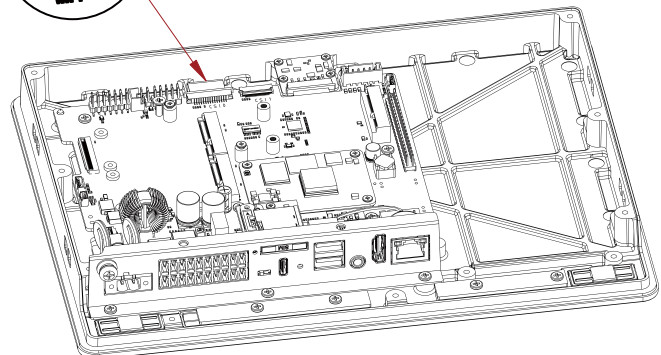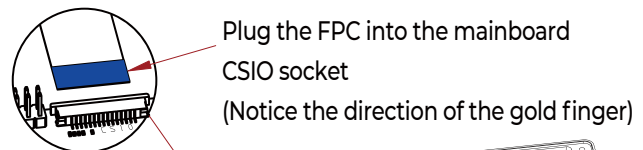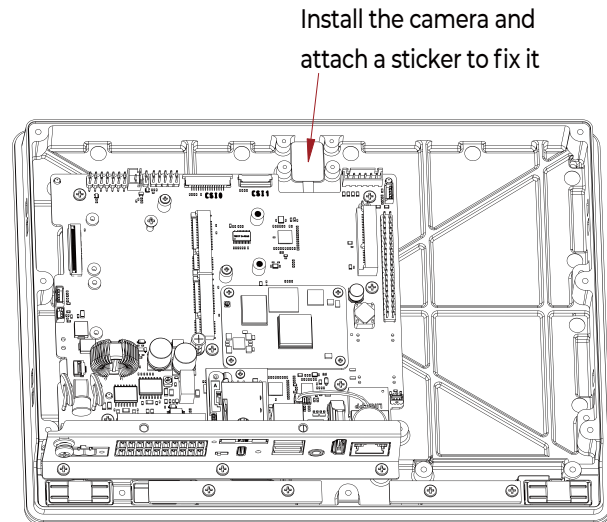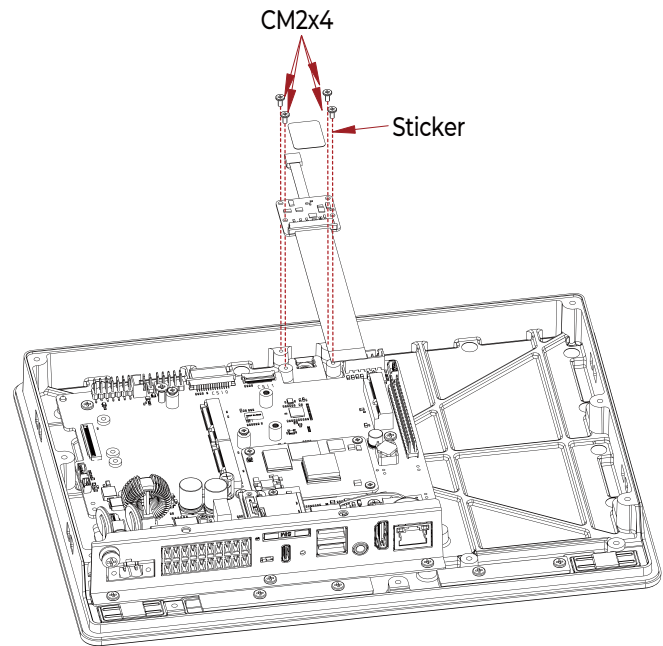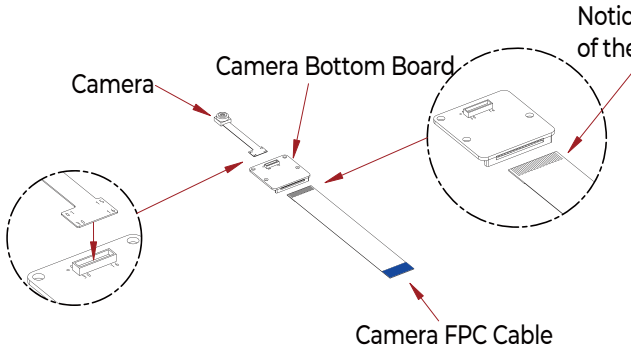
3.8 Assemble PoE Module

Step 1: Remove the back cover and take out the mainboard.
Step 2: Insert the PoE into the mainboard according to the dot mark.
Step 3: Solder the PoE module on the back of the mainboard.
Step 4: Lock back the mainboard, cover the back cover and lock the screws.

