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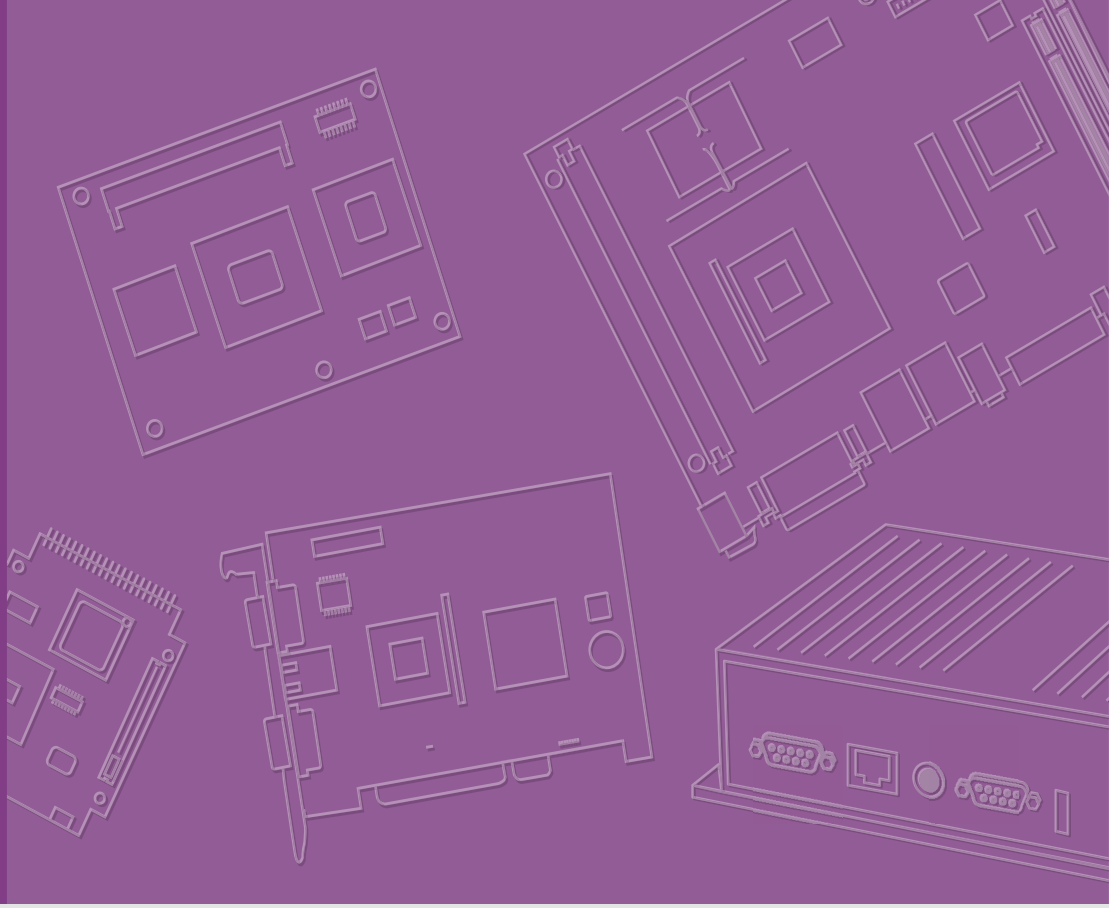
Manual

Advantech

SOM-2569

Com-SMARC Computer-on-Module with Intel® Apollo Lake Atom™ x5-E3930/x5-E3940/x7-E3950, Pentium® N4200 or Celeron®Series SoC N3350 Processor



User Manual

SOM-2569

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Acknowledgments

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.

Part No. 2006256900 Edition 2

Printed in Taiwan May 2020

Declaration of Conformity

CE

This product has passed the CE environmental specifications test. Criteria for passing included operating the equipment in an industrial enclosure. In order to protect the product from damage by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

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

FM

This equipment has passed the FM certification. According to the National Fire Protection Association, work sites are classified into different classes, divisions and groups, based on hazard considerations. This equipment is compliant with the specifications of Class I, Division 2, Groups A, B, C, and D indoor hazards.

Technical Support and Assistance

1. Visit the Advantech website at http://support.advantech.com 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

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. e.g.*

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.*

Document Feedback

To assist us in making improvements to this manual, we welcome comments and constructive criticism. Please send all such - in writing to: support@advantech.com.

Packing List

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

- SOM-2569 CPU module
- 1 x Heatspreader (1960083260N001 or 1960083261N001)

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 -20 °C (-4 °F) OR ABOVE 60 °C (140 °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.

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.

CONTENTS

Chapter 1

General Information

This chapter details background information on the SOM-2569 CPU Computer on Module.

Sections include:

- Introduction
- Functional Block Diagram
- Product Specification

1.1 Introduction

SOM-2569 is equipped with Intel Atom® x7-E3950, Celeron® and Pentium® N series platforms manufactured by Intel on 14nm processor technology. This product supports DDR4 2400MT/s with up to 8GB capacity. SOM-2569 supports WI-FI and Bluetooth modules with onboard with dual GbE. This machine also features onboard eMMC storage up to 64 GB. SOM-2569 supports 4 x PCIe x1. SOM-2569 is an energy-efficient and versatile computing solution in a compact module (82 x 50 mm/ 3.22 x 1.96 in).

SOM-2569 WI-FI module supports 802.11a/b/g/n/ac 2x2, is Wave-2 compliant with MU-MIMO, and is a complete 802.11n MIMO solution for 2.4GHz and 5Ghz bands. Maximum PHY data rate up to 866.7Mbps using 80MHz bandwidth. SOM-2569 supports Bluetooth 4.1/4.2 systems and is a LE Secure Connection using a software upgrade. SOM-2569 is compatible with Bluetooth v2.1 and v3.0+EDR. It supports multiple-displays — DP++, HDMI, LVDS, and DDI 4K. SOM-2569 also supports dual channel LVDS at 1366x768 resolution.

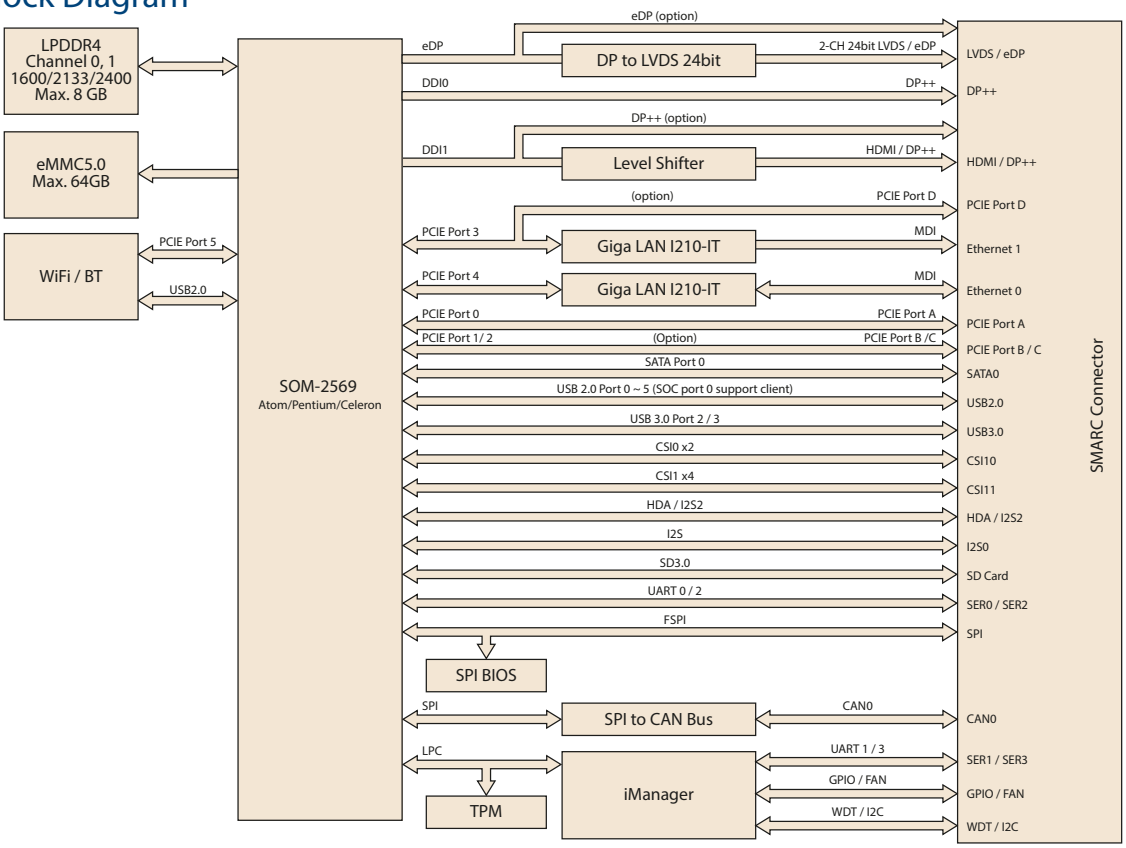
Advantech iManager (SUSI4) supports varied embedded application requirements such as a multi-level watchdog timer, voltage and temperature monitoring, thermal protection and mitigation through processor throttling, LCD backlight on/off and brightness control, and embedded storage for customized information. Combined with Advantech WISE-PaaS/RMM, it can remotely monitor and control devices. All Advantech SMARC modules integrate iManager and WISE-PaaS/RMM to offer add-on value for customers.

Acronyms

Term	Define
AC'97	Audio CODEC (Coder-Decoder)
ACPI	Advanced Configuration Power Interface – standard to implement power saving modes in PC-AT systems.
BIOS	Basic Input Output System – firmware in PC-AT system that is used to initialize system components before handing control over to the operating system.
CAN	Controller-area network (CAN or CAN-bus) is a vehicle bus standard designed to allow micro controllers to communicate with each other within a vehicle without a host computer.
DDI	Digital Display Interface – containing Display Port, HDMI/DVI, and SDVO.
EAPI	Embedded Application Programmable Interface. Software interface for COM Express® specific industrial function: ■ System information ■ Watchdog timer ■ I²C Bus ■ Flat Panel brightness control ■ User storage area ■ GPIO
GbE	Gigabit Ethernet
GPIO	General purpose input output
HDA	Intel High Definition Audio (HD Audio) refers to the specification released by Intel in 2004 for delivering high definition audio that is capable of playing back more channels at higher quality than AC'97.
I²C	Inter Integrated Circuit – 2 wire (clock and data) signaling scheme allowing communication between integrated circuit, primarily used to read and load register values.
ME	Management Engine
PC-AT	"Personal Computer – Advanced Technology" – an IBM trademark term used to refer to Intel based personal computer in 1990s.
PEG	PCI Express Graphics
RTC	Real Time Clock – battery backed circuit in PC-AT systems that keeps system time and date as well as certain system setup parameters.
SPD	Serial Presence Detect – refers to serial EEPROM on DRAMs that has DRAM Module configuration information.
TPM	Trusted Platform Module, chip to enhance the security features of a computer system.
UEFI	Unified Extensible Firmware Interface
WDT	Watchdog Timer

1.2 Functional Block Diagram

Block Diagram



1.3 Product Specification

1.3.1 Compliance

- SMARC 2.0 and SMARC 2.1
- Basic Size – 82 x 50 mm (3.22 x 1.96 in)

1.3.2 Feature List

Feature	Min/Max in spec	SOM-2569
Memory	1	LPDDR4
eMMC (on module)	0/(N/A)	1
LVDS LCD/eDP	0/1	1
HDMI/DP++	0/1	1
DP++	0/1	1
Camera (MIPI-CSI)	0/2	2
SDIO	0/1	1
SPI	0/2	1 (SPI)
Audio I2S	0/1	1
Audio HDA/I2S2	0/1	1
SMBus	0/1	1
I²C	I²C2/6	5
Serial Port	2/4	4
CAN Bus	0/2	0
USB2.0	2/6	6
USB3.0	0/2	2
USB (OTG)	0/2	1
PCIe (Gen2)	0/4	4
SATA	0/1	1
GbE	0/2	2
Watchdog	0/1	1
GPIO	12/12	12
Management	1/1	1
Boot Select	1/1	1
JTAG (on board)	0/1	0
Wife Module	0/1	1
TPM	0/(N/A)	1
RTC	0/1	1

1.3.3 Processor System

CPU	Std. Freq.	Max. Turbo Freq.	Core	Cache (MB)	TDP(W)
Atom X7-E3950	1.6GHz	2.0GHz	4	2	12
Atom X5-E3940	1.6GHz	1.8GHz	4	2	9
Atom X5-E3930	1.3GHz	1.8GHz	2	2	6
Pentium N4200	1.1GHz	2.5GHz	4	2	6
Pentium N3350	1.1GHz	2.4GHz	2	2	6

1.3.4 Memory

Dual channels on-board LPDDR4 2400MHz up to 8GB (non-ECC).

1.3.5 Graphics / Audio

Graphic Core: Intel® Gen9 HD/P630 Graphic supports DX12, OGL5.0, OCL2.1, and MPEG2, HEVC/H265, VC1/WMV9 HW decode/encode/transcode acceleration.

CPU	Graphic Core	Base Freq.	Max Freq.
Atom X7-E3950	Gen9 HD Graphic	500MHz	650MHz
Atom X5-E3940	Gen9 HD Graphic	400MHz	600MHz
Atom X5-E3930	Gen9 HD Graphic	400MHz	550MHz
Pentium N4200	Gen9 HD Graphic	200MHz	750MHz
Pentium N3350	Gen9 HD Graphic	200MHz	650MHz

1.3.6 Expansion Interface

1.3.6.1 PCIe x1

PCI Express x1: Supports default 4 ports PCIe x1 compliant to PCIe Gen2 (5.0 GT/s) specification, configurable to PCIe x4 or PCIe x2 upon request. Several configurable combinations may need BIOS modifications. Please contact Advantech sales or FAE for more details.

SMARC PCIe Lane	Possible Link Configuration			
PCIe A	x1	x2	x2	x4
PCIe B	x1			
PCIe C	x1	x1	x2	
PCIe D	x1	x1		

1.3.7 Serial Bus

1.3.7.1 SMBus

Supports SMBus 2.0 specification.

1.3.7.2 I²C Bus

Supports I²C bus 7-bit and 8-bit address modes, up to 400KHz.

1.3.8 I/O

1.3.8.1 Gigabit Ethernet

Ethernet: Intel I210 Gigabit LAN supports 10/100/1000 Mbps Speed.

1.3.8.2 SATA

Supports 1 ports SATA3.0 (6.0 Gb/s). Supports AHCI 1.3.1 mode.

1.3.8.3 USB 3.0/USB 2.0

2 ports USB3.0 (5.0 Gaps) and 6 ports USB2.0 (480Mbps, include 1 client port) which are backwardly compatible to USB1.x.

1.3.8.4 USB 3.0

SMARC	P0	P1
SoC	P0	P1
SMARC	USB_0_1_OC	
SoC USB_OC#	OC_0#	

1.3.8.5 USB 2.0

SMARC	P0	P1	P2	P3	P4	P5	P6
SoC	P0	P1	P2	P3	P4	P5	P6
SMARC	OC_0123				OC_45		-
SoC USB_OC#	OC_0				OC_1		

1.3.8.6 HDA

Supports HD-Audio and LPE Audio for DDI[1:0] (Display Port and HDMI), 1.8V signal level, up to 24 MHz serial data clock.

1.3.8.7 SPI Bus

Supports Master SPI operation only. SPI clock can be 50MHz, 33MHz, or 20MHz, capacity up to 16MB.

1.3.8.8 eMMC

eMMC v5.0 HS400 DDR Mode. Supports data transfers in 1-bit, 4-bit, and 8-bit modes. Maximum HS400 Dual Rate 400 MB/s (200 MHz).

1.3.8.9 GPIO

12 x programmable general purpose Input or output (GPIO).

1.3.8.10 SDIO

Supports one SDIO 3.0 interface.

1.3.8.11 TXE

Trusted Execution Engine 3.0 (TXE3.0).

1.3.8.12 SMBus

SMBus 2.0 specification. Supports SMBALERT# signal. Signal level 3.3V or 1.8V selectable.

1.3.8.13 TPM

Supports TPM 2.0 module by default.

1.3.8.14 Serial port

Watchdog Timer

Supports multi-level watchdog time-out output. Provides 1-65535 levels, from 100ms to 109.22 minutes intervals.

Serial port

2 ports 4-wire HSUART signal interface using RTS/CTS control only:

- Programmable FIFO enable/disable
- 64B iDMA FIFO per channel with up to 32B burst capability
- Even, odd, or no parity bit selectable
- 1, 1.5, or 2 stop bit selectable

BIOS

BIOS chip is on module by default. Also allows the user to place BIOS chip on carrier board with appropriate design and a pull-down to GND on BIOS_DISABLE# pin.

Note! *If system COMS is cleared, we strongly suggest to go to the BIOS setup menu and load the default settings at the first time of boot up.*

1.3.9 Power Management

1.3.9.1 Power Supply

Supports both ATX and AT power modes. VSB is for suspend power and can be option if not require standby (suspend-to-RAM) support. RTC Battery may be option if keep time/date is not require.

- **VCC:** 5V +/- 5%
- **VSB:** 5V +/- 5% (Suspend power)
- **RTC Battery Power:** 2.0V - 3.3V

1.3.9.2 Power Sequence

According to SMARC 2.0/SMARC 2.1 specifications

1.3.9.3 Wake Event

Various wake-up events for different scenarios.

Wake-on-LAN(WOL): Wake to S0 from S3/S4/S5.

USB Wake: Wake to S0 from S3/S4.

PCIe Device Wake: depends on user inquiry and may need customized BIOS.

1.3.9.4 Advantech S5 ECO Mode (Deep Sleep Mode)

Advantech iManager provides additional features for allowing the system to enter a suspended low power mode – S5 ECO mode. In this mode, the module will cut all power including suspend/active power to the chipset and keep an on-module controller active. In this mode, only <50mW of power will be consumed increasing battery life. While this mode is enabled in BIOS, the system (or module) will only boot using the power button in-place of other methods such as WOL.

1.3.10 Environment

1.3.10.1 Temperature

Operating: 0 ~ 60 °C (32 ~ 140 °F), **Storage:** -40 °C ~ 85 °C(-40 ~ 185 °F)

Extended temperature support: -40 ~ 85 °C(-40 ~ 185 °F)

1.3.10.2 Humidity

Operating: 40 °C @ 95% relative humidity, non-condensing

Storage: 60 °C @ 95% relative humidity, non-condensing

1.3.10.3 Vibrations

3.5G, 5~500Hz X/Y/Z Axis

1.3.10.4 Drop Test (Shock)

Federal Standard 101 Method 5007 test procedure with standard packing.

1.3.10.5 EMC

CE EN55022 Class B and FCC Certifications: validated with standard development boards on Advantech chassis.

1.3.11 MTBF

Please refer Advantech SOM-2569 Series Reliability Prediction Report No: TBD. (Estimated date: 2020 Q1).

1.3.12 OS Support

To install the drivers, please connect to the Internet and browse to the website http://support.advantech.com.tw to download the setup file.

1.3.13 Advantech iManager

Supports APIs for GPIO, smart fan control, multi-stage watchdog timer and output, temperature sensor, hardware monitor, etc. Followed by PICMG EAPI 1.0 specification that provides backward compatibility.

1.3.14 Power Consumption

Power Consumption Table (Watt.)				
VSB=5V	**Active Power Domain**			**Mechanical off**
Power State	**S0 Max. Load**	**S0 Burn-in**	**S0 Idle**	**RTC (uA)**
SOM-2569+SOM-DB2500	14.11	11.943	3.45W	5.46

Hardware Configurations:

1. **MB:** SOM-2569 CNCCA-S7A1
2. **DRAM:** 8GB DDR4 2400MHz
3. **Carrier board:** SOM-DB2500-00A1
4. **Wireless function:** Wi-Fi/BT

Test Condition:

1. **Test temperature:** room temperature (about 25 °C /77 °F)
2. **Test voltage:** rated voltage DC +5.0V
3. **Test loading:**
   - **Maximum load mode:** According to Intel thermal/power test tools

- **Burn-in mode:** Burn-in Test V8.1 Pro (1023) for 64 bit Windows (CPU, RAM, 2D&3D Graphics and Disk with 100%)
- **Idle mode:** DUT power management off and no running any program

4. **OS:** Windows 10 Enterprise

1.3.15 Performance

For reference performance or benchmark data that compare with other module, please refer to “Advantech COM Performance & Power Consumption Table”.

