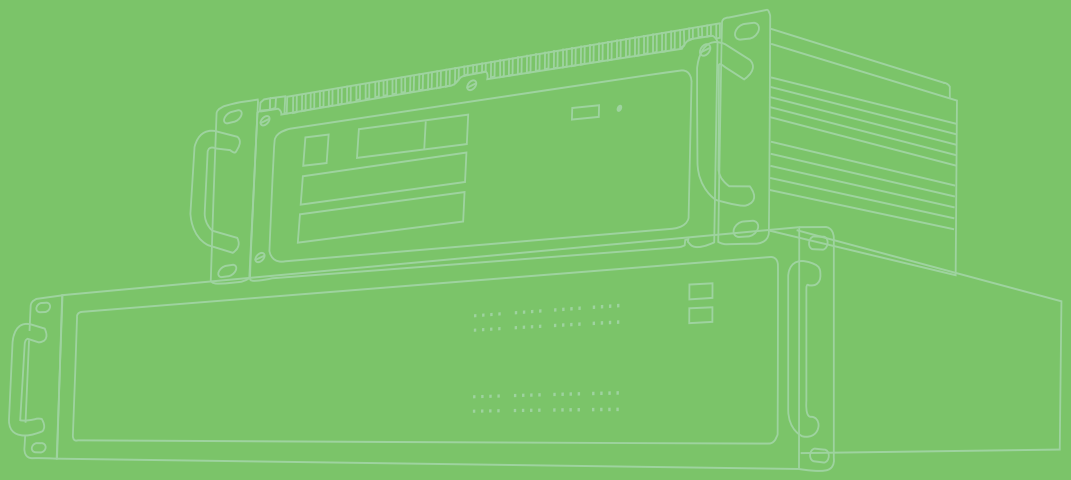

User Manual

ECU-479 Series

IEC-61850 Power Substation 2U Rackmount Server with 13th Generation Intel® Processor

ADVANTECH

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Acknowledgments

Support

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://www.advantech.com/en/support/

This manual is for the ECU-479 Series.

Part No. 2001047900 Edition 1

Printed in China January 2024

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

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.

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. This product is intended to be supplied by AC mains or Listed rated DC 100-240V, 3.0A minimum, Tma 50 degree C minimum, power source, if need further assistance, please contact Advantech for further information.
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.
    The computer will be installed and maintained by skilled person, please contact Advantech for further assistance.
    Note
    - No modification of this equipment is allowed.
    - If there is any other problem, please consult or return the device to your distributor. Do not try to repair a defective device.
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.

Contents

Chapter 1

Overview

This chapter provides an overview of the ECU-479 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 the ECU-479, 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-479 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.

Fast and Easy Customization

- The structured and functional internal design of the module allows for easy customization and fast assembly to suit different kinds of applications for the CTOS manufacturing process.
- Customer-focused service provides fast response for customization requests based on this product's main hardware structure.

1.2 Hardware Specifications

1.2.1 General

- **Certifications:** CE, FCC Class A, IEC61850-3, IEEE 1613, CB/UL
- **Dimensions (W x D x H):** 483 x 478 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:** Max.150W
- **Weight:** 13 kg
- **OS Support:** Windows 10, 11, Windows Server 2022, Ubuntu 22.04

Table 1.1: Power Consumption (Watts)

System Configuration	Idle Mode	Max. Condition
ECU-479 Base System	39	61
16 Cores CPU, limited to 25 W		
64 GB RAM		
4 x 2.5" SSD (64/120/128/240GB)		
2 x M.2 NVMe to PCIe adapters		
2 x PCIe 10Gbps LAN cards		

1.2.2 System Hardware

- **CPU:** 13th/12th Generation Intel® Core™ i socket CPU (LGA1700)
- **Memory:** DDR4 SODIMM-ECC/non-ECC 3200 MHz (4 GB, 8 GB, 16 GB, 32 GB) x 2 slots, up to 64 GB
- **Indicators:** LEDs for Power. SSD, programmable LED, LAN (LINK, ACT), expansion cards
- **Storage:** Swappable 4 x 2.5" SATA SSD (RAID 0, RAID 1, RAID 5, RAID 10) 1 x M.2 SATA/NVMe
- **Display:** 4 x DP++ 1.2 up to 4K @ 60Hz

1.2.3 I/O Interface

- **Ethernet:** 4 x Gigabit RJ-45 ports
- **USB Ports:** 5 x USB 3.2 Gen1 (2 front, 3 rear), 1 x internal USB 2.0
- **Serial Ports:** 2 x DB-9 RS-232/422/485, 2,500 VDC isolation, 50~115,200 bps

1.2.4 Environment

- **Humidity:** 95% @ 40°C (non-condensing)
- **Operating Temperature:** -25 ~ 70°C(-13 ~ 158°F), IEC 60068-2-2 with 100% CPU and I/O loading, 24 hrs
- **Operating Humidity:** 5 ~ 95% RH (non-condensing)
- **Storage Humidity:** 5 ~ 95% RH (non-condensing)
- **Shock Protection:** IEC 60068-2-27 SSD: 20 G, 11 ms
- **Vibration Protection:** IEC 60068-2-64 m-SATA: 2 G @ 5 ~ 500 Hz

1.3 Function Block Diagram

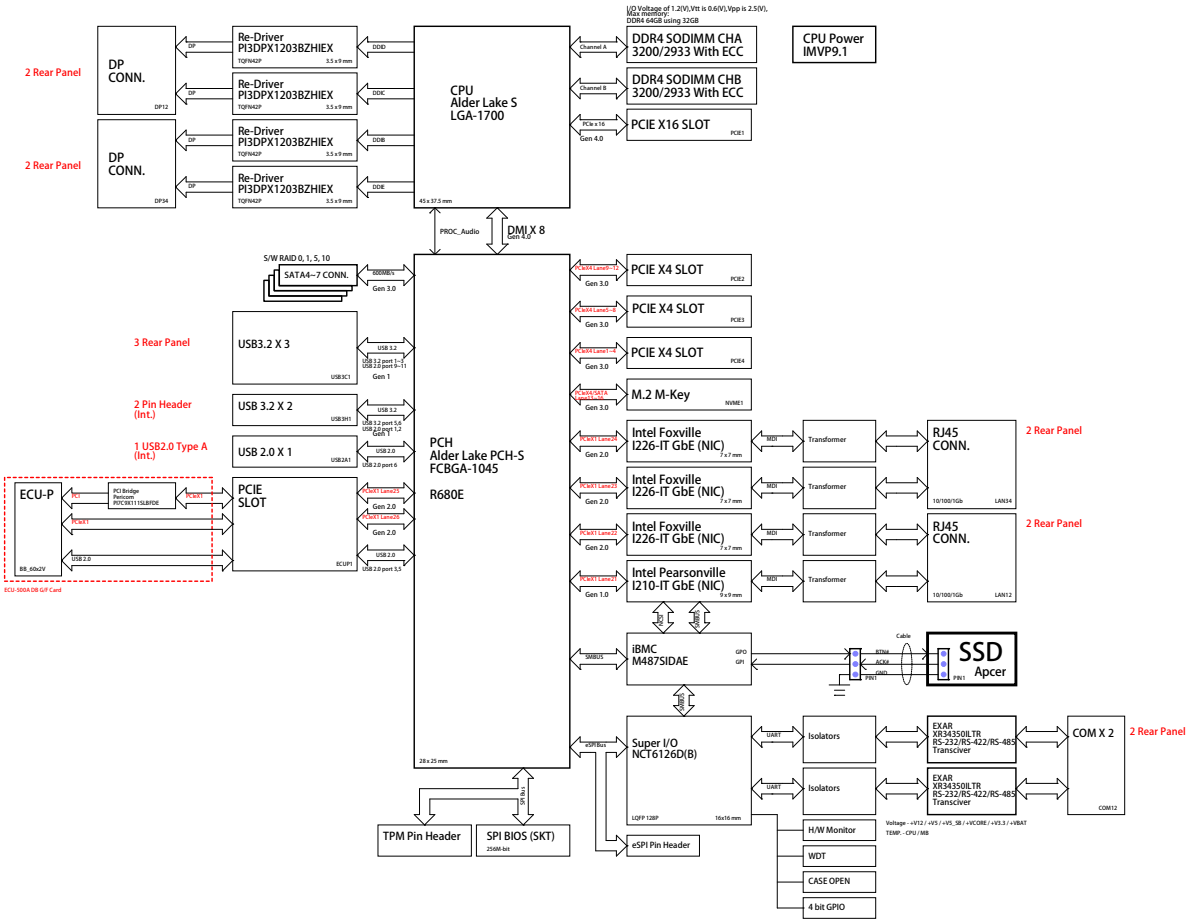


Figure 1.1 ECU-479 Series Product Function Block

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-479 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

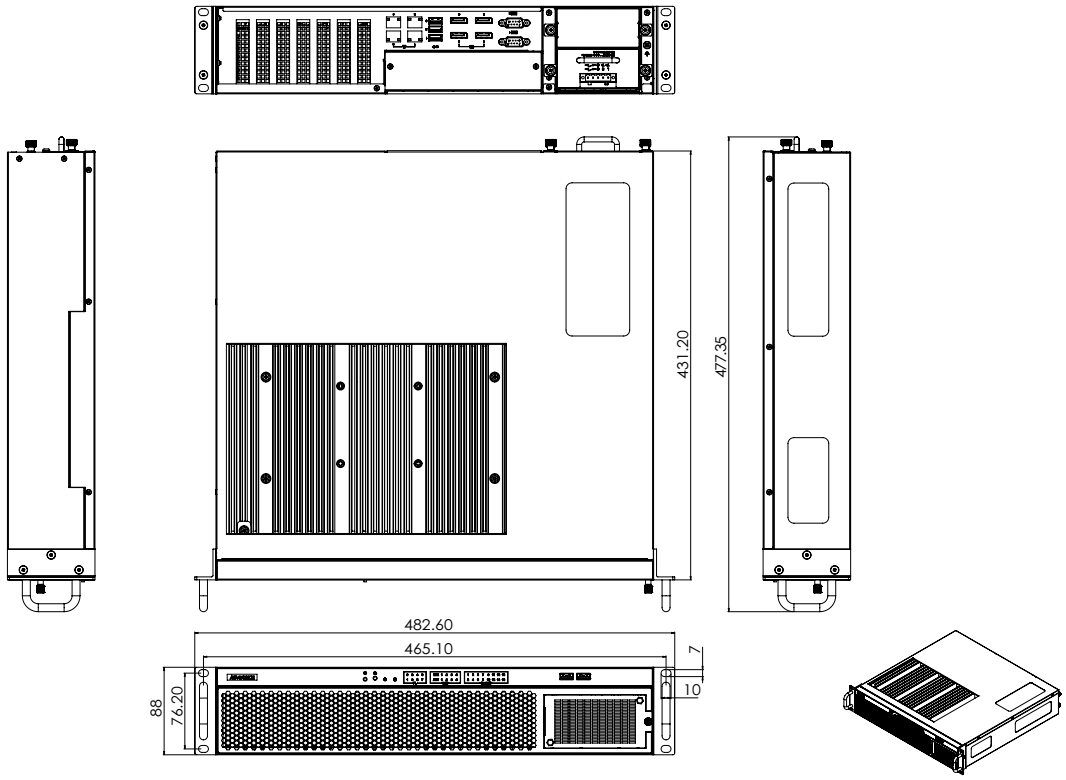


Figure 1.2 ECU-479 Chassis Dimensions

1.6 Packing List

The package of the ECU-479 Series contains the following items:

- The main ECU-479 unit
- Accessory box (screws, terminal block, thermal pads)
- 1 x warranty card
- 1 x ROHS LIST

Chapter 2

Hardware Specifications

Sections include:

- Overview
- Front Elements (LED, FAN, SATA Slots)
- Power Input
- Ethernet Interface (On-Board)
- Display Interface
- USB
- Expansion Functions
- Storage (SATA, M.2)
- Processors
- Memory
- TPM
- Platform Features Description
- Available Accessories

2.1 Overview

2.1.1 ECU-479 LED and Interface

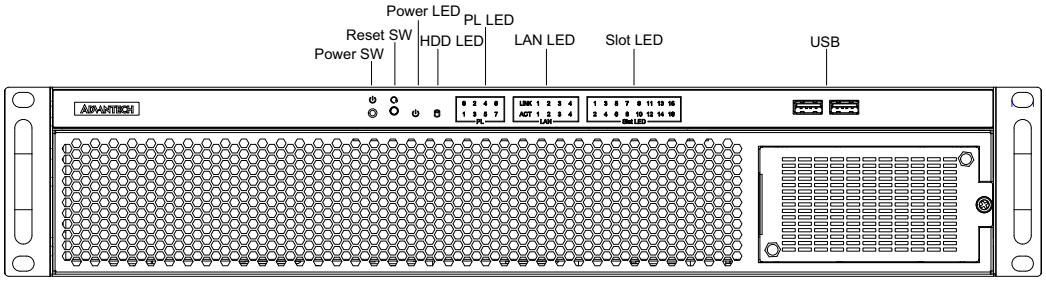


Figure 2.1 ECU-479 Front Panel

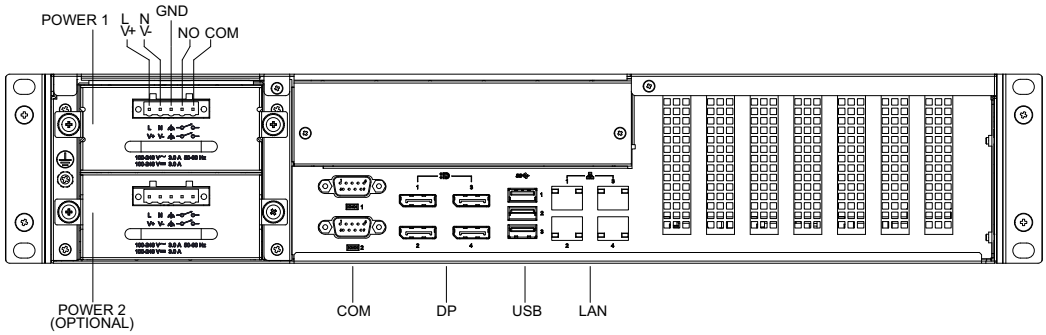


Figure 2.2 ECU-479 Rear Panel

2.2 Front Elements

2.2.1 LED Indicators

The LEDs on the front panel can be divided into 4 groups.

2.2.1.1 System Status Indicators

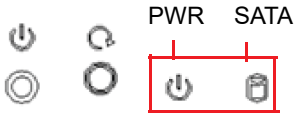


Table 2.1: Definition of System Status Indicators		
LED	**Status**	**Description**
PWR	Green	System power 1 or 2 is on
	Off	System power 1 and 2 is off
SATA	Green	Data is transmitting
	Off	No data is transmitting

2.2.1.2 LAN Status Indicators

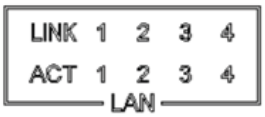
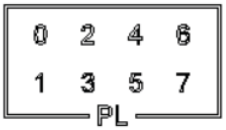


Table 2.2: Definition of System Status Indicators			
Item	**LED**	**Status**	**Description**
1	LAN/LINK (Port 1 ~ 4)	Green	1 Gbps network link
		Orange	100 Mbps network link
		Off	10 Mbps network link or invalid network link
2	LAN/ACT (Port 1 ~ 4)	Green	Ethernet date being received/transmitted
		Off	Invalid network link

2.2.1.3 Programmable LED



The ECU-479 Series products provide 4 programmable LED indicators which are convenient for users to control the programmable LED state using API programming. They can be used to indicate and edit the machine's operating status. Below is a detailed explanation of how to use API programming with this product.

Table 2.3: Programmable LED Status Indicators	
LED	**Description**
PL 0	COM1 RX
PL 1	COM1 TX
PL 2	COM2 RX
PL 3	COM2 TX
PL 4 ~ 7	GPIO 0~3. Customers can, according to their needs, define the programmable LED state.

There are 4 LEDs (LED4 ~ LED7) which can control and monitor the status (On/Off). The Advantech programmable LED driver provides examples of how to use the ECU-479's programmable LEDs and offers references for users to develop their own applications. You can modify these sample applications to meet your requirements.

To utilize the programmable LEDs PL 4~7 (GPIO 0~3), please download SUSI for ECU-479 (software API) from Advantech's product page.

2.2.1.4 Slot LED

The Slot LED is different according to the corresponding expansion card. Here, we take the LED definition of UNOP-1514RE/PE as an example to show how it is defined. Other LEDs are defined according to the description of the relevant expansion card and manual.

The below table shows the LED number definitions for UNOP-1514RE/PE:

Table 2.4: Ex. UNOP-1524PE/RE LED Status Indicators

LED No.	LAN Status	LED Status	Description
1	LAN 1 Active	White (blinking)	Data being received/transmitted
		Off	No data being received/transmitted
2	LAN 1 Link	White	10 Mbps / 100 Mbps / 1 Gbps network link
		Off	Invalid network link
3	LAN 2 Active	White (blinking)	Data being received/transmitted
		Off	No data being received/transmitted
4	LAN 2 Link	White	10 Mbps / 100 Mbps / 1 Gbps network link
		Off	Invalid network link
5	LAN 3 Active	White (blinking)	Data being received/transmitted
		Off	No data being received
6	LAN 3 Link	White	10 Mbps / 100 Mbps / 1 Gbps network link
		Off	Invalid network link
7	LAN 4 Active	White (blinking)	Data being received/transmitted
		Off	No data being received/transmitted
8	LAN 4 Link	White	10 Mbps / 100 Mbps / 1 Gbps network link
		Off	Invalid network link
9 - 16	N/A	-	-

2.2.2 Disk Bay

ECU-479 supports four swappable 2.5” SSDs at the front.

Follow these steps below to install an SSD:

1. Remove the baffle on the right of the front panel, and pull out the disk tray.

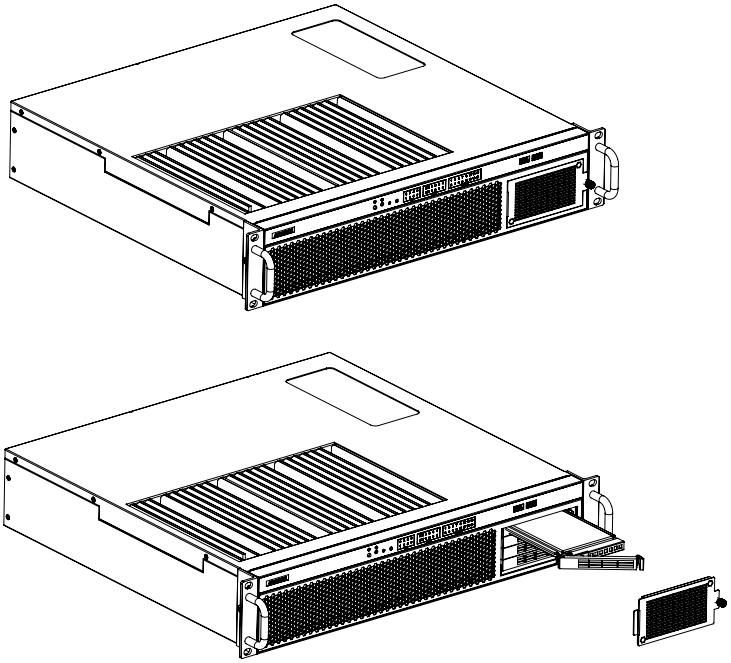


Figure 2.3 Removing the SATA Baffle

2. Attach the SATA disk to the tray and push it back into the disk bay. Then attach the baffle in front of the SATA bay.

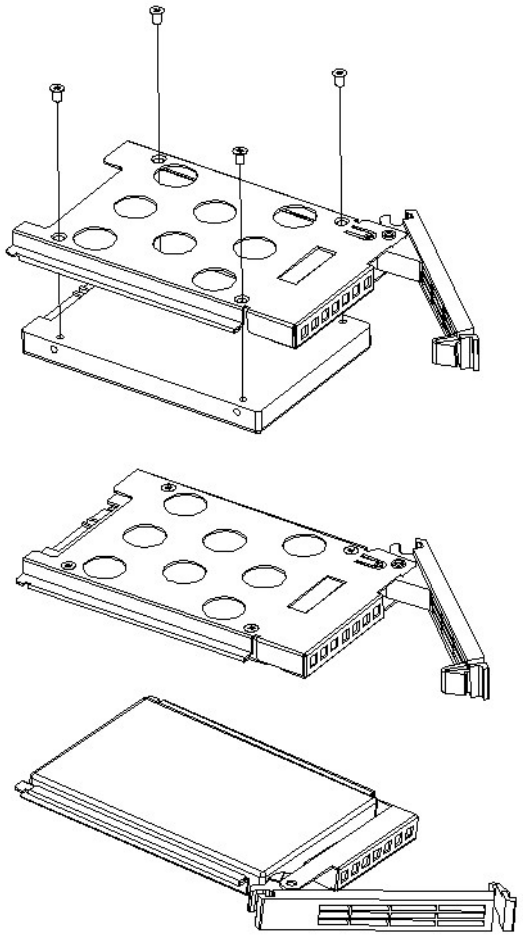


Figure 2.4 Fixing the SATA Disk onto the Disk Tray

2.3 Jumpers and Connectors

The tables below list the function of each of the jumpers and connectors. Later sections in this chapter give instructions on setting jumpers that are used to configure your system for your application.

Table 2.5: Jumpers

Label	Function
JCMOS1	CMOS clearness
JWDT1	Watchdog timer reset
JOBS1	Hardware monitor alarm
JME1	Intel® ME update
PSON1	AT/ATX mode selection
JUSB_1, JUSB_2	USB power source switch between +5V and +5V_DUAL
SMB1, SMB2	PCIe SMBus connection setting for PCIE2~PCIE4 slots
SMB3, SMB4	PCIe SMBus connection setting for PCIE1 slot

Table 2.6: Connectors

Label	Function
COM1,2	Serial port: RS-232/422/485 (9-pin header)
DP1~4	DP connector
USB1~3,4,5	USB 3.2 Gen 1 port
USB6	USB 2.0 port
LAN1	GbE LAN (Intel I210IT)
LAN2~4	GbE LAN (Intel I226IT)
SATA4~7	Serial ATA 3.0 port
SATAPWR4~7	2.5" SATA SSD power connector
PCIE1	PCIe x16 slot (x16 Gen4 link)
PCIE2~4	PCIe x4 slot (x4 Gen3 link)
NVME1	M.2 2280 M-Key socket (SATA 3.0 or PCIe x4 Gen3 link)
DIMMA1, DIMMB1	Channel A,B DIMM1
SPI_TPM1	Serial peripheral interface (SPI) connector
JFP3	Power LED Suspend: fast flash (ATX/AT) System on: on (ATX/AT) System off: off (ATX/AT)
JFP2	External speaker / HDD LED connector / SMBus connector
JFP1	Power switch / reset connector

2.4 Board Layout: Jumper and Connector Locations

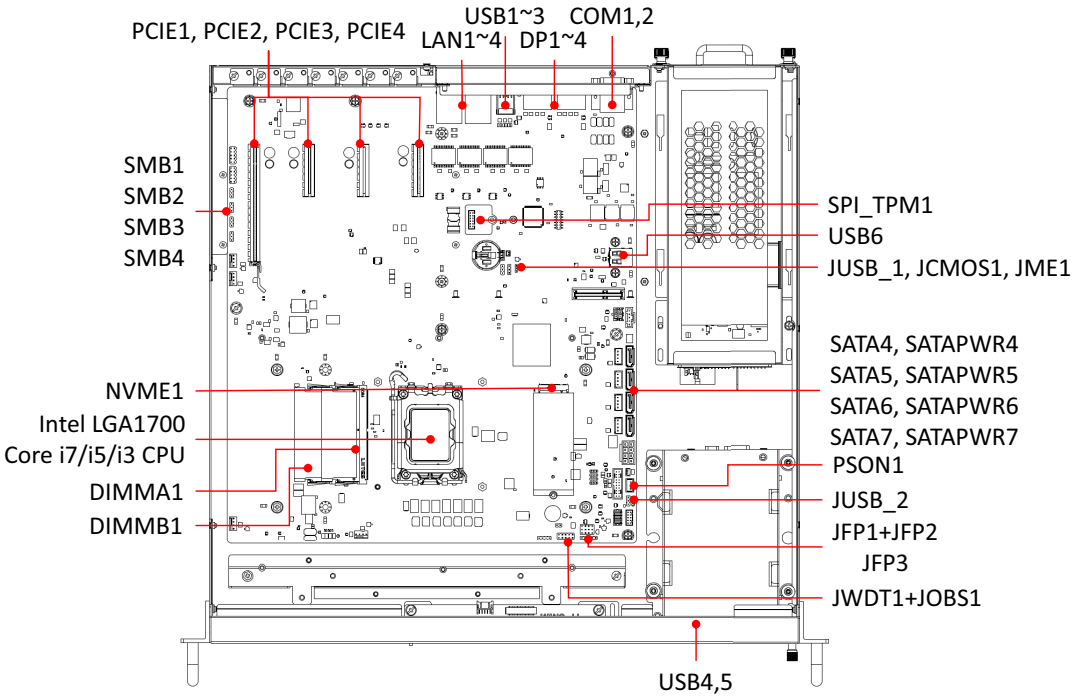


Figure 2.5 Jumper and Connector Locations

2.5 Power Input

The ECU-479 Series products support redundant power input for both A/C and D/C.