Mainboard

PoE

Solder the PoE module on the back of the mainboard
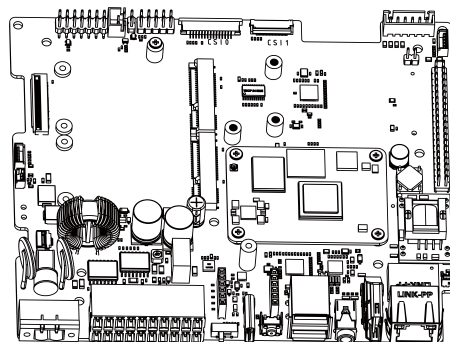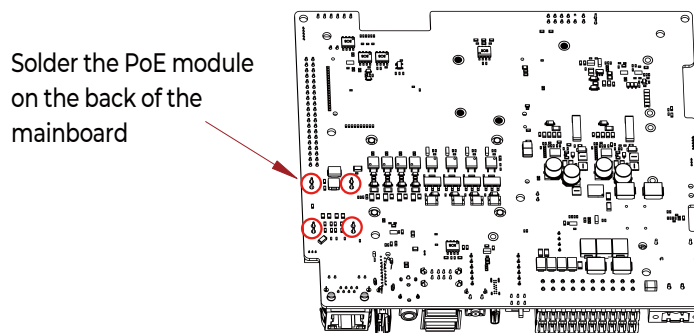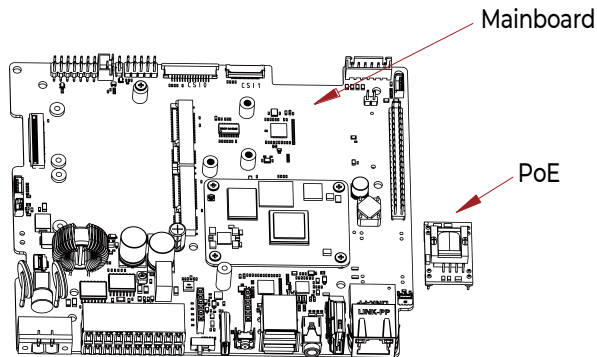
3.9 RTC Battery Replacement

Step 1: Remove the back cover.
Step 2: Insert the RTC battery cable into the RTC battery socket, and attach the RTC battery to the network port.
Step 3: Cover the back cover back and lock the screws.
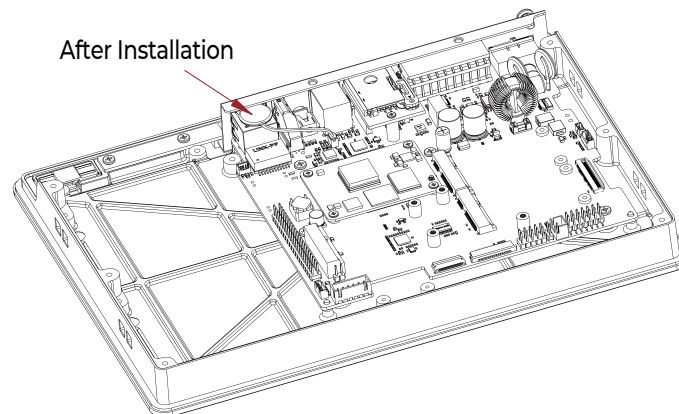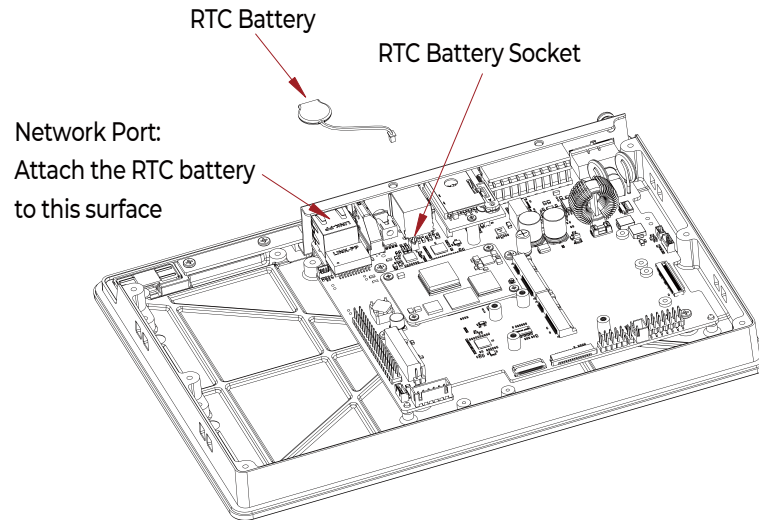
3.10 Fuse Replacement

