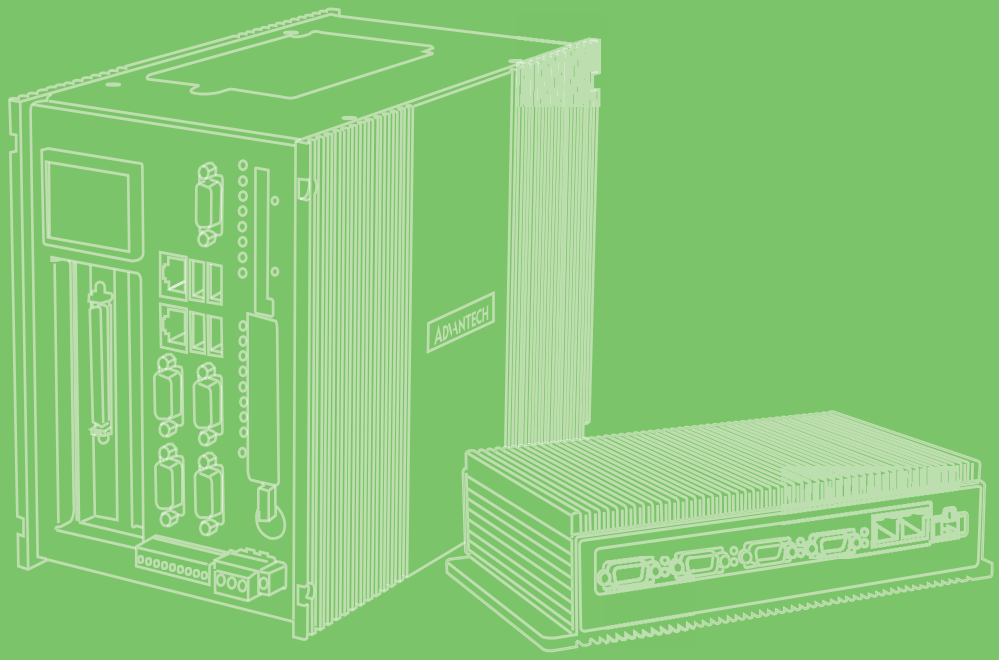
User Manual



UNO-148 V2 Industrial PC

Intel® Raptor Lake Processor Automation Computer, with 3 x LAN, 4 x COM, 2 x USB 3.2 Gen 2, 1 x USB 3.2 Gen 1, 1 x USB 2.0, 2 x DP 1.4, 8DI/8DO, 1 x mPCIe, 2 x M.2 M-Key, 1 x M.2 E-Key, 1 x Nano SIM Slot and TPM 2.0

ADVANTECH

Enabling an Intelligent Planet

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For more information on this and other Advantech products, please visit our website at http://www.advantech.com

For technical support services, please visit our support website at http://support.advantech.com/

This manual applies to the following models. These are abbreviated as UNO-148 products in this article.

*Model name

UNO-148 V2

UNO148D

*Part numbers:

UNO-148-D73BA/UNO-148-D53BA/UNO-148-D33BA

UNO148D73B2401-T UNO148D73B2402-T UNO148D73B2403-T
UNO148D73B2501-T UNO148D73B2502-T UNO148D73B2503-T
UNO148D73B2504-T UNO148D73B2505-T UNO148D73B2506-T
UNO148D73B2507-T UNO148D73B2508-T UNO148D73B2509-T
UNO148D73B2601-T UNO148D73B2602-T UNO148D73B2603-T
UNO148D73B2604-T UNO148D73B2605-T UNO148D73B2606-T
UNO148D73B2607-T UNO148D73B2608-T UNO148D73B2609-T
UNO148D73B2701-T UNO148D73B2702-T UNO148D73B2703-T
UNO148D73B2704-T UNO148D73B2705-T UNO148D73B2706-T
UNO148D73B2801-T UNO148D73B2802-T UNO148D73B2803-T
UNO148D53B2401-T UNO148D53B2402-T UNO148D53B2403-T
UNO148D53B2501-T UNO148D53B2502-T UNO148D53B2503-T
UNO148D53B2504-T UNO148D53B2505-T UNO148D33B2506-T
UNO148D53B2507-T UNO148D53B2508-T UNO148D53B2509-T
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UNO148D53B2607-T UNO148D33B2608-T UNO148D53B2609-T
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UNO148D33B2704-T UNO148D33B2705-T UNO148D33B2706-T
UNO148D33B2801-T UNO148D33B2802-T UNO148D33B2803-T

Product Warranty (2 years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product to be defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

CE

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 type of cable is available from Advantech. Please contact your local supplier for ordering information.

Test criteria also include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electrostatic discharge (ESD) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. In this event, users are required to correct the interference at their own expense.

警告使用者

為避免電磁干擾，本產品不應安裝或使用於住宅環境。

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Part No. 2001148V00 Edition 1
Printed in Taiwan January 2025

Safety Precautions - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from the PC chassis before manual handling. Do not touch any components on the CPU card or other cards while the PC is powered on.
- Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and be easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If any of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture.
    - The equipment is malfunctioning, or does not operate according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of breakage.
15. Do not leave the equipment in an environment with a storage temperature of below -20°C (-4°F) or above 60°C (140°F) as this may damage the components. The equipment should be kept in a controlled environment.
16. CAUTION: Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
17. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position should not exceed 70 dB (A).

18. This product is intended to be supplied by a UL-certified power supply or DC source with SELV output, rated 10 V_{DC}, 7.7 A, with a minimum TMA of 40°C. If you need further assistance, please contact Advantech for further information.
19. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet. The power outlet socket should have a grounded connection.
20. This equipment is for use in indoor, pollution-free environments.
21. This equipment is not suitable for use in locations where children are likely to be present.
22. If the equipment is used in a manner not specified by Advantech, the protection provided by the equipment may be impaired.
23. The equipment contains no user-serviceable parts. Do not open. Return to the manufacturer for servicing.
24. Do not block air ventilation holes.
25. This is open-type equipment and should be installed in a suitable enclosure.

DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Consignes de sécurité

1. Lire attentivement les instructions de sécurité.
2. Conserver ce manuel pour utilisation ultérieure,
3. Débranchez cet équipement de toute prise secteur avant le nettoyer. Utilisez seulement un chiffon humide. N'utilisez pas de détergent liquide ou pulvérisé pour le nettoyage.
4. Gardez cet équipement à l'abri de l'humidité.
5. Placez cet équipement sur une surface fiable pendant l'installation. Le faire ou bien le laisser tomber peut causer des dégâts.
6. Les ouvertures sur l'enceinte servent à la convection de l'air. Protégez l'équipement contre surchauffe. NE COUVREZ PAS LES OUVERTURES.
7. Assurez-vous que la tension de la source d'alimentation est correcte avant de connecter l'équipement à une prise de courant. La prise de courant doit avoir une connexion à la terre.
8. Placez le câble d'alimentation de manière à ce que personne ne puisse marcher dessus. Ne placez rien sur le câble d'alimentation.
9. Toutes les mises en garde et tous les avertissements sur l'équipement doivent être notés.
10. Si l'équipement n'est pas utilisé pendant une longue période, débranchez-le de la source d'alimentation pour éviter tout endommagement dû à une surtension transitoire.
11. Ne jamais verser de liquide dans une ouverture. Cela pourrait provoquer un incendie ou un choc électrique.
12. N'ouvrez jamais l'équipement. Pour des raisons de sécurité, l'équipement doit être ouvert uniquement par du personnel qualifié.
13. Si l'une des situations suivantes se présente, faites vérifier l'équipement par le personnel de service:
    - Un liquide a pénétré dans l'équipment.
    - L'équipement a été exposé à l'humidité.
    - L'équipement ne fonctionne pas bien, ou vous ne pouvez pas le faire fonctionner selon le manuel de l'utilisateur.

- L'équipement est tombé et endommagé.
- L'équipement présente des signes évidents de rupture.

14. NE LAISSEZ PAS CET ÉQUIPEMENT DANS UN ENVIRONNEMENT OU LA TEMPÉRATURE DE STOCKAGE PEUT ÊTRE INFÉRIEURE À -40 °C (-4 °F) OU BIEN SUPÉRIEURE À 70 °C (158 °F). CECI POURRAIT ENDOMMAGER L'EQUIPEMENT. L'ÉQUIPEMENT DEVRAIT ÊTRE DANS UN ENVIRONNEMENT CONTRÔLÉ.
15. Ce produit est destiné à être alimenté par une source d'alimentation certifiée UL ou par une source cc convenant à une utilisation à une température minimale de 40 degrés Celsius, dont la sortie est conforme à la norme SELV et dont la puissance nominale est de 10 V_{DC}, 7.7 A, en cas de besoin. contactez Advantech pour plus d'informations.
16. Pour une utilisation dans des environnements non polluant et à l'intérieur.
17. C'est appareil ne doit pas être utilisé dans des endroits où se trouvent des enfants.
18. Si l'équipement est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par l'équipement peut être altéré.
19. L'équipement ne contient aucune pièce réparable par l'utilisateur. Ne pas ouvrir, retourner au fabricant pour réparation.
20. Ne bloquez pas les ou es de ventilation.
21. Il s'agit d'un équipement de type ouvert et doit être installé dans un boîtier approprié.

ATTENTION: Danger d'explosion si la batterie est mal remplace. Remplacer uniquement par le meme type ou equivalent recommandé par le fabricant. Jeter les piles usagées selon les instructions du fabricant.

安全指示

1. 請仔細閱讀此安全操作說明。
2. 請妥善保存此用戶手冊供日後參考。
3. 用濕抹布清洗設備前，請確認拔除電源線。請勿使用液體或去污噴霧劑清洗設備。
4. 對於使用電源線的設備，設備周圍必須有容易接觸到的電源插座。
5. 請勿在潮濕環境中試用設備。
6. 請在安裝前確保設備放置在可靠的平面上，意外摔落可能會導致設備損壞。
7. 設備機殼的開孔適用於空氣對，從而防止設備過熱。請勿覆蓋開孔。
8. 當您連接設備到電源插座前，請確認電源插座的電壓符合要求。
9. 請將電源線佈置在人們不易絆倒的位置，請勿在電源線上覆蓋任何雜物。
10. 請注意設備上所有的警告標示。
11. 如果長時間不使用設備，請拔除與電源插座的連結，避免設備被超標的電壓波動損壞。
12. 請勿讓任何液體流入通風口，以免引起火灾或短路。
13. 請勿自行打開設備。為了確保您的安全，請透過經認證的工程師來打開設備。
14. 如遇下列情況，請由專業人員維修：
    - 電源線或插頭損壞；
    - 設備內部有液體流入；
    - 設備曾暴露在過度潮濕環境中使用；
    - 設備無法正常工作，或您無法透過用戶手冊來正常工作；
    - 設備摔落或損壞；
    - 設備有明顯外觀損；

15. 請勿將設備放置在超出建議溫度範圍的環境，即不要低於 -40°C （-40°F）或高於 60 °C （140°F），否則可能會造成設備損壞。
16. 注意：若電池更換不正確，將有爆炸危險。因此，只可以使用製造商推薦的同一種或者同等型號的電池進行替換。請按照製造商的指示處理舊電池。
17. 根據 IEC 704 - 1:1982 規定，操作員所在位置音量不可高於 70 分貝。
18. 限制區域：請勿將設備安裝於限制區域使用。
19. 免責聲明：請安全訓示符合 IEC 704 - 1 要求。研華公司對其內容之準確性不承擔任何法律責任。
20. 消费者若使用电源适配器供电，则应购买配套使用获得 CCC 认证并满足标准要求的电源适配器。

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Chapter 1

Overview

This chapter outlines specifications for UNO-148 V2.

- Introduction
- Safety Precautions
- Accessories
- Hardware Specifications
- Dimensions

1.1 Introduction

Advantech's UNO-100 series are DIN-rail integrated controllers that feature a modular design for flexible configuration according to specific usage requirements.

UNO-148 V2 is equipped with an 13th Generation Intel® Core™ i Processor (standard 1.2 GHz, optional up to 4.9 Ghz) with 8 GB DDR5 RAM, and 3 x LAN, 4 x COM, 3 x USB 3.2 Gen 2, 1 x USB 2.0, 8 x DI, 8 x DO and 2 x DP 1.4. The controller also sup- ports 1 x full size Mini PCIe, 2 x M.2 (M-Key), 1 x M.2 (E-Key), and 1 x nano SIM card for convenient expansion that supports Advantech's iDoor technology for integrating additional industrial Fieldbus, wireless communication, I/O, and peripheral modules.

1.2 Safety Precautions

Below are a few safety precautions for preventing injury when making connections. In most cases, users can use a standard cable for connection.

Warning! *Always disconnect the power cord from the chassis before manual handling. Do not connect the chassis while the system power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electronics personnel should open the chassis.*



Warning! *Toujours à la terre pour éliminer toute charge d'électricité statique avant toucher UNO-148 V2. Appareils électroniques modernes sont très sensibles à charges d'électricité statique. Utilisez un bracelet antistatique à tout moment. Placez tous composants électroniques sur une surface antistatique ou dans un statique-sac blindé.*



Caution! *Always ground yourself to remove any static electric charge before touching UNO-148 V2. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static shielded bag.*



Caution! *Toujours débrancher le cordon d'alimentation de votre boîtier lorsque vous êtes travailler. Ne branchez pas lorsque l'appareil est allumé. Un afflux soudain de puissance peut endommager les composants électroniques sensibles. Seulement connu personnel de l'électronique devraient ouvrir le châssis.*



1.3 Packing List

Please refer to the below packing list:

- UNO-148 V2 (with DIN-rail mount)
- 2 x 10-pin plug-in block for COM port
- 1 x 20-pin plug-in block for DIO
- 1 x 2-pin plug-in for Power
- 1 x earth-ground cable
- Quick Start Guide
- Warranty card

If anything is missing or damaged, contact your distributor or sales representative immediately.

1.4 Hardware Specifications

1.4.1 General

Table 1.1: General	
Dimensions (W x D x H)	53 x 140 x 200 mm
Weight (Net)	1.8 kg
Mounting	DIN-rail
Power Requirement	10 - 36V_{DC}
Power Consumption	41 W (typical), 63 W (Max)

1.4.2 System Hardware

Table 1.2: System Hardware	
BIOS	AMI UEFI 256 Mbit
Watchdog Timer	Programmable 255-level timer interval, from 1 to 255 sec
Hardware Security	TPM 2.0
Processor	13th Gen Intel® Core™ 1.2 GHz (up to 4.9 GHz)
Memory	2 slots, built-in 8 GB DDR5 4800 MHz (default 8 GB single slot, max. up to 64 GB per slot)
Graphics Engine	Intel® Iris® Xᵉ (Supports i7 CPU) Intel® UHD Graphics (Supports i3 & i5 CPU)
Ethernet	1 x 10/100/1000 BASE-T Fast Ethernet (RJ-45) 2 x 10/100/1000/2500 BASE-T Fast Ethernet (RJ-45)
LED Indicators	1 x Power: Green-S0, Orange S3 or S5 1 x RUN: Green-Programmable (PLED) 1 x BTR: RED-RTC Battery Low
Communication	M.2 slot for E-Key
Storage	2 x M.2 M-Key 2280 NVMe SSD (PCIe x4 signal)
Expansion	M.2 E-Key 2230 WiFi module (PCIe/USB signal) 1 x Mini PCIe (PCIe/USB 2.0 signal) 1 x Nano SIM card slot

1.4.3 I/O Interfaces

Table 1.3: I/O Interfaces	
Serial Ports	4 x RS-232/422/485 (terminal block), 50 ~115.2 kbps (Isolation Protection: 2500 VDC)
LAN Ports	2x Intel® I226-IT Ethernet Chip 1x Intel® I219 Ethernet Chip
Speed	1 x 10/100/1000BASE-T Fast Ethernet (RJ-45) 2 x 10/100/1000/2500BASE-T Fast Ethernet (RJ-45)
USB Ports	2 x USB 3.2 Gen 2, 1 x USB 3.2 Gen 1 & 1 x USB 2.0 (Type-A)
Isolated DIO	8-ch digital input, 8-ch digital output (Isolation Protection: 2500V_{DC}) Input Voltage (Wet Contact) Logic 0: 10 ~ 30 V_{DC} Logic 1: 0 ~ 3 V_{DC} Input Voltage (Dry Contact) Logic 0: Shorted to GND Logic 1: Open Digital Output Output Voltage: 5 ~ 30 V_{DC} Output Capability Sink: 500 mA max./channel
Displays	2 x DP 1.4, up to 3480 X 2160 (4K) @ 60Hz
Power Connector	1 x 2-pin (terminal block)

1.4.4 Environment

Table 1.4: Environment	
Operating Temperature	-20 ~ 60°C (-4 ~ 140°F) with 0.7 m/s airflow
Storage Temperature	- 40 ~ 85°C (-40 ~ 185°F)
Relative Humidity	95% RH @ 40°C/104 °F, non-condensing
Shock Protection	Operating, IEC 60068-2-27, 50G, half sine, 11 ms
Vibration Protection	Operating, IEC 60068-2-64, 2 Grms, random, 5 ~ 500 Hz, 1hr/axis (SSD) Operating, IEC 60068-2-64, 0.3 Grms, random, 5 ~ 500 Hz, 1hr/axis (HDD)

1.4.5 Certification

Table 1.5: Certification	
Certification	CE, FCC, CB, UL 61010-2-201, BSMI

1.4.6 Extension Kit (Optional)

UNO-148 V2 features a modularized design. Advantech offers optional 2nd extension kit.

Table 1.6: UNO-148-IS2EA Expansion unit (1 x iDoor and 1 x 2.5” SSD/HDD)	
Part number	UNO-148-IS2EA
Description	2nd stack extension kit to supports 1 x iDoor and 1 x 2.5” SSD/HDD storage on UNO-148-IS2EA
Ports	1 x iDoor, 1 x 2.5” SSD/HDD
Dimensions (W x D x H)	35 x 140 x 200 mm
Weight	0.5 kg

Table 1.7: UNO-148-P11EA Expansion unit (1 x PCIe x4 expansion)	
Part number	UNO-148-P11EA
Description	2nd stack extension kit to supports 1 x PCIe x4 on UNO-148- P11EA
Ports	1 x PCIe x4 expansion
Dimensions (W x D x H)	35 x 140 x 200 mm
Weight	0.5 kg

Note! *Because of the power used by PCIe x4, the recommended power input for UNO-148 is 24 V_{DC} (±20%).*

1.5 Dimensions

53 x 140 x 200 mm (W x D x H mm)

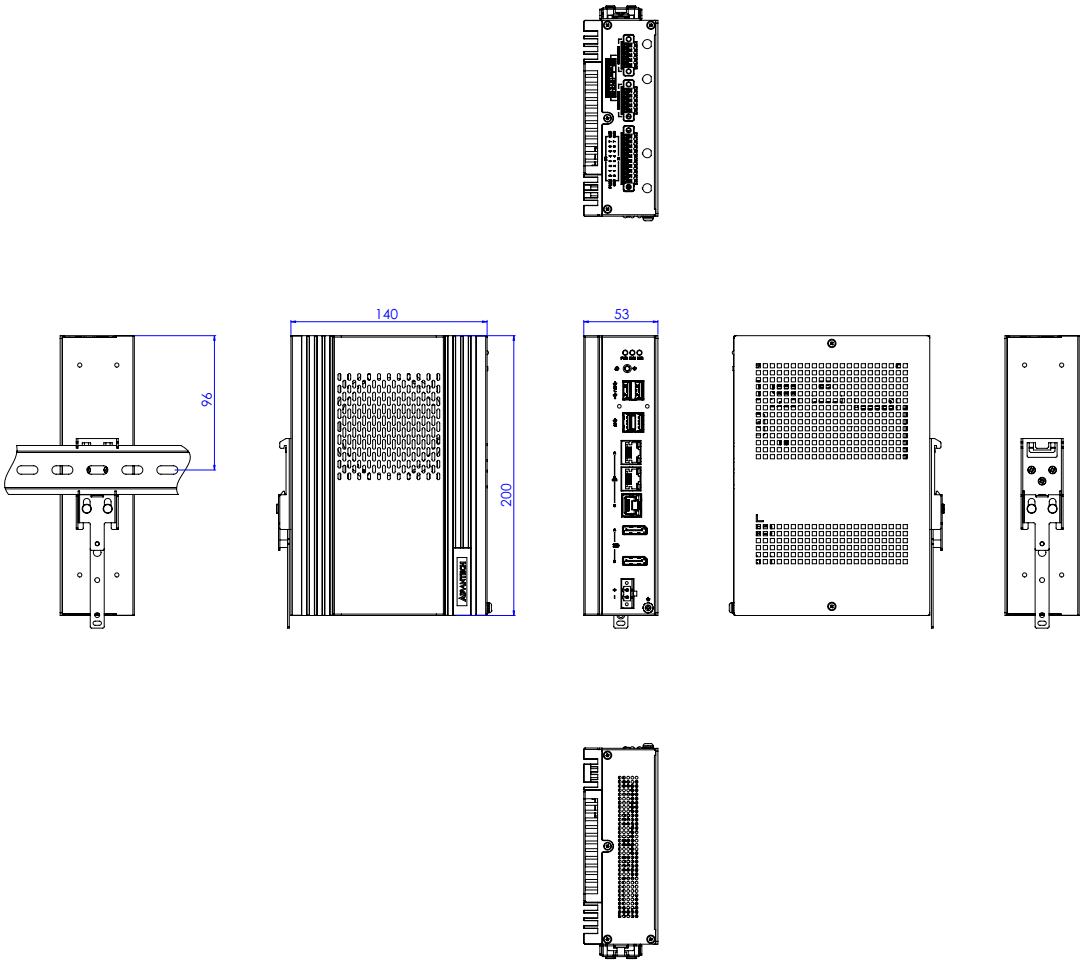


Figure 1.1 UNO-148 V2 Dimensions

88 x 140 x 200 mm (W x D x H mm)

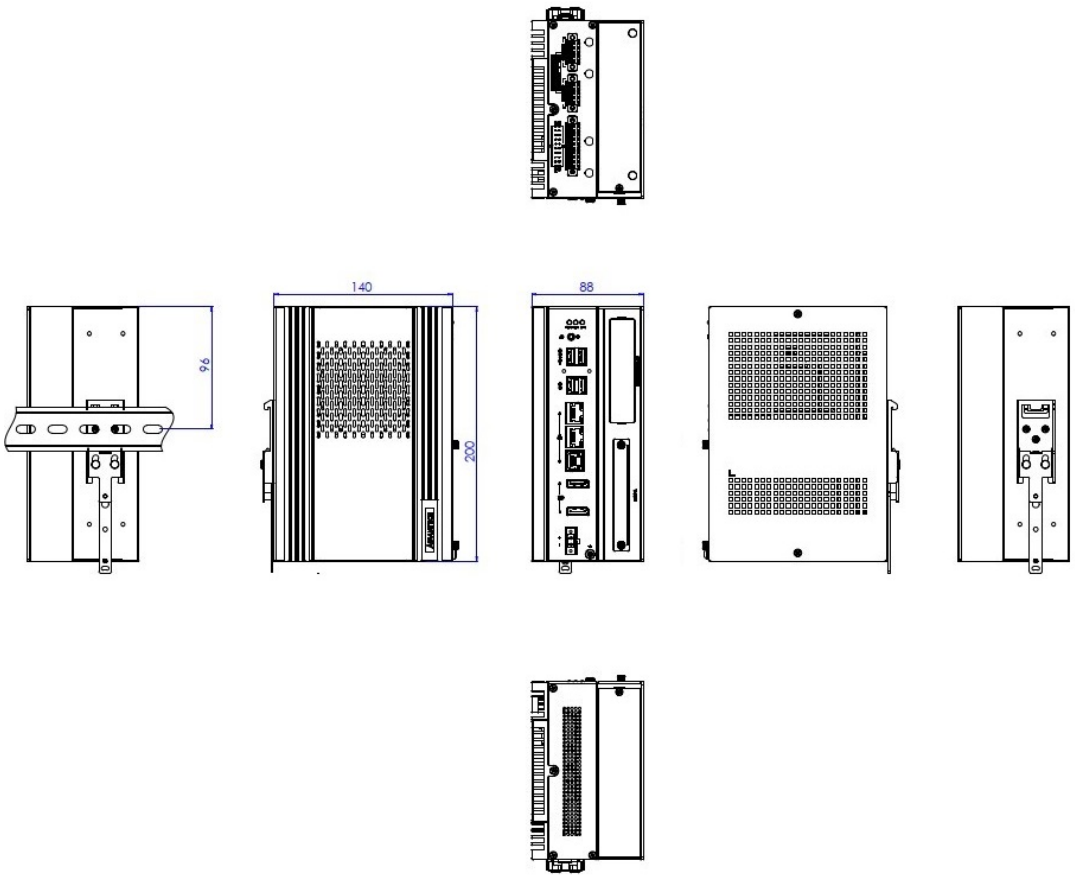


Figure 1.2 UNO-148 V2 Dimensions (With UNO-148-IS2EA Optional Extension Kit))

Chapter 2

Hardware Functionality

This chapter details setup instructions for the hardware functions of the UNO-148 V2. It includes connecting peripherals and indicators.

