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Manual

Advantech

SOM-3569

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



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User Manual

SOM-3569

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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.

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

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

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged 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 would welcome comments and constructive criticism. Please send all such - in writing to: support@advan-tech.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-3569 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.

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Chapter 1

General Information

This chapter gives background information on the SOM-3569 CPU Computer on Module

Sections include:

- Introduction
- Functional Block Diagram
- Product Specification

1.1 Introduction

SOM-3569 is equipped with Intel Atom® processor E3900 series, Celeron® & Pentium®N series platform, which are manufactured on Intel 14nm process technology. SOM-3569 non-ECC memory supports LPDDR4 2400MT/s with 1.2V power design, and up to 8GB dual channel. SOM-3569 is able to support 4 PCIe x1 with Gen2 technology, as well as PCIe x1, x2, x4 configurations if requested. Most importantly, SOM-3569 adopts a 13.2mm heatsink passive thermal solution and supports CPU TDP up to 12 watt at 60°C ambient (option accessory) temp. This is suitable for multiple I/O designs for high performance applications, such as for in mobile, automation, HMI equipment, and control monitoring fields.

SOM-3569 offers over 30% growth in processor performance over previous platforms. It supports DX12, OpenGL 4.3, OGL ES 3.0, and OpenCL 2.0. In addition, dual displays are supported, as is HDMI/DisplayPort with 4K2K resolution, and dual channel LVDS at 1920x1200 full HD resolution is also available.

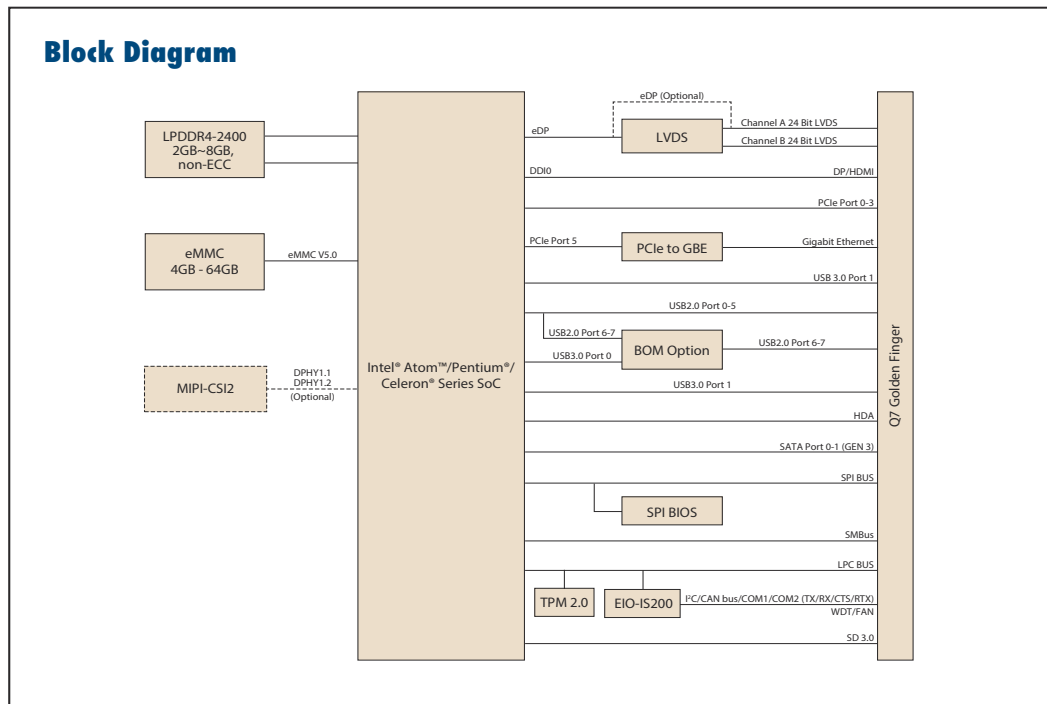
Advantech iManager & WISE-PaaS/RMM is designed to satisfy a lot of embedded application requirements such as multi-level watchdog timer, voltage and temperature monitoring, thermal protection and mitigation through processor throttling, LCD backlight on/off and brightness control, embedded storage for customized information, and more. Combining Advantech WISE-PaaS/RMM, it can remotely monitor and control devices through the internet. All Advantech Qseven modules integrate iManager and WISE-PaaS/RMM to benefit customer's applications.

With extreme performance, embedded platform power consumption, and various extensions and I/O interfaces, SOM-3569 is suitable for computing intensive designs, thermal sensitive designs, graphics/media sensitive designs, and all I/O demanding applications.

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 DisplayPort, HDMI/DVI, and SDVO |
| EAPI | <p>Embedded Application Programmable Interface Software interface for COM Express® specific industrial function</p> <ul style="list-style-type: none"> ■ System information ■ Watchdog timer ■ I2C Bus ■ Flat Panel brightness control ■ User storage area ■ GPIO |
| GbE | Gigabit Ethernet |
| 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 | Watch Dog Timer |

1.2 Functional Block Diagram



1.3 Product Specification

1.3.1 Compliance

- PICMG Seven Revision 2.1
- Basic Size - 70 x707mm
- Pin-out Seven R2.1 compatible

1.3.2 Feature List

| Seven Features R2.1 | | | SOM-3569 | |
|--|---------------------------------|-----------------------------|----------------------------|--------|
| System I/O Interface | x86 Based Minimum Configuration | Maximum Configuration | Default | Option |
| PCI Express Lanes | 1 (x1 link) | 4 | 4 | - |
| Serial ATA Channels | 0 | 2 | 2 | - |
| USB2.0 ports | 4 | 8 | 6 | 8 |
| USB3.0 ports | 0 | 3 | 2 | 1 |
| LVDS channels/ embedded DisplayPort | 0 0 | Dual Channel 24-bit 2 | Dual Cannel 24-bit 0 | 0 1 |
| DisplayPort/ TMDS | 0 | 1 | 1 | - |
| HD Audio/AC'97/I2S | 0 | 1 | 1 (HD Audio) | - |
| Ethernet (10/100/Giga-bit) | 0 | 1 (Gigabit Ethernet) | 1 | - |
| UART | 0 | 1 | 1 | 2 |
| LPC | 0 | 1 | 1 | - |
| SDIO 4-bit for SD/MMC Card | 0 | 1 | 1 (4-bit) | - |
| SMBus | 1 | 1 | 1 | - |
| I2C Bus | 1 | 1 | 1 | - |
| SPI Bus | 0 | 1 | 1 | - |
| CAN Bus | 0 | 1 | 1 | - |
| Watchdog Trigger | 1 | 1 | 1 | - |
| Power Button | 1 | 1 | 1 | - |
| Power Good | 1 | 1 | 1 | - |
| Reset Button | 1 | 1 | 1 | - |
| LID Button | 0 | 1 | 1 | - |
| Sleep Button | 0 | 1 | 1 | - |
| Suspend to RAM (S3 mode) | 0 | 1 | 1 | - |
| Wake | 0 | 1 | 1 | - |
| Battery Low Alarm | 0 | 1 | 1 | - |
| Thermal Control | 0 | 1 | 1 | - |
| FAN Control | 0 | 1 | 1 | - |

1.3.3 Processor System

| CPU | Std. Free. | Max. Turbo Free. | Core | Cache (MB) | TDP(W) |
|---------------|------------|------------------|------|------------|--------|
| Pentium N4200 | 1.1GHz | 2.5GHz | 4 | 2 | 6 |
| Celeron N3350 | 1.1GHz | 2.4GHz | 2 | 2 | 6 |
| 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 |

1.3.4 Memory

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

1.3.5 Graphics / Audio

Graphic Core: Intelligent 9.0 LP Graphic supports DX9.3/10/11.3/12; OpenGL 4.3; OGL ES 3.0; OpenCL 2.0, HEVC/H265, VC1/WMV9 HW decode/encode acceleration.

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

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.

| So | P0 | P1 | P2 | P3 | P4 | P5 |
|---------|----|----|----|----|----|-----|
| Default | X1 | X1 | X1 | X1 | | GBE |
| Option | X4 | | | | | GBE |
| Other 1 | X2 | | X2 | | | GBE |
| Other 2 | X2 | | X1 | X1 | | GBE |

1.3.6.2 LPC

Supports Low Pin Count (LPC) 1.1 specification, without DMA or bus mastering. Allows connection to Super I/O, embedded controller, or TPM. LPC clock is 25MHz.

