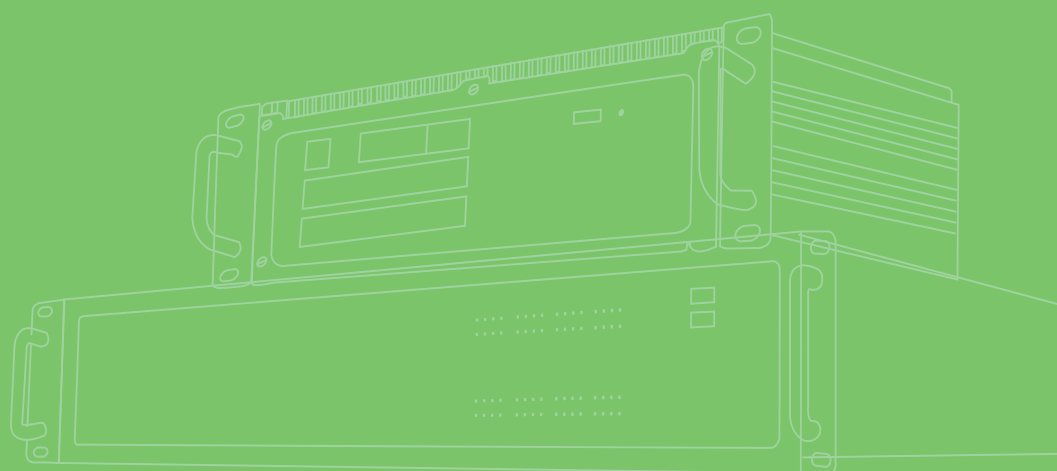


User Manual



ECU-4784 V2 Series

**IEC-61850 Power Substation 2U
Rackmount Server with Intel®
14th Generation Processor**

ADVANTECH

Enabling an Intelligent Planet

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This manual is for the ECU-4784-V2 Series.

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 onscreen 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 conditions for passing 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.

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

Packing List

Before system installation, check that the items listed below are included and in good condition. If any item does not accord with the list, contact your dealer immediately.

- The main ECU-4784-V2 unit
- Accessory box (screws, SSD bracket, terminal block, thermal pads)
- 1 x warranty card
- 1 x ROHS LIST

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect this equipment from any A/C outlets before cleaning. Use a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket should be located near the equipment and 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 only be opened by qualified service personnel.
14. If one 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 -25° C (-13° F) or above 70° C (158° 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. Due to the sensitive nature of the equipment, it must be stored in a restricted access location, only accessible by qualified engineers.
18. When installing this equipment, ensure that the earth cable is securely attached using a 3.5 mm screw.
19. The sound pressure level at the operator's position according to IEC 704-1:1982 should be no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Consignes de Sécurité

1. Lisez attentivement ces consignes de sécurité.
 2. Conservez ce manuel d'utilisation pour référence ultérieure.
 3. Débranchez cet équipement de toute prise A/C avant de le nettoyer. Utilisez un chiffon humide chiffon pour le nettoyage. N'utilisez pas de détergents liquides ou en aérosol.
 4. Pour les équipements enfichables, la prise de courant doit être située près du matériel et facilement accessible.
 5. Protégez l'équipement de l'humidité.
 6. Placez l'équipement sur une surface fiable pendant l'installation. Abandonner ou laisser la chute de l'équipement peut causer des dommages.
 7. Les ouvertures du boîtier sont destinées à la convection d'air. Protéger le matériel de la surchauffe. **NE PAS COUVRIR LES OUVERTURES.**
 8. Ce produit est destiné à être alimenté par le secteur CA ou une source d'alimentation nominale CC 100-240 V, 3,0 A minimum, Tma 50 degrés C minimum, si besoin d'aide supplémentaire, veuillez contacter Advantech pour plus d'informations.
 9. Éloignez le cordon d'alimentation des zones à fort trafic. Ne placez rien dessus le cordon d'alimentation.
 10. Toutes les mises en garde et tous les avertissements sur l'équipement doivent être notés.
 11. Si l'équipement n'est pas utilisé pendant une longue période, débranchez-le de la source d'alimentation pour éviter les dommages causés par les surtensions transitoires.
 12. Ne versez jamais de liquide dans une ouverture. Cela peut provoquer un incendie ou un choc électrique.
 13. N'ouvrez jamais l'équipement.
 14. L'ordinateur sera installé et entretenu par une personne qualifiée, veuillez contacter Advantech pour plus d'assistance.
- Note
- Aucune modification de cet équipement n'est autorisée.
 - En cas d'autre problème, veuillez consulter ou retourner l'appareil à votre distributeur. N'essayez pas de réparer un appareil défectueux.
15. Si l'un des événements suivants se produit, faites vérifier l'équipement par un personnel:
 - Le cordon d'alimentation ou la fiche est endommagé.
 - Du liquide a pénétré dans l'équipement.
 - L'équipement a été exposé à l'humidité.
 - L'équipement fonctionne mal ou ne fonctionne pas selon l'utilisateur manuel.
 - L'équipement est tombé et a été endommagé.
 - L'équipement montre des signes évidents de bris.
 16. Ne laissez pas l'équipement dans un environnement dont la température de stockage est inférieure à -25° C (-13° F) ou supérieure à 70° C (158° F) car cela pourrait endommager les composants. L'équipement doit être conservé dans un environnement contrôlé.
 17. **ATTENTION:** Les piles risquent d'exploser si elles ne sont pas remplacées correctement. Remplacez uniquement par le même type ou un type équivalent recommandé par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant. En raison de la nature sensible de l'équipement, il doit être stocké dans un emplacement d'accès, accessible uniquement par des ingénieurs qualifiés.

18. Lors de l'installation de cet équipement, assurez-vous que le câble de terre est solidement à l'aide d'une vis de 3.5 mm.
19. La pression sonore niveau au poste de l'opérateur selon CEI 704-1:1982 ne doit pas être plus supérieur à 70 dB(A).

AVIS DE NON-RESPONSABILITÉ: cet ensemble d'instructions est fourni conformément à la norme CEI 704-1. Advantech décline toute responsabilité quant à l'exactitude des déclarations contenues dans ce document.

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 electricity after connecting a jumper or installing a card may damage sensitive electronic components.

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Chapter 1

Overview

This chapter provides an overview of the ECU-4784-V2 Series specifications.

Sections include:

- Introduction
- Hardware Specifications
- Safety Precautions
- Function Block Diagram
- Chassis Dimensions
- Packing List

1.1 Introduction

Upgrades of smart grid technologies are in demand in this new era motivated by the requirement for rugged computing platforms with faster processors and increased reliable storage capacity in modern substation automation systems. To fulfill the performance requirements of modern distributed software applications which require fast processing, Advantech offers ECU-4784-V2 which is targeted at advanced server-level data concentrators and protocol converters in scenarios like substation automation, energy management, secondary communication and control, etc.

In years past, substations were managed under the well-established SCADA OT system. Now, in this next phase of virtualization, more centralized computing is a better fit for the requirement of higher energy efficiency. There is also a demand for immediate and flexible optimization based on the cloud-as-a-service business model.

ECU-4784-V2 is certified with IEC 61850-3, the standard for electrical substation automation design, which ensures high reliability and stability. The standard is suitable for any global power & energy automation market and defines communication between all intelligent electronic devices (IED) and other related equipment from the process level (data acquisition, sensors, and actuators), providing high performance and reliable functionality to meet the needs of the most critical computing applications. It also supports remote monitoring and diagnosis and remote device connectivity to enhance maintenance efficiency.

Isolation & High-Speed Communication Interface

- A comprehensive communication interface is used for smart substation communication servers and IED analyzers to easily implement data gateway & protocol conversion. There is support for a variety of protocols (IEC-60870-104, DNP3.0, etc.).
- Network interfaces are required to respond to real-time data and collect high-density network packets and accurately facilitate data analysis.
- Versatile communication interface: the IED analyzer easily fulfills the data gateway & protocol conversion requirement.

Easy to Diagnose and Maintain in an Efficient Manner

- Remote diagnosis can be done and the system can be managed to provide high system maintenance efficiency.
- The rear I/O connections and LEDs on the front panel are for various ports and modes, simplifying the monitoring of operation status.

Easy-to-Expand Domain I/O with Functional modules and Enhance Maintenance Efficiency

- Combined with two domain I/O slots to bring more flexible industrial application for customers to extend more rich data collection and variety.
- Integrated functional module design is convenient for wiring, installation, and maintenance.

1.2 Hardware Specifications

1.2.1 General

- **Certifications:** CE, FCC Class A, IEC61850-3, IEEE 1613
- **Dimensions (W x D x H):** 440 x 280 x 88 mm
- **Enclosure:** SECC & Aluminum
- **Mounting:** 2U 19" Rackmount
- **Power Requirements:**
 - Power 1: 100 ~ 240 V_{AC} (50 ~ 60 Hz)/V_{DC}
 - Power 2: 100 ~ 240 V_{AC} (50 ~ 60 Hz)/V_{DC}
- **Power Consumption:** Idle. 40W, Max.150W
- **Weight:** 8 kg
- **OS Support:** Windows 10,11, Windows Server 2022, Ubuntu 24.04

1.2.2 System Hardware

- **CPU:** 14th Generation Intel® Core™ i socket CPU (LGA1700)
- **PCH:** Intel 600 series Alder Lake refresh R680E
- **Memory:** DDR4 SODIMM-ECC/non-ECC 3200 MHz (8 GB, 16 GB, 32GB) x 2 slots, up to 64 GB
- **Indicators:** LEDs for Power, HDD, Programmable LED, LAN (Active, Status) and Serial (Tx, Rx)
- **Storage:** 4 x 2.5" SATA SSD (RAID0, RAID1, RAID5, RAID10) 1 x M.2 NVMe
- **Display:** 3 x DP++ 1.2 up to 4K @ 60Hz

1.2.3 I/O Interface

- **Ethernet:** 8 x RJ-45 ports
- **USB Ports:** 1 x USB 2.0 (front), 1 x USB 3.2 Gen1 (front), 3 x USB 2.0 (rear), 2 x internal USB 2.0
- **Serial Ports:** 2 x RS-232/422/485, 2.5KV Isolation with DB9 connector, 8 x RS-232/422/485, 2.5KV Isolation with Terminal Block
- **Audio x 1:** Line out pin header

1.2.4 Environment

- **Humidity:** 95% @ 40°C (non-condensing)
- **Operating Temperature:** -25 ~ 60°C (-13 ~ 140°F) with 1 x ECU-P expansion card, -25 ~ 50°C (-13 ~ 122°F) with 2 x ECU-P expansion cards
- **Operating Humidity:** 5 ~ 95% RH (non-condensing)
- **Storage Humidity:** 5 ~ 95% RH (non-condensing)
- **Shock Protection:** IEC 60255-21-2, Acceleration: 10 G (OP), 30 G (non-OP), 11 ms
- **Vibration Protection:** IEC 60068-2-64, Random PSD 2.0 Grms, 1hrs @ 5 ~ 500 Hz
- **Bump Protection:** IEC 60255-21-2, Acceleration: 20 G, Duration: 16 ms

1.3 Function Block Diagram

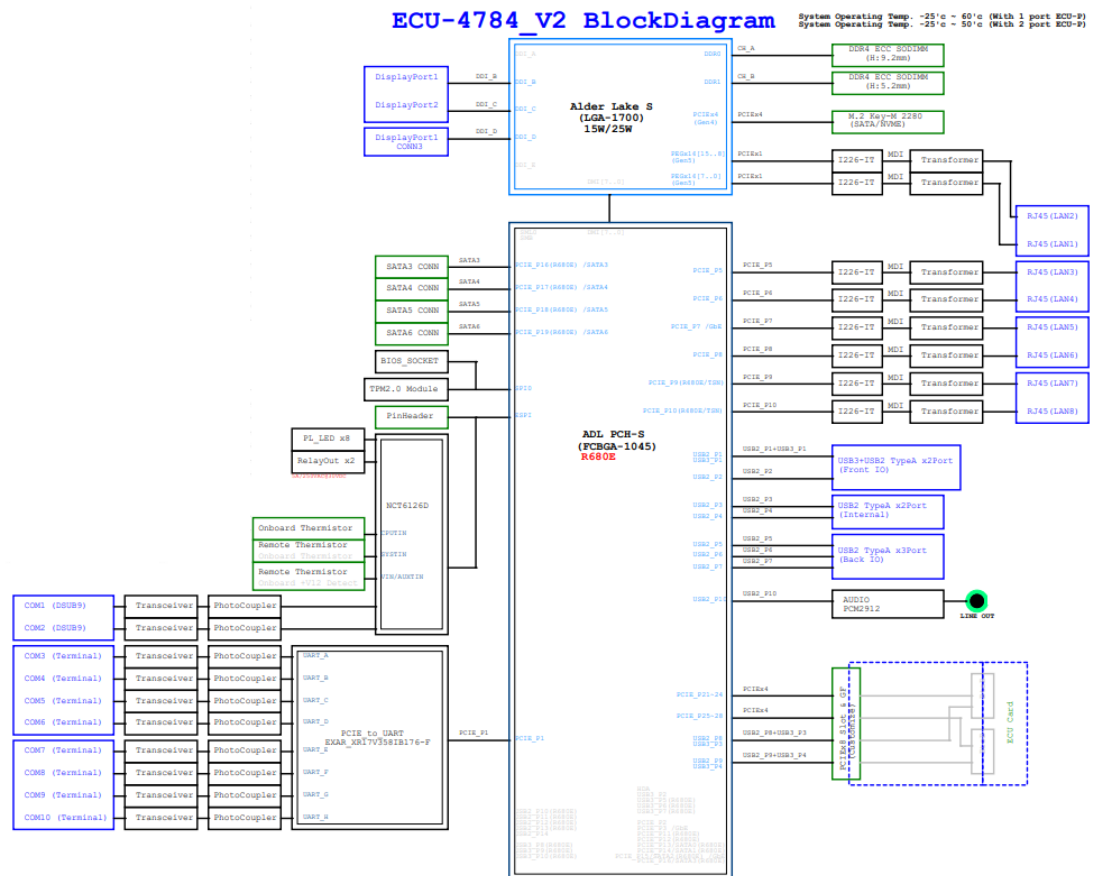


Figure 1.1 ECU-4784-V2 Block Diagram

1.4 Safety Precautions

The following messages inform how to make each connection. In most cases, you will simply need to connect a standard cable.

Warning! Always disconnect the power cord from your chassis whenever you are working on it. Do not connect it while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electronics personnel should open the chassis.



Caution! Always ground yourself to remove any static electric charge before touching the ECU-4784-V2 series. 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.

Note! If DC voltage is supplied by an external circuit, please put a protection device in the power supply input port.



Caution, Shock, Hazard.
Attention, Choc, Danger.



Disconnect all power sources.
Débranchez toutes les sources d'alimentation.

1.5 Chassis Dimensions

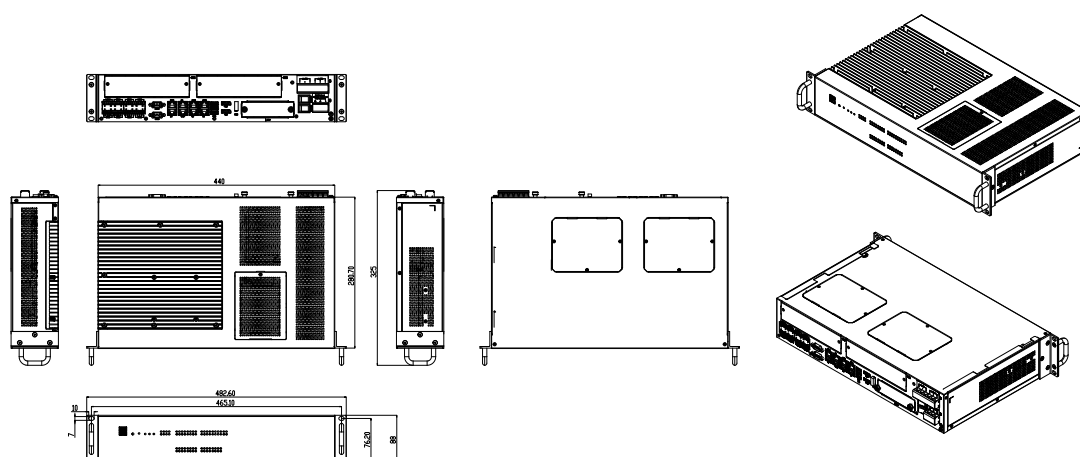


Figure 1.2 ECU-4784-V2 Chassis Dimensions

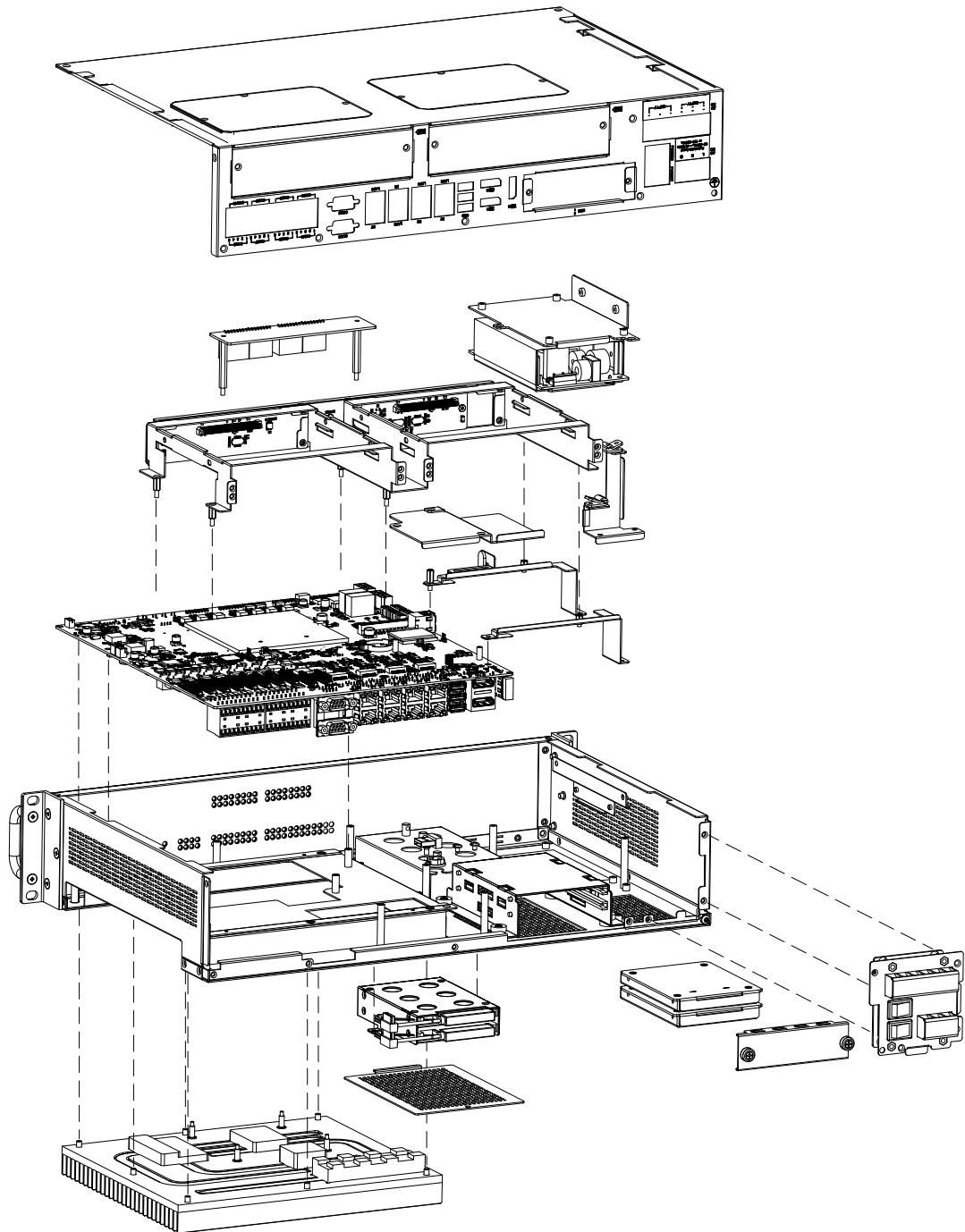


Figure 1.3 ECU-4784-V2 Series Exploded Diagram

Chapter 2

Hardware Specifications

Sections include:

- Overview
- LED Indicators
- Power Input
- Ethernet Interface
- Display Interface
- USB Ports
- Expansion Functions
- Storage (SATA, M.2)
- Processors
- Memory
- TPM
- Platform Features Description

2.1 Overview

2.1.1 ECU-4784-V2 LED and Interface

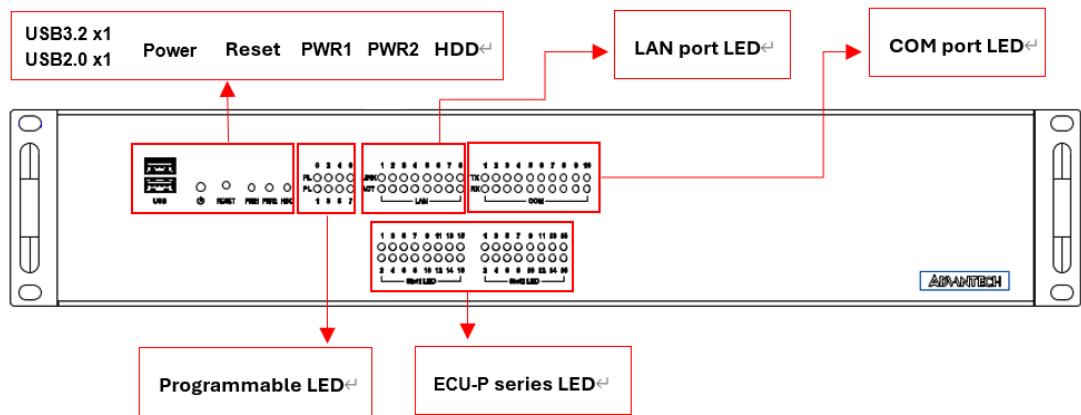


Figure 2.1 ECU-4784-V2 Front Panel

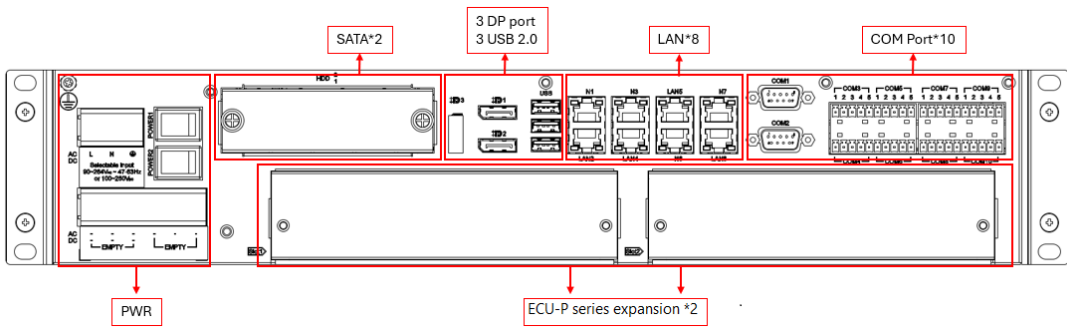


Figure 2.2 ECU-4784-V2 Rear Panel

2.2 Front Elements

2.2.1 LED Indicators

The LEDs on the front panel can be divided into 5 groups.