1.3.16 Selection Guide w/ P/N

P/N	CPU	Freq.	Cores	CPU TDP	Memory	eMMC	Wi-Fi/ BT	Thermal Solution	Operating Temperature
SOM-2569CNCCA-S7A1	Atom x7-E3950	1.6	4	12W	8GB	64GB	Yes	Passive	0 ~ 60 °C (32 ~140 °F)
SOM-2569BNBCA-S7A1	Atom x7-E3950	1.6	4	12W	4GB	32GB	Yes	Passive	0 ~ 60 °C (32 ~140 °F)
SOM-2569BNBC-S7A1	Atom x7-E3950	1.6	4	12W	4GB	32GB	-	Passive	0 ~ 60 °C (32 ~140 °F)
SOM-2569BNBC-S6A1	Atom x5-E3940	1.6	4	9.5W	4GB	32GB	-	Passive	0 ~ 60 °C (32 ~140 °F)
SOM-2569BNOC-S3A1	Atom x5-E3930	1.3	2	6.5W	4GB	-	-	Passive	0 ~ 60 °C (32 ~140 °F)
SOM-2569CNCCA-S2A1	Pentium N4200	1.1	4	6W	8GB	64GB	Yes	Passive	0 ~ 60 °C (32 ~140 °F)
SOM-2569BCBC-S1A1	Celeron N3350	1.1	2	6W	4GB	32GB	-	Passive	0 ~ 60 °C (32 ~140 °F)
SOM-2569BNBX-S7A1	Atom x7-E3950	1.6	4	12W	4GB	32GB-		Passive	-40 ~ 85 °C (-40 ~185 °F)

1.3.17 Packing List

Part No.	Description	Quantity
-	SOM-2569 SMARC Module	1
1960093125T001	SOM-2569 E3900 SKU heat spreader	1
1970004428N001	SOM-2569 N Series SKU heat spreader	1

1.3.18 Development Board

Part No.	Description
SOM-DB2500-00A1	Development Board for SMARC

1.3.19 Optional Accessories

Part No.	Description
1960093089T001	Semi-Heatsink, 82L x 34W x 18H

1.3.20 Pin Description

Advantech provides useful checklists for schematic design and layout routing. The schematic checklist details pin electrical properties and connection instructions for different user scenarios. The user checklist further specifies layout constraints and recommendations for trace length, impedance, and other relevant information during design.
Please contact the nearest Advantech branch office for access to design documents and further advance support.

Chapter 2

Mechanical Information

This chapter details mechanical information on the SOM-2569 CPU Computer on Module.

Sections include:

- Board Information
- Mechanical diagram
- Assembly diagram

2.1 Board Information

The figures below indicate the main chips on SOM-2569 Computer-on-Module.

Please aware on these positions while design customer's own carrier board to avoid mechanical violence and thermal solutions contacts for best thermal dispassion performance.

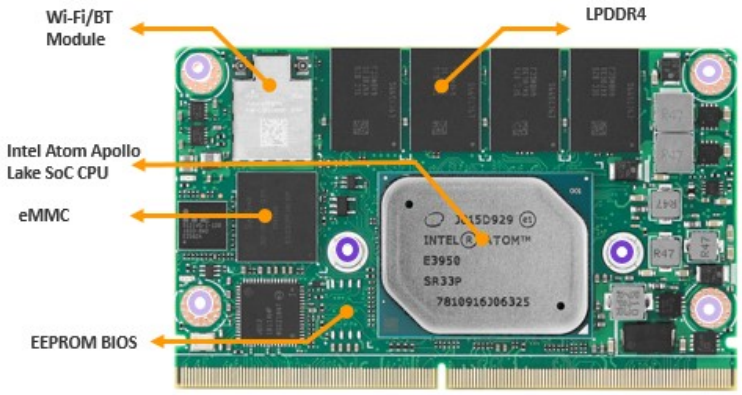


Figure 2.1 Atom_E3900 Board chips identify – Front

Figure 2.2 Atom_E3900 Board chips identify – Rear

2.2 Mechanical Diagram

For more detail about 2D/3D models, please refer to the Advantech COM support service website http://com.advantech.com.

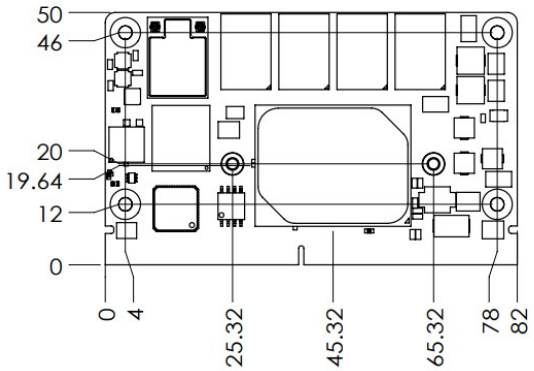


Figure 2.3 Atom_E3900 Board Mechanical Diagram - Front

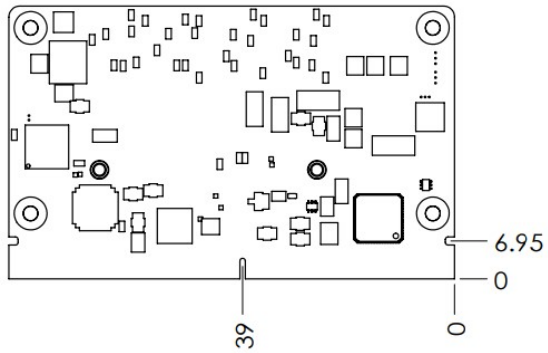


Figure 2.4 Atom_E3900 Board Mechanical Diagram – Rear

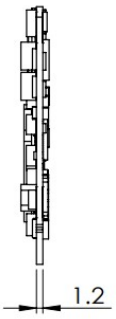


Figure 2.5 Atom_E3900 Board Mechanical Diagram – Side1

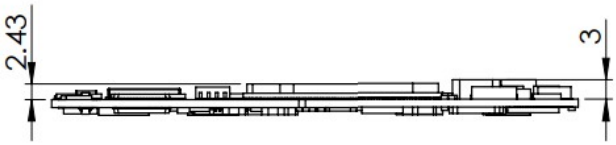


Figure 2.6 Atom_E3900 Board Mechanical Diagram – Side2

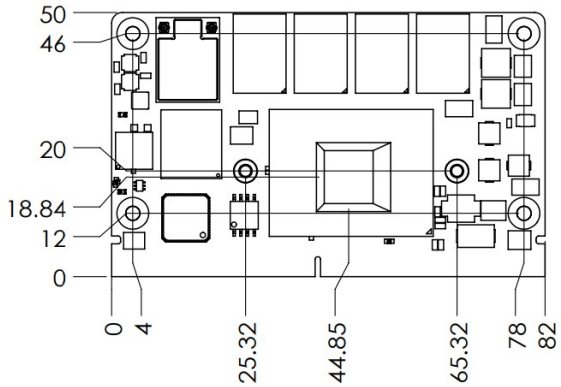


Figure 2.7 Pentium_Celeron_N_J Series Board Mechanical Diagram – Front

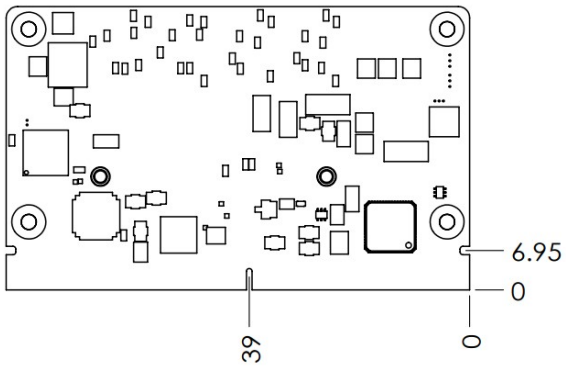


Figure 2.8 Pentium_Celeron_N_J Series Board Mechanical Diagram – Rear

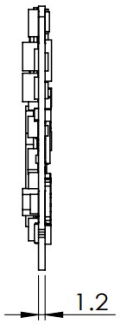


Figure 2.9 Pentium_Celeron_N_J Series Board Mechanical Diagram – Side1

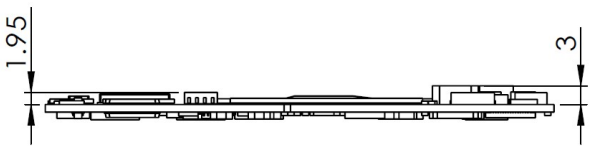


Figure 2.10 Pentium_Celeron_N_J Series Board Mechanical Diagram – Side2

2.3 Assembly Diagram

These figures demonstrate the oder of assembly for the thermal module, COM module to carrier board.

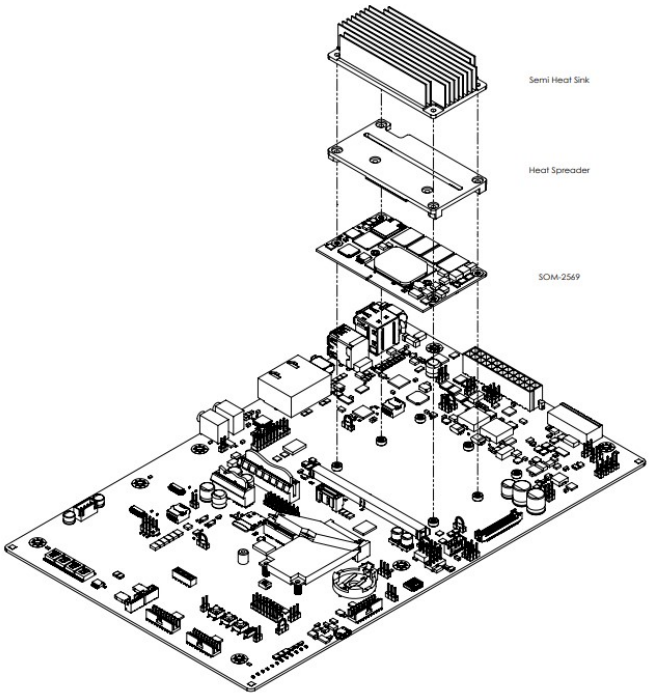
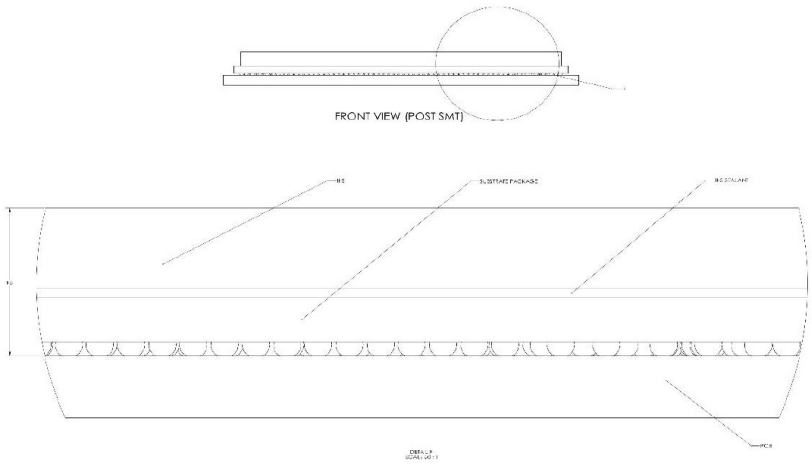


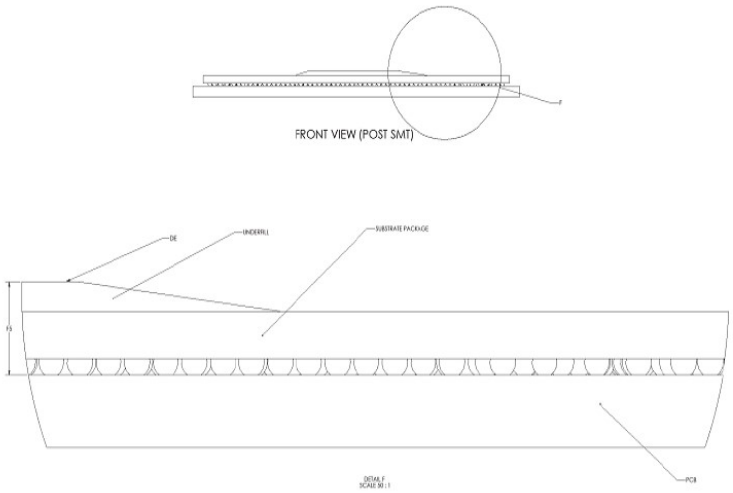
Figure 2.11 Assembly Diagram

There are 4 reserved screw holes for SOM-2569 to be pre-assembled with heat spreader.Please consider the CPU and chip height tolerance when designing your thermal solution.



Intel Atom® Processor E3900 & A3900 Series

Figure 2.12 Main Chip Height and Tolerance



Intel® Pentium and Celeron N and J Series Processors

Figure 2.13 Main Chip Height and Tolerance

Chapter 3

AMI BIOS

This chapter details BIOS setup information for the SOM-2569 CPU computer-on module.

Sections include:

- Introduction
- Entering Setup
- Hot/Operation Key
- Exit BIOS Setup Utility

3.1 Introduction

AMI BIOS has been integrated into motherboards for over a decade. With the AMI BIOS Setup Utility, users can modify BIOS settings and control various system features. This chapter describes the basic navigation of the BIOS Setup Utility.

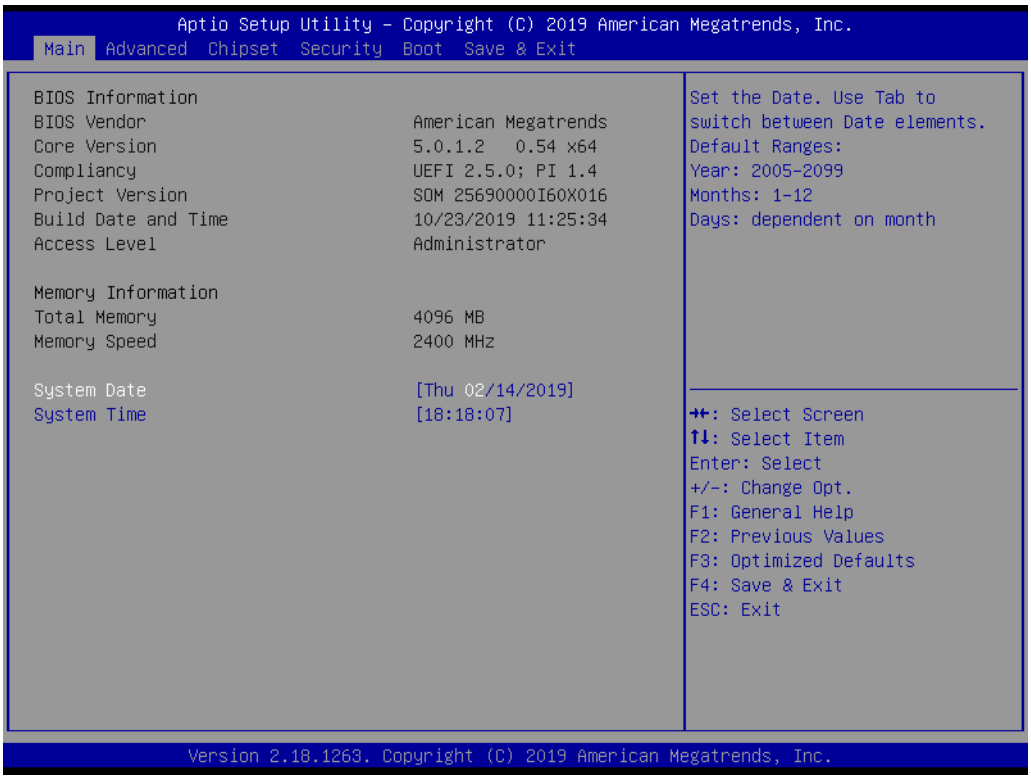


Figure 3.1 Setup program initial screen

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

3.2 Entering Setup

Turn on the computer and press <DEL> or <ESC> to enter the Setup menu.

3.3 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.

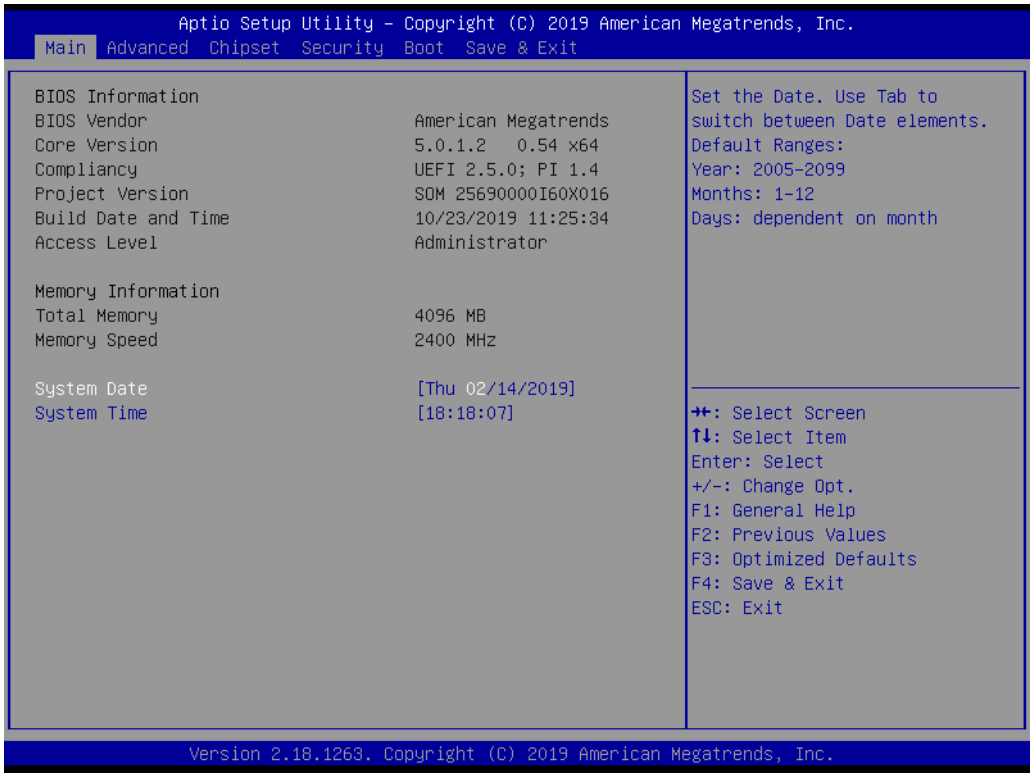


Figure 3.2 Main setup screen

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 time / System date

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

3.4 Advanced BIOS Features Setup

Select the Advanced tab from the SOM-2569 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.

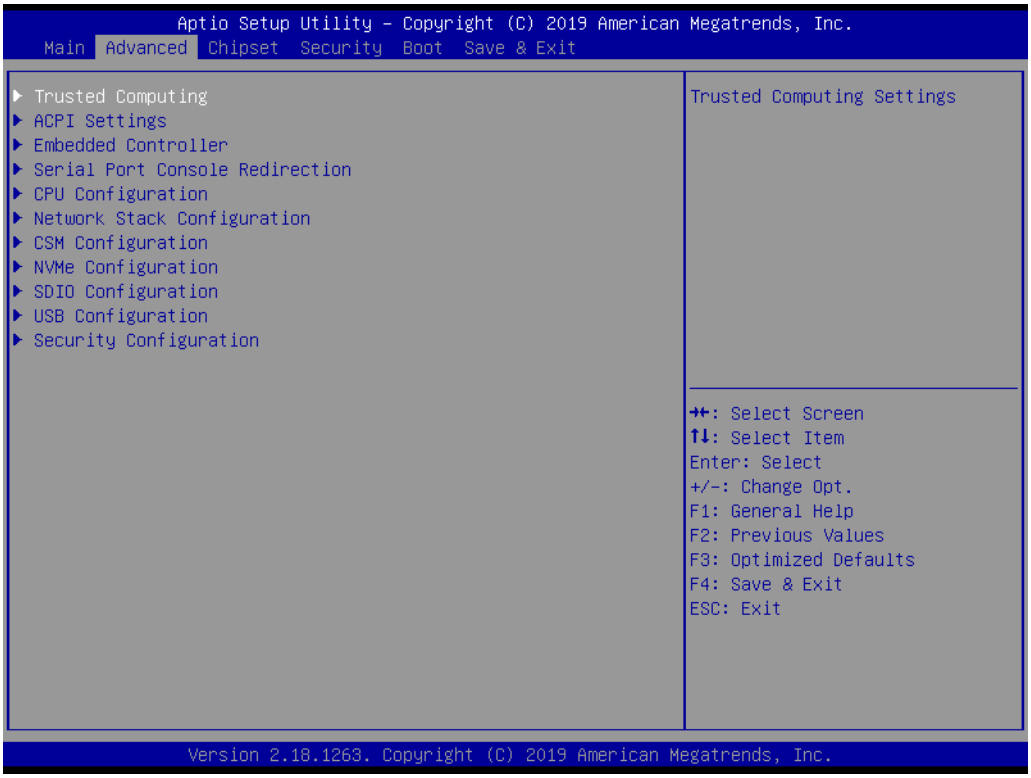


Figure 3.3 Advanced BIOS features setup screen

Trusted Computing

Trusted Computing Settings.

ACPI Settings

System ACPI Parameters.

Embedded Controller

Embedded Controller Parameters.

Serial Port Console Redirection

Serial Port Console Redirection.

CPU Configuration

CPU Configuration Parameters.

Network Stack Configuration

Network Stack Settings.

CSM Configuration

CSM configuration: Enable/Disable, Option ROM execution settings, etc.

NVMe Configuration

NVMe Device Options Settings.

SDIO Configuration

SDIO Configuration Parameters.

USB Configuration

USB Configuration Parameters.

Platform Trust Technology

Platform Trust Technology.

Security Configuration

Intel ® Anti-Theft Technology Configuration.

