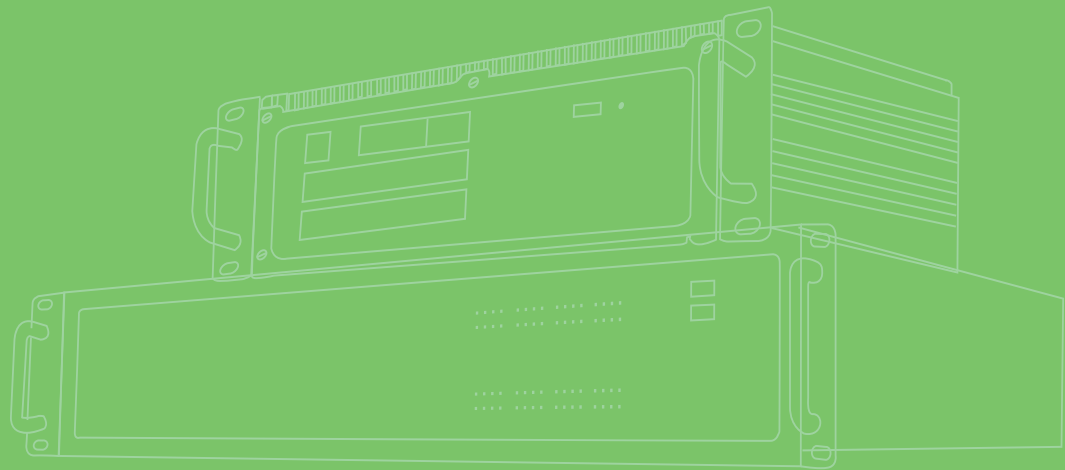


User Manual



ECU-4784 Series

**Intel® Haswell Core i7/Intel
Haswell Core i3/ Intel Celeron
2980U/ Intel Skylake Xeon E3
Quad-Core Power & Energy
Automation Computer with
8 x LAN, 10 x COM and 2 x
Expansion Slots**

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 for ECU-4784 Series.

Product Warranty (2 years)

Advantech warrants to you, 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 which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which 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 of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

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 you get 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 an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it 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 kind of cable is available from Advantech. Please contact your local supplier for ordering information.

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 interference in which case the user is required to correct interference at his own expense.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
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 you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it 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. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. 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 by transient overvoltage.
12. Never pour any 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 one of the following situations arises, get the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well, or you cannot get it to work according to the user's manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.
15. **DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -25° C (-13° F) OR ABOVE 70° C (158° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.**
16. **CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE 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.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

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

Safety Precaution - 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 your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

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Chapter 1

Overview

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

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 the station level (HMI/SCADA), Advantech's ECU-4784 Series computers can operate as Smart substation station level Communication server; HMI/SCADA work station; Remote Control Station; cyber security servers (UTM); and Environment Status Monitoring station, and thereby System Integrators are able to design the optimized digital substation automation system while allowing energy operators to deliver electricity 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 of smart grid automation ; It provide high performance and reliable functionality to meet the most critical computing applications for Virtualization solutions to reduce project deployment and maintenance costs ; Support Remote monitoring and diagnosis for the remote device connectivity to enhance management and maintenance efficiency; Easy to expand domain I/O with its modular design, Protect the system to meet the critical security application requirement.

High-performance Computing Platforms for Power and Energy Automation Applications

- High Computing performance processor to meet the most critical computing applications by VT-D (support VMWare), which can run multiple software application to built the excellent SCADA Performance, energy operators can leverage virtual machine (VM) resources on the ECU-4784 to reduce project deployment cost.
- High Integrated Application in the All in one server platform to enhance the Smart Substation's station level project deployment efficiency by integrate HMI Visualization, Monitoring, and Control with Data Concentrator & Protocol Converter to finish all the station level task, these function would be implemented by the different data collection Gateway and SCADA station combination before.

Certification for Robust and Reliability System

- IEC-61850-3 and IEEE 1613 certification stand for the highest reliability , which are made to withstand vibration, electrical surges, fast transients, and extreme temperatures. It will be bring more confident to the customer to apply ECU-4784 in the other industry (Oil and Gas, telecommunication station, Industry network & security firewalls, harsh environments etc).
- ECU-4784 Series support TUV IEC 61850-3 and IEEE 1613 certification, ECU-4784 has higher standard than other embedded automation controller and contributes to higher reliability and stability, suitable for any Global P&E automation market and harsh environment.
- ECU-4784 Series is designed for the applications in substation where is supposed to have certain electric interference. Equipped with isolated power, isolated communication ports, ECU-4784 Series has high resistance toward electrical noise. It has been proved not only can work well in substation but also suitable for any harsh applications.

Easy to Diagnose System & Communication and Enhance Maintenance Efficiency

- Remote Monitor & Diagnose and Manage System to provide the high system maintenance efficiency by AMT(built in Remote KVM) to quick access to remote device's desktop for diagnosis and troubleshooting without on-site technical support to reduce maintenance costs. iCDManager Design provides remote monitoring (instant alert & event Log) and diagnosis for the remote device connectivity to enhance network communication maintenance efficiency

Easy to expand domain I/O by functional modules and enhance maintenance efficiency

- Combined with two domain I/O slots to bring more flexible industrial application for customer to extend more rich data collection channel & variety.
- Integrated Functional module design is convenient for wiring, installing and maintaining.

1.2 Hardware Specifications

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") fits into standard 19 inch rack
- **Enclosure:** SECC & Aluminum
- **Mounting:** 2U Rack mount
- **Power Consumption:** 19 W/220VAC or VDC (Typical)
- **Power Requirements:** 100 ~ 240 VAC or 100 ~ 240 VDC;
- **Power Type:** ATX, AT
- **Weight:** 6.0 kg
- **System Design:** Fan less design
- **OS Support:** Windows7, Windows8, Window server 2008 R2 (64bits)
WES7, Windows server 2012R2, Windows Embedded8 (64bits), Linux
iCDManager: intelligent Connectivity Diagnose and Manager Software

System Hardware

- **CPU:**
 - ECU-4784-D55SBE: Intel Haswell Core i7
 - ECU-4784-D56SBE: Intel Haswell Core i7
 - ECU-4784-E15SAE: Intel Haswell Core i3
 - ECU-4784-C25SAE: Intel Celeron 2980U
 - ECU-4784-E56SAE: Intel Skylake Xeon E3 quad-core
- **Memory:** DDR3L 1.35V non-ECC 8G (Up to 16G by 2 Piece 8G)
DDR4 1.2V ECC 16G (Up to 32G, ECU-4784-E56SAE)
- **Indicators:** LEDs for Power, HDD, Programmable LED, LAN (Active, Status) and Serial (Tx, Rx)
- **Storage:** 2 x 2.5" SATA HDD(RAID 0,1); 1 x CFast socket
- **Display:** DB15 VGA connector, 1 x DVI-D, 1920 x 1200 @ 60 HZ
- **Watch Dog Timer:** Programmable 256 levels time interval, from 1 to 255 seconds for each tier (Super I/O Chip: W83627HG)

I/O Interface

- **Serial Ports:**
 - 2 x DB-9 RS-232 (5-Pin)
 - 8 x screw terminals with 3-wired RS-422/485 (Terminal Block) (Automatic RS-485 data flow control) 2,000 VDC isolation
- **Serial Port Speed:**
 - (COM1, COM2) RS-232: 50 ~ 115200 bps,
 - (COM3 ~ COM8) RS-422: 50 ~ 115200 bps, RS-485: 50 ~ 921600 bps
- **LAN:**
 - 1 x 10/100/1000 Base T RJ45 ports (Intel i218LM Gigabit Ethernet Controller, AMT, Teaming Function, PXE);
 - 7 x 10/100/1000 Base T RJ45 ports (Intel i210 Gigabit Ethernet Controller, Teaming Function, PXE)
- **USB Ports:** 6 x USB, UHCI, Rev. 2.0 compliant, 2 x Front, 3 x Rear and 1 x Internal ports. (ECU-4784-D56SBE, ECU-4784-E15SAE, ECU-4784-D45SAE front USB ports Rev. 3.0 compliant)
- **Expansion:** 2 x Domain I/O Expansions (Each Slot Supports up to 1 PCIe or 2 PCI device)
- **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, 48 hrs (ECU-4784-D55SBE/D56SBE/C25SAE/E15SAE)
 - 25 ~ 60° C (-13 ~ 140° F) IEC 60068-2-1/2 with 50% CPU/ I/O loading, 24 hrs (ECU-4784-E56SAE)
- **Operating Humidity:** 20 ~ 95% (non-condensing)
- **Safety Cert. Temperature:** -20 ~ 50° C (-4 ~ 122° F)
- **Shock Protection:** IEC 68 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

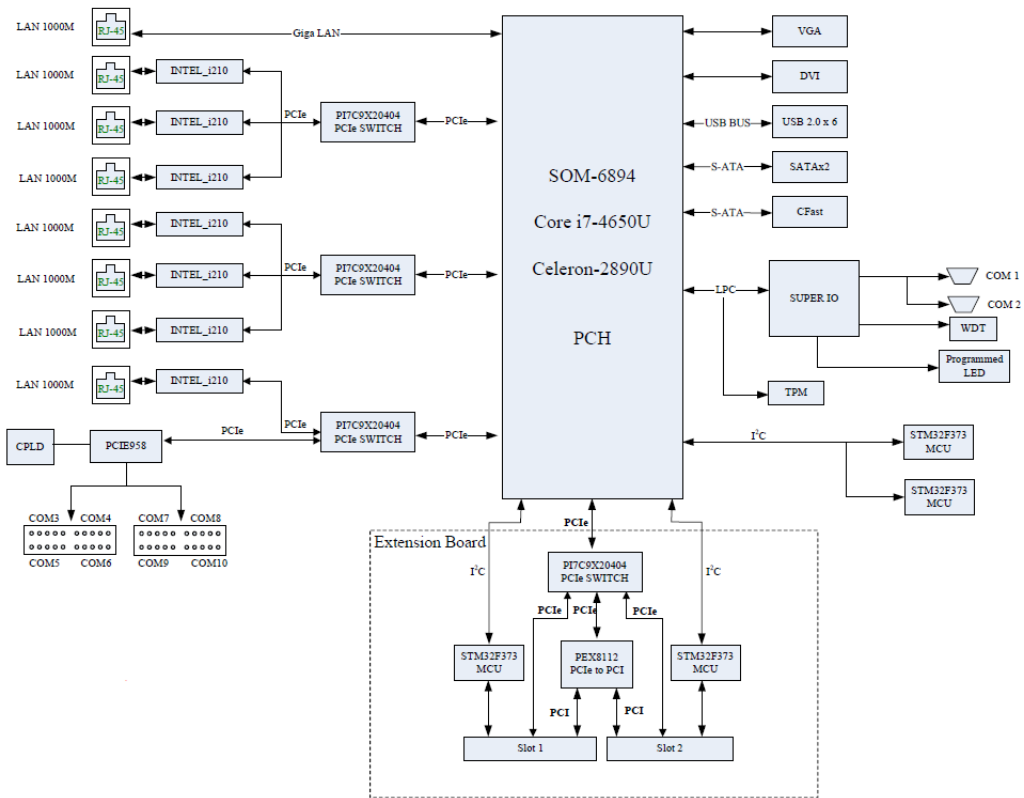


Figure 1.1 ECU-4784-C25SAE function block

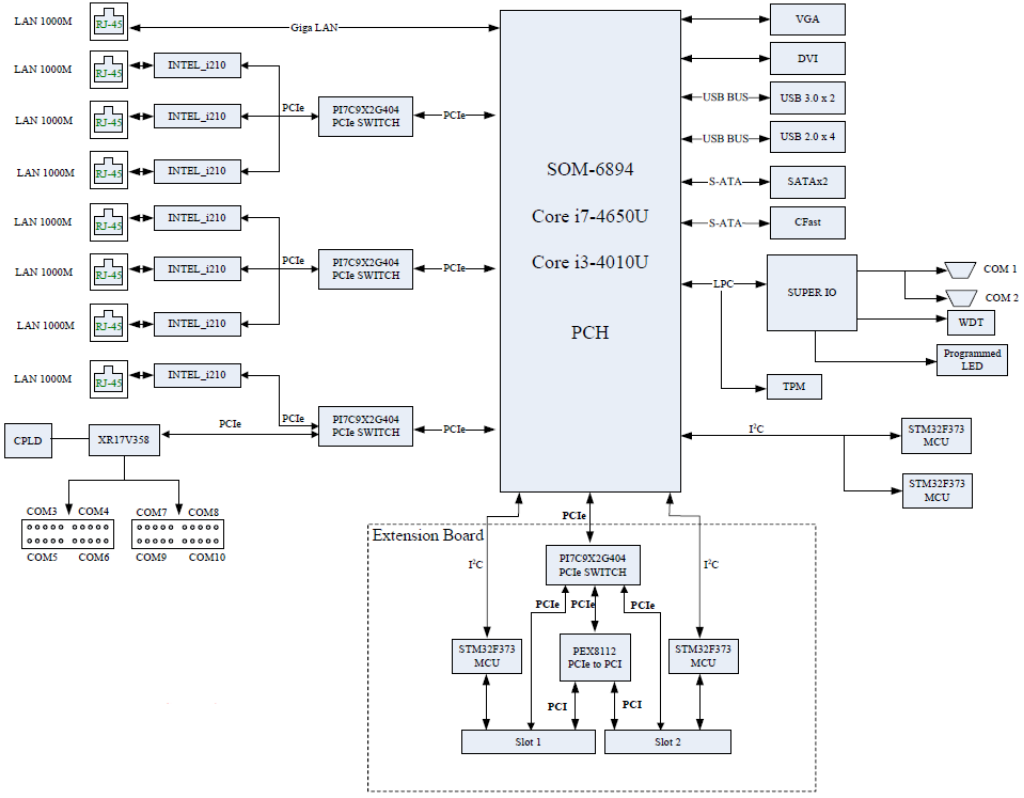


Figure 1.2 ECU-4784-D55SBE/D56SBE/E15SAE function block

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

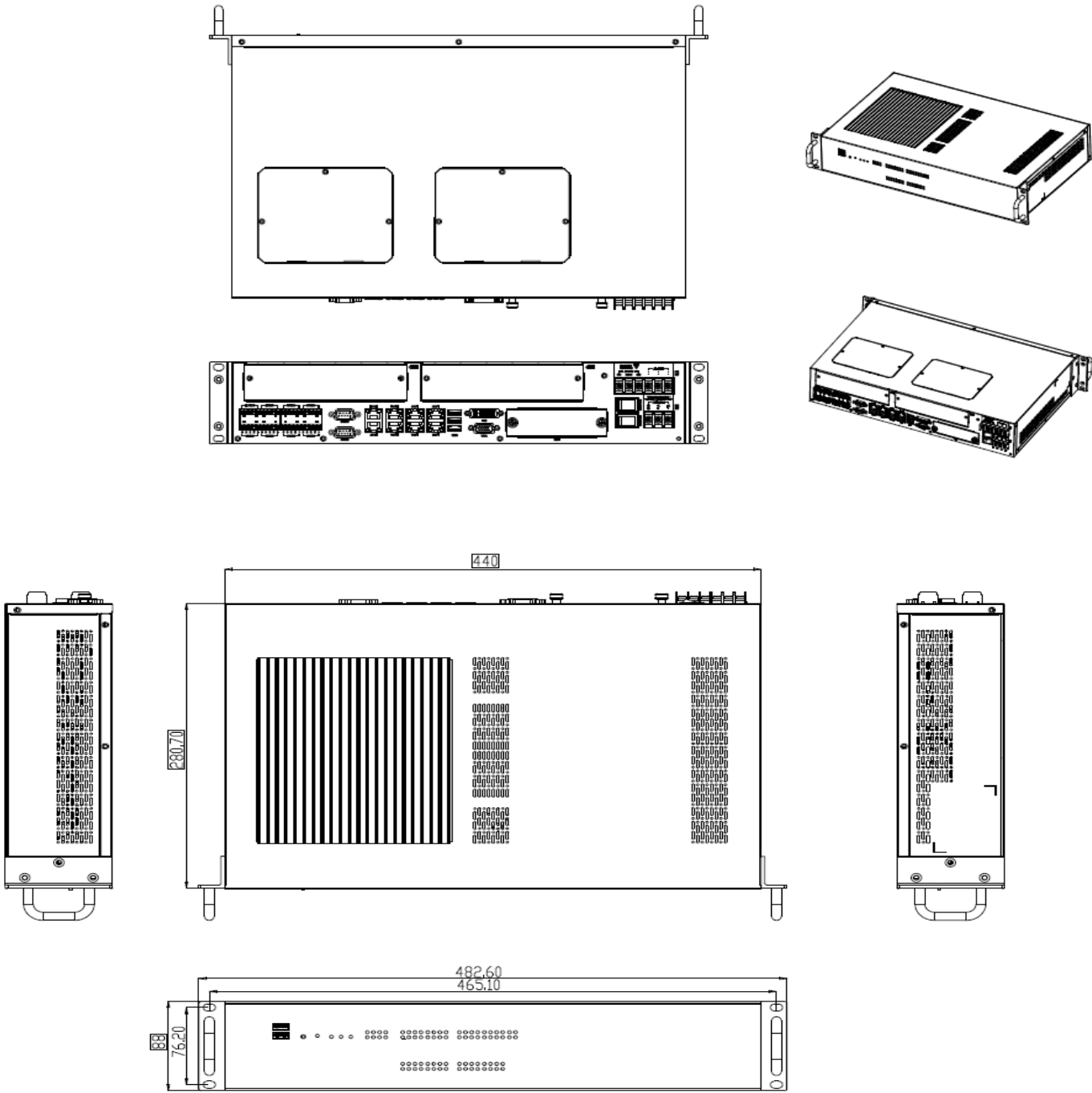


Figure 1.4 ECU-4784 Series Chassis Dimensions

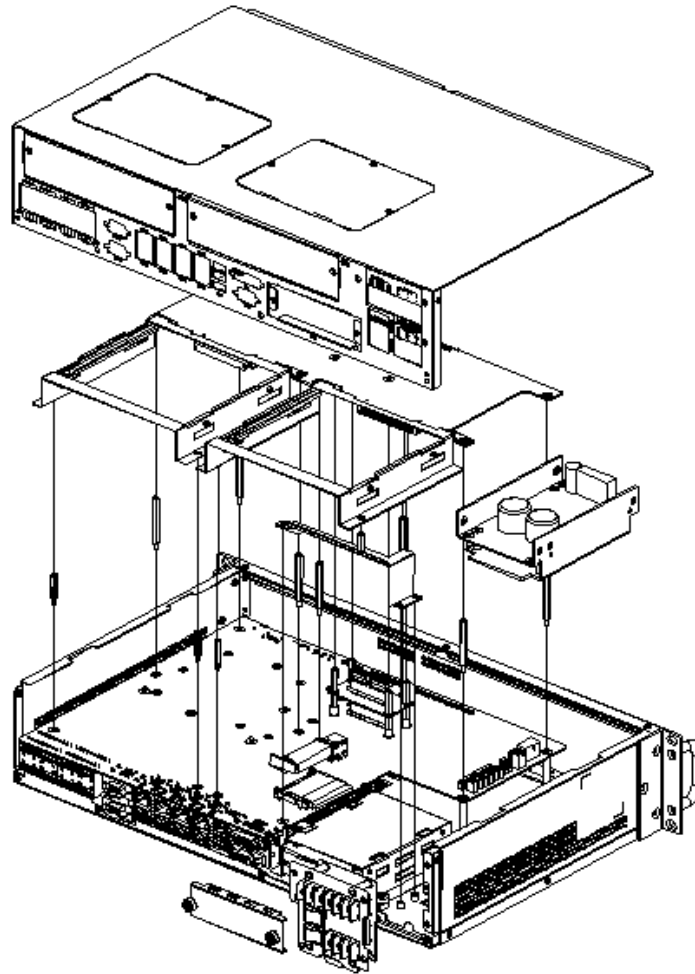


Figure 1.5 ECU-4784 Series Explode picture

1.7 Packing List

The accessory package of ECU-4784 Series contains the following items:

ECU-4784 Accessory:

- (A) 1 x ECU-4784 Product
- (B) 4 x 10-pins green screw terminals
- (C) 16 x jumper shorters
- (D) 2 x M3 black screws for USB clamp
- (E) 1 x clamp for USB dongle
- (F) 2 x HDD hold BRK(with black HDD Mylar)
- (G) 8 x M3*5L ST Ni Screw
- (H) 4 x Cu NYLOK
- (I) 1 x Label POWER2
- (J) 1x Startup manual
- (K) 1 x DVD For Product Driver and Manual DISC
- (L) 1x ROHS LIST
- (M) 1 x warranty card

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
- VGA Display
- 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 function of each peripheral.

