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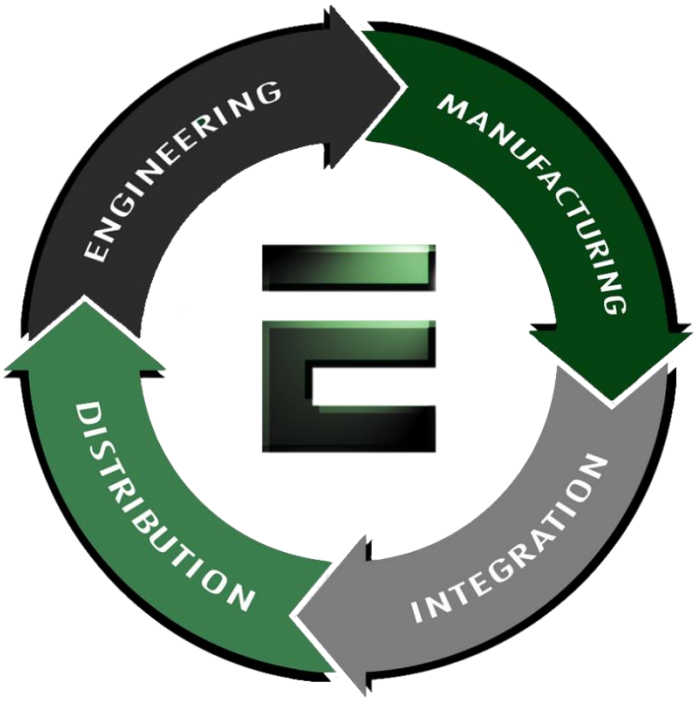

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For purchase information please contact info@emacinc.com

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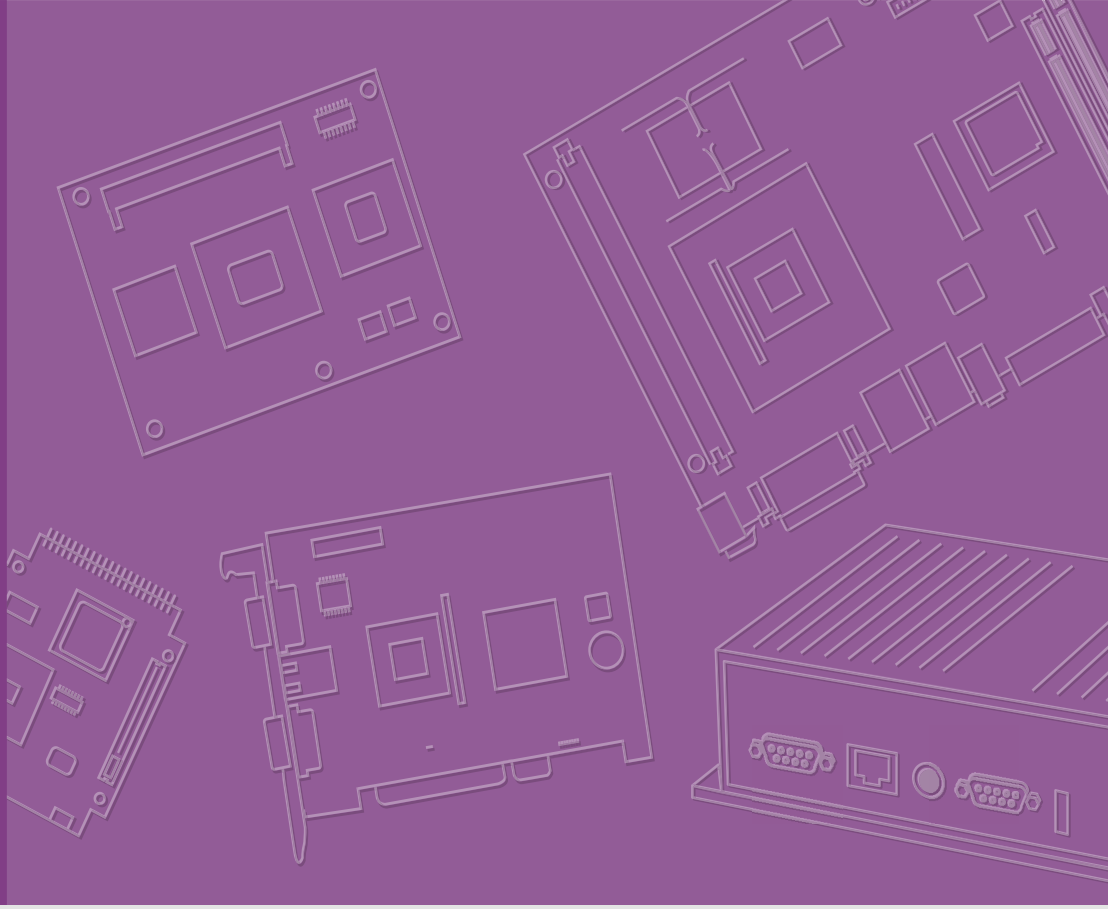

User Manual

EPC-S201

Fanless Embedded PC

ADVANTECH

Enabling an Intelligent Planet

Attention!

Please note:

This package contains a hard-copy user manual in Chinese for China CCC certification purposes. There is an English user manual included as a PDF file on the website. Please disregard the Chinese hard copy user manual if the product is not to be sold and/or installed in China.

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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

FCC Class B

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

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

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 the Advantech 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.

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which, if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data.*

There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*

Packing List

Before installation, please ensure the following items have been shipped:

- 1 x EPC-S201 unit
- 1 x China RoHS

Ordering Information

Model Number	Description
EPC-S201M00-S1A1E	Intel N3350 1.1GHz EPC, 12VDC,VGA,DIO,2 COM port

*Optional Accessories

For EPC-S201

Part Number	Description
96PSA-A60W12P2-1	DC power 12V/5A 60W, 0 ~ 40 °C, w/ Phoneix type power connector
1702002600-01	Power cable 3-pin 183 cm, USA type
1700018704	Power cable 3-pin 180 cm, UK type
1702002605	Power cable 3-pin 183 cm, Europe type
1700000237-01	Power cable 3-pin 183 cm, PSE type
EWM-W135F01E	WIFI Module: 802.11 a/b/g/n, Atheros AR9382, 2T2R
1750008717-01	External Antenna, Dipole Ant. D.B 2.4/5G WIFI 3dBi
1750006043	SMA Cable, R-SMA(F)/MHF 1.32 150mm

*Optional: default not included

Safety Instructions

1. Please read these safety instructions carefully.
2. Please keep this User's Manual for later reference.
3. Please disconnect this equipment from AC outlet before cleaning. Use a damp cloth. Don't use liquid or sprayed detergent for cleaning. Use a moisture sheet or cloth for cleaning.
4. For pluggable equipment, the socket-outlet should be near the equipment and easily accessible.
5. Please keep equipment away from humidity.
6. Place this equipment on a reliable surface when installing. A drop or fall may cause injury.
7. The openings on the enclosure are for air convection to protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Check the voltage of the power source when connecting the equipment to the power outlet.
9. Make sure to connect the power cord to a socket-outlet with an earthing connection.
10. Place the power cord in such a way that people cannot step on it. Do not place anything over the power cord.
11. All cautions and warnings on the equipment should be noted.
12. If the equipment is not used for long time, disconnect the equipment from mains to avoid damage from transient over-voltage.
13. Never pour any liquid into ventilation openings; this may cause fire or electrical shock.
14. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.
15. Before any internal installation procedures are carried out on the system, make sure the system is turned off and cools down for 15 minutes. Failing to turn off the system before opening can cause permanent damage to the system and serious or fatal injury to the user.
16. 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.
17. Do not leave this equipment in an environment where the storage temperature may go below -40° C (-40° F) or above 85° C (185° F). This could damage the equipment.The equipment should be kept in a controlled environment.
18. Caution: There is the danger of an explosion if battery is incorrectly replaced. Replace only with the same or an equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
    - Risk of explosion if the battery is replaced by an incorrect type.
    - Replacement of a BATTERY with an incorrect type that can defeat a SAFEGUARD (for example, in the case of some lithium BATTERY types);
    - Disposal of a BATTERY into fire or a hot oven, or mechanically crushing or cutting of a BATTERY, can result in an EXPLOSION;

- Leaving a BATTERY in an extremely high temperature surrounding environment that can result in an EXPLOSION or the leakage of flammable liquid or gas;
- A BATTERY subjected to extremely low air pressure that may result in an EXPLOSION or the leakage of flammable liquid or gas.

19. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).
20. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.
21. This equipment is not suitable for use in locations where children are likely to be present.
22. Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75
23. DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Instructions de sécurité

1. Veuillez lire attentivement ces instructions de sécurité.
2. Veuillez conserver ce manuel de l'utilisateur pour toute référence ultérieure.
3. Veuillez déconnecter cet équipement de la prise secteur avant le nettoyage, utilisez un chiffon humide, n'utilisez pas de détergent liquide ou pulvérisé pour le nettoyage, utilisez une feuille d'humidité ou un chiffon pour le nettoyer.
4. Pour les équipements enfichables, la prise de courant doit se trouver à proximité de l'équipement et doit être facilement accessible.
5. Veuillez garder cet équipement de l'humidité.
6. Posez cet équipement sur une surface fiable lorsqu'il est installé.
7. Les ouvertures de l'enceinte sont destinées à la convection de l'air et protègent finalement l'équipement contre la surchauffe.
8. Assurez-vous de la tension de la source d'alimentation lorsque vous connectez l'équipement à la prise secteur.
9. Assurez-vous de connecter le cordon d'alimentation à une prise de courant avec connexion à la terre
10. Placez le cordon d'alimentation de manière à ce que les personnes ne puissent pas marcher dessus. Ne placez rien sur le cordon d'alimentation.
11. Toutes les précautions et tous les avertissements sur l'équipement doivent être notés.
12. Si l'appareil n'est pas utilisé pendant une longue période, débranchez-le du secteur pour éviter d'être endommagé par une surtension transitoire.
13. Ne jamais verser de liquide dans les ouvertures de ventilation, cela pourrait provoquer un incendie ou un choc électrique.
14. N'ouvrez jamais l'appareil.Pour des raisons de sécurité, seul le personnel de maintenance qualifié doit ouvrir l'équipement.
15. Avant d'effectuer toute procédure d'installation interne sur le système, assurez-vous que le système est éteint et refroidi pendant 15 minutes, sans quoi le système risque d'être endommagé de manière permanente et de provoquer des blessures graves ou mortelles. L'utilisateur
16. Si l'une des situations suivantes se présente, faites vérifier l'équipement par le personnel de service:
    - Le cordon d'alimentation ou la fiche est endommagé.
    - Le liquide a pénétré dans l'équipement.

- Equipment L'équipement a été exposé à l'humidité.
- Equipment L'équipement ne fonctionne pas bien ou vous ne pouvez pas le faire fonctionner conformément au manuel de l'utilisateur.
- Equipment L'équipement est tombé et est endommagé.
- Equipment L'équipement présente des signes évidents de rupture.

17. Ne laissez pas cet appareil dans un environnement où la température de stockage peut être inférieure à -40 ° C (-40° F) ou supérieure à 85 ° C (185° F), ce qui pourrait endommager l'équipement. Environnement contrôlé
18. Attention: Danger d'explosion si la batterie n'est pas remplacée correctement Remplacez uniquement par un type identique ou équivalent recommandé par le fabricant, jetez les piles usagées conformément aux instructions du fabricant.
    - Risque d'explosion si la batterie est remplacée par un type incorrect
    - Remplacement d'une BATTERIE par un type incorrect pouvant neutraliser un SAFEGUARD (par exemple dans le cas de certains types de BATTERIE au lithium);
    - La mise au rebut d'une BATTERIE au feu ou dans un four chaud, ou le broyage ou la découpe mécanique d'une BATTERIE, pouvant entra?ner une EXPLOSION;
    - Laisser une BATTERIE dans un environnement extrêmement chaud pouvant entraîner une EXPLOSION ou une fuite de liquide ou de gaz inflammable;
    - Une BATTERIE </ RTI> est une pression d'air extrêmement basse qui peut provoquer une EXPLOSION ou une fuite de liquide ou de gaz inflammable.
19. Le niveau de pression acoustique au poste de conduite conformément à la norme CEI 704-1: 1982 ne dépasse pas 70 dB (A).
20. ZONE D'ACCÈS RESTREINTE: L'équipement ne doit être installé que dans une zone d'accès restreint.
21. Cet équipement ne peut pas être utilisé dans des endroits où des enfants sont susceptibles d'être présents.
22. Convient à une installation dans des salles informatiques conformément à l'article 645 du Code national de l'électricité et à la norme NFPA 75
23. AVIS DE NON-RESPONSABILITÉ: Cet ensemble d'instructions est conforme à la norme CEI 704-1. Advantech décline toute responsabilité concernant l'exactitude des déclarations contenues dans ce document.

Contents

Chapter 1

General Introduction

This chapter gives background information on the EPC-S201 series.

1.1 Introduction

EPC-S201 is a small, fan-less embedded system. The size is no bigger than the palm of a hand and it supports Din rail/wall/desk mounting. EPC-S201 I/O is at the front and side, which is suitable for Din rail assembly or other types of mounting. Reserve I/O ports are able to be upgraded with extension modules by demand. EPC-S201 is a semi-industrial system that allows for further extensions and is then equipped inside the machine cabinet. This system targets markets like Factory Automation, Equipment Integration, KIOSKs, and other space limited machine equipment.