3.4.1 Trusted Computing

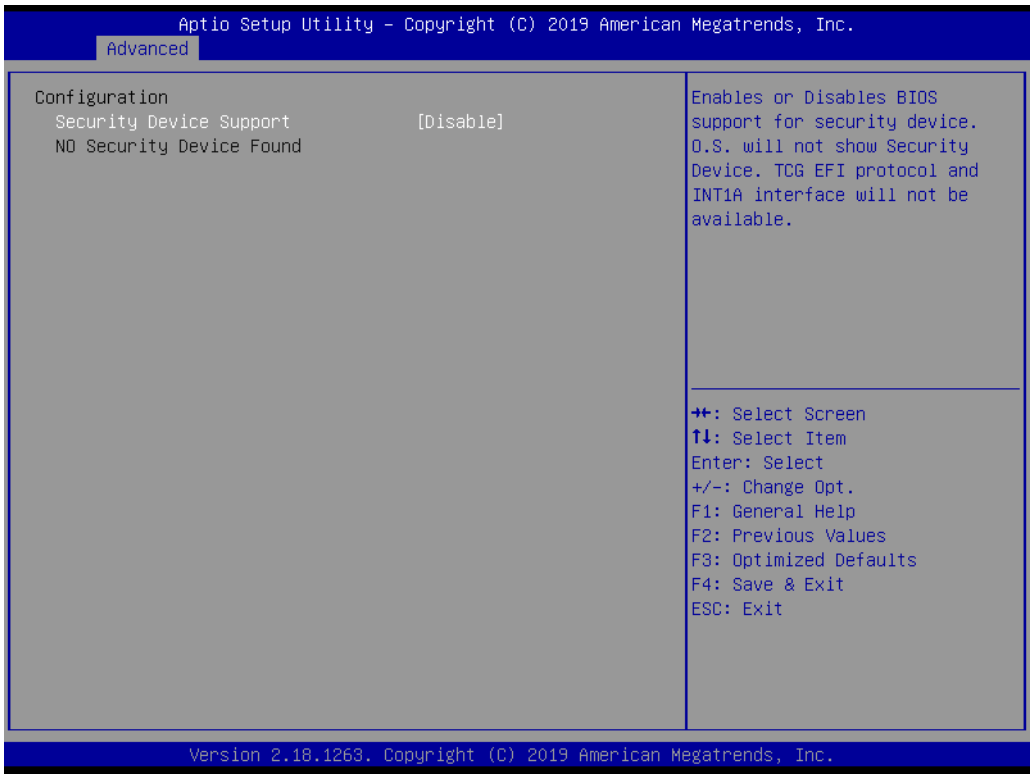


Figure 3.4 Trusted Computing

Security Device Support

Enables or Disables BIOS support for security device. The OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

3.4.2 ACPI Settings

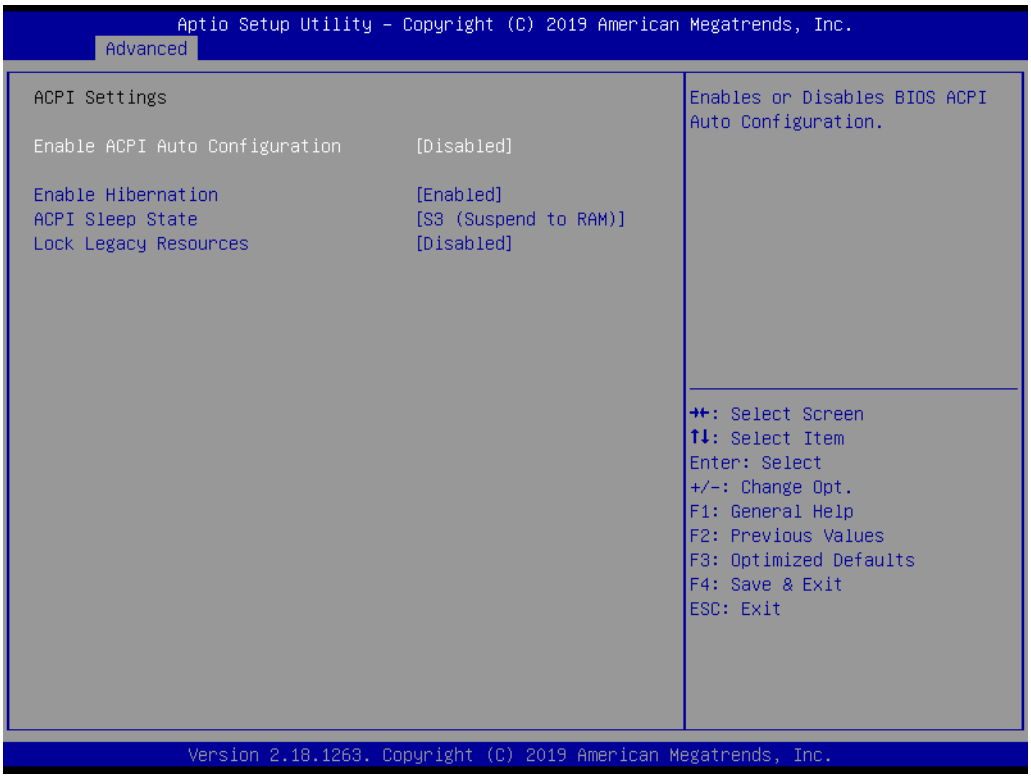


Figure 3.5 ACPI Settings

Enable ACPI Auto Configuration

Enables or Disables BIOS ACPI Auto Configuration.

Enable Hibernation

Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

ACPI Sleep State

Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

Lock Legacy Resources

Enables or Disables Lock of Legacy Resources.

3.4.3 Embedded Controller

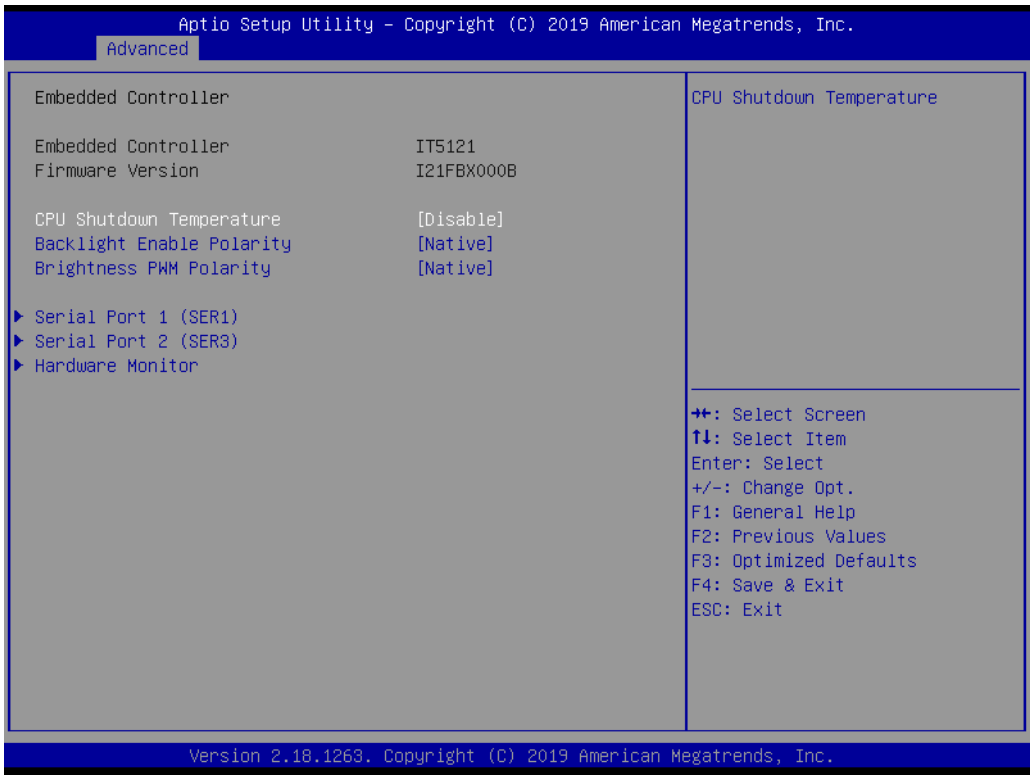


Figure 3.6 Embedded Controller

CPU Shutdown Temperature

CPU Shutdown Temperature.

Smart Fan - Carrier Board

Control Carrier Board Smart FAN function. Get value from EC and only set value when using Save Changes.

Backlight Enable Polarity

Switch Backlight Enable Polarity for Native or Invert.

Brightness PWM Polarity

Backlight Control Brightness PWM Polarity for Native or Invert.

Power Saving Mode

Select power saving Mode.

Serial Port 1 Configuration

Set parameters of Serial Port 1 (COMA).

Serial Port 2 Configuration

Set parameters of Serial Port 2 (COMB).

Hardware Monitor

Monitor hardware status.

3.4.3.1 Serial Port 1 Configuration

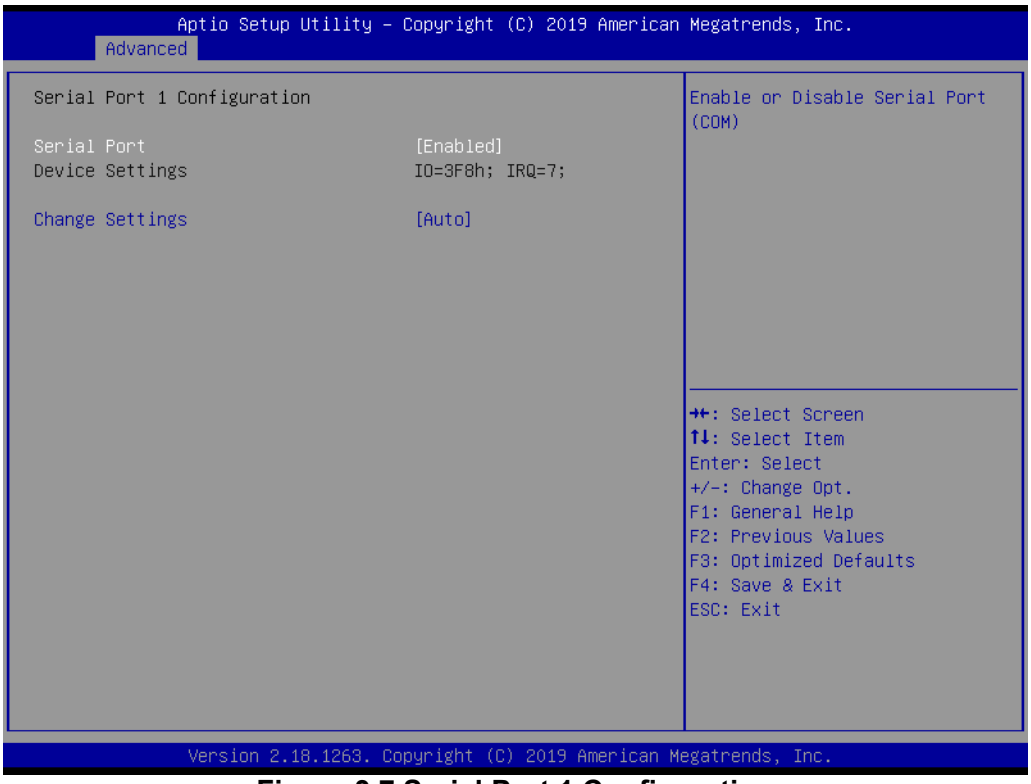


Figure 3.7 Serial Port 1 Configuration

Serial Port

Enable or disable Serial Port (COM).

Device Settings

Set parameters of Serial Port 1 (COMA).

Change Settings

Select an optimal setting for Super I/O Device.

3.4.3.2 Serial Port 2 Configuration

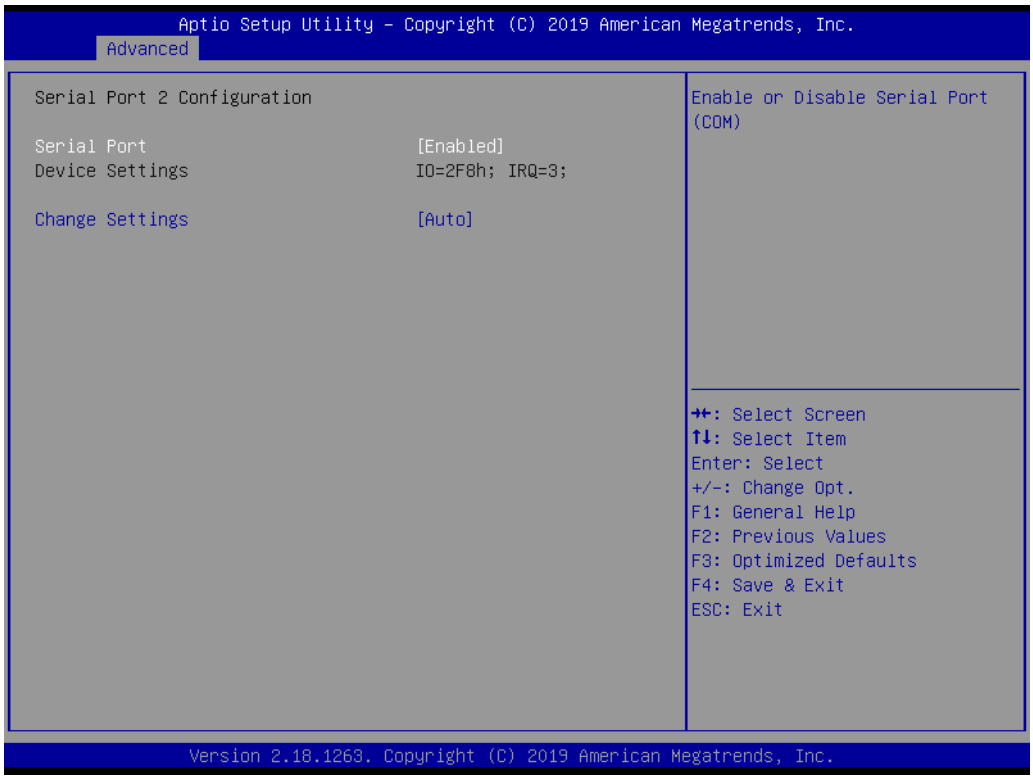


Figure 3.8 Serial Port 2 Configuration

Serial Port

Enable or Disable Serial Port (COM).

Device Settings

Set parameters of Serial Port 2 (COMB).

Change Settings

Select an optimal setting for Super I/O Device.

3.4.3.3 Hardware Monitor

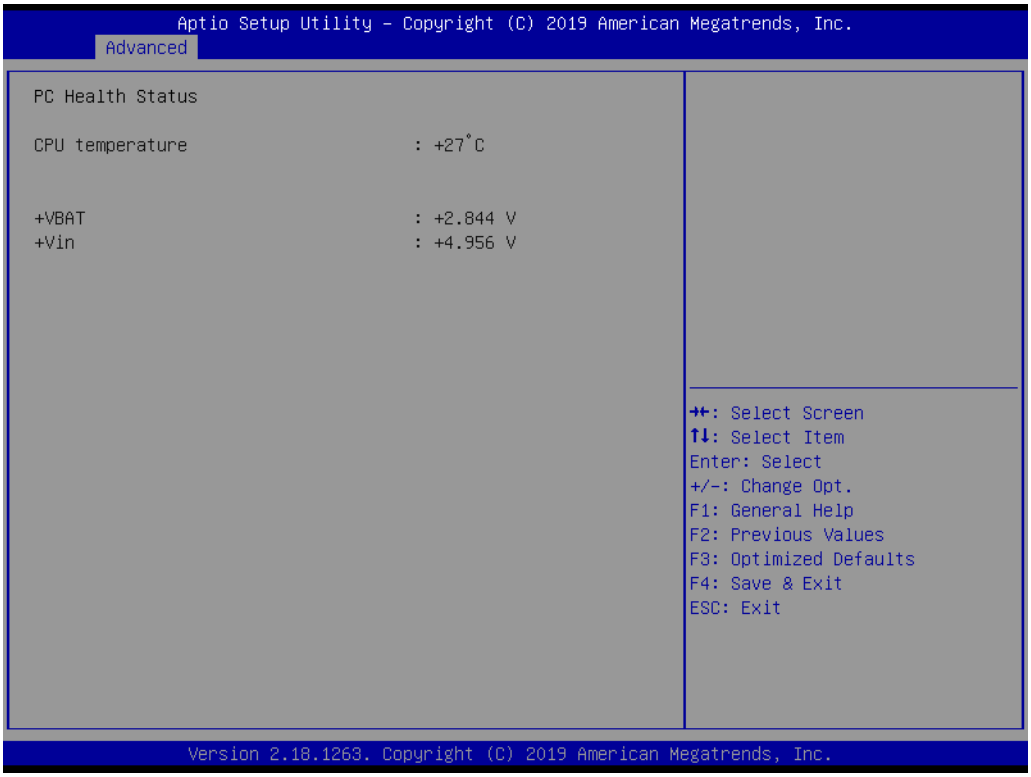


Figure 3.9 Hardware Monitor

3.4.4 Serial Port Console Redirection

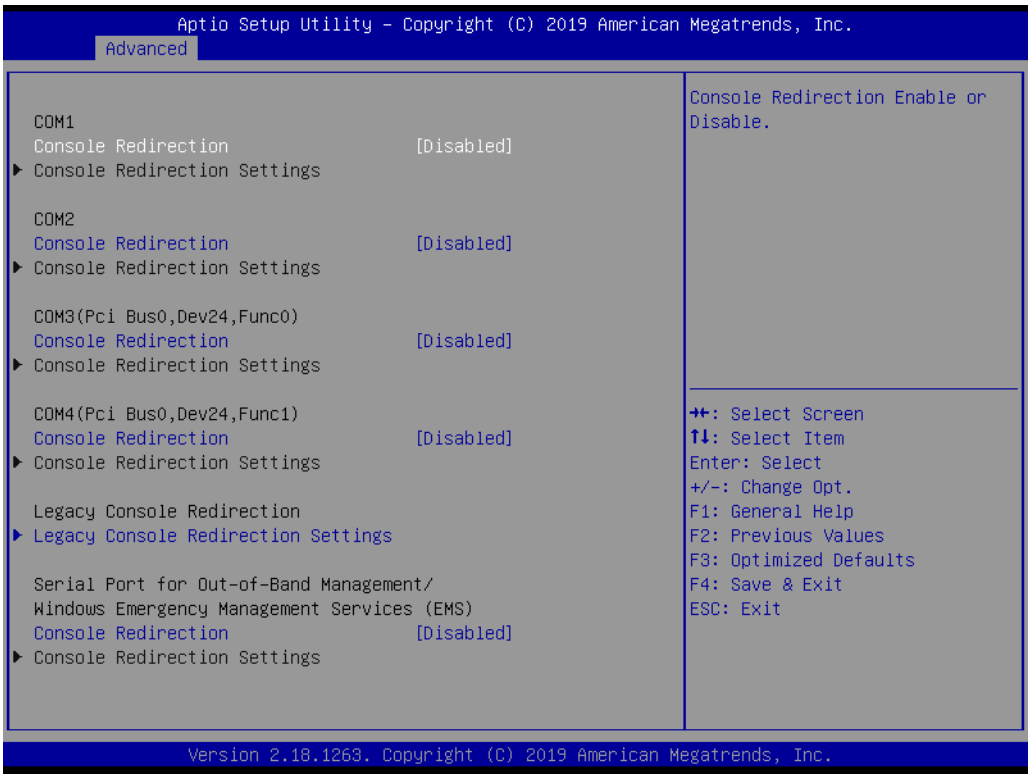


Figure 3.10 Serial Port console Redirection

COM1

Console Redirection

Console Redirection Enable or Disable.

Console Redirection Settings

These settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

COM2

Console Redirection

Console Redirection Enable or Disable.

Console Redirection Settings

These settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

COM3

Console Redirection

Console Redirection Enable or Disable.

Console Redirection Settings

These settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

COM4

Console Redirection

Console Redirection Enable or Disable.

Console Redirection Settings

These settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible.

Legacy Console Redirection

Legacy Console Redirection Settings

Legacy Console Redirection Settings.

Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS)

Console Redirection

Console Redirection Enable or Disable.

Console Redirection Settings

Theses settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

3.4.5 CPU Configuration

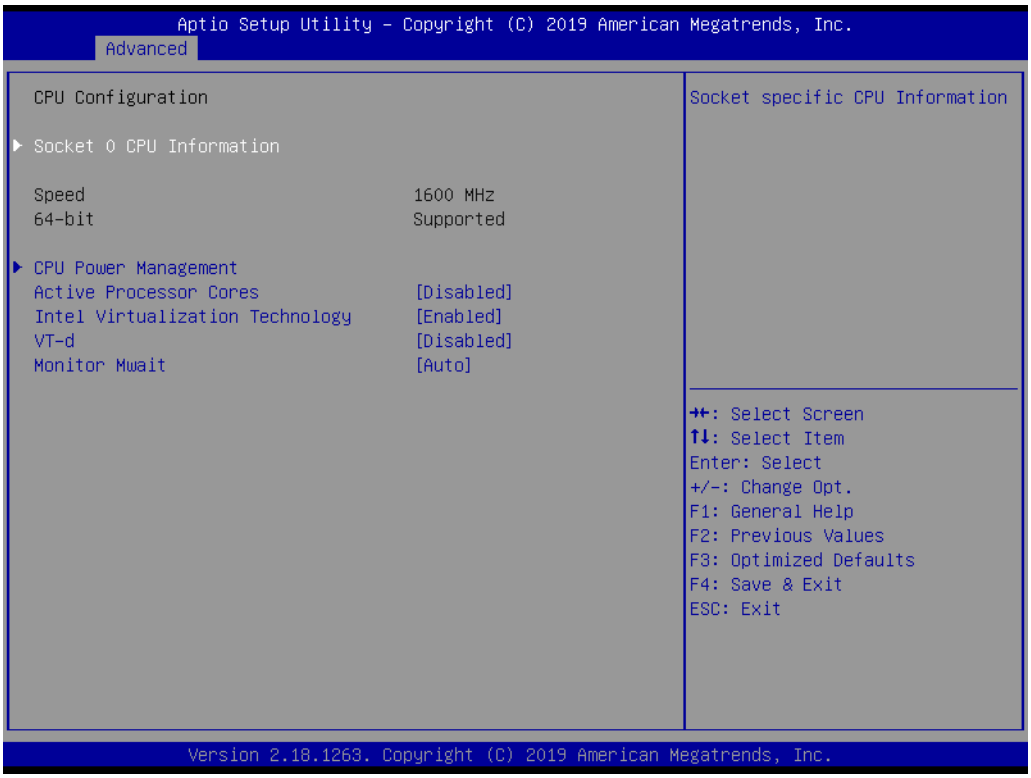


Figure 3.11 CPU Configuration

Socket 0 CPU Information

Socket specific CPU Information.