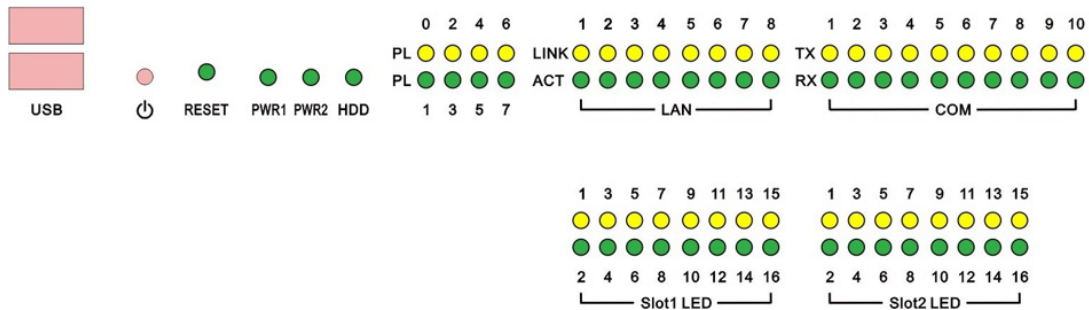


Figure 2.3 LED Indicators

2.2.1.1 System Status Indicators



Figure 2.4 System Status Indicators

Table 2.1: Definition of System Status Indicators

LED	Status	Description
ATX button		ATX Button when Power on/off
PWR1	Green	System power 1 or 2 is on
	Off	System power 1 and 2 is off
PWR2 (optional)	Green	System power 1 or 2 is on
	Off	System power 1 and 2 is off
HDD	Green	Data is transmitting
	Off	No data is transmitting
Reset		Reset Button for restart

Note! Front Panel PWR2 LED is reserved when the customer chooses dual power to supply.



2.2.1.2 LAN Status Indicators

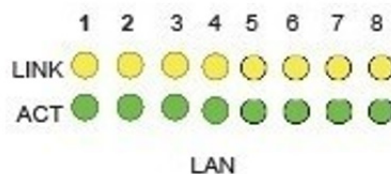


Figure 2.5 LAN Status Indicators

Table 2.2: Definition of System Status Indicators

Item	LED	Status	Description
1	LAN/LINK (Port 1 ~ 8)	Green	1 Gbps network link
		Orange	100 Mbps network link
		Off	10 Mbps network link or invalid network link
2	LAN/ACT (Port 1 ~ 8)	Green	Ethernet data being received/transmitted
		Off	Invalid network link

2.2.1.3 Serial Communication Status Indicators

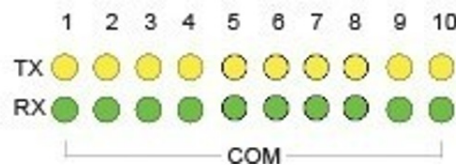


Figure 2.6 Serial communication Status Indicators

Table 2.3: Definition of Serial COM Status Indicators

Item	LED	Status	Description
1	COM/Rx (Port 1 ~ 10)	Green	Serial port data being received
		Off	No data being received
2	COM/Tx (Port 1 ~ 10)	Orange	Serial port data being transmitted
		Off	No data being transmitted

2.2.1.4 Programmable LED

The ECU-4784-V2 Series provides 8 programmable indication LEDs, which are convenient for users to control the programmable LED states (green, off). API programming can be used to indicate and edit machine operating status.

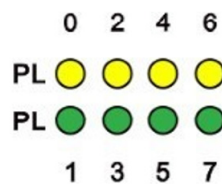


Figure 2.7 Programmable LED

Table 2.4: Ex. ECU-4784-V2 LED Status Indicators

LED No.	LED Status	Description
PL (0~7)	Green	Customers can, according to their needs, define the Programmable LED state
	off	

There are up to 8 LEDs (LED0~LED7) which control and monitor the status (On/Off). The Advantech programmable LED driver provides examples on how to use the ECU-4784-V2 programmable LED and offers reference for users to develop their own applications. You can modify these sample applications to meet your requirements. You can find code examples in the below installation path located in the "C:\Program Files\Advantech\AdvPLED\Examples\VC++\PLEDTool" directory.

2.2.2 Disk Bay

ECU-4784-V2 supports four 2.5" SSDs. There are 2 locations for the installation:

1. Two available SATA slots to install from the rear panel.

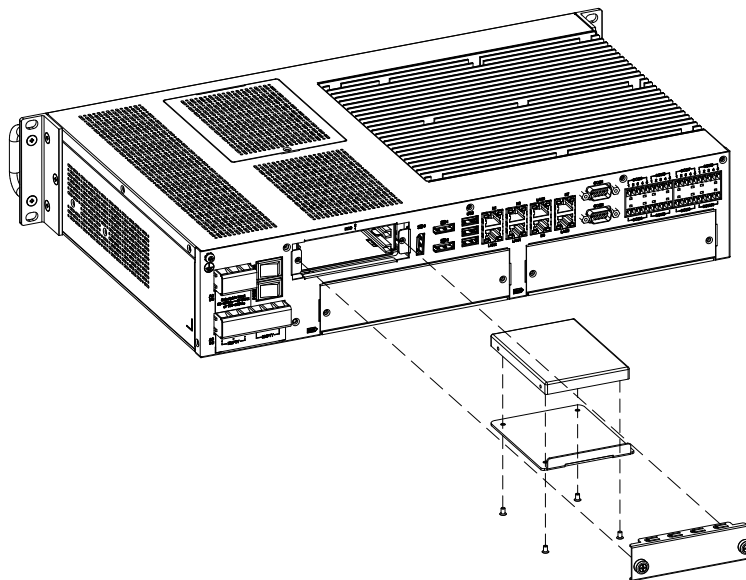


Figure 2.8 SATA Installation from Rear Panel

2. Two available SATA slots to install from the top of the unit, make sure the front of the SSD faces to the top side.

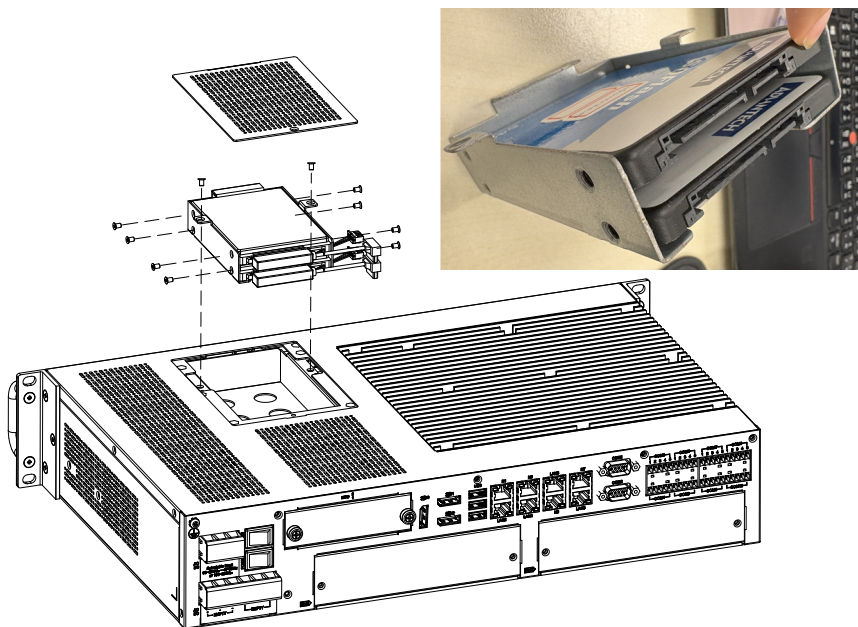


Figure 2.9 SATA Installation from the Top

2.2.3 M.2 SSD and Internal USB

ECU-4784-V2 supports one M.2 SSD in the system as well as an internal USB.

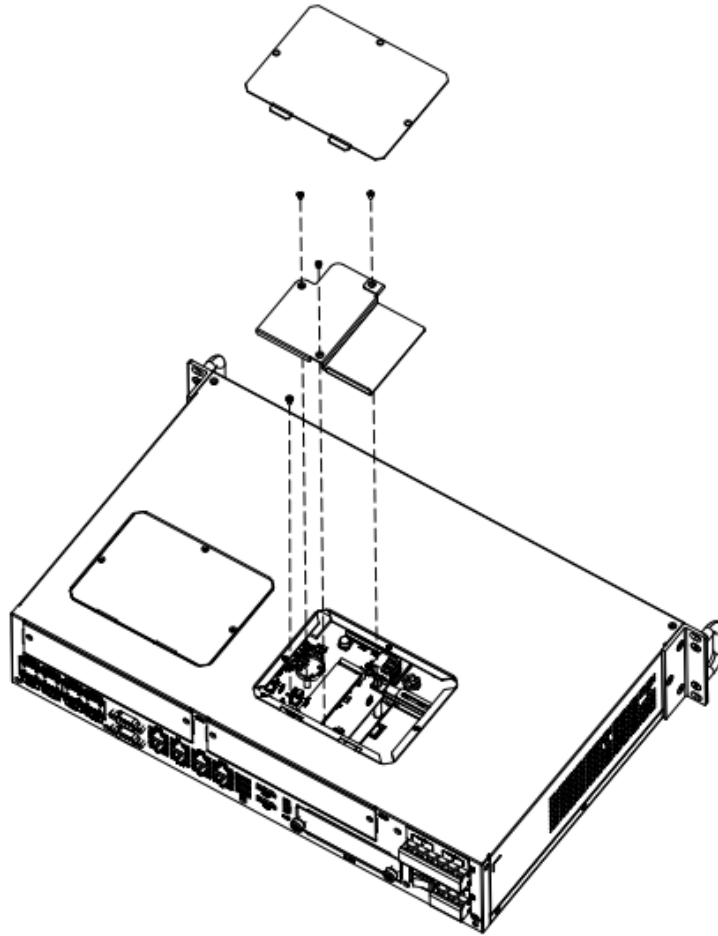


Figure 2.10 Installation of M.2 SSD (1)

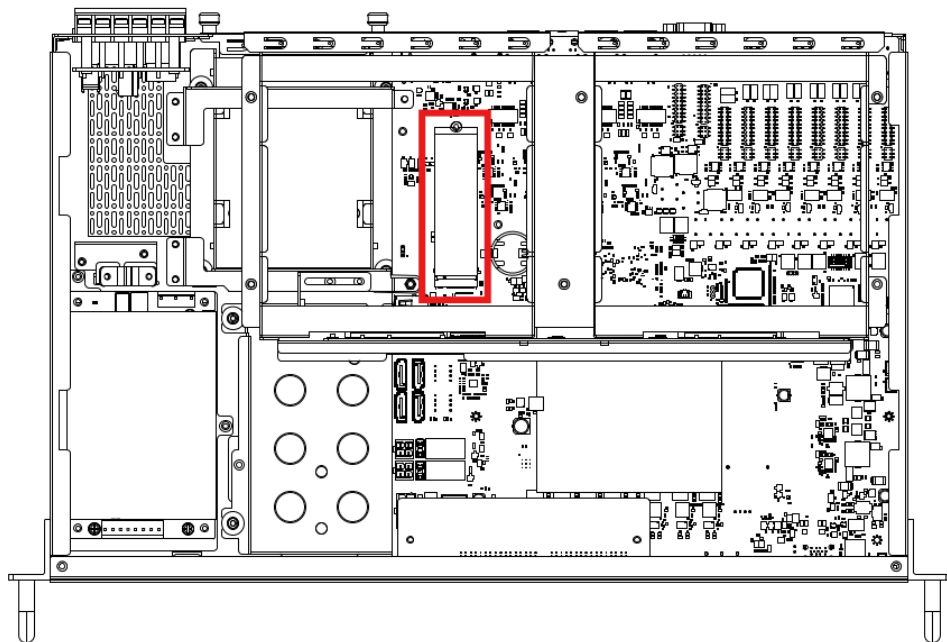


Figure 2.11 Installation of M.2 SSD (2)

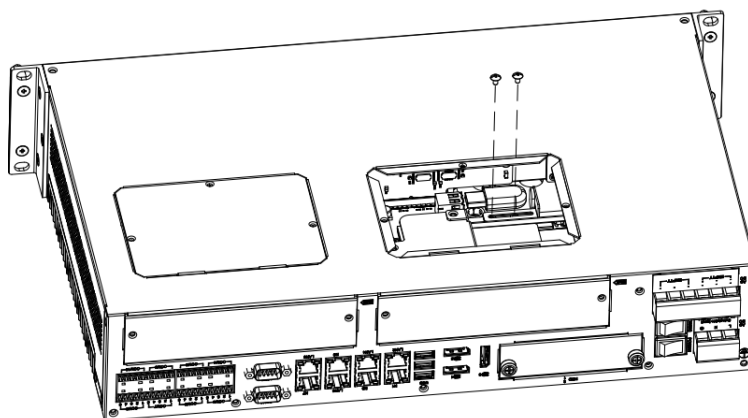


Figure 2.12 Installation of Internal USB (1)

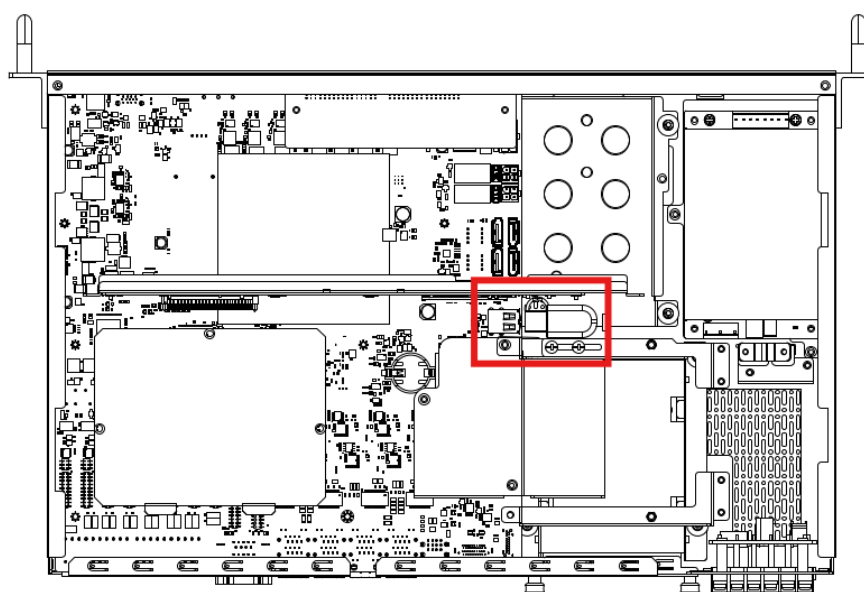


Figure 2.13 Installation of Internal USB (2)

2.3 Power Input

The ECU-4784-V2 Series products support single power input AC or DC.

Table 2.5: Power Input

Item	AC/DC	Volt. Range	Power Rating	Connector Type
PWR1	AC	100-240 VAC	3.0 A 50-60 Hz	3-pin screw terminal
	DC	100-240 VAC	3.0 A	3-pin screw terminal

The function of each part is described as below:

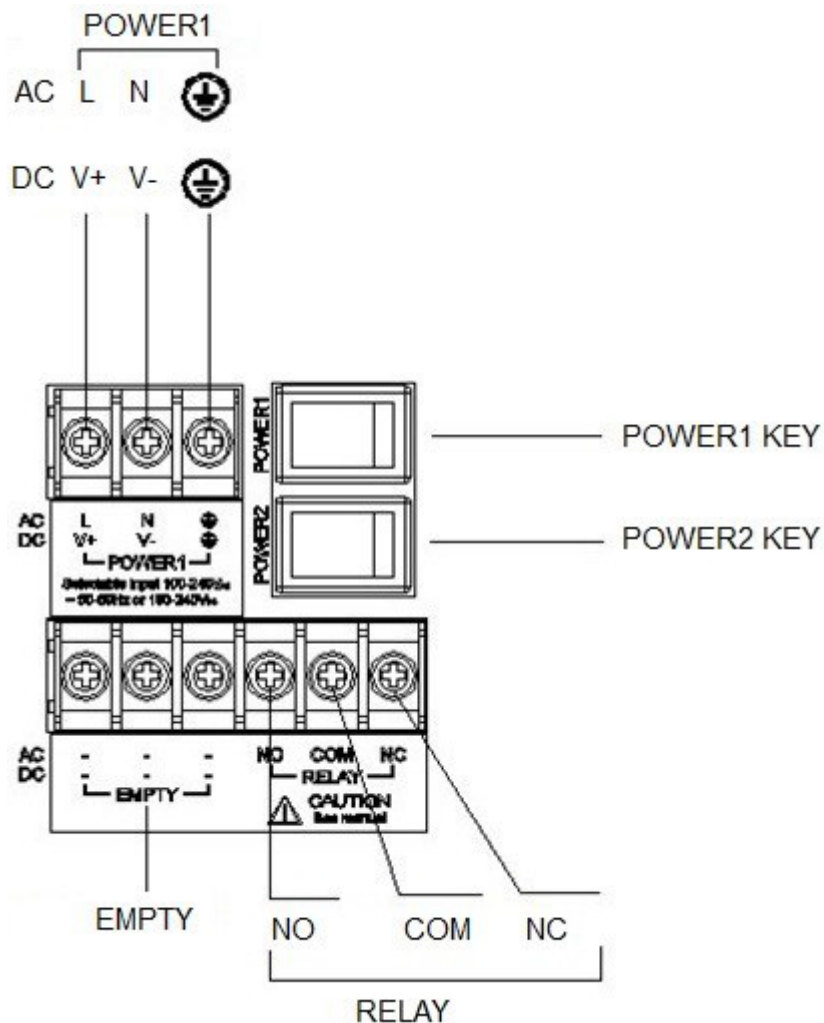


Figure 2.14 Power1 Input Location

Table 2.6: Table 2.6: AC/DC Power Input PIN Definition

Pin	Screen Printing	Function Description
1	L/V+	PWR1 L/PWR1 V+ AC/DC power input PIN
2	N/V-	PWR1 N/PWR1 V- AC/DC power input PIN
3		GND Provided adjacent to the main protective earthing terminal (IEC 60417-5019).

Make sure the voltage of the power source is correct before securing the power outlet with the connection to earth.

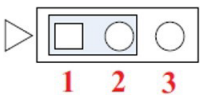
Caution! The earthing wire of the protective earthing conductor is green-and-yellow (20 AWG/0.5 mm²) and should be connected to the building with earthing connection.



Caution! The terminals for connecting protective earthing conductors should comply with conductor size 1.0 (mm²), Minimum nominal thread diameter: 3.0 (mm) for Pillar type or stud type; 3.5 (mm) for Screw type.



Table 2.7: Jumper Setting of ATX/AT Power Mode Selection

Jumper Setting	Description
 1 2 3 ATXAT (Default)	ATX Power Mode
 1 2 3	AT Power Mode

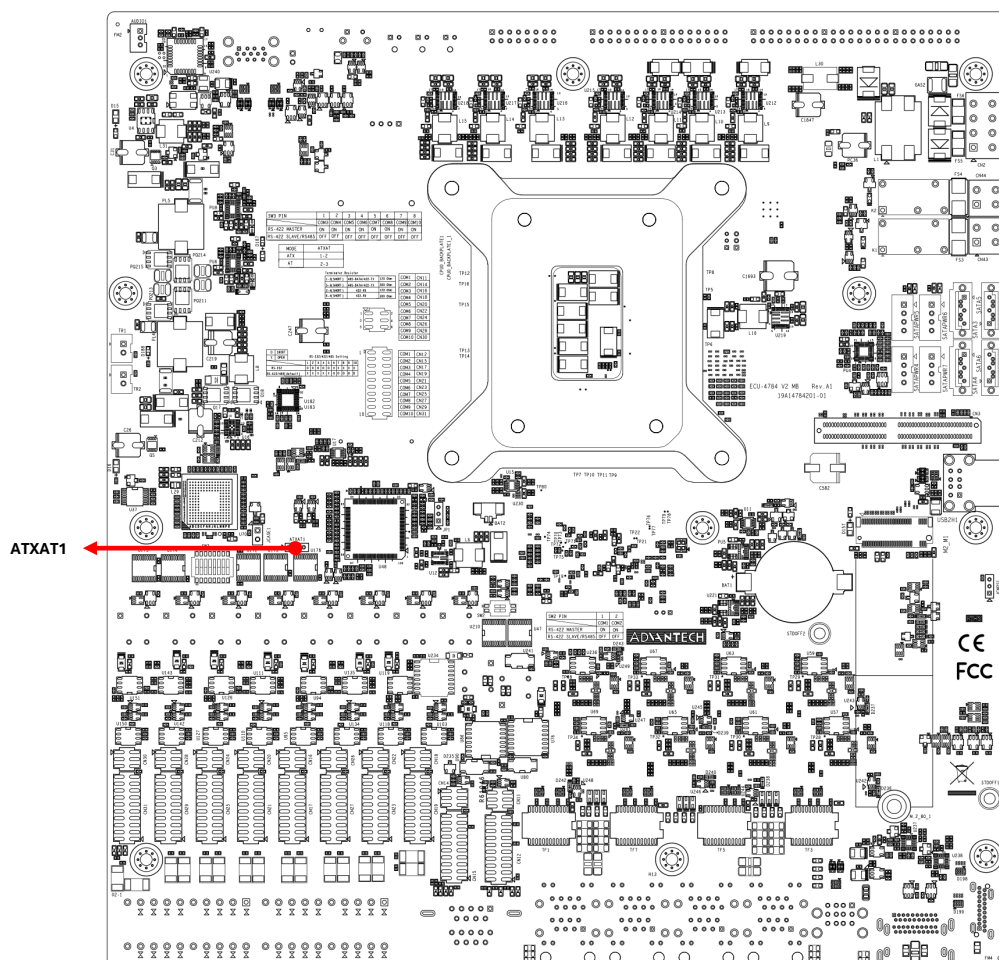


Figure 2.15 ATXAT Power Mode Select Location (ATXAT1)

2.4 Serial Ports (COM1, COM2)

The ECU-4784-V2 series offer two serial ports with DB9 connectors supporting RS-232/422/485 communication. Please refer to Table 2.9 for pin assignments. It can not support IRQ, if the I/O address is the same as the super I/O.