- Introduction
- External I/O Connectors
- Internal I/O Connectors
- LED Indicators
- Reset Buttons
- Antenna Holes

2.1 Introduction

The following diagram shows the locations of the UNO-148 V2 motherboard's key components and internal/external connectors.

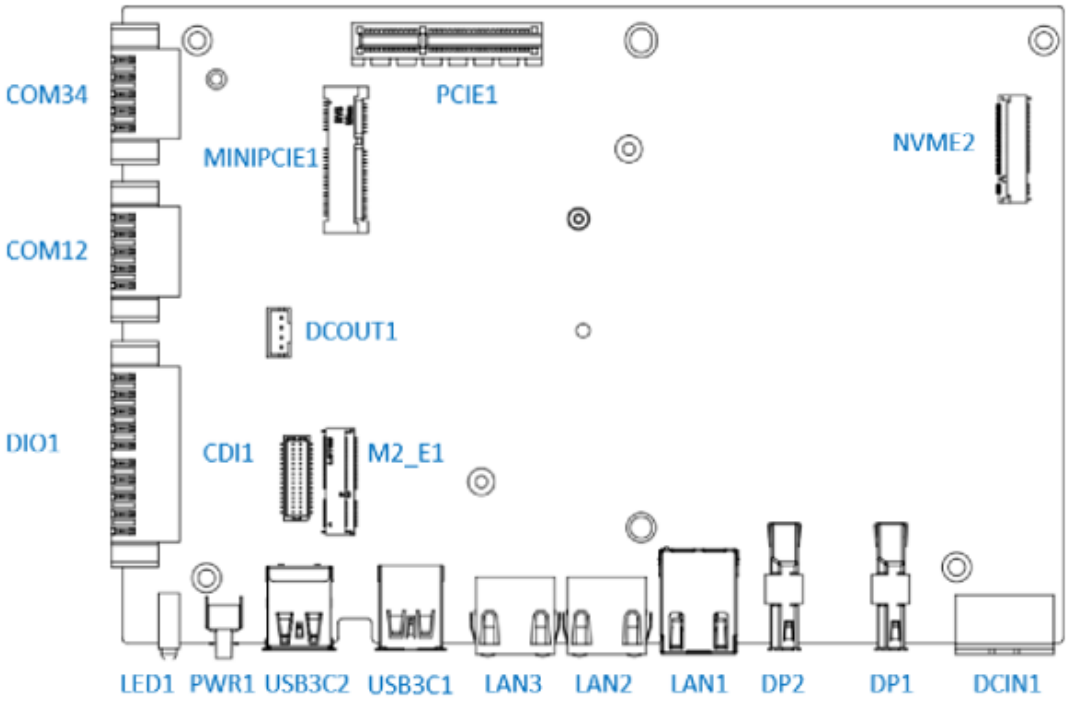


Figure 2.1 Diagram of Connector Locations on UNO-148 V2 (Top Side)

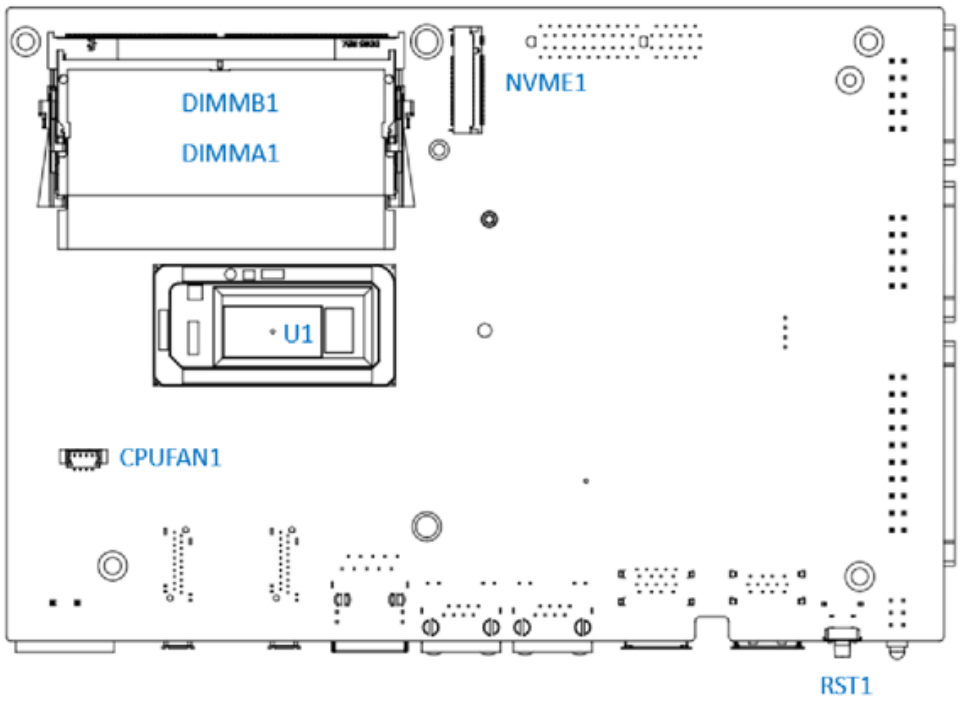


Figure 2.2 Key Component Locations on UNO-148 V2 (Bottom Side)

Table 2.1: Key Components, Connectors Onboard

Category	Label	Function
External	DCIN1	Power Connector
	DP1	DisplayPort Connector
	DP2	DisplayPort Connector
	LAN1	LAN Connector
	LAN2	LAN Connector
	LAN3	LAN Connector
	USB3C1	USB3.2 Gen2
	USB3C2	USB3.2 Gen1
	PWR1	Power Button
	LED1	LED Indicator
	DIO1	8DI/8DO Terminal Connector
	COM12	COM Port Terminal Connector (RS232/422/485)
	COM34	COM Port Terminal Connector (RS232/422/485)
Internal	PCIE1	Riser Connector
	MINIPCIE1	Mini PCIe Connector
	M2_E1	M.2 E-Key for 2230 Connector
	NVME1	M.2 M-Key for 2280 Connector
	NVME2	M.2 M-Key for 2280 Connector
	DCOUT1	iDoor Power Connector
	CDI1	Reserved for iLink Connector
	CPUFAN1	CPU FAN Connector
	DIMM2	Memory Slot Connector
	DIMM1	Memory Slot Connector

2.2 External I/O Connector

2.2.1 UNO-148 V2 Base Unit

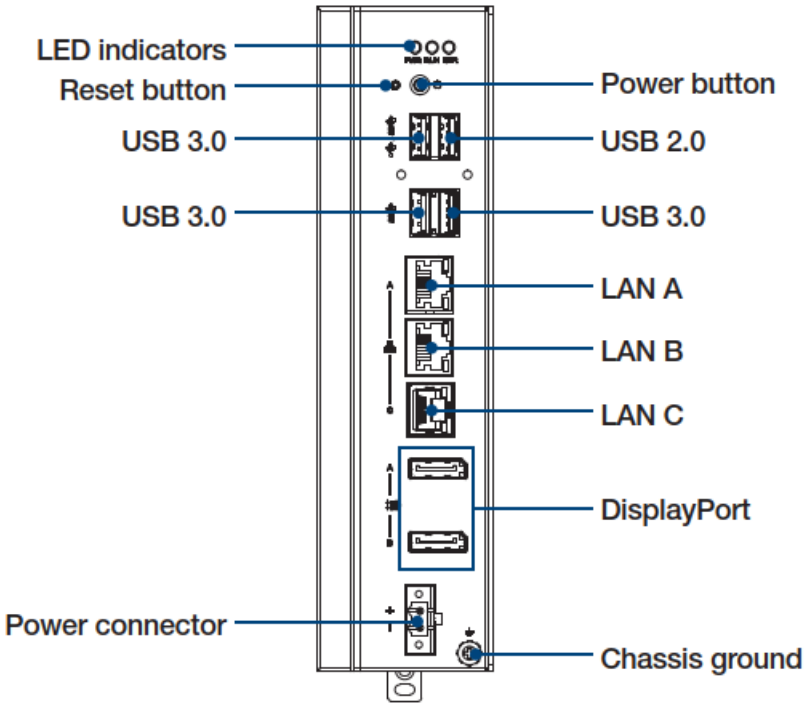


Figure 2.3 Front Panel of UNO-148 V2

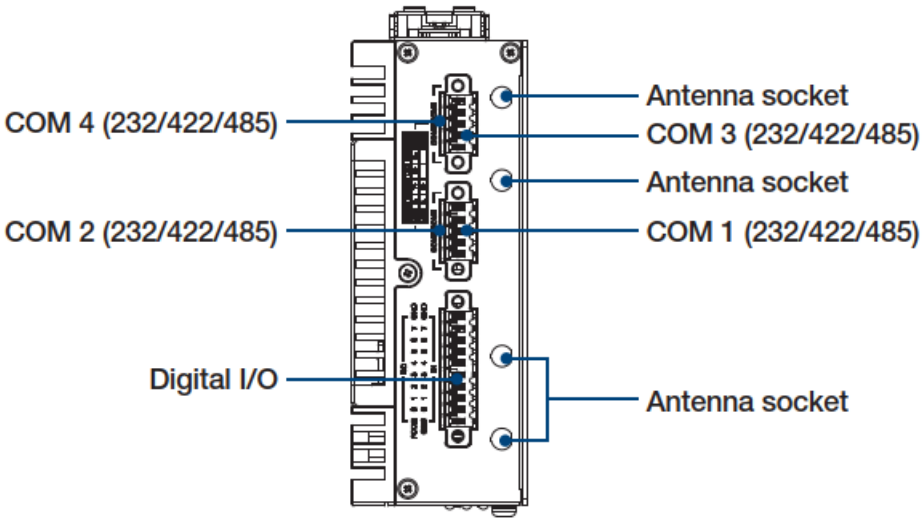


Figure 2.4 Top View of UNO-148 V2

2.2.2 Power Connector

UNO-148 V2 comes with a Phoenix connector that carries 10 - 36 V_{DC} external power input, and features reversed wiring protection. Therefore, the system will not accrue damage from reversed polarity of ground lines and power lines.

2.2.3 LAN: Ethernet Connectors

UNO-148 V2 is equipped with three Gigabit LAN controllers. Intel® i219/i226 Ethernet controller that complies with IEEE 802.3u 10/100/1000 or 10/100/1000/2500 Base-T is used as the controller chip. The Ethernet port is a standard RJ-45 jack. Additionally, LED indicators are provided on the front of the device to indicate the system's Link (off/green/orange) and Active (green) status.

2.2.4 USB Connectors

UNO-148 V2 features 4 x USB ports that comply with USB EHCI (3 x USB 3.2, 1 x USB 2.0 (Type-A)) specifications. The USB connectors support plug-and-play and hot- swapping functionality for external devices. Additionally, this can be enabled/disabled in the BIOS menu.

2.2.5 Display Connectors

The UNO-148 V2 provides 2 x DP 1.4 connectors for a high-resolution interface up to 3480 X 2160 (4K) @ 60Hz. It also supports DP++ which can be compatible with a passive adapter.

2.2.6 COM Connector

UNO-148 V2has 4 x COM RS232/422/485 ports of terminal block type. They offer transmission speeds of 50 ~115.2 kbps.

The default mode for both COM ports (COM1&COM2) is RS-232 Mode. Settings can be adjusted via an on-board switch (SW1).

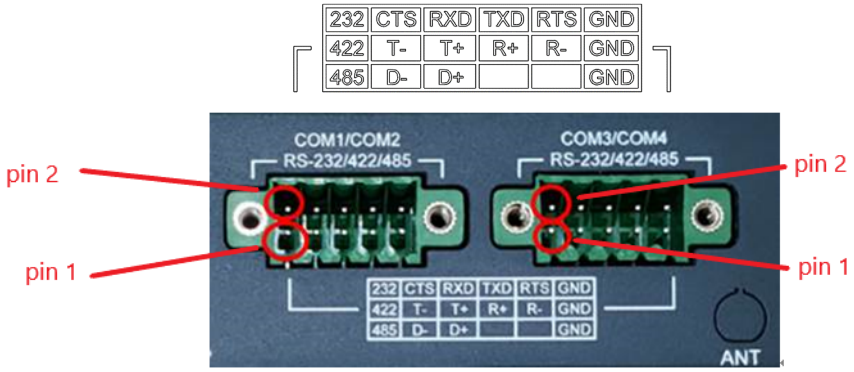
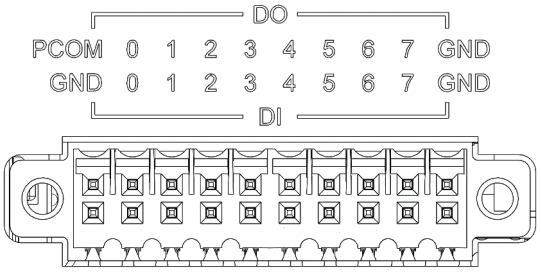


Table 2.2: COM Connector Pin Assignments

Pin	COM1 Mode	Signal Name	Pin	COM2 Mode	Signal Name
1	RS232	CTS	2	RS232	CTS
	RS422	T-		RS422	T-
	RS485	D-		RS485	D-
3	RS232	RXD	4	RS232	RXD
	RS422	T+		RS422	T+
	RS485	D+		RS485	D+
5	RS232	TXD	6	RS232	TXD
	RS422	R+		RS422	R+
	RS485			RS485	
7	RS232	RTS	8	RS232	RTS
	RS422	R-		RS422	R-
	RS485			RS485	
9	RS232	GND	10	RS232	GND
	RS422	GND		RS422	GND
	RS485	GND		RS485	GND

2.2.7 Digital Inputs and Outputs

There are 8 x digital inputs and 8 x digital outputs configured from GPIO pins for on/ off triggering and status reading.



The following table indicates the mapping for DIO and GPIO.

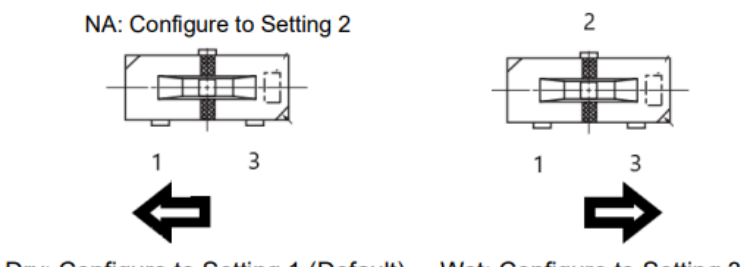
GPIO Pin	Pin 0	Pin1	Pin2	Pin3
DI Pin	DI0	DI1	DI2	DI3
GPIO Pin	Pin 4	Pin5	Pin6	Pin7
DI Pin	DI4	DI5	DI6	DI7
GPIO Pin	Pin 8	Pin9	Pin10	Pin11
DO Pin	DO0	DO1	DO2	DO3
GPIO Pin	Pin 12	Pin13	Pin14	Pin15
DO Pin	DO4	DO5	DO6	DO7

And the below table indicates the mapping of DIO and Linux GPIO.

Table 2.3: Digital Inputs and Outputs

DI point	Number	DO point	Number
DI0	424	DO0	314
DI1	425	DO1	315
DI2	426	DO2	325
DI3	427	DO3	326
DI4	428	DO4	327
DI5	429	DO5	328
DI6	430	DO6	329
DI7	431	DO7	330

Use SW3 to set Wet Contact and Dry Contact for Digital input.



Dry: Configure to Setting 1 (Default) Wet: Configure to Setting 3

Digital Input

- Input Channels 8
- Input Voltage (Wet Contact), Configure SW3 to Setting 3
  - Logic 0: 10 ~ 30 V_{DC}
  - Logic 1: 0 ~ 3 V_{DC}
- Input Voltage (Dry Contact), Configure SW3 to Setting 1
  - Logic 0: Shorted to GND
  - Logic 1: Open
- Isolation Protection 2,500 V_{DC}
- Over-voltage Protection 30 V_{DC}
- Opto-Isolator Response 50 µs

Digital Output

- Output Channels 8
- Output Voltage: 5 ~ 30 V_{DC}
- Output Capability Sink: 500 mA max./channel
- Opto-Isolator Response 50 µs

Isolated Digital Input

Each of the 8 x isolated digital input channels accept voltages from 0 to 30 V. The following figure shows how to connect an external input source to the isolated inputs of UNO- 148 V2.

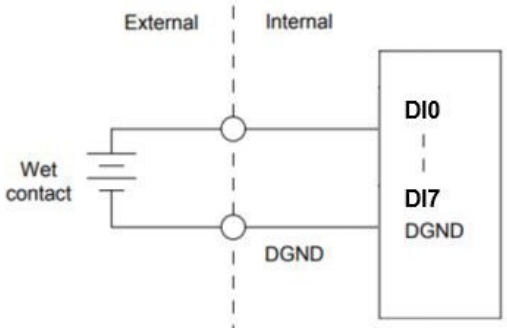


Figure 2.5 Isolated DI Wet Connection Diagram

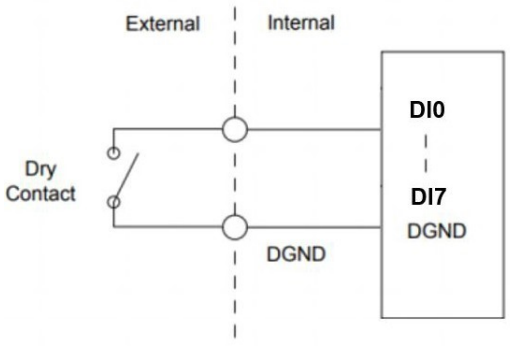


Figure 2.6 Isolated DI Dry Connection Diagram

Isolated Digital Output

If the external voltage source (5 ~ 30 V) is connected to each isolated digital output channel and its isolated digital output turns on (500 mA max./ch), the board's current will sink from the external voltage source. The following figure shows how to connect an external output load to the isolated outputs on UNO-148 V2.

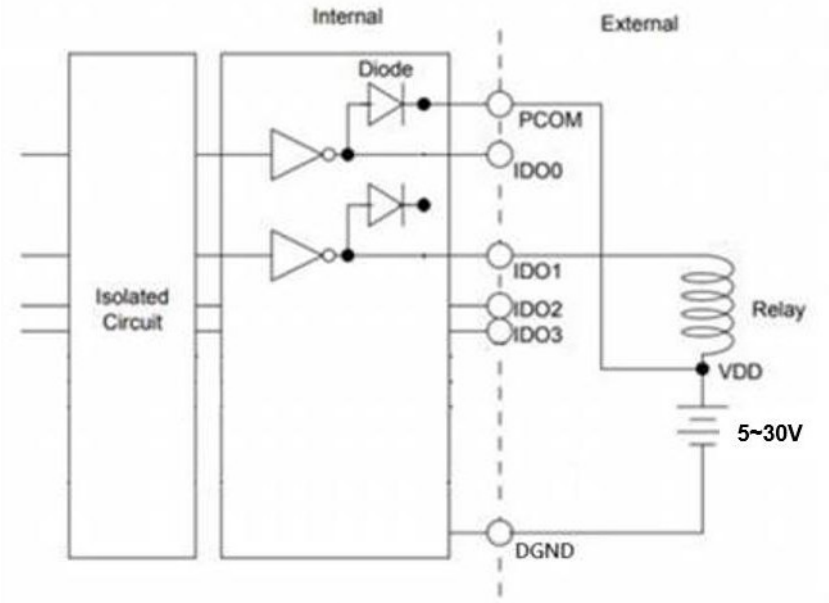
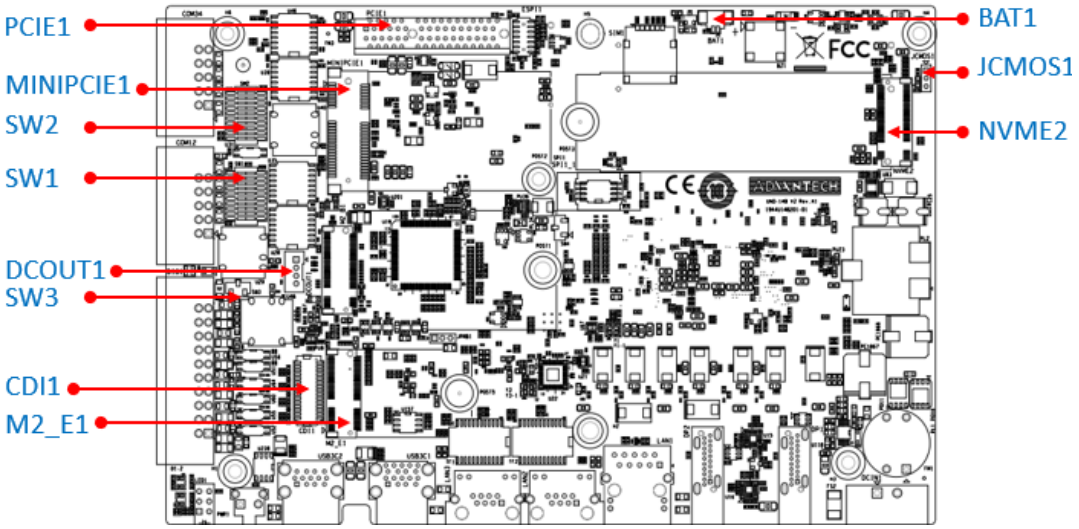


Figure 2.7 Isolated DO Connection Diagram

2.3 Internal I/O Connectors and Switches

The following figure demonstrates the locations of internal connectors and switches on the UNO-148 V2 motherboard.



