

## **AFE-R760**

**Intel® Core™ Ultra 7/5  
Processors – AMR Control  
System**

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This manual is for the AFE-R760.

## 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

### FCC Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

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## Technical Support and Assistance

1. Visit the Advantech website at [www.advantech.com/support](http://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

## Warnings, Cautions, and Notes

**Warning!** *Warnings indicate conditions that could cause personal injury if not observed!*



**Caution!** *Cautions are included to help prevent hardware damage and data loss. For example,*



*“Batteries are at risk of exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.”*

**Note!** *Notes provide additional and/or optional information.*



## Packing List

Before you begin installing your card, please make sure that the following materials have been shipped:

- 1 x AFE-R760 Unit
- 1 x User Manual (Simplified Chinese)
- 1 x China RoHS
- 1 x 2-pin plug-in block for power in

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

## Ordering Information

| Part Number   | Description                                  |
|---------------|----------------------------------------------|
| AFE-R760-Q5A1 | Intel MTL Ultra 5 125H 3LAN+4COM+4USB+2CANFD |
| AFE-R760-Q8A1 | Intel MTL Ultra 7 155H 3LAN+4COM+4USB+2CANFD |

## Optional Accessories

| Part Number       | Description                                                    |
|-------------------|----------------------------------------------------------------|
| 96PSA-A150W24T2-4 | AC to DC adapter, DC 24V 150W, -10 ~ 60°C (10% derating @60°C) |
| 1702002600        | Power cable 3-pin 183 cm (6 ft), USA type                      |
| 1702002605        | Power cable 3-pin 183 cm (6 ft), EU type                       |
| 1702031801        | Power cable 3-pin 183 cm (6 ft), UK type                       |
| 1700000237        | Power cable 3-Pin 183 cm (6 ft), PSE type                      |
| MIOE-GMSL-4PA1    | MIOe-GMSL Module, 4x GMSL (I/O bracket P/N: 1960117094N011)    |
| 1700021869-01     | DB37(male) to 4 x DB9 (male) cable                             |
| 1700035708-01     | AFE-R760 Internal Audio Cable/Line out/Mic IN                  |

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## Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must 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 be opened only by qualified service personnel.
14. If any of the following occurs, have the equipment checked by service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated the equipment.
  - The equipment has been exposed to moisture.
  - The equipment is malfunctioning, or does not operate according to the user manual.
  - The equipment has been dropped and damaged.
  - The equipment shows obvious signs of breakage.
15. Do not leave the equipment in an environment with a storage temperature of below -40°C (-40°F) or above 85°C (185°F) as this may damage the components. The equipment should be kept in a controlled environment.
16. Any unverified component may cause unexpected damage. To ensure correct installation, always use the components (e.g., screws) provided in the accessory box.
17. **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.
18. Always disconnect the power cord from the chassis before manually handling the hardware. Do not implement connections or configuration changes while the device is powered on. Sudden power surges may damage sensitive electronic components.
19. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).
20. **DISCLAIMER:** These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

21. This product is intended to be supplied by an UL Listed power adapter, or DC power source, rated: 12~24Vdc, 12.5-6.25A, Tma=60°C, if need further assistance, please contact Advantech for further information
22. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.

## Consignes de Sécurité

1. Veuillez lire attentivement ces instructions de sécurité.
2. Veuillez conserver ce manuel de l'utilisateur pour référence ultérieure.
3. Veuillez débrancher cet équipement de la prise secteur avant le nettoyage. Utilisez un chiffon humide. Ne pas utiliser de détergent liquide ou pulvérisé pour le nettoyage. Utilisez une feuille ou un chiffon humide pour le nettoyage.
4. Pour les équipements enfichables, la prise de courant doit être à proximité de l'équipement et doit être facilement accessible.
5. S'il vous plaît garder cet équipement de l'humidité.
6. Posez cet équipement sur une surface fiable lors de l'installation. Une chute ou une chute pourrait causer des blessures.
7. Les ouvertures sur le boîtier sont destinées à la convection d'air, protégeant ainsi l'équipement de la surchauffe. **NE COUVREZ PAS LES OUVERTURES.**
8. Au moyen d'un cordon d'alimentation connecté à une prise de courant avec mise à la terre.
9. Placez le cordon d'alimentation de sorte que personne ne puisse marcher dessus. Ne placez rien sur le cordon d'alimentation.
10. Tous les avertissements et mises en garde sur l'équipement doivent être notés.
11. Si l'appareil n'est pas utilisé pendant une longue période, débranchez-le du secteur pour ne pas être endommagé par une surtension transitoire.
12. Ne jamais verser de liquide dans les ouvertures de ventilation; Cela pourrait provoquer un incendie ou un choc électrique.
13. N'ouvrez jamais l'équipement. Pour des raisons de sécurité, seul le personnel de maintenance qualifié doit ouvrir l'équipement.
14. Si l'une des situations suivantes se présente, faites vérifier le matériel par le personnel de service:
  - Le cordon d'alimentation ou la fiche est endommagé.
  - Un liquide a pénétré dans l'appareil.
  - L'équipement a été exposé à l'humidité.
  - L'équipement ne fonctionne pas bien ou vous ne pouvez pas le faire fonctionner conformément au manuel d'utilisation.
  - Equipment L'équipement est tombé et a été endommagé.
  - Equipment L'équipement présente des signes évidents de rupture.
15. Ne laissez pas cet équipement dans un environnement où la température de stockage peut être inférieure à -40°C (-40°F) ou supérieure à 85°C (185°F). Cela pourrait endommager l'équipement. L'équipement doit être dans un environnement contrôlé.
16. Tout composant non vérifié peut causer des dommages inattendus. Pour garantir une installation correcte, veuillez toujours utiliser les composants (ex. Vis) fournis avec la boîte d'accessoires.
17. **ATTENTION:** L'ordinateur est équipé d'un circuit d'horloge temps réel alimenté par batterie. Il y a un risque d'explosion si la batterie est remplacée de manière incorrecte. Remplacez uniquement avec le même type ou un type équivalent recommandé par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant.

- 
18. Débranchez toujours complètement le cordon d'alimentation de votre châssis lorsque vous utilisez du matériel. Ne faites pas de connexion quand l'appareil est sous tension. Les composants électroniques sensibles peuvent être endommagés par des surtensions soudaines.
  19. Niveau de pression acoustique au poste de l'opérateur selon la norme CEI 704-1: 1982 n'est pas supérieur à 70 dB (A).
  20. AVERTISSEMENT: Cet ensemble d'instructions est donné conformément à la norme CEI 704-1. Advantech décline toute responsabilité quant à l'exactitude des déclarations contenues dans ce.
  21. Ce produit est destiné à être alimenté par un adaptateur secteur répertorié UL ou une source d'alimentation CC, évalué: 12~24Vdc, 12.5-6.25A, Tma = 60 degrés C, si besoin d'assistance supplémentaire, veuillez contacter Advantech pour plus d'informations
  22. ZONE D'ACCES RESTREINTE: L'équipement ne doit être installé que dans une zone d'accès restreint.

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# Chapter 1

## General Information

## 1.1 Introduction

AFE-R760 is powered by Intel® Core™ Ultra H series processors. AFE-R760 offers embedded SUSI 4.0 and WISE-PaaS/DeviceOn created by Advantech to monitor and control system operation effectively and remotely.

AFE-R760 adopts the latest hybrid core design processor, for improvements in CPU processing, graphics, security and I/O flexibility.

## 1.2 Specifications

### 1.2.1 Processor System

**Table 1.1: Processor System**

|                                |                                     |                     |
|--------------------------------|-------------------------------------|---------------------|
| <b>Processor</b>               | Core™ Ultra 7, 155H                 | Core™ Ultra 5, 125H |
| <b>Max. Frequency</b>          | 4.8GHz                              | 4.5GHz              |
| <b>Base Frequency (P-Core)</b> | 1.4GHz                              | 1.2GHz              |
| <b>Cores/Threads</b>           | 16, 6P+8E+2LE/ 22                   | 14, 4P+8E+2LPE/ 18  |
| <b>LLC</b>                     | 24MB                                | 18MB                |
| <b>TDP</b>                     | 28W                                 | 28W                 |
| <b>Chipset</b>                 | On-package Intel 600 Series Chipset |                     |
| <b>BIOS</b>                    | AMI EFI 256Mbit                     |                     |

### 1.2.2 Memory

**Table 1.2: Memory**

|                      |                    |
|----------------------|--------------------|
| <b>Technology</b>    | DDR5 5600 MHz      |
| <b>Max. Capacity</b> | 96 GB              |
| <b>Socket</b>        | 2 x 262-pin SODIMM |

### 1.2.3 Graphics

**Table 1.3: Graphics**

|                            |                                                                           |
|----------------------------|---------------------------------------------------------------------------|
| <b>Chipset</b>             | Intel® ARC™ Graphics                                                      |
| <b>3D/ HW Acceleration</b> | DX12.2, OGL4.6, OCL 3.0, HW Encode/ Decode: H.265 (HEVC), H.264, AV1, VP9 |
| <b>DP</b>                  | 1 x DP 1.4a, up to 4096 x 2160x 36bpp @60Hz                               |

### 1.2.4 Ethernet

**Table 1.4: Ethernet**

|                 |                                                              |
|-----------------|--------------------------------------------------------------|
| <b>LAN1/2/3</b> | 10/100/1000/2500 Mbps Intel i226-LM GbE, support Wake-On-LAN |
|-----------------|--------------------------------------------------------------|

### 1.2.5 Audio

**Table 1.5: Audio**

|                  |                                             |
|------------------|---------------------------------------------|
| <b>Interface</b> | Realtek ALC888s, Line-out/Mic-in (optional) |
|------------------|---------------------------------------------|

## 1.2.6 Others

| Table 1.6: Others     |                                            |
|-----------------------|--------------------------------------------|
| <b>Watchdog Timer</b> | 65536-level, 0~65535 sec                   |
| <b>TPM</b>            | Discrete TPM 2.0, fTPM* support by request |

## 1.2.7 I/O Interface

| Table 1.7: I/O Interface |                                                              |
|--------------------------|--------------------------------------------------------------|
| <b>Serial Port</b>       | 4 x RS-232/422/485, max. 1Mbps                               |
| <b>USB Type-C</b>        | 2 x USB 3.2 Gen2x1 10Gbps, support DisplayPort 1.4 Alt. Mode |
| <b>USB Type-A</b>        | 2 x USB 3.2 Gen2x1 10Gbps                                    |
| <b>GPIO</b>              | 8-bit general purpose input output I/O                       |
| <b>CAN Bus</b>           | 2 x CAN-FD                                                   |
| <b>FAN</b>               | 12V0.35A                                                     |

## 1.2.8 Expansions

| Table 1.8: Expansions |                                                                               |
|-----------------------|-------------------------------------------------------------------------------|
| <b>M.2 E-Key</b>      | 1 x E-Key 2230 (PCIex2, USB 2.0)                                              |
| <b>M.2 B-Key</b>      | 1 x B-Key 3052 (PCIe x2/ SATA, USB 2.0) w/ Nano SIM                           |
| <b>M.2 M-Key</b>      | 2 x M-Key 2280 (PCIe x4 Gen.4 NVMe)                                           |
| <b>GMSL</b>           | Up to 4 x FAKRA, expanded through GMSL interfaced card, MIOe-GMSL. (Optional) |

## 1.2.9 Software Support

| Table 1.9: Software Support |                             |
|-----------------------------|-----------------------------|
| <b>Microsoft Windows</b>    | Windows 10/ 11              |
| <b>Linux</b>                | Ubuntu 22.04/ 24.04         |
| <b>ROS2</b>                 | Via Advantech Robotic Suite |

## 1.2.10 Power Requirements

| Table 1.10: Power Requirements |                                                |
|--------------------------------|------------------------------------------------|
| <b>Power Input Voltage</b>     | 12-24 VDC                                      |
| <b>Power Source</b>            | DC Battery or AC to DC 150W adapter (optional) |

## 1.2.11 Power Consumption (CPU/Memory Only)

| Table 1.11: Power Consumption (CPU/Memory Only) |        |
|-------------------------------------------------|--------|
| <b>Typical (OS idle mode)</b>                   | 9.12W  |
| <b>Max. (Full loading)</b>                      | 45.12W |

## 1.2.12 Mechanical

| Table 1.12: Mechanical        |                            |
|-------------------------------|----------------------------|
| <b>Construction</b>           | Aluminum housing           |
| <b>Mounting</b>               | DIN-rail mount, wall mount |
| <b>Dimensions (W x H x D)</b> | 175 x 60 x 130 mm          |

**Table 1.12: Mechanical**

|               |                 |
|---------------|-----------------|
| <b>Weight</b> | 1.6 kg (3.5 lb) |
|---------------|-----------------|

### 1.2.13 Environment

**Table 1.13: Environment**

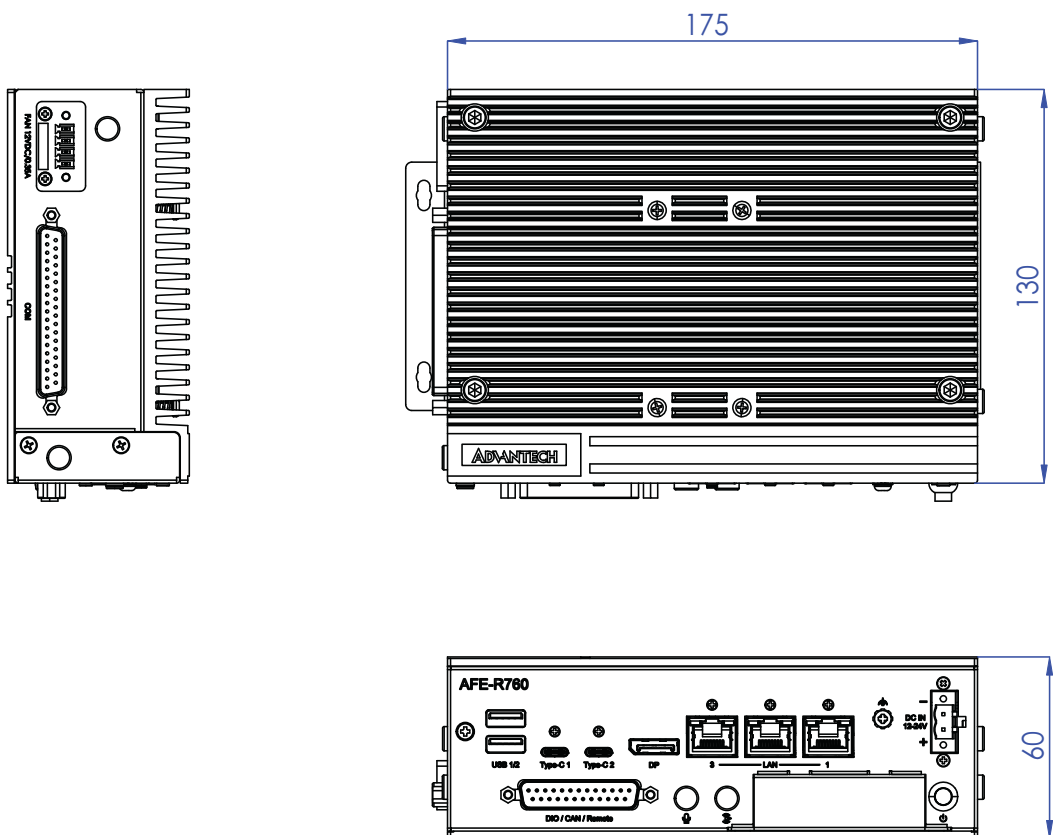
|                                   |                                                                 |
|-----------------------------------|-----------------------------------------------------------------|
| <b>Operating Temperature</b>      | With extended temp peripherals: -20 ~ 60°C with 0.7m/s air flow |
| <b>Storage Temperature</b>        | -40 ~ 85°C                                                      |
| <b>Relative Humidity</b>          | 95% @ 40°C (non-condensing)                                     |
| <b>Vibration During Operation</b> | 3 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 hr/axis.          |
| <b>Shock During Operation</b>     | 30 G, IEC 60068-2-27, half sine, 11 ms duration                 |
| <b>EMC</b>                        | Heavy industrial certificates, CE/FCC Class B, UKCA, CCC, BSMI  |
| <b>Safety</b>                     | CB, UL, UKCA, CCC, BSMI                                         |

## 1.3 Mechanical Specifications

### 1.3.1 Dimensions

**W/O Mounting:**

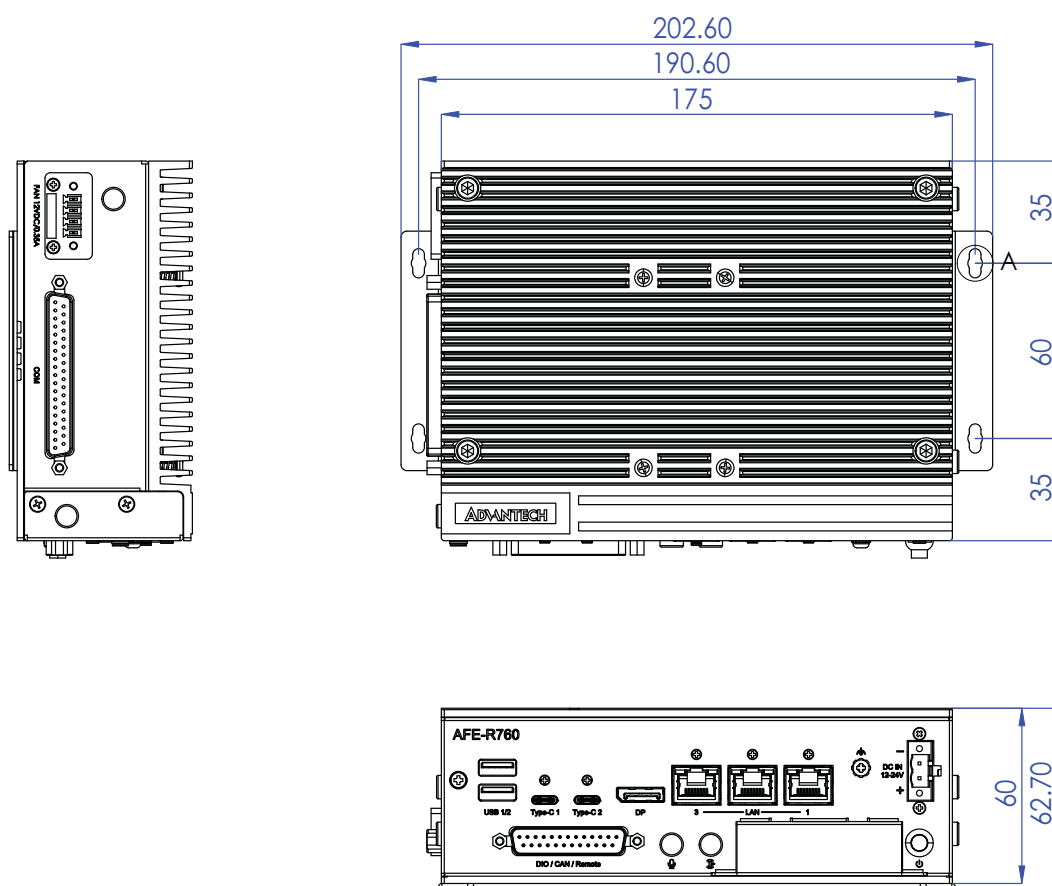
175 x 60 x 130 mm / 6.89 x 2.36 x 5.12 in (W x H x D)



**Figure 1.1 AFE-R760 Mechanical Diagram**

**With Wall Mount:**

202.6 x 62.7 x 130 mm / 7.97 x 2.47 x 5.12 in (W x H x D)

**Figure 1.2 AFE-R760 Mechanical Diagram**



# Chapter 2

## Jumpers and Connectors

## 2.1 Jumper & Switches

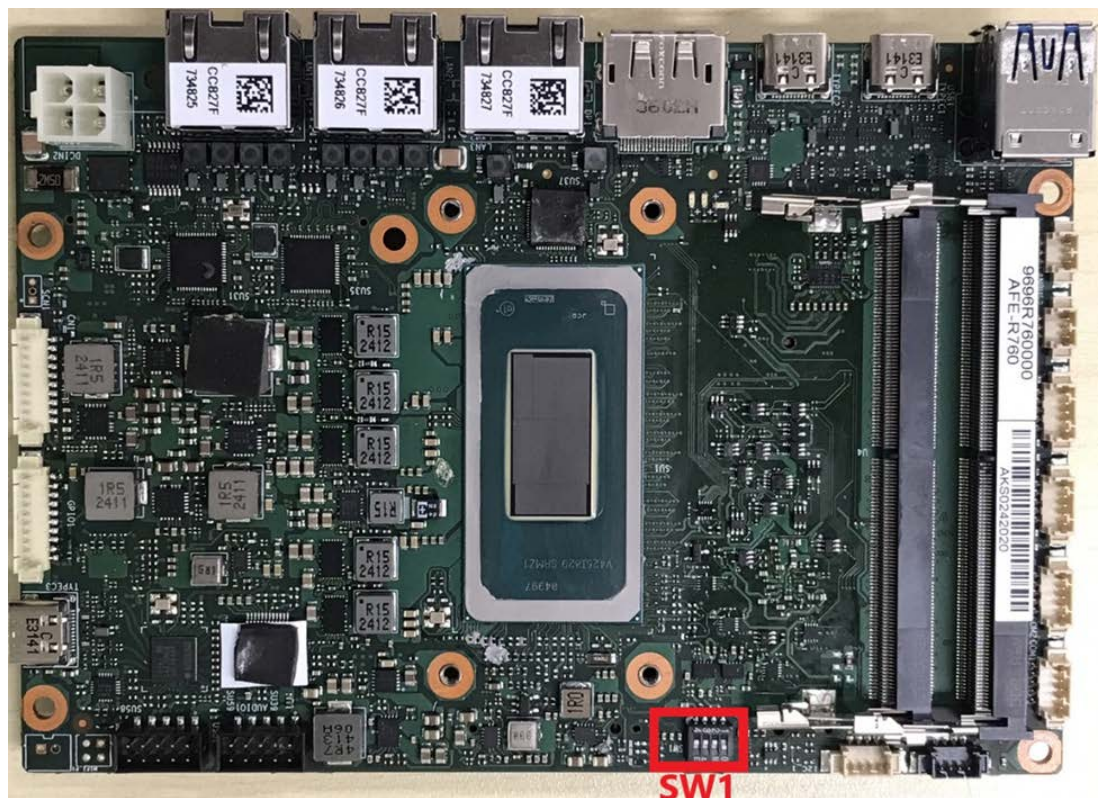
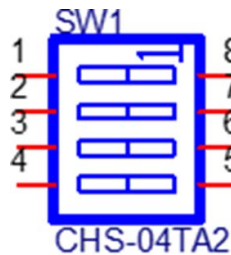
The AFE-R760 has a number of jumpers that allow you to configure your system to suit your application. The table below lists the functions of the various jumpers.