Table 2.8: Jumper Setting of RS-232/RS-422/RS-485 Selection (For COM(1~2))

CNx	Description																			
CN12 CN15	2 4 6 8 10 12 14 16 18 20 1 3 5 7 9 11 13 15 17 19																			
	2 4 6 8 10 12 14 16 18 20 1 3 5 7 9 11 13 15 17 19																			

Table 2.9: COM (1~2) Port Pin Definitions

Pins	RS-232	RS-422	RS-485
1	DCD	TX-	Data-
2	RXD	TX+	Data+
3	TXD	RX+	
4	DTR	RX-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS		
9	RI		

Table 2.10: Mapping Table of Jumper for COM (1~2) Port

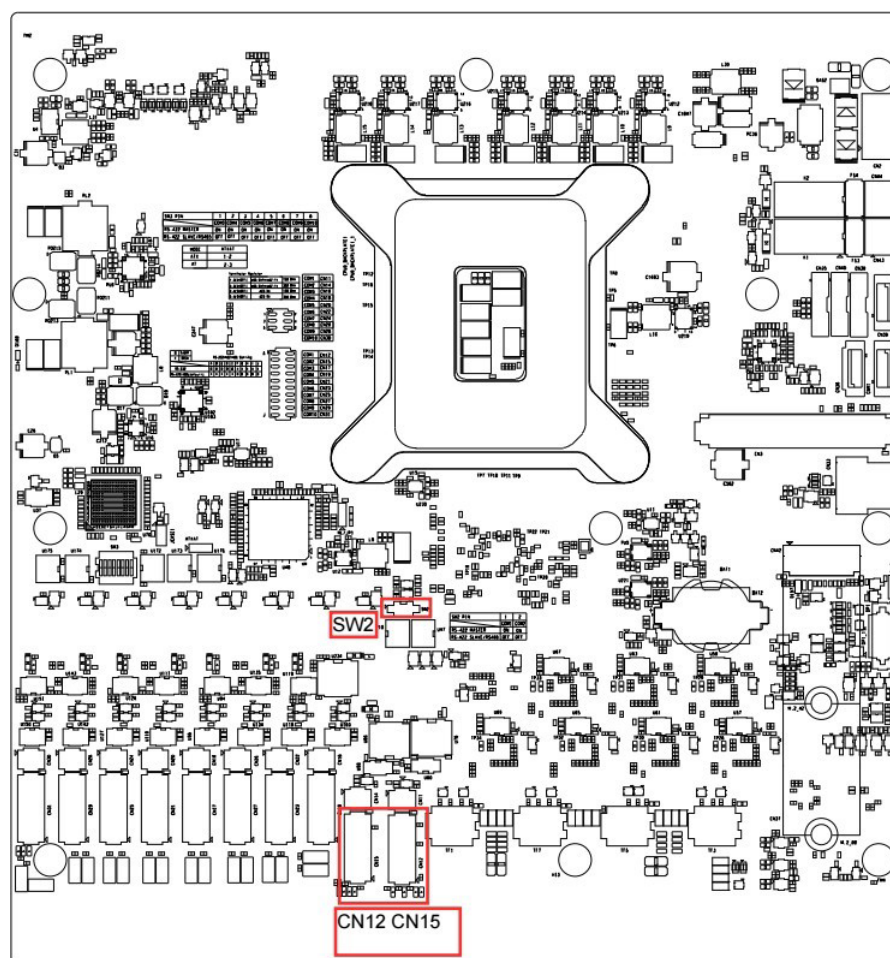
COM Port	Jumper for RS-232/RS-422/RS-485 Selection
COM1	CN12
COM2	CN15

Table 2.11: Switch Setting of RS-422 Master/Slave Selection

		Description
SW2	OFF (default)	RS-422 Slave Mode
	ON	RS-422 Master Mode

Table 2.12: Mapping Table of SW2 for COM (1~2) Port

COM Port	Jumper for master/slave of RS-485
COM1	1
COM2	2

**Figure 2.16 COM1~2 Port Related Jumper Locations (CN12 CN15,SW2)**

2.4.1 RS-422/485 Detection

In RS-422/485 mode, ECU-4784-V2 Series automatically detects signals to match RS-422 or RS-485 networks. (No jumper change required)

2.4.2 Automatic Data Flow Control Function for RS-485

In RS-485 mode, the ECU-4784-V2 Series automatically detect the direction of incoming data. So no handshake signal (e.g. RTS signal) is necessary. This lets you conveniently build an RS-485 network with just two wires.

2.4.3 Terminal Resistor for RS-422/RS-485

The onboard termination resistor (120 ohm/300 ohm) for COM1~2 can be used for long distance transmission or device matching. (Default Open.) Please refer to Table 2.14 for the mapping table of Jumper and COM port.

2.4.3.1 COM (1~2) RS-422/RS-485 Terminal Resistor Setting Instructions

Table 2.13: Jumper Setting of Terminal Resistor for COM (1~2)

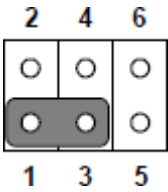
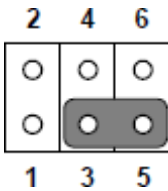
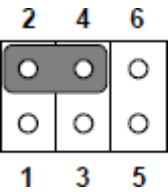
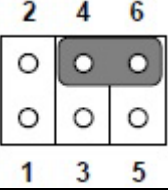
CNx	Description	
CN11 CN14		Add 120 ohm terminal resistor on TX+/TX- of RS-485
		Add 300 ohm terminal resistor on TX+/TX- of RS-485
		Add 120 ohm terminal resistor on Rx+/Rx- of RS-422
		Add 300 ohm terminal resistor on Rx+/Rx- of RS-422

Table 2.14: Mapping Table of Jumper for COM (1~2) Port

COM Port	Jumper for Terminal Resistor
COM1	CN11
COM2	CN14

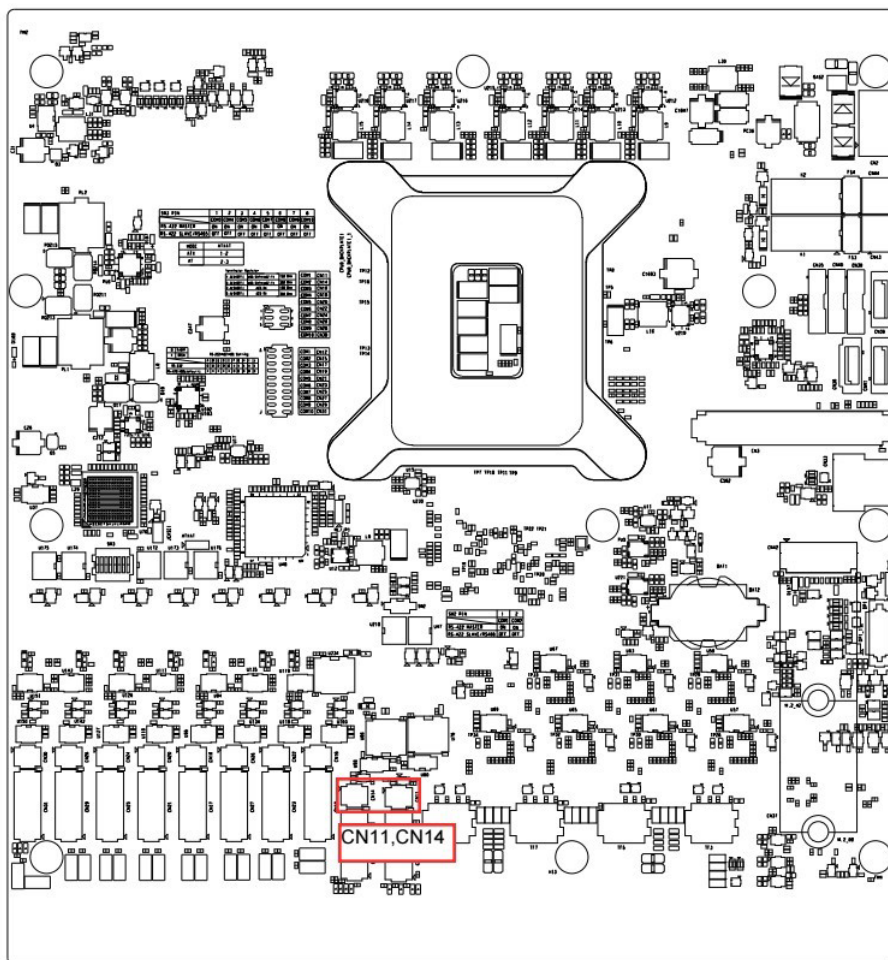


Figure 2.17 COM1~2 Port Related Jumper Locations (CN11 CN14)

2.5 Serial Ports (COM3~COM10)

The ECU-4784-V2 Series offers 8 serial ports with terminal block support RS-232/422/485 communication: COM3 to COM10. Please refer to Table 2.17 for their pin assignment.

Table 2.15: Jumper Setting of RS-232/RS-422/RS-485 Selection (For COM(3~10))

CNx		Description
CN17		RS-232
CN19		
CN21		
CN23		
CN25		
CN27		RS-422/485 (Default)
CN29		
CN31		

Table 2.16: Mapping Table of Jumper for COM (3~10) Port

COM Port	Jumper for RS-232/RS-422/RS-485 Selection
COM3	CN17
COM4	CN19
COM5	CN21
COM6	CN23
COM7	CN25
COM8	CN27
COM9	CN29
COM10	CN31

Table 2.17: COM(3 ~10) Port Pin Definitions

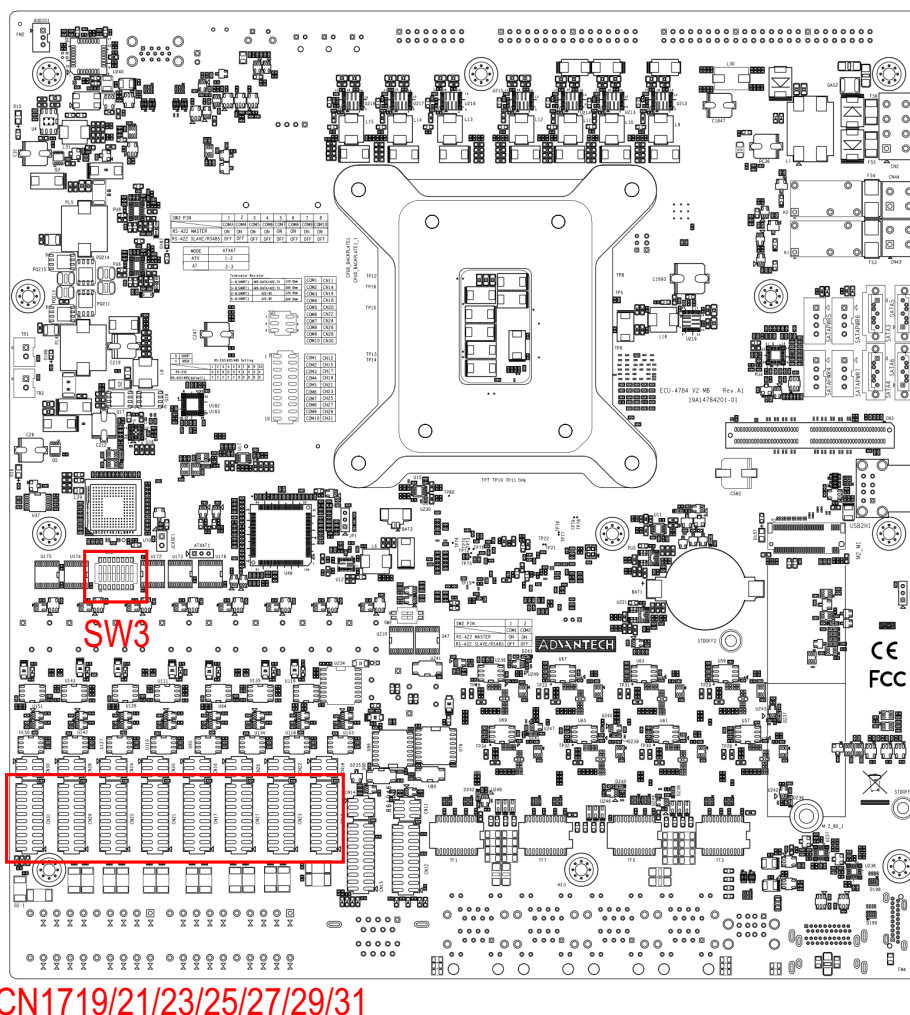
Pins	RS-232	RS-422	RS-485
1	RxD	TX+	Data+
2	TxD	Tx-	Data-
3	RTS	RX+	
4	CTS	RX-	
5	GND	GND	GND

Table 2.18: Switch Setting of RS-422 Master/Slave Selection

		Description
SW3	OFF (default)	RS-422 Slave Mode
	ON	RS-422 Master Mode

Table 2.19: Mapping Table of SW3 for COM (3~10) Port

COM Port	Jumper for RS-232/RS-422/RS-485 Selection
COM3	1
COM4	2
COM5	3
COM6	4
COM7	5
COM8	6
COM9	7
COM10	8

**Figure 2.18 COM3~10 Port Related Jumper Locations (CN17-CN31, SW3)**

2.5.1 UART Chips

ECU-4784-V2 with Intel 14th Generation processor comes with EXAR XR17V358IB UART containing 128 bytes FIFO.

2.5.2 RS-422/485 Detection

In RS-422/485 mode, ECU-4784-V2 Series automatically detects signal to match RS-422 or RS-485 networks. (No jumper change required)

2.5.3 Automatic Data Flow Control Function for RS-485

In RS-485 mode, the ECU-4784-V2 Series automatically detect the direction of incoming data. No handshake signal (e.g. RTS signal) is required. This allows you conveniently build an RS-485 network with just two wires.

2.5.4 Terminal Resistor for RS-422/RS-485

The onboard termination resistor (120 ohm/300 ohm) for COM3~COM10 can be used for long distance transmission or device matching (Default Open). Please refer to Table 2.21 for the mapping table of Jumper and COM ports.

2.5.4.1 COM (3~10) RS-422/RS-485 Terminal Resistor Setting Instructions

Table 2.20: Jumper Setting of Terminal Resistor for COM (3~10)

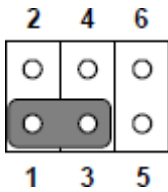
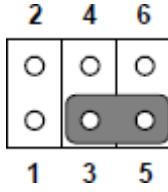
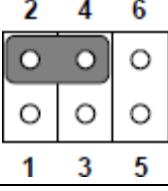
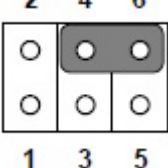
CNx	Description
	 Add 120 ohm terminal resistor on TX+/TX- of RS-485
CN16 CN18 CN20 CN22 CN24 CN26 CN28 CN30	 Add 300 ohm terminal resistor on TX+/TX- of RS-485
	 Add 120 ohm terminal resistor on Rx+/Rx- of RS-422
	 Add 300 ohm terminal resistor on Rx+/Rx- of RS-422

Table 2.21: Mapping Table of Jumper for COM (3~10) Port

COM Port	Jumper for Terminal Resistor
COM3	CN16
COM4	CN18
COM5	CN20
COM6	CN22
COM7	CN24
COM8	CN26
COM9	CN28
COM10	CN30

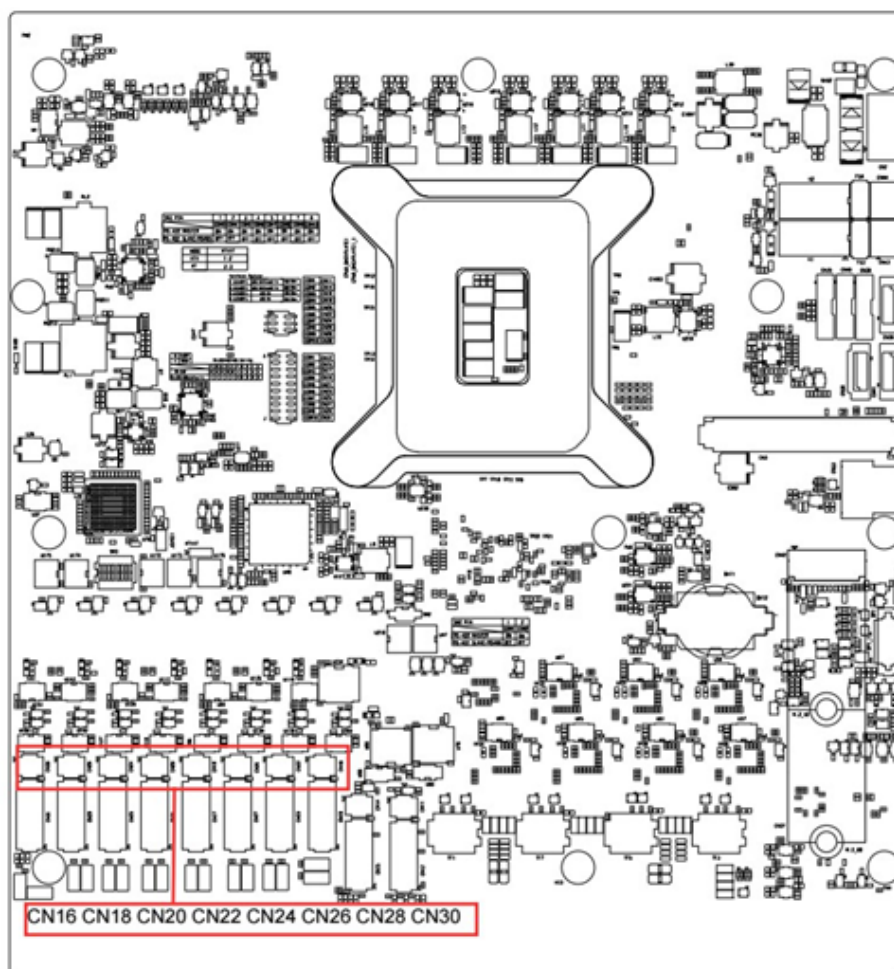


Figure 2.19 COM3~10 Port Related Jumper Locations (CN16-CN30)

2.6 CMOS CLR Jumper (JCMOS1)

The ECU-4784-V2 motherboard contains a jumper, which can erase CMOS data and reset the system BIOS information. Normally, the instrument should be set to 1-2 pin closure. To reset CMOS data, set JCMOS1 to pin 2-3 off for a few seconds, and then move the jumper back to pin 1-2 off. This program will reset CMOS to the default settings.

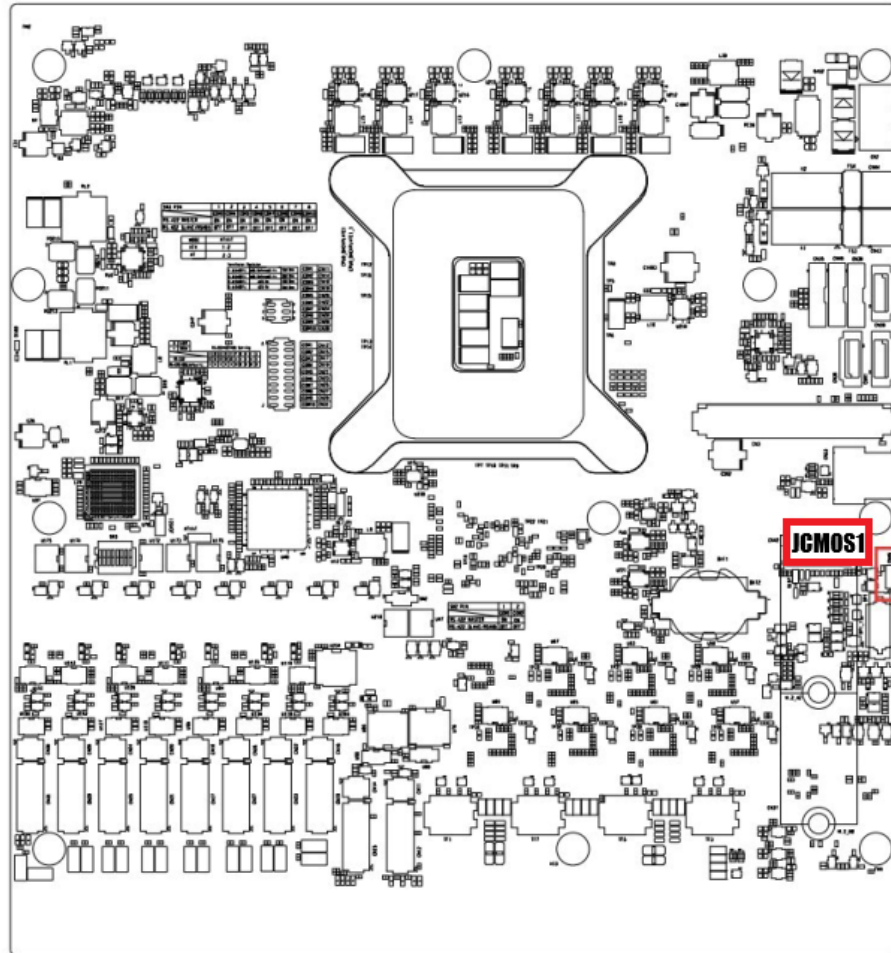


Figure 2.20 CMOS Clear Jumper location (JCMOS1)

Table 2.22: CMOS CLR Jumper

Mode	Jumper Setting
* KEEP CMOS	1-2
CLR CMOS	2-3

*Default setting

2.7 Relay Output For Event

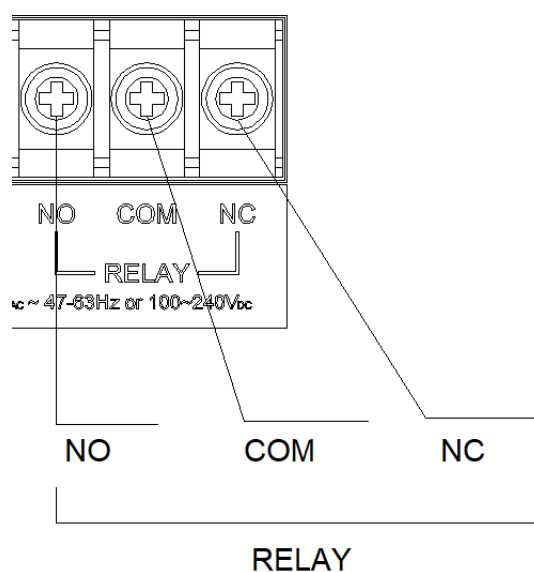


Figure 2.21 Relay Output Connections

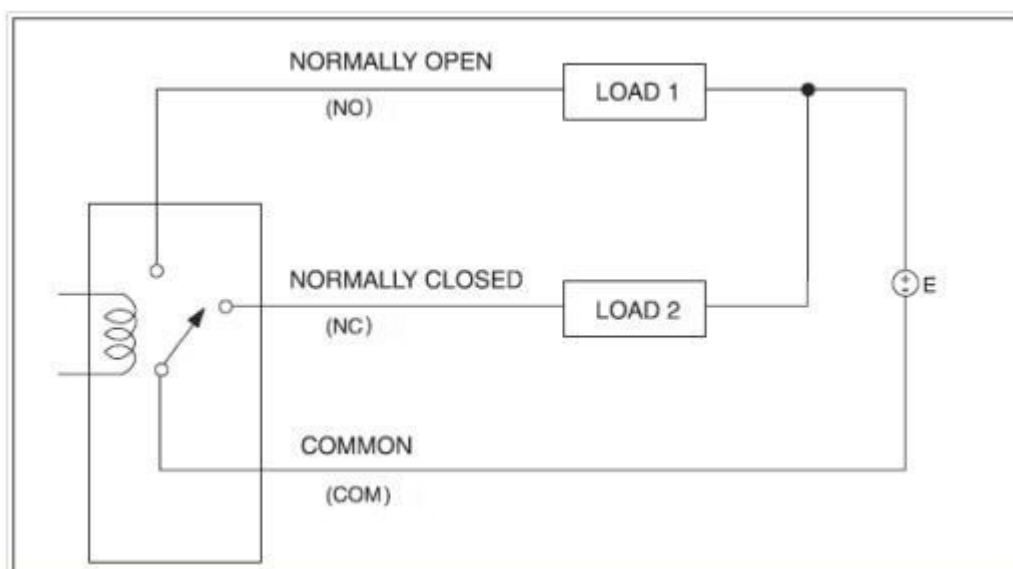
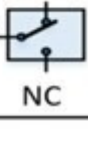


Figure 2.22 Wiring Diagram of the Relay out

The ECU-4784-V2 Series provides a relay out alarm function, which is convenient for the user to control the relay out alarm using the API. For a detailed explanation of the relay out API, please refer to:

C:\Program Files\Advantech\AdvRelay\Examples\VC++\RelayTool" directory.