Easy & Simple Design

The EPC-S201 is powered by Intel® Celeron® N3350 to offer high performance with low power consumption. Palm-sized system dimensions are designed to let users perform installation in space limited environments.

EPC-S201 supports up to 2 COM port, offers 2 USB 3.0 , 1 GbE LAN , 1 x MINIPCIe, 1x mSATA for storage, and 1 SO-DIMM Memory socket for an extension module which provides multiple choice for satisfying different kind of usage for users.

For EPC-S201, the default power input is 12V DC in.

EPC-S201 passes worldwide certification including CE/FCC, VCCI and plan to have CB, UL, CCC and BSMI.

Multiple Display Support

EPC-S201 supports up to two display types: VGA and HDMI. In EPC-S201, the system provides one VGA display of up to 2048 x 1280 @60Hz. In EPC-S201, the system offers two 4K2K HDMI displays. The graphics engine is DirectX 11.3, OpenGL 4.4, and OpenCL 2.1 Full AVC/ VC1/MPEG2 HW Decode.

Built in Intelligent Management Tools - WISE-PaSS/RMM

Advantech WISE-PaSS/RMM provides a valuable suite of programmable APIs such as multi-level watchdog, hardware monitor, system restore, and other user-friendly interfaces. WISE-PaSS/RMM makes the whole system more reliable and more intelligent. EPC-S201 provides easy remote management so users can monitor, configure, and control a large number of terminals to make maintenance and system recovery simpler.

1.2 Product Features

1.2.1 General

- **CPU:**
  - Intel® Celeron® N3350 DC SoC 1.1GHz boost up to 2.4 GHz
- **BIOS:** AMI UEFI 64Mbit
- **System Memory:** 1x DDR3L 1866MHz up to 8 GB (Memory is option, default not included)
- **Watchdog Timer:** Single chip Watchdog 255-level interval timer, setup by software
- **Serial Port:** 2 x RS-232/422/485
- **USB:** 2 x USB 3.0
- **Audio:** High Definition Audio (HD), Line out, Line-in
- **Storage:** mSATA through 1 x half size MiniPCIe socket (storage is optional) (default not included)
- **Expansion Interface:** Supports 1 x Full Size MiniPCIe socket (expansion function is option) (default not included)

1.2.2 Display

- **Controller:** Intel® HD Graphics 500
- **Resolution:** VGA, support up to 2048 x 1280 @ 60Hz

1.2.3 Ethernet

- **Chipset:** LAN1 Intel i210
- **Speed:** 1000 Mbps
- **Interface:** 1 x RJ45
- **Standard:** Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.3y, IEEE 802.ab.

1.3 Chipset

1.3.1 Functional Specification

1.3.1.1 Processor

Processor	Intel® Celeron® N3350 DC SoC 1.1GHz boost up to 2.4 GHz
Memory	Supports DDR3L 1866MHz up to 8GB (optional) 1 x 204-pin SODIMM socket type

1.3.1.2 Chipset

Serial ports	■ EPC-S201C support 4x RS-232/422/485 ■ support auto-flow control.COM connector: D-SUB CON. 9P
Internal Graphics Features	■ DirectX 11.3, OpenGL 4.4 ■ VGA, HDMI
Video Accelerator	■ H/W accelerated video decode ■ Video decoder: AVC/VC1/MPEG2 HW Decode
USB Interface	■ USB host interface with support up to 4 USB 3.0 ports ■ All ports are High-Speed, Full-Speed, and Low-Speed capable ■ Supports legacy keyboard/mouse software
BIOS	■ UEFI 64Mbit

1.3.1.3 Others

Ethernet	**LAN Intel i210** ■ Supports 10/100/1000 Mbps. LAN Connectors: Phone Jack RJ45 8P 90D(F)
Audio	**Audio Codec: Realtek ALC888S:** ■ Compliant with HD Audio specifications ■ Supports 16/20/24-bit DAC and 16/20/24-bit ADC resolution ■ Supports: Line-out, Line-in Audio Connectors: Ear Phone Jack * 2
Battery backup	■ BATTERY 3V/210 mAh with WIRE x 1

1.3.2 WISE-PaSS/RMM

Sequence control	Supported
Watchdog timer	Multi Level WDT Programmable 1-255 sec / min

Hardware monitor	CPU Temperature / input Current / input Voltage
Power saving	Deep sleep S5 mode
System information	Running HR / Boot record

1.4 Mechanical Specifications

1.4.1 EPC-S201 Dimensions

139 x 100 x 44 Unit: mm [Inch]

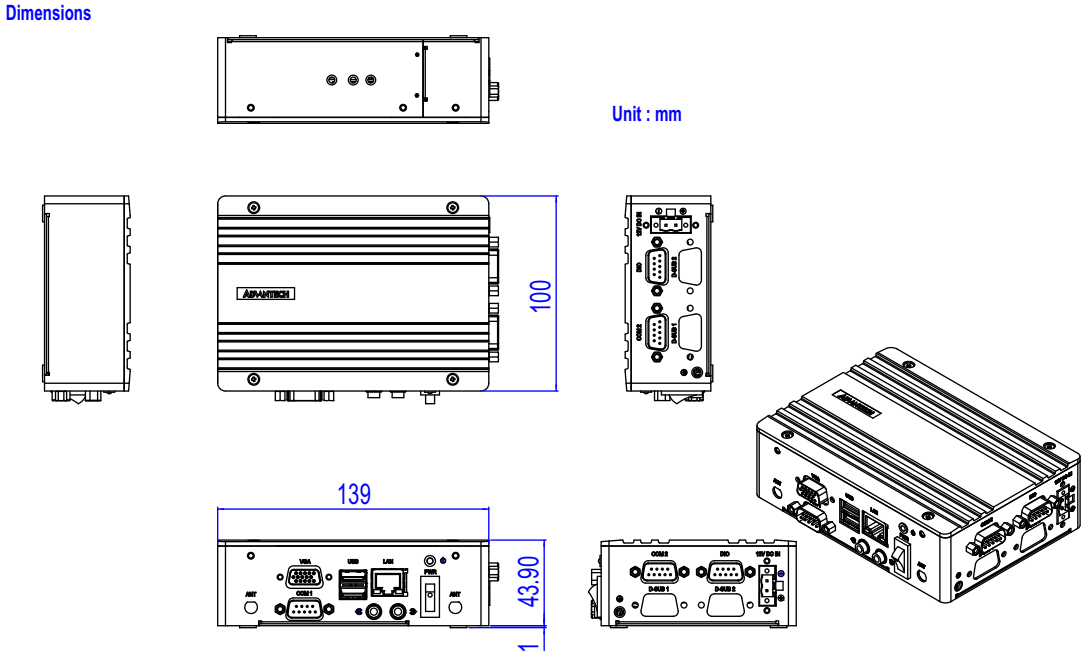


Figure 1.1 EPC-S201 Mechanical Dimension Drawing

1.4.2 Weight

0.6kg

1.5 Power Requirement

1.5.1 System Power

- **Minimum power input:** DC 12V, 5A

1.5.2 RTC Battery

- Lithium 3 V/210 mAH

1.6 Environment Specification

1.6.1 Operating Temperature

- 0 ~ 50° C, with air flow, speed=0.7 m/sec

1.6.2 Relative Humidity

- 95% @ 40° C (non-condensing)

1.6.3 Storage Temperature

- -40 ~ 85° C (-40 ~ 185° F)

1.6.4 Vibration during Operation

- Desk/Wall Mount/ DIN Rail: 3 Grms, IEC 60068-2-64, random vibration, 5 ~ 500 Hz, 1 hr/axis

1.6.5 Shock during Operation

- 30G, IEC60068-2-27, half sine, 11m duration

1.6.6 Safety

- UL, CB, CCC, BSMI

1.6.7 EMC

- CE, FCC, CCC, BSMI, VCCI

Chapter 2

H/W Installation

This chapter introduces the external I/O and the installation of EPC-S201 hardware.

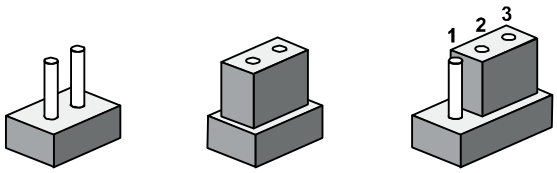
2.1 Introduction

The following sections show the internal jumper settings and the external connector pin assignments for the application.

2.2 Jumpers

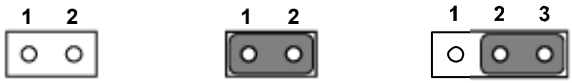
2.2.1 Jumper Description

You may configure EPC-S201 to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, connect the pins with the clip. To open a jumper, remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case, connect either pins 1 and 2, or 2 and 3.



open **closed** **closed 2-3**

The jumper settings are schematically depicted in this manual as follows.



open **closed** **closed 2-3**

A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

2.2.2 Jumper List

Table 2.1: Jumper Setting	
J1	Auto Power On Setting

2.2.3 Jumper Location

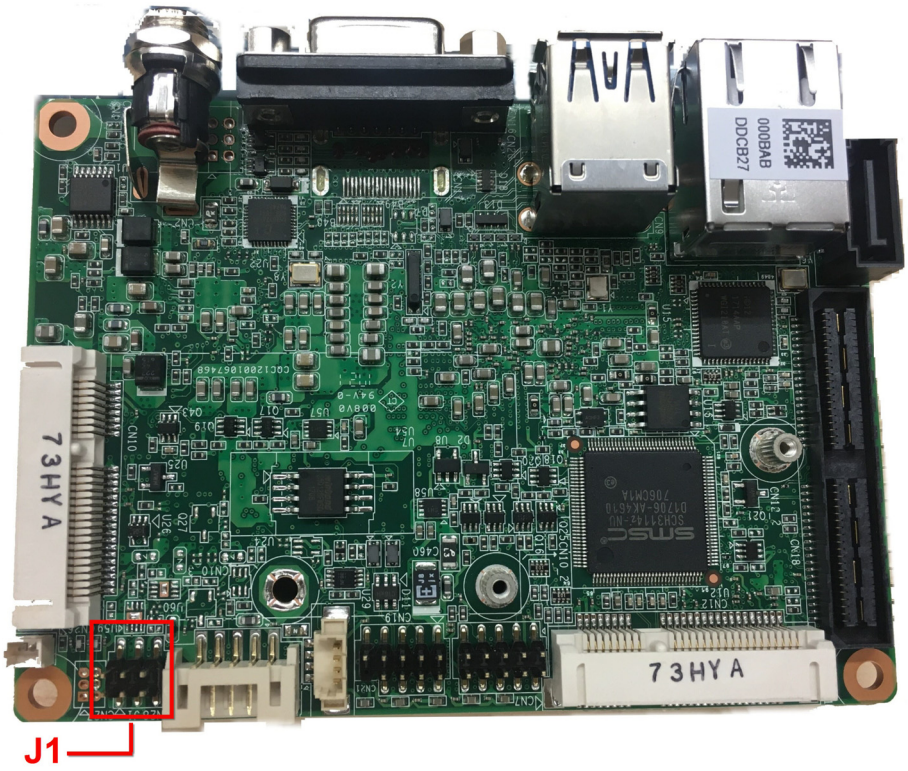
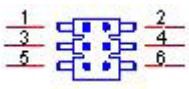


Figure 2.1 Jumper Layout

2.2.4 Jumper Setting

On the Motherboard

J1	Auto Power On Setting
Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3x2P 2.0mm 180D(M) SMD SOURCE PIN
Setting	Function
NL	Power On by power button (default)
(1-2)	+5V
(3-4)	+3.3V
(5-6)	AT Mode



2.3 I/O Introduction

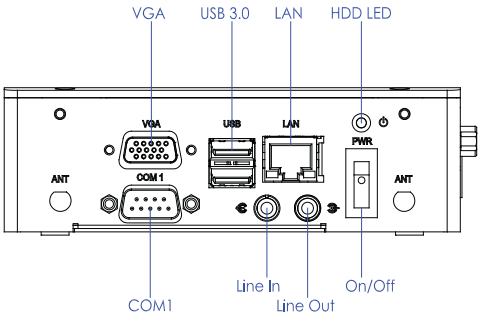


Figure 2.2 EPC-S201 Front View

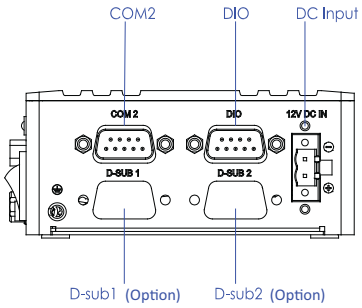


Figure 2.3 EPC-S201 Rear View

2.4 EPC-S201 External I/O

2.4.1 Power On/Off Button

EPC-S201 has a Power On/Off switch button on the front side that shows On status (I) and Off/Suspend status (O).