Step 1: Remove the back cover.
Step 2: Take out the old fuse in the mainboard fuse socket and put in the new fuse.
Step 3: Cover the back cover back and lock the screws.

New   Old   Take Out

Load In

Fuse Socket
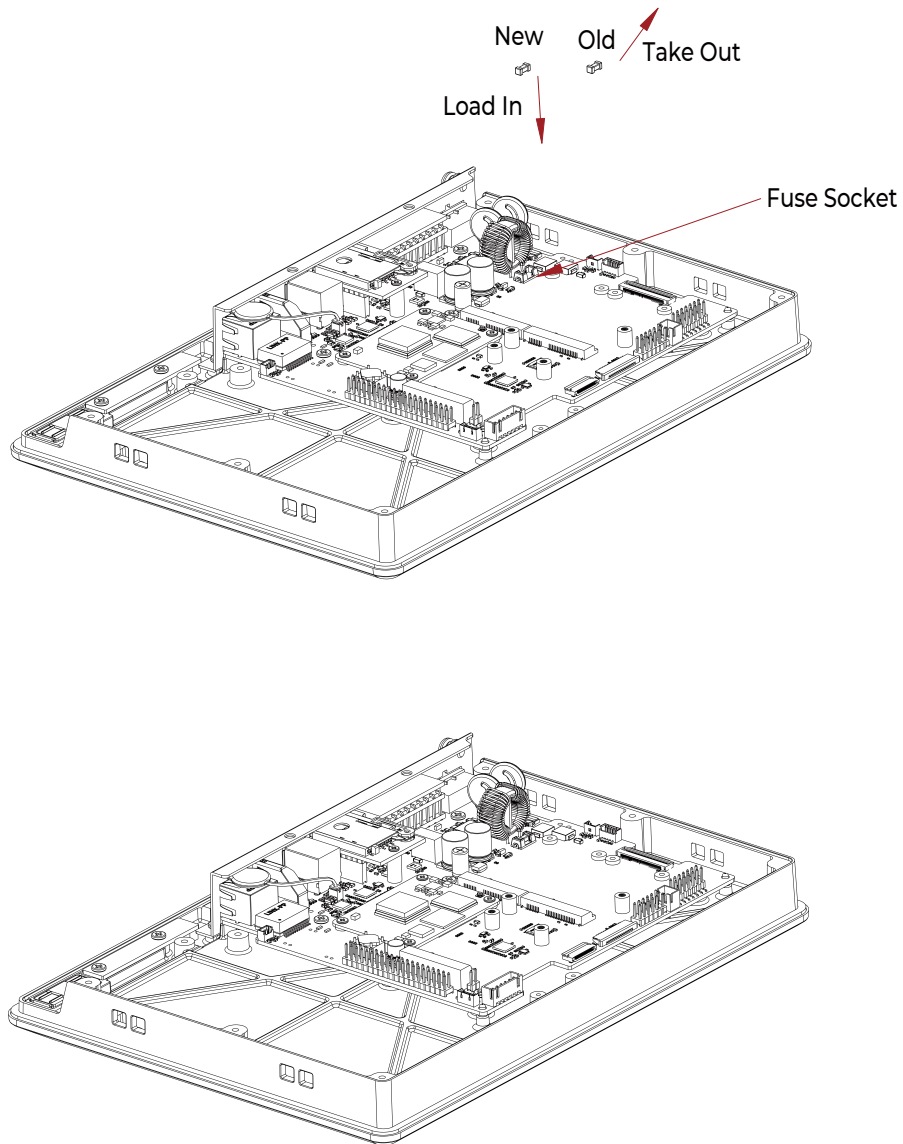
3.11 Chassis Grounding Guide

Step 1: Loosen the grounding screw.
Step 2: Load the grounding connector and tighten the screw.