### 2.1.1 Miscellaneous Selection Jumper: SW1

Unscrew the 4 spring screws and 4 hex head screws on the top cover, and remove the top cover. Please refer to the picture to find the SW1 location.

**Table 2.1: Miscellaneous Selection Jumper: SW1**

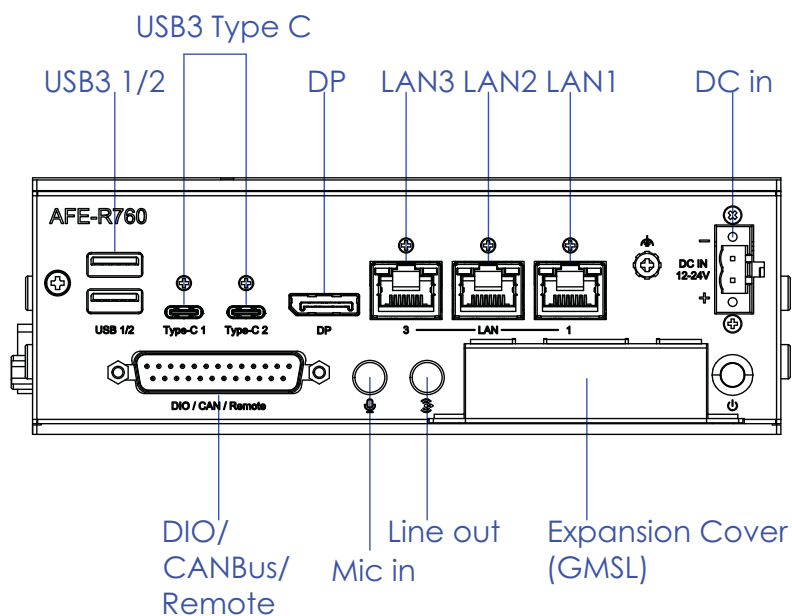
| Jumper Short | Panel Function                    |
|--------------|-----------------------------------|
| 1            | ATX_DET (Default)                 |
| 2            | LOAD_BIOS_DEFAULT (Default_off)   |
| 3            | GPI (no function)                 |
| 4            | Topswap (no function, default on) |
| 5            | Topswap (no function, default on) |
| 6            | GPI (no function)                 |
| 7            | LOAD_BIOS_DEFAULT (On)            |
| 8            | AT_DET#                           |



## 2.2 Connectors

### 2.2.1 AFE-R760 External I/O Locations

Front I/O:



Side I/O:

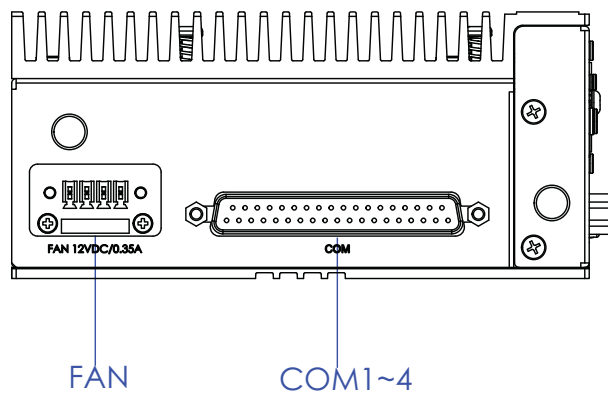
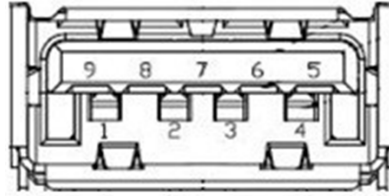


Figure 2.1 AFE-R760 Front and Side I/O Connector Diagram

## 2.3 Connector Pin Definitions

### 2.3.1 USB 3.2 - Gen2 and Gen1

AFE-R760 supports 2 x USB 3.2 The USB interfaces comply with USB UHCI, Rev. 3.0 standards. Please refer to Table 3.1 for pin assignments.

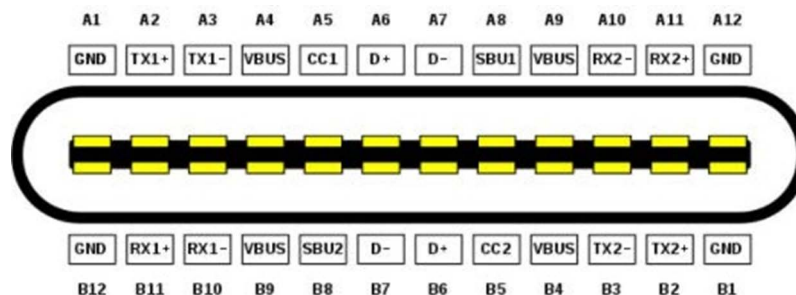


**Table 2.2: USB 3.2 Gen1/2 Connector Pin Assignments**

| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 1   | +5V         | 2   | USB_data-   |
| 3   | USB_data+   | 4   | GND         |
| 5   | SSRX-       | 6   | SSRX+       |
| 7   | GND         | 8   | SSTX-       |
| 9   | SSTX+       |     |             |

### 2.3.2 USB Type-C

AFE-R760 supports USB Type-C 24-pin USB connector with a rotationally symmetrical connector.



**Table 2.3: USB Type-C Connector Pin Assignments**

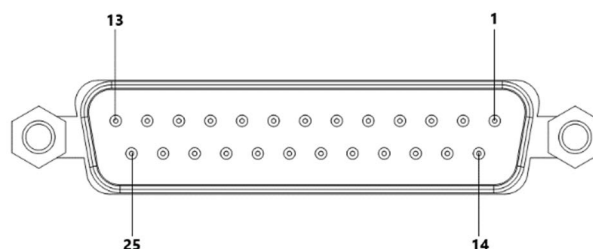
| Type-C receptacle A pin layout |        |                                                 |
|--------------------------------|--------|-------------------------------------------------|
| Pin                            | Name   | Description                                     |
| A1                             | GND    | Ground return                                   |
| A2                             | SSTXp1 | SuperSpeed differential pair #1, TX, positive   |
| A3                             | SSTXn1 | SuperSpeed differential pair #1, TX, negative   |
| A4                             | VBUS   | Bus power                                       |
| A5                             | CC1    | Configuration channel                           |
| A6                             | Dp1    | USB 2.0 differential pair, position 1, positive |
| A7                             | Dn1    | USB 2.0 differential pair, position 1, negative |
| A8                             | SBU1   | Sideband use (SBU)                              |
| A9                             | VBUS   | Bus power                                       |
| A10                            | SSRXn2 | SuperSpeed differential pair #4, RX, negative   |

**Table 2.3: USB Type-C Connector Pin Assignments**

| A11                            | SSRXp2 | SuperSpeed differential pair #4, RX, positive       |
|--------------------------------|--------|-----------------------------------------------------|
| A12                            | GND    | Ground return                                       |
| Type-C Receptacle B Pin Layout |        |                                                     |
| Pin                            | Name   | Description                                         |
| B12                            | GND    | Ground return                                       |
| B11                            | SSTXp1 | SuperSpeed differential pair #2, RX, positive       |
| B10                            | SSTXn1 | SuperSpeed differential pair #2, RX, negative       |
| B9                             | VBUS   | Bus power                                           |
| B8                             | SBU2   | Sideband use (SBU)                                  |
| B7                             | Dn2    | USB 2.0 differential pair, position 2, negative [a] |
| B6                             | Dp2    | USB 2.0 differential pair, position 2, positive [a] |
| B5                             | CC2    | Configuration channel                               |
| B4                             | VBUS   | Bus power                                           |
| B3                             | SSRXn2 | SuperSpeed differential pair #3, TX, negative       |
| B2                             | SSRXp2 | SuperSpeed differential pair #3, TX, positive       |
| B1                             | GND    | Ground return                                       |

### 2.3.3 GPIO/ CAN Bus / REMOTE

AFE-R770 is equipped with a DP25 with GPIO/ CAN Bus / REMOTE function. Please refer to Table 3.3 for its pin assignments.

**Table 2.4: GPIO / CAN Bus / REMOTE Connector Pin Assignments**

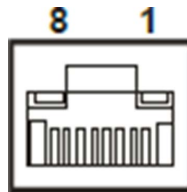
| Pin | Signal Definition |
|-----|-------------------|
| 1   | GND               |
| 2   | GPIO0             |
| 3   | GPIO1             |
| 4   | GPIO2             |
| 5   | GPIO3             |
| 6   | GPIO4             |
| 7   | GPIO5             |
| 8   | GPIO6             |
| 9   | GPIO7             |
| 10  | +5V               |
| 11  |                   |
| 12  | -                 |
| 13  | -                 |
| 14  | GND               |
| 15  | CAN0_D-           |
| 16  | CAN0_D+           |

**Table 2.4: GPIO / CAN Bus / REMOTE Connector Pin Assignments**

|    |         |
|----|---------|
| 17 | GND     |
| 18 | CAN1_D- |
| 19 | CAN1_D+ |
| 20 | GND     |
| 21 | PWRBTN  |
| 22 | Reset   |
| 23 | -       |
| 24 | -       |
| 25 | -       |

### 2.3.4 Ethernet Connector (LAN)

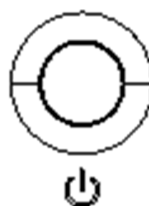
AFE-R760 is equipped with up to 3 x Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000/2500 Mbps CSMA/CD standards. These Ethernet ports provide a standard RJ-45 jack connector with LED indicators on the front side to show Active/Link status (Green LED on the right) and Speed status (Yellow/Green LED on the left).

**Table 2.5: Ethernet Connector Pin Assignments**

| Pin | 10/100/1000/2500 BaseT Signal Name |
|-----|------------------------------------|
| 1   | TX+                                |
| 2   | TX-                                |
| 3   | RX+                                |
| 4   | MDI2+                              |
| 5   | MDI2-                              |
| 6   | RX-                                |
| 7   | MDI3+                              |
| 8   | MDI3-                              |

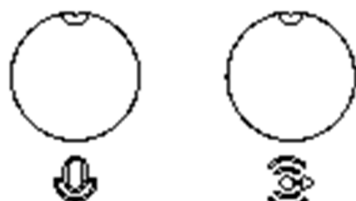
### 2.3.5 Power On/Off Button

AFE-R760 has a Power On/Off button with dual functions: Soft Power-On/Off (Instant off or Delay 4 Seconds then off), and Suspend.



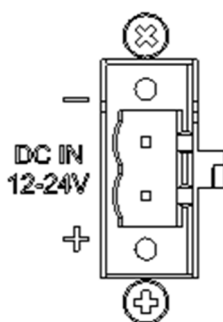
### 2.3.6 Audio Connector (Optional)

AFE-R760 features one phone jack connector that supports stereo Line-Out or Mic-In audio ports. The audio chip is controlled by ALC888S and compliant with the Azalea standards.



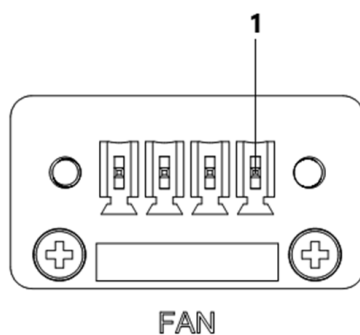
### 2.3.7 Phoenix Terminal Connector

AFE-R760 supports one 2-pin Phoenix terminal power input connector.



### 2.3.8 FAN Connector

AFE-R760 supports one 2-pin Phoenix terminal power input connector. This is only compatible with fans rated at 0.38A or less.

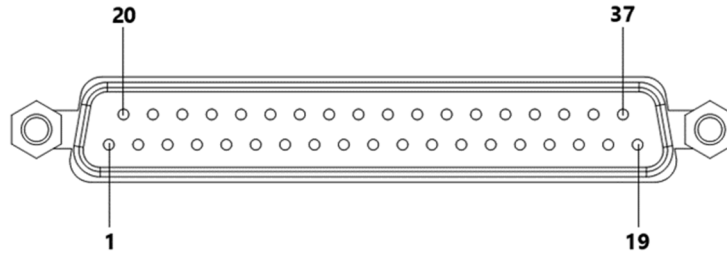


**Table 2.6: FAN Connector Pin Assignments**

| Pin | Signal Definition |
|-----|-------------------|
| 1   | GND               |
| 2   | +12V              |
| 3   | FAN_TACH          |
| 4   | CPU_PWM           |

### 2.3.9 COM Connector

AFE-R760 provides a D-sub 37-pin connector, which offers RS-232/422/485 serial communication interface ports. The default setting is RS-232, and the mode RS-422/485 can be supported via the BIOS settings.



**Table 2.7: COM Port**

| Pin | Signal Definition                        | Pin | Signal Definition                        |
|-----|------------------------------------------|-----|------------------------------------------|
| 1   | -                                        | 20  | -                                        |
| 2   | -                                        | 21  | -                                        |
| 3   | COM1_GND                                 | 22  | -                                        |
| 4   | COM1_RS232-CTS#_RS422-TX-<br>_RS485-DAT- | 23  | COM1_RS232-RTS#_RS422-RX-                |
| 5   | COM1_RS232-RXD_RS422-<br>TX+_RS485-DAT+  | 24  | COM1_RS232-TXD_RS422-RX+                 |
| 6   | -                                        | 25  | -                                        |
| 7   | -                                        | 26  | COM2_GND                                 |
| 8   | -                                        | 27  | COM2_RS232-CTS#_RS422-TX-<br>_RS485-DAT- |
| 9   | COM2_RS232-RTS#_RS422-RX-                | 28  | COM2_RS232-RXD_RS422-<br>TX+_RS485-DAT+  |
| 10  | COM2_RS232-TXD_RS422-RX+                 | 29  | -                                        |
| 11  | -                                        | 30  | -                                        |
| 12  | COM3_GND                                 | 31  | -                                        |
| 13  | COM3_RS232-CTS#_RS422-TX-<br>_RS485-DAT- | 32  | COM3_RS232-RTS#_RS422-RX-                |
| 14  | COM3_RS232-RXD_RS422-<br>TX+_RS485-DAT+  | 33  | COM3_RS232-TXD_RS422-RX+                 |
| 15  | -                                        | 34  | -                                        |
| 16  | -                                        | 35  | COM4_GND                                 |
| 17  | -                                        | 36  | COM4_RS232-CTS#_RS422-TX-<br>_RS485-DAT- |
| 18  | COM4_RS232-RTS#_RS422-RX-                | 37  | COM4_RS232-RXD_RS422-<br>TX+_RS485-DAT+  |
| 19  | COM4_RS232-TXD_RS422-RX+                 |     |                                          |

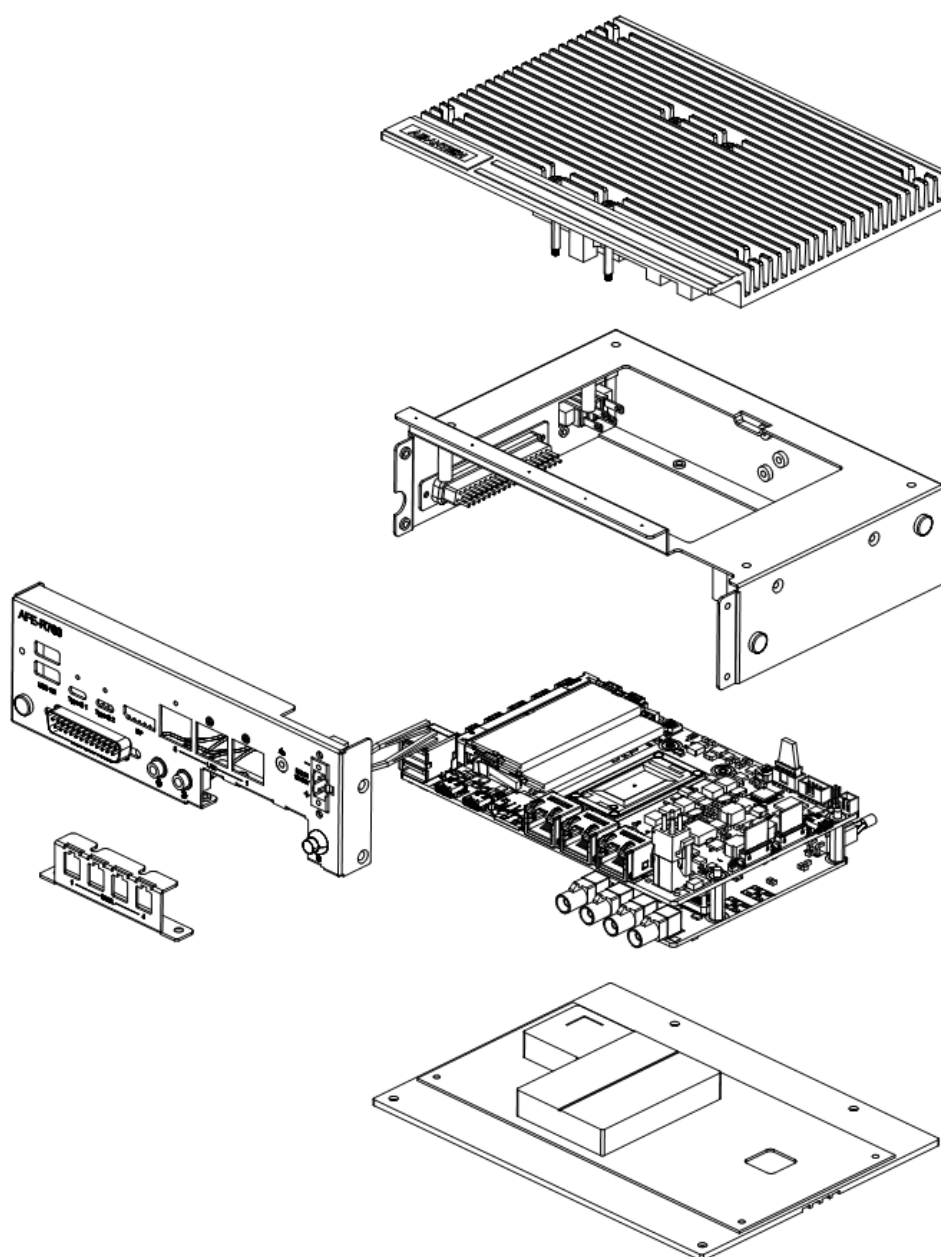
When using the optional 1700021869-01, please ensure that the ports and cables are connected to the corresponding signals as indicated below.