Table 2.7: Power Input				
Item	**AC/DC**	**Voltage Range**	**Power Rating**	**Installation**
	A/C	100-240 V_{AC}	3 A 50-60 Hz	Terminal Block
	D/C	100-240 V_{DC}	3 A	

- Use a circuit breaker that is rated at 20 amps
- Connect protective earthing first, with at least 14 AWG G/Y color PE conductor, diameter 4.0mm min., screw type PE terminal, and a spring/star washer to provide satisfactory locking.

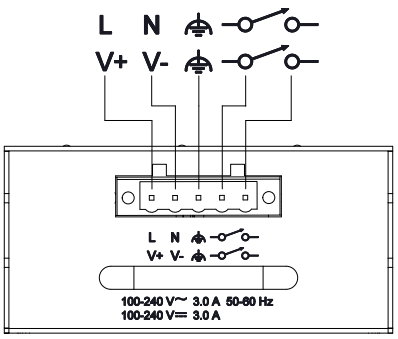


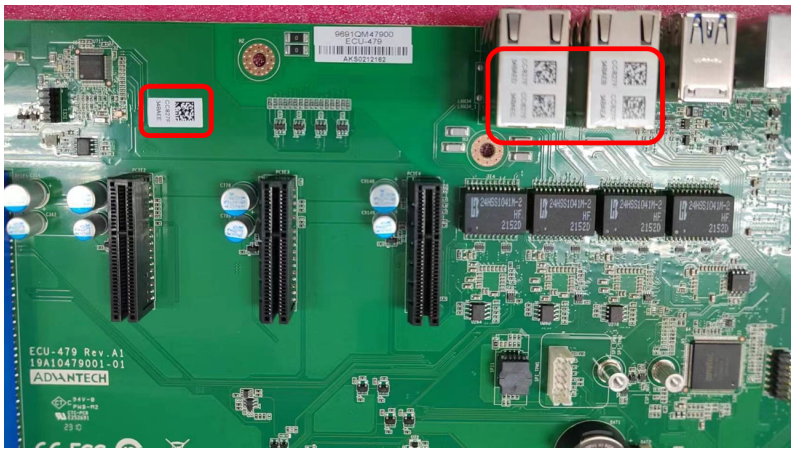
Figure 2.6 Power Panel

2.6 Ethernet Interface

The ECU-479 Series products are equipped with Intel® 4 x Giga LAN. LAN1 port is shared with the iBMC function. The LAN2 port is shared with the IAMT function.

2.6.1 MAC Address

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



2.7 Display Interface

The ECU-479 is configured with quad DP++ connectors

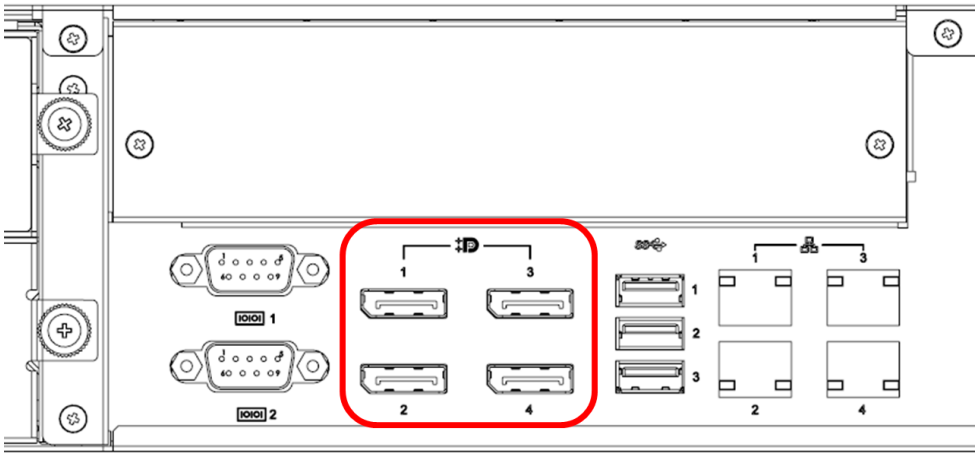


Figure 2.7 Display Position

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

2.8 USB Ports

2.8.1 USB Ports Positions

The ECU-479 is equipped with 3 x USB 3.2 Gen1 connectors on the rear panel and 2 x USB 3.2 Gen1 connectors on the front panel, with transmission rates of up to 5 Gbps via USB 3.2 Gen1 and eFuse protection being supported.

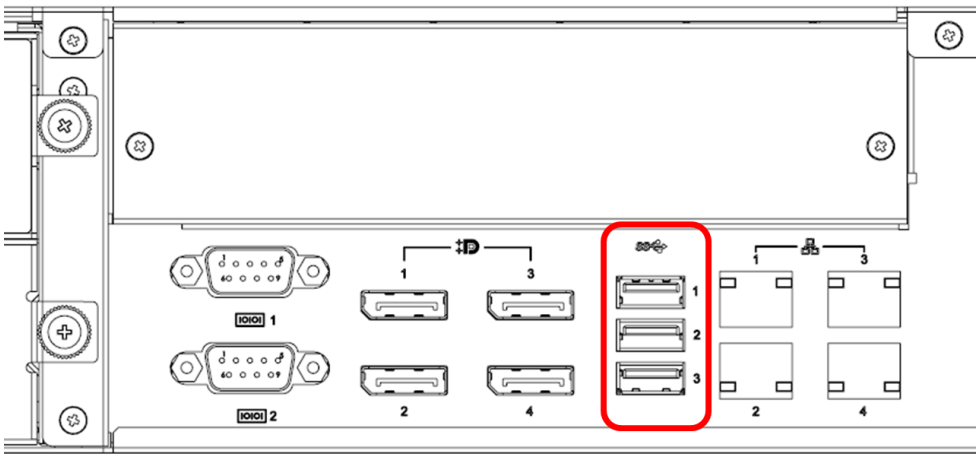


Figure 2.8 Rear USB Port Positions

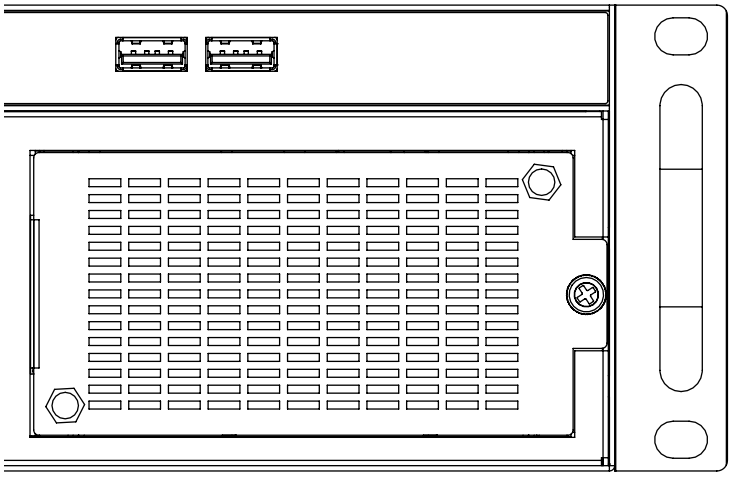


Figure 2.9 Front USB Port Positions

2.8.2 Installing a USB Dongle

The ECU-479 provides an internal USB 2.0 port for the USB dongle. Follow these steps to install the USB dongle:

1. Remove proprietary PCI/PCIe cards if any.
2. Remove the screws shown in Figure 2.10 to open the chassis.

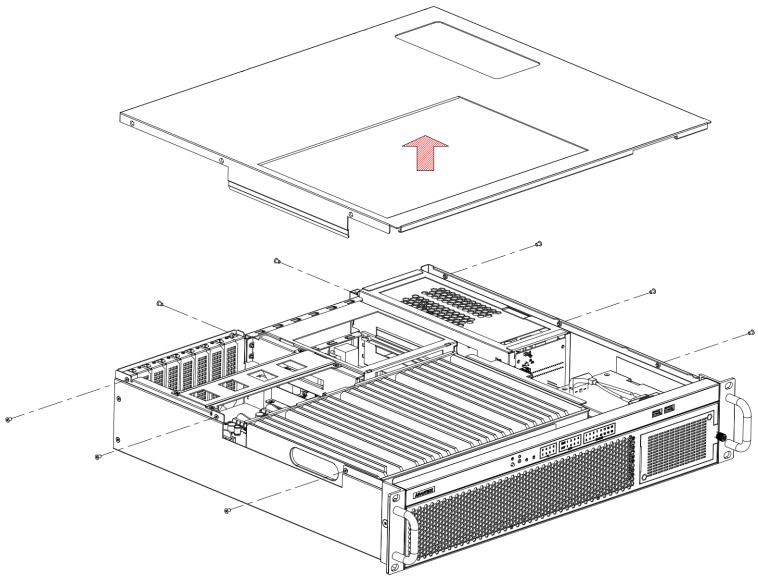


Figure 2.10 Open the Chassis

3. Remove the USB fastening bracket and plug in the USB dongle to the upper port of USB6 (USB2A1). Note that the lower port is a dummy port. A USB dongle is not included in the package.

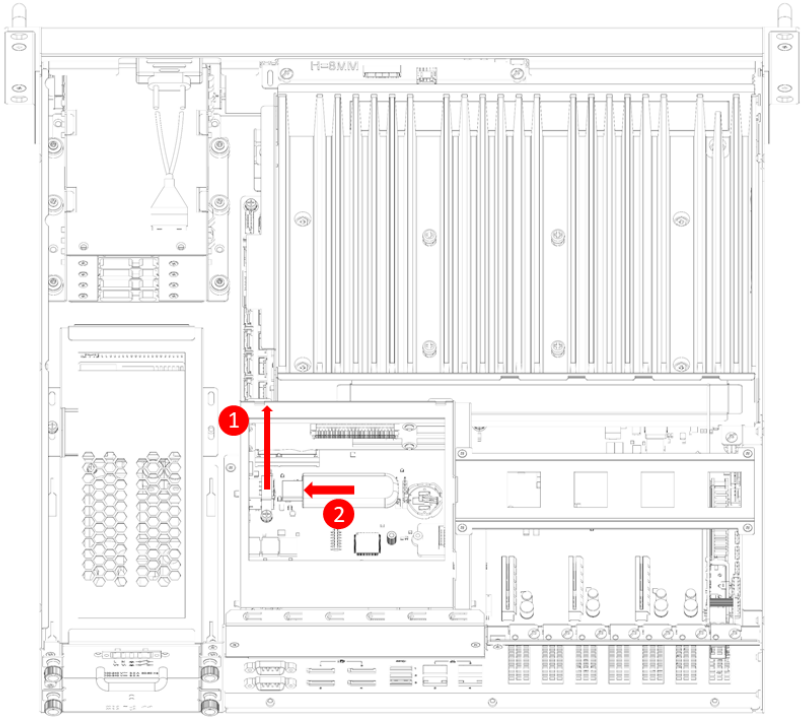


Figure 2.11 Location of USB6 Internal USB Port (USB2A1)

4. Install the USB fastening bracket. Cover and resume operating theECU-479.

2.9 Expansion Slots

2.9.1 Expansion PCI/PCIe Slot

2.9.1.1 Expansion PCI/PCIe Slot Illustration

The ECU-479 supports one standard domain I/O expansion. Customers can choose different proprietary PCI/PCIe cards from Table 2.7.1.2 according to their needs.

Through the interface card, the ECU-479 Series can also use standard PCI cards, PCIe cards, mini-PCI cards, as well as PCI-104 cards.

The maximum power support for proprietary PCI/PCIe slot is:

5 V @ 2 A

3.3 V @ 1.5 A

12 V @ 0.25 A

2.9.1.2 Proprietary PCI/PCIe Card List

Below is the list of proprietary cards compatible with ECU-479:

Table 2.8: Proprietary PCI/PCIe Card List

ECU Standard P/N	Description
ECU-P1618D-AE	8-port RS-232/422/485 serial port card
ECU-P1628D-AE	8-port isolated RS-232/422/485 serial port card
ECU-P1524PE-GAE	2-port SFP Gigabit Ethernet card with HSR/PRP
ECU-P1761A-AE	4-ch digital input 4-ch relay output card with IRIG-B
UNOP-1624D-AE	4-port Iso.RS-232/422/485 & IRIG-B card
UNOP-1000I-BE	PCI & Mini-PCI expansion card
UNOP-1000J-BE	PCI-104 & Mini-PCIe expansion card
UNOP-1000K-AE	PCIe expansion card
ECU-P1528RE-AE	8-port RJ-45 LAN Gigabit card
ECU-P1528PE-AE	8-port SFP LAN Gigabit card

2.9.1.3 Installing a Proprietary PCI/PCIe Card

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

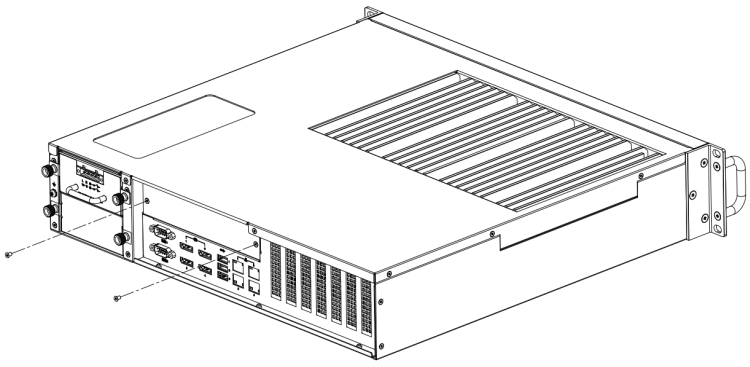


Figure 2.12 Open the ECU-P cover

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

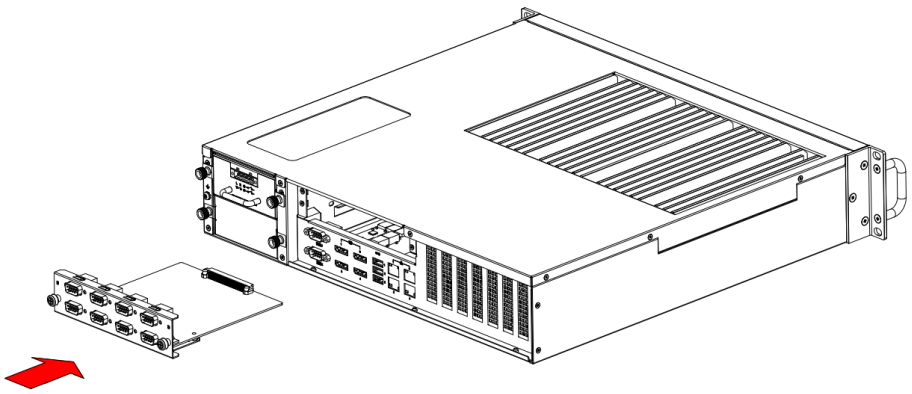


Figure 2.13 Insert the expansion card

2.9.2 PCIe Expansion Cards

2.9.2.1 PCIe Expansion Card Illustration

ECU-479 supports 4 low-profile PCIe cards. The size limitation is shown below:

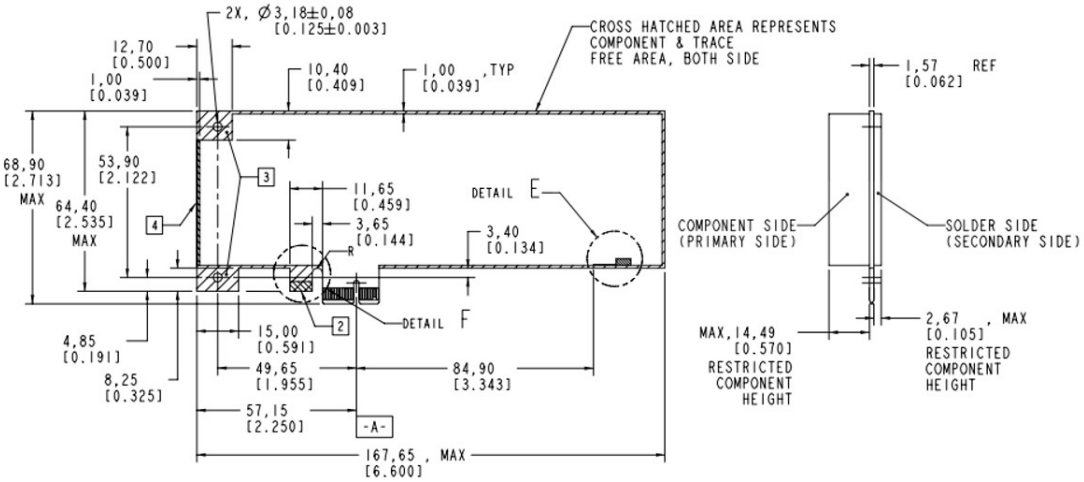


Figure 2.14 PCIe Card Dimension Limitation

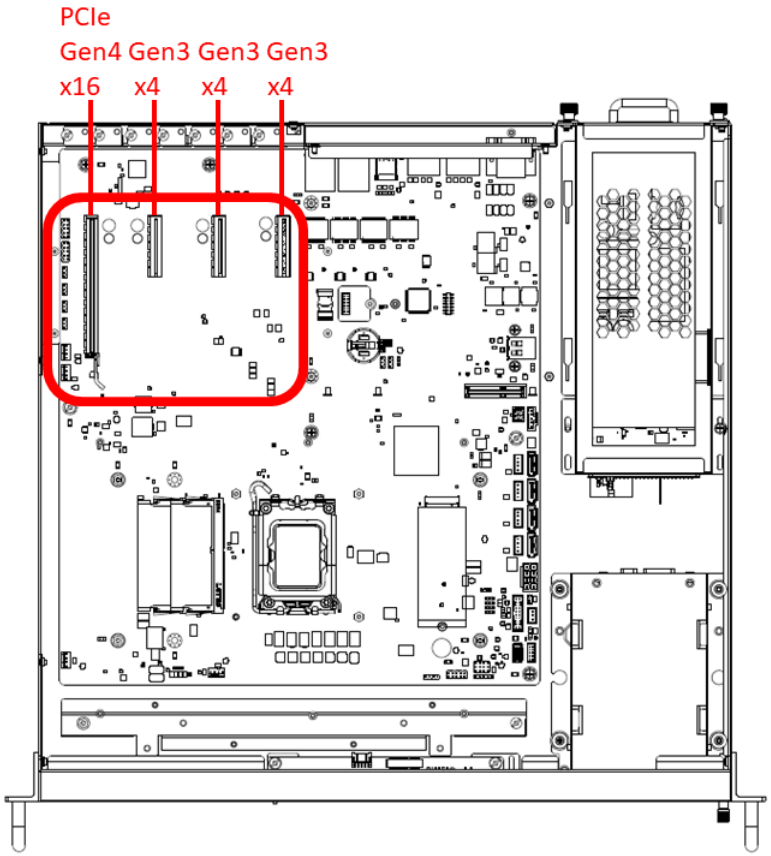


Figure 2.15 PCIe Card Position on the Main Board

2.9.2.2 PCIe Expansion Card list

The tested PCIe expansion list is as follows:

Part Number	Description
PCIE-1130PS-00A1E	Quad port copper Gigabit Ethernet PCI Express server adapter with Intel® I350 (Advantech form factor)
PCIE-2130NP-00A1E	Quad port fiber Gigabit Ethernet PCI Express server adapter with Intel® I350
PCIE-2230NP-00A1E	Quad port fiber 10GbE Ethernet PCI Express server adapter with Intel® XL710-BM1
PCIE-2220NP-00A1E	Dual port fiber 10GbE Ethernet PCI Express server adapter with Intel® 82599ES

2.9.2.3 Installing PCIe Cards

1. Remove the screws shown in Figure 2.10 to open the chassis.
2. Remove front PCIe bracket from the top holder, then install your PCIe cards.

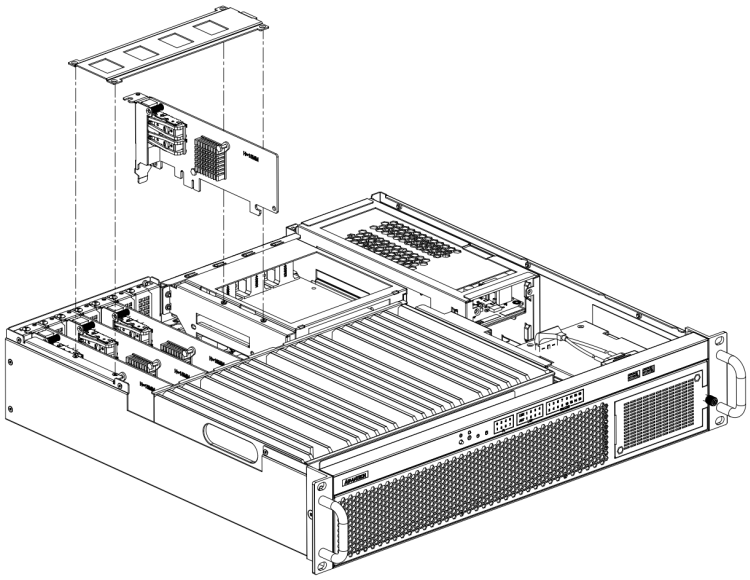


Figure 2.16 Installing PCIe cards

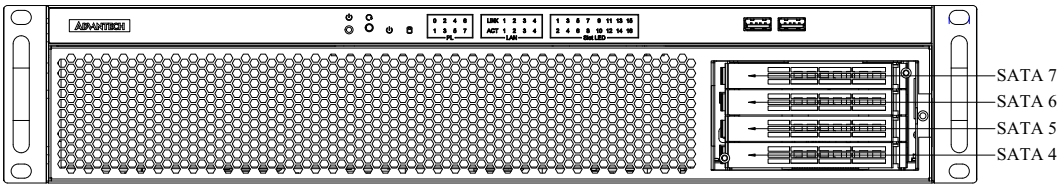
3. Reinstall the PCIe top holder. Cover and resume ECU-479.

2.10 Storage (SATA, M.2)

2.10.1 SATA Disks

The ECU-479 provides 4 slots for 2.5” SATA drives that support RAID 0, 1, 5, and 10.

Note! *SATA ports name in BIOS:*



2.10.2 M.2 Storage

The M.2 2280 connector supports both SATA and PCIe SSD devices for higher read/write speeds.

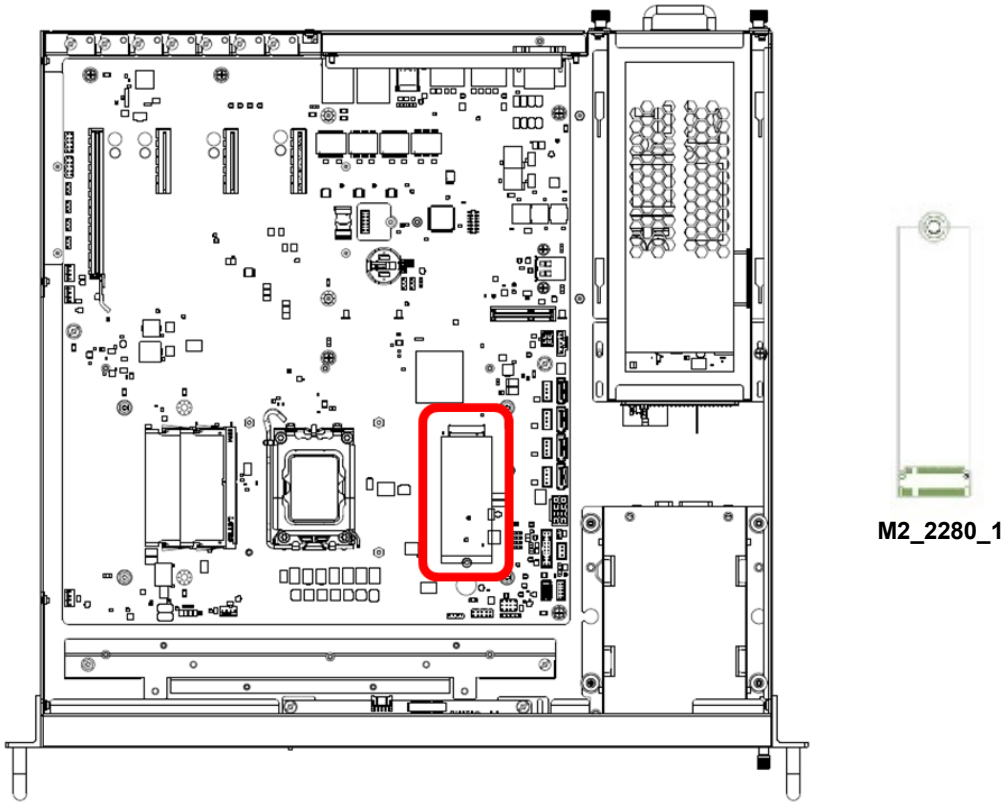


Figure 2.17 M.2 Connector Position on the Main Board

2.11 Processors

2.11.1 Compatible with 13th/12th Gen Intel® Core™ CPU

The ECU-479 is equipped with one CPU socket to support 13th/12th Gen Intel® Core™ Series processors with up to 16 cores.