Ground Connector

Ground Screw
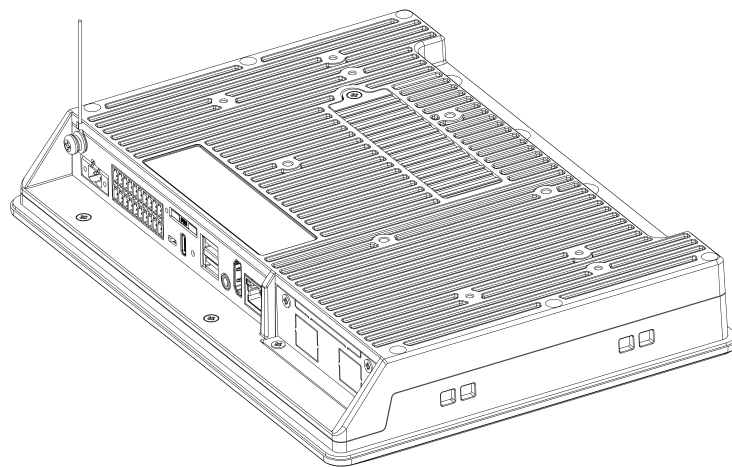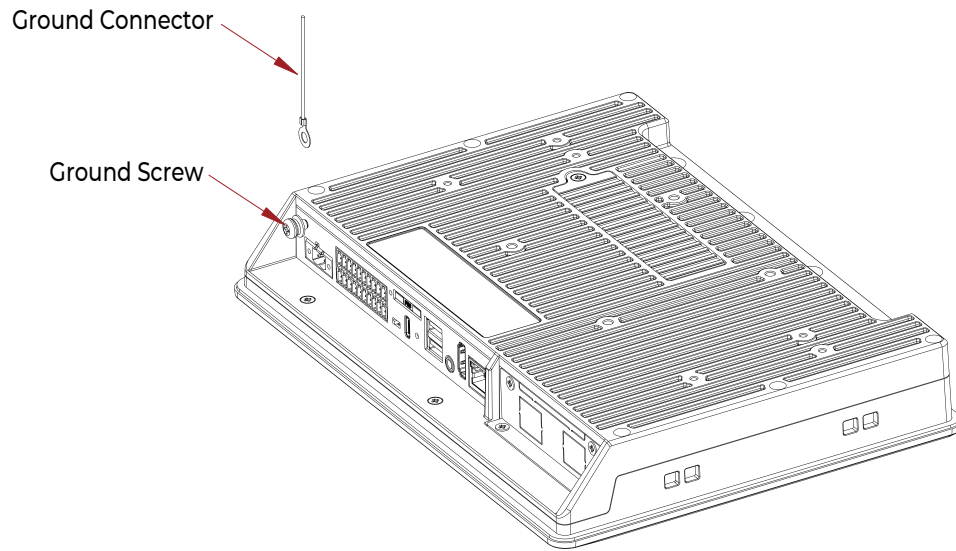
3.12 Terminal Connection Guide

Step 1: Insert the power connector in the direction shown below.
Step 2: Insert the cable connector in the direction shown below.