Power1 Status	Power2 Status	Relay Out Function
OFF	OFF	
OFF	ON	Software control
ON	OFF	Software control
ON	ON	

Users can program the relay out function by API, the detailed parameters can be referred to in the software help document. The Advantech relay out driver provides examples, explaining how to use ECU- 4784's relay out with a series of real examples and reference information for users to develop their own applications. You can modify these sample applications to meet your needs. You can find the example in the below installation path:

C:\Program Files\Advantech\AdvRelay\Examples\VC++\RelayTool" directory.

2.8 LAN: Ethernet Connector

The ECU-4784-V2 Series are equipped with Intel i226IT Gigabit LAN Ethernet controller, which are compliant with IEEE802.3 1000Base-T, 100Base-TX and 10Base-T (802.3, 802.3u and 802.3ab). The Ethernet port provides a standard RJ-45 jack on board, and LED indicators on the front side to show its Link and Active status.

2.9 USB Ports

The ECU-4784-V2 Series provide five USB interface connectors, which provide complete Plug & Play and hot swapping for up to 127 external devices. It provides 1 x USB 2.0 port and 1 x USB 3.2 Gen1 on the front panel, and 3 USB 2.0 ports on the rear panel. It also provides 2 x USB 2.0 ports inside the chassis for a USB dongle key.

2.10 Display Ports

The ECU-4784-V2 Series equipped with 3 DP++, the resolution is up to 4K@60Hz.

2.11 Advanced Watchdog Timer

The ECU-4784-V2 Series provides one hardware Watchdog Timer for users to have a chance to escalate system status before the forced system reset. Users can operate system I/O port 2E and 2F to set different times. You can see the Interface or Advantech's example in Appendix A.

2.12 ECU-P Expansion

The ECU-4784-V2 Series supports 2 proprietary PCIe slots which support up to 2 ECU-P expansion cards. Users could also expand other functions of the PCIe interface to meet demands.

Due to the ECU-4784-V2 Series being an embedded system, the power provision for the expansion slot is limited. The maximum power support for each slot is:

5 V @ 2 A

3.3 V @ 1.5 A

12 V @ 0.25 A

Supports a maximum 25 W (at 50° C condition) for all slots. Before you configure all the modules and plug-in card, please note not to exceed the power limit.

2.13 VT-D

The ECU-4784-V2 Series supports virtualization solutions which allow multiple operating systems and applications to run in independent partitions all on a single ECU-4784-V2. Using virtualization capabilities, one physical computer system can function as multiple "virtual" systems. Intel® Virtualization Technology (Intel VT) improves the performance and robustness of today's virtual machine solutions by adding hardware support for efficient virtual machines. Intel® Virtualization Technology for Directed I/O (VT-d) extends Intel's Virtualization Technology (VT) roadmap by providing hardware assists for virtualization solution. VT-d continues from the existing support for IA-32 (VT-x) and Itanium® processor (VT-i) virtualization adding new support for I/O-device virtualization. Intel VT-d can help end users improve security and reliability of the systems and also improve performance of I/O devices in virtualized environments. These inherently helps IT managers reduce the overall total cost of ownership by reducing potential down time and increasing productive throughput by better utilization of the data center resources.

2.14 AMT

Intel AMT is part of the Intel vPro technology offering. Platforms equipped with Intel AMT can be managed remotely, regardless of whether they are powered up or whether they have a functioning OS.

2.15 TPM

The ECU-4784-V2 Series support Trusted Platform Module (TPM) technology, TPM is designed to provide hardware-based, security-related functions. A TPM is a micro-chip designed to provide basic security-related functions, primarily involving encryption keys. The TPM is usually installed on the motherboard of a computer, and communicates with the rest of the system using a hardware bus.

The Trusted Platform Module (TPM) is the root-of-trust in a given platform (such as on desktop computers). If built into a computer that runs an operating system that is aware of this chip, it can check the system integrity and authenticate third-party users who would like to access security features, while remaining under complete control of its primary user. Therefore, privacy and confidentiality are assured.

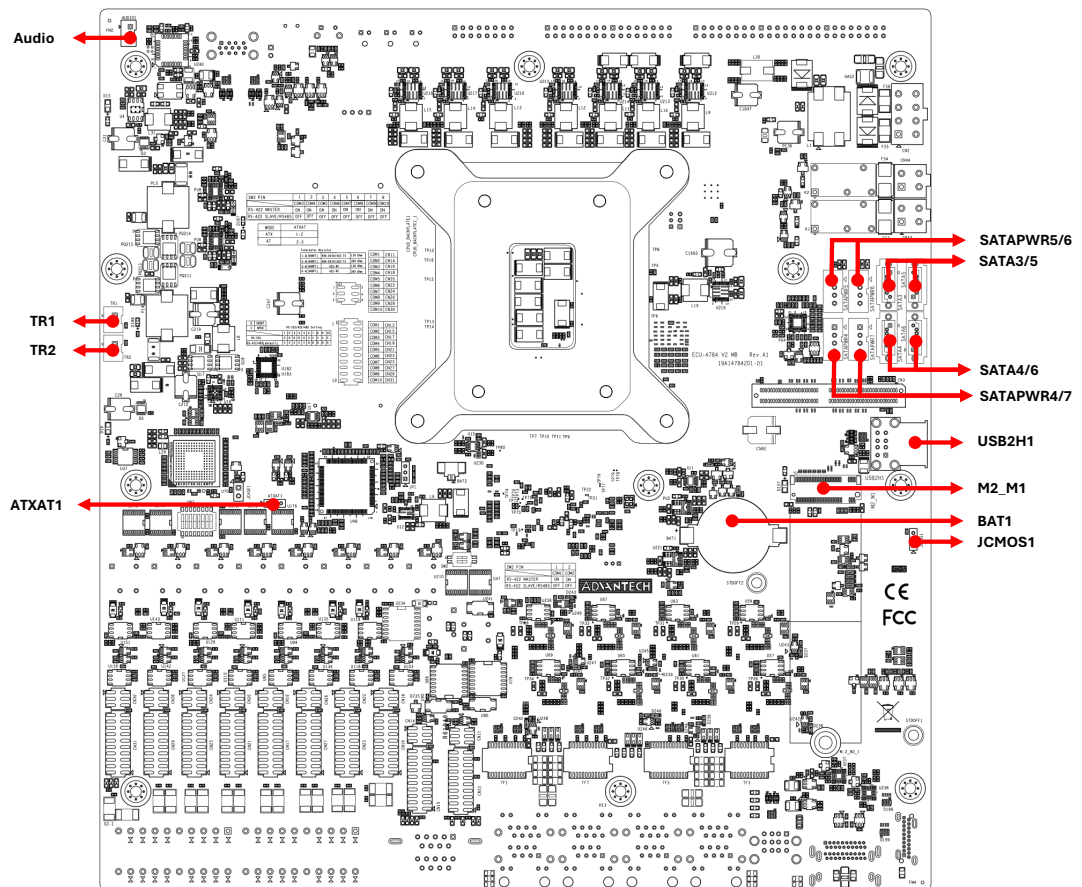
2.16 Connectors

The tables below list the function of each of the connectors.

Table 2.23: Connectors

Label	Function
COM1,2	Serial port: RS-232/422/485 (9-pin header)
DP1~3	DP connector
USB3C1	Front USB: USB2.0 (top) and USB3.2 Gen1 (Bottom)
USB2C1	Rear USB: USB2.0 x3
USB2H1	Internal USB: USB2.0 x2
LAN1~8	GbE LAN (Intel I226IT)
SATA3~6	Serial ATA 3.0 port
SATA PWR 4~7	2.5" SATA SSD power connector
M.2_M1	M.2 2280 M-key socket (PCIe x4 Gen4 link)
DIMMA1, DIMMB1	260-pin SODIMM socket
COM3~10	Serial port: RS232/422/485 (Terminal block)

2.17 Board Layout: Jumper and Connector Locations



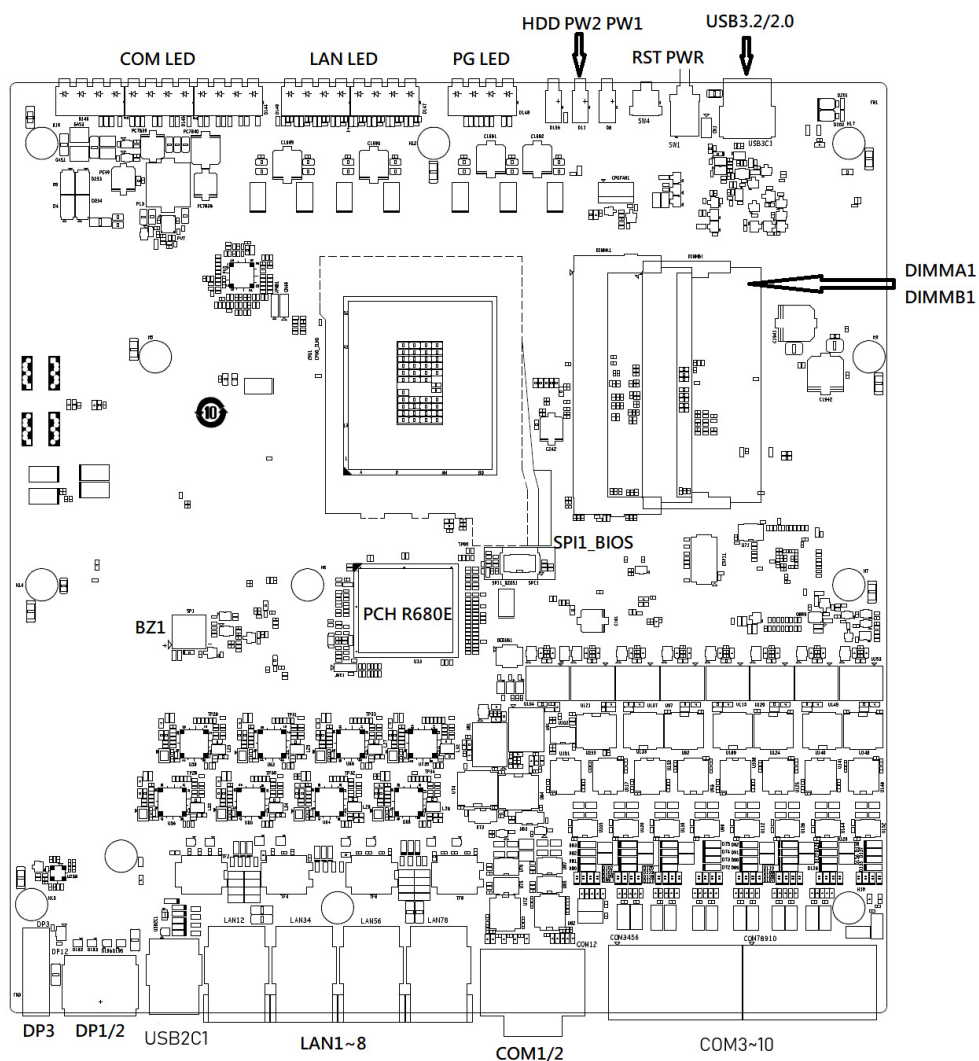


Figure 2.23 Jumper and Connector Locations

2.18 Ethernet Interface

The ECU-4784-V2 Series products are equipped with Intel® 8 x Giga LAN. LAN1 port is shared with the IAMT function.

2.18.1 MAC Address

You can identify MAC addresses according to the labels placed on Ethernet connectors as shown below.

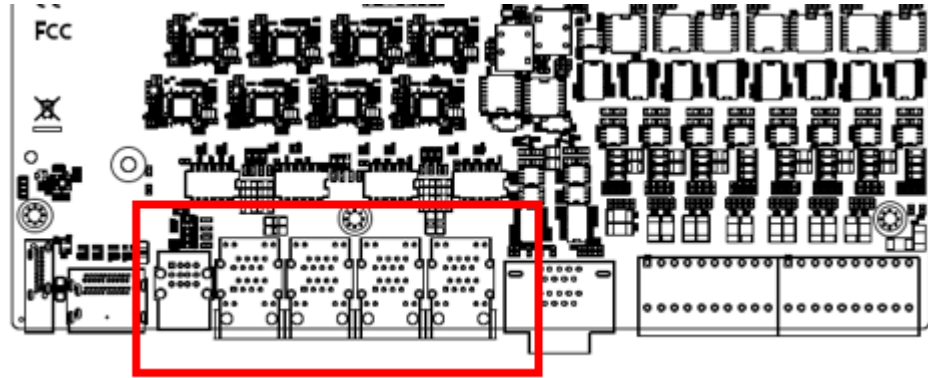


Figure 2.24 MAC Address

Table 2.24: LAN Connector Pin Assignments

Pin	Assignment	Description
1	TD+	Transmit +
2	TD-	Transmit -
3	RD +	Receive +
4	N/C	Not used
5	N/C	Not used
6	RD-	Receive -
7	N/C	Not used
8	N/C	Not used

2.19 Display Interface

ECU-4784-V2 is configured with three DP++ connectors.

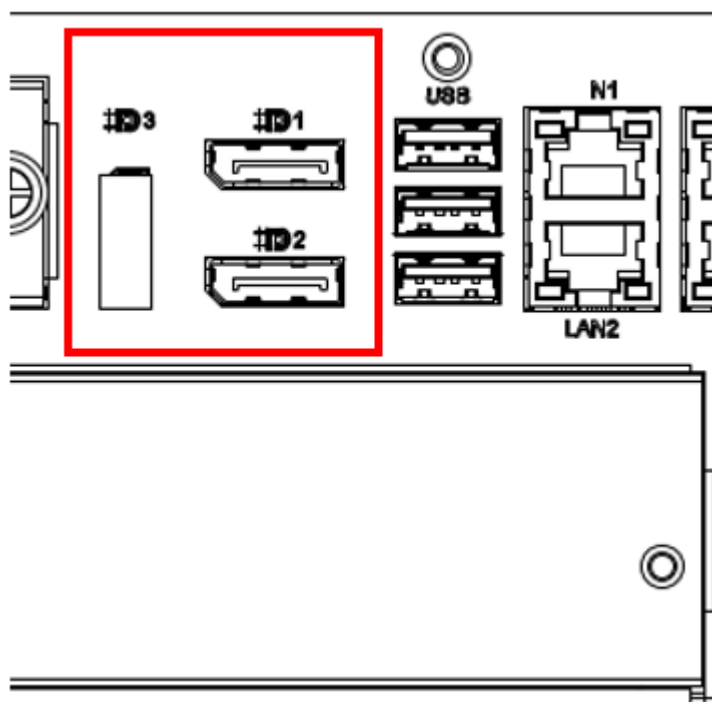


Figure 2.25 Display Position

The first time you get started with a bare sever, the operating system needs to be installed. “UEFI” is the default mode on the bare machine.

2.20 USB Ports

2.20.1 USB Ports Positions

ECU-4784-V2 is equipped with 3 x USB 2.0 connectors on the rear panel, 1 x USB 3.2 Gen1 connector and 1 x USB 2.0 connector on the front panel.

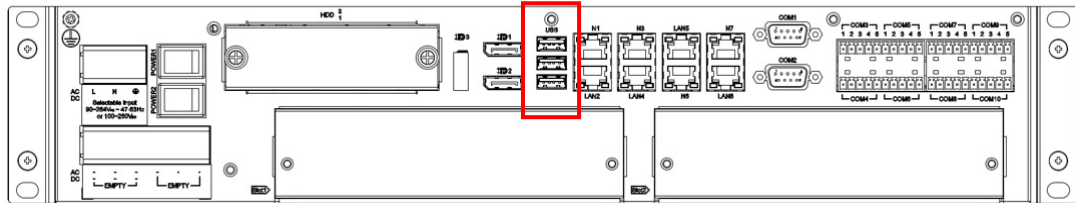


Figure 2.26 Rear USB Port Positions

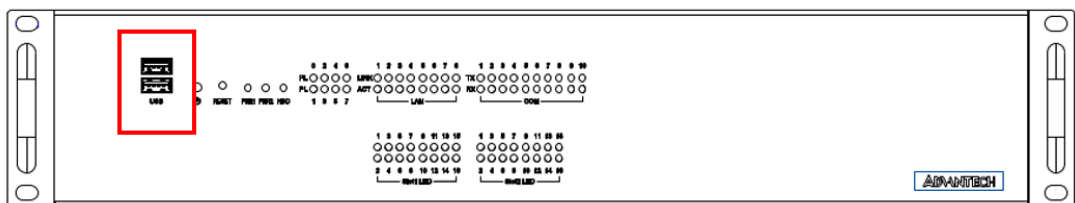


Figure 2.27 Front USB Port Positions

Table 2.25: USB 3.2 Pin Assignment

Pin	Signal
1	+5V
2	D-
3	D+
4	GND
5	STDA SSRX-
6	STDA SSRX+
7	Shield GND DRAIN
8	STDA SSTX-
9	STDA SSTX+

2.21 Expansion Slots

2.21.1 Expansion PCIe Slot

2.21.1.1 Expansion PCIe Slot Illustration`

ECU-4784-V2 supports 2 standard domain I/O expansions. Customers can choose different proprietary PCIe cards from the following Table 2.26 according to their needs.

The maximum power support for proprietary PCIe slot is: 5 V @ 2 A

3.3 V @ 1.5 A

12 V @ 0.25 A

2.21.1.2 Proprietary PCIe Card List

Below is the list of proprietary cards compatible with ECU-4784-V2:

Table 2.26: Proprietary PCIe Card List	
ECU Standard P/N	Description
UNOP-1000K-AE	PCIe expansion card
ECU-P1618D-B	8-port Non-Isolated RS-232/422/485 Serial port Card
ECU-P1628D-B	8-port isolated RS-232/422/485 serial port card
ECU-P1528RE-B	8-port RJ45 Gigabit Ethernet Card
ECU-P1528PE-B	8-port SFP Gigabit Ethernet Card
ECU-P1524PE	2-port SFP Ethernet Card with HSR/PRP

2.21.1.3 Installing a Proprietary PCIe Card

1. Remove the screws as shown below to open the expansion back plate.

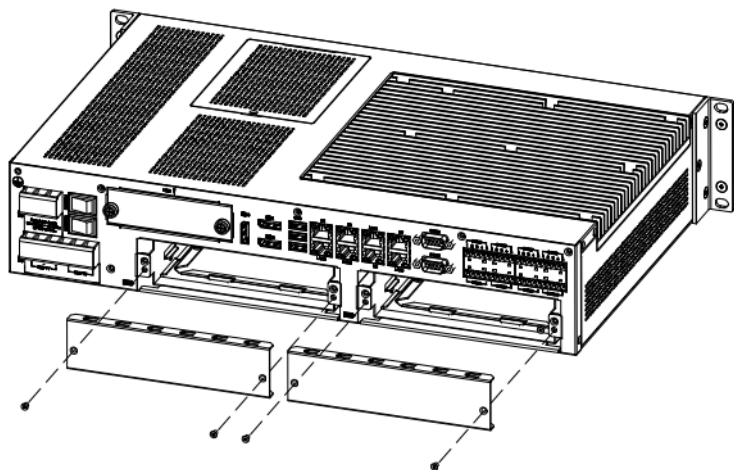


Figure 2.28 Open the ECU-P Cover

2. Insert the ECU-P expansion card through the DIN rails, and tighten the screws on the card.

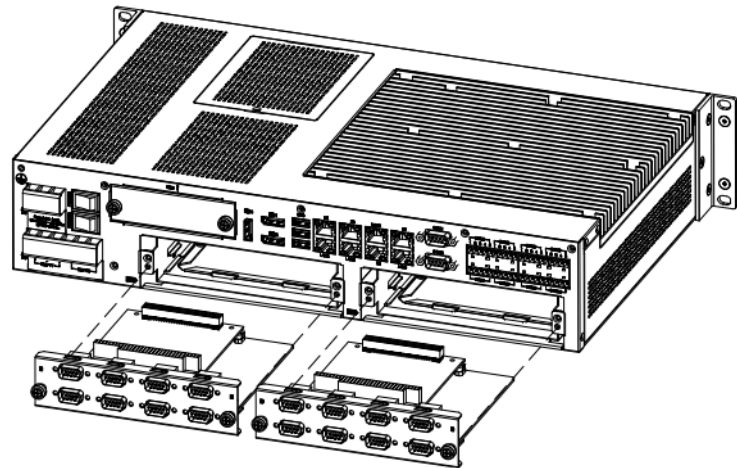


Figure 2.29 Insert the Expansion Card

Chapter 3

BIOS Operation

3.1 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 ECU-4784-V2 setup screens.



Figure 3.1 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 flash ROM so it retains the Setup information when the power is turned off.

3.2 Entering BIOS Setup

Press at bootup 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.

3.2.1 Main 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.



Figure 3.2 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.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the ECU-4784-V2 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.

