Edge AI Applied Computing

SINTRONES

VBOX-3132 Series

User Manual

Version 1.1

Revision History

Version	Date	Description of Changes
1.0	2026-02-13	Initial release.
1.1	2026-05-25	Added information about the DIP switch for the CAN FD port in Section 3.5.

Copyright

Disclaimer

SINTRONES® Technology Corp. shall not be liable for any incidental or consequential damages resulting from the performance or use of this product.

SINTRONES® Technology Corp. makes no representation or warranty regarding the content of this manual. Information in this manual has been carefully checked for accuracy; however, no guarantee is given to the correctness of the contents. For continuing product improvement, SINTRONES® Technology Corp. reserves the right to revise the manual or make changes to the specifications of this product at any time without notice and obligation to any person or entity regarding such change. The information contained in this manual is provided for general use by customers.

Declaration of Conformity

The CE symbol on your product indicates that it complies with the European Union (EU) directives. A Certificate of Compliance is available by contacting Technical Support. This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables.

This product has been tested and found to comply with the limits for a Class A device, according to Part 15 of the FCC Rules. These limits are designed to protect reasonably against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used by the manufacturer’s instructions, may cause harmful interference to radio communications.

Trademarks

SINTRONES® is a registered trademark of SINTRONES® Technology Corp.

The terms HDMI, HDMI High-Definition Multimedia Interface, HDMI Trade dress and the HDMI Logos are trademarks or registered trademarks of HDMI Licensing Administrator, Inc.

All the trademarks, registrations, and brands mentioned herein are used for identification purposes only and may be trademarks and registered trademarks of their respective owners.

Safety Information

Read the following precautions before setting up a SINTRONES® Product.

Electrical Safety

- Disconnect the power cable from the electrical outlet to prevent shock hazards before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. Disrupt all power cables from the existing system before adding a device.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Before connecting or removing signal cables from the motherboard, ensure all power cables are unplugged.
- Ensure your power supply is set to the correct voltage in your area. If you are unsure of the voltage of your current electrical outlets, contact your local power company.
- If the power supply is broken, do not fix it by yourself. Contact a qualified service technician or your retailer.

Operation Safety

- Before installing the motherboard and adding devices, carefully read all the manuals in the package.
- Before using the product, ensure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- Keep paper clips, screws, and staples away from connectors, slots, sockets, and circuitry to avoid short circuits.
- Avoid dust, humidity, and temperature extremes. Please do not place the product in any area that may become wet.
- Place the product on a stable surface.
- Contact a qualified service technician or retailer if you encounter technical problems with the product.

Environmental Safety

- Use this product in environments with ambient temperatures between -30˚C and 70˚C.
- Do not leave this product in an environment where the storage temperature may be below -40˚C or above 80˚C. To prevent damage, the product must be used in a controlled environment.

CAUTION:
Incorrectly replacing the battery may damage this computer. Replace only with the same or equivalent recommended by SINTRONES® Technology Corp. Dispose of the used battery according to the manufacturer's instructions.

Technical Support

Please call or e-mail our customer service when you cannot fix the problems.

- TEL: +886-2-8228-0101
- FAX: +886-2-8228-0100
- E-mail: sales@sintrones.com

Contents

1. Introduction

The VBOX-3132 Series is a compact in-vehicle computer designed for seamless installation in space-constrained environments such as industrial cabinets. Engineered for reliability in harsh conditions, this edge computing solution supports both wall and DIN-rail mounting and features hardware expandability, flexible connectivity, and a modular, customizable design, making it an ideal choice for diverse industrial and transportation applications.

The VBOX-3132 Series provides a variety of CPU options, allowing users to select the processor that best suits their specific application requirements. Additionally, this in-vehicle computer supports DDR5 SODIMM memory for enhanced multitasking and two M.2 2280 slots for NVMe SSD expansion needs, making it a scalable solution for handling increasing data loads without performance degradation.

For multi-connectivity, the industrial-grade computer offers configurable features such as dual 2.5GbE uplinks for high-bandwidth data transmission and PoE support for streamlined sensor or peripheral integration. Optional M12 X-coded connectors further enhance robustness in demanding environments. The VBOX-3132 Series also features a built-in CAN port for seamless integration and communication within vehicles.

This chapter introduces SINTRONES® VBOX-3132 Series and gives an overview of its product details.

Topics in this chapter include:

1.1. Product Information

Table 1-1 Specifications

System

Processor

- Intel Atom® x7835RE 8-core processor up to 3.6 GHz
- Intel Atom® x7433RE 4-core processor up to 3.4 GHz
- Intel® Twin Lake N355 Core™ 3 8-core processor up to 3.9 GHz
- Intel® Twin Lake N150 4-core processor up to 3.6GHz

Graphics

- Intel® UHD Graphics

Memory

- 1 x DDR5-4800 SO-DIMM up to 16GB

Security

- TPM 2.0

Watchdog

- Auto reset for unresponsive system (custom 1-255 sec/min settings in BIOS)

Interface

Video

- 1 x HDMI® up to 3840 x 2160 @ 60Hz as specified in HDMI 2.1

Audio

- 1 x Line-out, 1 x Mic-in (Optional)

Ethernet

PoE Models:

- 1 x 2.5GbE (Intel I226-IT) via RJ-45 (optional M12 X-code)
- 4 x GbE* (Marvell Ethernet Switch) w/ PoE (PSE Class 3: 15W) via RJ-45 (optional M12 X-code)

*Ports share 1GbE; total PoE power budget: 60W

Non-PoE Models:

- 2 x 2.5GbE via RJ-45 (optional M12 X-code)

CAN

- 1 x CAN FD

USB

- 2 x USB 3.2
- 2 x USB 2.0

DIO

- 8 x DI (DC 5-48V), 4 x DO (DC 12V/100mA)

COM

- 2 x RS-232/422/485 (expandable to 4 ports)

Internal Expansion

M.2

- 1 x M.2 3042/3052 Key B for WWAN w/ dual Nano SIM support
- 1 x M.2 2230 Key E for Wi-Fi/BT

Storage

Type

- 1 x M.2 2280 Key M for NVMe SSD
- 1 x M.2 2280 Key M for NVMe/SATA SSD

Power

Power Input

- DC 9-60V (nominal power input DC 12V/24V/48V) via 3-pin terminal block (optional M12 K-code)

*Power input for PoE models is recommended to be 24V or above.

Power Protection

- OCP, OVP, surge protection, reversed polarity protection

Power Management

- Ignition detection, Smart Power Management

Battery Backup Unit (BBU)

- Backup battery for system power continuity (Non-PoE models only)

Software

Operating System

- Windows 11 IoT Enterprise LTSC
- Ubuntu 24.04 LTS

Environmental

Operating Temp.

- x7000RE* Processor: -40°C ~ 70°C (-40°F ~ 158°F) with 0.6 m/s airflow

*Non-PoE models with x7000RE processor support operating temperature up to 75°C (167°F), though the processor performance may be limited.

- N-series Processor: -30°C ~70°C (-22°F ~ 158°F) with 0.6m/s airflow

*Operating temperature varies by accessories installed.

Storage Temp.

- -40°C ~ 80°C (-40°F ~ 176°F)

Relative Humidity

- 10% RH ~ 90% RH (non-condensing)

Vibration

- IEC 60068-2-64, random, 2.5G@5~500Hz, 1hr/axis
- MIL-STD-810H, Method 514.8, Procedure I, Category 4

Shock

- MIL-STD-810H, Method 516.8, Procedure I, trucks and semi-trailers = 15G (11ms)

Certification / Compliance

- CE, FCC Class A, UKCA, E-Mark, EN 62368-1, EN 50155, EN 45545-2 (R25)

Mechanical

Construction

- Aluminum alloy

Antenna

- 6 x SMA connector mounting hole

Mounting

- DIN-rail/Wall mounting

Net Weight

- RJ-45 PoE model: 1.50 kg (3.31 lb)
- M12 PoE model: 1.79 kg (3.95 lb)

Dimensions (L x W x H)

- RJ-45 model: 150 x 150 x 65 mm (5.91 x 5.91 x 2.56 in.)
- M12 PoE model: 150 x 150 x 87 mm (5.91 x 5.91 x 3.43 in.)

Ingress Protection

- IP40

Table 1-2 Ordering Information

Model Number	VBOX-3132-D25	VBOX-3132-D25-zz (D25= w/ 2.5GbE, zz=N355=Intel® Core™ 3 Processor N355, zz=N150=Intel® Processor N150)
		Intel® Twin Lake Processor Dual 2.5GbE RJ-45 Fanless Edge Computer (Optional BBU)
	VBOX-3132-D25-M12X	VBOX-3132-D25-M12X-zz (D25= w/ 2.5GbE, zz=x7835=Intel Atom® x7835RE, zz=N355=Intel® Core™ 3 Processor N355, zz=N150=Intel® Processor N150)
		Intel Atom® x7000RE/Intel® Twin Lake Processor Dual 2.5GbE M12 DIN-rail Rugged Edge Computer (Optional BBU)
	VBOX-3132P	VBOX-3132P-zz (P= w/ PoE, zz=x7835=Intel Atom® x7835RE, zz=x7433=Intel Atom® x7433RE)
		Intel Atom® x7000RE 4-Port PoE RJ-45 Fanless Edge Computer
	VBOX-3132P-M12X	VBOX-3132P-M12X-zz (P= w/ PoE, zz=x7835=Intel Atom® x7835RE, zz=x7433=Intel Atom® x7433RE)
		Intel Atom® x7000RE 4-Port PoE M12 DIN-rail Rugged Edge Computer

Table 1-3 Model List

Model Name	RJ-45 Model	M12 Model	2.5GbE	GbE	PoE	BBU
VBOX-3132P-M12X-x7835	-	✓	1	4	✓	-
VBOX-3132P-M12X-x7433	-	✓	1	4	✓	-
VBOX-3132P-x7835	✓	-	1	4	✓	-
VBOX-3132P-x7433	✓	-	1	4	✓	-
VBOX-3132-D25-M12X-x7835	-	✓	2	-	-	✓
VBOX-3132-D25-M12X-N355	-	✓	2	-	-	✓
VBOX-3132-D25-M12X-N150	-	✓	2	-	-	✓
VBOX-3132-D25-N355	✓	-	2	-	-	✓
VBOX-3132-D25-N150	✓	-	2	-	-	✓

Table 1-4 Optional Accessories

Memory	DDR5-4800 SO-DIMM 16GB
Storage	M.2 2280 NVMe SSD 256GB~2TB
Wi-Fi	M.2 2230 Wi-Fi Module
WWAN	M.2 3042/3052 WWAN Modem
GNSS	M.2 2242 GNSS Module
Battery (BBU)	BAT-2300v2 (Operating Temp. : -20°C ~ 60°C (-4°F ~ 140°F) (Non-PoE models only)
Power Adapter	Non-PoE models: DC 12V, 60W PoE models: DC 24V, 160W
Ethernet Cable	M12 X-code to RJ-45 (1M)

Note:

All items listed in the Optional Accessories table are sold separately.

1.2. Product Photos

The VBOX-3132 Series offers a range of SKUs to suit specific application requirements. The product photos below provide one example — VBOX-3132-D25-M12X — for reference. Please refer to Mechanical Drawings *(on page 13)* for a visual comparison of all available SKUs.

Figure 1-1 Front View of VBOX-3132-D25-M12X

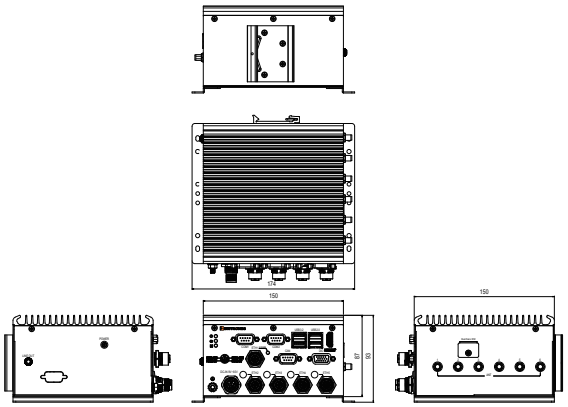
Figure 1-2 Left Side View of VBOX-3132-D25-M12X

Figure 1-3 Right Side View of VBOX-3132-D25-M12X

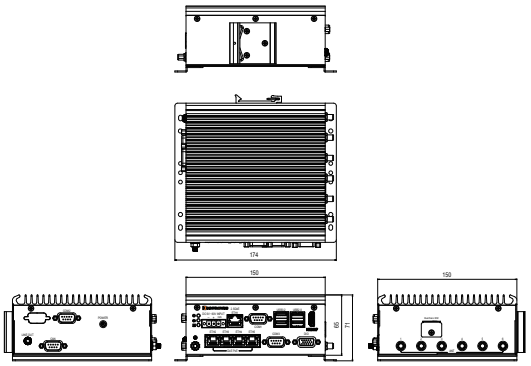
1.3. Mechanical Drawings

Unit : mm

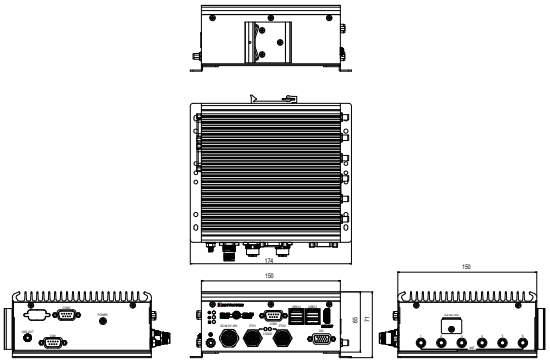
VBOX-3132P-M12X



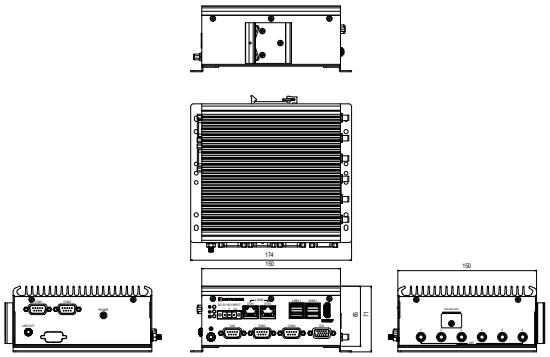
VBOX-3132P



VBOX-3132-D25-M12X



VBOX-3132-D25



1.4. Package Contents

See the following list to check if it matches your product package contents. Please contact SINTRONES® sales representatives or our sales partners if any of the items is missing.

Table 1-5 Package Contents

Item	Photo	Quantity	Description
VBOX-3132 Series	See Product Photos *(on page 12)*	1	The in-vehicle computer
Wall Mounting Bracket		2	Used to mount the computer onto the wall.
Power Cable (M12 Models *(on page 10)* Only)		1	Used to connect the computer with a M12 K-coded connector to a DC power supply
Accessory Bag 1			
3-Pin Terminal Block (Non-M12 Models *(on page 10)* Only)		1	Used to connect to a DC power supply
Thermal Pad 24x60x1.75Tmm		1	Used to transfer heat from an installed memory module
Thermal Pad 30x34x1.5Tmm		1	Used to transfer heat from an installed M.2 WWAN module
Thermal Pad 31x11x1.0Tmm		1	Used to transfer heat from an installed M.2 WWAN module
Thermal Pad 70x22x1.75Tmm		2	Used to transfer heat from an installed NVMe SSD expansion module

Item	Photo	Quantity	Description
Screw I Type (M2.5x5L)		7	Used to fasten an M.2 module or DDR heatsink
Round Hand Screw (P2.5x12L)		1	Used to fasten the heatsink for an M.2 3042/3052 module
Round Head Screw (P3x6L)		1	Used to fasten the heatsink for an M.2 3042/3052 module
Hex Copper Pillar (H75D50)		1	Used to fasten the heatsink for an M.2 3042 module
Screw F Type #6-32*6L Ni		2	Used to fasten the wall mounting brackets to the computer
Screw F Type M3x6L		3~4	Used to fasten the DIN rail clip to the computer **Note:** **Quantity**: • 3 screws for all models except VBOX-3132P-M12X • 4 screws for the VBOX-3132P-M12X model
Accessory Bag 2			
DIN Rail Clip	60 mm (VBOX-3132P-M12X only) 	1	Used to mount the computer onto a DIN rail

Item	Photo	Quantity	Description
	44 mm (Other models) 		
DDR HEATSINK_Type 5		1	Used to transfer heat from an installed DDR5 memory module
M.2 WWAN Heatsink_-Type 14		1	Used to transfer heat from an installed M.2 3042 or 3052 WWAN module

1.5. Power Consumption

See the following tables as the power consumption of —

- VBOX-3132P: PoE models equipped with the Intel Atom® Processor x7835RE or Intel Atom® Processor x7433RE
- VBOX-3132-D25: Non-PoE models equipped with the Intel® Processor Core™ 3 N355 or Intel® Processor N150

Table 1-6 Power Consumption of VBOX-3132P (PoE models)

Mode	Input Voltage	Intel Atom® Processor			
		x7835RE (TDP: 12W)		x7433RE (TDP: 9W)	
S0 (Burn-In Test)	12V	7.80A	93.6W	7.42A	89.0W
	24V	3.82A	91.7W	3.64A	87.4W
	48V	1.91A	91.7W	1.83A	87.8W
S0 (Burn-In Test with PoE Disabled)	12V	1.99A	23.9W	1.67A	20.0W
	24V	1.05A	25.2W	0.87A	20.9W
	48V	0.53A	25.4W	0.48A	23.0W
S0 (Idle)	12V	0.73A	8.8W	0.75A	9.0W
	24V	0.38A	9.1W	0.37A	8.9W
	48V	0.22A	10.6W	0.22A	10.6W
S4	12V	0.16A	1.9W	0.16A	1.9W
	24V	0.11A	2.6W	0.11A	2.6W
	48V	0.09A	4.3W	0.09A	4.3W
S5	12V	0.16A	1.9W	0.16A	1.9W
	24V	0.11A	2.6W	0.11A	2.6W
	48V	0.09A	4.3W	0.09A	4.3W
S0 (Maximum Loading, PoE 60W)	12V	8.48A	101.8W	8.53A	102.4W
	24V	4.11A	98.6W	4.15A	99.6W

Mode	Input Voltage	Intel Atom® Processor			
		x7835RE (TDP: 12W)		x7433RE (TDP: 9W)	
	48V	2.07A	99.4W	2.12A	101.8W

Table 1-7 Power Consumption of VBOX-3132-D25 (Non-PoE models)

Mode	Input Voltage	Intel® Processor			
		Core™ 3 N355 (TDP: 15W)		N150 (TDP: 6W)	
S0 (Burn-In Test)	12V	2.09A	25.1W	1.21A	14.5W
	24V	1.06A	25.4W	0.61A	14.6W
	48V	0.55A	26.4W	0.32A	15.4W
S0 (Idle)	12V	0.56A	6.7W	0.55A	6.6W
	24V	0.31A	7.4W	0.30A	7.2W
	48V	0.19A	9.1W	0.18A	8.6W
S4	12V	0.10A	1.2W	0.11A	1.3W
	24V	0.08A	1.9W	0.08A	1.9W
	48V	0.07A	3.4W	0.07A	3.4W
S5	12V	0.10A	1.2W	0.11A	1.3W
	24V	0.08A	1.9W	0.08A	1.9W
	48V	0.07A	3.4W	0.07A	3.4W
S0 (Maximum Loading)	12V	3.80A	45.6W	2.35A	28.2W
	24V	1.83A	43.9W	1.17A	28.1W
	48V	0.87A	41.8W	0.62A	29.8W

2. Getting Started

Topics in this chapter include:

2.1. System Setup

This section illustrates how to open the system chassis to install expansion modules. It also provides an important notice regarding system reassembly.

The VBOX-3132 Series includes four SKUs:

- **Non-PoE Models**:
  - VBOX-3132**-D25**: BBU + RJ-45 (2 x 2.5 GbE)
  - VBOX-3132**-D25-M12X**: BBU + M12 (2 x 2.5 GbE)
- **PoE Models**:
  - VBOX-3132**P**: PoE + RJ-45 (1 x 2.5GbE, 4 x GbE)
  - VBOX-3132**P-M12X**: PoE + M12 (1 x 2.5GbE, 4 x GbE)

Appearances differ among SKUs, and disassembly instructions also vary between Non-PoE and PoE models. Always follow the illustrations and instructions for the SKU you purchased.

2.1.1. Opening the Chassis

See below as the primary steps to open the chassis for specific expansion module installation:

- Removing the Front Bracket *(on page 20)* for memory, M.2 WWAN, M.2 WLAN, and BBU (Non-PoE models only) installation.
- Removing the Rear Bracket *(on page 22)* for detaching the mainboard from the top cover.
- Detaching the Mainboard from the Top Cover (Non-PoE Models) *(on page 25)* for M.2 strorage module installation in non-PoE models.
- Detaching the Mainboard from the Top Cover (PoE Models) *(on page 26)* for M.2 strorage module installation in PoE models.

Before you start the installation, check the following safety instructions:

Important:

- Ensure the device is not connected to any power source such as a power adapter or a battery.
- Prior to installing any modules on the mainboard, always touch an unpainted and grounded metal object or wear a grounded anti-static wrist strap to prevent electrostatic discharge (ESD).

2.1.1.1. Removing the Front Bracket

The **front bracket** consists of the **bottom cover** and the **front panel**. It must be removed to install memory, M.2 WWAN, M.2 WLAN, or BBU (Non-PoE models only) modules. Removing the front bracket is also required before detaching the mainboard from the top cover to install M.2 storage module(s).

1. Place the system upside down and remove the five screws from the **bottom cover**.

2. Remove the three screws from the **front panel**.

Figure 2-1 VBOX-3132-D25

Figure 2-2 VBOX-3132-D25-M12X

Figure 2-3 VBOX-3132P

Figure 2-4 VBOX-3132P-M12X

3. After all screws are removed, gently lift the front bracket (bottom cover + front panel) and set it aside on a clean, flat surface.

   Figure 2-5 Front Bracket (Illustration only, actual configuration may differ)

Note:
In practice, cables are attached between the mainboard and the front bracket. Handle the front bracket carefully to avoid pinching, crushing, or disconnecting cables.

2.1.1.2. Removing the Rear Bracket

The **rear bracket** consists of the **right side panel**, **rear panel**, and the **left side panel**. It must be removed before detaching the mainboard from the top cover to install M.2 storage module(s).

1. Remove the front bracket (bottom cover + front panel). See Removing the Front Bracket *(on page 20)* for the instructions.
2. Locate and remove the copper pillar as shown below.

Important:
This step is critical to prevent scratching the rear bracket during disassembly.

3. Remove the SIM card tray.

Important:
This step is critical to prevent damage to the SIM card tray during disassembly.