2.1.1 ECU-4784 LED and Interface position

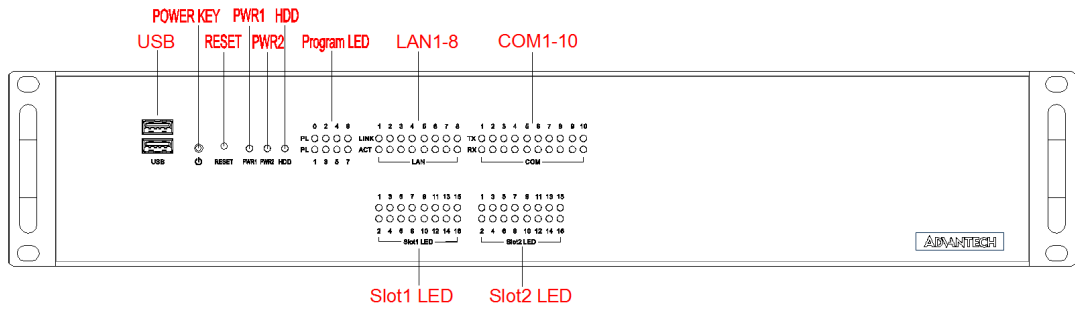


Figure 2.1 ECU-4784 Front Panel

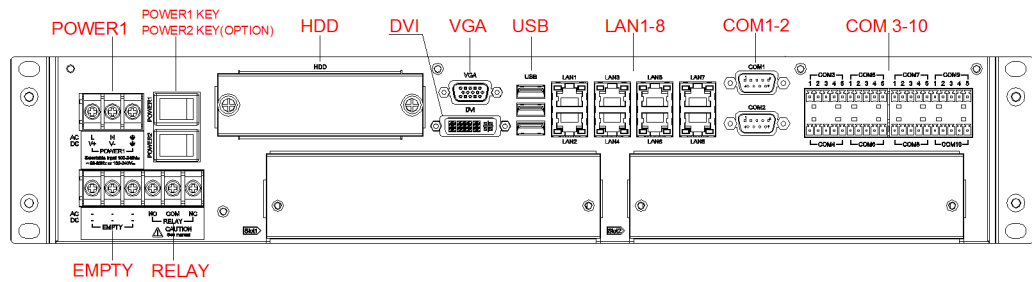
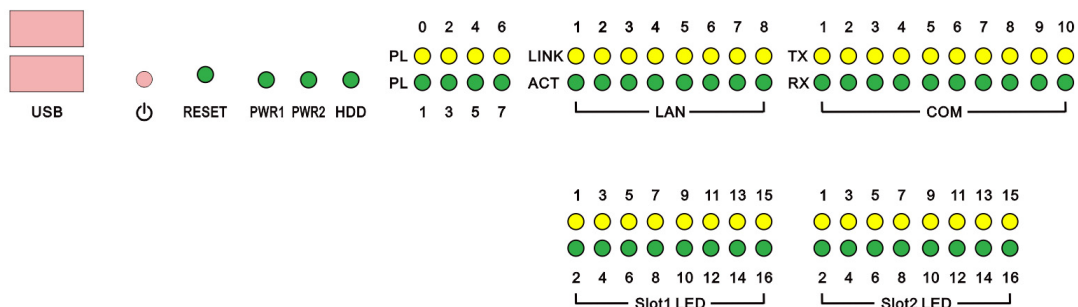


Figure 2.2 ECU-4784 Rear Panel

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



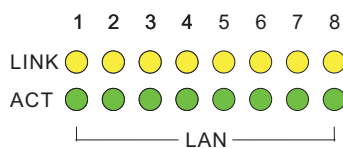
Table 2.1: Definition of System Status Indicators

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

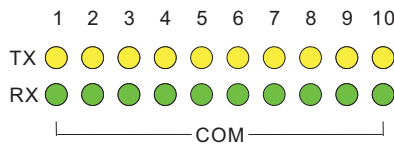


ECU-4784 LAN LED status Indicators

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

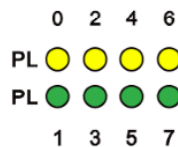


ECU-4784 (10COM) Serial Communication Status Indicators:

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

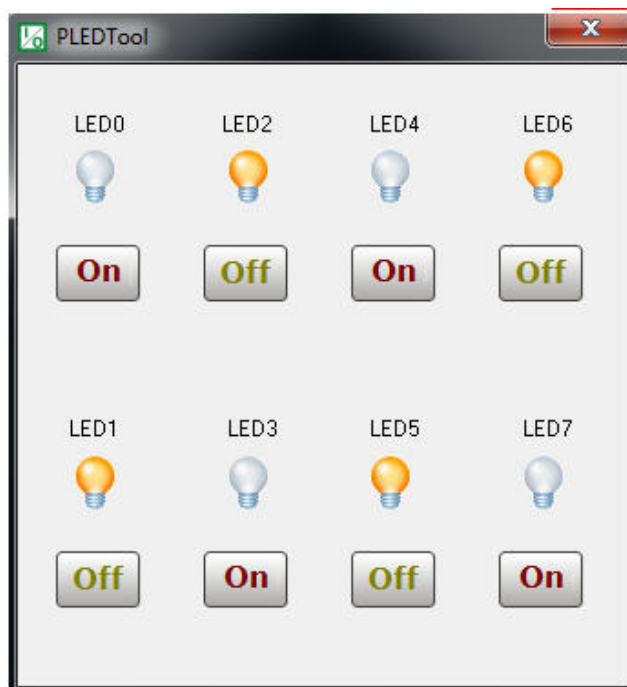


The ECU-4784 Series products provide 8 programmable indicating LEDs, which are convenient for users to control the Programmable LED state (green, off) using API programming, it can be used to indicate and edit this machines operating status, a detailed explanation of the API programming. Refer to the 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) and could 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 offering reference for users to develop their own applications. You can modify these sample applications to meet your requirements . You can find the example in the below installation path, it is 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 VAC	0.7 A 50-60 Hz	3Pin Screw Terminal
	DC	100-240 VDC	0.7 A	3Pin Screw Terminal

The function of each part is described as below:

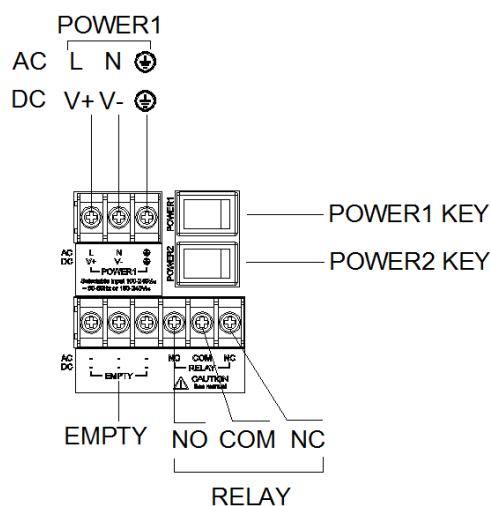


Figure 2.3 Power1 input location

Table 2.6: AC/DC Power Input PIN Definition


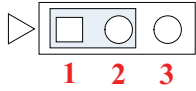
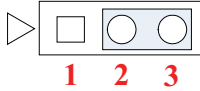
Pin	Screen printing	Function Description
1	L/V+	PWR1 L/PWR1 V+ AC/DC power input PIN
2	N/V-	PWR1 N/PWR1 V- AC/DC power input PIN
3		GND

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

Jumper setting	Description
	ATX Power Mode
CN60 (Default)	
	AT Power Mode

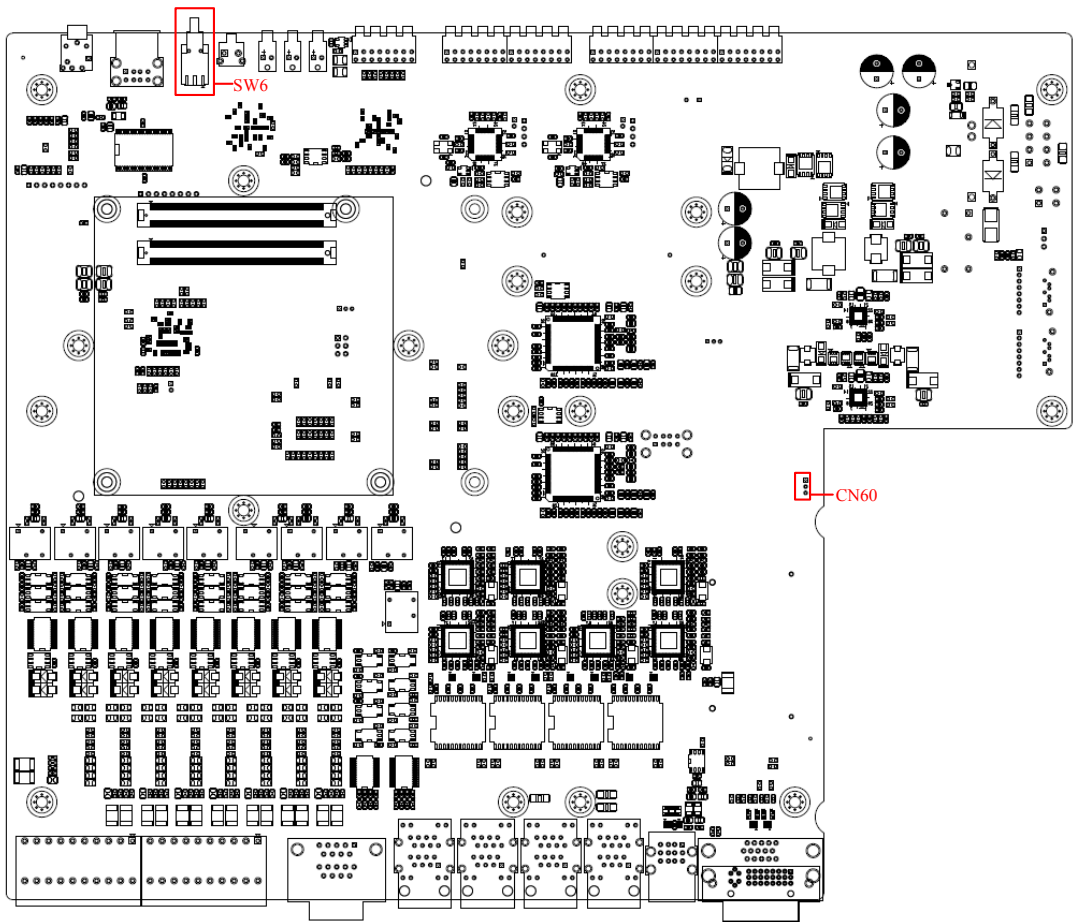


Figure 2.4 AT X /AT Power Mode Select location (CN60)

2.4 RS-232 Interface (COM1,COM2)

The ECU-4784 Series offers two standard RS-232 serial communication interface ports: COM1 and COM2. Please refer to A.1 for pin assignments. It can not support the IRQ, I/O address is the same with Supper 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 CN21 CN22 CN23	
	RS-232
	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

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

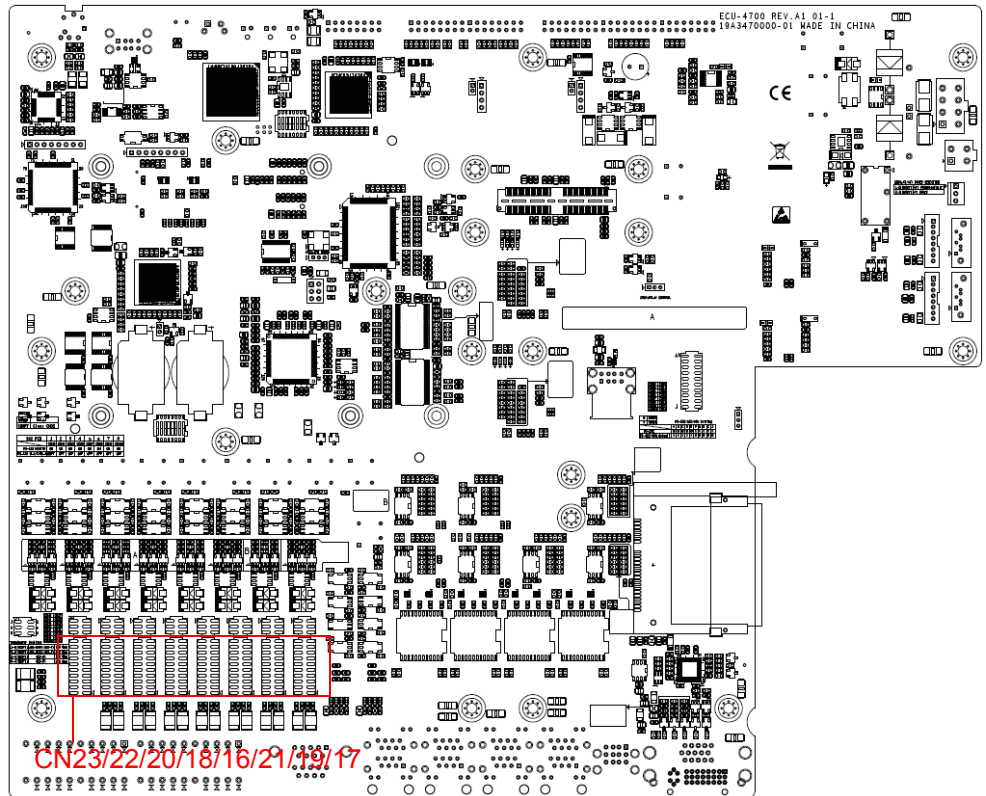


Figure 2.5 COM3~10 Port Related Jumper Locations (CN16-CN23)

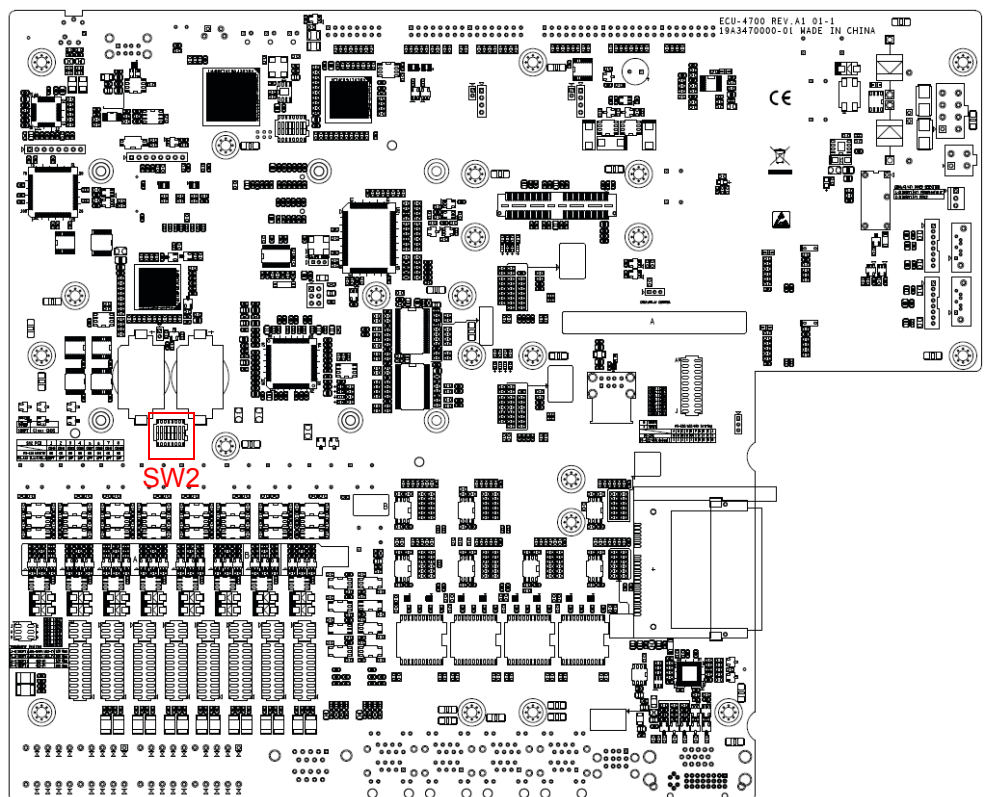


Figure 2.6 COM3~10 Port Related Jumper Locations(SW2)

2.5.1 UART Chips

ECU-4784-C25SAE comes with Oxford OxPCle958 UART containing 128bytes FIFO. ECU-4784-D55SBE/D56SBE/E15SAE/E56SAE come with EXAR XR-17V358 UART containing 256bytes FIFO.

2.5.2 RS-422/485 Detection

In RS-422/485 mode, ECU-4784 Series automatically detects signals 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 detects 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~COM18 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))

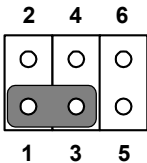
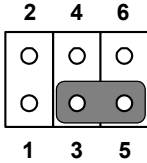
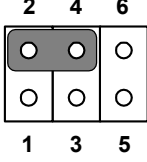
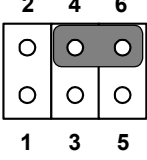
CNx	Description
	 <p>Add 120 ohm terminal resistor on TX+/TX- of RS-485</p>
CN27 CN28 CN29 CN30	 <p>Add 300 ohm terminal resistor on TX+/TX- of RS-485</p>
CN31 CN32 CN33 CN34	 <p>Add 120 ohm terminal resistor on Rx+/Rx- of RS-422 (optional)</p>
	 <p>Add 300 ohm terminal resistor on Rx+/Rx- of RS-422 (optional)</p>

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

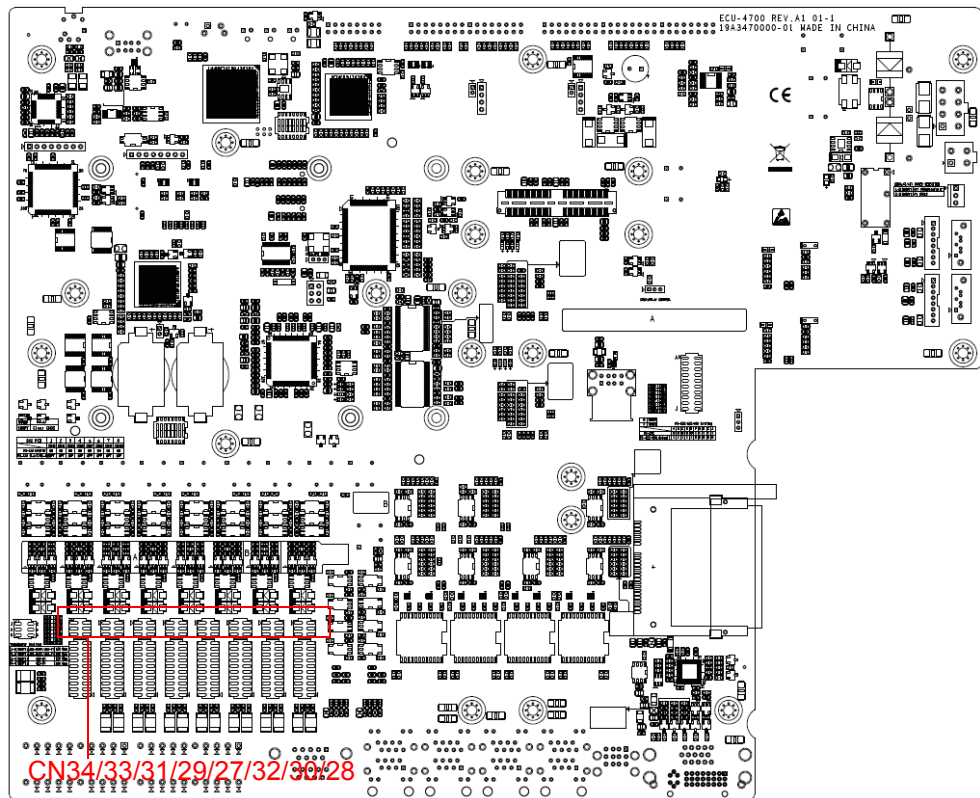


Figure 2.7 COM3~10 Port Related Jumper Locations(CN27-CN34)

2.6 Relay Output For Event



Figure 2.8 Relay output connections

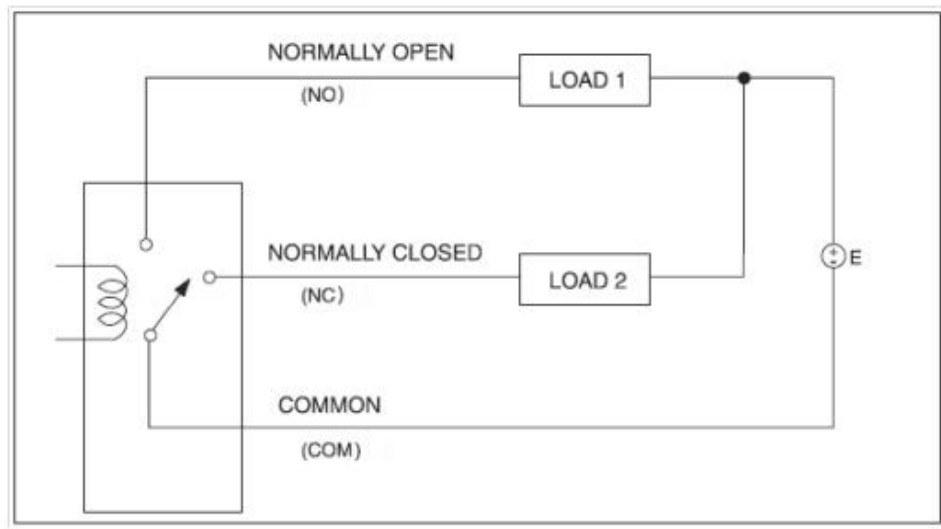


Figure 2.9 Wiring Diagram of the Relay Out

The ECU-4784 Series products provide Relay out Alarm Function, which is convenient for the user to control the Relay out Alarm by the API, for the detailed explanation of the Relay out API, please refer to C:\Program Files\Advantech\AdvRelay\Examples\VC++\RelayTool" directory.

Power 1 Status	Power 2 Status	Relay Out function
Off	Off	NC (Normally Close)
Off	On	Software control
on	Off	Software control
On	On	Software control

Users can program the relay out function with the API function, the detailed parameter can refer to the software help document. Users can set Relay out status by programming API interface.