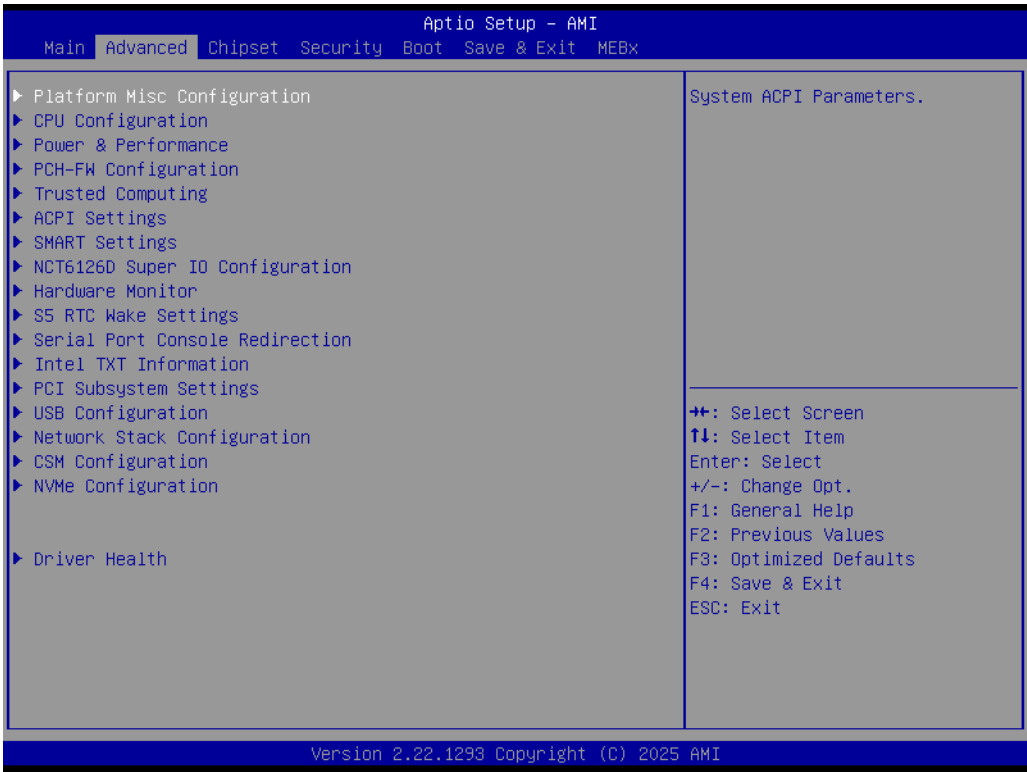


Figure 3.3 Advanced BIOS features setup screen

3.2.2.1 Platform Misc Configuration

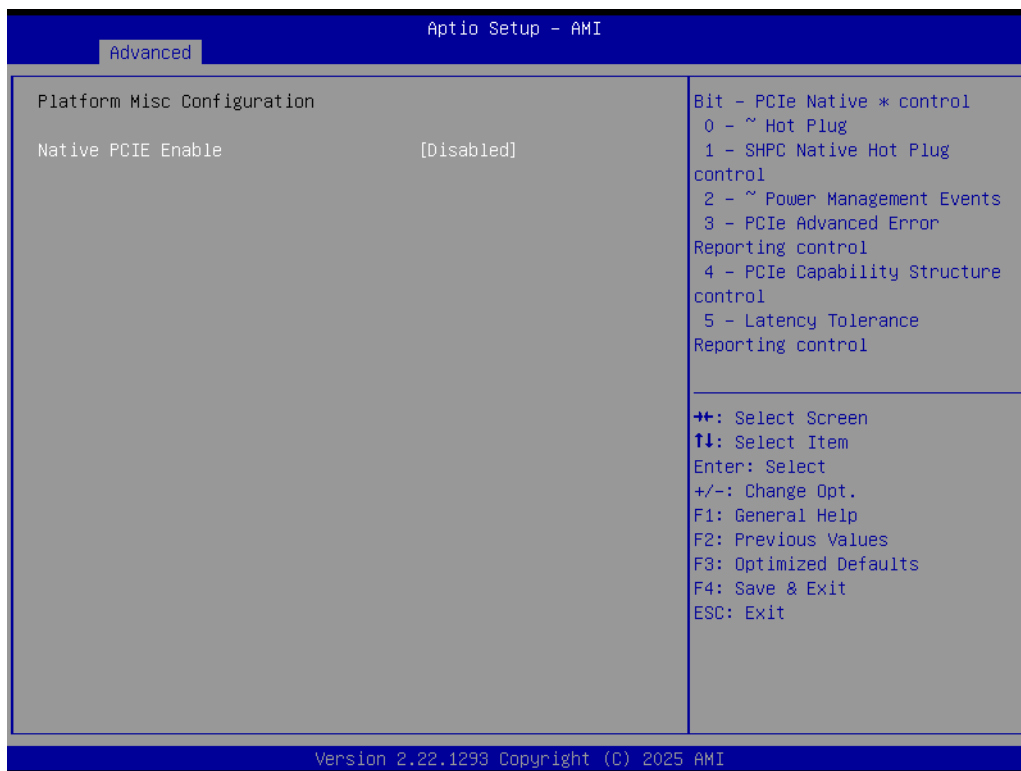


Figure 3.4 Platform Misc Configuration

- Native PCIE Enable
Enable/Disable PCI Express native support.

3.2.2.2 CPU Configuration

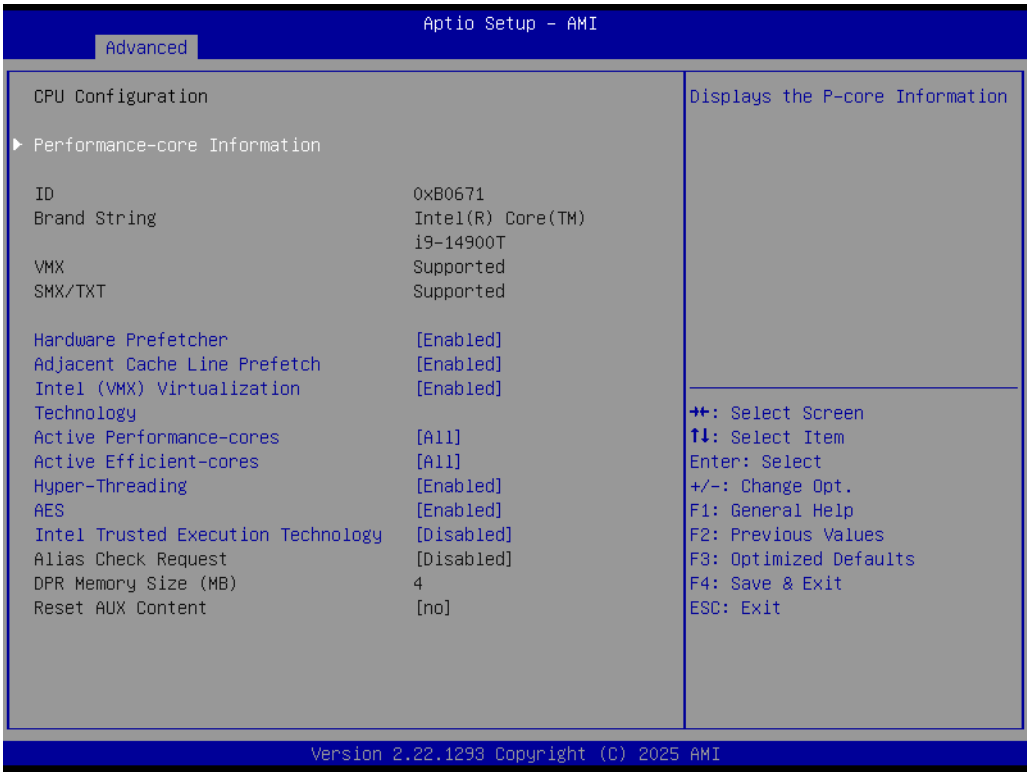


Figure 3.5 CPU Configuration

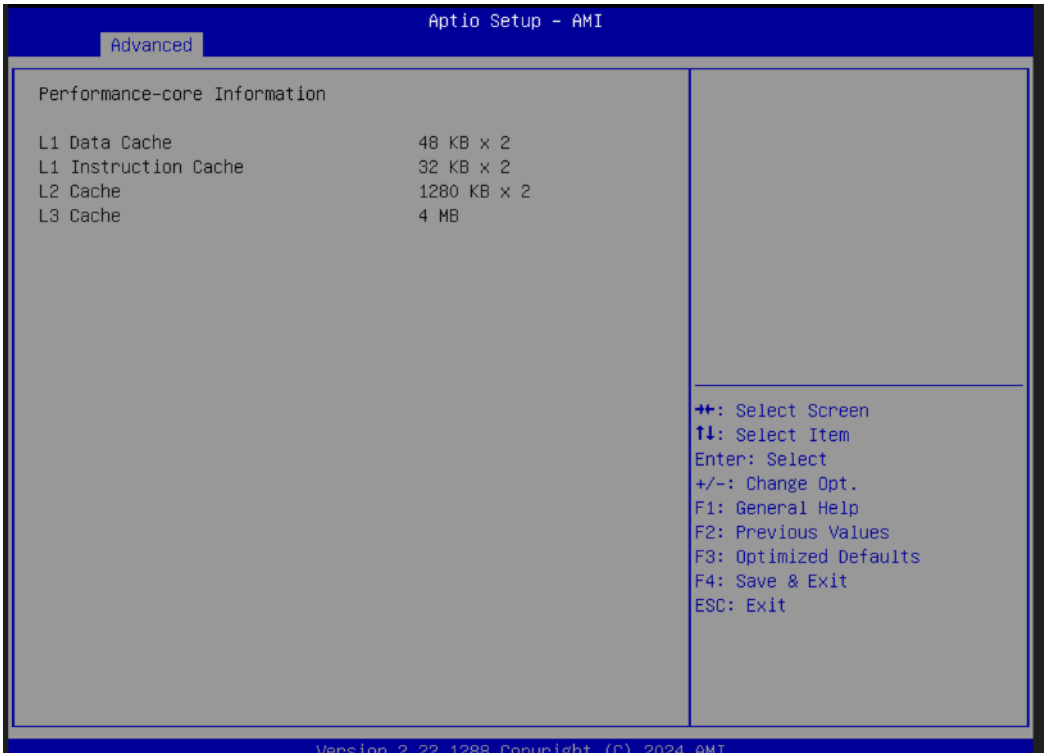


Figure 3.6 Performance-core Information

- **Performance-core Information**
Performance-core (P-core) information of current CPU used is displayed here.

- **Hardware Prefetcher**
Hardware Prefetcher is a technique that fetches instructions and/or data from memory into the CPU cache memory well before the CPU needs it to improve the load-to-use latency. You may choose to Enable or Disable it.
- **Adjacent Cache Line Prefetch**
The Adjacent Cache-Line Prefetch mechanism, like automatic hardware prefetch, operates without programmer intervention. When it is enabled through the BIOS, two 64-byte cache lines are fetched into a 128-byte sector, regardless of whether the additional cache line has been requested or not. You may choose to Enable or Disable it.
- **Intel® Virtualization Technology**
Enable/Disable Intel® Virtualization Technology (IVT) extension. This allows multiple operating systems to run simultaneously on the same system by creating virtual machines, each running its own x86 operating system.
- **Active Processor Core**
Use this item to select the number of processor cores you want to activate when you are using a multi-core processor.
- **Hyper-Threading**
Enable/Disable Intel® Hyper Threading technology.
- **AES**
This item allows users to Enable/Disable the Advanced Encryption Standard instruction set.

3.2.2.3 Power & Performance



Figure 3.7 Power & Performance

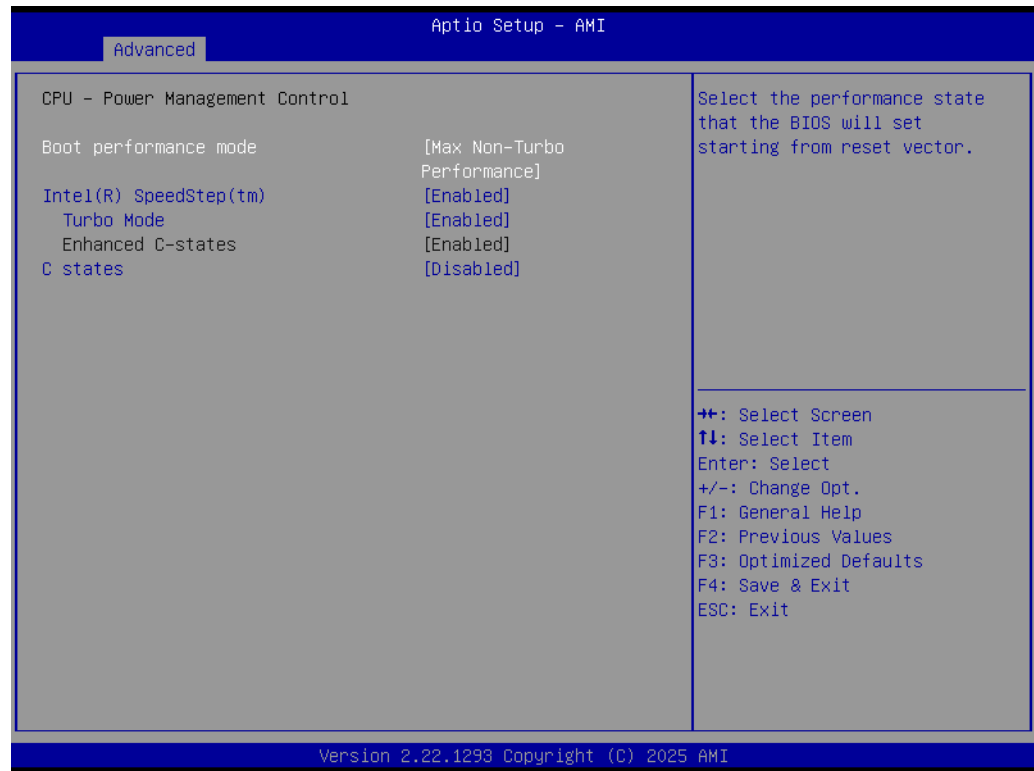


Figure 3.8 CPU - Power Management Control

- **Boot Performance**
Select the performance state that the BIOS will set before OS handoff.
- **Intel® Speedstep™**
Allows more than two frequency ranges to be supported.
- **Turbo Mode**
Enable/Disable processor turbo mode.
- **C states**
Intel® C states setting for power saving. We suggest enable for ErP.

3.2.2.4 PCH-FW Configuration

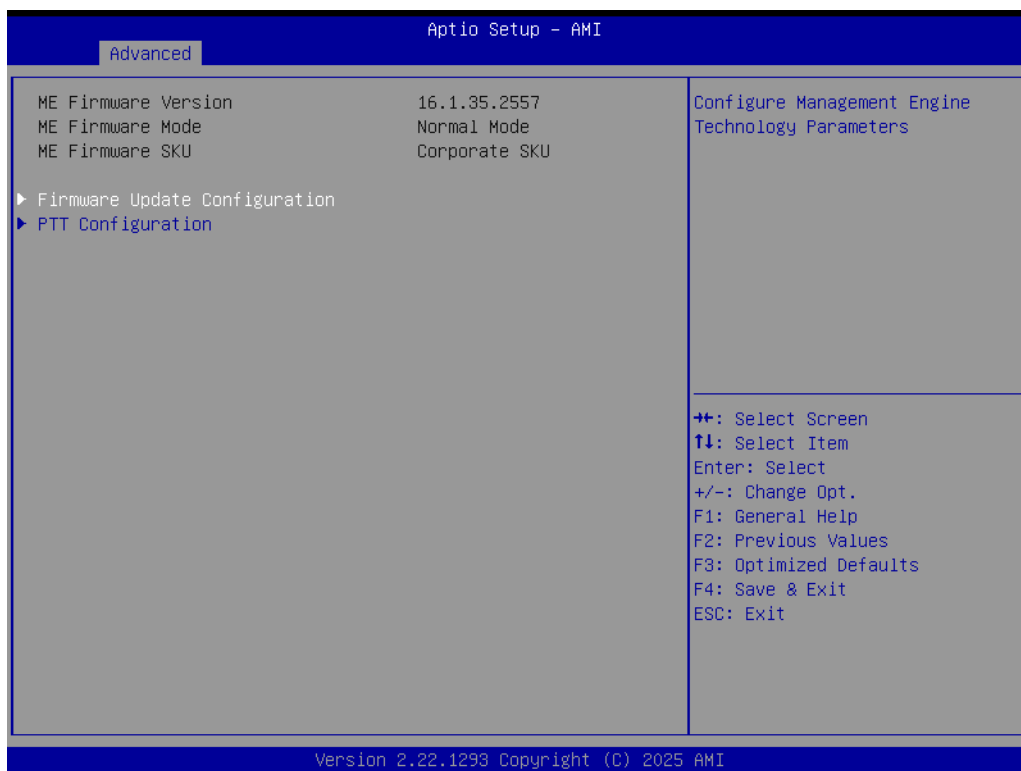


Figure 3.9 PCH-FW Configuration

- **Boot Performance PCH-FW Version**
PCH-FW page shows Intel® ME FW information.

■ Firmware Update Configuration

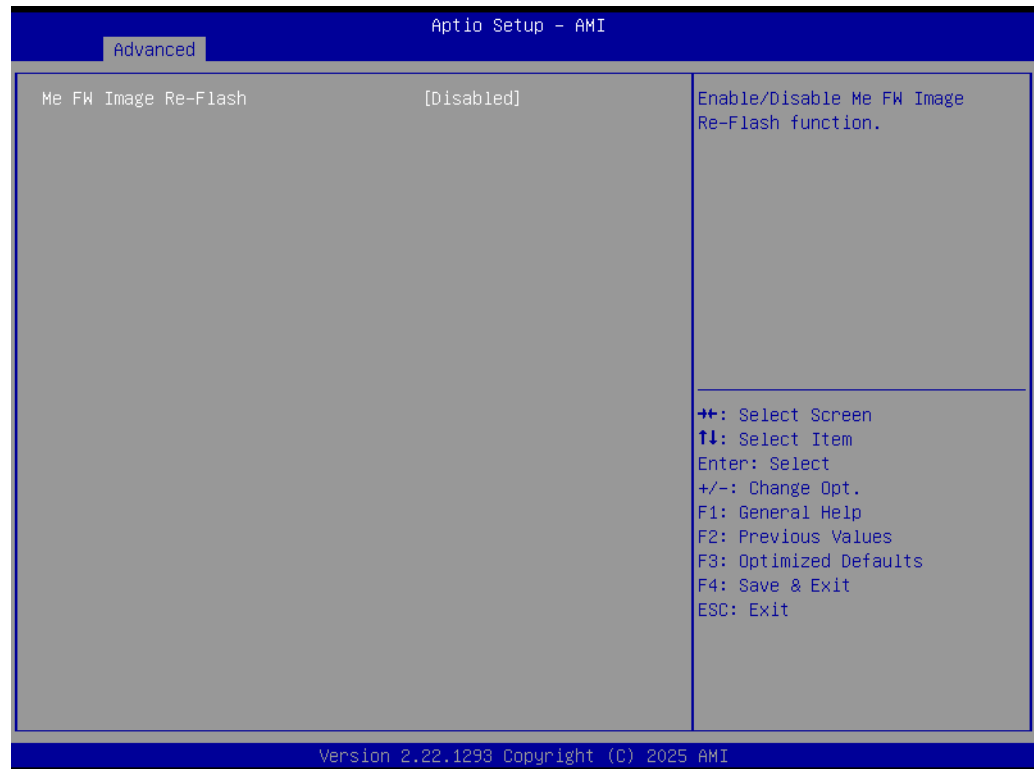


Figure 3.10 Firmware Update Configuration

- **ME FW Image Re-flash**
Enable/Disable ME firmware image re-flash function.

■ PTT Configuration

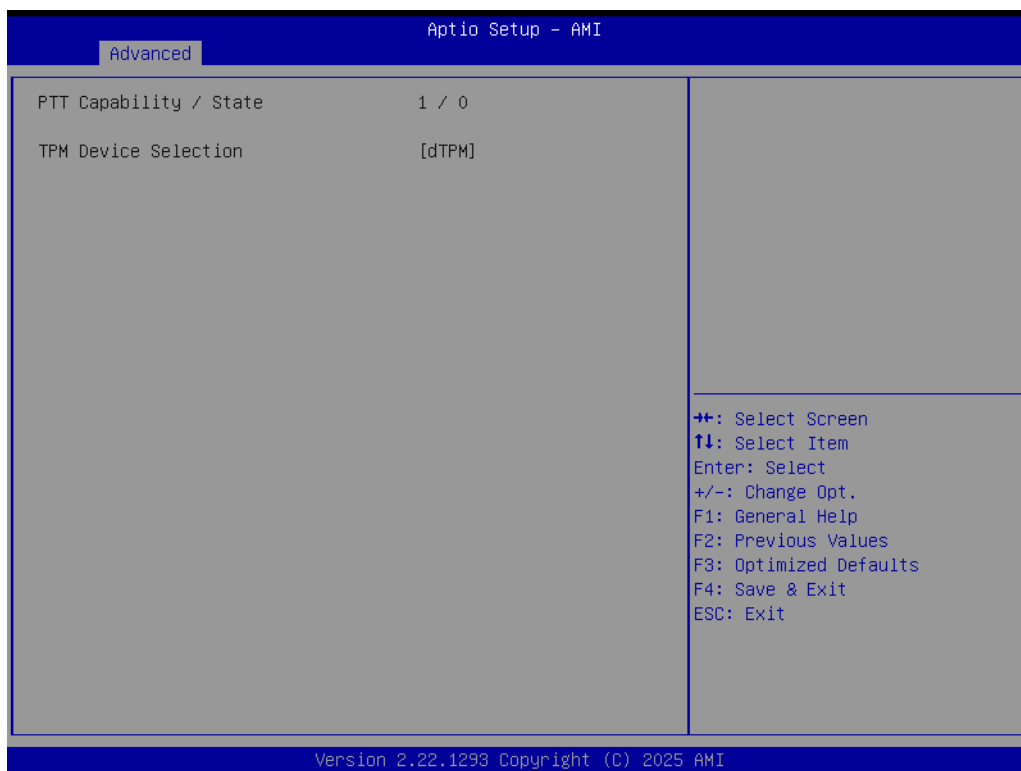


Figure 3.11 PTT Configuration

– TPM Device Selection

Select TPM device “dTPM or PTT”. dTPM is selected for discrete TPM, dTPM module. PTT (Intel Platform Trust Technology) is a firmware TPM.

3.2.2.5 Trusted Computing

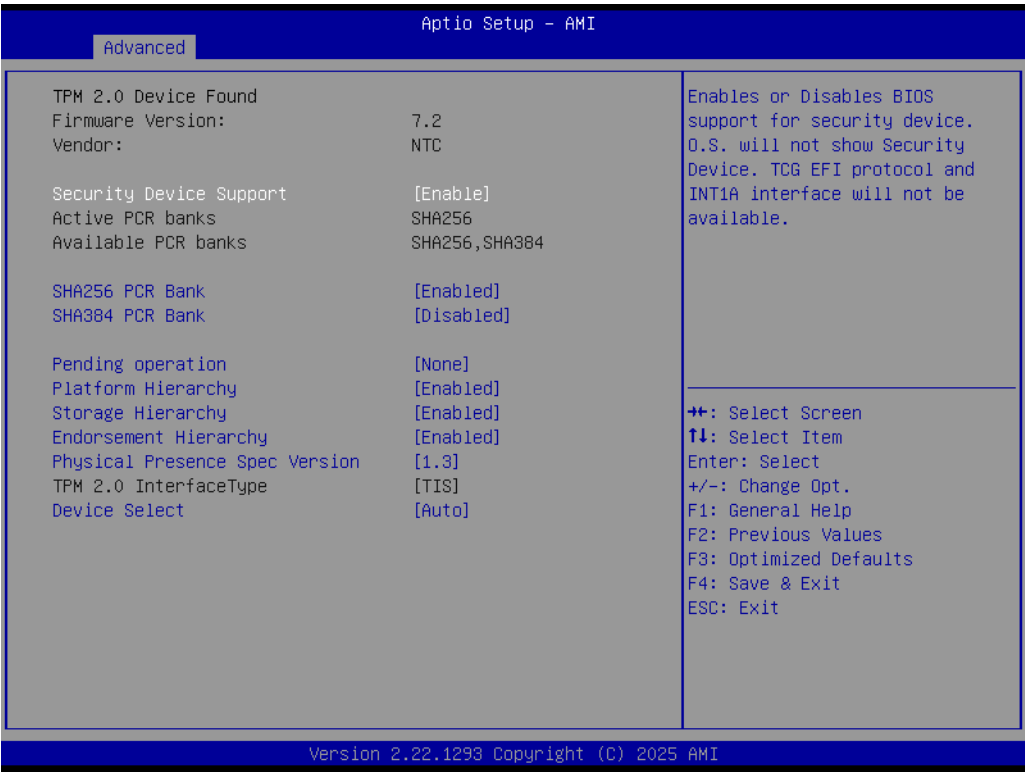


Figure 3.12 TPM Settings

- **Security Device Support**
Enable/Disable TPM Support.