**Table 2.8: DB37 (Male) to 4 x DB9 (Male) Connector Signal**

| <b>AFE-R760</b> | <b>1700021869-01</b> |
|-----------------|----------------------|
| COM1            | COM3                 |
| COM2            | COM4                 |
| COM3            | COM2                 |
| COM4            | COM1                 |

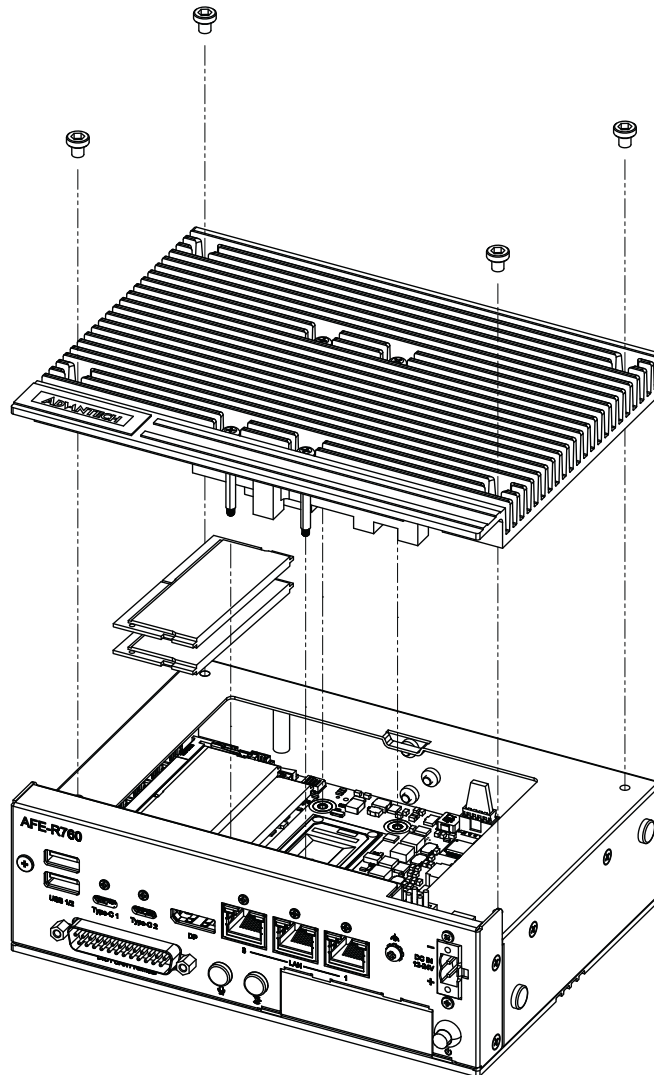
## 2.4 Installation

### 2.4.1 Exploded View



## 2.4.2 Memory Installation

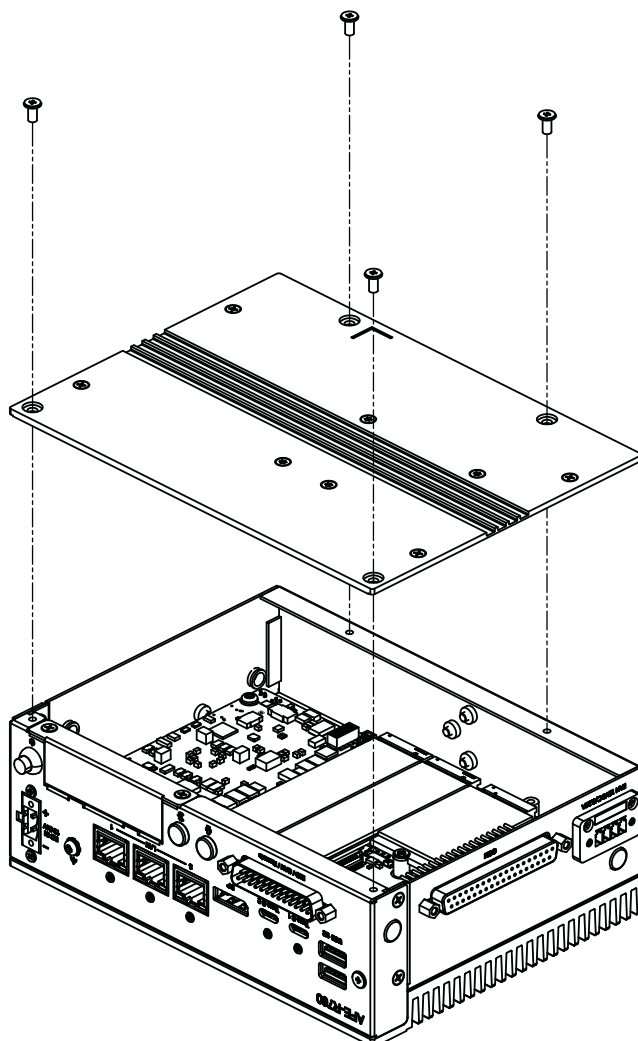
1. Unscrew the 4 spring screws and 4 hex head screws on the top cover, and remove the top cover.
  2. Install the memory into the system.
  3. Replace the top cover.
1. *Dévissez les 4 vis à ressort et les 4 vis à tête hexagonale sur le couvercle supérieur, puis retirez le couvercle supérieur.*
  2. *Installez la mémoire dans le système.*
  3. *Remettez le couvercle supérieur.*



### 2.4.3 Remove the Bottom Cover

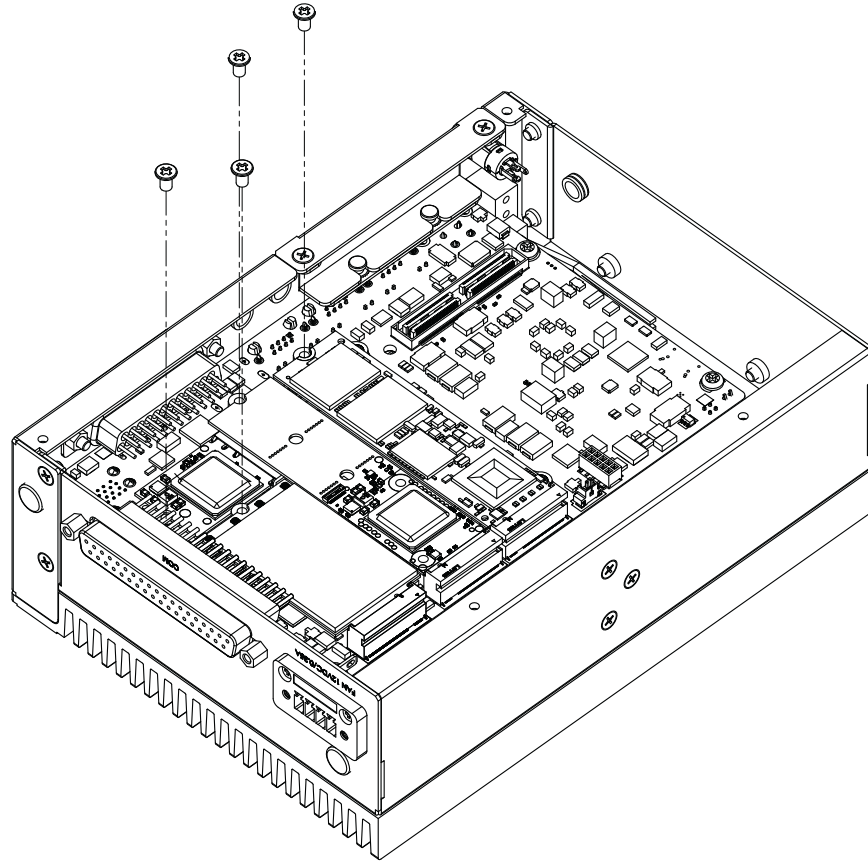
Unscrew the 4 x M3x5L screws on the bottom cover.

*Dévissez les 4 x M3x5L vis du couvercle inférieur.*



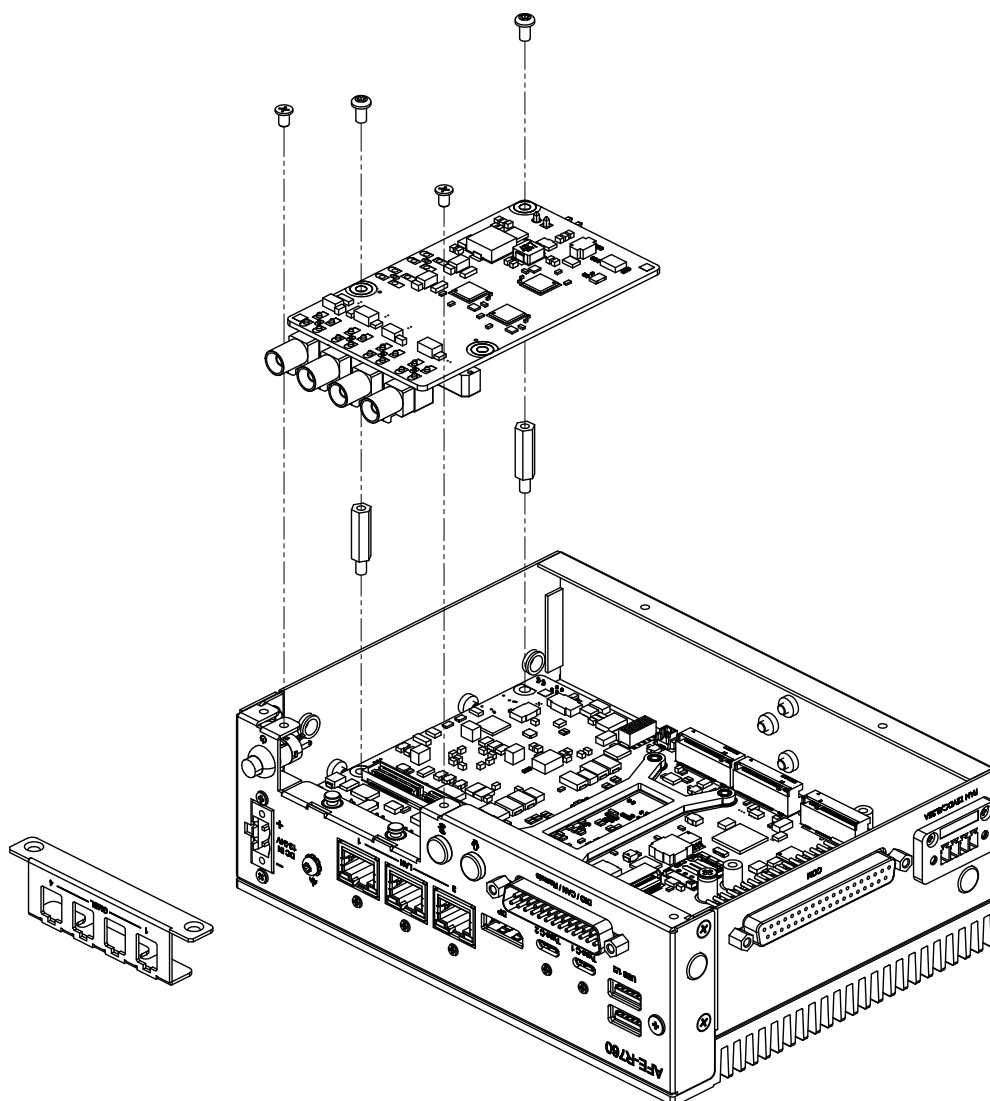
## 2.4.4 M.2 Module Installation

1. Remove the bottom cover (2.4.3).
2. Install the M.2 module with 1 x M3x5L screw (per socket).
3. Replace the bottom cover and fix it in place with 4 x M3x5L screws.
1. *Retirez le couvercle inférieur (2.4.3).*
2. *Installez le module M.2 avec 1 x M3x5L vis (par socket).*
3. *Remettez le couvercle inférieur et fixez-le en place avec 4 x M3x5L vis.*



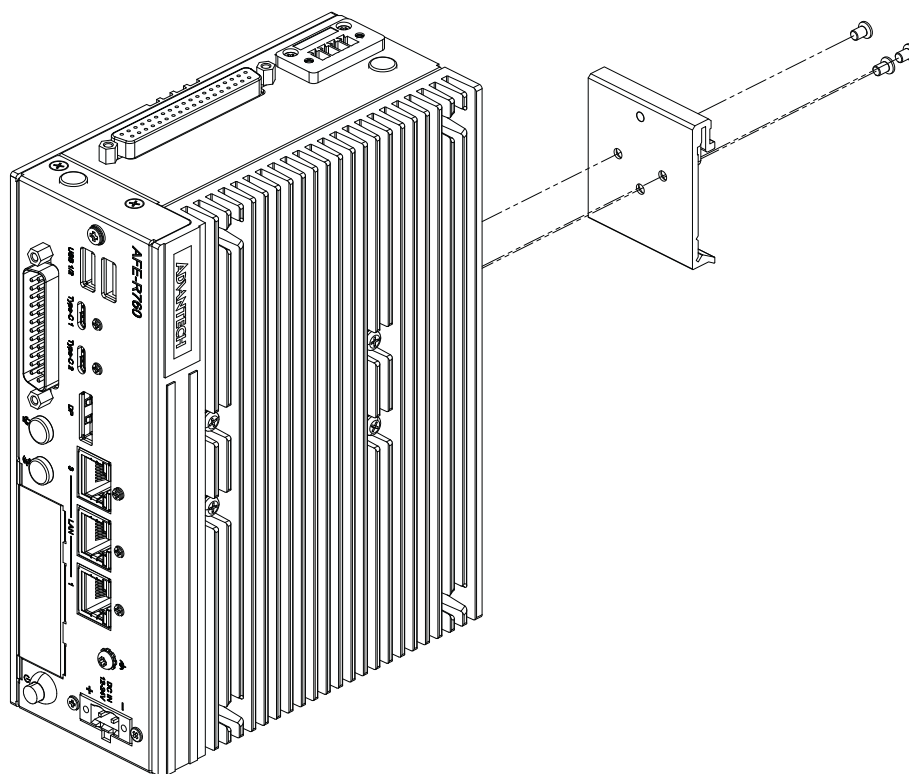
### 2.4.5 GMSL Board Installation

1. Remove the bottom cover (2.4.3).
  2. Remove 2 x M3x5L screws on the I/O bracket.
  3. Attach 2 x copper pillars and install the GMSL board via MIOe-GMSL connector.
  4. Install the I/O bracket with 2 x M3x5L screws and attach the board with 2 x M3x5L screws.
  5. Replace the bottom cover.
1. *Retirez le couvercle inférieur (2.4.3).*
  2. *Retirez les 2 vis M3x5L du support I/O.*
  3. *Fixez les 2 piliers en cuivre et installez la carte GMSL via le connecteur MIOe-GMSL.*
  4. *Installez le support I/O avec les 2 vis M3x5L et fixez la carte avec les 2 vis M3x5L.*
  5. *Remettez le couvercle inférieur.*



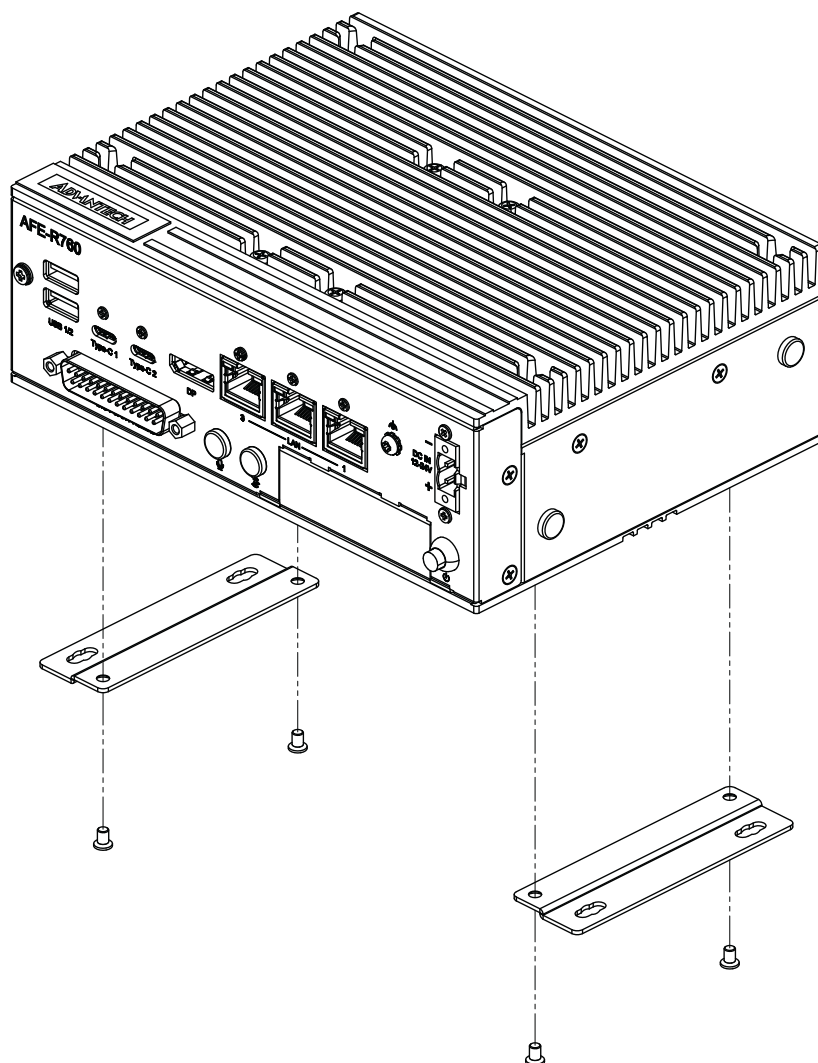
### 2.4.6 DIN-RAIL Kit Installation

1. Unscrew the 3 x M3x5L screws from the back side of AFE-R760.
2. Secure the DIN-rail bracket using 3 x M3x5L screws on the back.
1. *Dévissez les 3 vis M3x5L à l'arrière de l' AFE-R760.*
2. *Revissez le support du rail DIN avec les trois x M3x5L vis.*



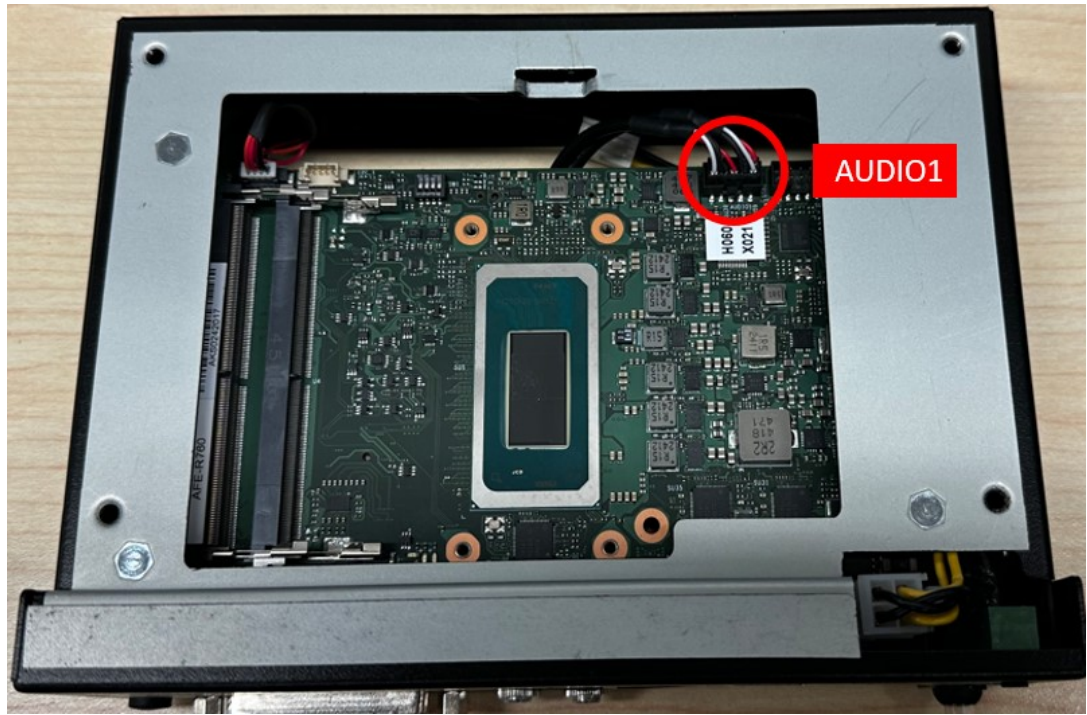
### 2.4.7 Wall Mount Kit Installation

1. Unscrew the 4 x M3x5L screws from the bottom side of AFE-R760.
2. Secure the 2 x wall mount brackets using 4 x M3x5L screws on the bottom.
1. *Dévissez les 4 vis M3x5L du côté inférieur de l'AFE-R760.*
2. *Fixez les 2 supports muraux à l'aide de 4 vis M3x5L sur le dessous.*



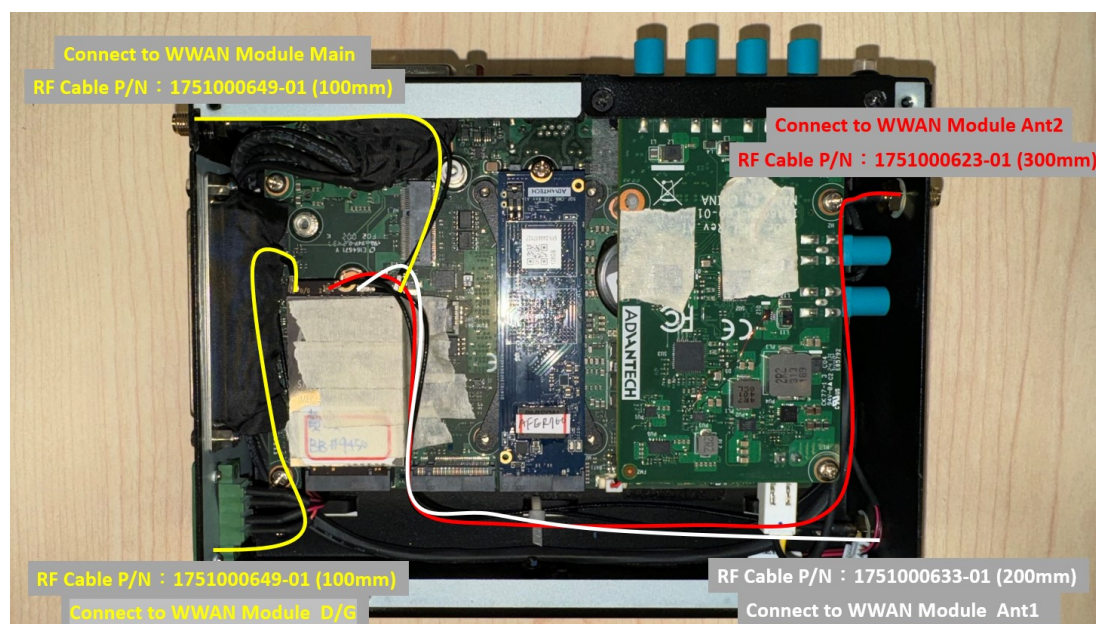
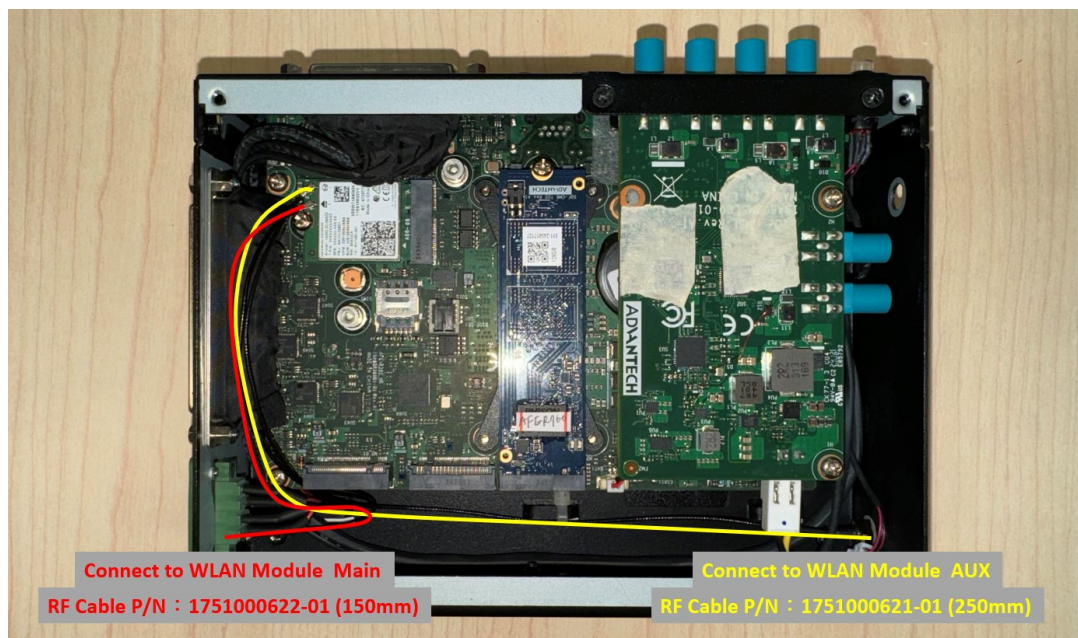
## 2.4.8 Audio Cable Installation

1. Remove the bottom cover (2.4.3)
2. Install the audio cable (P/N: 1700035708-01)
1. *Retirez le couvercle inférieur (2.4.3).*
2. *Installer le câble audio (P/N: 1700035708-01)*



## 2.4.9 Wireless Module Installation

1. Remove the bottom cover (2.4.3).
2. Wireless cable routing (refer to the picture below).
1. *Retirer le couvercle inférieur (2.4.3).*
2. *Acheminement du câble sans fil (voir l'image ci-dessous).*





# Chapter 3

## AMI BIOS Setup

AMIBIOS has been integrated into a plethora of motherboards for decades. With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the AFE-R760 BIOS setup screens.