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 10-bit address modes, up to 400KHz.

1.3.8 I/O**1.3.8.1 Gigabit Ethernet**

Ethernet: Intel I211AT Gigabit LAN supports 100/1000 Mbps Speed.

1.3.8.2 SATA

Support 2 ports SATA Gen3 (6.0 Gb/s), backward compliant to SATA Gen2 (3.0 Gb/s) and Gen1 (1.5 Gb/s). Maximum data rate is 600 MB/s. Supports AHCI 1.3.1 mode.

1.3.8.3 USB3.0/USB2.0

1 ports USB3.0 (5.0 Gbps) and 8 ports USB2.0 (480 Mbps) which are backward compatible to USB1.x.

1.3.8.4 USB3.0

| | | |
|-------------|------------|----|
| Seven | P0 | P1 |
| So | P0 | P1 |
| Schematics | USB_0_1_OC | |
| SoC USB_OC# | OC0# | |

1.3.8.5 USB2.0

| | | | | | |
|-------------|------------|----|------------|----|------------|
| Qseven | P0 | P1 | P2 | P3 | P4 |
| SoC | P0 | P1 | P2 | P3 | P4 |
| Schematics | USB_0_1_OC | | USB_2_3_OC | | USB_4_5_OC |
| SoC USB_OC# | OC0# | | OC1# | | |

1.3.8.6 HDA

Supports HD-Audio and LPE Audio for DDI[1:0] (DisplayPort 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 transfer the data in 1-bit, 4-bit, and 8-bit modes. Maximum HS400 Dual Rate 400 MB/s (200 MHz).

1.3.8.9 SD

SD Memory Card Specification v3.01. SD clock frequency at 25, 50, 100, and 200 MHz. Data Rate up to 104 MB/s using 4 parallel data lines (SDR104 mode).

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 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

1.3.8.14 MIPI

Supports CSI2 image sensors connected using both D-PHY 1.1 and D-PHY 1.2. SoC has 4 dedicated DPHY1.2 lanes and 2 differential clock lanes, supporting peak transfer rates of 2.5Gb/s per lane.

1.3.8.15 TPM

Supports TPM 2.0 module by default.

1.3.8.16 BIOS

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

Note! If the system COMS is cleared, we strongly suggest to go to the BIOS setup menu and load default settings on first 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 PWROK

Power OK from main power supply. A high value indicates that the power is good. This signal can be used to hold off Module startup to allow Carrier based FPGAs or other configurable devices time to be programmed.

1.3.9.3 Power Sequence

Refer to Qseven R2.1 electrical specification

1.3.9.4 Wake Event

Various wake-up events supporting allow user to apply into different scenario.

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

USB Wake: Wake to S0 from S3

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

LPC Wake: depends on user inquiry and may need customized BIOS

1.3.9.5 Advantech S5 ECO Mode (Deep Sleep Mode)

Advantech iManager provides additional feature to allow system enter a very low suspend power mode - S5 ECO mode. In this mode, Module will cut all power including suspend and active power into chipset and keep an on-module controller active. Therefore, only an under 50mW power will consume which means user's battery pack can last longer time. While this mode enable in BIOS, system (or module) only allow a power button to boot rather than others 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: validate with standard development boards in Advantech chassis

1.3.11 MTBF

Please refer Advantech SOM-3569 Series Reliability Prediction Report No: TBD. (estimated date is 2018,January.)

1.3.12 OS Support (duplicate with SW chapter)

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.

To install the drivers, please connect to internet and browse the website [http:// support.advantech.com.tw](http://support.advantech.com.tw) to download the setup file.

1.3.13 Advantech iManager

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

1.3.14 Power Consumption

| Power Consumption Table (Watt.) | | | | | | |
|---------------------------------|---------------------|------------|---------|----------------------|---------------|----------------|
| VCC=12V, VSB=5V | Active Power Domain | | | Suspend Power Domain | | Mechanical off |
| Power State | S0 Max. Load | S0 Burn-in | S0 Idle | S5 | S5 Deep Sleep | RTC (uA) |
| SOM-3569CN0C-S2A1 | 8.22W | 5.89W | 3.71W | 0.73W | - | - |

Hardware Configurations:

1. MB: SOM-3569CN0C-S2A1 (PCB_A101-2)
2. DRAM: 8Gb LPDDR4 2400MHz *4 (4GB)
3. Carrier board: SOM-DB3520-00A1E

Test Condition:

1. Test temperature: room temperature (about 25°C)
2. Test voltage: rated voltage DC +12.0V
3. Test loading:
 - 3.1 Maximum load mode: According to Intel thermal/power test tools
 - 3.2 Burn-in mode: Burn-In Test V8.1 Pro(1013)(CPU, RAM, 2D&3D Graphics and Disk with 100%)
 - 3.3 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

| Part No. | CPU | Freq. | Core | CPU TDP | Memory | eMMC | Thermal Solution | Operating Temperature |
|-------------------|---------------|--------|------|---------|--------|------|------------------|-----------------------|
| SOM-3569CNOC-S2A1 | Pentium N4200 | 1.1GHz | 4C | 6W | 4GB | N/A | Passive | 0 ~ 60 °C |
| SOM-3569CNOC-S1A1 | Celeron N3350 | 1.1GHz | 2C | 6W | 4GB | N/A | Passive | 0 ~ 60 °C |
| SOM-3569CNBC-S7A1 | Atom E3950 | 1.6GHz | 4C | 12W | 4GB | 32GB | Passive | 0 ~ 60 °C |
| SOM-3569CNOC-S6A1 | Atom E3940 | 1.6GHz | 4C | 9W | 4GB | N/A | Passive | 0 ~ 60 °C |
| SOM-3569CNOC-S3A1 | Atom E3930 | 1.3GHz | 2C | 6W | 4GB | N/A | Passive | 0 ~ 60 °C |

1.3.17 Packing list

| Part No. | Description | Quantity |
|----------------|--|----------|
| - | SOM-3569 Qseven CPU Module | 1 |
| 1960083260N001 | SOM-3569 non-I-APL Heatspreader (N4200 & N3350) | 1 |
| 1960083261N001 | SOM-3569 I-APL Heatspreader (E3930, E3940 & E3950) | 1 |

1.3.18 Development Board

| Part No. | Description |
|------------------|--------------------------|
| SOM-DB3520-00A1E | Qseven Development Board |

1.3.19 Optional Accessory

| Part No. | Description |
|----------------|--|
| 1960058145N001 | Semi-Heatsink, 70L x 63W x 13.2H (0 ~ 60 °C) |
| 1960061089N001 | Semi-Heatsink, 70L x 63W x 34H (-40 ~ 85 °C) |

1.3.20 Pin Description

Advantech provides useful checklists for schematic design and layout routing. A schematic checklist will specify details about each pin's electrical properties and how to connect for different applications. The layout checklist will specify the layout constraints and recommendations for trace length, impedance, and other necessary information during design and development. Please contact your nearest Advantech branch office or call to request design documents and further advanced support.

Chapter 2

Mechanical Information

This chapter gives mechanical information on the SOM-3569 CPU Computer on Module

Sections include:

- Board Information
- Mechanical Drawing
- Assembly Drawing

2.1 Board Information

The figures below indicate the main chips on SOM-3569 Computer-on-Module. Be aware of these positions while designing a carrier board to avoid mechanical and thermal issues for the best thermal dissipation performance.