3.2.2.6 ACPI Settings

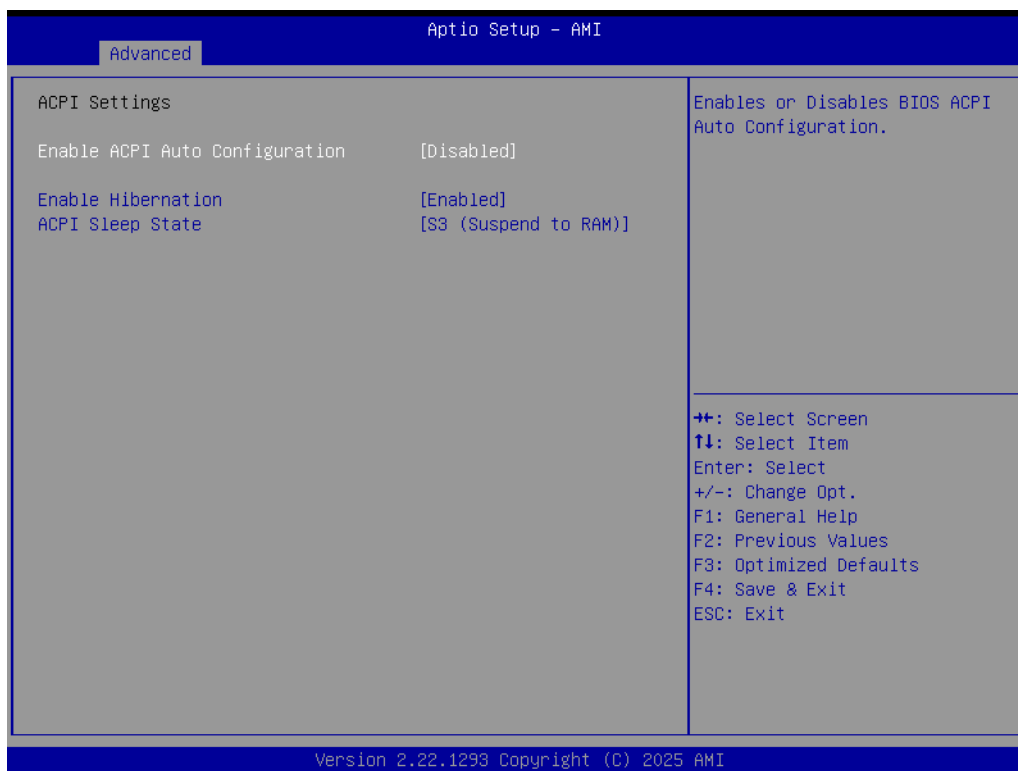


Figure 3.13 ACPI Settings

- **Enable ACPI Auto Configuration**
Enable/Disable ACPI auto configuration.
- **Enable Hibernation**
Enable/Disable Hibernation (OS/S4 Sleep State). This option may not be applied in some OS.
- **ACPI Sleep State**
Suspend Disabled or S3 (Suspend to RAM) ACPI Sleep State.

3.2.2.7 SMART Settings

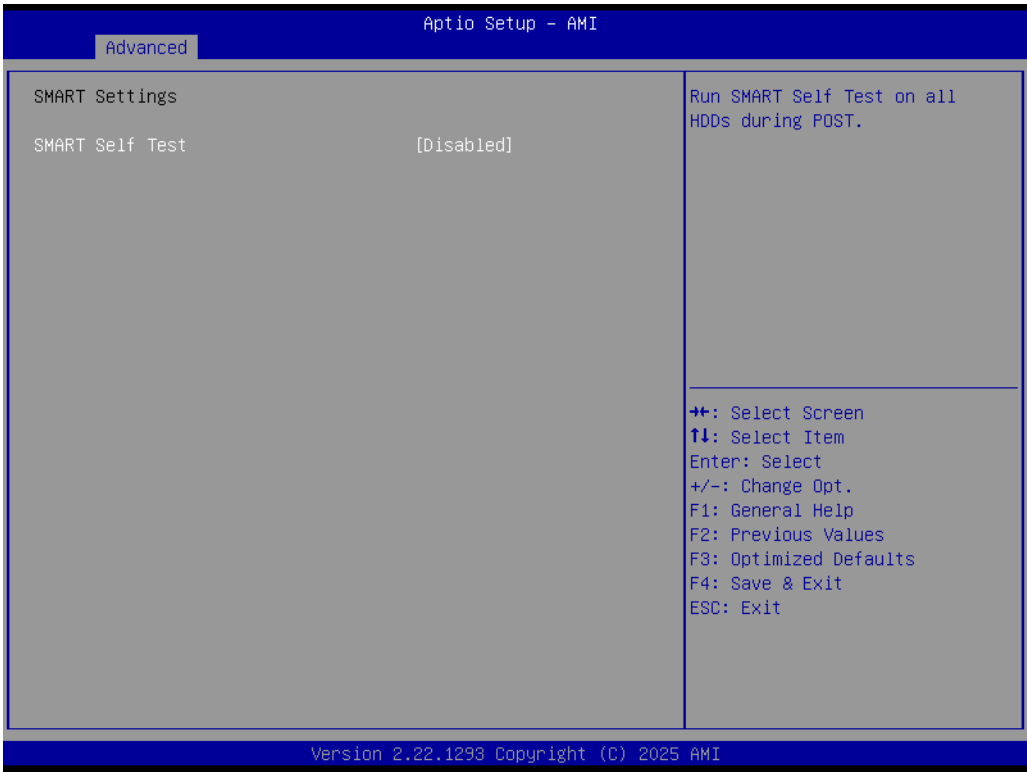


Figure 3.14 SMART Settings

- **SMART Self Test**
Enable/Disable SMART Self Test on all HDDs during POST.

3.2.2.8 NCT6126D Super IO Configuration



Figure 3.15 NCT6126D Super IO Configuration

■ Serial Port 1, 2 Configuration

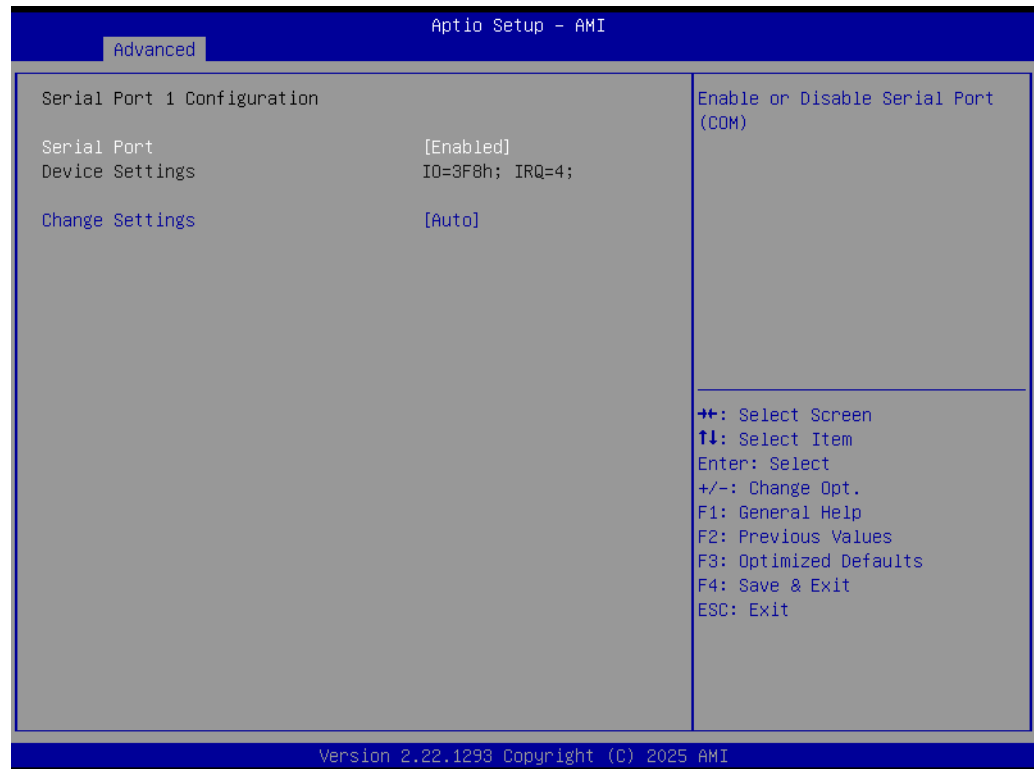


Figure 3.16 Serial Port 1 Configuration

- **Serial Port**
Enable/Disable serial port.
- **Change Settings**
Select an optimal setting for the super I/O device.

3.2.2.9 Hardware Monitor

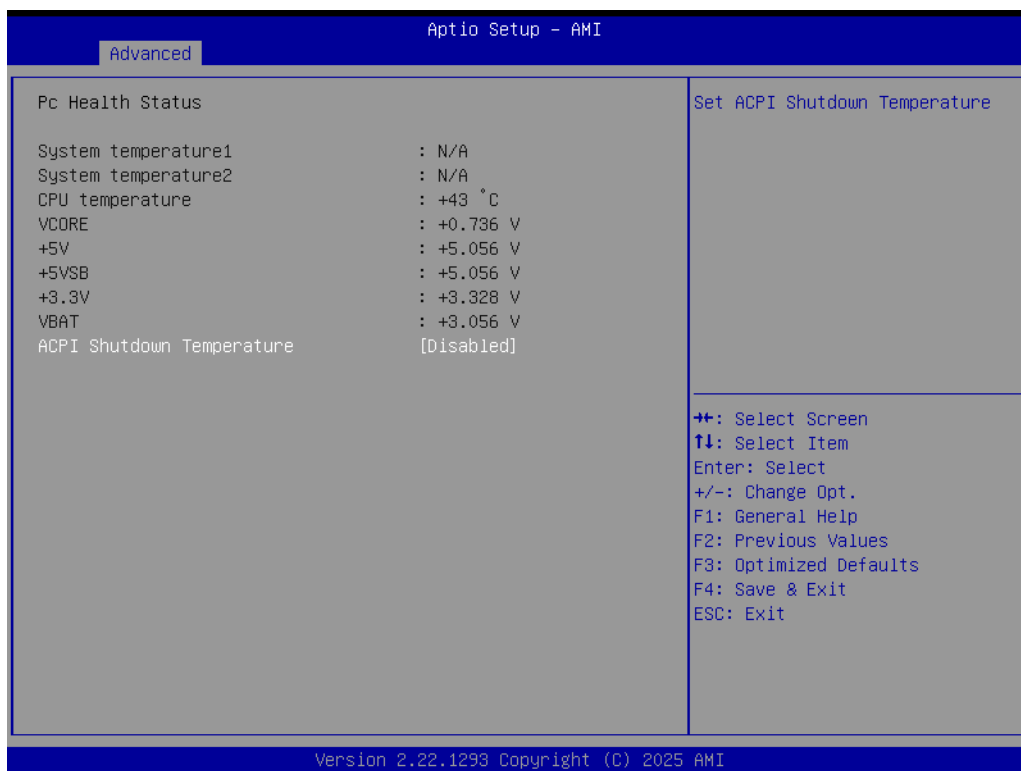


Figure 3.17 Hardware Monitor

- **ACPI Shutdown Temperature**
Use this item to set the ACPI shutdown temperature. When the system reaches the shutdown temperature, it will be automatically shut down by ACPI OS to protect the system from overheat damage.

3.2.2.10 S5 RTC Wake Settings

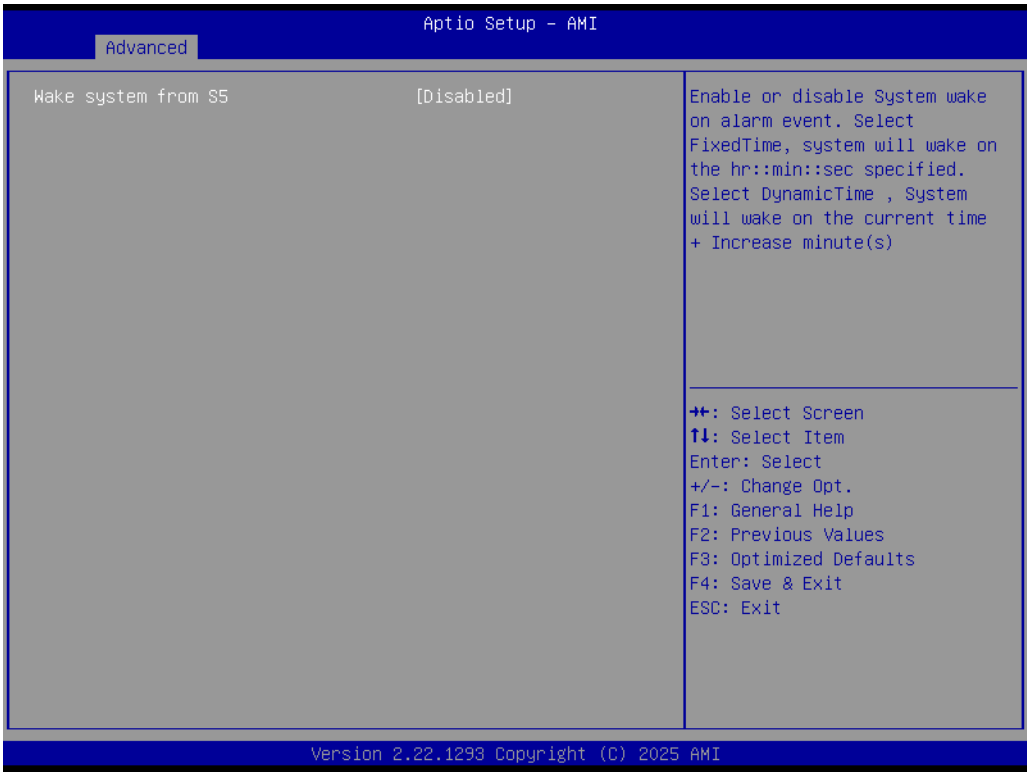


Figure 3.18 S5 RTC Wake Settings

- **Wake system with Fixed Time**
Enable/Disable System wake on alarm event. The system will wake on the hr:min:sec as specified.

3.2.2.11 Serial Port Console Redirection



Figure 3.19 Serial Port Console Redirection



Figure 3.20 Legacy Console Redirection Settings

- **COM1**
 - **Console Redirection Settings**
Console Redirection Enable or Disable.
- **Legacy Console Redirection**
 - **Legacy Console Redirection Settings**
Select a COM port to display redirection of Legacy OS and Legacy OPRM Messages.
- **Serial Port for Out-of-Band Management/ Windows Emergency Management services (EMS)**
 - **Console Redirection Settings**
Console Redirection Enable or Disable.

3.2.2.12 Intel® TXT Information



Figure 3.21 Intel® TXT Information

3.2.2.13 PCI Subsystem Setting

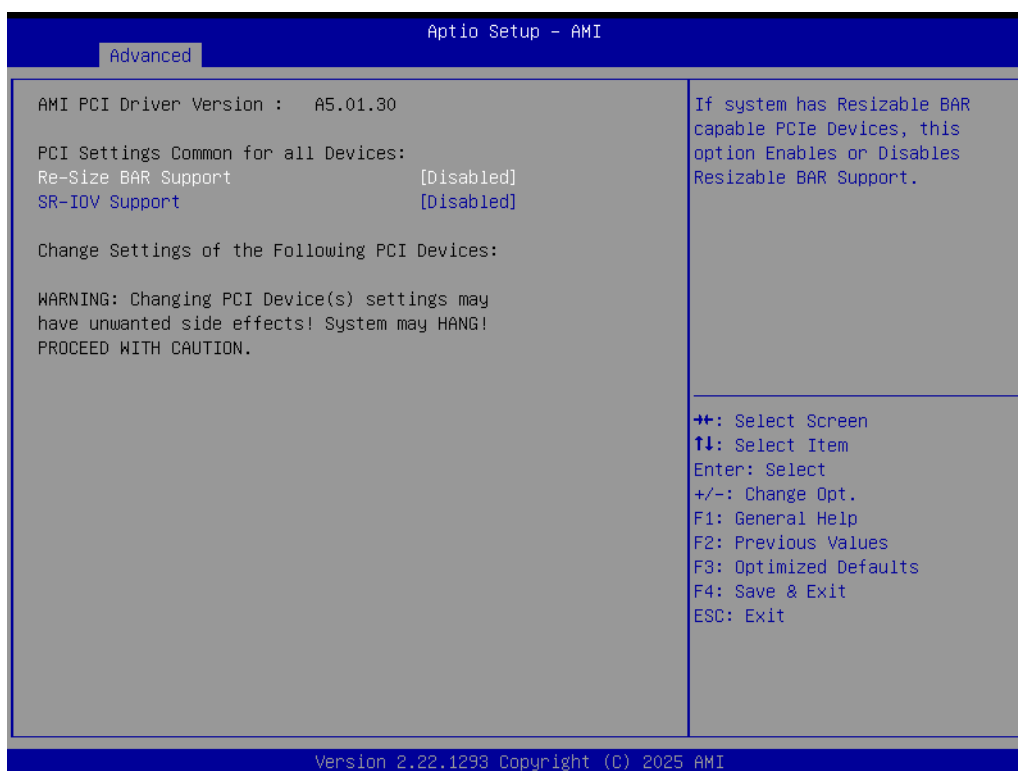


Figure 3.22 PCI subsystem Setting

3.2.2.14 USB Configuration

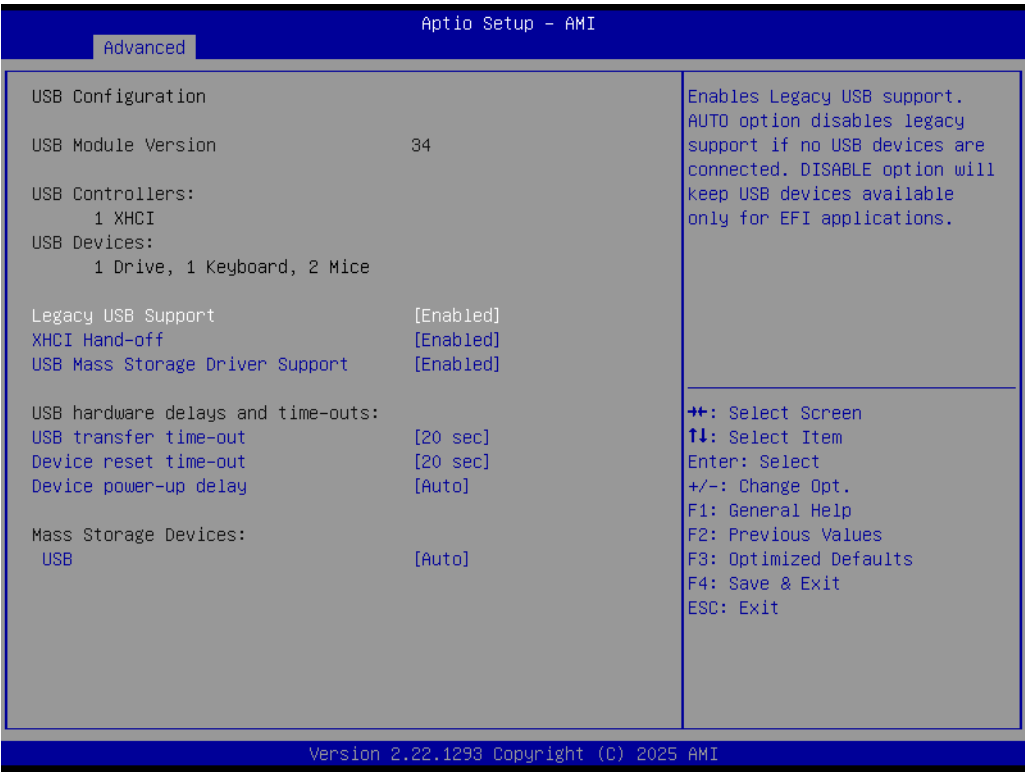


Figure 3.23 USB Information

- **Legacy USB Support**
This supports USB device under legacy OS such as DOS. When choosing AUTO, the system will automatically detect if any USB device is plugged into the computer and enable USB legacy mode when a USB device is plugged in and disable USB legacy mode when no USB device is plugged in.
- **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 or Disable” USB Mass Storage driver support.
- **USB transfer time-out**
Allows you to select the USB transfer time-out value. [1,5,10,20sec]
- **Device reset time-out**
Allows you to select the USB device reset time-out value. [10,20,30,40sec]
- **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 100 ms, for a Hub port the delay is take from Hub descriptor.

3.2.2.15 Network Stack Configuration

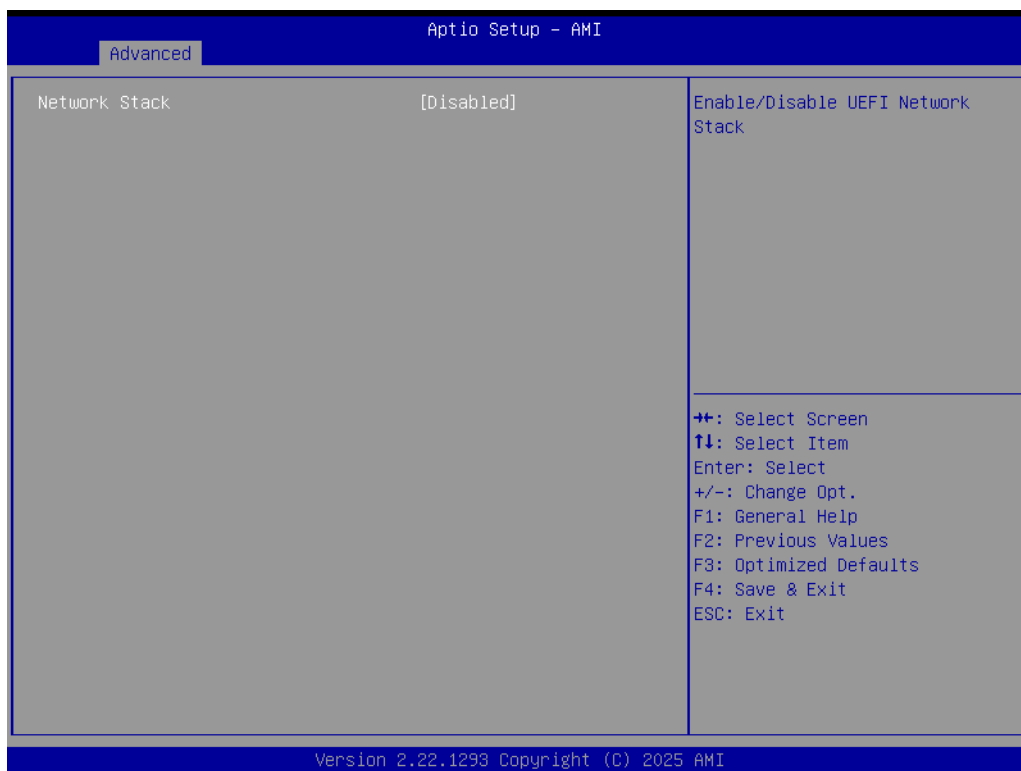


Figure 3.24 Network Stack Configuration

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

3.2.2.16 CSM Configuration



Figure 3.25 CSM Configuration

3.2.2.17 NVMe Configuration



Figure 3.26 NVMe Configuration

- **NVMe Configuration**
 Supports NVMe M.2 storage device.