Speed

Displays the Processor Speed.

64-bit

Displays if 64-bit is supported.

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.

VT-d

Enable/Disable CPU VT-d.

Monitor Mwait

Enable/Disable Monitor Mwait.

3.4.5.1 Socket 0 CPU Information

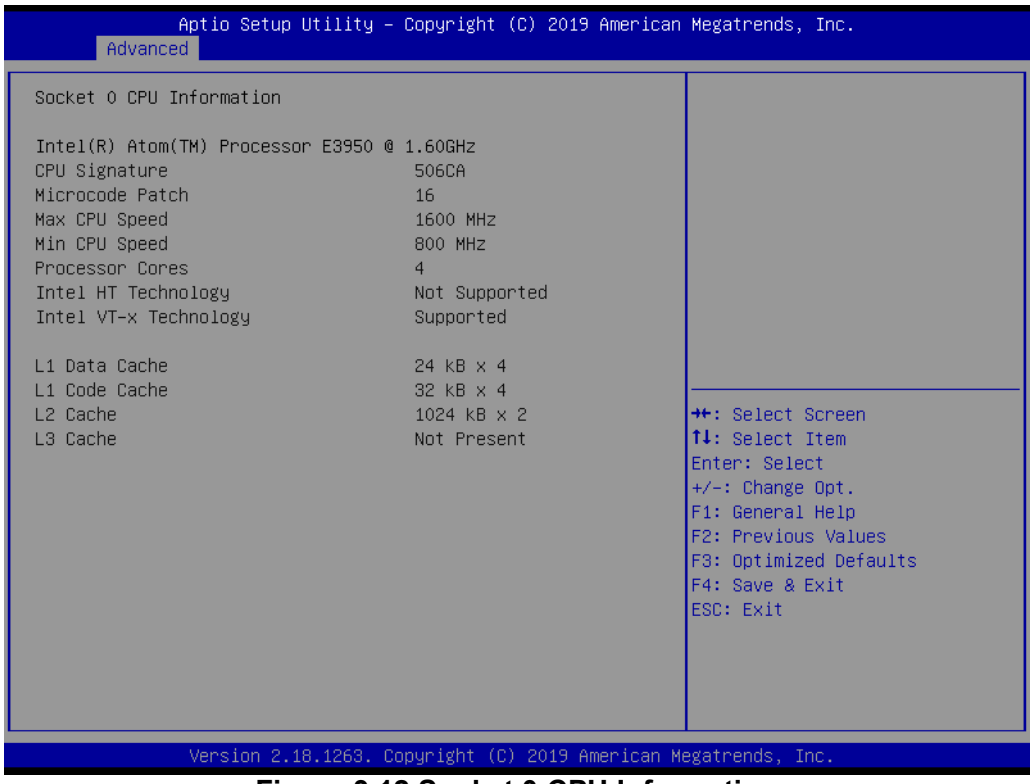


Figure 3.12 Socket 0 CPU Information

CPU Signature

Displays CPU Signature.

Microcode Patch

CPU Microcode Patch Revision.

Max CPU Speed

Displays the Max CPU Speed.

Min CPU Speed

Displays the Max CPU Speed.

Processor Cores

Displays number of cores.

Intel HT Technology

When Hyper-threading is enabled, 2 logical CPUs per core are present.

Intel VT-x Technology

CPU VMX hardware support for virtual machines.

L1 Data Cache

L1 Data Cache Size.

L1 Code Cache

L1 Code Cache Size.

L2 Cache

L2 Cache Size.

L3 Cache

L3 Cache Size.

3.4.5.2 CPU Power Management

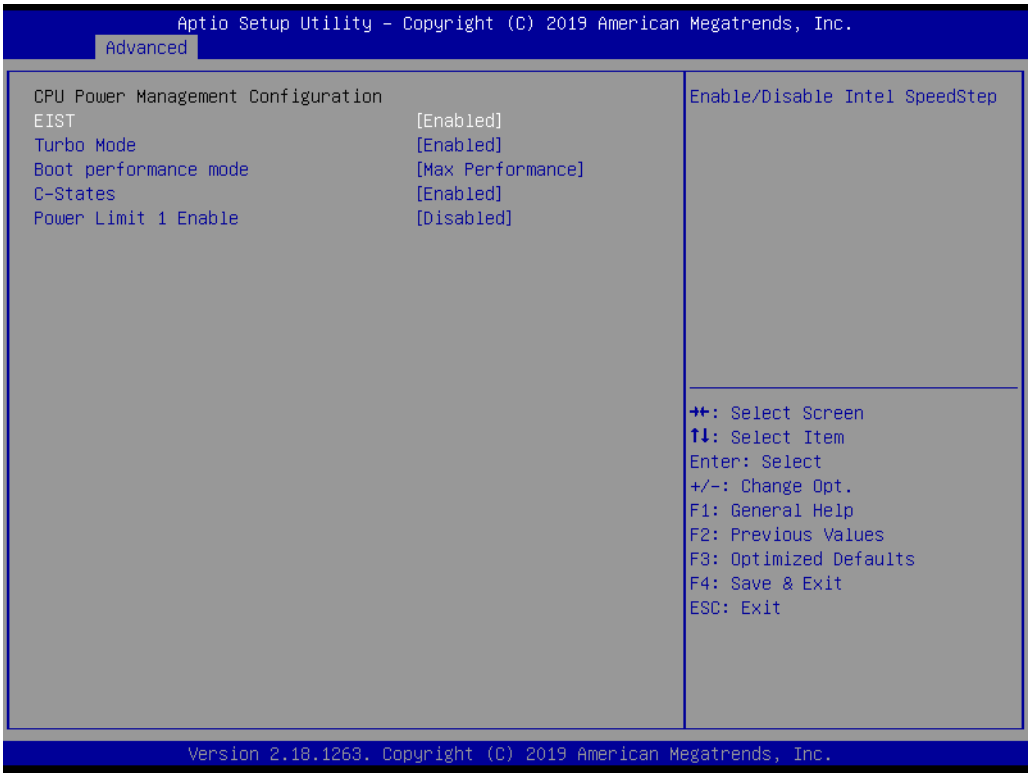


Figure 3.13 CPU Power Management

EIST

Enable/Disable Intel SpeedStep.

Turbo Mode

Turbo Mode.

Boot performance mode

Select the performance state that the BIOS will set before OS handoff.

C-States

Enable/Disable C States.

Power Limit 1 Enable

Enable/Disable Power Limit 1.

3.4.6 Network Stack Configuration

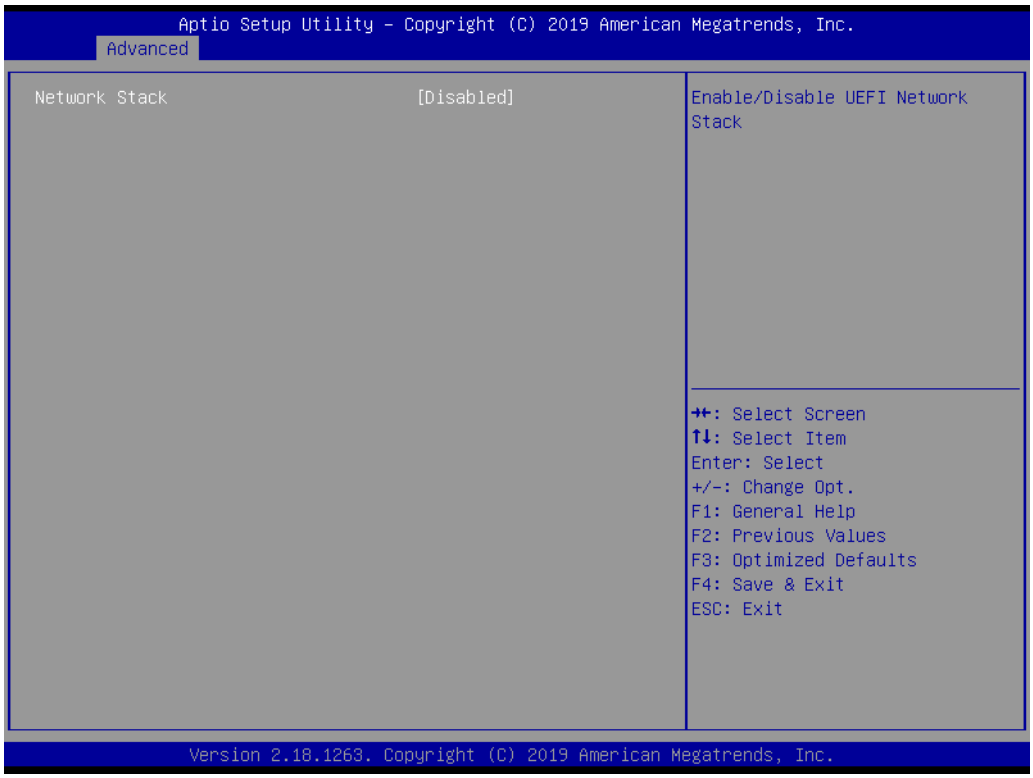


Figure 3.14 Network Stack Configuration

Network Stack

Enable/Disable UEFI Network Stack.

3.4.7 CSM Configuration

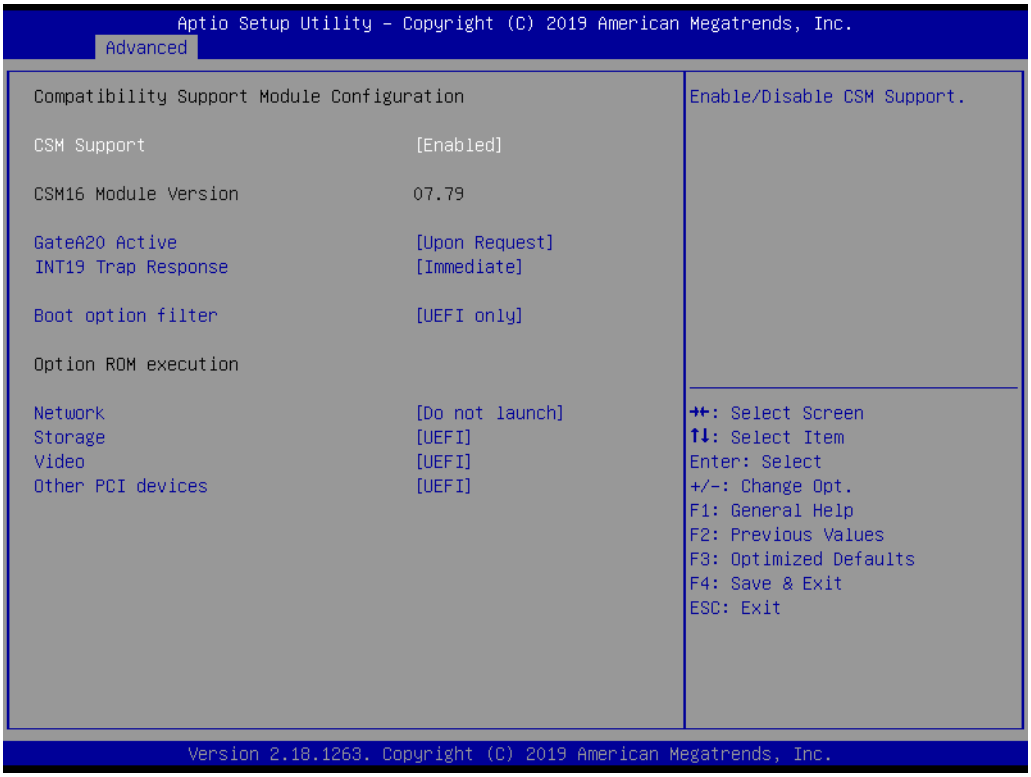


Figure 3.15 CSM Configuration

CSM Support

Enable/Disable CSM Support.

CSM16 Module Version

CSM16 Module Version.

GateA20 Active

This item is useful when RT code is executed above 1MB. When this is set as "Upon Request", GA20 can be disabled using BIOS services. When it's set as "Always", it does not allow disabling of GA20.

Option ROM Messages

Set display mode for Option ROM.

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.

Option ROM execution

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.

3.4.8 NVMe Configuration

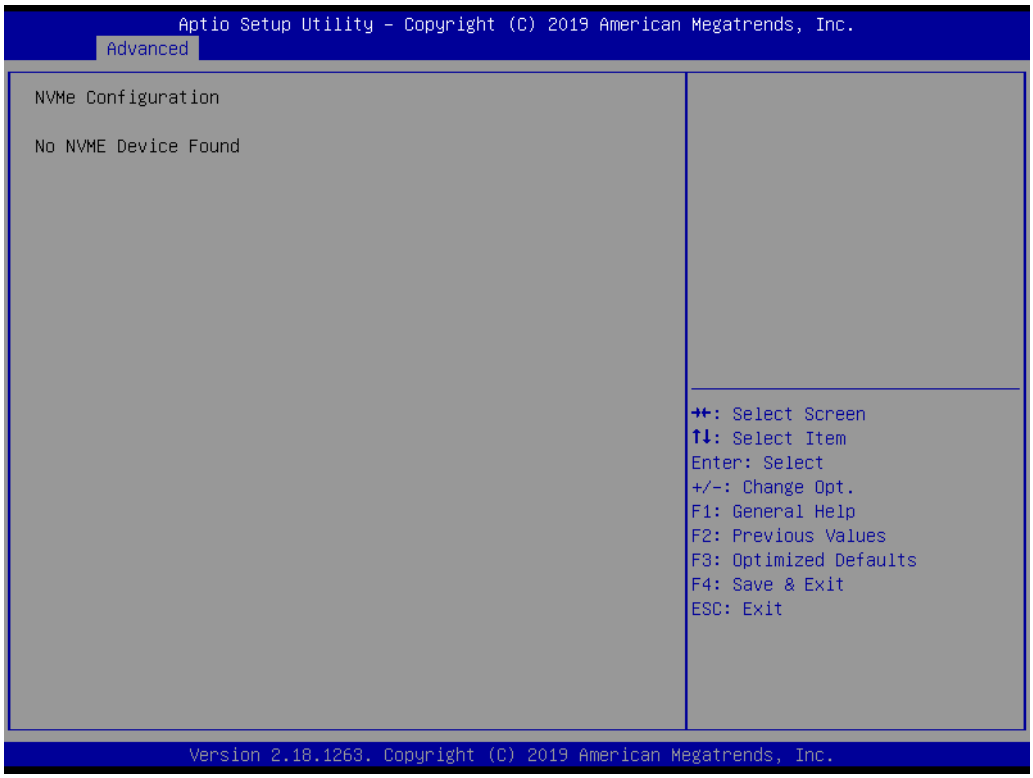


Figure 3.16 NVMe Configuration

3.4.9 SDIO Configuration

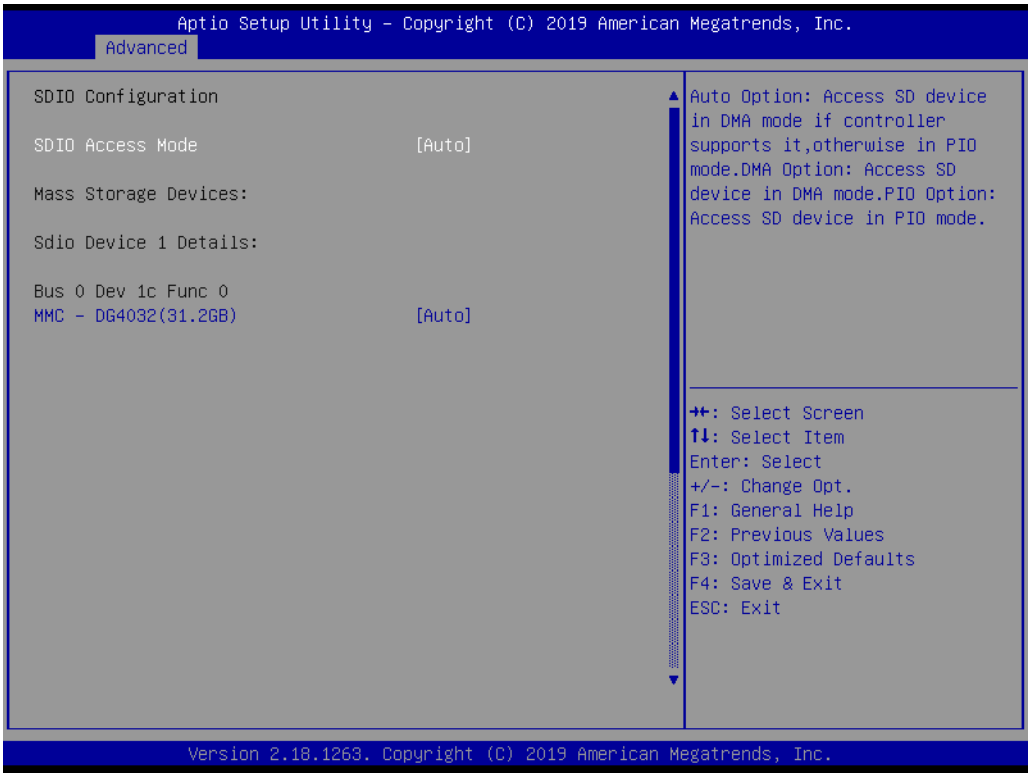


Figure 3.17 SDIO Configuration

SDIO Access Mode

Auto Option: Access SD device in DMA mode if the controller supports it, otherwise in PIO mode.DMA Option: Access SD device in DMA mode.PIO Option: Access SD device in PIO mode.

MMC – G4032

3.4.10 USB Configuration

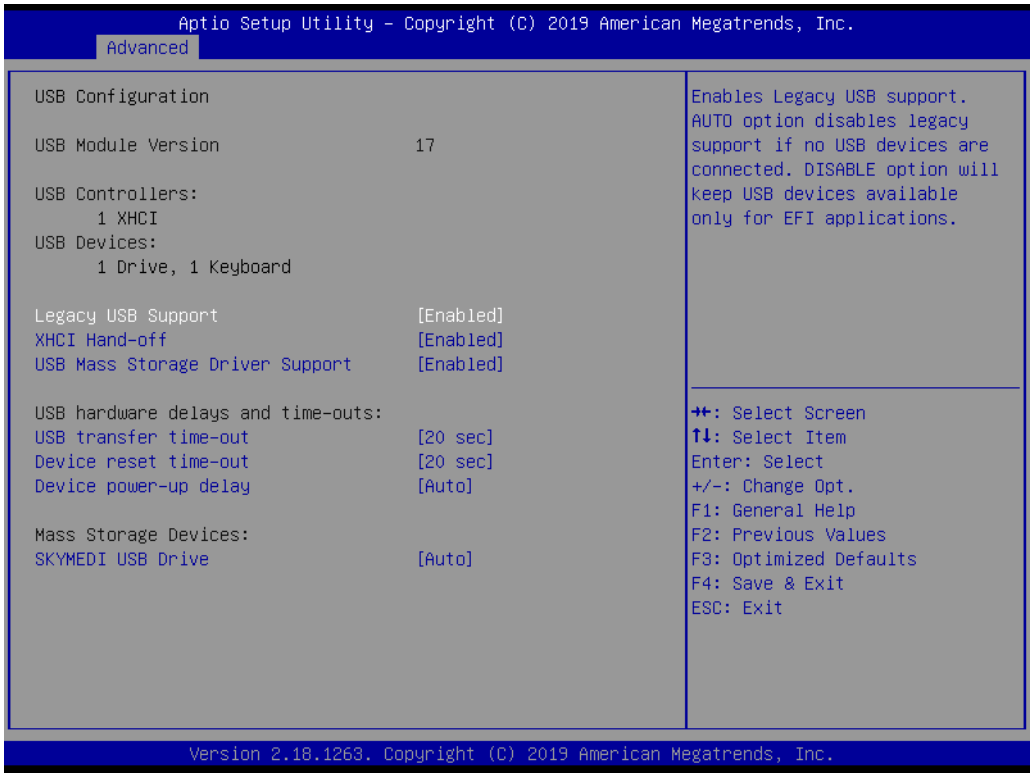


Figure 3.18 USB Configuration

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 Hand-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.

USB transfer time-out

The time-out value for Control, Bulk, and Interrupt transfers.

Device reset time-out

USB mass storage device Start Unit command time-out.

Device power-up delay

Maximum time the device will take before it properly reports itself to the Host Controller.

'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

Device power-up delay in seconds

Delay range is 1 ~ 40 seconds, in one second increments.