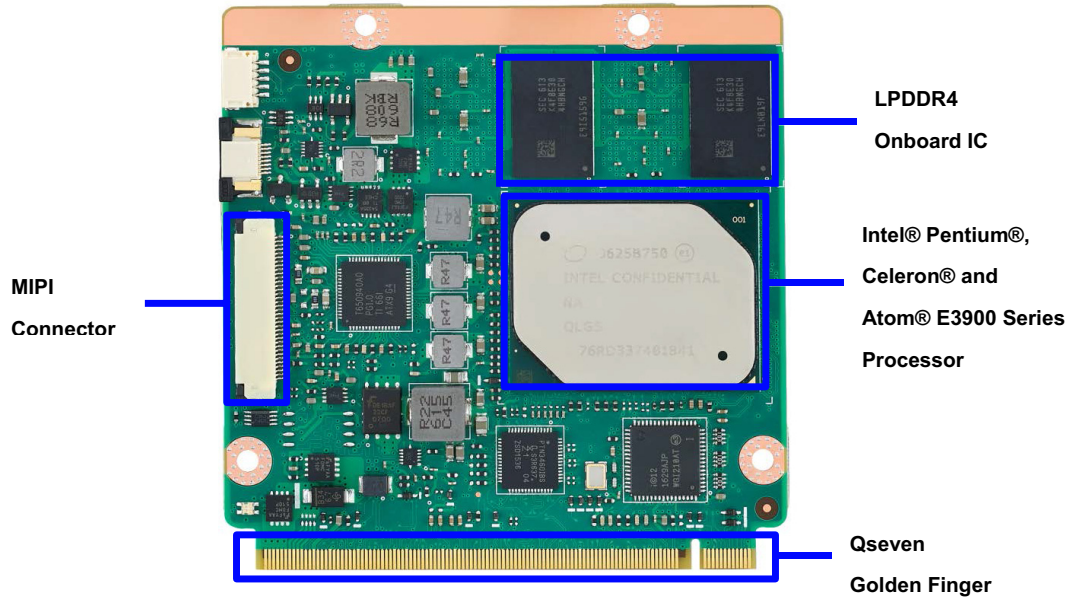


Figure 2.1 Board chips identify - Front

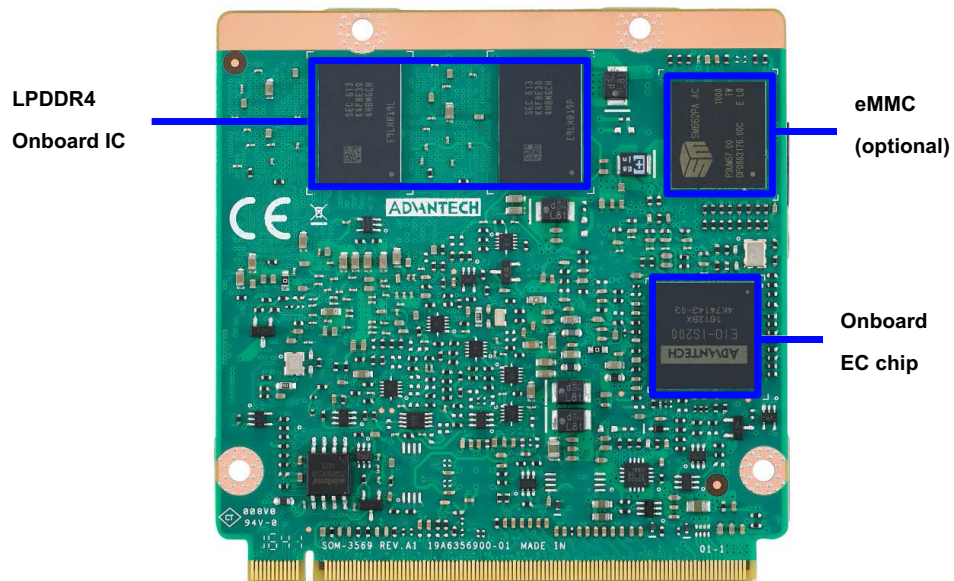


Figure 2.2 Board chips identify - Rear

2.2 Mechanical Drawing

For more details about 2D/3D models, please look on the Advantech COM support service website <http://com.advantech.com>.

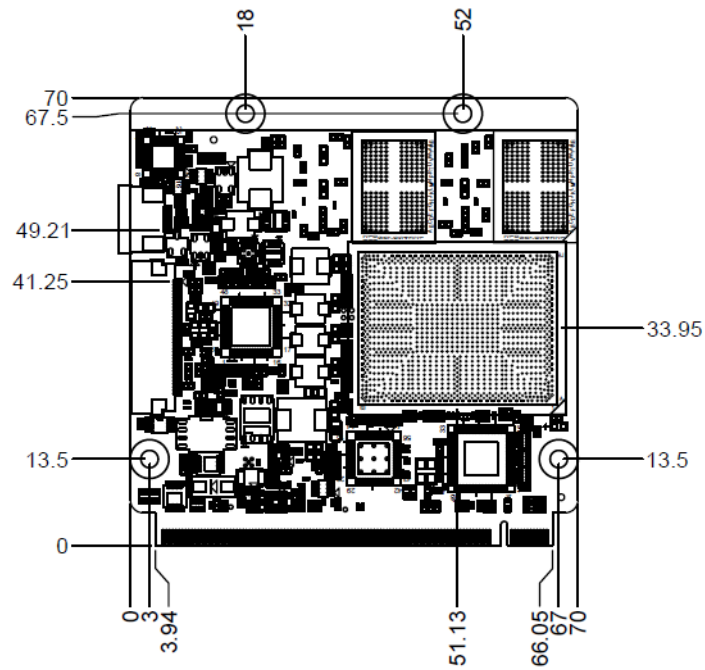


Figure 2.3 Board Mechanical Drawing - Front

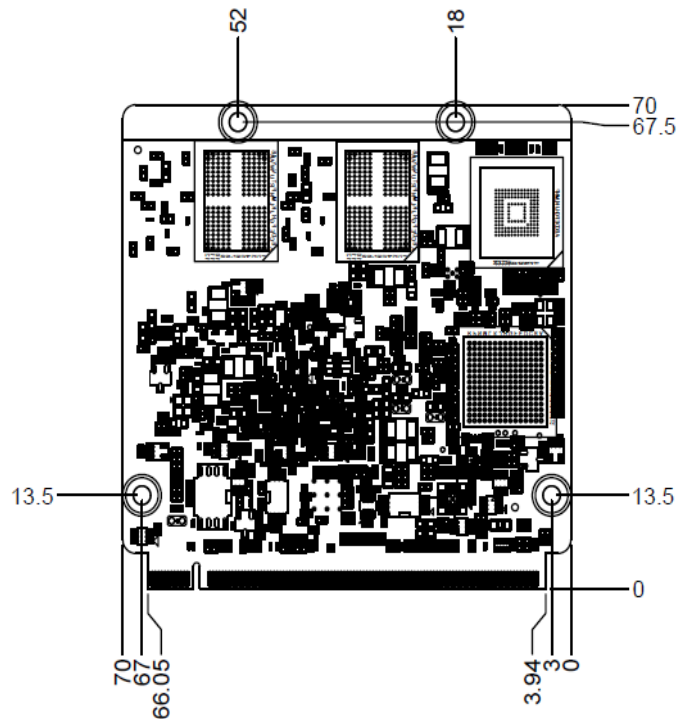


Figure 2.4 Board Mechanical Drawing - Rear

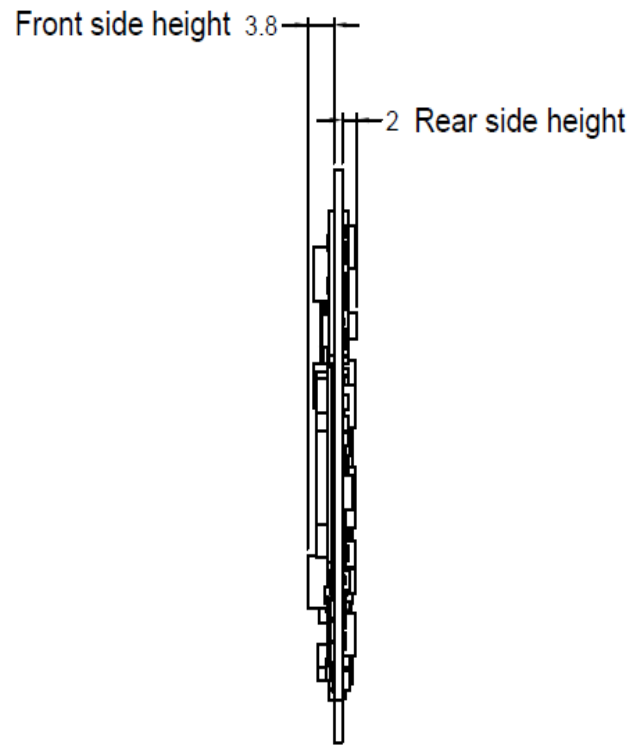


Figure 2.5 Board Mechanical Drawing - Side

2.3 Assembly Drawing

These figures demonstrate the assembly order from the thermal module and COM module to the carrier board.