Power Connector

Cable Connector
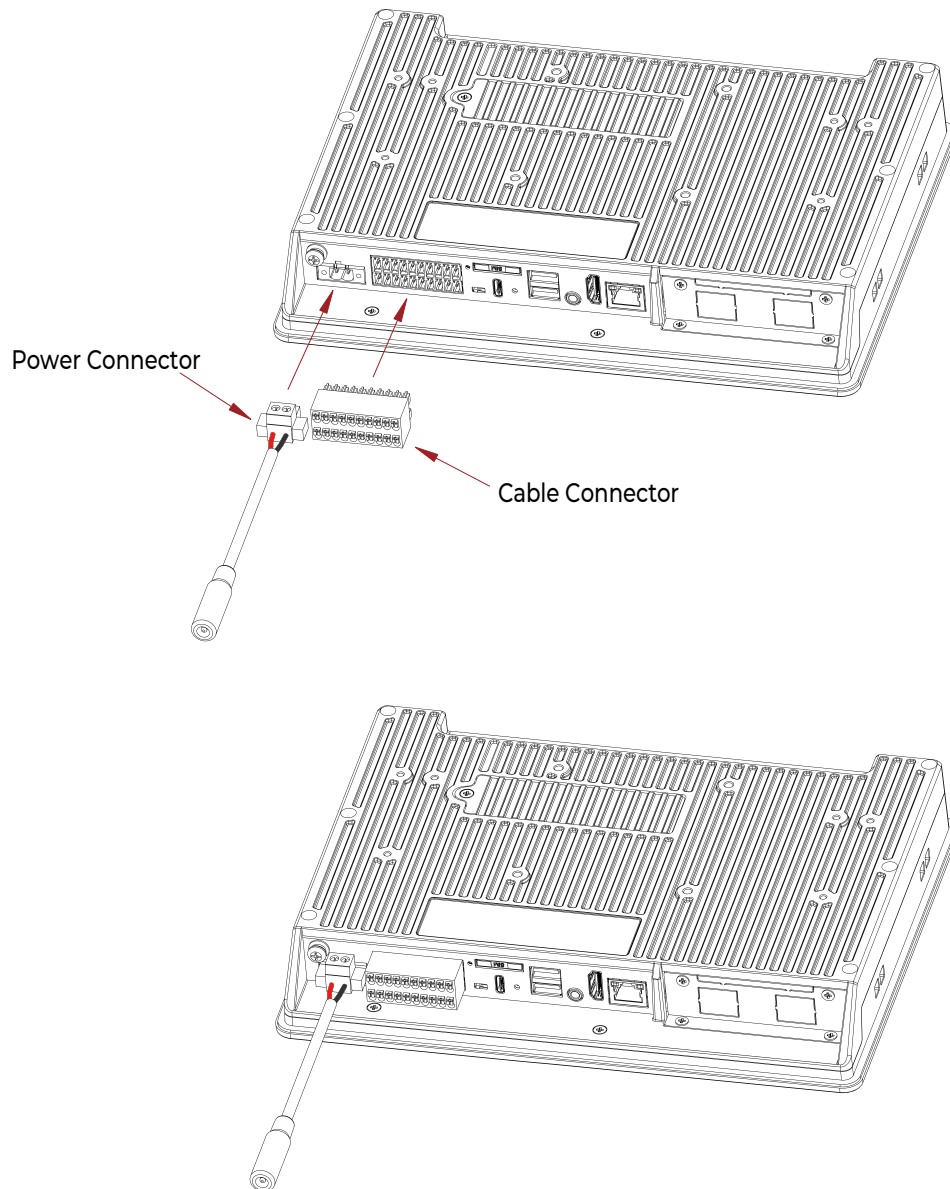
C4. Mounting Guide

The reTerminal DM supports multiple installation methods, and users can choose flexibly according to their usage scenarios. It should be noted that the standard product does not come with the accessories required for Panel Mount and Din Rail Mount, and defined accessories need to be purchased for installation. For details on accessories, please refer to section 2.3 Optional Interfaces and Modules.