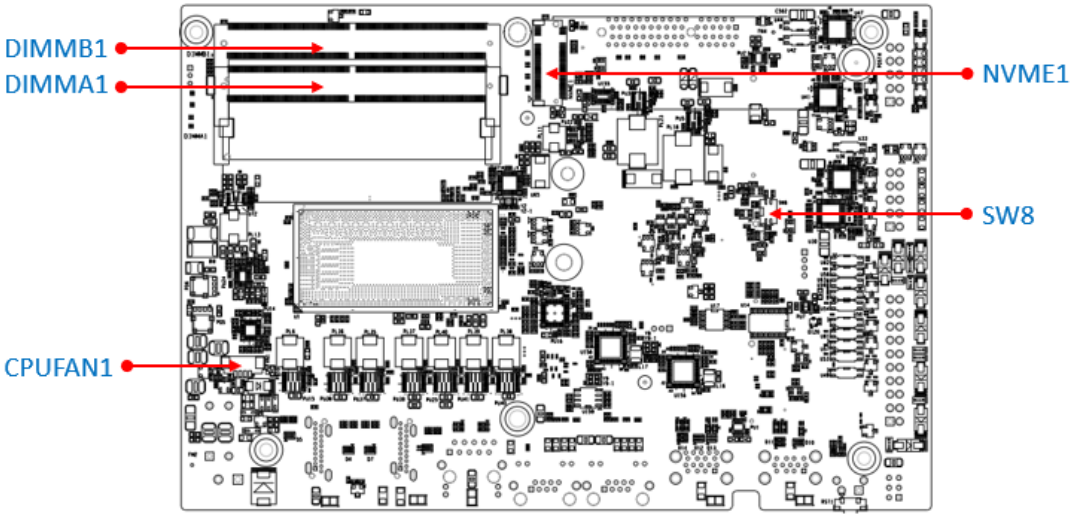


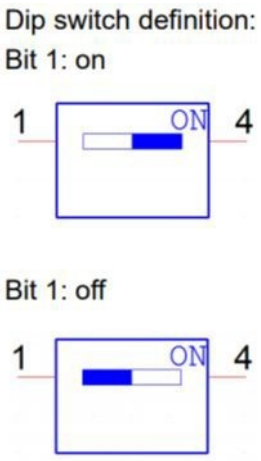
Figure 2.8 Locations Internal I/O Connectors/Switches for UNO-148 V2

Table 2.4: Internal Connectors and Jumper Switches

Label	Function
PCIE1	Riser connector
MINIPCIE1	Mini PCIe connector
SW2	COM34 Port RS232/422/485 settings
SW1	COM12 Port RS232/422/485 settings
DCOUT1	iDoor power connector
SW3	DI Setting (Dry/Wet)
CDI1	Reserved for iLink connector
M2_E1	M.2 E-Key for 2230 connector
BAT1	RTC battery connector
JCMOS1	Clear CMOS connector
NVME2	M.2 M-Key for 2280 connector
NVME1	M.2 M-Key for 2280 connector
DIMMB1 DIMMA1	Memory slot connector Memory slot connector
CPUFAN1	CPU Fan connector
SW8	AT/ATX/Remote setting

Note! **This power is from DC Power inputs.*

Configure the UNO-148 V2 to match the needs of your application by setting switches. The following details the switch setting definitions:



2.3.1 mPCIe Connector

There is one socket for a full-size Mini PCI Express card, labeled “MINI1” on the board. It supports the iDoor module for diversified applications such as isolated COM port, Profibus, WLAN GPRS, LTE, and MRAM. Users can install iDoor easily with the optional extension kit.

2.3.2 Nano SIM Slot

There’s one Nano SIM slot for supporting LTE functionality, labeled “CN14-1” on the board. In addition to installing a SIM card in “CN14-1”, users are required to install an LTE Module on “CN14” M.2 B-Key to enable the functionality.

2.4 Others

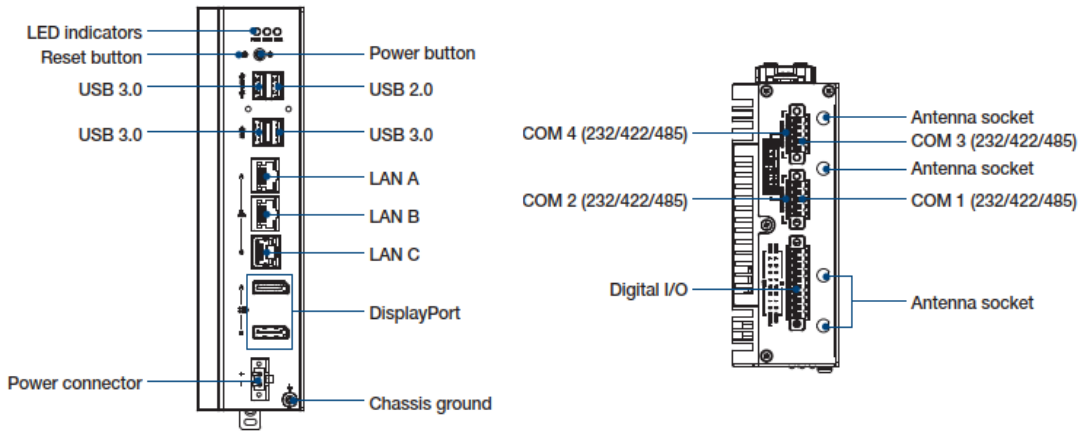


Figure 2.9 Indicators, Reset Buttons, and Antenna Holes

2.4.1 LED Indicators

Three LEDs indicate the status of the system's power, RTC battery, and programmable LED for user configurations.

- PWR (Power): Green indicates **Normal** and orange indicates **Standby**.
- BTR (RTC Battery): Red indicates a **Low RTC Battery**. Check the RTC battery.
- RUN (Programmable): Users can configure the LED indicator's behavior through GPO signal controls. Green indicates **Programmed Operation**.

2.4.2 Reset Buttons

Press the **Reset** button to initiate a hardware reset.

2.4.3 Antenna Hole

This product offers two antenna mounting holes pre-cut for users to install an antenna kit for LTE or wireless functions.

Note! *Please be aware of the Maximum OD value of the Antenna Hole when selecting the antenna.*

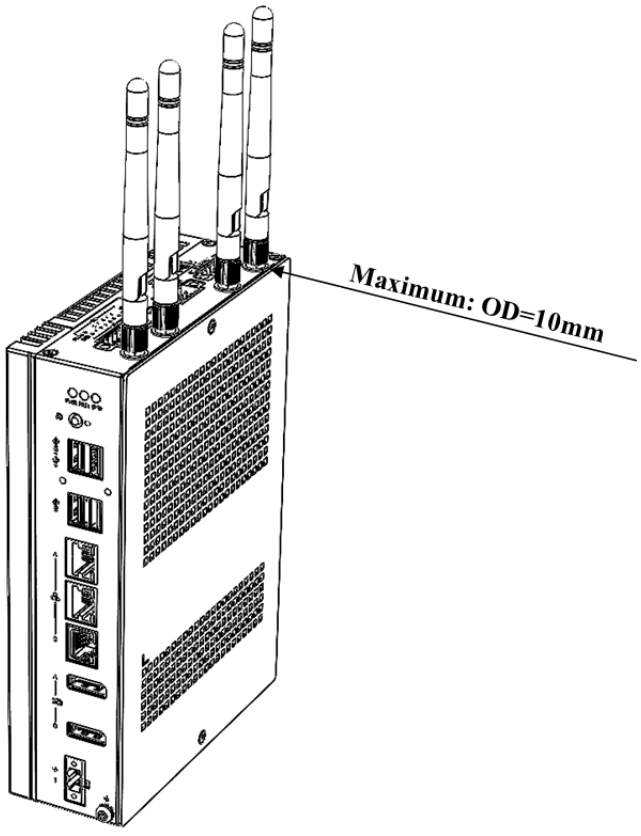


Figure 2.10 Diagram of Maximum OD Value for the Antenna Holes

Chapter 3

Initial Setup

This chapter explains how to Initialize UNO-148 V2.

- Chassis Grounding
- Connecting Power
- Storage Installation (Optional)
- DIN-Rail Installation
- Wireless Module Installation (Optional)
- Expansion Module Installation (Optional)
- Remote Power/On & Reset Setting
- BIOS Setting

3.1 Chassis Grounding

UNO-148 V 2 provides good EMI protection and a stable grounding base. There is an easy-to-connect chassis grounding point.

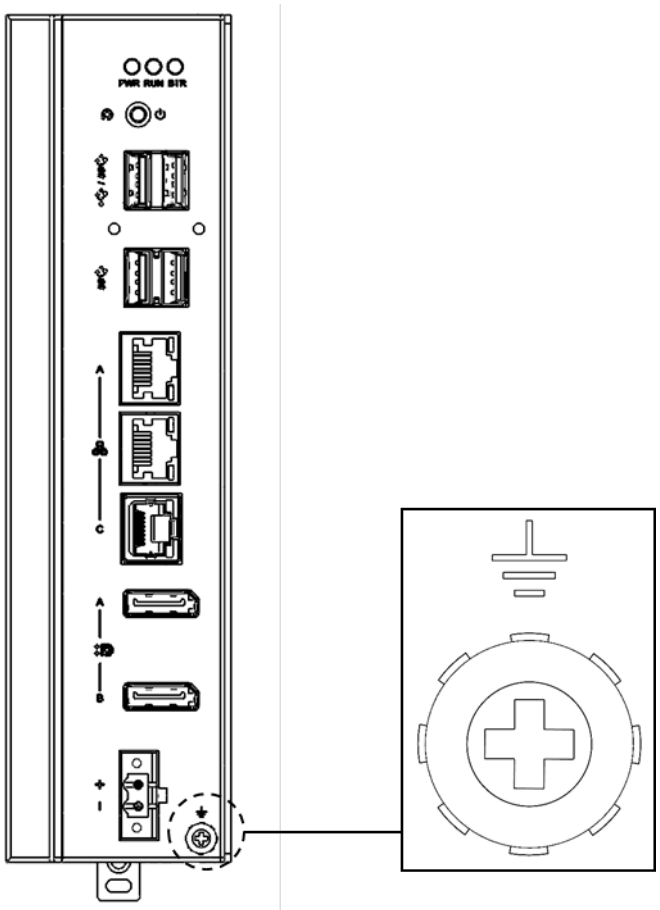


Figure 3.1 Chassis Grounding Connection

The earth terminal should use a 16 AWG minimum size green and yellow conductor connector to connect to the earth.

3.2 Connecting Power

This product is intended to be supplied by an approved power adapter or DC power source. This adapter is rated at 10 - 36 V_{DC}, 6.3-1.75A and has a maximum temperature of 60°C (140°F). If you need further assistance or information, please con- tact Advantech.

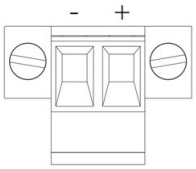
Note! *It is recommended to choose a 150 W adapter when the iDoor expansion module (e.g. PCM-24R2PE) is installed. Recommended PN: 96PSA- A150W24T2-4*

Follow the below instructions:

1. Insert the positive and negative wires into the V+ and V- contacts on the terminal block connector.
2. Tighten the wire-clamp screws to prevent the DC wires from coming loose.

Take the following guidelines into consideration before wiring the device:

1. The terminal block is suitable for 12-24 AWG (12 A). Torque value = 7 lb-in. Use copper conductors only.
2. The temperature rating of the input connection cable should be higher than 95 °C (203°F).

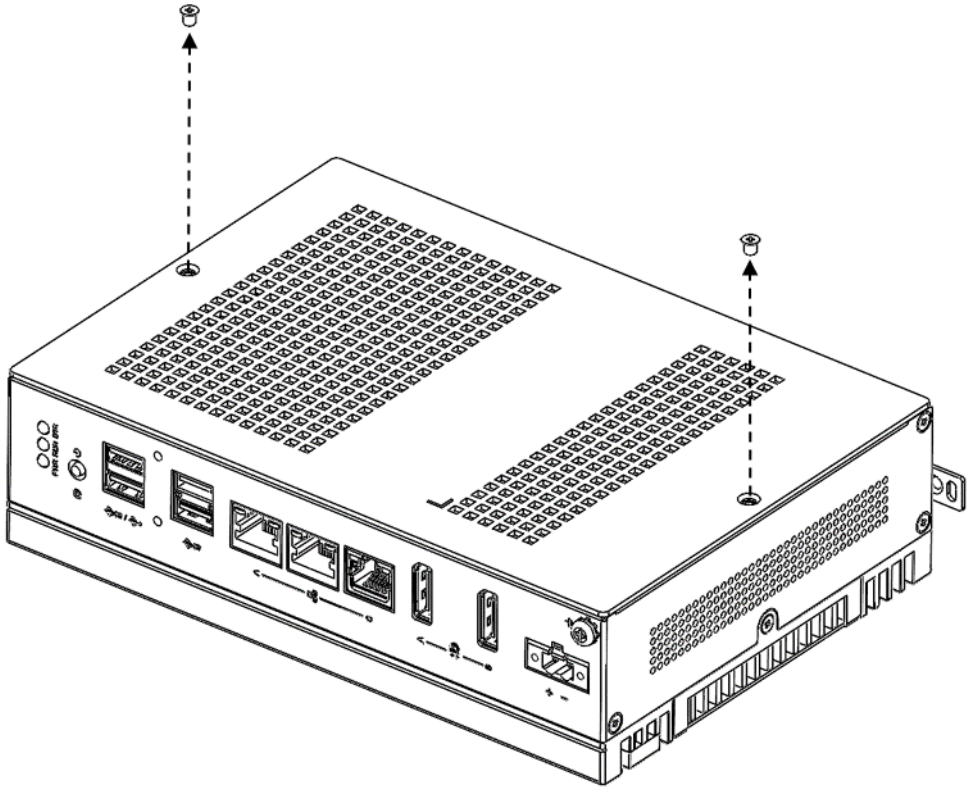


3.3 Storage Installation (Optional)

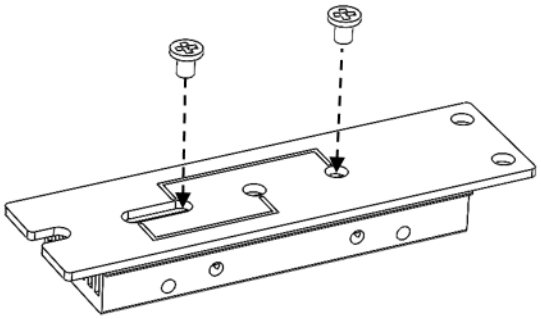
UNO-148 supports the installation of one M.2 2280 NVMe SSD. The installation is demonstrated in the following steps.

3.3.1 Installing M.2 2280 NVMe

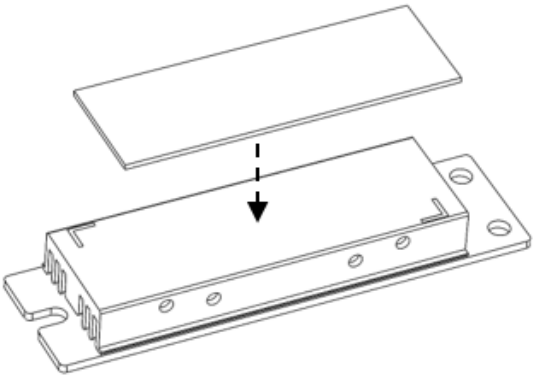
1. Remove the two screws from the UNO-148 V2 back cover.



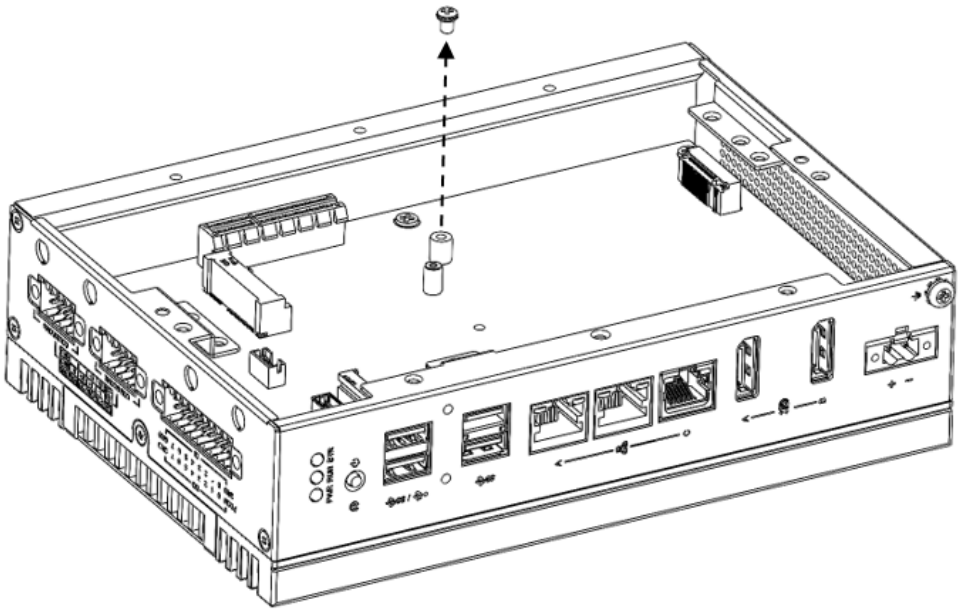
2. Attach the heatsink and NVME bracket using supplied screws.



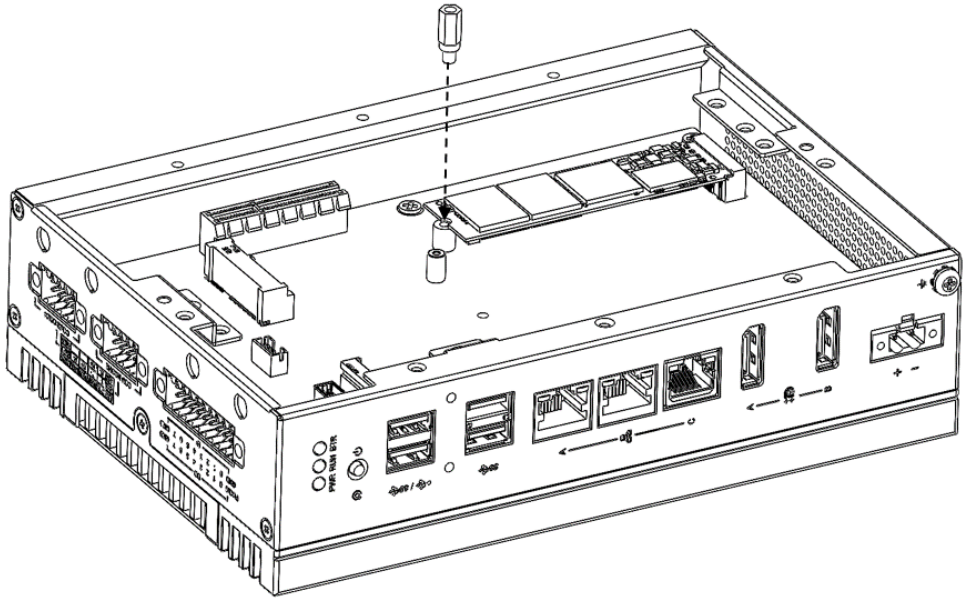
3. Paste the thermal pad onto heatsink.



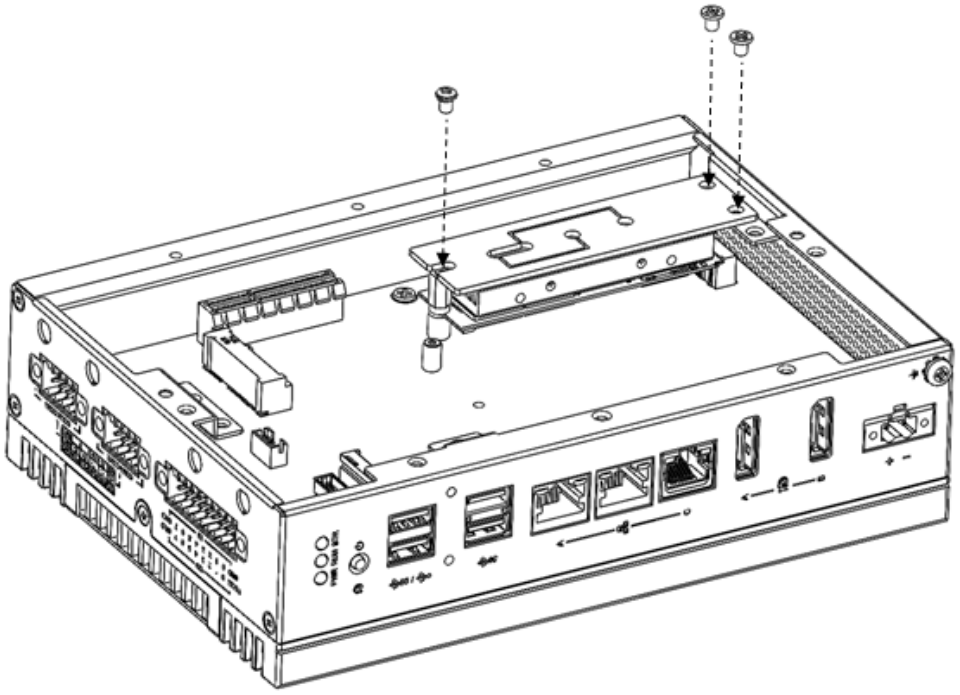
4. Remove screws (default locked on system).