3.4.11 Security Configuration

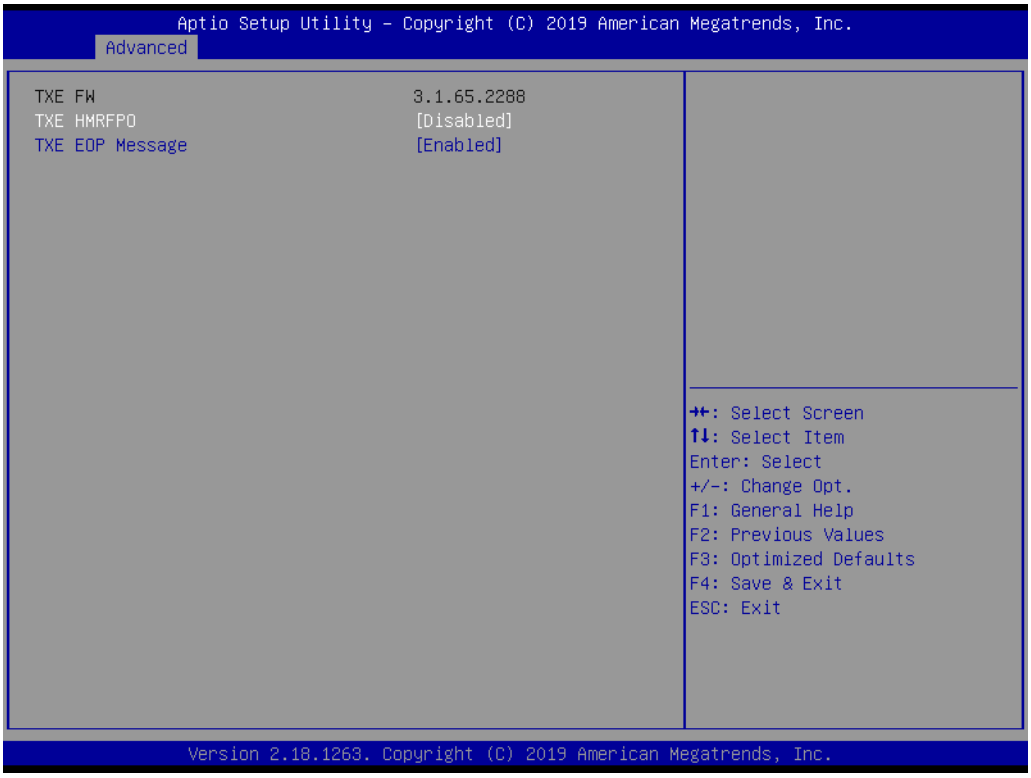


Figure 3.19 Security Configuration

TXE HMRFPO

TXE EOP Message

Send EOP Message Before Enter OS.

3.5 Chipset Setup

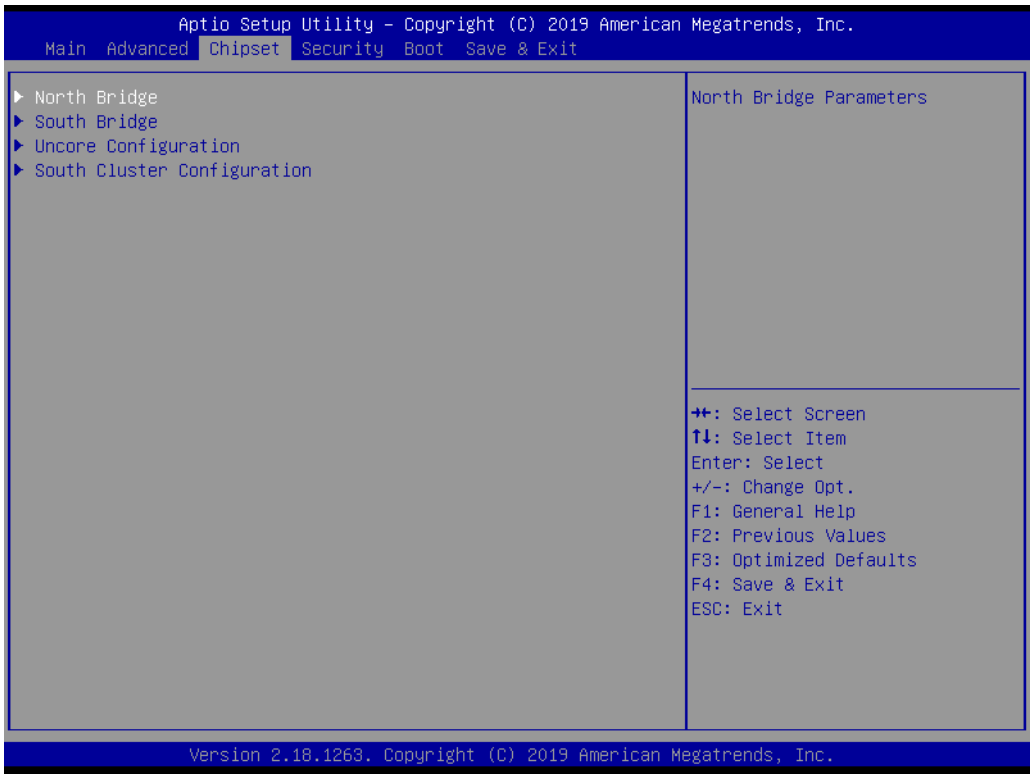


Figure 3.20 Chipset Setup

North Bridge

North Bridge Parameters.

South Bridge

South Bridge Parameters.

Uncore Configuration

Uncore Configuration.

South Cluster Configuration

South Cluster Configuration.

3.5.1 North Bridge

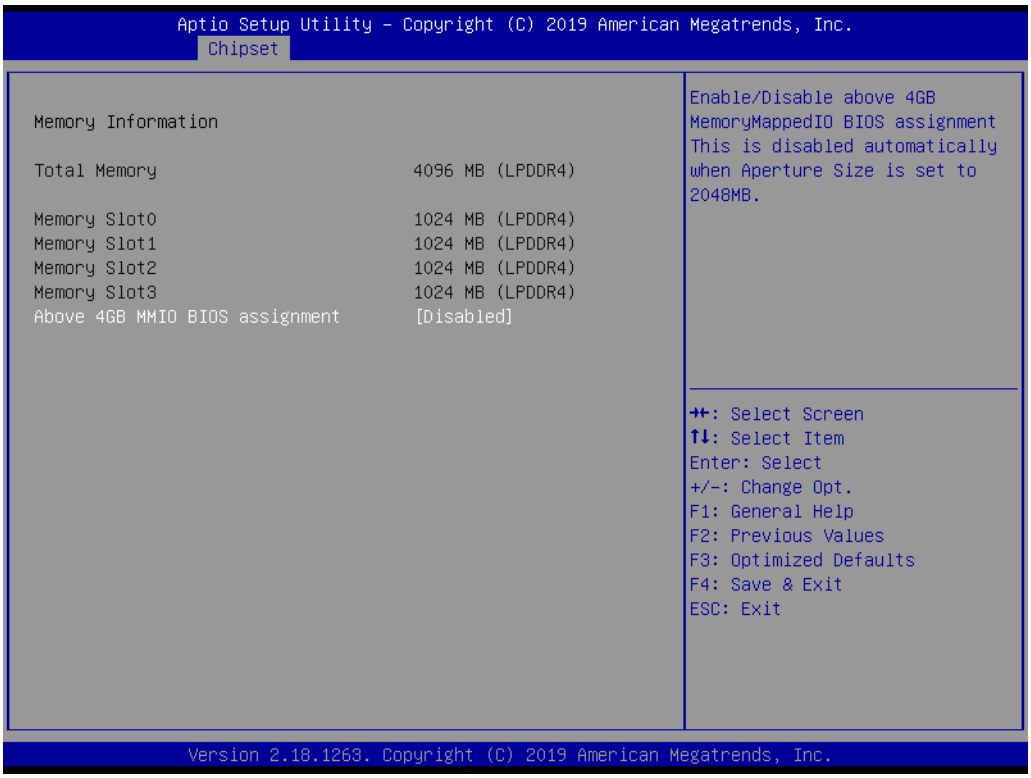


Figure 3.21 North Bridge

Total Memory

Total Memory in the system.

Memory Slot0

Memory in the slot.

Memory Slot1

Memory in the slot.

Memory Slot2

Memory in the slot.

Memory Slot3

Memory in the slot.

Above 4GB MMIO BIOS assignment

Enable/Disable above 4GB Memory Mapped I/O BIOS assignment. This is disabled automatically when Aperture Size is set to 2048MB.

3.5.2 South Bridge

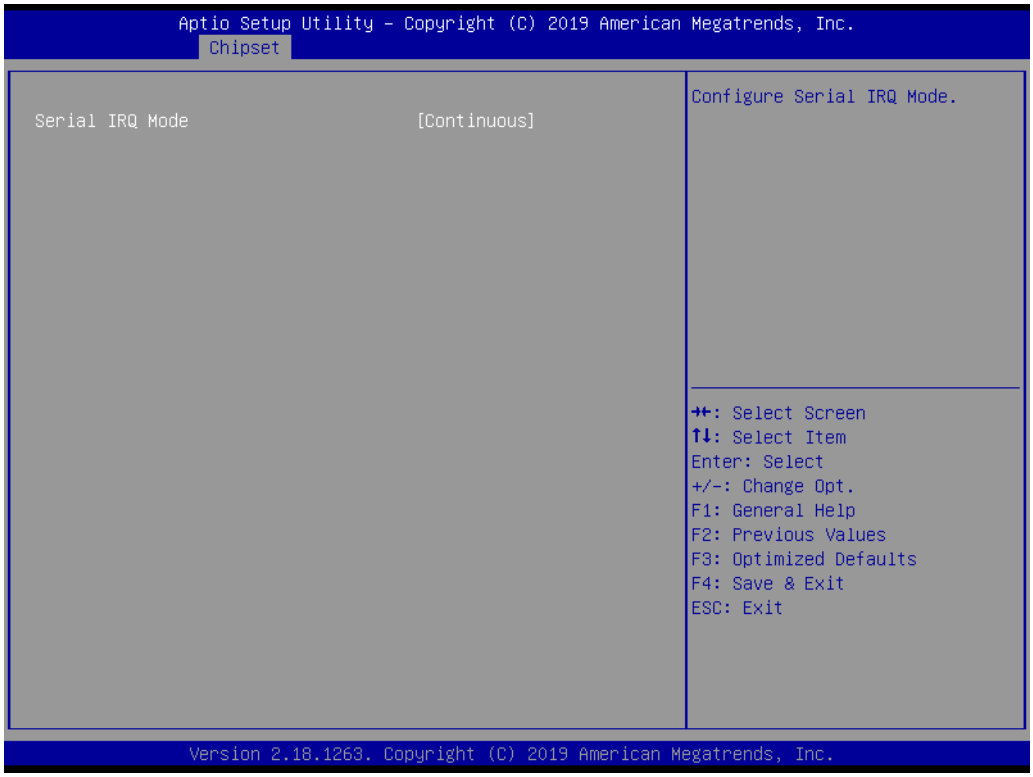


Figure 3.22 South Bridge

Serial IRQ Mode

Configure Serial IRQ Mode.

3.5.3 Uncore Configuration

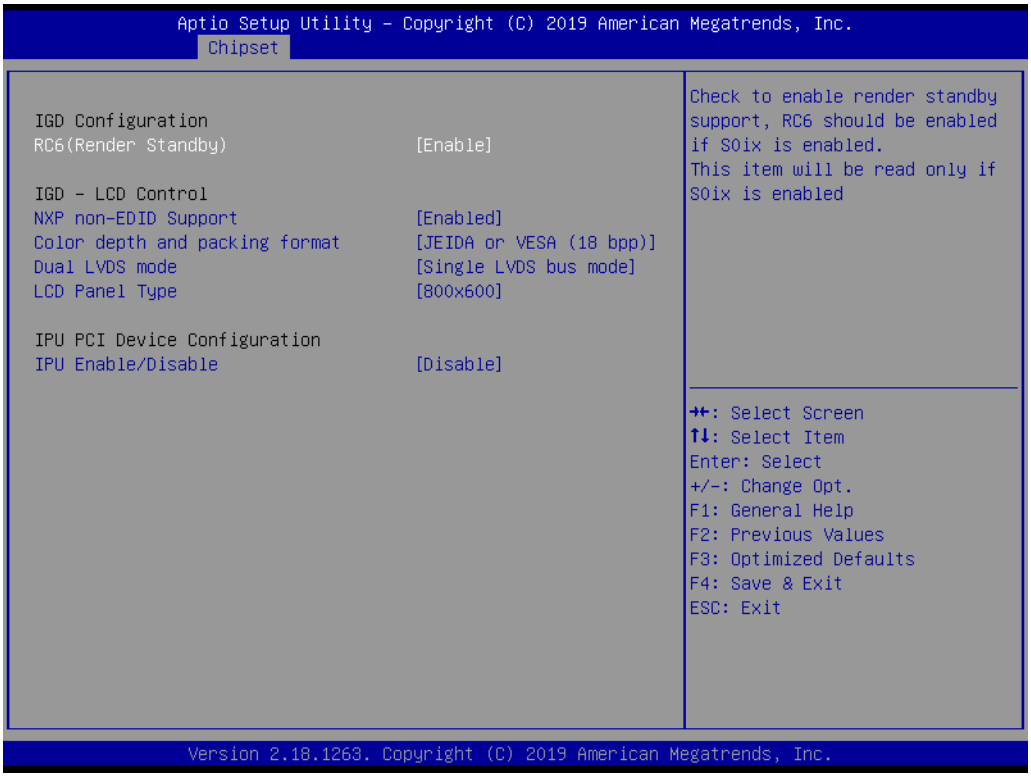


Figure 3.23 Uncore Configuration

IGD Configuration

RC6(Render Standby)

Check to enable render standby support, RC6 should be enabled if S0ix is enabled. This item will be read only if S0ix is enabled.

IGD - LCD Control

NXP non-EDID Support

NXP PTN3460 Support: Enable: Used internal EDID setting; Disable: Get EDID from DDC bus.

Color depth and packing format

Color depth and packing format.

Dual LVDS mode

Dual LVDS mode.

LCD Panel Type

Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.

IPU

Enable Image Processing Unit function.

(IPC: A processor analyzes and modifies input images).

3.5.4 South Cluster Configuration

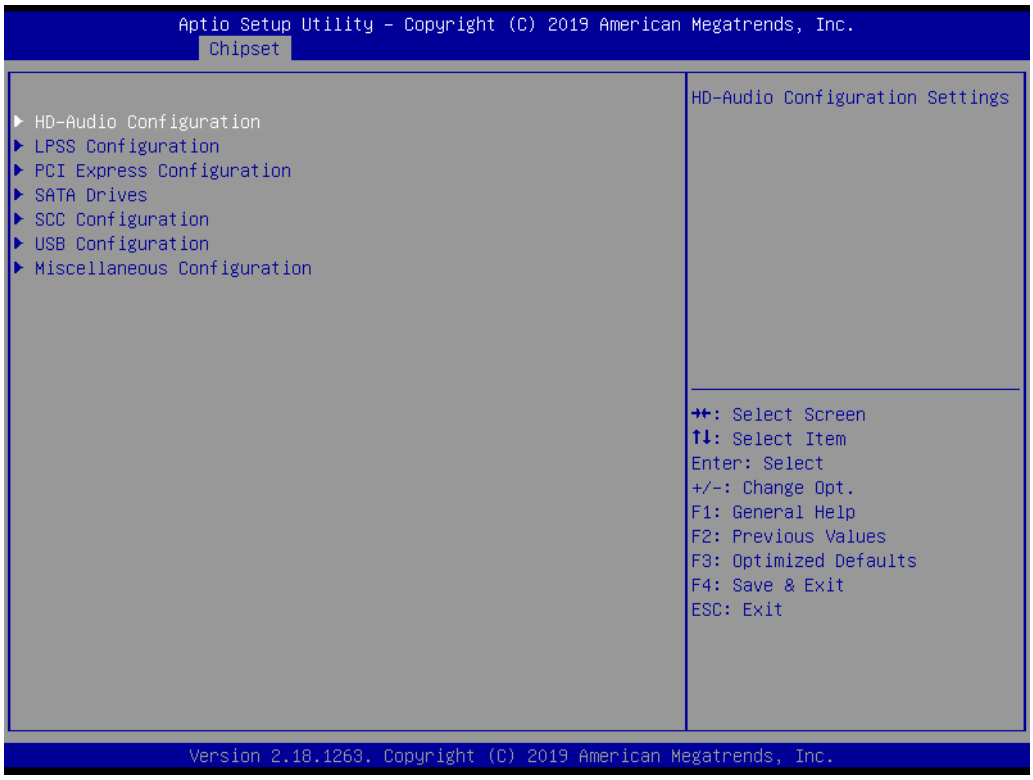


Figure 3.24 South Cluster Configuration

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.

SCC Configuration

SCC Configuration Settings.

USB Configuration

USB Configuration Settings.

Miscellaneous Configuration

Enable/Disable Misc. Features.

3.5.4.1 HD-Audio Configuration

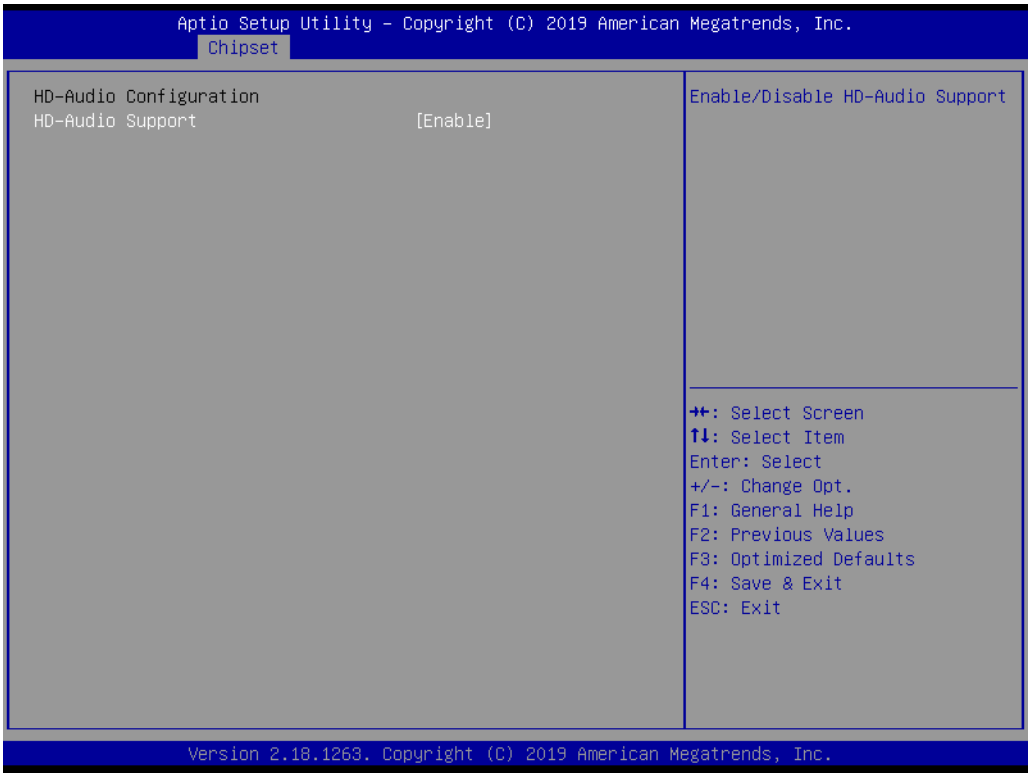


Figure 3.25 HD-Audio Configuration

HD-Audio Support

Enable/Disable HD-Audio Support.

3.5.4.2 PCI Express Configuration

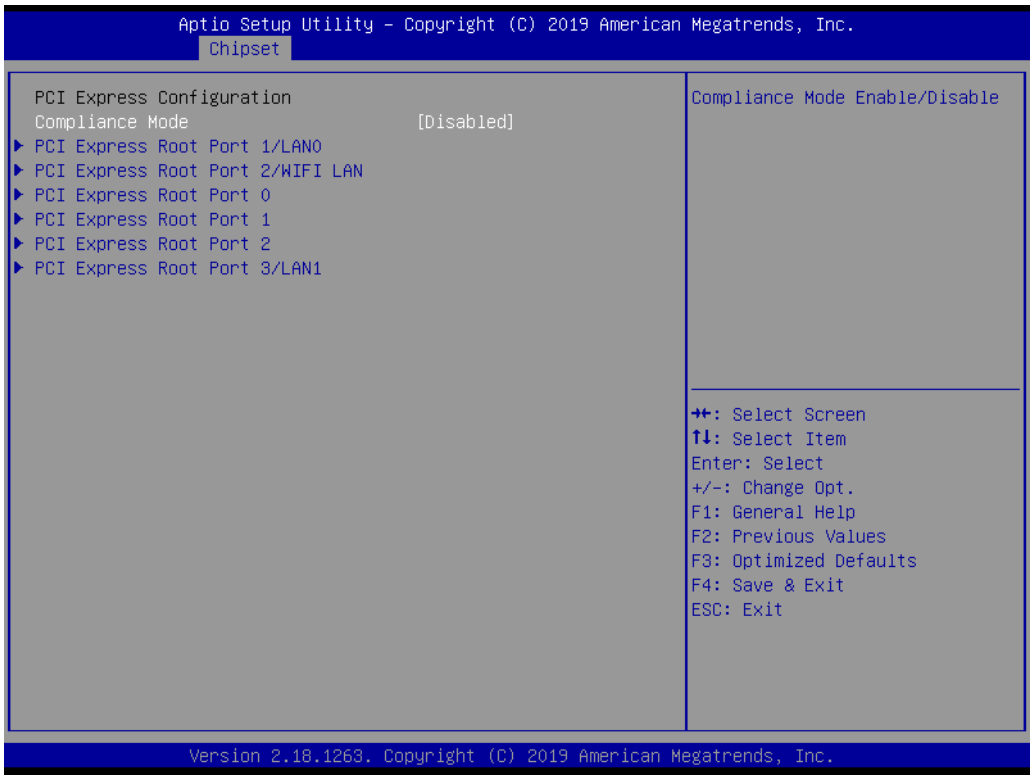


Figure 3.26 PCI Express Configuration

Compliance Mode

Compliance Mode Enable/Disable.