Table 2.9: Validated 13th/12th Gen Intel® Core™

Test Item	Description						
CPU Family	S-Spec	Base Frequency	Core Stepping	Power	Number of Processor Cores	Shared Last Level Cache	Package Type
i7-13700TE	SRMG4	4.8 GHz	B0	35 W	16	30 MB	FCLGA1700
i5-13500TE	SRMFZ	4.5 GHz	C0	35 W	14	24 MB	FCLGA1700
i3-13100TE	SRMFT	4.1 GHz	H0	35 W	4	12 MB	FCLGA1700
i7-12700TE	SRL6E	4.6 GHz	C0	35 W	12	25 MB	FCLGA1700
i5-12500TE	SRL6V	4.3 GHz	H0	35 W	6	18 MB	FCLGA1700
i3-12100TE	SRL6T	4.0 GHz	H0	35 W	4	12 MB	FCLGA1700
i7-13700E	SRMG3	4.8 GHz	B0	65 W	16	30 MB	FCLGA1700
i5-13500E	SRMFW	4.5 GHz	C0	65 W	14	24 MB	FCLGA1700
i3-13100E	SRMFR	4.2 GHz	H0	60 W	4	12 MB	FCLGA1700
i7-12700E	SRL6D	5.1 GHz	C0	65 W	12	25 MB	FCLGA1700
i5-12500E	SRL6W	4.6 GHz	H0	65 W	6	18 MB	FCLGA1700
i3-12100E	SRL6U	4.4 GHz	H0	60 W	4	12 MB	FCLGA1700

2.12 Memory

ECU-479 has 2 x 260-pin memory slots for DDR4 3200/2933/2666 mHz ECC/non-ECC memory modules with a maximum total capacity of 64 GB (maximum 32 GB for each SODIMM).

2.12.1 Validated Memory

Advantech has tested a list of RAM for your reference, all of which are verified as compatible with the ECU-479..

Table 2.10: Validated Memory

Brand	Size	Speed (MHz)	Type	ECC	Vendor PN
Advantech	32 GB	3200	DDR4	Y	SQR-SD4I32G3K2SEAB
Advantech	16 GB	3200	DDR4	Y	SQR-SD4I16G3K2SECB
Advantech	8 GB	3200	DDR4	Y	SQR-SD4I8G3K2SEBCB
Advantech	32 GB	3200	DDR4	Y	AQD-SD4U32E32-SBW
Advantech	16 GB	3200	DDR4	Y	AQD-SD4U16E32-SEW
Advantech	8 GB	3200	DDR4	Y	AQD-SD4U8GE32-SEW
Advantech	32 GB	3200	DDR4	N	SQR-SD4I32G3K2SNAB
Advantech	16 GB	3200	DDR4	N	SQR-SD4I16G3K2SNCB
Advantech	8 GB	3200	DDR4	N	SQR-SD4I8G3K2SNBCB
Advantech	32 GB	3200	DDR4	N	AQD-SD4U32N32-SBW1
Advantech	16 GB	3200	DDR4	N	AQD-SD4U16N32-SEW1
Advantech	8 GB	3200	DDR4	N	AQD-SD4U8GN32-SEW1

2.13 TPM

The ECU-479 supports Trusted Platform Module (TPM 2.0) technology. TPM is designed to provide hardware-based security-related functions. TPM is a microchip designed to provide basic security-related functions primarily involving encryption keys. 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 the security features while remaining under complete control of its primary user.

2.14 Installing CPU, Memory and M.2 Storage

1. Remove the screws shown in Figure 2.10 to open the chassis.
2. Remove the 12 screws shown in Figure 2.15. Note that the 4 spring screws in the red boxes cannot be taken out after loosening.

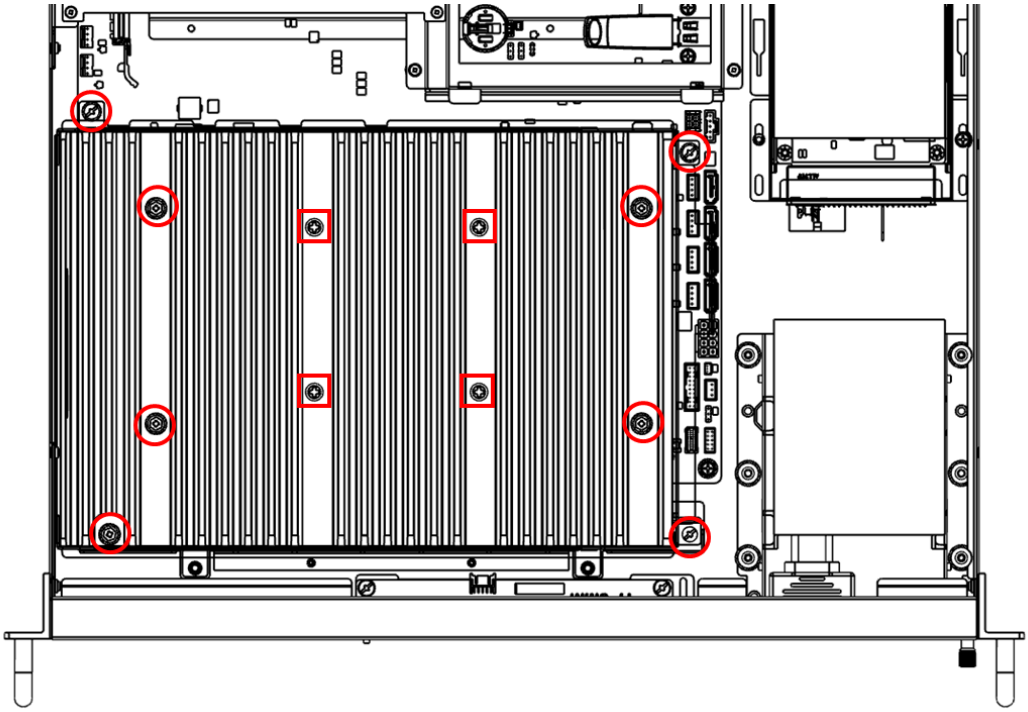


Figure 2.18 Heatsink screws Positions

3. Carefully lift the heatsink, then flip it over.

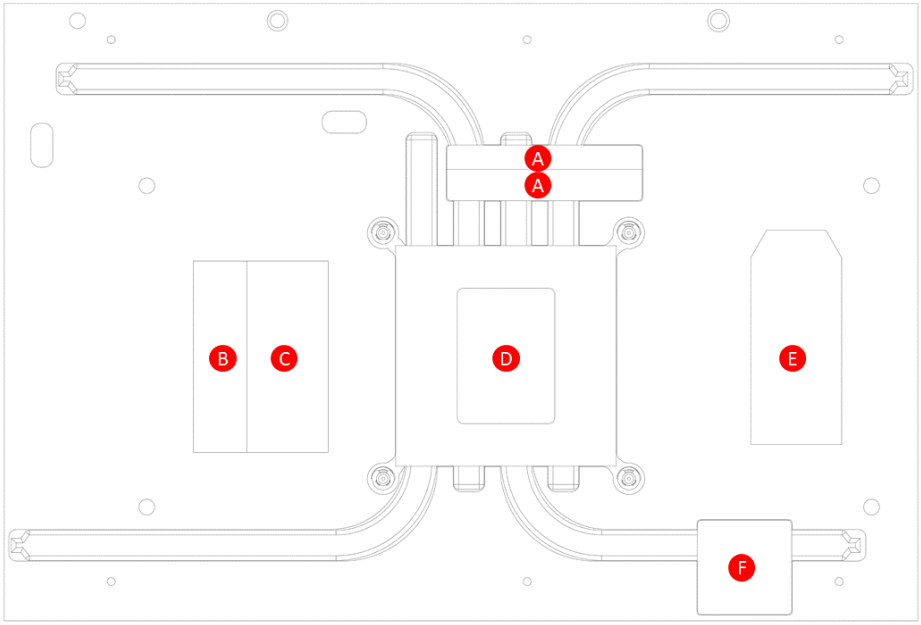


Figure 2.19 Heatsink-Bottom Side

4. Paste the thermal pads according to your configuration on the heatsink with care. When you install an M.2 storage device, paste thermal pad E on the heatsink and pad G on the motherboard under the M.2 storage.

Table 2.11: Thermal Pad List

Position	Dimensions (L x W x H)	Outward appearance
A	59 x 7 x 1 mm	Grey
B	59 x 16 x 1 mm	Blue
C	59 x 24.3 x 1 mm	Blue
D	45 x 30 x 0.21 mm	Green
E	59 x 16 x 1 mm	Grey
F	27.8 x 27.8 x 1 mm	Blue
G	60 x 16 x 6 mm	Black

5. Install the CPU, memory, and M.2 storage according to your configuration.

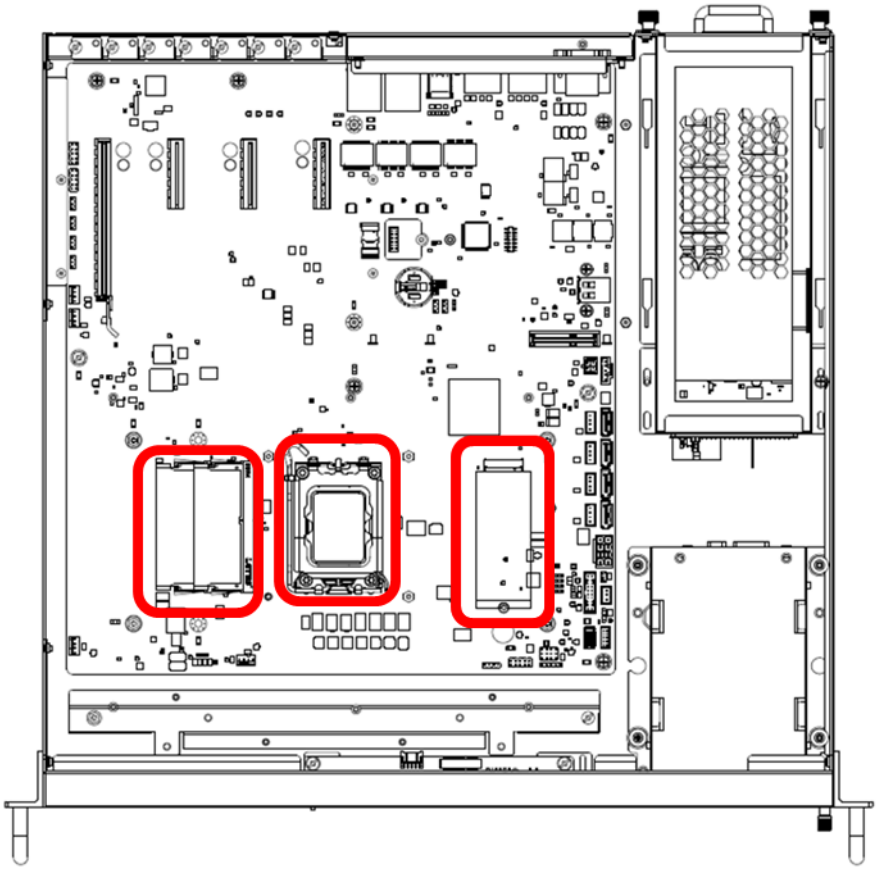


Figure 2.20 CPU, memory, and M.2 storage positions

6. Carefully reinstall the heatsink. Tighten the screws in the order shown in Figure 2.18, torque = 5.5 kgf.

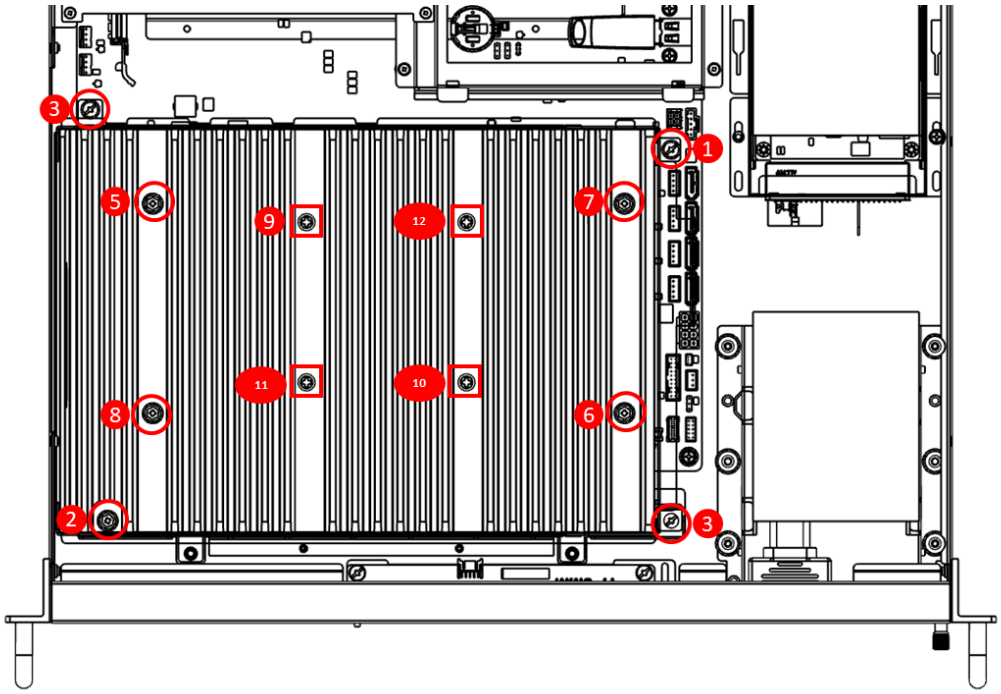


Figure 2.21 Heatsink Screw Locking Sequence

7. Cover and resume ECU-479.

Note! *The computer should be installed by a skilled person.*

Note! *Thermal pads cannot be re-used. Please contact Advantech or your distributor before modifying the configuration.*

2.15 Platform Feature Description

2.15.1 BIOS

With the AMI 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. This chapter describes the basic navigation of the ECU-479 setup screens.

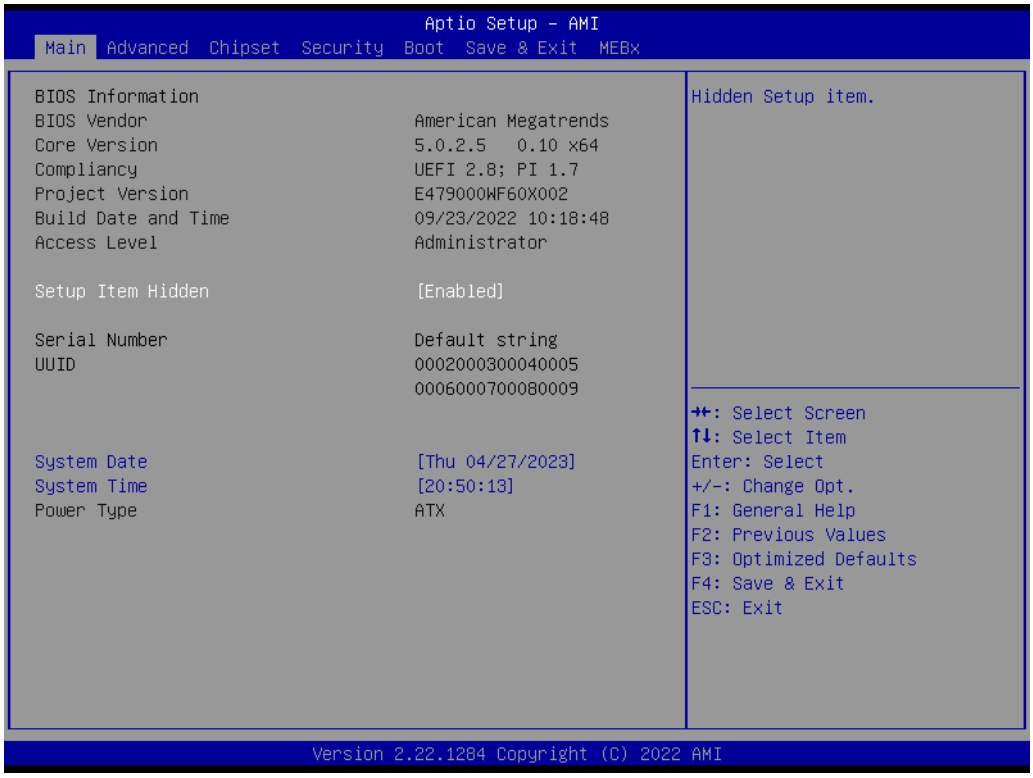


Figure 2.22 BIOS Interface

The ECU-479's BIOS ROM has a built-in setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS so that it retains the setup information when the power is turned off.

Note! *The BIOS setup screens shown in this manual are for reference only. They may not match exactly what you see on your display.*

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 legend. Above the legend 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.

2.15.2 Watchdog

2.15.2.1 Watchdog Timer Overview

The watchdog timer is built into the Super I/O controller, NCT6126D (B). It provides the following functions for user programming and can be enabled and disabled by the user's program timer, which can be set from 1 to 255 seconds. It generates an interrupt or reset signal if the software fails to reset the timer before time-out.

To get the driver and test case for Windows and Linux operating systems, you can visit the official Advantech website on the ECU-479 product page to download the driver with the test sample.

2.15.3 iBMC

The ECU-479 is equipped with the Nuvoton M487SIDAE and supports iBMC 1.2 (Intelligent board management controller) via a LAN port.

LAN1 can operate with the iBMC function that allows for remote control management. High reliability and outstanding performance make ECU-479 the ideal platform for industrial server/networking applications.

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 specific features on or off. This chapter describes the basic navigation of the ECU-479 setup screens.

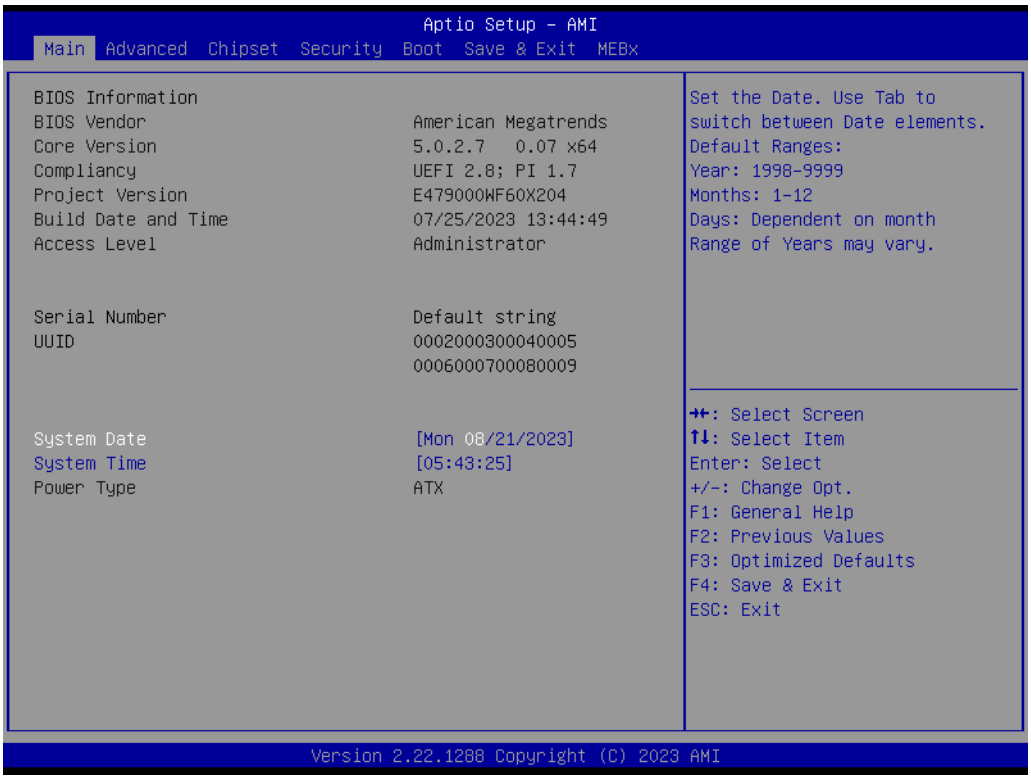


Figure 3.1 Main Setup Screen

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

3.2 Entering BIOS Setup

Press <DEL> during bootup to enter the 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.

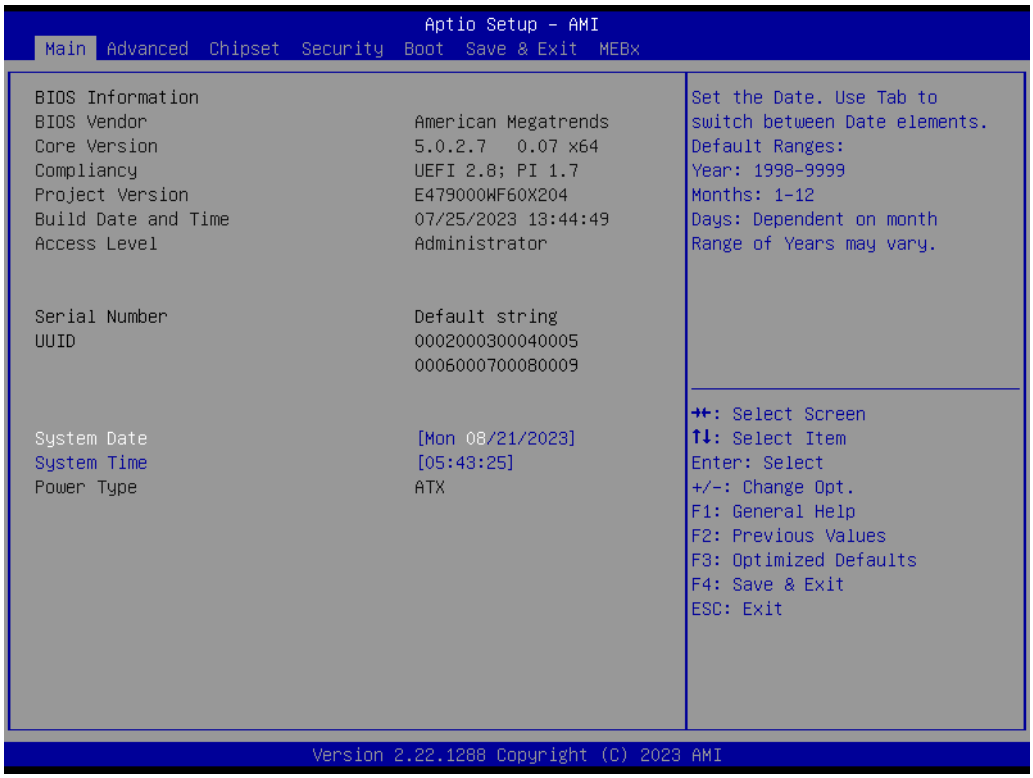


Figure 3.2 Main Setup Screen

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-479 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.

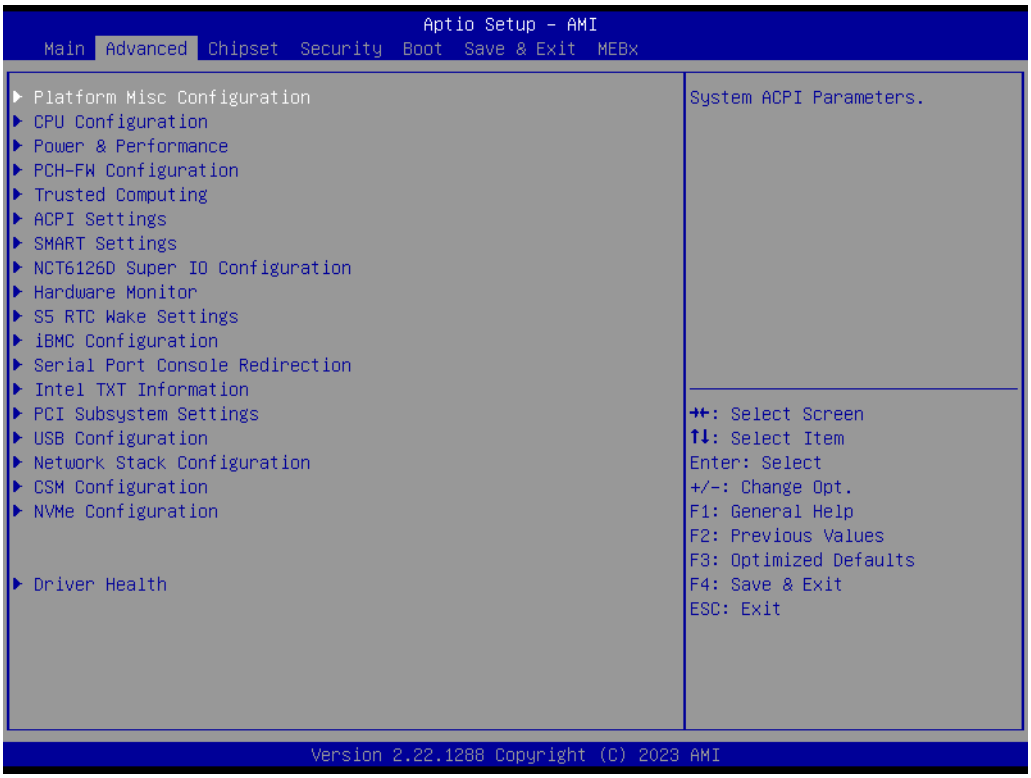


Figure 3.3 Advanced BIOS Features Setup Screen

3.2.2.1 Platform Misc Configuration

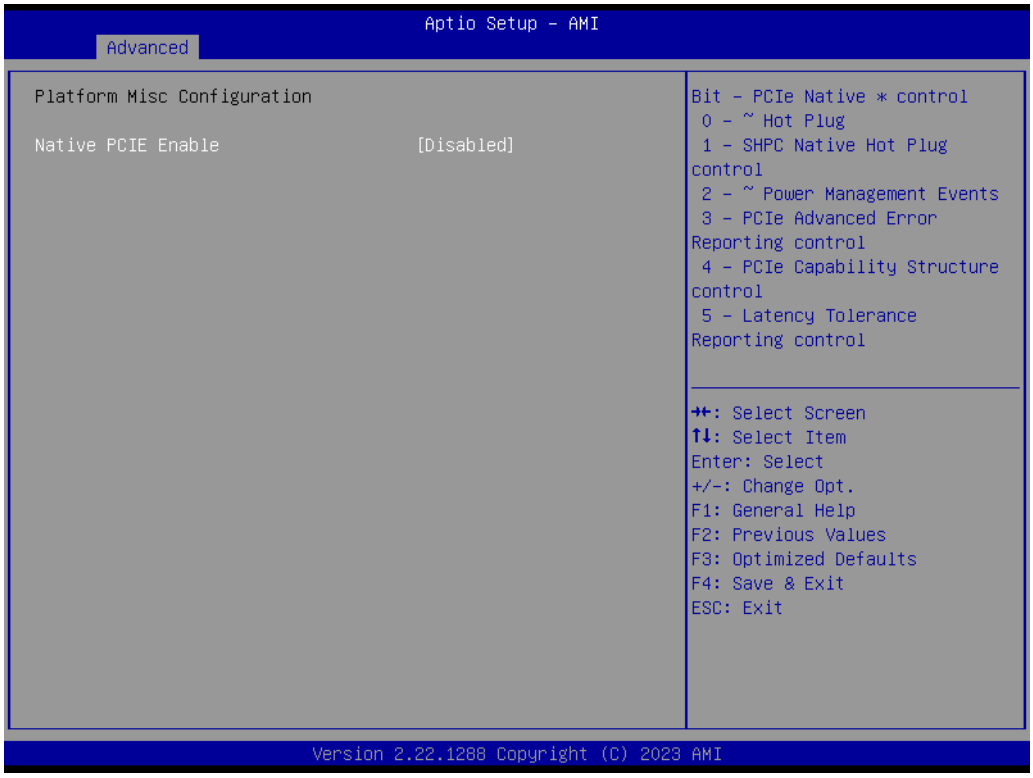


Figure 3.4 Platform Misc Configuration

- **Native PCIE Enable**
  "Enable or Disable" PCI Express native support.

