

User Manual

ECU-4784 Series

**IEC-61850 Power Substation
2U Rack-mount Server with
Intel® 6th & 9th Generation
Processor**

ADVANTECH

Enabling an Intelligent Planet

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Support

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For technical support and service, please visit our support website at:
<http://www.advantech.com/support/>

This manual is applicable to the following models:

ECU-4784-C3xxxx

ECU-4784-E3xxxx

ECU-4784-E4xxxx

ECU-4784-E5xxxx

ECU-4784-G5xxxx

Product Warranty (2 years)

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

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

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

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

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

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

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

FCC Class A

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

Technical Support and Assistance

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

Packing List

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

- 1 x ECU-4784 Product
- 4 x 10-pins green screw terminals
- 16 x jumper shorts
- 2 x M3 black screws for USB clamp
- 1 x clamp for USB dongle
- 2 x HDD hold BRK (with black HDD Mylar)
- 8 x M3*5L ST Ni screw
- 4 x Cu NYLOK
- 3 x Label POWER2
- 1x ROHS LIST
- 1 x warranty card

Safety Precautions - Static Electricity

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

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

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth 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 -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 equipment does not include a power cord and plug.
20. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).

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

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Chapter 1

Overview

This chapter provides an overview of the ECU-4784 with Intel 6th & 9th Generation Processor.

Sections include:

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

1.1 Introduction

Based on IEC 61850-3, a standard for the design of electrical substation automation, which defines communication between all Intelligent Electronic Devices (IED) and other related equipment from the process level (data acquisition, sensors and actuators) to the bay level (protection, monitoring and control tasks) and up to station level (HMI/SCADA). Advantech's ECU-4784 Series can operate as a smart substation station level communication server, a HMI/SCADA workstation, a remote control station, a cyber security server, and an environment status monitoring station. System integrators can thereby design an optimized digital substation while allowing energy operators to deliver electricity which is more secure, reliable, economical, and efficient.

Advantech's ECU-4784 Series are certified by IEC 61850-3 and IEEE 1613 to meet the harsh and critical requirements in smart grid automation. It provides high performance and reliable functionality to meet the most critical computing applications and reduces project deployment and maintenance costs. It supports remote monitoring and diagnosis for remote device connectivity to enhance management and maintenance efficiency. It is easy to expand domain I/O with its modular design, and protects the system to meet the critical security application requirements.

High-performance Platforms for Power and Energy Automation Applications

- High computing performance processors to meet the most critical computing applications with VT-D, which can run multiple software applications. Energy operators can leverage virtual machine (VM) resources on the ECU-4784 to reduce project deployment costs.
- Highly integrated all in one server platform to enhance smart substation level deployment efficiency by integrating HMI visualization, monitoring, and control with data concentrator and protocol converter to accomplish all station level tasks. Normally, these functions would be implemented by different data collection gateways and SCADA workstations.

Certification for Robust and Reliable Systems

- IEC-61850-3 and IEEE 1613 certification stands for the highest reliability, which means products are made to withstand vibration, electrical surges, fast transients, and extreme temperatures.
- ECU-4784 Series supports TUV IEC 61850-3 and IEEE 1613 certification, ECU-4784 has higher standards than other embedded automation controllers and contributes to higher reliability and stability. This makes it suitable for any global P&E automation applications in harsh environments.
- ECU-4784 Series is designed for applications in substations where it is subjected to certain electric interference. Equipped with isolated power, isolated communication ports, ECU-4784 Series has high resistance against electrical noise and is proven in substation applications.

Easy to Diagnose System with Enhanced Maintenance Efficiency

- Remotely monitor, diagnose and manage systems to provide high system maintenance efficiency. Use AMT (built in remote KVM) to quickly access a remote device's desktop for diagnosis and troubleshooting without on-site technical support.

Easy to Expand Domain I/O Through Functional Modules

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

1.2 Hardware Specifications

| | | | |
|---------------------------|---|---|--|
| Model | ECU-4784-C3xxx ECU-4784-E3xxx ECU-4784-E4xxx | ECU-4784-E5xxx | ECU-4784-G5xxx |
| General | | | |
| Certification | IEC 61850-3, IEEE 1613, CE, FCC class A, UL, CCC, CB, LVD | | |
| Dimensions (W x D x H) | 2U (440 x 280 x 88 mm/17.3" x 8.6" x 3.4") | | |
| Enclosure | SECC & Aluminum | | |
| Mounting | 2U Rack mount | | |
| Input | 100 ~ 240 V _{AC} or 100 ~ 240 V _{DC} ; 48V _{DC} optional with selectable power module | | |
| Power Type | ATX, AT | | |
| Weight | 6.0 kg | | |
| System Design | Fanless design | | |
| OS Support | Windows 10, Windows Server 2016/2019, Linux | | |
| System Hardware | | | |
| SOM | SOM-6897 | SOM-5897 | SOM-5899 |
| CPU | 3955U, i5-6300U, i7-6600U | E3-1505L v5 | E-2276ML |
| Memory | DDR3L | DDR4 | DDR4 |
| Display | 1 x DVI-D, 1 x DVI-I | 1 x DVI-D, 1 x VGA | 1 x DVI-D, 1 x DVI-I |
| Indicators | LEDs for Power, HDD, Programmable LED, LAN (Active, Status) and Serial (Tx, Rx) | | |
| Storage | 3 x 2.5" SATA HDD (RAID 0,1,5); 1 x M.2 PCIE | 2 x 2.5" SATA HDD (RAID 0,1); 1 x CFast | 3 x 2.5" SATA HDD (RAID 0,1,5); 1 x M.2 PCIE |
| Watch Dog Timer | Programmable 256 levels time interval, from 1 to 255 seconds for each tier | | |
| I/O Interface | | | |
| Serial Ports | 2 x DB-9 RS-232 (9-wired), 8 x terminal block (5-wired), RS-422/485 (Automatic RS-485 data flow control) 2,000 V _{DC} isolation | | |
| Serial Port Speed | (COM1 ~ COM2) RS-232: 50 ~ 115200 bps (COM3 ~ COM10) RS-422/485: 50 ~ 921600 bps | | |
| LAN | 1 x 10/100/1000 Base T RJ45 ports (Intel i219LM GbE Controller, AMT, Teaming Function, PXE) 7 x 10/100/1000 Base T RJ45 ports (Intel i210 GbE Controller, Teaming Function, PXE) | | |
| USB | 4 x USB, UHCI, rev 2.0 compliant (3 x rear,1 x internal) 2 x USB, UHCI, rev 3.0 compliant (2 x front) | | |
| Expansion | 2 x Domain I/O Expansions (Each Slot Supports up to 1 PCIe or 2 PCI devices) | | |
| Relay Output | Form C, Contact 5 A @ 125 V _{AC} /5 A @ 30 V _{DC} (For IEC-61010-2-201) | | |
| Programmable LED | 8-ch programmable LED indicator | | |

1.3 Environment

- **Humidity:** 95% @ 40° C (non-condensing)
- **Operating Temperature:**
 - -25 ~ 70° C (-13 ~ 158° F) IEC 60068-2-1/2 with 100% CPU/I/O loading
 - -25 ~ 60° C (-13 ~ 140° F) IEC 60068-2-1/2 with 50% CPU/I/O loading (ECU-4784-E5/G5 Series)
- **Operating Humidity:** 20 ~ 95% (non-condensing)
- **Safety Cert. Temperature:** -20 ~ 50° C (-4 ~ 122° F)
- **Shock Protection:** 60068-2-27 CFast®: 50 G half sine, 11 ms HDD: 20 G half sine, 11 ms
- **Vibration Protection:** IEC 60068-2-64 (Random 1 Oct./min, 1 hr/axis.) CFast: 2 Grms @ 5 ~ 500 Hz, HDD: 1 Grms @ 5 ~ 500 Hz

1.4 Function Block Diagram

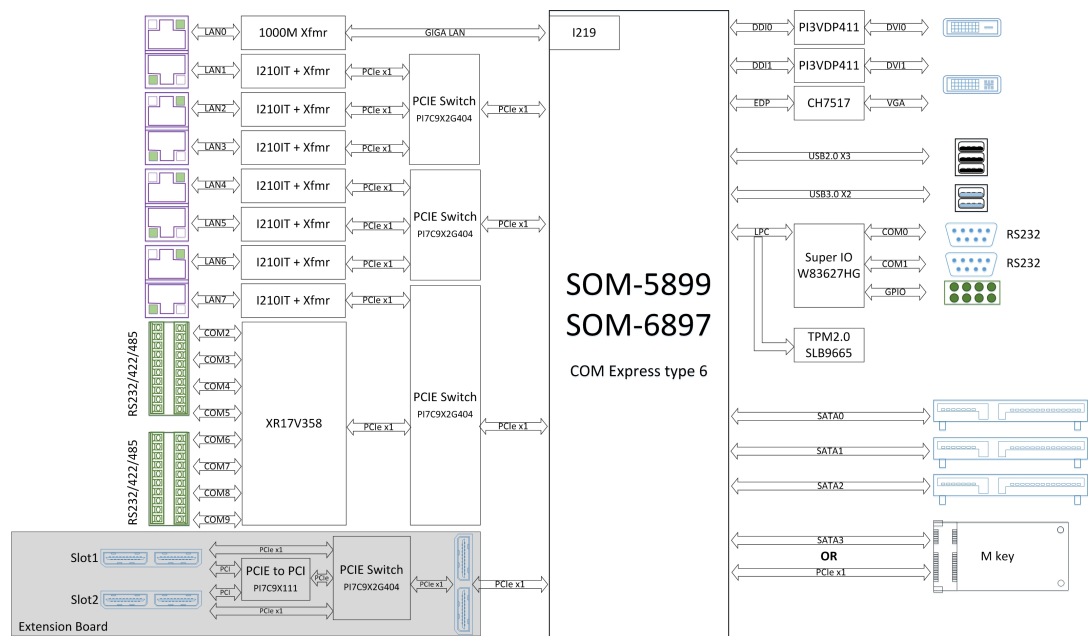


Figure 1.1 ECU-4784 with Intel 6th & 9th Generation Processor Function Block

1.5 Safety Precautions

The following messages inform the details of making a 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 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 ECU-4784 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.*



1.6 Chassis Dimensions

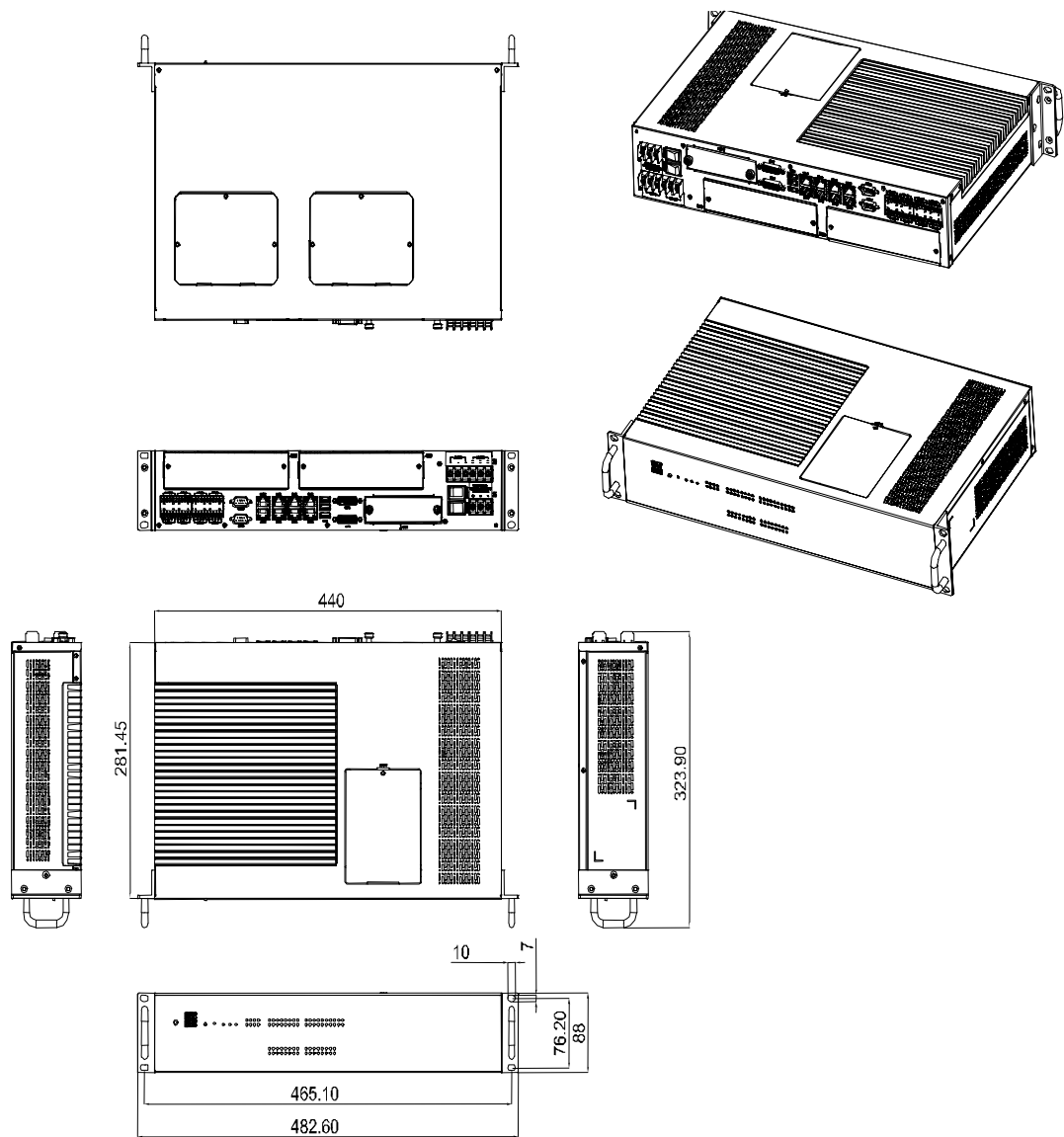


Figure 1.2 ECU-4784 Series Chassis Dimensions

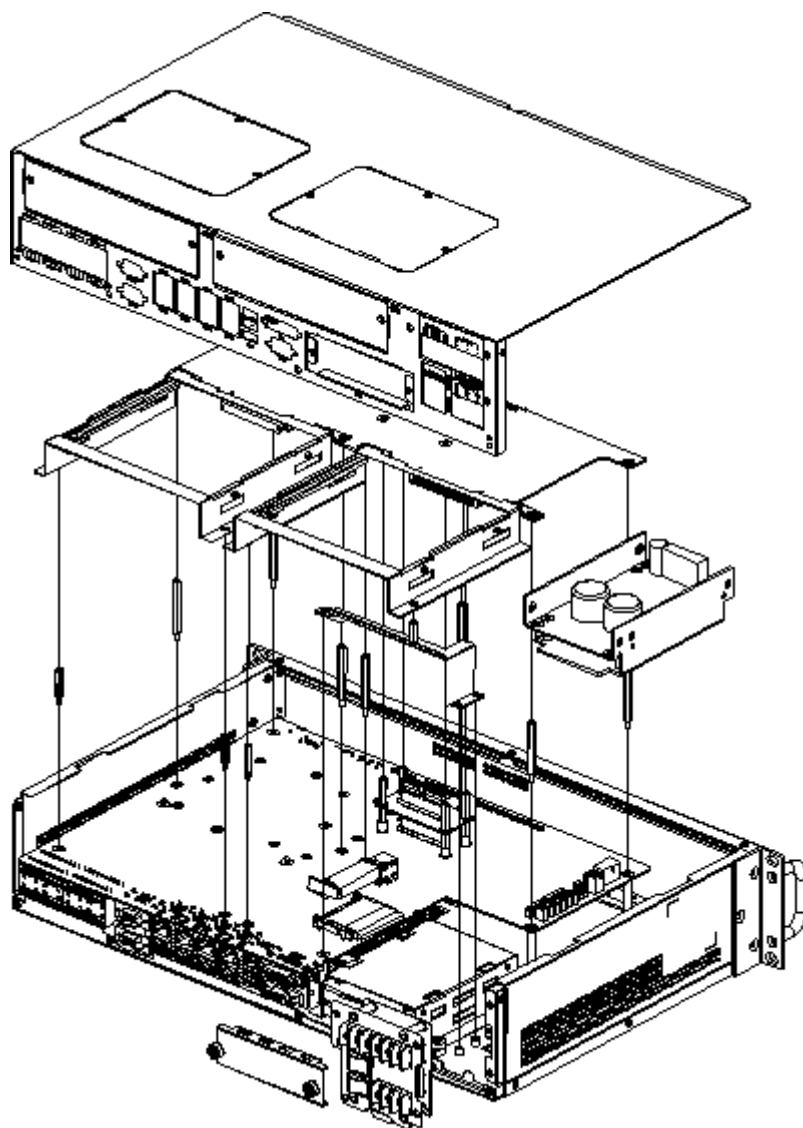


Figure 1.3 ECU-4784 Series Exploded Diagram

Chapter 2

Hardware Function

This chapter shows how to setup the hardware functions, including connecting peripherals, setting jumpers and indicators.

Sections include:

- Overview
- LED Indicators
- Power Input
- RS-232 Interface
- RS-422/485 Interface
- Relay Out
- LAN: Ethernet Connector
- USB Ports
- DVI Display
- Advanced Watchdog Timer
- Expansion PCI & PCIE
- AMT
- TPM

2.1 Overview

The following figures show the indicators and connectors on the ECU-4784 Series. The following sections give you detailed information about the functions of each peripheral.

2.1.1 ECU-4784 LED and Interface Position

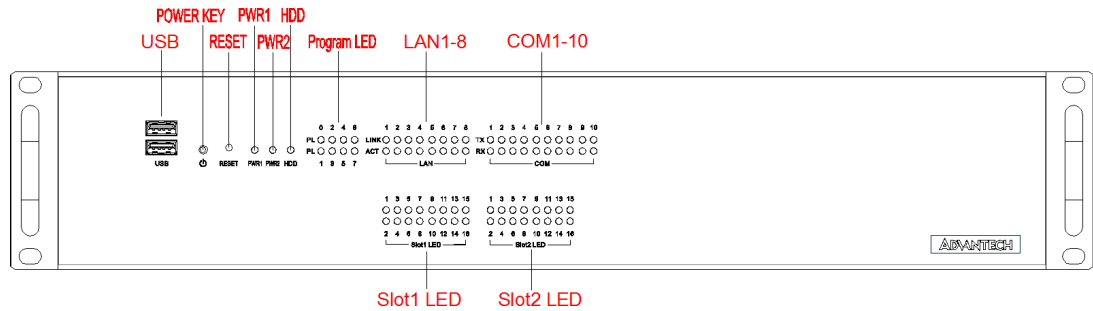


Figure 2.1 ECU-4784 Front Panel

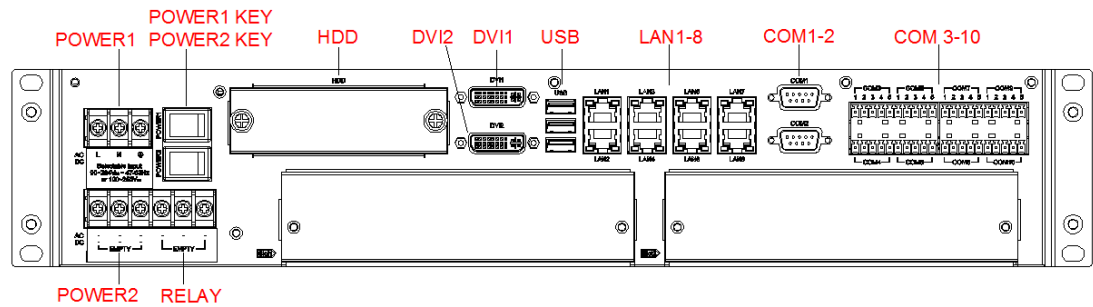
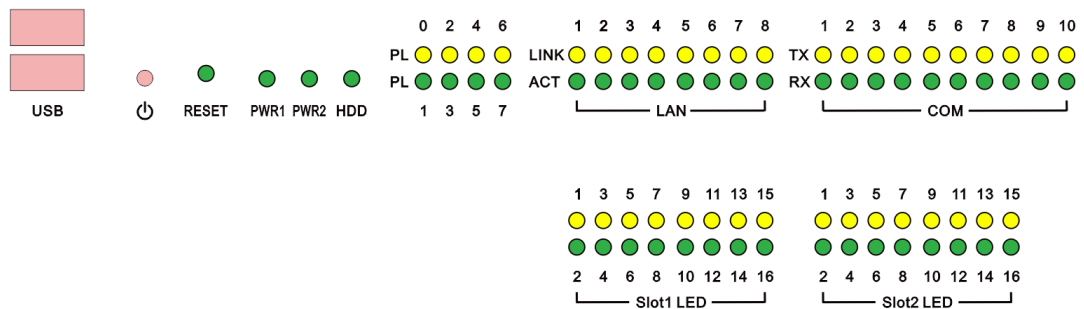


Figure 2.2 ECU-4784 Rear Panel

2.2 LED Indicators

2.2.1 ECU-4784 LED Indicators

The LEDs in the front panel can be divided into 3 groups.



2.2.1.1 System Status Indicators



Table 2.1: Definition of System Status Indicators

| Item | LED | Status | Description |
|------|--------------------|------------------------------|--|
| 1 | PWR1 | Green | System power1 is on |
| | | Off | System power1 is off |
| 2 | PWR2 (Optional) | Green | System power2 is on |
| | | Off | System power2 is off |
| 3 | HDD | Green | Data being received/transmitted between storage devices |
| | | Off | No Data being received/transmitted between storage devices |
| 4 | RESET | | |
| 5 | ATX Button | ATX Button when Power on/off | |

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



2.2.1.2 LAN Status Indicators

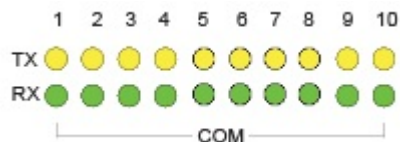


ECU-4784 LAN LED status Indicators.