4. Remove the two screws on the right side panel.

Figure 2-6 VBOX-3132-D25/VBOX-3132-D25-M12X/VBOX-3132P

Figure 2-7 VBOX-3132P-M12X

5. Remove the three screws on the rear panel.

Figure 2-8 VBOX-3132-D25/VBOX-3132-D25-M12X/VBOX-3132P

Figure 2-9 VBOX-3132P-M12X

6. Remove the two screws on the left side panel.

Figure 2-10 VBOX-3132-D25

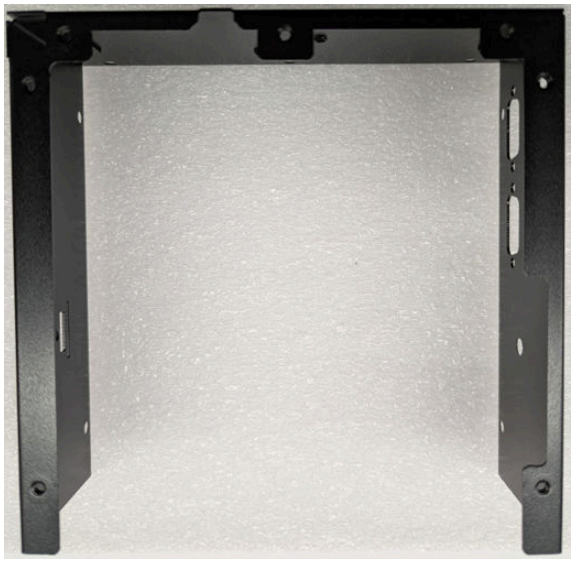
Figure 2-11 VBOX-3132-D25-M12X

Figure 2-12 VBOX-3132P

Figure 2-13 VBOX-3132P-M12X

7. After all screws are removed, gently lift the rear bracket (right + rear + left panels) and set it aside on a clean, flat surface.

Figure 2-14 Rear Bracket (Illustration only, actual configuration may differ)



Note:
In practice, cables are attached between the mainboard and the rear bracket. Handle the rear bracket carefully to avoid pinching, crushing, or disconnecting cables.

2.1.1.3. Detaching the Mainboard from the Top Cover (Non-PoE Models)

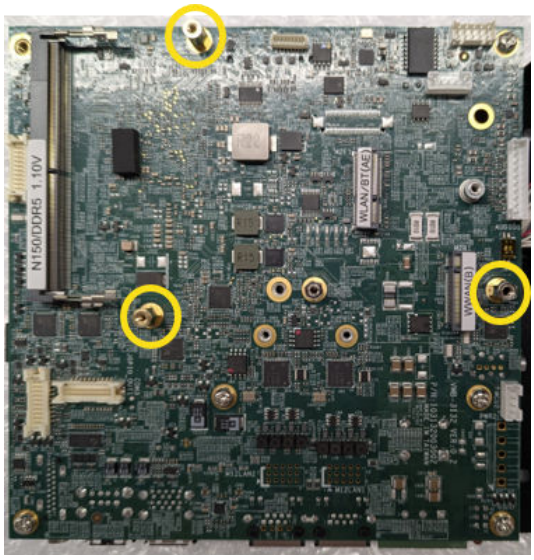
The top cover must be removed before installing storage module(s). The following instructions apply to:

- VBOX-3132-D25
- VBOX-3132-D25-M12X

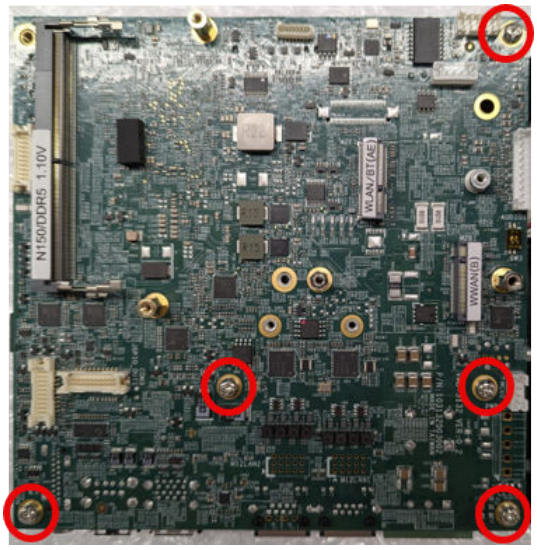
CAUTION:

- Since removal of the top cover involves complex and delicate procedures, it is recommended to purchase and install at least one optional M.2 storage module prior to shipping.
- Improper removal of the top cover may cause CPU damage, potentially resulting in system malfunctions. To prevent system damage, consult SINTRONES technical support before proceeding with top cover removal.

1. Remove the rear bracket. See Removing the Rear Bracket *(on page 22)* for the instructions.
2. Remove the three copper pillars from the mainboard.



3. Remove the five screws from the mainboard.



4. Gently lift the mainboard from the top cover and set it aside on a clean, flat surface. Place the mainboard carefully, ensuring cables remain clear and securely connected.
5. To install an M.2 storage module, see Installing Storage Module(s) *(on page 38)* for the instructions.

Important:
To ensure proper reassembly, check Important Notice: System Reassembly *(on page 41)* before reassembling the system.

2.1.1.4. Detaching the Mainboard from the Top Cover (PoE Models)

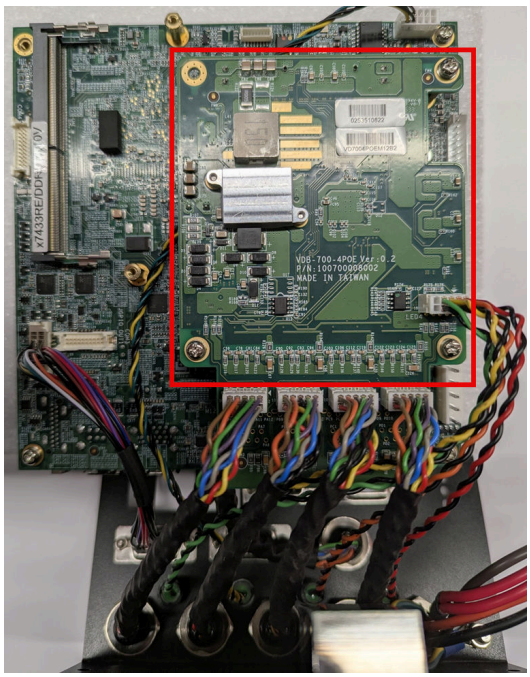
The top cover must be removed before installing storage module(s). The following instructions apply to:

- VBOX-3132P
- VBOX-3132P-M12X

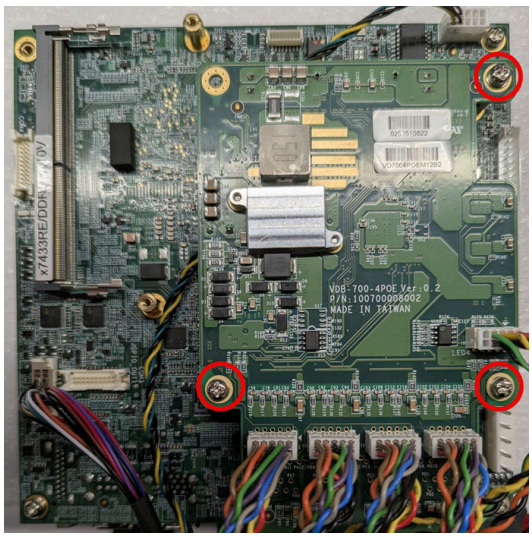
CAUTION:

- Since removal of the top cover involves complex and delicate procedures, it is recommended to purchase and install at least one optional M.2 storage module prior to shipping.
- Improper removal of the top cover may cause CPU damage, potentially resulting in system malfunctions. To prevent system damage, consult SINTRONES technical support before proceeding with top cover removal.

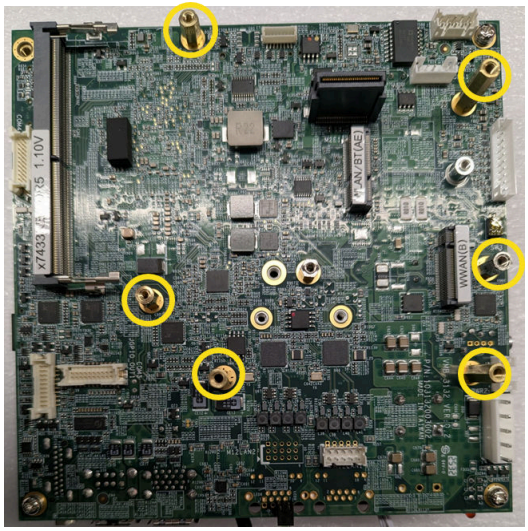
1. Remove the rear bracket. See Removing the Rear Bracket *(on page 22)* for the instructions.
2. Locate the PoE board above the mainboard.



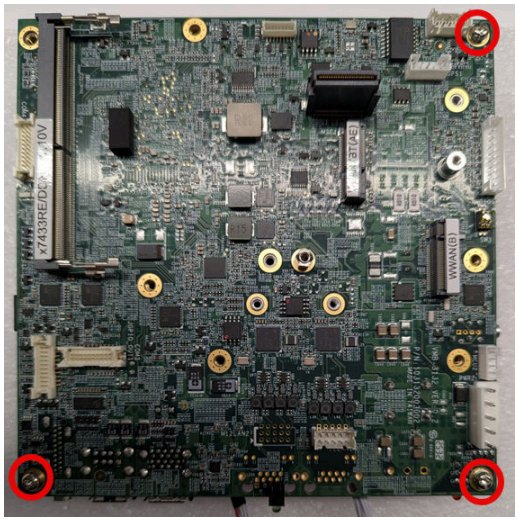
3. Remove the three screws from the PoE board.



4. Gently lift the PoE board from the mainboard and set it aside on a clean, flat surface. Place the PoE board carefully, ensuring cables remain clear and securely connected.
5. Remove the six copper pillars from the mainboard.



6. Remove the three screws from the mainboard.



7. Gently lift the mainboard from the top cover and set it aside on a clean, flat surface. Place the mainboard carefully, ensuring cables remain clear and securely connected.
8. To install an M.2 storage module, see Installing Storage Module(s) *(on page 38)* for the instructions.

Important:
To ensure proper reassembly, check Important Notice: System Reassembly *(on page 41)* before reassembling the system.

2.1.2. Installing Expansion Modules

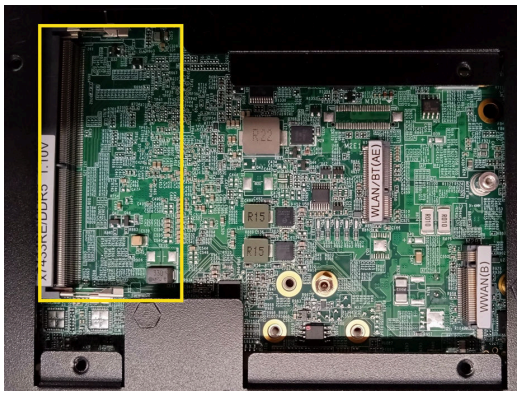
This section describes how to install memory, storage and other expansion modules, as well as an **optional backup battery (BBU)** for **Non-PoE models only** in the VBOX-3132 Series.

The following instructions are illustrated with product photos of VBOX-3132-D25.

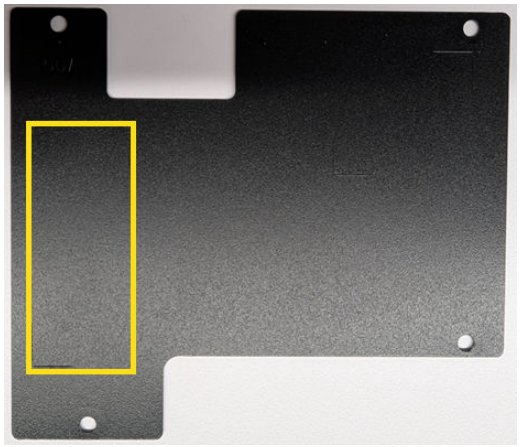
2.1.2.1. Installing Memory Module

The system provides an SO-DIMM slot for installing a DDR5-4800 memory module with capacities up to 16GB.

1. You need to remove the bottom cover to install the memory module. See Removing the Bottom Cover *(on page)* for the instructions.
2. Locate the memory slot on the mainboard.



3. Align the notch on the memory module with the tab in the slot and gently insert the module at a 30 degree angle until it is fully embedded.
4. Press the memory module down until the clips lock into place.
5. On the back of the bottom cover, locate the highlighted area as shown below. Attach the thermal pad (24x60x1.75T mm) *(on page)* to the area.



6. Reassemble the bottom cover to the chassis and secure it with four screws.

2.1.2.1.1. Preparing the Heatsink for Memory Module

The thermal kit for a momery module is included in the accessory package (see Package Contents *(on page 14)*).

1. Before you begin, check if the thermal kit contains the items listed below.
    - 1 x DDR heatsink Type 5
    - 1 x thermal pad (24x60x1.75T mm)
    - 3 x M2.5x5L screw
2. Peel off the thermal pad release liner.
3. Attach the thermal pad to the heatsink at the designated area shown below.

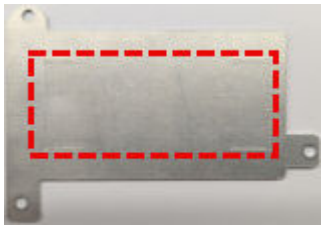
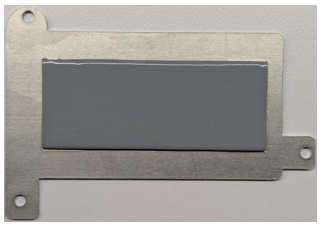


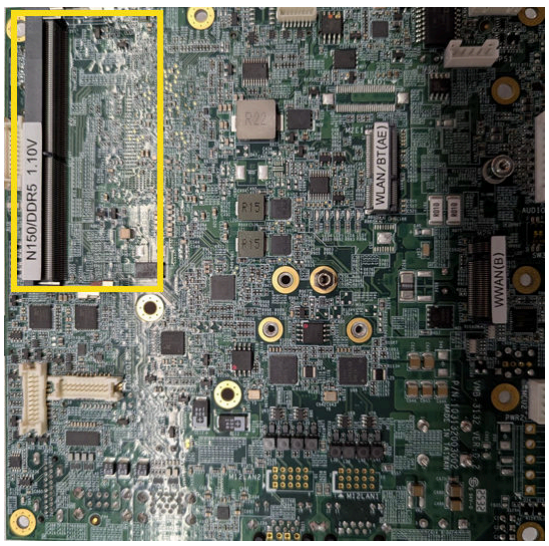
Figure 2-15 Thermal pad attached to the heatsink



4. Go to the following section: *Installing the Memory Module*.

2.1.2.1.2. Installing the Memory Module

1. You need to remove the front bracket to install the memory module. See Removing the Front Bracket *(on page 20)* for the instructions.
2. After removing the front bracket, locate the memory slot on the mainboard.

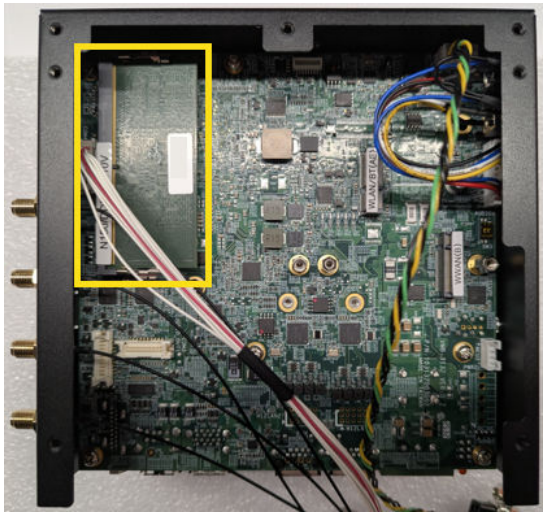


3. Align the notch on the memory module with the tab on the memory slot and gently insert the module at a 30 degree angle.

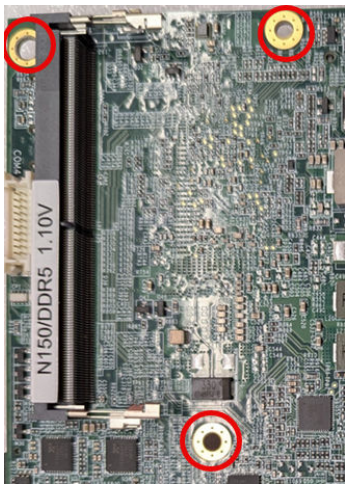
Important:
For PoE models, a PoE board is located near the memory slot. Insert the module carefully to avoid damaging the PoE board.

4. Press the memory module down until the clips lock into place.

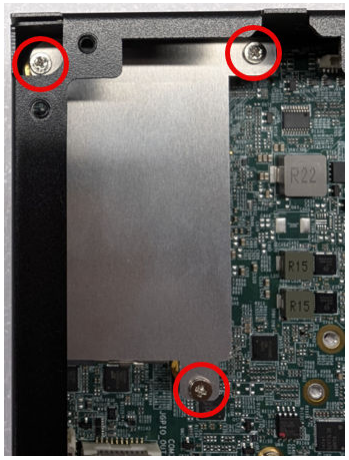
Figure 2-16 Memory Module Installed



5. Align the three screw holes on the heatsink with the three copper pillars around the memory module.



6. Fasten the heatsink to the mainboard with the M2.5x5L screws (see Package Contents *(on page 14)*).



2.1.2.2. Installing M.2 WWAN Module

The system provides an M.2 3042/3052 Key B slot for installing a WWAN expansion module.

Important:
For PoE models (See Table 1-3 : Model List *(on page 10)* for details), before installing the M.2 WWAN module, the PoE board must be carefully removed by following the PoE board removal: steps 2~4 in *Detaching the Mainboard from the Top Cover (PoE Models) (on page 27)* instructions. It is recommended to consult SINTRONES technical support in advance to prevent system damage.

2.1.2.2.1. Preparing the Heatsink for WWAN Module

The thermal kit for a WWAN module is included in the accessory package (see Package Contents *(on page 14)*).

1. Before you begin, check if the thermal kit contains the items listed below.
    - 1 x M.2 WWAN heatsink Type 14
    - 1 x thermal pad (30x34x1.5T mm)
    - 1 x thermal pad (31x11x1.0T mm)
    - 1 x M2.5x12L screw
    - 1 x P3x6L screw
2. Follow the images below to attach the thermal pads to the heatsink for later use.

Figure 2-17 M.2 WWAN Heatsink Type 14

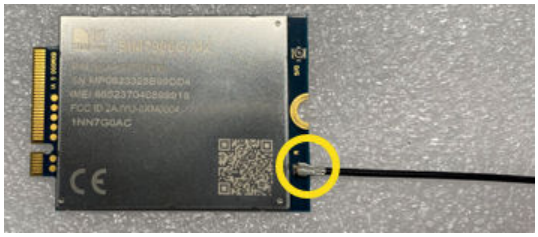
Figure 2-18 Thermal pad attached to the heatsink-1

Figure 2-19 Thermal pad attached to the heatsink-2

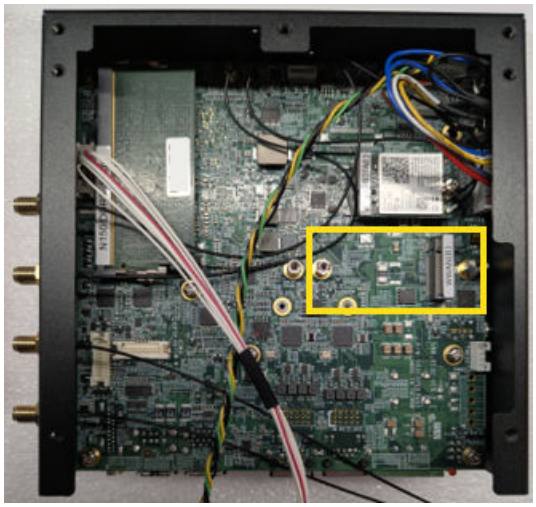
2.1.2.2.2. Installing 4G Module

Follow the instructions below to install a 4G module into the system.

1. You need to remove the front bracket to install the 4G module. See Removing the Front Bracket *(on page 20)* for the instructions.
2. Depending on the module's design and network support, connect the required number of antenna cables to the M.2 3042 **4G** WWAN module.

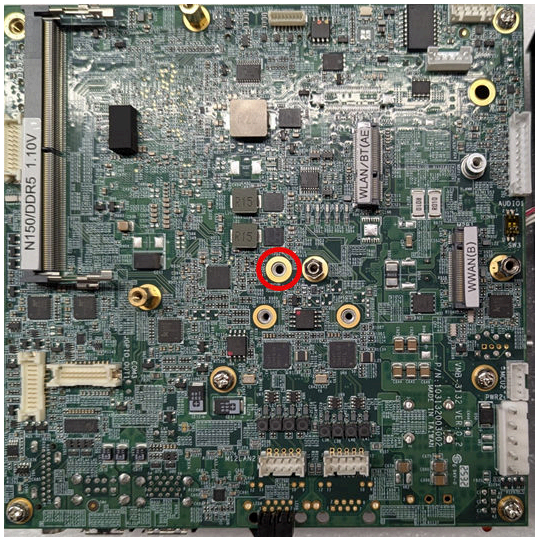


3. Locate the M.2 3042 Key B slot labelled as **WWAN(B)** on the mainboard.

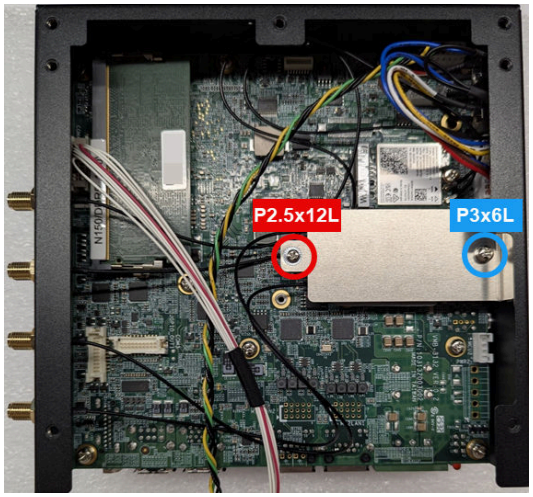


> **Note:**
> For PoE models (See Table 1-3 : Model List *(on page 10)* for details), the PoE board must be carefully removed to reveal the M.2 3042 key B slot. Follow the PoE board removal: steps 2~4 in *Detaching the Mainboard from the Top Cover (PoE Models) (on page 27)* instructions. It is recommended to consult SINTRONES technical support in advance to prevent system damage.

4. Fasten the hex copper pillar (H75D50) *(on page 15)*, which is provided in the package, to the mainboard.



5. Align the notch on the M.2 3042 WWAN module with the tab in the slot and gently insert the WWAN card at a 30 degree angle until it is fully embedded, and then press it down.
6. Secure the expansion module to the mainboard with the M2.5x5L screw *(on page 15)* provided in the accessory package.
7. Fasten the heatsink to the mainboard with the P2.5x12L *(on page 15)* and P3x6L *(on page 15)* screws provided in the accessory package.



Tip:
It is recommended to fasten the P2.5x12L screw first to secure the heatsink in place.