3.2.2.2 CPU Configuration

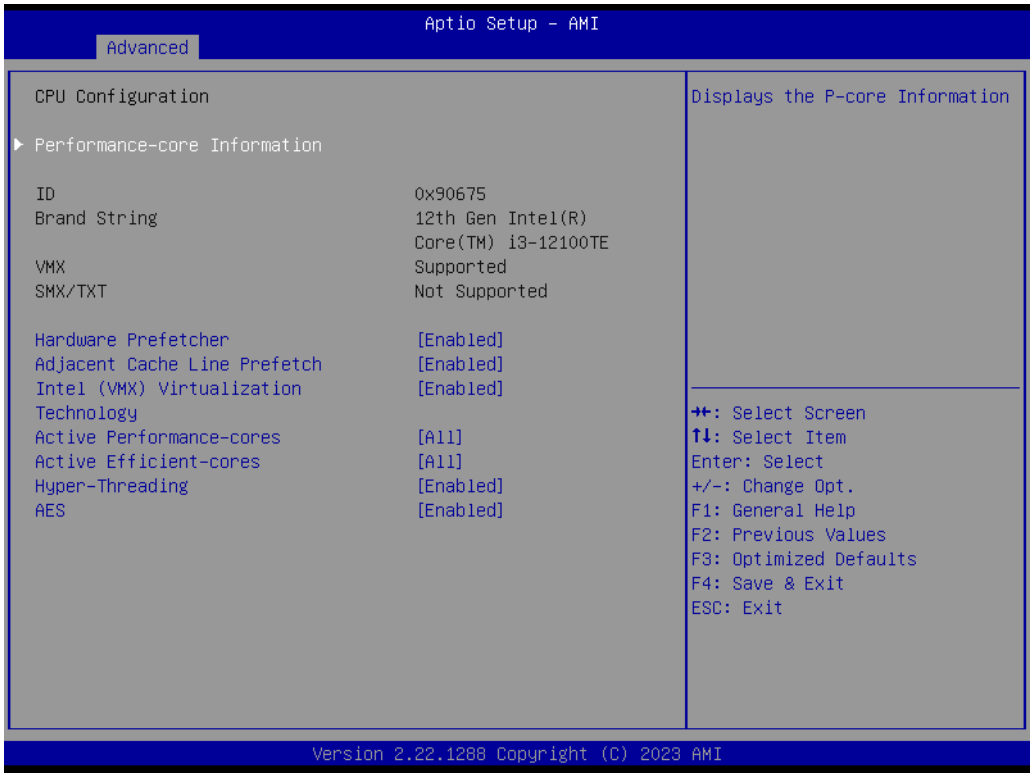


Figure 3.5 CPU Configuration

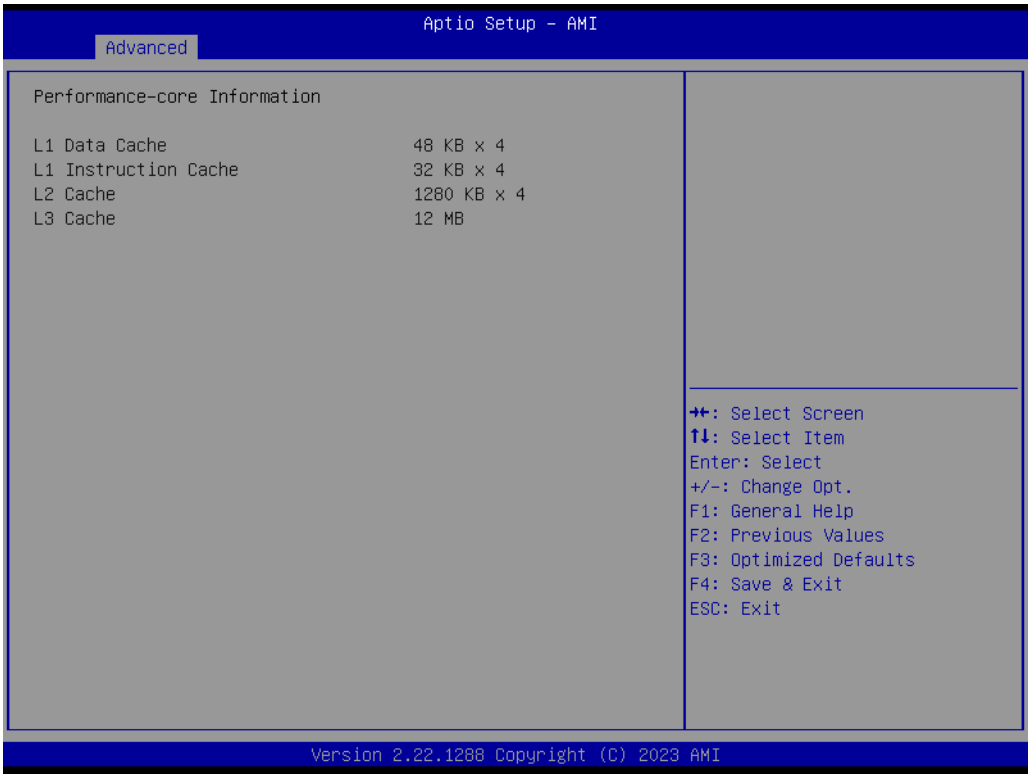


Figure 3.6 Performance-Core Information

- **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**
  This feature is used to "Enable" or “Disable" Intel® Virtualization Technology (IVT) extension. It 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" or “Disable" Intel® Hyper Threading technology.
- **AES**
  "Enable" or “Disable" CPA advanced encryption standard instruction

3.2.2.3 Power & Performance

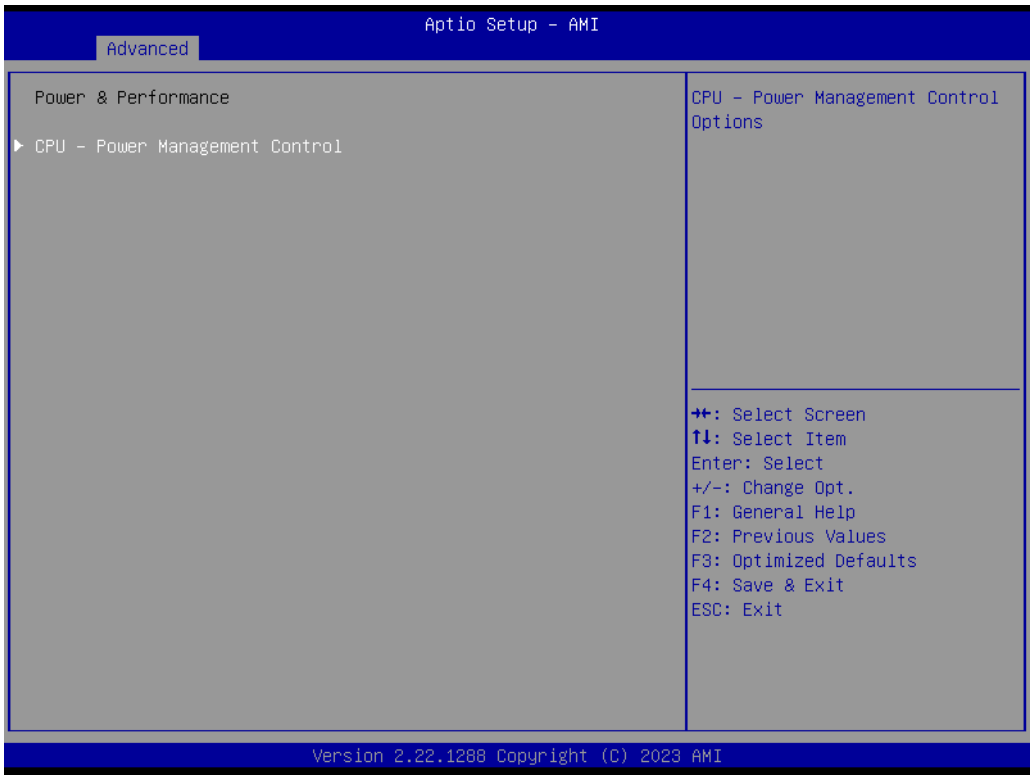


Figure 3.7 Power & Performance

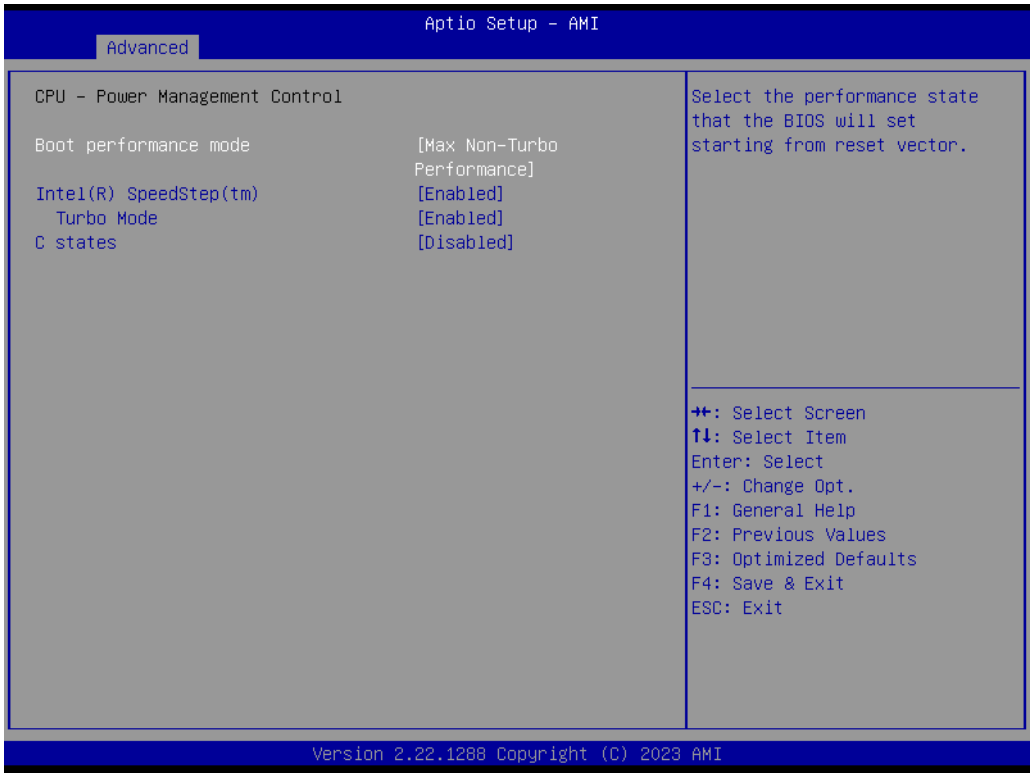


Figure 3.8 CPU - Power Management Control

- **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" or "Disable" processor turbo mode.
- **C States**
  Intel® C states setting for power saving. Suggest enable for ErP.

3.2.2.4 PCH-FW Configuration

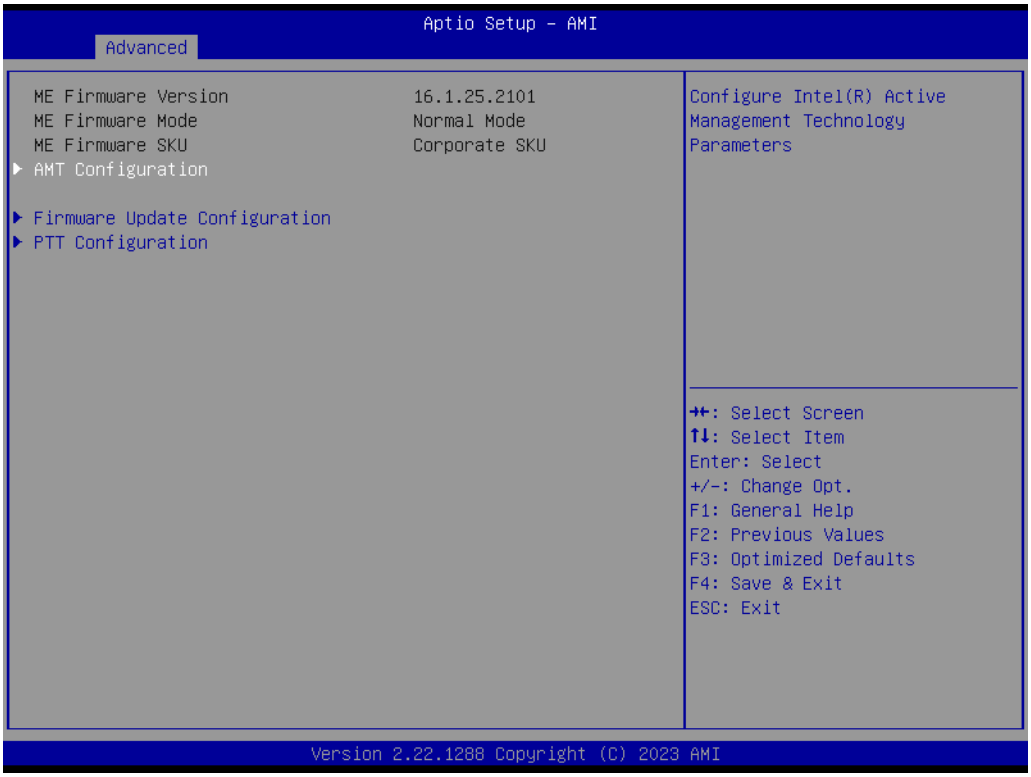


Figure 3.9 PCH-FW Configuration

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

AMT Configuration

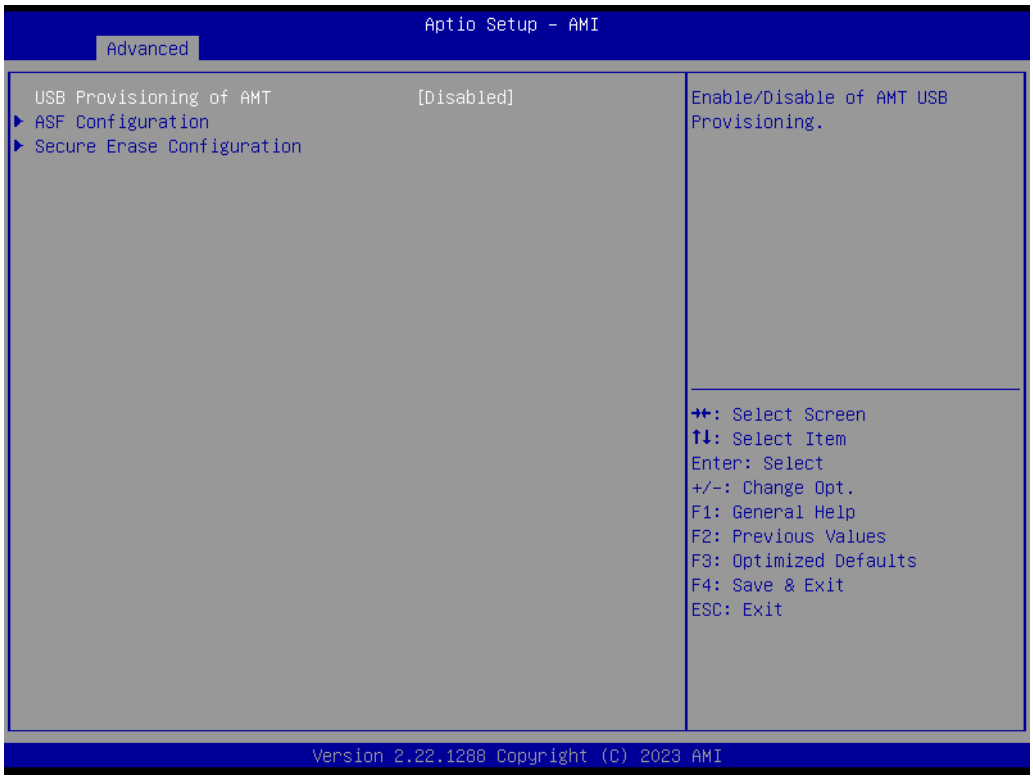


Figure 3.10 AMT Configuration

ASF Configuration

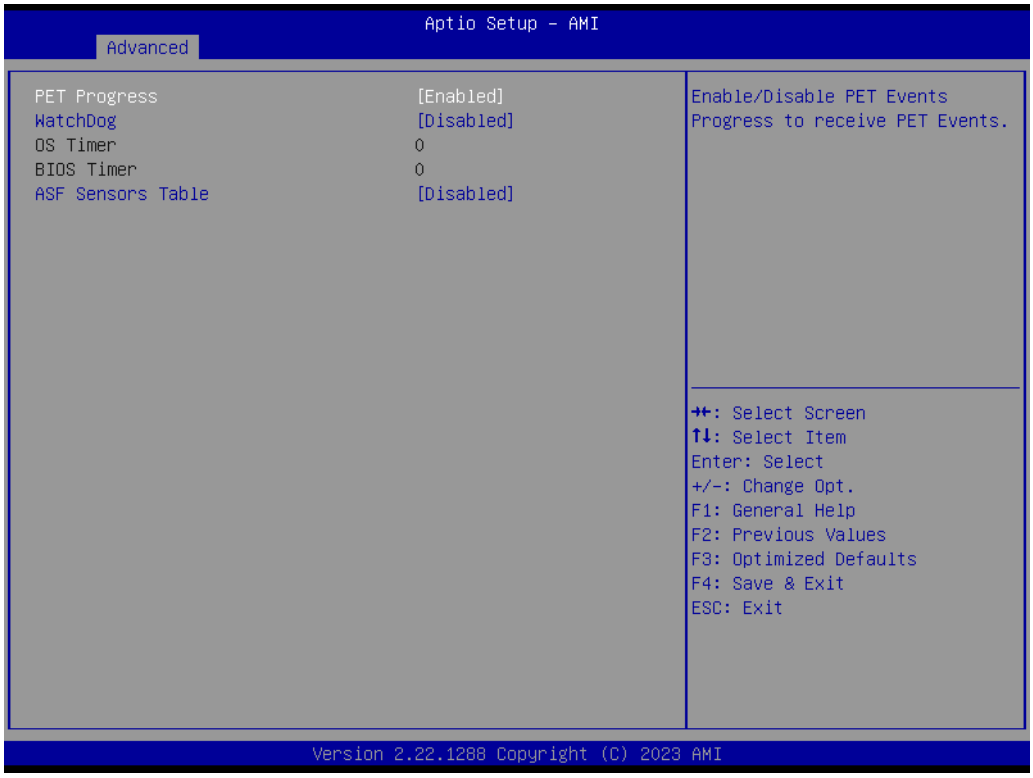


Figure 3.11 ASF Configuration

– PET Progress
"Enable" or "Disable" PET events Progress to receive PET events.ASF Configuration

– WatchDog
  “Enable” or “Disable” Watchdog Timer.
– ASF Sensors Table
  "Enable” or “Disable" to add ASF Sensor Table into ASF ACPI Table.

Secure Erase Configuration

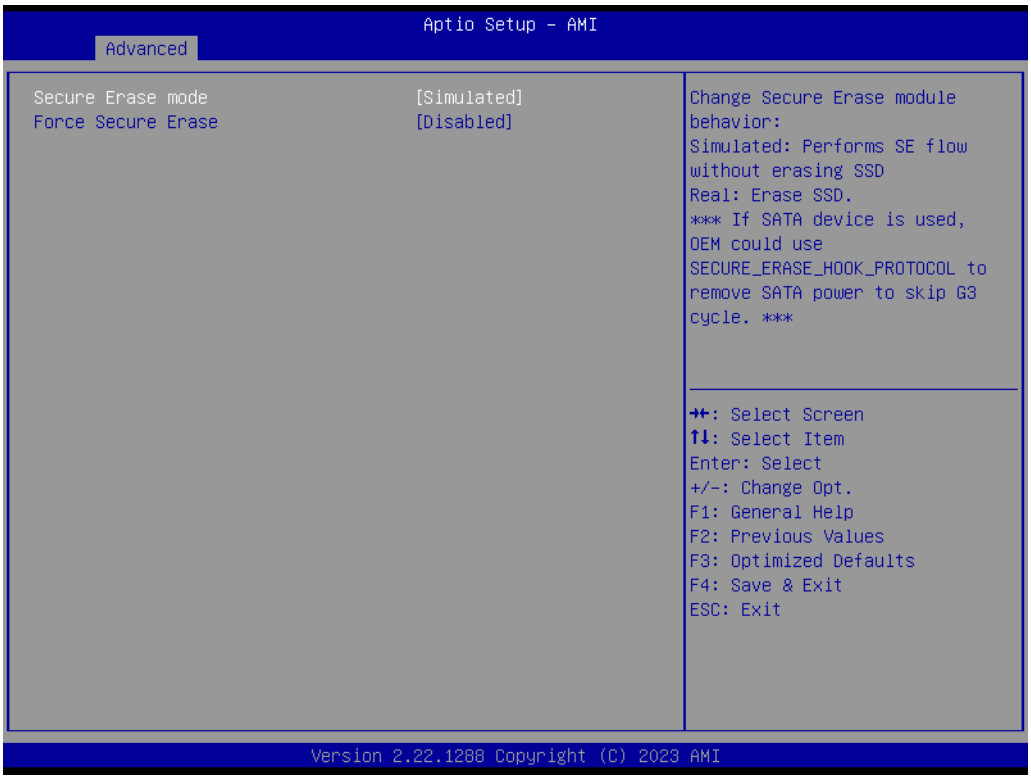


Figure 3.12 Secure Erase Configuration

– Secure Erase mode
  Change secure erase module behavior as “Simulated” or “Real”.
– Forced Secure Erase
  “Enable” or “Disable” forced secure erase on next boot.

Firmware Update Configuration

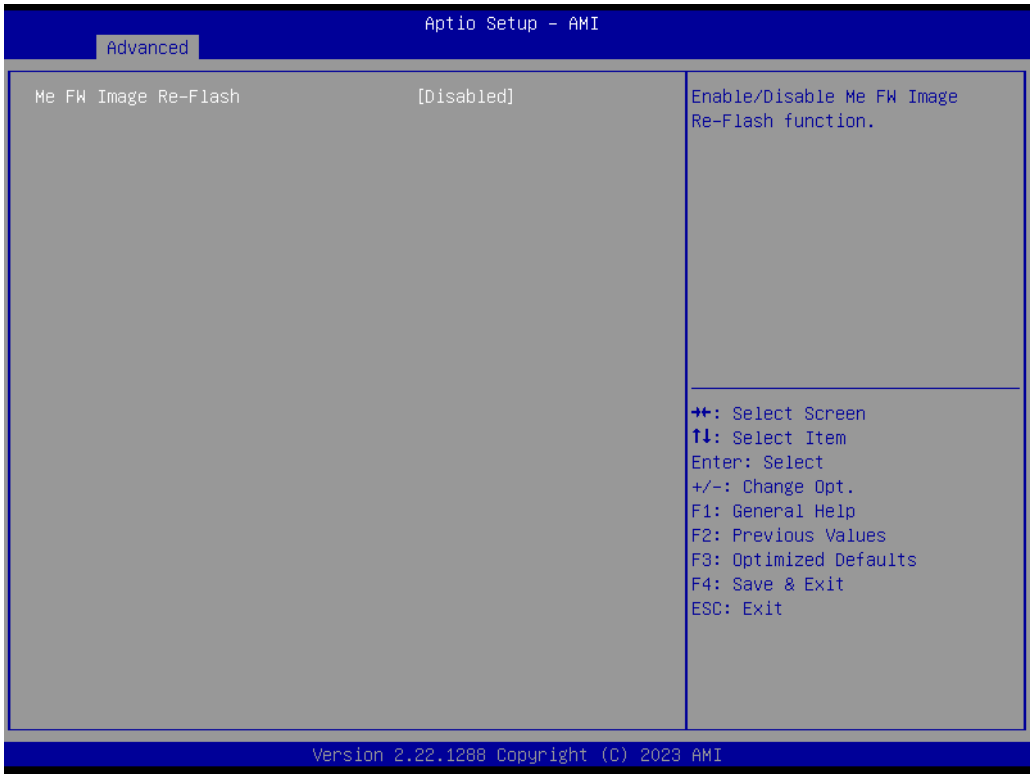


Figure 3.13 Firmware Update Configuration

– ME FW Image Re-flash
"Enable or Disable" ME firmware image re-flash function.