Table 2.2: Definition of LAN Status Indicators

| Item | LED | Status | Description |
|------|------------------------|--------|---|
| 1 | LAN/LINK (Port 1~8) | Green | 1Gbps network link |
| | | Orange | 100Mbps network link |
| | | Off | 10Mbps network link or invalid network link |
| 2 | LAN/ACT (Port 1~8) | Green | Ethernet data being received/transmitted |
| | | Off | No Ethernet data being received/transmitted |

2.2.1.3 Serial Communication Status Indicators

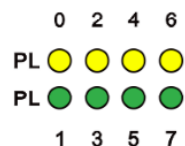


ECU-4784 (10COM) Serial Communication Status Indicators:

Table 2.3: Definition of Serial COM Status Indicators

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

2.2.1.4 Programmable LED

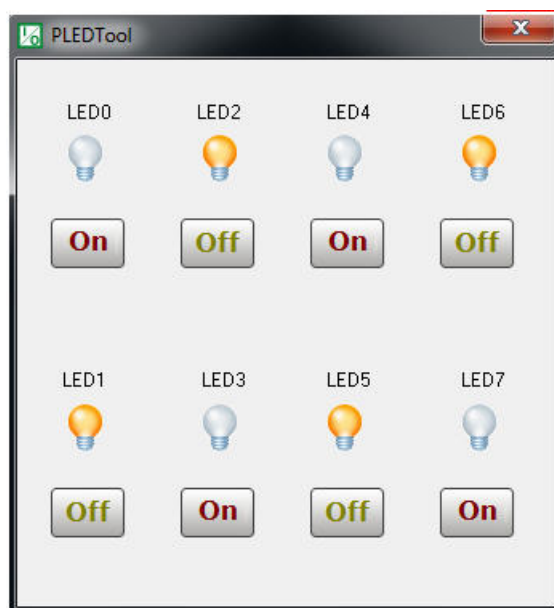


The ECU-4784 Series provides 8 programmable indication LEDs, which are convenient for users to control the programmable LED states (green, off). API programming can be used to indicate and edit machine operating status. Refer to the product CD for more information.

Table 2.4: Programmable LED Status Indicators

| LED | Status | Description |
|----------|--------|--|
| PL (0~7) | Green | Customers can, according to their needs, define the Programmable LED state |
| | Off | |

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



2.3 Power Input

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

Table 2.5: Power Input

| Item | AC/DC | Volt. Range | Power Rating | Connector Type |
|------|-------|-------------------------|----------------|---------------------|
| PWR1 | AC | 100-240 V _{AC} | 3.0 A 50-60 Hz | 3Pin Screw Terminal |
| | DC | 100-240 V _{DC} | 3.0 A | 3Pin Screw Terminal |

The function of each part is described as below:

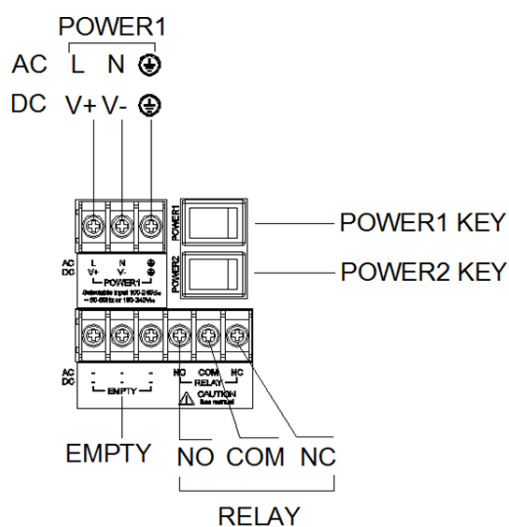


Figure 2.3 Power1 Input Location

| Table 2.6: AC/DC Power Input PIN Definition | | |
|---|-----------------|---|
| Pin | Screen Printing | Function Description |
| 1 | L/V+ | PWR1 L/PWR1 V+ AC/DC power input PIN |
| 2 | N/V- | PWR1 N/PWR1 V- AC/DC power input PIN |
| 3 | ⊕ | GND Provided adjacent to the main protective earthing terminal (IEC 60417-5019). |

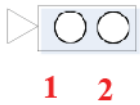

Make sure the voltage of the power source is correct before securing the power outlet with the connection to earth.

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



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



| Table 2.7: Jumper Setting of ATX/AT Power Mode Selection | | |
|--|--|----------------|
| | Jumper Setting | Description |
| CN67 |  | AT Power Mode |
| |  (Default) | ATX Power Mode |

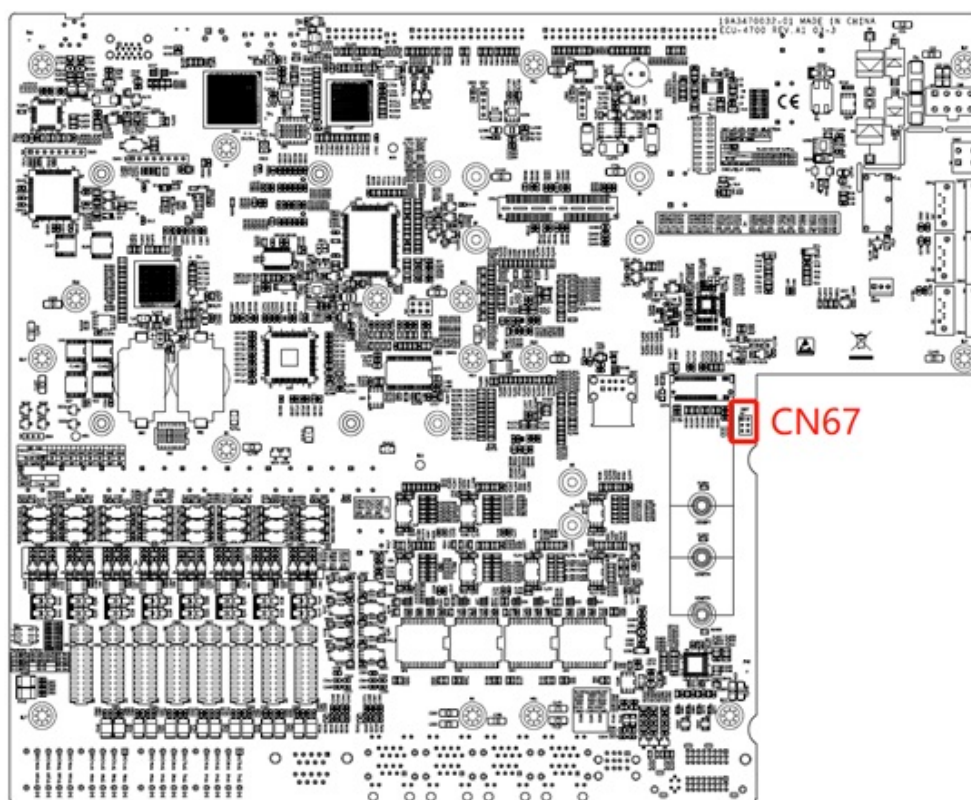


Figure 2.4 AT X/AT Power Mode Select Location (CN67)

2.4 RS-232 Interface (COM1, COM2)

The ECU-4784 Series offer two standard RS-232 serial communication interface ports: COM1 and COM2. Please refer to A.1 for pin assignments. It can not support IRQ, if the I/O address is the same as the super I/O.

2.5 RS-232/422/485 Interface (COM3~COM10)

The ECU-4784 Series offers 8 ports RS-232/422/485 serial communication interface ports: COM3 to COM10. Please refer to Appendix A.2 for their pin assignments. Users can select each port for RS-232 or RS-422/485 through different connections.

Table 2.8: Jumper Setting of RS-232/RS-422/RS-485 Selection (For COM(3~10))

| CNx | | Description |
|--------------------------------------|--|-------------------------|
| CN16 CN17 CN18 CN19 CN20 | | RS-232 |
| CN21 CN22 CN23 | | RS-422/485 (Default) |

Table 2.9: Mapping Table of Jumper for COM (3~10) Port

| COM Port | Jumper for RS-232/RS-422/RS-485 Selection |
|----------|---|
| COM3 | CN16 |
| COM4 | CN17 |
| COM5 | CN18 |
| COM6 | CN19 |
| COM7 | CN20 |
| COM8 | CN21 |
| COM9 | CN22 |
| COM10 | CN23 |

Table 2.10: Switch Setting of RS-422 Master/Slave Selection

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

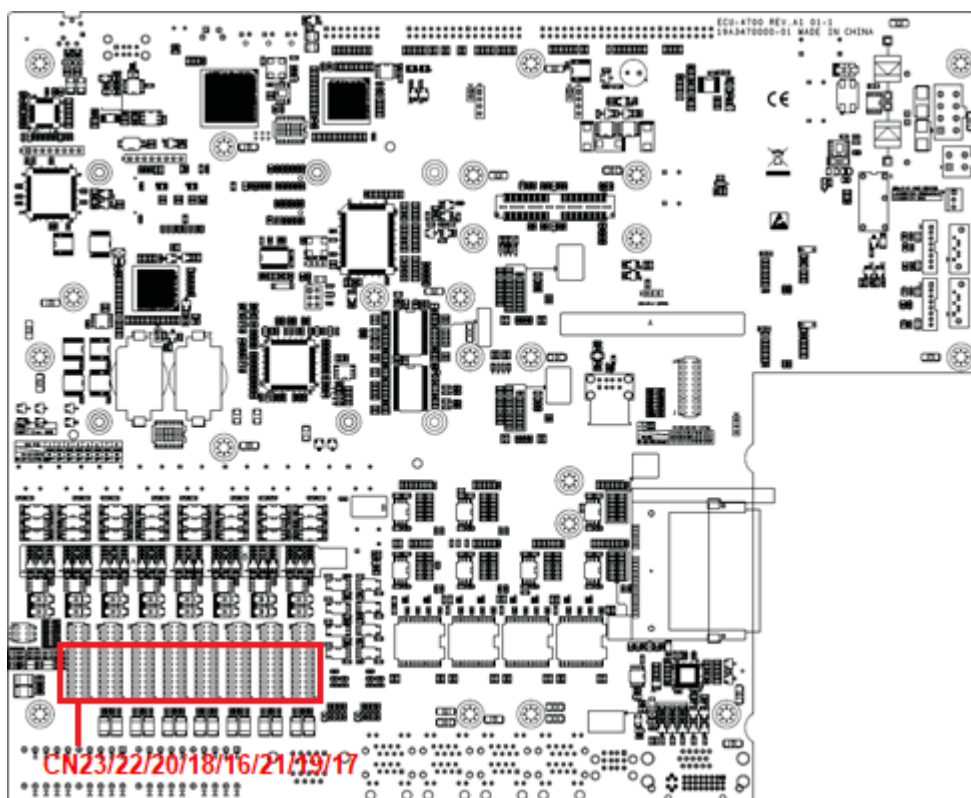


Figure 2.5 COM3~10 Port Related Jumper Locations (CN16-CN23)

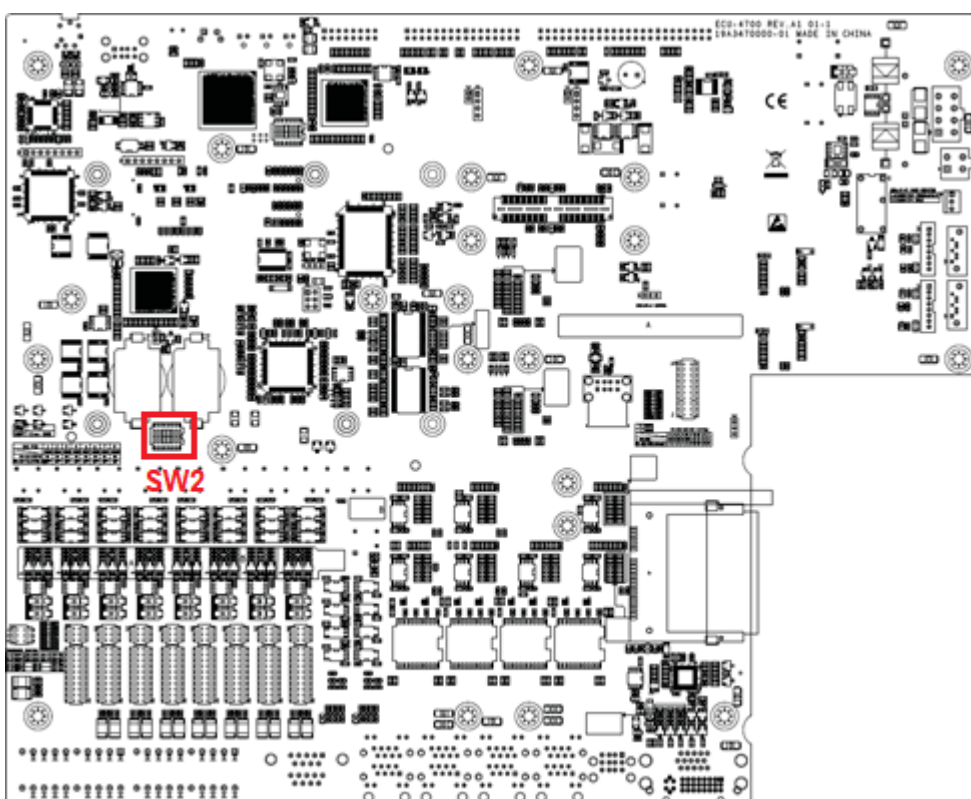


Figure 2.6 COM3~10 Port Related Jumper Locations (SW2)

2.5.1 UART Chips

ECU-4784 with Intel 6th & 9th Generation processor comes with EXAR XR17V3581B UART containing 128bytes FIFO.

2.5.2 RS-422/485 Detection

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

2.5.3 Automatic Data Flow Control Function for RS-485

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

2.5.4 Terminal Resistor for RS-485

The onboard termination resistor (120 ohm/300 ohm) for COM3~COM10 can be used for long distance transmission or device matching. (Default Open.) Please refer to Table 2.8 for the mapping table of Jumper and COM port.

2.5.4.1 COM (3~10) RS-485 terminal resistor setting instructions

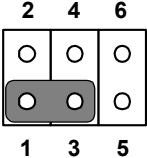
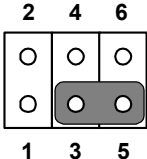
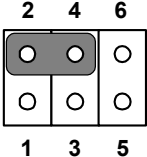
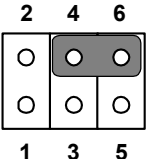
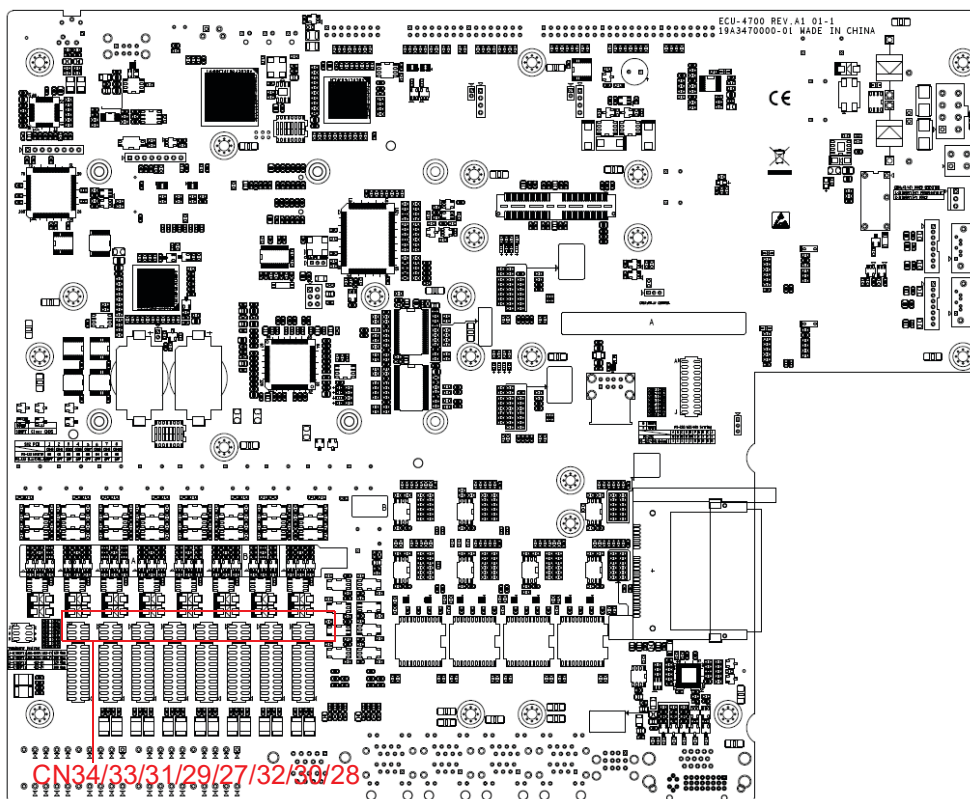
| Table 2.11: Jumper Setting of Terminal Resistor (for COM (3~10)) | | |
|--|---|---|
| CNx | | Description |
| CN27 CN28 CN29 CN30 CN31 CN32 CN33 CN34 |  | Add 120 ohm terminal resistor on TX+/TX- of RS-485 |
| |  | Add 300 ohm terminal resistor on TX+/TX- of RS-485 |
| |  | Add 300 ohm terminal resistor on Rx+/Rx- of RS-422 (optional) |
| |  | Add 120 ohm terminal resistor on Rx+/Rx- of RS-422 (optional) |

Table 2.12: Mapping Table of Jumper for COM (3~10) Port

| COM Port | Jumper for Terminal Resistor |
|----------|------------------------------|
| COM3 | CN27 |
| COM4 | CN28 |
| COM5 | CN29 |
| COM6 | CN30 |
| COM7 | CN31 |
| COM8 | CN32 |
| COM9 | CN33 |
| COM10 | CN34 |

**Figure 2.7 COM3~10 Port Related Jumper Locations (CN27-CN34)**

2.6 Relay Output For Event

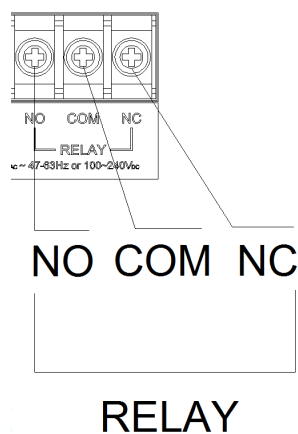


Figure 2.8 Relay Output Connections

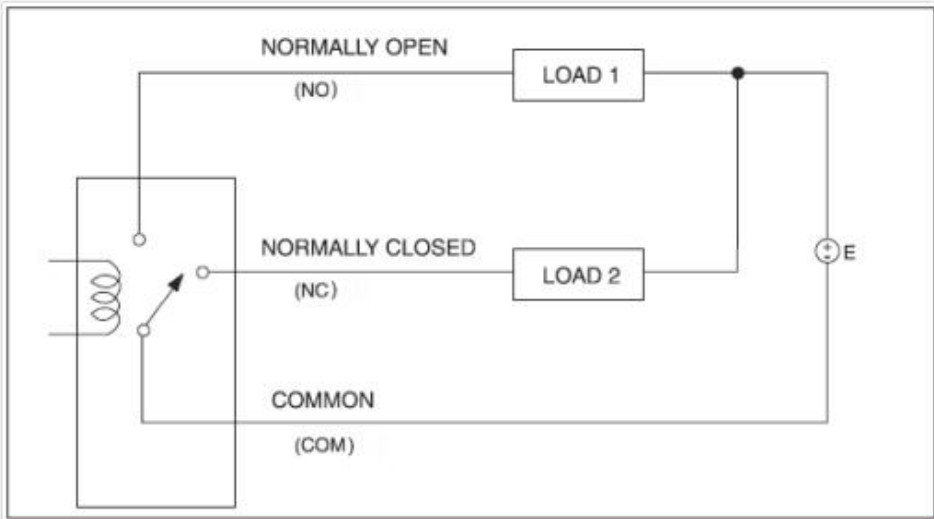


Figure 2.9 Wiring Diagram of the Relay out

The ECU-4784 Series provides a relay out alarm function, which is convenient for the user to control the relay out alarm using the API. For the detailed explanation of the relay out API, please refer to:
C:\Program Files\Advantech\AdvRelay\Examples\VC++\RelayTool" directory.

| Power1 Status | Power2 Status | Relay Out Function |
|---------------|---------------|--------------------|
| OFF | OFF | NO COM NC |
| OFF | ON | Software control |
| ON | OFF | Software control |
| ON | ON | NO COM NC |

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

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

2.7 LAN: Ethernet Connector

The ECU-4784 Series are equipped with Intel i219LM Gigabit LAN Ethernet controller, which are compliant with IEEE802.3 1000Base-T, 100Base-TX and 10Base-T (802.3, 802.3u and 802.3ab). They are also equipped with 7 Intel i210 Gigabit LAN network controllers, which are compliant with IEEE802.3u 10/100Base-T CSMA/CD standards. The Ethernet port provides a standard RJ-45 jack on board, and LED indicators on the front side to show its Link and Active status. Please note these LAN controllers all use the PCI resource, so the bandwidth or throughput may be restricted by the PCI bandwidth.

2.8 USB Ports

The ECU-4784 Series provide five USB interface connectors, which provide complete Plug & Play and hot swapping for up to 127 external devices. It provides 2 x USB 3.0 ports on the front panel, and 3 USB 2.0 ports on the rear panel. It also provides 1 USB 2.0 port inside the chassis for a USB dongle key.

2.9 DVI and VGA Display

The ECU-4784 Series equipped with DVI-I and DVI-D, the resolution is up to 1920 x 1200@60Hz. Please refer to the specification table in Chapter 1 for further information.

2.10 Advanced Watchdog Timer

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

2.11 Expansion PCI & PCIE

The ECU-4784 Series supports 2 standard domain I/O expansions which support up to 2 PCI devices and 1 PCIe device. Users could also expand other functions of the PCI & PCIe interface to meet demands.

The ECU-4784 Series offer 2 expansion slots for modularized domain I/O plug-in cards. Through the interface card, the ECU-4784 Series can also use standard PCI cards, PCIe cards, mini-PCI cards as well as a PCI-104 card. Due to the ECU-4784 Series being an embedded system, the power provision for the expansion slot is limited. The maximum power support for each slot is:

5 V @ 2 A

3.3 V @ 1.5 A

12 V @ 0.25 A

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

2.12 VT-D

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

2.13 AMT

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

The ECU-4784 Series supports AMT. You can see the step-by-step guide on how to enable AMT function in the help guide.

2.14 TPM

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

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

For step-by-step guide on how to enable TPM and perform TPM application, you can refer to the ECU-4784 TPM help document for details.