5. Install NVME and lock by post.

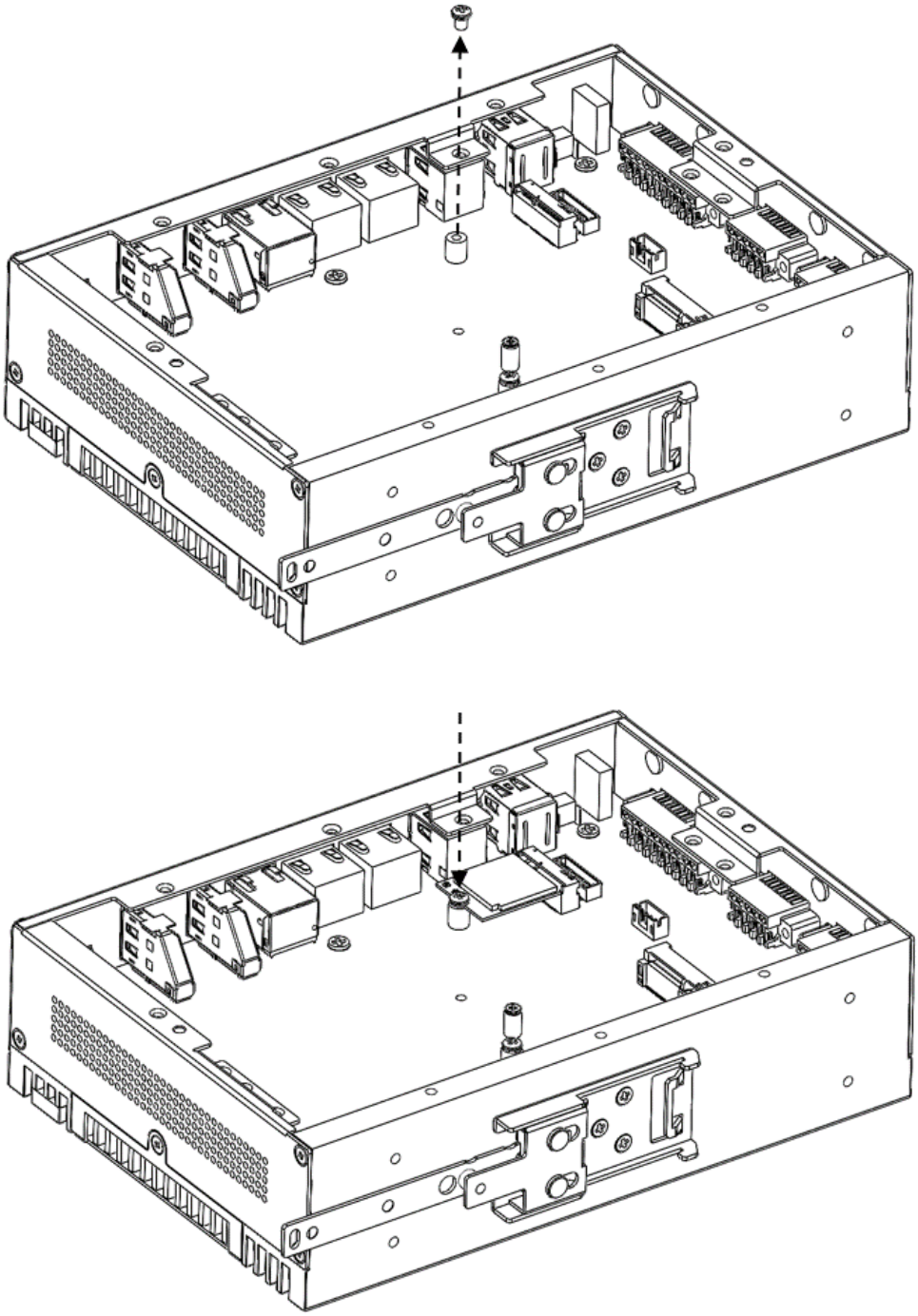


6. Attach heatsink onto the system using three screws.



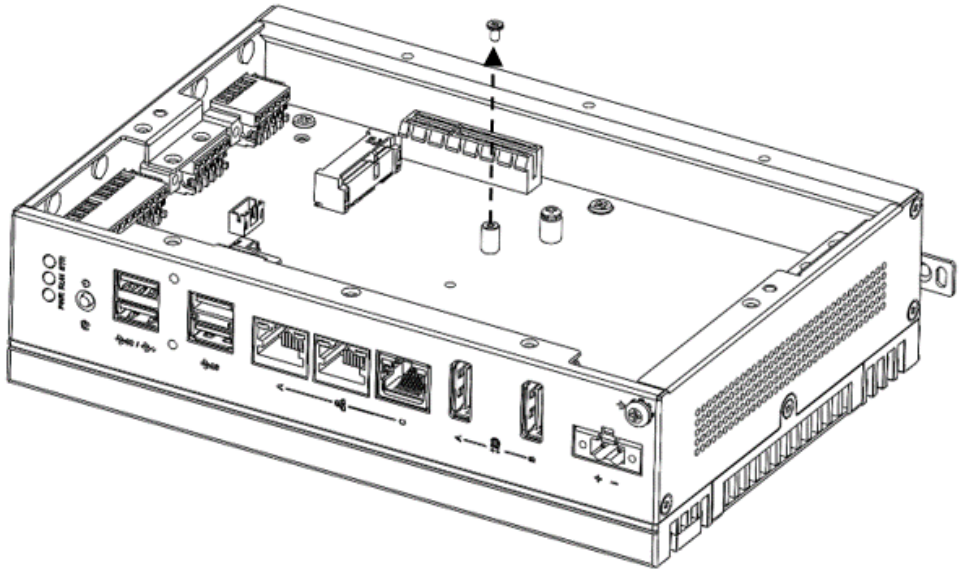
3.3.2 M.2 2230 Installation

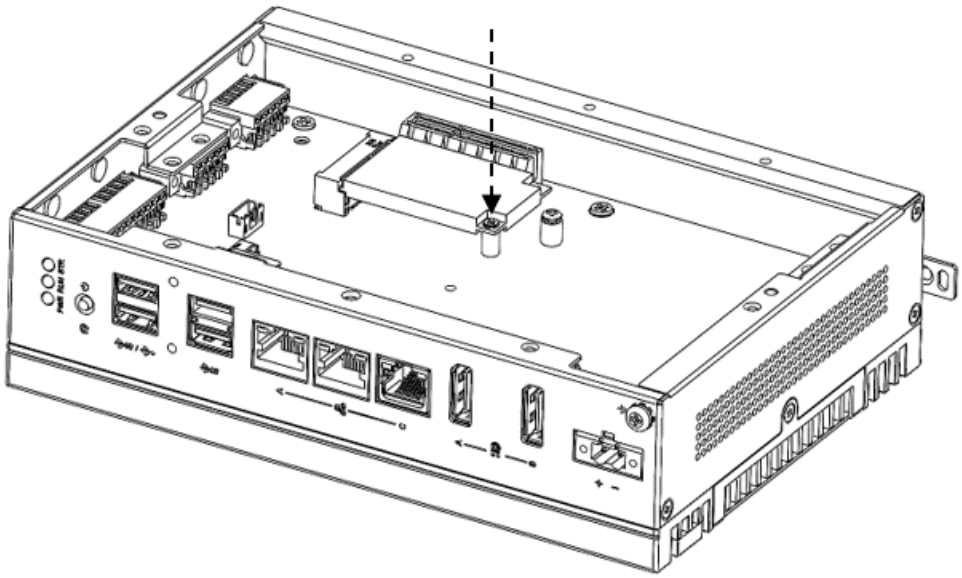
Remove screws (default locked on system), install M.2 2230 then re-attach with screws.



3.3.3 mPCIE Installation

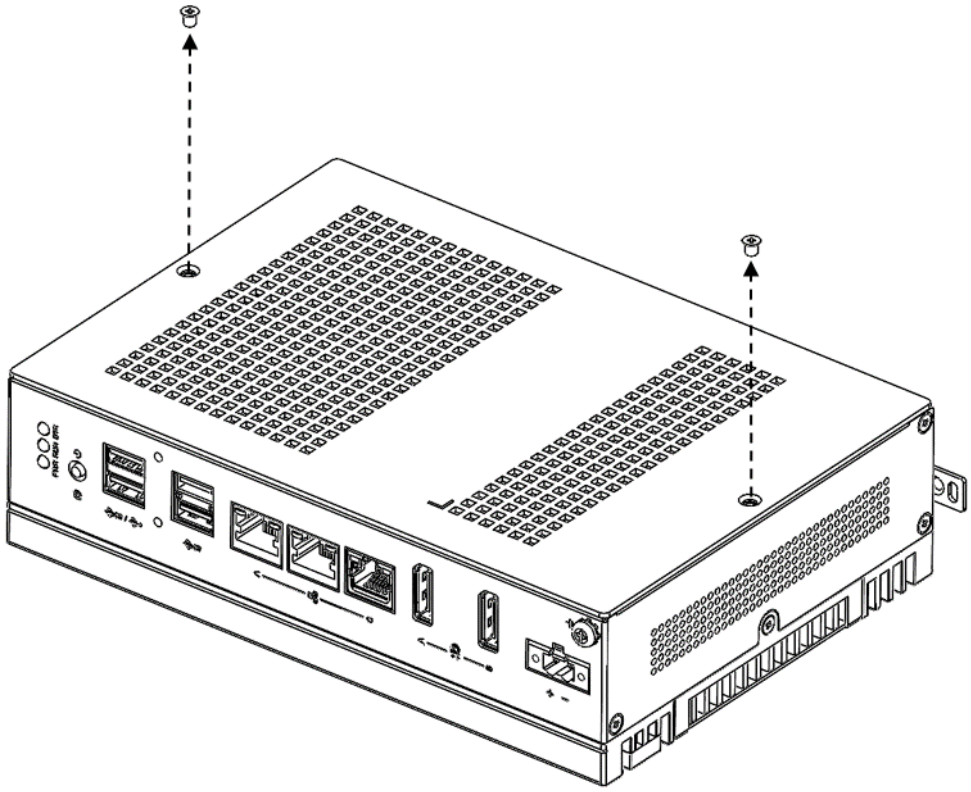
Remove screws (default locked on system), install mPCIE installation, then re-attach with screws.



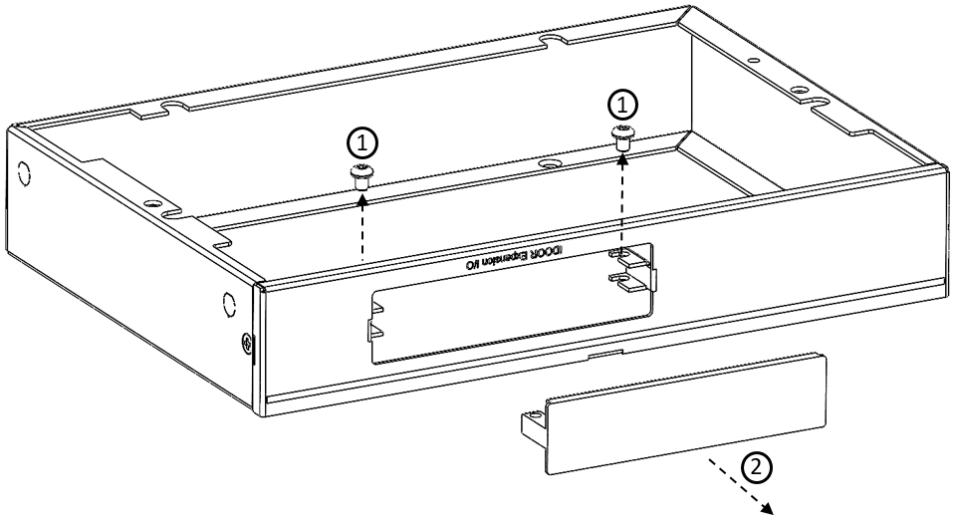


3.3.4 iDoor Module

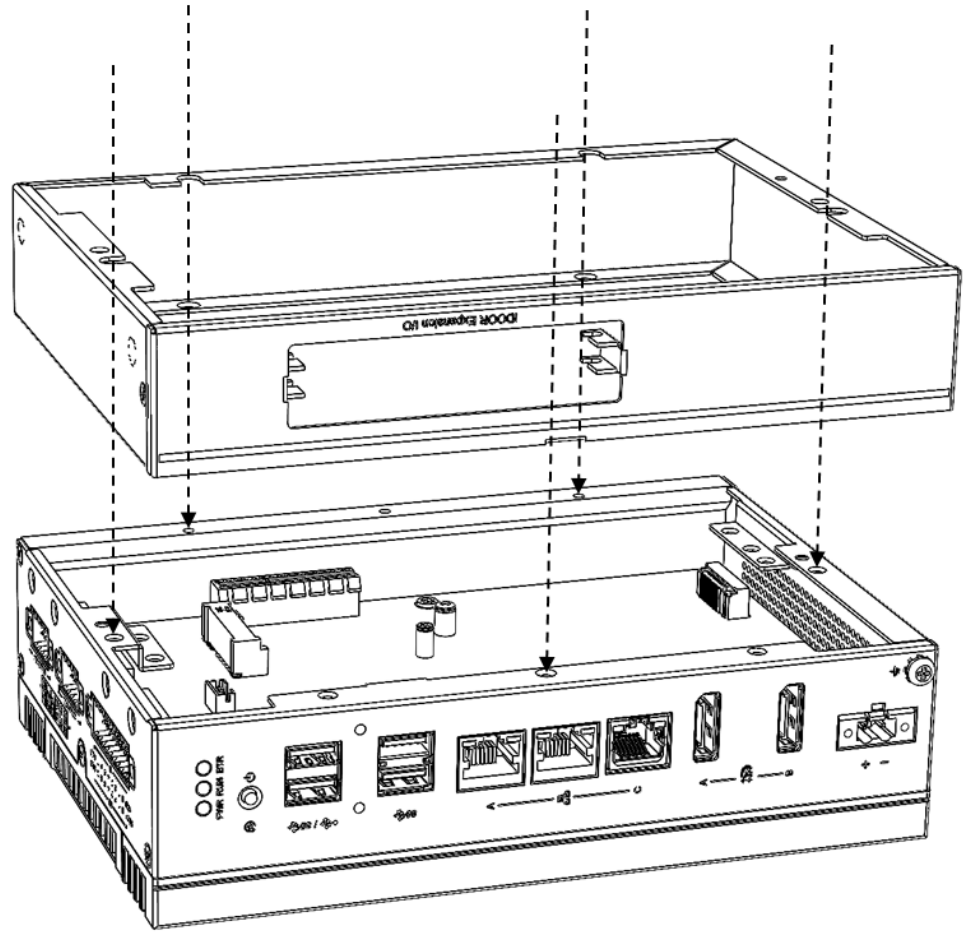
1. Remove two screws from the bottom cover.



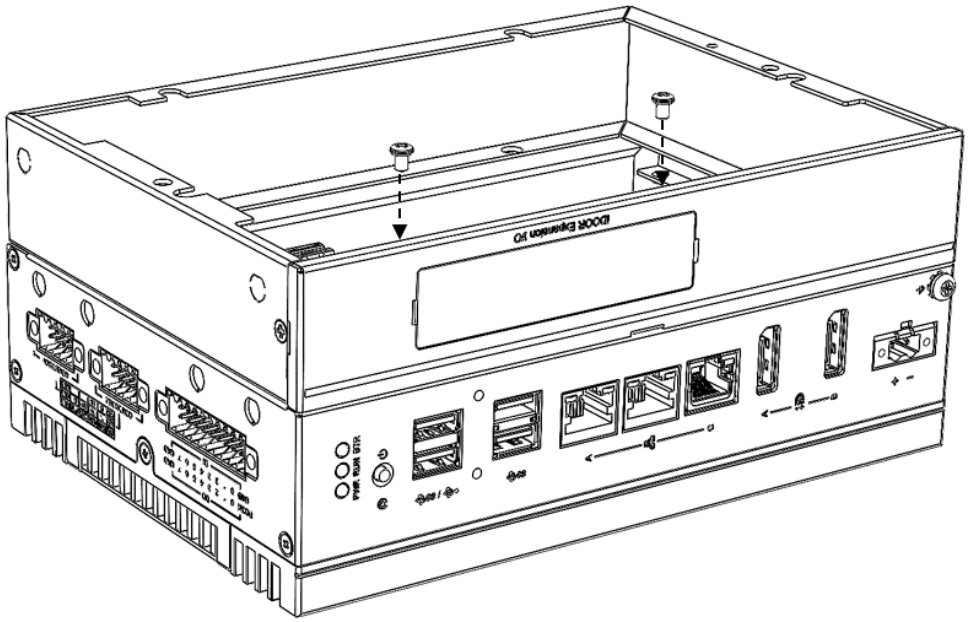
2. Remove iDoor cover.



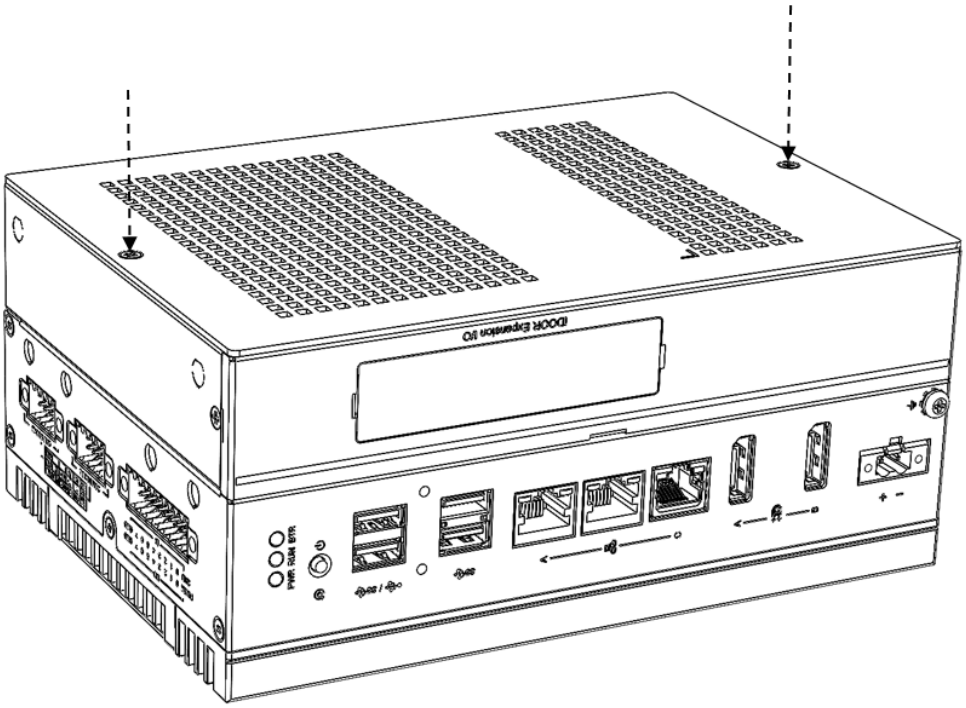
3. Attach and tighten with five screws on 2nd stack to combine base unit.



4. Attach the iDoor cover.

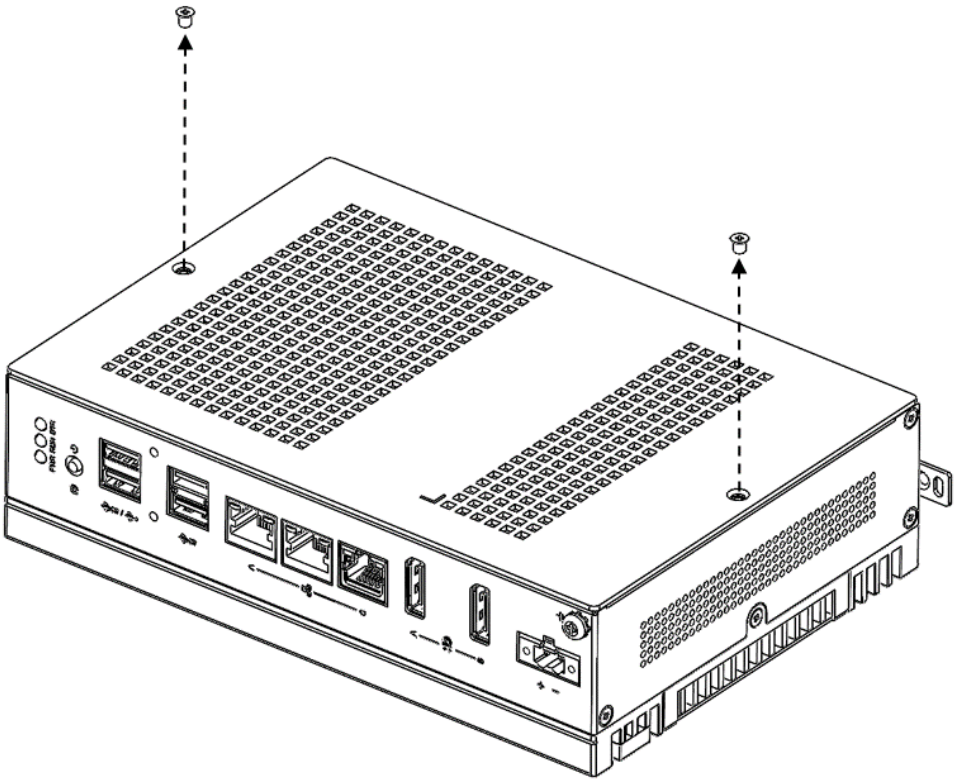


5. Tighten screws back onto the bottom cover.

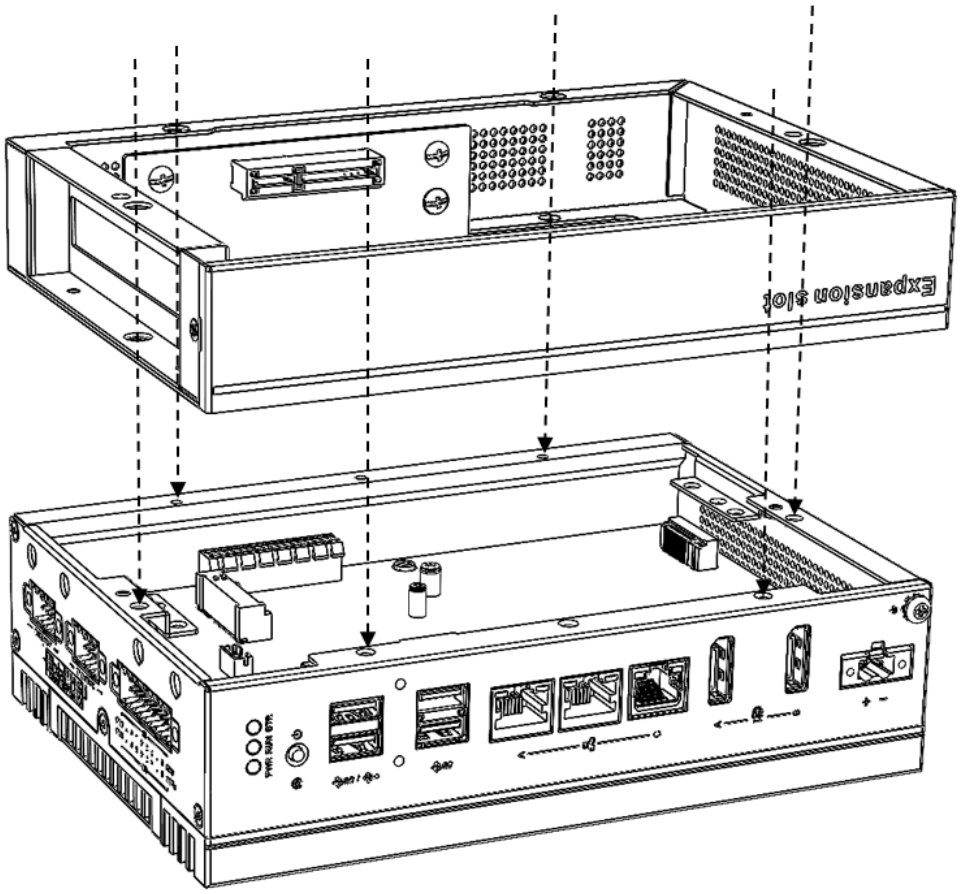


3.3.5 PCIE Module

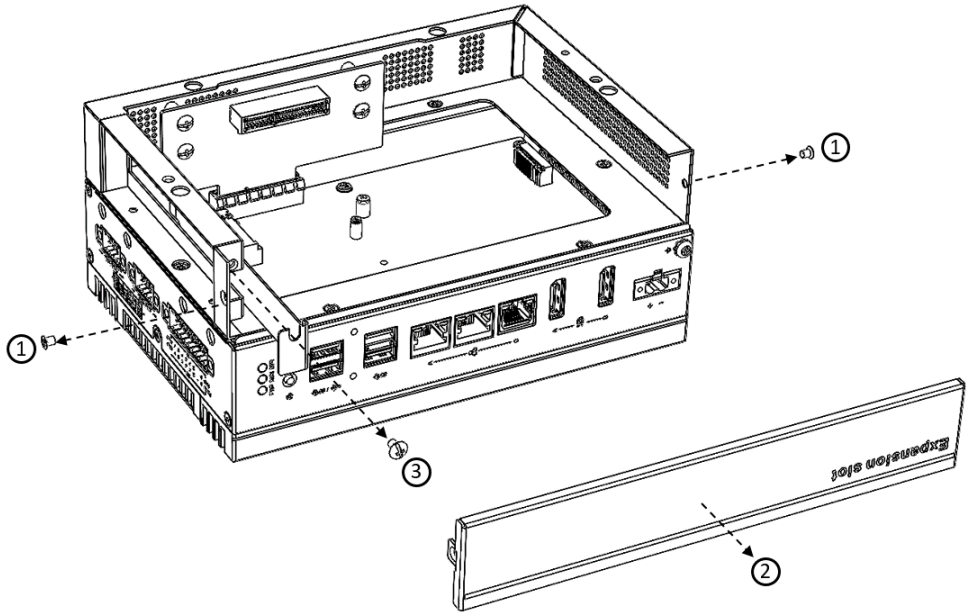
1. Remove the two screws from the bottom cover.