PTT Configuration

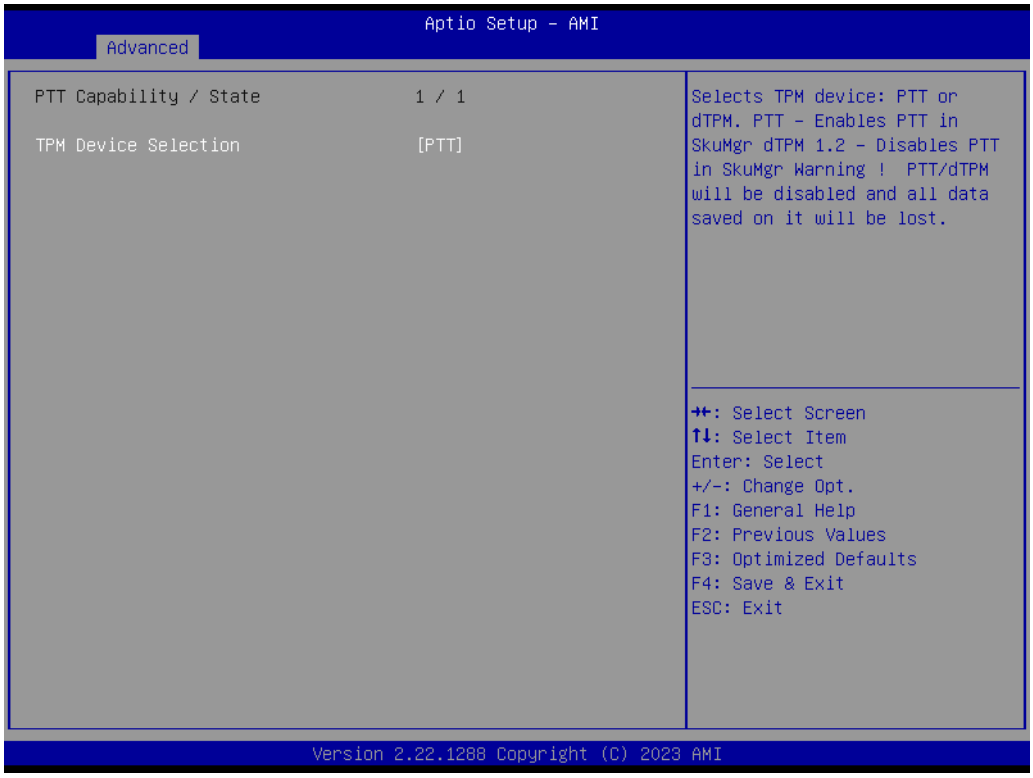


Figure 3.14 PTT Configuration

– 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

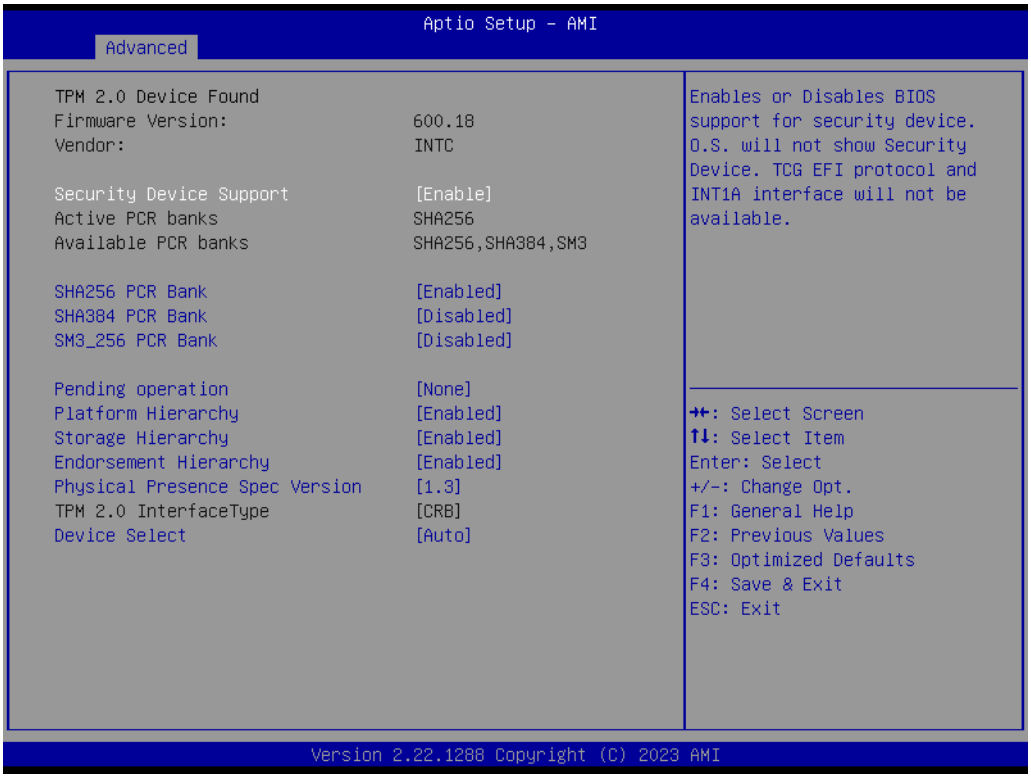


Figure 3.15 TPM Settings

- **Security Device Support**
  “Enable” or “Disable” TPM Support. You can purchase an Advantech-designed dTPM 2.0 module to enable the TPM function. P/N: PCA-TPMSPI-00A1.

3.2.2.6 ACPI Settings

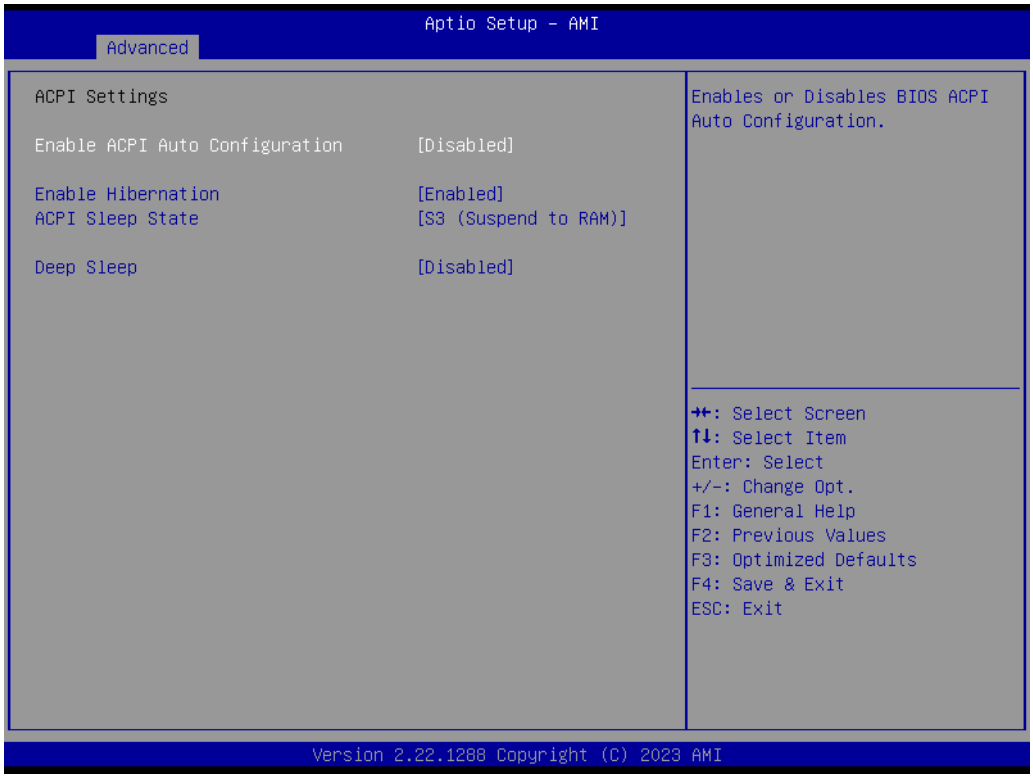


Figure 3.16 ACPI Settings

- **Enable ACPI Auto Configuration**
  "Enable" or "Disable" ACPI auto configuration.
- **Enable Hibernation**
  "Enable" or "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.
- **Deep Sleep**
  Select "Disabled" or "Enable (S4+S5)" or "Enable (S5 only)" sleep mode. Enable this function to cut off the power of peripherals in sleep state. Please enable this function to comply with EU ErP (Energy-related Product) regulations if required. If "Enable (S5 only)" is chosen, only the power button can turn on the system (fast startup must be disabled under OS)

3.2.2.7 SMART Settings

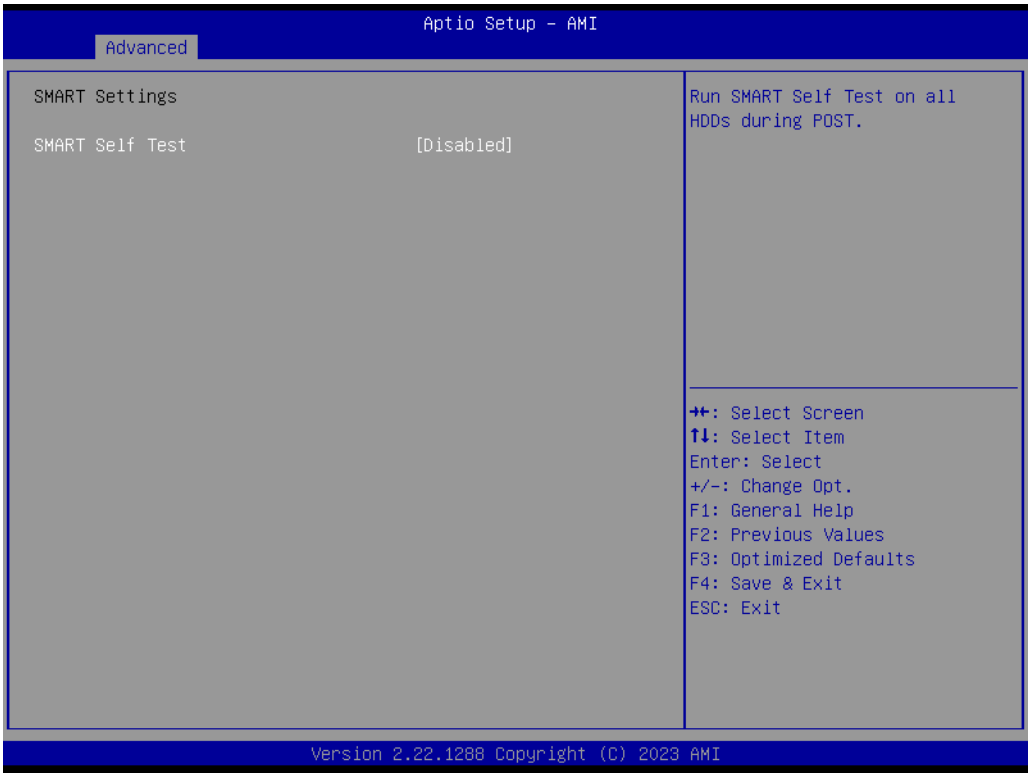


Figure 3.17 SMART Settings

- **SMART Self Test**
  "Enable" or "Disable" SMART self test on all HDDs during POST.

3.2.2.8 NCT6126D Super IO Configuration

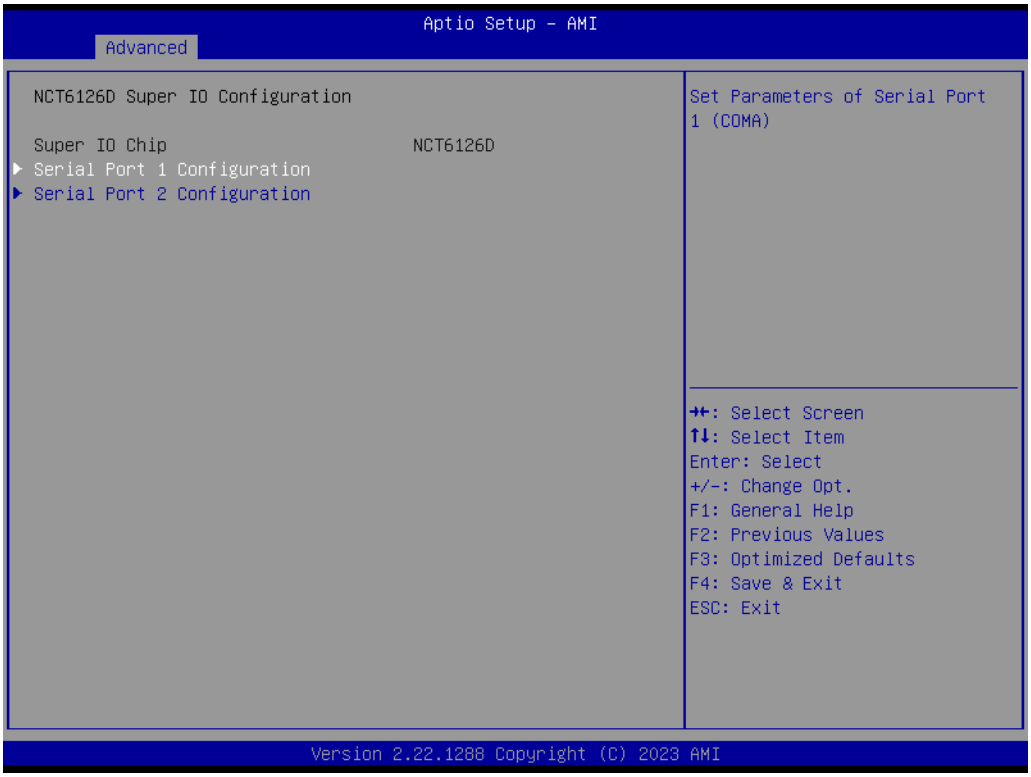


Figure 3.18 NCT6126D Super IO Configuration

- Serial Port 1,2 Configuration

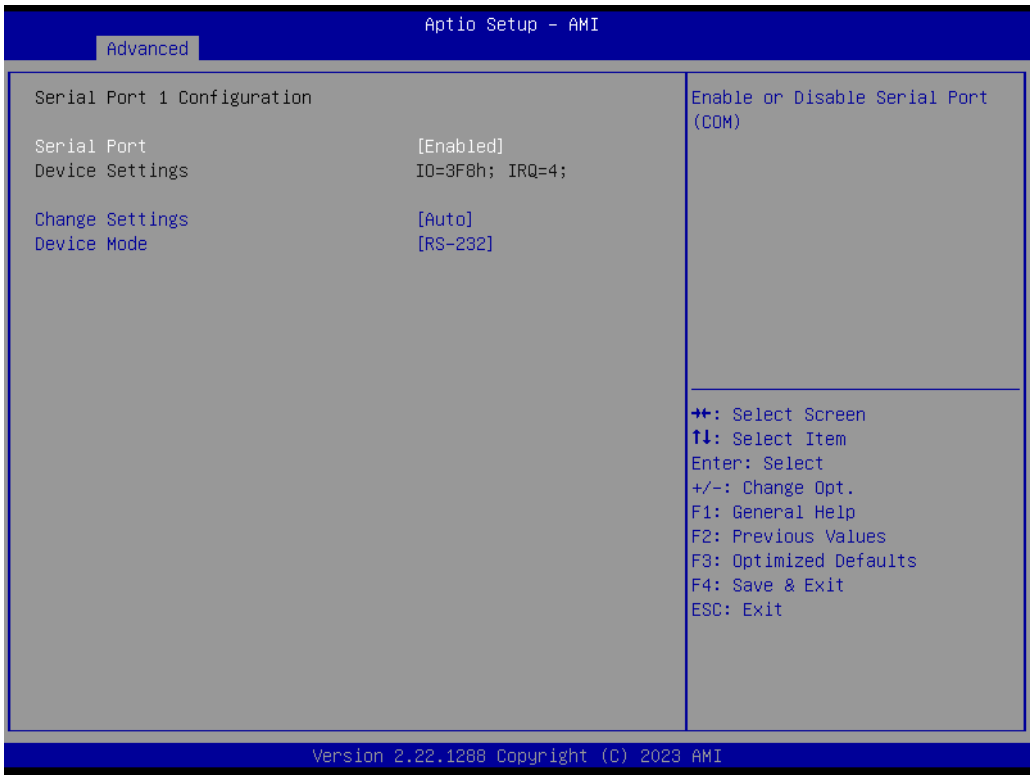


Figure 3.19 Serial Port 1 Configuration

– Serial Port
"Enable" or "Disable" serial port.

– Change Settings
Select an optimal setting for serial port 3.

– Device Mode
Default for device mode is "RS-232".

3.2.2.9 Hardware Monitor

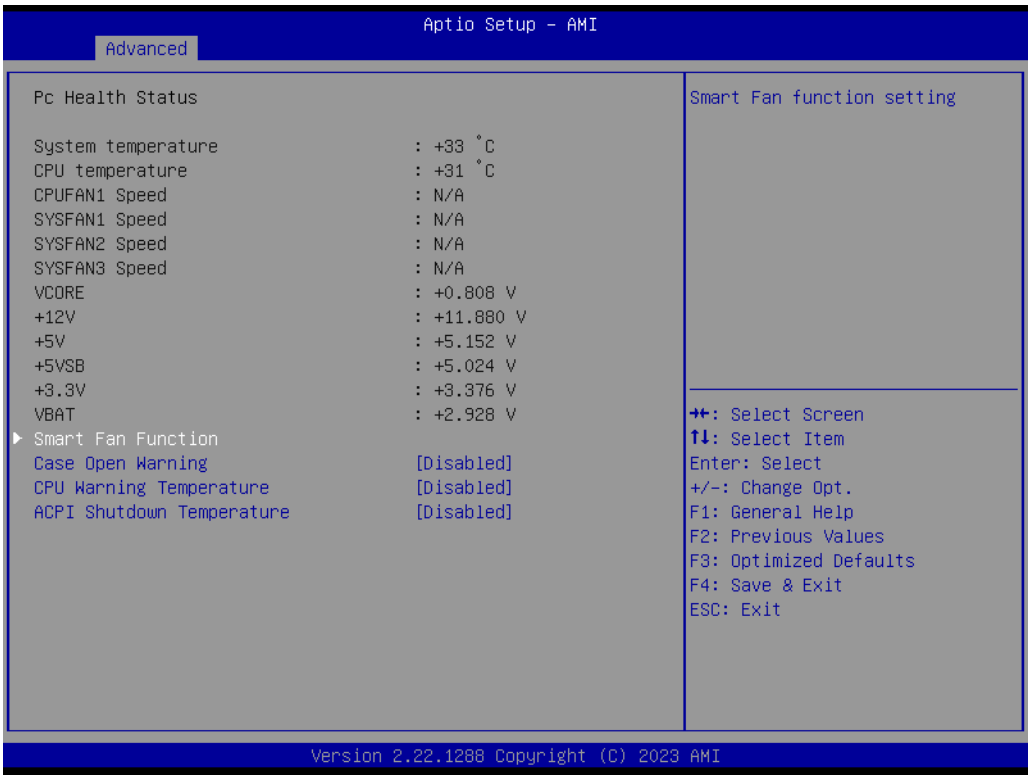


Figure 3.20 Hardware Monitor

- **Case Open Warning**
  "Enable" or "Disable" the chassis Intrusion monitoring function. When it is enabled and the case is opened, the speaker beeps.
- **CPU Warning Temperature**
  Use this item to set the CPU warning temperature. When the system reaches the warning temperature, the speaker will beep.
- **ACPI Shutdown Temperature**
  Use this item to set the ACPI shutdown temperature. When the system reaches the shutdown temperature limit, it will be automatically shut down by the ACPI OS to protect the system from overheating damage.

3.2.2.10 S5 RTC Wake Settings

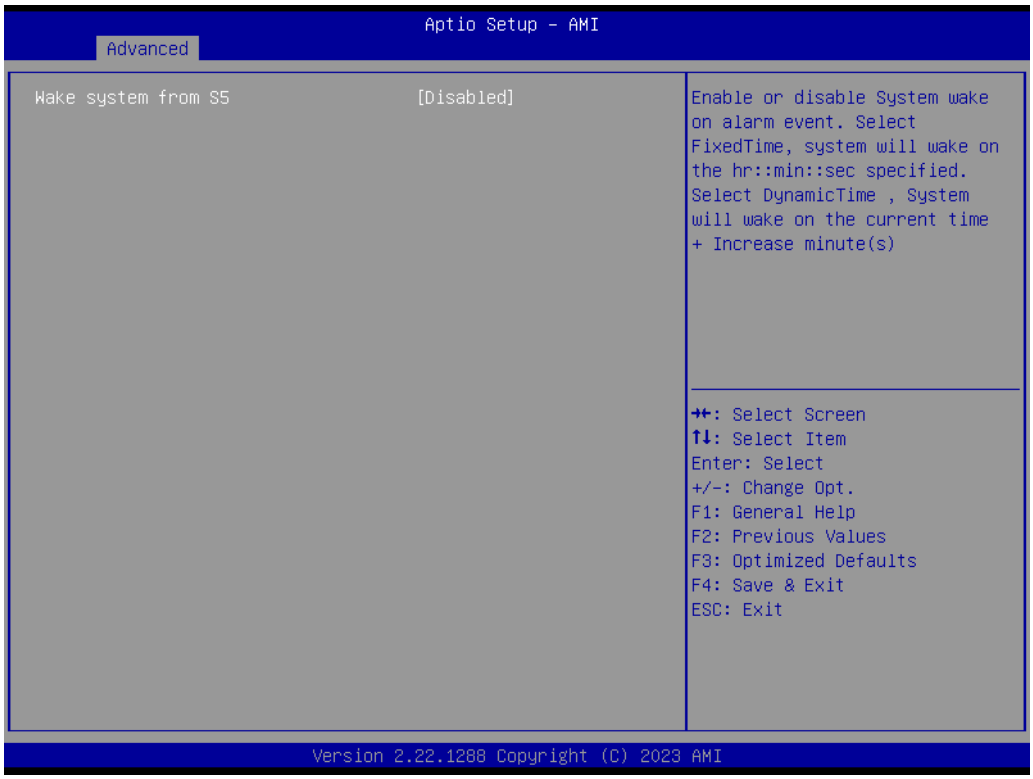


Figure 3.21 S5 RTC Wake Settings

- **Wake System with Fixed Time**

  "Enable" or "Disable" System wake on alarm event. The system will wake on the hr:min:sec as specified.

3.2.2.11 iBMC Configuration

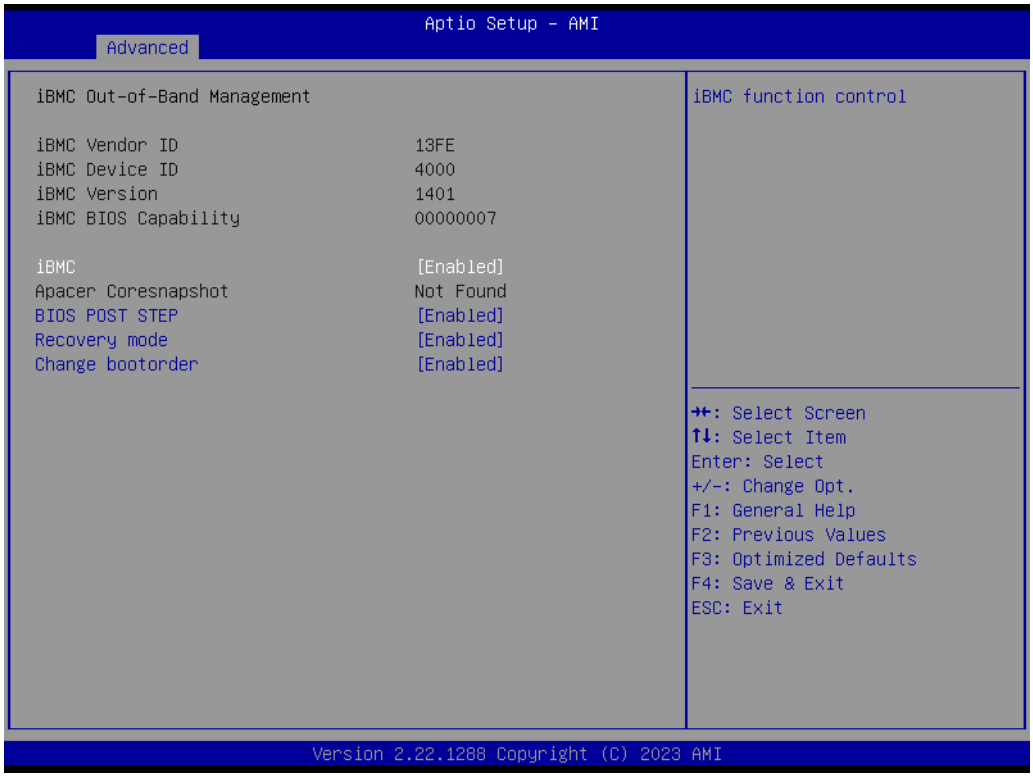


Figure 3.22 iBMC Configuration

- **iBMC**
  “Enable” or “Disable” iBMC controller’s hardware communication. The default setting is “Enabled”. iBMC controller/function can be disabled if the item is selected as “Disabled”.
- **BIOS POST STEP**
  “Enable” or “Disable” BIOS POST STEP.
- **Recovery mode**
  “Enable” or “Disable” recovery mode.
- **Change bootorder**
  “Enable” or “Disable” change bootorder.