3.2.2.18 Driver Health

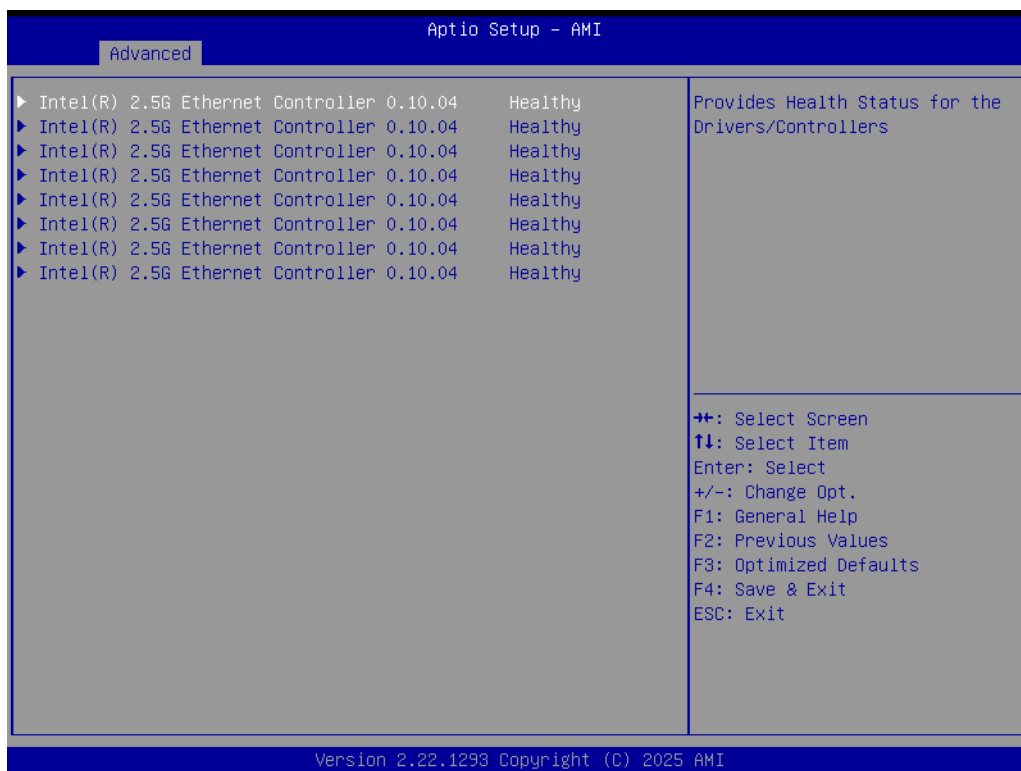


Figure 3.27 Driver Health

3.2.3 Chipset



Figure 3.28 Chipset

This page provides information on the ECU-4784-V2 chipset.

3.2.3.1 System Agent (SA) Configuration

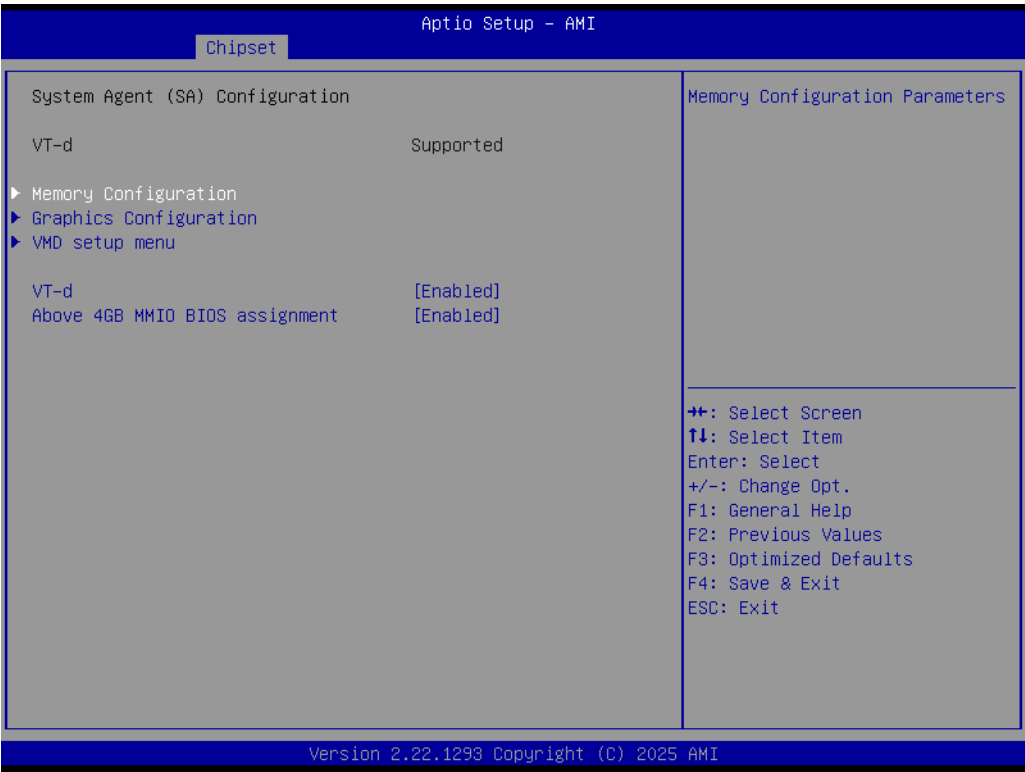


Figure 3.29 System Agent (SA) Configuration

- **VT-d**
Enable/Disable VT-d function.
- **Above 4GB MMIO BIOS assignment**
Enable/Disable above 4GB MemoryMappedIO BIOS assignment.

3.2.3.2 Memory Configuration

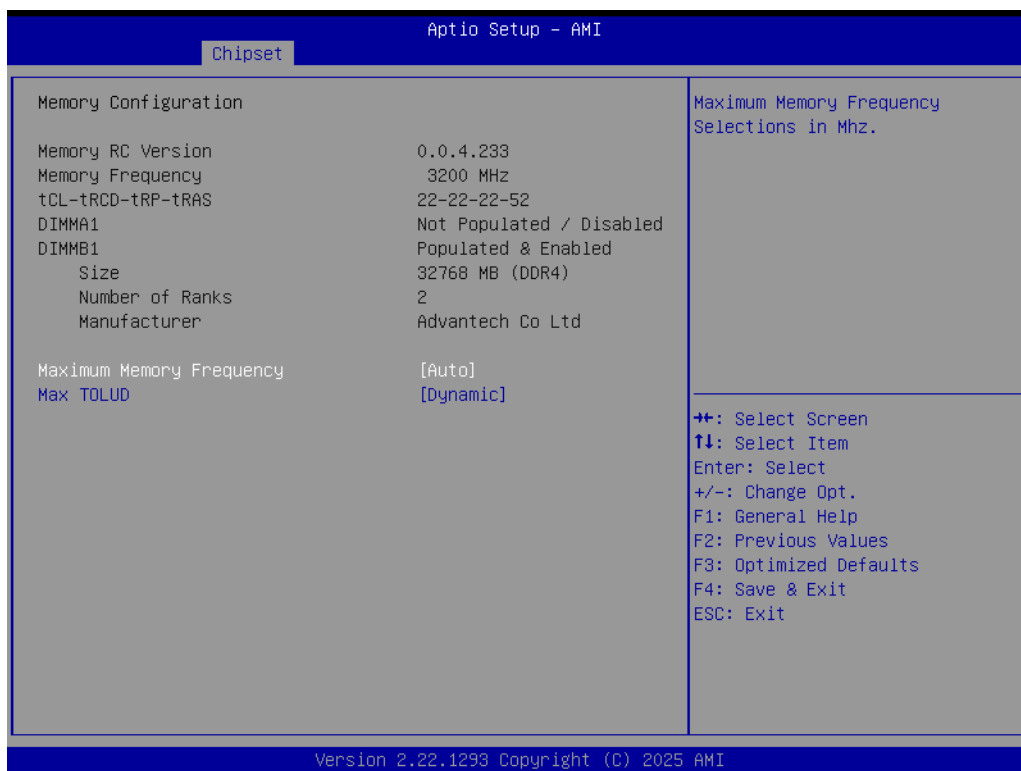


Figure 3.30 Memory Configuration

- **Maximum Memory Frequency**
Maximum memory frequency selections in MHz.
- **Max TOLUD**
Maximum value of TOLUD.

3.2.3.3 Graphics Configuration

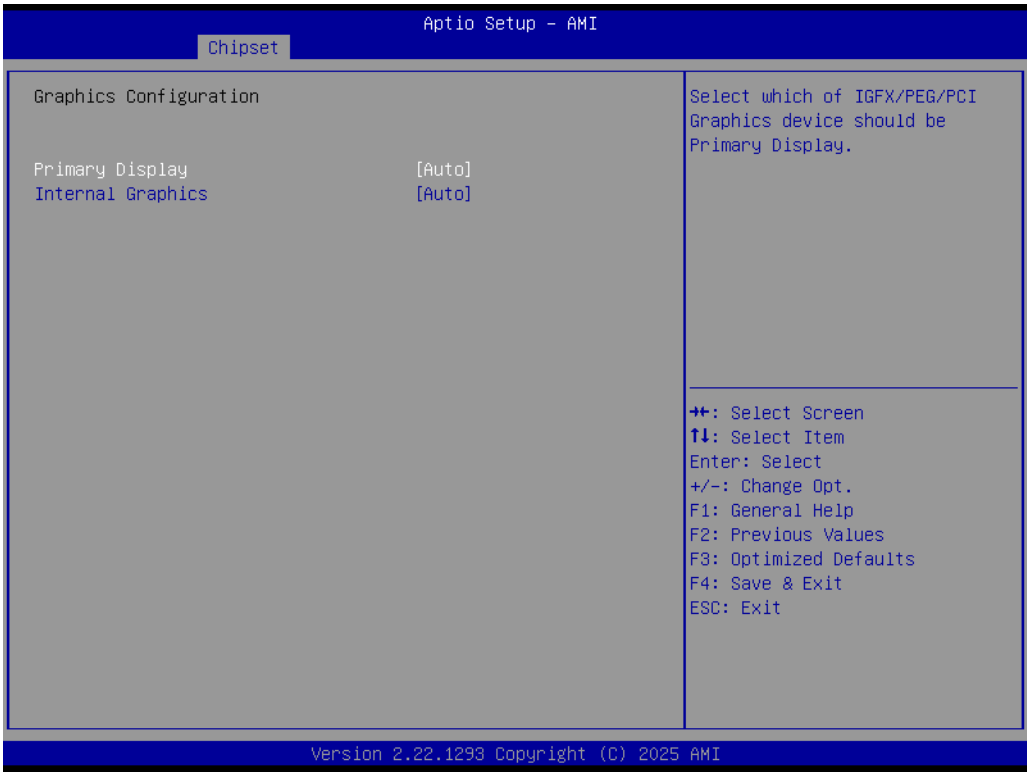


Figure 3.31 Graphics Configuration

- **Primary Display**
Set Primary Display to "Auto", "IGFX", "PEG", "PCI", or "SG".
- **Internal Graphics**
Set Internal Graphics to "Auto", "Disable" or "Enable". "Auto" will disable internal graphics when a GPU card is installed. If GPU and internal graphics outputs are required at the same time, set this item to "Enable".

3.2.3.4 VMD Setup Menu



Figure 3.32 VMD Setup Menu

- **Enable VMD controller**
Enable/Disable VMD controller. Enable VMD controller to active Intel Rapid Storage Technology option and setup RAID.

3.2.3.5 PCH-IO Configuration

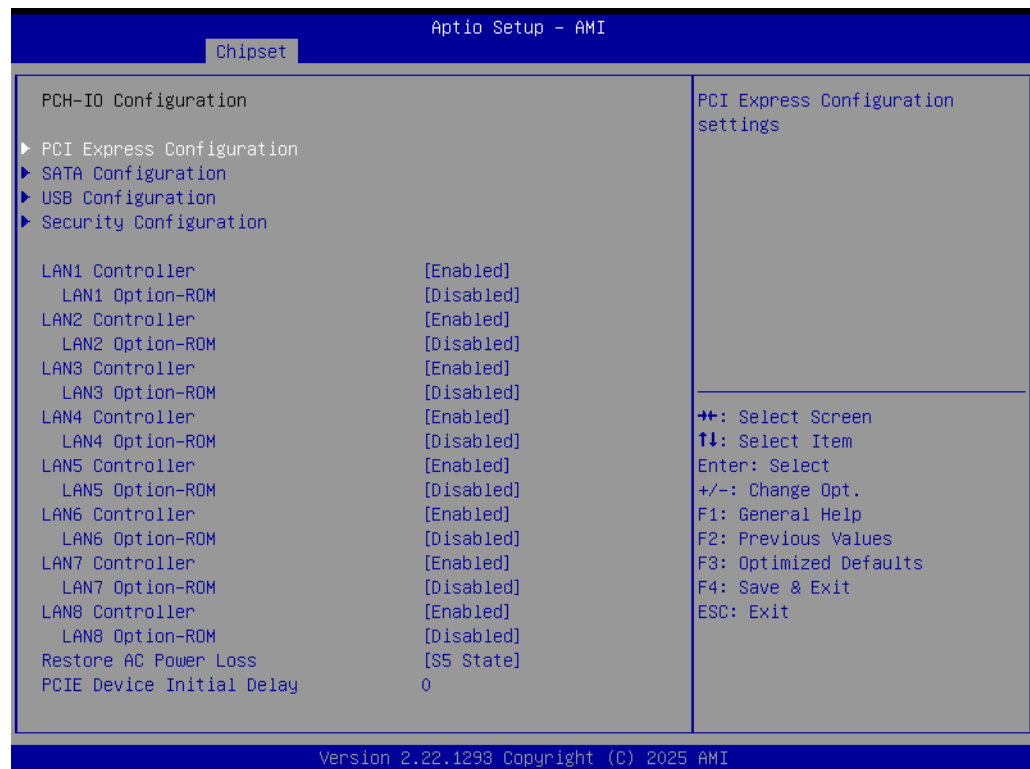


Figure 3.33 PCH-IO Configuration

- **LAN1~8 Controller**
Enable/Disable LAN1~8 controller.
- **PCIE Wake**
Enable/Disable PCIE to wake the system from S5. When this item is selected as Disabled, Wake on LAN2 function is also disabled.
- **LAN1~8 Option ROM**
This item allows users to Enable/Disable boot options for the LANX controller.
- **Restore AC Power Loss**
Select behavior when recovering from AC power loss: "S0 State" (power on), "S5 State" (power off), or "Last State".
- **PCIE Device Initial Delay**
Users can set seconds to delay PCIE device initial time.

3.2.3.6 PCI Express Configuration

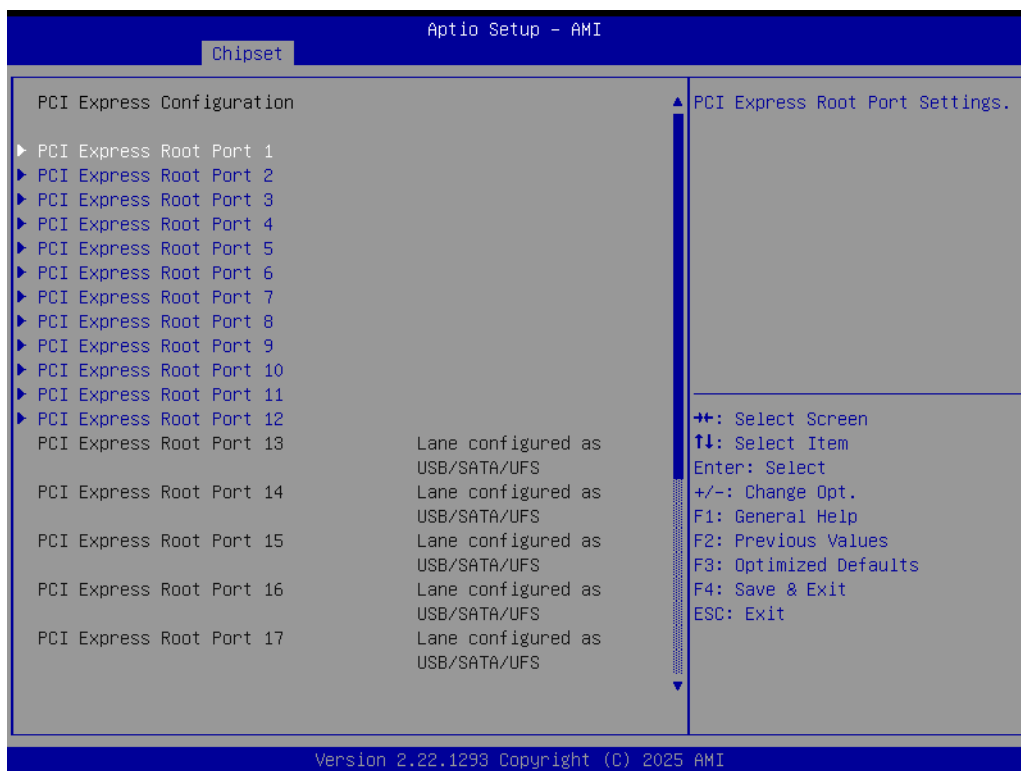


Figure 3.34 PCI Express Configuration

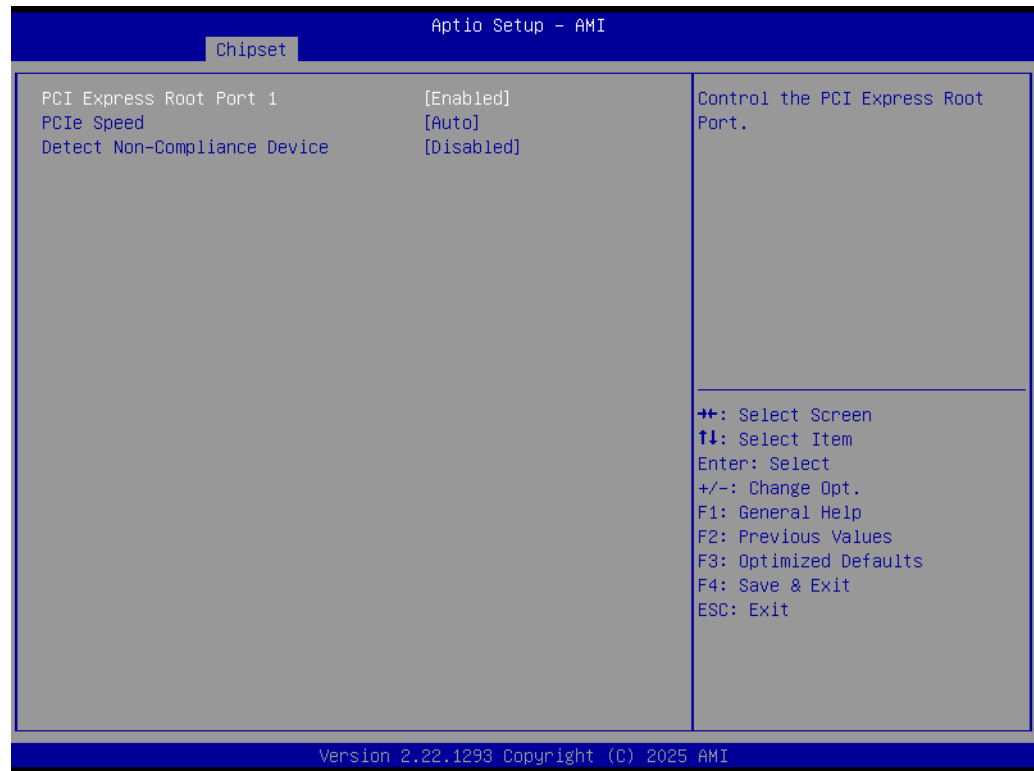


Figure 3.35 Express Root Port

- **PCI Express Root Port 1**
Enable/Disable PCI Express Root Port.
- **PCIe Speed**
Select "Auto, Gen1, Gen2, Gen 3" for PCIe Speed.
- **Detect Non-compliance Device**
If enabled, it will take more time during POST.

3.2.3.7 SATA Configuration

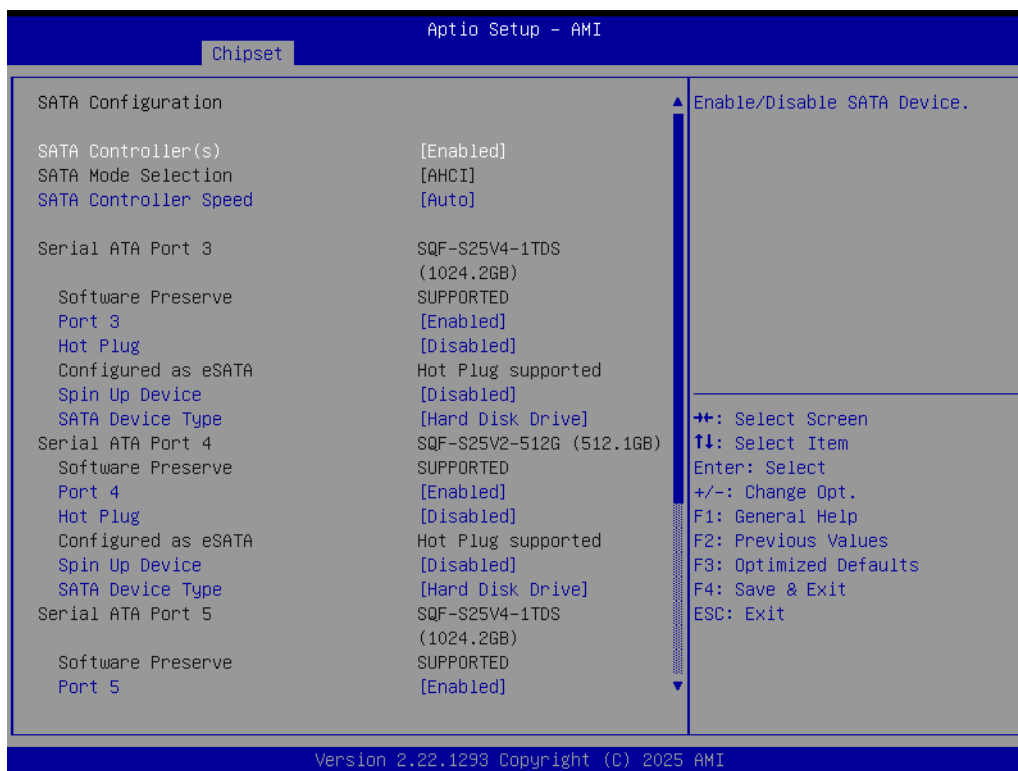


Figure 3.36 SATA and RST Configuration

- **SATA Controller(s)**
Enable/Disable SATA controller.
- **SATA Mode Selection**
This is fixed as 'AHCI'.
- **SATA Controller Speed**
Select "Auto, Gen2, Gen3" of SATA controller speed.
- **Port 3~6**
Enable/Disable SATA port 3~6.
- **Hot Plug**
Enable/Disable SATA Hot-Plug.
- **Spin Up Device**
Enable/Disable spin up device.
- **SATA Device Type**
To identify the SATA that is connected to a "Solid State Drive or Hard Disk Drive".