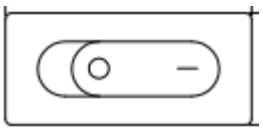


Figure 2.4 Power On/Off Switch Button

2.4.2 Power Input Connector

EPC-S201 is designed with the phoenix connector and 12DC input. (-) stands for GND; (+) stands for +12V

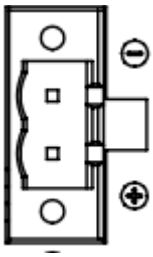


Figure 2.5 Power Input Connector

2.4.3 Ethernet Connector (LAN)

EPC-S201 is equipped with two Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. LAN1, LAN2 are all equipped with i210 Ethernet controller. The Ethernet port provides a standard RJ-45 jack connector with LED indicators on the front side to show its Active/Link status (Green LED) and Speed status (Yellow LED).

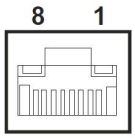


Figure 2.6 Ethernet Connector (LAN)

Table 2.2: Ethernet Connector (LAN) Pin Definition

Pin	10/100/1000 Mbps Signal Name
1	BI_DA+(GHz)
2	BI_DA-(GHz)
3	BI_DB+(GHz)
4	BI_DC+(GHz)
5	BI_DC-(GHz)
6	BI_DB-(GHz)
7	BI_DD+(GHz)
8	BI_DD-(GHz)
H3	GND
H4	GND

2.4.4 USB 3.0 Connector

EPC-S201 supports four USB3.0 interfaces, which provide complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 3.0.

Please refer to Table. 2.3 for its pin assignments. USB 3.0 connectors contain legacy pins to interface to USB 2.0 devices, and a new set of pins for USB 3.0 connectivity (both sets reside in the same connector).

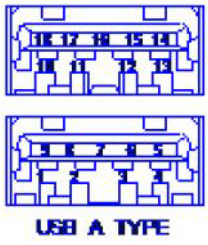


Figure 2.7 USB Connector

Table 2.3: USB Connector Pin Definition

Pin	Signal Name
1	+5V
2	D-_0
3	D+_0

Table 2.3: USB Connector Pin Definition	
4	GND
5	USB0_SSRX-
6	USB0_SSRX+
7	GND
8	USB0_SSTX-
9	USB0_SSTX+
10	+5V
11	D-_1
12	D+_1
13	GND
14	USB1_SSRX-
15	USB1_SSRX+
16	GND
17	USB1_SSTX-
18	USB1_SSTX+

2.4.5 Audio Connector

EPC-S201 offers stereo audio ports by two phone jack connectors of Line Out, Line In. The audio chip is controlled by ALC888S, and it's compliant with the Azalea standard.

Figure 2.8 Audio Connector

Table 2.4: Audio Connector Pin Definition	
Pin	**Signal Name**
1	Line-out
2	Line-in

2.4.6 COM Connector

EPC-S201 provides one D-sub 9-pin connector, which offers RS232/422/485 serial communication interface ports. The default setting is RS-232. If you want to use RS-422/ 485, you can find the BIOS manual to change settings.

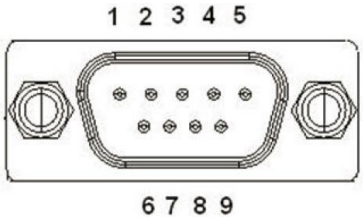


Figure 2.9 COM Connector

Table 2.5: COM Connector Pin Definition

	RS-232	RS-422	RS-485
Pin	**Signal Name**		
1	DCD	Tx-	DATA-
2	RxD	Tx+	DATA+
3	TxD	Rx+	NC
4	DTR	Rx-	NC
5	GND	GND	GND
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

NC represents “No Connection”.

2.4.7 HDMI Connector

EPC-S201 offers a SKU that supports the HDMI port. This 19-pin receptacle connector has a HDMI 1.4a interface. The HDMI link supports resolutions of up to 3840 x 2160 @ 30 Hz.

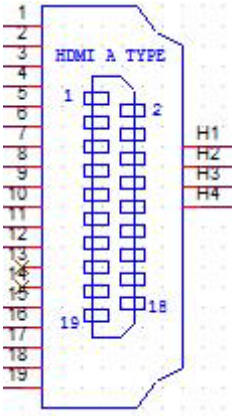


Figure 2.10 HDMI Connector

Table 2.6: HDMI Connector Pin Definition	
Pin	**Signal Name**
1	HDMI_TX2+
2	GND
3	HDMI_TX2-
4	HDMI_TX1+
5	GND
6	HDMI_TX1-
7	HDMI_TX0+
8	GND
9	HDMI_TX0-
10	HDMI_CLK+
11	GND
12	HDMI_CLK-
13	NC
14	NC
15	HDMI_DCLK
16	HDMI_DDAT
17	GND
18	+V5_HDMI-HPD
19	DDP0_HPD

NC represents “No Connection”.

2.4.8 Power LED Indicators

EPC-S201 provides one LED on the front panel that indicates power status.

Figure 2.11 Power LED Indicators

2.4.9 Antenna Hole

EPC-S201 reserves two antenna holes for wireless antenna installation. Each of antenna holes is marked “ANT” for easy recognition.

Figure 2.12 Antenna Hole

2.4.10 Digital In-put/Output (DIO) Connector

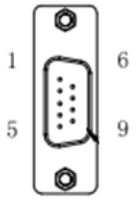


Figure 2.13 DIO Connector Pin Definition

Table 2.7: DIO Connector Pin Definition	
Pin	**Signal Name**
1	GPIO0
2	GPIO1
3	GPIO2
4	GPIO3
5	GPIO4
6	GPIO5
7	GPIO6
8	GPIO7
9	GND

2.4.11 VGA Connector

The EPC-S201U provides a high resolution VGA interface connected by a D-sub 15-pin connector to support a VGA CRT monitor. It supports display resolutions of up to 2048 x 1280 @ 60Hz.

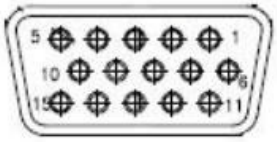


Figure 2.14 VGA Connector

Table 2.8: VGA Connector Pin Definition	
Pin	**Signal Name**
1	VGA_z_R
2	VGA_z_G
3	VGA_z_B
4	VGA_z_SPC
5	GND
6	GND_RGB
7	GND_RGB
8	GND_RGB
9	+V5
10	GND
11	VGA_z_SPD
12	VGA_z_DDAT

Table 2.8: VGA Connector Pin Definition	
13	VGA_z_HS
14	VGA_z_VS
15	VGA_z_DCLK
16	NC
17	NC
18	GND_IO
19	GND_IO

NC represents “No Connection”.

2.5 Installation

2.5.1 Memory Installation

1. Loosen screws, open TOP case.

Figure 2.15 Loosen Screws, Open TOP Case

2. Install memory and tighten up the screws again.

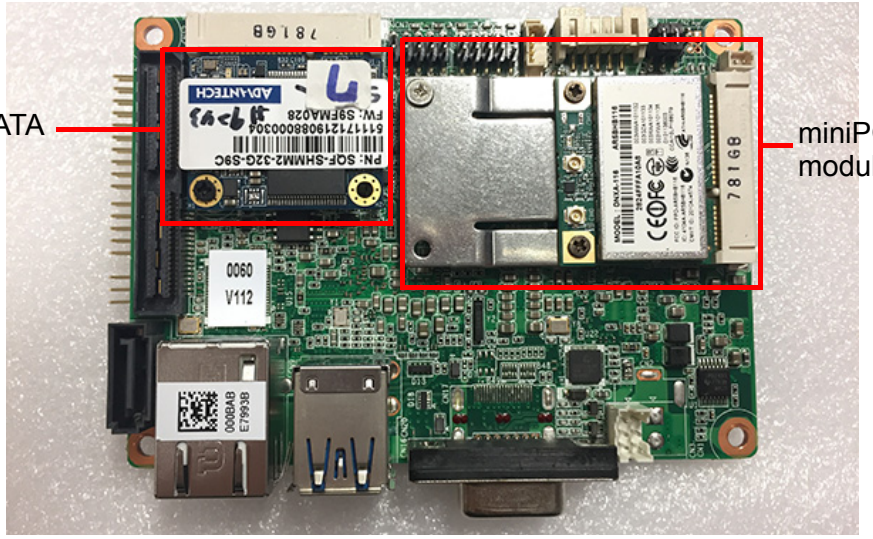
Figure 2.16 Install Memory

2.5.2 RAM Installation

1. Loosen screws, open bottom case

Figure 2.17 Loosen Screws, Open Bottom Case

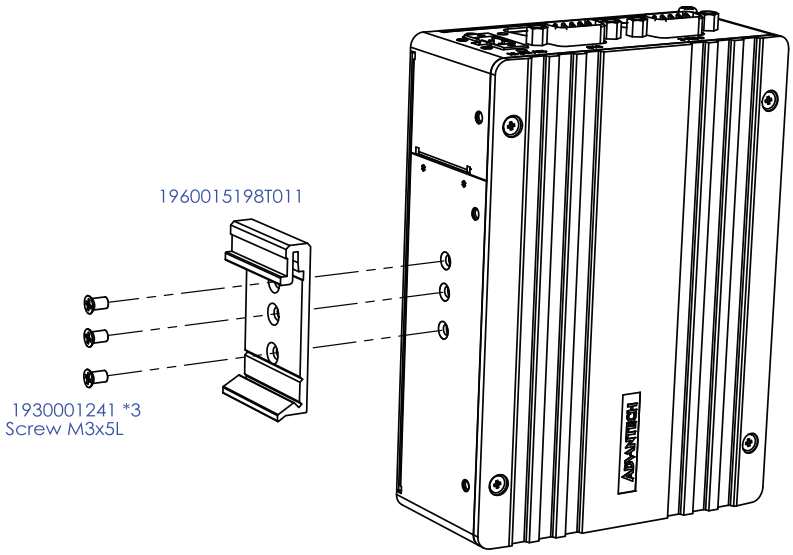
2. Install mSATA or miniPCIe module. We suggest to install mSATA in CTOS. (*mSATA and miniPCIe module are not included, demonstration only).



3. Replace the bottom case and screw the four screws back on.

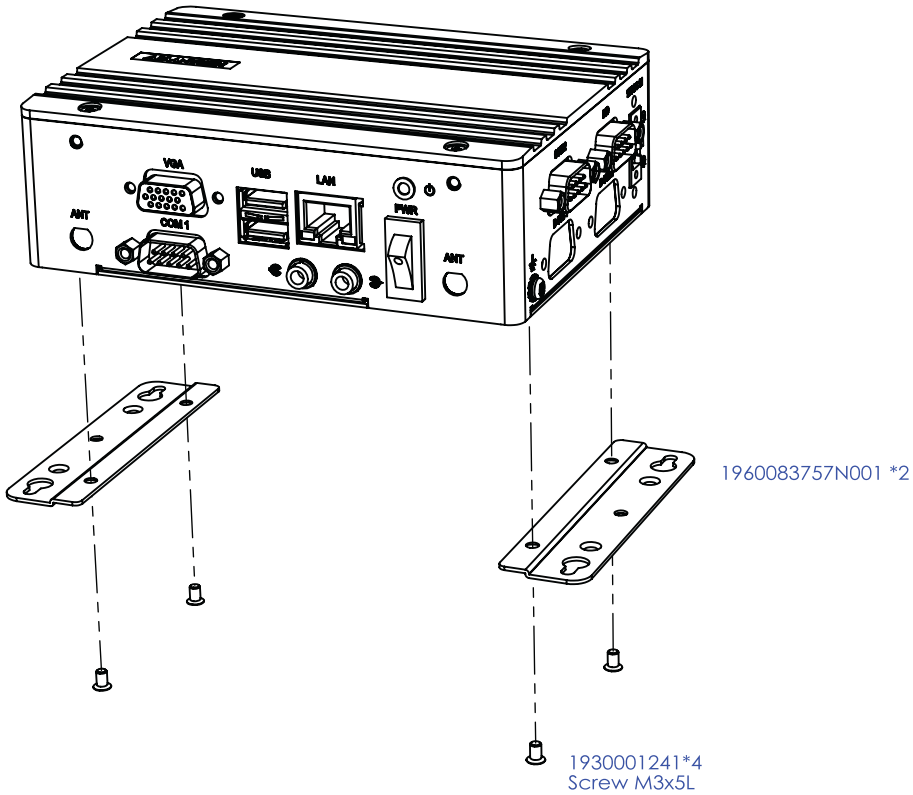
2.5.3 Din Rail Installation (Optional)

1. Loosen 3 pcs Din rail screws on back cover.
2. Use Din rail screws to mount Din rail.



2.5.4 Wall Mount Installation (Optional)

1. Loosen four side screws of the top case (M3x5L) and screw back with the wall mount bracket.
2. Screw down the four wall mount screws (M3x5L) to the table.



Chapter 3

BIOS Settings

3.1 BIOS Setup

AMI BIOS has been integrated into a plethora of motherboards for decades. With the AMI BIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the EPC-S201 BIOS setup screens.

Figure 3.1 Setup Program Initial Screen

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

3.2 Entering Setup

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

3.2.1 Main Setup

When first entering 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 3.2 Main Setup Screen

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. 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 Date / System Time**

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

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the EPC-S201 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub menus are described on the following pages.