3.2.2.12 Serial Port Console Redirection

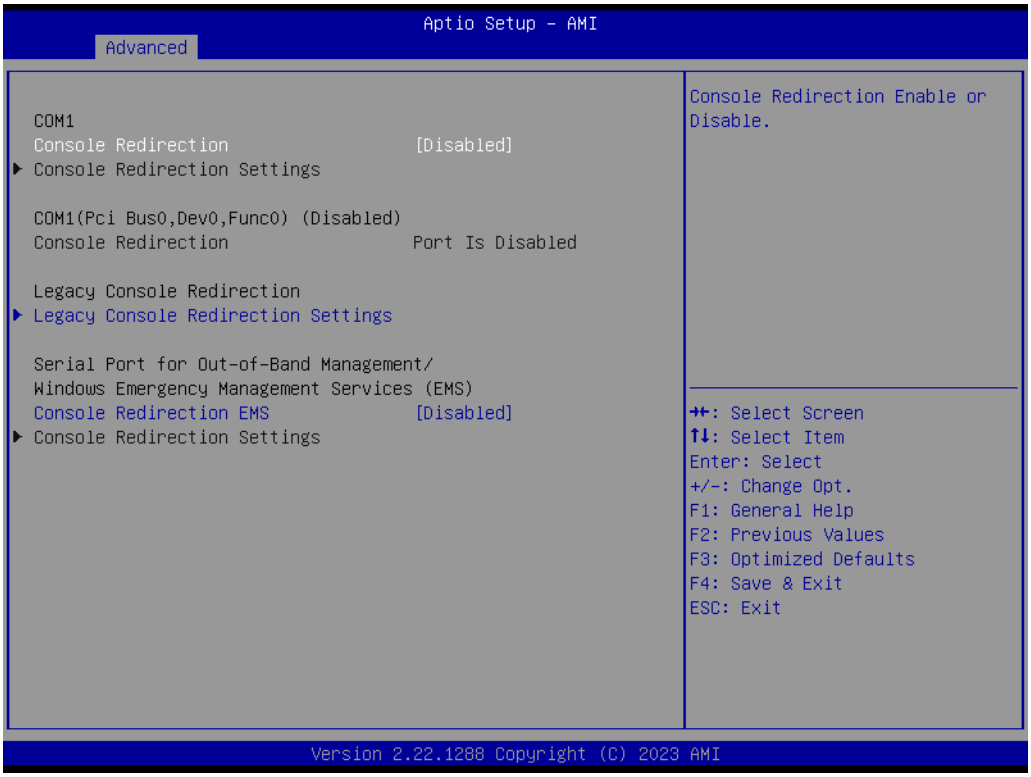


Figure 3.23 Serial Port Console Redirection

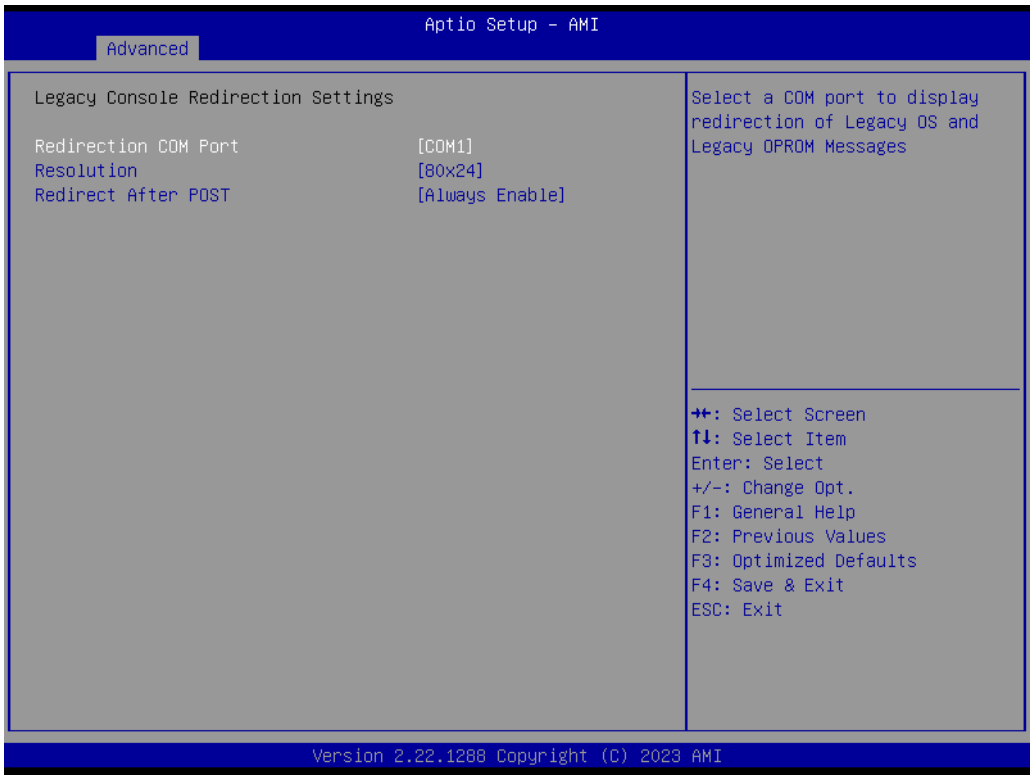


Figure 3.24 Legacy Console Redirection Settings

- **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 OPROM Messages.
- **Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS)**
  - **Console Redirection Settings**
    Console redirection “Enable” or “Disable”.

3.2.2.13 Intel® TXT Information

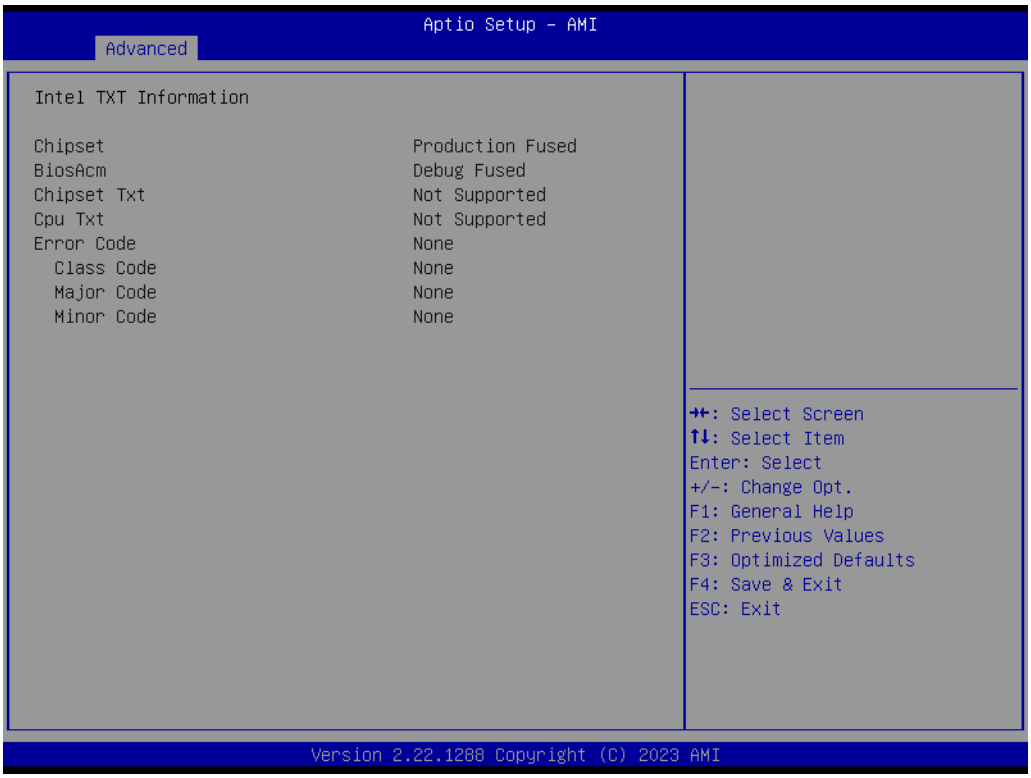


Figure 3.25 Intel® TXT Information

3.2.2.14 USB Configuration

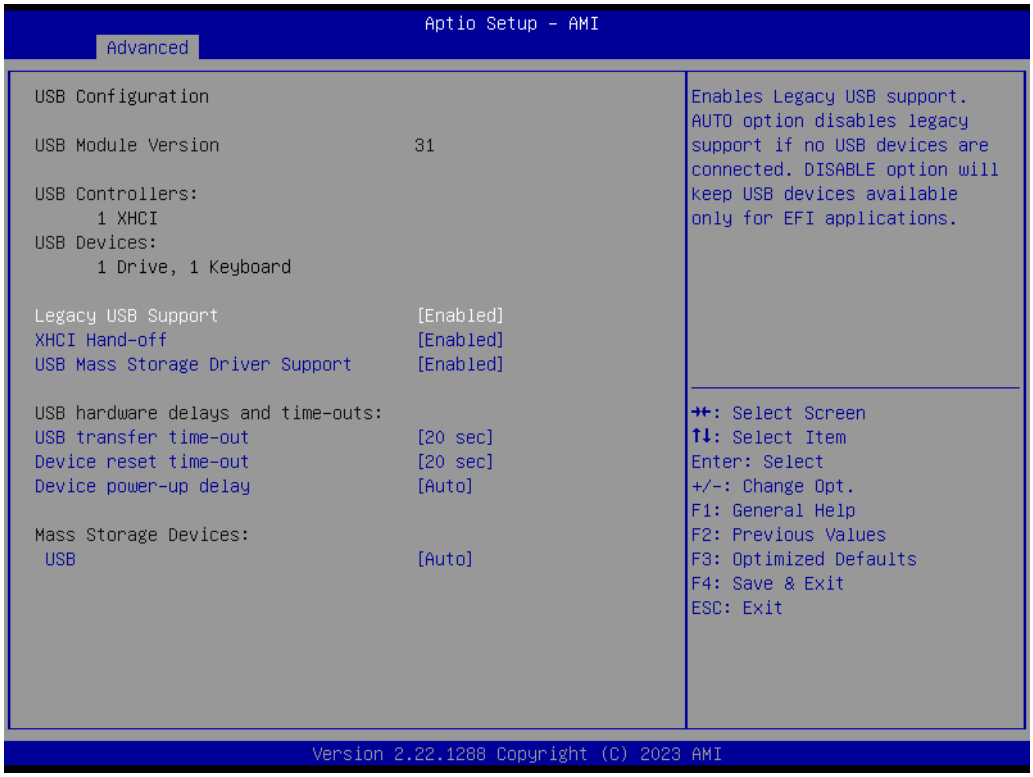


Figure 3.26 USB Information

- **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 the 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. [1,5,10,20 sec]

- **Device Reset Time-Out**

  Allows you to select the USB device reset time-out value. [10,20,30,40 sec]

- **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

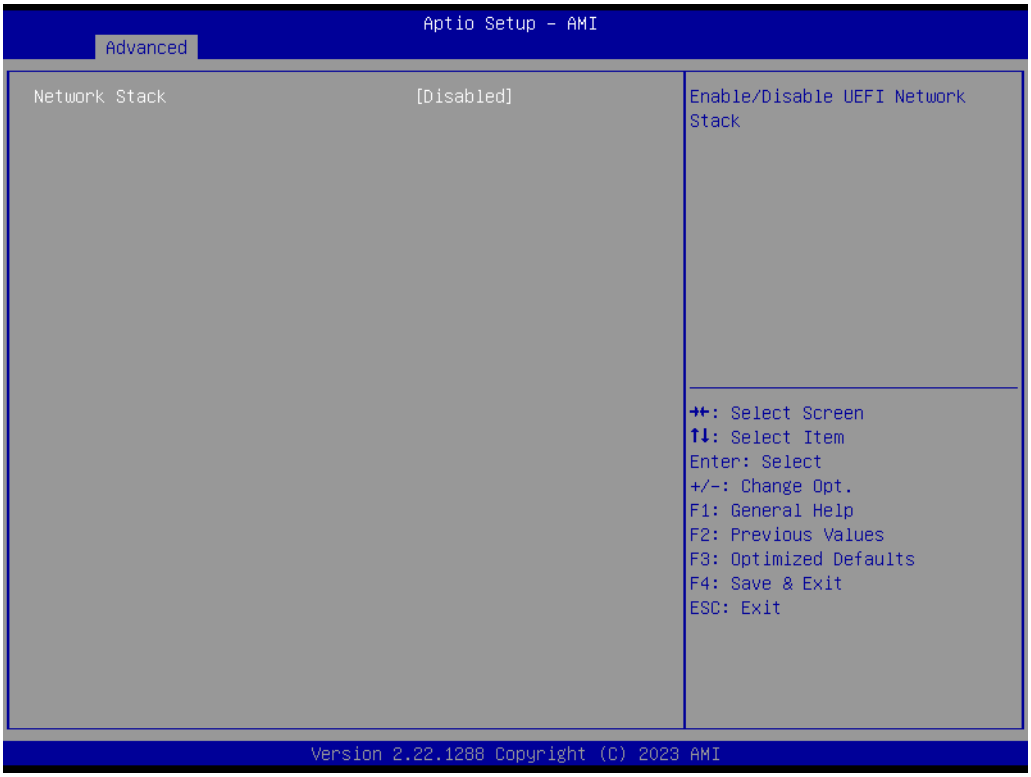


Figure 3.27 Network Stack Configuration

- **Network Stack**
  "Enable" or "Disable" UEFI Network Stack.

3.2.2.16 CSM Configuration

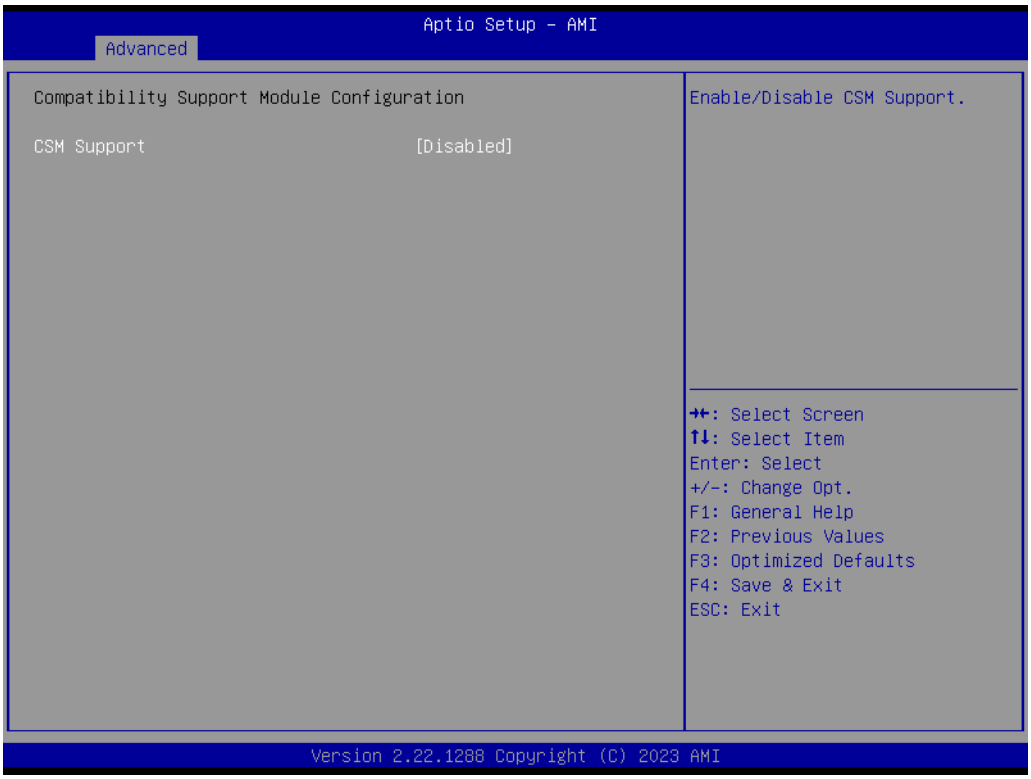


Figure 3.28 CSM Configuration

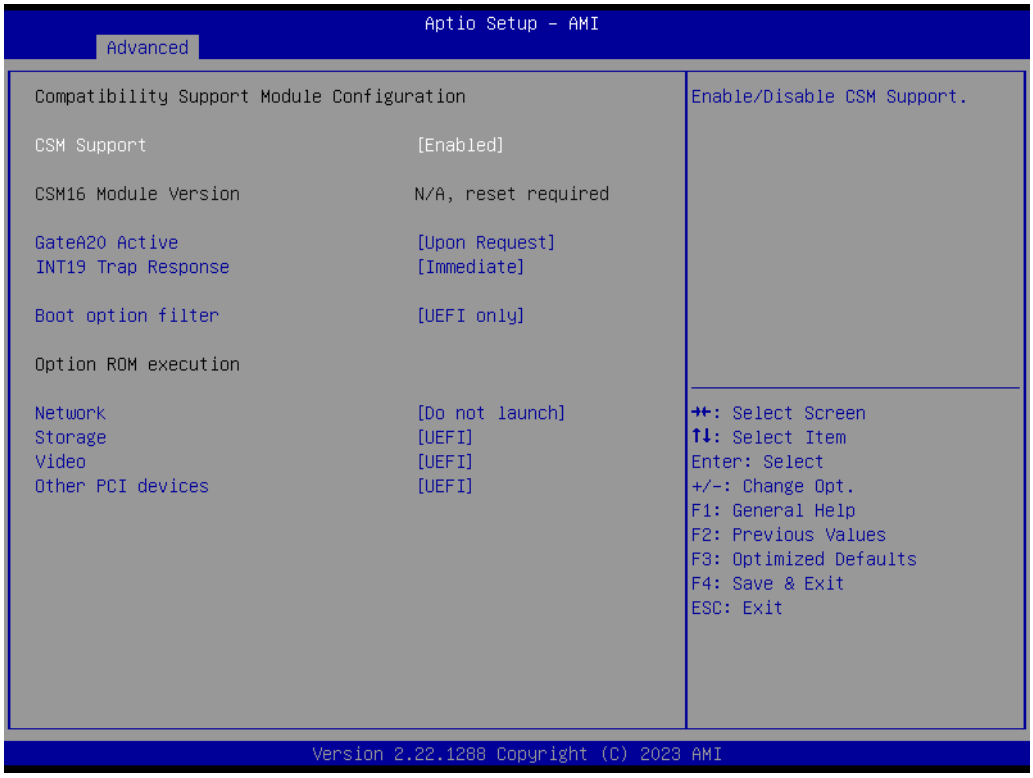


Figure 3.29 CSM Configuration (CSM Support "Enabled")

- **Compatibility Support Module Configuration**
  - **CSM Support**

    "Enable" or "Disable" CSM Support. The default setting is "Disabled". If your graphics card does not support UEFI mode, make sure to select "Enabled" to allow non-UEFI boot mode before installing the graphics card to turn on the computer.

3.2.2.17 NVMe Configuration

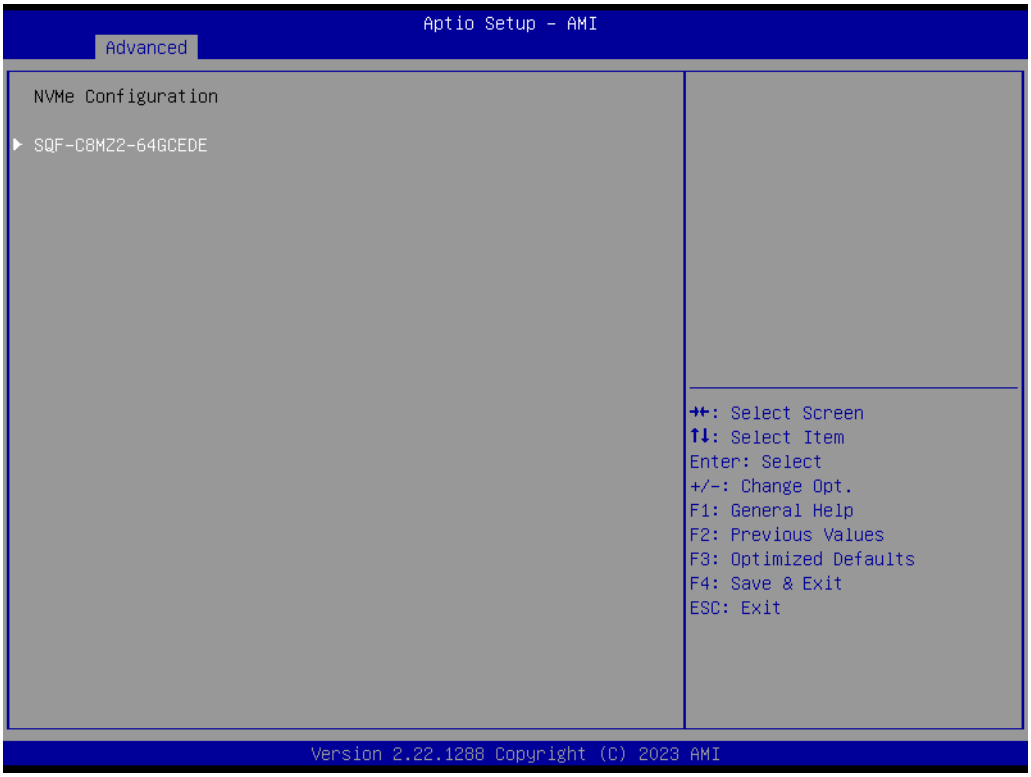


Figure 3.30 NVMe Configuration

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

3.2.2.18 Driver Health

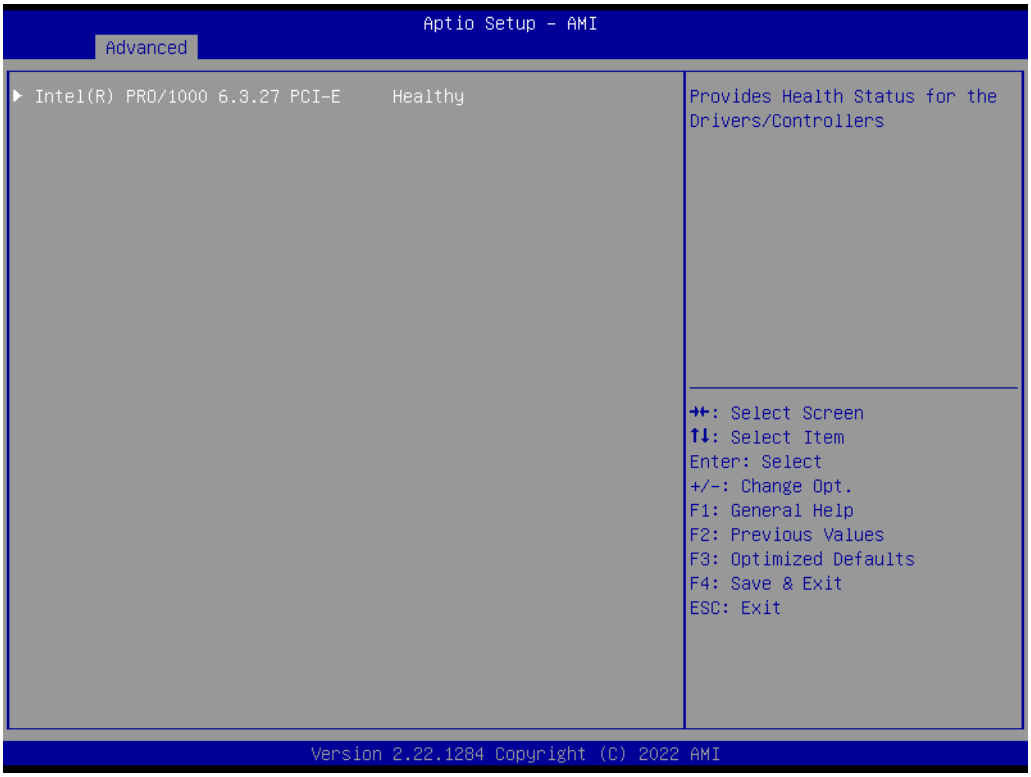


Figure 3.31 Driver Health

3.2.3 Chipset

Figure 3.32 Chipset

This page provides information on the ECU-479 chipset.