The Advantech Relay out driver provides examples, explaining how to use ECU-4784's Relay out with series of real examples and offering reference 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 products are equipped with Intel i218LM Gigabit LAN Ethernet Controller, which are compliant with IEEE802.3 1000Base-T, 100Base-TX and 10Base-T (802.3, 802.3u and 802.3ab). And it is 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 PCI resource, the bandwidth or throughput may be restricted by the PCI bandwidth.

2.8 USB Ports

The ECU-4784 Series provides five USB interface connectors, which provide complete Plug & Play and hot swapping for up to 127 external devices.

The USB interface complies with USB UHCI, Rev. 2.0 compliant. ECU-4784-D56SBE, ECU-4784-E15SAE, ECU-4784-D45SAE front USB ports Rev. 3.0 compliant. The USB interface can be disabled in the system BIOS setup. ECU-4784 SERIES provides 1 USB port on the front panel, and 3 USB port on the rear panel. It also provides 1 USB port inside the chassis for USB dongle key.

2.9 VGA Display

The ECU-4784 Series with Intel HD graphics 5000 controller, provides a resolution of 1920 x 1200 for VGA output.

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 time. You can see the Interface technique of Microcomputer or Advantech's example in Appendix B.

2.11 Expansion PCI & PCIe:

The ECU-4784 Series supports 2 standard Domain I/O Expansions (each supports 1 PCIe and 2 PCI devices) which supports up to 2 PCI devices and 1 PCIe device. You could also install the expansion of other functions of the PCI & PCIe interface to meet customer's demand.

The ECU-4784 Series offers 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 the PCI-104 card. Due to the ECU-4784 Series being an embedded system, the power providing 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

And totally support maximum 25 W (at 50 °C condition) for all slots. Before you configure all the module 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. Step by Step Guide on how to Enable VT-d and Perform Direct Device Assignment, you can refer to as the ECU-4784 VT-D Help document for the detailed applications.

Now the ECU-4784-D56SBE, ECU-4784-E15SAE, and ECU-4784-D45SAE support VT-D function.

2.13 AMT

Intel AMT is part of the Intel vPro technology [i] 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 supports 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.

Step by Step Guide on How to Enable TPM and Perform TPM application, you can refer to as the ECU-4784 TPM Help document for the detailed application.

2.15 iCDManager

Advantech ECU-4784 Series product supports iCDManager software developed by Advantech. It offered user friendly GUI, user could check system communication status by graphic mode, and get diagnosis information when connectivity exception occurs. It make the system could enhance maintenance efficiency, and ensure the system could be operated smoothly.

Please refer to the CD://ECU-4784 Series/Driver/Windows Driver/iCDManager Driver/iCDManager_User_Interface.chm, which provides detailed description of the specific application of the iCDManager configuration.

As you know, the substation communication gateway play the important roles, which communicate with the more intelligent device in the smart substation , Suppose the remote SCADA operator find that there are some communication issue with the substation gateway, which may occurred in the remotely substation, because the substation is located in the remote suburb usually, the service engineer will take the long time to get to the substation and maintain the communication issue it will cause the high maintain cost and low efficiency.

How to help the remote SCADA operator to diagnose the communication health issue and analyze the root cause of the communication issue?

Advantech iCDManager will provide the intelligent connectivity diagnose solution for this requirement, the remote SCADA operator can monitor the substation gateway's communication health and guide the substation field operator to examine the physical communication link or the other software application configuration by the iCDManager service.

Advantech iCDManager is the intelligent Connectivity Diagnose Manager tools, which can monitor and diagnose the Power & Energy computers 's communication status, this tools can report the communication quality and failure for the network communication issue, it can improve diagnose efficiency and save the maintain cost in the complicated network application.

2.15.1 System Structure Diagram

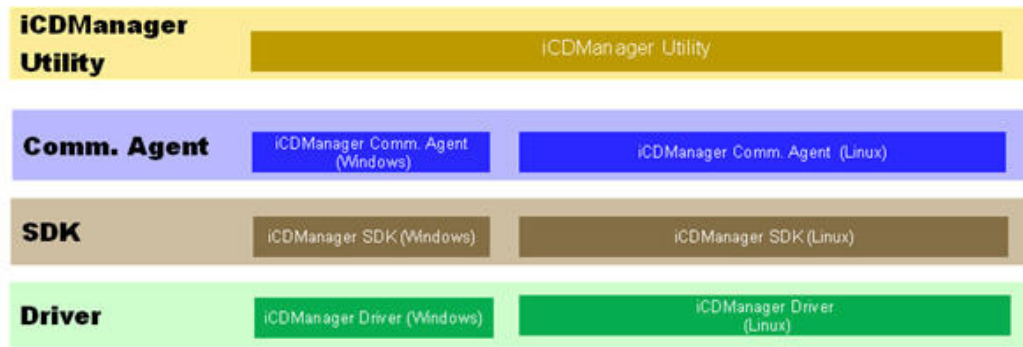


Figure 2.10 iCDManager software structure diagram

Figure 2.12 illustrates the iCDManager's system structure and components:

- **iCDManager SDK**

The iCDManager SDK module will provide the iCDManager driver and Program API for the customer application for ECU-4784.

- **iCDManager Communication Agent**

The communication Agent will run in the Power & Energy computers (ECU -4674 Series), which can communicate with the remote PC 's iCDManager Application software, this Agent will transfer the communication port status to the iCDManager application software according to the iCDManager's configuration requirement. iCDManager Utility communicate with the communication Agent by TCP/IP with ECU- 4784, ECU Listening TCP Port is 7000, the Protocol format is defined by Advantech. it can connect the more Power & Energy computers and monitor the multi ECUDevice 's communication status.

- **iCDManager Utility**

iCDManager Utility will run in the Local ECU-4784, it can connect the more Power & Energy computers and monitor the multi ECU Device 's communication status.

- **iCDManager Application Software**

iCDManager Application Software will run in the Remote SCADA PC, which can communicate with the remote ECU-4784 's iCDManager Agent, it can connect the more Power & Energy computers and monitor the multi ECU Device 's communication status by communication with iCDManager Agent 's communication protocol.

Users can configure the different communication mode and iCDManager will rate the communication quality according to the communication data transferring content.

2.15.2 Installation: Install iCDManager Driver & SDK

Installation is required. Verify that your computer meets the hardware and software requirements to run Advantech iCDManager SDK. If you do not already have a copy of the installer Advantech iCDManager driver, pls. download the installer. You can run iCDManager.exe, This will install driver and SDK of iCDManager.

2.15.3 iCDManager for Serial Communication

For the serial communication, we will use the iCDManager to monitor the serial physical communication and get send and receive signal active status, including the RX Signal Elapsed interval, TX signal Elapsed interval, Response time interval. iCDManager will configure the communication mode and get the com port rate result (Excellent & Good & Average & Poor). Users should select a different serial communication mode configuration before they start up the diagnose the connectivity according to the actual requirement.

2.15.4 iCDManager for Ethernet Communication

For the Ethernet Communication, iCDManager will monitor the network communication\status (link or down) and Link speed (10M\100\1000M), detect the speed of the link is 100Mb/s or 10Mb/s. 100Mbs, Elapsed of Last active time interval. iCDManager will indicate if there is any activity on the link; Physical LAN link status (connected or disconnected).

iCDManager will configure the communication mode and there will be four possible communication quality rating status as (Excellent & Good & Average & Poor).

Chapter 3

Initial Setup

Sections include:

- Configuration
- Installing a CompactFlash Card
- Installing a USB Dongle
- Installing 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 shown below.

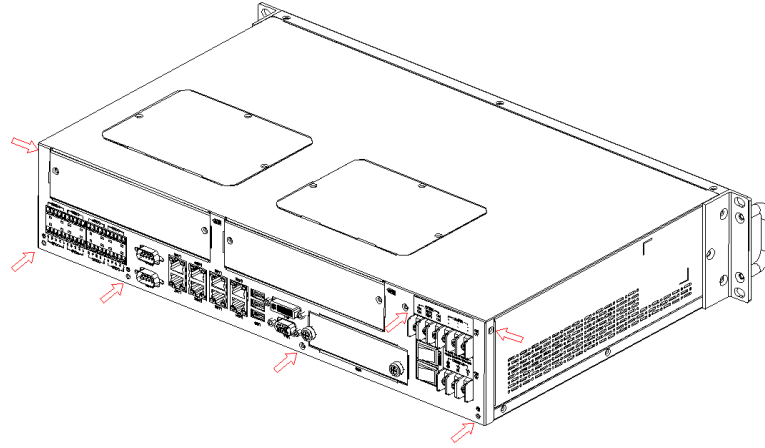


Figure 3.1 ECU-4784 screw location

3. Remove the chassis's top cover:

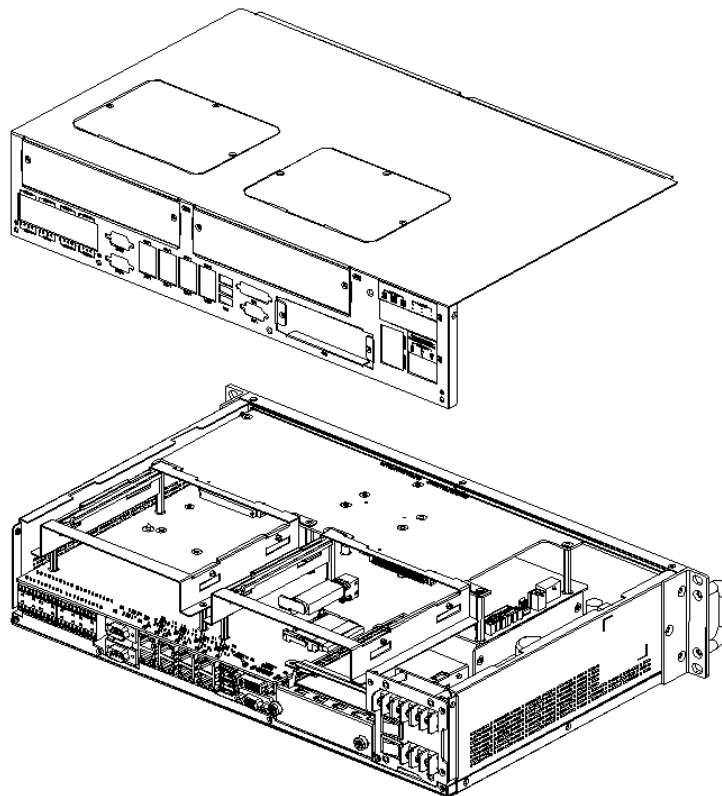


Figure 3.2 ECU-4784 removing top cover

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.

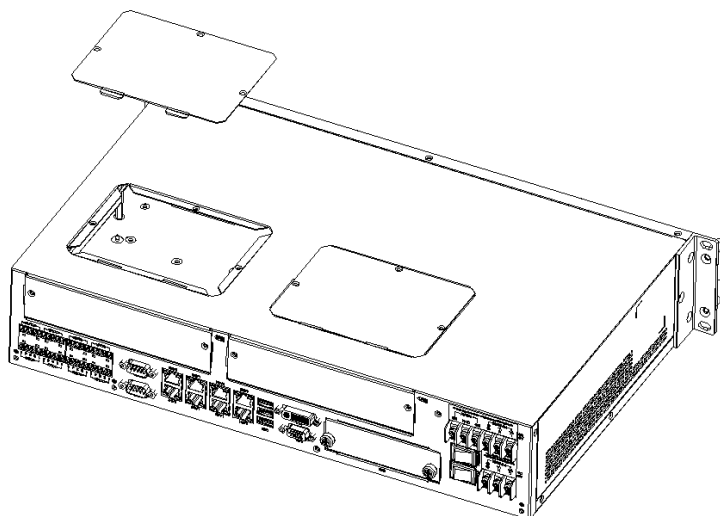


Figure 3.3 ECU-4784 open chassis top cover

3.2 Installing a CFast Card

The ECU-4784 Series provides 1 CFast Card slot, to install the cards:

1. Unscrew the 2 screws and remove the CFast back plate

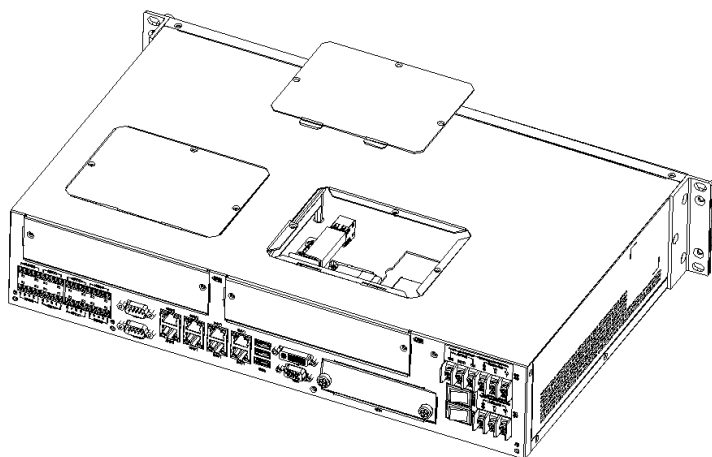


Figure 3.4 CFast Card Slot Location (CN3)

2. Insert the card at location (CN45) shown below.

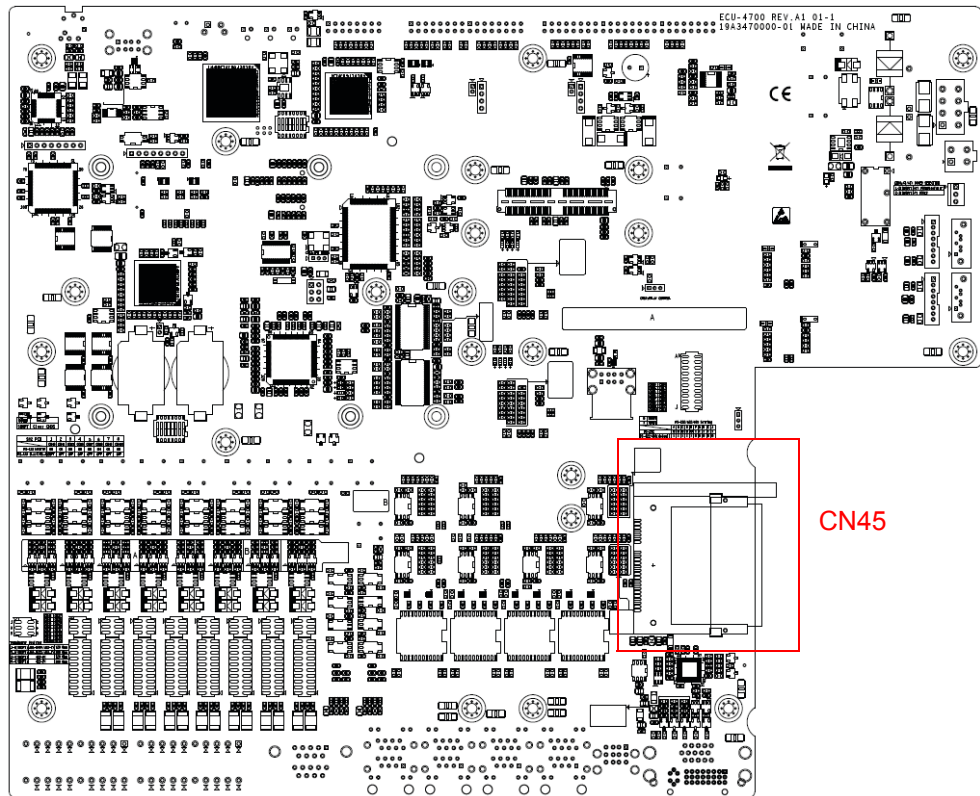


Figure 3.5 CFAST Card Slot Location (CN45)

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 the steps to install the USB dongle and clamp:

1. Refer to section 3.1 to open the chassis.

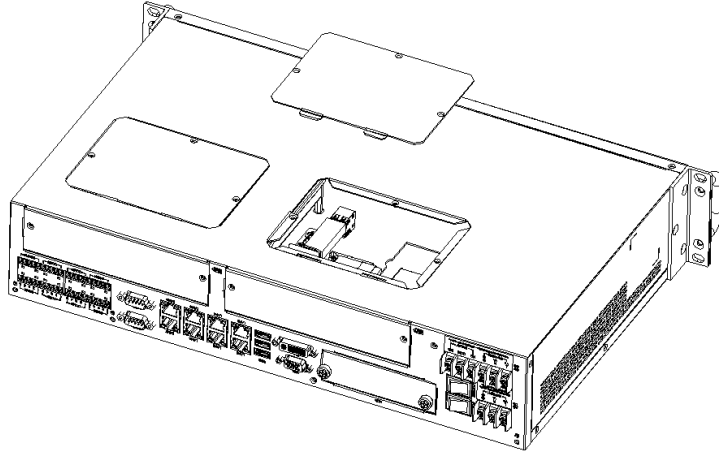


Figure 3.6 Open the chassis

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

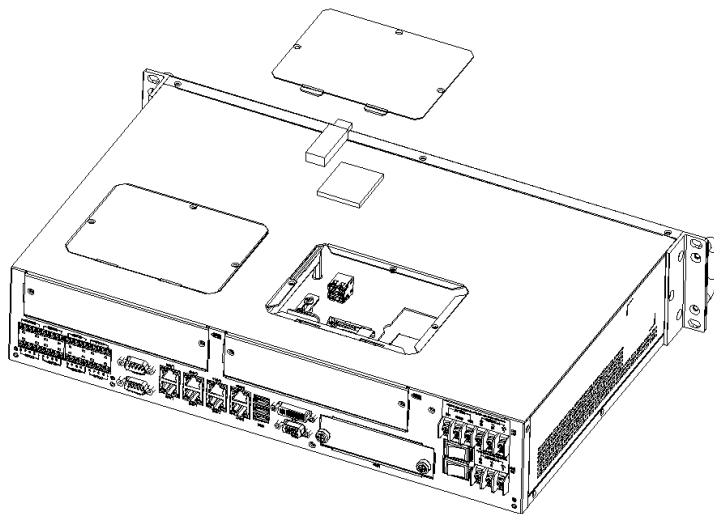


Figure 3.7 CN14 Location of Internal USB Port

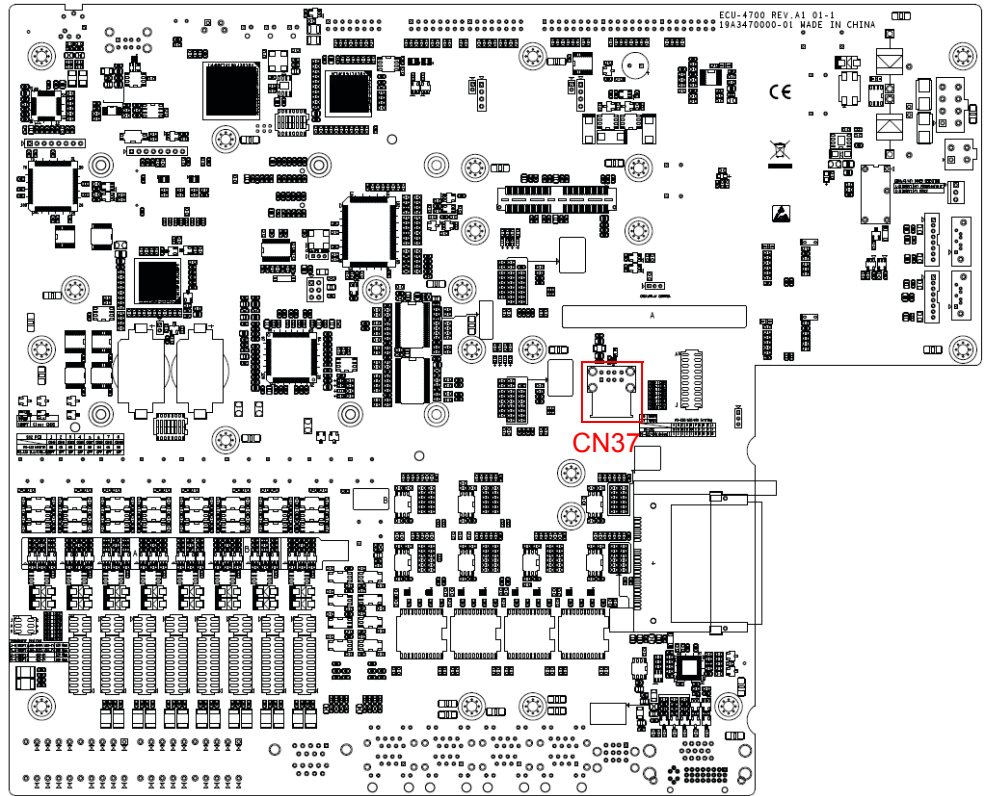
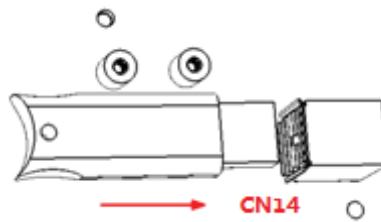
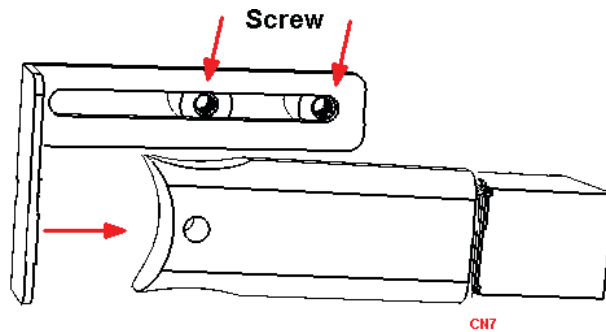
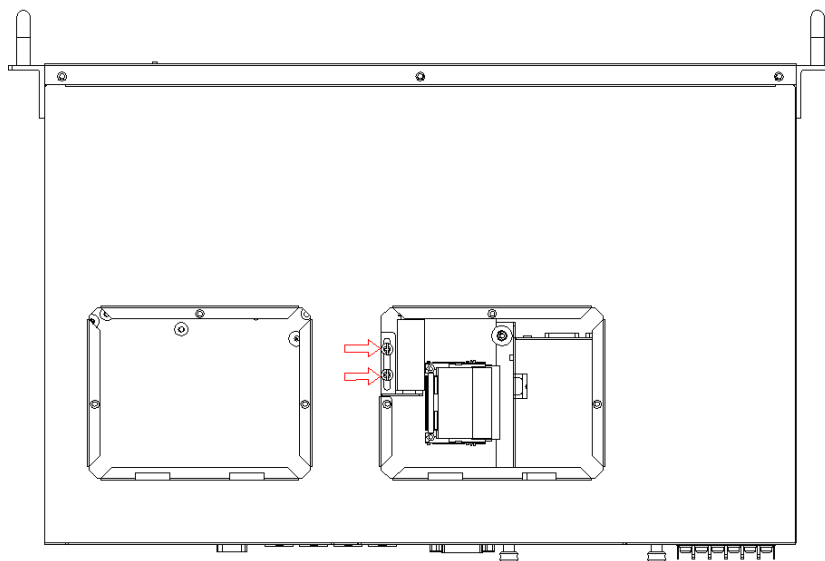


Figure 3.8 CN37 Location of Internal USB Port



3. Adjust the position of the kit to fasten the USB dongle, and then screw 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).