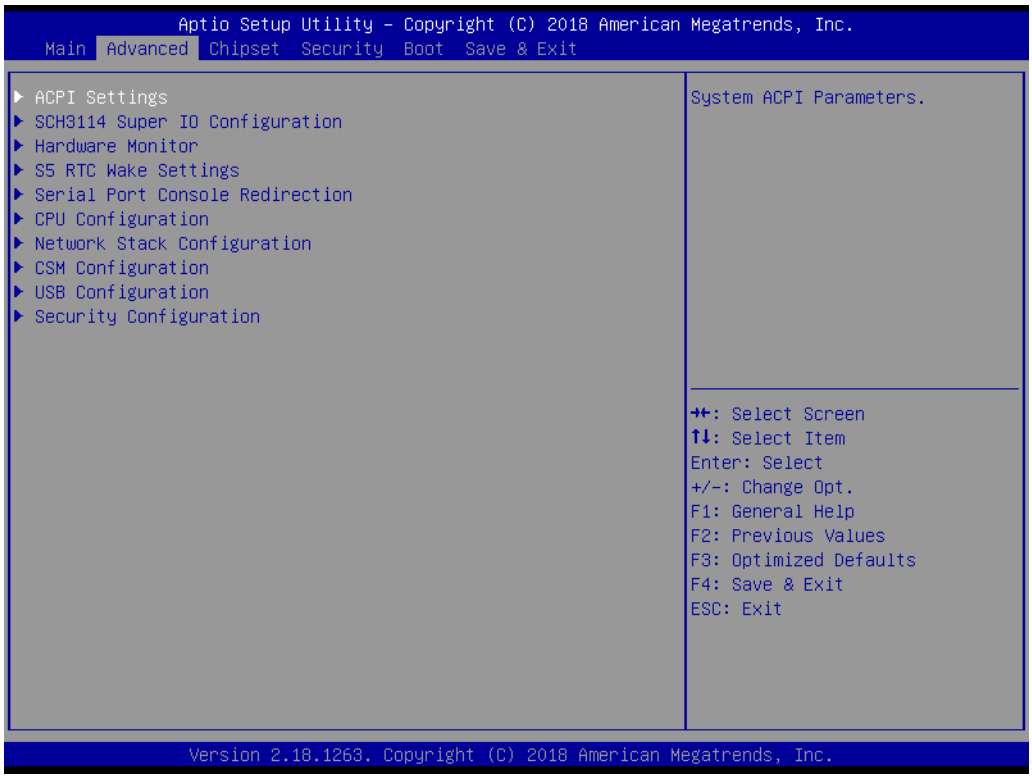


Figure 3.3 Advanced BIOS Features Setup Screen

3.2.2.1 ACPI Settings

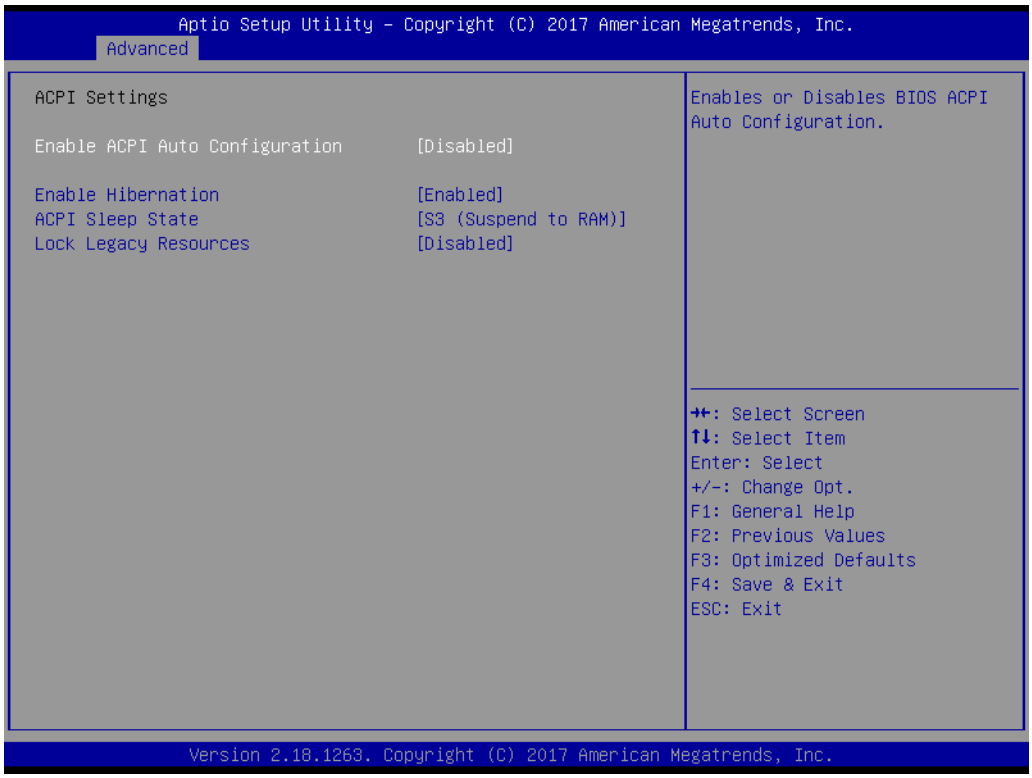


Figure 3.4 ACPI Setting

- **Enable ACPI Auto Configuration**
  Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
  This item allows users enables or disables system ability to hibernate (OS/S4 Sleep State).
- (*This option may be not effective with some OS.).
- **ACPI Sleep State**
  This item allows users to set the ACPI sleep state.
- **Lock Legacy Resources**
  This item allows users to lock legacy device resources.

3.2.2.2 Super I/O Configuration

First Super I/O Configuration (SCH3114)

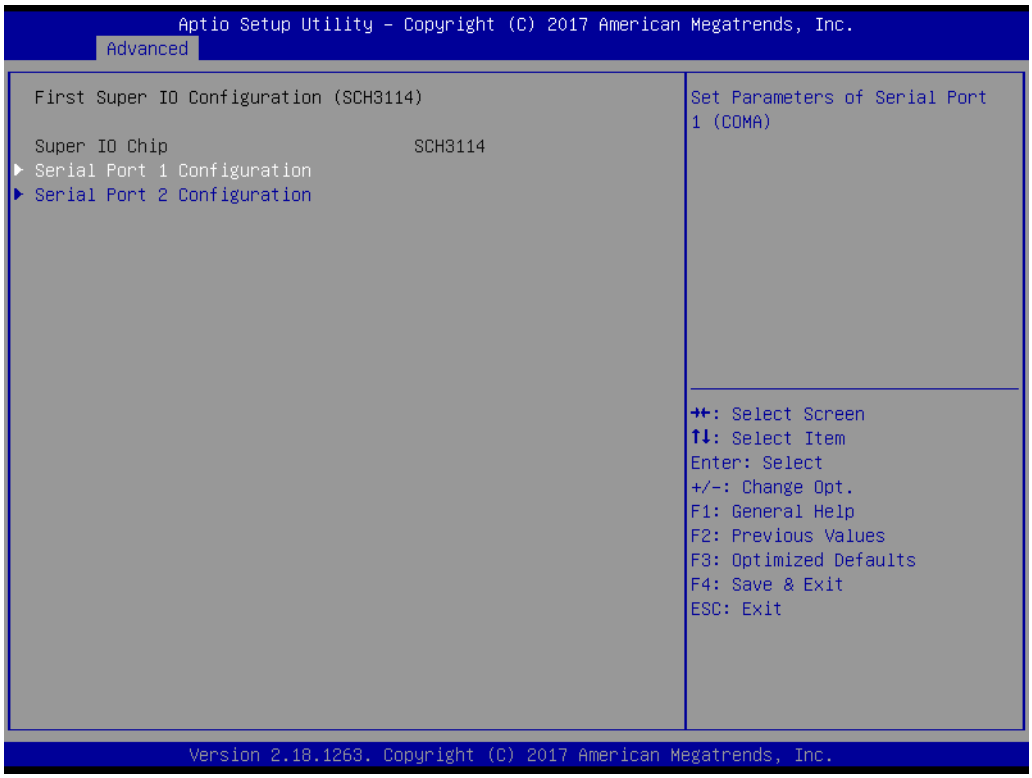
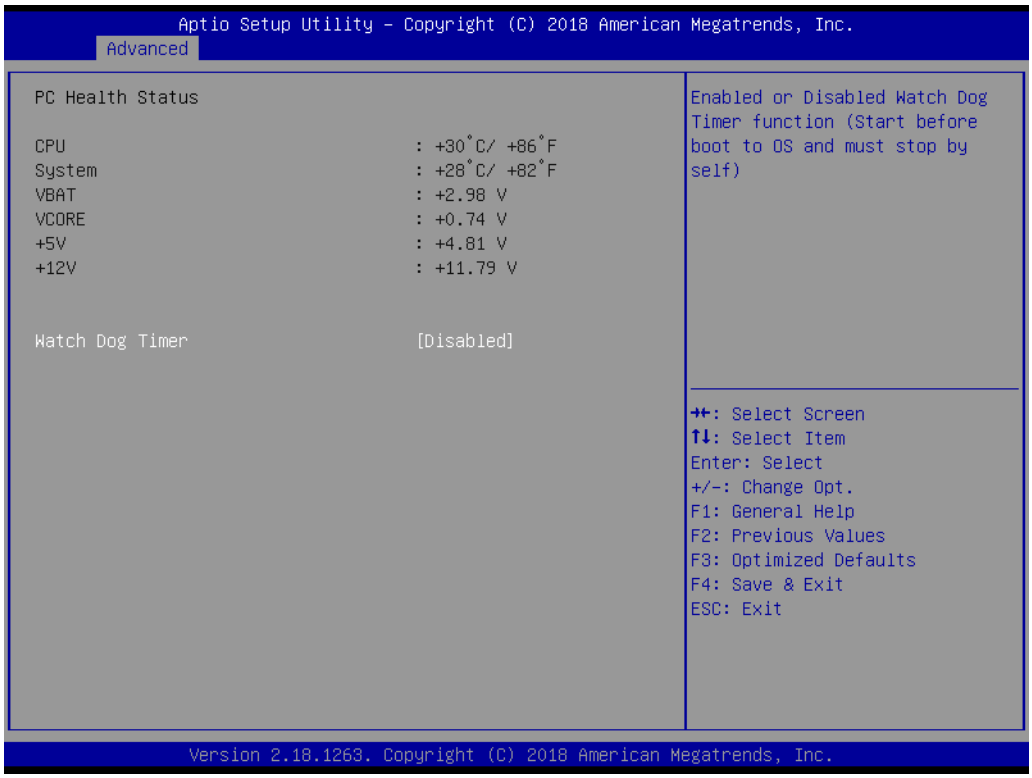


Figure 3.5 First Serial Port Configuration(SCH3114)

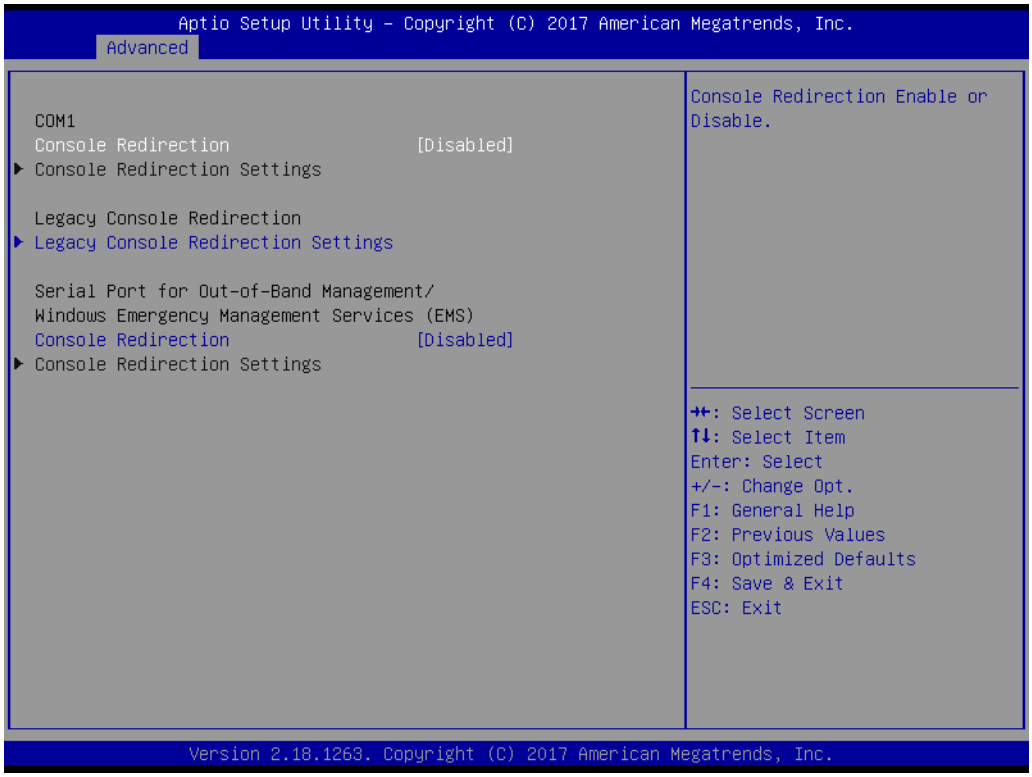
– Serial Port 1 Configuration
  Set Parameters of Serial Port 1 (COMA).
– Serial Port 2 Configuration
  Set Parameters of Serial Port 2 (COMB).

3.2.2.3 Hardware Monitor



- **PC Health Status**
  This page displays all the information about system Temperature/Voltage.
- **Watch Dog Timer**
  Enabled or Disabled Watch Dog Timer function.