Chapter 3

Initial Setup

Sections include:

- Configuration
- Installing a CompactFlash Card
- Installing a USB Dongle
- Installing a Hard Disk
- Installation on Rack
- BIOS Setup and System Assignments

3.1 Configuration

To open the ECU-4784 Series product chassis, follow the steps below:

1. Remove all power and signal connections.
2. Remove the screws as shown below.

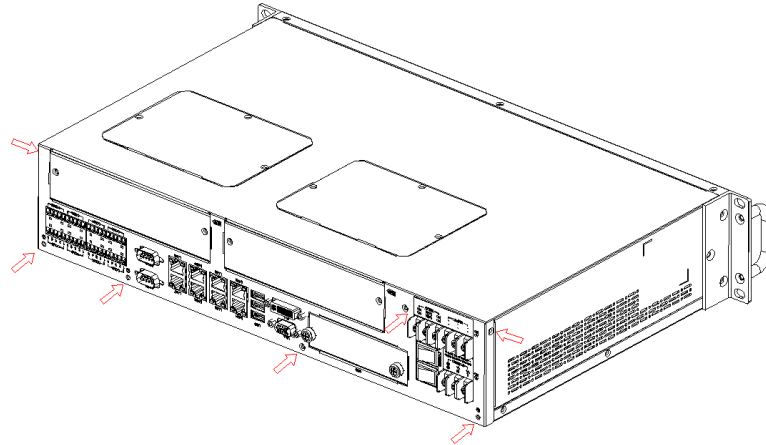


Figure 3.1 ECU-4784 Screw Location

3. Remove the chassis's top cover:

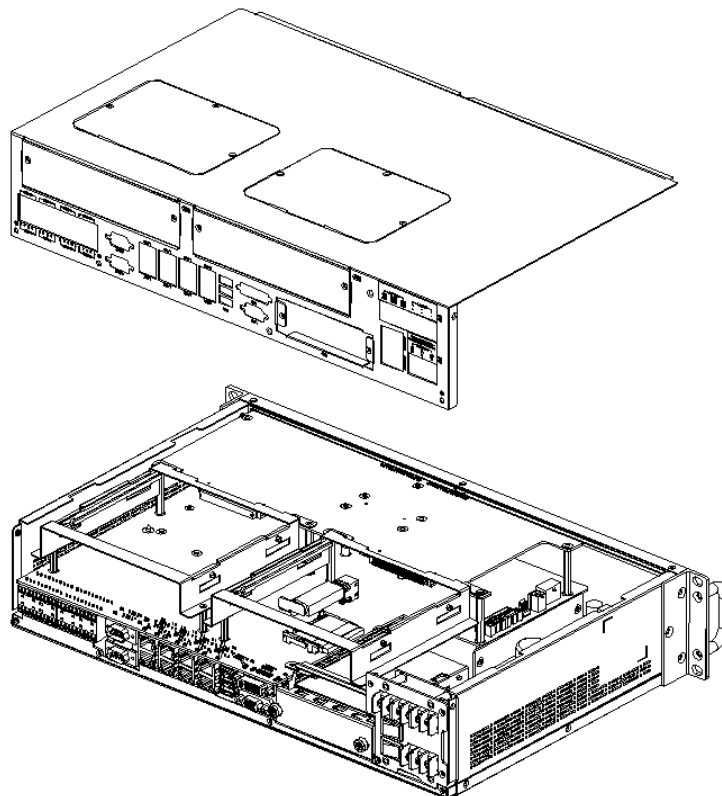


Figure 3.2 ECU-4784 Removing the Top Cover

4. Open the chassis's top cover, Users can set the COM port terminal resistor by jumper according to demand. For more detailed information users should refer to chapter 2.5.

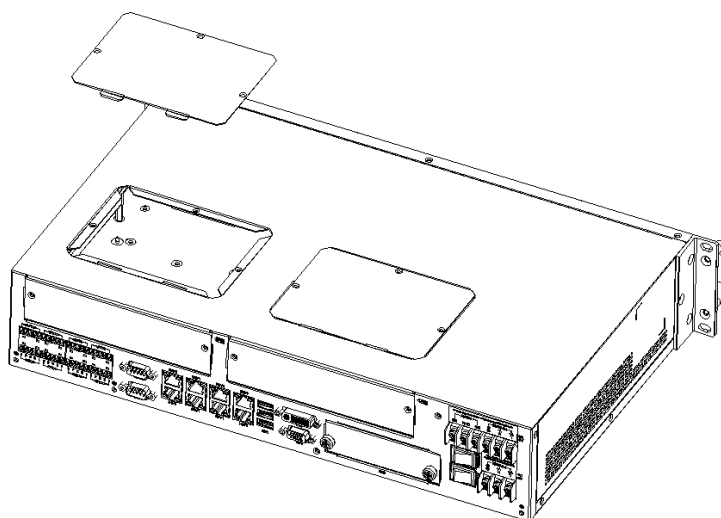


Figure 3.3 ECU-4784 Open the Chassis Top Cover

3.2 Installing a M.2 PCIE Card

The ECU-4784 Series provides 1 x M.2 PCIE card slot to install the cards:

1. Unscrew the 2 screws and remove the M.2 PCIE card back plate.

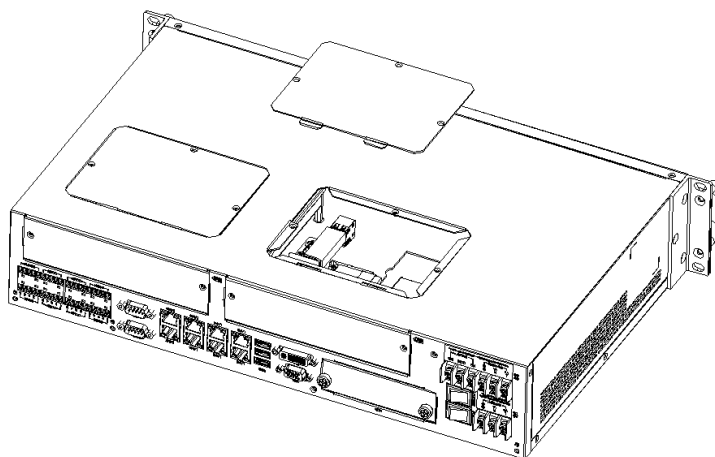


Figure 3.4 M.2 PCIE Card Slot Location

2. Insert the card at location (CN74) shown below.

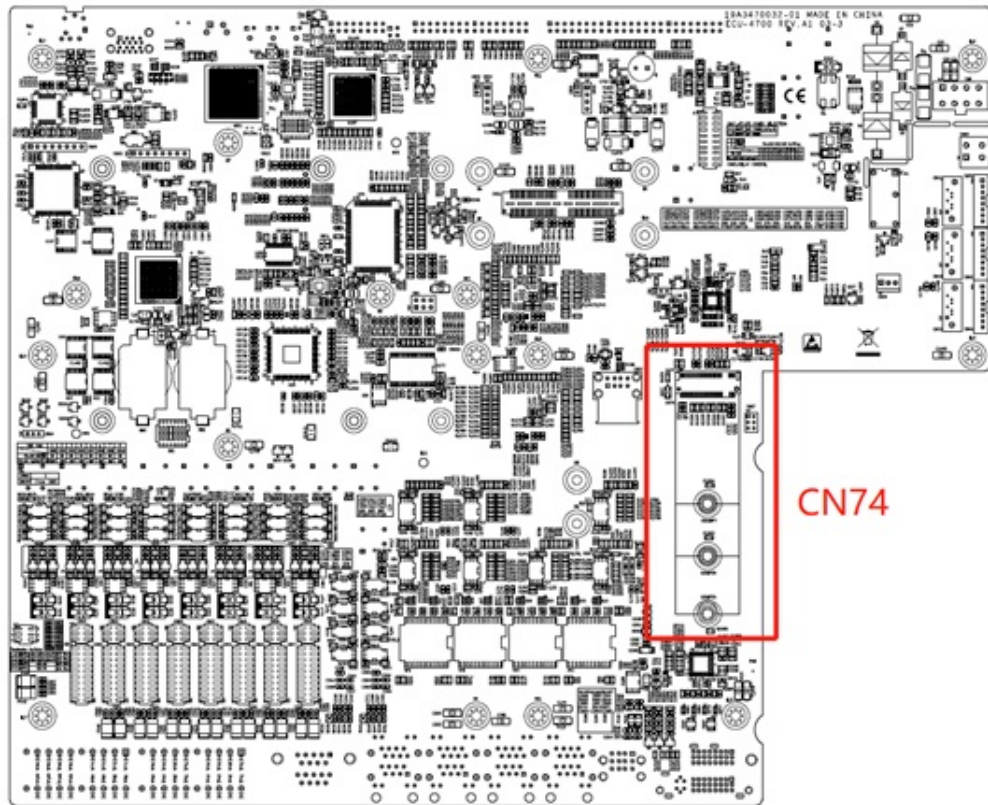


Figure 3.5 M.2 PCIE Card Slot Location (CN74)

3.3 Installing a USB Dongle

The ECU-4784 Series provides a clamp for the USB dongle which can be installed inside the chassis. Follow these steps to install the USB dongle and clamp:

1. Refer to section 3.1 to open the chassis.

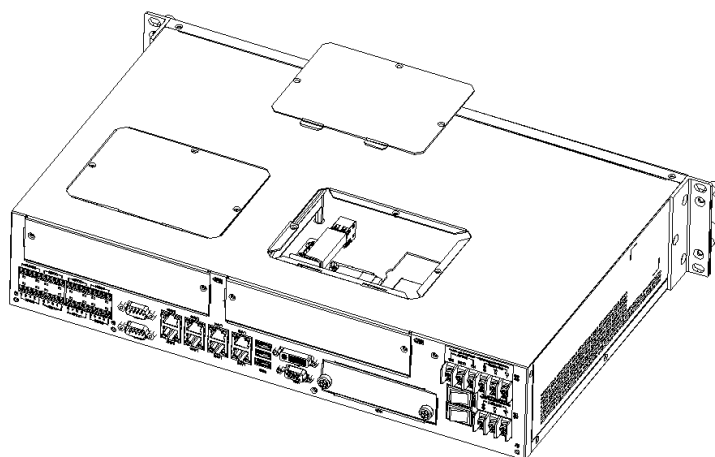


Figure 3.6 Open the Chassis

2. Plug the USB Dongle in the upper port of CN14, note that the lower port is a dummy port.

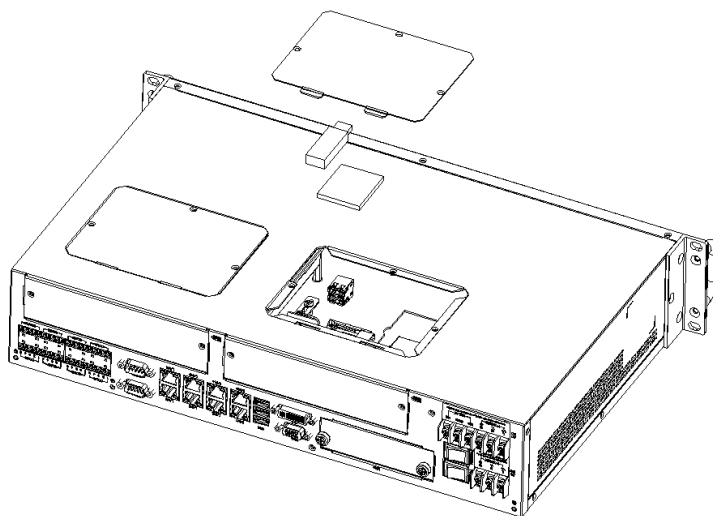


Figure 3.7 CN14 Location of Internal USB Port

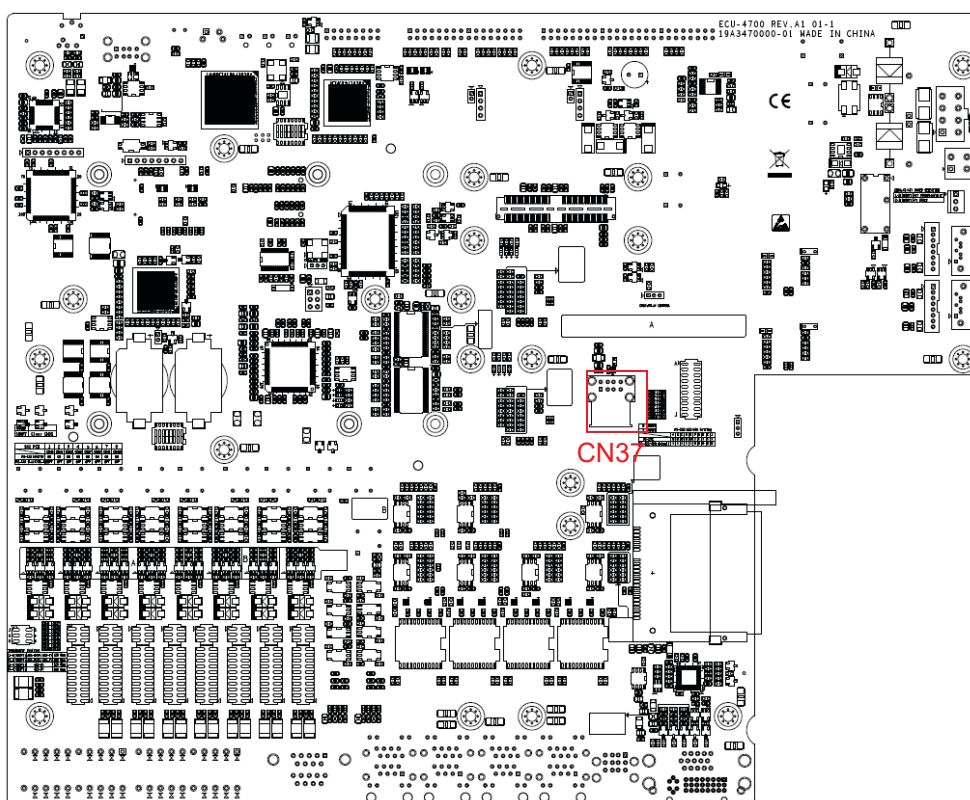
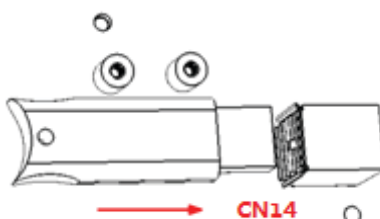
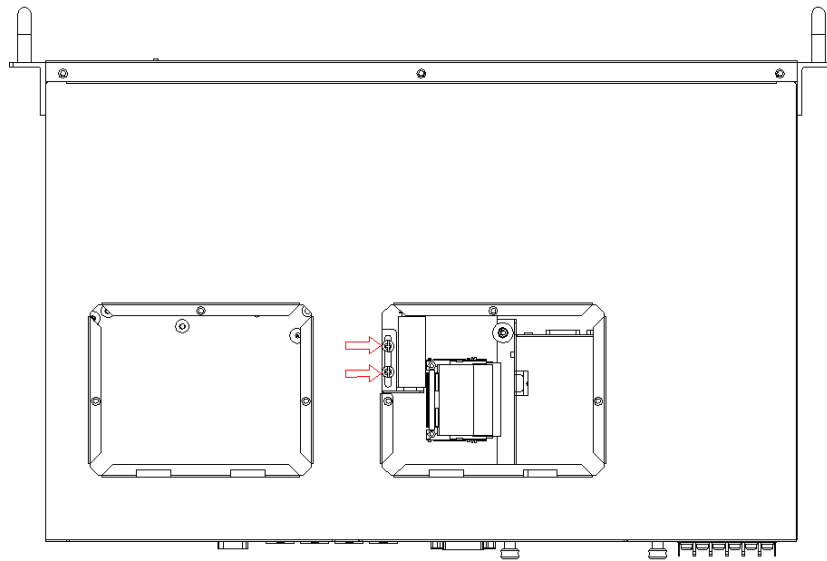
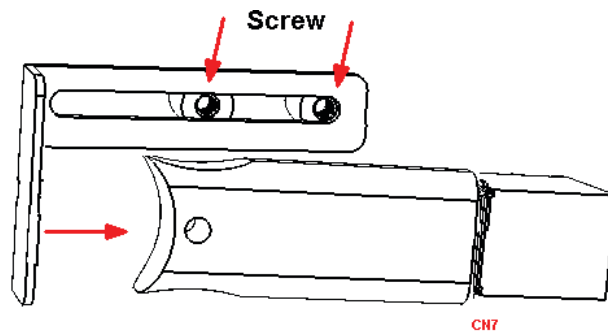


Figure 3.8 CN37 Location of the Internal USB Port



3. Adjust the position of the kit to fasten the USB dongle, then use screws to fix the kit.



3.4 Installing a Hard Disk

Follow the steps below to install a HDD:

1. To install a HDD and HDD bracket (in the accessory).

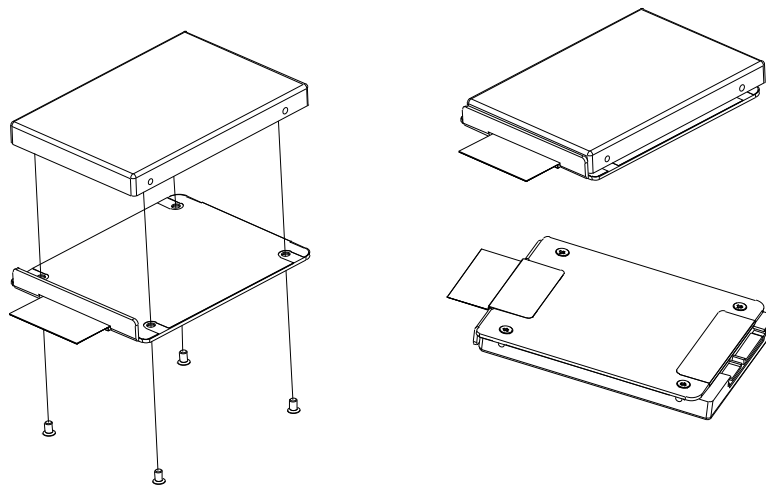


Figure 3.9 SATA HDD Fixed Diagram

2. Unscrew the 2 screws and remove the HDD back plate.

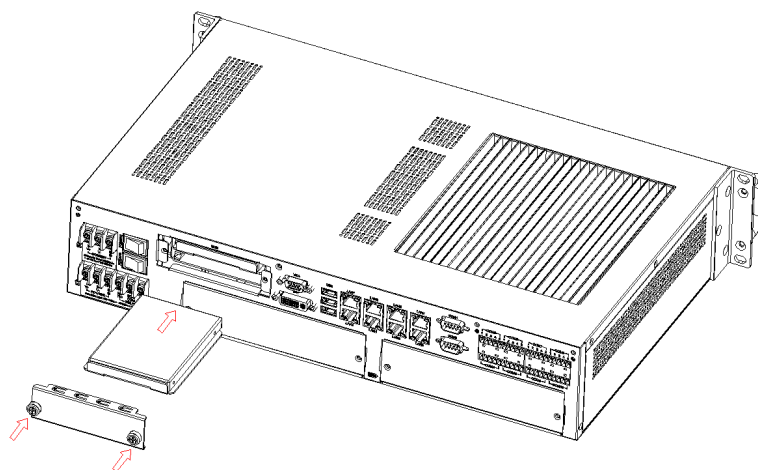
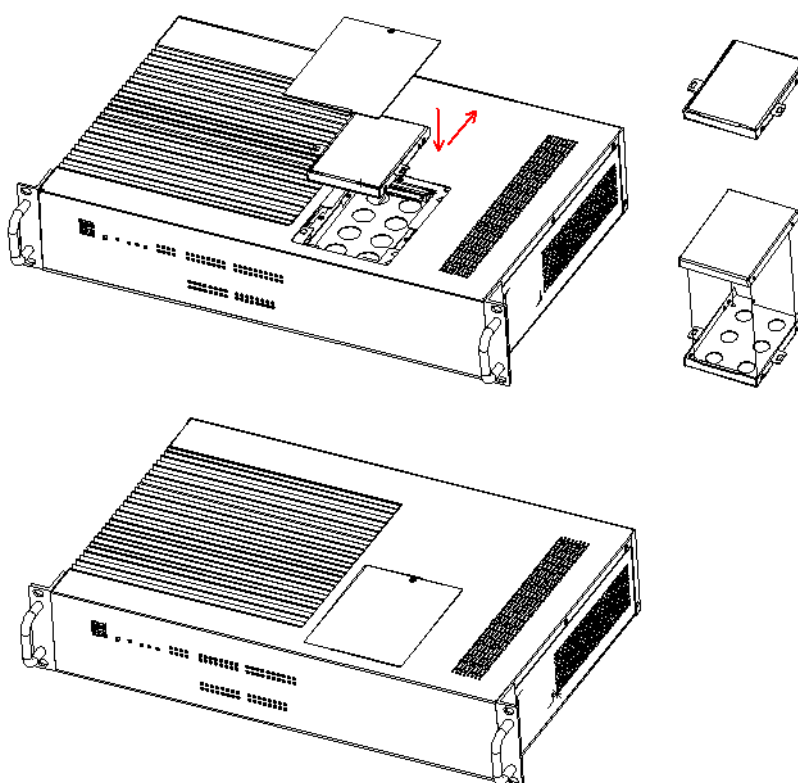


Figure 3.10 HDD Back Plate Location and SATA HDD Installation Diagram

3. According to the schematic drawing, the HDD is directly installed on the device through the DIN-Rails (ECU-4784 supports up to 3 x HDD the 3rd HDD location is on top as show below).



4. ECU-4784 series contains SATA signal and power cable for three SATA HDD in the chassis. The locations of the connectors are shown below, SATA signal connector and SATA power connectors are located on CN41/43/CN75.