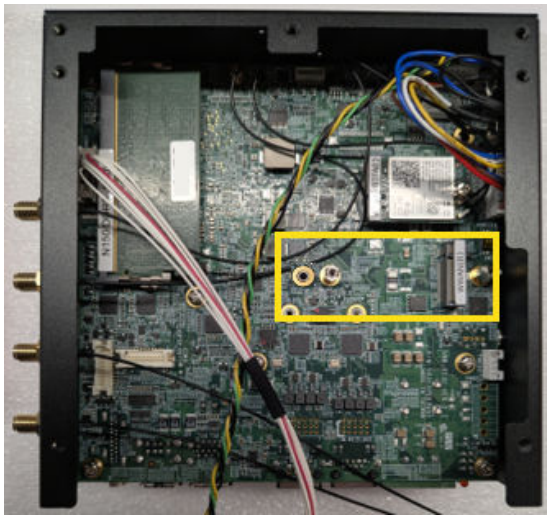
8. Secure the antenna jack(s) into the antenna hole(s), and then connect the other end(s) of the antenna cable(s) to the antenna jack(s).
9. Reassemble the system.
10. Insert the paired SIM card(s) into the SIM card slot(s).

2.1.2.2.3. Installing 5G Module

Follow the instructions below to install a 5G module into the system.

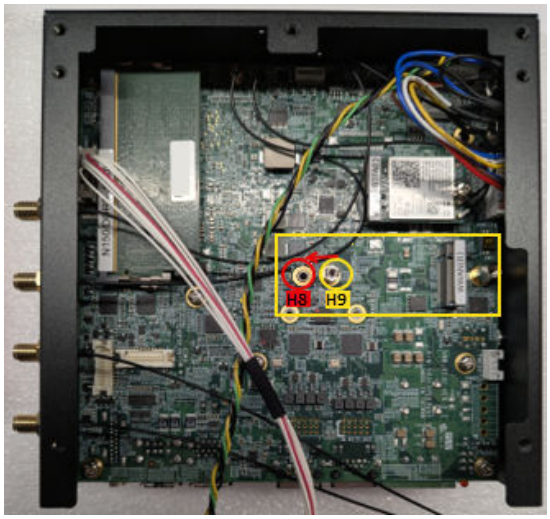
1. You need to remove the front bracket to install the 5G module. See Removing the Front Bracket *(on page 20)* for the instructions.
2. Depending on the module's design and network support, connect the required number of antenna cables to the M.2 3052 **5G** WWAN module.

3. Locate the M.2 3052 Key B slot labelled as **WWAN(B)** on the mainboard.

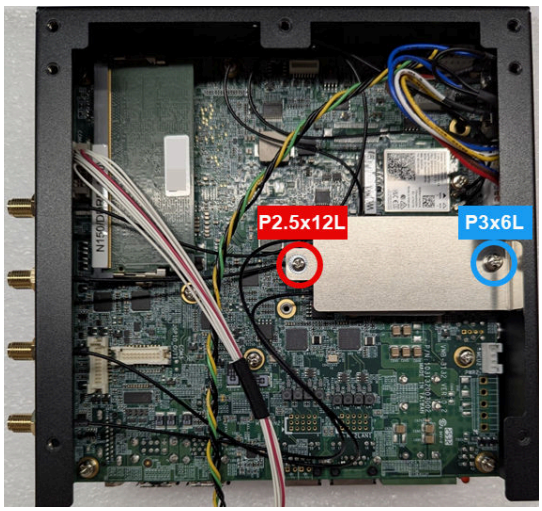


Note:
For PoE models (See Table 1-3 : Model List *(on page 10)* for details), the PoE board must be carefully removed to reveal the M.2 3052 key B slot. Follow the PoE board removal: steps 2~4 in *Detaching the Mainboard from the Top Cover (PoE Models) (on page 27)* instructions. It is recommended to consult SINTRONES technical support in advance to prevent system damage.

4. Move the copper pillar from H9 to H8 as indicated below.



5. Align the notch on the M.2 3052 WWAN module with the tab in the slot and gently insert the WWAN card at a 30 degree angle until it is fully embedded.
6. Since the M.2 3052 module has not been secured to the mainboard yet, press the card down before you proceed to the next step.
7. Align the two mounting holes on the heatsink with the copper pillar bumps on the mainboard, and then place the heatsink above the installed M.2 3052 module.
8. Fasten the heatsink to the mainboard with the P2.5x12L *(on page 15)* and P3x6L *(on page 15)* screws provided in the accessory package.



Tip:
It is recommended to fasten the P2.5x12L screw first to secure the heatsink in place.

9. Secure the antenna jack(s) into the antenna hole(s), and then connect the other end(s) of the antenna cable(s) to the antenna jack(s).
10. Reassemble the system.

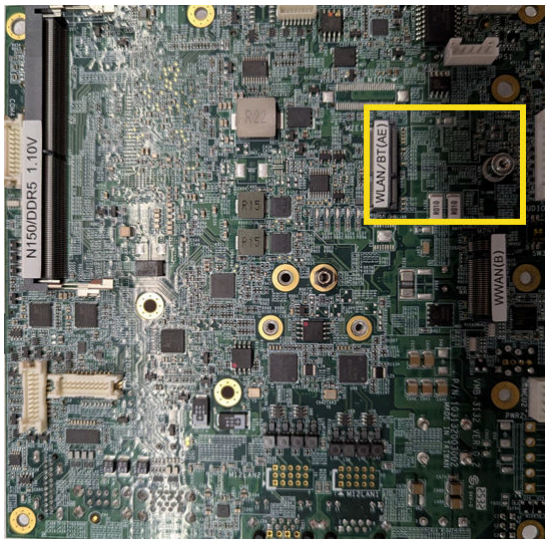
11. Insert the paired SIM card(s) into the SIM card slot(s).

2.1.2.3. Installing M.2 WLAN Module

The system provides an M.2 2230 Key E slot for installing a WLAN expansion module.

Important:
For PoE models (See Table 1-3 : Model List *(on page 10)* for details), before installing the M.2 WLAN module, the PoE board must be carefully removed by following the PoE board removal: steps 2~4 in *Detaching the Mainboard from the Top Cover (PoE Models) (on page 27)* instructions. It is recommended to consult SINTRONES technical support in advance to prevent system damage,

1. You need to remove the front bracket to install expansion modules. See Removing the Front Bracket *(on page 20)* for the instructions.
2. Depending on the module's design and network support, connect the required number of antenna cables to the M.2 2230 Key E WLAN module.
3. Locate the M.2 2230 Key E slot labelled as **WLAN/BT(AE)** on the mainboard.



Note:
For PoE models (See Table 1-3 : Model List *(on page 10)* for details), the PoE board must be carefully removed to reveal the M.2 2230 key E slot. Follow the PoE board removal: steps 2~4 in *Detaching the Mainboard from the Top Cover (PoE Models) (on page 27)* instructions. It is recommended to consult SINTRONES technical support in advance to prevent system damage.

4. Align the notch on the expansion module with the tab in the slot and gently insert the module at a 30 degree angle until it is fully embedded, and then press it down.

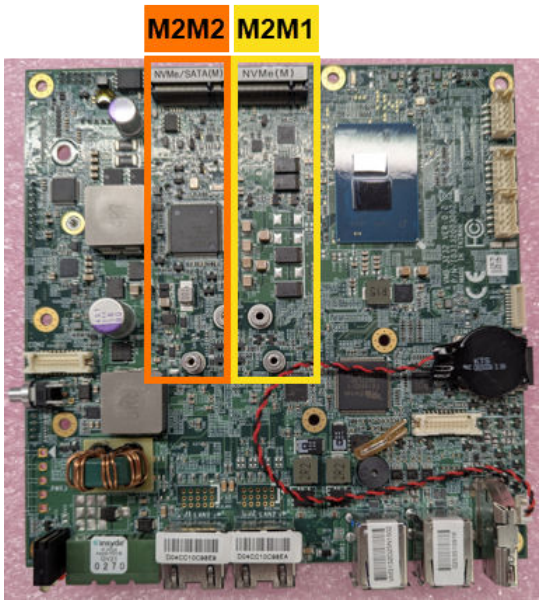
Note:
Ensure you align the semicircular mounting hole at the center of the opposite edge on the module with the copper pillar bump when pressing the module down.

5. Secure the expansion module to the mainboard with the M2.5x5L screw *(on page 15)* provided in the accessory package.
6. Secure the antenna jack(s) into the antenna hole(s), and then connect the other end(s) of the antenna(s) to the antenna jack(s).
7. Reassemble the system.

2.1.2.4. Installing Storage Module(s)

The system provides two M.2 2280 slots for storage expansion. One is used to install an NVMe SSD only; the other one can be used to install an NVMe or a SATA SSD.

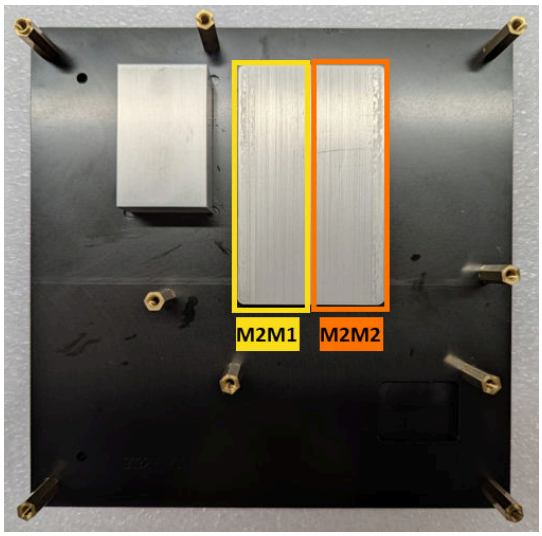
1. You need to **detach mainboard from the top cover** to install an M.2 storage module.
   - For **Non-PoE** models, see Detaching the Mainboard from the Top Cover (Non-PoE Models) *(on page 25)* for the instructions.
   - For **PoE** models, see Detaching the Mainboard from the Top Cover (PoE Models) *(on page 26)* for the instructions.
2. Locate the M.2 key M slots labelled as **NVMe(M)** (M2M1) or **NVMe/SATA(M)** (M2M2) on the mainboard.



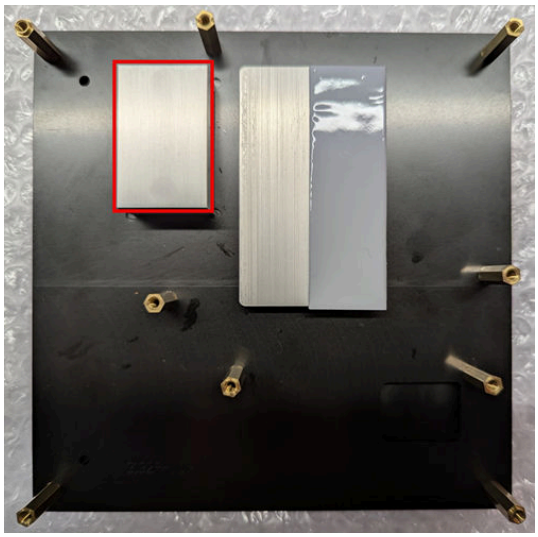
Important:
The M2M1 slot can only be used to install NVMe SSDs, while the M2M2 slot is used to install an NVMe or a SATA SSD.

3. Align the notch on the SSD card with the tab in the slot and gently insert the SSD card at a 30 degree angle until it is fully embedded.
4. On the back of the top cover, locate the area aligned with the M.2 2280 key M slot to be installed. Attach the thermal pad to the area as shown below.

Note:
The thermal pad *(on page 14)* is included in the accessory package.



5. Repeat the steps above to install any additional SSD into the other M.2 2280 slot.
6. When reassembling the mainboard to the top cover, place the mainboard in the correct orientation so that the CPU thermal pad aligns with the designated area shown below, highlighted in a red frame. **Misalignment may cause permanent CPU damage**, See Important Notice: System Reassembly *(on page 41)* for more details.



2.1.3. Installing the Backup Battery (BBU)

The following instructions apply **exclusively** to the models listed below.

- VBOX-3132-D25
- VBOX-3132-D25-M12

1. Before you begin, check the optional backup battery kit purchased from SINTRONES®, which includes:
    - 1 x battery cover

    - 1 x battery with a power cable

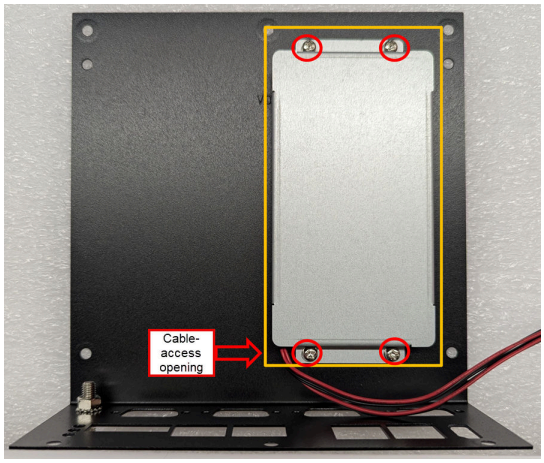
    - 4 x P3*6L screw

    - 1 x sponge

2. On both sides of the battery, peel off the release liners of the double-sided tapes.
3. Adhere the battery to the battery cover with the information label face up.

4. Peel off the release liner of the sponge.
5. Attach the sponge to the battery at the designated area shown below.

6. Locate the area to install the battery on the bottom cover. Fasten the battery to the bottom cover with the P3x6L screws. Get the power cable out from the cable-access opening as shown below.



7. Connect the other end of the power cable to the UPS1 position on the bottom side of the mainboard. See Bottom View of Mainboard / PoE Board *(on page 68)* for more information.

2.1.4. Important Notice: System Reassembly

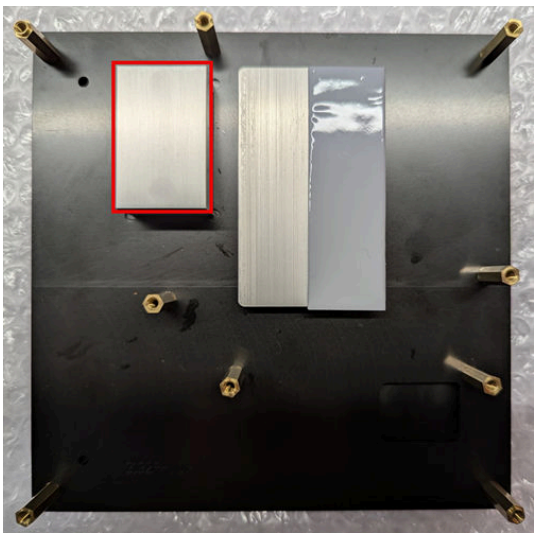
Before reassembling the system, ensure the following procedures are completed:

1. **Before reassembling the mainboard to the top cover**:

   a. **Inspect the CPU thermal pad**: Check whether the CPU thermal pad is damaged or broken.

   Note:
   If replacement is required, contact SINTRONES® technical support or your sales representative (Part No.: 271016027020).

   b. **Align the mainboard correctly**: Position the mainboard in the correct orientation so that the CPU thermal pad aligns precisely with the designated area (highlighted in red in the illustration below) of the top cover.

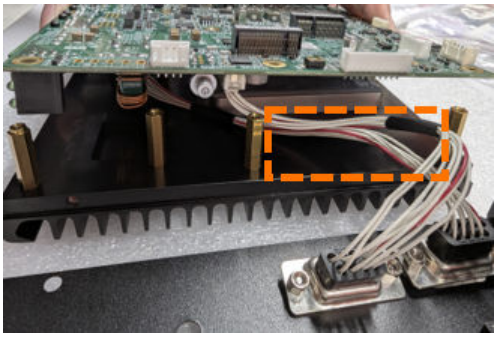


   CAUTION:
   Misalignment may result in inadequate thermal contact, which can cause permanent CPU damage.

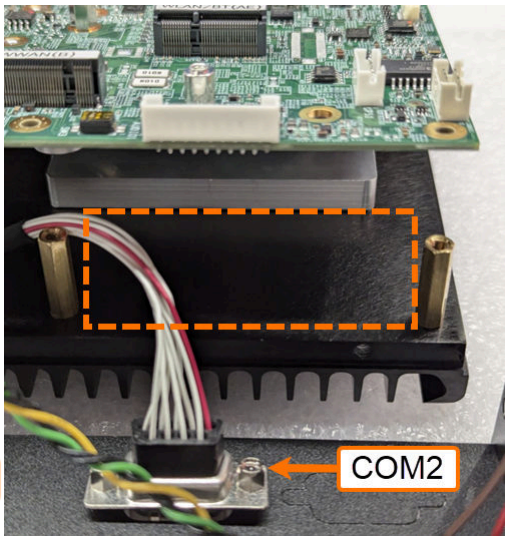
   c. **Organize the cables**: Carefully route cables into the designated space (highlighted in orange in the corresponding model illustrations below) between the mainboard and the top cover to prevent interference with the chassis during reassembly.

CAUTION:
Improper cable routing may cause the cables to be pinched or damaged by the chassis during system reassembly.

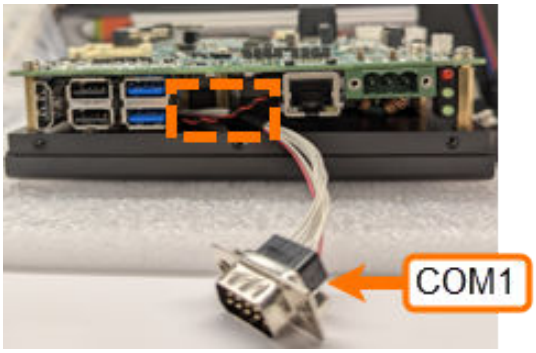
- **VBOX-3132-D25**:

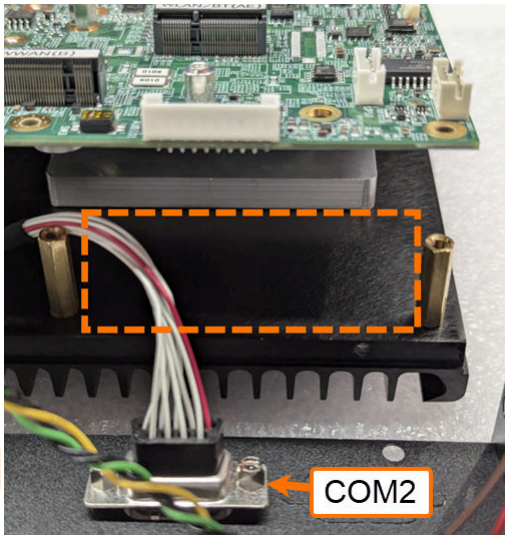


- **VBOX-3132-D25-M12X**:

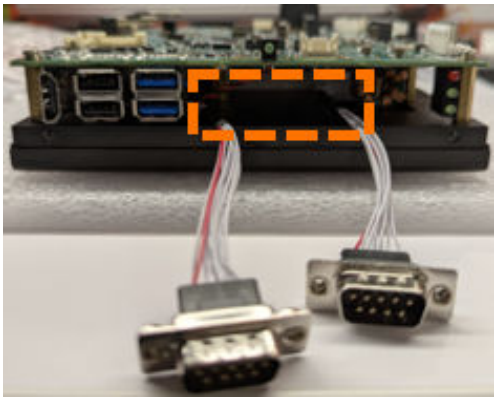


- **VBOX-3132P**:



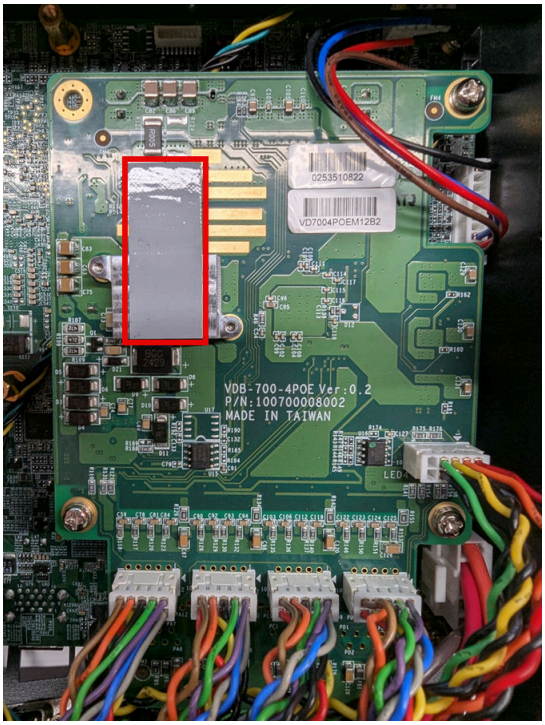


- **VBOX-3132P-M12X**:



2. **Before reassembling the PoE board to the mainboard** (VBOX-3132P and VBOX-3132P-M12X models only):

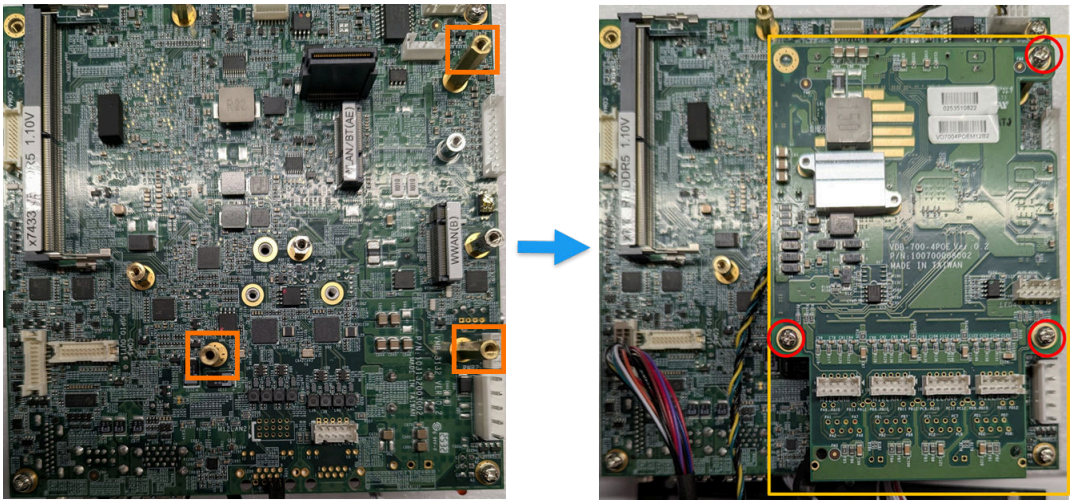
   a. **Inspect the PoE board thermal pad**: Check whether the PoE board thermal pad is damaged or broken (highlighted in red in the illustration below).



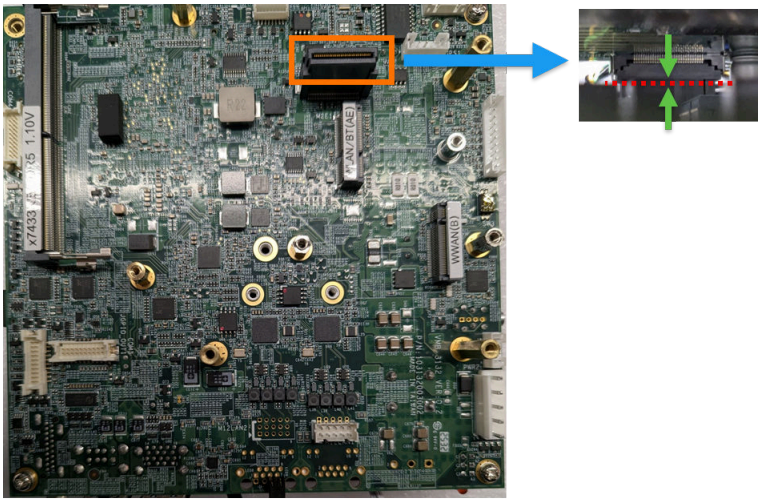
Note:
If replacement is required, contact SINTRONES® technical support or your sales representative (Part No.: 271013031000).

   b. **Align the screw holes and avoid cable interference**:

- Precisely align the screw holes on the PoE board with the copper pillars on the mainboard.
- Ensure the cables do not interfere with the chassis before fastening the screws.