3.2.2.4 Serial Port Console Redirection



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

3.2.2.5 CPU Configuration

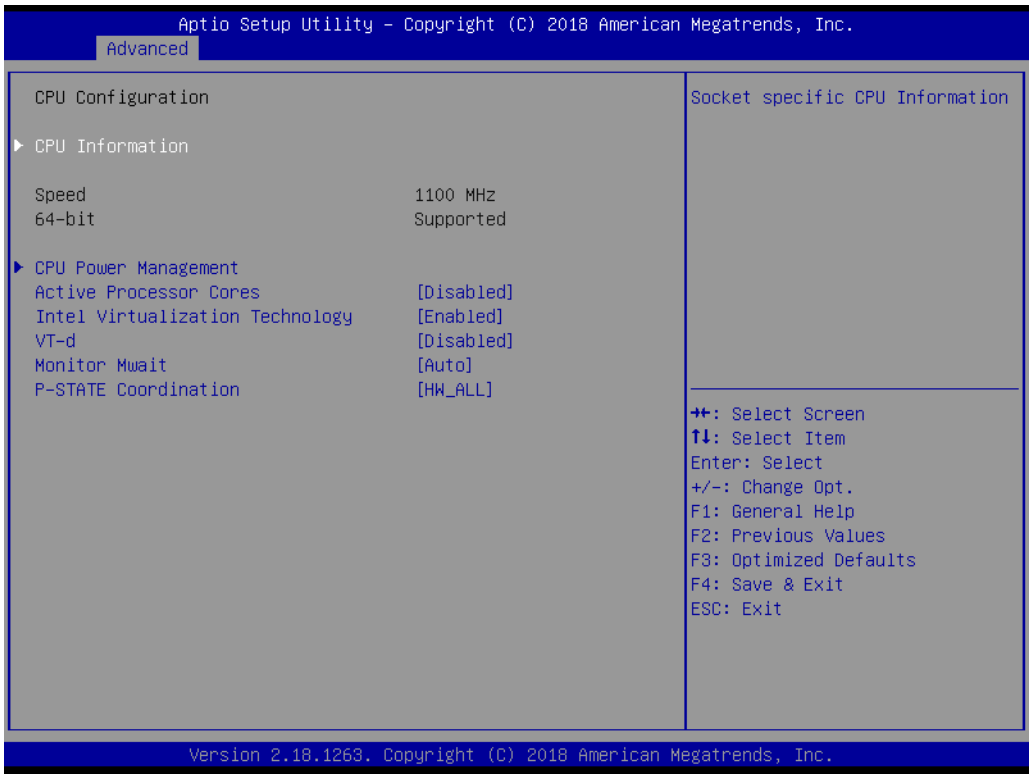


Figure 3.6 CPU Configuration

- **CPU Configuration**
  Socket specific CPU Information.
- **CPU Power Management**
  CPU Power Management options.
- **Active Processor Cores**
  Number of cores to enable in each processor package.
- **Intel Virtualization Technology**
  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **Monitor Mwait**
  Enable/Disable Monitor Mwait.
- **VT-d**
  Enable/Disable CPU VT-d.
- **P-STATE Coordination**
  Change P-STATE Coordination type.

3.2.2.6 Network Stack Configuration

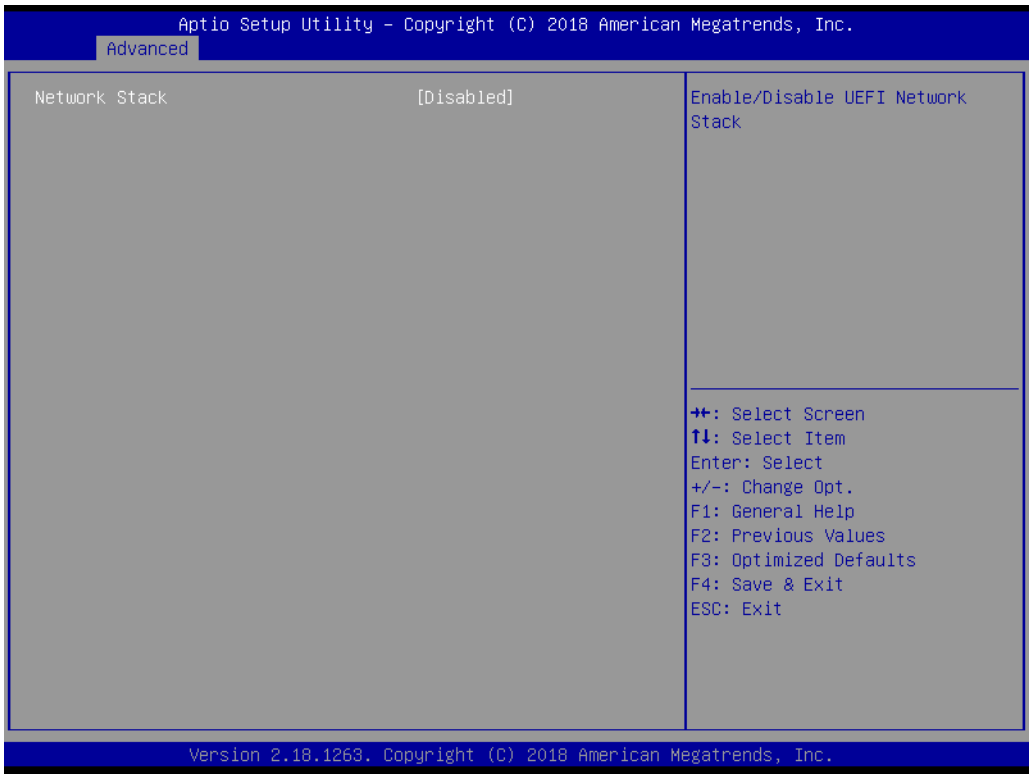


Figure 3.7 Network Configuration Settings

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

3.2.2.7 CSM Configuration

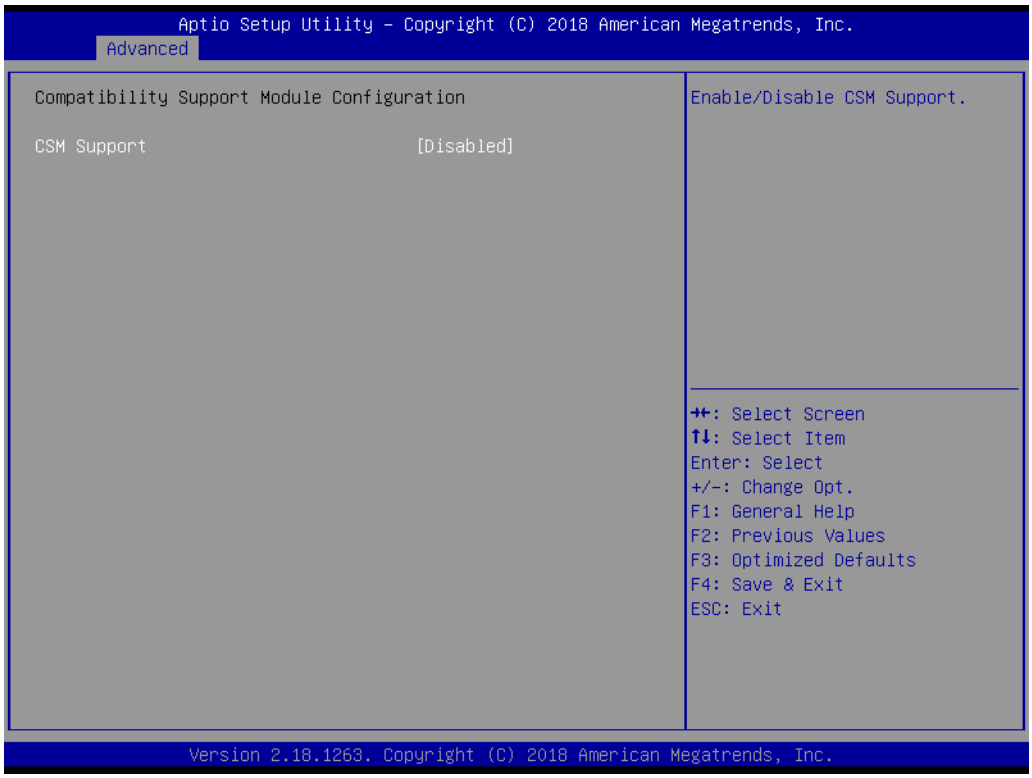


Figure 3.8 CSM Configuration Settings

- **CSM Support**
  Enable/Disable CSM Support.
- **GateA20 Active**
  UPON REQUEST - GA20 can be disabled using BIOS services. ALWAYS - do not allow disabling GA20; this option is useful when any RT code is executed above 1 MB.
- **INT19 Trap Response**
  BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE - execute the trap right away; POSTPONED - execute the trap during legacy boot.
- **Boot Option Filter**
  This option controls Legacy/UEFI ROMs priority.
- **Network**
  Controls the execution of UEFI and Legacy PXE OpROM.
- **Storage**
  Controls the execution of UEFI and Legacy Storage OpROM.
- **Video**
  Controls the execution of UEFI and Legacy Video OpROM.
- **Other PCI devices**
  Determines OpROM execution policy for devices other than Network, Storage, or Video.

3.2.2.8 USB Configuration

- **Legacy USB Support**
  Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
- **XHCI Hands-Off**
  This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage Driver Support.
- **Device Reset Time-Out**
  USB mass storage device start unit command time-out.
- **Device Power-Up Delay**
  Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

3.2.2.9 Security Configuration

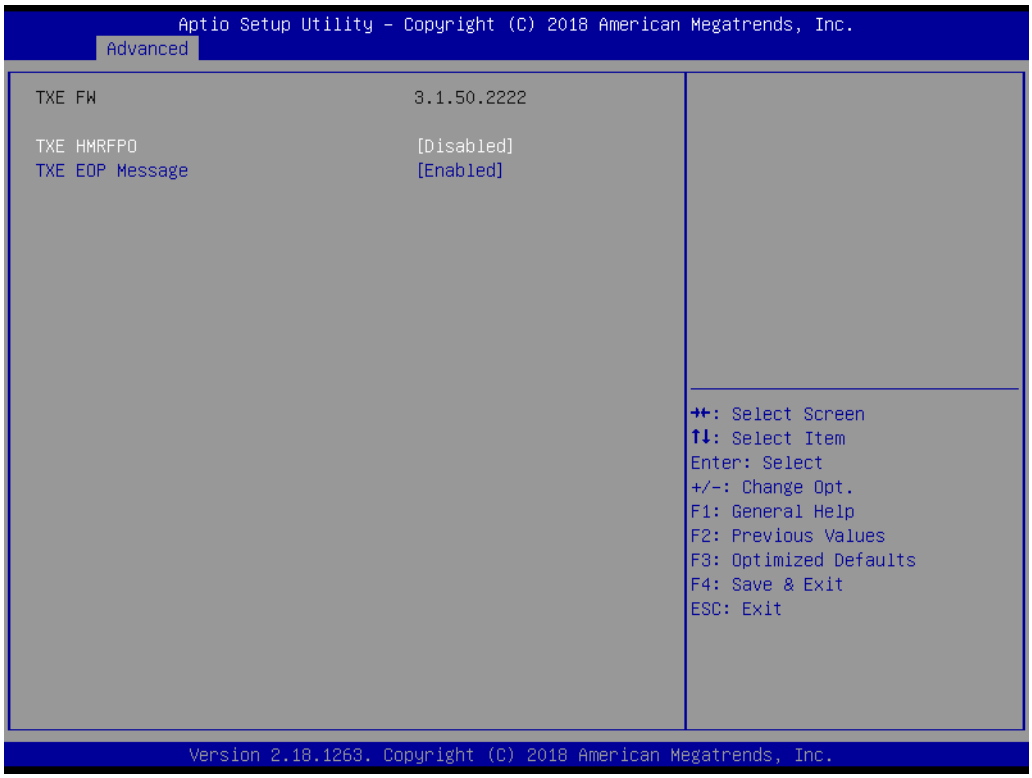


Figure 3.9 Security Configuration Settings

- **TXE EOP Message**
  Send EOP message before entering OS

3.2.3 Chipset Configuration

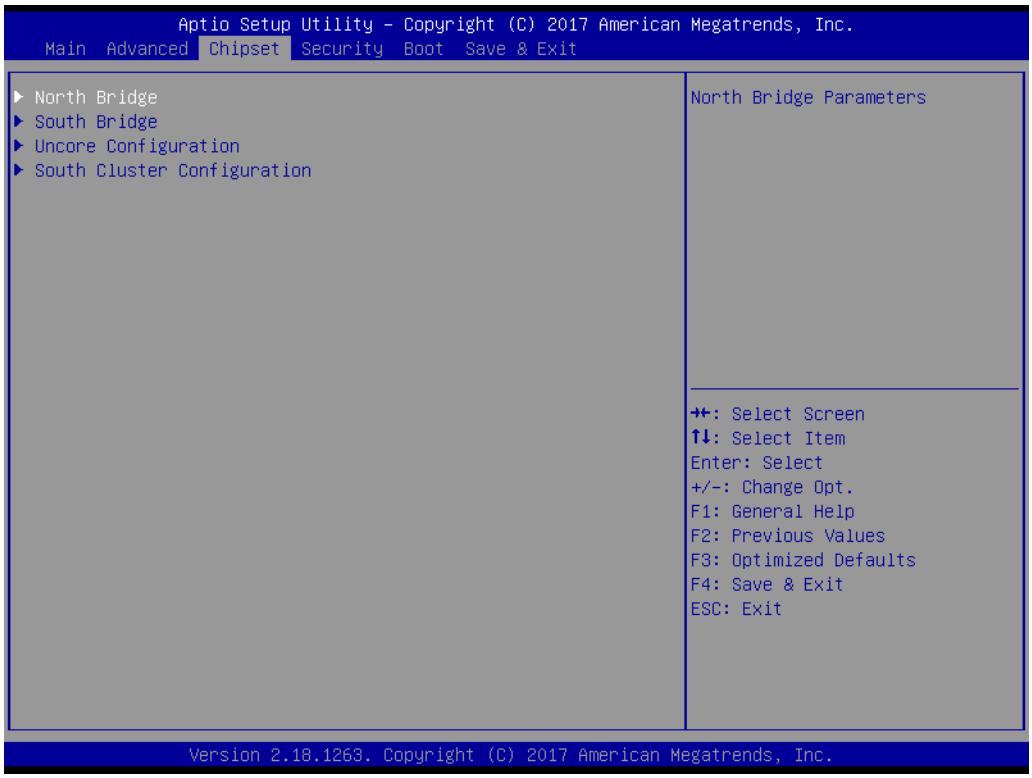


Figure 3.10 Chipset Configuration

- **North Bridge**
  Details for North Bridge items.
- **South Bridge**
  Details for South Bridge items.
- **Uncore Configuration**
  Detail for Uncore items.
- **South Cluster Configuration**
  Detail for South Cluster items

3.2.3.1 North Bridge

Figure 3.11 North Bridge Configuration

- **Max TOLUD**
  Maximum value of TOLUD.