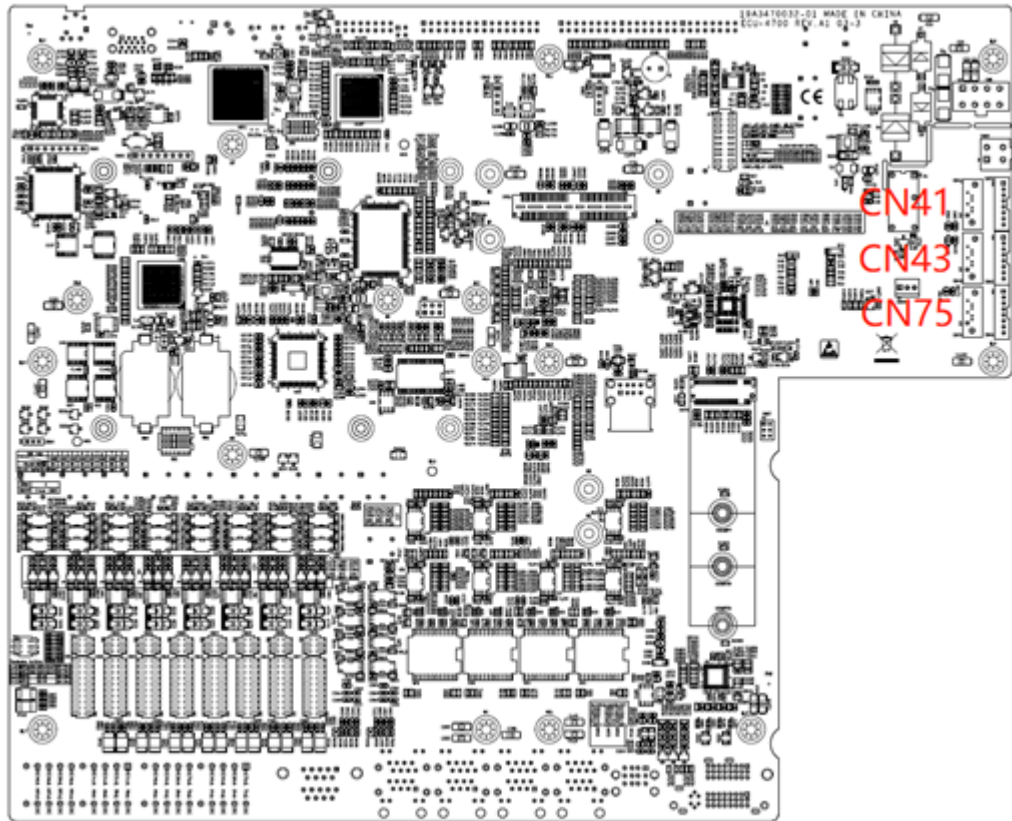


Figure 3.11 2 x SATA Signal and Power Connector Locations (CN41/43/75)

3.5 Rack Installation

The ECU-4784 Series provide kits for rack mounting in the chassis.

1. Use the 4 screw holes to mount the ECU-4784 series on the rack.

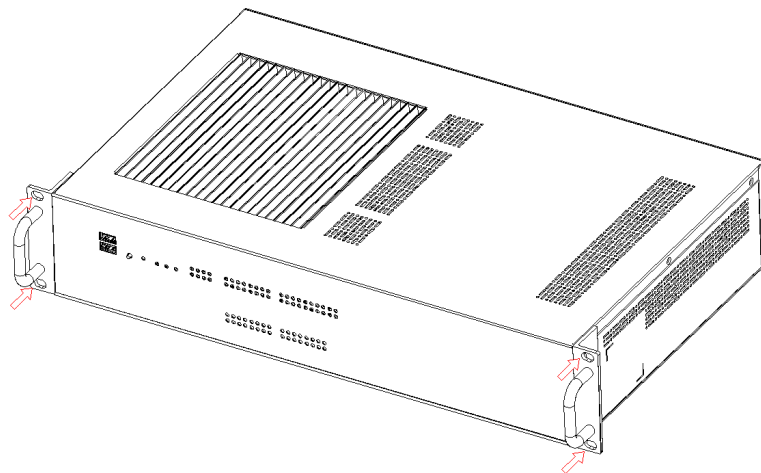


Figure 3.12 ECU-4784 Series Product Installation on Rack Location

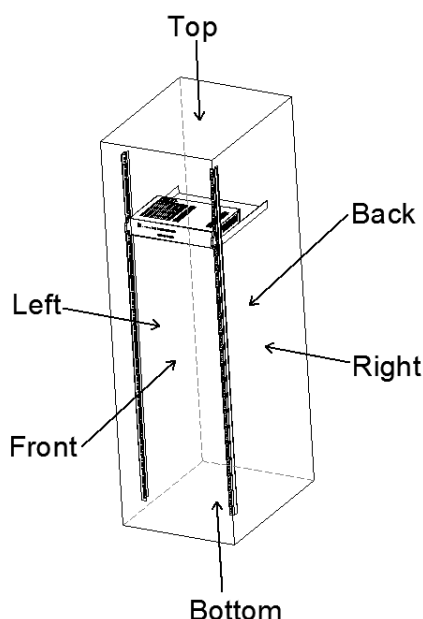


Figure 3.13 The Installation Cabinet of ECU-4784 Series Product

Caution! *The ECU-4784 can only be used in a standard equipment cabinet with a minimum of 2Us available. The equipment cabinet must satisfy two requirements. (1) The maximum size of the cooling hole on the top, left, right, front and back is no more than 5mm. (2) There is no limit on the size of the hole on the bottom.*

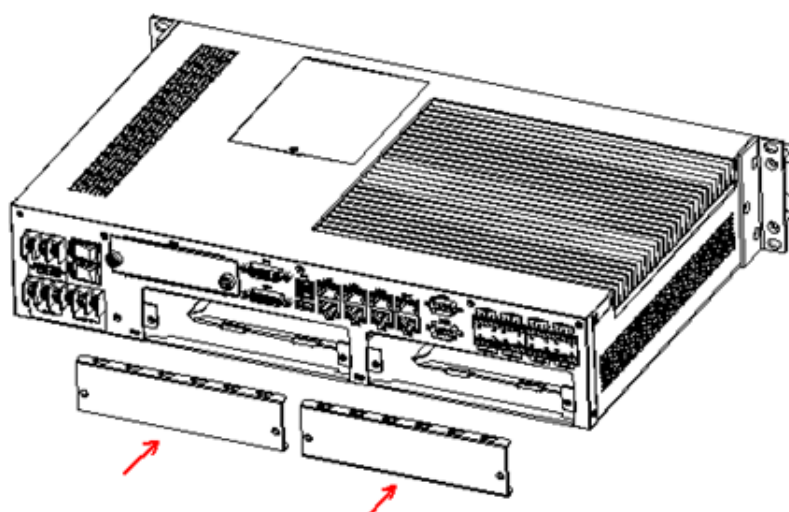


2. The ECU-4784 Series has aluminum fins on the top of the unit as heat-sink. It can generate natural convection for better heat transmission. To have optimal thermal performance, leave 2U (88.9 mm) space above the unit.

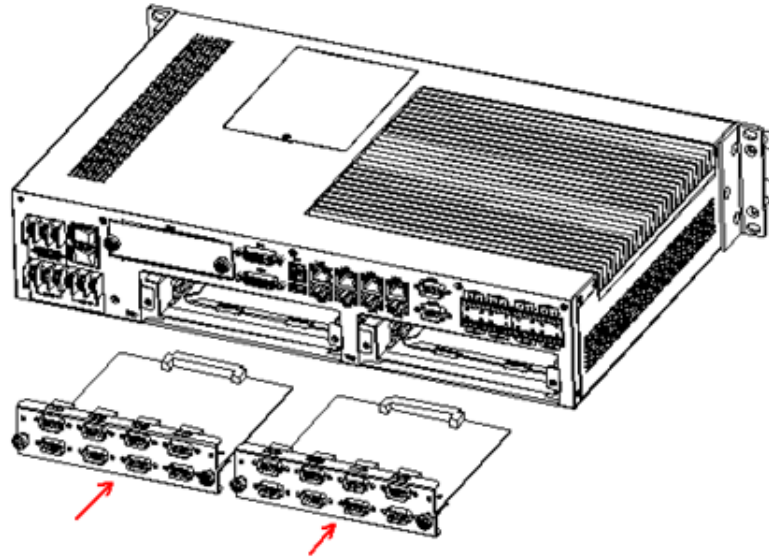
3.6 Installing the Expansion Card

The ECU-4784 series provides two expansion slots for expansion card installation.

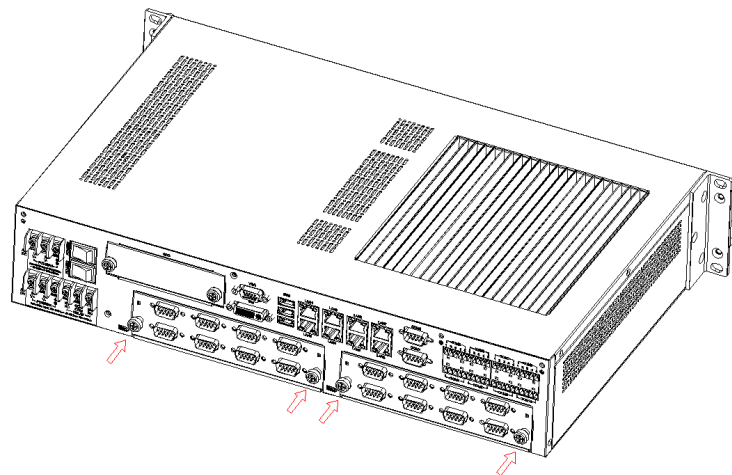
1. Unscrew the 2 screws and remove the two expansion back plate.



2. Plug in the PCI Card or PCIE card through the DIN-Rails.



3. Then secure the expansion cards using the previously removed screws.



3.7 BIOS Setup and System Assignments

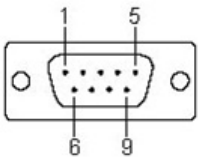
The ECU-4784 with Intel 6th & 9th Generation Processor adopts Advantech's CPU module, and ECU-4784 with Intel 6th & 9th Generation Processor adopts Advantech's CPU module. Further information about the SOM module, can be found in the SOM user manual. You can find this manual on the companion disc or visit the website.

Please note that you can find detailed info on the BIOS Setup for ECU-4784-G5 as examples in Appendix C. More queries, please contact Advantech for more information.

Appendix **A**

Pin Assignments

A.1 RS-232 Serial Ports (COM1 ~ COM2)



| Table A.1: COM (1~2) Port Pin Definitions | |
|---|--------|
| Pins | RS-232 |
| 1 | DCD |
| 2 | RXD |
| 3 | TXD |
| 4 | DTR |
| 5 | GND |
| 6 | DSR |
| 7 | RTS |
| 8 | CTS |
| 9 | RI |

A.2 RS-232/422/485 Serial Ports (COM3 ~ COM10)

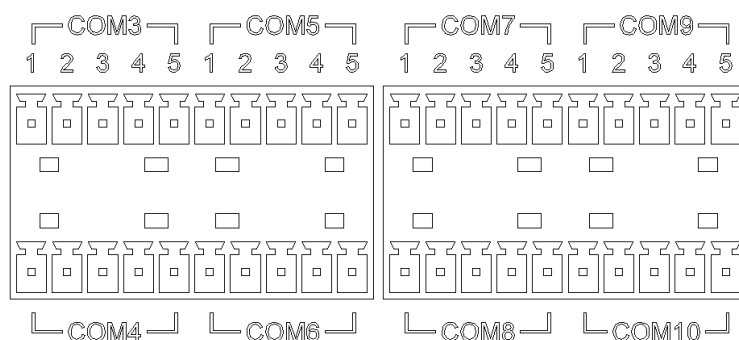


Table A.2: RS-232/422/485 Serial Ports (COM3 ~ 10)

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

Table A.3: Relay Output Connectors Pin Definitions

| Pins | Definitions |
|------|------------------|
| NO | Normal OPEN |
| COM | COMMON Reference |
| NC | Normal CLOSE |

Power Failure and Relay out Function

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

A.3 Relay Output Connectors Pin Assignments



A.4 USB Connectors (USB1 ~ USB5)

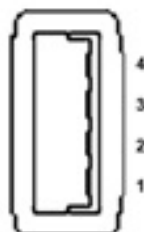


Table A.4: USB Connector Pin Assignments

| Pin | Signal | Cable Color |
|-----|--------|-------------|
| 1 | VCC | Red |
| 2 | DATA- | White |
| 3 | DATA+ | Green |
| 4 | GND | Black |

A.5 LAN Connectors (LAN1~LAN8)

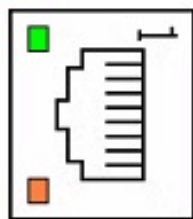


Table A.5: LAN Connector Pin Assignments

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

A.6 VGA Display Connector

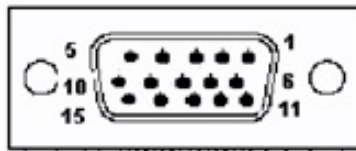


Table A.6: VGA Adaptor Cable Pin Assignments

| Pin | Signal |
|-----|---------|
| 1 | RED |
| 2 | GREEN |
| 3 | BLUE |
| 4 | N/C |
| 5 | GND |
| 6 | GND |
| 7 | GND |
| 8 | GND |
| 9 | VCC |
| 10 | GND |
| 11 | N/C |
| 12 | VGA_SDA |
| 13 | HSYNC |
| 14 | VSYNC |
| 15 | VGA_SCL |

A.7 DVI Display Connector

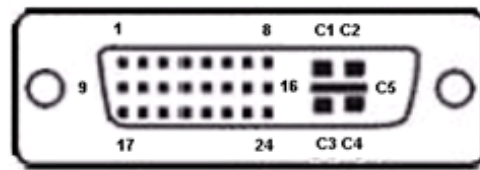


Table A.7: DVI Adaptor Cable Pin Assignments

| Pin | Signal |
|-----|--------------|
| 1 | TMDS_C2# |
| 2 | TMDS_C2 |
| 3 | GND |
| 4 | CRT_DDC_CLK |
| 5 | CRT_DDC_DATA |
| 6 | MDVI_CLK |
| 7 | MDVI_DATA |
| 8 | VGA_VSY |
| 9 | TMDS_C1# |
| 10 | TMDS_C1 |
| 11 | GND |
| 12 | - |
| 13 | - |
| 14 | VCC_DVI |
| 15 | VGA Detect |
| 16 | HP_DET |
| 17 | TMDS_C0# |
| 18 | TMDS_C0 |
| 19 | GND |
| 20 | - |
| 21 | - |
| 22 | GND |
| 23 | TMDS_CK# |
| 24 | TMDS_CK |
| 25 | VGAR |
| 26 | VGAG |
| 27 | VGAB |
| 28 | VGAHSY |
| 29 | GND |

A.8 POWER Pin Assignments

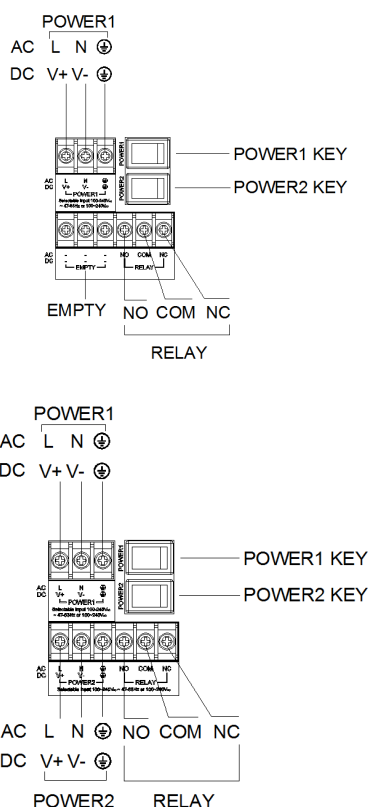



Table A.8: AC/DC Power Input PIN Definition

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

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

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



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



Note! If the customer wants to use a dual power supply, refer to Table2.1 for power input specifications.



Appendix **B**

Watchdog Timer Programming

B.1 Watchdog Timer Programming

```
-----  
-----  
Enter the extended function mode, interruptible double-write  
-----
```

```
----- MOV DX,2EH  
MOV AL,87H OUT DX,AL OUT DX,AL  
-----
```

```
-----  
Configured logical device 8, configuration register CRF6  
-----
```

```
----- MOV DX,2EH  
MOV AL,2BH OUT DX,AL MOV DX,2FH IN AL,DX  
AND AL,0EFH; Setbit 4=0 Pin 89=WDTO OUT DX,AL  
MOV DX,2EH  
MOV AL,07H; point to Logical Device Number Reg. OUT DX,AL  
MOV DX,2FH  
MOV AL,08H; select logical device 8 OUT DX,AL;  
MOV DX,2EH  
MOV AL,30H;Set watch dog activate or inactivate OUT DX,AL  
MOV DX,2FH  
MOV AL,01H; 01:activate 00:inactivate OUT DX,AL;  
MOV DX,2EH  
MOV AL,F5H; Setting counter unit is second OUT DX,AL  
MOV DX,2FH MOV AL,00H OUT DX,AL; MOV DX,2EH MOV AL,F6H OUT  
DX,AL MOV DX,2FH  
MOV AL,05H; Set 5 seconds
```

```
OUT DX,AL  
;-----  
; Exit extended function mode  
;----- MOV DX,2EH  
MOV AL,AAH OUT DX,AL
```

Appendix **C**

BIOS Setup

C.1 BIOS Setup and System Assignments

With the AMIBIOS Setup program, users can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the BIOS setup screens. The ECU-4784 with Intel 6th & 9th Generation Processor adopts Advantech's core CPU module. Further information about the SOM module, can be found in the SOM user manual.



Figure C.1 BIOS Setup Utility Main Screen

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

C.2 Entering Setup

Turn on the computer and then press <F2> or to enter Setup menu.

C.2.1 Main Setup

When users first enter the BIOS Setup Utility, users will 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. They are described in this section. The Main BIOS Setup screen is shown below.

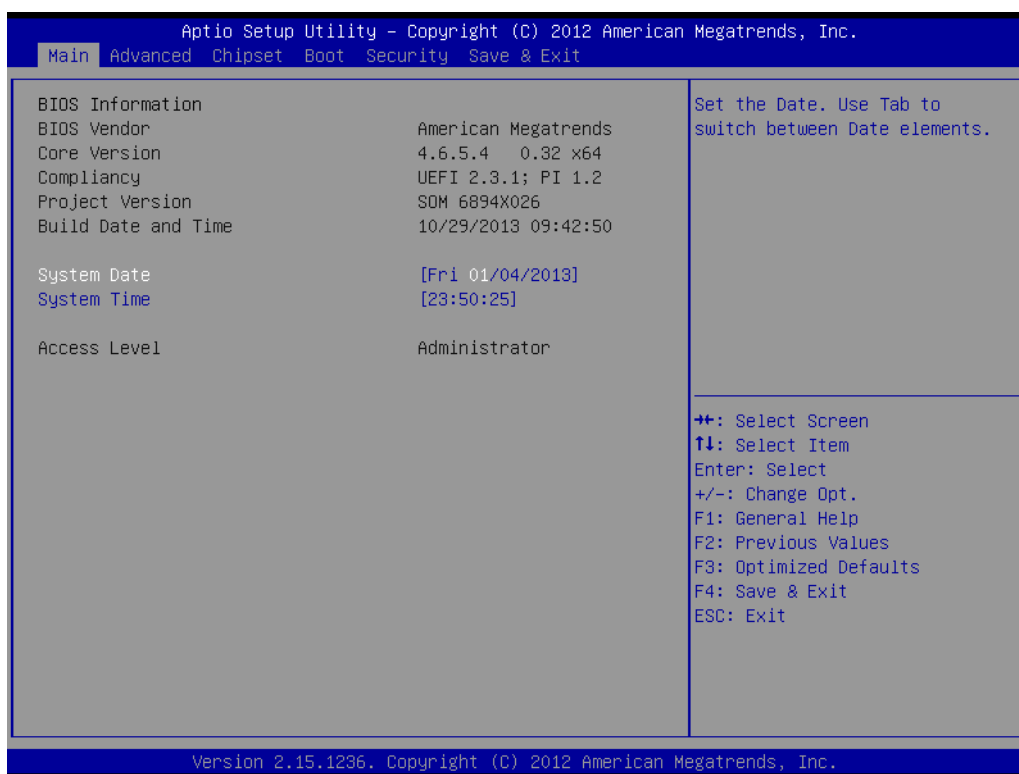


Figure C.2 Main Setup Screen

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. 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.

C.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the ECU-4784 setup screen to enter the Advanced BIOS Setup screen. Users can select any item in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. Users 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 are shown below. The sub menus are described on the following pages.

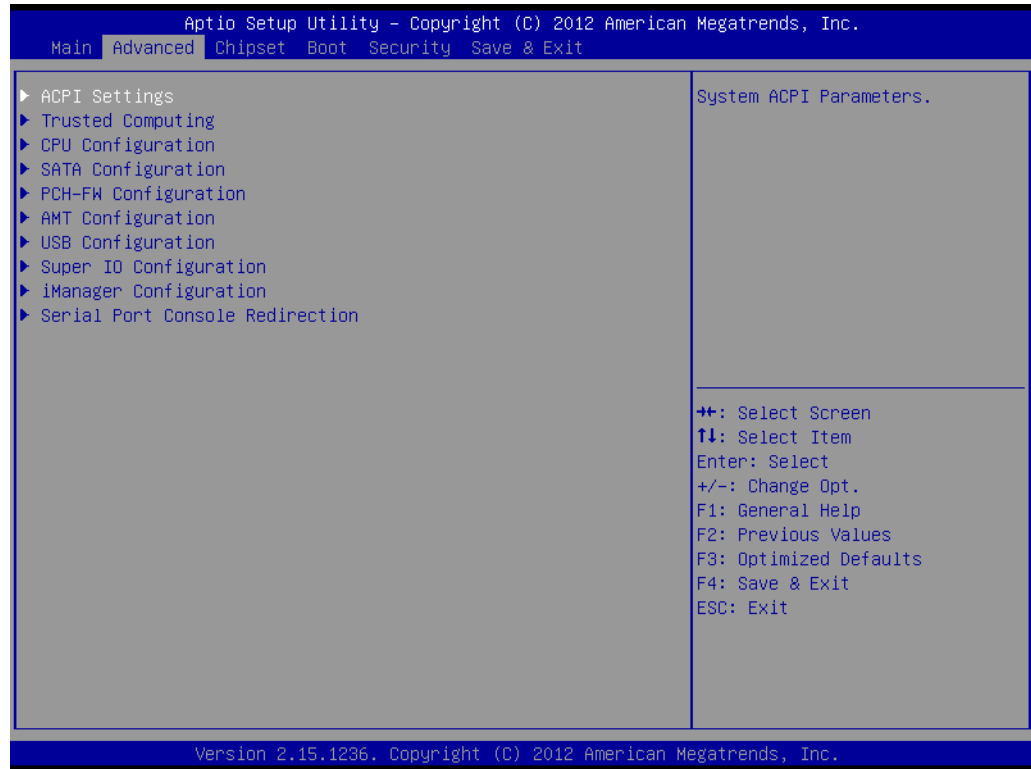


Figure C.3 Advanced BIOS Features Setup Screen

C.2.2.1 ACPI Settings

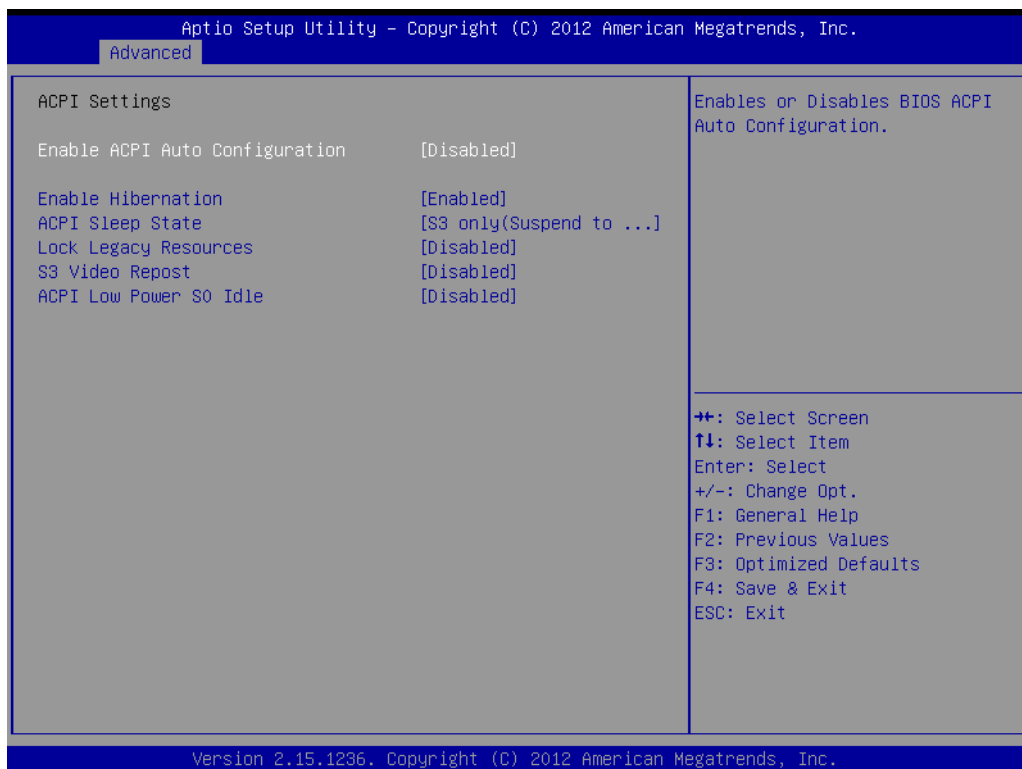


Figure C.4 ACPI Setting

- **Enable ACPI Auto Configuration**
This item allows users to enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
This item allows users to enable or disable hibernation.
- **ACPI Sleep State**
This item allows users to set the ACPI sleep state.
- **Lock Legacy Resources**
This item allows users to lock legacy devices resources.
- **S3 Video Repost**
Enable or Disable S3 Video Repost.
- **ACPI Low Power S0 Idle**
This item allows users to enable or disable ACPI Low Power S0 Idle support.