PCI Express Root Port 1 /LANO

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

PCI Express Root Port 2 WIFI LAN

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

PCI Express Root Port 0

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

PCI Express Root Port 1

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

PCI Express Root Port 2

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

PCI Express Root Port 3 /LANO

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

PCI Express Root Port 1 /LANO

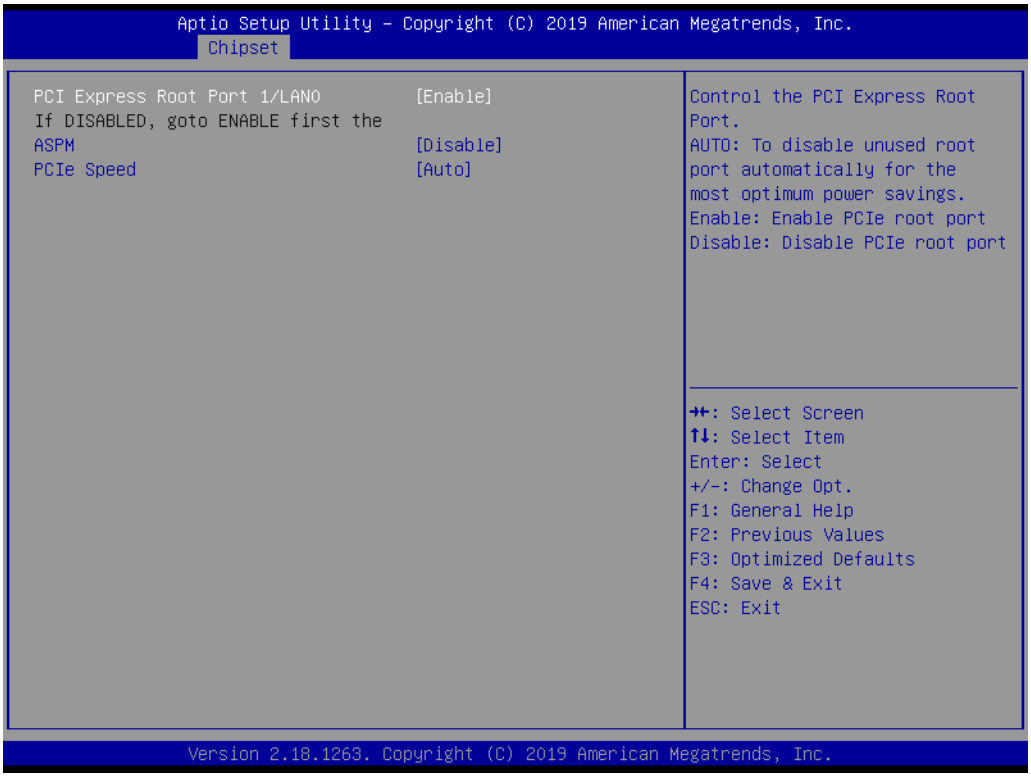


Figure 3.27 PCI Express Root Port 1 /LANO

PCI Express Root Port 1 /LANO

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

ASPM

PCI Express Active State Power Management settings.

PCIe Speed

Configure PCIe Speed.

PCI Express Root Port 2 WIFI LAN

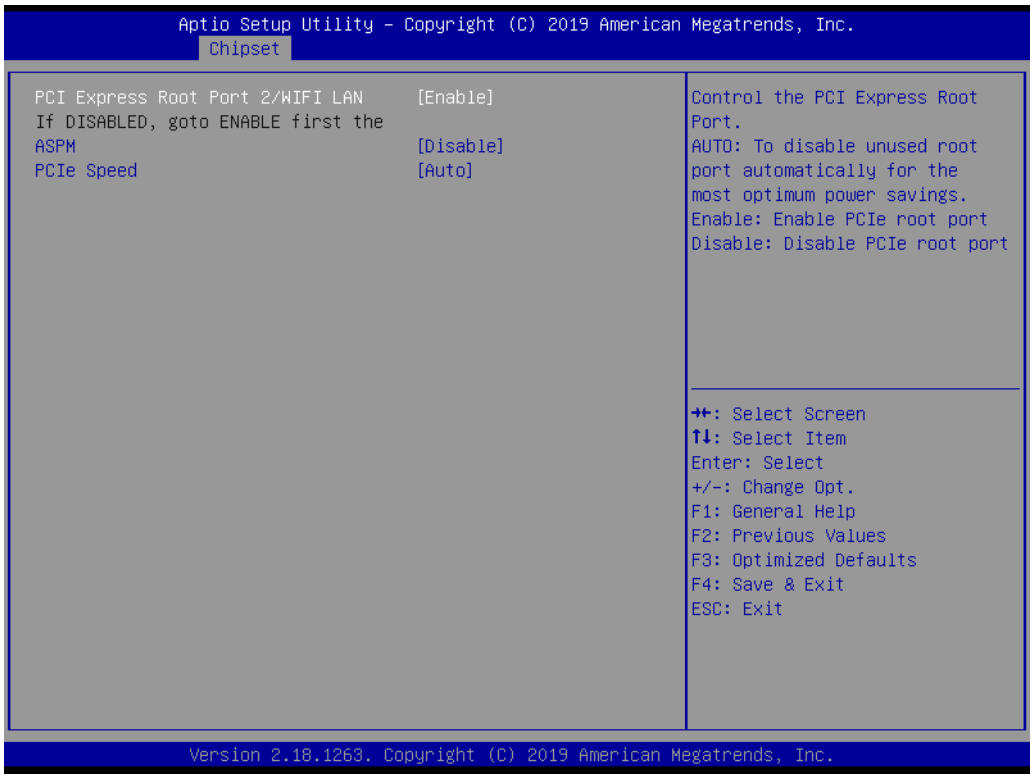


Figure 3.28 PCI Express Root Port 2 WIFI LAN

PCI Express Root Port 2 WIFI LAN

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

ASPM

PCI Express Active State Power Management settings.

PCIe Speed

Configure PCIe Speed.

PCI Express Root Port 0

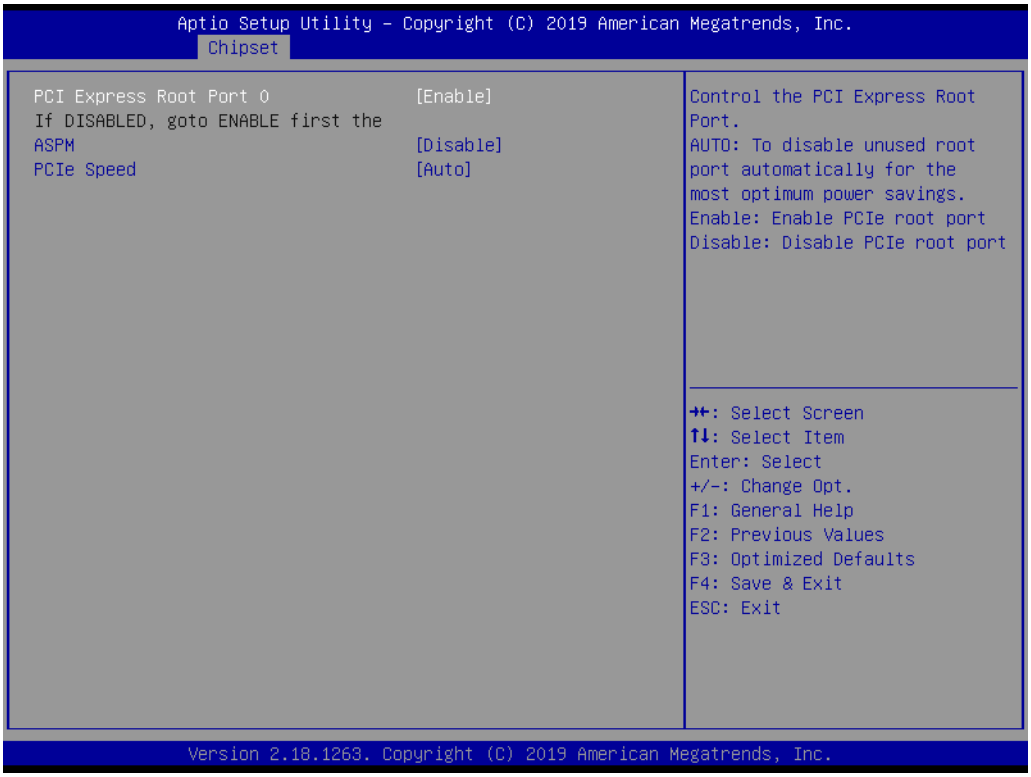


Figure 3.29 PCI Express Root Port 0

PCI Express Root Port 0

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

ASPM

PCI Express Active State Power Management settings.

PCIe Speed

Configure PCIe Speed.

PCI Express Root Port 1

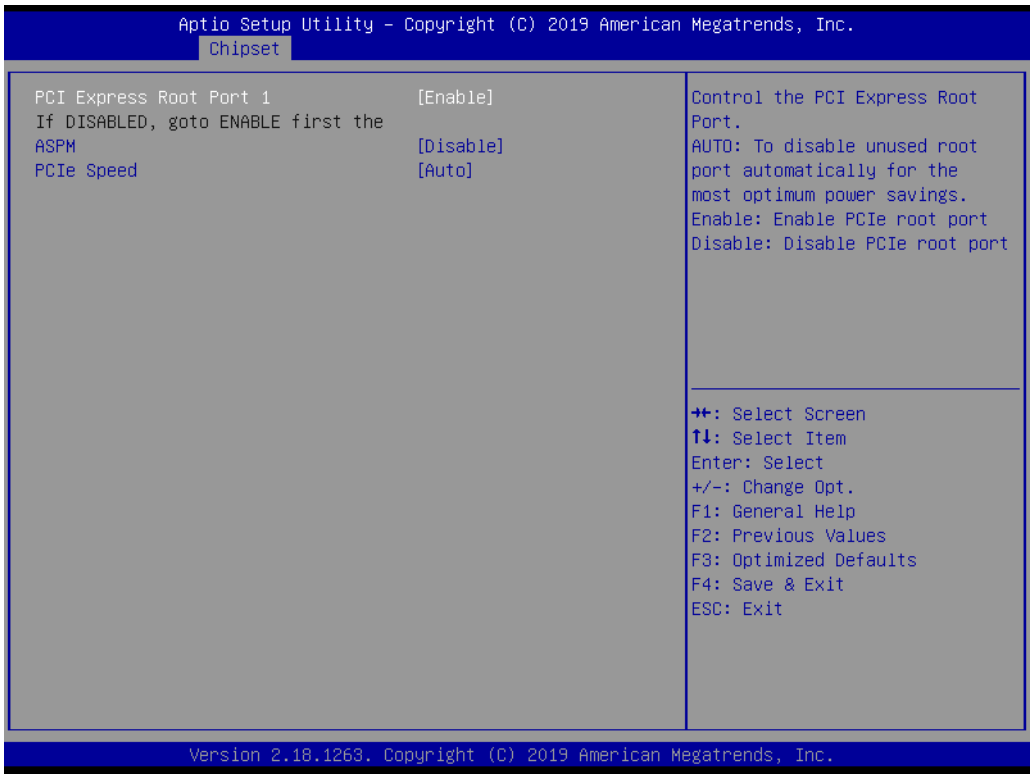


Figure 3.30 PCI Express Root Port 1

PCI Express Root Port 1

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

ASPM

PCI Express Active State Power Management settings.

PCIe Speed

Configure PCIe Speed.

PCI Express Root Port 2

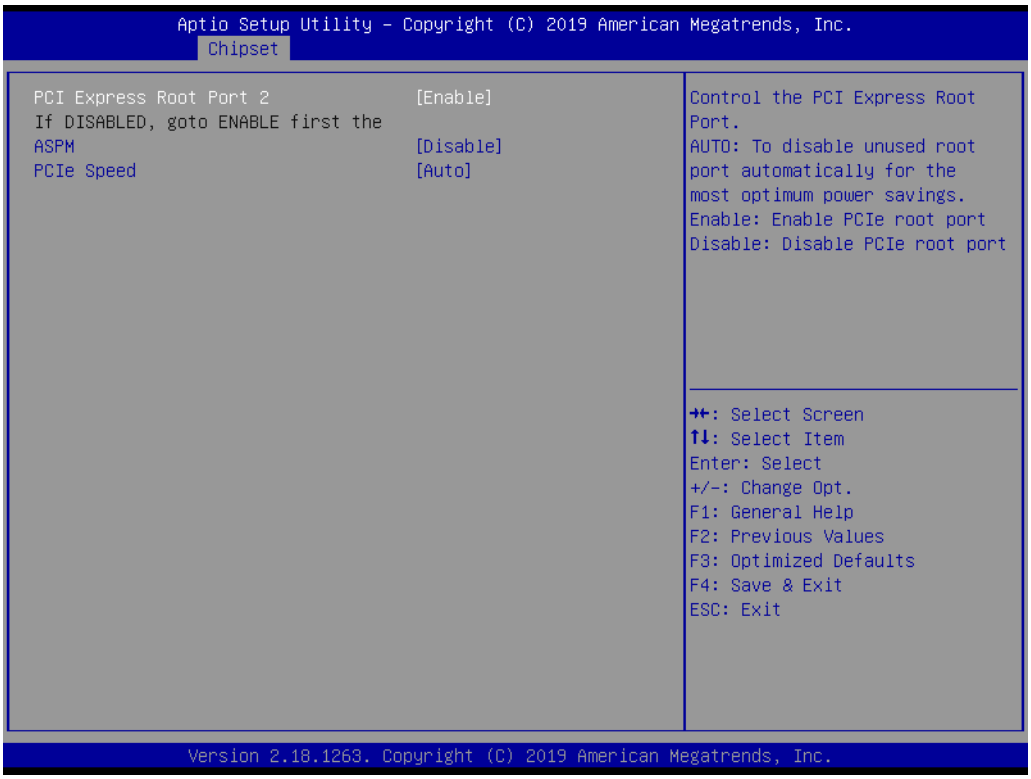


Figure 3.31 PCI Express Root Port 2

PCI Express Root Port 2

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

ASPM

PCI Express Active State Power Management settings.

PCIe Speed

Configure PCIe Speed.

PCI Express Root Port 3/LAN1

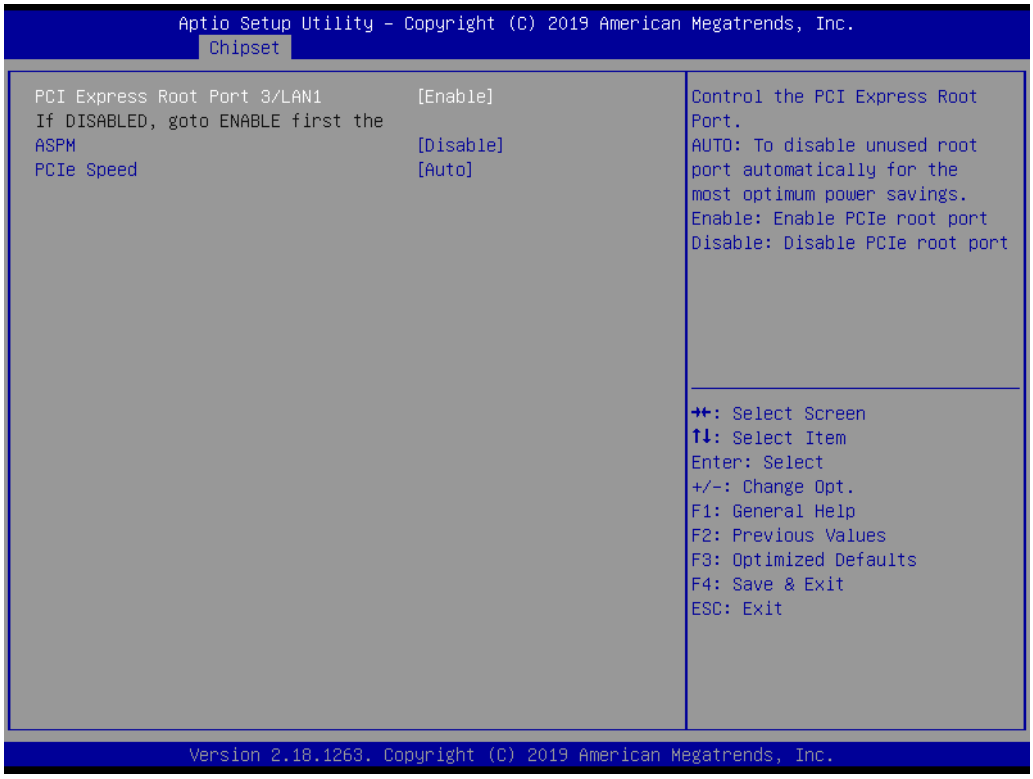


Figure 3.32 PCI Express Root Port 3/LAN1

PCI Express Root Port 3

Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port Disable: Disable PCIe root port.

ASPM

PCI Express Active State Power Management settings.

PCIe Speed

Configure PCIe Speed.

3.5.4.3 SATA Drive

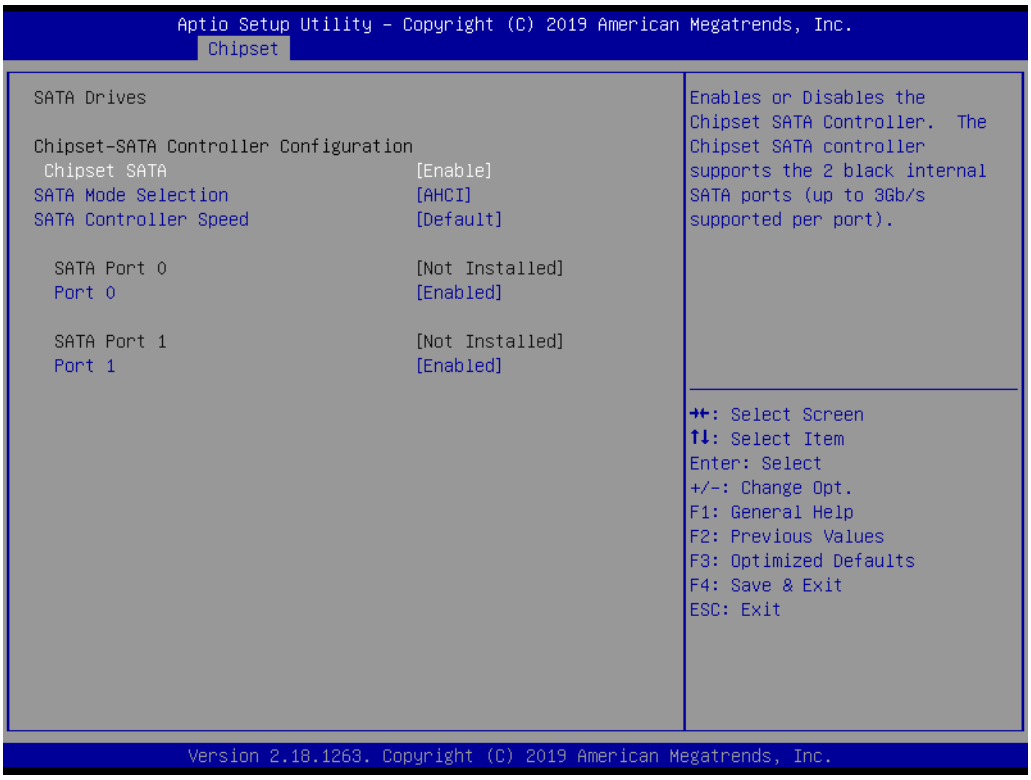


Figure 3.33 SATA Drives

Chipset-SATA Controller Configuration

Chipset SATA

Enables or Disables the Chipset SATA Controller. The Chipset SATA controller supports the 2 black internal SATA ports (up to 3Gb/s supported per port).

SATA Mode Selection

Determines how SATA controller(s) operate.

SATA Controller Speed

Indicates the maximum speed the SATA controller can support.

SATA Port 0

Port 0

Enable or Disable SATA Port.

SATA Port 1

Port 1

Enable or Disable SATA Port.