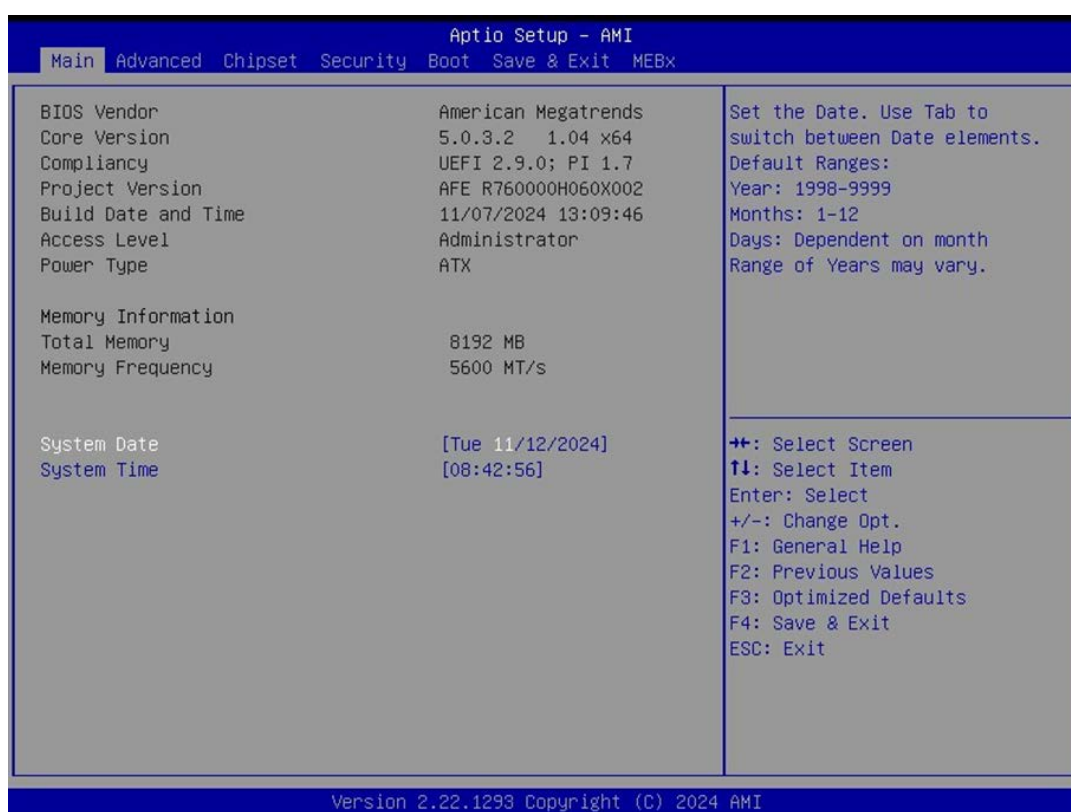
AMI BIOS ROM has a built-in setup program that allows users to modify the basic system configuration. This information is stored in battery-backed CMOS so it retains the setup information when the power is turned off.

## 3.1 Entering Setup

Turn on the computer and check for the patch code. If there is a number assigned to the patch code, it means that the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press <DEL> and you will immediately be allowed to enter Setup.

### 3.1.1 Main Setup

When you first enter the BIOS Setup Utility, you will encounter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



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. The right frame displays the key legend.

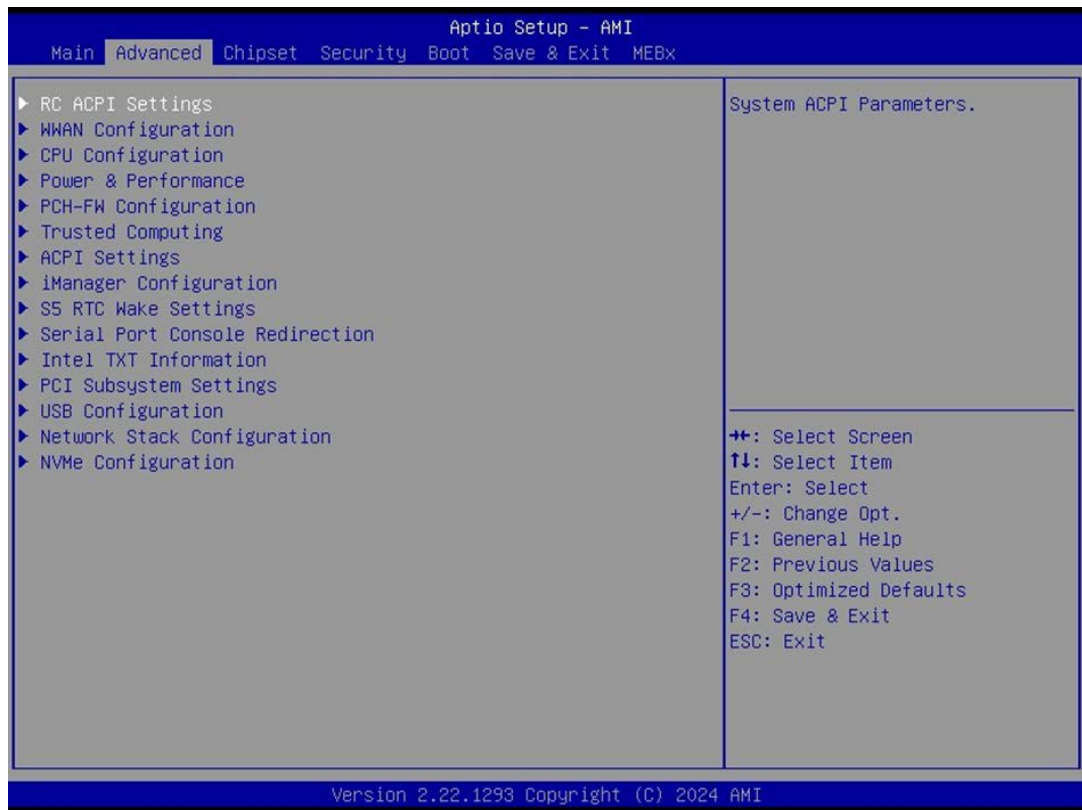
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

#### ■ System Time / System Date

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

### 3.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the AFE-R760 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 <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens is shown below. The sub-menus are described on the following pages.

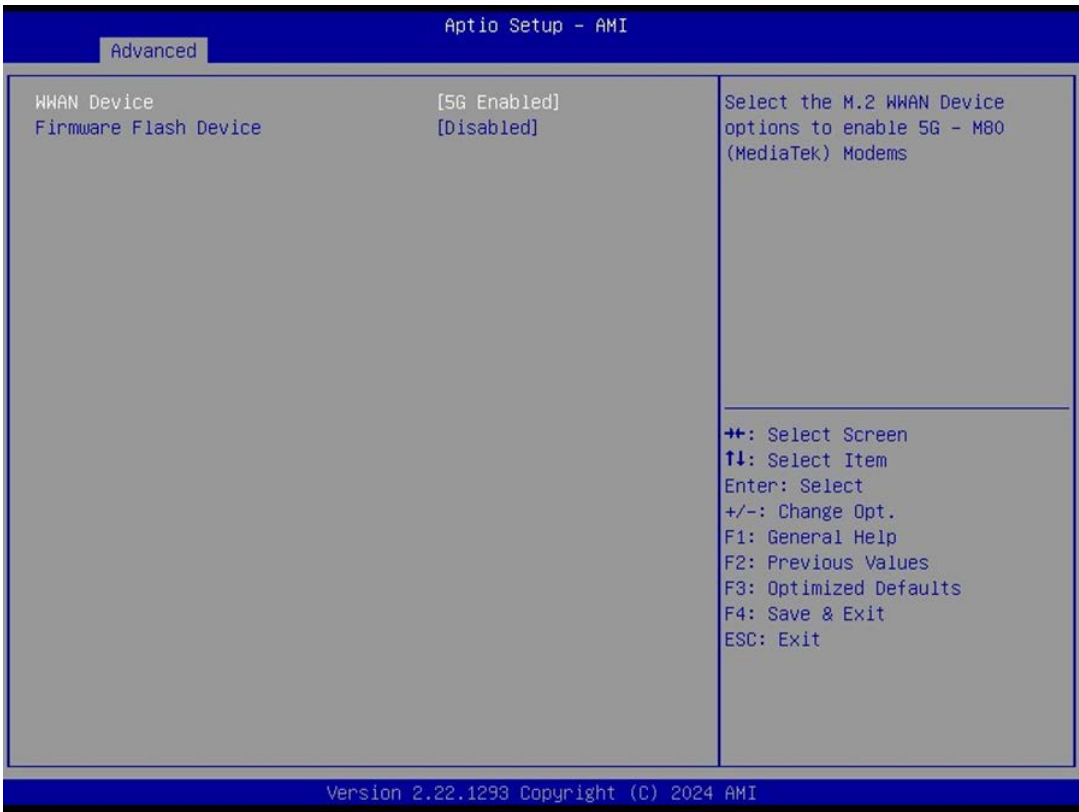


### 3.1.2.1 RC ACPI Settings



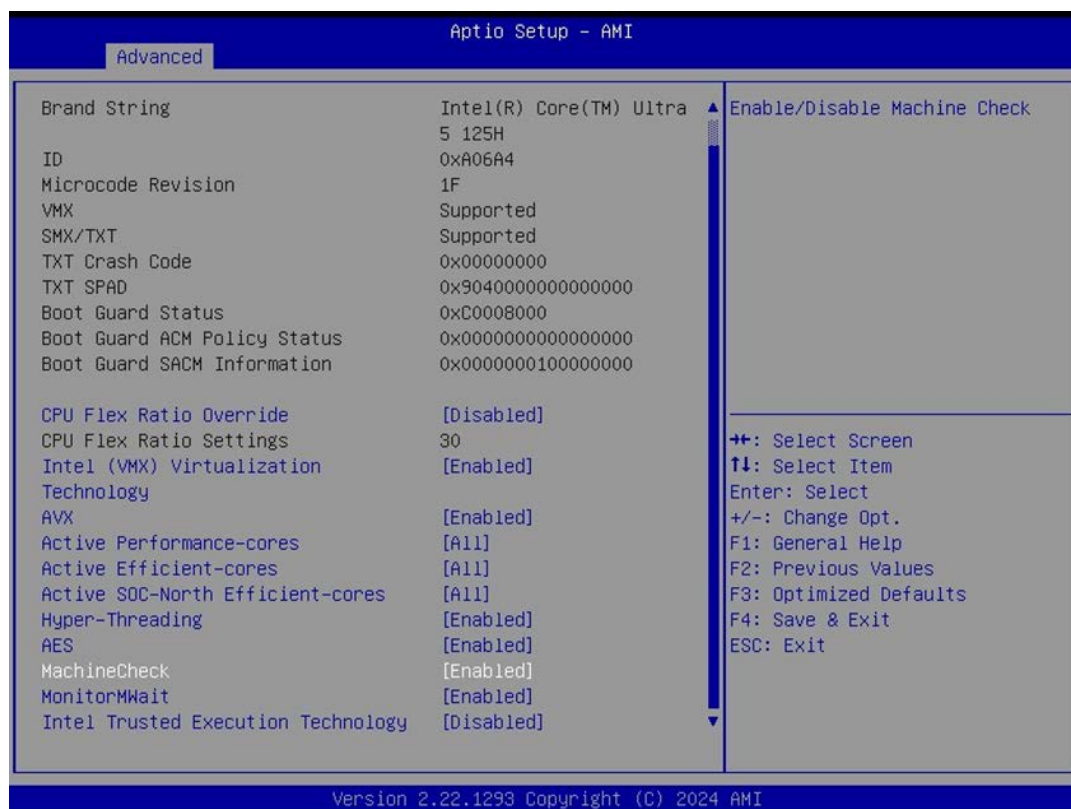
- **Native PCIE Enable**  
Enable/Disable PCIE Native Control reported in ACPI Table.
- **Native ASPM**  
Choose ASPM feature is controlled by OS or BIOS.
- **Low Power S0 Idle Capability**  
This item determines to Enable/Disable ACPI Low Power S0 Idle Capability under OS.

### 3.1.2.2 WWAN Configuration



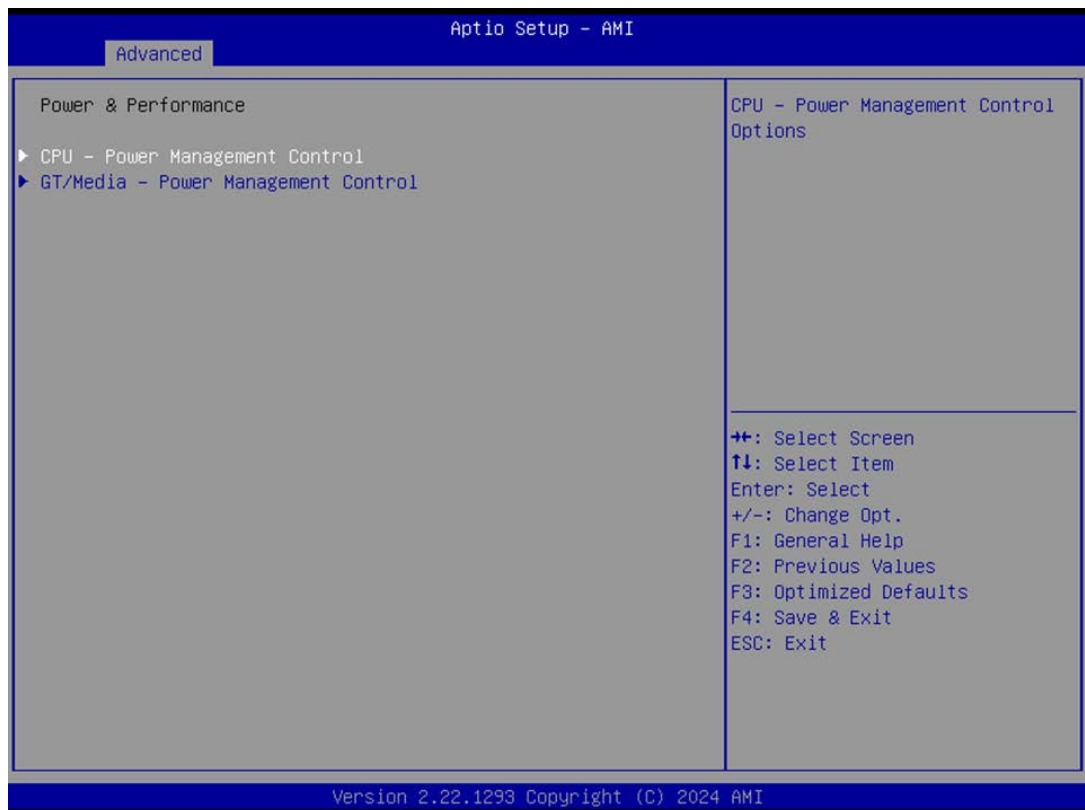
- **WWAN Device**  
Select the M.2 WWAN Device option to enable 5G Modems.
- **Firmware Flash Device**  
Enable or Disable a WWAN Firmware Flash Device.

## 3.1.2.3 CPU Configuration



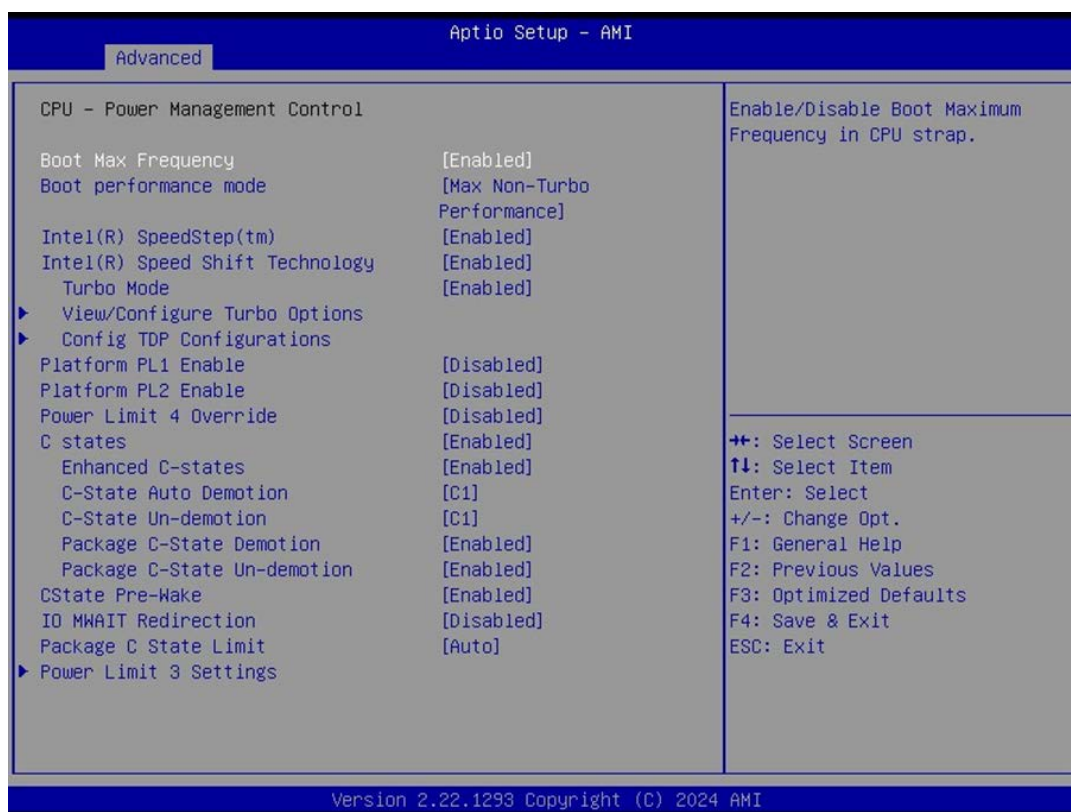
- **CPU Flex Ratio Override**  
Enable/Disable CPU Flex Ratio Programming.
- **Intel (VMX) Virtualization Technology**  
When Enabled, a VMM can utilize the additional hardware capability provided by Vanderpool Technology.
- **AVX**  
Enable/Disable the AVX 2/3 Instructions.
- **Active Performance-cores**  
Number of P-cores to enable in each processor package.
- **Active Efficient-cores**  
Number of E-cores to enable in each processor package.
- **Active SOC-North Efficient-Core**  
Number of SOC-North Efficient-cores to enable in SOC North
- **Hyper-Threading**  
This item allows users to Enable/Disable Hyper-Threading Technology.
- **AES**  
Enable/Disable AES (Advanced Encryption Standard).
- **MachineCheck**  
Enable/Disable Machine Check.
- **MonitorMWait**  
Enable/Disable MonitorMWait.
- **Intel Trusted Execution Technology**  
Enables utilization of additional hardware capability provided by Intel® Trusted Execution Technology.