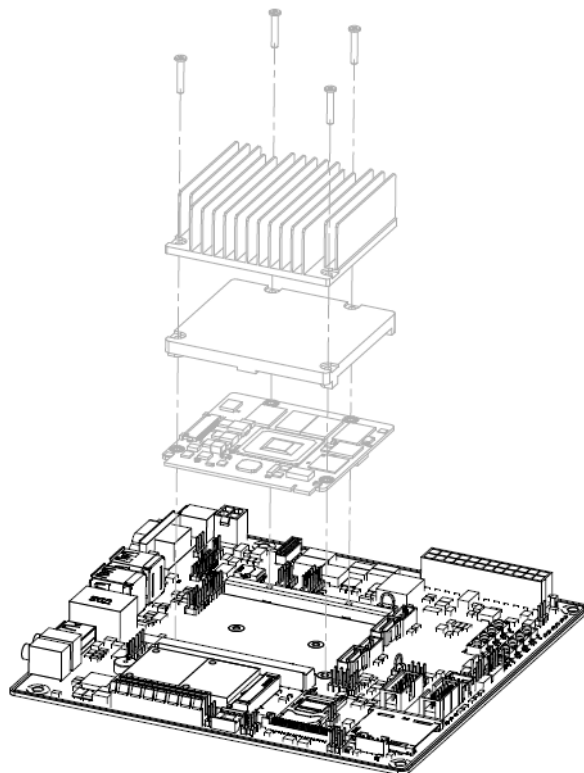
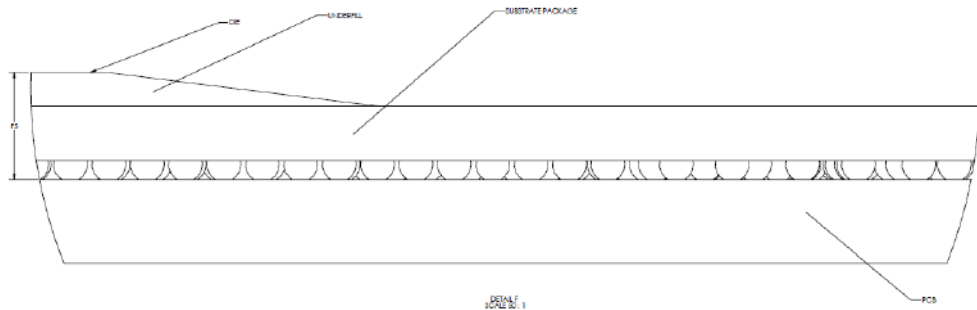


Figure 2.6 Assembly Drawing

There are 4 reserved screw holes for SOM-3569 to be pre-assembled with the heat spreader.

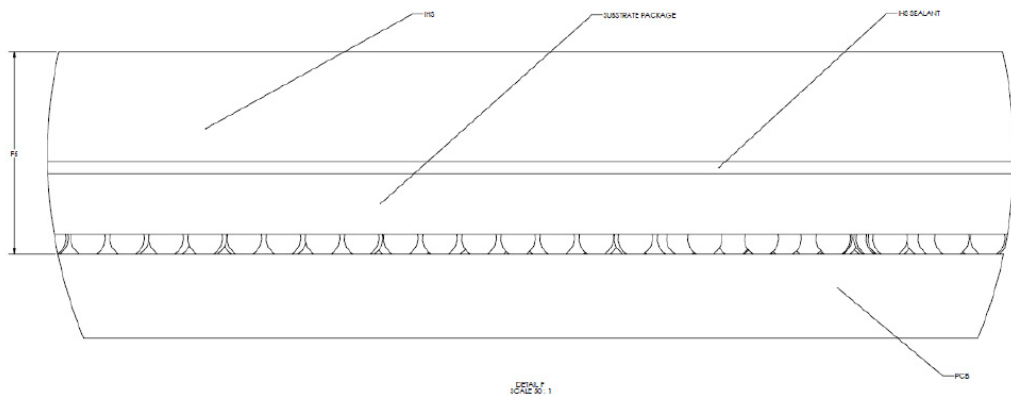
2.4 CPU Mechanical Drawing

Carefully consider the CPU and chip height tolerance when designing your thermal solution.



Intel® Pentium and Celeron N and J Series Processors

Figure 2.7 Main Chip Height and Tolerance



Intel® Pentium and Celeron N and J Series Processors

Figure 2.8 Main Chip Height and Tolerance

Chapter 3

AMI BIOS

This chapter gives BIOS setup information for the SOM-3569 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 many 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 configuration. This information is stored in flash ROM so it retains the Setup information when the power is turned off.

3.2 Entering Setup

Turn on the computer and then press 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-3569 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.

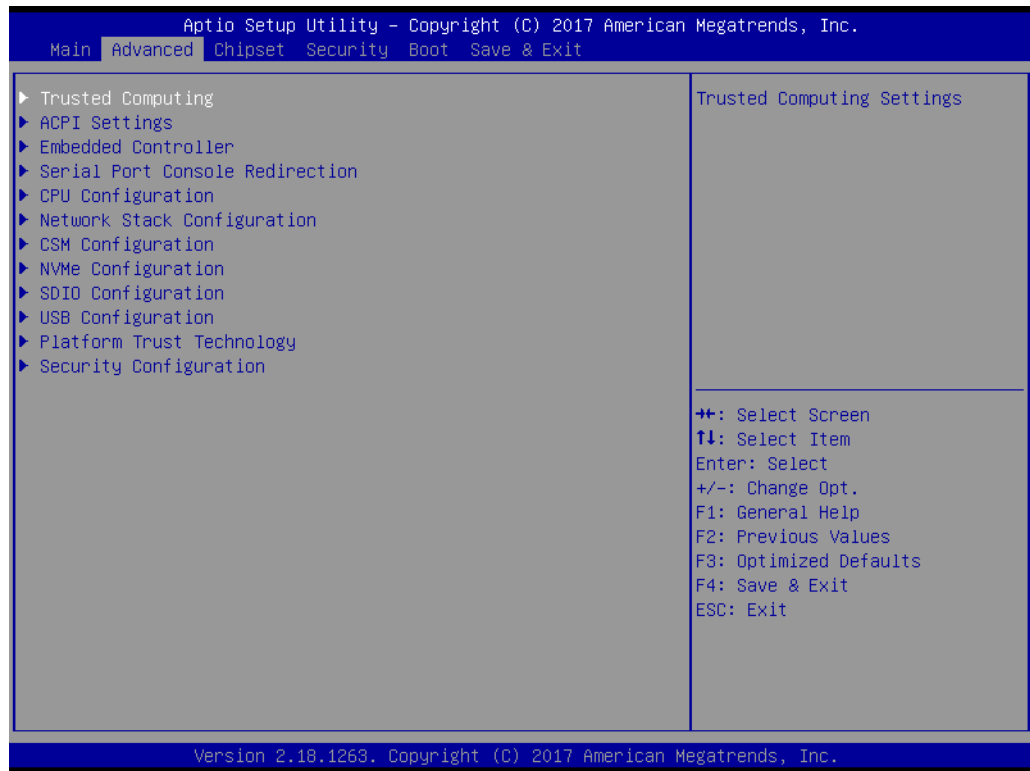


Figure 3.3 Advanced BIOS features setup screen

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(R) 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