3.5.4.4 SCC Configuration

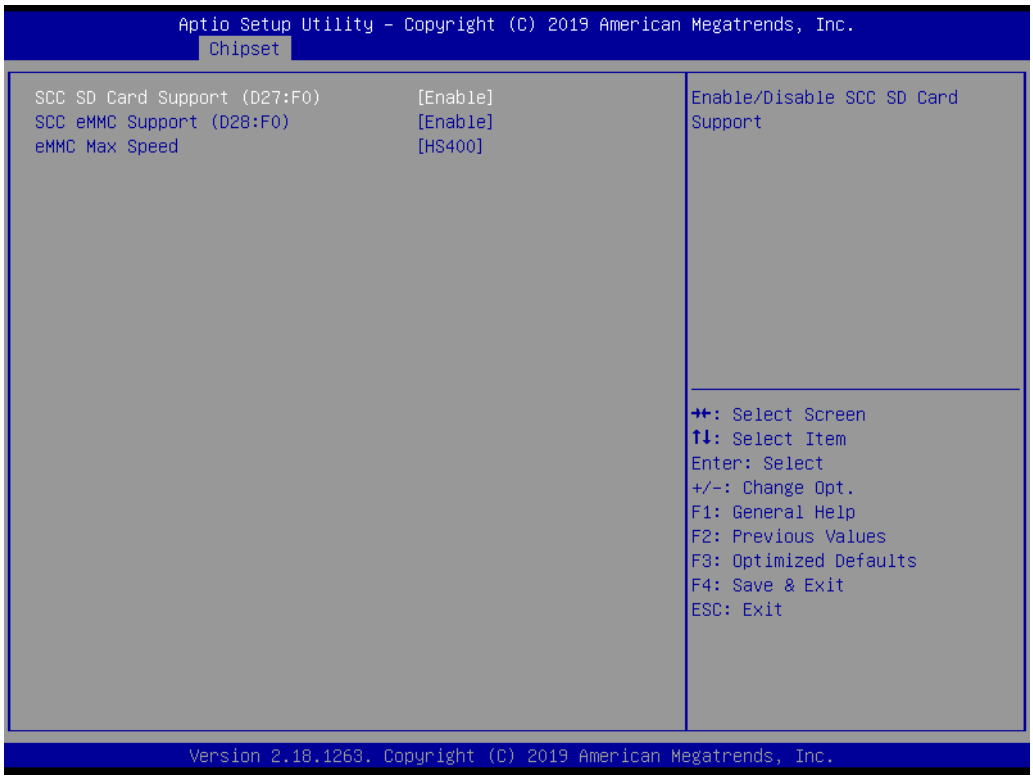


Figure 3.34 SCC Configuration

SCC SD Card Support (D27:F0)

Enable/Disable SCC SD card support.

SCC eMMC Support (D28:F0)

Enable/Disable SCC eMMC support.

eMMC Max Speed

Select the eMMC max speed allowed.

3.5.4.5 USB Configuration

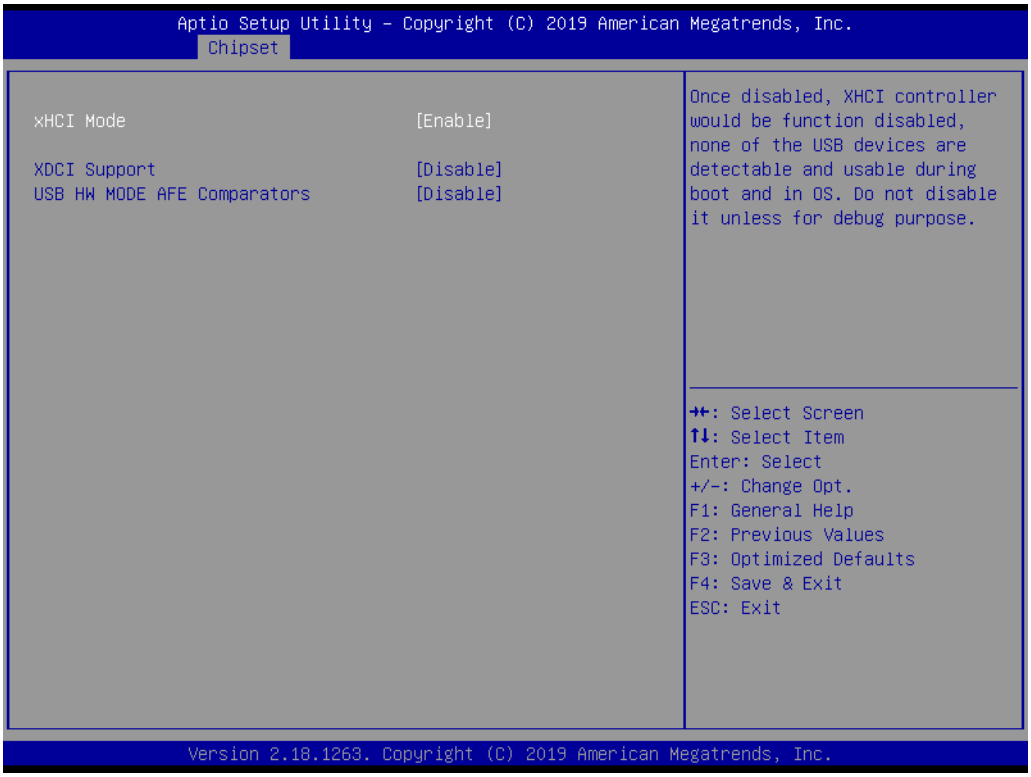


Figure 3.35 USB Configuration

xHCI Mode

Once disabled, XHCI controller would be function disabled, none of the USB devices are detectable and usable during boot and in OS. Do not disable it unless for debugging purposes.

XDCI Support

Enable/Disable XDCI.

USB HW MODE AFE Comparators

Enable/Disable USB HW MODE AFE comparators.

3.5.4.6 Miscellaneous Configuration

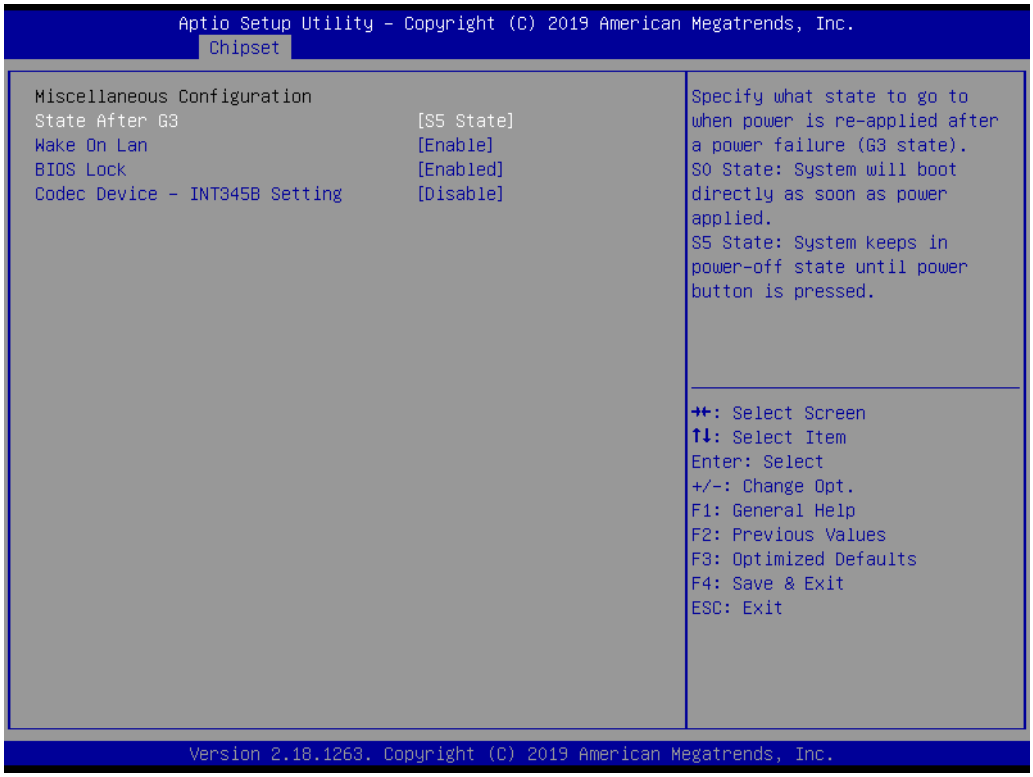


Figure 3.36 Miscellaneous Configuration

State After G3

Specify what state to go to when power is re-applied after a power failure (G3 state). S0 State: System will boot directly as soon as power applied. S5 State: System keeps in power-off state until power button is pressed.

Wake On Lan

Enable or Disable the Wake on Lan.

BIOS Lock

Enable/Disable the SC BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.

3.6 Security Chipset

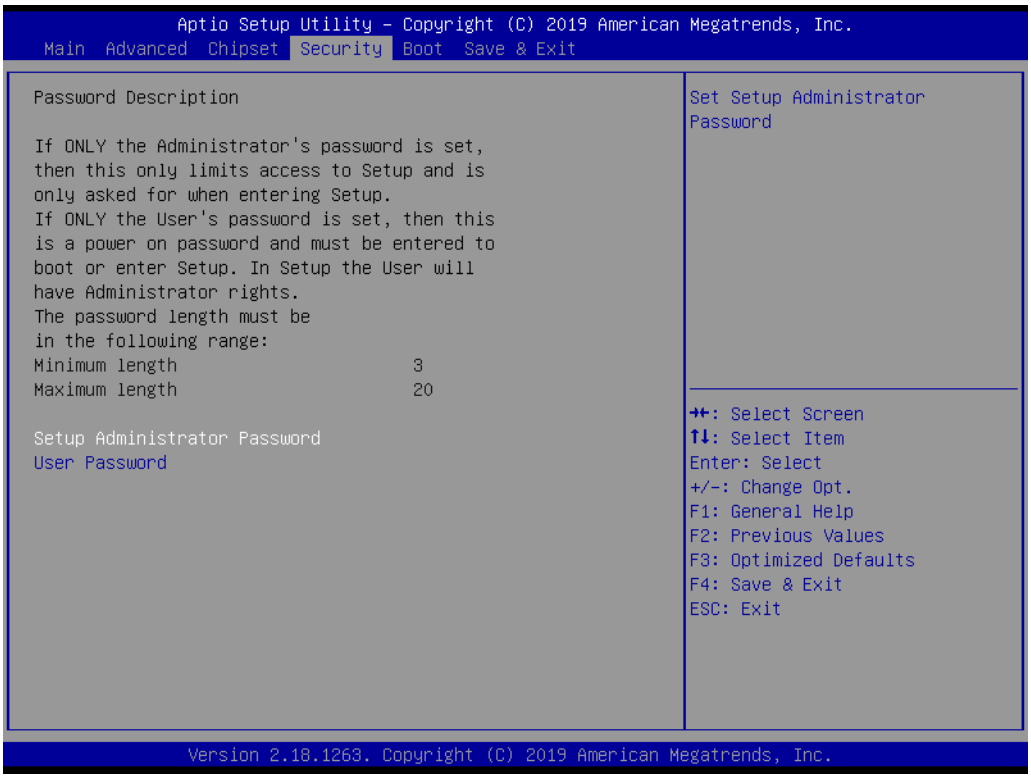


Figure 3.37 Security Chipset

Setup Administrator Password

Set Setup Administrator Password.

User Password

Set User Password.

3.7 Boot Setup

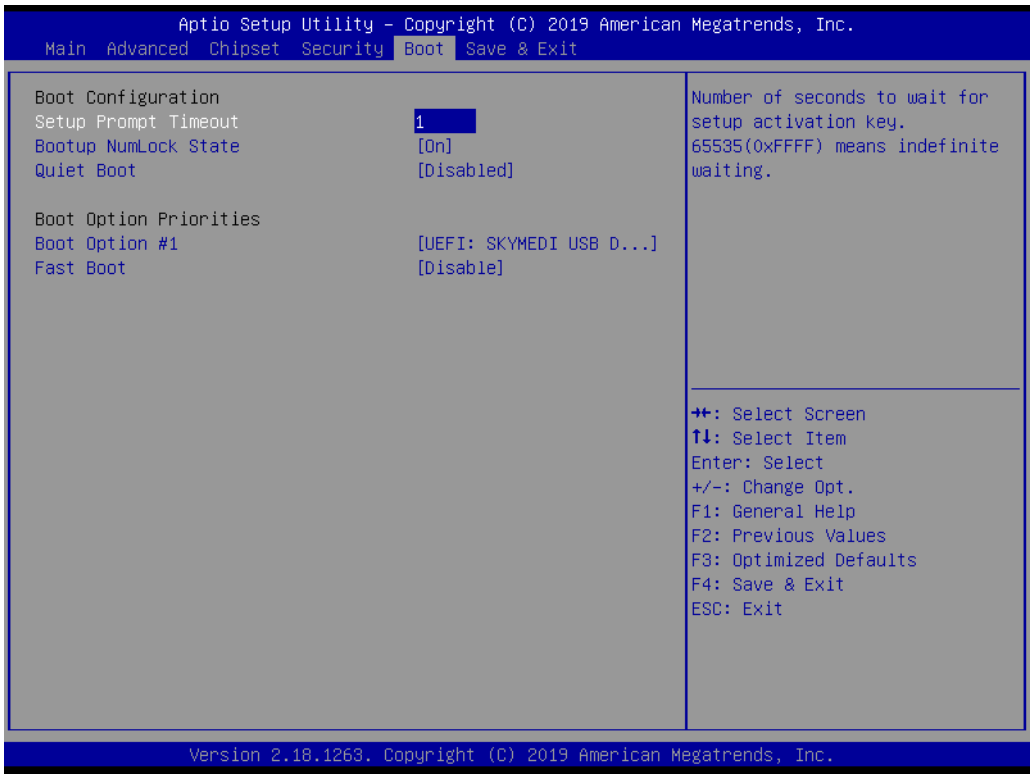


Figure 3.38 Boot Setup

Boot Configuration

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 Priorities

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.

3.8 Save & Exit

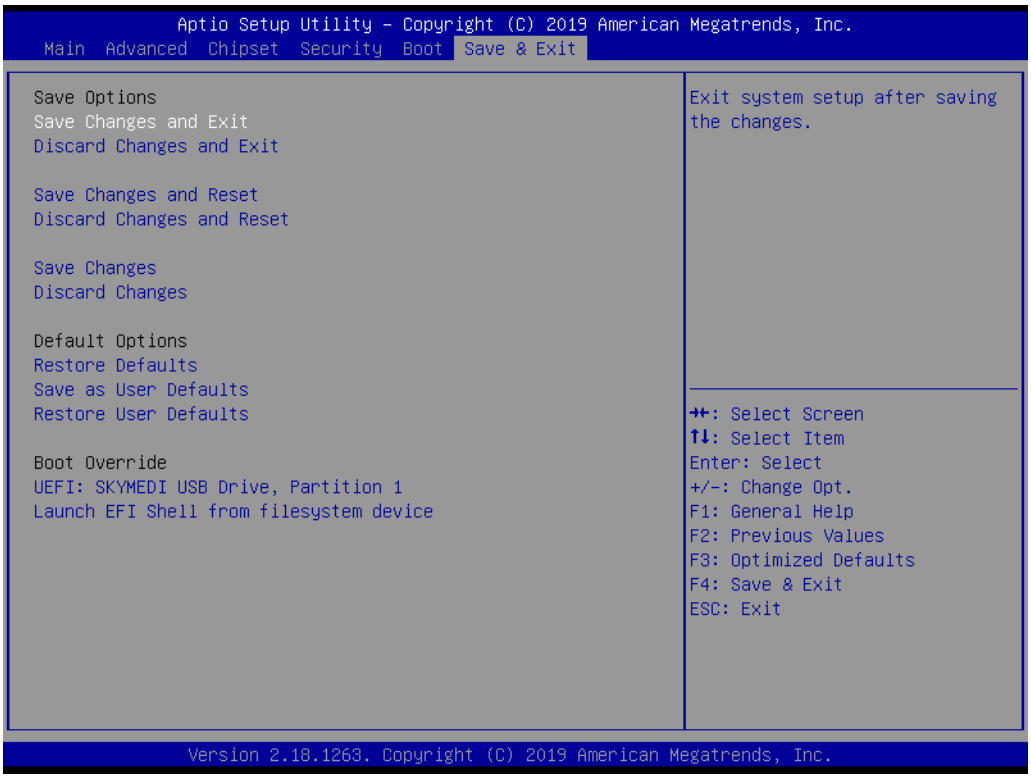


Figure 3.39 Save & Exit

Save Options

Save Changes and Exit3.4.1

Exit system setup after saving the changes.

Discard Changes and Exit

Exit system setup without saving any changes.

Save Changes and Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

Default Options

Restore Defaults

Restore/Load Default values for all the setup options.

Save as User Defaults

Save the changes done so far as User Defaults.

Restore User Defaults

Restore the User Defaults to all the setup options.

Boot Override

Launch EFI Shell from file system device

Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices.

Chapter 4

S/W Introduction & Installation

- S/W Introduction
- Driver Installation
- Advantech iManager (SUSI 4)

4.1 S/W Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft Windows embedded technology." We enable Windows Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (Hardware suppliers, System integrators, Embedded OS distributor) for projects. Our goal is to make Windows Embedded Software solutions easily and widely available to the embedded computing community.

4.2 Driver Installation

The Intel Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured.

4.2.1 Windows Driver Setup

To install the drivers on a windows-based operating system, please connect to Internet, enter the website http://support.advantech.com.tw, and download the drivers you want to install. Follow Driver Setup instructions to complete the installation.

4.2.2 Other OS

Linux Ubuntu 18.04.1

Windows 10 IoT Core

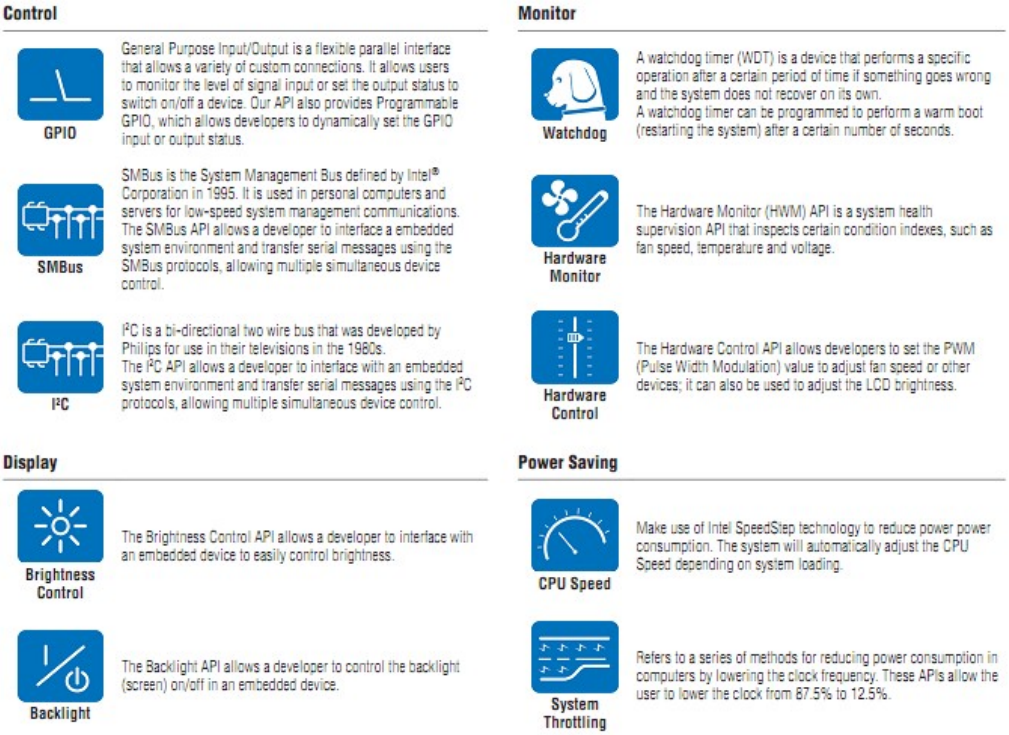
Linux Wind River 64-bit

VxWorks (7.0)

4.3 Advantech iManager

Advantech's platforms come equipped with iManager, a micro controller that provides embedded features for system integrators. Embedded features have been moved from the OS/BIOS level to the board level, to increase reliability and simplify integration.

iManager runs whether the operating system is running or not; it can count the boot times and running hours of the device, monitor device health, and provide an advanced watchdog to handle errors just as they happen. iManager also comes with a secure & encrypted EEPROM for storing important security key or other customer define information. All the embedded functions are configured through API and provide corresponding utilities to demonstrate. These APIs comply with PICMG EAPI (Embedded Application Programmable Interface) specification and unify in the same structures. It makes these embedded features easier to integrate, speed up developing schedule, and provide the customer's software continuity while upgrade hardware. For more details on how to use the APIs and utilities, please refer to Advantech iManager 2.0 Software API User Manual.



Appendix A

Pin Assignment

This appendix details information on the hardware pin assignment of the SOM-2569 CPU System on Module.

Sections include:

- SOM-2569 Pin Assignment

A.1 SOM-2569 Pin Assignment

This section details SOM-2569 pin assignments on SMARC connectors compliant with SMARC 2.0/SMARC 2.1 definitions. For further details on pins usage, or to find design reference materials, please contact to Advantech for design guides, check-lists, reference schematics, and other hardware/software support.