#### 3.1.2.4 Power & Performance



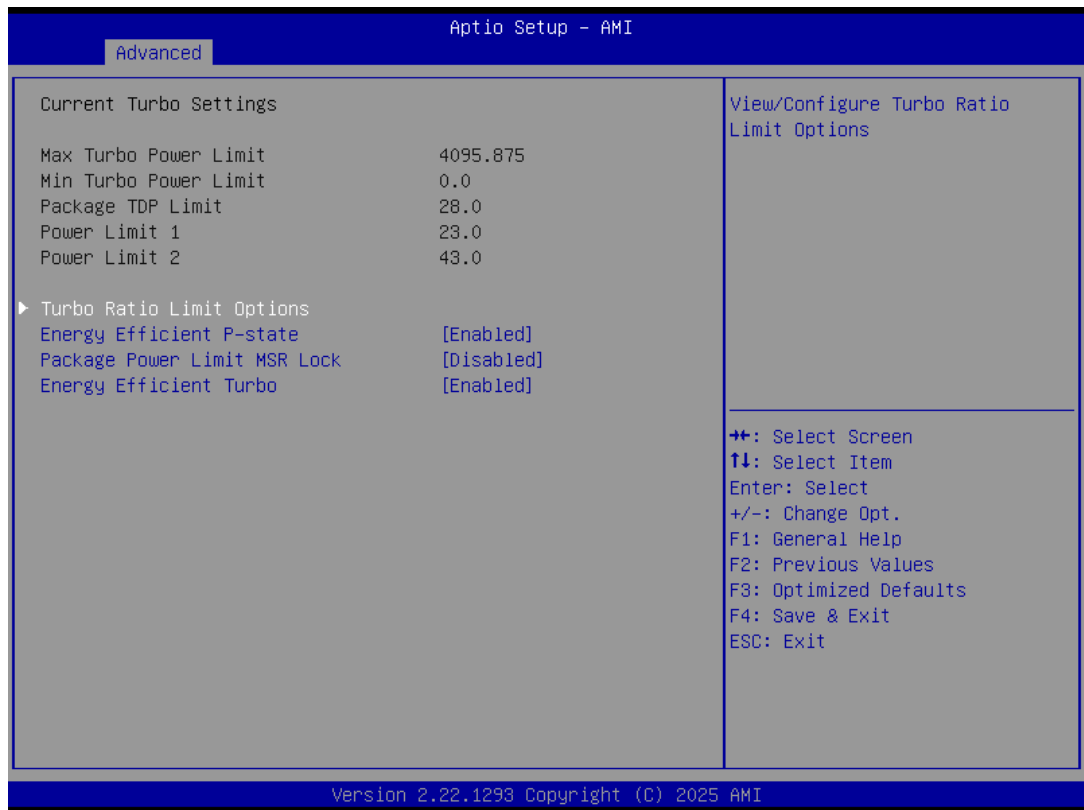
- **CPU – Power Management Control**  
CPU – Power Management Control Options.
- **GT – Power Management Control**  
GT – Power Management Control Options.

## CPU - Power Management Control



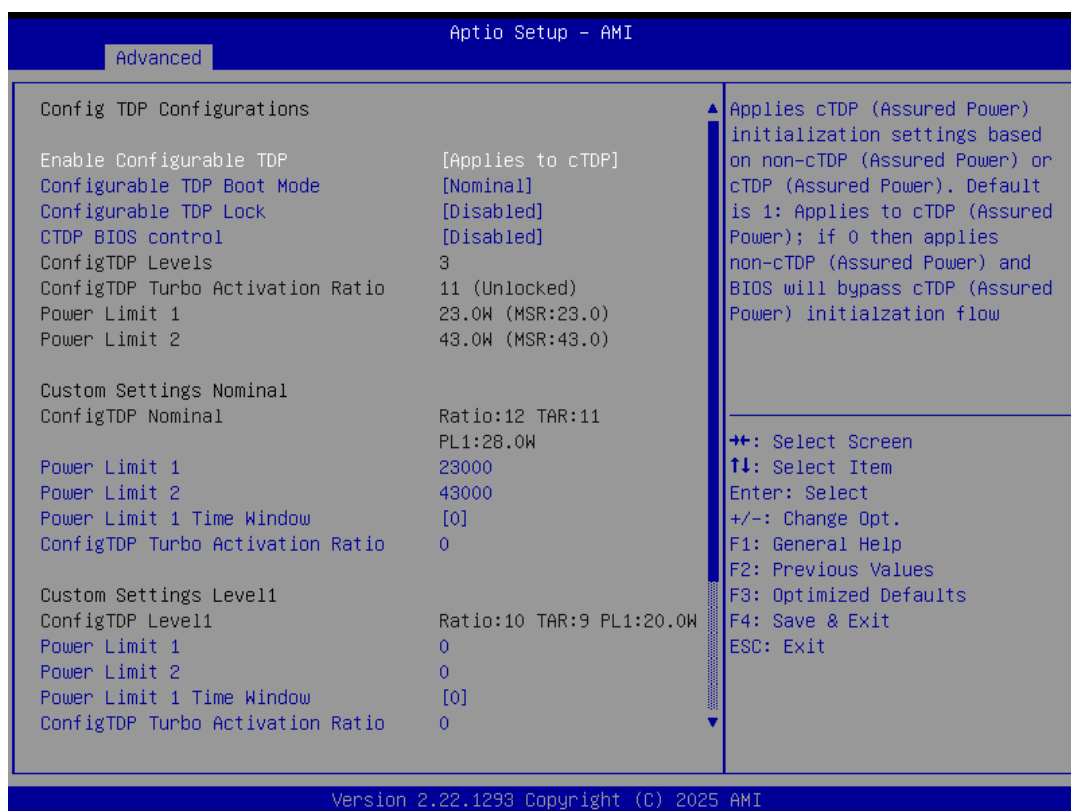
- **Boot Max Frequency**  
Enable/Disable Boot Maximum Frequency in CPU strap.
- **Boot performance mode**  
Select the performance state that the BIOS will set before OS handoff.
- **Intel® SpeedStep™**  
Allows more than two frequency ranges to be supported.
- **Intel® Speed Shift Technology**  
Enable/Disable Intel® Speed Shift Technology support.
- **Turbo Mode**  
Enable/Disable processor turbo mode.
- **View/Configure Turbo Options**  
View and Configure Turbo Options.
- **Config TDP Configuration**  
Config TDP Configurations.
- **Platform PL1 Enable**  
Enable/Disable Platform Power Limit 1 programming.
- **Platform PL2 Enable**  
Enable/Disable Platform Power Limit 1 programming.
- **Power Limit 4 Override**

- Enable/Disable Power Limit 4 override.
- **C states**  
Enable/Disable CPU Power Management.
- **PowerLimit 3 Settings**  
Power Limit 3 Settings.
- **View/Configure Turbo Options**



- **Turbo Ratio Limit Option**  
View/Configure Turbo Ratio Limit Options.
- **Energy Efficient P-state**  
Enable/Disable Energy Efficient P-state feature.
- **Package Power Limit MSR Lock**  
Enable/Disable locking of Package Power Limit settings.
- **Energy Efficient Turbo**  
Enable/Disable Energy Efficient Turbo feature.

## ■ Config TDP Configurations



- **Enable Configurable TDP**  
Applies TDP initialization settings based on non-cTDP or cTDP.
- **Configurable TDP Boot Mode**  
Configurable TDP Mode as Nominal/Up/Down/Deactivate TDP selection.
- **Configurable TDP Lock**  
Configurable TDP Mode Lock sets the Lock bit.
- **CTDP BIOS control**  
Enables CTDP control via runtime ACPI BIOS method.
- **Power Limit 1**  
Power Limit 1 in Milliwatts.
- **Power Limit 2**  
Power Limit 2 in Milliwatts.
- **Power Limit 1 Time Window**  
Power Limit 1 Time Window value in seconds.
- **ConfigTDP Turbo Activation Ration**  
Custom value for Turbo Activation Ratio.

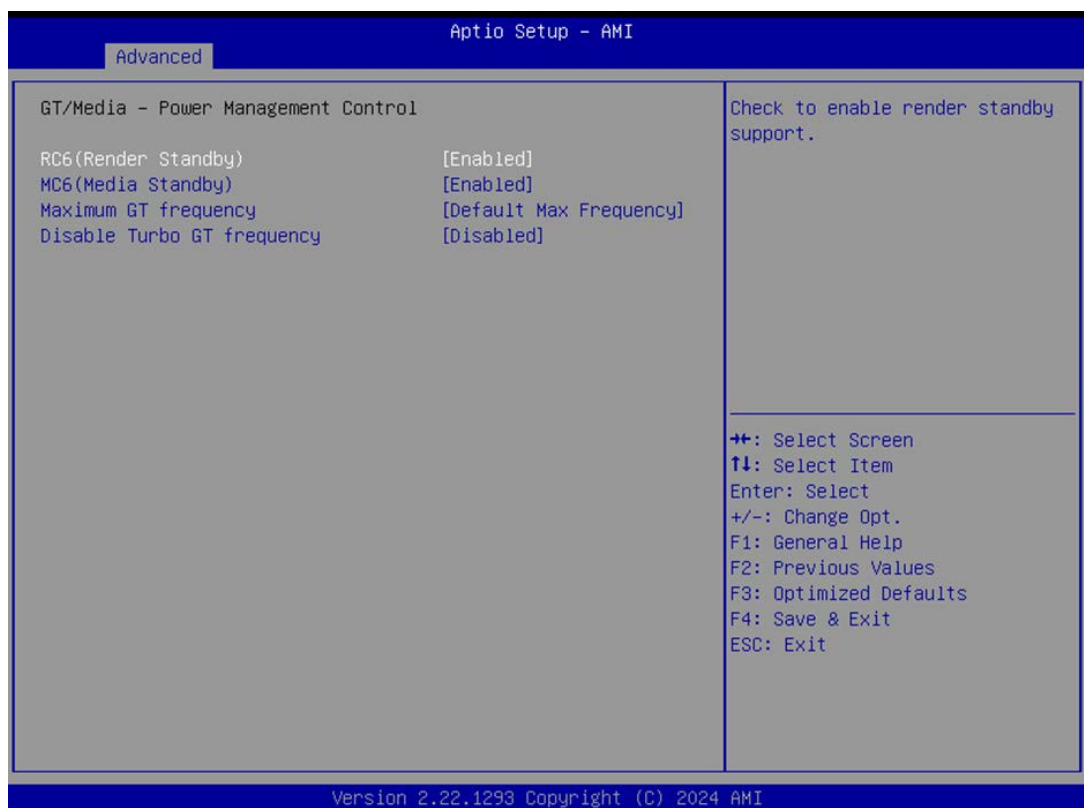
## ■ Power Limit 3 Settings



### – Power Limit 3 Override

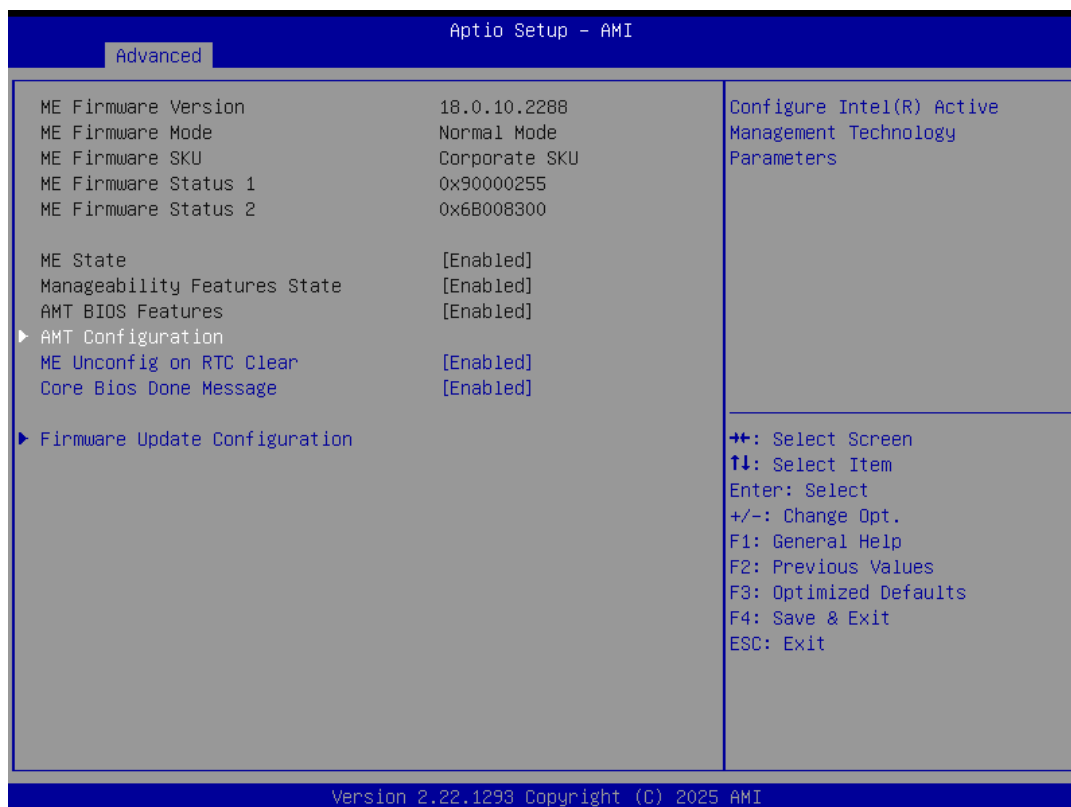
Enable/Disable Power Limit 3 override.

## GT - Power Management Control



- **RC6 (Render Standby)**  
Check to enable render standby support.
- **Maximum GT frequency**  
Maximum GT frequency limited by user.
- **Disable Turbo GT frequency**  
Enabled/Disabled Turbo GT frequency.
- **MC6 (Media Standby)**  
Check to enable Media standby support.

### 3.1.2.5 PCH-FW Configuration



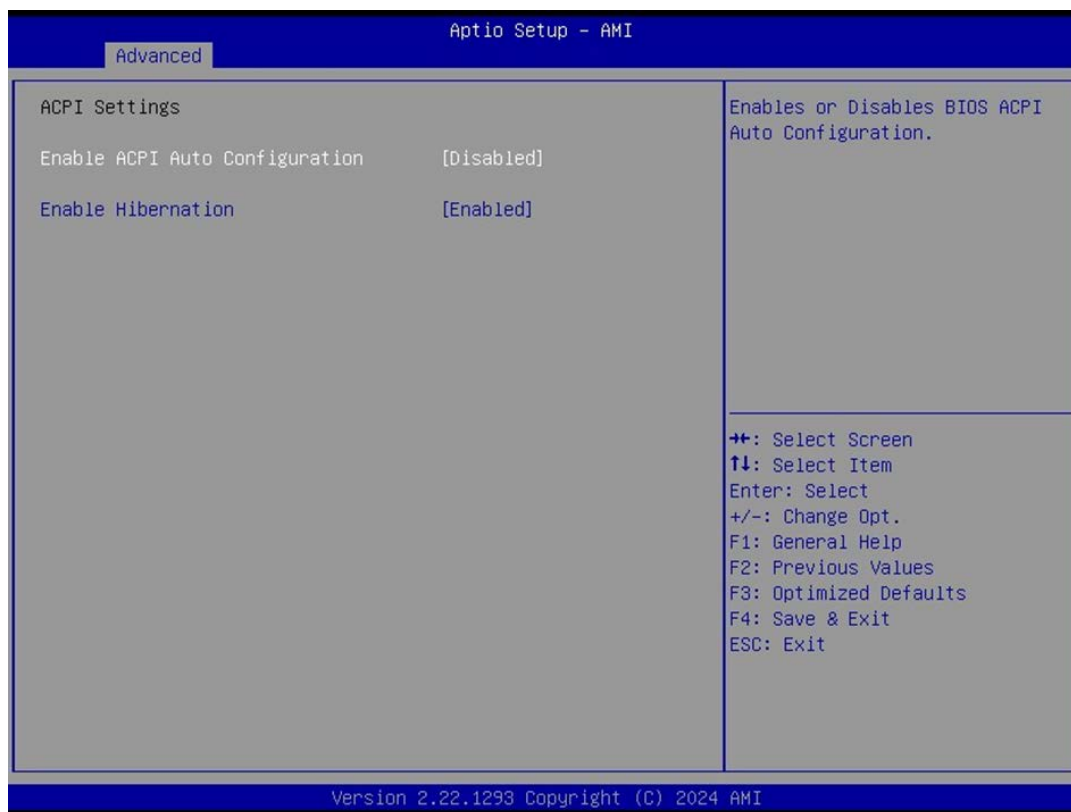
- **ME State**  
When Disabled ME will be put ME into Temporarily Disabled Mode.
- **Manageability Feature State**  
When Disabled, ME will not be unconfigured on RTC Clear.
- **AMT BIOS Features**  
When Disabled, ME will not be unconfigured on RTC Clear.
- **AMT Configuration**  
Configure Intel® Active Management Technology Parameters.
- **ME Unconfig on RTC Clear**  
When Disabled, ME will not be unconfigured on RTC Clear.
- **Core BIOS Done Message**  
Enable/Disable Core BIOS Done message sent to ME.
- **Firmware Update Configuration**  
Configure Management Engine Technology Parameters.

### 3.1.2.6 Trusted Computing



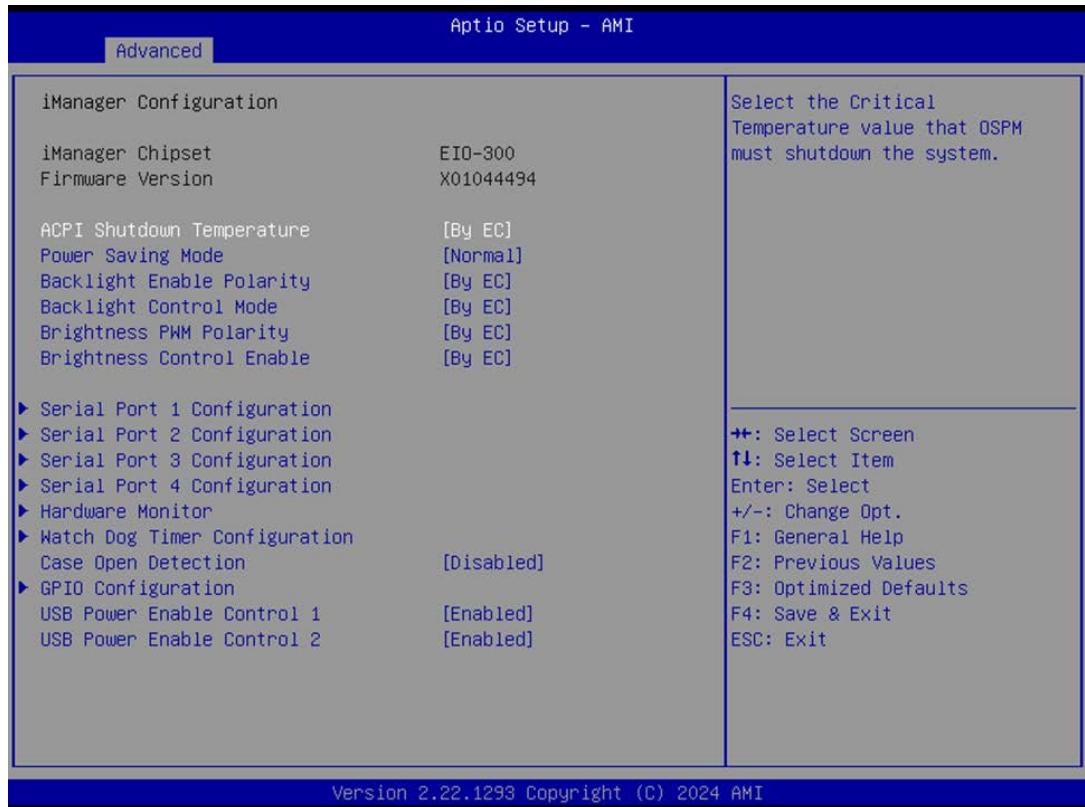
- **Security Device Support**  
Enable or disable BIOS support for the security device.
- **SHA256 PCR Bank**  
Enable or Disable SHA256 PCR Bank.
- **Pending operation**  
Schedule an operation for the security device.
- **Platform Hierarchy**  
Enable or Disable Platform Hierarchy.
- **Storage Hierarchy**  
Enable or Disable Storage Hierarchy.
- **Endorsement Hierarchy**  
Enable or Disable Endorsement Hierarchy.
- **Physical Presence Spec Version**  
Select to Tell the OS to support PPI Spec Version 1.2 or 1.3.
- **Device Select**  
TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices.