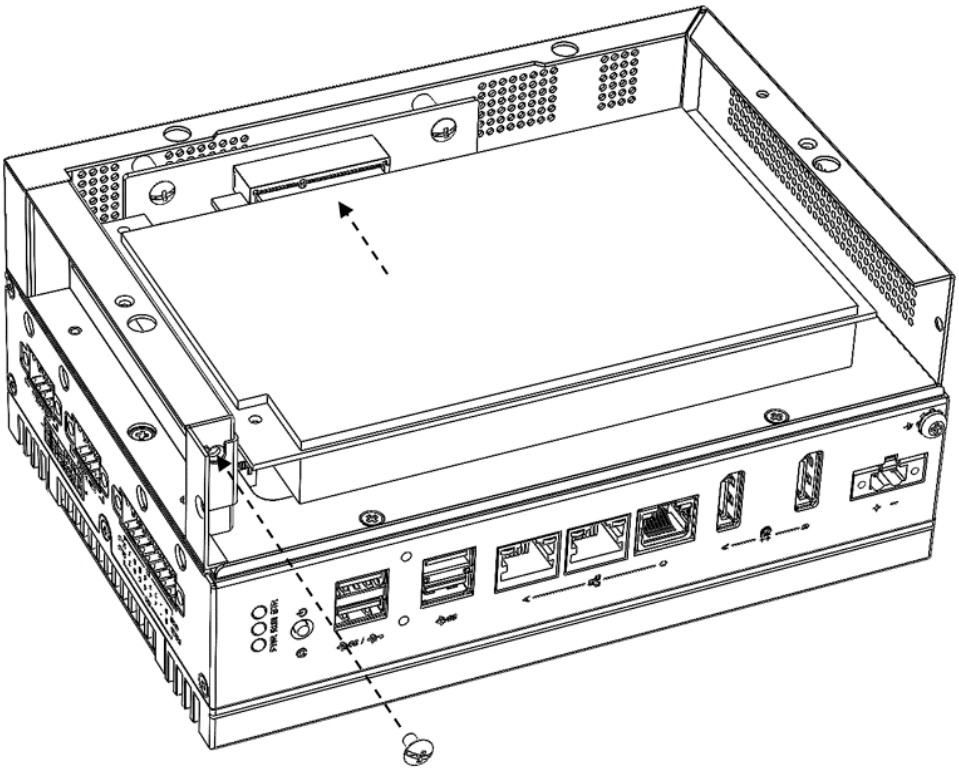
2. Reattach the six screws on 2nd stack to combine the base unit.



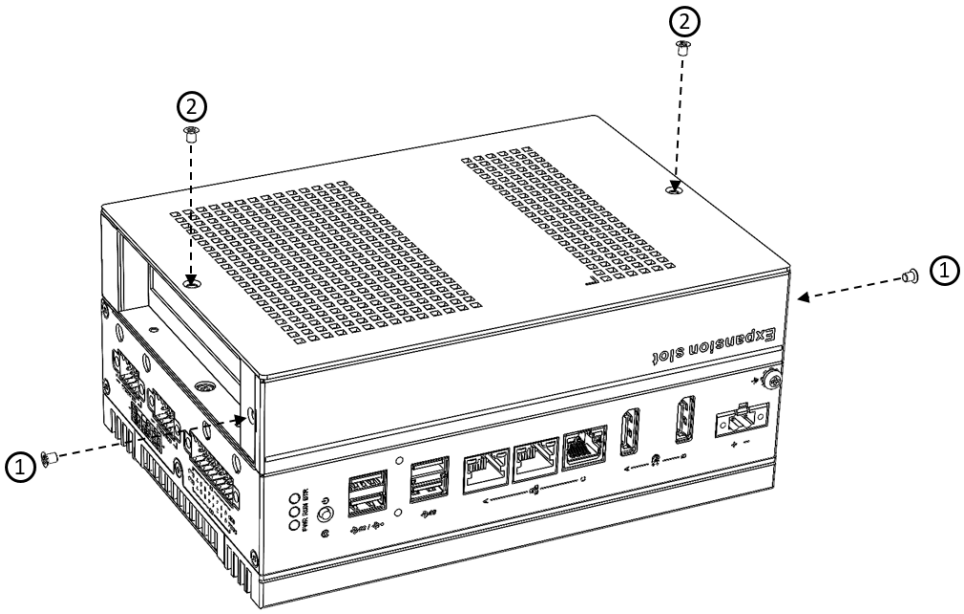
3. Attach the extension module on 2nd stack and remove the front cover and PCIE bracket.



4. Install the PCIE card and secure it by tightening the screws.

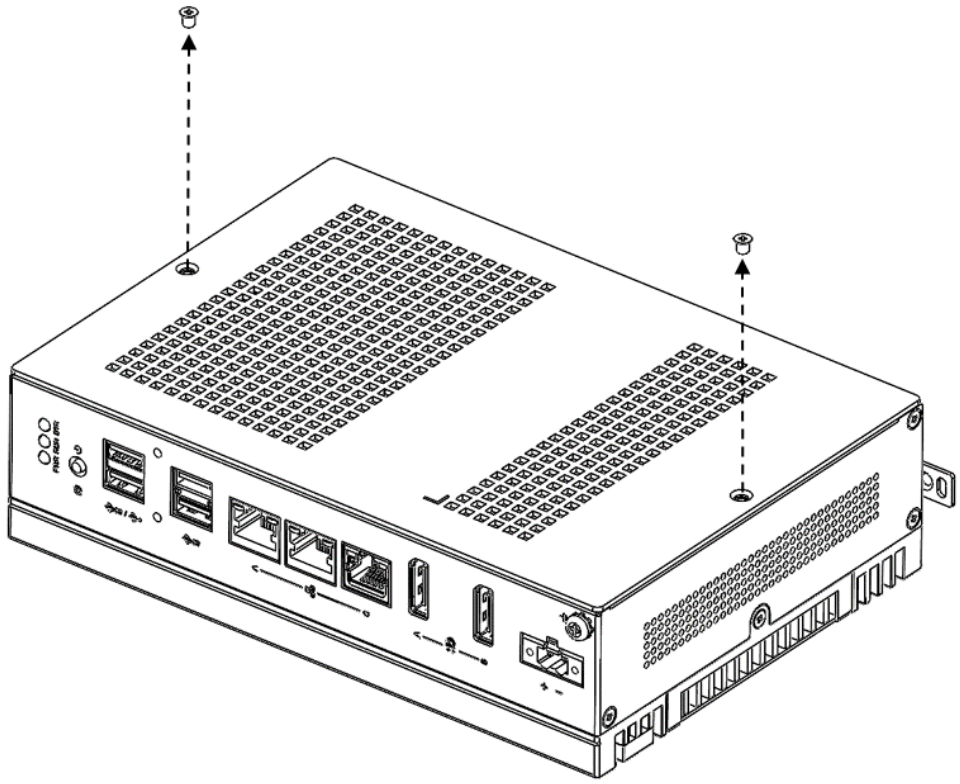


5. Attach the front and bottom cover then secure with screws.

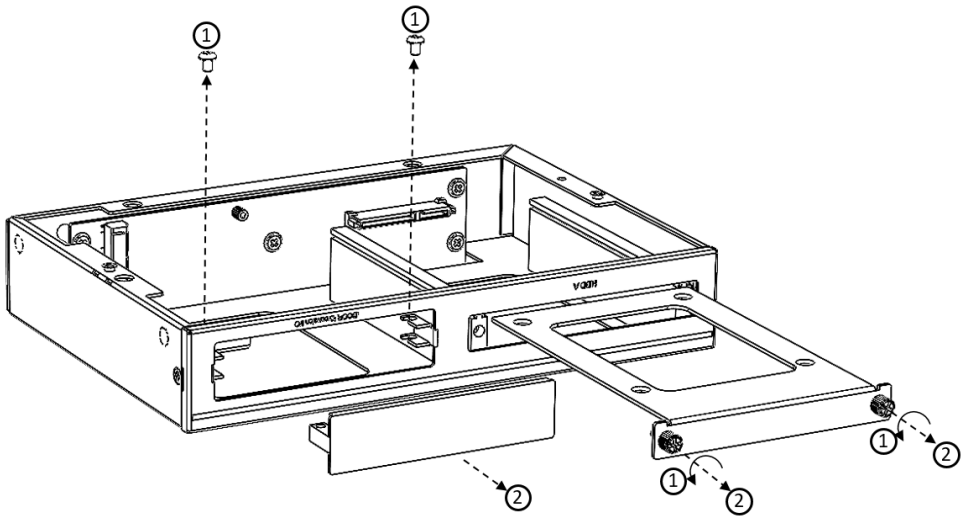


3.3.6 iDoor&HDD Module

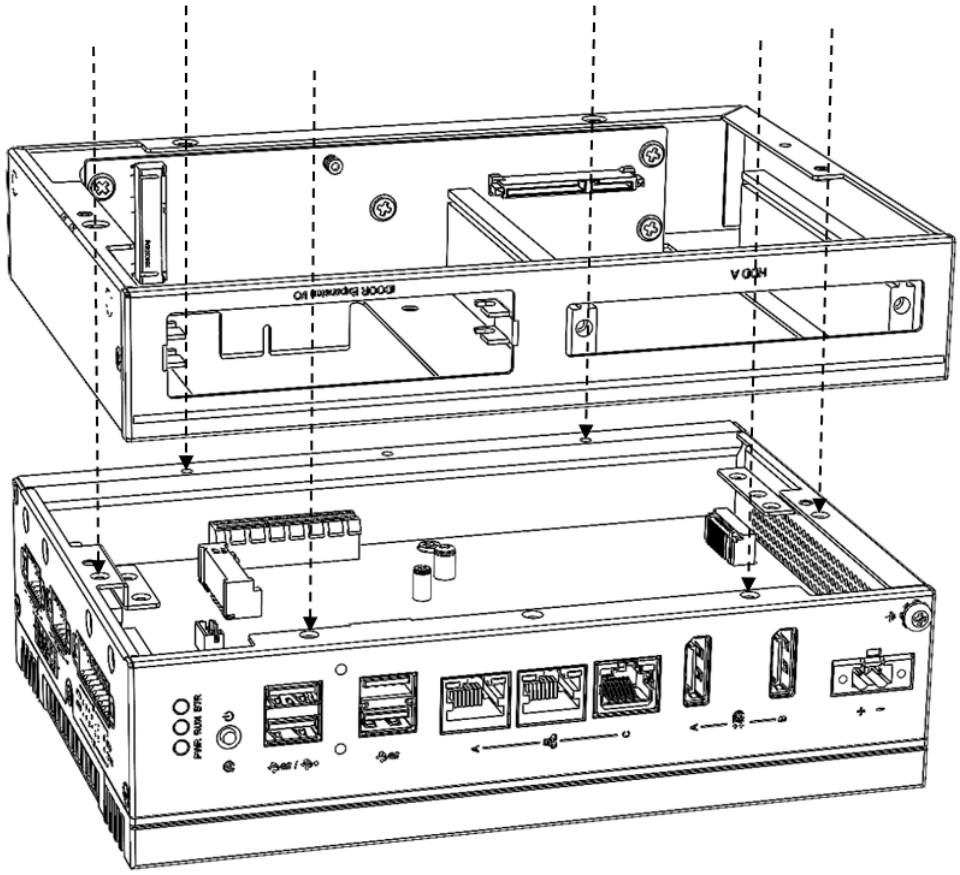
1. Remove the two screws from the bottom cover.



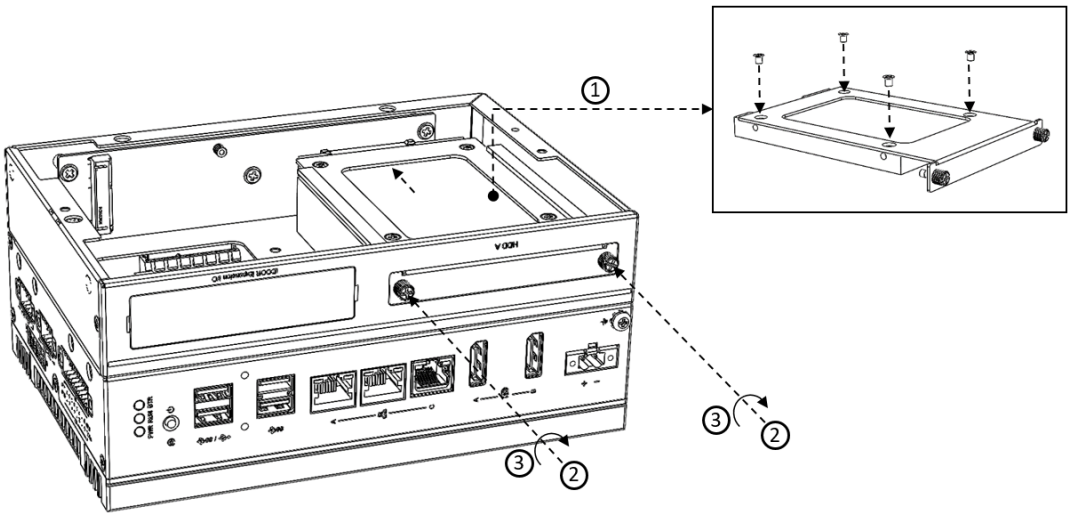
2. Remove iDoor cover and the HDD tray.



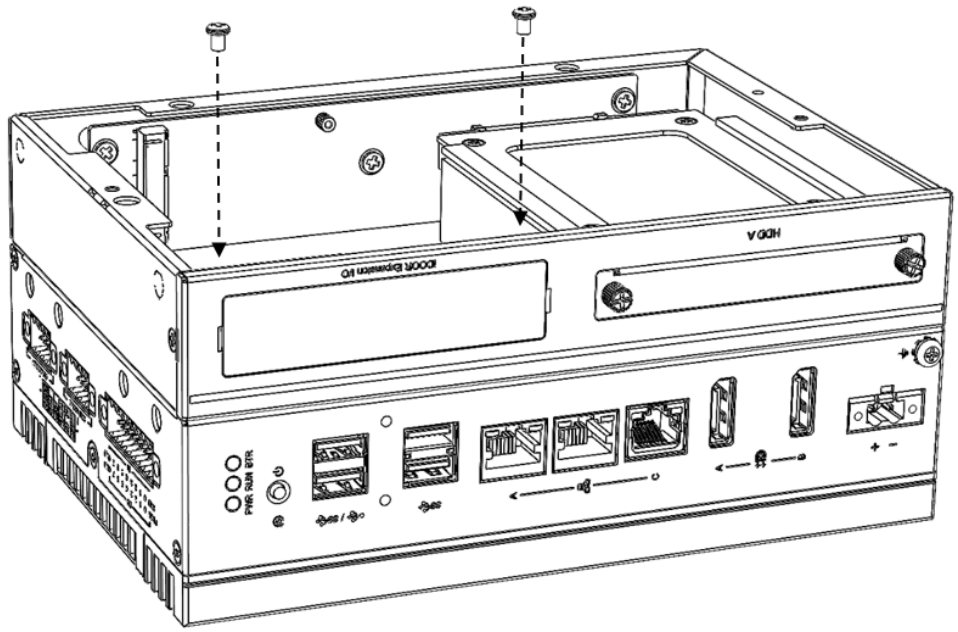
3. Attach six screws on 2nd stack to combine the base unit.



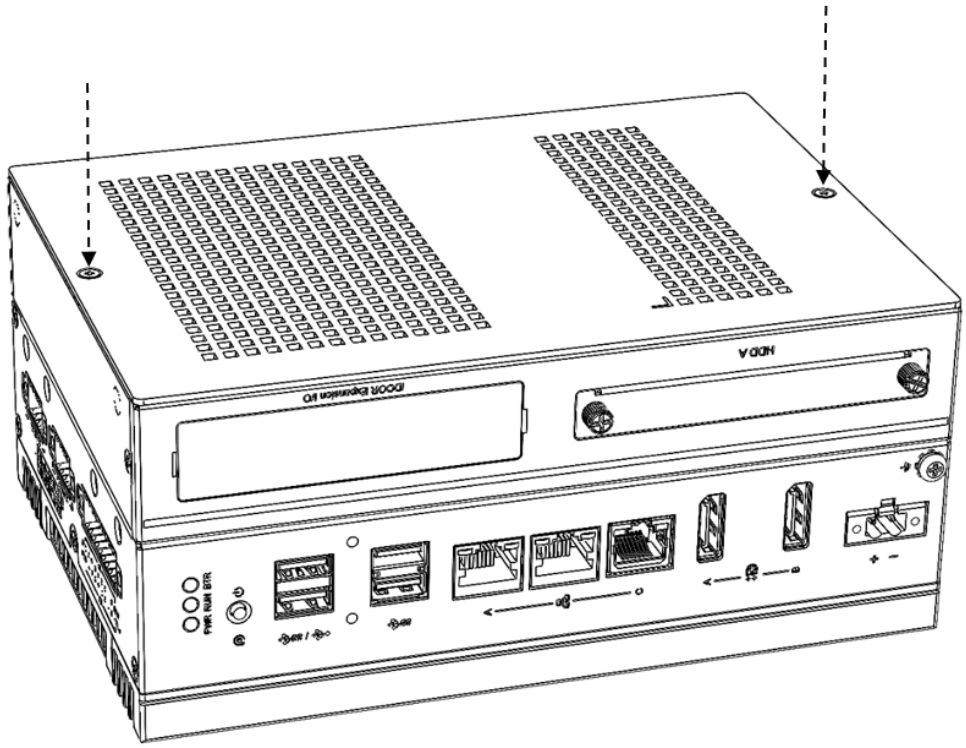
4. HDD extension slot: lock the HDD into the HDD tray and insert HDD tray on the track and tighten the screws.



5. iDoor extension slot: Tighten the two screws on the iDoor cover.