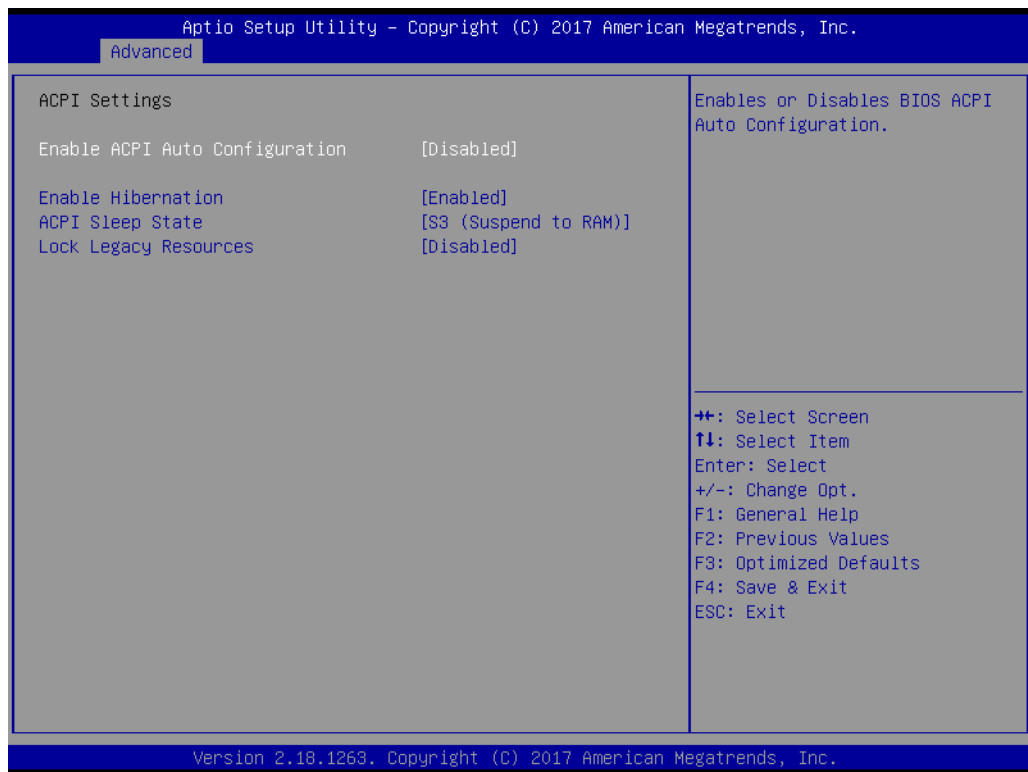


Figure 3.5 ACPI Settings

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

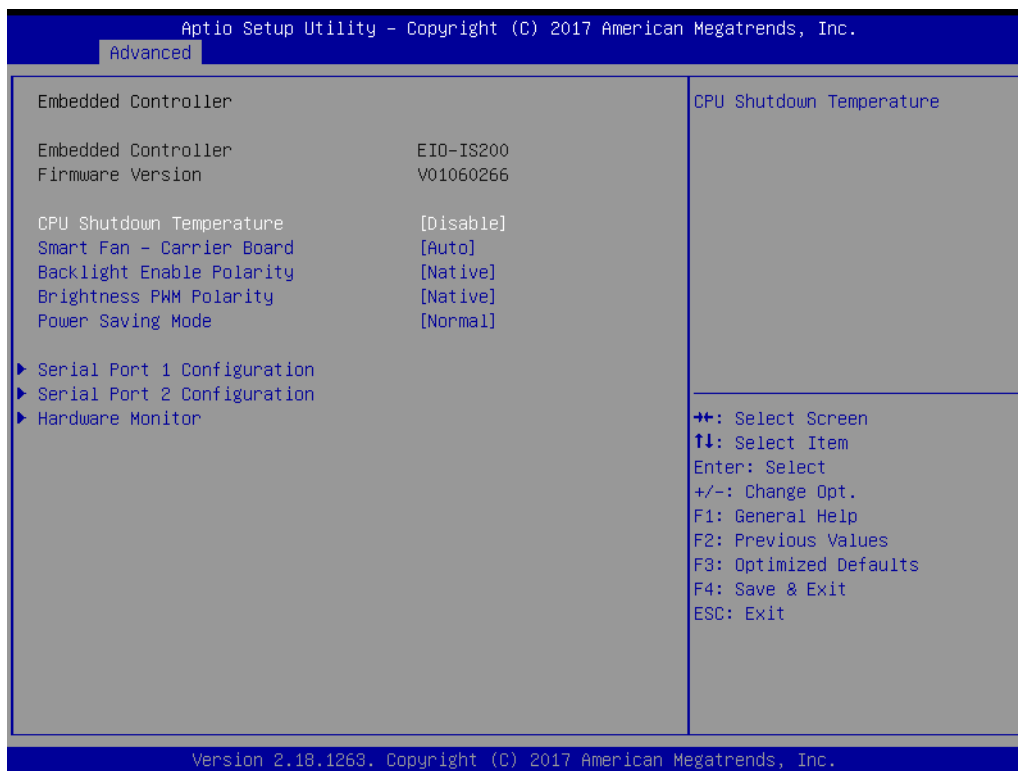


Figure 3.6 Embedded Controller

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 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

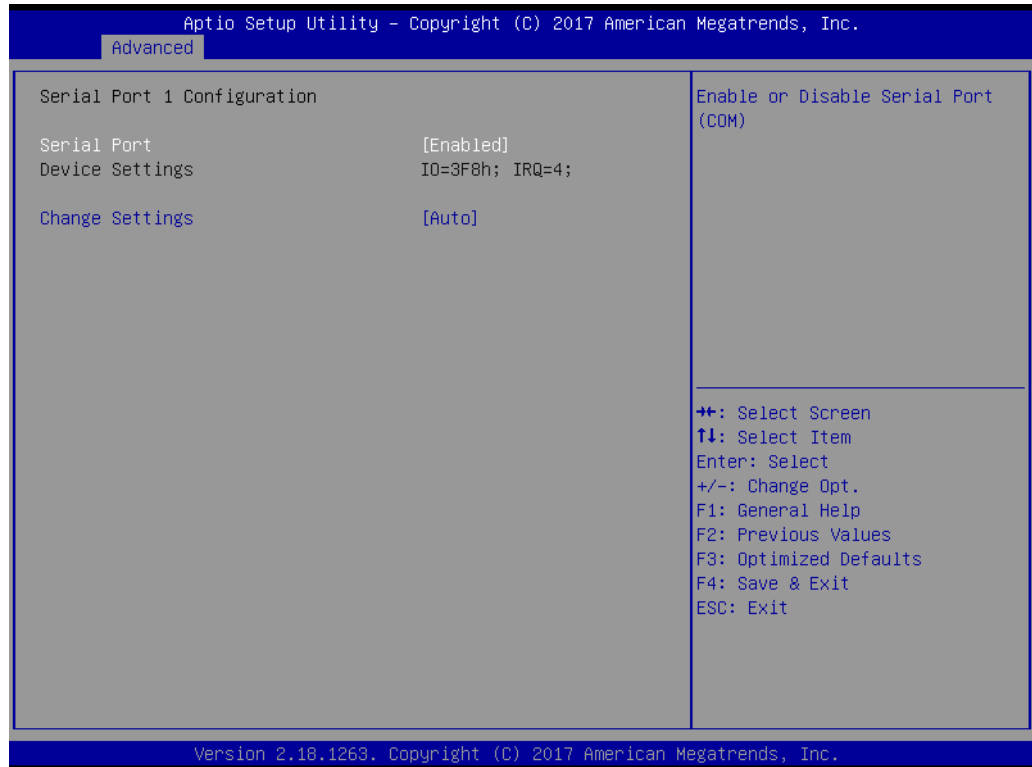


Figure 3.7 Serial Port 1 Configuration

Serial Port

Enable or Disable Serial Port (COM)

Device Settings

Set Parameters of Serial Port 1 (COMA)

Change Settings

Select an optimal settings for Super IO Device

3.4.3.2 Serial Port 2 Configuration

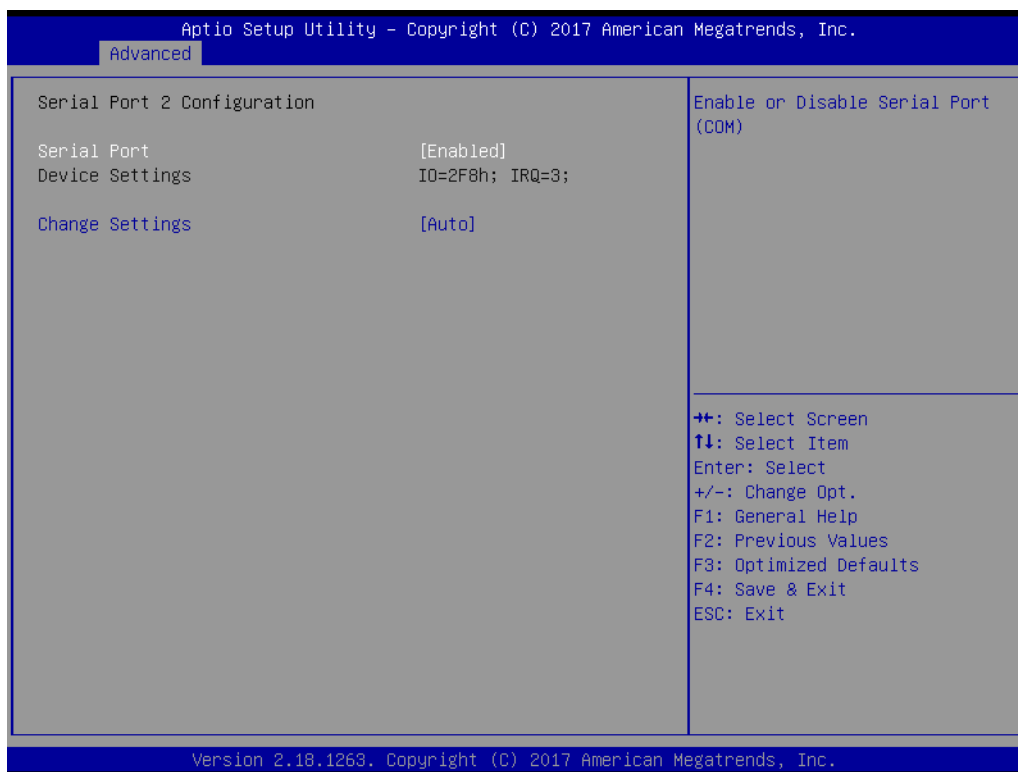


Figure 3.8 Serial Port 2 Configuration

Serial Port

Enable or Disable Serial Port (COM)