3. **After reassembling the PoE board to the mainboard** (VBOX-3132P and VBOX-3132P-M12X models only):
   - **Inspect the PoE board connection**: Check the MIO connectors to confirm that the PoE board is correctly connected to the mainboard.



2.2. Mounting the System

The VBOX-3132 Series offers DIN-rail and wall mounting options. See below as the instructions.

2.2.1. DIN-Rail Mounting

The VBOX-3132 Series can be mounted horizontally or vertically on a DIN rail using the DIN rail clip provided in the accessory package.

1. Check the Package Contents *(on page 14)* and get the items below:
   - 3 x Screw F Type M3x6L **(for all models except VBOX-3132P-M12X)**
   - 4 x Screw F Type M3x6L **(for VBOX-3132P-M12X only)**
   - 1 x DIN Rail Clip
2. Locate the three or four screw holes on the rear panel.

   Figure 2-20 All models except VBOX-3132P-M12X

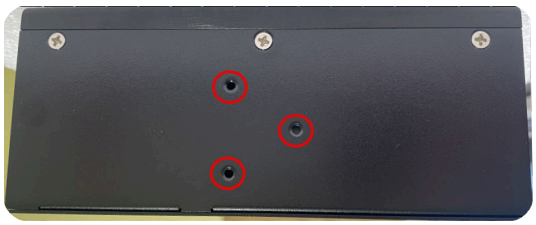
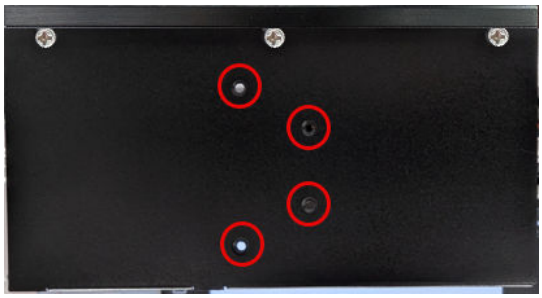
   

   Figure 2-21 VBOX-3132P-M12X

3. Align the screw holes with those on the DIN rail clip, and then place the DIN rail clip on the rear panel.
4. Secure the DIN rail clip to the rear panel with the F Type M3x6L screws.

   Figure 2-22 All models except VBOX-3132P-M12X

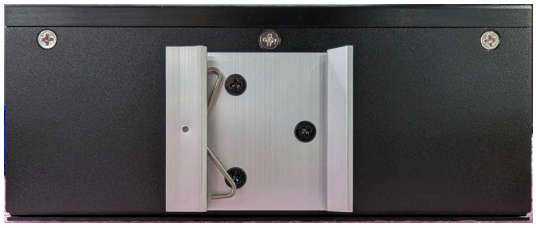
   

   Figure 2-23 VBOX-3132P-M12X

2.2.2. Wall Mounting

The VBOX-3132 Series can be mounted on a wall using the wall mounting brackets included in the package.

1. Check the Package Contents *(on page 14)* and get the items below:
    - 2 x Screw F Type #6-32*6L Ni
    - 2 x Wall Mounting Bracket
2. Remove the two screws from the bottom cover for later use.

3. Locate the four screw holes on the bottom cover.

4. Align the screw holes on the bottom cover with those on the wall mounting brackets, and then place the mounting brackets on either side of the bottom cover.

5. Secure the mounting brackets to the bottom cover using four F Type #6-32*6L Ni screws (two provided in the package, and two taken from those removed in Step 2 *(on page 46)*).

2.3. Booting the System

This section describes how to boot the system via an ignition switch or the power button.

2.3.1. Turning On System By Ignition Switch (Non-M12 Models)

The following instructions apply to the models without M12 connectors:

- VBOX-3132-D25
- VBOX-3132P

1. Get the terminal block provided in the accessory package.
2. Prepare the wires for connecting the terminal block to a power supply. See the following diagrams as the illustration of wiring an ignition switch to use in fields with or without an ignition system.

Figure 2-24 Fields with an Ignition System

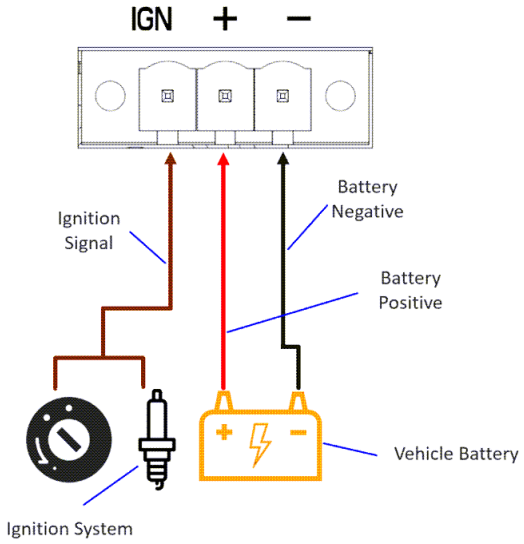
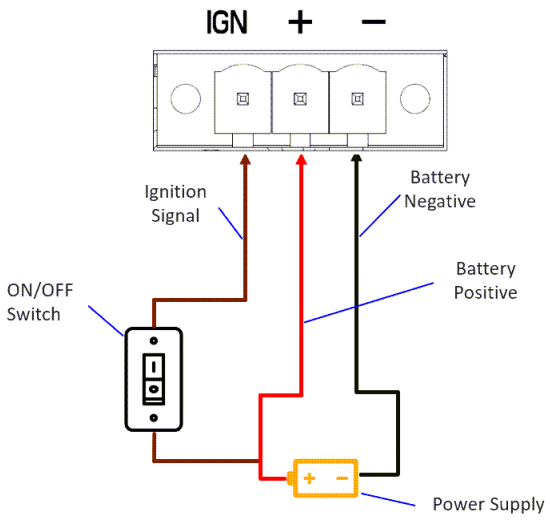


Figure 2-25 Fields without an Ignition System

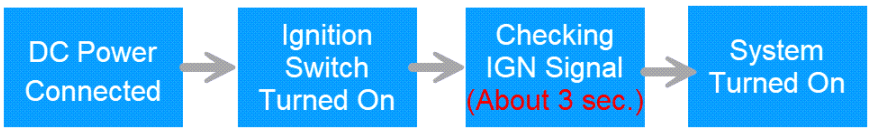


3. Insert each wire into the correct terminal block position.
4. Plug the terminal block into the DC-IN port of the computer and then plug the other end of the attached wires to a power source.
5. When the power is ready, turn on the ignition switch.
6. The system starts checking if there's any incoming ignition signal. It takes about **3 seconds** for the system to run the ignition control process.

> **Note:**
> SINTRONES® provides ignition power management that monitors the ignition signal and controls the system boot process to avoid potential risk of downtime or damages to the connected devices and system.

7. After the ignition control process is complete, the system will boot up.

Figure 2-26 Turning On System By Ignition Switch



2.3.2. Turning On System By Ignition Switch (M12 Models)

The following instructions apply to the models with M12 connectors::

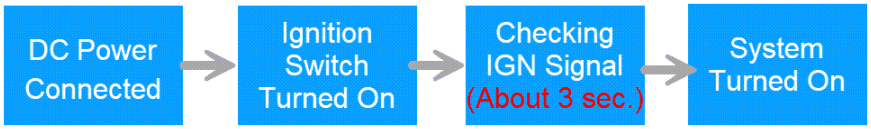
- VBOX-3132-D25-M12X
- VBOX-3132P-M12X

1. Get the power cable provided in the accessory package.
2. Plug one end of the power cable into the DC-IN port of the computer and then plug the other end to a power source.
3. When the power is ready, turn on the ignition switch.
4. The system starts checking if there's any incoming ignition signal. It takes about **3 seconds** for the system to run the ignition control process.

   Note:
   SINTRONES® provides ignition power management that monitors the ignition signal and controls the system boot process to avoid potential risk of downtime or damages to the connected devices and system.

5. After the ignition control process is complete, the system will boot up.

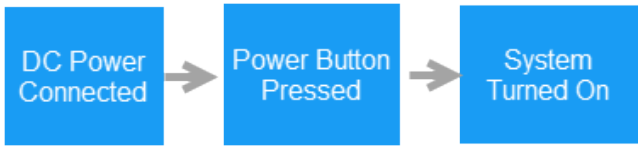
Figure 2-27 Turning On System By Ignition Switch



2.3.3. Turning On System By Power Button

1. When the system is connected to a suitable DC power source, press the power button.
2. The **Power Button** turns to blue light when the system boots up.

Figure 2-28 Turning On System By Power Button



3. External I/O Ports

This chapter provides panel drawings, associated descriptions, and specifications of the external input/output ports.

Topics in this chapter include:

3.1. Front Panels

This section provides the front panel view and the description of the associated I/O interface.

Front Panels of VBOX-3132 Series

3.1.1. RJ-45 Models

Figure 3-1 Front Panel of VBOX-3132P (PoE, RJ-45)

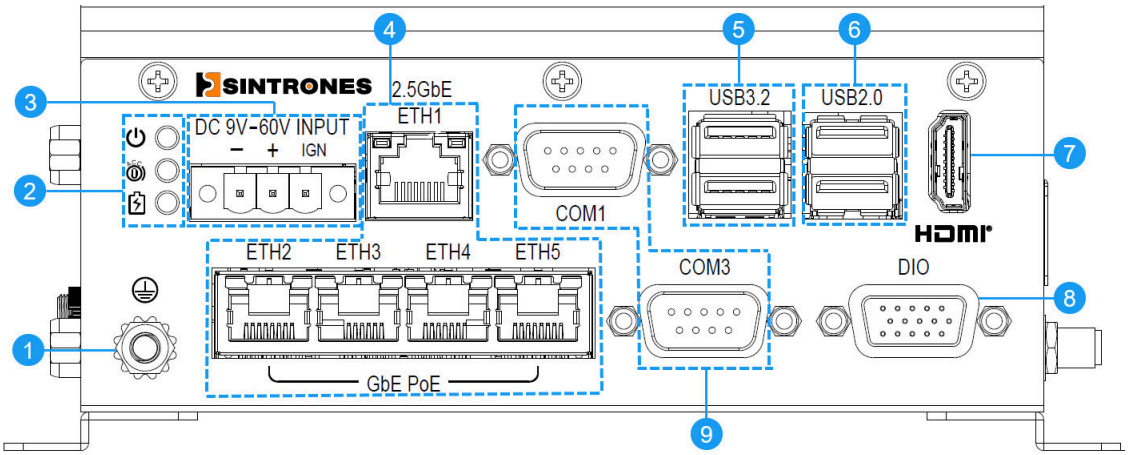


Figure 3-2 Front Panel of VBOX-3132-D25 (2 x 2.5 GbE, RJ-45)

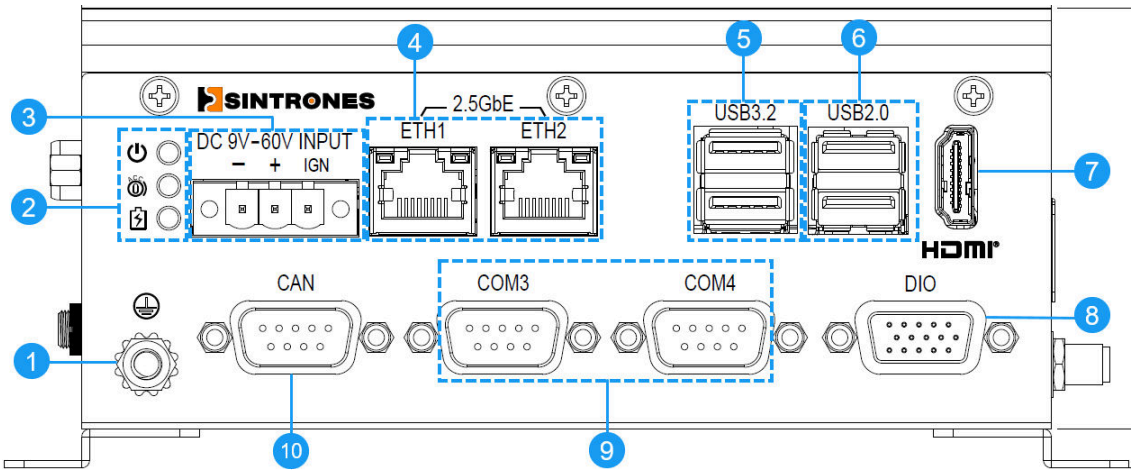


Table 3-1 I/O Interface on Front Panel

Item	I/O Interface	Description	Specification
1	Grounding Terminal	M5 bolt with nut for chassis grounding	-
2	LED Indicators	• ⏻ (System power status:): ◦ Red light: Standby mode ◦ Blue light: System turned on	-

Item	I/O Interface	Description	Specification
		•  (ACC): ◦ Flashing: Checking ignition signal ◦ ON: Ignition signal detected	
		•  (BBU) (VBOX-3132-D25 only) ◦ ON: Internal backup battery enabled ◦ OFF: Power supplied from external power source or no backup battery installed	
3	DC Input	Input voltage range: DC 9-60V *Power input for PoE models is recommended to be 24V or above.	DC-IN Port (Terminal Block) *(on page 59)*
4	Ethernet Ports	**VBOX-3132P**: • ETH1: 2.5GbE • ETH2~ETH5: 4 ports share 1GbE with PoE (PSE Class 3: 15W; total power budget: 60W) **VBOX-3132-D25**: • ETH1/ETH2: 2.5GbE	LAN/ETH Port *(on page 60)*
5	USB Ports	USB 3.2 (10 Gbps, 5V/900mA)	USB 3.2 Port *(on page 61)*
6	USB Ports	USB 2.0 (480 Mbps, 5V/500mA)	USB 2.0 Port *(on page 61)*
7	HDMI® Port	Supports up to 3840 x 2160 @ 60Hz as specified in HDMI 2.1	HDMI® Port *(on page 62)*
8	DIO Port	8 x DI (DC 5-48V), 4 x DO (DC 12V/100mA)	DIO Port *(on page 62)*
9	COM Ports	RS-232/422/485 serial ports	COM Port *(on page 63)*
10	CAN Port	• Supports CAN FD protocol • Backward compatible with CAN bus 2.0	CAN FD Port *(on page 64)*

3.1.2. M12X Models

Figure 3-3 Front Panel of VBOX-3132P-M12X (PoE, M12 X-code)

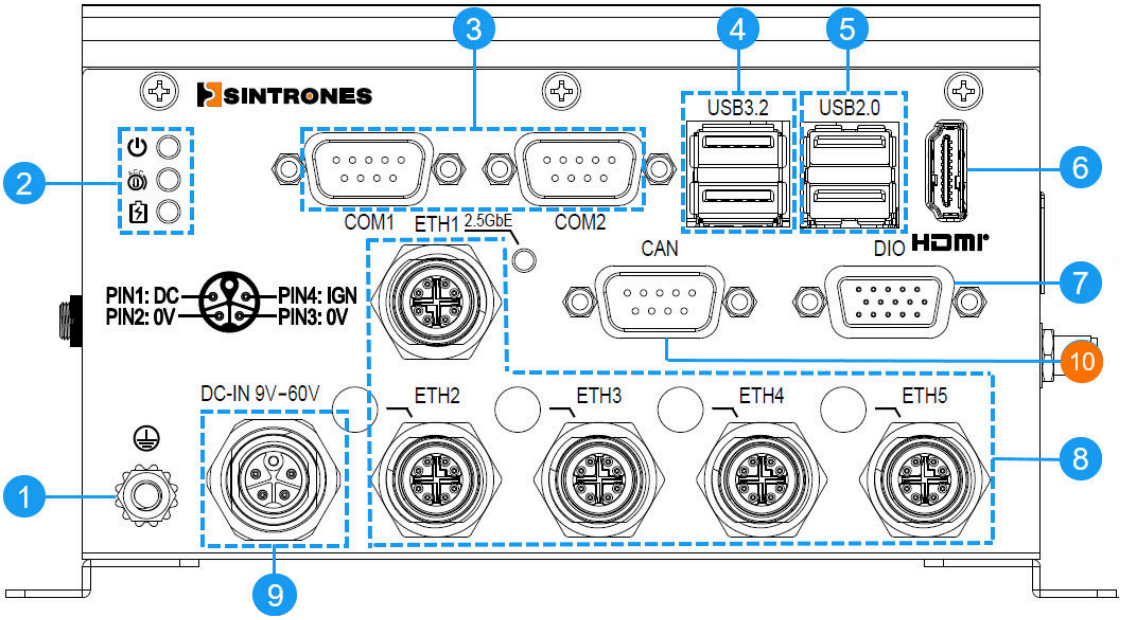


Figure 3-4 Front Panel of VBOX-3132-D25-M12X (2 x 2.5 GbE, M12 X-code)

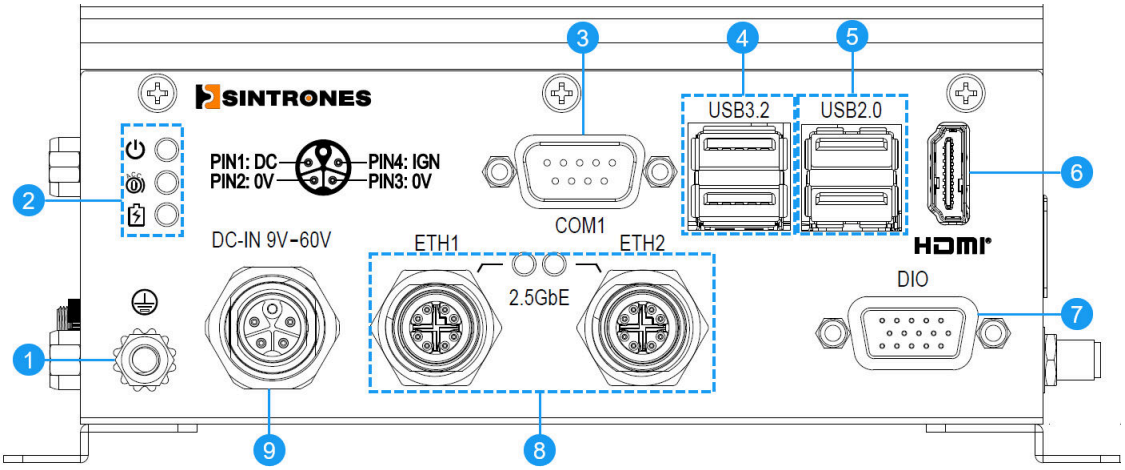


Table 3-2 I/O Interface on Front Panel

Item	I/O Interface	Description	Specification
1	Grounding Terminal	M5 bolt with nut for chassis grounding	-
2	LED Indicators	• ⏻ (System power status:): ◦ Red light: Standby mode ◦ Blue light: System turned on	-

Item	I/O Interface	Description	Specification
		•  (ACC): ◦ Flashing: Checking ignition signal ◦ ON: Ignition signal detected	
		•  (BBU) (VBOX-3132-D25-M12X only) ◦ ON: Internal backup battery enabled ◦ OFF: Power supplied from external power source or no backup battery installed	
3	COM Port(s)	RS-232/422/485 serial port(s)	COM Port *(on page 63)*
4	USB Ports	USB 3.2 (10 Gbps, 5V/900mA)	USB 3.2 Port *(on page 61)*
5	USB Ports	USB 2.0 (480 Mbps, 5V/500mA)	USB 2.0 Port *(on page 61)*
6	HDMI® Port	Supports up to 3840 x 2160 @ 60Hz as specified in HDMI 2.1	HDMI® Port *(on page 62)*
7	DIO Port	8 x DI (DC 5-48V), 4 x DO (DC 12V/100mA)	DIO Port *(on page 62)*
8	Ethernet Ports	• Support **M12 X-coded** connectors • **VBOX-3132P-M12X**: ◦ ETH1: 2.5GbE ◦ ETH2~ETH5: 4 ports share 1GbE with PoE (PSE Class 3: 15W; total power budget: 60W) • **VBOX-3132-D25-M12X**: ◦ ETH1/ETH2: 2.5GbE	LAN/ETH Port (M12 X-Code) *(on page 60)*
9	DC Input	Input voltage range: DC 9-60V *Power input for PoE models is recommended to be 24V or above.	DC-IN Port (M12 K-coded Connector) *(on page 59)*
10	CAN Port	• Supports CAN FD protocol • Backward compatible with CAN bus 2.0	CAN FD Port *(on page 64)*

3.2. Left Side Panel

This section provides the left side panel view and the description of the associated I/O interface.