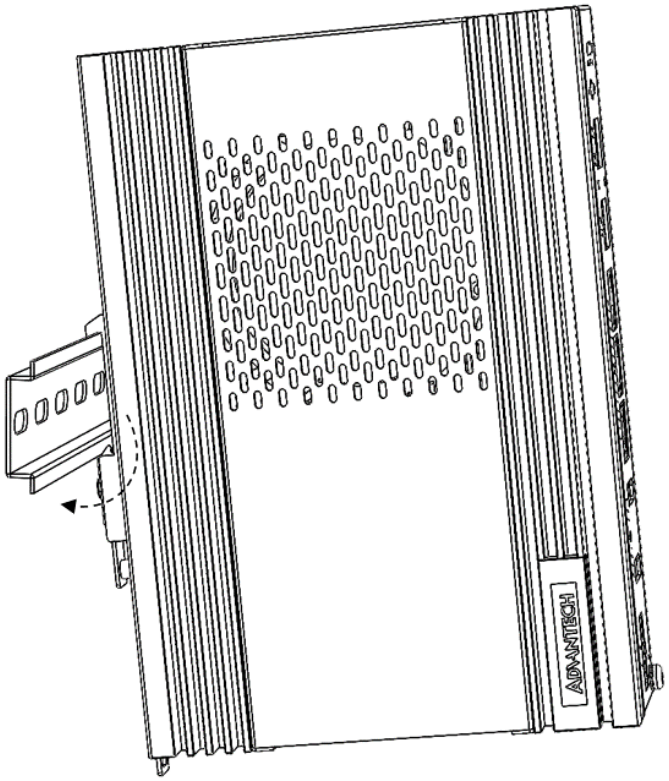


6. Tighten the screws on the bottom cover.

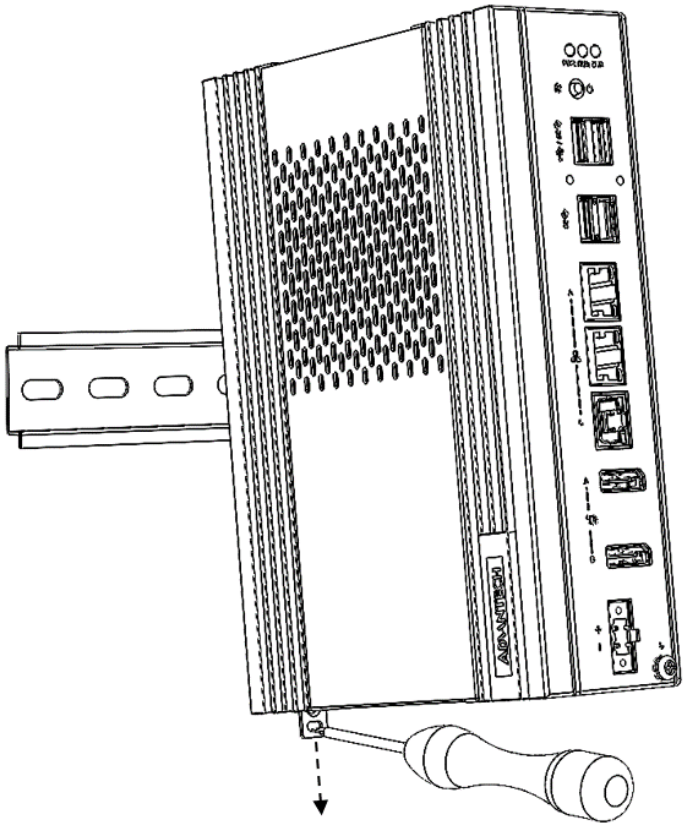


3.4 Din-Rail Installation

1. Hang up the din rail on one track and buckle it inwards to snap onto the other track.

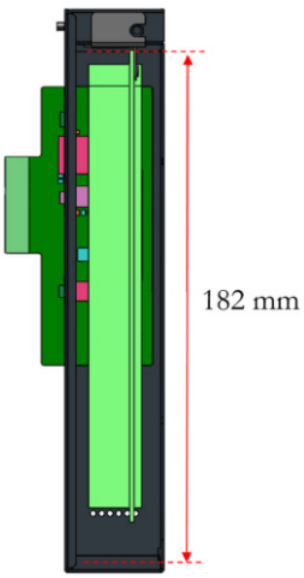


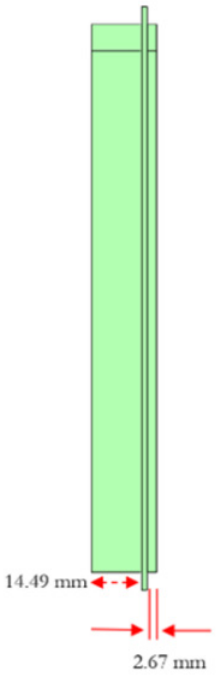
2. Pull down the “Release Latch” for disassembly using a screwdriver.



Note! *PCIe expansion module dimension limitations.*

The maximum length of the PcIe expansion module is 182 mm.

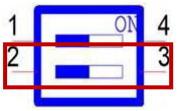
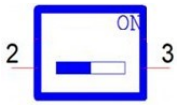
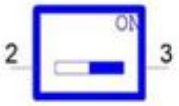




3.5 Remote Power & Reset Settings

UNO-148 V2 supports remote power & reset functions through a DI connector with the switch setting (SW8) on the motherboard. The default setting is for DI6/DI7 functionality. If you want to configure UNO-148 V2 for remote control functions, configure SW8 bit-2 to “on”, then DI6 can be used for remote power settings, and DI7 can be used for remote reset setting.

Table 3.1: Remote Power/On & Reset Settings

SW8 Default		
Description	**Instruction**	**SW8**
DI function for DI6/DI7 (Default)	Bit 2 off	
Remote setting function	Bit 2 on	

3.6 BIOS Setting

With the BIOS Setup program, you can modify BIOS settings and control the special features of your computer. The Setup program uses a number of menus for making changes and turning special features on or off.

Press the “ESC” key upon the first boot up to enter the BIOS Setup screen, then,

press the “Delete” key during the Power On Self Test (POST) process to enter the BIOS Setup screen, otherwise the system will continue the POST process.

(Please refer to User Manual- Appendix A.11~A.15 for more settings)

Appendix A

System Settings/Pin Assignments

A.1 Power Connector (CN1)

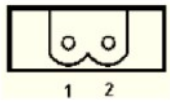


Table A.1: Power Connector Pin Assignments

Pin	Signal	Description
1	Power IN V+	10 - 36 V_{DC}
2	Power IN V- (GND)	

A.2 LAN: Ethernet Connector (CN4)

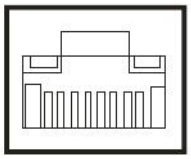


Table A.2: Ethernet Connector Pin Assignments

RJ45 Pin	Signal	Description
1	MDI0+	■ In BASE-T: Media Dependent Interface[0]: ■ 2500BASE-T: In MDI configuration, MDI[0]+/- corresponds to BI_DA+/- and in MDI-X configuration MDI[0]+/- corresponds to BI_DB+/-. ■ 10BASE-T and 100BASE-TX: In MDI configuration, MDI[0]+/- is used for the transmit pair and in MDIX configuration MDI[0]+/- is used for the receive pair.
2	MDI0-	
3	MDI1+	■ In BASE-T: Media Dependent Interface[1]: 2500BASE-T: In MDI configuration, MDI[1]+/- corresponds to BI_DB+/- and in MDI-X configuration MDI[1]+/- corresponds to BI_DA+/-. ■ 10BASE-T and 100BASE-TX: In MDI configuration MDI[1]+/- is used for the receive pair and in MDI-X configuration MDI[1]+/- is used for the transmit pair.
6	MDI1-	
4	MDI2+	■ In BASE-T: Media Dependent Interface[3:2]: 2500BASE-T: In MDI and in MDI-X configuration, MDI[2]+/- corresponds to BI_DC+/- and MDI[3]+/- corresponds to BI_DD+/-. ■ 100BASE-TX: Unused. ■ 10BASE-T: Unused.
5	MDI2-	
7	MDI3+	
8	MDI3-	

Table A.3: LEDs

Left LED			Right LED
100/10 Link	**1000 Link**	**2500 Link**	**Active**
Off	**Orange**	**Green**	**Green**

A.3 USB Connectors (CN5, CN6)

A.3.1 USB 2.0 Connector

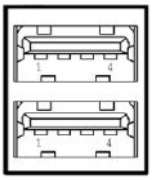


Table A.4: Connector Pin Assignments

Pin	Signal Name	Description
1	VBUS	Power
2	D-	USB 2.0 differential pair
3	D+	
4	GND	Ground for power return

A.3.2 USB 3.0 Connector

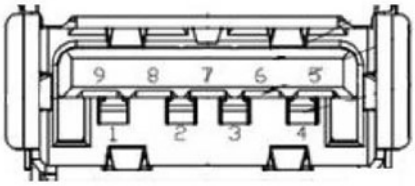


Table A.5: USB 3.0 Connector Pin Assignments

Pin	Signal Name	Description
1	VBUS	Power
2	D-	USB 2.0 differential pair
3	D+	
4	GND	Ground for power return
5	StdA_SSRX-	SuperSpeed receiver differential pair
6	StdA_SSRX+	
7	GND_DRIAN	Ground for signal return
8	StdA_SSTX-	SuperSpeed transmitter differential pair
9	StdA_SSTX+	

A.4 Display Connector (CN2, CN3)

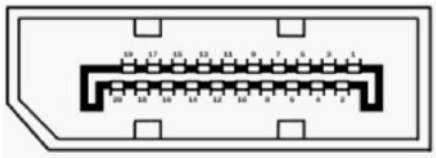


Table A.6: DisplayPort Adapter Cable Pin Assignments

Pin	Signal Name
1	ML_Lane 0 (p)
2	GND
3	ML_Lane 0 (n)
4	ML_Lane 1 (p)
5	GND
6	ML_Lane 1 (n)
7	ML_Lane 2 (p)
8	GND
9	ML_Lane2 (2)
10	ML_Lane 3 (p)
11	GND
12	ML_Lane 3 (n)
13	CONFIG1
14	CONFIG2
15	AUX CH (p)
16	GND
17	AUX CH (n)
18	Hot Plug
19	Return

A.5 M.2 Connector (CN15)

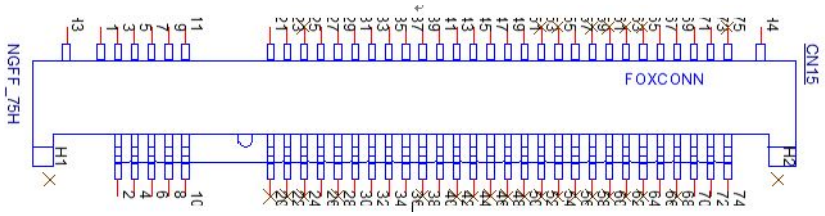


Table A.7: M.2 B-Key Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	M2_SATA1_DET	2	+V3.3_M2
3	GND	4	+V3.3_M2
5	GND	6	M2_LTE_PWR_OFF#
7	M2_LTE_USB_DP	8	M2_LTE_W1_DISABLE_N
9	M2_LTE_USB_DN	10	+V3.3_M2
11	GND	12	Mechanical notch B
13	Mechanical notch B	14	Mechanical notch B
15	Mechanical notch B	16	Mechanical notch B
17	Mechanical notch B	18	Mechanical notch B
19	Mechanical notch B	20	NC
21	NC	22	NC
23	WAKE_ON_WAN#	24	NC
25	NC	26	M2_LTE_W2_DISABLE_N
27	GND	28	NC
29	USB_Z_SSRX1-	30	M2_SIM1_RESET
31	USB_Z_SSRX1+	32	M2_SIM1_CLK
33	GND	34	M2_SIM1_DATA
35	USB_C_SSTX1-	36	M2_SIM1_PWR
37	USB_C_SSTX1+	38	NC
39	GND	40	M2_SIM2_DET
41	SATA1_RX+	42	NC
43	SATA1_RX-	44	NC
45	GND	46	NC
47	SATA1_C_TX-	48	NC
49	SATA1_C_TX+	50	NC
51	GND	52	NC
53	NC	54	NC
55	NC	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	M2_SIM1_DET
67	LTE_RST#_P67	68	NC
69	NC	70	+V3.3_M2
71	GND	72	+V3.3_M2
73	GND	74	+V3.3_M2
75	NC		

A.6 mPCIe Connector (MINI1)

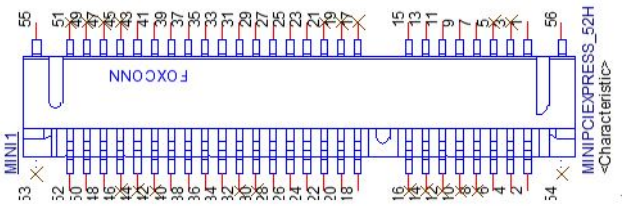


Table A.8: mPCIe Connector Pin Assignments

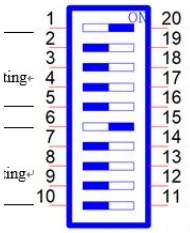
Pin	Signal Name	Pin	Signal Name
1	PCIE_WAKE#_3.3	2	+V3.3_MINI
3	NC	4	GND
5	NC	6	+V1.5
7	+V3.3	8	NC
9	GND	10	NC
11	CLK_PCIE_mPCIe1-	12	NC
13	CLK_PCIE_mPCIe1+	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	WIFI_DISABLE#
21	NC	22	MINI_PLTRST#
23	PCIE_mPCIe_RX4-	24	+V3.3_MINI
25	PCIE_mPCIe_RX4+	26	GND
27	GND	28	+V1.5
29	GND	30	NC
31	PCIE_TX2-_Z	32	NC
33	PCIE_TX2+Z	34	GND
35	GND	36	USB_Z_P0-
37	GND	38	USB_Z_P0+
39	+V3.3_MINI	40	GND
41	+V3.3_MINI	42	NC
43	MPCIE_PWRSEL	44	NC
45	NC	46	NC
47	NC	48	+V1.5
49	NC	50	GND
51	NC	52	+V3.3_MINI

A.7 COM Port RS232/422/485 Settings

The default setting for the COM port is RS-232. This can be changed to RS-422 or RS-485 modes and can be configured by adjusting the switch on the motherboard.

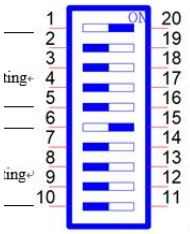
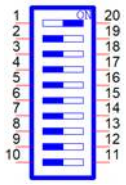
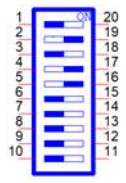
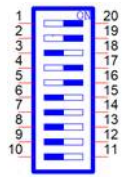
A.7.1 COM1/COM2 TS232/422/485 Settings (SW1)

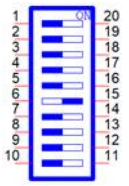
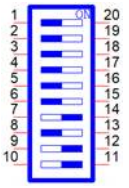
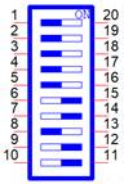
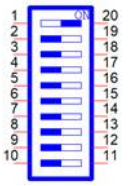
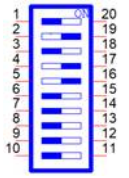
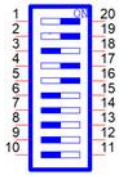
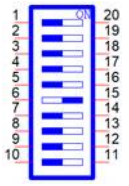
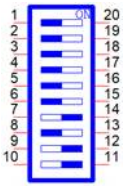
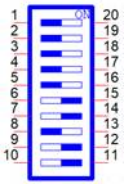
Table A.9: COM1/COM2 TS232/422/485 Settings (SW1)

SW1 Default	
Description settings	This switch is used to select RS232/422/485 mode setting
Default	RS232 mode

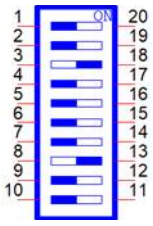
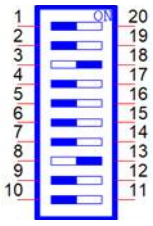
A.7.2 COM3/COM4 RS232/422/485 Settings (SW2)

Table A.10: COM3/COM4 RS232/422/485 Settings (SW2)

SW1 Default			
Description settings		This switch is used to select RS232/422/485 mode setting	
Default		RS232 mode	
COM1	**RS232 Mode**	Bit 1 ON Bit 2,3,4,5,6,7,8,9,10 OFF	
	RS485 Mode	Bit 2,4,5 ON Bit 1,3,6,7,8,9,10 OFF	
	RS422 Mode	Bit 1,2,4,5 ON Bit 3,6,7,8,9,10 OFF	

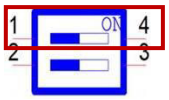
COM2	**RS232 Mode**	Bit 6 ON Bit 1,2,3,4,5,7,8,9,10 OFF	
	RS485 Mode	Bit 7,9,10 ON Bit 1,2,3,4,5,7,8 OFF	
	RS422 Mode	Bit 6,7,9,10 ON Bit 1,2,3,4,5,8 OFF	
COM3	**RS232 Mode**	Bit 1 ON Bit 2,3,4,5,6,7,8,9,10 OFF	
	RS485 Mode	Bit 2,4,5 ON Bit 1,3,6,7,8,9,10 OFF	
	RS422 Mode	Bit 1,2,4,5 ON Bit 3,6,7,8,9,10 OFF	
COM4	**RS232 Mode**	Bit 6 ON Bit 1,2,3,4,5,7,8,9,10 OFF	
	RS485 Mode	Bit 7,9,10 ON Bit 1,2,3,4,5,7,8 OFF	
	RS422 Mode	Bit 6,7,9,10 ON Bit 1,2,3,4,5,8 OFF	

A.7.3 COM Port RS422/485 Termination Resistor Settings

Table A.11: COM Port RS422/485 Termination Resistor Settings		
SW1	Termination Resistor Setting	
Description	This switch is used to select the Termination Resistor (120 ohm) for long distance transmission or device matching.	
Default	Bit-3 off & Bit-8 off	
COM1	Bit3 on	
COM2	Bit8 on	
SW2	Termination Resistor Setting	
Description	This switch is used to select the Termination Resistor (120 ohm) for long distance transmission or device matching.	
Default	Bit-3 off & Bit-8 off	
COM3	Bit-3 on	
COM4	Bit-8 on	

A.8 AT/ATX Setting (SW8)

SW8 can be used for the AT/ATX setting. The default setting is AT mode. See the following table for switch configuration.

Table A.12: AT/ATX Setting (SW8)		
SW8 Default		
Description	**Instruction**	**SW8**
AT Mode (Default)	Bit-1 off	
ATX Mode	Bit-1 on	

A.9 Riser Connector (CN12)

Table A.13: Expansion Board to Board Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
A1	DCIN	B1	GND
A2	DCIN	B2	GND
A3	DCIN	B3	GND
A4	DCIN	B4	GND
A5	N/A	B5	SMB_CLK
A6	GND	B6	SMB_DAT
A7	GND	B7	GND
A8	GND	B8	+V5
A9	USB+	B9	+V5
A10	USB-	B10	+V5
A11	GND	B11	+V5
A12	GND	B12	PCIeX4_EN
A13	CLK+	B13	GND
A14	CLK-	B14	RX0+
A15	GND	B15	RX0-
A16	TX0+	B16	GND
A17	TX0-	B17	SLP_S3
A18	GND	B18	GND
A19	N/A	B19	RX1+
A20	GND	B20	RX1-
A21	TX1+	B21	GND
A22	TX1-	B22	GND
A23	GND	B23	RX2+
A24	GND	B24	RX2-
A25	TX2+	B25	GND
A26	TX2-	B26	GND
A27	GND	B27	RX3+
A28	GND	B28	RX3-
A29	TX3+	B29	GND
A30	TX3-	B30	PLTRST
A31	GND	B31	SATA0_DET
A32	SATA1_DET	B32	GND

A.10 BIOS Operation

A.10.1 Introduction

With the AMI BIOS Setup Utility, you can modify BIOS settings and control the specific features of your computer. The Setup Utility uses a number of menus for making changes and turning the specific features on or off. This chapter describes the basic navigation of the UNO-148V2 setup screens.

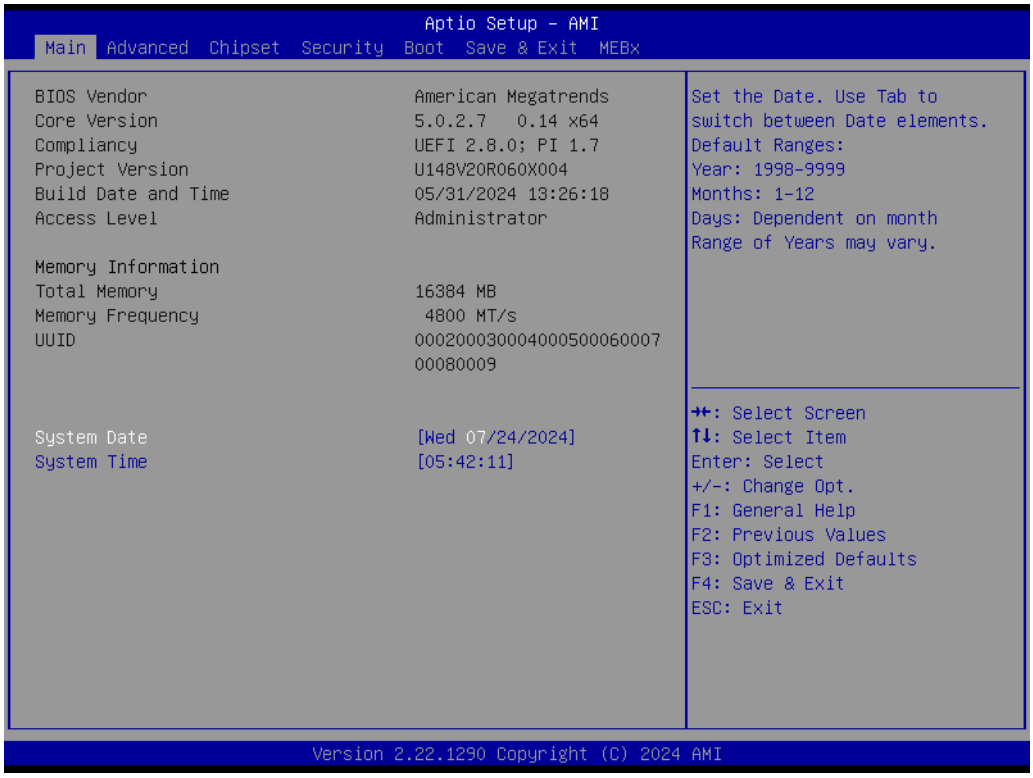


Figure A.1 Main Setup Screen

AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in the NVRAM area so it retains the setup information when the power is turned off.

A.10.2 Entering BIOS Setup

Press <Del> to enter AMI BIOS Setup Utility, the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

When users first enter the BIOS Setup Utility, they enter the Main setup screen. Users can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options described in this section. The Main BIOS Setup screen is shown below.

A.10.2.1 Main Menu

Press <Del> to enter AMI BIOS Setup Utility, the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

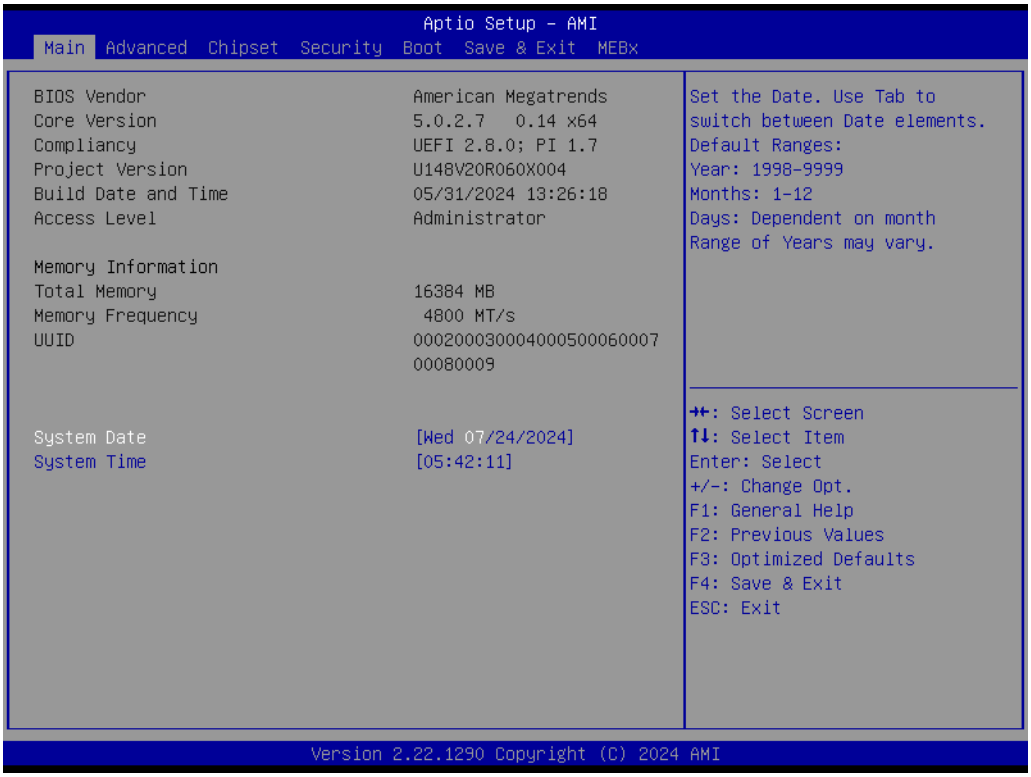


Figure A.2 Main Setup Screen

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can be. The right frame displays the key legend.