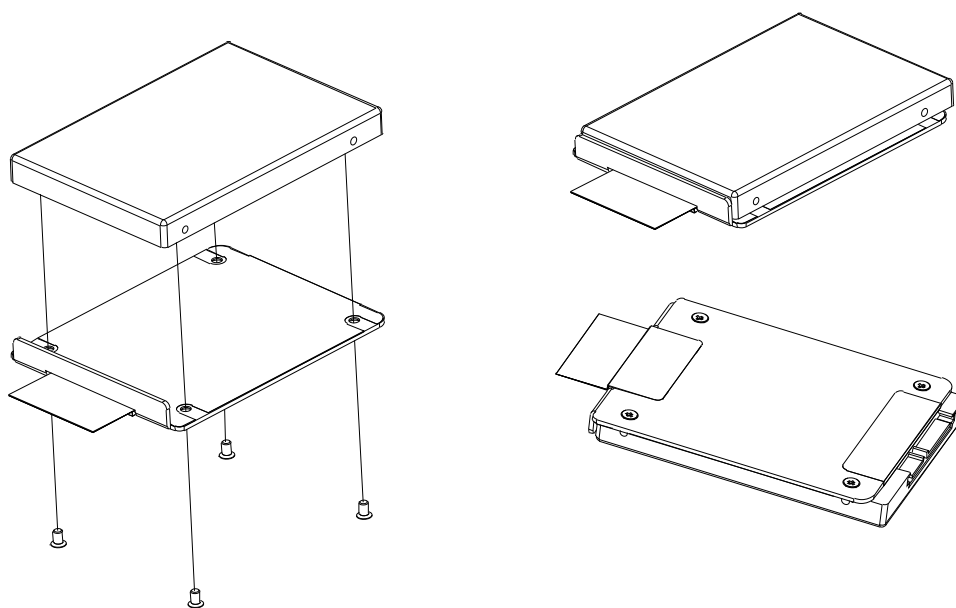


Figure 3.9 SATA HDD Fixed diagram

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

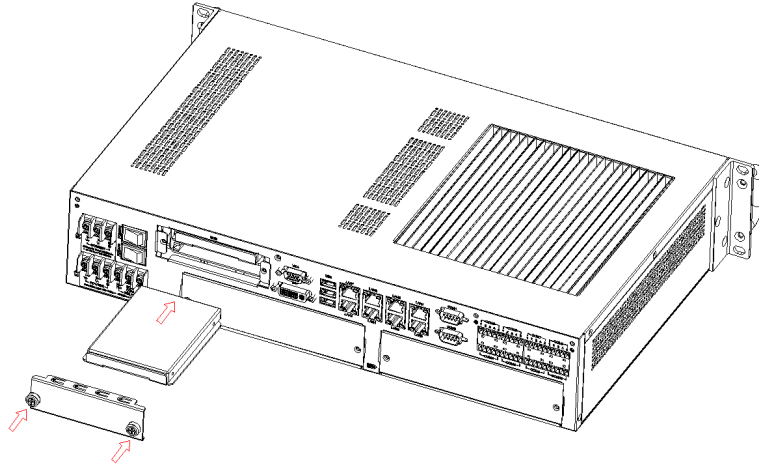


Figure 3.10 HDD back plate location and SATA HDD Installation diagram

3. According to the schematic drawing, HDD is directly installed on the device through the DIN-Rails (ECU-4784 Series product supports up to 2 x HDD).
4. ECU-4784 series contains SATA signal and power cable for two SATA HDD in the chassis. The locations of the connectors are shown below, SATA signal connector locates on CN42/44 and SATA power connector locates on CN41/43.

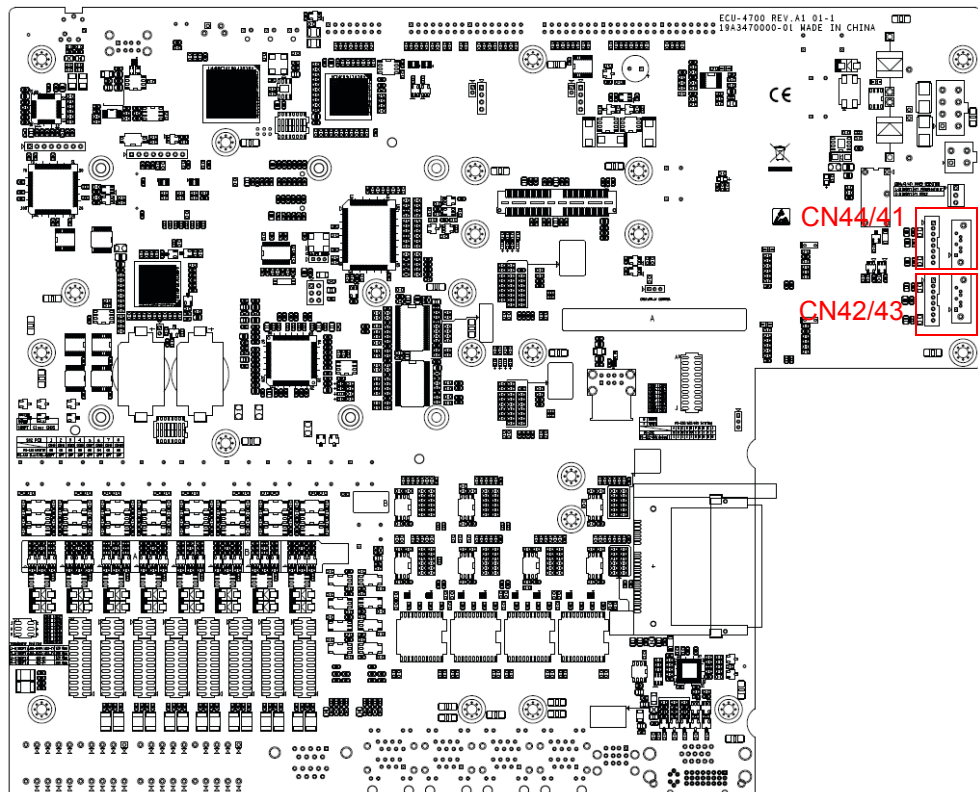


Figure 3.11 2 x SATA Signal and Power Connector Location (CN42/44, CN42/43)

3.5 Rack Installation

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

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

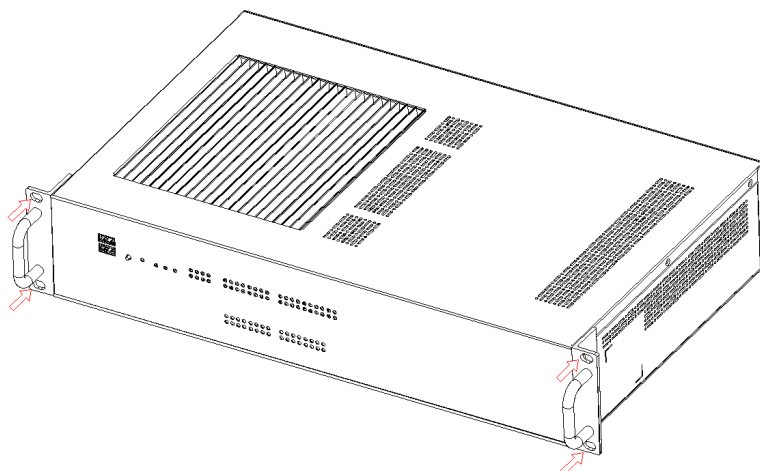


Figure 3.12 ECU-4784 Series product installation on rack location

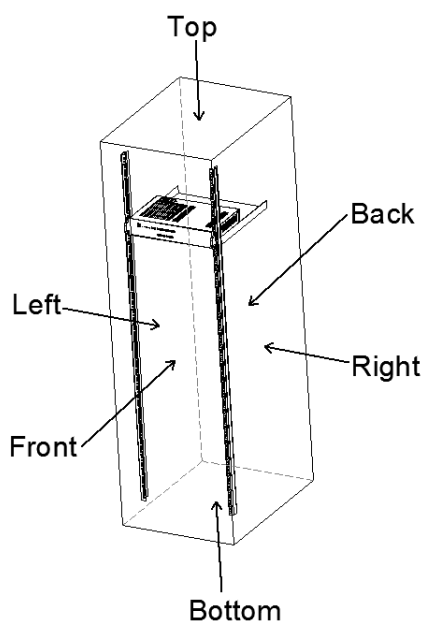


Figure 3.13 The installation cabinet of ECU-4784 Series product

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.*

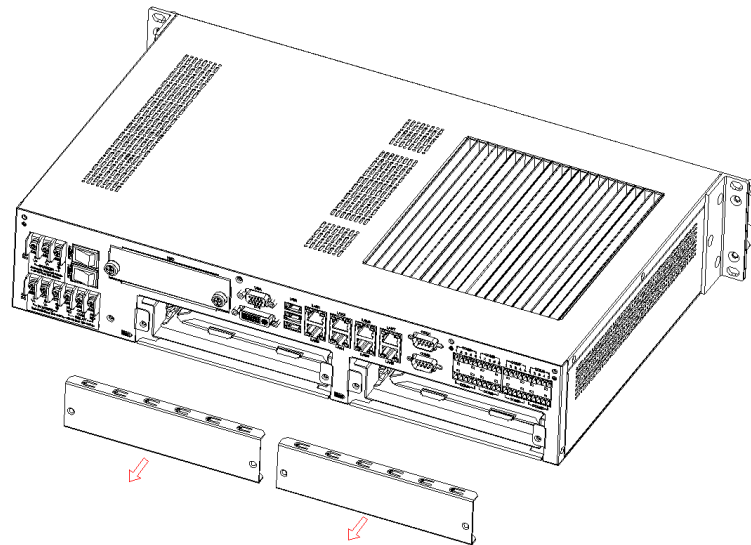


2. The ECU-4784 Series has Aluminum Fins on the top of the unit as heat-sink. It can generate nature convection for better heat transmission. To have optimal thermal performance, leave 2U (88.9 mm) space above the unit.

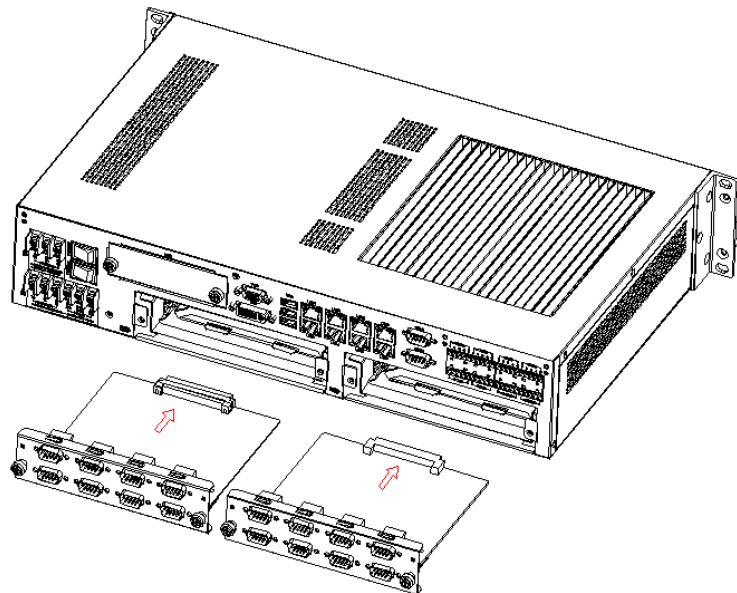
3.6 Installing the Expansion Card

The ECU-4784 Series provides two Expansion Slots for Expansion card installation

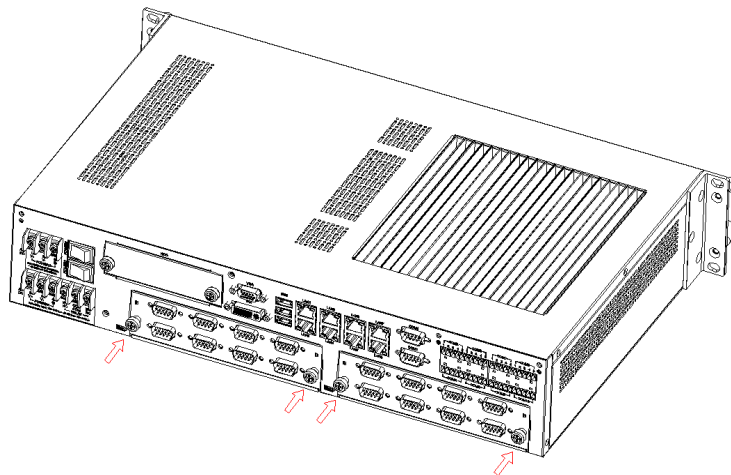
1. Unscrew the 2 screws and remove the two Expansion back plate.



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 Series adopts Advantech's SOM-6894 CPU module. Further information about the SOM module, can be found in SOM's user's manual. You can find this manual on the ECU-4784 SERIES's companion disc.

Please note that you can find the detailed info on BIOS Setup in Appendix C.

Appendix **A**

Pin Assignments

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

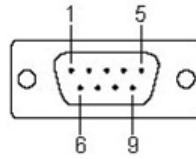


Table A.1: COM (1~2) Port Pin Definitions

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)

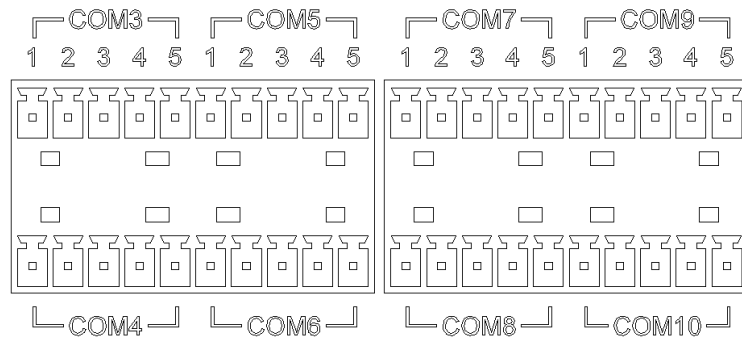


Table A.2: RS-232/422/485 Serial Ports (COM3 ~ 10)

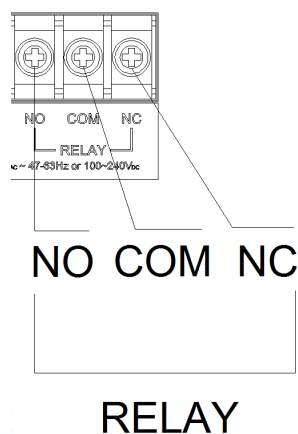
Pins	RS-232	RS-422	RS-485
1	RxD	TX+	Data+
2	TxD	Tx-	Data-
3	RTS	RX+	
4	CTS	RX-	
5	GND	GND	GND

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

Power 1 Status	Power 2 Status	Relay Out function
Off	Off	NC(Normally Close)
Off	On	Software control
On	Off	Software control
On	On	Software control

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)

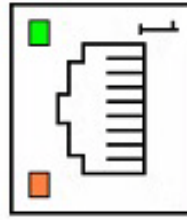


Table A.5: LAN Connector Pin Assignments

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

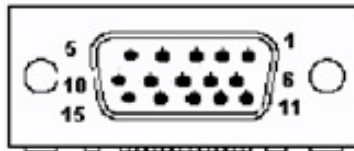


Table A.6: VGA Adaptor Cable Pin Assignments

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

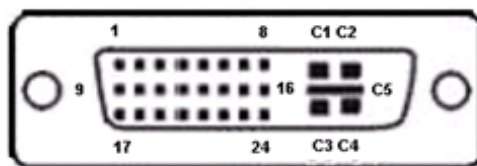


Table A.7: DVI Adaptor Cable Pin Assignments

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	VGAVSY
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	VGHSY
29	GND

A.8 POWER Pin Assignments

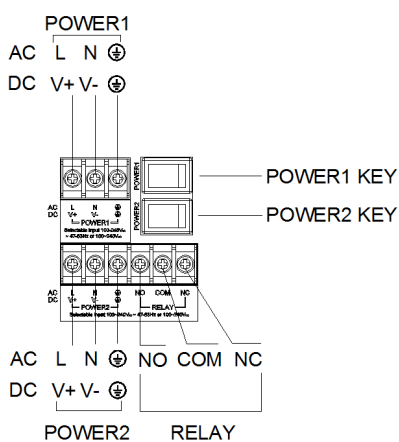
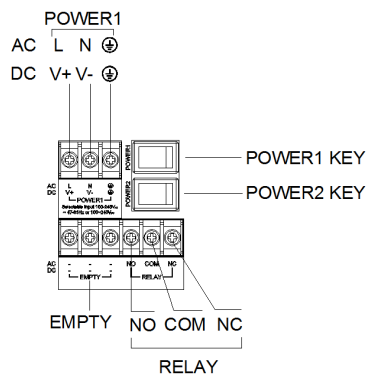


Table A.8: AC/DC Power Input PIN Definition

Pins	Screen printing	Function Description
1	L/V+	PWR1 AC/DC power input PIN
2	N/V-	PWR1 AC/DC power input PIN
3	⊕	GND

Note! If the customer wants to use a dual power supply, refer to Table 2.1 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

The ECU-4784 Series adopts Advantech's SOM-6894 CPU module. Further information about the SOM module, can be found in SOM' user's manual. You can find this manual on the ECU-4784 Series companion Disc.

Please note that you can try to "LOAD BIOS DEFAULTS" from the BIOS Setup if the ECU-4784 Series does not work properly.

AMIBIOS has been integrated into many motherboards for over a decade. With the AMIBIOS Setup program, users can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the SOM-6894 BIOS setup screens.



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.

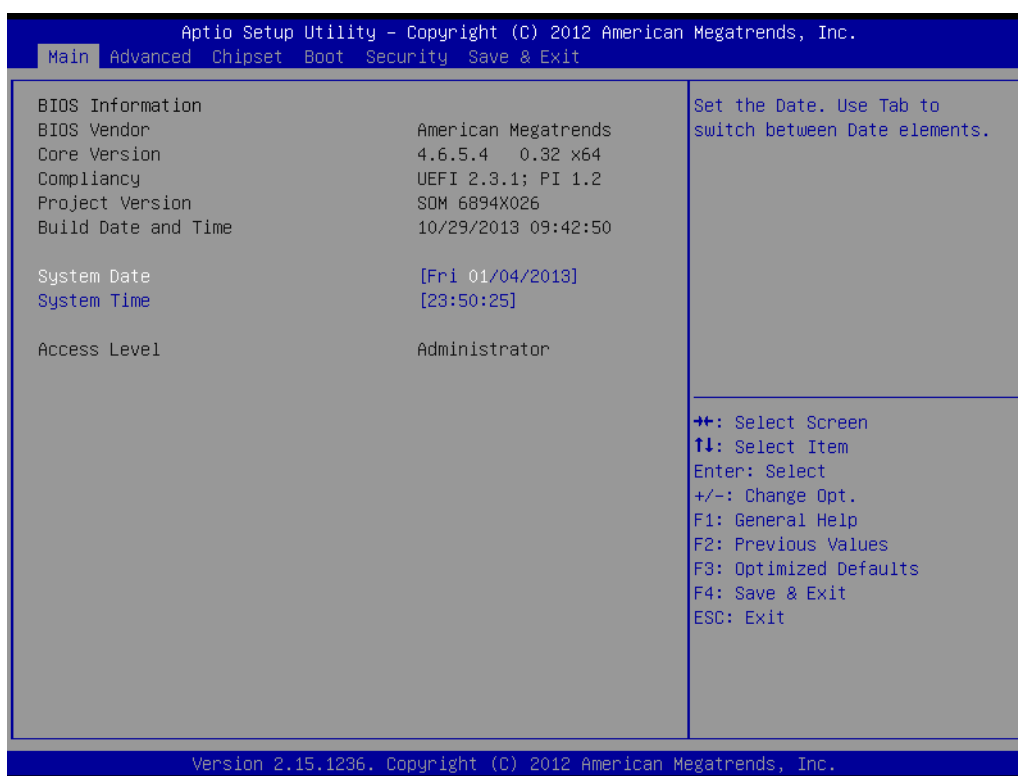


Figure C.2 Main setup screen

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.