4.1 Panel Mount

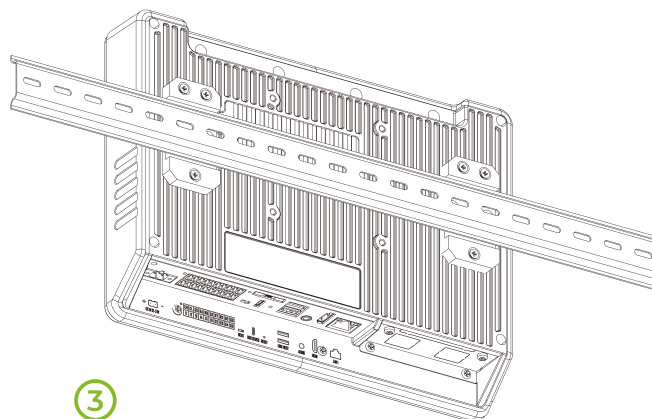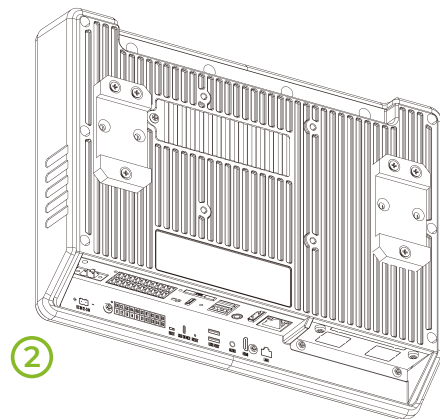110061503, Panel mount Kit for reTerminal DM is required for panel mounting
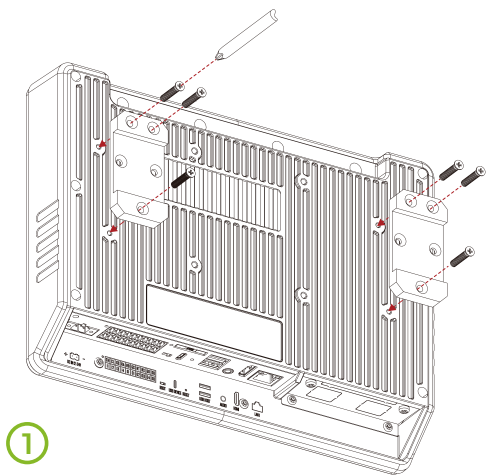
4.2 VESA Mount

① ②
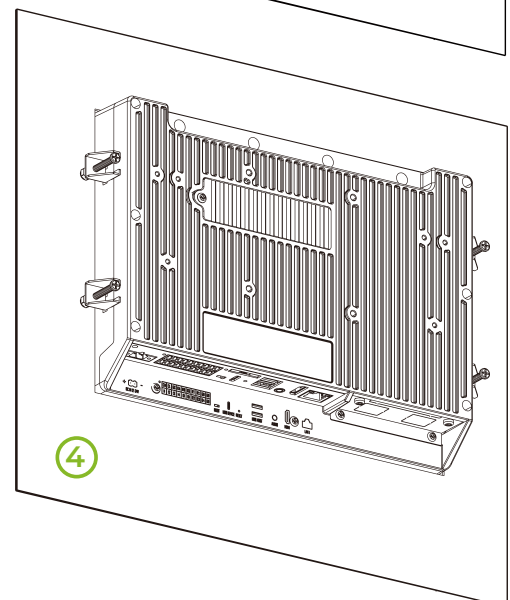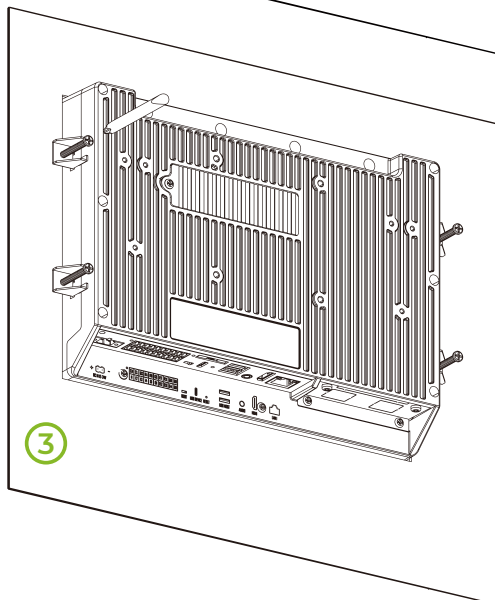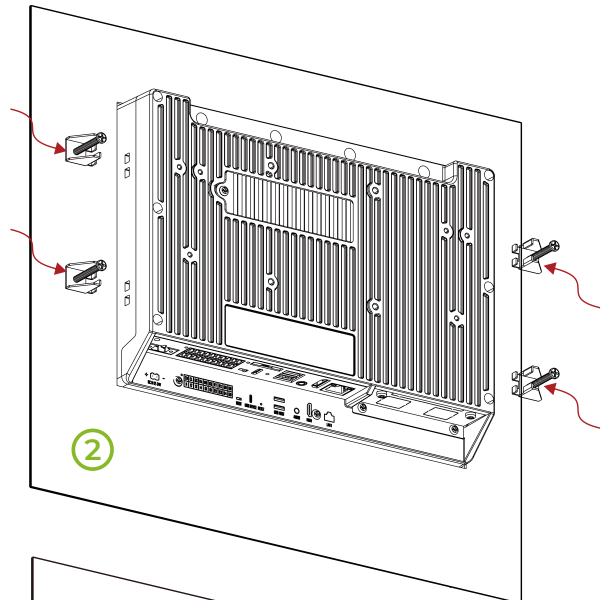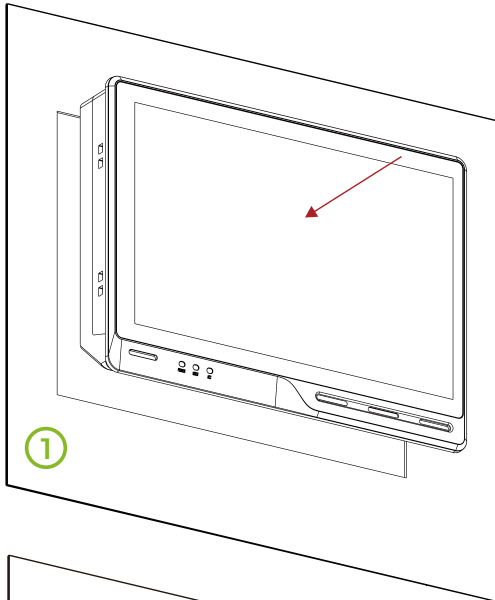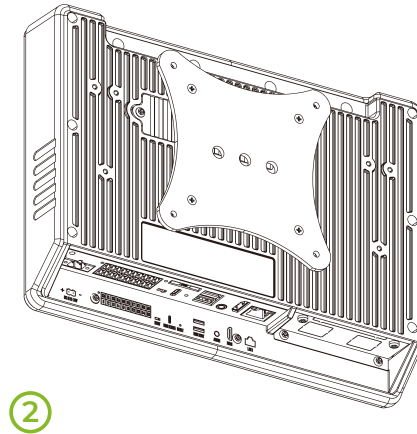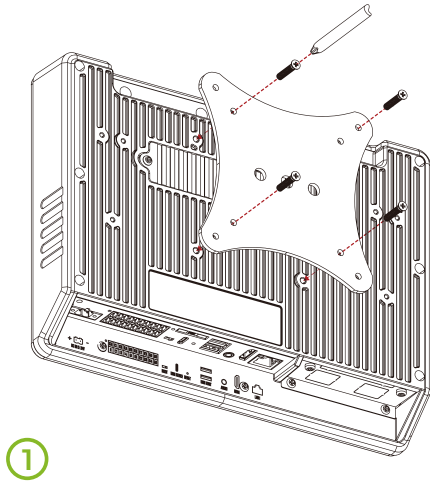
4.3 DIN Rail Mount