### 3.1.2.7 ACPI Settings



- **Enable ACPI Auto Configuration**  
Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**  
Enables or Disables the System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

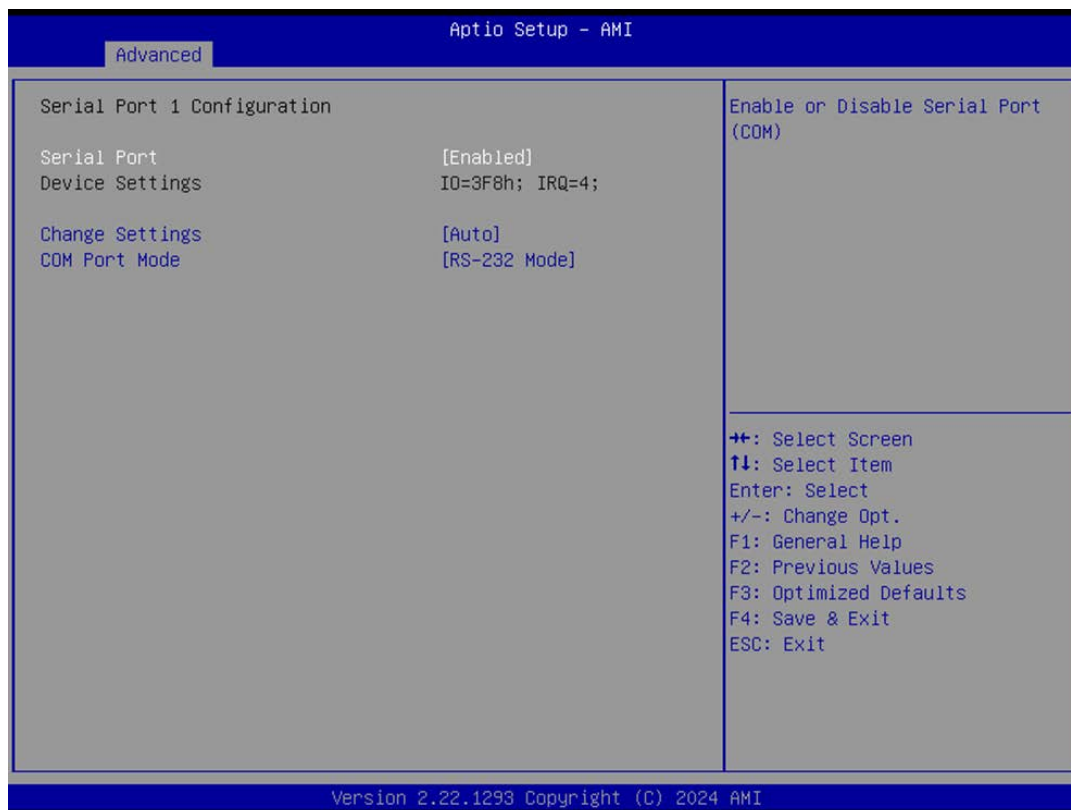
### 3.1.2.8 iManager Configuration



- **ACPI Shutdown Temperature**  
Enable/Disable CPU Shutdown Temperature.
- **Power Saving Mode**  
Enable/Disable power saving mode.
- **Backlight Enable Polarity**  
Switch Backlight Enable Polarity for Native or Invert.
- **Backlight Control Mode**  
Switch Backlight Control to PWM or DC mode.
- **Brightness PWM Polarity**  
Backlight Control Brightness PWM Polarity for Native or Invert.
- **Brightness Control Enable**  
Choose to control LVDS brightness value by EC or User override during POST stage.
- **Serial Port 1 Configuration**  
Set Parameters of Serial Port 1.
- **Serial Port 2 Configuration**  
Set Parameters of Serial Port 2.
- **Serial Port 3 Configuration**  
Set Parameters of Serial Port 3.
- **Serial Port 4 Configuration**  
Set Parameters of Serial Port 4.
- **Hardware Monitor**  
Monitor hardware Status.
- **Watch Dog Timer Configuration**

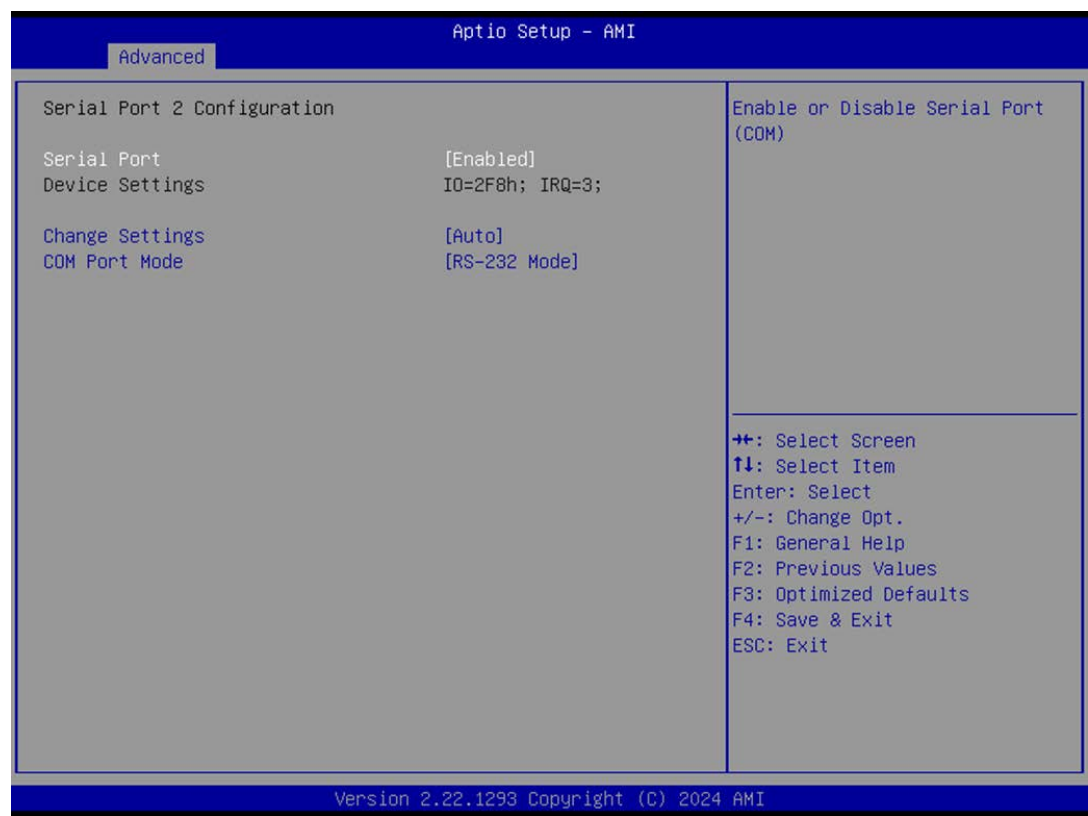
- Watch Dog Timer Configuration Page.
- **Case Open Detection**  
Enable or Disable Case Open Detect Function.
- **GPIO Configuration**  
GPIO Configuration Settings.

### Serial Port 1 Configuration



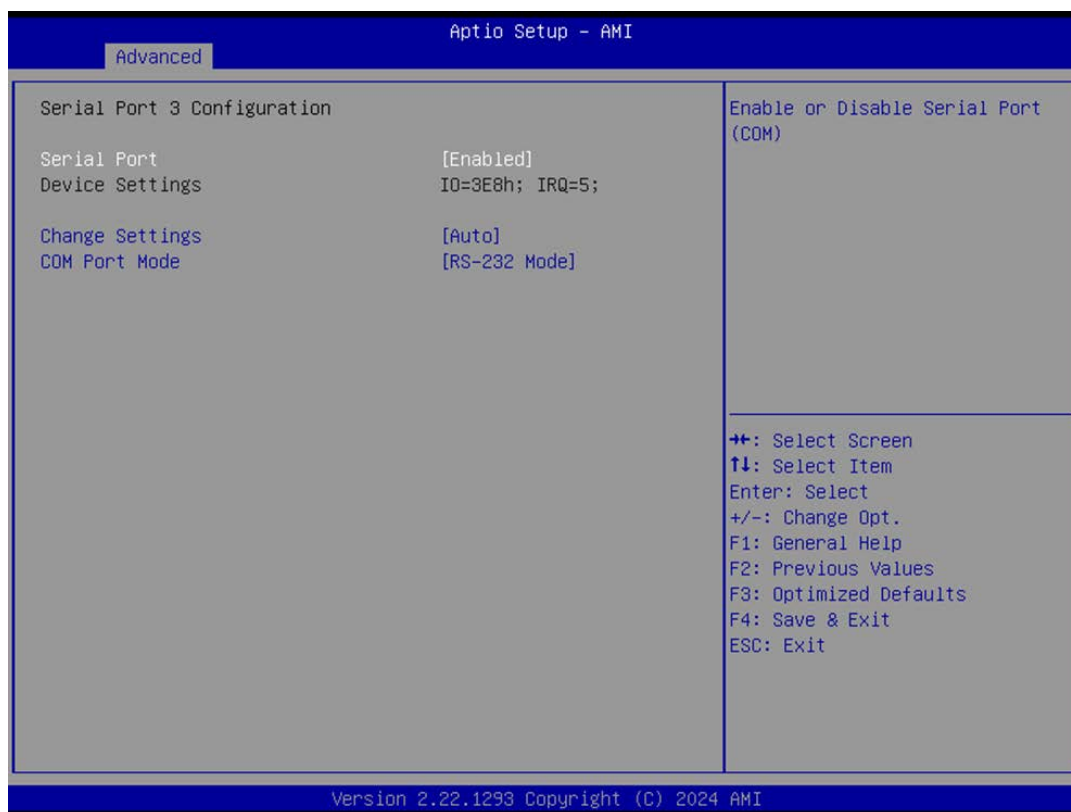
- **Serial Port**  
Enable or Disable Serial Port (COM).
- **Change Settings**  
Select an optimal settings for Super IO device.
- **COM Port Mode**  
COM Port Mode Select.

## Serial Port 2 Configuration



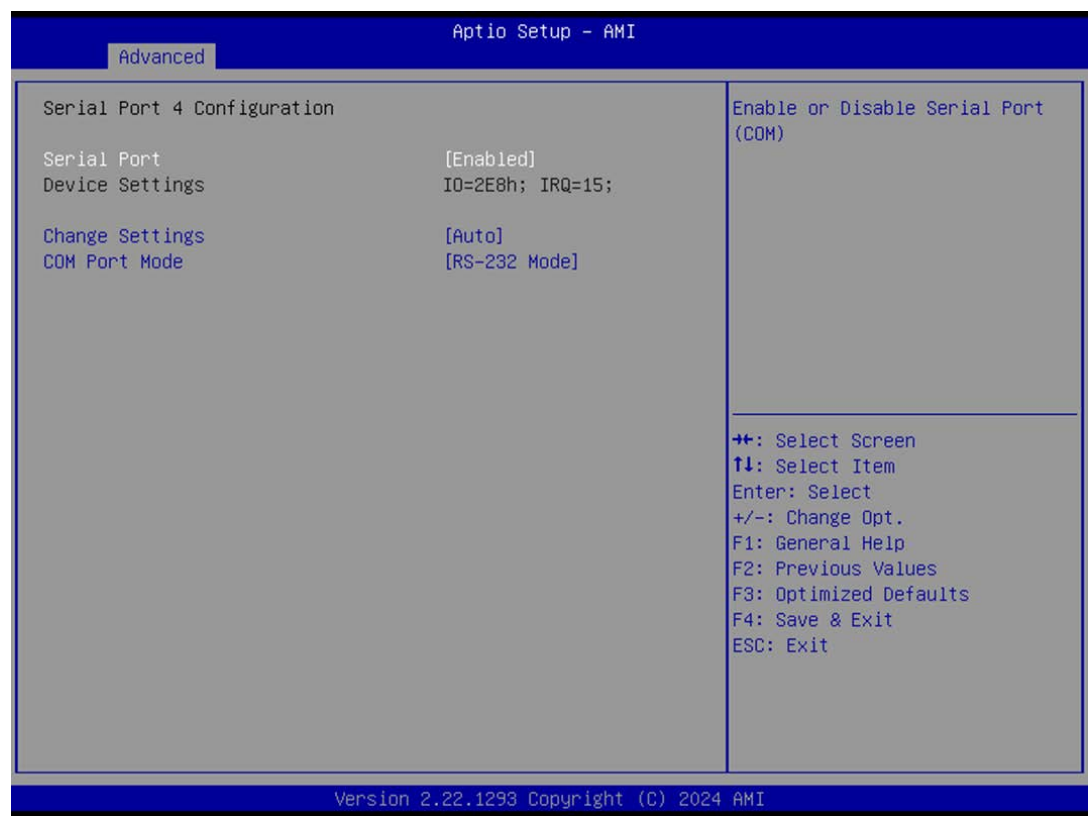
- **Serial Port**  
Enable or Disable Serial Port (COM).
- **Change Settings**  
Select an optimal settings for Super IO device.
- **COM Port Mode**  
COM Port Mode Select.

## Serial Port 3 Configuration



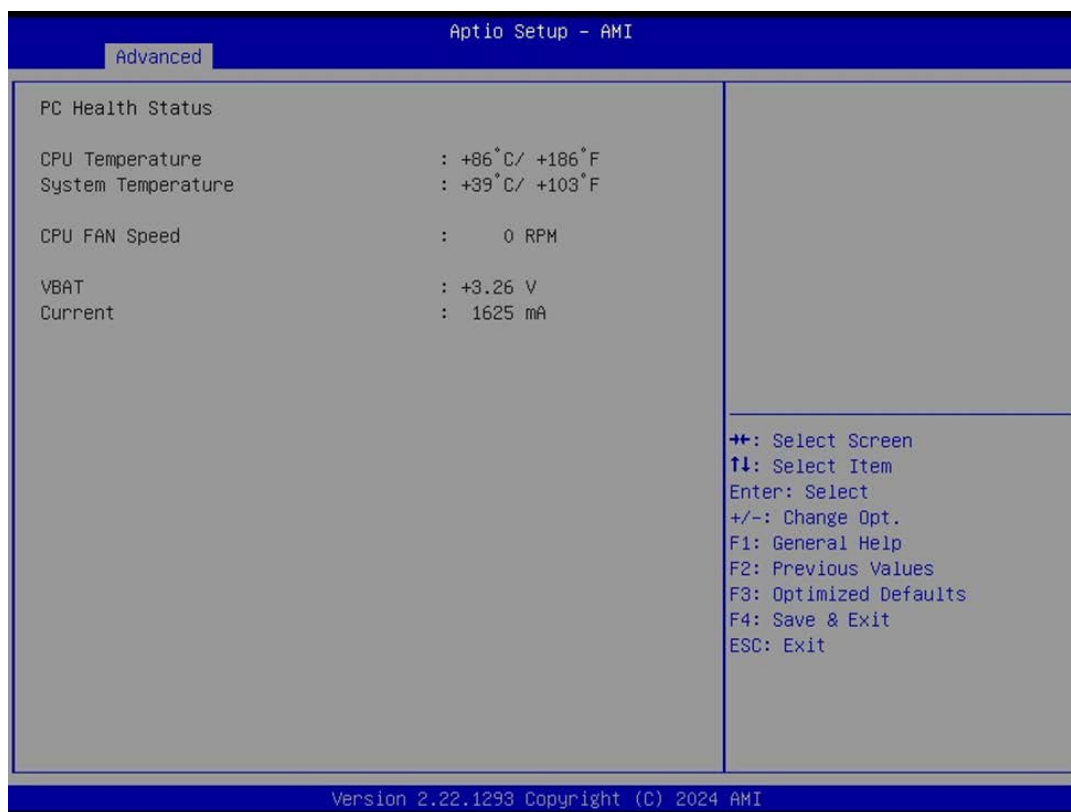
- **Serial Port**  
Enable or Disable Serial Port (COM).
- **Change Settings**  
Select an optimal settings for Super IO device.
- **COM Port Mode**  
COM Port Mode Select.

## Serial Port 4 Configuration

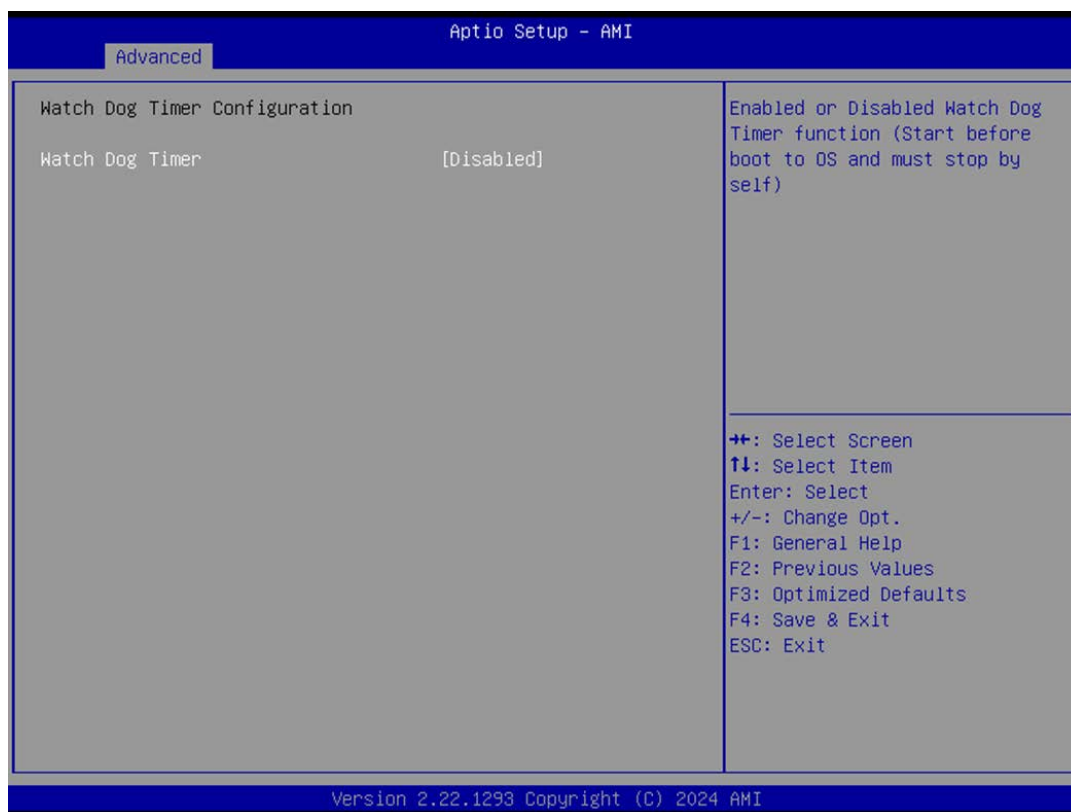


- **Serial Port**  
Enable or Disable Serial Port (COM).
- **Change Settings**  
Select an optimal settings for Super IO device.
- **COM Port Mode**  
COM Port Mode Select.