3.2.3.2 South Bridge

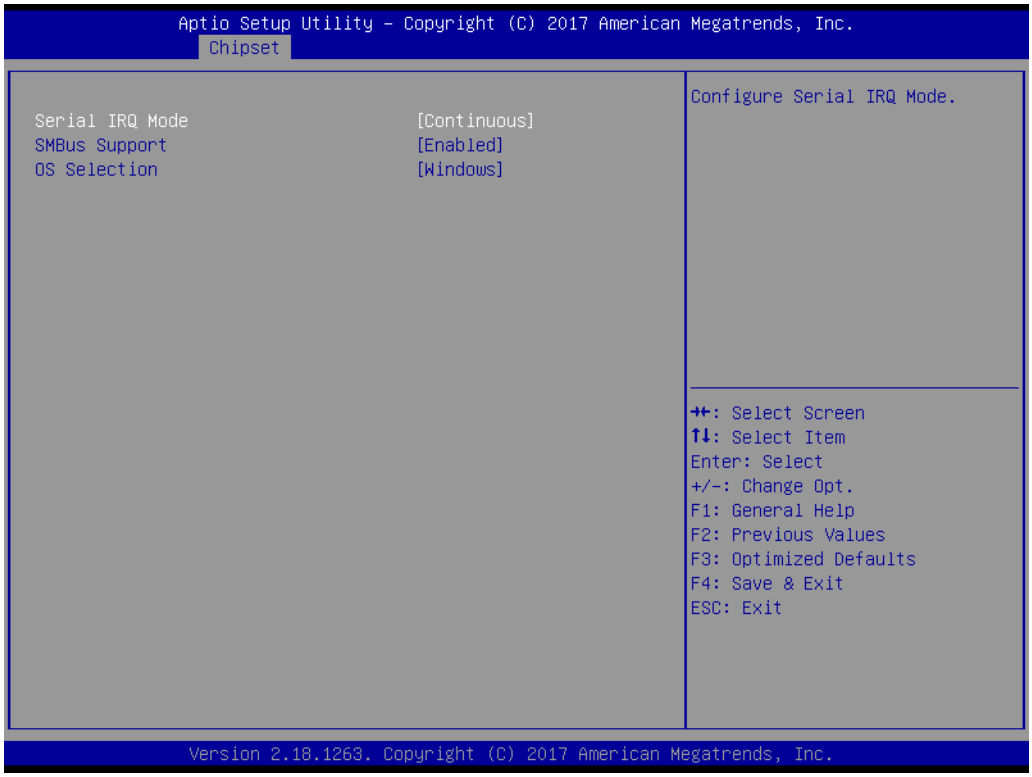


Figure 3.12 South Bridge Configuration

- **Serial IRQ Mode**
  Configure Serial IRQ Mode.
- **SMBus Support**
  Enable/Disable SMBus Support.
- **OS Selection**
  Select the target OS.

3.2.3.3 Uncore Configuration

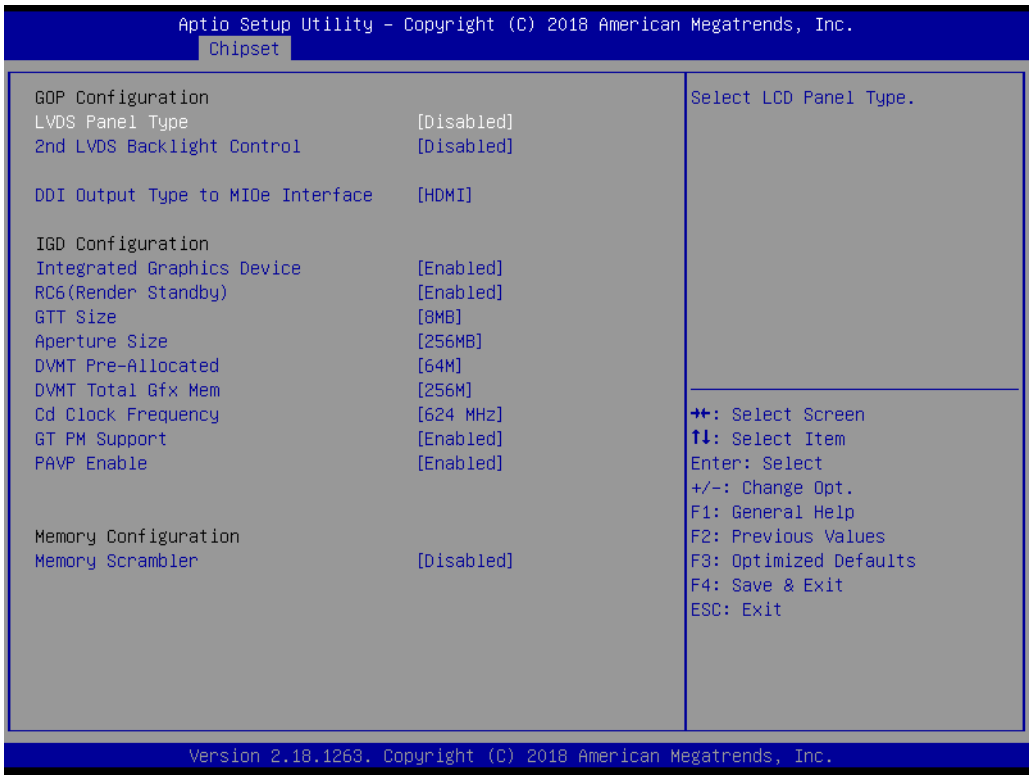


Figure 3.13 Uncore Configuration

- **Integrated Graphics Device**
  Enable: Enable Integrated Graphics Device (IGD) when selected as the Primary Video Adaptor. Disable: Always disable IGD.
- **Primary Display**
  Select which of IGD/PCI Graphics device should be Primary Display.
- **RC6(Render Standby)**
  Check to enable render standby support.
- **GTT Size**
  Select the GTT Size.
- **Aperture Size**
  Select the Aperture Size.
- **DVMT Pre-Allocated**
  Select DVMT 4.0 Pre-Allocated (UMA) Graphics Memory size used by the Internal Graphics Device.
- **DVMT Total Gfx Mem**
  Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.
- **GT PM Support**

Enable/Disable GT PM Support.

- **PAVP Enable**
  Enable/Disable PAVP
- **DVMT Total Gfx Mem**
  Select DVMT 5.0 Total Graphic Memory size used by the Internal Graphics Device.
- **Cd Clock Frequency**
  Select the highest Cd Clock frequency supported by the platform.
- **GT PM Support**
  Enable/Disable GT PM Support.
- **PAVP Enable**
  Enable/Disable PAVP.
- **Memory Scrambler**
  Enable/Disable Memory Scrambler support

3.2.3.4 South Cluster Configuration

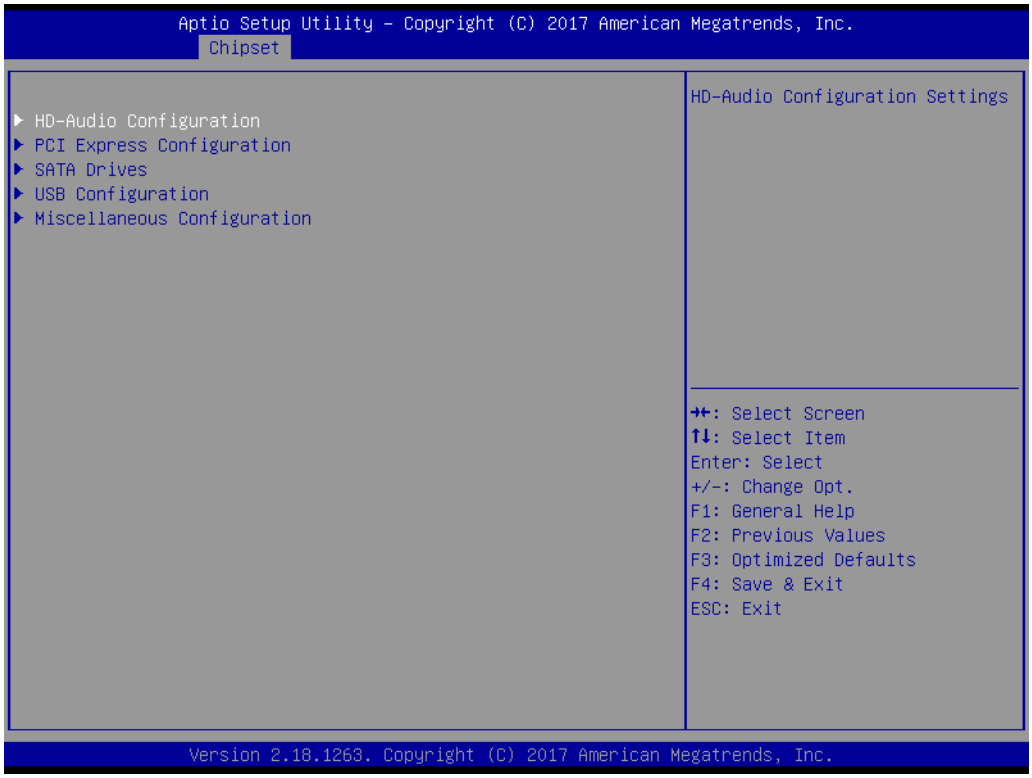


Figure 3.14 South Cluster Configuration

- **HD-Audio Configuration**
  HD-Audio Configuration Settings.
- **PCI Express Configuration**
  PCI Express Configuration Settings.
- **SATA Drives**
  Press <Enter> to select the SATA Device Configuration Setup options.
- **USB Configuration**
  USB Configuration Settings.
- **Miscellaneous Configuration**
  Enable/Disable Misc. Features.