The key legend above is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

- **System time/System date**
  End user can use System time/System date options to change the system time and date. Highlight System Time or System Date using the keys. Enter new values through the keyboard, press the key or the keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

A.10.2.2 Advanced BIOS Features

Setup Select the Advanced tab from the UNO-148V2 setup screen to enter the Advanced BIOS setup screen. You can select any of the items in the left frame of the screen, such as CPU configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub menus are described on the following pages.

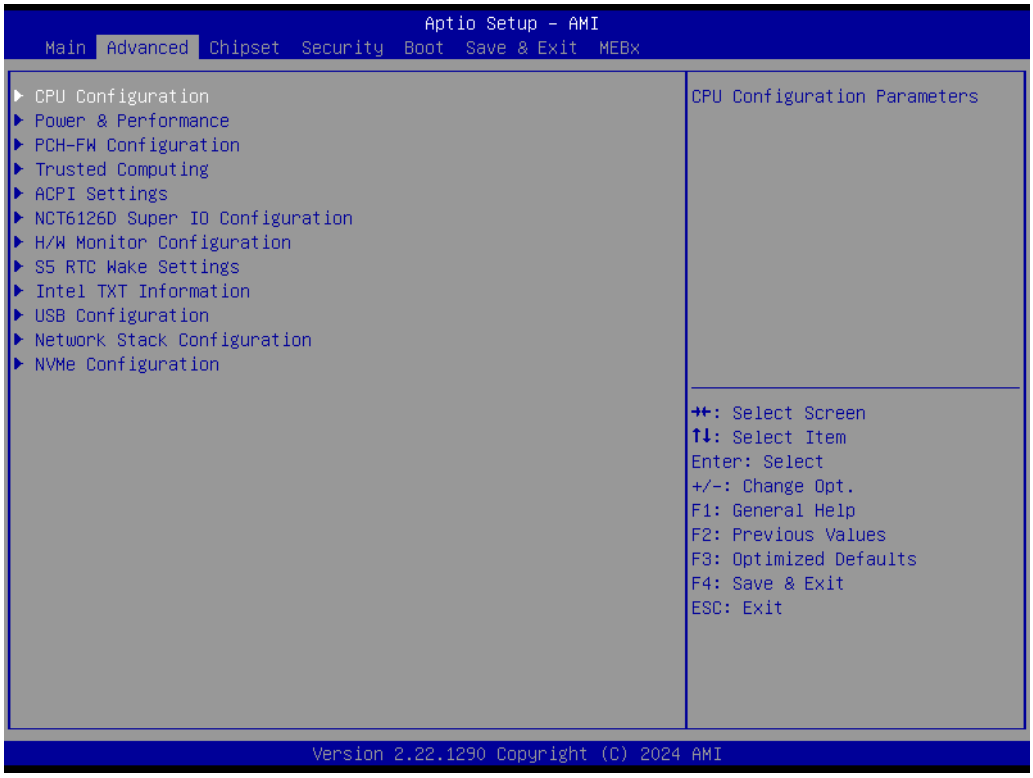


Figure A.3 Advanced BIOS Features Setup Screen

A.10.2.3 CPU Configuration



Figure A.4 CPU Configuration

- **CPU Flex Ratio Overide**
  Enable/Disable CPU Flex Ratio Programming.
- **Hardware Prefetcher**
  Hardware Prefetcher is used to turn the MLC streamer prefetcher on or off.
- **Adjacent Cache Line Prefetch**
  Turns on or off prefetching of adjacent cache lines.
- **Intel (VHX) Virtualization Technology**
  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **Active Processor Cores**
  Number of cores to enable in each processor package.
- **BIST**
  To enable or disable BIST (Built-in Self Test) on reset.
- **AP Threads Idle Manner**
  AP Threads Idle Manner for waiting signal to run
- **AES**
  To enable or disable AES (Advanced Encryption Standard).
- **MachineCheck**
  Enable or disable Machine Check.
- **CPU SMM Enhancement**
  SMM Use Delay Indication: Enable/Disable usage of SMM_DELAYED MSR for MP Sync in SMI.
  SMM Use Block Indication: Enable/Disable usage of SMM_BLOCKED MSR for MP Sync in SMI.
  SMM Use SMM en-US Indication: Enable/Disable usage of SMM_ENABLE MSR for MP Sync in SMI.

A.10.2.4 Power & Performance



Figure A.5 Power & Performance

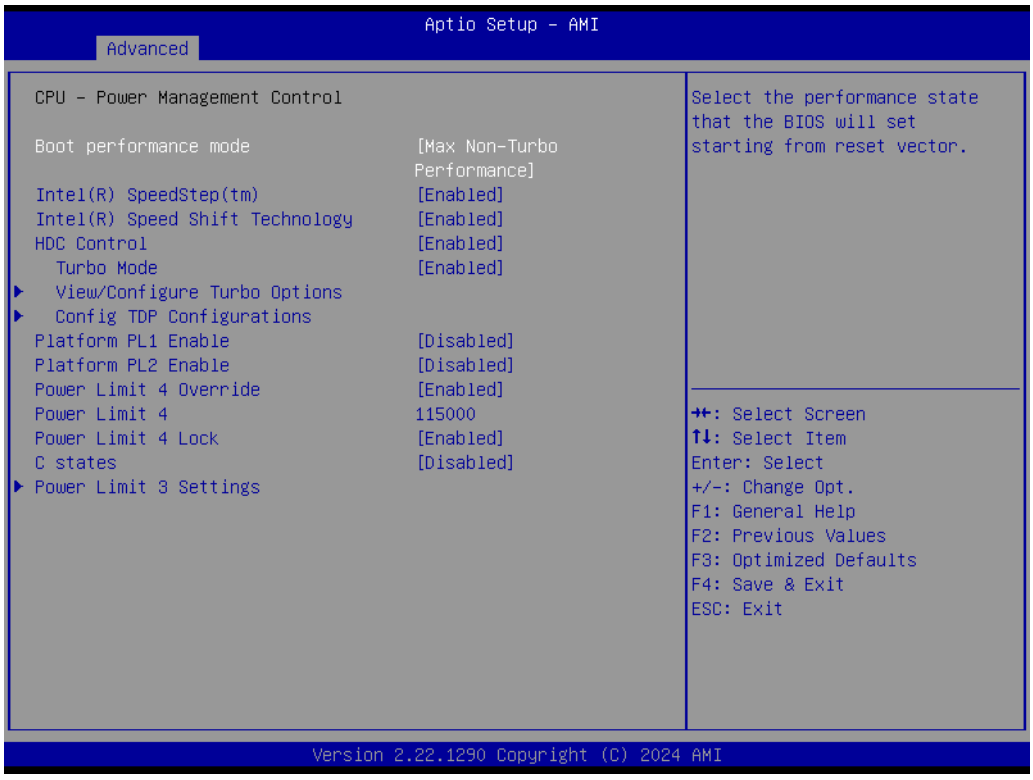


Figure A.6 CPU - Power Management Control-1

A.10.2.5 CPU Power Management Control:

- **Boot performance mode**
  Select the performance state that the BIOS will set starting from the reset vector.
- **Intel® SpeedStep(tm)**
  Allows more than two frequency ranges to be supported
- **Race to Halt (RTH)**
  Enable/Disable Race to Halt feature. RTH will dynamically increase CPU frequency in order to enter pkg C-State faster to reduce overall power. (RTH is controlled through MSR 1FC bit 20)
- **Intel(R) Speed Shift Technology**
  Enable or disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-state.
- **HwP Autonomous EPP Grouping**
- **HDC Control**
  This option allows HDC configuration.
  Disabled: Disable HDC.
  Enabled: Can be enabled by OS if OS native support is available.
- **CPU VR Settings**
- **Platform PL1 Enable**
  Enable/Disable Platform Power Limit 1 programming. If this option is enabled, it activates the PL1 value to be used by the processor to limit the average power of given time window.
- **Platform PL2 Enable**
  Enable/Disable Platform Power Limit 2 programming. If this option is disabled, BIOS will program the default values for platform Power Limit 2.
- **Power Limit 4 Override**
  Enable/Disable Platform Power Limit 4 override. If this option is disabled, BIOS will leave the default values for platform Power Limit 4.
- **C states**
  Enable/Disable CPU Power Management. Allows CPU to go to C states when it’s not 100% utilized.
- **Thermal Monitor**
  Enable/Disable Thermal Monitor
- **Interrupt Redirection Mode Selection**
  Interrupt Redirection Mode Select for Logical Interrupts
- **Timed MWAIT**
  Enable/Disable Timed MWAIT Support
- **Custom P-state Table**
  Add Custom P-state Table
- **EC Turbo Control Mode**
  Enable/Disable EC Turbo Control mode
- **Energy Performance Gain**
  Enable/Disable Energy Performance Gain
- **CPU Lock Configuration**

GT – Power Management Control

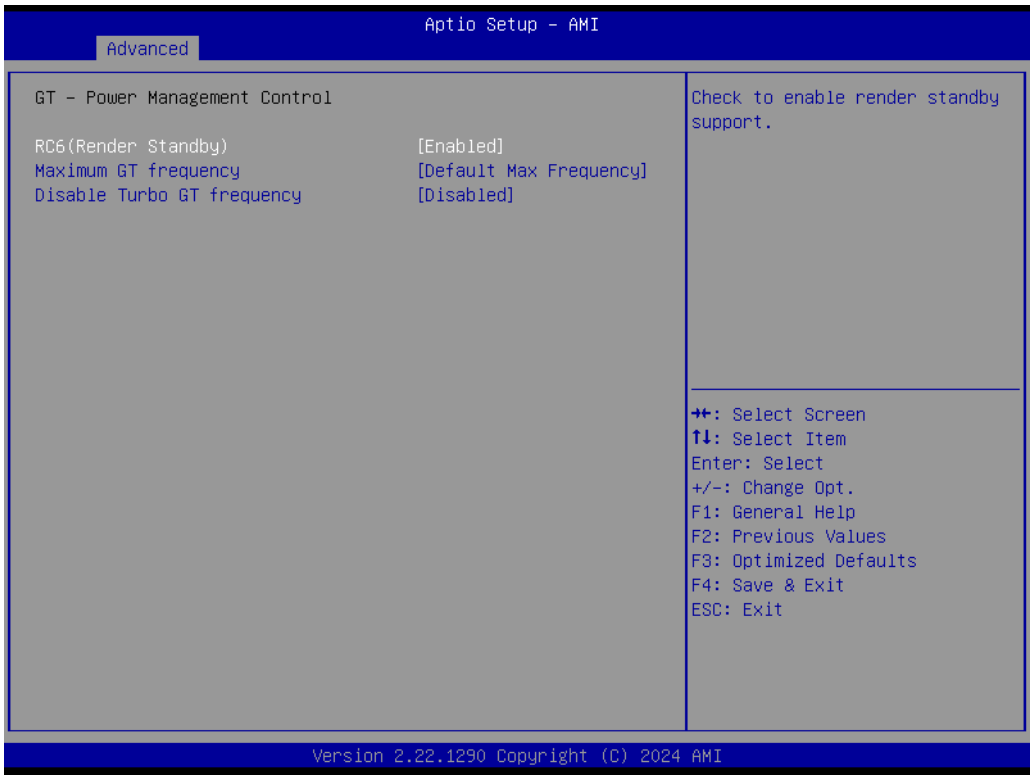


Figure A.7 GT Disable Turbo GT Frequency-1

- **RC6 (Render Standby)**
  Check to enable render standby support
- **Maximum GT frequency**
  Maximum GT frequency limited by the user. Choose between 200MHz (RPN) AND 750MHz (RP0). Value beyond the range will be clipped to min/max supported by SKU
- **Disable Turbo GT Frequency**
  Enabled: Disables Turbo GT frequency.
  Disabled: GT frequency is not limited.

A.10.2.6 AMT Configuration

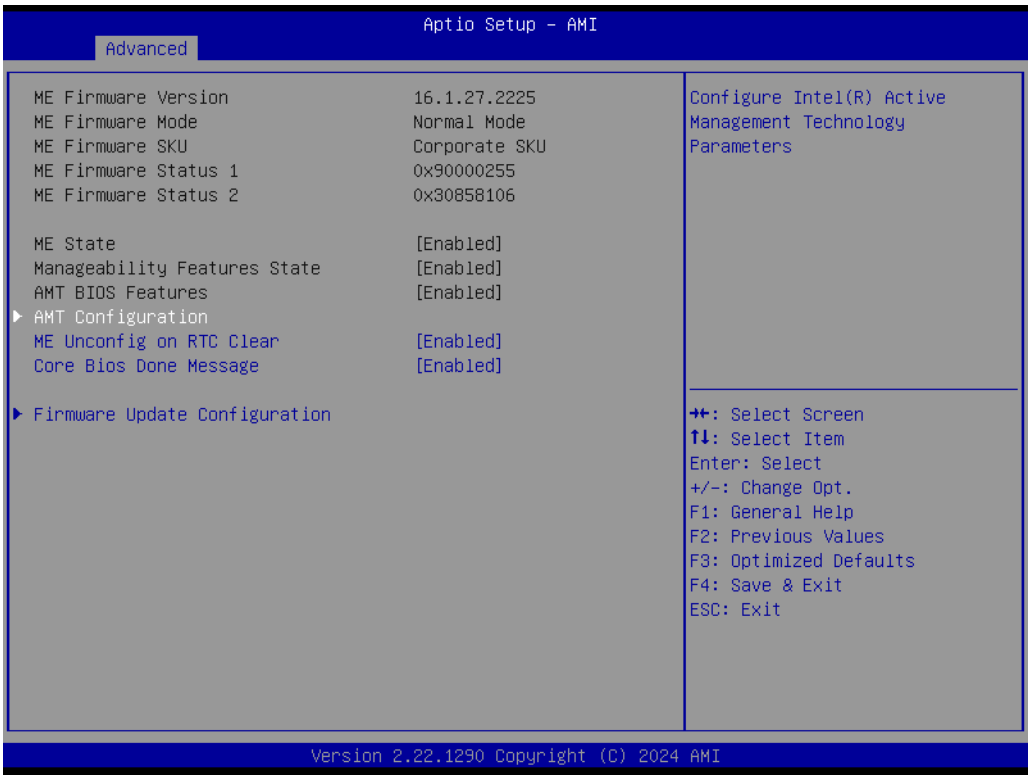


Figure A.8 AMT Configuration

- **Configure Intel Active Management Technology Parameters**

A.10.2.7 Secure Erase Mode

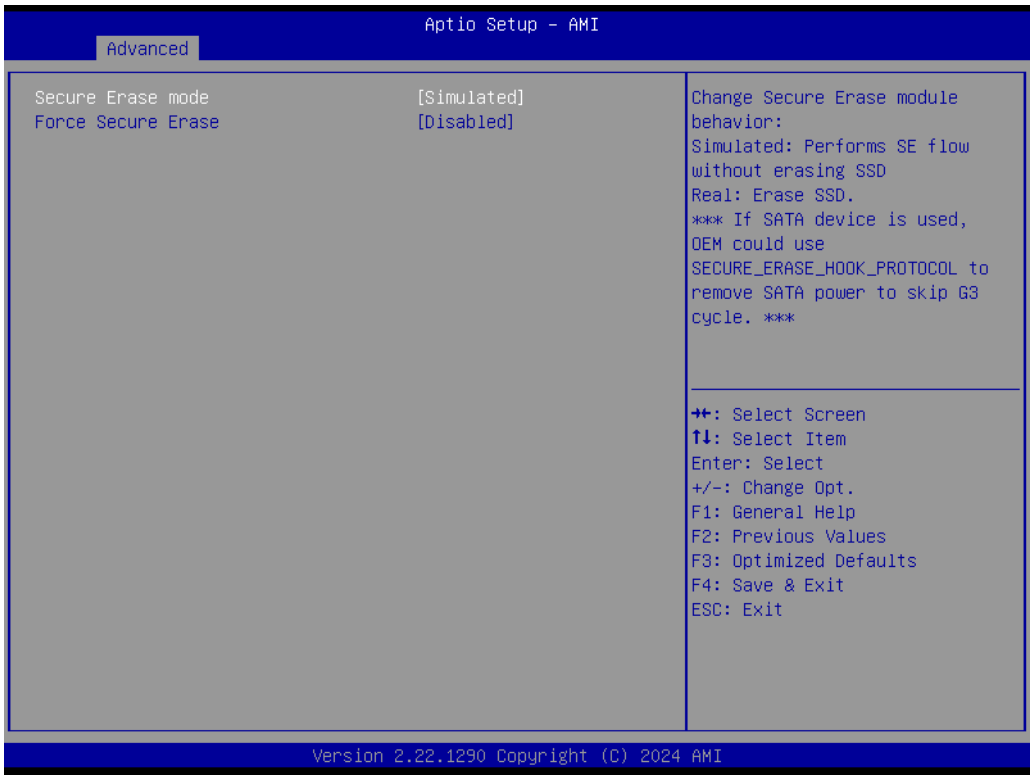


Figure A.9 Secure Erase Mode

- **Change Secure Erase module behavior**
  Simulated: Performs SE flow without erasing SSD.
  Real: Erase SSD.
  **If SATA device is used, OEM could use SECURE_ERASE_HOOK_PROTOCOL to remove SATA power to skip G3 cycle.

A.10.2.8 TPM Device Selection



Figure A.10 TPM Device Selection

- Select TPM device: fTPM or dTPM. fTPM -Enables fTPM. dTPM-Disable fTPM and Enable dTPM. Warnin: fTPM/dTPM will be disabled and all data saved on it will be lost.

A.10.2.9 NCT6126D Super IO Configuration: Serial Port 1 Configuration

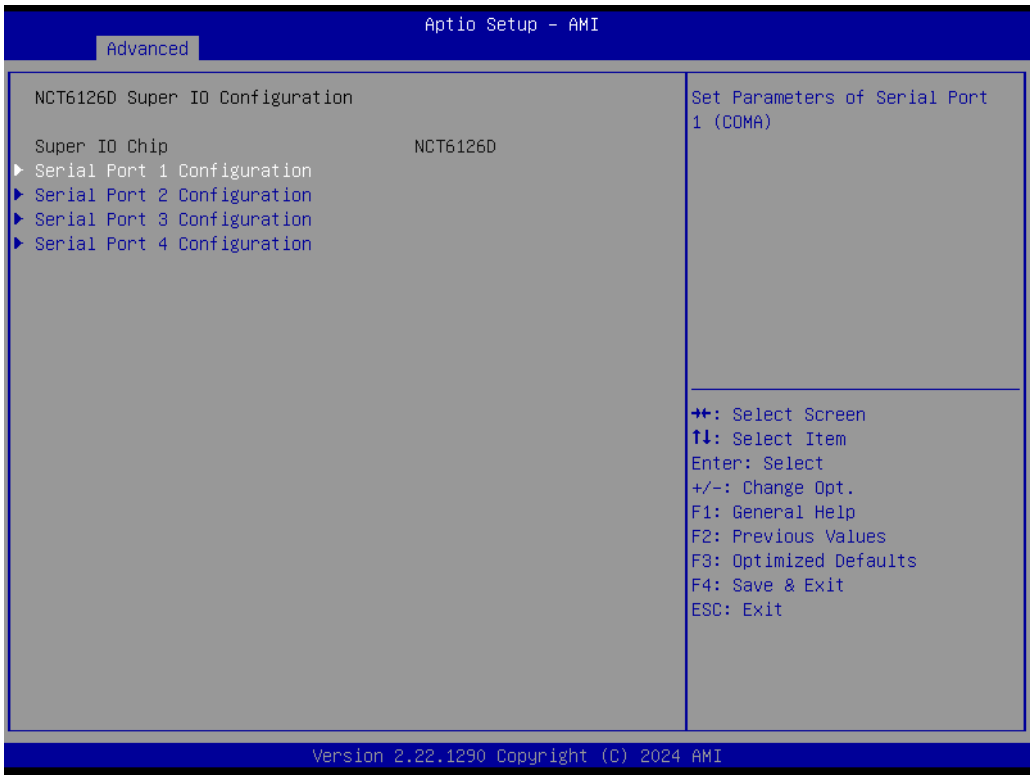


Figure A.11 NCT61260 Super IO Configuration

- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1 (COM).

A.10.2.10S5 RTC Make Settings: Wake System from S5



Figure A.12 S5 RTC Make Settings

- **Wake System from S5**
  Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime, System will wake on current time + Increase minute(s).