Device Settings

Set Parameters of Serial Port 2 (COMB)

Change Settings

Select an optimal settings for Super IO Device

3.4.3.3 Hardware Monitor

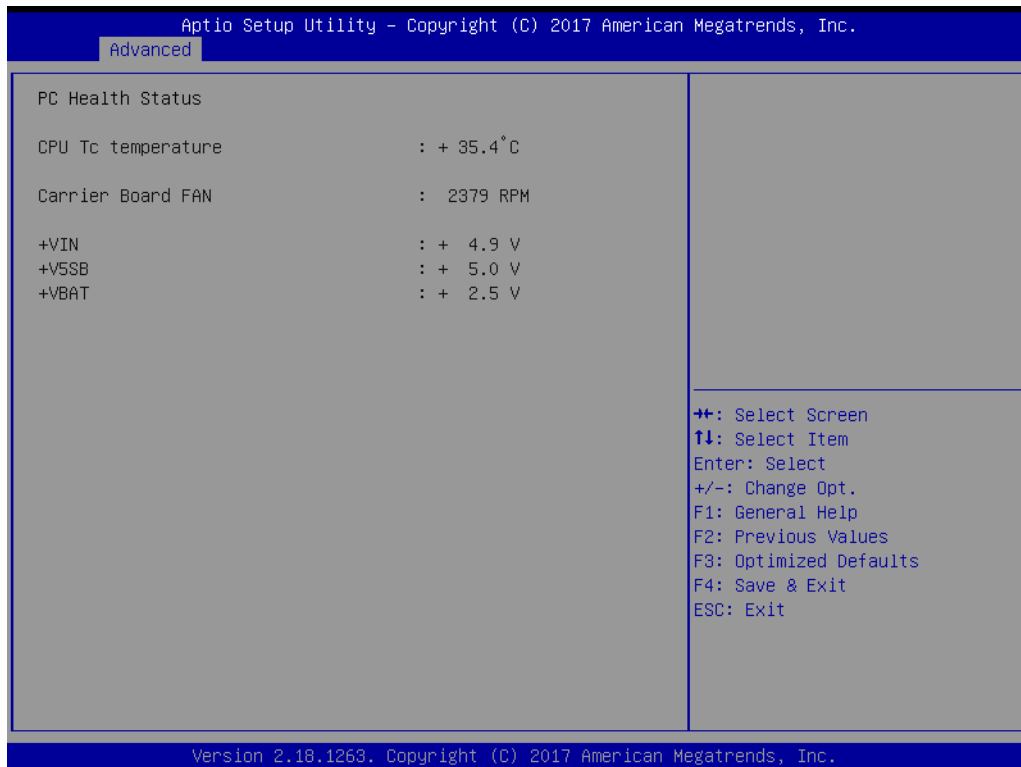


Figure 3.9 Hardware Monitor

3.4.4 Serial Port Console Redirection

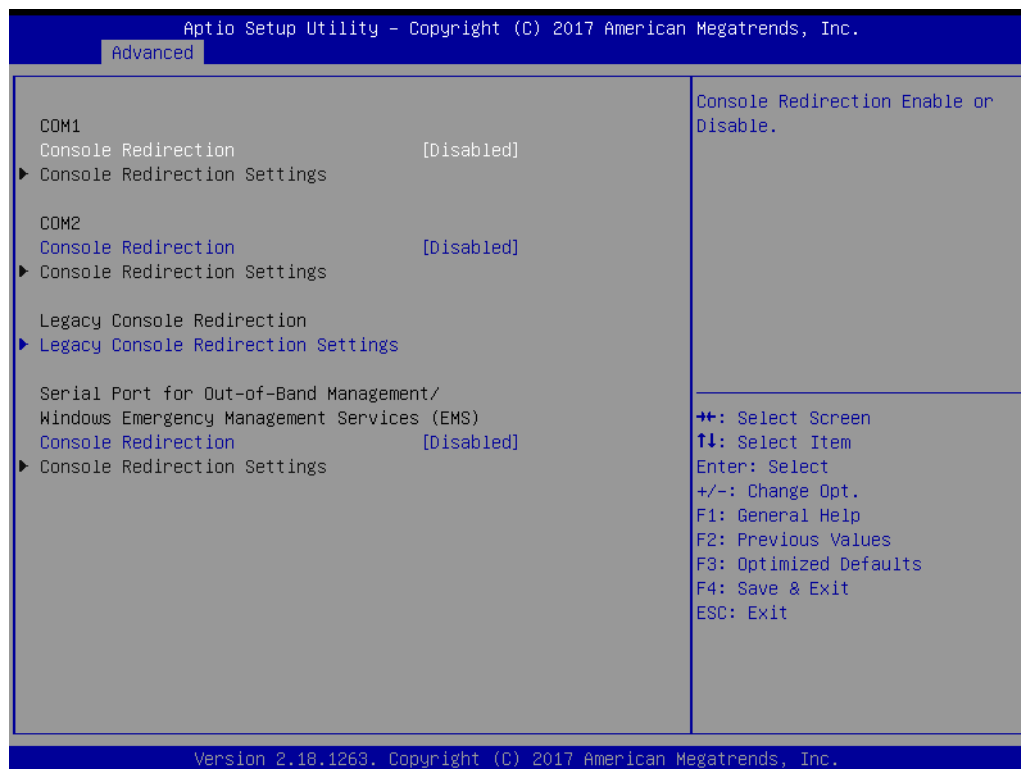


Figure 3.10 Serial Port console Redirection

COM1**Console Redirection**

Console Redirection Enable or Disable.

Console Redirection Settings

The 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

The 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.