3.2.3.8 Security Configuration

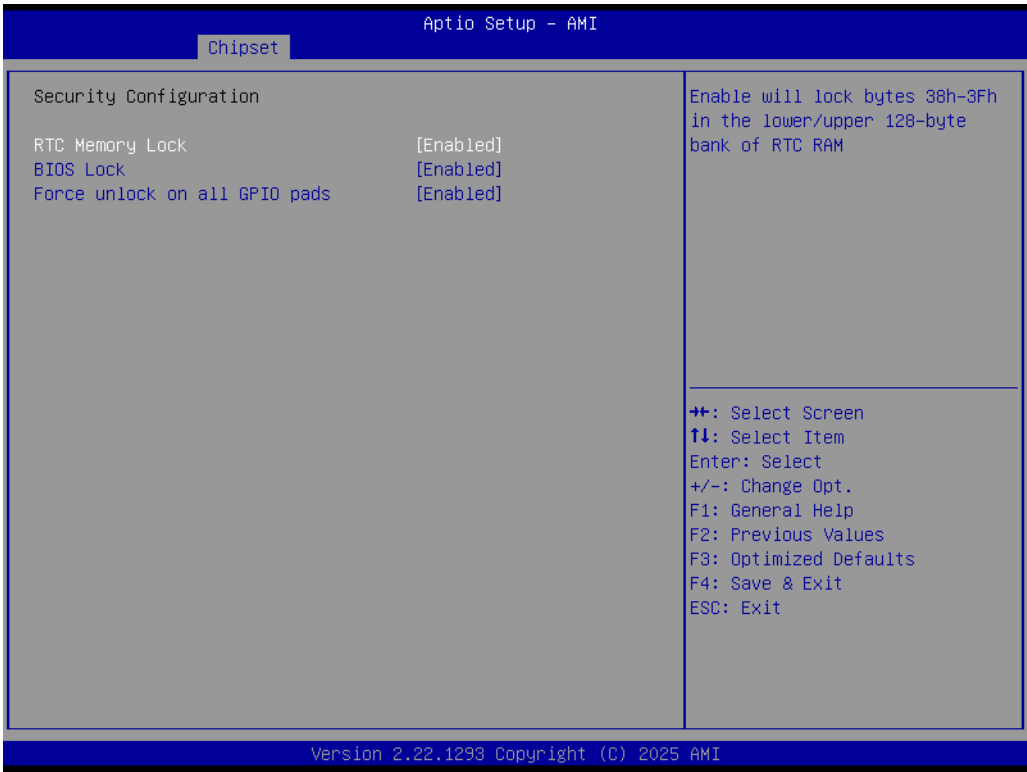


Figure 3.37 Security Configuration

- **RTC Memory Lock**
Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
- **BIOS Lock**
Enable/Disable the PCH BIOS Lock Enable feature. Needs to be enabled to ensure SMM protection of flash.
- **Force unlock on all GPIO pads**
If Enabled, BIOS will force all GPIO pads into an unlocked state.

3.2.4 Security

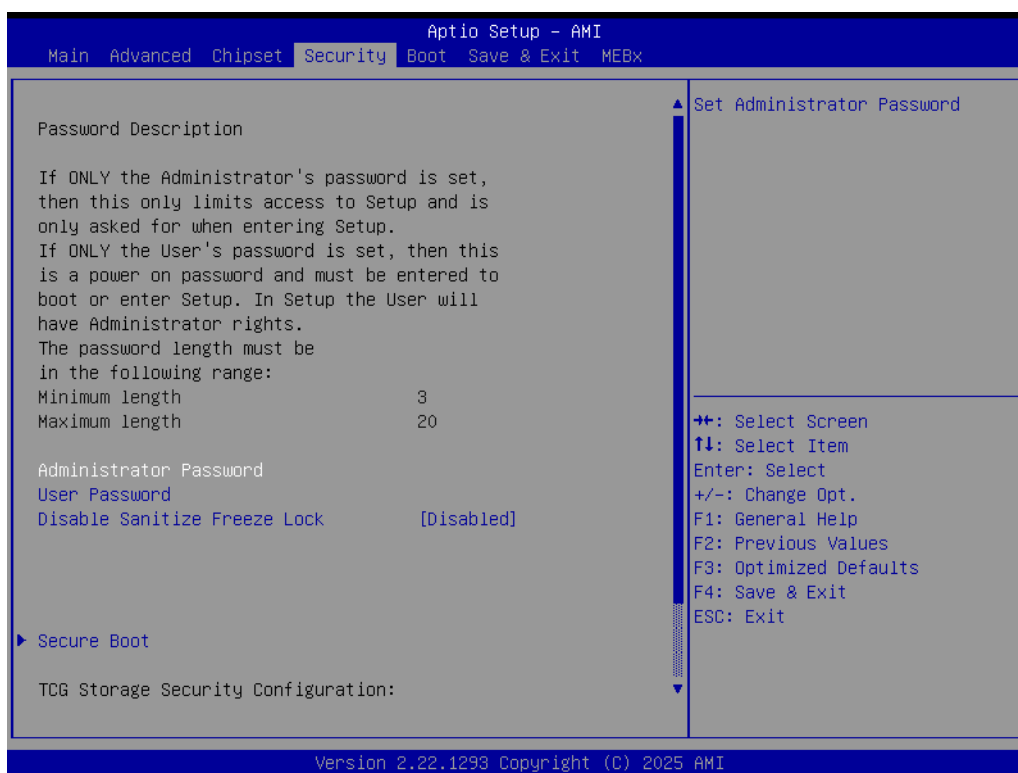


Figure 3.38 Security

Select Security Setup from the ECU-4784-V2 BIOS setup menu. All Security Setup options, such as password protection and Secure Boot, are displayed in this section.

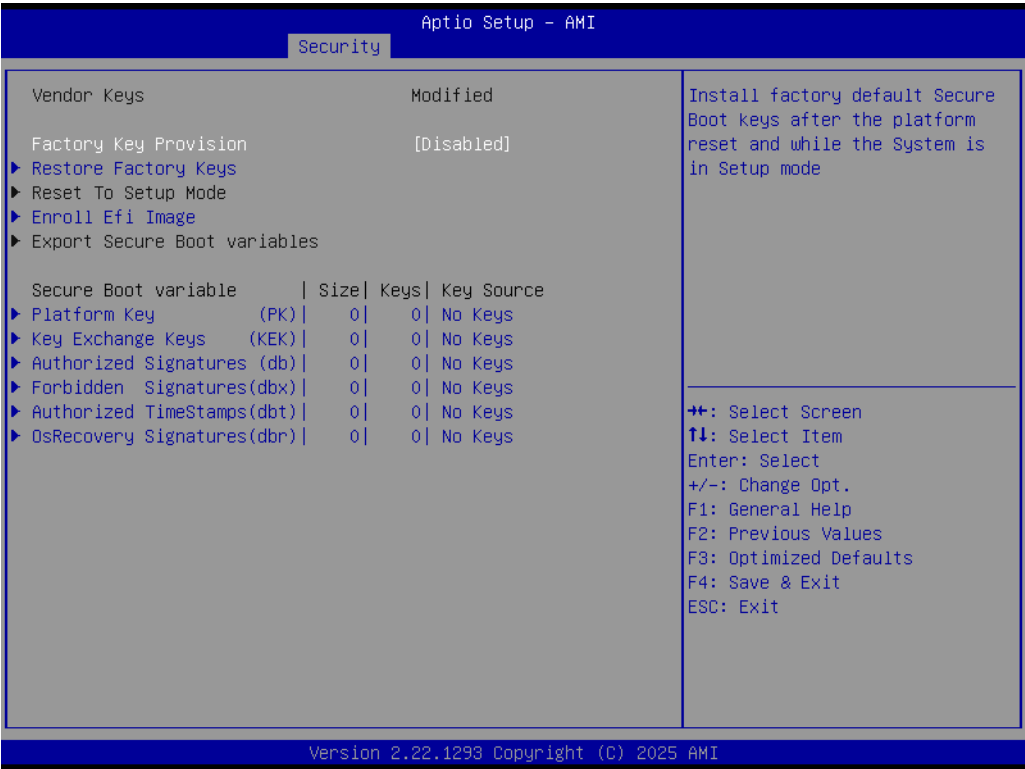
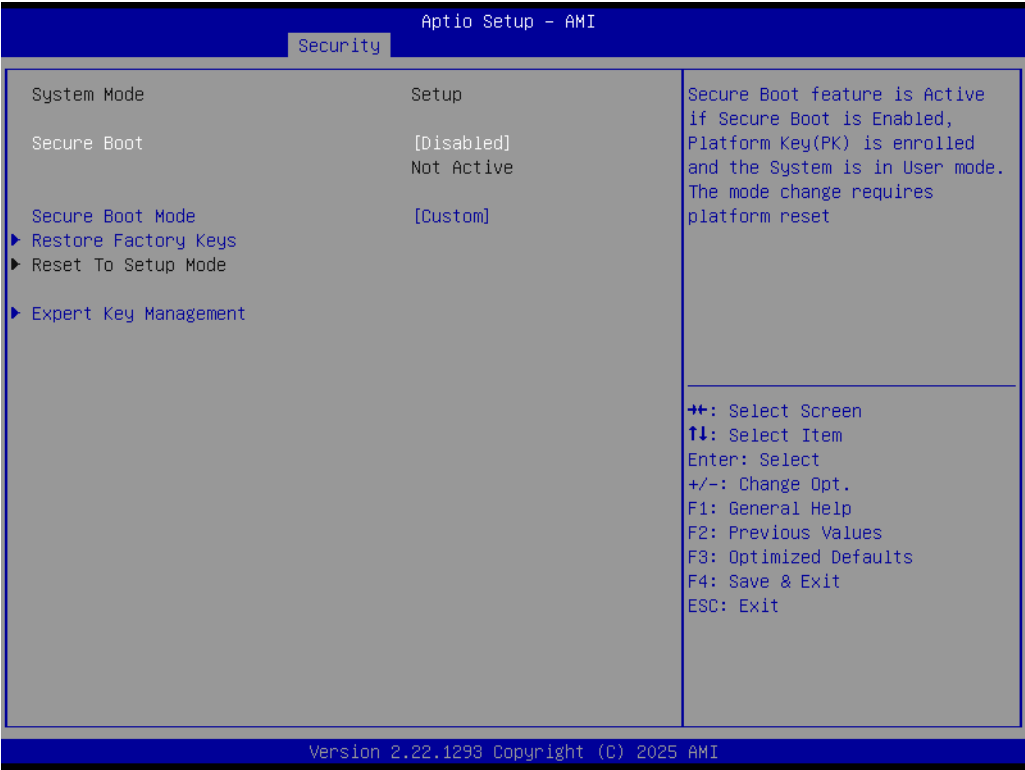
■ Secure Boot

Secure Boot feature setup.

Note! *If only one user password is set, the user will have Administrator rights. Setting an administrator password is strongly recommended if you have security concerns.*



3.2.4.1 Secure Boot



- **Secure Boot**
Secure Boot feature is active if Secure Boot is enabled, the Platform Key (PK) is enrolled and the system is in user mode. The mode change requires a platform reset.

- **Secure Boot Mode**
Secure Boot mode options: Standard or Custom. In Custom mode, the 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.

3.2.5 Boot

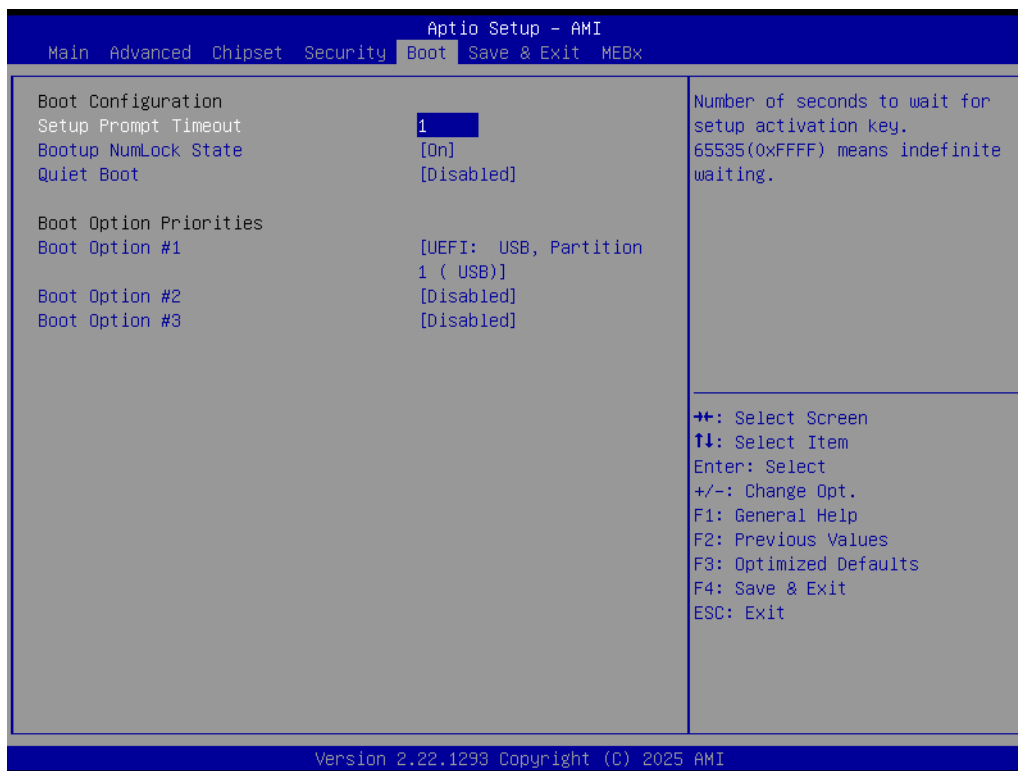


Figure 3.39 Boot

- **Setup Prompt Timeout**
Directly key in the number, or use the <+> and <-> keys to adjust the number of seconds to wait for setup activation key.
- **Bootup NumLock State**
Default state for the NumLock key during power on.
- **Quiet Boot**
Enable/Disable Quiet Boot option. When enabled, BIOS logo will show in place of the POST screen.
- **Boot Option Priorities**
Sets the boot order.

3.2.6 Save & Exit



Figure 3.40 Save & Exit

- **Save Changes and Exit**
Exit system setup after saving the changes.
- **Discard Changes and Exit**
Exit system setup without saving any changes.
- **Save Changes and Reset**
Reset the system after saving changes.
- **Discard Changes and Reset**
Reset system setup without saving any changes.
- **Save Changes**
Save changes done so far to any of the setup options.
- **Discard Changes**
Discard changes done so far to any of the setup options.
- **Restore Defaults**
Restore/Load default values for all the setup options.
- **Save as User Defaults**
Save the changes done so far as user defaults.
- **Restore User Defaults**
Restore the user defaults to all the setup options.

Appendix **A**

Programming the Watchdog Timer

The ECU-4784-V2's watchdog timer can be used to monitor system software operations and take corrective action if the software fails to function within the programmed period. This section describes the operation of the watchdog timer and how to program it.

A.1 Watchdog Timer overview

The watchdog timer is built into the super I/O controller NCT6126D. It provides the following functions for user programming:

- Can be enabled and disabled via the user's program.
- The timer can be set from 1 to 255 seconds/minutes.
- Generates an interrupt or reset signal if the software fails to reset the timer before time-out.

A.2 Programming the Watchdog Timer

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. You must first write an address value into address port 2E (hex), and then write/read data to/from the assigned register through data port 2F (hex).

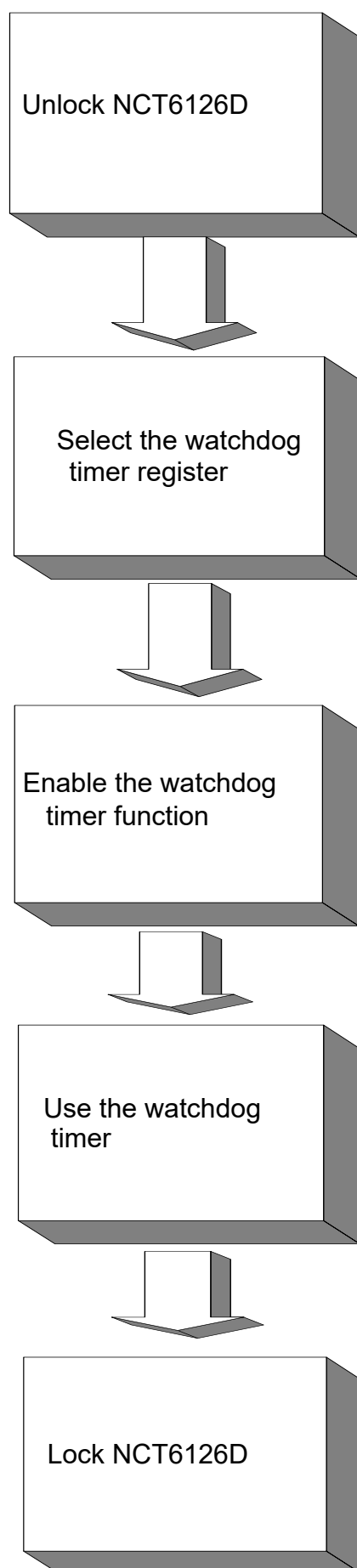


Table A.1: Watchdog Timer Registers

Address Register (2E)	Read/Write	Value (2F) and Description
87 (hex)	-	Write this address to I/O address port 2E (hex) twice to unlock NCT6126D.
07 (hex)	write	Write 08 (hex) to select the register of the watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the watchdog timer function. The default setting is Disabled.
F0 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to Bit 3: set seconds as the counting unit (default). Write 1 to Bit 3: set minutes as the counting unit.
F1 (hex)	write	0: Stop timer (default) 01 ~ FF (hex): The amount of the count, in seconds or minutes, depends on the value set in register F0 (hex). This number decides how long the watchdog timer waits for strobe before generating an interrupt or reset signal. Writing a new value to this register can reset the timer to count from the new value.
F2 (hex)	read/write	Bit 6: Write 1 to enable timer reset via the keyboard, or 0 to disable (default). Bit 5: Write 1 to generate a timeout signal immediately and automatically return to 0 (the default setting is 0). Bit 4: Read the watchdog timer status. 1 means the timer has reached timeout.
AA (hex)	-	Write this address to I/O port 2E (hex) to lock NCT6126D.

Appendix **B**

RTC Battery

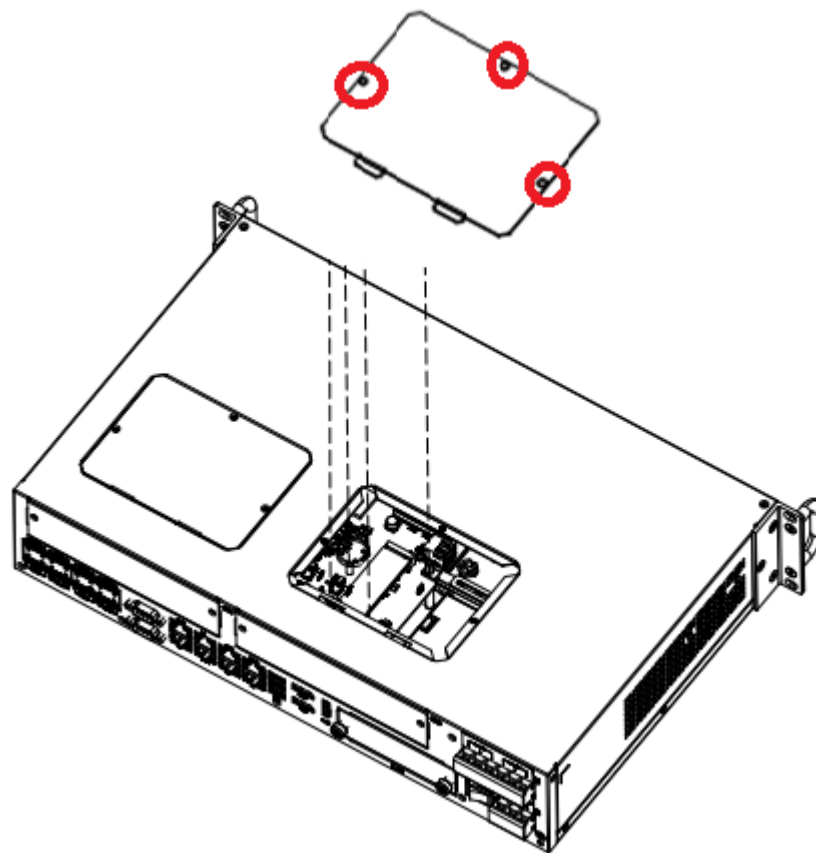
B.1 RTC Battery

1. A CMOS battery is inside ECU-4784 and need to be maintained and changed when it runs out of power.
2. Battery Model: BR2032
3. Battery Lifecycle:
The CMOS battery will be consumed when the system is powered off.
The lifecycle of the battery will vary with different conditions.

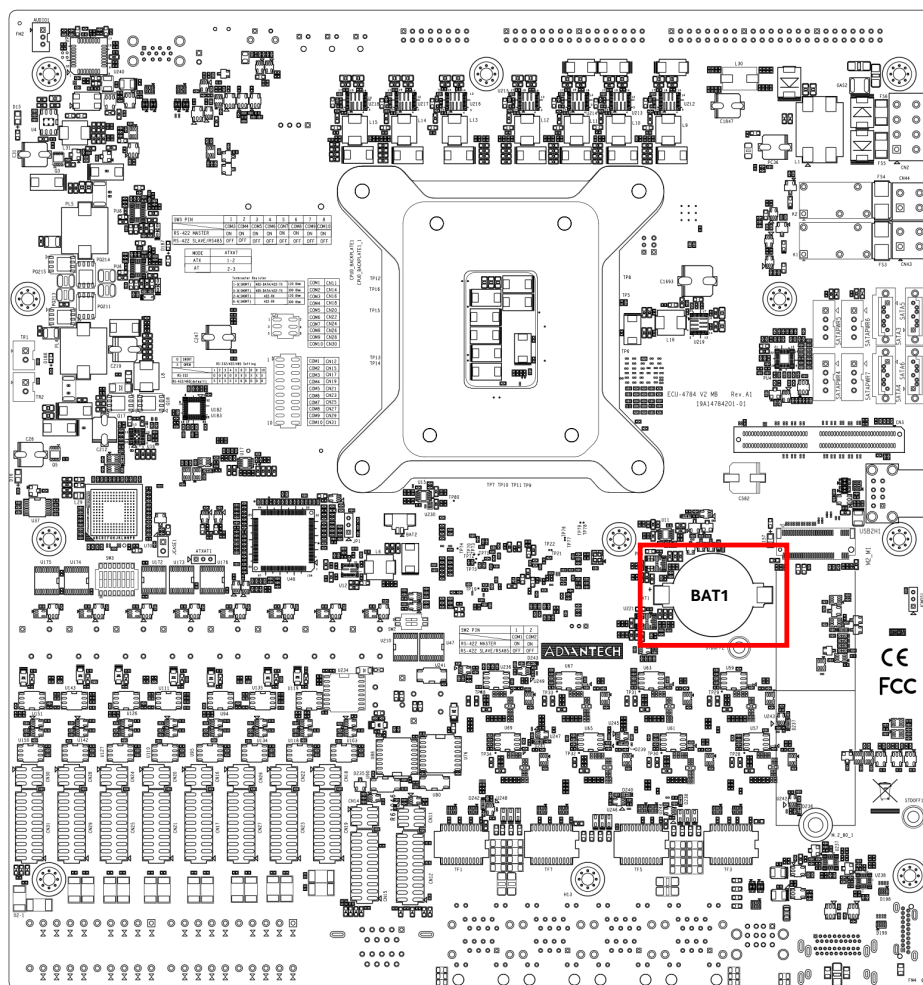
For system remain powered off: 3 years

For system remain powered on: 10 years

4. Changing the battery.
To change the battery, please prepare a new BR2032 and following the instruction below.
 - a. Open the chassis of the system marked in red.



- b. Remove the RTC battery on the board marked in red and change with the new battery.



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