## Hardware Monitor

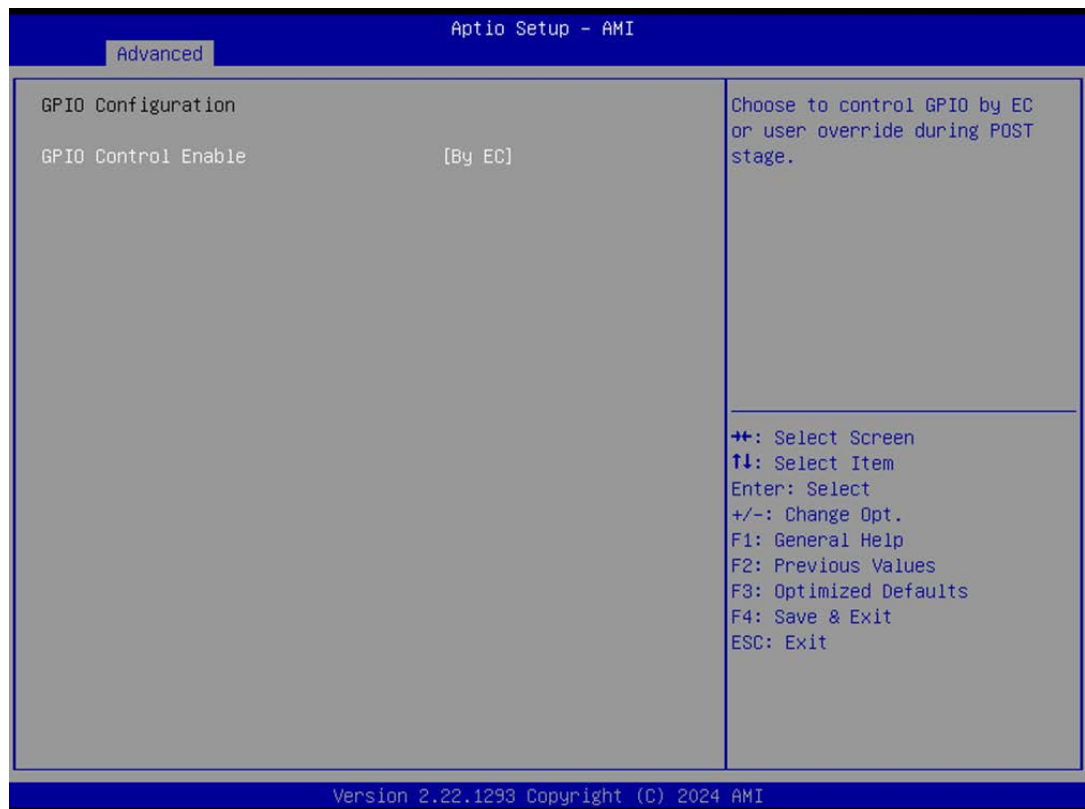


## Watch Dog Timer Configuration



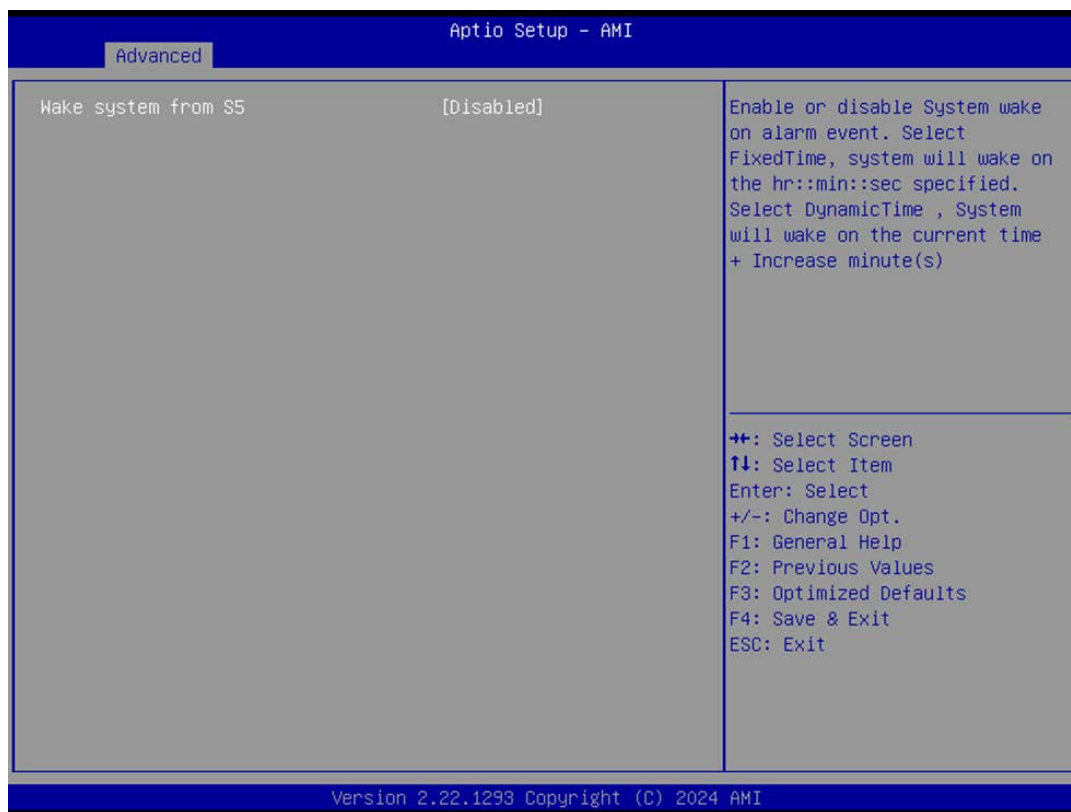
- **Watch Dog Timer**  
Enable or Disable the Watch Dog Timer Function.

## GPIO Configuration



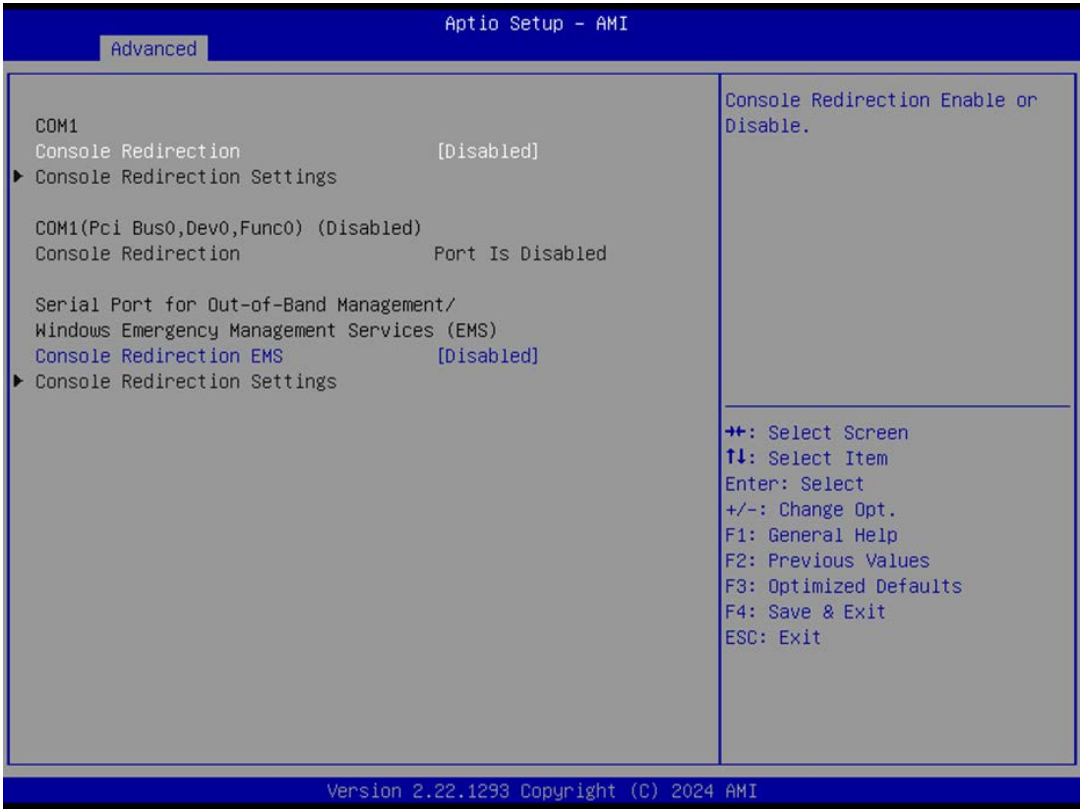
- **GPIO Control Enable**  
Choose to control GPIO by EC or user override during POST stage.
- **GPIO0/1/2/3/4/5/6/7**  
Configure GPIO0/1/2/3/4/5/6/7.

### 3.1.2.9 S5 RTC Wake Settings



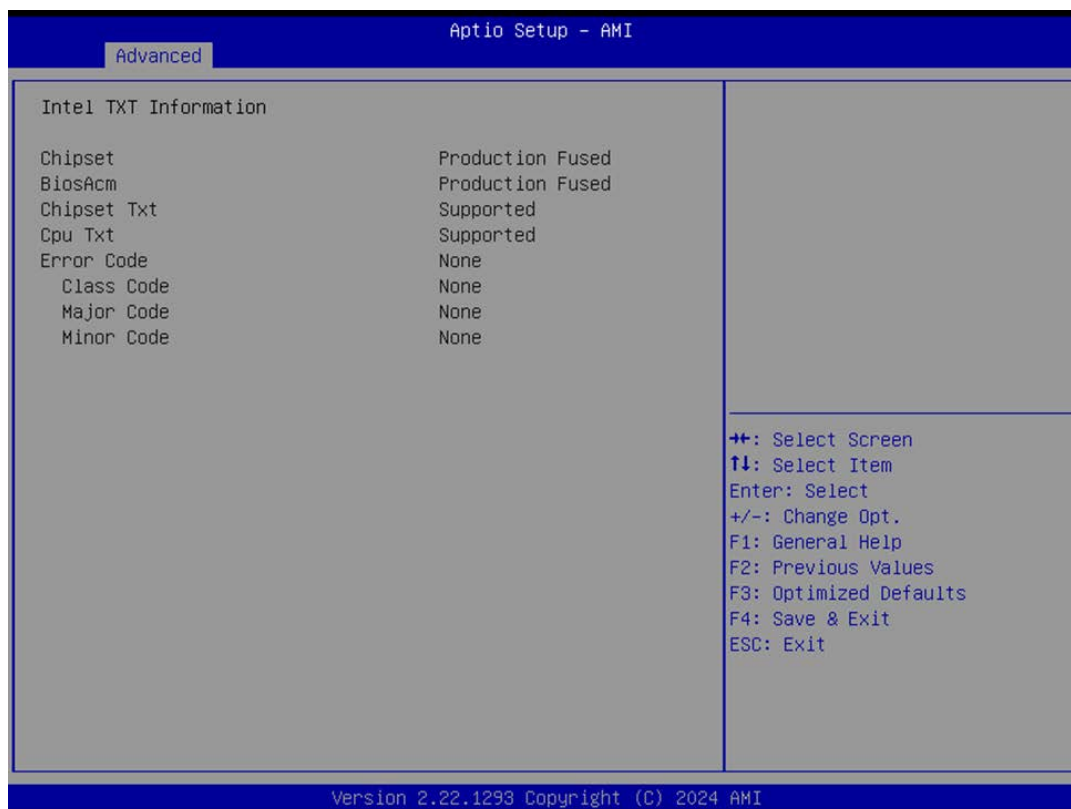
- **Wake system from S5**  
Enable or disable system wake on alarm event. Select FixedTime, and the system will wake on the hr:min:sec specified.

3.1.2.10 Serial Port Console Redirection



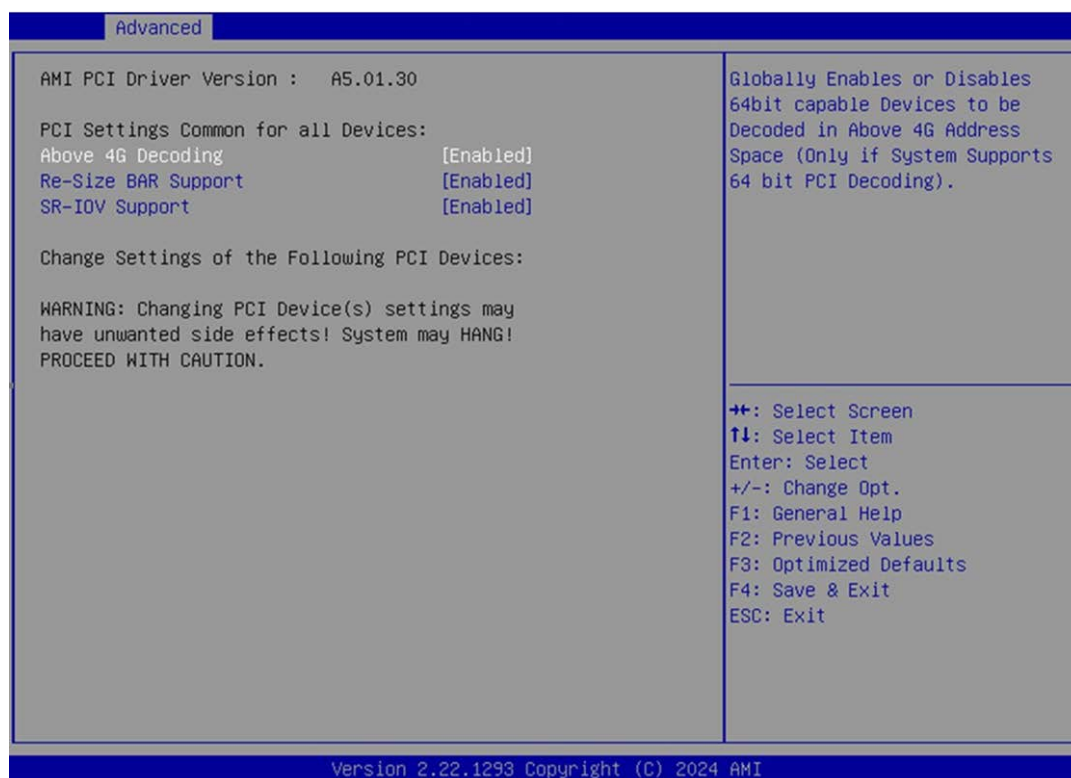
- **Console Redirection**  
This item allows users to configure console redirection detail settings.
- **Console Redirection EMS**  
This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).

### 3.1.2.11 Intel TXT Information



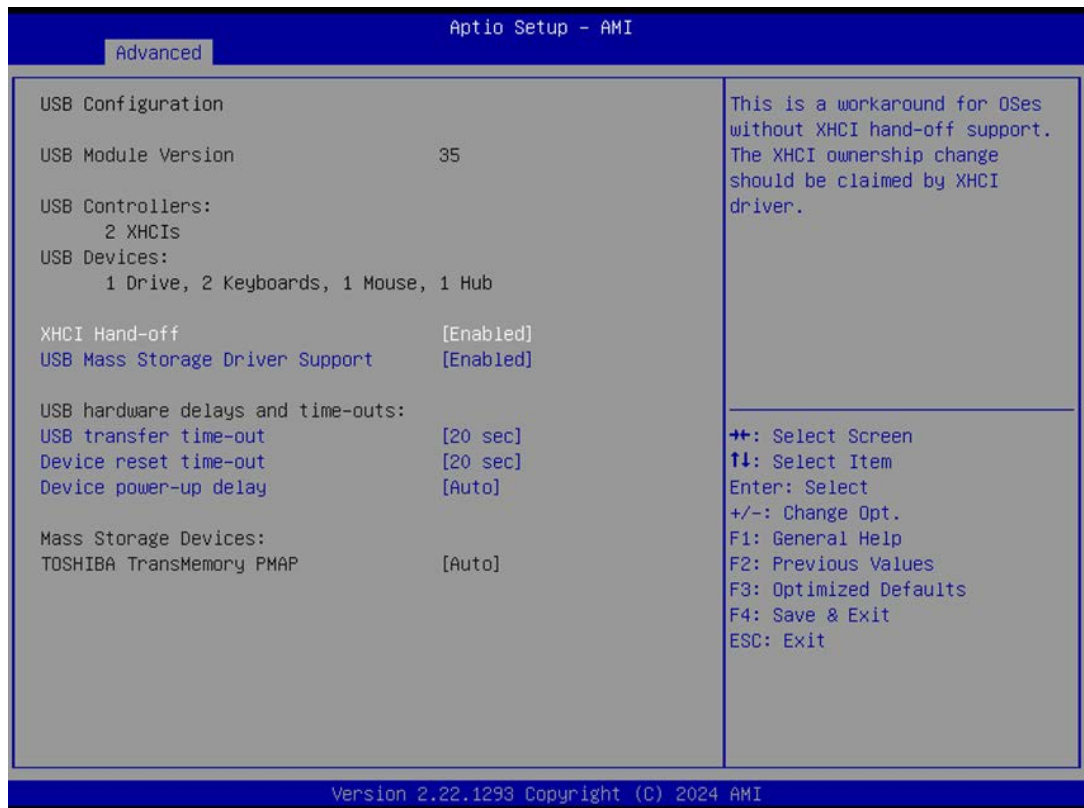
- **Intel TXT Information**  
Display Intel TXT information.

### 3.1.2.12 PCI Subsystem Settings



- **Above 4G Decoding**  
Globally Enables or Disables 64-bit capable Devices to be Decoded in Above 4G Address Space. (Only if System Supports 64-bit PCI Decoding).
- **Re-size BAR Support**  
If the system has Resizable BAR capable PCIe Devices, this option Enables or Disables Resizable BAR Support.
- **SR-IOV Support**  
If system has SR-IOV capable PCIe Devices, this option Enables or Disables Single Root IO Virtualization Support.

### 3.1.2.13 USB Configuration



- **XHCI Hand-off**  
This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by the XHCI driver.
- **USB Mass Storage Driver Support**  
Enable/Disable USB Mass Storage Driver Support.
- **USB transfer time-out**  
Time-out value for control, bulk, and interrupt transfers.
- **Device reset time-out**  
USB mass storage device start unit command time-out.
- **Device power-up delay**  
Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a hub port the delay is taken from the hub descriptor.

### 3.1.2.14 Network Stack Configuration



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

### 3.1.2.15 NVMe Configuration



### 3.1.3 Chipset Configuration

Select the Chipset tab from the AFE-R760 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

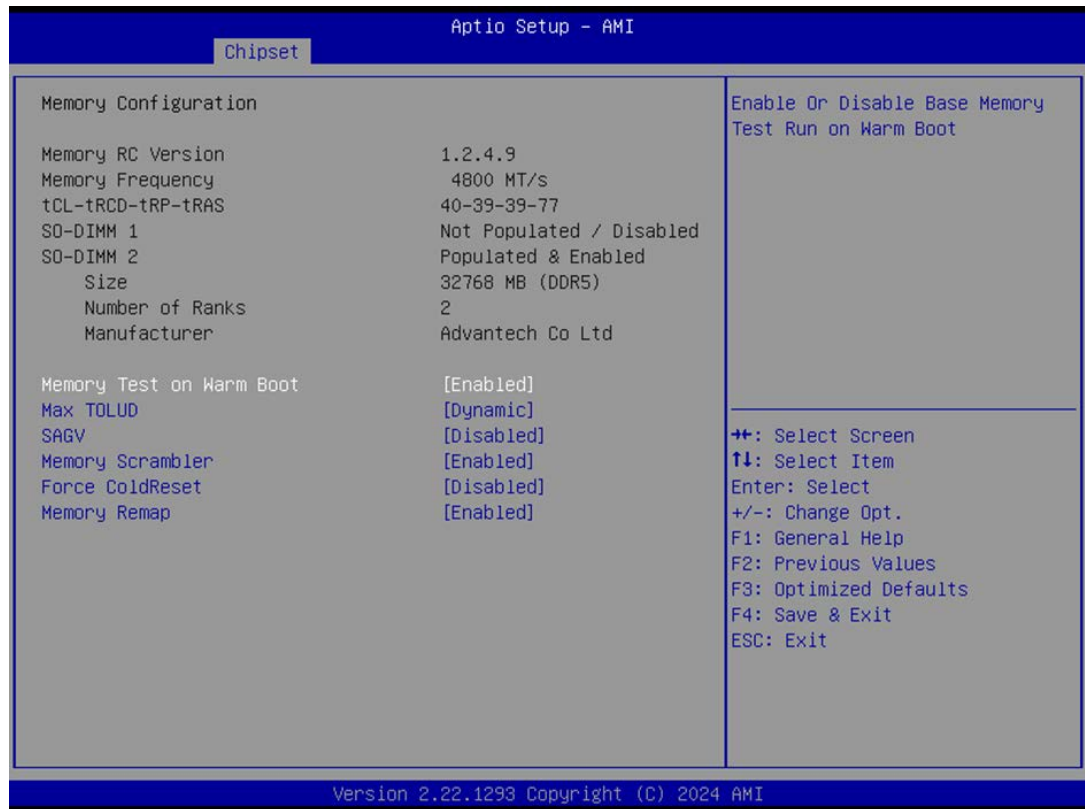


### 3.1.3.1 System Agent (SA) Configuration



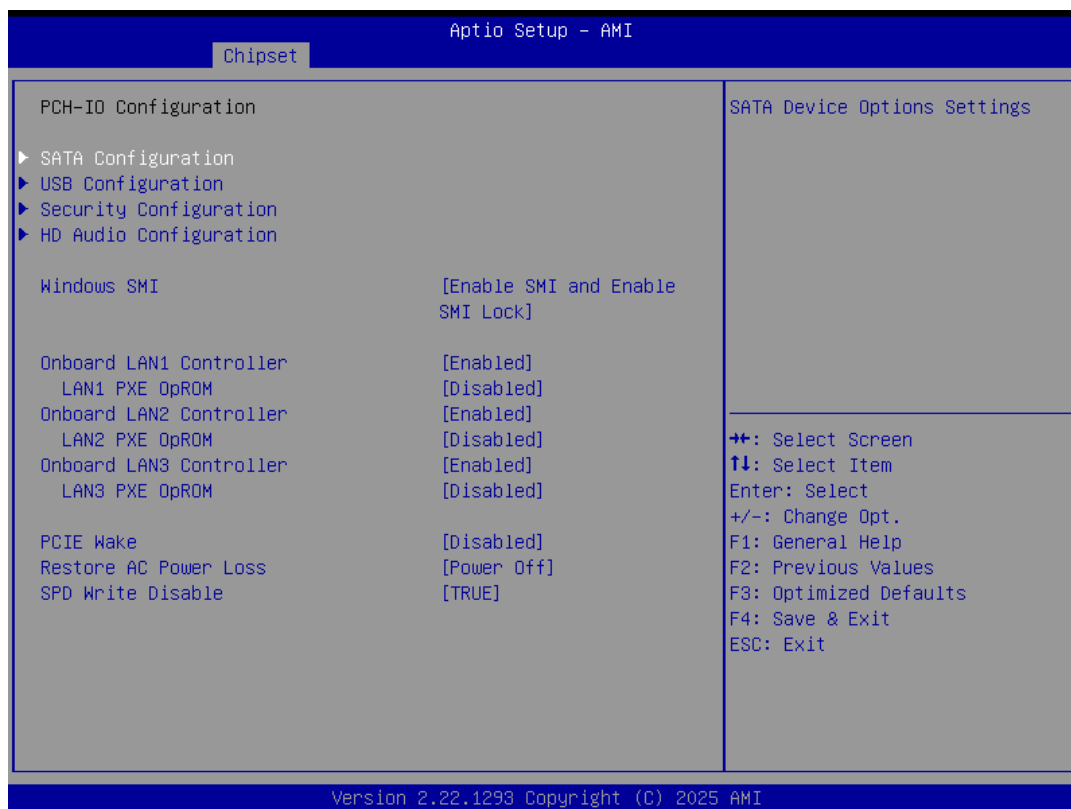
- **Memory Configuration**  
Memory Configuration Parameters.
- **TCSS setup menu**  
TCSS Configuration settings.
- **VMD setup menu**  
VMD setup.
- **VT-d**  
VT-D capability.
- **Above 4GB MMIO BIOS assignment**  
Enable/Disable Above 4GB MMIO BIOS assignment.
- **IPU Device**  
Enable/Disable IPU Device.
- **NPU Device**  
Enable/Disable NPU Device.