C.2.2.2 Trusted Computing

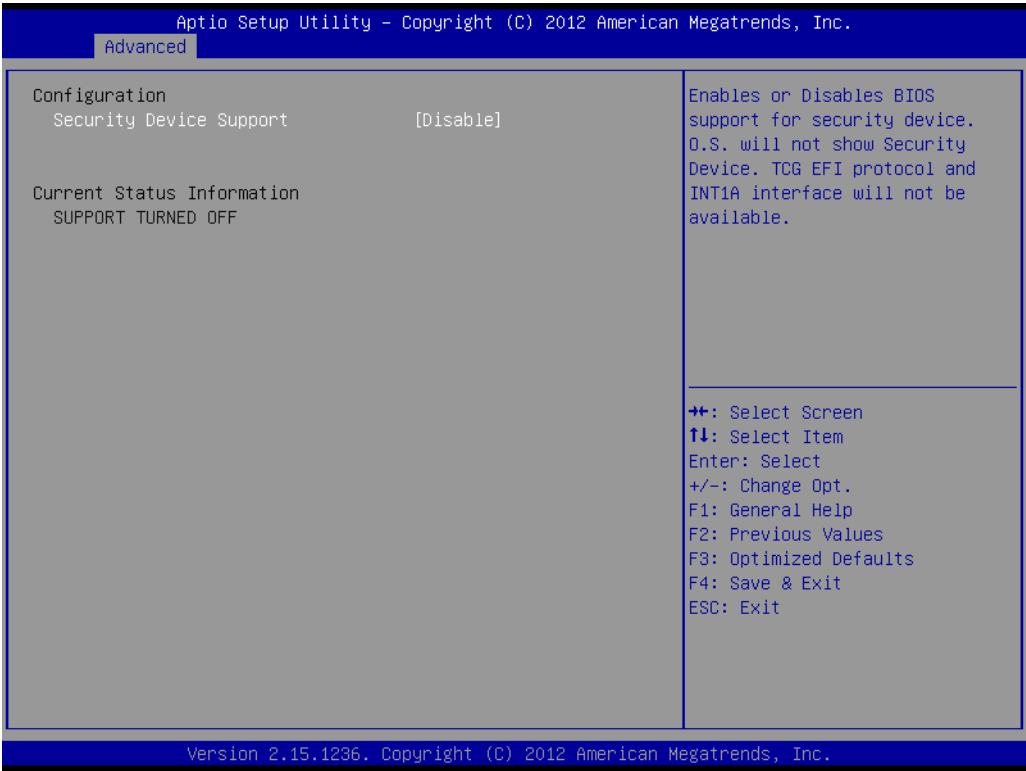


Figure C.5 Trusted Computing

- **Security Device Support**
This item allows users to enable or disable BIOS support for security device support, and the OS will not show the Security Device. TCG EFI Protocol and INT1A interface will not be available.

C.2.2.3 CPU Configuration

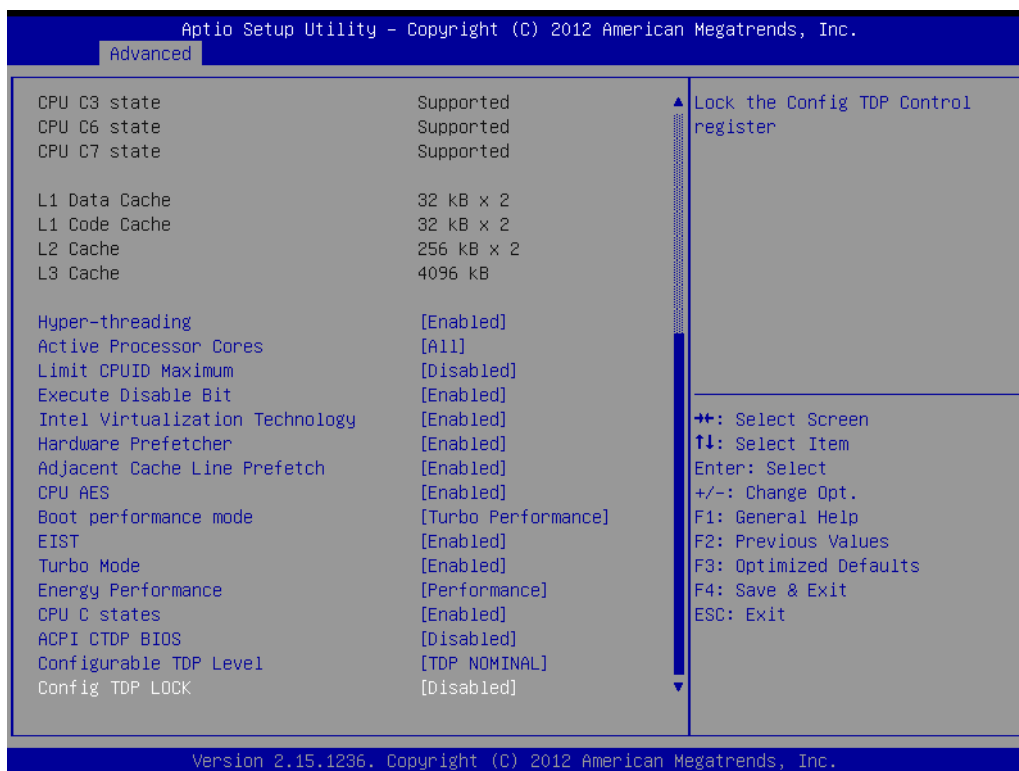


Figure C.6 CPU Configuration

- **Hyper-threading**
Enable for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disable for other OS (OS not optimized for Hyper-Threading Technology). When Disabled only one thread per core is enabled.
- **Active Processor Cores**
This item allows users to enable a number of cores in each processor package.
- **Limit CPUID Maximum**
Disable for Windows XP.
- **Execute Disable Bit**
This item allows users to enable or disable Execute Disable Bit.
XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows server 2003 SP1, Windows XP SP2 SuSE Linux 9.2, RedHat Enterprise 3 update 3.)
- **Intel Virtualization Technology**
This item allows users to enable or disable Intel Virtualization Technology.
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **Hardware Prefetcher**
This item allows users to enable or disable Hardware Prefetcher. Enable the Mid Level Cache (L2) streamer prefetcher.
- **Adjacent Cache Line Prefetch**
This item allows users to enable or disable Adjacent Cache Line Prefetch. Enable the Mid Level Cache (L2) prefetching of adjacent cache lines.

- **CPU AES**
This item allows users to enable or disable CPU Advanced Encryption Standard instructions.
- **Boot performance mode**
This Item allows users to select the performance state that the BIOS will set before OS handoff.
- **EIST**
This item allows users to enable or disable Intel SpeedStep.
- **Turbo Mode**
This item allows users to enable or disable Turbo Mode.
- **Energy Performance**
This Item allows users to optimize between performance and power savings.
- **CPU C states**
This item allows users to enable or disable CPU C states.
- **ACPI CTPD BIOS**
This item allows users to enable or disable ACPI CTPD BIOS support.
- **Configurable TDP Level**
This Item allows users to select Configurable TDP Level.
Allow re-configuration of TDP levels based on current power and thermal delivery capabilities of the system.
- **Config TDP Lock**
This item allows users to enable or disable Config TDP Lock. Locks the Config TDP Control register.

C.2.2.4 SATA Configuration

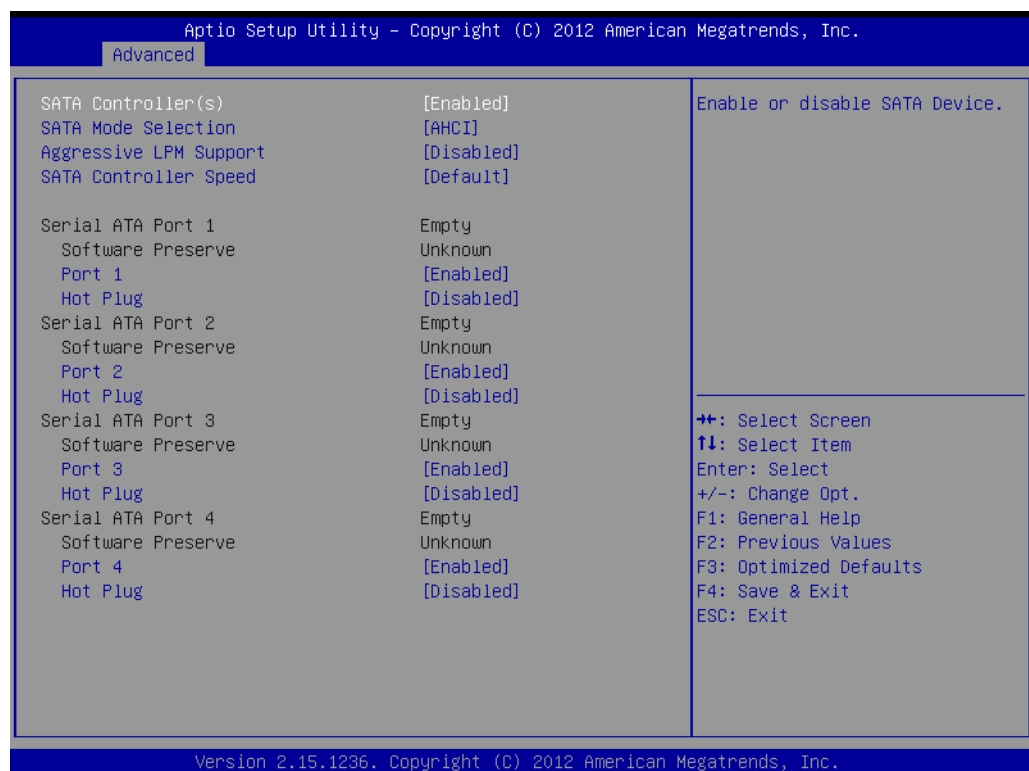


Figure C.7 SATA Configuration

- **SATA Controller(s)**
This item allows users to enable or disable SATA devices.
- **SATA Mode Selection**
This item allows users to select SATA mode selection. (Determines how SATA controller(s) operate)
- **Aggressive LPM Support**
This item allows users to enable or disable PCH to aggressively enter link power state.
- **SATA Controller Speed**
Indicates the maximum speed the SATA controller can support.
- **SATA Port 0 DevSlp**
Enable/Disable SATA Port 0 DevSlp. For DevSlp to work, both hard drive and SATA Port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.
- **Serial ATA Port 1**
Software Preserve
 - Port 1
Enable or Disable SATA Port.
 - SATA Device Type
Identify the SATA port is connected to solid state Driver or Hard Disk Drive.
 - SATA Port 1 DevSlp
Enable/Disable SATA Port 1 DevSlp. For DevSlp to work, both hard drive and SATA Port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.
- **Serial ATA Port 2**
Software Preserve
 - Port 2
Enable or Disable SATA Port.
 - SATA Device Type
Identify the SATA port is connected to solid state Driver or Hard Disk Drive.
 - SATA Port 2 DevSlp
Enable/Disable SATA Port 2 DevSlp. For DevSlp to work, both hard drive and SATA Port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.
- **Serial ATA Port 3**
Software Preserve
 - Port 3
Enable or Disable SATA Port.
 - SATA Device Type
Identify the SATA port is connected to solid state Driver or Hard Disk Drive.
 - SATA Port 3 DevSlp
Enable/Disable SATA Port 3 DevSlp. For DevSlp to work, both hard drive and SATA Port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.

C.2.2.5 PCH-FW Configuration

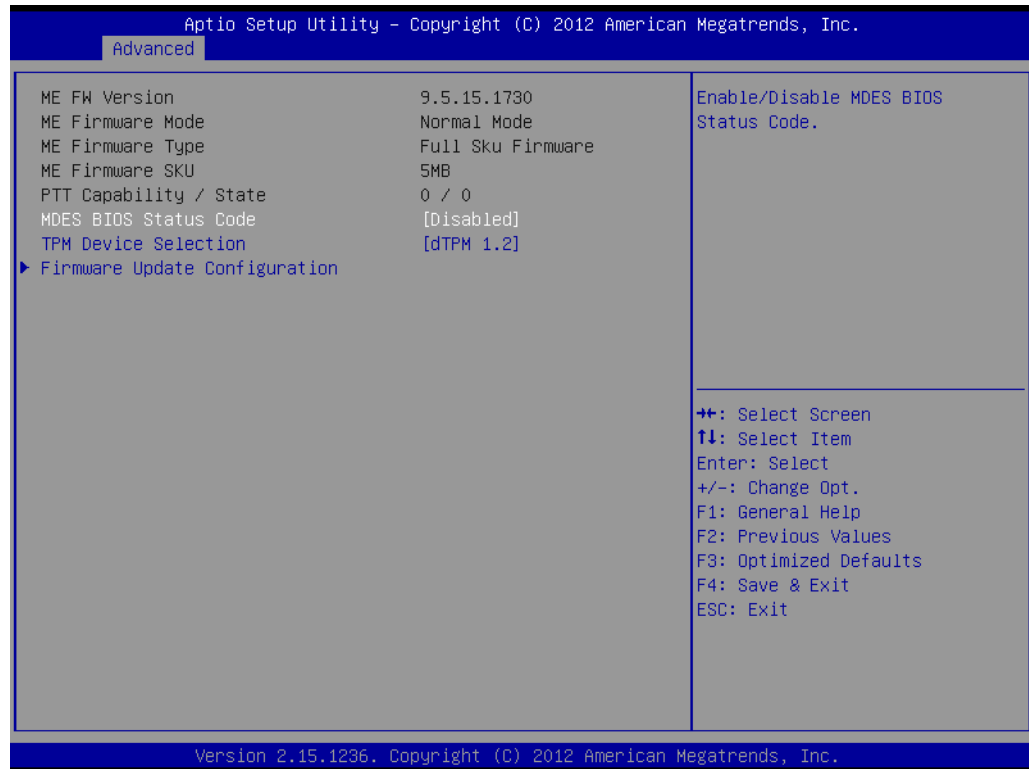


Figure C.8 PCH-FW Configuration

- **MDES BIOS Status Code**
This item allows users to enable or disable MDES BIOS status code.
- **TPM Device Selection**
This item allows users to enable or disable TPM Device Selection. (PTT or dTPM. PTT-Enables PTT in SkuMgr dTPM 1.2- Disables PTT in SkuMgr Warning! PTT/dTPM will be disable and all data saved on it will be lost.
- **Firmware Update Configuration**
Configure Management Engine Technology Parameters

Firmware Update Configuration



Figure C.9 Firmware Update Configuration

- **ME FW Image Re-Flash**
This item allows users to enable or disable ME FW Image Re-Flash function.

C.2.2.6 AMT Configuration

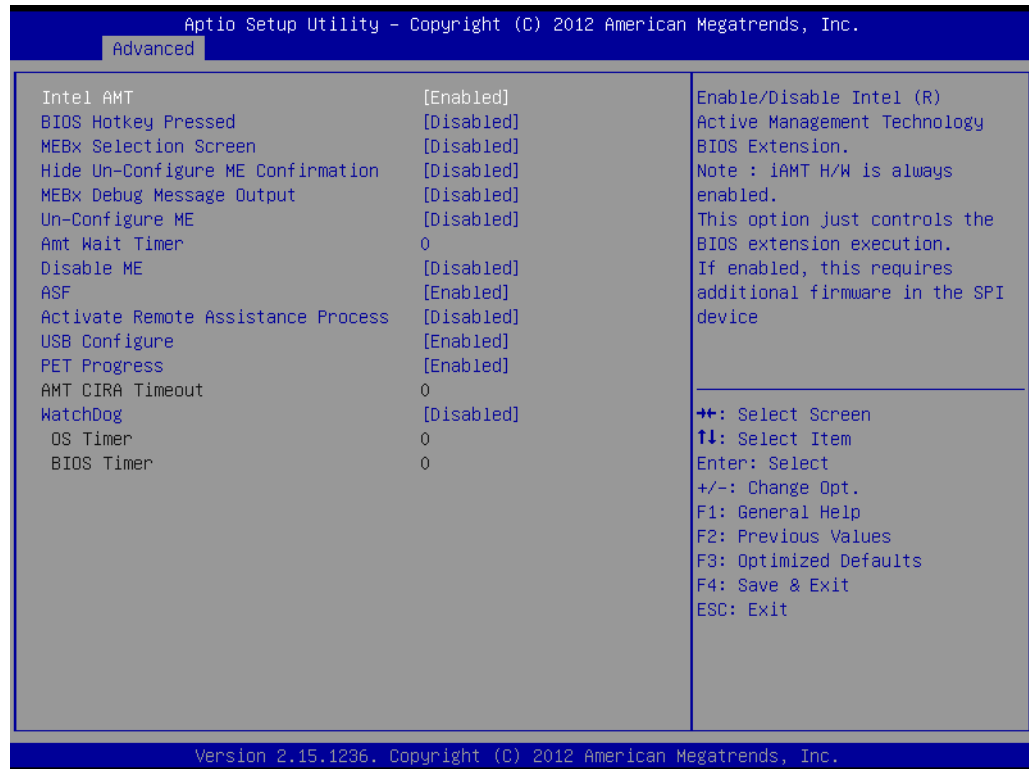


Figure C.10 AMT Configuration

■ Intel AMT

This item allows users to enable or disable Intel AMT (Active Management Technology) BIOS Extension.

Note! *iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.*



■ BIOS Hotkey Pressed

This item allows users to enable or disable BIOS Hotkey Pressed.

■ MEBx Selection Screen

This item allows users to enable or disable MEBx Selection Screen.

■ Hide Un-Configure ME Confirmation

This item allows users to hide un-configure ME without password confirmation prompt.

■ MEBx Debug Message Output

This item allows users to enable or disable MEBx Debug Message Output.

■ Un-Configure ME

This item allows users to enable or disable Un-Configure ME.

■ Amt Wait Timer

This item allows users to set timer to wait before sending ASF_GET_BOOT_OPTIONS.

■ Disable ME

This item allows users to set ME to Soft Temporary disabled.

■ ASF

This item allows users to enable or disable Alert Specification Format.

- **Activate Remote Assistance Process**
This item allows users to enable or disable Activate Remote Assistance Process. To Trigger CIRA boot.
- **USB Configure**
This item allows users to enable or disable USB Configure function.
- **PET Progress**
This item allows users to enable or disable PET Events progress to receive PET events or not.
- **WatchDog**
This item allows users to enable or disable WatchDog.