Figure 3-5 Left Side Panel of VBOX-3132P (PoE, RJ-45)

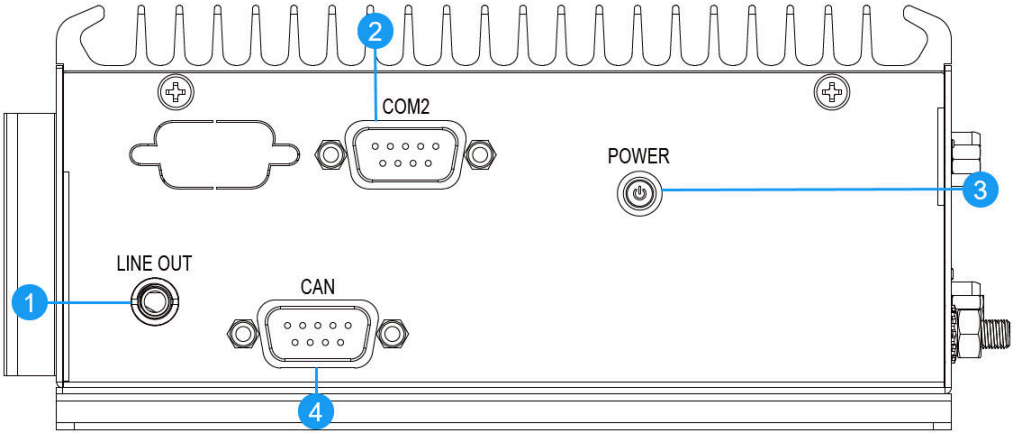


Figure 3-6 Left Side Panel of VBOX-3132-D25 (2 x 2.5 GbE, RJ-45)

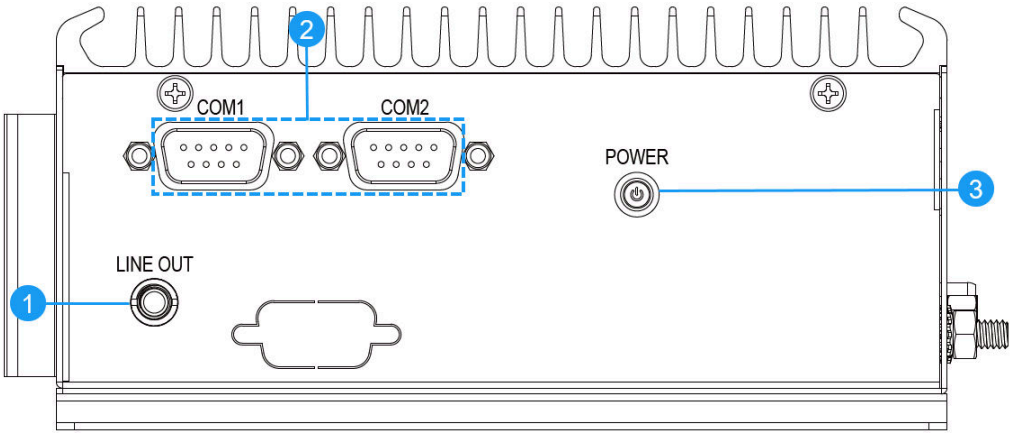


Figure 3-7 Left Side Panel of VBOX-3132P-M12X (PoE, M12 X-code)

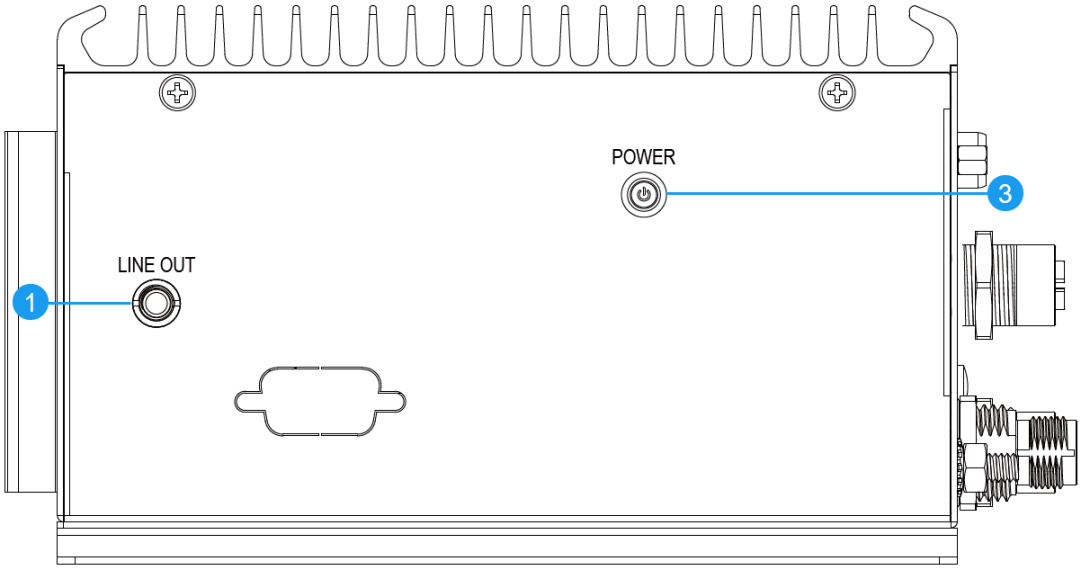


Figure 3-8 Left Side Panel of VBOX-3132-D25-M12X (2 x 2.5 GbE, M12 X-code)

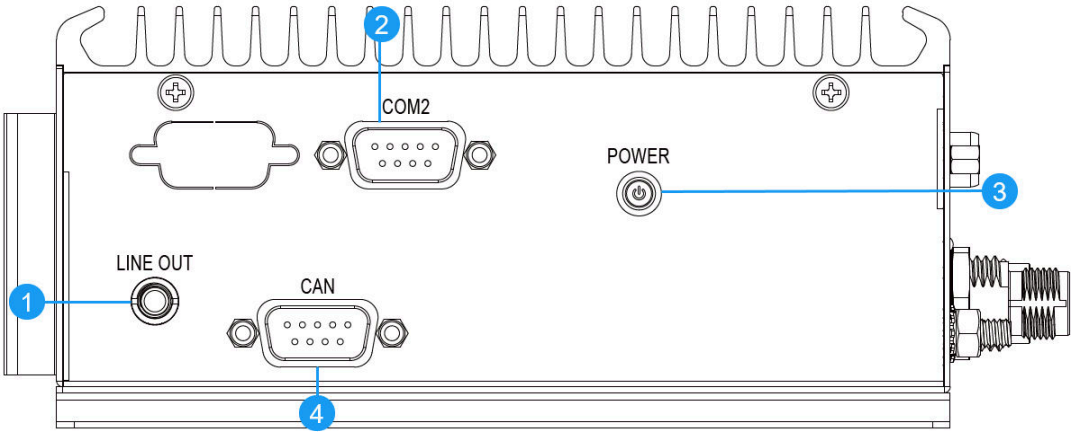


Table 3-3 I/O Interface on Left Side Panel

Item	I/O Interface	Description	
1	Audio Port	LINE OUT: sends audio signals via a 3.5mm audio cable	-
2	COM Port(s)	RS-232/422/485 serial port(s)	COM Port *(on page 63)*
3	Power Button	System power status: • Red light: Standby mode • Blue light: System turned on	-
4	CAN Port	• Supports CAN FD protocol • Backward compatible with CAN bus 2.0	CAN FD Port *(on page 64)*

3.3. Right Side Panel

This section provides the right side panel view and the description of the associated I/O interface.

Figure 3-9 Right Side Panel of VBOX-3132 Series

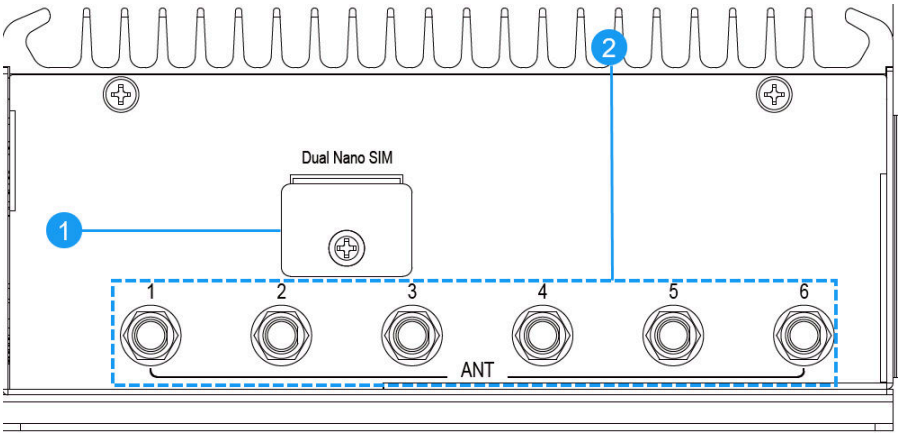


Table 3-4 I/O Interface on Right Side Panel

Item	I/O Interface	Description	Specification
1	SIM Card Slot	Supports 2 Nano SIM cards (selectable via utility software) **Note:** Ensure you power off the system before removing the SIM card(s).	-
2	SMA Connector Mounting Holes	Used for connecting antennas	-

3.4. Rear Panel

This section provides the rear panel view and the description of the associated I/O interface.

Figure 3-10 Rear Panel of VBOX-3132P-M12X

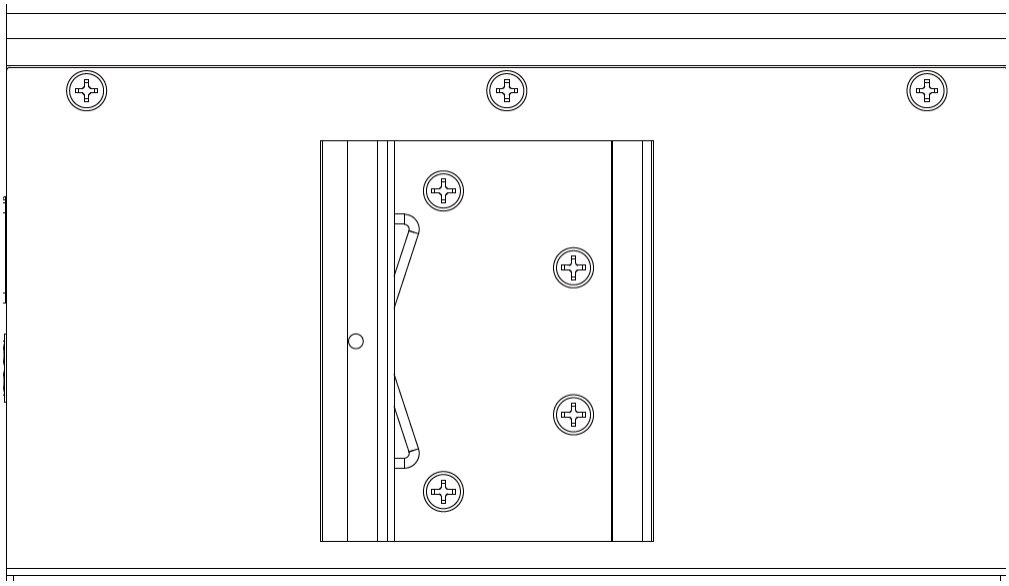
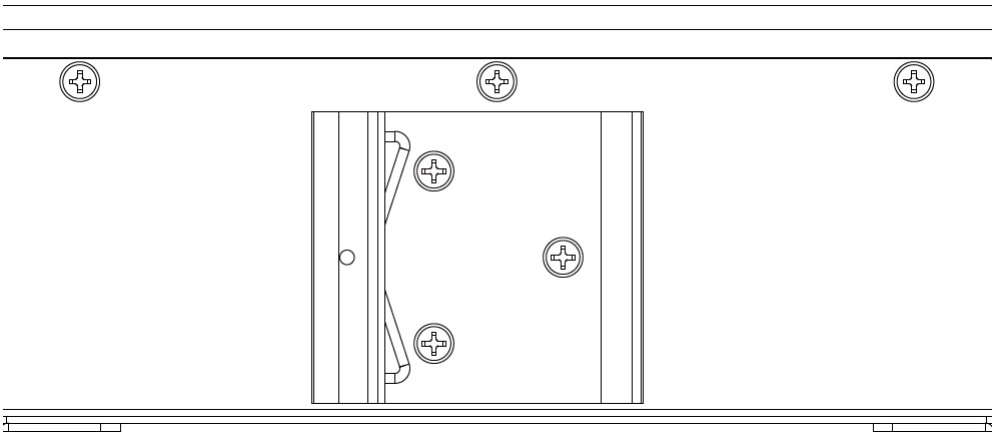


Figure 3-11 Rear Panel of VBOX-3132P / VBOX-3132-D25 / VBOX-3132-D25-M12X



The rear panel is designed for DIN-rail mounting. See DIN-Rail Mounting *(on page 45)* for the instructions.

3.5. Specifications of External I/O Ports

This section provides drawings and pin definitions of the external I/O ports.

3.5.1. DC-IN Port (Terminal Block)

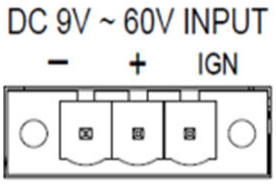


Table 3-5 Pin Definition of DC-IN Port

Pin	Signal
1	V-
2	V+
3	Ignition

3.5.2. DC-IN Port (M12 K-coded Connector)

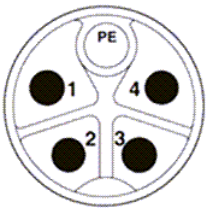


Table 3-6 Pin Definition of DC-IN Port (M12 K-coded Connector)

Pin	Signal
1	+ (9 ~ 60 VDC)
2	– (0V)
3	– (0V)
4	IGN

3.5.3. LAN/ETH Port

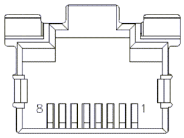


Table 3-7 Pin Definition of LAN Port

Pin	Signal
1	TX_D1+
2	TX_D1-
3	RX_D2+
4	BI_D3+
5	BI_D3-
6	RX_D2-
7	BI_D4+
8	BI_D4-

3.5.4. LAN/ETH Port (M12 X-Code)

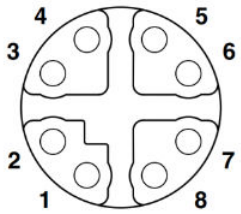


Table 3-8 Pin Definition of LAN Port (M12 X-Code Connector)

Pin	Signal
1	LAN_MDI0P
2	LAN_MDI0N
3	LAN_MDI1P
4	LAN_MDI1N
5	LAN_MDI3P
6	LAN_MDI3N
7	LAN_MDI2N
8	LAN_MDI2P

3.5.5. USB 3.2 Port

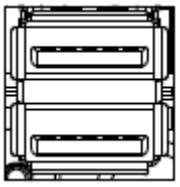


Table 3-9 Pin Definition of USB 3.2 Port

Pin	Signal	Pin	Signal
1	5V (Top)	12	USB2.0 DP (Bot)
2	USB2.0 DM (Top)	13	GND
3	USB2.0 DP (Top)	14	USB3.2 RXN (Bot)
4	GND	15	USB3.2 RXP (Bot)
5	USB3.2 RXN (Top)	16	GND
6	USB3.2 RXP (Top)	17	USB3.2 TXN (Bot)
7	GND	18	USB3.2 TXP (Bot)
8	USB3.2 TXN (Top)	19	GND
9	USB3.2 TXP (Top)	20	GND
10	5V	21	GND
11	USB2.0 DM (Bot)	22	GND

3.5.6. USB 2.0 Port

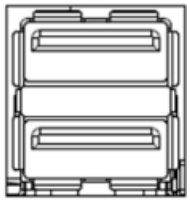


Table 3-10 Pin Definition of USB 2.0 Port

Pin	Signal	Pin	Signal
1	USB 5V	5	USB 5V
2	USB2.0 DN	6	USB2.0 DN
3	USB2.0 DP	7	USB2.0 DP
4	GND	8	GND

3.5.7. HDMI® Port

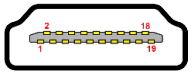


Table 3-11 Pin Definition of HDMI® Port

Pin	Signal	Pin	Signal
1	HDMI_DATA2_P	14	NC
2	GND	15	HDMI_SCL
3	HDMI_DATA2_N	16	HDMI_DATA
4	HDMI_DATA1_P	17	GND
5	GND	18	V5P_S_HDMI
6	HDMI_DATA1_N	19	HDMI_HPDET
7	HDMI_DATA0_P	G1	GND_HDMI
8	GND	G2	GND_HDMI
9	HDMI_DATA0_N	G3	GND_HDMI
10	HDMI_CLK_P	G4	GND_HDMI
11	GND	G5	GND_HDMI
12	HDMI_CLK_N	G6	GND_HDMI
13	NC		

3.5.8. DIO Port

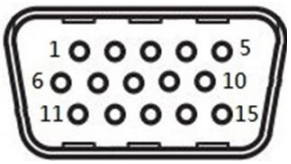


Table 3-12 Pin Definition of DIO Port

Pin	Signal	Pin	Signal
1	DO_1	2	DO_2
3	DO_3	4	DO_4
5	GND	6	GND
7	DI_1	8	DI_2
9	DI_3	10	DI_4
11	DI_5	12	DI_6
13	DI_7	14	DI_8
15	GND		

3.5.9. COM Port

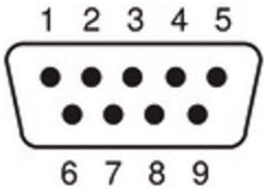


Table 3-13 Pin Definition of COM Port

Pin	D-SUB 9 (Male)		
	RS-232	RS-422	RS-485
1	DCD#	TXD-	Data-
2	RXD	TXD+	Data+
3	TXD	RXD+	NC
4	DTR#	RXD-	NC
5	GND	GND	GND
6	DSR#	NC	NC
7	RTS#	NC	NC
8	CTS#	NC	NC
9	RI#	NC	NC

3.5.10. CAN FD Port

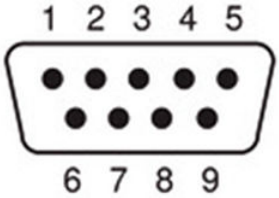


Table 3-14 Pin Definition of CAN FD Port

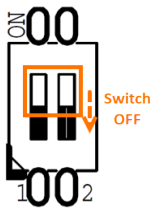
Pin	D-SUB 9 (Male)
	CAN FD
1	NC
2	CAN_L
3	GND
4	NC
5	NC
6	GND
7	CAN_H
8	NC
9	NC

3.5.10.1. DIP Switch for CAN FD Port

The DIP switch controls the 120Ω terminating resistors for the CAN FD port.

By default, the DIP switch bits are set to **ON**.

Refer to the table below for the bit assignments and corresponding terminating control.

DIP Switch Illustration	Description
	**Bit 1 and Bit 2 ON**: 120Ω termination enabled for the CAN bus.
	**Bit 1 and Bit 2 OFF**: 120Ω termination disabled for the CAN bus.

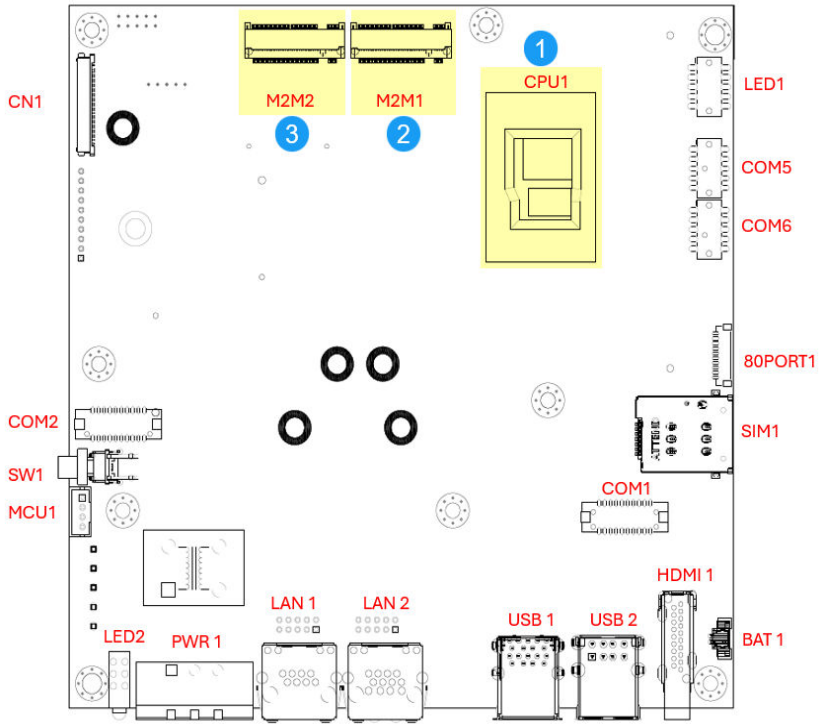
4. Expansion

This chapter provides more details about the internal slots or connectors used for expansion purpose.

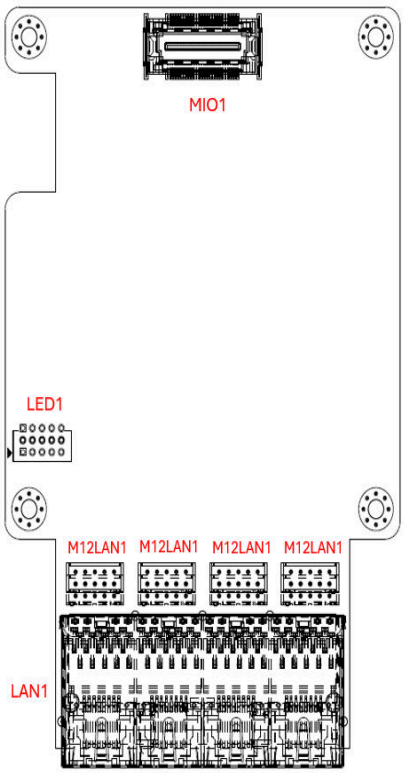
Topics in this chapter include:

4.1. Top View of Mainboard / PoE Board

Mainboard of VBOX-3132 Series (Top View)



PoE Board (Top View) – PoE Models Only



Item	Internal Connector	Description	Specification
1	CPU1	Supported CPUs for PoE models (VBOX-3132P-yyy-zz): • Intel Atom® x7835RE • Intel Atom® x7433RE	CPU Specifications *(on page 67)*
		Supported CPUs for non-PoE models (VBOX-3132-D25-yyy-zz) • Intel Atom® x7835RE • Intel® Twin Lake N355 • Intel® Twin Lake N150	
2	M2M1	M.2 2280 Key M slots used for installing an NVMe SSD	M.2 Key M Slot (M2M1) *(on page 69)*
3	M2M2	M.2 2280 Key M slot used for installing an NVMe or a SATA SSD	M.2 Key M Slot (M2M2) *(on page 71)*

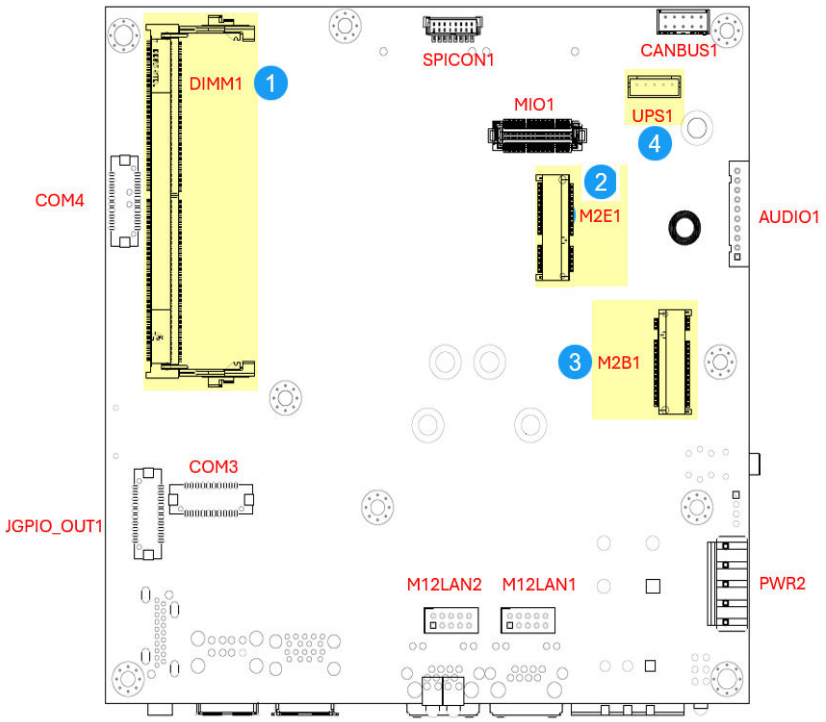
4.1.1. CPU Specifications

See the following table as the CPU specifications supported by VBOX-3132 Series.