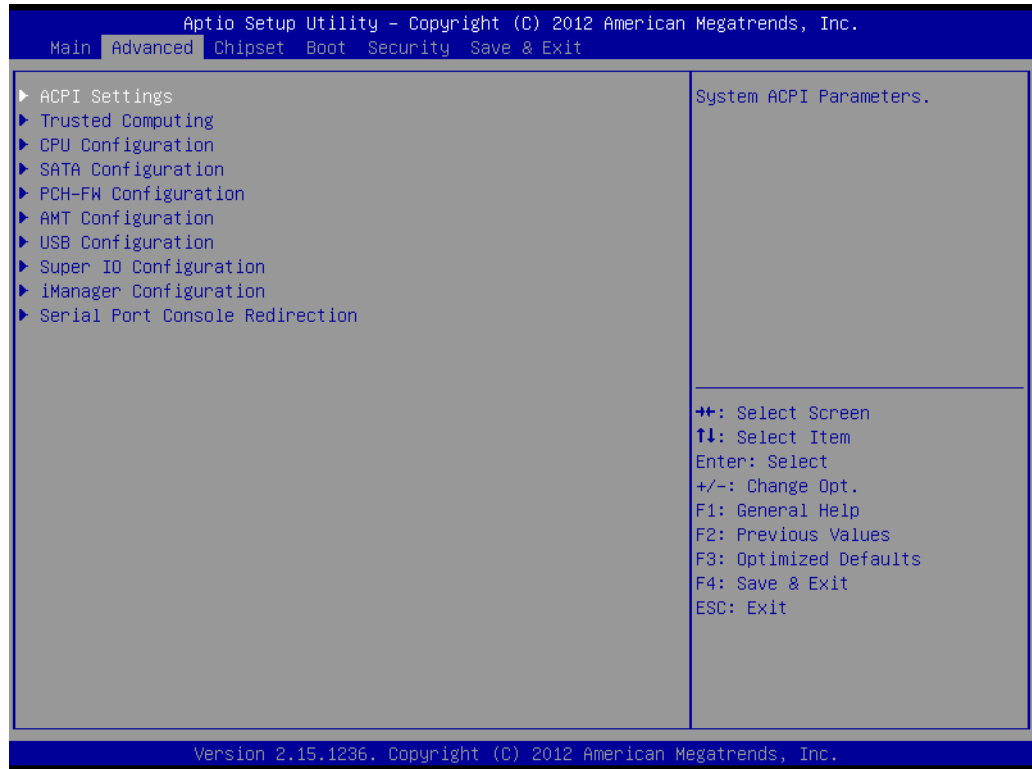


Figure C.3 Advanced BIOS features setup screen

C.2.2.1 ACPI Settings

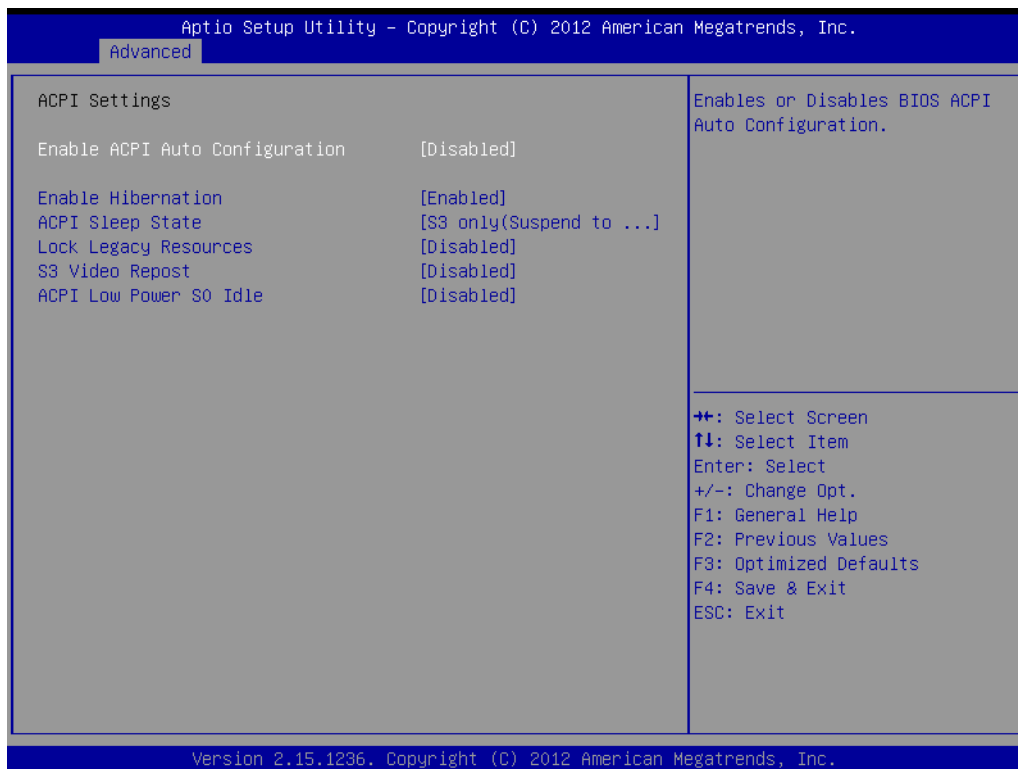


Figure C.4 ACPI Setting

- **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

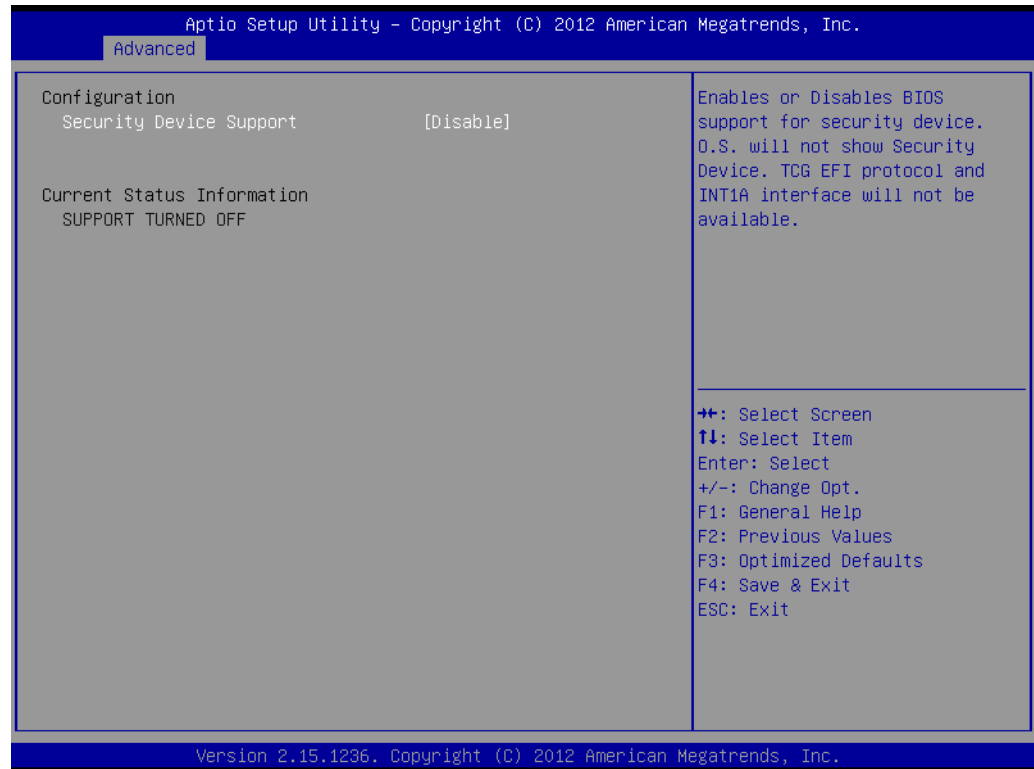


Figure C.5 Trusted Computing

■ 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

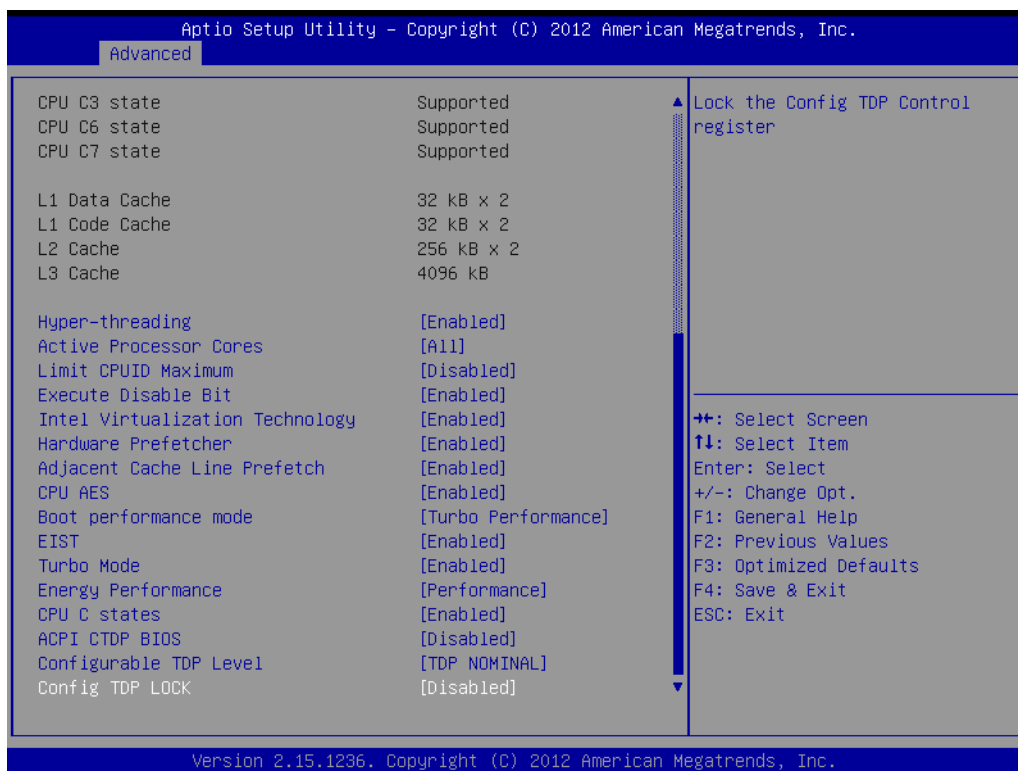


Figure C.6 CPU Configuration

- **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) 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

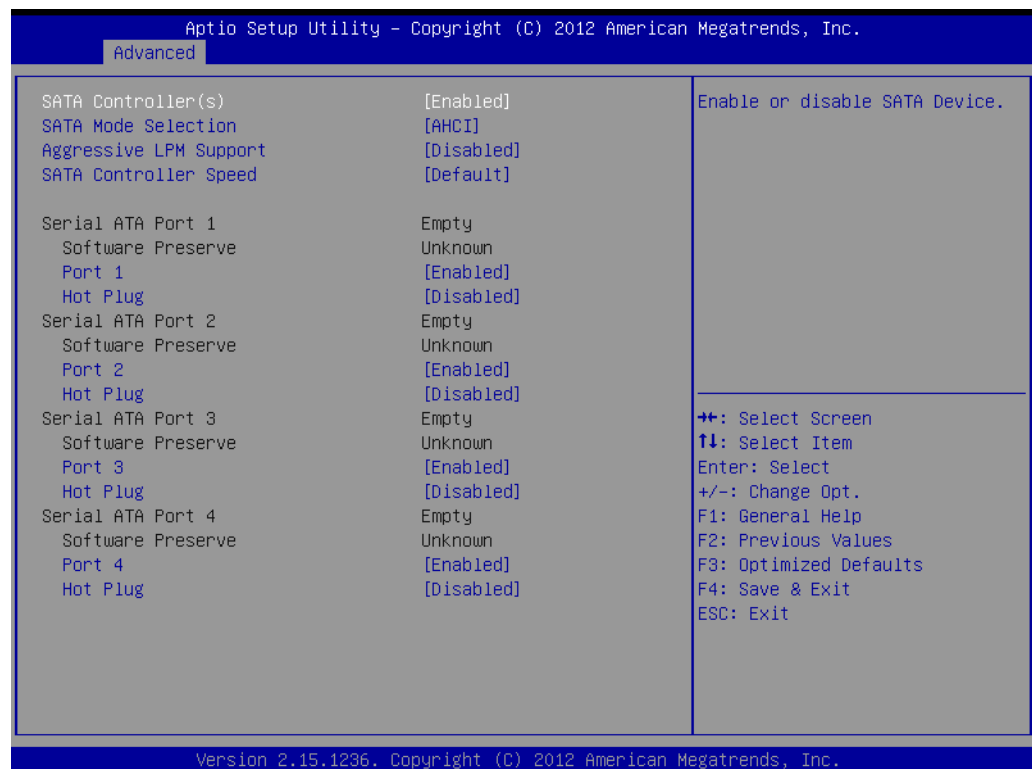


Figure C.7 SATA Configuration

- **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.
- **Serial ATA Port 1**
 - **Port 1**
This item allows users to enable or disable the Serial ATA Port.
 - **Hot Plug**
Designates this port as Hot Pluggable.
- **Serial ATA Port 2**
 - **Port 2**
This item allows users to enable or disable Serial ATA Ports.
 - **Hot Plug**
Designates this port as Hot Pluggable.
- **Serial ATA Port 3**
 - **Port 3**
This item allows users to enable or disable Serial ATA Port.
 - **Hot Plug**
Designates this port as Hot Pluggable.
- **Serial ATA Port 4**
 - **Port 4**
This item allows users to enable or disable Serial ATA Ports.
 - **Hot Plug**
Designates this port as Hot Pluggable.

C.2.2.5 PCH-FW Configuration

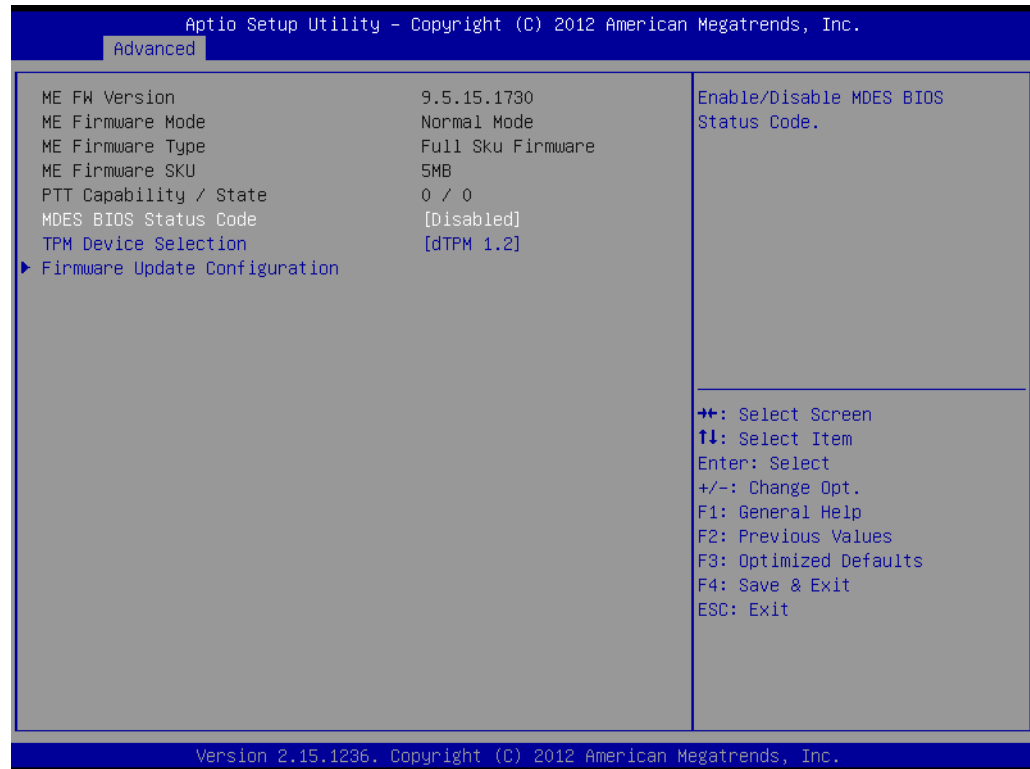


Figure C.8 PCH-FW Configuration

- **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

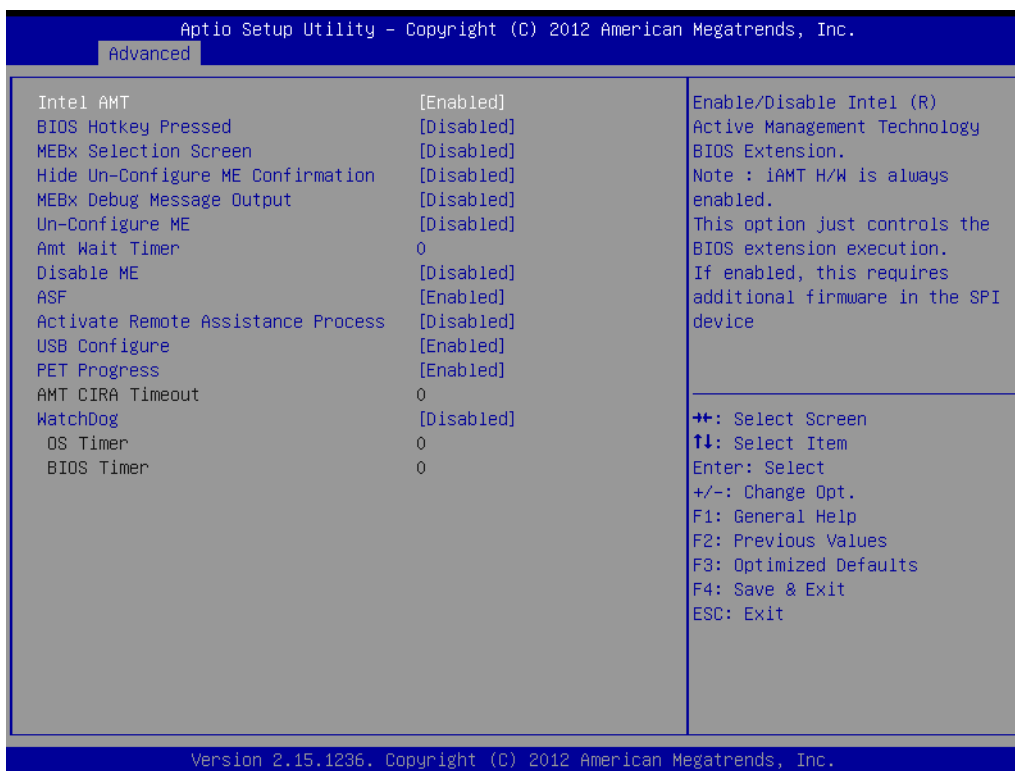



Figure C.10 AMT Configuration

- **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

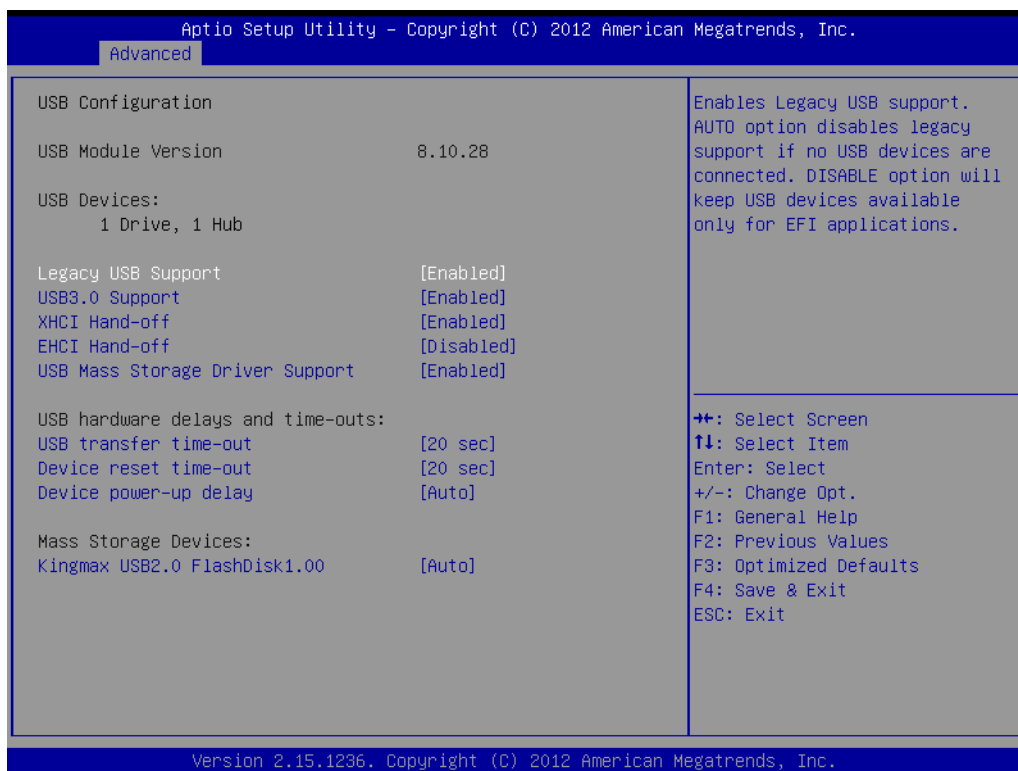


Figure C.11 USB Configuration

- **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**

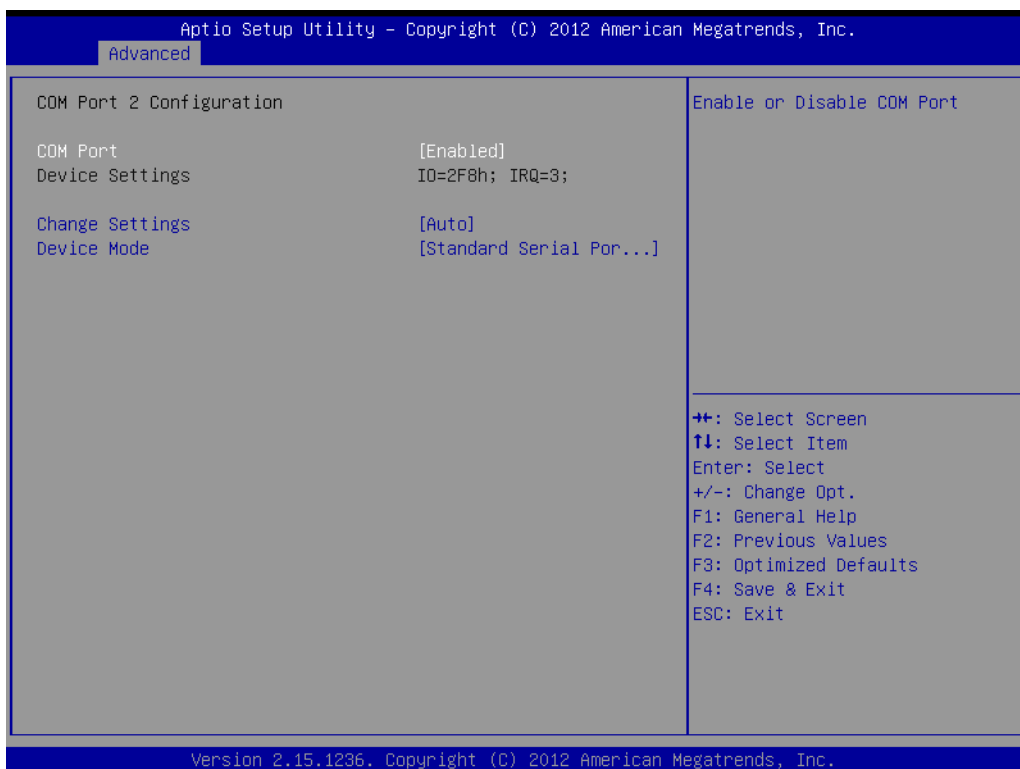


Figure C.14 COM Port 2 Configuration

- **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

This item monitors hardware status.