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

The 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

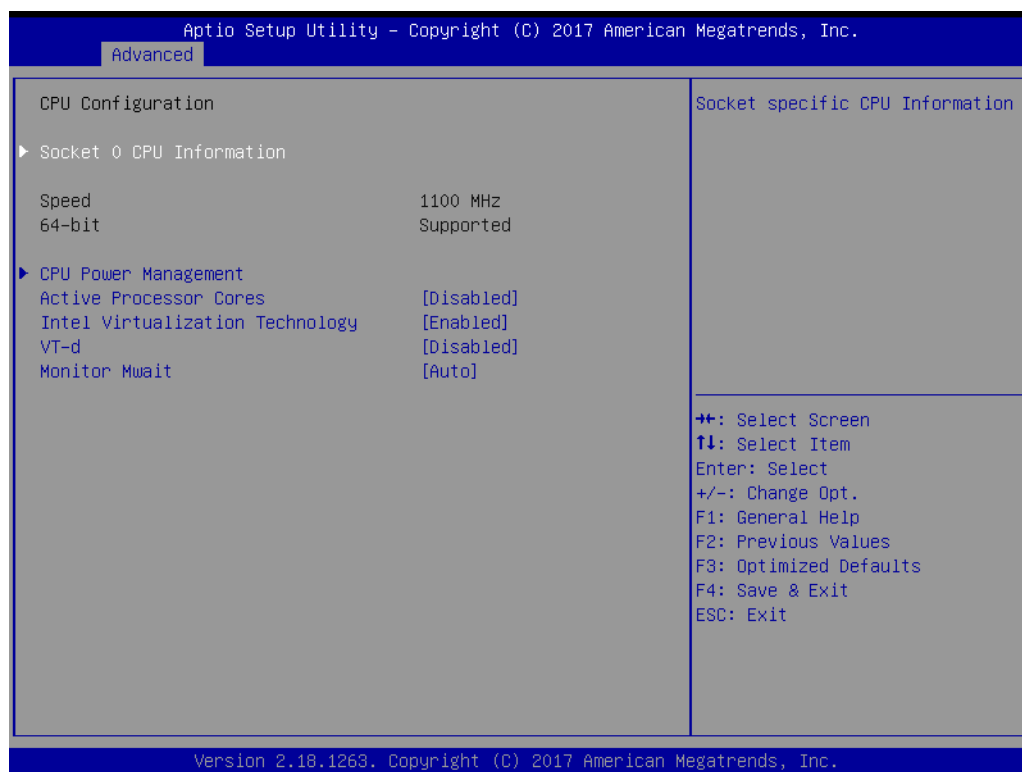


Figure 3.11 CPU Configuration

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

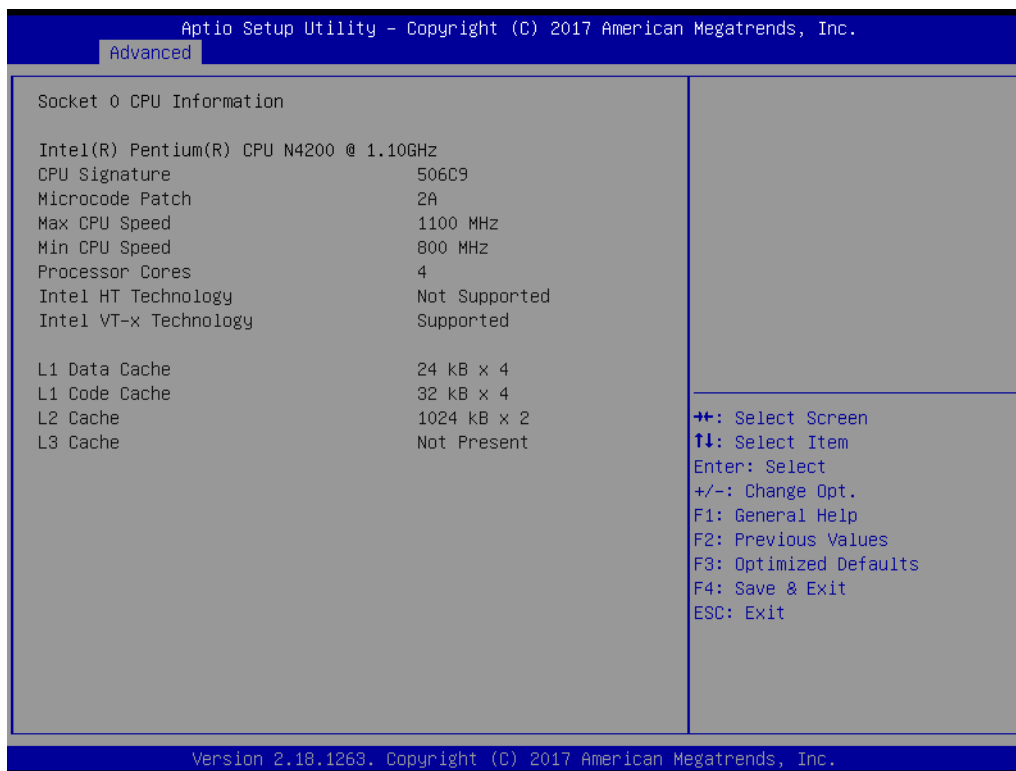


Figure 3.12 Socket 0 CPU Information

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 is 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

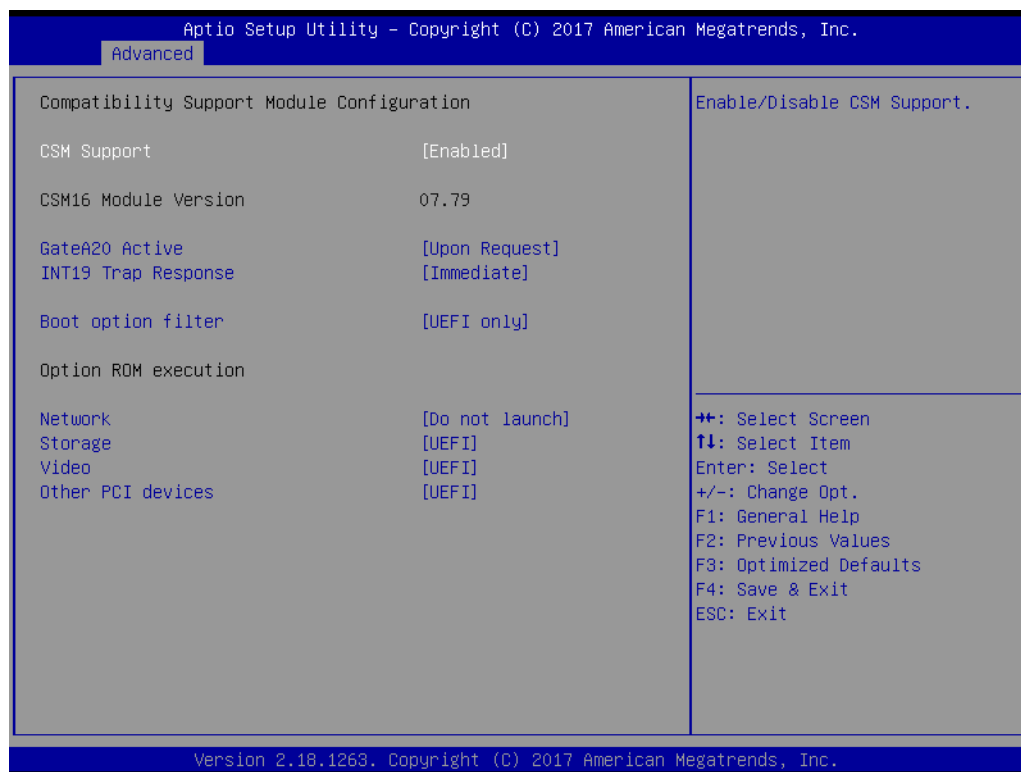


Figure 3.15 CSM Configuration

CSM Support

Enable/Disable CSM Support.

CSM16 Module Version

CSM16 Module Version

GateA20 Active

UPON REQUEST - GA20 can be disabled using BIOS services. Do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.

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

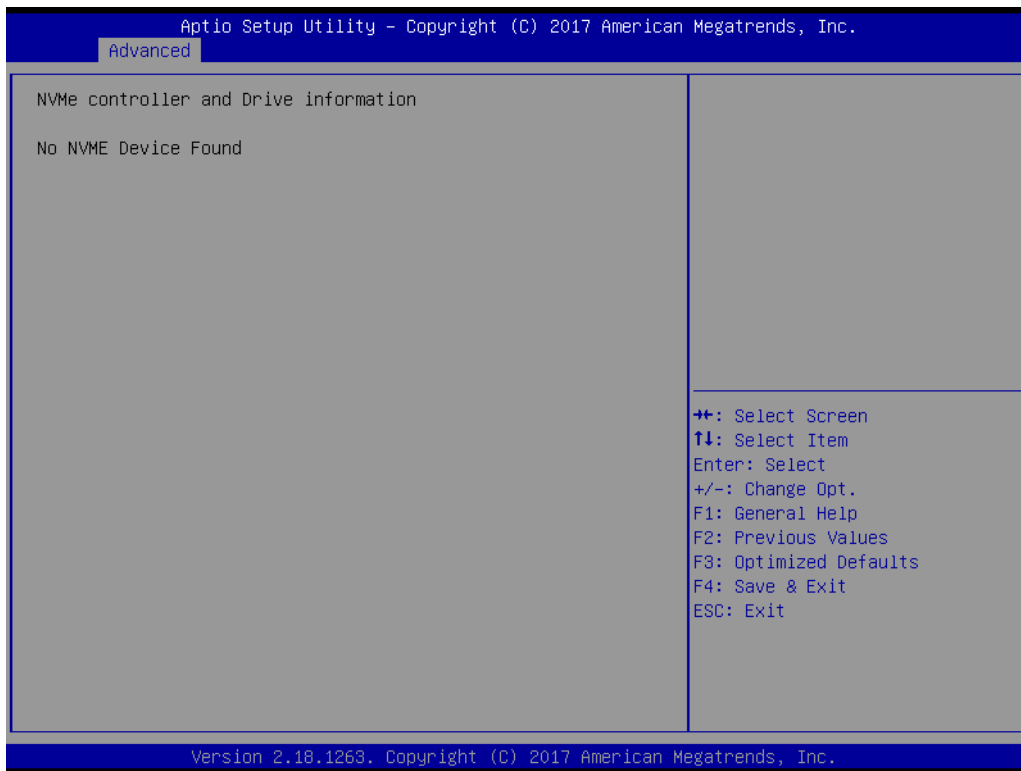


Figure 3.16 NVMe Configuration

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.