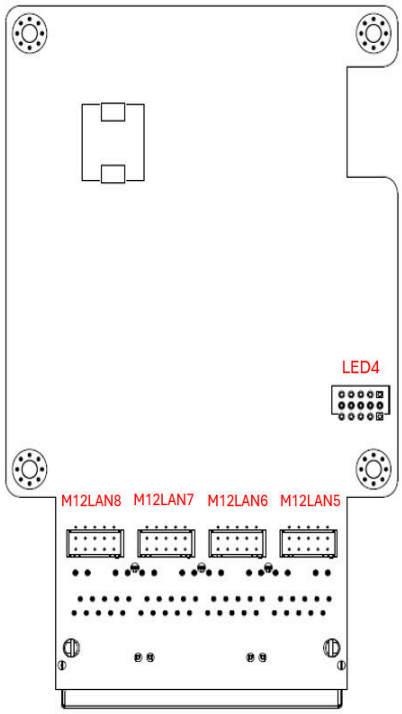
Brand	Processor	TDP	Cores	Threads	Cache	Base Frequency
Intel®	Atom x7835RE	12W	8	8	6MB	3.6 GHz
Intel®	Atom x7433RE	9W	4	4	6MB	3.4 GHz
Intel®	Twin Lake Core™ 3 N355	15W	8	8	6MB	3.9 GHz
Intel®	Twin Lake N150	6W	4	4	6MB	3.6 GHz

4.2. Bottom View of Mainboard / PoE Board

Mainboard of VBOX-3132 Series (Bottom View)



PoE Board (Bottom View) – PoE Models Only



Item	Internal Connector	Description	Specification
1	DIMM1	Memory slot used for installing a DRAM module	SO-DIMM Slot *(on page 69)*
2	M2E1	M.2 2230 Key E slot used for installing an expansion module such as a WLAN or Bluetooth module	M.2 Key E Slot *(on page 72)*
3	M2B1	M.2 3042/3052 Key B slot used for installing an expansion module such as a WWAN module	M.2 Key B Slot *(on page 75)*
4	UPS1	Used for installing the backup battery unit (BBU) **Note:** Only the non-PoE models (VBOX-3132-D25-yyy-zz) support the backup battery unit.	-

4.3. Specifications of Expansion Slots/Connectors

This section provides drawings and pin definitions about the slots or connectors used to install expansion modules.

4.3.1. SO-DIMM Slot

SO-DIMM Slot	Description
Size	262 Pin
Type	DDR5 SO-DIMM Socket (H: 9.2mm)
Location	See Bottom View of Mainboard / PoE Board *(on page 68)* for the information.

4.3.2. M.2 Key M Slot (M2M1)

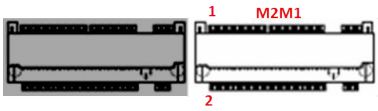
M.2 Key M Slot	Description
Size	NGFF 2280 / 75 Pin
Type	M.2 Key M (H: 8.5mm)
Supported Interface	PCIe x2
Location	See Top View of Mainboard / PoE Board *(on page 66)* for the information.
Drawing	

Table 4-1 Pin Definition of M.2 Key M Slot (M2M1)

Pin	Signal	Pin	Signal
1	GND	2	3.3V
3	GND	4	3.3V
5	NC	6	NC
7	NC	8	NC
9	GND	10	LED#
11	NC	12	3.3V
13	NC	14	3.3V
15	GND	16	3.3V

Pin	Signal	Pin	Signal
17	NC	18	3.3V
19	NC	20	NC
21	GND	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	PCIE_RX-1	30	NC
31	PCIE_RX+1	32	NC
33	GND	34	NC
35	PCIE_TX-1	36	NC
37	PCIE_TX+1	38	NC
39	GND	40	SMB_IO_CLK
41	PCIE_RX-0	42	SMB_IO_DAT
43	PCIE_RX+0	44	NC
45	GND	46	NC
47	PCIE_TX-0	48	NC
49	PCIE_TX+0	50	PERST#
51	GND	52	CLKREQ#
53	PCIECLK_-0	54	PEWAKE#
55	PCIECLK_+0	56	NC
57	GND	58	NC
59	KEY	60	KEY
61	KEY	62	KEY
63	KEY	64	KEY
65	KEY	66	KEY
67	NC	68	NC
69	PEDET	70	3.3V
71	GND	72	3.3V
73	GND	74	3.3V
75	GND		

4.3.3. M.2 Key M Slot (M2M2)

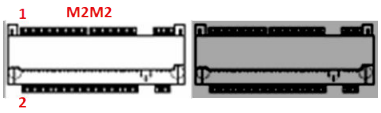
M.2 Key M Slot	Description
Size	NGFF 2280 / 75 Pin
Type	M.2 Key M H: 8.5mm
Supported Interface	PCIe x1, SATA 6Gb/s
Location	See Top View of Mainboard / PoE Board *(on page 66)* for the information.
Drawing	

Table 4-2 Pin Definition of M.2 Key M Slot (M2M2)

Pin	Signal	Pin	Signal
1	GND	2	3.3V
3	GND	4	3.3V
5	NC	6	NC
7	NC	8	NC
9	GND	10	LED#
11	NC	12	3.3V
13	NC	14	3.3V
15	GND	16	3.3V
17	NC	18	3.3V
19	NC	20	NC
21	GND	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	NC	30	NC
31	NC	32	NC
33	GND	34	NC
35	NC	36	NC
37	NC	38	NC
39	GND	40	SMB_IO_CLK

Pin	Signal	Pin	Signal
41	PCIE_RX-0 / SATA_RX+	42	SMB_IO_DAT
43	PCIE_RX+0 / SATA_RX-	44	NC
45	GND	46	NC
47	PCIE_TX-0 / SATA_TX-	48	NC
49	PCIE_TX+0 / SATA_TX+	50	PERST#
51	GND	52	CLKREQ#
53	PCIECLK_-0	54	PEWAKE#
55	PCIECLK_+0	56	NC
57	GND	58	NC
59	KEY	60	KEY
61	KEY	62	KEY
63	KEY	64	KEY
65	KEY	66	KEY
67	NC	68	NC
69	PEDET(GND-SATA)	70	3.3V
71	GND	72	3.3V
73	GND	74	3.3V
75	GND		

4.3.4. M.2 Key E Slot

M.2 Key E Slot	Description
Size	NGFF 2230 / 75 Pin
Type	M.2 Key E (H: 8.5mm)
Supported Interface	PCIe / USB 2.0
Location	See Bottom View of Mainboard / PoE Board *(on page 68)* for the information.

M.2 Key E Slot	Description
Drawing	

Table 4-3 Pin Definition of M.2 Key E Slot

Pin	Signal	Pin	Signal
1	GND	2	3.3V
3	USB_D+	4	3.3V
5	USB_D-	6	NC
7	GND	8	NC
9	NC	10	NC
11	NC	12	NC
13	GND	14	NC
15	NC	16	NC
17	NC	18	NC
19	GND	20	NC
21	NC	22	NC
23	NC	24	KEY
25	KEY	26	KEY
27	KEY	28	KEY
29	KEY	30	KEY
31	KEY	32	NC
33	GND	34	NC
35	PCIE_TXP	36	NC
37	PCIE_TXN	38	NC
39	GND	40	NC
41	PCIE_RXP	42	NC
43	PCIE_RXN	44	NC
45	GND	46	NC
47	REFCLK_P	48	NC
49	REFCLK_N	50	NC

Pin	Signal	Pin	Signal
51	GND	52	PERST#
53	CLKREQ#	54	DIS2#
55	PEWAKE#	56	DIS1#
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	NC
65	NC	66	PRESET
67	NC	68	PCIE_CLKREQ#
69	GND	70	WAKE#
71	NC	72	3.3V
73	NC	74	3.3V
75	GND		

4.3.5. M.2 Key B Slot

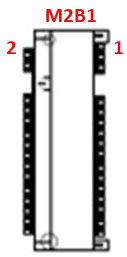
M.2 Key B Slot	Description
Size	NGFF 3042 / 3052 / 75 Pin
Type	M.2 Key B (H: 8.5mm)
Supported Interface	PCIe, USB 2.0, USB 3.0
Location	See Bottom View of Mainboard / PoE Board *(on page 68)* for the information.
Drawing	

Table 4-4 Pin Definition of M.2 Key B Slot

Pin	Signal	Pin	Signal
1	NC	2	3.3V
3	GND	4	3.3V
5	GND	6	NC
7	USB_D+	8	NC
9	USB_D-	10	3.3V
11	GND	12	KEY
13	KEY	14	KEY
15	KEY	16	KEY
17	KEY	18	KEY
19	KEY	20	NC
21	NC	22	NC
23	PCH_WAKE#	24	NC
25	DPR	26	3.3V
27	GND	28	NC
29	USB3_RX-	30	UIM_RST
31	USB3_RX+	32	UIM_CLK
33	GND	34	UIM_DAT

Pin	Signal	Pin	Signal
35	USB3_TX-	36	UIM_PWR
37	USB3_TX+	38	NC
39	GND	40	GNSS_SCL
41	PCIE_RX-	42	GNSS_SDA
43	PCIE_RX+	44	NC
45	GND	46	NC
47	PCIE_TX-	48	NC
49	PCIE_TX+	50	PERST#
51	GND	52	NC
53	PCIE_CK-	54	PCH_WAKE#
55	PCIE_CK+	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	NC
67	3.3V	68	NC
69	NC	70	3.3V
71	GND	72	3.3V
73	GND	74	3.3V
75	NC		

5. Software

Topics in this chapter include:

5.1. BIOS Setup

This section describes how to view or modify the BIOS settings for the system. See the following steps for how to enter the BIOS **SETUP** screen and some navigation tips.

Warning:
Changing BIOS settings incorrectly may lead to system or hardware failure. It is suggested to contact SINTRONES® technical support before you change the default BIOS settings.

1. After the system boots up and completes the Power-On Self-Test (POST) process, the message **Press [Delete] to enter SETUP** will appear on the connected screen.
2. Press **Delete** key to enter **SETUP**.

   Note:
   If the message disappears before you respond and you still wish to enter **SETUP**, restart the system by turning it OFF and then ON. You may also restart the system by simultaneously pressing the **[Ctrl]**, **[Alt]**, and **[Delete]** keys.

3. After entering the **SETUP** screen, the first menu you will see is the **Main** menu. See the following table as a quick glance on how to navigate the BIOS.

   Note:

   - The items under each BIOS category described in this section are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.
   - Upon booting up, the first line appearing after the memory count is the BIOS version.

Menu/Screen	Description
Main Menu	• Displays general product information, including processor type, DRAM frequency, total memory, system time and date. • Provides available options allowed to change. You can use the arrow keys (↑↓) to select the menu item. Description for each menu item is displayed at the bottom of its icon.
SubMenu	A right-pointing arrow appears to the left of certain menu items, indicating that clicking on the menu item will reveal a submenu. A submenu provides additional options related to a selected menu item. See the following description for how to interact with a submenu. • Use arrow keys (↑↓) to highlight the menu item and press **Enter** to call up its sub-menu. • Use the control keys to adjust values or select within a sub-menu. • Enter **Esc** to return to the main menu.
General Help Screen	Can be called up by simply pressing **F1**. The Help screen lists the appropriate keys to use and the options available for the selected item for your reference. To exit the Help screen, press **Esc**.

5.1.1. BIOS Control Keys

See the following table as the control keys list available in BIOS settings. These keys and associated descriptions also display at the bottom of each BIOS setup screen.

Table 5-1 Control Keys in BIOS Settings

Key	Description
[↑]	Select the previous item.
[↓]	Select the next item.
[←]	Select the item on the left.
[→]	Select the item on the right.
[Enter]	Select SubMenu. Select item to enable or disable it.
[Esc]	Main Menu: Quit and jump to the Exit Menu. Other pages: Exit current page and return to Main Menu.
[F5]/[-]	Move the selected device **down** in the boot priority list.
[F6]/[+]	Move the selected device **up** in the boot priority list.
[F1]	General help.
[F9]	Load the default settings.
[F10]	Save changes and exit.

5.1.2. Overview of BIOS Setup Menus

The following table describes the top-level BIOS setup menus.

Note:

The grayed-out options on the setup menus are not allowed to change. Some of them purely display information and some ot them require administrator privileges to change.

Table 5-2 Top-Level BIOS Setup Menus

Menu	Description	More info
Main	• Displays general product information, including BIOS version, processor type, total memory, and system time/ date. • You can change the system time and date settings on this menu.	Main Menu *(on page 81)*
Advanced	You can check the configuration settings associated with ACPI, CPU, power and performance, memory, System Agent (Agent), PCH-IO, serial ports, and watch-dog timer, and enable or disable them if needed.	Advanced Menu *(on page 82)*
Security	• Displays the supported security features and settings. • You can set or change the user and supervisor passwords for the system or the installed storage devices.	Security Menu *(on page 89)*
Power	You can set or schedule an auto wake for the system.	Power Menu *(on page 90)*
Boot	You can specify your system booting preferences such as faster booting or booting priority for the installed devices.	Boot Menu *(on page 91)*
Exit	You can save changes or discard changes, load optimal/custom default settings, or save cutom default settings.	Exit Menu *(on page 93)*

5.1.2.1. Main Menu

The **Main** menu displays general product information, including BIOS version, processor type, total memory, system time/date, etc.

Figure 5-1 Main Menu Screen

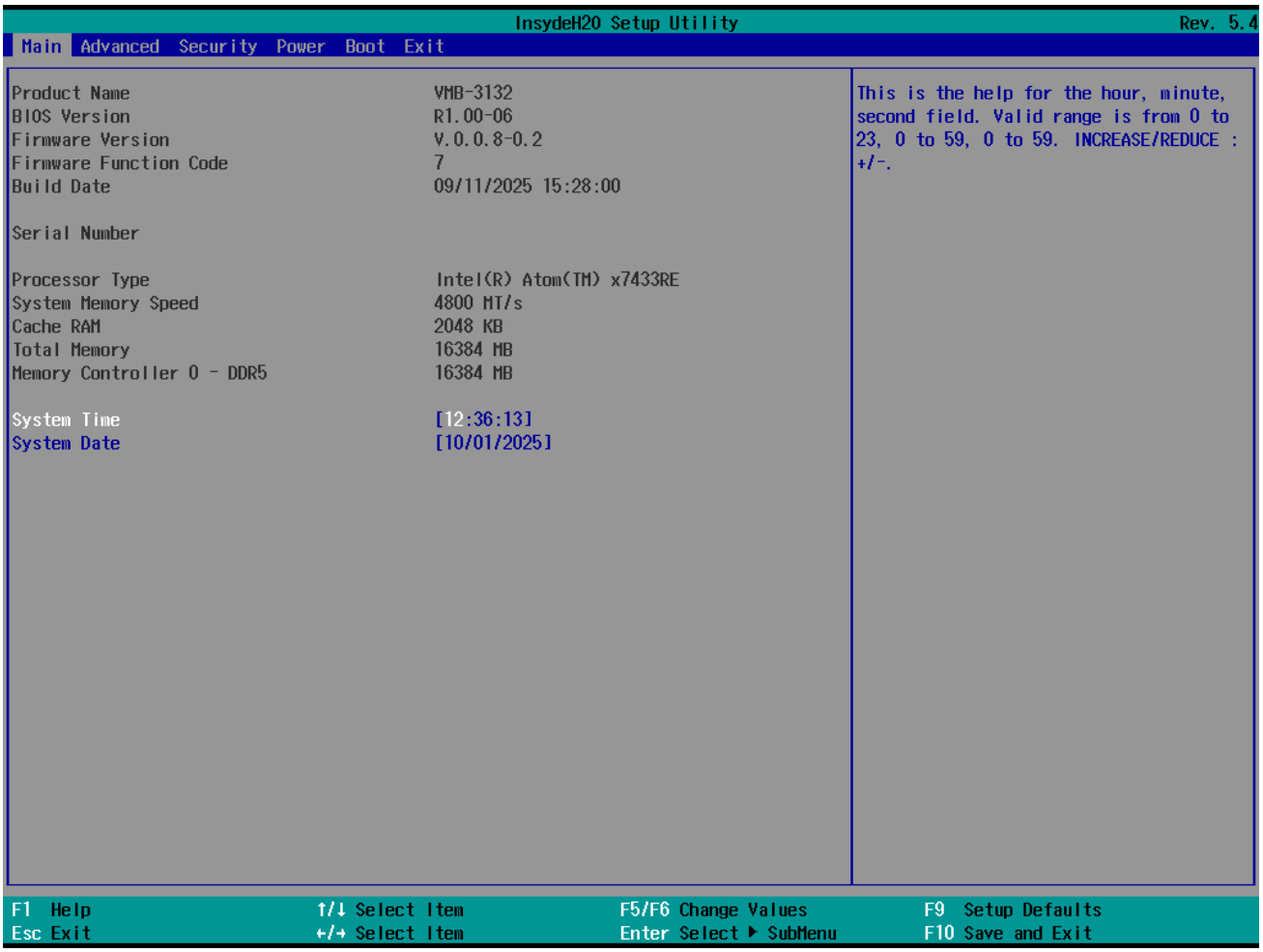


Table 5-3 Main Menu Options

Option	Description
System Time	Allows you to set the system time. The time format is <Hour> <Minute> <Second>.
System Date	Allows you to set the system date. The time format is <Month><Day><Year>.

5.1.2.2. Advanced Menu

The **Advanced** menu provides detailed configuration information for hardware components and system functionalities such as CPU, power management, memory, SATA, and Super I/O settings. The available options are described in the table that follows.

Figure 5-2 Advanced Menu Screen

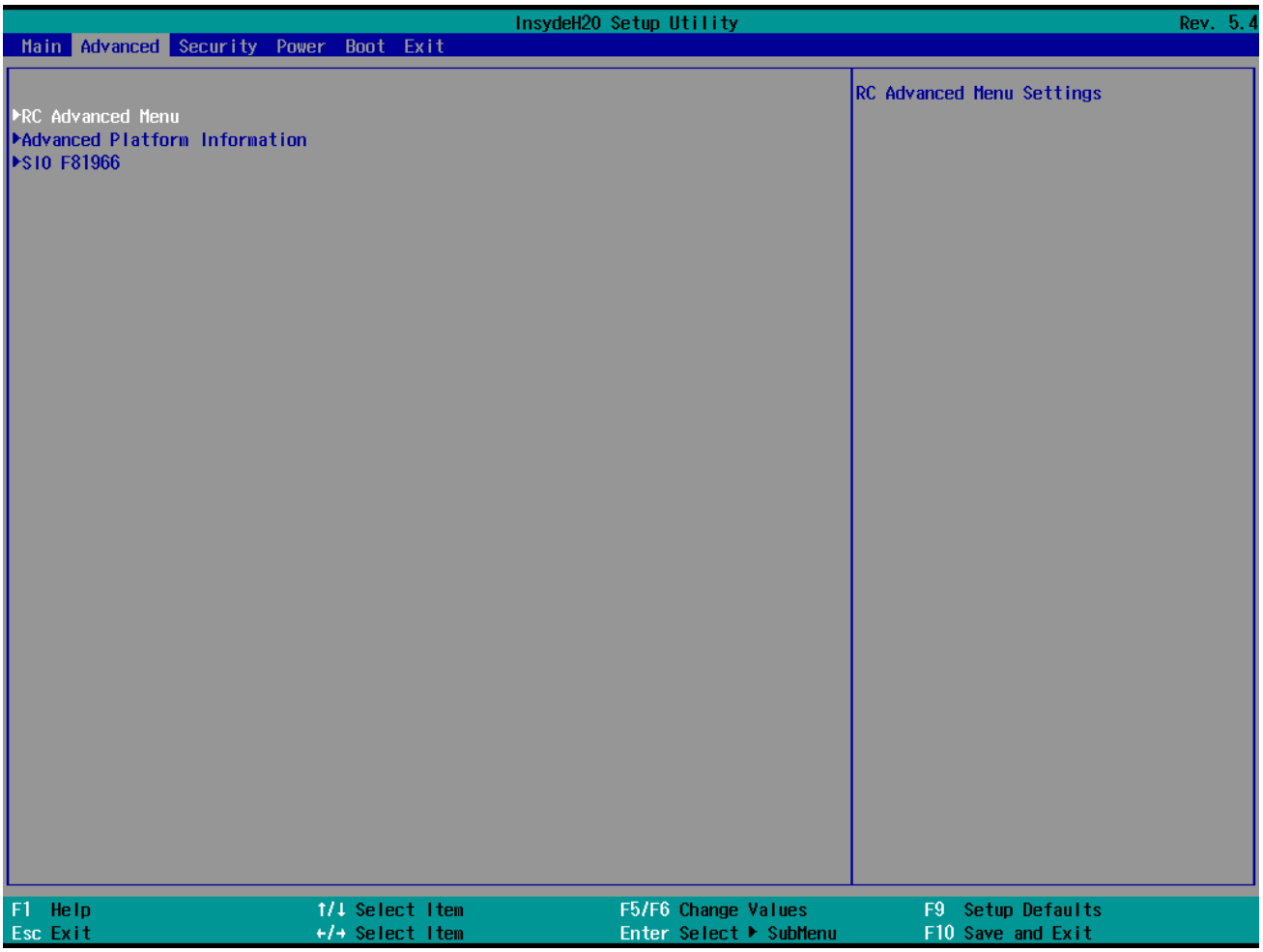


Table 5-4 Advanced Menu Options

Menu	Description	More Info
RC Advanced	Used to configure highly advanced settings for controlling the chipset and processor. Main options include: • **ACPI Settings > Enable Hibernation** • **CPU Configuration > Intel (VMX) Virtualization Technology** • **System Agent (SA) Configuration > Graphics Configuration** • **PCI-IO Configuration**: ◦ **SATA configuration** ◦ **State After G3**	RC Advanced Menu *(on page 84)*

Menu	Description	More Info
Advanced Platform Information	Displays hardware and firmware data about the system's core components.	Advanced Platform Information Menu *(on page 86)*
SIO F81966	Used to configure functions handled by the Super Input/Output (SIO) chip Fintek F81966. Main options include: • **UART port 1 Configuration** • **Hardware Monitor** • **Watch-Dog Timer**	SIO F81966 Menu *(on page 87)*

5.1.2.2.1. RC Advanced Menu

The **RC Advanced** menu allows you to configure settings associated with ACPI, CPU, power and performance, memory, System Agent (Agent), and PCH-IO. The available options are described in the table that follows.