- **HD-Audio Configuration Settings**

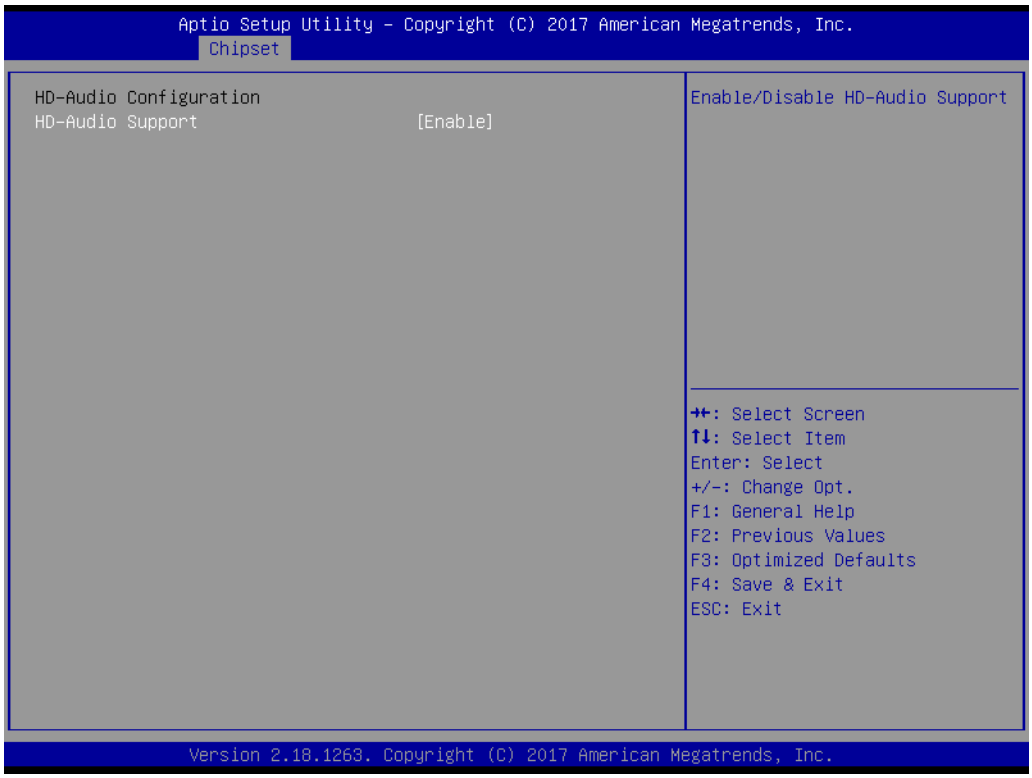
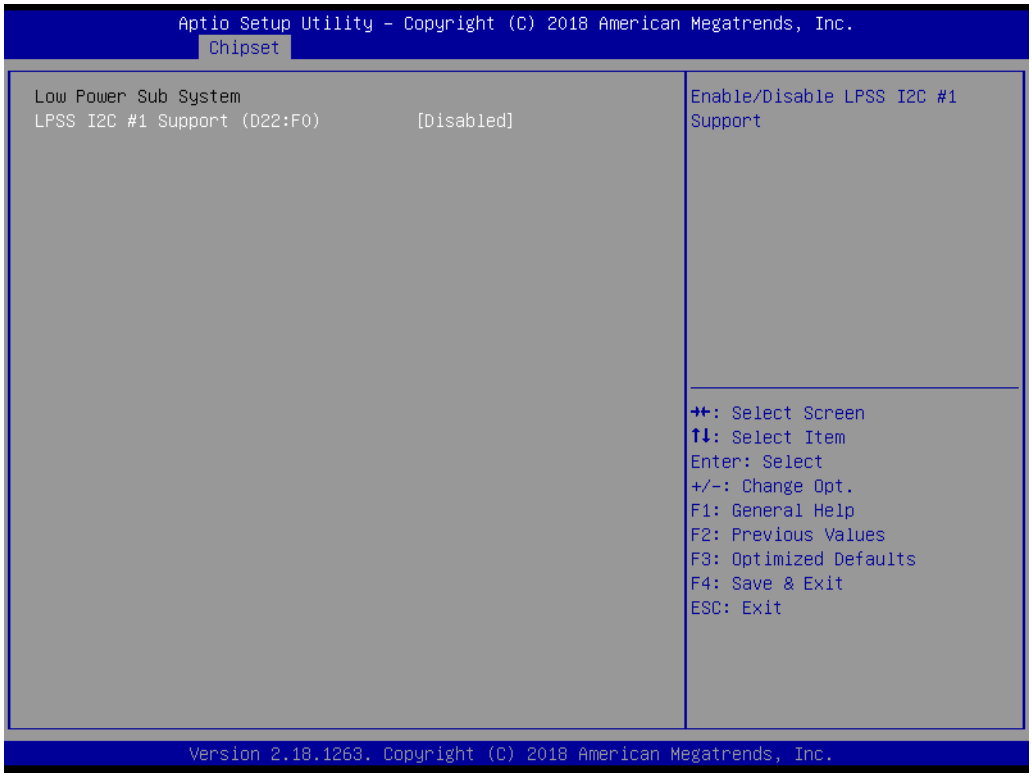


Figure 3.15 HD-Audio Configuration Settings

- **HD-Audio Support**
  Enable/Disable HD-Audio Support.

3.2.3.5 LPSS Configuration



LPSS Configuration

LPSS I2C #1 Support (D22:F0)

Enable/Disable LPSS I2C #1 Support.

PCI Express Configuration

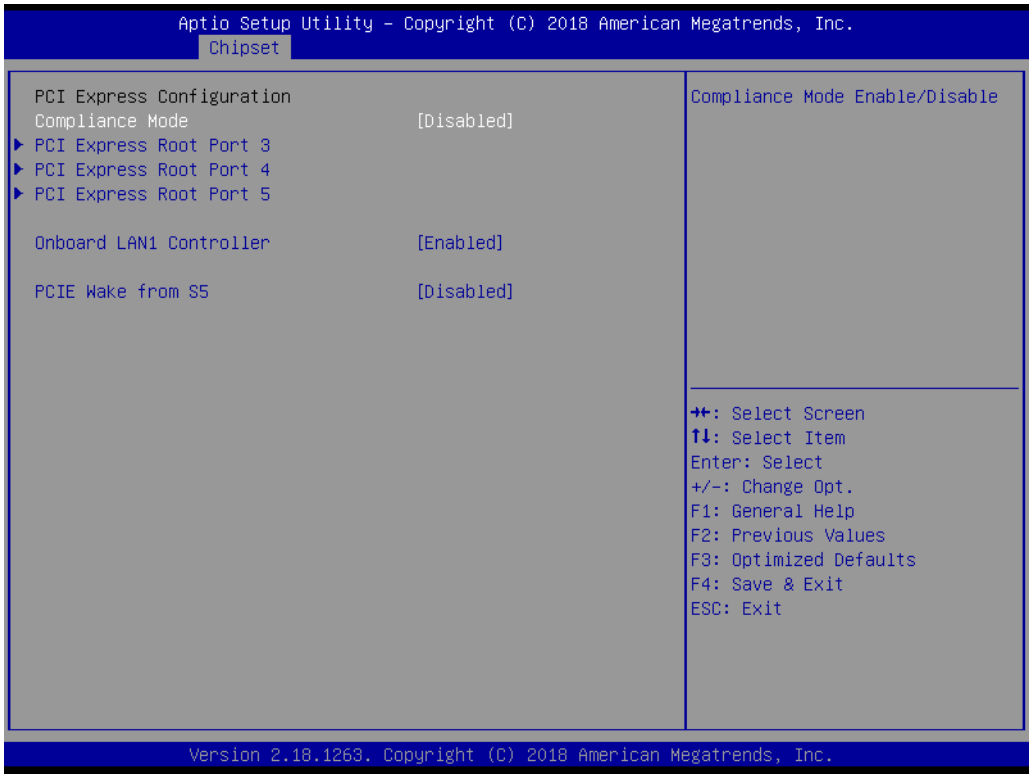


Figure 3.16 PCI Express Configuration

- Compliance Mode
  Compliance Mode Enable/Disable.
- PCI Express Root Port 3 / 4 / 5
  Control the PCI Express Root Port.
- Onboard LAN1 Controller
  Select to Enable or Disable Onboard LAN1 Controller.
- LAN Option ROM
  Enabled / Disabled Onboard LAN's PXE option ROM.
- PCIE Wake from S5
  Enable or disable PCIE to wake the system from S5.

SATA Drives

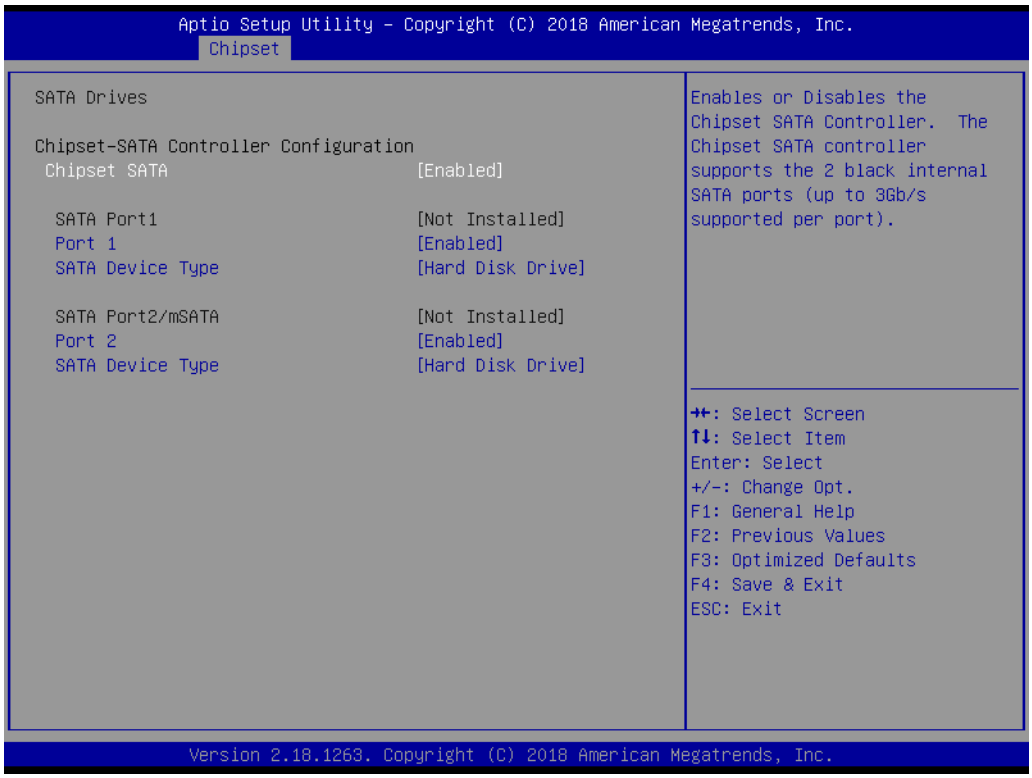


Figure 3.17 SATA Drives Settings

– Chipset SATA
Enable or Disable the Chipset SATA Controller.

USB Configuration

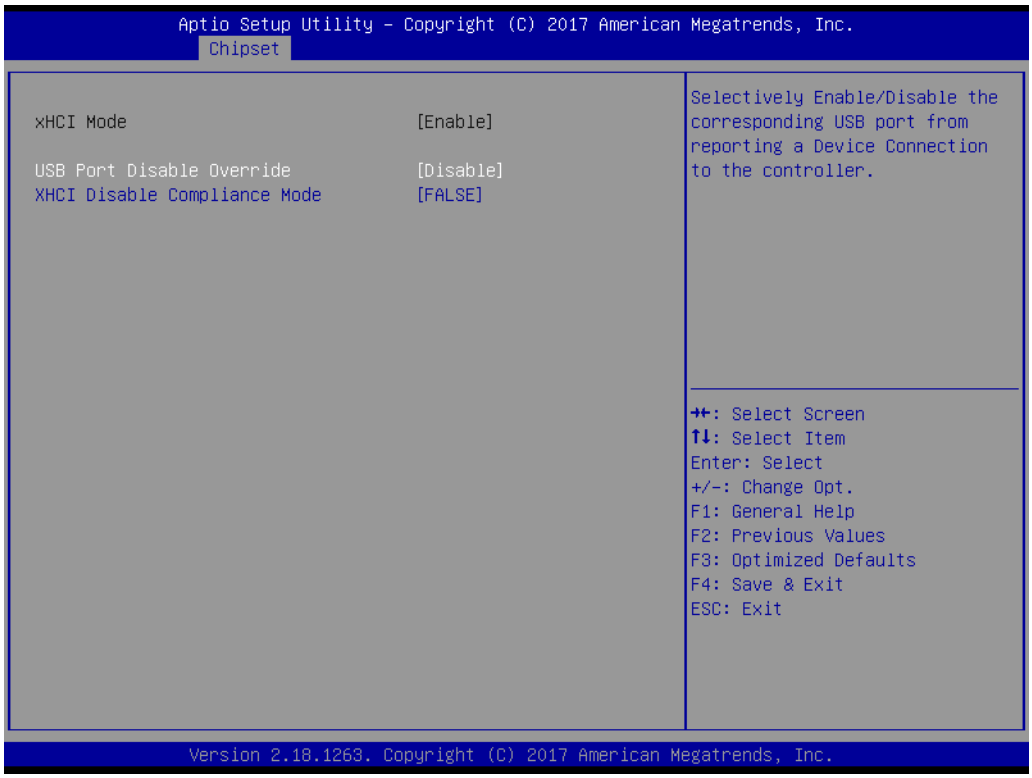


Figure 3.18 USB Configuration Settings

– XHCI Pre-Boot Driver
Enable/Disable XHCI Pre-Boot Driver Support.

– USB Port Disable Override
Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.

– XHCI Disable Compliance Mode
Options to disable XHCI Link Compliance Mode. Default is FALSE to not disable Compliance Mode. Set TRUE to disable Compliance Mode.