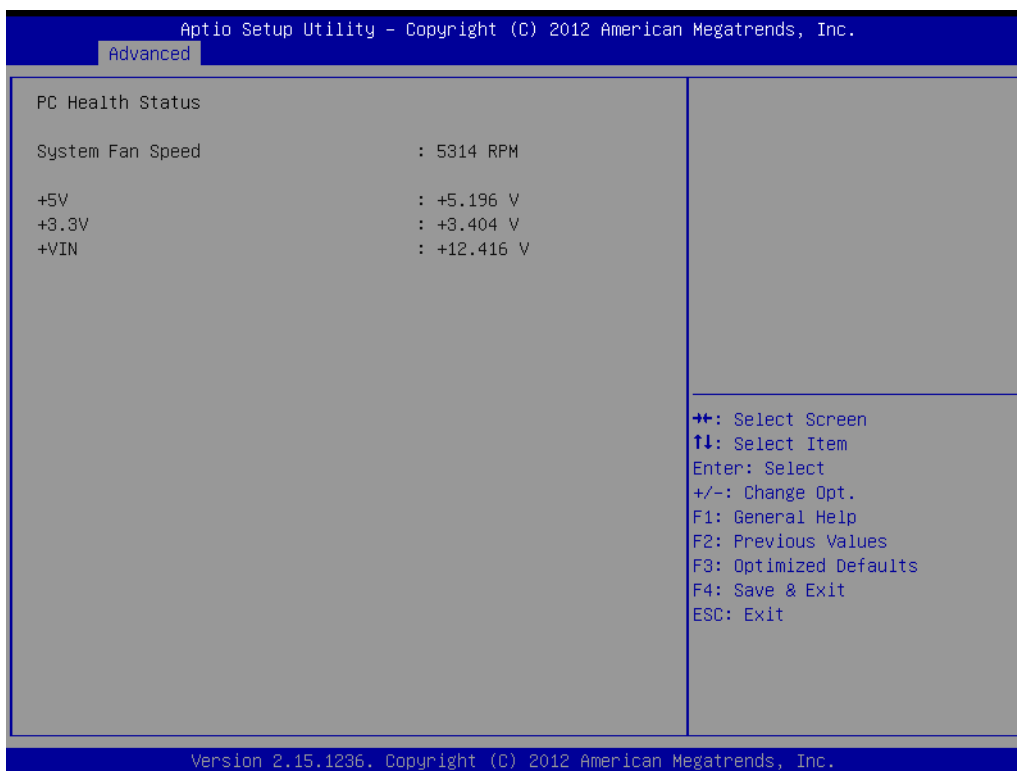


Figure C.16 PC Hardware Monitor

C.2.2.9 iManager Configuration

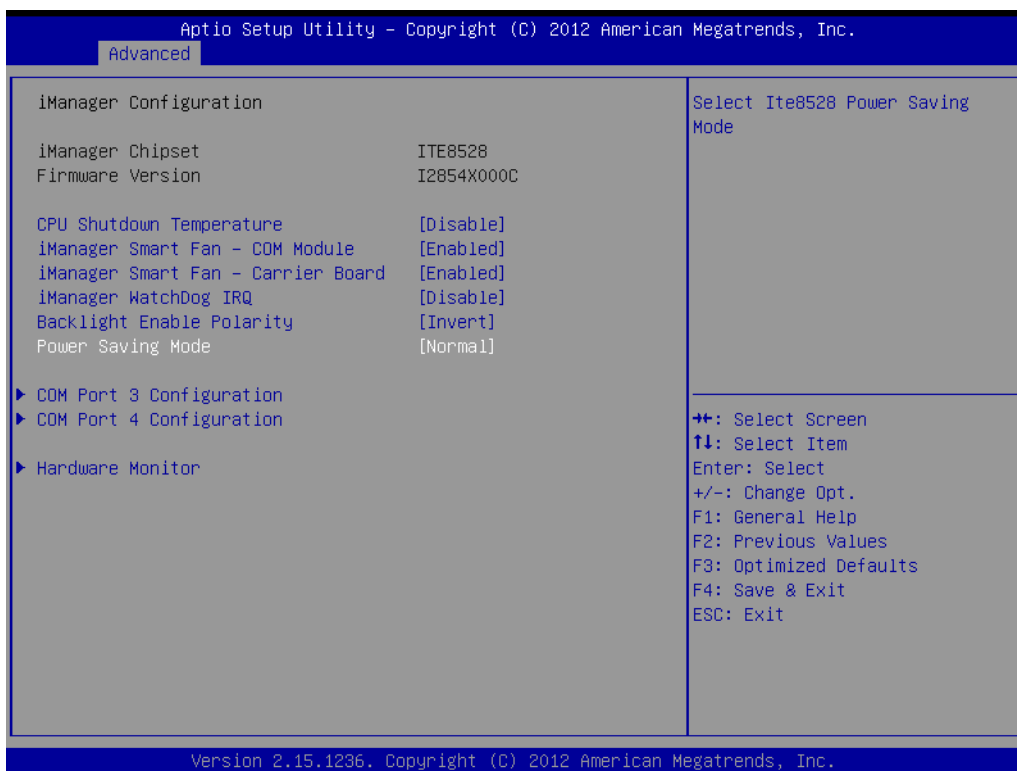


Figure C.17 iManager Configuration

- **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**

This item monitor hardware status.

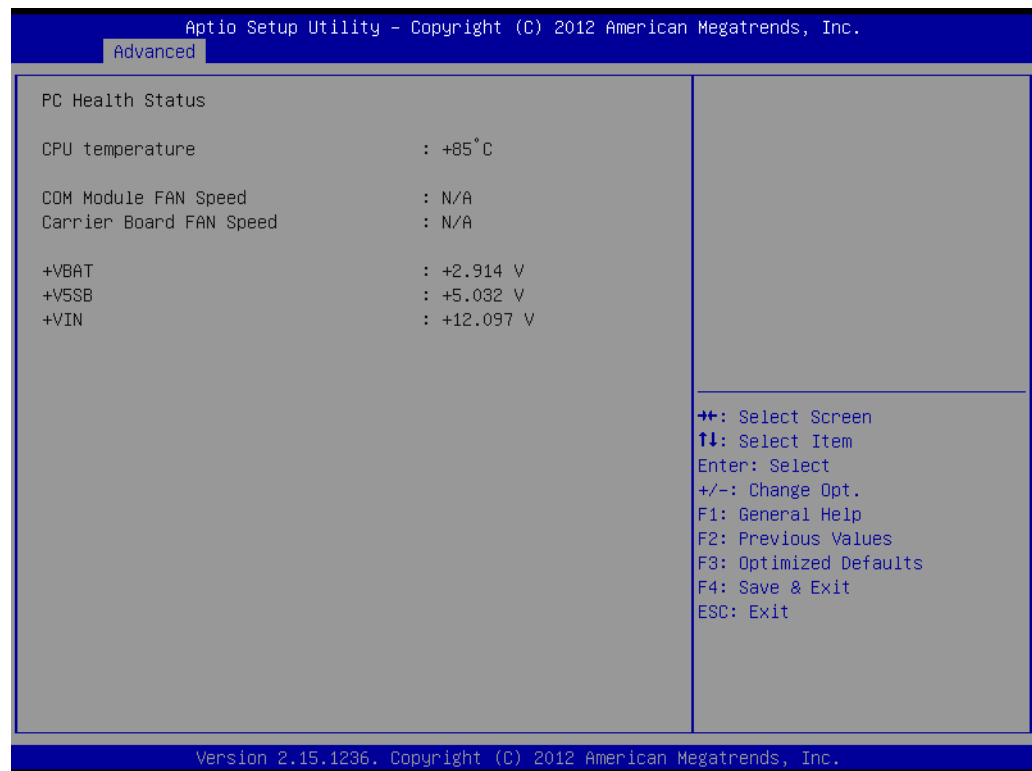


Figure C.20 Hardware Monitor

C.2.2.10 Serial Port Console Redirection

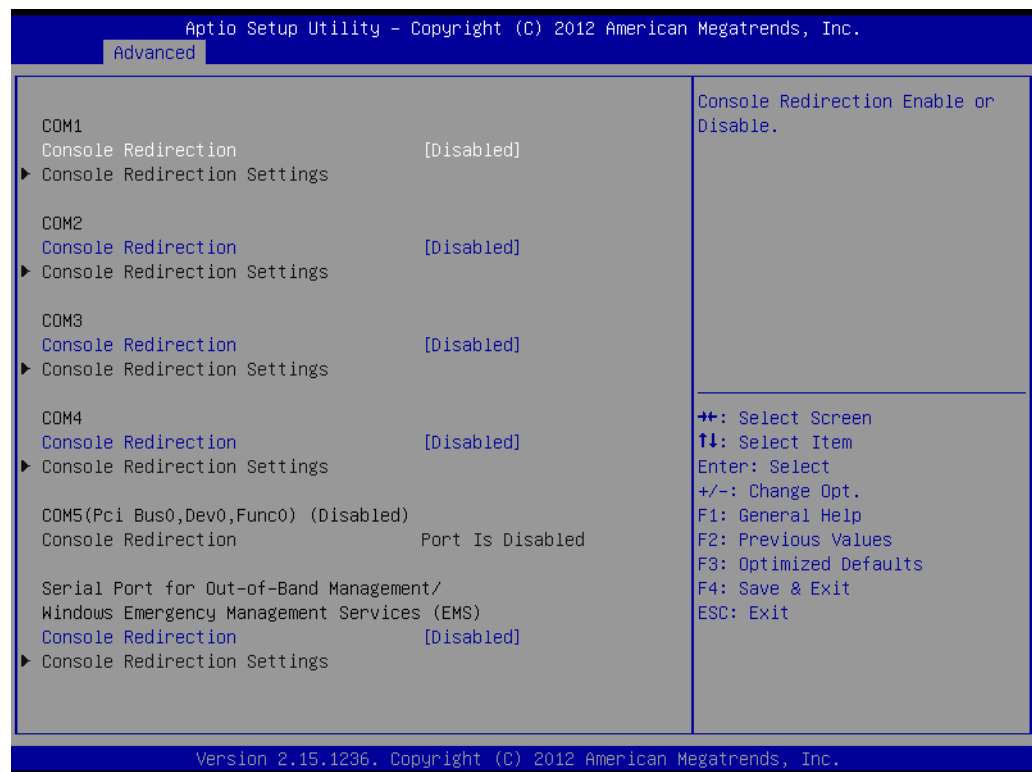


Figure C.21 Serial Port Console Redirection

- **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.

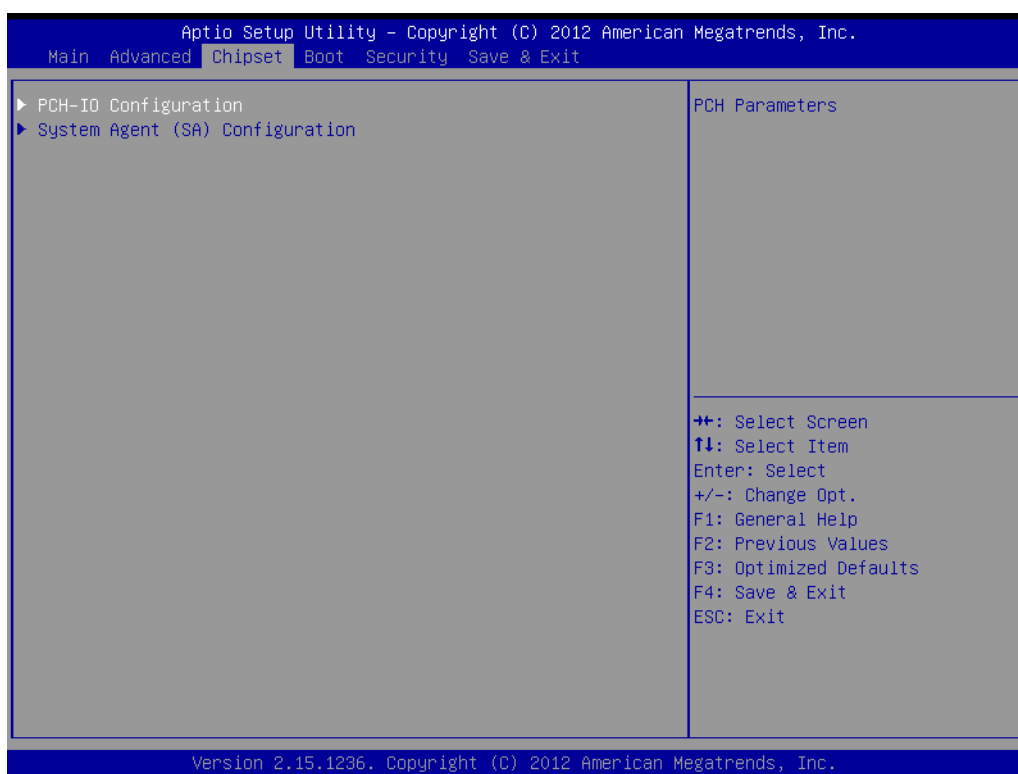


Figure C.22 Chipset Setup

- **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

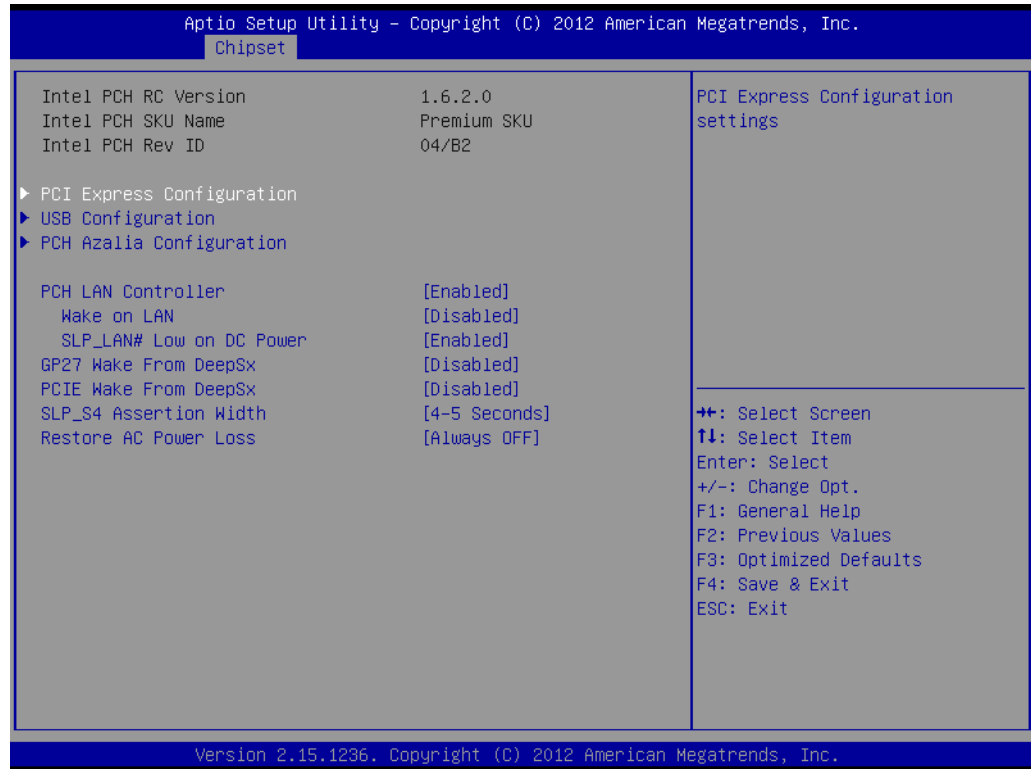


Figure C.23 PCH-IO Configuration

- **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 Azalia Configuration**
This item allows users to change PCH Azalia 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)
- **SLP_LAN# Low on DC Power**
This item allows users to enable or disable SLP_LAN# Low on DC Power.
- **GP27 Wake From DeepSx**
This item allows users to enable or disable GP27 Wake From DeepSx. Wake from DeepSx by the assertion of GP27 pin.
- **PCIE Wake From DeepSx**
This item allows users to enable or disable PCIE Wake From DeepSx. Wake from DeepSx by the assertion of PCIE.
- **SLP_S4 Assertion Width**
This item allows users to select a minimum assertion width of the SLP_S4# signal.
- **Restore AC Power Loss**
This item allows users to select AC power state when power is re-applied after a power failure.