114070181, Sliding Block for Linear Guideway Rail is required for DIN Rail mounting

① ②

③

C5. Warranty & Support

5.1 Warranty

1 - From the date of sale, the company provides 24 months free warranty for the products.

2 - Warranty coverage is limited to products purchased from the official Seeed Studio website or authorized distributors. Customers need to keep receipts and purchase vouchers.

3 - The products to be repaired shall be properly packaged and transported, and the customer shall be responsible for any loss or damage during transportation.

4 - During the warranty period, the freight and maintenance costs arising from product quality failures shall be borne by Seeed Studio. If the warranty period exceeds 24 months, Seeed Studio will charge the fee for replacing parts according to the product failure, and the freight is borne by the user.

5 - During the free warranty period, in case of any of the following events, Seeed Studio has the right to refuse service or charge materials and service fees at its discretion.

- Product failure or damage caused by improper use by users.
- The product label is damaged and the product information cannot be identified.
- Even within the warranty period, if the product has functional issues or is difficult to repair due to improper customer use, unauthorized disassembly or modification, poor operating environment, improper maintenance, accidents, or other reasons. Seeed Studio reserves the right to make judgments on the above situations and collect maintenance fees.
- Other unavoidable external factors cause product failure and damage.

The above warranty regulations are only applicable to the above Seeed Studio reTerminal DM, other products are not applicable!

5.2 Support

Quick start guide:
https://wiki.seeedstudio.com/reterminal-dm

Tech support email:
techsupport@seeed.io

Customized service email:
odm@seeed.cc

Discord:
Welcome to join our official community, where you can exchange product-relatedquestions and get relevant support.
http://discord.seeed.cc