Figure 5-3 RC Advanced Menu Screen

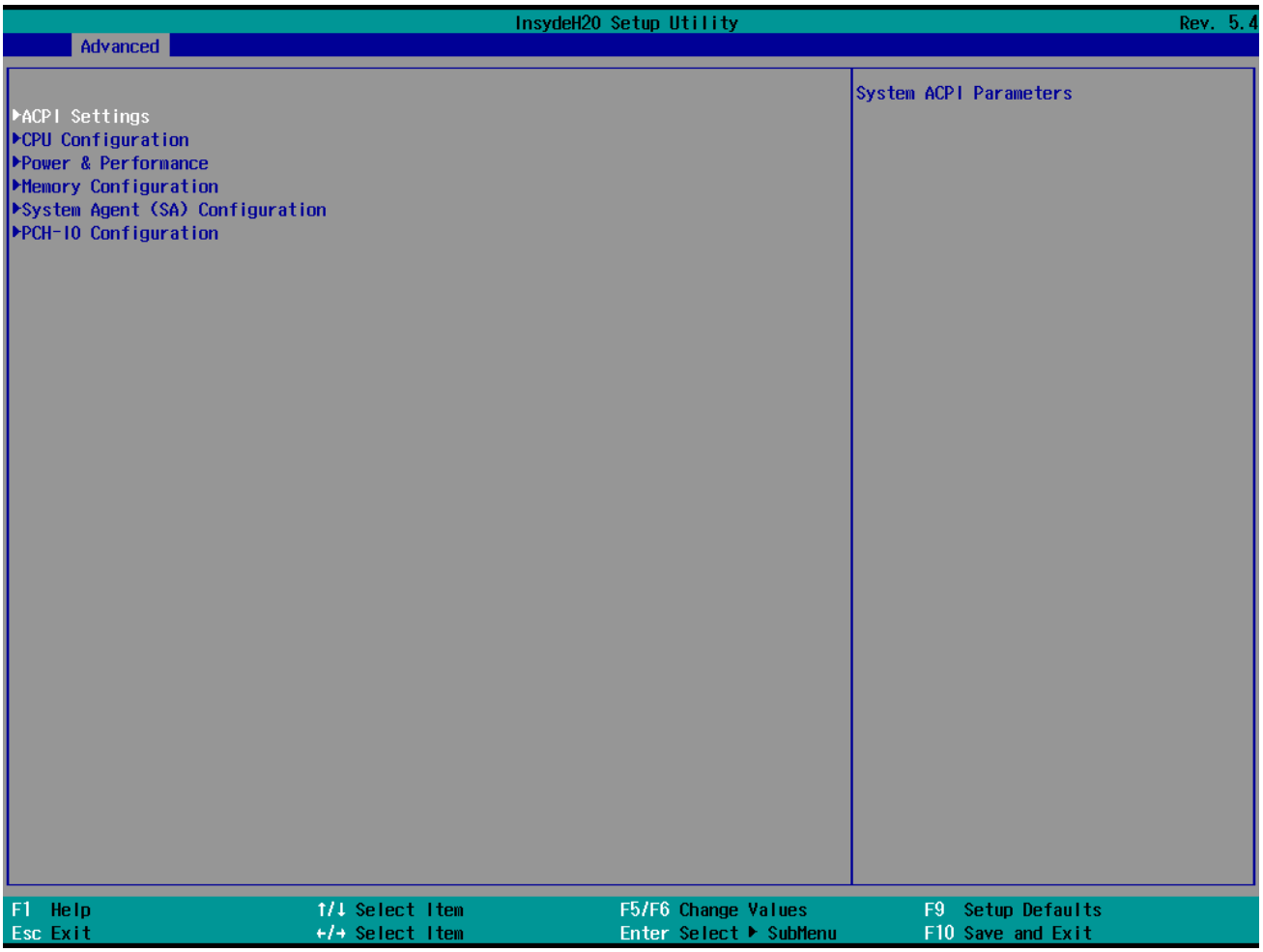


Table 5-5 RC Advanced Menu Options

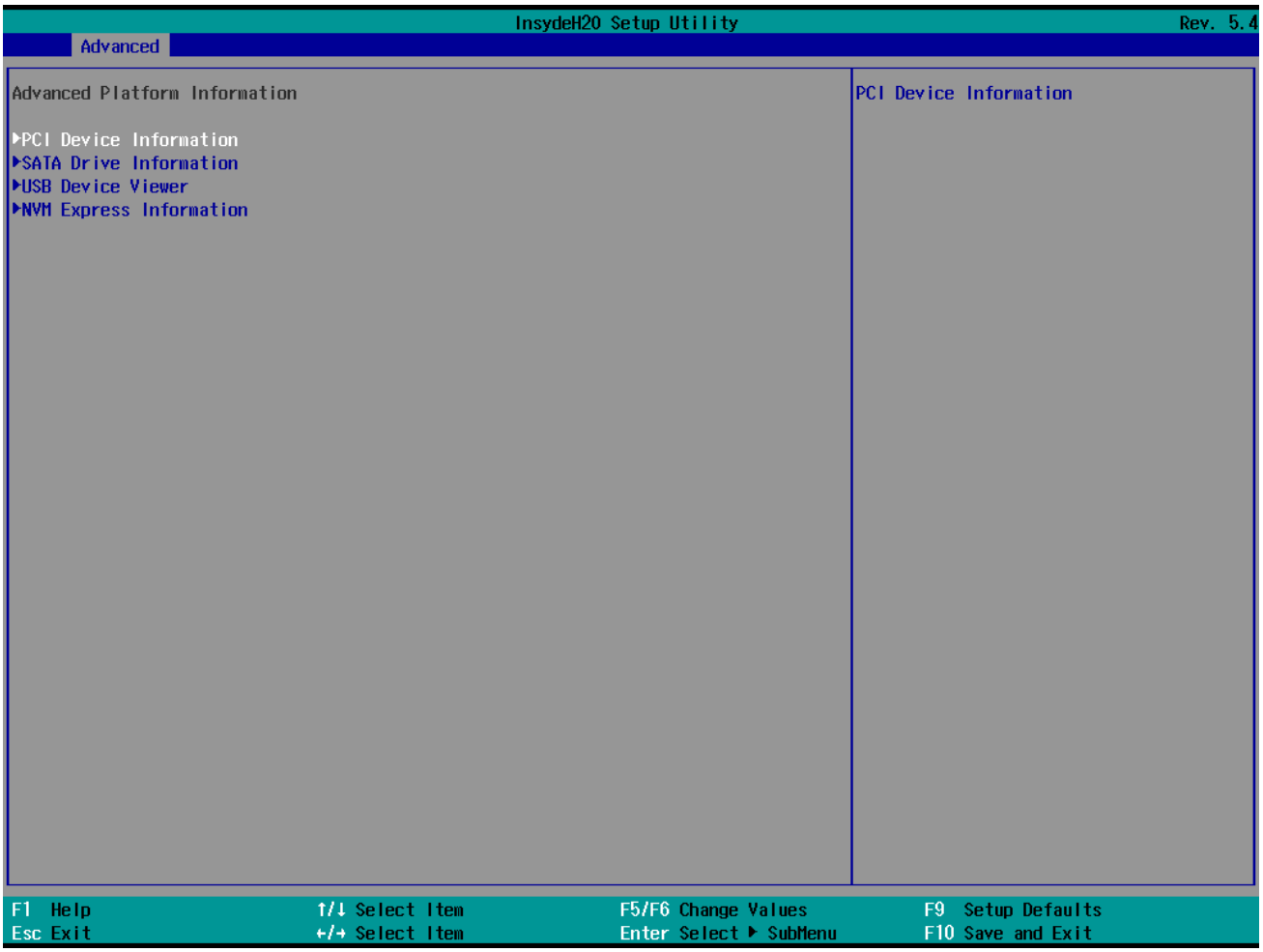
Menu	Description
ACPI Settings > Enable Hibernation	Used to enable or disable the system's hibernation function (S4 sleep state).
CPU Configuration > Intel (VMX) Virtualization Technology	Used to enable or disable Intel® Virtualization Technology for running virtual machines efficiently.
System Agent (SA) Configuration > Graphics Configuration	• Used to set which graphics (IGFX/PEG/PCI) the system uses and which one is treated as the primary display output. • **Auto** option is available to set the system to automatically detect which graphics to use.

Menu	Description
PCH-IO Configuration	• **> SATA configuration**: Used to set how the SATA controller is detected and functions. • **> State After G3**: Used to specify the system's behavior when power returns after a power failure (G3 state). Available options include: ◦ S0 State: Power on ◦ S5 State: Power off

5.1.2.2.2. Advanced Platform Information Menu

The **Advanced Platform Information** menu displays read-only information about the system's hardware components.

Figure 5-4 Advanced Platform Information Menu Screen



5.1.2.2.3. SIO F81966 Menu

The **SIO F81966** menu enables users to configure functions handled by the Super Input/Output (SIO) chip Fintek F81966. The available options are described in the table that follows.

Figure 5-5 SIO F81966 Menu Screen

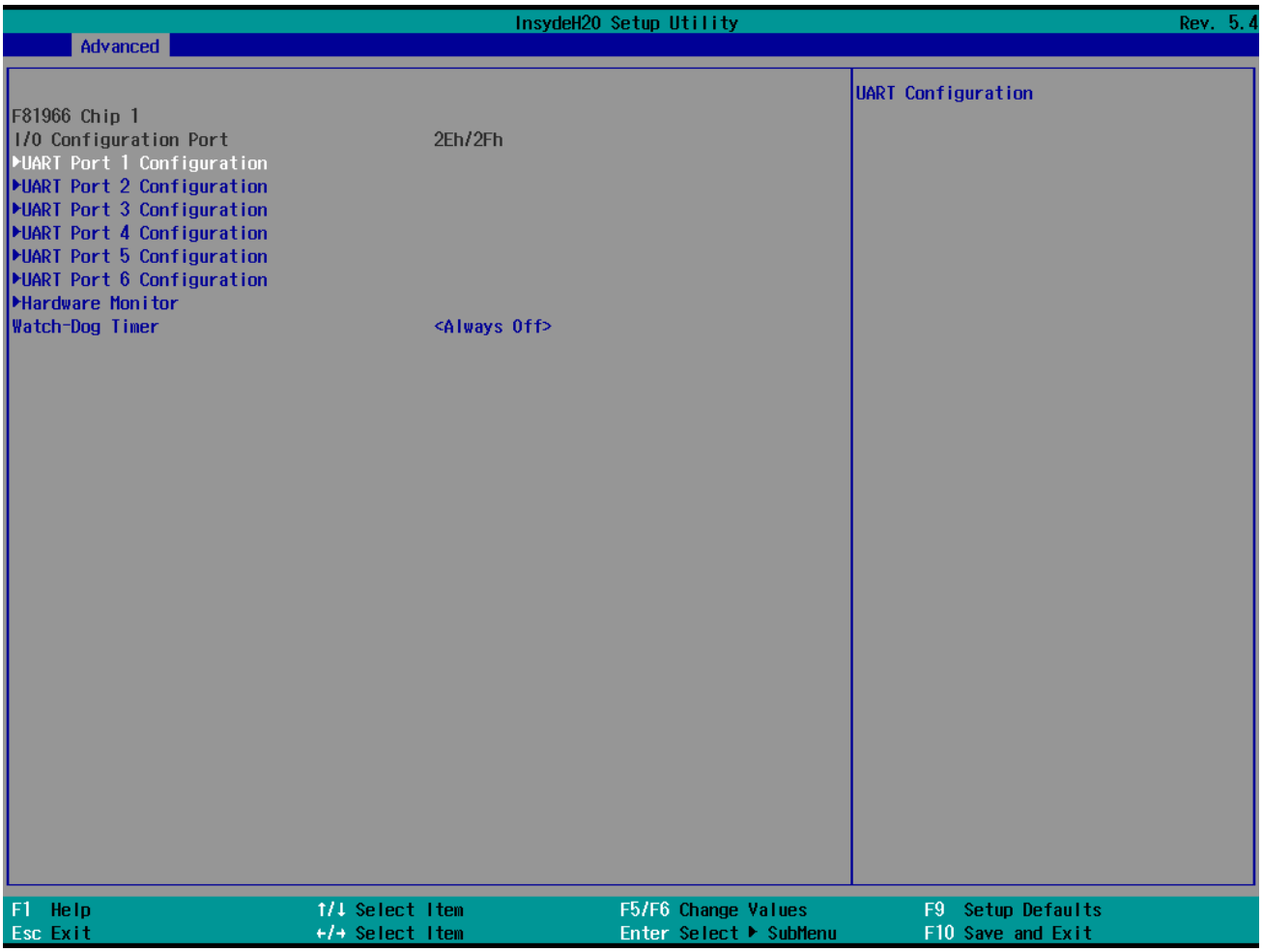


Table 5-6 Advanced Menu Options

Menu	Description
UART port 1 Configuration	Once enabled, the following options appear: • RS232 • RS422 • RS485
Watchdog Timer	• Once the Watchdog Timer (WDT) is selected, three options are available: ◦ **Always off**: Turn off the WDT function ◦ **Always On**:

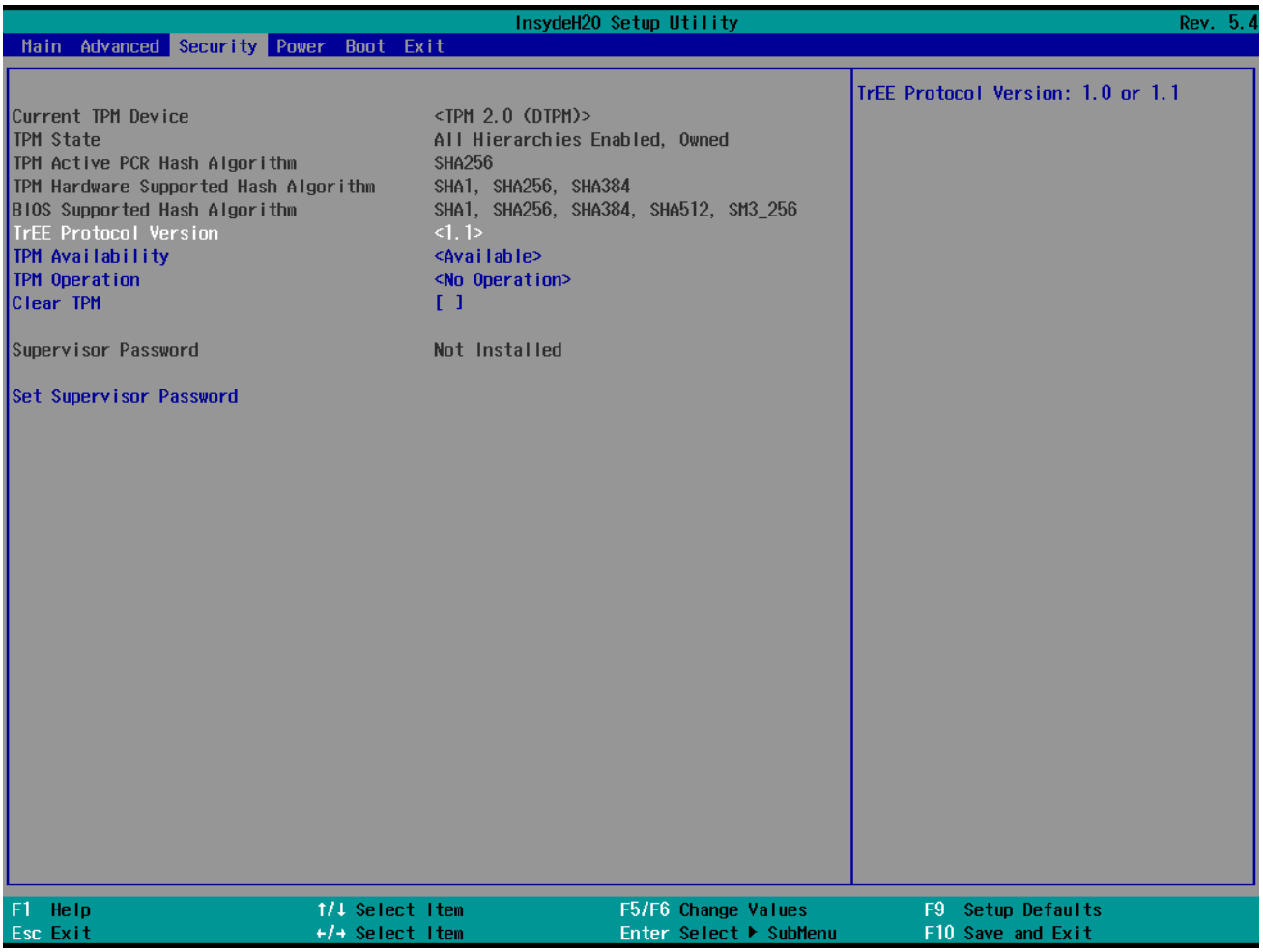
Menu	Description
	▪ Turn on the WDT function. WDT event will be triggered after timeout. ▪ When turning on the WDT function, you can proceed to specify the time unit by seconds or minutes and timeout. **Note:** The timeout is restricted to 1 to 255 seccond(s) or minute(s). ◦ **Suspended At BIOS Setup**: Turn on the WDT function and WDT event will be triggered after timeout; however, the WDT function will be turned off in SCU.

5.1.2.3. Security Menu

The **Security** menu displays the supported TPM (Trusted Platform Module) and associated information.

You can view the TPM operation state or set security passwords for the system or the installed storage devices.

Figure 5-6 Security Menu Screen



5.1.2.4. Power Menu

The **Power** menu allows you to set auto reboot or schedule an auto wake for the system when it's powered off or in sleep mode.

Figure 5-7 Power Menu Screen

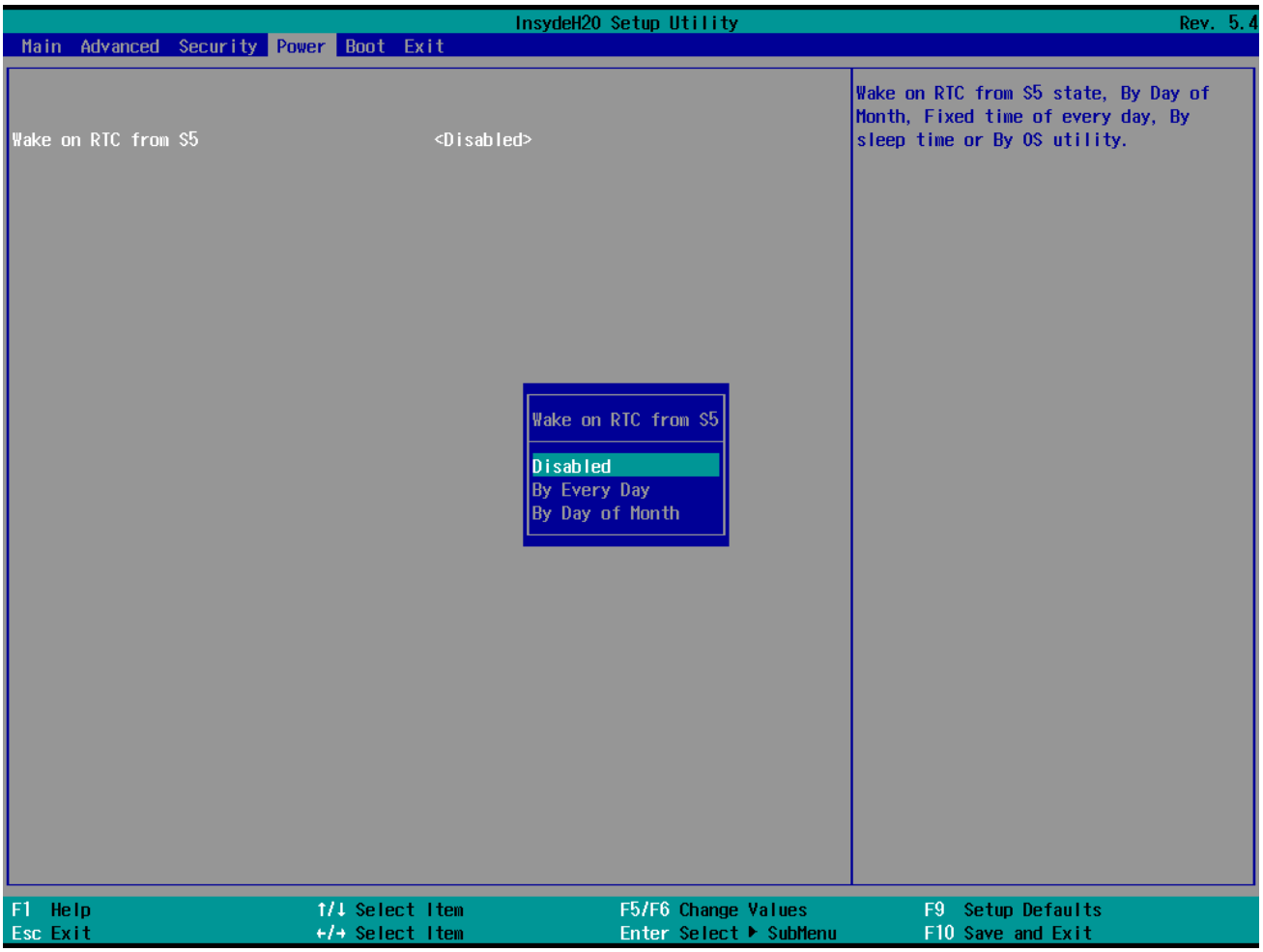


Table 5-7 Power Menu Options

Option	Description
Wake on RTC from S5	This option allows you to configure system auto wake on S5. The default setting is **Disabled**. 1. Enable **Wake on RTC from S5**. 2. Select **By Every Day** or **By Day of Month** to specify a fixed time of every day or certain day of every month to automatically wake up the system from the S5 mode.

5.1.2.5. Boot Menu

The **Boot** menu allows you to define system booting preferences.