■ PCI Express Configuration

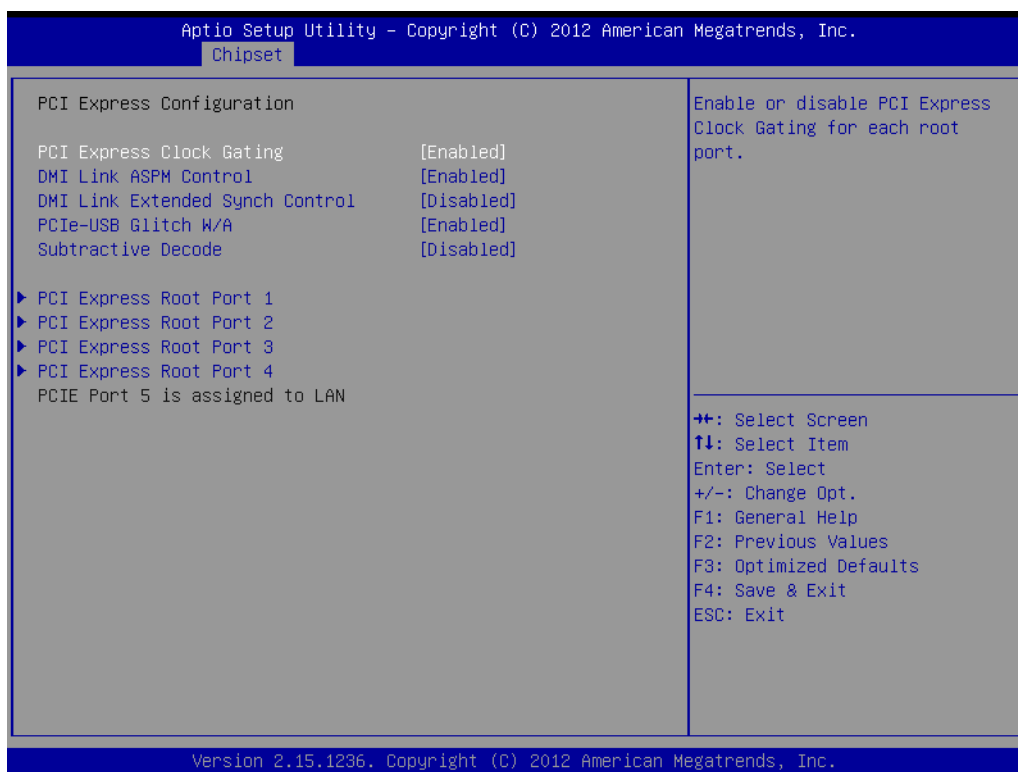


Figure C.24 PCI Express Configuration

- **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.
- **DMI Link Extended Synch Control**
This item allows users to enable or disable DMI Link Extended Synch Control.
The Control of Extended Synch on SB side of the DMI Link.
- **PCIe-USB Glitch W/A**
This item allows users to enable or disable PCIe-USB Glitch W/A.
PCIe-USB Glitch W/A for bad USB device(s) connected behind PCIE/PEG Port.
- **Subtractive Decode**
This item allows users to enable or disable Subtractive Decode.
- **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

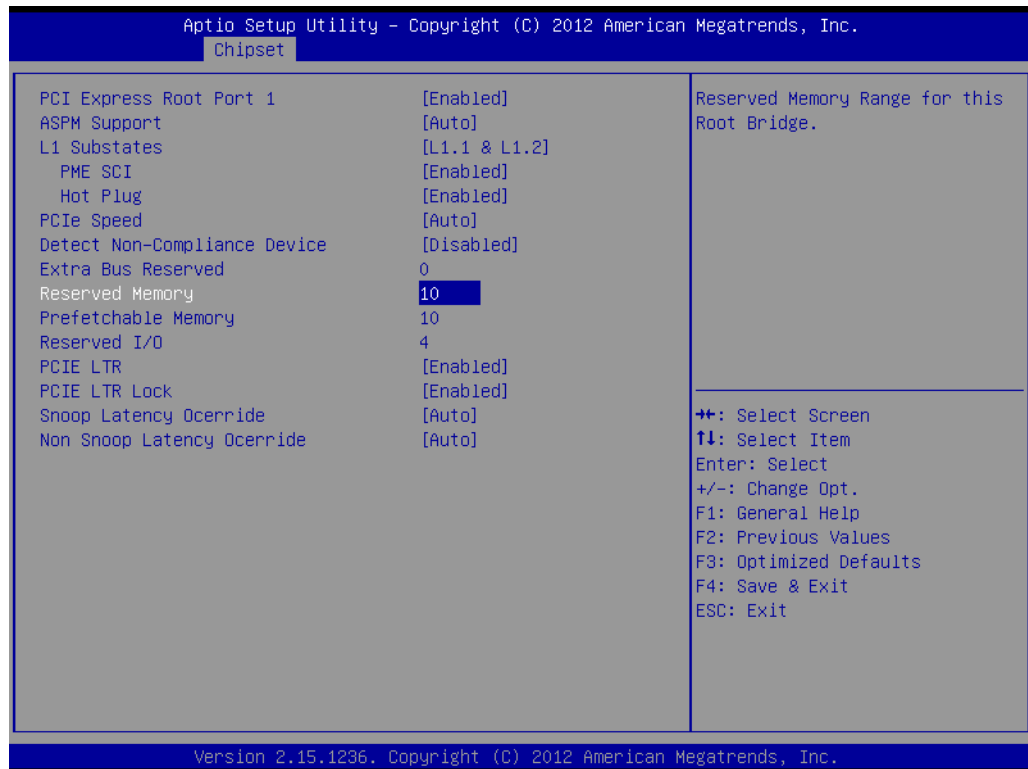


Figure C.25 PCI Express Root Port 1 Configuration

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.

PME SCI

This item allows users to enable or disable PME SCI.

Hot Plug

This item allows users to enable or disable Hot Plug.

PCIe Speed

This item allows users to select PCIe Speed.

Detect Non-Compliance Device

This item allows users to enable or disable Detect Non-Compliance Device. If enabled, it will take more time at POST time.

Extra Bus Reserved

This item allows users to select Extra Bus Reserved (0~7) for bridges behind this root bridge.

Reserved Memory

This item allows users to select Reserved Memory range for this root bridge.

Prefetchable Memory

This item allows users to select Prefetchable Memory range for this root bridge.

Reserved I/O

This item allows users to select Reserved I/O (4k/8k/12k/16k.../48k) range for this root bridge.

PCIE LTR

This item allows users to enable or disable PCIE LTR.

PCIE LTR Lock

This item allows users to enable or disable PCIE LTR Configuration Lock.

Snoop Latency Ocerride

This item allows users to select Snoop Latency Ocerride for PCH PCIE.

Non Snoop Latency Ocerride

This item allows users to select Non Snoop Latency Ocerride for PCH PCIE.

– PCI Express Root Port 2 Configuration

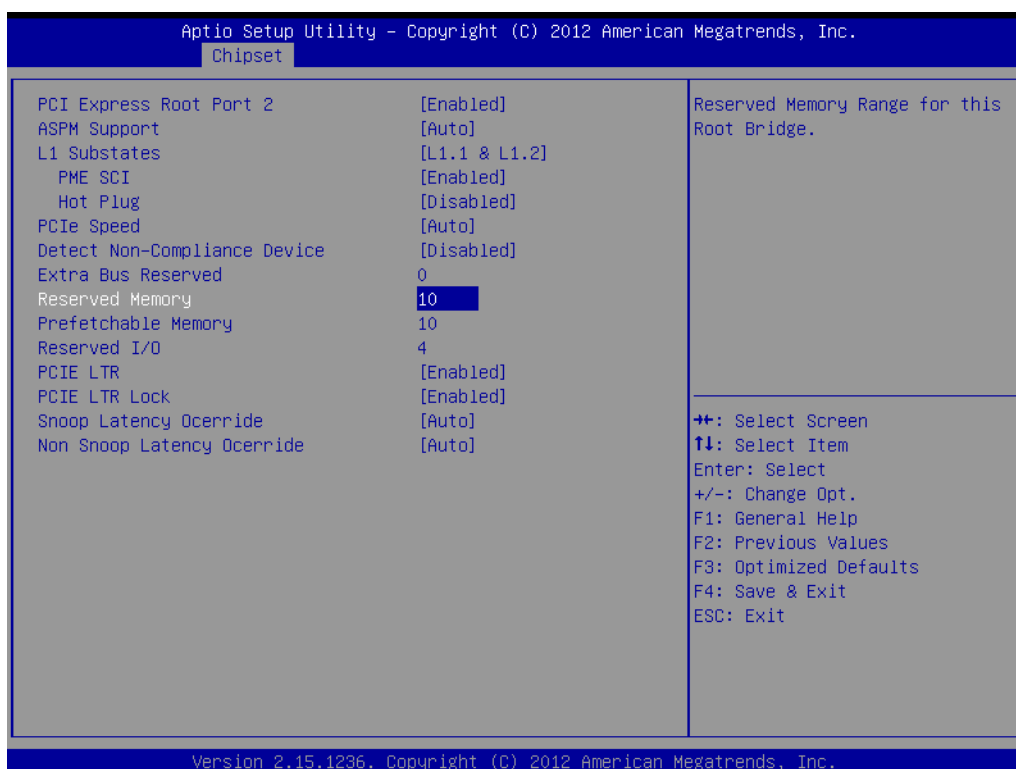


Figure C.26 PCI Express Root Port 2 Configuration

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

L1 Substates

This item allows users to change L1 Substates settings.

PME SCI

This item allows users to enable or disable PME SCI.

Hot Plug

This item allows users to enable or disable Hot Plug.

PCIe Speed

This item allows users to select PCIe Speed.

Detect Non-Compliance Device

This item allows users to enable or disable Detect Non-Compliance Device. If enable, it will take more time at POST time.

Extra Bus Reserved

This item allows users to select Extra Bus Reserved (0~7) for bridges behind this root bridge.

Reserved Memory

This item allows users to select Reserved Memory range for this root bridge.

Prefetchable Memory

This item allows users to select Prefetchable Memory range for this root bridge.

Reserved I/O

This item allows users to select Reserved I/O (4k/8k/12k/16k.../48k) range for this root bridge.

PCIE LTR

This item allows users to enable or disable PCIE LTR.

PCIE LTR Lock

This item allows users to enable or disable PCIE LTR Configuration Lock.

Snoop Latency Ocerride

This item allows users to select Snoop Latency Ocerride for PCH PCIE.

Non Snoop Latency Ocerride

This item allows users to select Non Snoop Latency Ocerride for PCH PCIE.

– PCI Express Root Port 3 Configuration

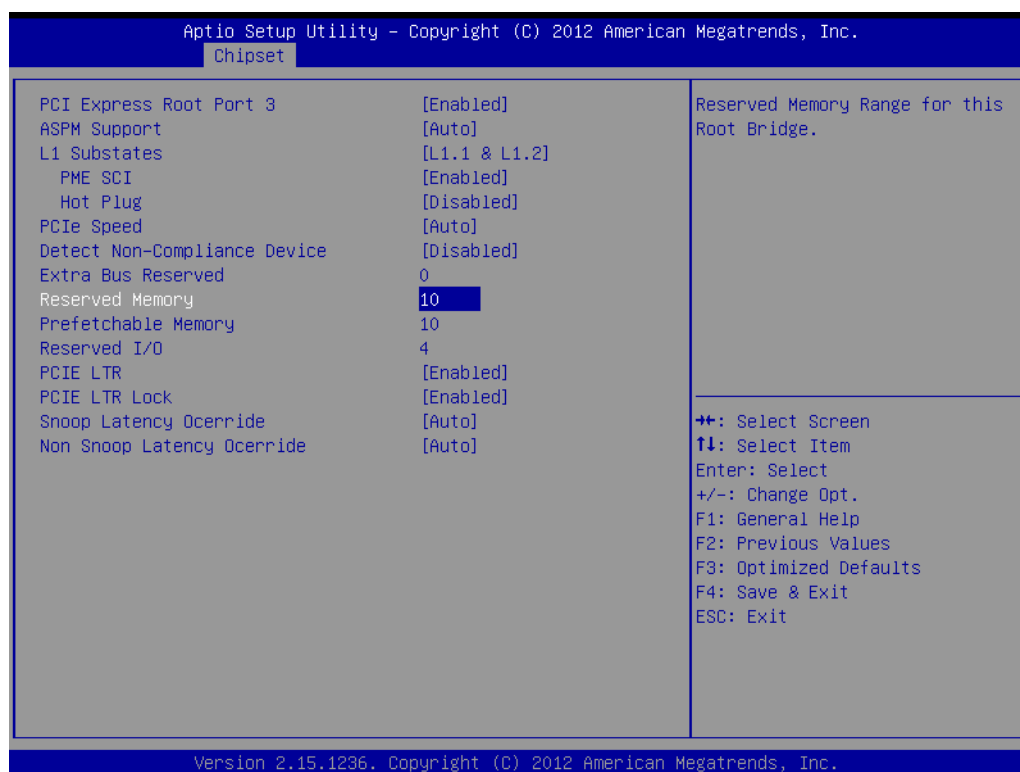


Figure C.27 PCI Express Root Port 3 Configuration

PCI Express Root Port 3

This item allows users to enable or disable PCI Express Root Port.

ASPM Support

This item allows users to 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.

PME SCI

This item allows users to enable or disable PME SCI.

Hot Plug

This item allows users to enable or disable Hot Plug.

PCIe Speed

This item allows users to select PCIe Speed.

Detect Non-Compliance Device

This item allows users to enable or disable Detect Non-Compliance Device. If enable, it will take more time at POST time.

Extra Bus Reserved

This item allows users to select Extra Bus Reserved (0~7) for bridges behind this root bridge.

Reserved Memory

This item allows users to select Reserved Memory range for this root bridge.

Prefetchable Memory

This item allows users to select Prefetchable Memory range for this root bridge.

Reserved I/O

This item allows users to select Reserved I/O (4k/8k/12k/16k.../48k) range for this root bridge.

PCIE LTR

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 enable or disable PCIE LTR.

PCIE LTR Lock

This item allows users to enable or disable PCIE LTR Configuration Lock.

Snoop Latency Ocerride

This item allows users to select Snoop Latency Ocerride for PCH PCIE.

Non Snoop Latency Ocerride

This item allows users to select Non Snoop Latency Ocerride for PCH PCIE.

– PCI Express Root Port 4 Configuration

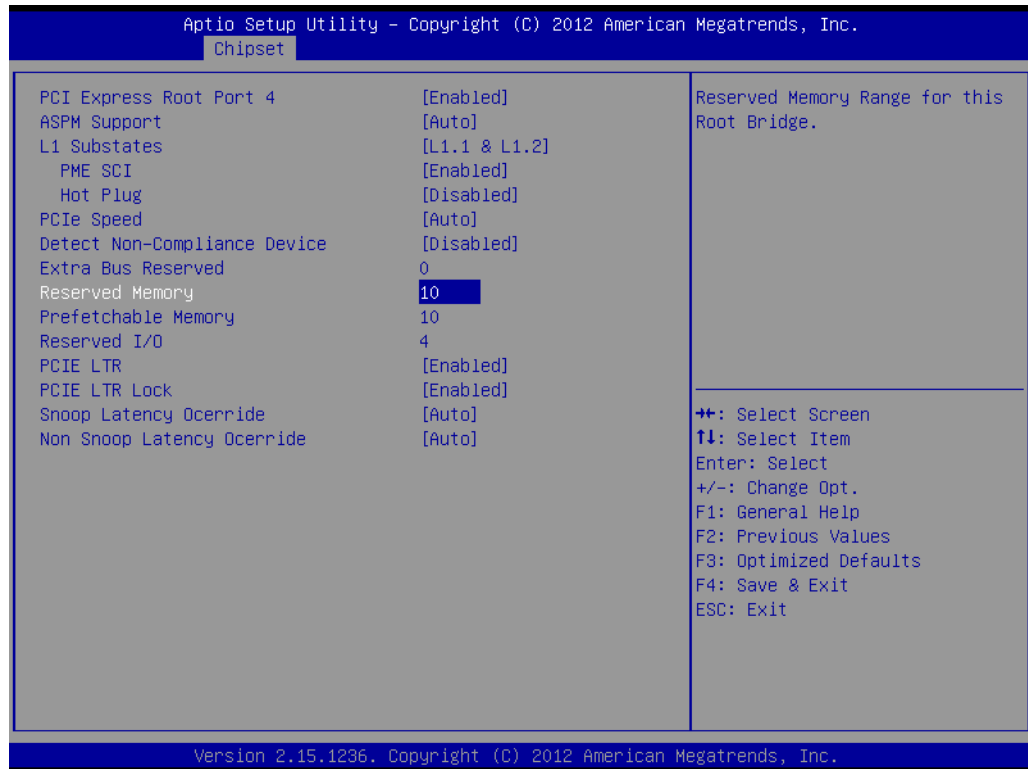


Figure C.28 PCI Express Root Port 4 Configuration

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.

PME SCI

This item allows users to enable or disable PME SCI.

Hot Plug

This item allows users to enable or disable Hot Plug.

PCIe Speed

This item allows users to select PCIe Speed.

Detect Non-Compliance Device

This item allows users to enable or disable Detect Non-Compliance Device. If enable, it will take more time at POST time.

Extra Bus Reserved

This item allows users to select Extra Bus Reserved (0~7) for bridges behind this root bridge.

Reserved Memory

This item allows users to select Reserved Memory range for this root bridge.

Prefetchable Memory

This item allows users to select Prefetchable Memory range for this root bridge.

Reserved I/O

This item allows users to select Reserved I/O (4k/8k/12k/16k.../48k) range for this root bridge.

PCIE LTR

This item allows users to enable or disable PCIE LTR.

PCIE LTR Lock

This item allows users to enable or disable PCIE LTR Configuration Lock.

Snoop Latency Ocerride

This item allows users to select Snoop Latency Ocerride for PCH PCIE.

Non Snoop Latency Ocerride

This item allows users to select Non Snoop Latency Ocerride for PCH PCIE.

■ USB Configuration

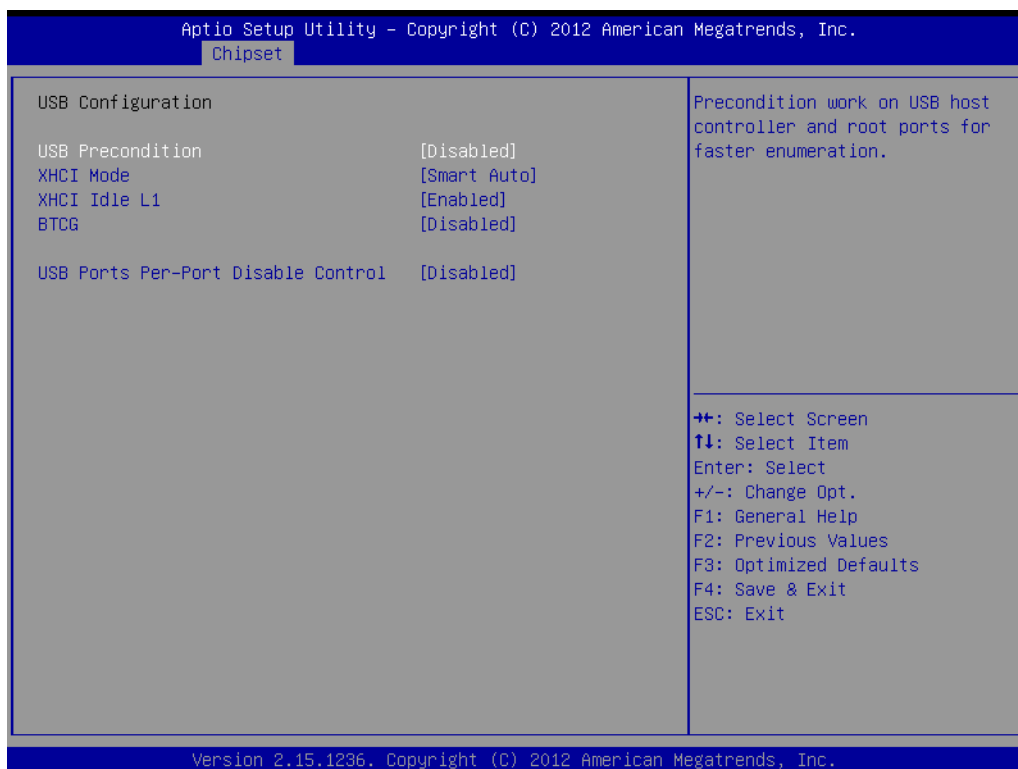


Figure C.29 USB Configuration

- **USB Precondition**

This item allows users to enable or disable USB Precondition.

Precondition work on USB host controller and root ports for faster enumeration.

- **XHCI Mode**

This item allows users to select mode of operation of XHCI mode.

- **XHCI Idle L1**

This item allows users to enable or disable XHCI Idle L1.

XHCIIDLE L1 can be set to disable for LPT-LP Ax stepping to workaround USB3 hot plug will fail after 1 hot plug removal.

- **BTCG**

This item allows users to enable or disable trunk clock gating.

- **USB Ports Per-Port Disable Control**

This item allows users to enable or disable USB Ports Per-Port Disable Control. Control each of the USB ports (0~13) disabling

■ PCH Azalia Configuration



Figure C.30 PCH Azalia Configuration

– Azalia

This item allows users to change Azalia settings. Control detection of the Azalia device.

Disable- Azalia will be unconditionally Disabled

Enabled- Azalia will be unconditionally Enabled

Auto- Azalia will be enabled if present, disabled otherwise.

C.2.3.2 System Agent (SA) Configuration

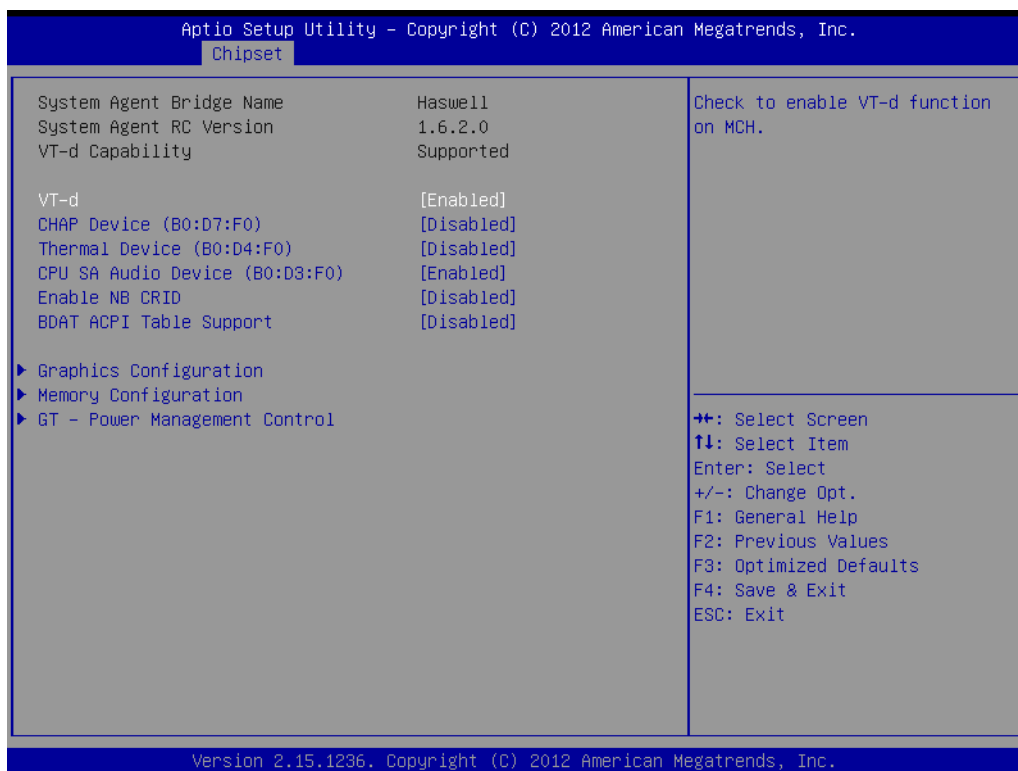


Figure C.31 System Agent (SA) Configuration

- **VT-D**
This item allows users to enable or disable VT-d function.
- **CHAP Device (B0:D7:F0)**
This item allows users to enable or disable SA CHAP Device.
- **Thermal Device (B0:D4:F0)**
This item allows users to enable or disable SA Thermal Device.
- **CPU SA Audio Device (B0:D3:F0)**
This item allows users to enable or disable CPU SA Audio Device.
- **Enable NB CRID**
This item allows users to enable or disable Enable NB CRID workaround.
- **BDAT ACPI Table Support**
This item allows users to enable or disable the BDAT ACPI Table.
- **Graphics Configuration**
This item allows users to change graphics setting.
- **Memory Configuration**
This item allows users to change memory configuration parameters.
- **GT- Power Management Control**
This item allows users to change GT- Power Management Control Options.