3.2.3.1 System Agent (SA) Configuration

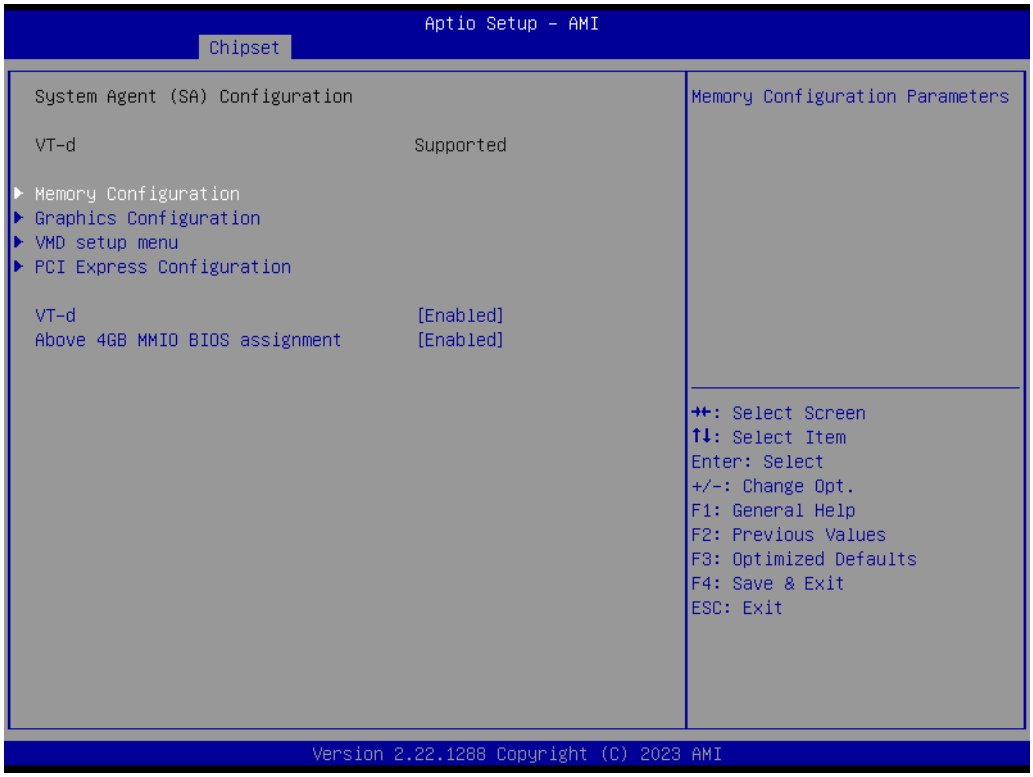


Figure 3.33 System Agent (SA) Configuration

- **VT-d**
  "Enable" or "Disable" VT-d function.
- **Above 4GB MMIO BIOS Assignment**
  "Enable" or "Disable" above 4GB memory-mapped IO BIOS assignment.

3.2.3.2 Memory Configuration

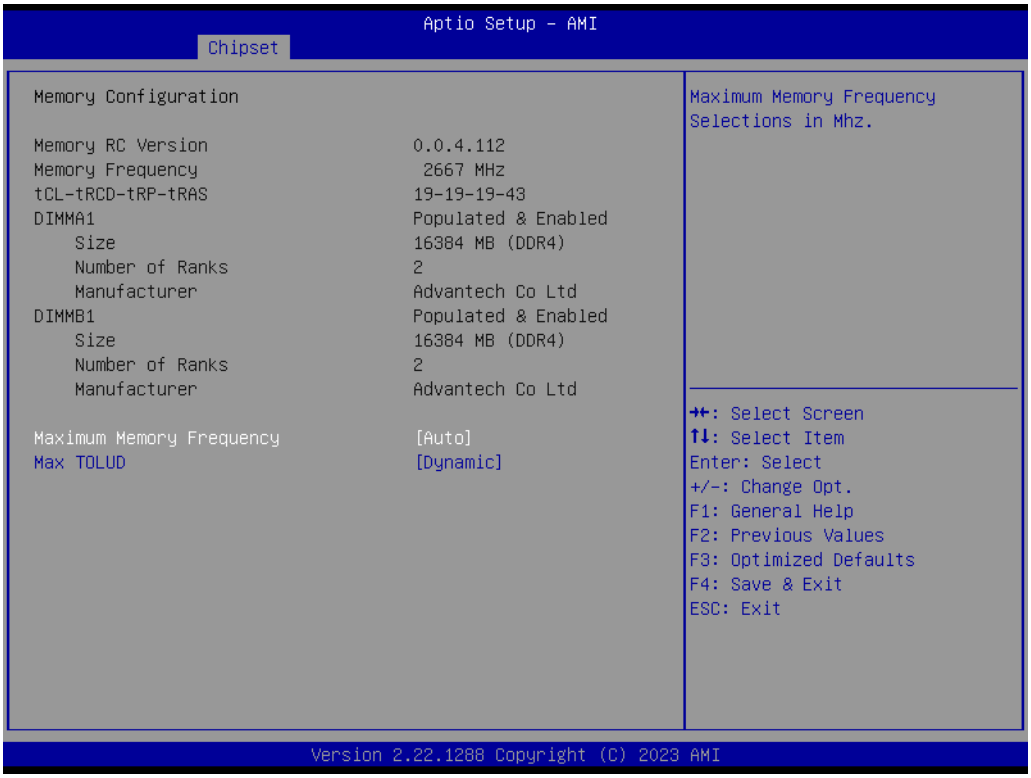


Figure 3.34 Memory Configuration

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

3.2.3.3 Graphics Configuration

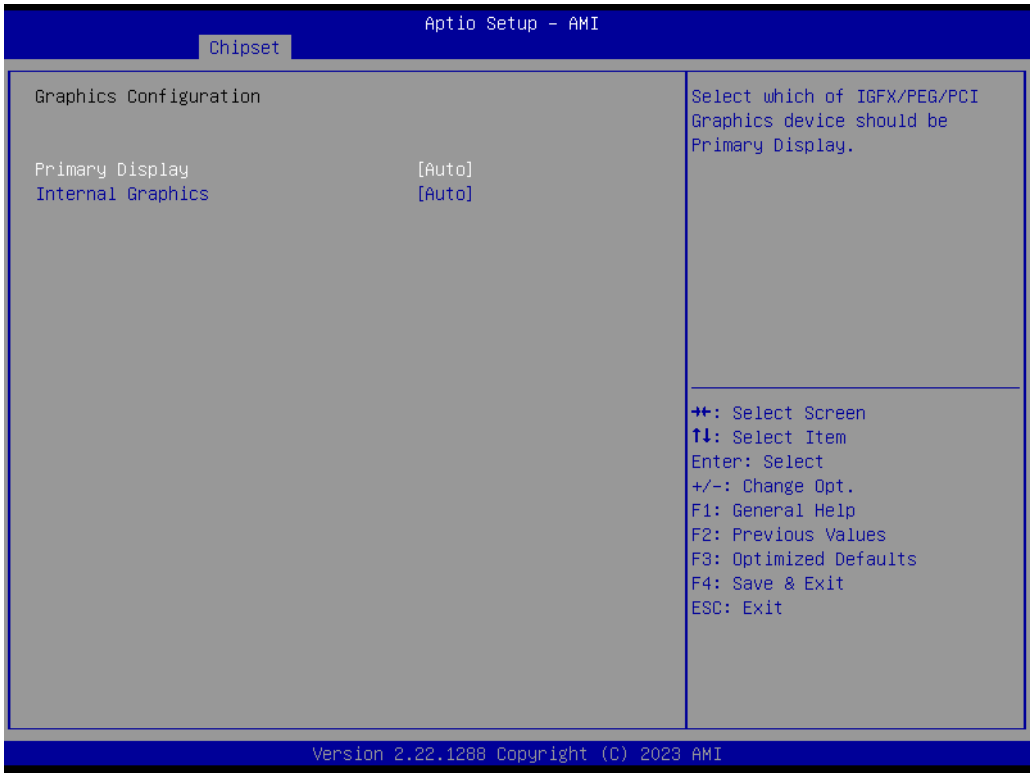


Figure 3.35 Graphics Configuration

- **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

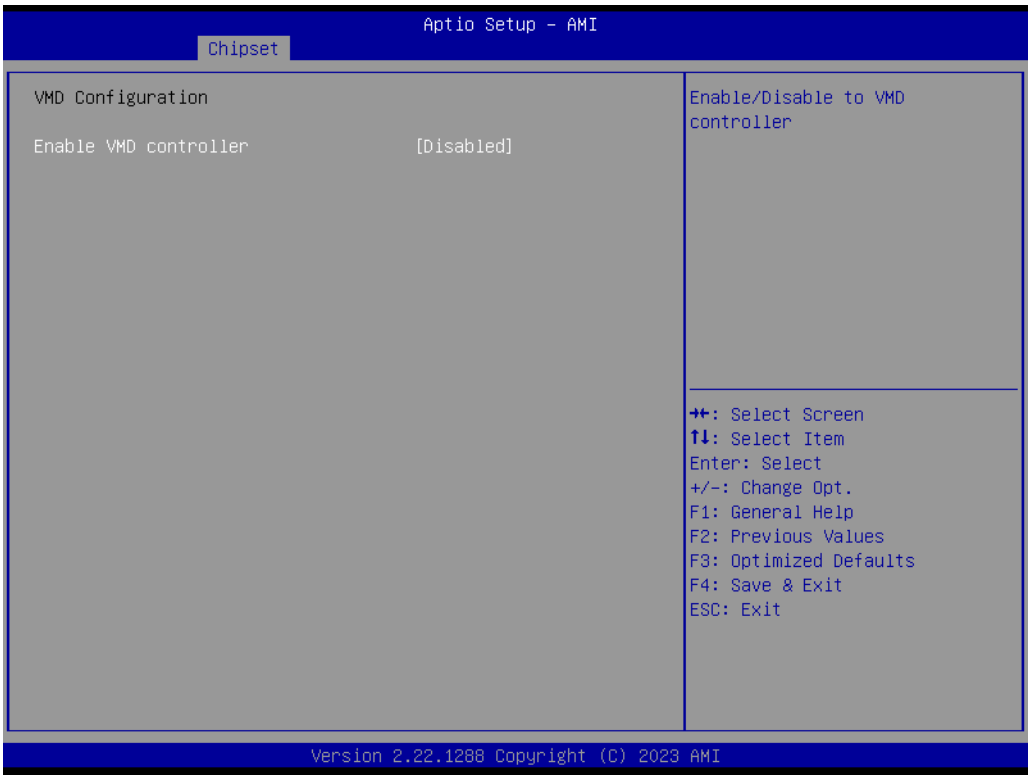


Figure 3.36 VMD Setup Menu

- **Enable VMD controller**

  “Enable” or “Disable” VMD controller. Enable VMD controller to active "Intel Rapid Storage Technology" option and setup RAID.

3.2.3.5 PCI Express Configuration

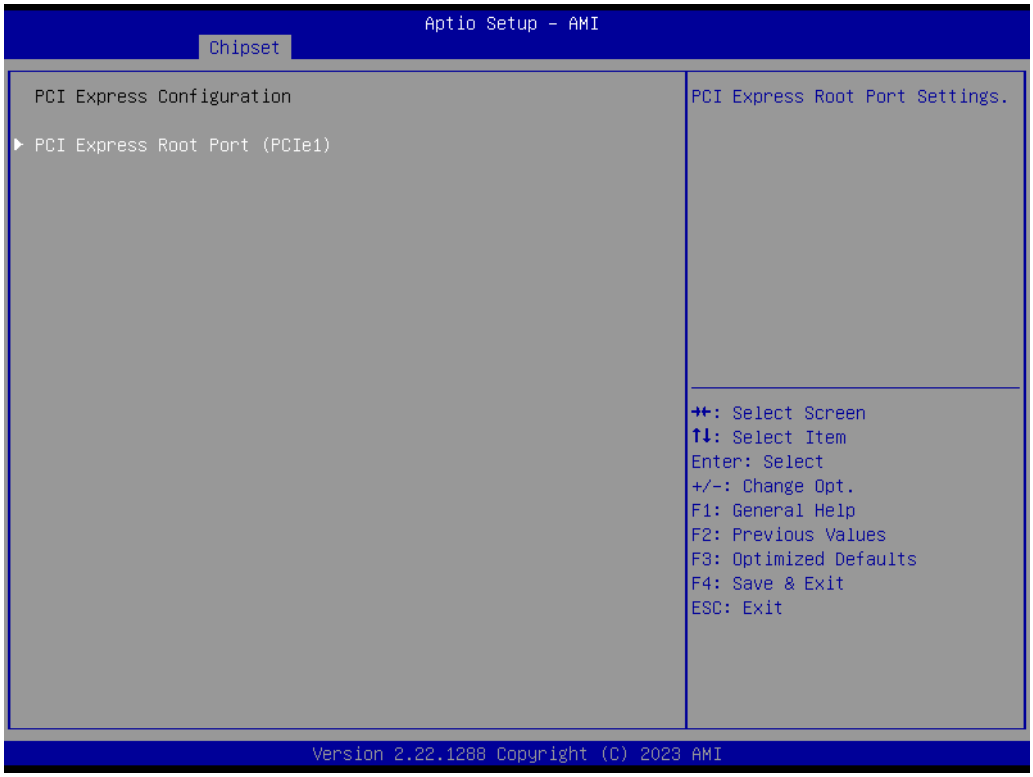


Figure 3.37 PCI Express Configuration

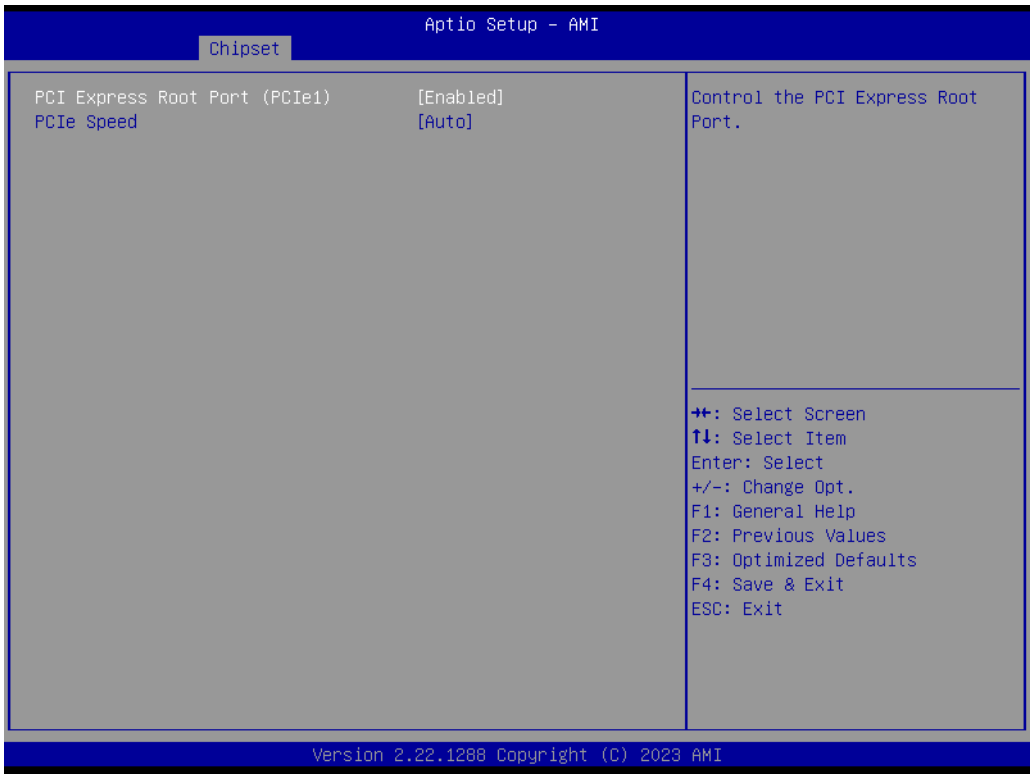


Figure 3.38 PCI Express Root Port (PCIe1)

For PCIE1 x16 Gen4 slot.

- **PCI Express Root Port (PCIe 1)**
  - PCI Express Root Port (PCIe 1)
    "Enable" or "Disable" PCI Express root port.

– PCIe Speed
Select "Auto, Gen1, Gen2, Gen 3, Gen 4" for PCIe speed.

3.2.3.6 PCH-IO Configuration

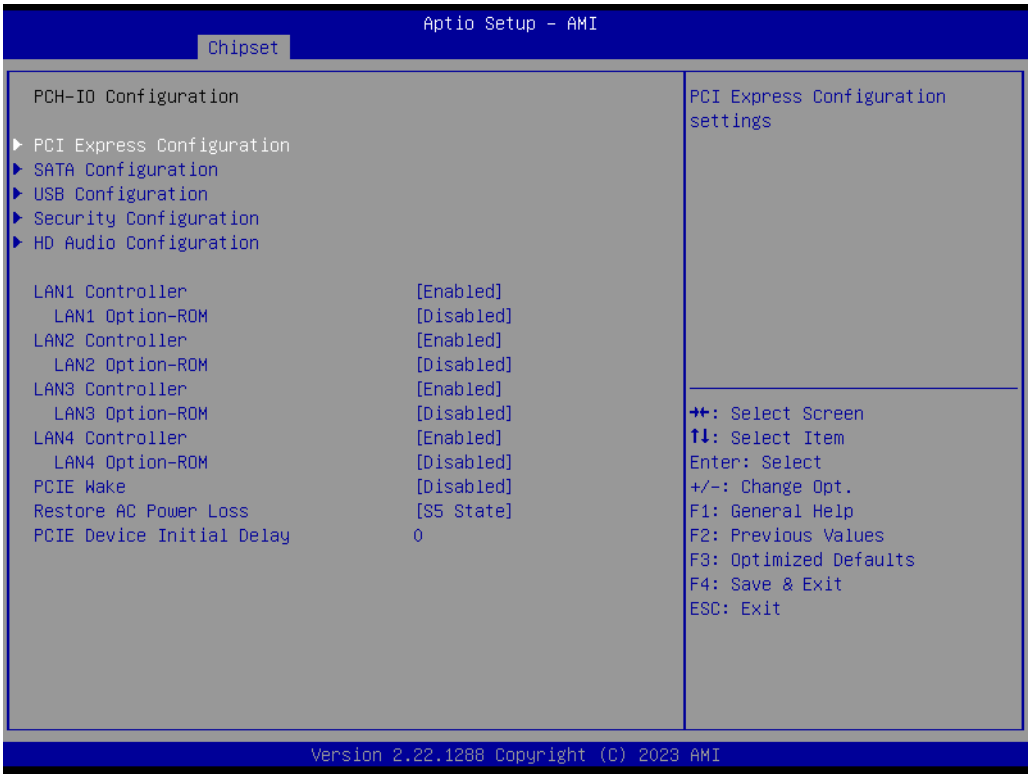


Figure 3.39 PCH-IO Configuration

- **LAN1~4 Controller**
  "Enable or Disable" LAN1~4 controller.
- **LAN1~4 Option-ROM**
  "Enable or Disable" LAN1~4 boot option for legacy network devices.
- **PCIE Wake**
  "Enable or Disable" PCIE to wake the system from S5. When this item is selected as "Disabled", Wake on LAN2 function is also disabled.
- **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.

3.2.3.7 PCI Express Configuration

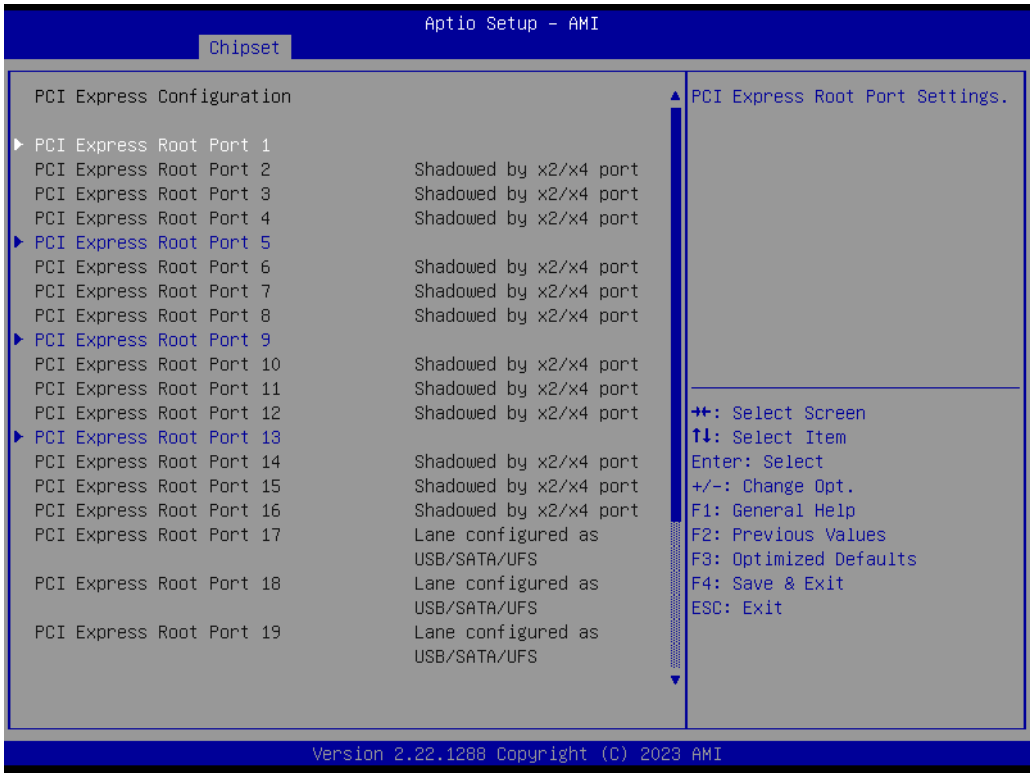


Figure 3.40 PCI Express Configuration

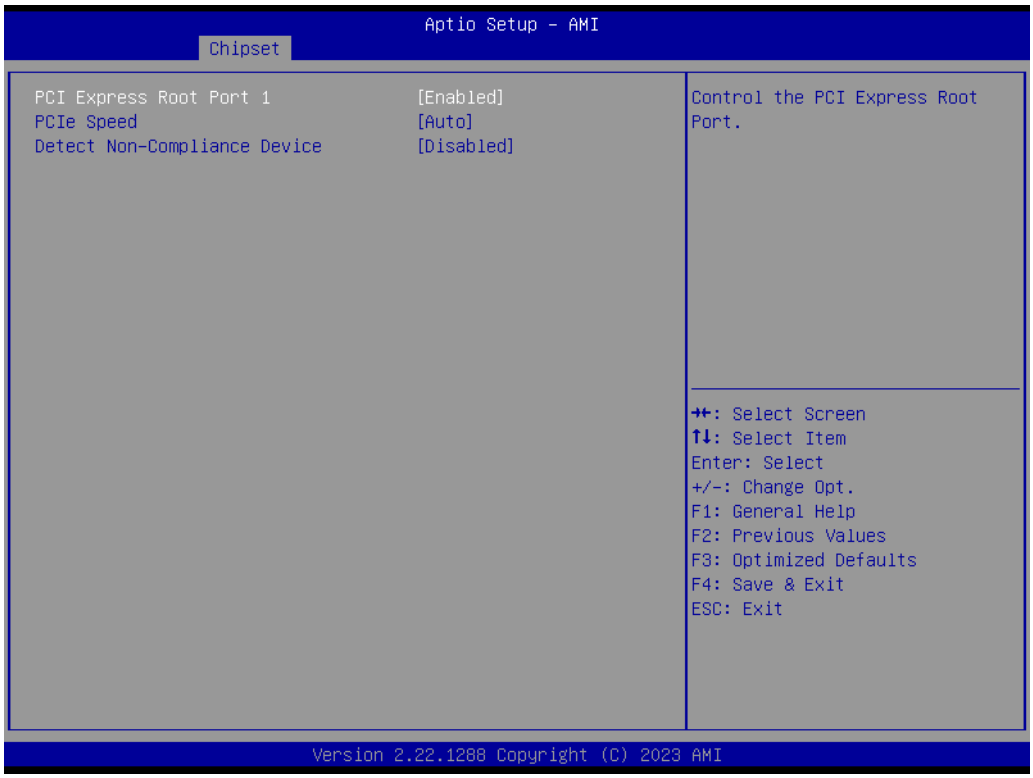


Figure 3.41 Express Root Port

For PCIE2~4 x4 Gen3 slots.

PCIE2: Root Port 9~12; PCIE3: Root Port 5~8; PCIE4: Root Port 1~4

- **PCI Express Root Port 1**
  "Enable" or "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.

3.2.3.8 SATA and RST Configuration

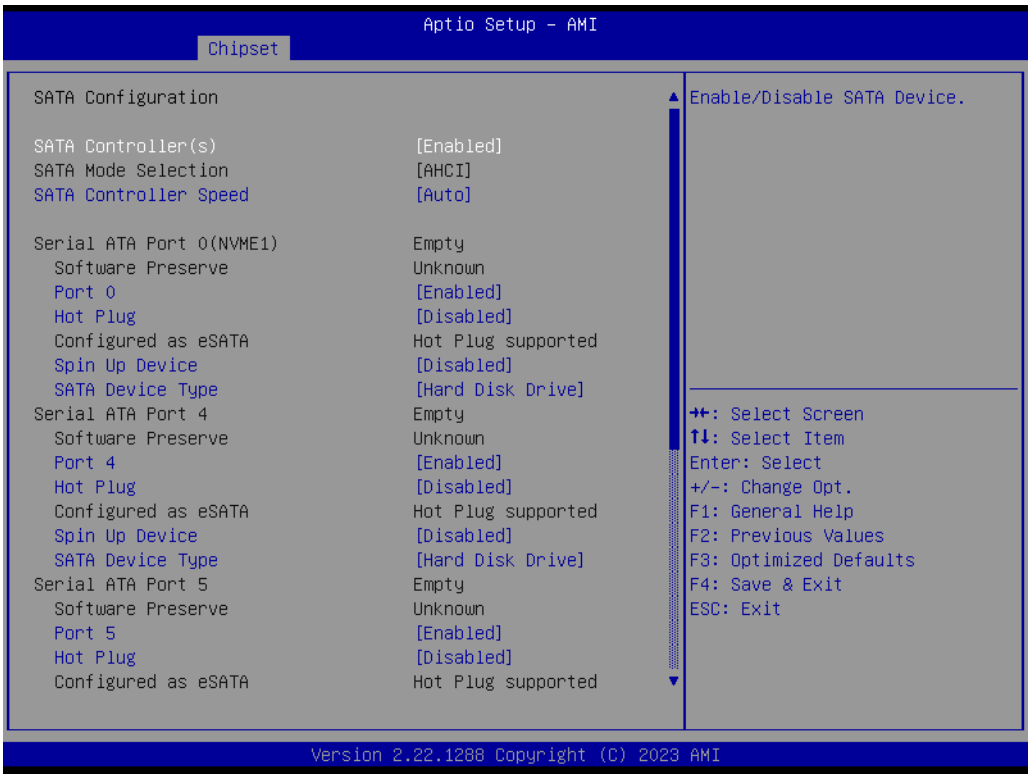


Figure 3.42 SATA and RST Configuration

- **SATA Controller(s)**
  "Enable or Disable" SATA controller.
- **SATA Mode Selection**
  This is fixed as 'AHCI'.
- **SATA Controller Speed**
  Select "Auto, Gen2, Gen3" of SATA controller speed.
- **Port 4~7**
  "Enable" or "Disable" SATA port 4~7.
- **Hot Plug**
  "Enable" or "Disable" SATA Hot-Plug.
- **Spin Up Device**
  "Enable" or "Disable" spin up device.
- **SATA Device Type**
  To identify the SATA that is connected to a "Solid State Drive" or "Hard Disk Drive".