Miscellaneous Configuration

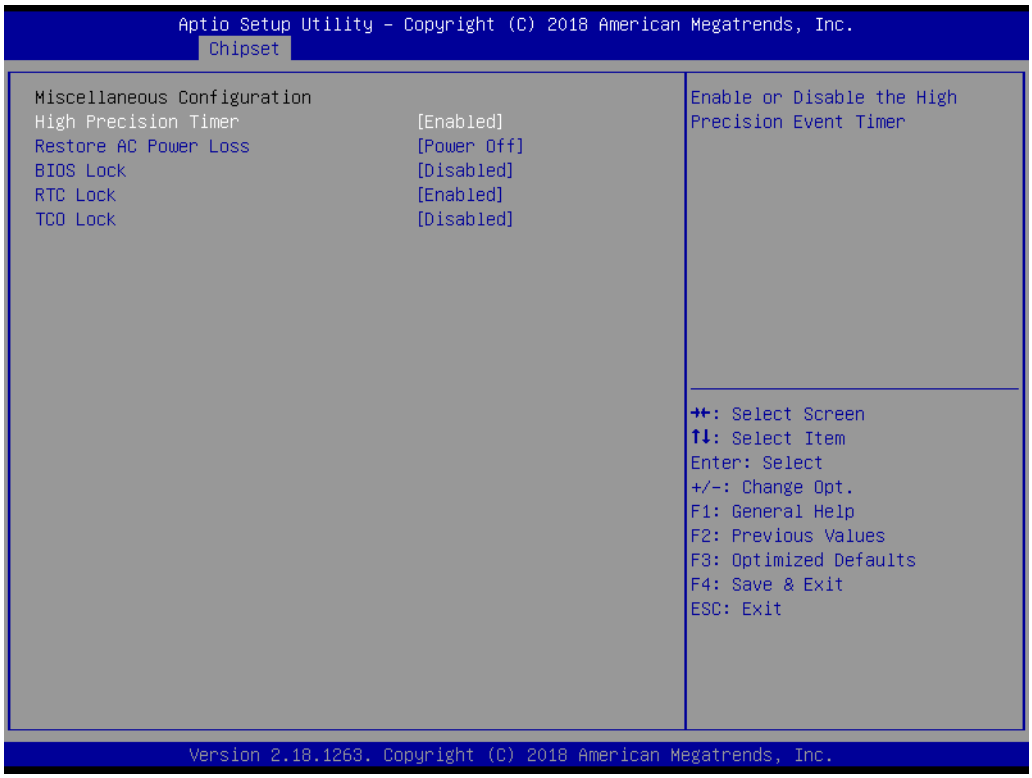


Figure 3.19 Miscellaneous Configuration Settings

- High Precision Timer
  Enable or Disable the High Precision Event Timer.
- Restore AC Power Loss
  Specify what state to go to when power is re-applied after a power failure (G3 state).
  Power On: System will boot directly as soon as power applied.
  Power Off: System keeps in power-off state until power button is pressed.
  Last State: System will act as like last power states.
- BIOS Lock
  Enable/Disable the SC BIOS Lock Enable feature.
- RTC Lock
  Enable or disable bytes 38h-3Fh in the upper and lower 128-byte bank of RTC RAM lockdown.
- TCO SMI Lock
  Enable TCO and Lock Down TCO.

3.2.4 Security

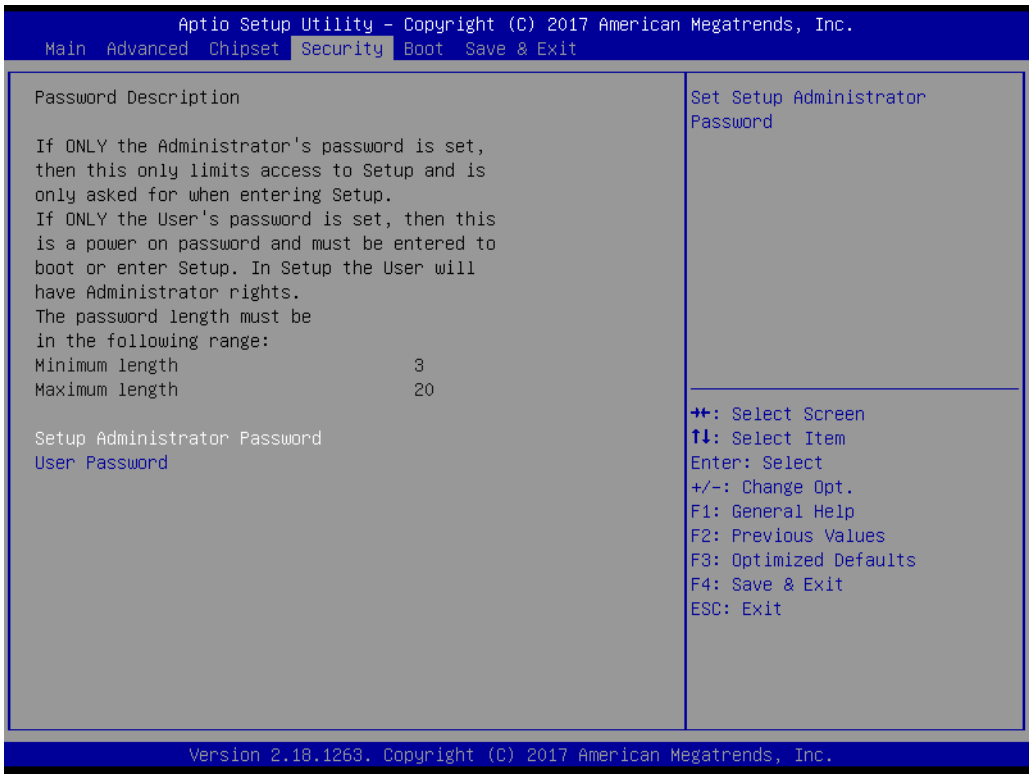
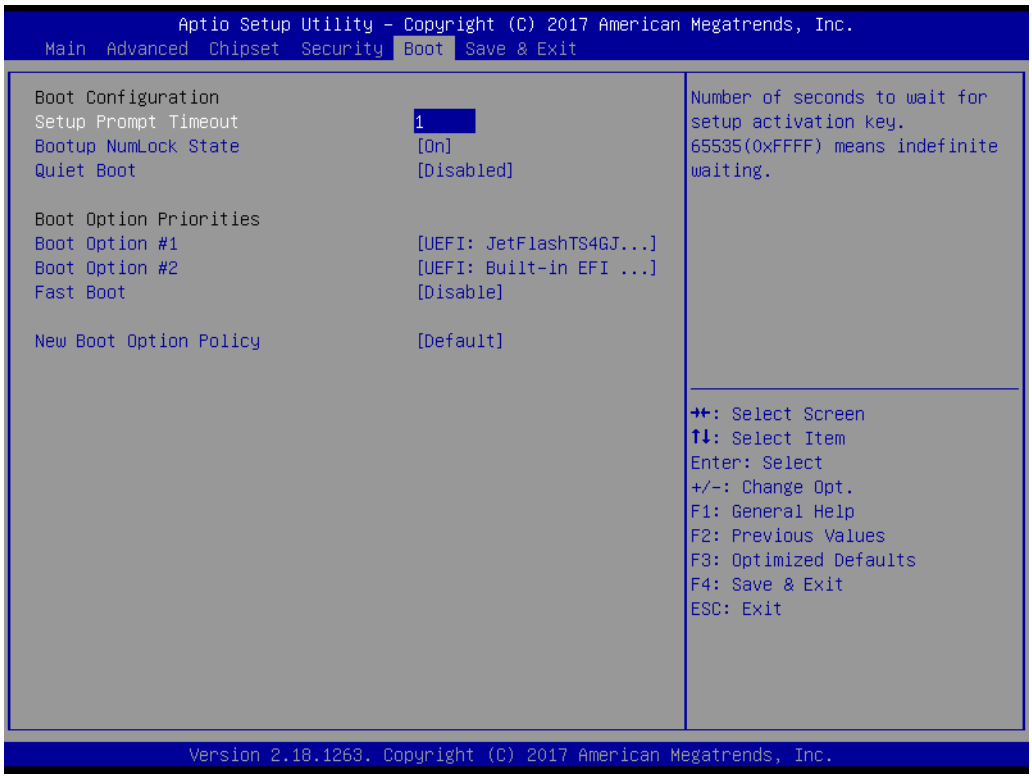


Figure 3.20 Security Settings

Select Security Setup from the EPC-S201 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

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

3.2.5 Boot



- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
- **Bootup NumLock State**
  Select the keyboard NumLock state.
- **Quiet Boot**
  Enables or disables Quiet Boot option.
- **Boot Option #1**
  Sets the system boot order.
- **Fast Boot**
  Enable or Disable FastBoot features. Most probes are skipped to reduce time cost during boot.
- **New Boot Option Policy**
  Controls the placement of newly detected UEFI boot options.

3.2.6 Save & Exit

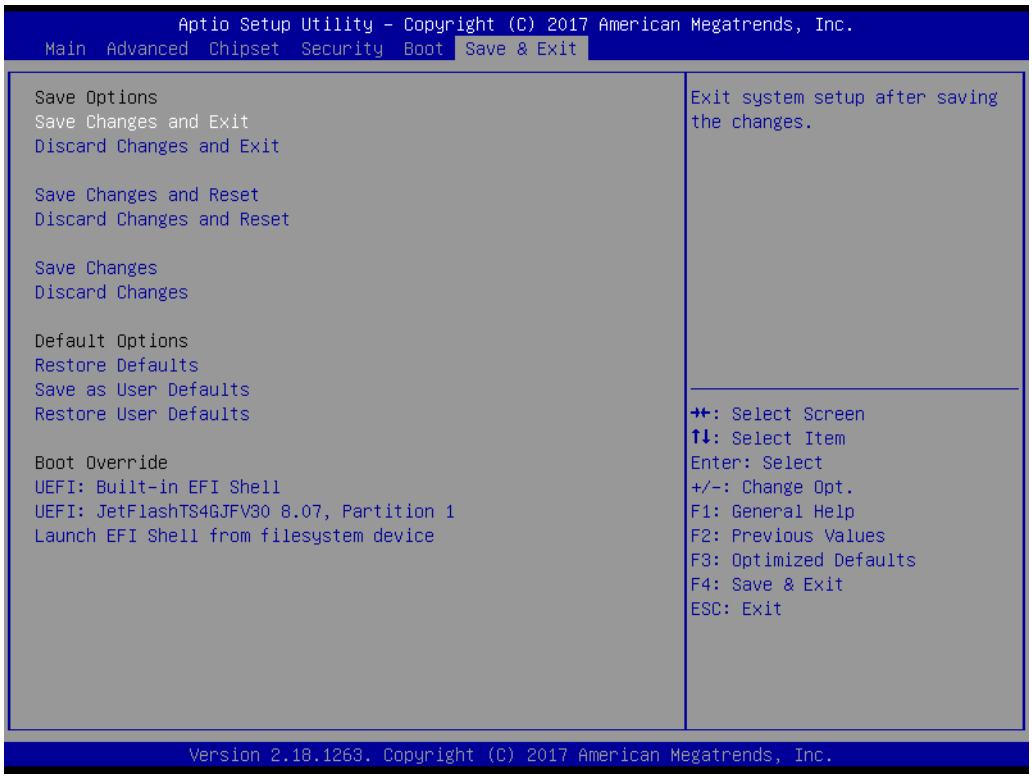


Figure 3.21 Save & Exit

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

Appendix A

Watchdog Timer Sample Code

A.1 Watchdog Timer Sample Code

Watchdog Function:

```
The SCH3114 Runtime base I/O address is A00h
Setting WatchDog time value location at offset 66h
If set value is "0", it means disable WatchDog function.
Superio_GPIO_Port = A00h
mov dx,Superio_GPIO_Port + 66h
mov al,00h
out dx,al
.model small
.486p
.stack 256
.data
SCH3114_IO EQU A00h
.code
org 100h
.STARTup
;=====================================================
;47H
;enable WDT function bit [0]=0Ch
;=====================================================
mov dx,SCH3114_IO + 47h
mov al,0Ch
out dx,al
;=====================================================
;65H
;bit [1:0]=Reserved
;bit [6:2]Reserve=00000
;bit [7] WDT time-out Value Units Select
;Minutes=0 (default) Seconds=1
;=====================================================
mov dx,SCH3114_IO + 65h;
mov al,080h
out dx,al
;=====================================================
;66H
;WDT timer time-out value
;bit[7:0]=0~255
;=====================================================
mov dx,SCH3114_IO + 66h
mov al,01h
out dx,al
;=====================================================
;bit[0] status bit R/W
;WD timeout occurred =1;WD timer counting = 0
;=====================================================
mov dx,SCH3114_IO + 68h
```

```
mov al,01h
out dx,al
.exit
END
```

Appendix B

SUSI API Introduction

B.1 SUSI API Introduction

To make hardware easier and more convenient to access for programmers, Advantech has released a suite of API (Application Programming Interface) in the form of a program library. The program library is called Secured and Unified Smart Interface or SUSI for short.

SUSI provides a uniform API for application programmers to access the hardware functions in different Operating Systems and on different Advantech hardware platforms.

Application programmers can invoke the functions exported by SUSI instead of calling the drivers directly. The benefit of using SUSI is portability. The same set of APIs is defined for different Advantech hardware platforms. Also, the same API set is implemented in different Operating Systems. This user's manual describes some sample programs and the API in SUSI. The hardware functions currently supported by SUSI can be grouped into a few categories including Watchdog and Hardware Monitor. Each category of API in SUSI is briefly described below.

B.1.1 The Watchdog API

A watchdog timer (abbreviated as WDT) is a hardware device which triggers an action, e.g. rebooting the system, if the system does not reset the timer within a specific period of time. The WDT API in SUSI provides developers with functions such as starting the timer, resetting the timer, and setting the timeout value if the hardware requires customized timeout values.

B.1.2 The Hardware Monitor API

The hardware monitor (abbreviated as HWM) is a system health supervision capability achieved by placing certain I/O chips along with sensors for inspecting the target of interests for certain condition indexes, such as temperature and voltage etc.

However, due to the inaccuracy among many commercially available hardware monitoring chips, Advantech has developed a unique scheme for hardware monitoring - achieved by using a dedicated micro-processor with algorithms specifically designed for providing accurate, real-time and reliable data content; helping protect your system in a more reliable manner.

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All product specifications are subject to change without notice.