C.2.2.7 USB Configuration

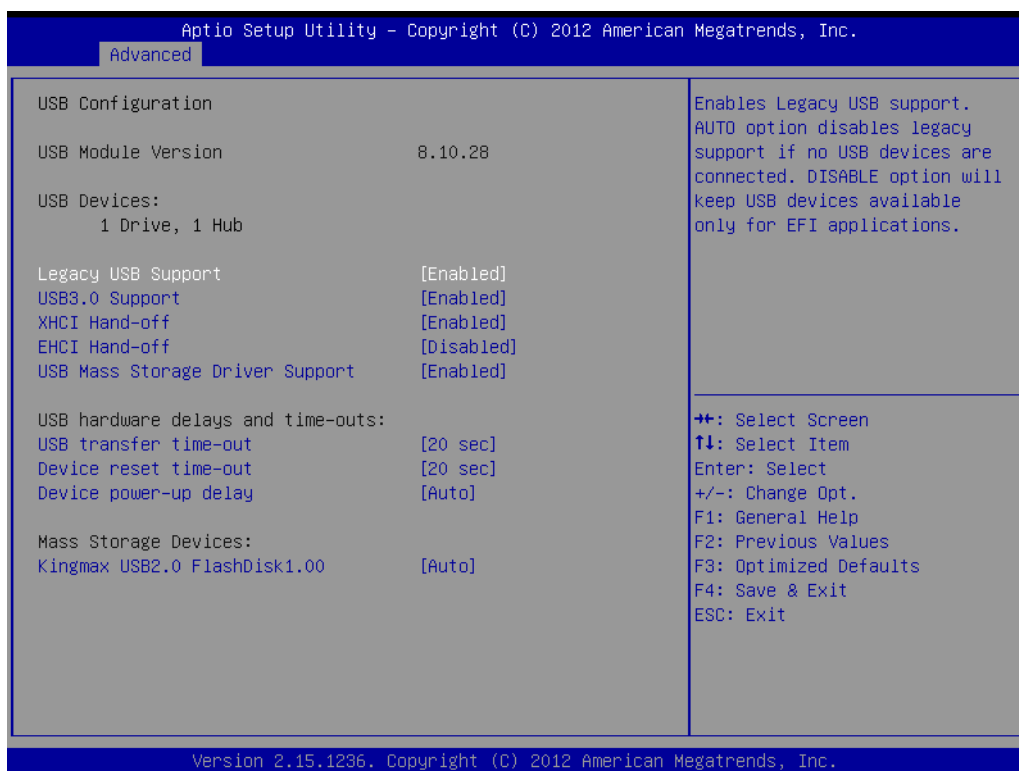


Figure C.11 USB Configuration

- **Legacy USB Support**
Enable the support for legacy USB. Auto option disables legacy support if no USB devices are connected. Auto option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications.
- **USB3.0 Support**
This item allows users to enable or disable USB3.0 (XHCI) controller support.
- **XHCI Hand-off**
This item allows users to enable or disable XHCI Hand-off.
This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **EHCI Hand-off**
This item allows users to enable or disable EHCI Hand-off.

This is a workaround for OS without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.

- **USB Mass Storage Driver Support**

This item allows users to enable or disable USB Mass Storage Driver Support.

- **USB transfer time-out**

This item allows users to select time-out section.

The time-out value for control, bulk, and interrupt transfers.

- **Device reset time-out**

This item allows users to select device time-out section. USB mass storage devices start unit command time-out.

- **Device power-up delay**

This item allows users to select device power-up section.

Maximum time the device will take before it properly reports itself to the Host controller. "Auto" uses a default value: for a Root port it is 100ms, for a Hub port the delay is taken from the Hub descriptor.

- **USB2.0 FlashDisk1.00**

This item allows users to select USB2.0 FlashDisk1.00 section.

Mass storage device emulation type. "Auto" enumerates devices according to their media format. Optical drives are emulated as "CDROM" drives with no media will be emulated according to a drive type.

C.2.2.8 Super IO Configuration

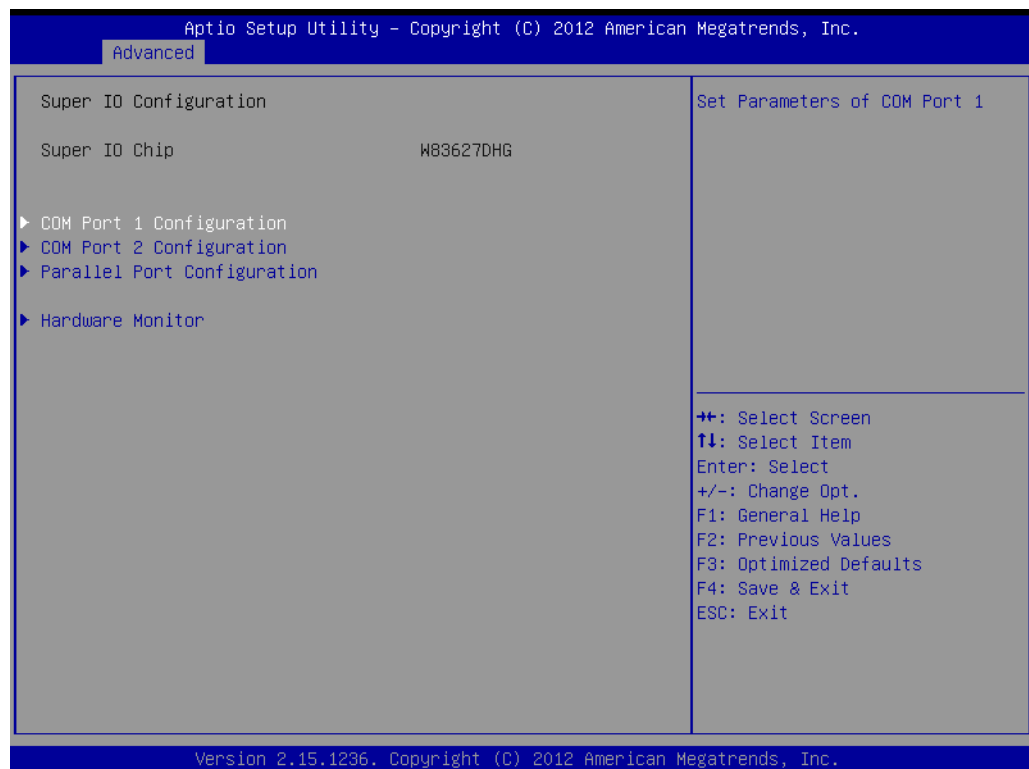


Figure C.12 Super I/O Configuration

- **COM Port 1 Configuration**

This item allows user to set Parameters of COM Port 1.

- **COM Port 2 Configuration**

This item allows user to set Parameters of COM Port 2.

- **Parallel Port Configuration**
This item allows users to set Parameters of Parallel Port (LPT/LPTE).
- **Hardware Monitor**
This item allows user to change monitor hardware status.

COM Port 1 Configuration

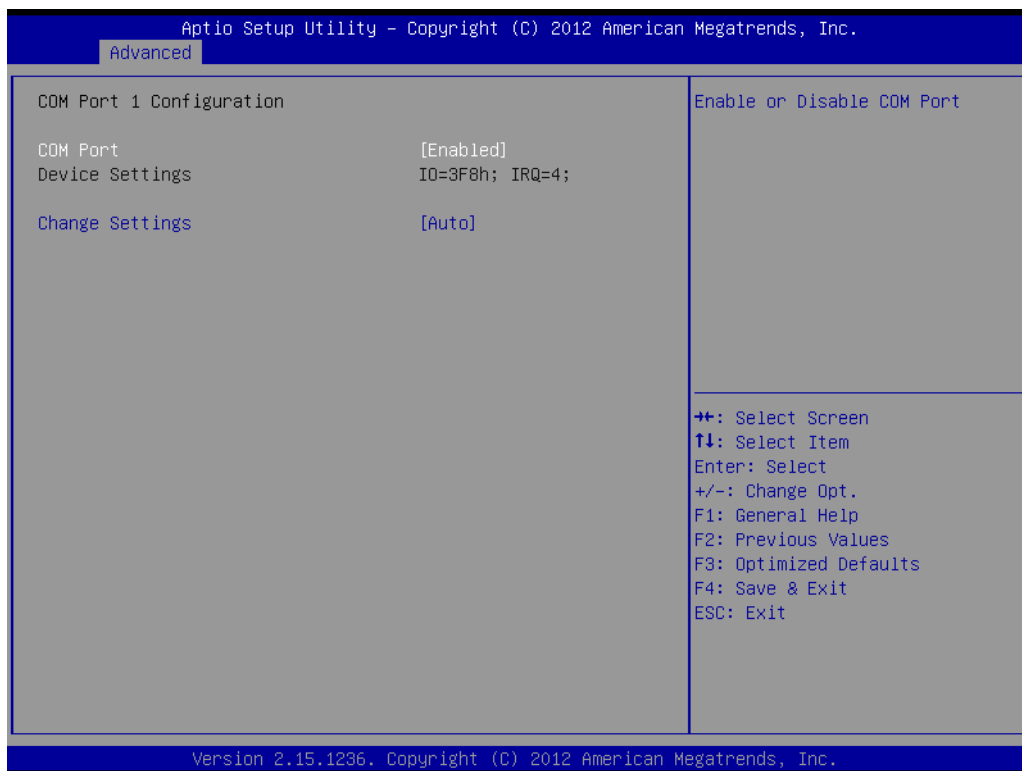


Figure C.13 COM Port 1 Configuration

- **COM Port 1**
This item allows users to enable or disable the COM Port.
- **Change settings**
This item allows users to select an optimal setting for Super I/O device.

COM Port 2 Configuration



Figure C.14 COM Port 2 Configuration

- **COM Port 2**
This item allows users to enable or disable the COM Port.
- **Change settings**
This item allows users to select an optimal setting for the Super IO device.
- **Device Mode**
This item allows users to change the Serial Port mode. Select <High Speed> or <Normal Mode> mode.

Parallel Port Configuration

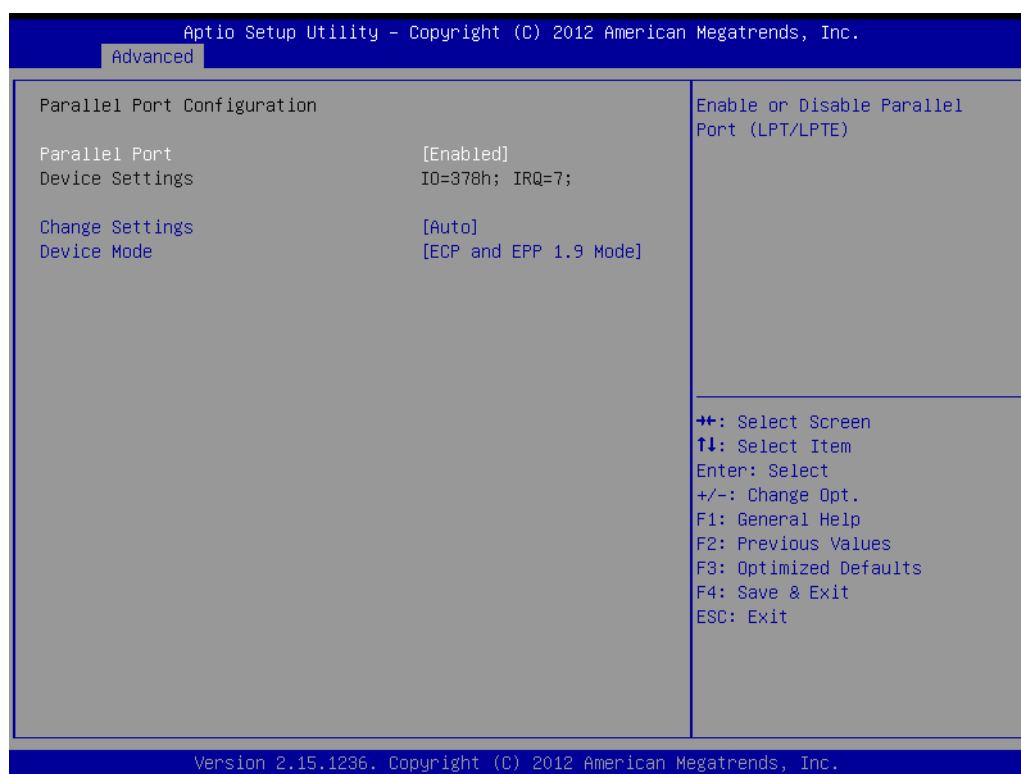


Figure C.15 Parallel Port Configuration

- **Parallel Port**
This item allows users to enable or disable Parallel Port (LPT/LPTE).
- **Change settings**
This item allows users to select an optimal setting for the Super IO device.
- **Device Mode**
This item allows users to change the Printer Port mode.

Hardware Monitor

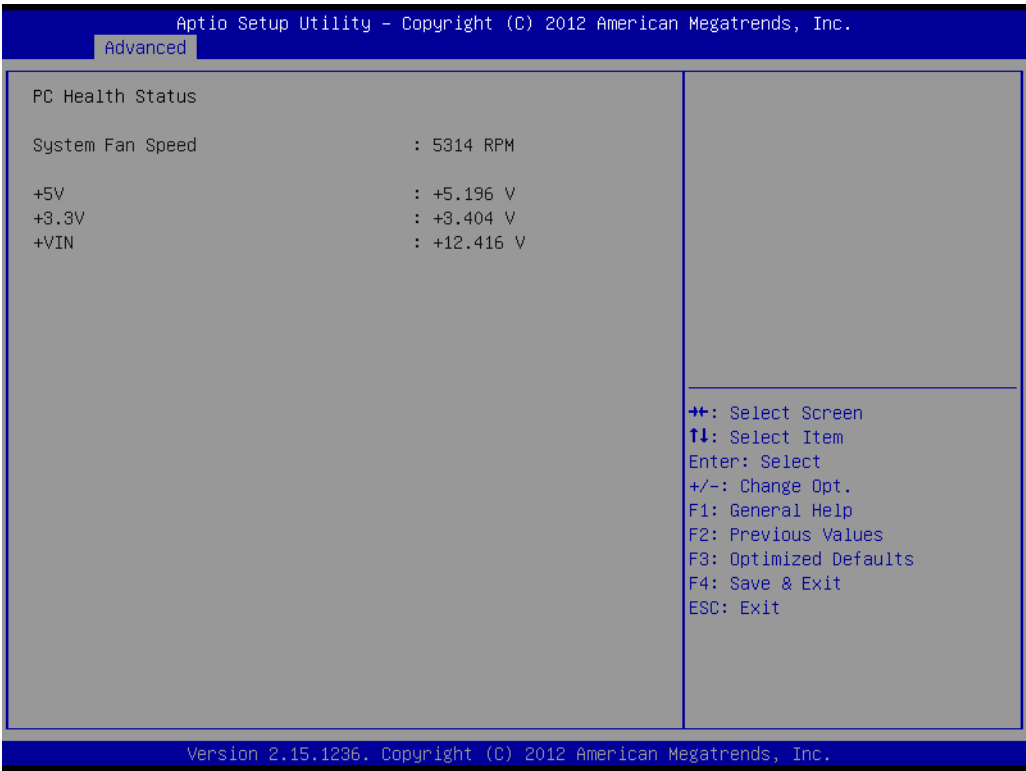


Figure C.16 PC Hardware Monitor

This item monitors hardware status.

C.2.2.9 iManager Configuration

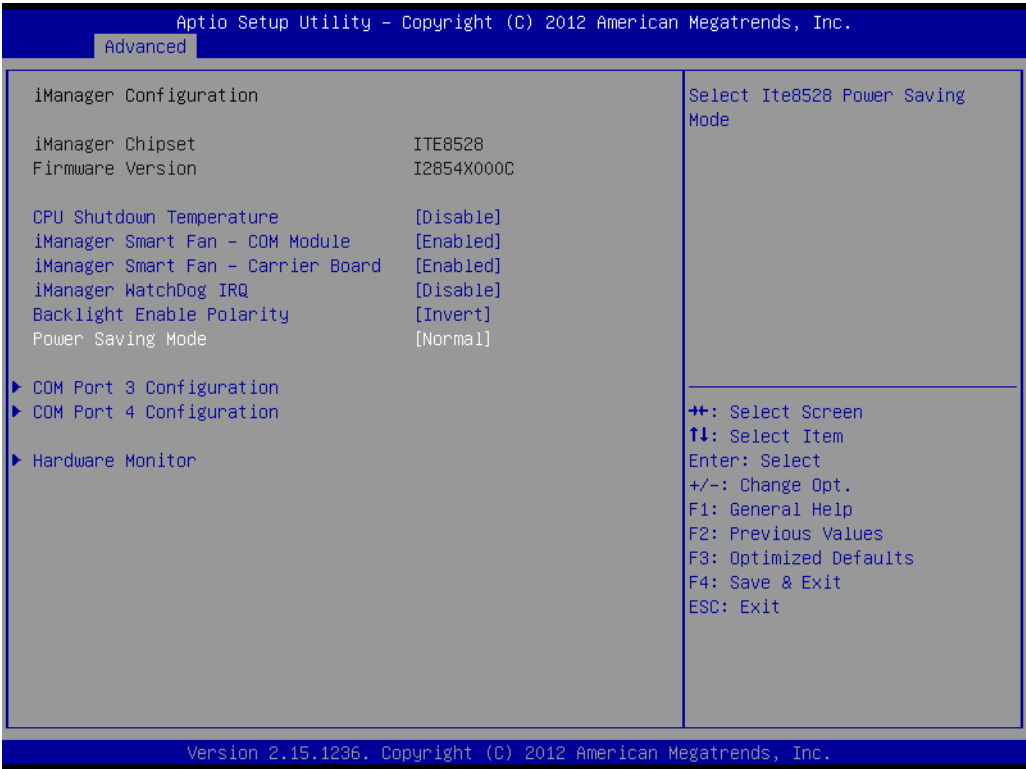


Figure C.17 iManager Configuration

- **CPU Shutdown Temperature**
This item allows users to select CPU Shutdown Temperature.
- **iManager Smart Fan - COM Module**
This item allows users to enable or disable iManager Smart Fan - COM Module. To control iManager Smart FAN function.
- **iManager Smart Fan - Carrier Board**
This item allows users to enable or disable iManager Smart Fan - Carrier Board. To control iManager Smart FAN Carrier Board function.
- **iManager WatchDog IRQ**
This item allows users to select iManager IRQ number eBrain WatchDog.
- **Backlight Enable Polarity**
This item allows users to switch Backlight Enable Polarity for Native or Invert.
- **Power Saving Mode**
This item allows users to select ITE8528 Power Saving Mode.

COM Port 3 Configuration

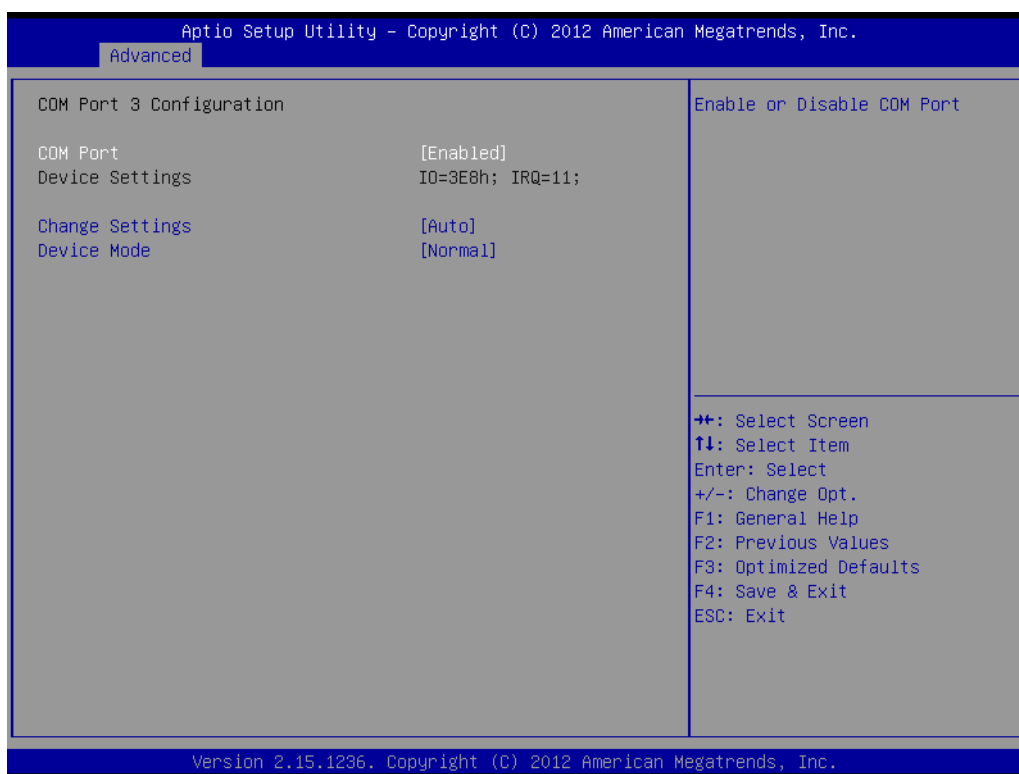


Figure C.18 COM 3 Configuration

- **COM Port 3**
This item allows users to enable or disable COM Port.
- **Change settings**
This item allows users to select an optimal setting for the Super IO device.
- **Device Mode**
This item allows users to change the Serial Port mode. Select <High Speed> or <Normal mode> mode.

COM Port 4 Configuration

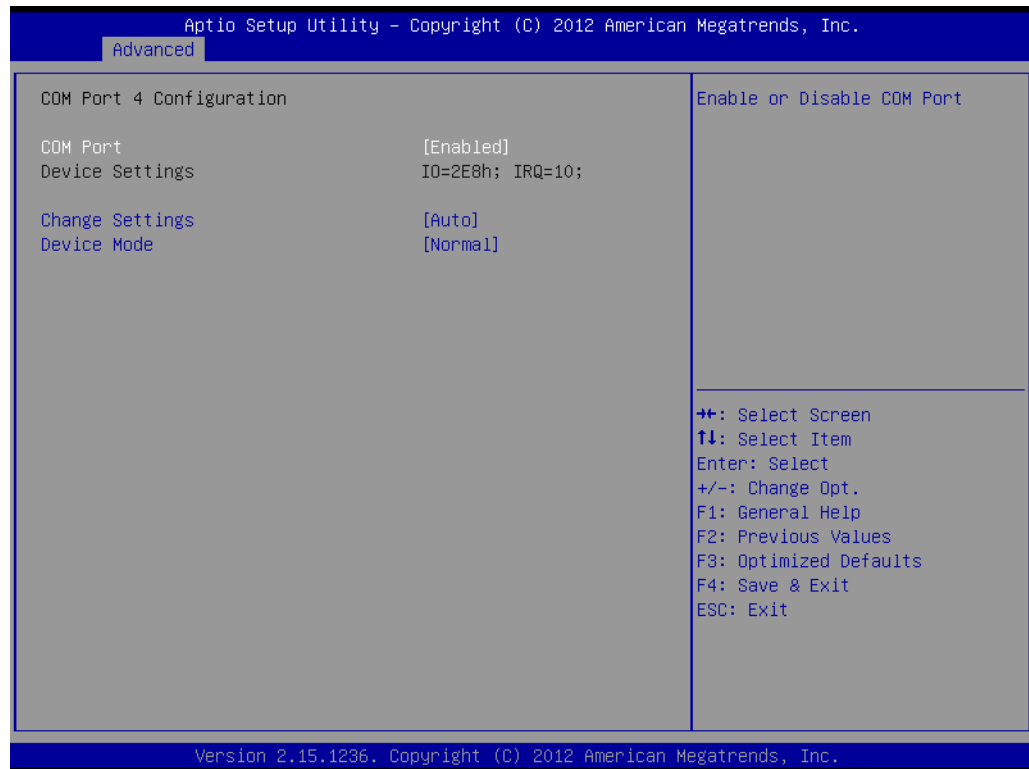


Figure C.19 COM Port 4 Configuration

- **COM Port 4**
This item allows users to enable or disable a COM Port.
- **Change settings**
This item allows users to select an optimal setting for the Super IO device.
- **Device Mode**
This item allows users to change the Serial Port mode. Select <High Speed> or <Normal mode> mode.