■ Graphics Configuration

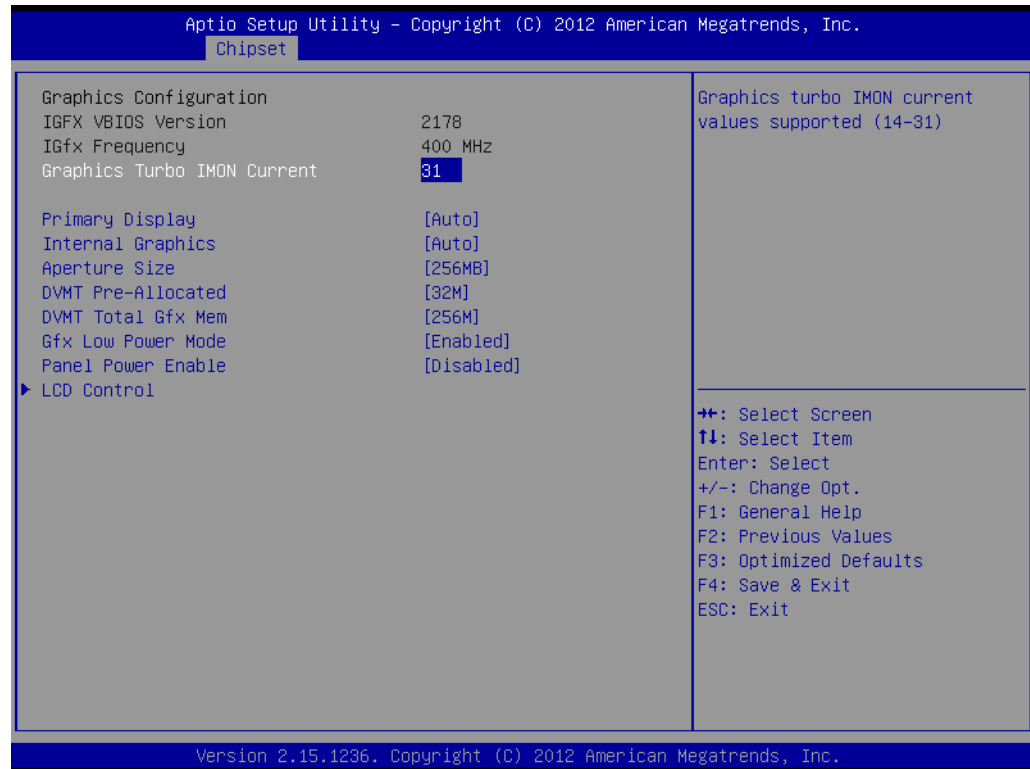


Figure C.32 Graphics Configuration

- **Graphics Turbo IMON Current**
Shows graphics turbo IMON Current values supported (14-31)
- **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.
- **DVMT Pre-Allocated**
This item allows users to select DVMT 5.0 Pre-allocated (fixed) graphics memory size used by the internal graphics device.
- **DVMT Total Gfx Mem**
This item allows users to select DVMT 5.0 total graphic memory size used by the internal graphics device.
- **Gfx Low Power Mode**
This option is applicable for SFF only.
- **Panel Power Enable**
This item allows users to enable or disable forcing of Panel Power in the BIOS.

– LCD Control

This item allows users to perform LCD control.

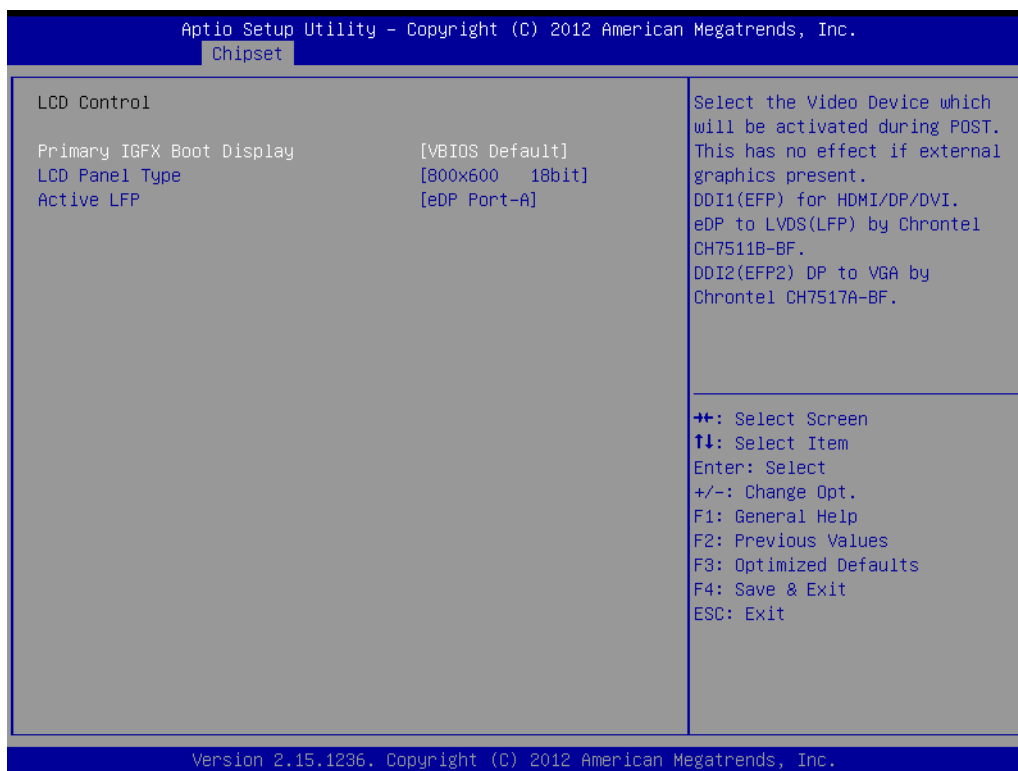


Figure C.33 LCD Control

Primary IGFX Boot Display

This item allows users to select the Video Device which will be activated during post.

This has no effect if external graphics present.

VGA: DDI2 (EFP2) DP to VGA by Chrontel CH7517A-BF DDI1: DDI1 (EFP) for HDMI (Default)/DP/DVI

LVDS: eDP to LVDS(LFP) by Chrontel CH7511B-BF

LCD Panel Type

This item allows users to select LCD Panel used by Internal Graphics device by selecting the appropriate setup item.

Active LFP

This item allows users to select the Active LFP configuration.

- **Memory Configuration**

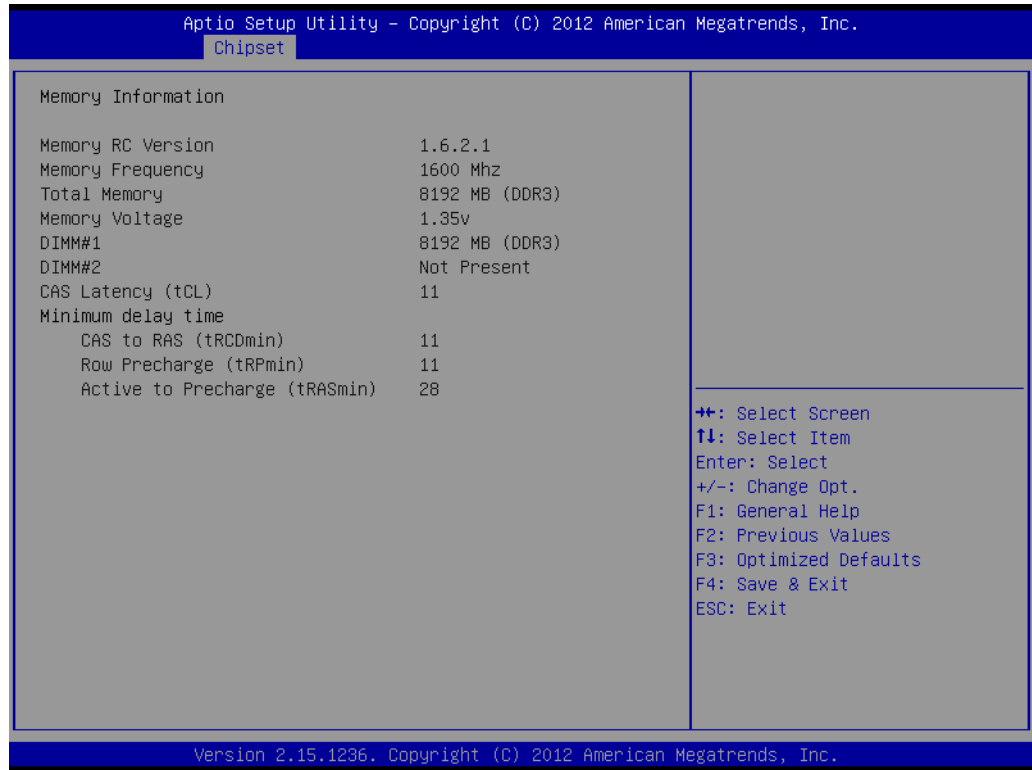


Figure C.34 Memory Configuration

- **Memory Information**

This item shows memory configuration parameters.

- **GT- Power Management Control**

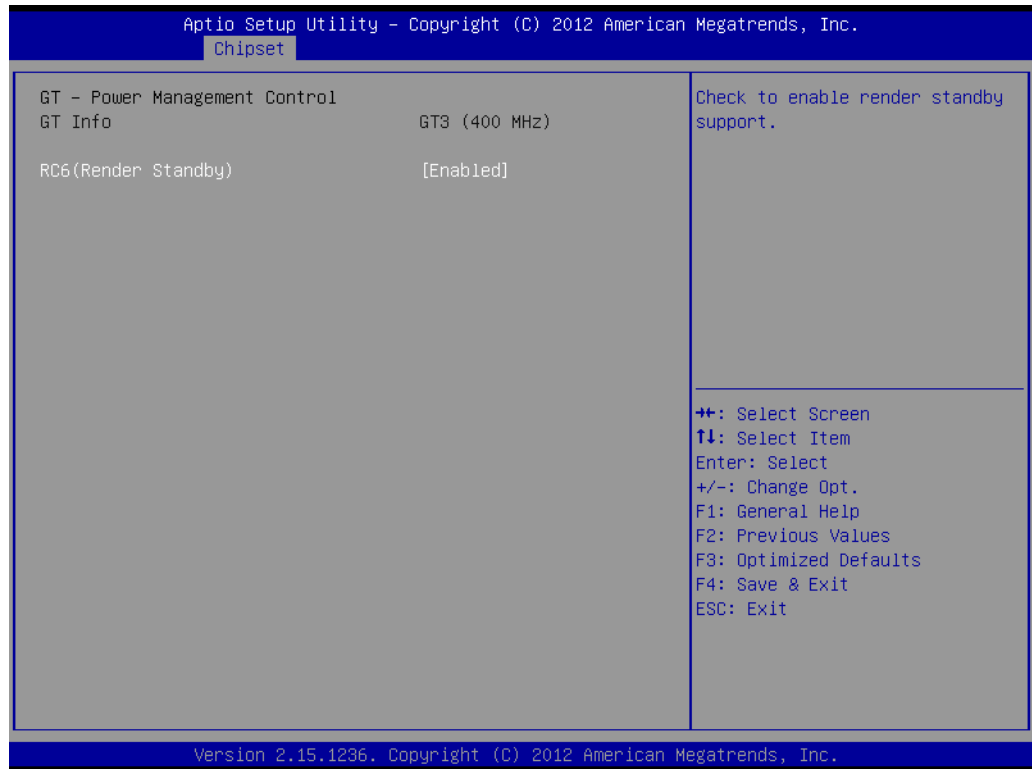


Figure C.35 GT- Power Management Control

- **RC6 (Render Standby)**

This item allows users to enable or disable RC6 (Render Standby) support.

C.2.4 Boot

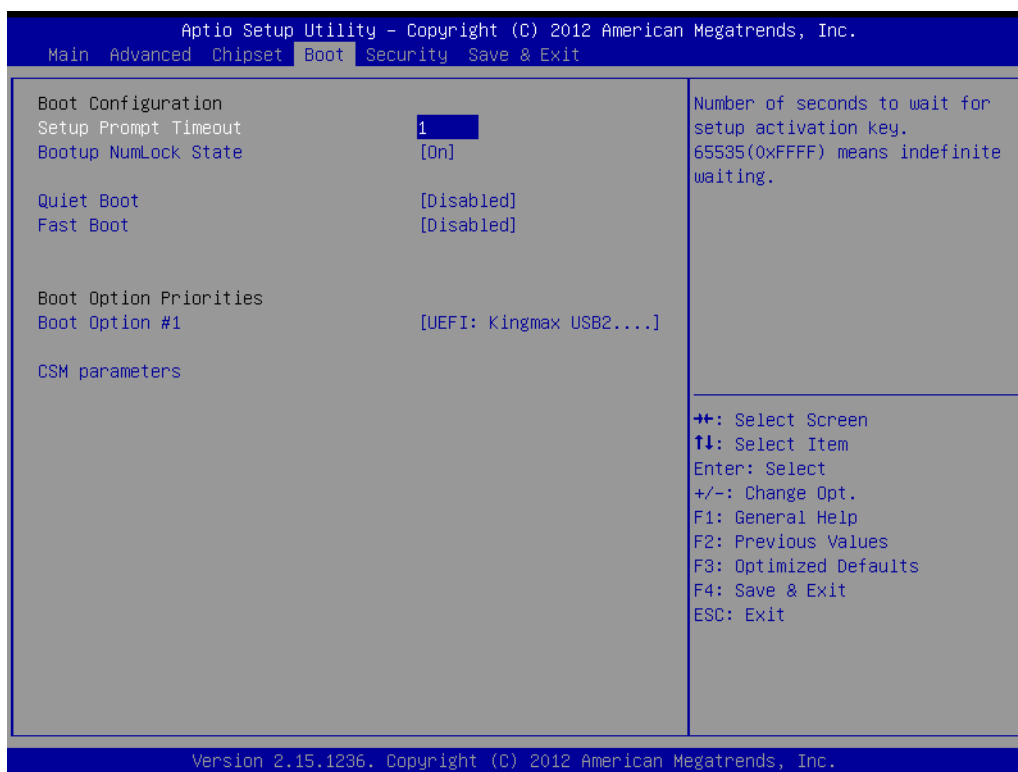


Figure C.36 Boot Setup Utility

- **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.
- **Hard Drive BBS Priorities**
This item allows users to set the order of the legacy devices in this group.
- **CSM parameters**
This item allows users to change CSM parameters setting.

C.2.4.1 CSM parameters

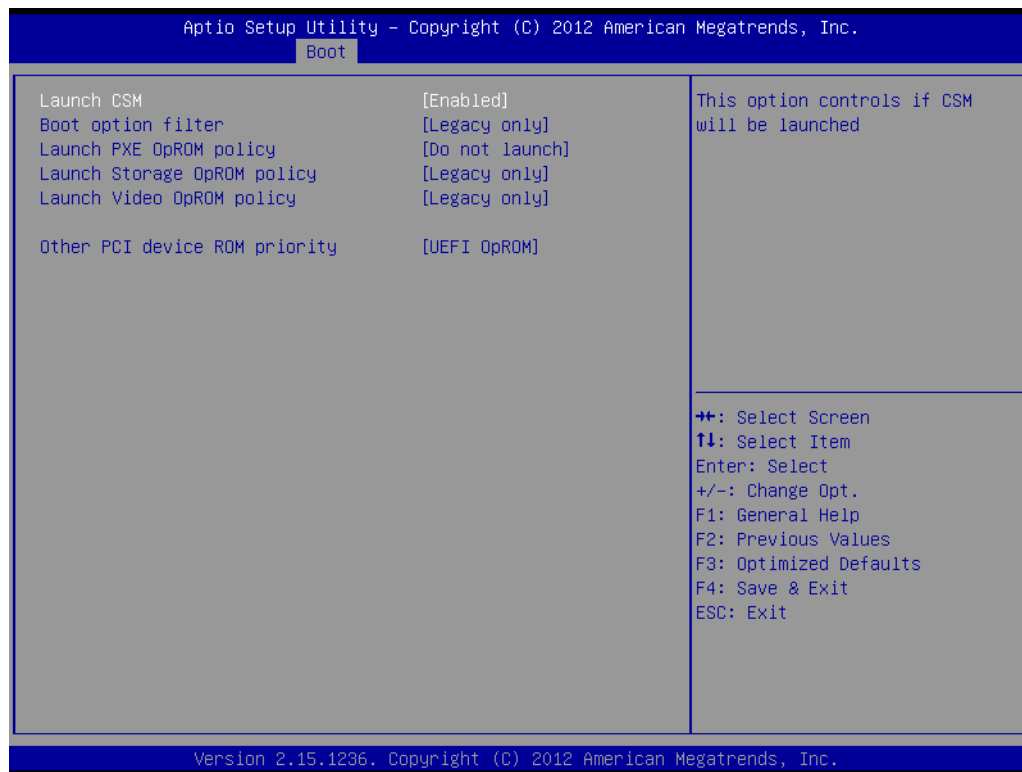


Figure C.37 CSM parameters

- **Launch CSM**
This item allows users to enable or disable Launch CSM.
- **Boot option filter**
This item allows users to select Boot option filter setting.
- **Launch PXE OpROM policy**
This item allows users to select Launch PXE OpROM policy setting.
- **Launch Storage OpROM Policy**
This item allows users to select Launch Storage OpROM policy setting.
- **Launch Video OpROM policy**
This item allows users to select Launch Video OpROM policy setting.
- **Other PCI device ROM priority**
This item allows users to select Other PCI device ROM priority setting.

C.2.5 Security Setup

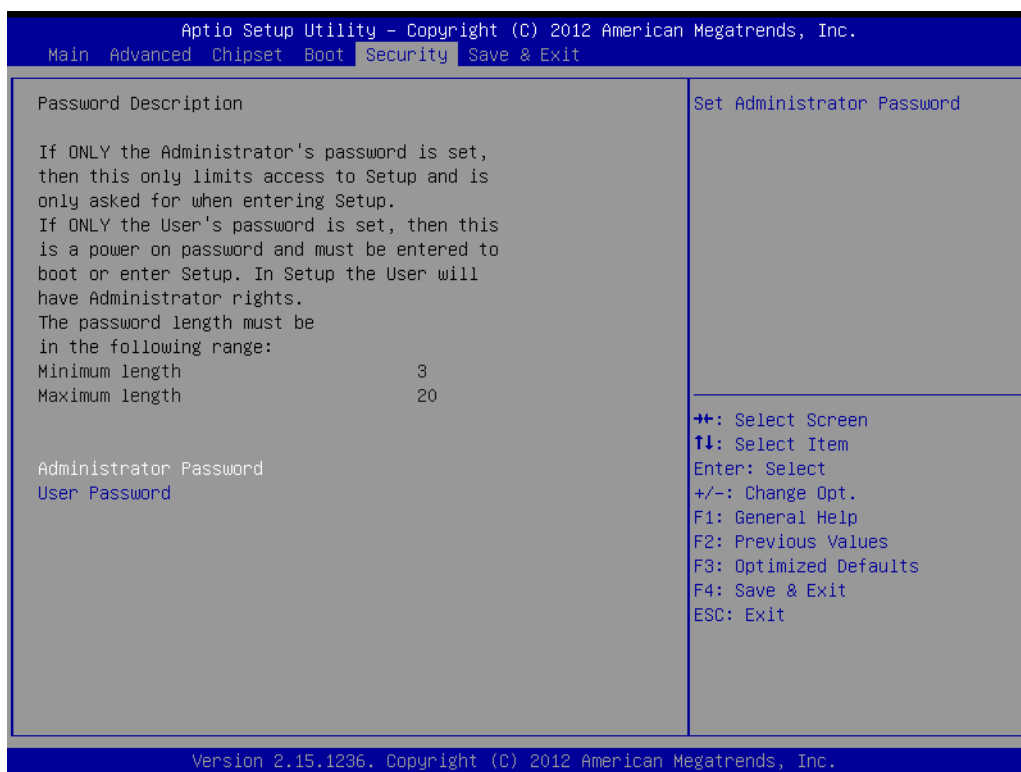


Figure C.38 Security Setup

Select Security Setup from the SOM-6894 Setup main BIOS setup menu. 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.39 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-6894 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 particular, 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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