Figure 5-8 BIOS Boot Menu

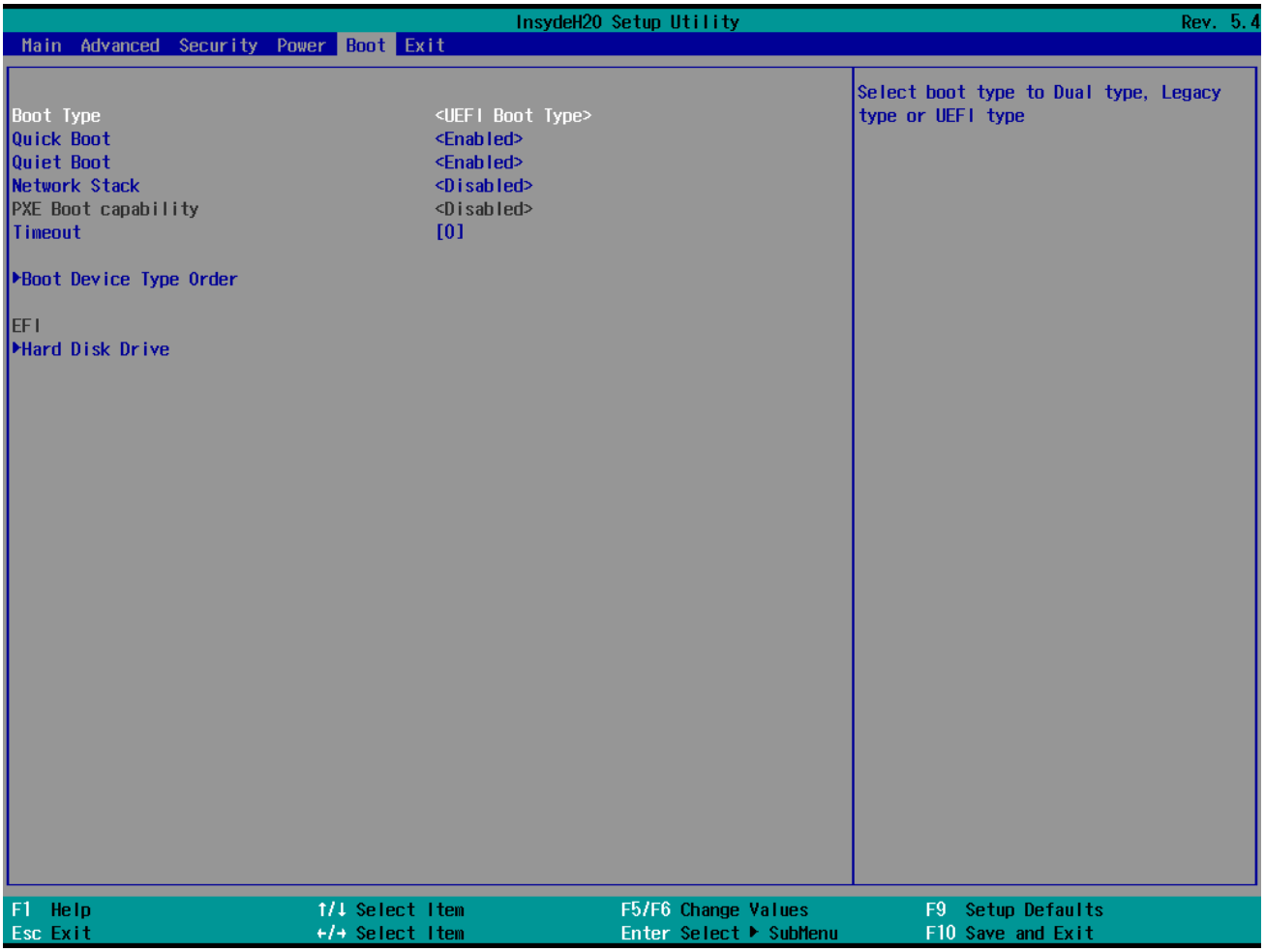


Table 5-8 BIOS Boot Menu

Option	Description
Boot Type	You can specify the desired boot type. Available options include; • Dual Boot Type • Legacy Boot Type • UEFI Boot Type
Quick Boot	Allows InsydeH20 Setup Utility to skip certain tests while booting. This will decrease the time needed to boot the system.
Boot Device Type Order	You can select the desired device type and use the **[F5]**/**[F6]** to set the boot priority. You can also select an item to enable or disable it. Device types include: • Hard Disk Drive • CD/DVD-ROM Drive

Option	Description
	• USB • Network • Others

5.1.2.6. Exit Menu

Settings available on the **Exit** menu include:

Figure 5-9 BIOS Exit Menu

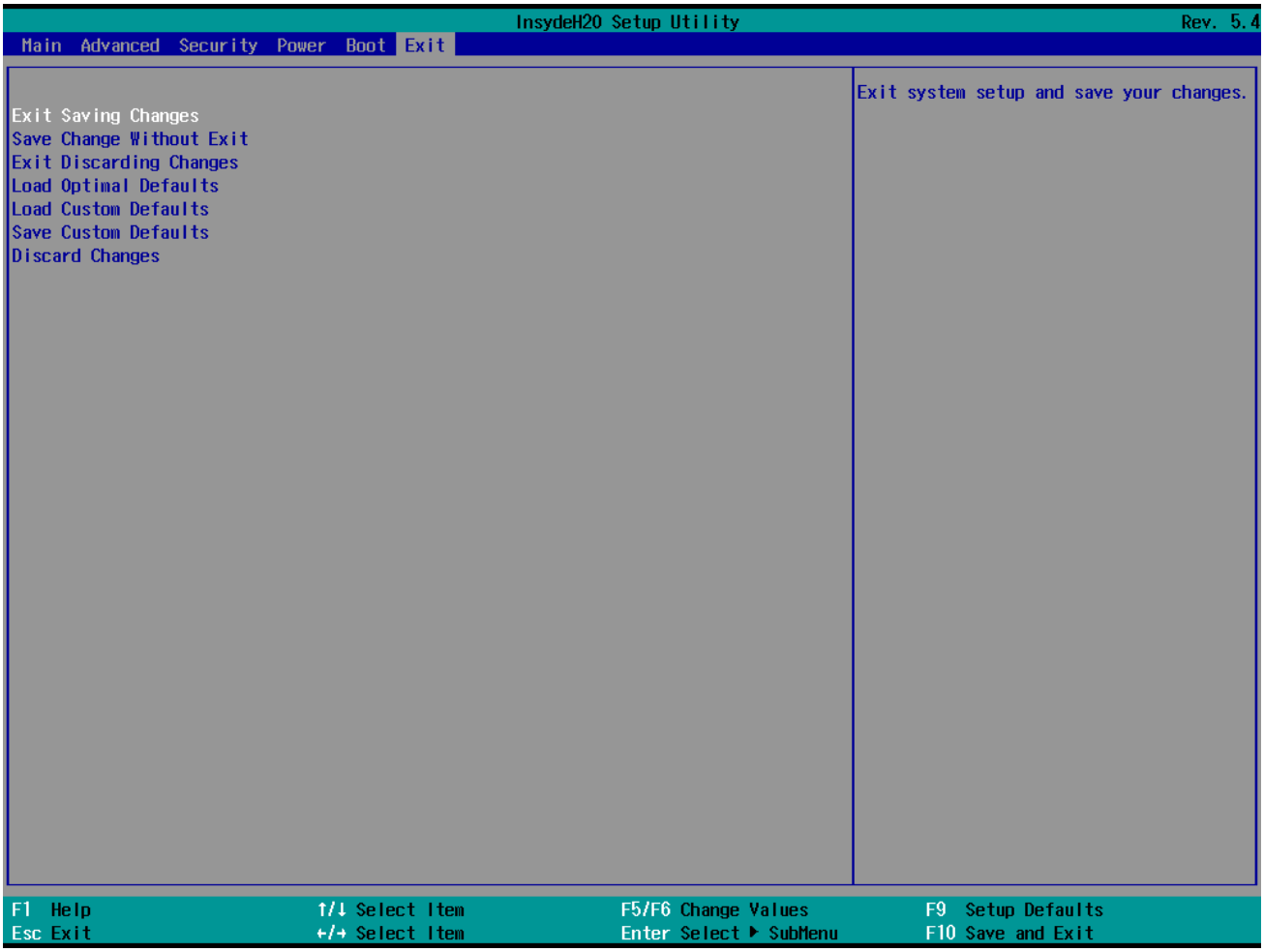


Table 5-9 BIOS Exit Menu

Option	Description
Exit Saving Changes	Exit the setup menus and save the changes.
Save Change without Exit	Save the changes and stay in the Exit menu.
Exit Discarding Changes	Exit the setup menus without saving the changes.
Load Optimal Defaults	Restore the optimized default settings.
Load Custom Defaults	Adopt the customized default settings.
Save Custom Defaults	Save the customized default settings.

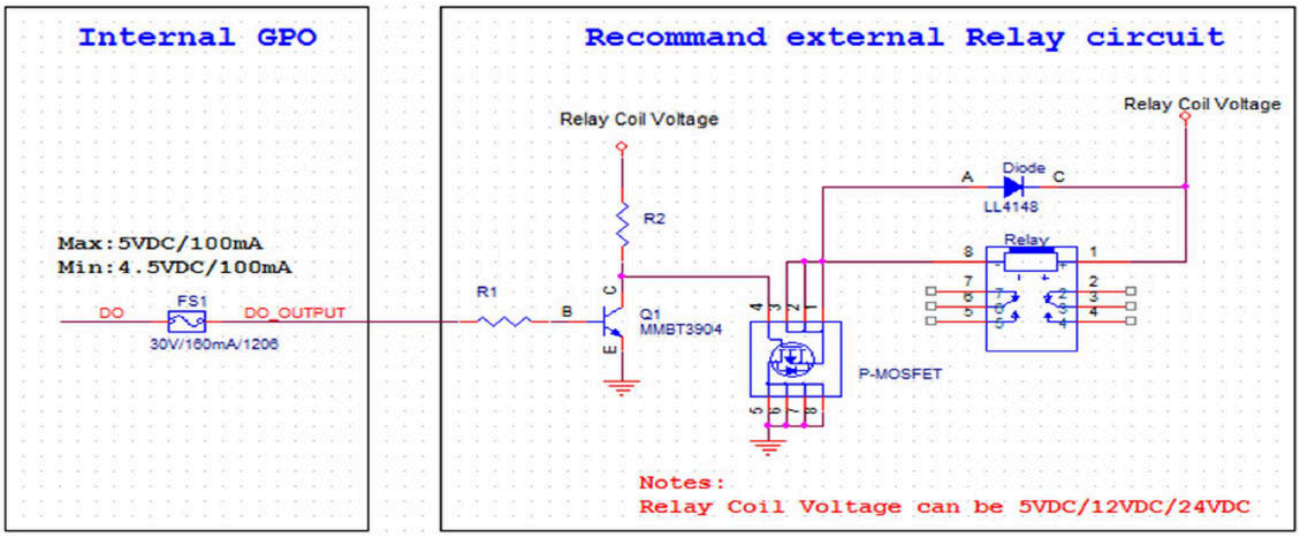
5.2. DIO Control

The system supports 8 programmable digital inputs (DI) and 4 digital outputs (DO), which can be configured to communicate or exchange data with the connected peripheral devices.

5.2.1. Hardware Specification

DI Voltage	DO Voltage	DO Max. Current
DC 5-48V	DC 12V	100mA

5.2.2. Digital Output and Recommended External Relay Circuit



5.2.3. Register Information for DIO Configuration

See the following tables as the register information for DIO configurations.

Table 5-10 Register Information

Field Names	Register	Description
`SMBus_base_addr`	**0xEFA0**	SMBus controller base address
`slave_addr`	**0x54**	Slave device address for DIO
`do_reg_addr`	**0x31**	Register address for setting the digital outputs (DO)
`di_reg_addr`	**0x30**	Register address for getting the status of digital inputs (DI)

Table 5-11 DO Data Register – 0x31

Pin	Bit	Default Setting	R/W	Description
DO_4	3	0	Read/Write	DO_4 output data
DO_3	2	0		DO_3 output data
DO_2	1	0		DO_2 output data
DO_1	0	0		DO_1 output data

Table 5-12 DI Status Register – 0x30

Pin	Bit	Default Setting	Read/Write	Description
DI_8	7	0	Read only	DI_8 pin status
DI_7	6	0		DI_7 pin status
DI_6	5	0		DI_6 pin status
DI_5	4	0		DI_5 pin status
DI_4	3	0		DI_4 pin status
DI_3	2	0		DI_3 pin status
DI_2	1	0		DI_2 pin status
DI_1	0	0		DI_1 pin status

5.2.4. DIO Configuration

See the following sections for the templates and example codes used to check DO/DI status or configure DO channels.

5.2.4.1. Checking DO/DI Status

The general process for checking DO/DI status is as follows:

1. Read the states (HIGH or LOW) of all DO or DI
    - 1 = High
    - 0 = Low
2. Check the status (HIGH or LOW) of a specific DO or DI.

The following table provides the templates and example codes corresponding to the process above:

No.	Template	Example Code	Description
1	`read_value = SMB_Read(<SMBus_base_addr>, <slave_addr>, <do/di_reg_addr>)`	`DO_Value = SMB_Read(0xEFA0, 0x54,0x31)`	Read the status of all DO at register 0x31.
		`DI_Value = SMB_Read(0xEFA0, 0x54, 0x30)`	Read the status of all DI at register 0x30.
2	`if ((read_value >> DO bit) & 0x01) == 1 : print("DO Number : HIGH") else : print("DO Number: LOW")`	`if ((DO_Value >> 3) & 0x01) == 1 : print("DO 4 : HIGH") else : print("LOW")`	Check the status of the specified DO. The given example checks whether DO_4 [bit 3] is HIGH.
	`if ((read_value >> DI bit) & 0x01) == 1 : print("DI Number : HIGH") else : print("LOW")`	`if ((DI_Value >> 3) & 0x01) == 1 : print("DI 4 : HIGH") else : print("LOW")`	Check the status of the specified DI. The given example checks whether DI_4 [bit 3] is HIGH.

5.2.4.2. DO Configuration

The general process for configuring DO is as follows:

1. Read the status (HIGH or LOW) of all DO.
2. Set all DO or a specific DO to HIGH or LOW
3. Execute the setting by writing to the register.

The following table provides the templates and example codes corresponding to the process above:

No.	Template	Example Code	Description
1	`read_value = SMB_Read(<SMBus_base_addr>, <slave_addr>, <do_reg_addr>)`	`DO_Value = SMB_Read(0xEFA0, 0x54, 0x31)`	Read the status of all DO.
2	`DO_Value = DO_Value & 0x00`		Set all DO to LOW
	`DO_Value = DO_Value | 0xff`		Set all DO to HIGH
	`DO_value = DO_Value | (0x01 << DO bit)`	`DO_Value = DO_Value | (0x01 << 3)`	Set the specified DO to HIGH. The given example code sets DO_4 [bit 3] to HIGH.
	`DO_Value = DO_Value & (0xff - (0x01 << DO bit))`	`DO_Value = DO_Value & (0xff - (0x01 << 3))`	Set the specified DO to LOW The given example sets DO_4 [bit 3] to LOW.

No.	Template	Example Code	Description
3	`SMB_Write(< SMBus_base_addr>, <slave_addr>, <reg_addr>, <DO_Value>)`	`SMB_Write(0xEFA0, 0x54, 0x31, DO_Value)`	Save and execute the setting.

5.3. PoE Configuration (PoE Models Only)

The PoE feature is only available on the **PoE models (VBOX-3132P)**. This section describes how to get PoE power transmission status, as well as turn on and turn off PoE power transmission.

Note:
By default, PoE power transmission is turned on.

5.3.1. Configuring All PoE Ports Simultaneouly

See the following table as the register information for configuring all PoE ports simultaneously.

Table 5-13 PoE Data Register for Configuring all PoE Ports Simultaneously - 0x3C

Name	Slave Address	Register	Bit	Default Setting	R/W	Description
POE_-POWER	0x54	0x3C	6	1	R/W	POE power control for all ports

The general process for controlling all PoE ports simultaneously is as follows:

1. **Read the power control value of all PoE ports at register 0x3C.**

   ```
   POE_Power = SMB_Read(0xEFA0, 0x54, 0x3C)
   ```

2. **Enable, disable, or get status of all PoE ports:**

   - To enable PoE power transmission, set bit 6 = 1:

     ```
     POE_Power = POE_Power | 0x40
     ```

     ```
     SMB_Write(0xEFA0, 0x54, 0x3C, POE_Power)
     ```

   - To disable PoE power transmission, set bit 6 = 0:

     ```
     POE_Power = POE_Power & 0xBF
     ```

     ```
     SMB_Write(0xEFA0, 0x54, 0x3C, POE_Power)
     ```

   - **To get power transmission status of all ports:**

     ```
     if ((POE_Power >> 6) & 0x01) == 1 : print( "POE Power : ON" )
     elif ((POE_Power >> 6) & 0x01) == 0 : print( "POE Power : OFF" )
     ```

     - POE_Power bit 6 = 1 → PoE enabled
     - POE_Power bit 6 = 0 → PoE disabled

5.3.2. Configuring Individual PoE Port

See the following tables and example codes used to check the status or enable/disable power transmission for a specific PoE port.

5.3.2.1. Register Information for Configuring Individual PoE Port

See the following tables as the register information for PoE configurations.

Table 5-14 Register Information

Field Names	Register	Description
`SMBus_base_addr`	**0xEFA0**	SMBus controller base address
`slave_addr`	**0x5E**	Slave device address for configuring individual PoE port
`opmd_reg_addr`	**0x12**	Register address for setting PoE operation mode
`detcls_reg_addr`	**0x14**	Register address for setting PoE detection and classification mode
`pwr_reg_addr`	**0x19**	Register address for setting PoE power mode

Table 5-15 PoE Operation Mode Control Register – 0x12

PoE Port	Bit	R/W	Description
PoE_4	7, 6	Read/Write	PoE_4 operation mode control
PoE_3	5, 4		PoE_3 operating mode control
PoE_2	3, 2		PoE_2 operating mode control
PoE_1	1, 0		PoE_1 operating mode control

Table 5-16 PoE Classification and Detection Control Register – 0x14

PoE Port	Bit	Name	R/W	Description
PoE_4	7	CLS_4	Read/Write	PoE_4 classification control
	3	DET_4		PoE_4 detection control
PoE_3	6	CLS_3		PoE_3 classification control
	2	DET_3		PoE_3 detection control
PoE_2	5	CLS_2		PoE_2 classification control
	1	DET_2		PoE_2 detection control
PoE_1	4	CLS_1		PoE_1 classification control
	0	DET_1		PoE_1 detection control

Table 5-17 PoE Power Control Register – 0x19

PoE Port	Bit	Name	R/W	Description
PoE_4	7	OFF_4	Read/Write	Disable PoE_4 power transmission
	3	ON_4		Enable PoE_4 power transmission
PoE_3	6	OFF_3		Disable PoE_3 power transmission
	2	ON_3		Enable PoE_3 power transmission
PoE_2	5	OFF_2		Disable PoE_2 power transmission
	1	ON_2		Enable PoE_2 power transmission
PoE_1	4	OFF_1		Disable PoE_1 power transmission
	0	ON_1		Enable PoE_1 power transmission

5.3.2.2. Checking PoE Status

The general process for checking PoE status is as follows:

1. Read the operation mode value of all PoE ports at register 0x12.
2. Read the operation mode value of a specific PoE port at register 0x12:
   - [1, 1]: Power transmission enabled
   - [0, 1]: Power transmission disabled

The following table provides the templates and example codes corresponding to the process above:

No.	Template	Example Code	Description
1	`read_value = SMB_Read(<SMBus_base_addr>, <slave_addr>, <opmd_reg_addr>)`	`PoE_opmd = SMB_Read(0xEFA0, 0x5E, 0x12)`	Read the operation mode value of all PoE ports at register 0x12.
2	`If ((PoE_opmd >> (2 * PoE_Number - 2)) & 0x03) == 0x03 : print("PoE number : Power ON") else : print("Power OFF")`	`If ((PoE_opmd >> 2) & 0x03) == 0x03 : print("PoE 2 : Power ON") else : print("Power OFF")`	Read the operation mode value of a specific PoE port at register 0x12. The given example checks whether PoE_2 power transmission is turned on or off. For PoE_2, PoE status is determined by bits [3:2]:

No.	Template	Example Code	Description
			• Bits [3:2] = [1,1] : PoE enabled • Bits [3:2] = [0,1] : PoE disabled

5.3.2.3. Turning ON PoE

The general process for turning on PoE power transmission is as follows:

1. **Read the operation mode value of all PoE ports at register 0x12.** See Table 5-14 : Register Information *(on page 99)* for the list of available registers.

   Template: `read_value = SMB_Read(<SMBus_base_addr>, <slave_addr>, <opmd_reg_addr>)`

   Example Code: `PoE_opmd = SMB_Read(0xEFA0, 0x5E, 0x12)`

2. **Set the two control bits for the specified PoE port to [1, 1] at register 0x12.** See Table 5-15 : PoE Operation Mode Control Register – 0x12 *(on page 99)* for the bit assignments per port.

   Template:

   ```
   PoE_opmd = PoE_opmd | (0x03 << (2 * PoE_Number - 2))
   ```

   Example Code:

   ```
   PoE_opmd = PoE_opmd | (0x03 << 4)
   ```

   The given example code sets PoE_3 [bit 5, bit 4] to [1, 1] at register 0x12.

3. **Read the detection and classification value of all PoE ports at register 0x14.**

   Template: `read_value = SMB_Read(<SMBus_base_addr>, <slave_addr>, <detcls_reg_addr>)`

   Example Code: `PoE_detcls = SMB_Read(0xEFA0, 0x5E, 0x14)`

4. **Set the two control bits for the specified PoE port to [1, 1] at register 0x14.** See Table 5-16 : PoE Classification and Detection Control Register – 0x14 *(on page 100)* for the bit assignments per port.

   Template:

   ```
   PoE_detcls = PoE_detcls | (0x11 << (PoE_Number - 1))
   ```

   Example Code:

   ```
   PoE_detcls = PoE_detcls | (0x11 << 2)
   ```

   The given example code sets PoE_3 [bit 6, bit 2] to [1, 1] at register 0x14.

5. **Execute the settings by writing to the register with the parameters pre-defined in step 2 and 4.**

   Template:

   ```
   SMB_Write(< SMBus_base_addr>, <slave_addr>, <opmd_reg_addr>, PoE_opmd)
   ```

   ```
   SMB_Write(<SMBus_base_addr>, <slave_addr>, <detcls_reg_addr>, PoE_detcls)
   ```

   Example Code:

   ```
   SMB_Write(0xEFA0, 0x5E, 0x12, PoE_opmd)
   ```

   ```
   SMB_Write(0xEFA0, 0x5E, 0x14, PoE_detcls)
   ```

5.3.2.4. Turning OFF PoE

The general process for turning off PoE power transmission is as follows:

1. **Read the operation mode value of all PoE ports at register 0x12.** See Table 5-14 : Register Information *(on page 99)* for the list of available registers.

   Template: `read_value = SMB_Read(<SMBus_base_addr>, <slave_addr>, <opmd_reg_addr>)`

   Example Code: `PoE_opmd = SMB_Read(0xEFA0, 0x5E, 0x12)`

2. **Set the two control bits for the speficied PoE port to [0, 1] at register 0x12.** See Table 5-15 : PoE Operation Mode Control Register – 0x12 *(on page 99)* for the bit assignments per port.

   Template:

   ```
   PoE_opmd = PoE_opmd | (0x01 << (2 * PoE_Number - 2))
   ```

   ```
   PoE_opmd = PoE_opmd & (0xFF - (0x01 << (2 * PoE_Number - 1)))
   ```

   Example Code:

   ```
   PoE_opmd = PoE_opmd | (0x01 << 4)
   ```

   ```
   PoE_opmd = PoE_opmd & (0xFF - (0x01 << 5))
   ```

   The given example code sets PoE_3 [bit 5, bit 4] to [0, 1] at register 0x12.

3. **Read the power control value of all PoE ports at register 0x19.**

   Template: `read_value = SMB_Read(<SMBus_base_addr>, <slave_addr>, <pwr_reg_addr>)`

   Example Code: `PoE_pwr = SMB_Read(0xEFA0, 0x5E, 0x19)`

4. **Set the two control bits for the specified PoE port to [1, 0] at register 0x19.** See Table 5-17 : PoE Power Control Register – 0x19 *(on page 101)* for the bit assignments per port.

   Template:

   ```
   PoE_pwr = PoE_pwr | (0x10 << (PoE_Number - 1))
   ```

   ```
   PoE_pwr = PoE_pwr & (0xFF - (0x01 << (PoE_Number - 1)))
   ```

   Example Code:

   ```
   PoE_pwr = PoE_pwr | (0x10 << 2)
   ```

   ```
   PoE_pwr = PoE_pwr & (0xFF - (0x01 << 2))
   ```

   The given example code sets PoE_3 [bit 6, bit 2] to [1, 0] at register 0x19.

5. **Execute the settings by writing to the register with the parameters pre-defined in step 2 and 4.**

   Template:

   ```
   SMB_Write(< SMBus_base_addr>, <slave_addr>, <opmd_reg_addr>, PoE_opmd)
   ```

   ```
   SMB_Write(< SMBus_base_addr>, <slave_addr>, <pwr_reg_addr>, PoE_pwr)
   ```

   Example Code:

   ```
   SMB_Write(0xEFA0, 0x5E, 0x12, PoE_opmd)
   ```

   ```
   SMB_Write(0xEFA0, 0x5E, 0x19, PoE_pwr)
   ```