Hardware Monitor

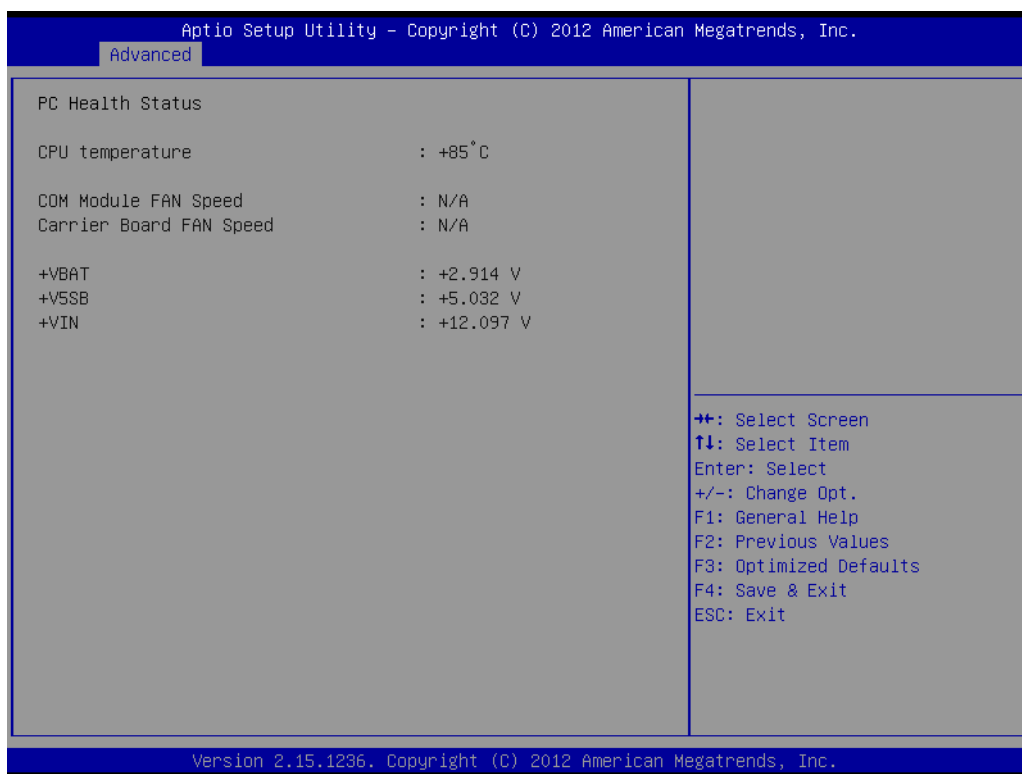


Figure C.20 Hardware Monitor

This item monitor hardware status.

C.2.2.10 Serial Port Console Redirection

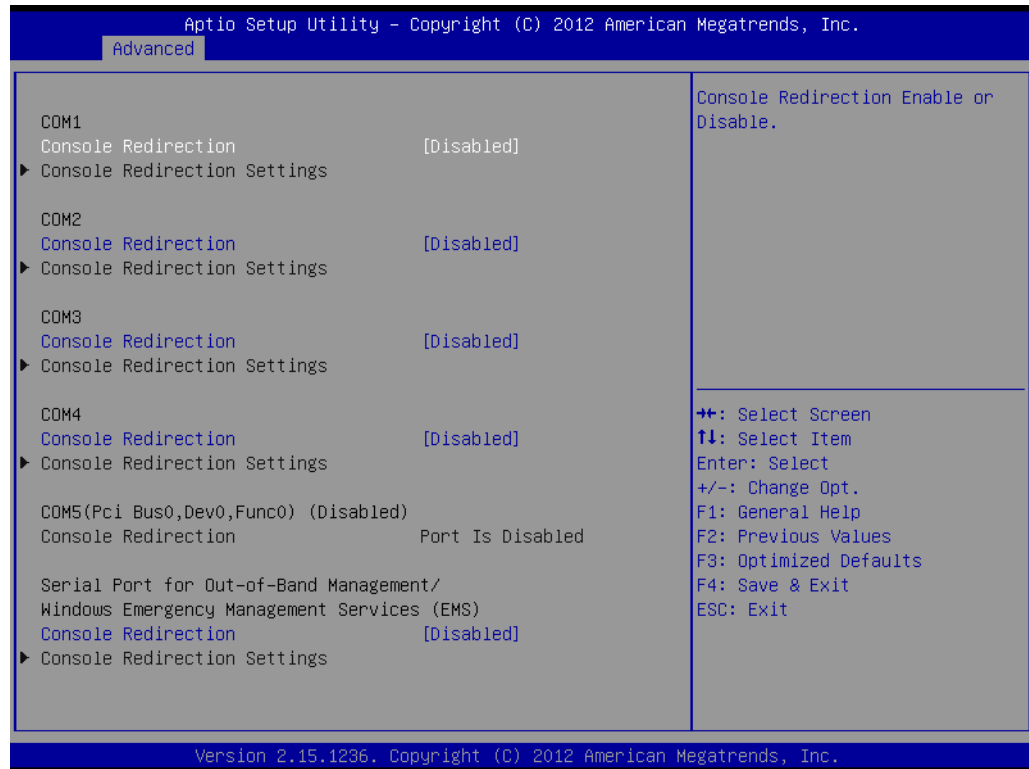


Figure C.21 Serial Port Console Redirection

- **COM1 Console Redirection**
This item allows users to enable or disable Console Redirection.
- **COM2 Console Redirection**
This item allows users to enable or disable Console Redirection.
- **COM3 Console Redirection**
This item allows users to enable or disable Console Redirection.
- **COM4 Console Redirection**
This item allows users to enable or disable Console Redirection.
- **EMS Console Redirection**
This item allows users to enable or disable Console Redirection.

C.2.3 Chipset

Select the Chipset tab from the ECU-4784 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.

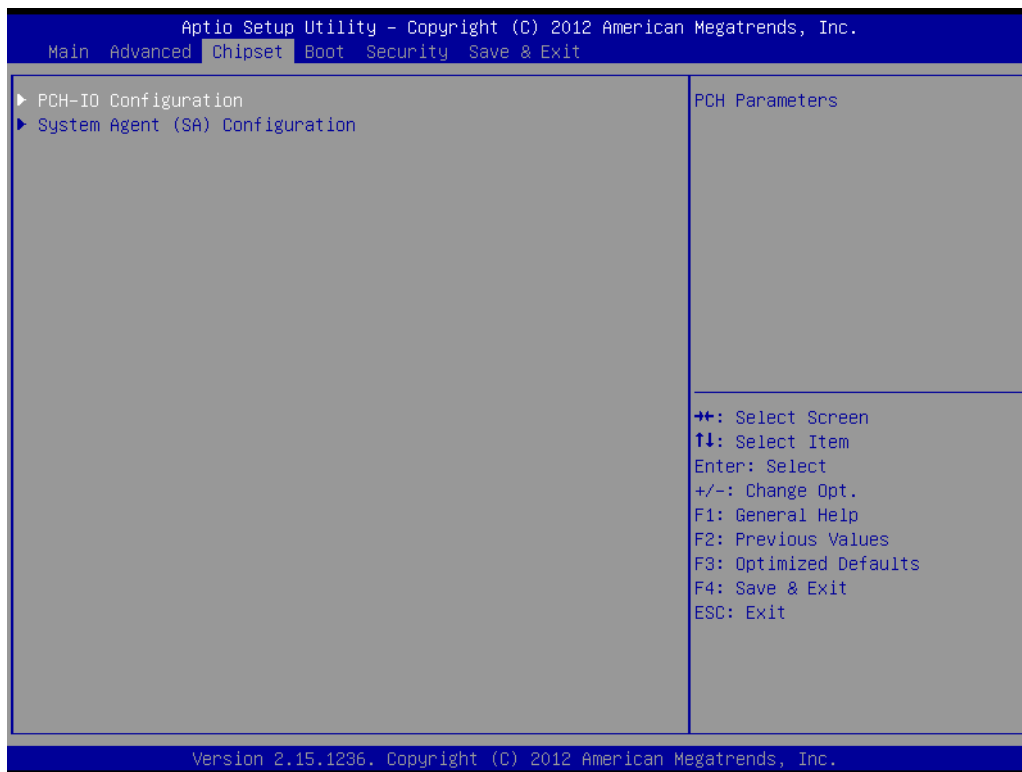


Figure C.22 Chipset Setup

- **PCH-IO Configuration**
This item allows users to change PCH Parameters.
- **System Agent (SA) Configuration**
This item allows users to change System Agent (SA) Parameters.

C.2.3.1 PCH-IO Configuration

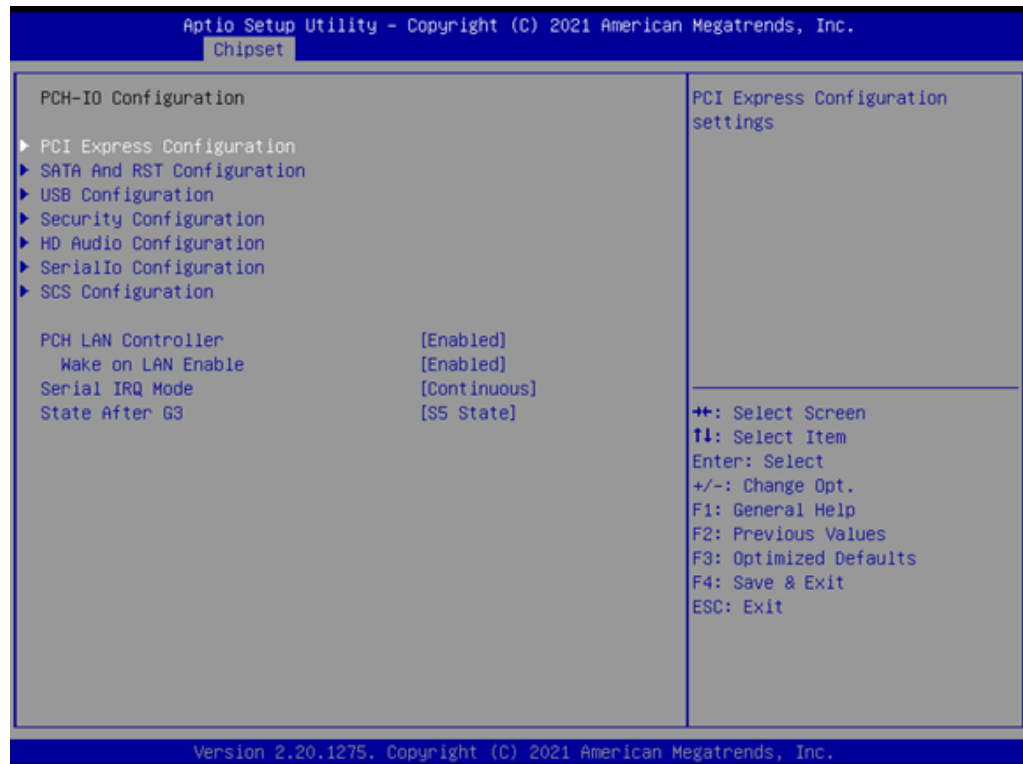


Figure C.23 PCH-IO Configuration

- **PCI Express Configuration**
This item allows users to change PCI Express Configuration settings.
- **USB Configuration**
This item allows users to change USB Configuration settings.
- **PCH LAN Controller**
This item allows users to enable or disable onboard NIC.
- **Wake on LAN**
This item allows users to enable or disable integrated LAN to wake the system.
(The Wake on LAN cannot be disabled if ME is no at Sx State.)

C.2.3.1.1 PCI Express Configuration



Figure C.24 PCI Express Configuration

- **PCI Express Clock Gating**
This item allows users to enable or disable PCI Express Clock Gating for each root port.
- **DMI Link ASPM Control**
This item allows users to enable or disable DMI Link ASPM Control. The Control of Active State Power Management on both NB side and SB side of the DMI Link.
- **PCI Express Root Port 1**
This item allows users to change PCI Express Root Port 1 settings.
- **PCI Express Root Port 2**
This item allows users to change PCI Express Root Port 2 settings.
- **PCI Express Root Port 3**
This item allows users to change PCI Express Root Port 3 settings.
- **PCI Express Root Port 4**
This item allows users to change PCI Express Root Port 4 settings.

PCI Express Root Port 1 Configuration

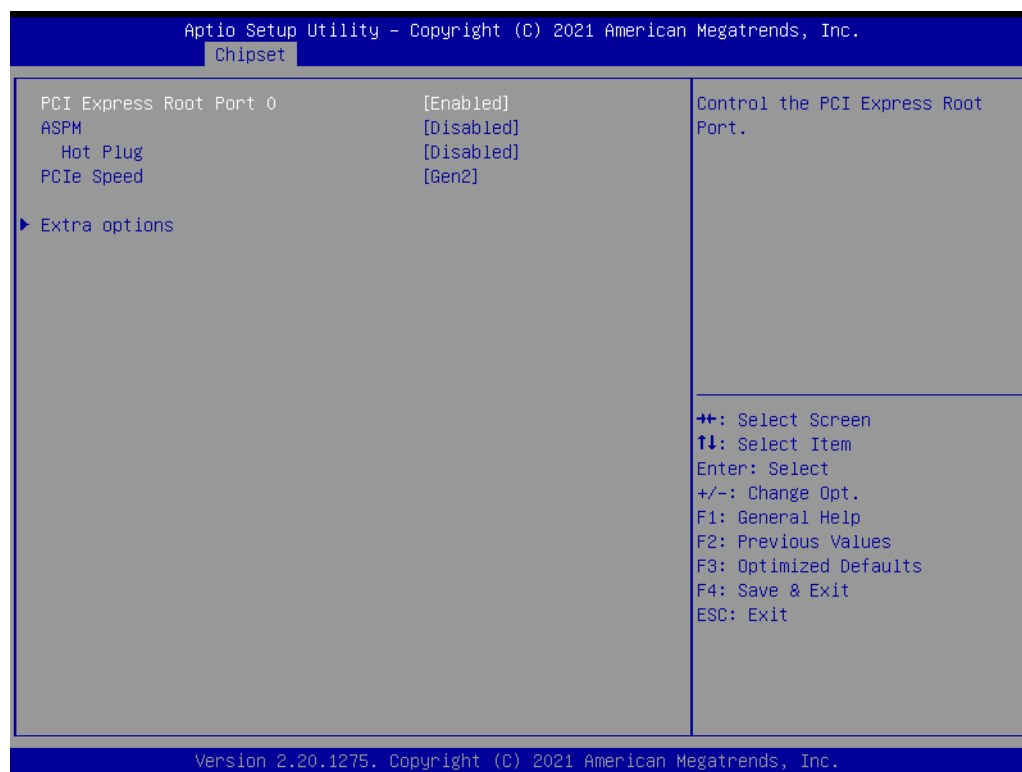


Figure C.25 PCI Express Root Port 1 Configuration

- **PCI Express Root Port 1**
This item allows users to enable or disable PCI Express Root Port.
- **ASPM Support**
This item allows users to set the ASPM level. Force L0s- Force all links to L0s state.
Auto-BIOS auto configure Disable- disables ASPM L1 Substates
This item allows users to change L1 Substates settings.
- **Hot Plug**
This item allows users to enable or disable Hot Plug.
- **PCIe Speed**
This item allows users to select PCIe Speed.

PCI Express Root Port 2 Configuration

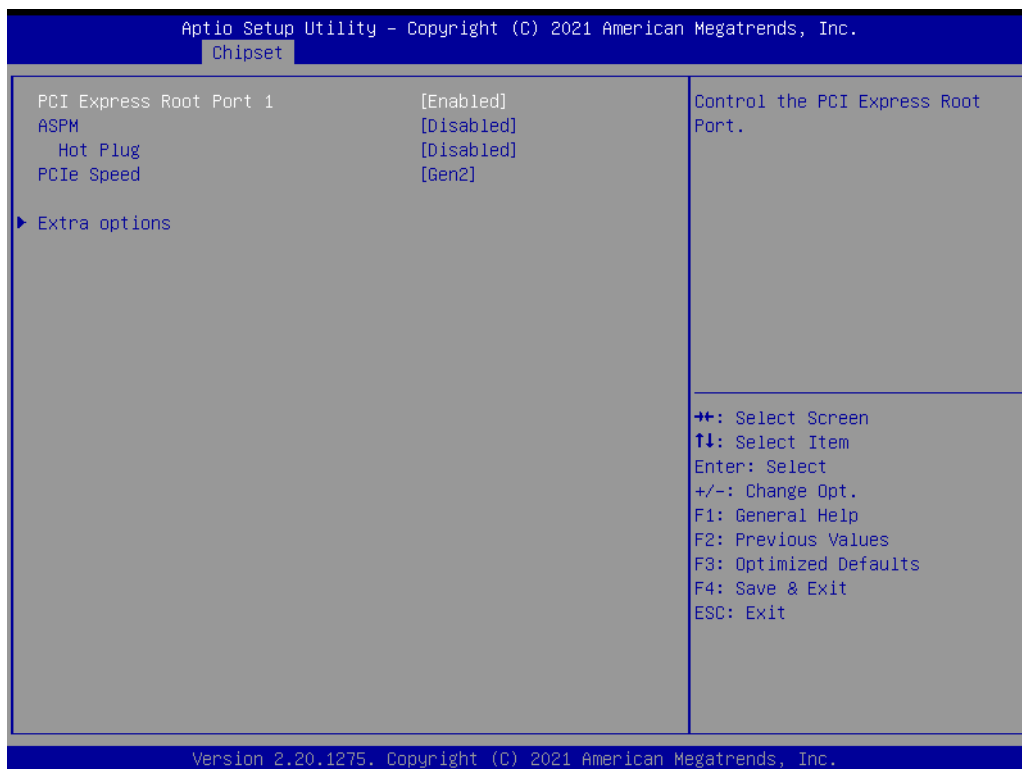


Figure C.26 PCI Express Root Port 2 Configuration

- **PCI Express Root Port 2**
This item allows users to enable or disable PCI Express Root Port.
- **ASPM Support**
This item allows users to set the ASPM level.
Force L0s- Force all links to L0s state. Auto-BIOS auto configure.
Disable- disables ASPM.
- **Hot Plug**
This item allows users to enable or disable Hot Plug.
- **PCIe Speed**
This item allows users to select PCIe Speed.

PCI Express Root Port 3 Configuration

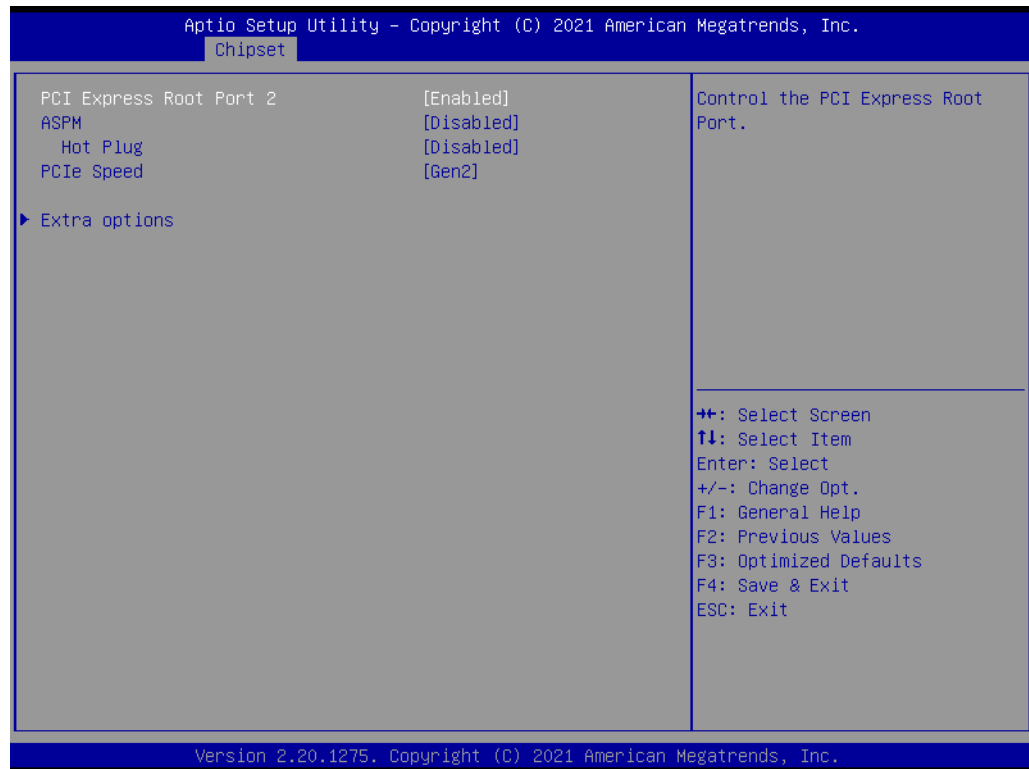


Figure C.27 PCI Express Root Port 3 Configuration

- **PCI Express Root Port 3**
This item allows users to enable or disable PCI Express Root Port.
- **ASPM Support**
This item allows users to change L1 Substates settings.
- **Hot Plug**
This item allows users to enable or disable Hot Plug.
- **PCIe Speed**
This item allows users to select PCIe Speed.