## Memory Configuration



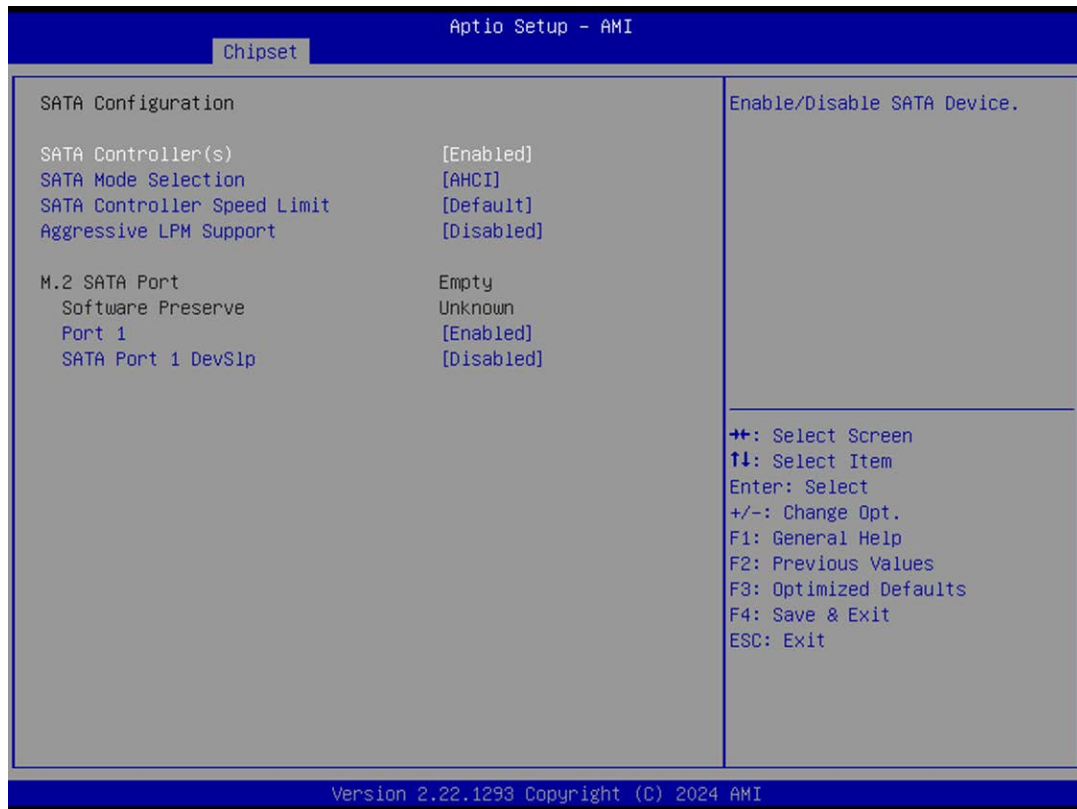
- **Memory Test on Warm Boot**  
Enable/Disable Base Memory Test Run on Warm Boot.
- **Max TOLUD**  
Maximum Value of TOLUD.
- **SA GV**  
System Agent Geyserville.
- **Memory Scrambler**  
Enable/Disable Memory Scrambler support.
- **Force ColdReset**  
Force ColdReset OR Choose MrcColdBoot mode.
- **Memory Remap**  
Enable/Disable Memory Remap above 4GB.

### 3.1.3.2 PCH-IO Configuration



- **SATA Configuration**  
SATA Device Options Settings.
- **USB Configuration**  
USB Configuration Settings.
- **Security Configuration**  
Security Configuration Settings.
- **HD Audio Configuration**  
HD Audio Subsystem Configuration Settings.
- **Windows SMI**  
Enable/Disable SMI and SMI Lock
- **LAN1/2/3 PXE ROM**  
Enable or disable boot option for LAN1/2/3 Controller.
- **Onboard LAN1/2/3 Controller**  
Select to Enable or Disable onboard LAN1/2/3 Controller.
- **LAN2 PXE ROM**  
Enable or disable boot option for LAN2 Controller.
- **PCIE Wake**  
Enable/Disable PCIE Wake
- **Restore AC Power Loss**  
Specify what state to go to when power is re-applied after a power failure (G3 state).
- **SPD Write Disable**  
Enable/Disable setting SPD Write Disable.

## SATA Configuration



- **SATA Controller**  
Enable or Disable SATA Device.
- **SATA Mode Selection**  
Determines how SATA controllers operate.
- **SATA Controller Speed Limit**  
Indicates the maximum speed the SATA controller can support.
- **Aggressive LPM Support**  
Enable PCH to aggressively enter link power state.

### M.2 SATA Port

- **Port 1**  
Enable or Disable SATA Port.
- **SATA Port 1 DevSlp**  
Enable/Disable SATA Port 1 DevSlp. For DevSlp to work, both hard drive and SATA ports need to support DevSlp function, otherwise an unexpected behavior could occur.

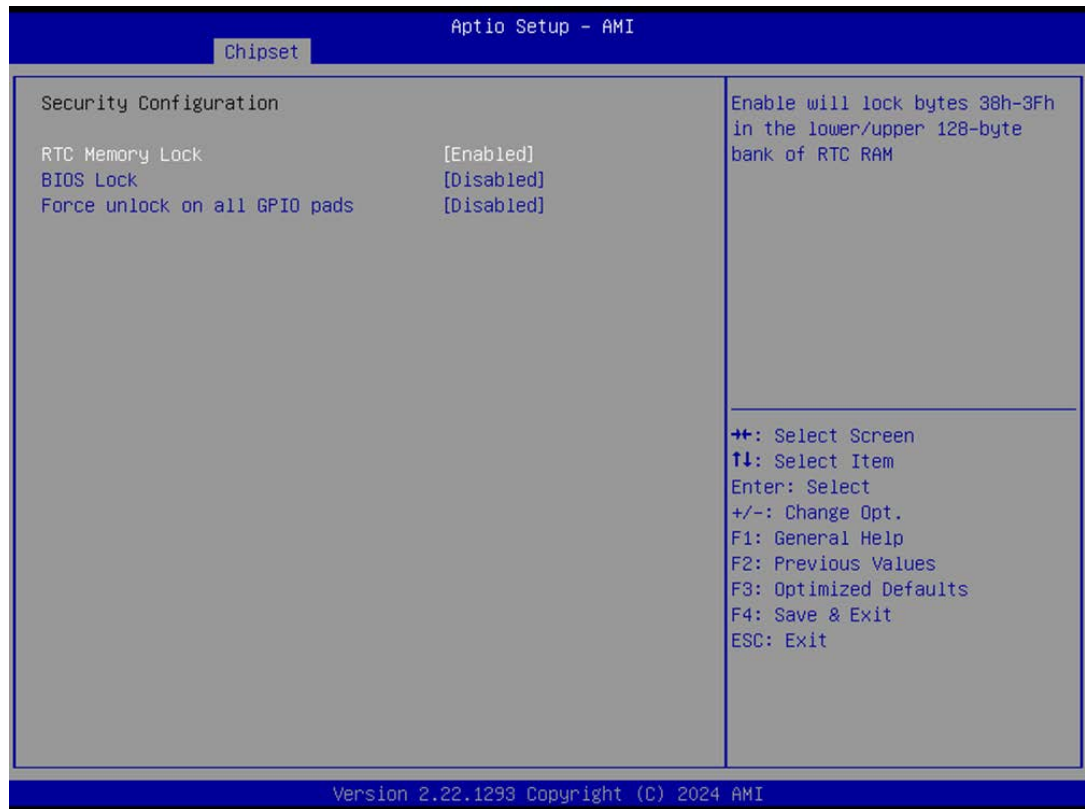
## USB Configuration



### ■ USB Port Disable Override

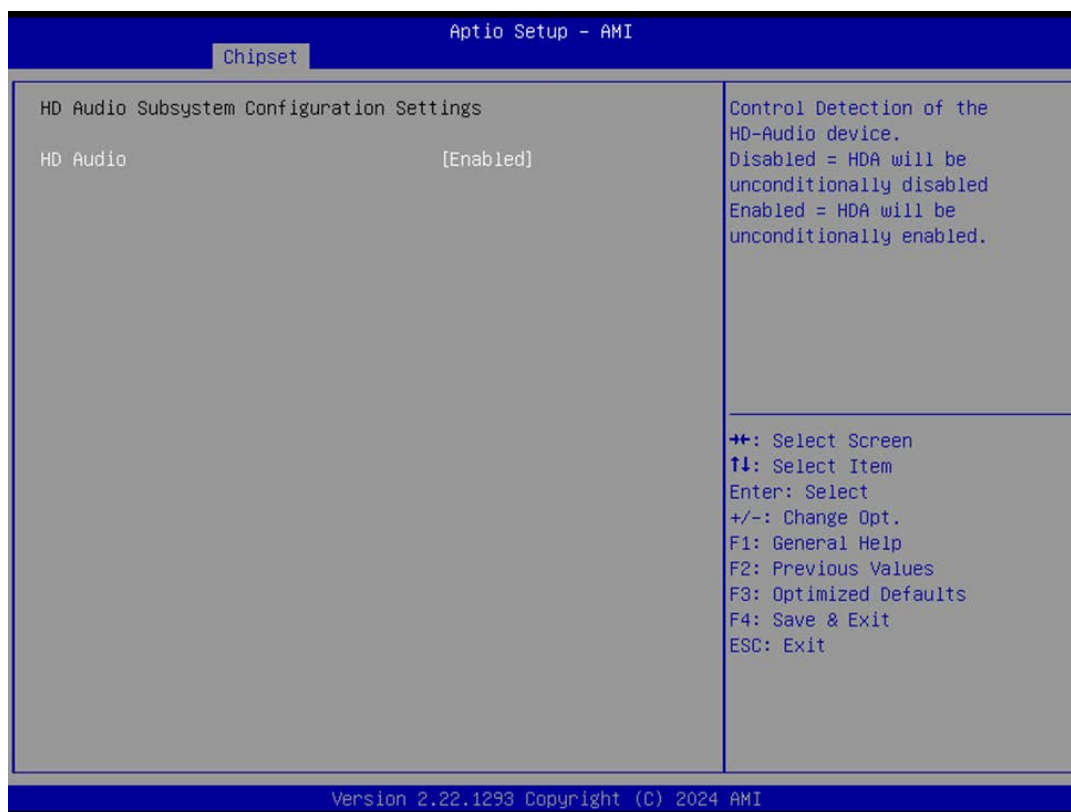
Selectively Enable/Disable the corresponding USB Port from reporting a Device Connection to the Controller.

## 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.
- **Force unlock on all GPIO pads**  
If Enabled, the BIOS will force all GPIO pads to be in unlock state.

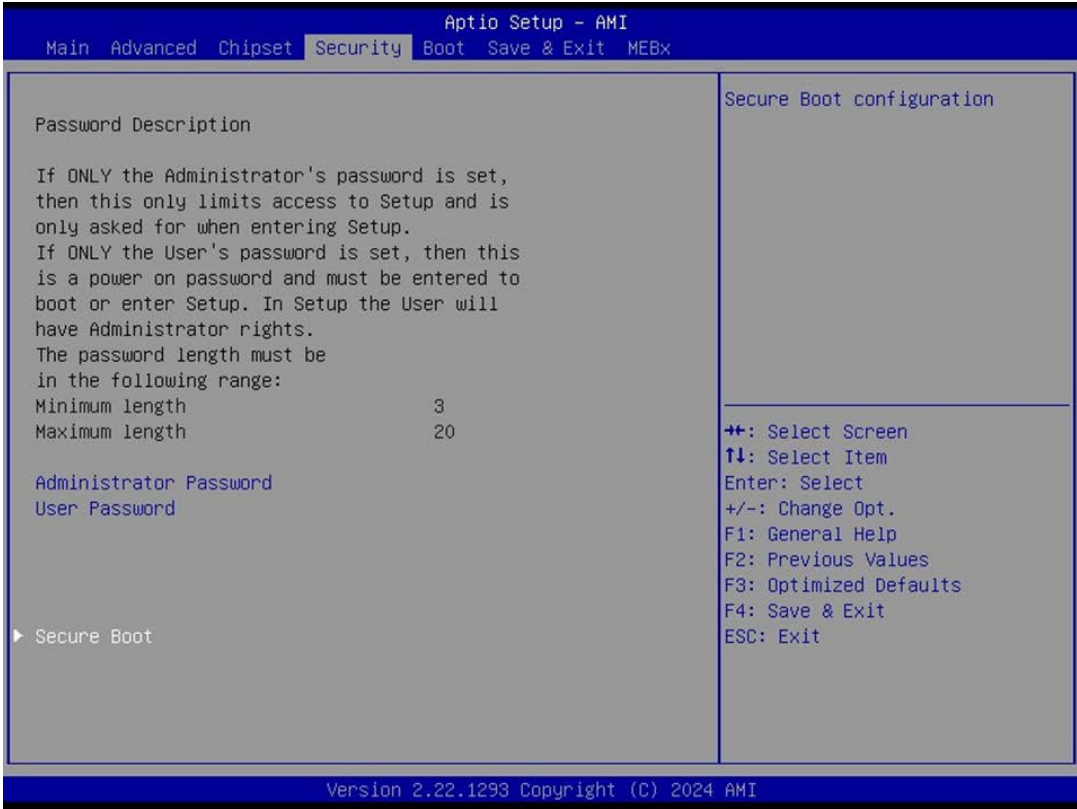
## HD Audio Configuration



### ■ HD Audio

Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled. Enabled = HDA will be unconditionally Enabled.

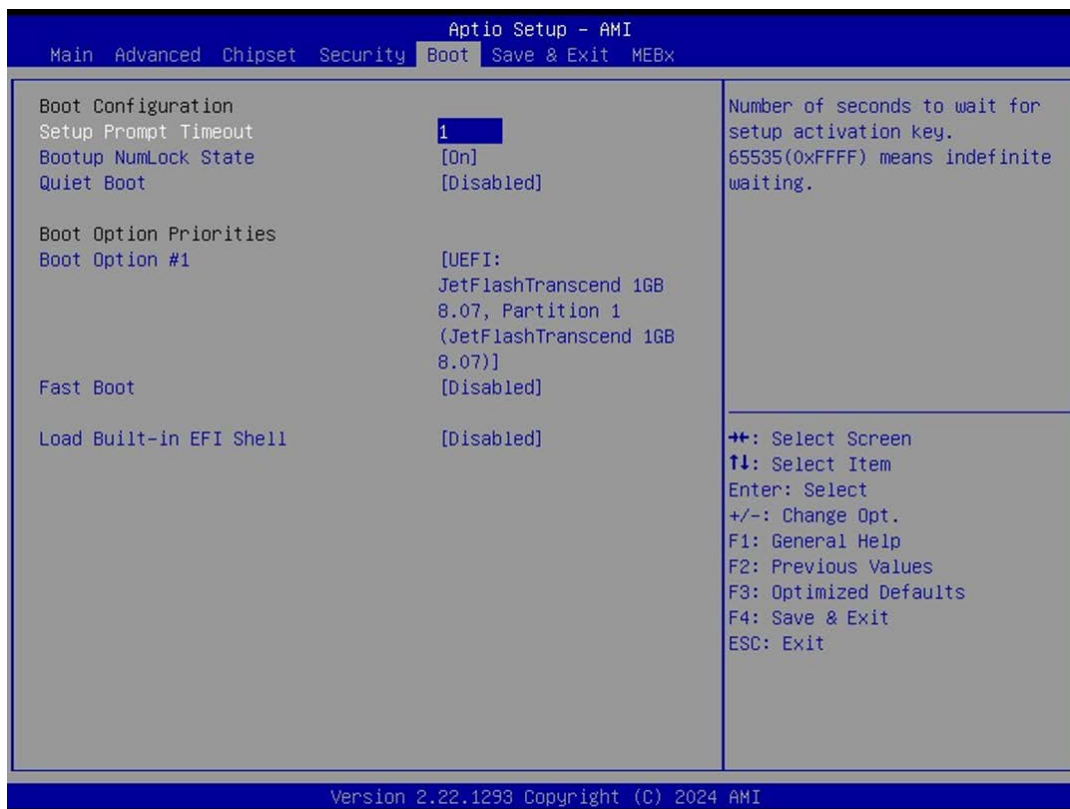
### 3.1.4 Security



Select Security Setup from the AFE-R760 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub-menu for the following items, select the item and press <Enter>:

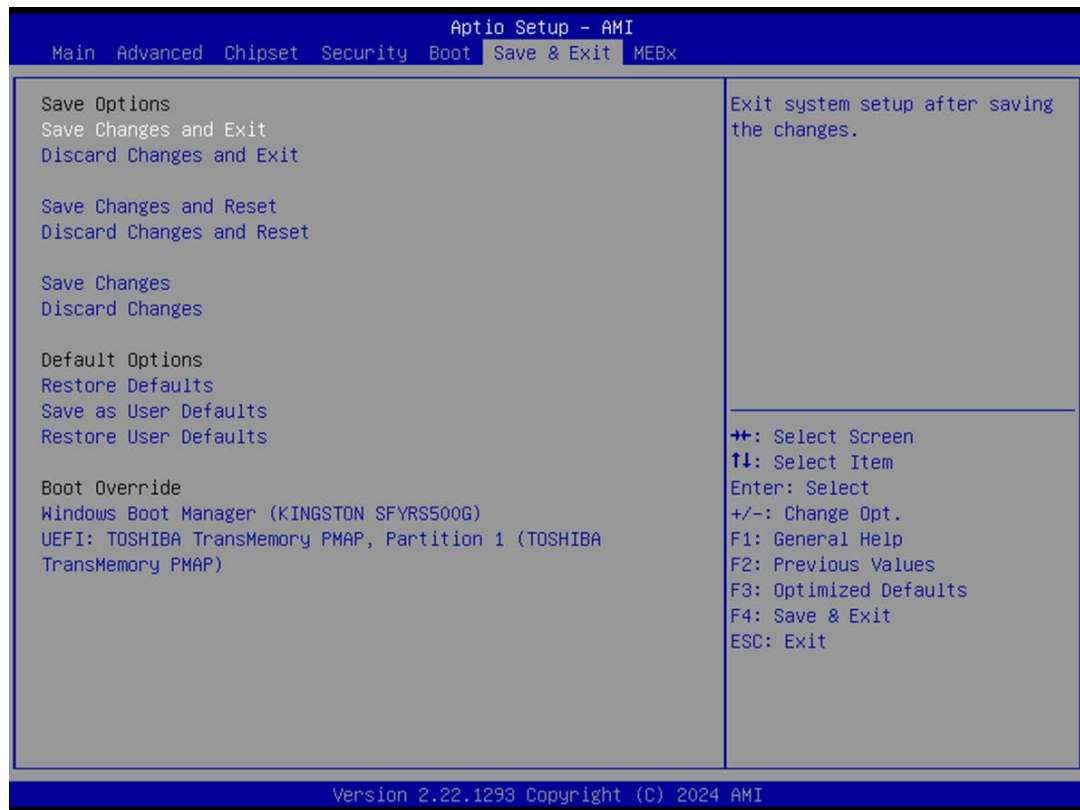
- **Change Administrator/User Password**  
Select this option and press <ENTER> to access the sub-menu, and then type in the password.
- **Secure Boot**  
Secure Boot Configurations.

### 3.1.5 Boot



- **Setup Prompt Timeout**  
Number of seconds that the firmware will wait before initiating the original default boot selection. A value of 0 indicates that the default boot selection is to be initiated immediately on boot. A value of 65535(0xFFFF) indicates that firmware will wait for user input before booting. This means the default boot selection is not automatically started by the firmware.
- **Bootup NumLock State**  
Select the keyboard NumLock state.
- **Quiet Boot**  
Enables or disables Quiet Boot option.
- **Boot Option #1**  
Sets the system boot order.
- **Fast Boot**  
Enables or disables boot with initialization of a minimal set of devices required to launch the active boot option. It has no effect on BBS boot options.
- **Load Built-in EFI Shell**  
Enable/Disable Load Built-in EFI Shell.

## 3.1.6 Save & Exit



- **Save Changes and Exit**  
This item allows you to exit system setup after saving the changes.
- **Discard Changes and Exit**  
This item allows you to exit system setup without saving any changes.
- **Save Changes and Reset**  
This item allows you to reset the system after saving the changes.
- **Discard Changes and Reset**  
This item allows you to rest system setup without saving any changes.
- **Save Changes**  
This item allows you to save changes done so far to any of the options.
- **Discard Changes**  
This item allows you to discard changes done so far to any of the options.
- **Restore Defaults**  
This item allows you to restore/load default values for all the options.
- **Save as User Defaults**  
This item allows you to save the changes done so far as user defaults.
- **Restore User Defaults**  
This item allows you to restore the user defaults to all the options.
- **Boot Override**  
Boot device select can override your boot priority.





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