3.2.3.9 Security Configuration

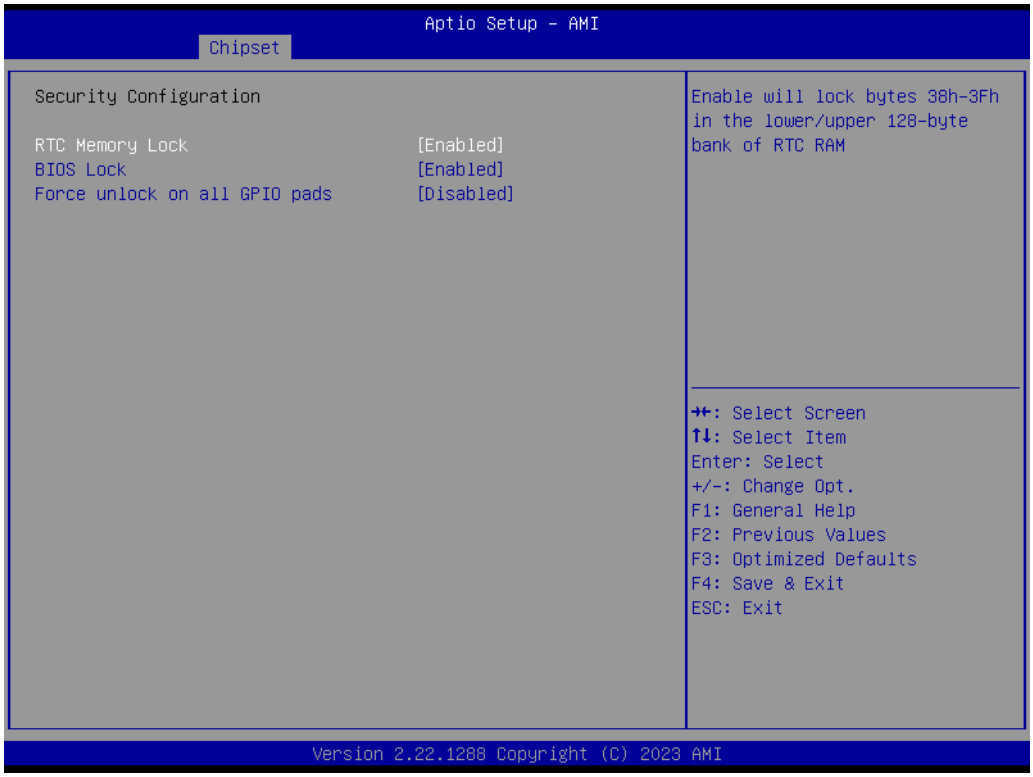


Figure 3.43 Security Configuration

- **RTC Memory Lock**
  Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
- **BIOS Lock**
  "Enable" or "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.

3.2.3.10 HD Audio Configuration

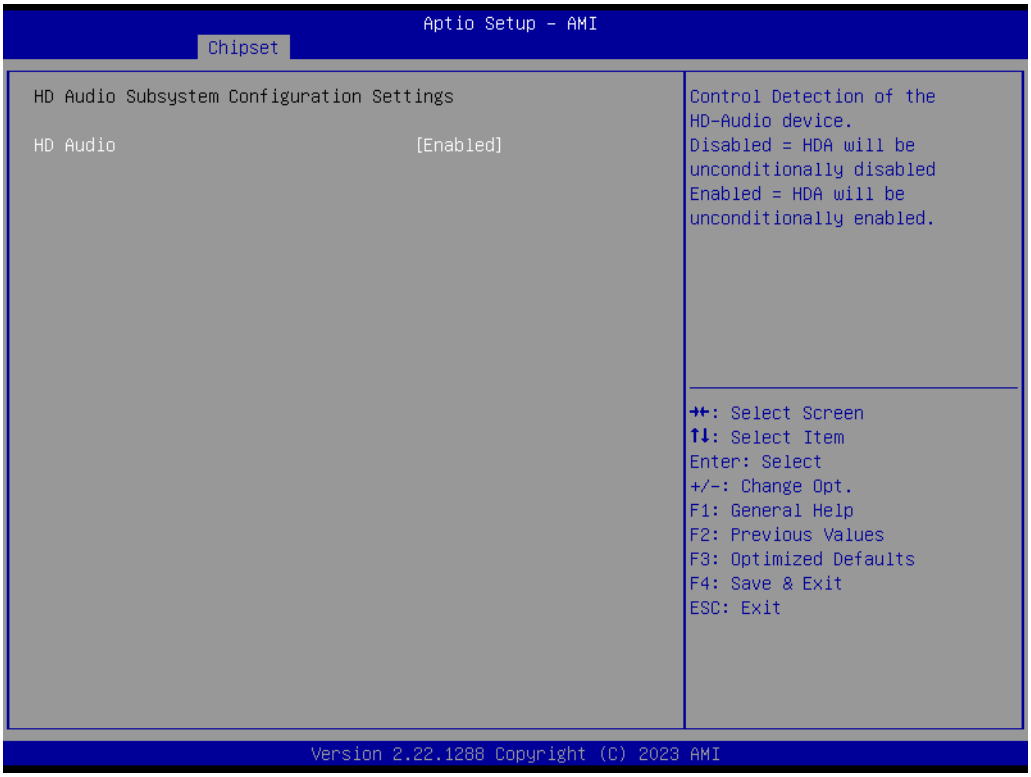


Figure 3.44 HD Audio Configuration

- **HD Audio**

  Control detection of the HD-Audio device.

  Disable = HDA will be unconditionally disabled.

  Enable = HDA will be unconditionally enabled.

3.2.4 Security

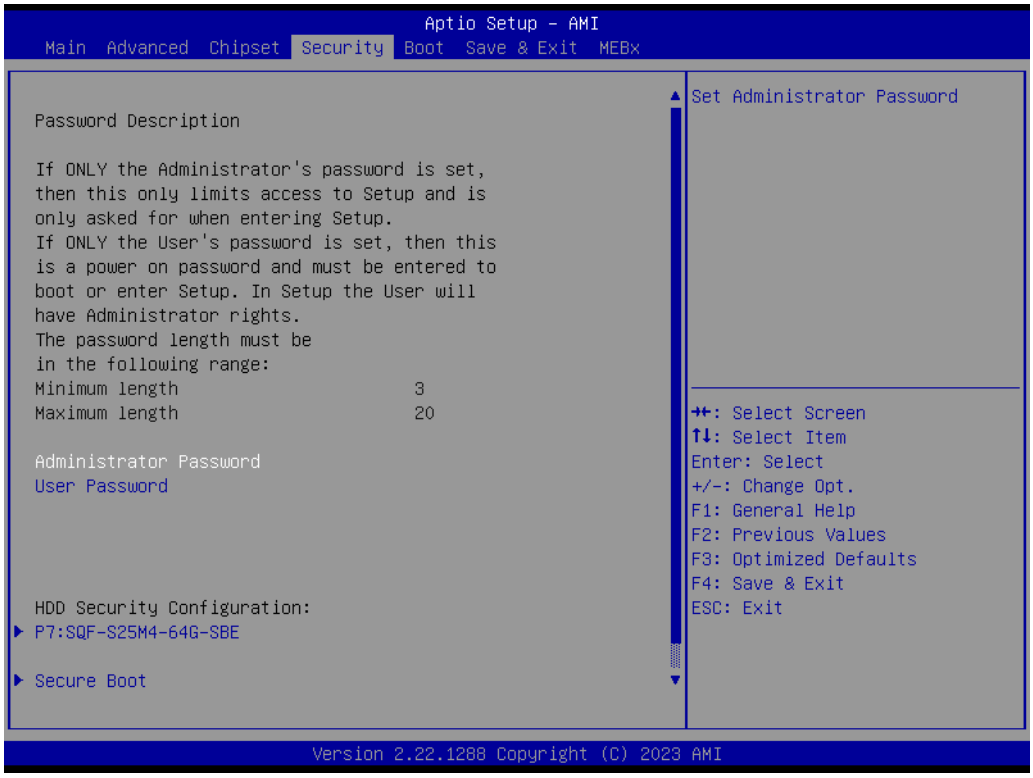


Figure 3.45 Security

Select security setup from the ECU-479 BIOS setup menu. All security setup options, such as password protection and secure boot, are displayed in this section.

- **Security Boot**
  Security 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.*

3.2.5 Boot

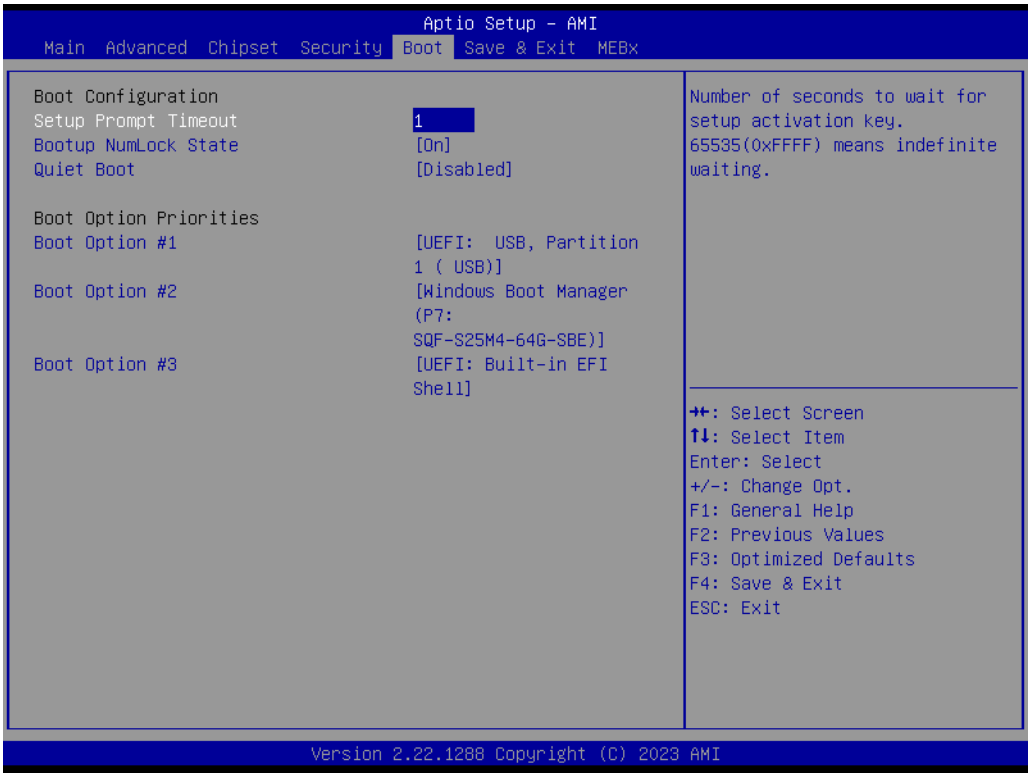


Figure 3.46 Boot

- **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 or Disable" Quiet Boot option. When enabled, the BIOS logo will show in place of POST screen.

- **Boot Option Priorities**

  Set the boot order.

3.2.6 Save & Exit

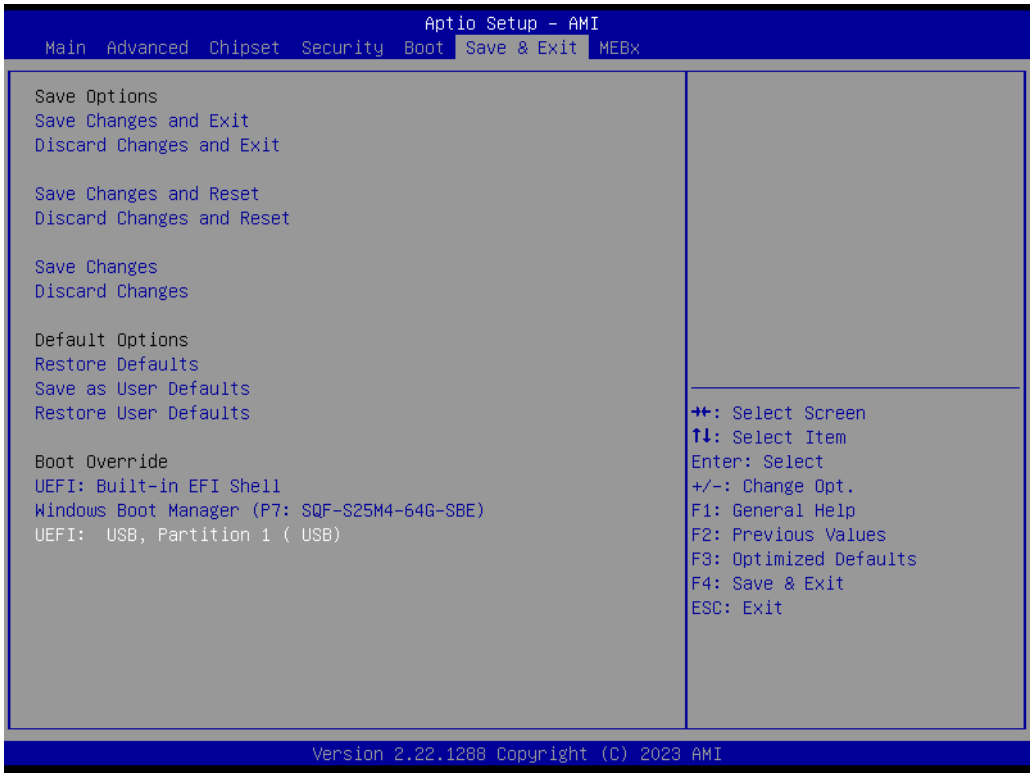


Figure 3.47 Save & Exit

- **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

I/O Pin Assignments

A.1 LAN1~LAN4

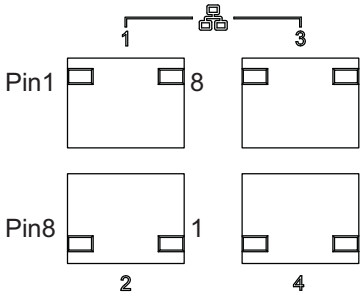


Table A.1: LAN Port (LAN1~LAN4)

Pin	Signal	Pin	Signal
1	DA+	5	DC+
2	DA-	6	DC-
3	DB+	7	DD+
4	DB-	8	DD-

A.2 USB1~USB5

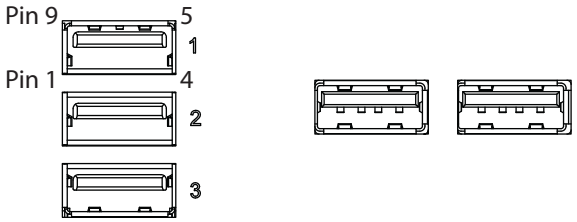


Table A.2: USB 3.2 Port (USB1~USB5)

Pin	Signal	Pin	Signal
1	+5V	6	STDA_SSRX+
2	D-	7	Shield GND_DRAIN
3	D+	8	STDA_SSTX-
4	GND	9	STDA_SSTX+
5	STDA_SSRX-		

A.3 DisplayPort Connector

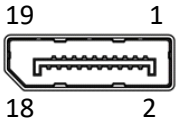


Table A.3: DisplayPort Connector (DP1~4)			
Pin	**Signal**	**Pin**	**Signal**
1	TMDS D2+	11	GND
2	GND	12	TMDS CLK-
3	TMDS D2-	13	N/C
4	TMDS D1+	14	N/C
5	GND	15	SCL
6	TMDS D1-	16	SDA
7	TMDS D0+	17	GND
8	GND	18	VCC (+5 V)
9	TMDS D0-	19	Hot plug detect
10	TMDS CLK+		

A.4 COM1,2

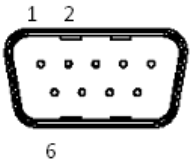
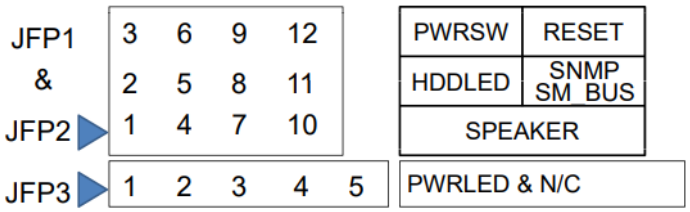


Table A.4: RS-232 DB-9 Connector (COM1,2)			
Pin	**RS-232**	**RS-485/422 Full Duplex**	**RS-485 Half Duplex**
1	DCD	TX-	Data-
2	RXD	TX+	Data+
3	TXD	RX+	
4	DTR	RX-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS		
9	RI		

A.5 SPI_TPM1

Table A.5: Serial Peripheral Interface(SPI) Connector (SPI_TPM1)			
Pin	**Signal**	**Pin**	**Signal**
1	CS#	7	MISO
2	PRSNT#	8	N.C.
3	CLK	9	IRQ#
4	GND	10	GND
5	MOSI	11	RESET#
6	GND	12	+3.3 V POWER

A.6 JFP1~JFP3



A.6.1 Power LED (JFP3)

Table A.6: Power LED (JFP3)	
Pin	**Function**
1	POWER_LED+
2	N/C
3	GND
4	N/C
5	N/C

A.6.2 External Speaker Connector (JFP2)

Table A.7: External Speaker Connector (JFP2)	
Pin	**Function**
1	EXTENAL_SPK_P1
4	EXTENAL_SPK_2
7	INTENAL_SPK_P3
10	INTENAL_SPK_P4

A.6.3 HDD LED Connector (JFP2)

Table A.8: HDD LED Connector (JFP2)	
Pin	**Signal**
2	HDD_LED+
5	HDD_LED-

A.6.4 SMBus Connector (JFP2)

Table A.9: SMBus Connector (JFP2)	
Pin	**Signal**
8	SMB_SNMP_SDAT
11	SMB_SNMP_SCLK

A.6.5 ATX Soft Power Switch (JFP1)

Table A.10: ATX Soft Power Switch (JFP1)	
Pin	**Signal**
3	PANSWIN#
6	GND

A.6.6 Reset Connector (JFP1)

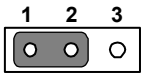
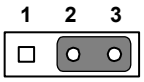
Table A.11: Reset Connector (JFP1)

Pin	Signal
9	SYSTEM RESET#
12	GND

A.7 CMOS clear (JCMOS1) and Intel® ME update (JME1)

The ECU-479 motherboard contains a jumper that can erase CMOS data and reset the system BIOS information. Normally this jumper should be set with pins 1-2 closed. If you want to reset the CMOS data, set JCMOS1 to pins 2-3 closed for just a few seconds, and then move the jumper back to pins 1-2 closed. This procedure will reset the CMOS to its default setting.

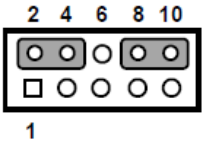
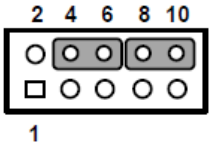
Table A.12: CMOS clear (JCMOS1) & Intel® ME update (JME1)

Function	Jumper Setting	
* Keep CMOS data * ME normal mode		1-2 closed
Clear CMOS data ME recovery mode		2-3 closed
* default setting		

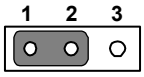
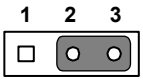
A.8 Watchdog timer output and OBS alarm (JWDT1+JOBS1)

The ECU-479 contains a watchdog timer that will reset the CPU. This feature means the ECU-479 will recover from a software failure or an EMI problem. The JWDT1 jumper settings control the outcome of what the computer will do in the event the watchdog timer is tripped.

The 2-pin OBS alarm header (JOBS1) enables/disables hardware monitor alarm functions.

Table A.13: WD timer output & OBS alarm (JWDT1+JOBS1)		
Function	**Jumper Setting**	
Watchdog timer disable (2-4) OBS beep (8-10)		2-4, 8-10 closed
*Watchdog timer reset (4-6) OBS beep (8-10)		4-6, 8-10 closed
* default setting		

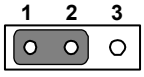
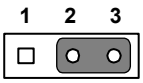
A.9 ATX/AT mode selection (PSON1)

Table A.14: ATX/AT mode selection (PSON1)		
Function	**Jumper Setting**	
AT mode		1-2 closed
* ATX mode		2-3 closed
* default setting		

A.10 USB power source switch between +5V and +5V_DUAL for onboard USB ports (JUSB_1, JUSB_2)

The ECU-479 allows users to set USB power between +5 V_DUAL and +5 V. When the jumper is set as +5 V, the USB ports doesn't support wake up from S3 via keyboard or mouse.

JUSB_1 controls rear USB1~3, JUSB_2 controls USB4,5 (front), 6 (internal).

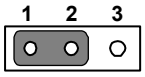
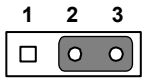
Table A.15: USB power source switch for USB ports		
Function	**Jumper Setting**	
USB +5 V_DUAL power		1-2 closed
USB +5 V power		2-3 closed
Default setting: JUSB_1 1-2 closed, JUSB_2 2-3 closed.		

A.11 PCIe SMBus connection setting of clock (SMB1, SMB3) and data (SMB2, SMB4) for PCIE1 ~ PCIE4 slots

Some PCIe add-on cards or devices may have SMBus address conflicts with DIMMB2 slot at slave address of 0xA6. In the case, users may disable the SMBus connection of clock (SMB1, SMB3) and data (SMB2, SMB4), while VPD (Vital Product Data) will not be accessed. The default setting is enabled. Please note that both SMB1 and SMB2 jumpers should be switched to the same setting, either pins 1-2 closed or pins 2-3 closed.

SMB1, SMB2 control PCIE2~PCIE4 slots; SMB3, SMB4 control PCIE1 slot.

Table A.16: PCIe SMBus connection setting of clock and data

Function	Jumper Setting	
*Enable PCIe SMBus connection		1-2 closed
Disable PCIe SMBus connection		2-3 closed
* default setting		

Appendix B

Programming the Watchdog Timer

The ECU-479'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.

B.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.

B.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).

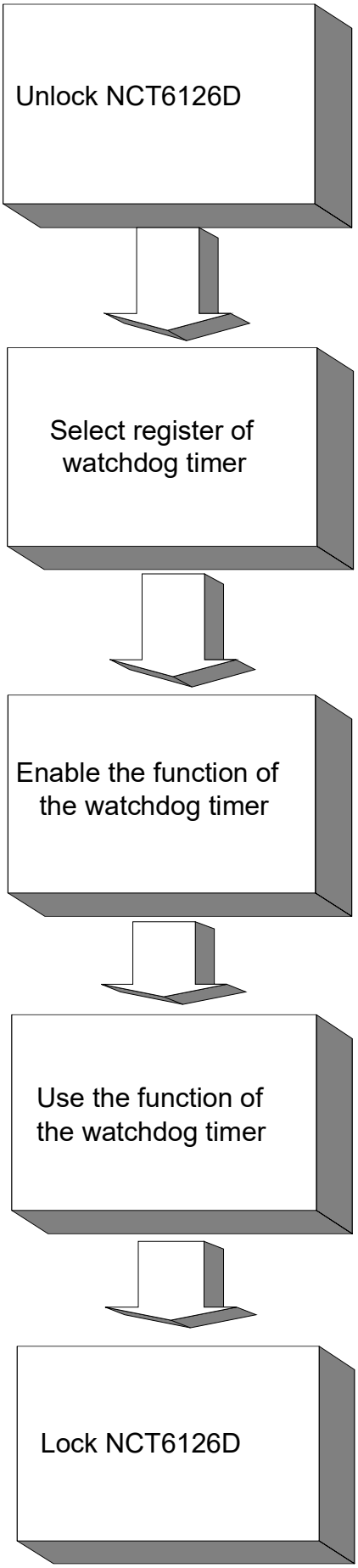

Unlock NCT6126D
Select register of watchdog timer
Enable the function of the watchdog timer
Use the function of the watchdog timer
Lock NCT6126D

Table B.1: Watchdog timer registers		
Address of register (2E)	Read/ Write	Value (2F) & description.
87 (hex)	-	Write this address to I/O address port 2E (hex) twice to unlock the NCT6126D.
07 (hex)	write	Write 08 (hex) to select register of watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the function of the watchdog timer. Enabled is set as default.
F0 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to bit 3: set seconds as counting unit. [default]. Write 1 to bit 3: set minutes as 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 with the new value.
F2 (hex)	read/ write	Bit 6: Write 1 to enable keyboard to reset the timer, 0 to disable.[default] Bit 5: Write 1 to generate a timeout signal immediately and automatically return to 0. [default=0] Bit 4: Read status of watchdog timer, 1 means timer is “timeout”.
AA (hex)	-	Write this address to I/O port 2E (hex) to lock NCT6126D.

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