PCI Express Root Port 4 Configuration

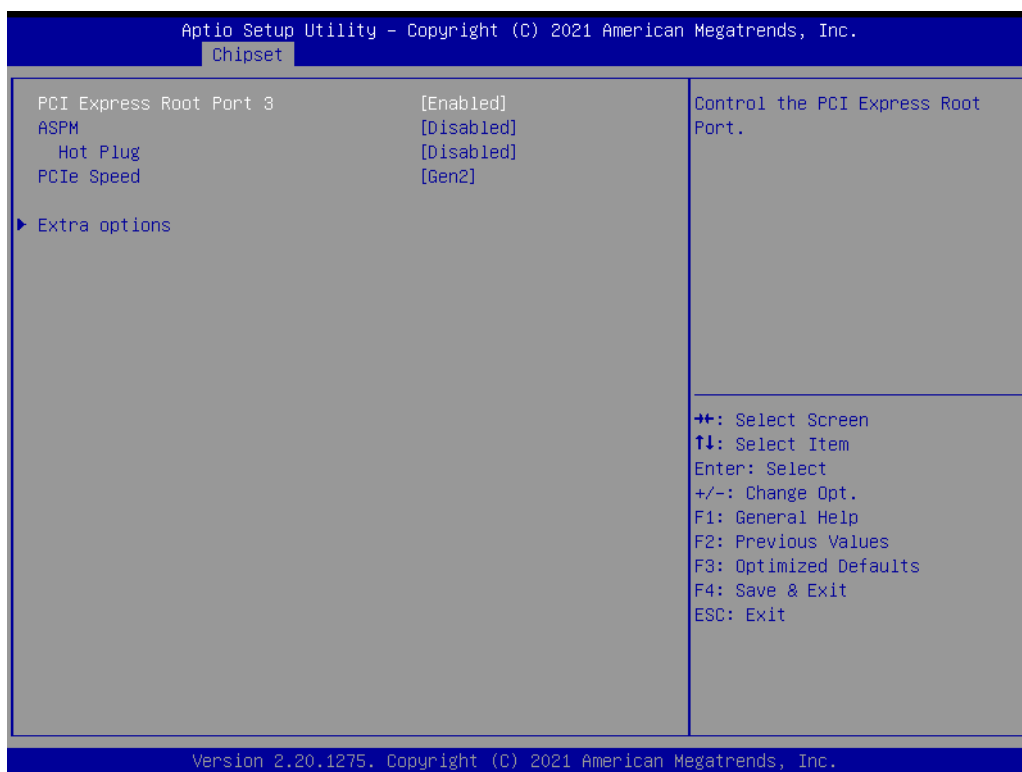


Figure C.28 PCI Express Root Port 4 Configuration

- **PCI Express Root Port 4**
This item allows users to enable or disable PCI Express Root Port.
- **ASPM Support**
This item allows users to change L1 Substates settings.
- **Hot Plug**
This item allows users to enable or disable Hot Plug.
- **PCIe Speed**
This item allows users to select PCIe Speed.

C.2.3.2 System Agent (SA) Configuration

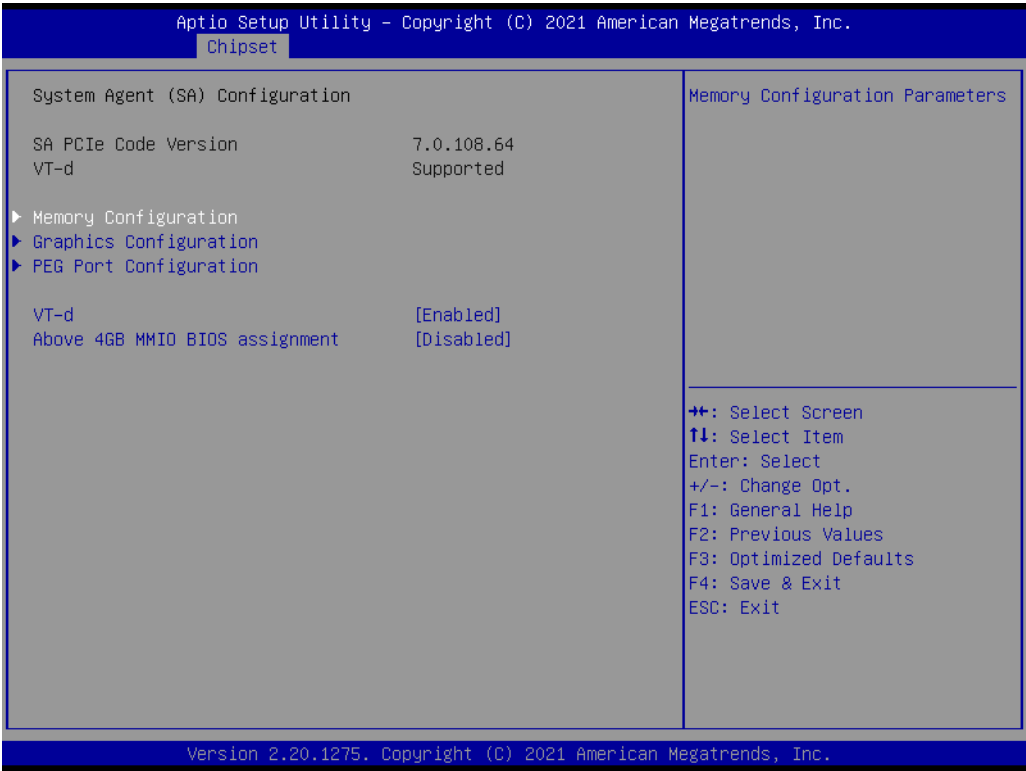


Figure C.29 System Agent (SA) Configuration

- **VT-D**
This item allows users to enable or disable VT-d function.
- **Graphics Configuration**
This item allows users to change graphics setting.
- **Memory Configuration**
This item allows users to change memory configuration parameters.

C.2.3.2.1 Graphics Configuration

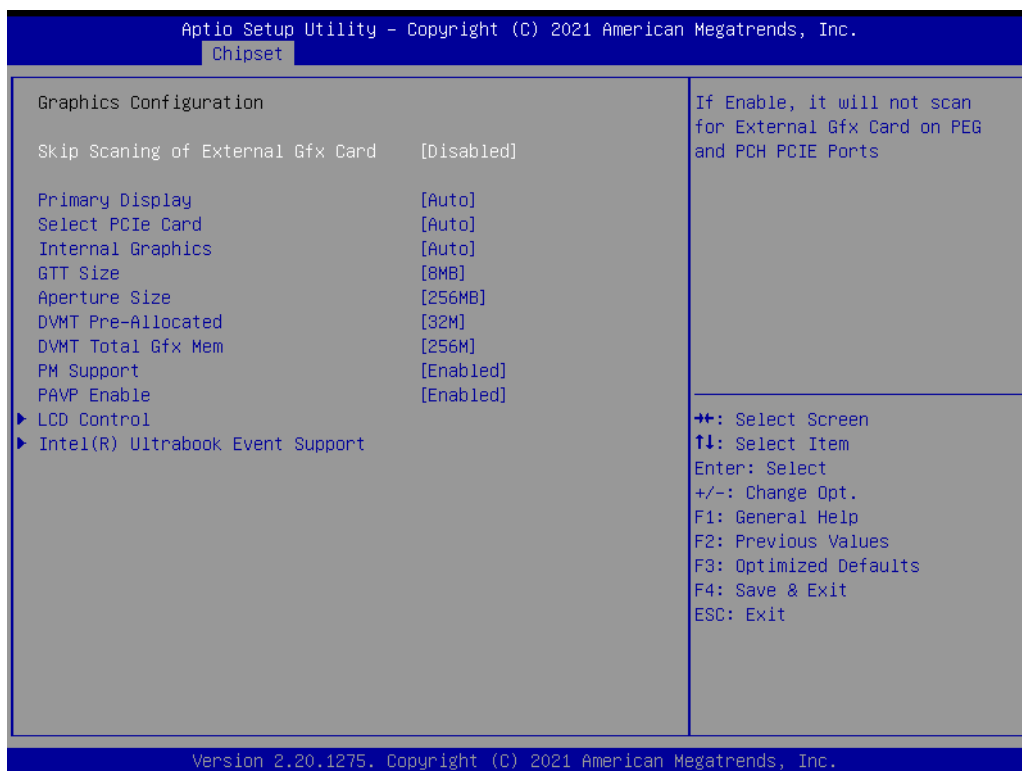


Figure C.30 Graphics Configuration

- **Primary Display**
This item allows users to select which of IGFX/PEG/PCI Graphics device should be Primary display or select SG for Switchable Gfx.
- **Internal Graphics**
This item keeps IGD enabled based on the setup options.
- **Aperture Size**
This item allows users to change Aperture Size.
- **DVM T Pre-Allocated**
This item allows users to select DVM T 5.0 Pre-allocated (fixed) graphics memory size used by the internal graphics device.
- **DVM T Total Gfx Mem**
This item allows users to select DVM T 5.0 total graphic memory size used by the internal graphics device.

LCD Control

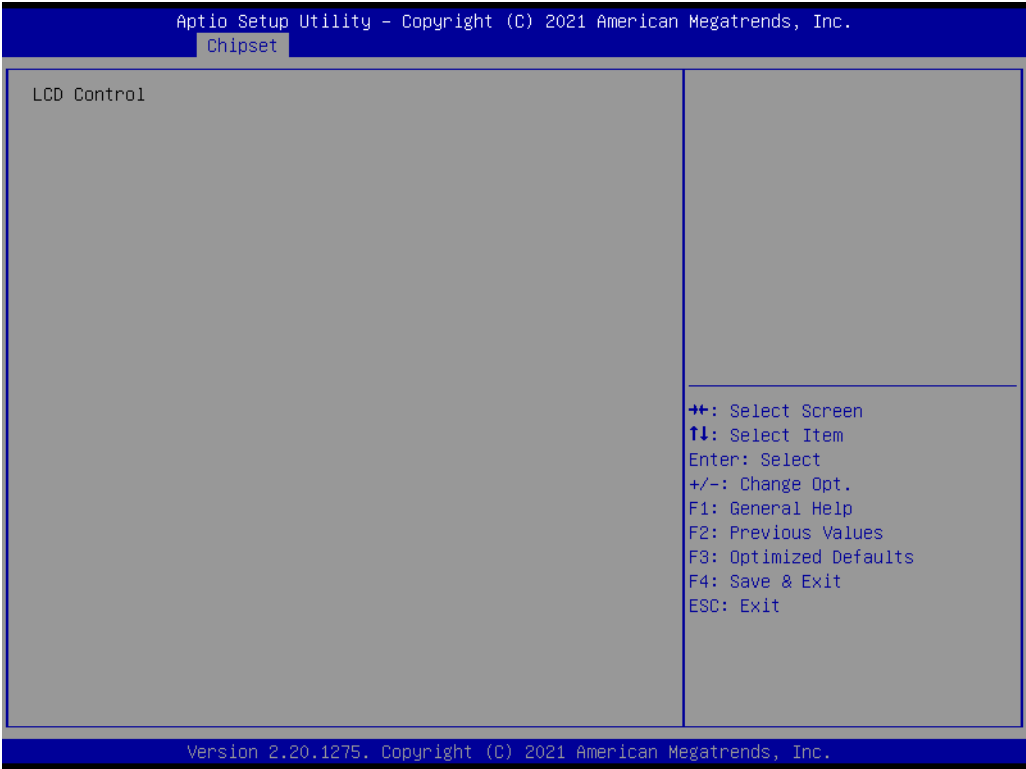


Figure C.31 LCD Control

This item allows users to perform LCD control.

C.2.3.2.2 Memory Configuration

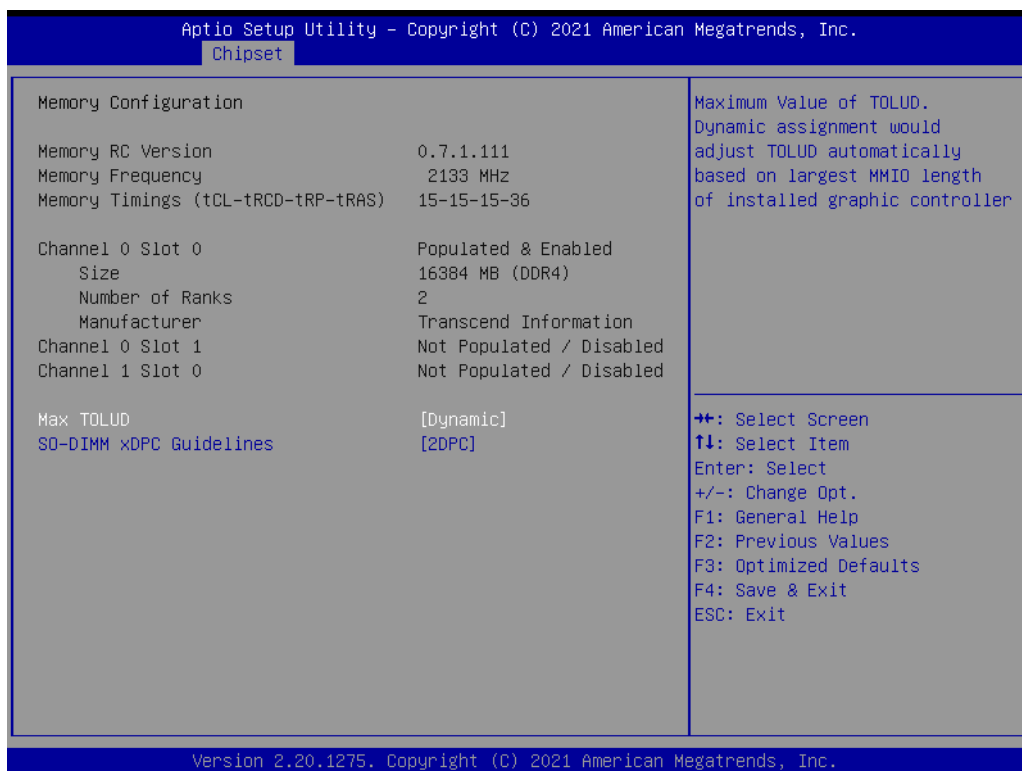


Figure C.32 Memory Configuration

■ Memory Information

This item shows memory configuration parameters.

C.2.4 Boot

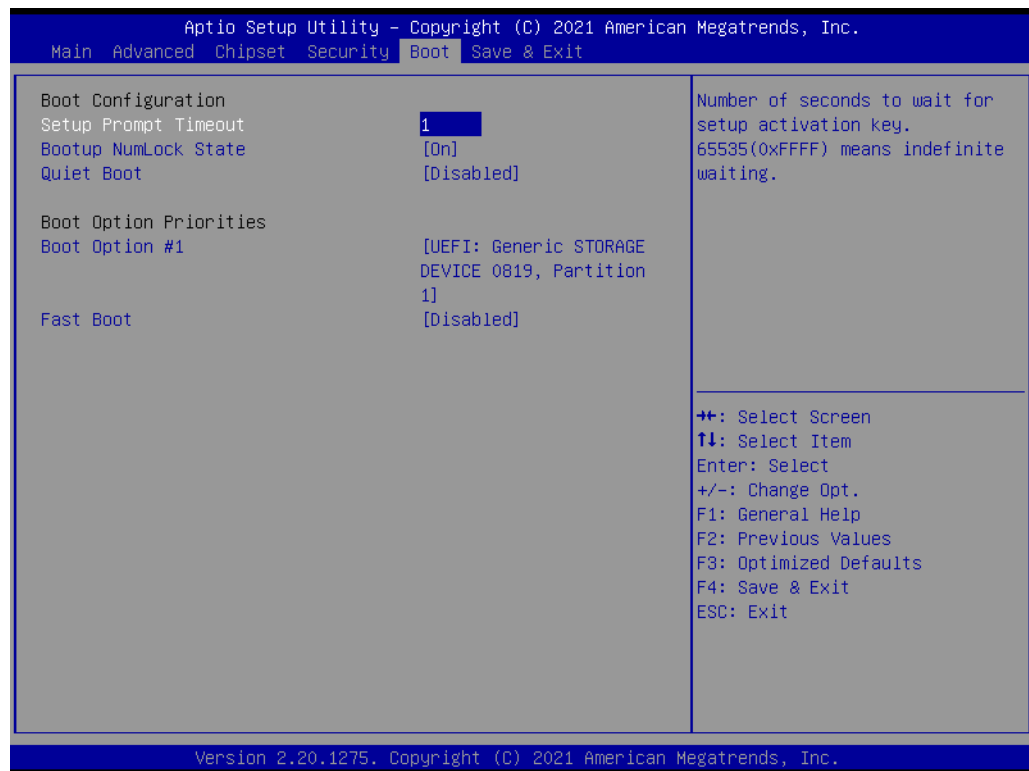


Figure C.33 Boot Setup Utility

- **Setup Prompt Timeout**
This item allows users to select the number of seconds to wait for setup activation key.
- **Bootup NumLock State**
Select the keyboard NumLock state.
- **Quiet Boot**
This item allows users to enable or disable Quiet Boot option.
- **Fast Boot**
This item allows users to enable or disable boot with initialization of a minimal set of devices required to launch active boot option. It has no effect for BBS boot options.
- **Boot Option #1**
This item allows users to set the system boot order.

C.2.5 Security Setup

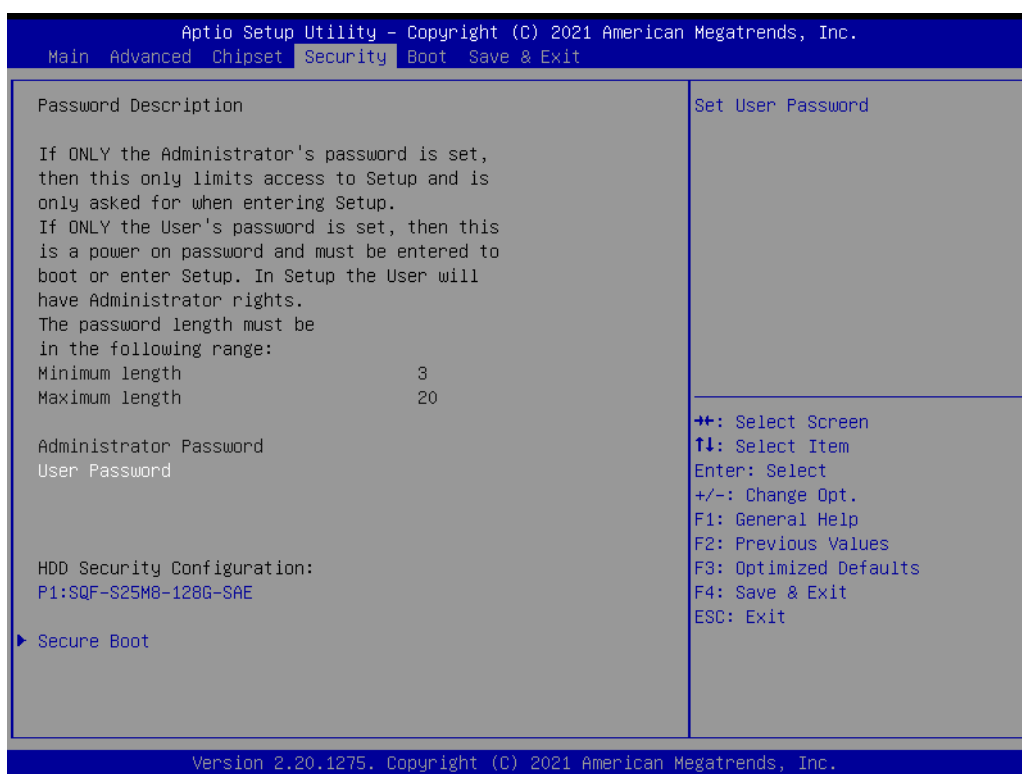


Figure C.34 Security Setup

All Security Setup options, such as password selection is 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.

C.2.6 Save & Exit

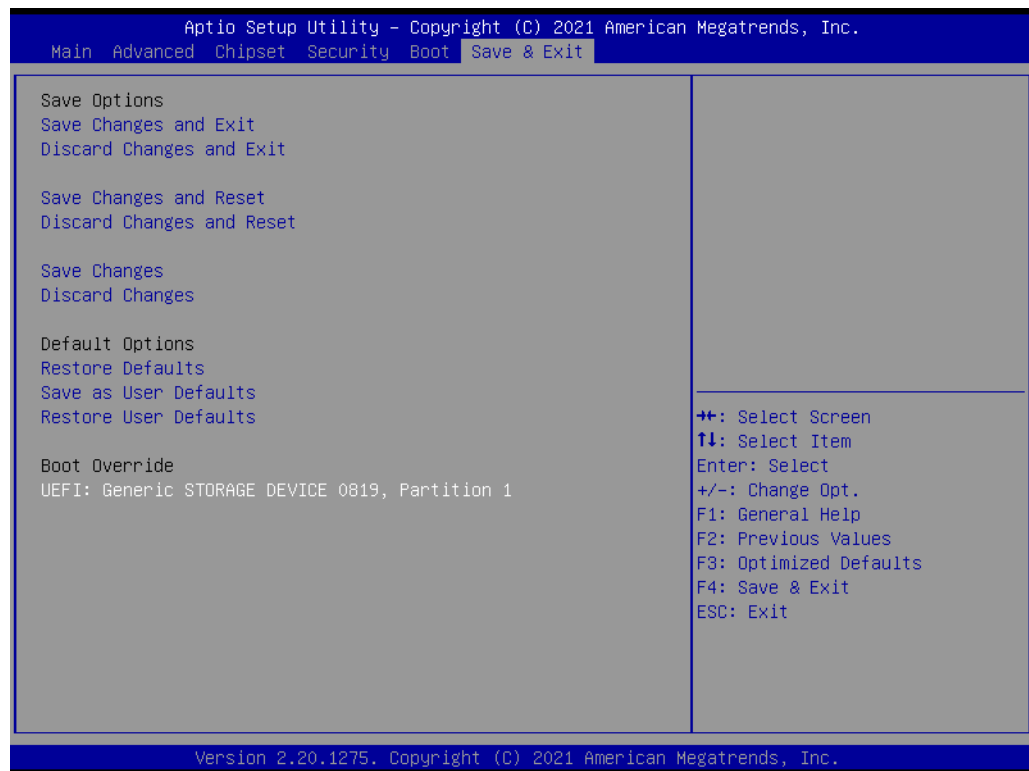


Figure C.35 Save & Exit

- **Save Changes and Exit**
When users have completed system configuration, select this option to save changes, exit BIOS setup menu and reboot the computer if necessary to take effect all system configuration parameters.
- **Discard Changes and Exit**
Select this option to quit Setup without making any permanent changes to the system configuration.
- **Save Changes and Reset**
When users have completed system configuration, select this option to save changes, exit BIOS setup menu and reboot the computer to take effect all system configuration parameters.
- **Discard Changes and Reset**
Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer.
- **Save Changes**
When users have completed system configuration, select this option to save changes without exit BIOS setup menu.
- **Discard Changes**
Select this option to discard any current changes and load previous system configuration.
- **Restore Defaults**
The SOM-5899 automatically configures all setup items to optimal settings when users select this option. Optimal Defaults are designed for maximum system performance, but may not work best for all computer applications. In partic-

ular, do not use the Optimal Defaults if the users computer is experiencing system configuration problems.

- **Save User Defaults**

When users have completed system configuration, select this option to save changes as user defaults without exit BIOS setup menu.

- **Restore User Defaults**

The users can select this option to restore user defaults.

- **Boot Override**

This item allows users to choose boot device.



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