SMARC Function	Pin	Pin Name	SOM-2569
LVDS / eDP	S125	LVDS0_0+ / eDP0_TX0+	v /v
	S126	LVDS0_0- / eDP0_TX0-	v /v
	S128	LVDS0_1+ / eDP0_TX1+	v /v
	S129	LVDS0_1- / eDP0_TX1-	v /v
	S131	LVDS0_2+ / eDP0_TX2+	v /v
	S132	LVDS0_2- / eDP0_TX2-	v /v
	S137	LVDS0_3+ / eDP0_TX3+	v /v
	S138	LVDS0_3- / eDP0_TX3-	v /v
	S134	LVDS0_CK+ / eDP0_AUX+	v /v
	S135	LVDS0_CK- / eDP0_AUX-	v /v
	S111	LVDS1_0+ / eDP1_TX0+	v / -
	S112	LVDS1_0- / eDP1_TX0-	v / -
	S114	LVDS1_1+ / eDP1_TX1+	v / -
	S115	LVDS1_1- / eDP1_TX1-	v / -
	S117	LVDS1_2+ / eDP1_TX2+	v / -
	S118	LVDS1_2- / eDP1_TX2-	v / -
	S120	LVDS1_3+ / eDP1_TX3+	v / -
	S121	LVDS1_3- / eDP1_TX3-	v / -
	S108	LVDS1_CK+ / eDP1_AUX+	v / -
	S109	LVDS1_CK- / eDP1_AUX-	v / -
	S139	I²C_LCD_CK	v
	S140	I²C_LCD_DAT	v
	S133	LCD0_VDD_EN	v
	S116	LCD1_VDD_EN	v
	S127	LCD0_BKLT_EN	v
	S107	LCD1_BKLT_EN	v
	S141	LCD0_BKLT_PWM	v
	S122	LCD1_BKLT_PWM	v
	S144	EDP0_HPD	v
	S113	EDP1_HPD	v
DP++ over HDMI	P92	DP1_LANE0+ / HDMI_D2+	v
	P93	DP1_LANE0- / HDMI_D2-	v
	P95	DP1_LANE1+ / HDMI_D1+	v
	P96	DP1_LANE1- / HDMI_D1-	v
	P98	DP1_LANE2+ / HDMI_D0+	v
	P99	DP1_LANE2- / HDMI_D0-	v
	P101	DP1_LANE3+ / HDMI_CK+	v
	P102	DP1_LANE3- / HDMI_CK-	v
	P104	DP1_HPD / HDMI_HPD	v
	P105	DP1_AUX- / HDMI_CTRL_DAT	v
	P106	DP1_AUX+ / HDMI_CTRL_CK	v
	P107	DP1_AUX_SEL	v

DP++	S102	DP0_LANE3+	v
	S103	DP0_LANE3-	v
	S99	DP0_LANE2+	v
	S100	DP0_LANE2-	v
	S96	DP0_LANE1+	v
	S97	DP0_LANE1-	v
	S93	DP0_LANE0+	v
	S94	DP0_LANE0-	v
	S105	DP0_AUX+	v
	S106	DP0_AUX -	v
	S98	DP0_HPD	v
	S95	DP0_AUX_SEL	v
CSI	P108	GPIO0 / CAM0_PWR#	v
	P109	GPIO1 / CAM1_PWR#	v
	P110	GPIO2 / CAM0_RST#	v
	P111	GPIO3 / CAM1_RST#	v
	S7	I²C_CAM0_DAT	v
	S5	I²C_CAM0_CK	v
	S2	I²C_CAM1_DAT	v
	S1	I²C_CAM1_CK	v
	S11	CSI0_RX0+	v
	S12	CSI0_RX0-	v
	S14	CSI0_RX1+	v
	S15	CSI0_RX1-	v
	P7	CSI1_RX0+	v
	P8	CSI1_RX0-	v
	P10	CSI1_RX1+	v
	P11	CSI1_RX1-	v
	P13	CSI1_RX2+	v
	P14	CSI1_RX2-	v
	P16	CSI1_RX3+	v
	P17	CSI1_RX3-	v
	S8	CSI0_CK+	v
	S9	CSI0_CK-	v
	P3	CSI1_CK+	v
	P4	CSI1_CK-	v
	S6	CAM_MCK	v
SDIO Card	P39	SDIO_D0	v
	P40	SDIO_D1	v
	P41	SDIO_D2	v
	P42	SDIO_D3	v
	P33	SDIO_CMD	v
	P36	SDIO_CK	v
	P34	SDIO_WP	v
	P35	SDIO_CD#	v
	P37	SDIO_PWR_EN	v

SPI0	P43	SPI0_CS0#	v
	P31	SPI0_CS1#	v
	P44	SPI0_CK	v
	P45	SPI0_DIN	v
	P46	SPI0_DO	v
eSPI/SPI1	P56	ESPI_CK	-
	P54	ESPI_CS0#	-
	P55	ESPI_CS1#	-
	P57	ESPI_IO_0	-
	P58	ESPI_IO_1	-
	S56	ESPI_IO_2	-
	S57	ESPI_IO_3	-
	S58	ESPI_RESET#	-
	S43	ESPI_ALERT0#	-
	S44	ESPI_ALERT1#	-
I2S	S38	I2S0_LRCK	-
	S40	I2S0_SDOUT	-
	S41	I2S0_SDIN	-
	S42	I2S0_CK	-
	S38	AUDIO_MCK	-
HDA / I2S	S50	HDA_SYNC	v
	S51	HDA_SDO	v
	S52	HDA_SDI	v
	S53	HDA_CK	v
	P112	HDA_RST#	v
I²C Interfaces	S48	I²C_GP_CK	v
	S49	I²C_GP_DAT	v
Serial Ports	P129	SER0_TX	v
	P130	SER0_RX	v
	P134	SER1_TX	v
	P135	SER1_RX	v
	P136	SER2_TX	v
	P137	SER2_RX	v
	P140	SER3_TX	v
	P141	SER3_RX	v
	P131	SER0_RTS#	v
	P132	SER0_CTS#	v
	P138	SER2_RTS#	v
	P139	SER2_CTS#	v
CAN Bus	P143	CAN0_TX	v
	P145	CAN1_TX	-
	P144	CAN0_RX	v
	P146	CAN1_RX	-

USB	P60	USB0+	v
	P61	USB0-	v
	P65	USB1+	v
	P66	USB1-	v
	P69	USB2+	v
	P70	USB2-	v
	S68	USB3+	v
	S69	USB3-	v
	S35	USB4+	v
	S36	USB4-	v
	S59	USB5+	v
	S60	USB5-	v
	P62	USB0_EN_OC#	v
	P67	USB1_EN_OC#	v
	P71	USB2_EN_OC#	v
	P74	USB3_EN_OC#	v
	P76	USB4_EN_OC#	v
	S55	USB5_EN_OC#	v
	P63	USB0_VBUS_DET	v
	S37	USB3_VBUS_DET	v
	P64	USB0_OTG_ID	v
	S104	USB3_OTG_ID	v
	S75	USB2SSRX-	v
	S74	USB2SSRX+	v
	S66	USB3SSRX-	v
	S65	USB3SSRX+	v
	S72	USB2SSTX-	v
	S71	USB2SSTX+	v
	S63	USB3SSTX-	v
	S62	USB3SSTX+	v

PCIe	P89	PCIE_A_TX+	v
	P90	PCIE_A_TX-	v
	S90	PCIE_B_TX+	v
	S91	PCIE_B_TX-	v
	S81	PCIE_C_TX+	v
	S82	PCIE_C_TX-	v
	S29	PCIE_D_TX+	v
	S30	PCIE_D_TX-	v
	P86	PCIE_A_RX+	v
	P87	PCIE_A_RX-	v
	S87	PCIE_B_RX+	v
	S88	PCIE_B_RX-	v
	S78	PCIE_C_RX+	v
	S79	PCIE_C_RX-	v
	S32	PCIE_D_RX+	v
	S33	PCIE_D_RX-	v
	P83	PCIE_A_REFCK+	v
	P84	PCIE_A_REFCK-	v
	S84	PCIE_B_REFCK+	v
	S85	PCIE_B_REFCK-	v
	P80	PCIE_C_REFCK+	v
	P81	PCIE_C_REFCK-	v
	P75	PCIE_A_RST#	v
	S76	PCIE_B_RST#	v
	S77	PCIE_C_RST#	v
	S146	PCIE_WAKE#	v
SATA	P48	SATA_TX+	v
	P49	SATA_TX-	v
	P51	SATA_RX+	v
	P52	SATA_RX-	v
	S54	SATA_ACT#	v

Ethernet	P30	GBE0_MDI0+	v
	P29	GBE0_MDI0-	v
	P27	GBE0_MDI1+	v
	P26	GBE0_MDI1-	v
	P24	GBE0_MDI2+	v
	P23	GBE0_MDI2-	v
	P20	GBE0_MDI3+	v
	P19	GBE0_MDI3-	v
	S17	GBE1_MDI0+	v
	S18	GBE1_MDI0-	v
	S20	GBE1_MDI1+	v
	S21	GBE1_MDI1-	v
	S23	GBE1_MDI2+	v
	S24	GBE1_MDI2-	v
	S26	GBE1_MDI3+	v
	S27	GBE1_MDI3-	v
	P21	GBE0_LINK100#	v
	S19	GBE0_LINK100#	v
	P22	GBE0_LINK1000#	v
	S22	GBE1_LINK1000#	v
	P25	GBE0_LINK_ACT#	v
	s31	GBE1_LINK_ACT#	v
	P28	GBE0_CTREF	v
	S28	GBE1_CTREF	v
	P6	GBE0_SDP	v
	P5	GBE1_SDP	v
Watchdog	S145	WDT_TIME_OUT#	v
GPIO	P108	GPIO0 / CAM0_PWR#	v
	P109	GPIO1 / CAM1_PWR#	v
	P110	GPIO2 / CAM0_RST#	v
	P111	GPIO3 / CAM1_RST#	v
	P112	GPIO4 / HDA_RST#	v
	P113	GPIO5 / PWM_OUT	v
	P114	GPIO6 / TACHIN	v
	P115	GPIO7	v
	P116	GPIO8	v
	P117	GPIO9	v
	P118	GPIO10	v
	P119	GPIO11	v

Management Pins	S150	VIN_PWR_BAD#	v
	S154	CARRIER_PWR_ON	v
	S153	CARRIER_STBY#	v
	P126	RESET_OUT#	v
	P127	RESET_IN#	v
	P128	POWER_BTN#	v
	S149	SLEEP#	v
	S148	LID#	v
	S156	BATLOW#	v
	P122	I²C_PM_DAT	v
	P121	I²C_PM_CK	v
	S151	CHARGING#	v
	S152	CHARGER_PRSNT#	v
	S157	TEST#	v
	P1	SMB_ALERT_1V8#	v
Boot Select	P123	BOOT_SEL0#	-
	P124	BOOT_SEL0#	-
	P125	BOOT_SEL2#	v
	S155	FORCE_RECOV#	v

Power / GND /RSVD	S147	VDD_RTC	v
	P147	VDD_IN	v
	P148	VDD_IN	v
	P149	VDD_IN	v
	P150	VDD_IN	v
	P151	VDD_IN	v
	P152	VDD_IN	v
	P153	VDD_IN	v
	P154	VDD_IN	v
	P155	VDD_IN	v
	P156	VDD_IN	v
	P2	GND	v
	P9	GND	v
	P12	GND	v
	P12	GND	v
	P15	GND	v
	P18	GND	v
	P32	GND	v
	P38	GND	v
	P47	GND	v
	P50	GND	v
	P53	GND	v
	P59	GND	v
	P68	GND	v
	P79	GND	v
	P82	GND	v
	P85	GND	v
	P88	GND	v
	P91	GND	v
	P94	GND	v
	P97	GND	v
	P100	GND	v
	P103	GND	v
	P120	GND	v
	P133	GND	v
	P142	GND	v
	S3	GND	v
	S10	GND	v
	S13	GND	v
	S16	GND	v
	S25	GND	v
	S34	GND	v
	S47	GND	v
	S61	GND	v
	S64	GND	v
	S67	GND	v
	S70	GND	v
	S73	GND	v
	S80	GND	v

JTAG	-	VDD_JTAG_IO	NC
	-	JTAG_TRST#	NC
	-	JTAG_TMS	NC
	-	JTAG_TDO	NC
	-	JTAG_TDI	NC
	-	JTAG_TCK	NC

Appendix B

Watchdog Timer

This appendix details information on the watchdog timer programming on the SOM-2569 CPU System on Module.

Sections include:

- Watchdog Timer Programming

B.1 Programming the Watchdog Timer

Trigger Event	Note
IRQ	(BIOS setting default disable)**
NMI	N/A
SCI	Power button event
Power Off	Support
H/W Restart	Support
WDT Pin Activate	Support

** WDT new driver support automatic select available IRQ number from BIOS, and then set to EC. Only Win10 supports it. In other OS, it will still use IRQ number from BIOS setting as usual.

For details, please refer to iManager & Software API User Manual.

Appendix C

System Assignments

This appendix details information on system resource allocation for the SOM-2569 CPU System on Module.

Sections include:

- System I/O ports
- DMA Channel Assignments
- Interrupt Assignments
- 1st MB Memory Map

C.1 System I/O Ports

Resource	Device
0x0000029C-0x0000029D	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000070-0x00000070	System CMOS/real time clock
0x00000080-0x0000008F	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x00000400-0x0000047F	Motherboard resources
0x00000500-0x000005FE	Motherboard resources
0x00000600-0x0000061F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x00000062-0x00000062	Microsoft ACPI-Compliant Embedded Controller
0x00000066-0x00000066	Microsoft ACPI-Compliant Embedded Controller
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x0000F000-0x0000F03F	Intel® HD Graphics 505
0x0000E000-0x0000EFFF	Intel ® Celeron ®/ Pentium ® Processor PCI Express Root Port - 5ADB
0x0000CF00-0x0000CFFF	Realtek 8822BE Wireless LAN 802.11ac PCI-E NIC
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x0000C000-0x0000CFFF	Intel ® Celeron ®/ Pentium ® Processor PCI Express Root Port - 5AD7

0x0000F090-0x0000F097	Standard SATA AHCI Controller
0x0000F080-0x0000F083	Standard SATA AHCI Controller
0x0000F060-0x0000F07F	Standard SATA AHCI Controller
0x00000000-0x0000006F	PCI Express Root Complex
0x00000078-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x0000F040-0x0000F05F	Intel ® Celeron ®/ Pentium ® Processor SMBUS - 5AD4
0x0000D000-0x0000DFFF	Intel ® Celeron ®/ Pentium ® Processor PCI Express Root Port - 5AD6
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer

C.2 Interrupt Assignments

Resource	Device
IRQ 0	System timer
IRQ 3	Communications Port (COM2)
IRQ 4	Intel ® Serial I/O UART Host Controller - 5ABC
IRQ 5	Intel ® Serial I/O UART Host Controller - 5ABE
IRQ 7	Communications Port (COM1)
IRQ 8	System CMOS/real time clock
IRQ 10	Intel ® Celeron ®/ Pentium ® Processor SMBUS - 5AD4
IRQ 14	Intel SD Host Controller
IRQ 14	Intel ® Serial I/O GPIO Host Controller - INT3452
IRQ 14	Intel ® Serial I/O GPIO Host Controller - INT3452
IRQ 14	Intel ® Serial I/O GPIO Host Controller - INT3452
IRQ 14	Intel ® Serial I/O GPIO Host Controller - INT3452
IRQ 25	High Definition Audio Controller
IRQ 27	Intel ® Serial I/O I²C Host Controller - 5AAC
IRQ 29	Intel ® Serial I/O I²C Host Controller - 5AB0
IRQ 35	Intel ® Serial I/O SPI Host Controller - 5AC2
IRQ 39	Intel SD Host Controller
IRQ 31	Intel ® Serial I/O I²C Host Controller - 5AB4
IRQ 4294967294	Intel ® Celeron ®/ Pentium ® Processor PCI Express Root Port - 5AD8
IRQ 4294967286	Intel ® Trusted Execution Engine Interface
IRQ 4294967287	Intel ® HD Graphics 505
IRQ 4294967291	Intel ® Celeron ®/ Pentium ® Processor PCI Express Root Port - 5ADB
IRQ 4294967272	Realtek 8822BE Wireless LAN 802.11ac PCI-E NIC
IRQ 4294967289	Intel ® Celeron ®/Pentium ® Processor PCI Express Root Port - 5AD7
IRQ 1024	Intel SD Host Controller
IRQ 4294967288	Standard SATA AHCI Controller
IRQ 4294967293	Intel ® Celeron ®/Pentium ® Processor PCI Express Root Port - 5AD9
IRQ 4294967292	Intel ® Celeron ®/Pentium ® Processor PCI Express Root Port - 5ADA
IRQ 4294967290	Intel ® Celeron ®/Pentium ® Processor PCI Express Root Port - 5AD6
IRQ 4294967273	Intel ® USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
IRQ 4294967279	Intel ® I210 Gigabit Network Connection #3
IRQ 4294967278	Intel ® I210 Gigabit Network Connection #3
IRQ 4294967277	Intel ® I210 Gigabit Network Connection #3
IRQ 4294967276	Intel ® I210 Gigabit Network Connection #3
IRQ 4294967275	Intel ® I210 Gigabit Network Connection #3

IRQ 4294967274	Intel ® I210 Gigabit Network Connection #3
IRQ 4294967285	Intel ® I210 Gigabit Network Connection #4
IRQ 4294967284	Intel ® I210 Gigabit Network Connection #4
IRQ 4294967283	Intel ® I210 Gigabit Network Connection #4
IRQ 4294967282	Intel ® I210 Gigabit Network Connection #4
IRQ 4294967281	Intel ® I210 Gigabit Network Connection #4
IRQ 4294967280	Intel ® I210 Gigabit Network Connection #4
IRQ 54	Microsoft ACPI-Compliant System
IRQ 55	Microsoft ACPI-Compliant System
IRQ 56	Microsoft ACPI-Compliant System
IRQ 57	Microsoft ACPI-Compliant System
IRQ 58	Microsoft ACPI-Compliant System
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C.3 1st MB Memory Map

Resource	Device
0xE0000000-0xEFFFFFFF	Motherboard resources
0xE0000000-0xEFFFFFFF	PCI Express Root Complex
0xFEA00000-0xFEAFFFFF	Motherboard resources
0xFED01000-0xFED01FFF	Motherboard resources
0xFED03000-0xFED03FFF	Motherboard resources
0xFED06000-0xFED06FFF	Motherboard resources
0xFED08000-0xFED09FFF	Motherboard resources
0xFED80000-0xFEDBFFFF	Motherboard resources
0xFED1C000-0xFED1CFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0xFED00000-0xFED003FF	High precision event timer
0x91420000-0x91420FFF	Intel ® Serial I/O UART Host Controller - 5ABC
0x9141F000-0x9141FFFF	Intel ® Serial I/O UART Host Controller - 5ABC
0x9142B000-0x9142BFFF	Intel ® Trusted Execution Engine Interface
0x91424000-0x91424FFF	Intel ® Serial I/O I²C Host Controller - 5AB0
0x91423000-0x91423FFF	Intel ® Serial I/O I²C Host Controller - 5AB0
0x90000000-0x90FFFFFF	Intel ® HD Graphics 505
0x80000000-0x8FFFFFFF	Intel ® HD Graphics 505
0x80000000-0x8FFFFFFF	PCI Express Root Complex
0x91300000-0x913FFFFF	Intel ® Celeron ®/ Pentium ® Processor PCI Express Root Port - 5ADB
0x91300000-0x913FFFFF	Intel ® I210 Gigabit Network Connection #4
0x911F0000-0x911FFFFF	Realtek 8822BE Wireless LAN 802.11ac PCI-E NIC
0x91100000-0x911FFFFF	Intel ® Celeron ®/ Pentium ® Processor PCI Express Root Port - 5AD7
0x9141A000-0x9141AFFF	Intel SD Host Controller
0x91419000-0x91419FFF	Intel SD Host Controller
0x91414000-0x91415FFF	Standard SATA AHCI Controller
0x91428000-0x914280FF	Standard SATA AHCI Controller
0x91427000-0x914277FF	Standard SATA AHCI Controller
0xA0000-0xBFFFF	PCI Express Root Complex
0xC0000-0xDFFFF	PCI Express Root Complex
0xE0000-0xFFFFF	PCI Express Root Complex
0x7C000001-0x7FFFFFFF	PCI Express Root Complex
0x7B800001-0x7BFFFFFF	PCI Express Root Complex
0x9141E000-0x9141EFFF	Intel ® Serial I/O UART Host Controller - 5ABE
0x9141D000-0x9141DFFF	Intel ® Serial I/O UART Host Controller - 5ABE
0x91410000-0x91413FFF	High Definition Audio Controller
0x91000000-0x910FFFFF	High Definition Audio Controller
0x91416000-0x914160FF	Intel ® Celeron ®/ Pentium ® Processor SMBUS - 5AD4
0x91418000-0x91418FFF	Intel SD Host Controller
0x91417000-0x91417FFF	Intel SD Host Controller

0xD0C50000-0xD0C5076B	Intel ® Serial I/O GPIO Host Controller - INT3452
0xD0C40000-0xD0C40763	Intel ® Serial I/O GPIO Host Controller - INT3452
0xD0C70000-0xD0C70673	Intel ® Serial I/O GPIO Host Controller - INT3452
0xD0C00000-0xD0C00653	Intel ® Serial I/O GPIO Host Controller - INT3452
0x91200000-0x912FFFFF	Intel ® Celeron ®/ Pentium ® Processor PCI Express Root Port - 5AD6
0x91200000-0x912FFFFF	Intel ® I210 Gigabit Network Connection #3
0x91422000-0x91422FFF	Intel ® Serial I/O I²C Host Controller - 5AB4
0x91421000-0x91421FFF	Intel ® Serial I/O I²C Host Controller - 5AB4
0x91426000-0x91426FFF	Intel ® Serial I/O I²C Host Controller - 5AAC
0x91425000-0x91425FFF	Intel ® Serial I/O I²C Host Controller - 5AAC
0x91400000-0x9140FFFF	Intel ® USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
0x91220000-0x91223FFF	Intel ® I210 Gigabit Network Connection #3
0x91320000-0x91323FFF	Intel ® I210 Gigabit Network Connection #4
0x9141C000-0x9141CFFF	Intel ® Serial I/O SPI Host Controller - 5AC2
0x9141B000-0x9141BFFF	Intel ® Serial I/O SPI Host Controller - 5AC2

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Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

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