A.10.2.11 USB Configuration

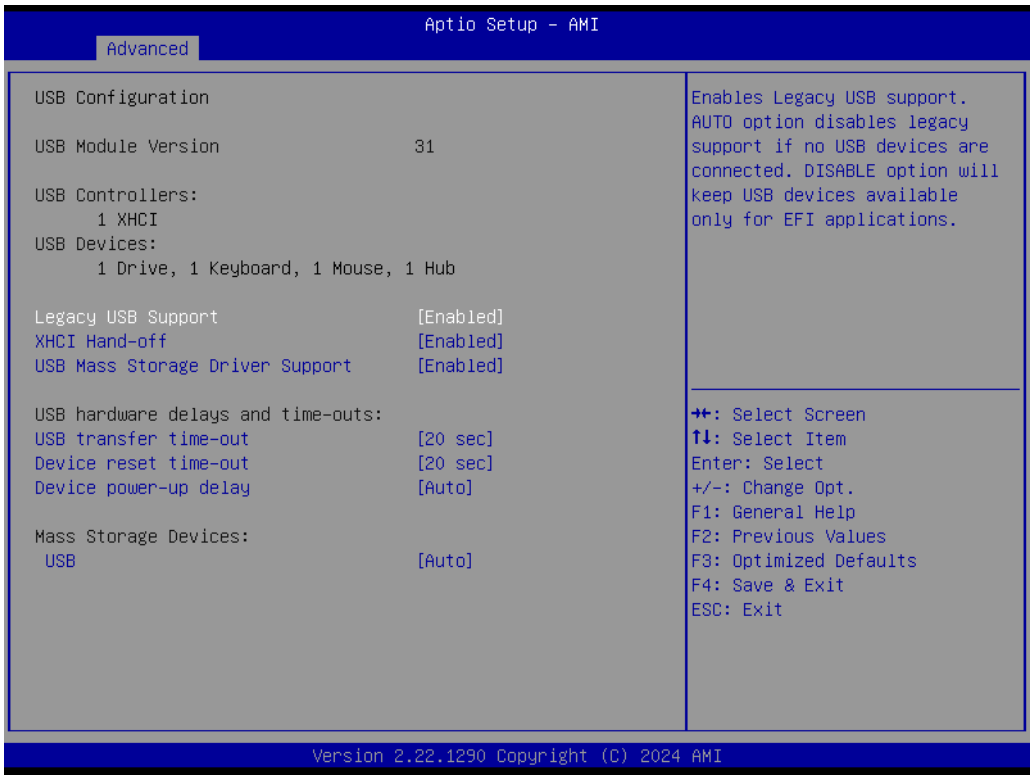


Figure A.13 USB Configuration

- **XHCI Hand-off**
  This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **USB Mass Storage Driver Support**
  Enable/ Disable USB Mass Storage Driver Support.
- **USB hardware delays and time-outs**
  USB transfer time-out: The time-out value for Control, Bulk, and Interrupt transfers.
  Device reset time-out: USB mass storage device Start Unit command time-out.
  Device power-up delay: Maximum time the device will take before it properly reports itself to the Host Controller. “Auto” uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from hub descriptor.
- **Mass Storage Devices: USB**
  Mass storage device emulation type. “AUTO” enumerates devices according to their media format. Optical drives are emulated as “CDROM”, drives with no media will be emulated according to a drive type.

A.10.2.12Network Stack Settings



Figure A.14 Network Stack Configuration

- **Network Stack**
  Enable/Disable UEFI Network Stack.

A.10.2.13Chipset

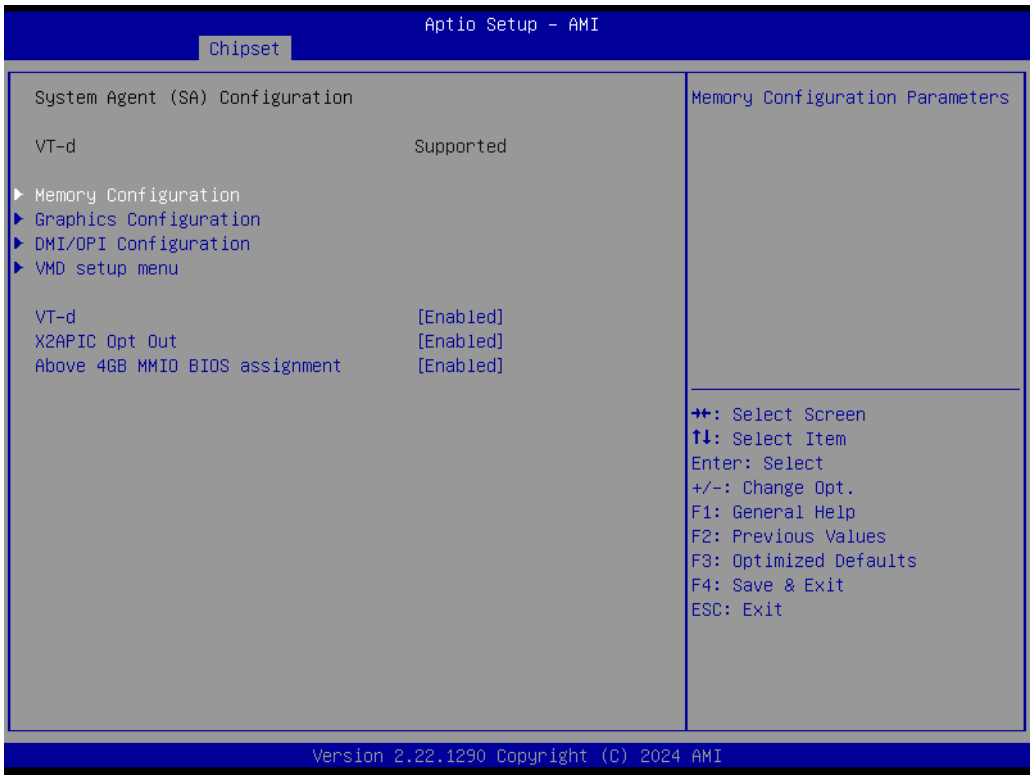


Figure A.15 Chipset

- **System Agent (SA) Configuration**
  - Memory Configuration
  - Graphics Configuration
    Skip Scanning of External Gfx Card. If Enable, it will not scan for external Gfx Card on PEG and PCH PCIE Ports.
    Primary Display: Select which of IGFx/PEG/PCI Graphics device should be Primary Display or select HG for Hybrid Gfx.
    Internal Graphics: Keep IGFX enabled based on the setup options.
  - VT-d
  - Above 4GB MMIO BIOS assignment: Enable/Disable above 4GB Memory-mapped IO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

A.10.2.14PCH-IO Configuration

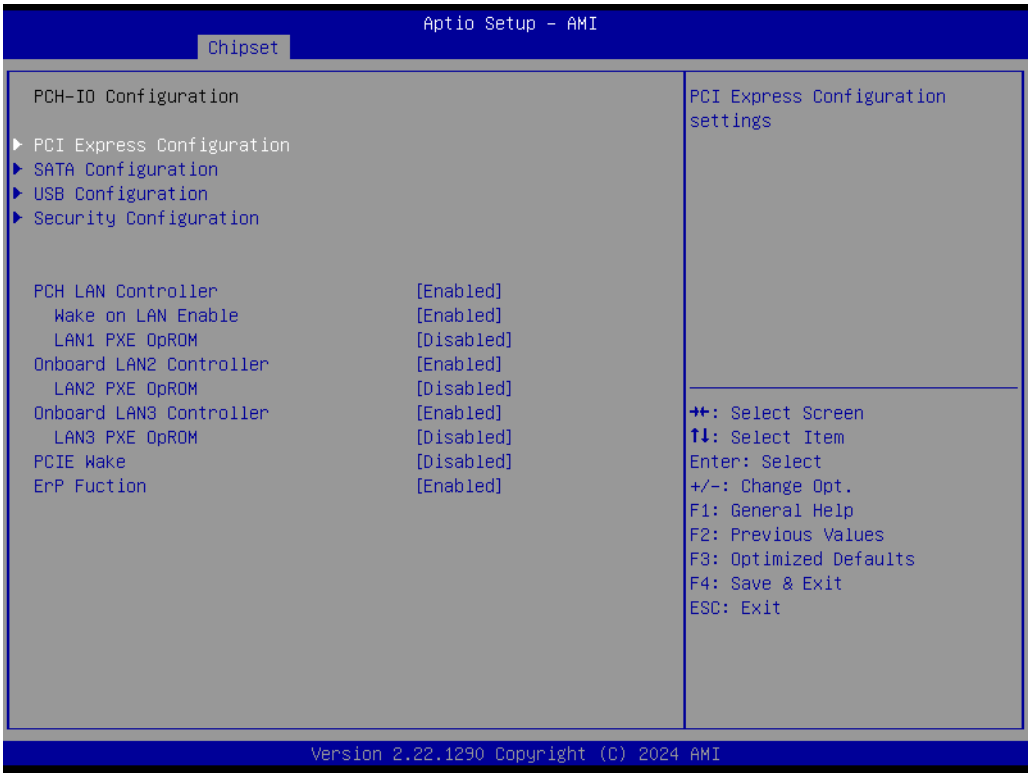


Figure A.16 PCH-IO Configuration

- **PCI Express Configuration**
  M.2 E-key: Control the PCI Express Root Port.
  ASPM: Set the ASPM Level: Force L0s-Force all links to L0s state. Auto-BIOS auto configure DISABLE-Disables ASPM.
  L1 Substates: PCI Express L1 Substates settings.
  Multi-VC: Enable/Disable Multi Virtual Channel.
- **SATA Configuration**
  SATA Controller(s): Enable/Disable SATA Device.
  SATA Mode Selection: Determines how SATA controller(s) operate.
  Aggressive LPM Support: Enabel PCH to aggressively enter link power state.
- **USB Configuration**
  Select “Disabled” for pin-based debug. If pin-based debug is enabled but USB overcurrent is not disabled, USB DbC does not work.
- **Security Configuration**
  RTC Memory Lock: Enable will lock bytes 38h-3Fh in the lower/uppder 128-byte bank of RTC RAM

A.10.2.15Security

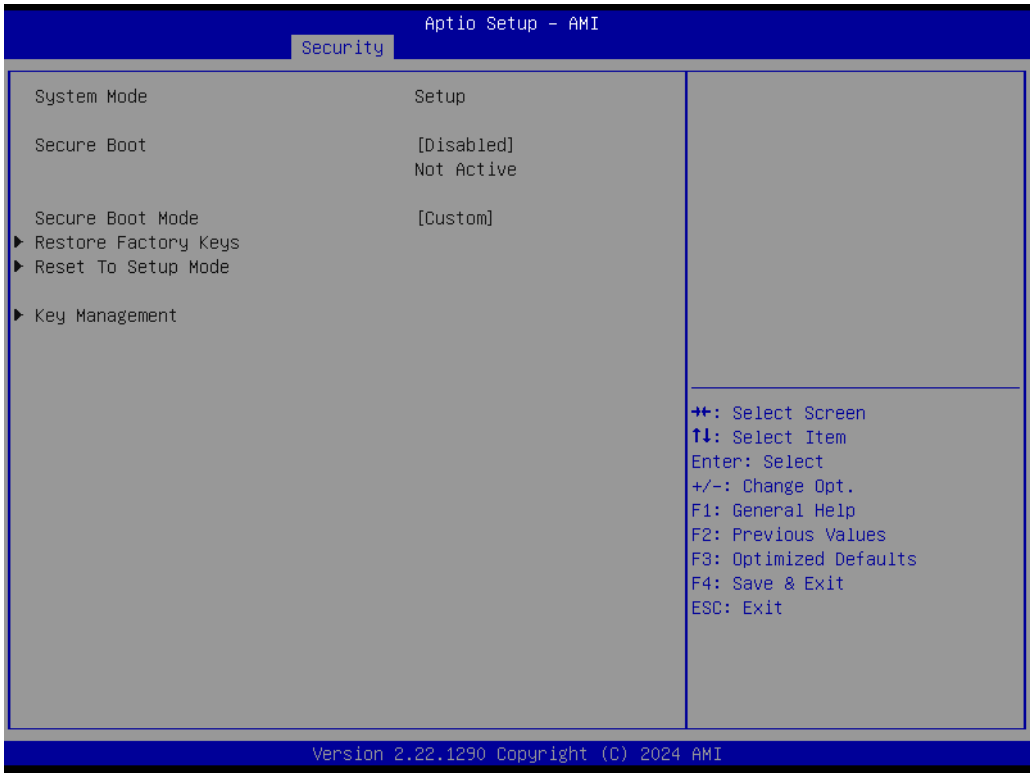


Figure A.17 Security

- **Secure Boot**
  Secure Boot feature is Active if Secure Boot is Enabld. Platform Key(PK) s enrolled and the System is in User mode. The mode change requires platform reset.
- **Secure Boot Mode**
  Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.
  - Restore Factory Keys: Force System to User Mode. Install factory default Secure Boot key databases.
  - Key Management: Enables expert users to modify Secure Boot Policy variables without full authentication

A.11 Storage RAID Configuration (VMD Setup)

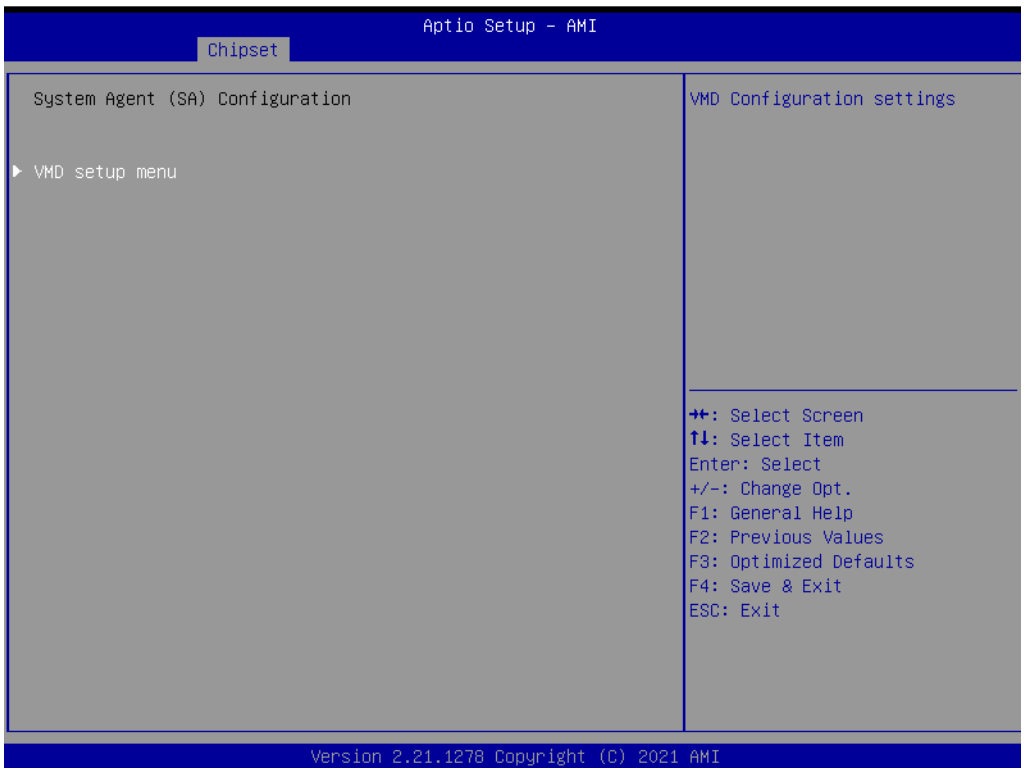
UNO-148 has special RAID configuration steps which differ from previous CPU generations. Customers can enable RAID with 2 x SATA storage or 2 x NVMe storage.

SATA RAID: M.2 B-Key & 2.5” HDD/SSD (UNO-148 base unit + UNO-148-IS2EA)

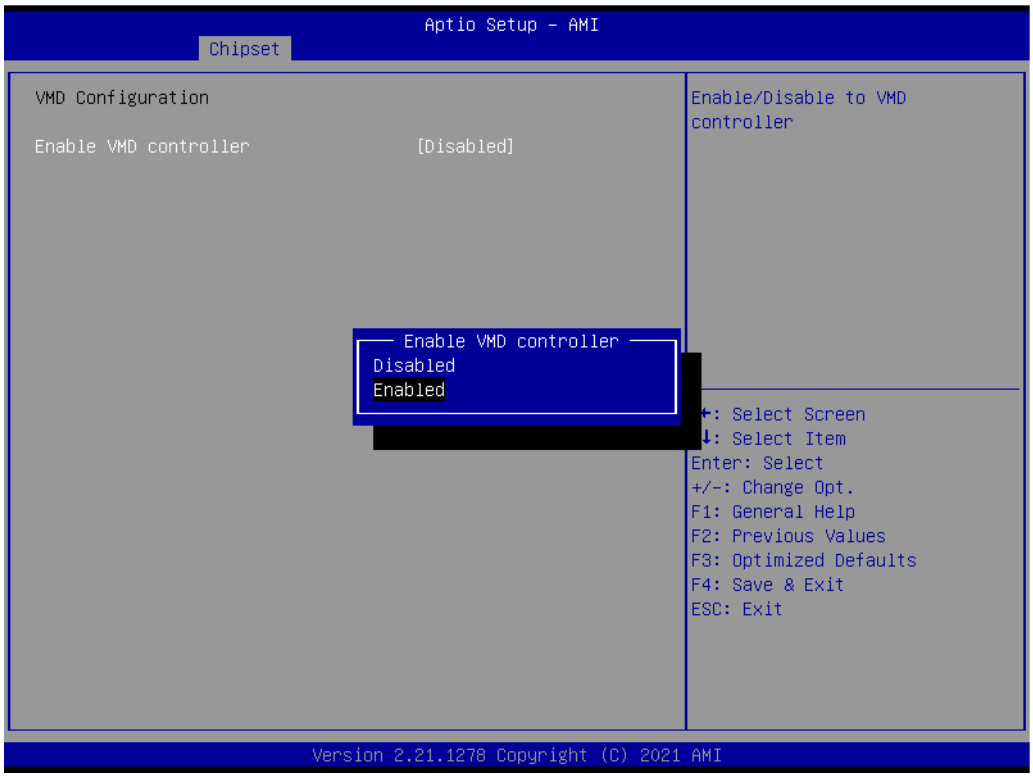
PCIe RAID: M.2 M-Key & PCIe x4 slot (UNO-148 base unit + UNO-148-P11EA, needs PCIe x4 to M.2 M NVMe transfer card)

Please refer to the below configuration instructions:

1. Go to Chipset→VMD setup menu.

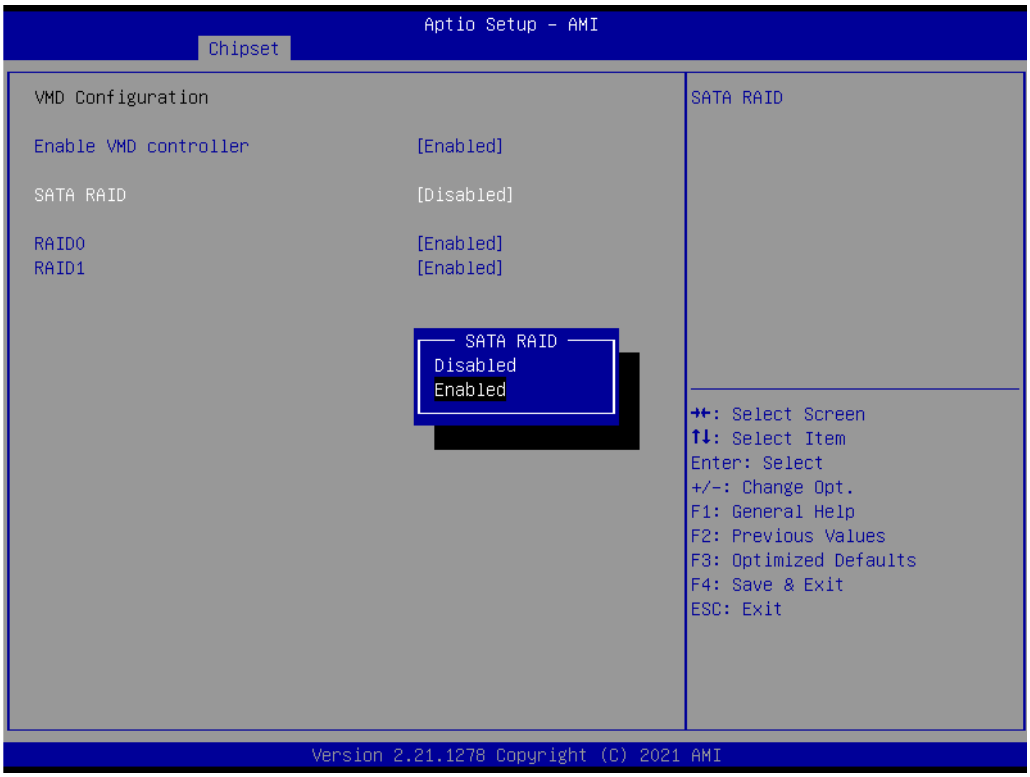


2. Set VMD controller to “Enabled”.

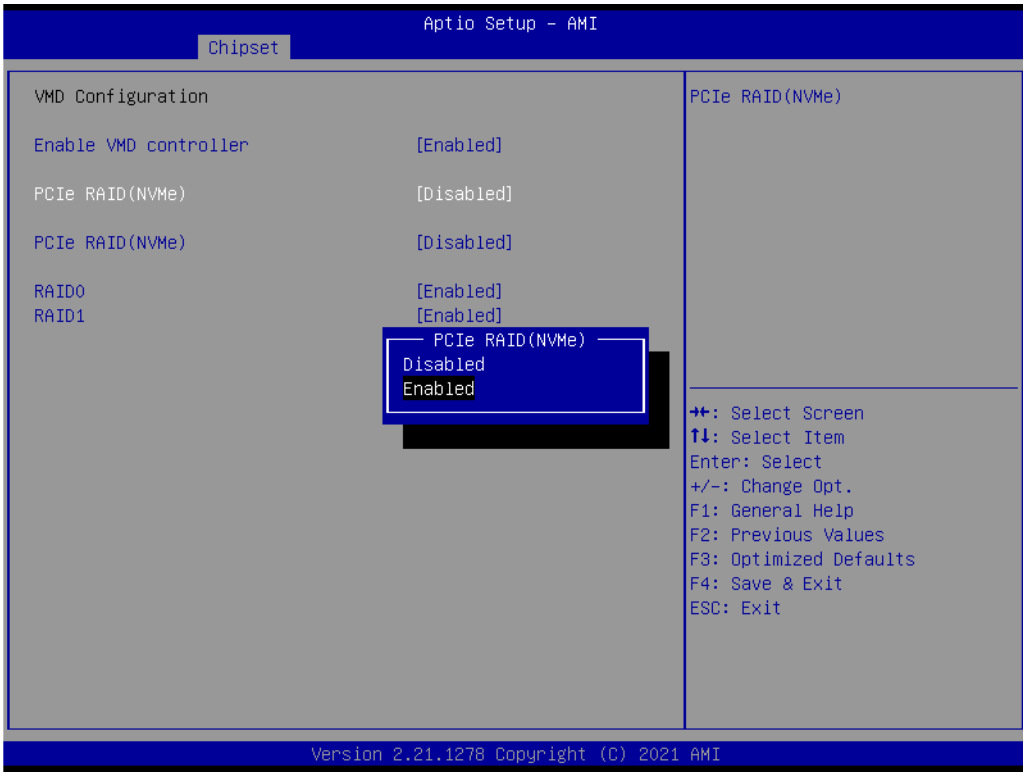


3. The system will detect the storage type (SATA/NVMe) and the RAID option will automatically pop up and the corresponding storage device will be installed.

SATA RAID



PCIe RAID (NVMe)



A.12 Dynamic Range Temperature Statement

Thermal Management of the 11th Gen Intel® Core™ Processor External Design Specification:

DTR is the range of temperature starting from boot (TBOOT) and transitioning to Cold-to-Hot (TBOOT + DTR) and/or Hot-to-Cold (TBOOT - DTR). A temperature outside the DTR range requires a reboot but is not enforced by the hardware. (A manual reboot can recover the system).

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