3.4.10 USB Configuration

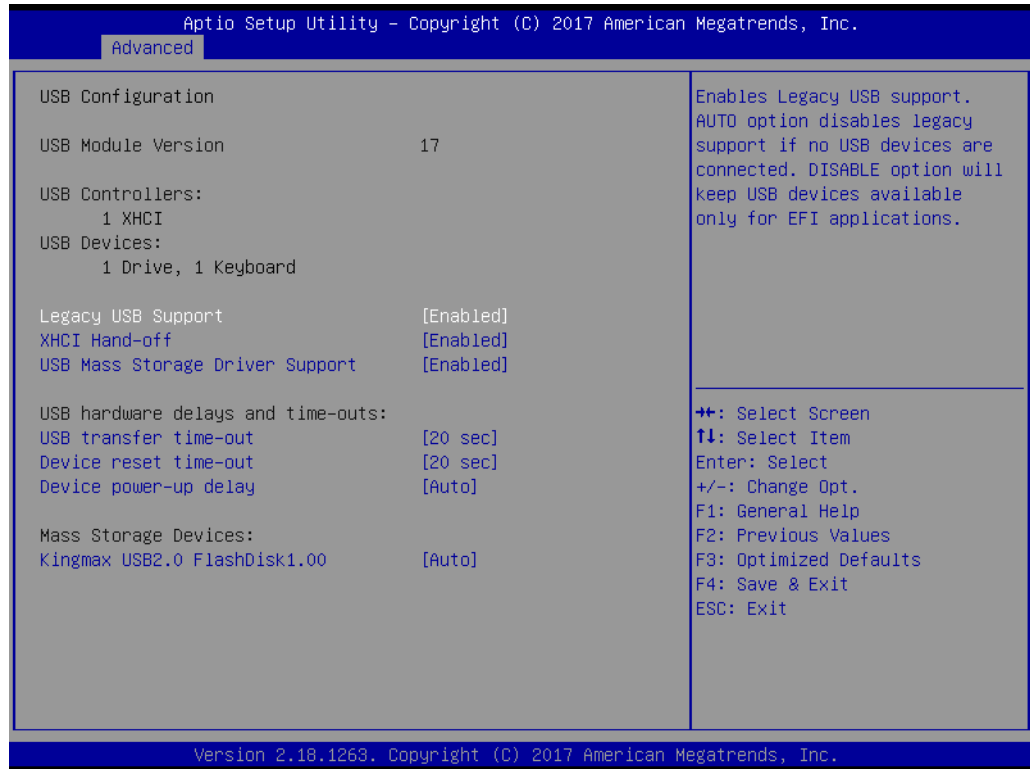


Figure 3.18 USB Configuration

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 Platform Trust Technology

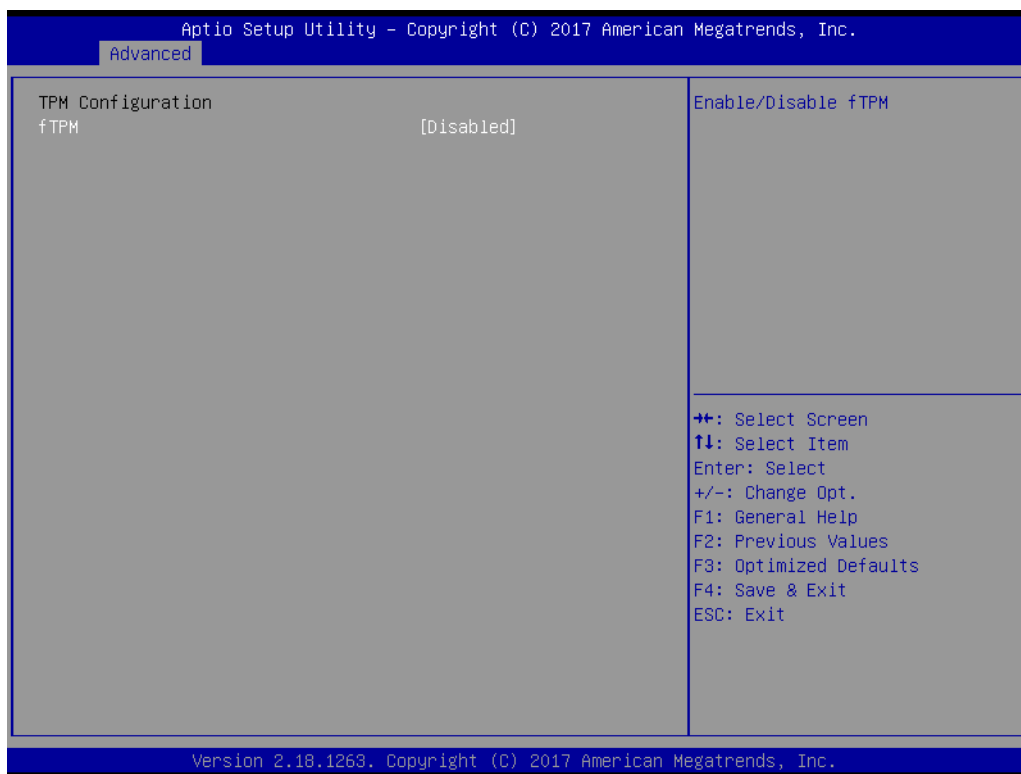


Figure 3.19 Platform Trust Technology

fTPM

Enable/Disable fTPM

3.4.12 Security Configuration

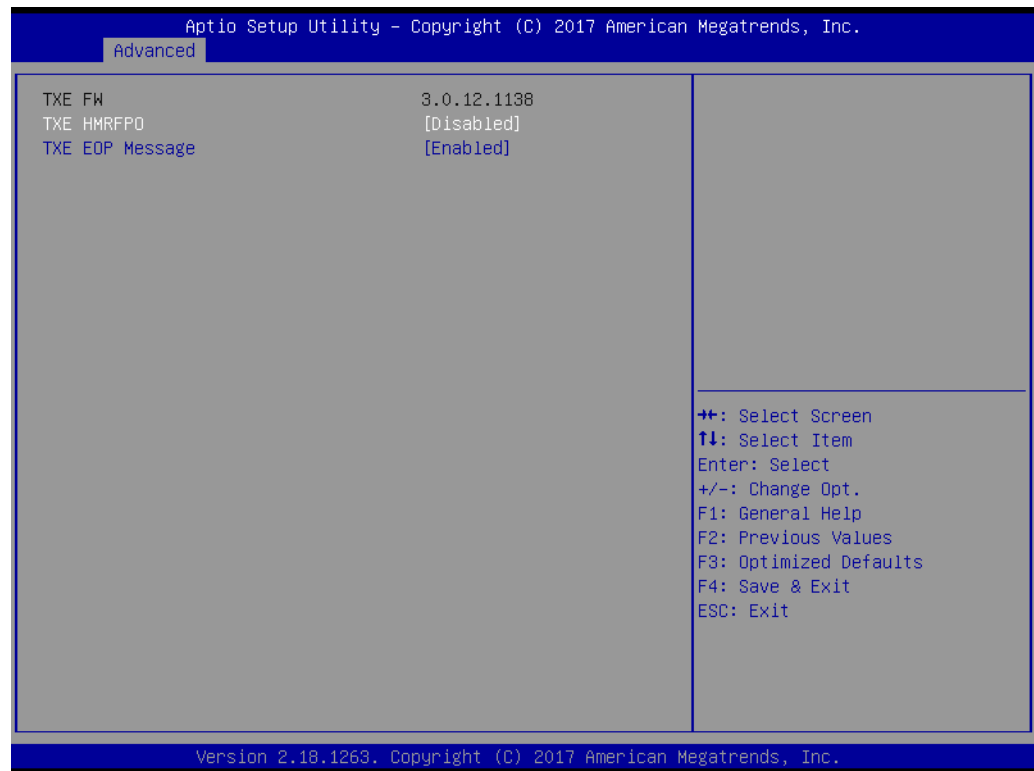


Figure 3.20 Security Configuration

TXE HMRFP0

TXE EOP Message

Send EOP Message Before Enter OS

3.5 Chipset Setup



Figure 3.21 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

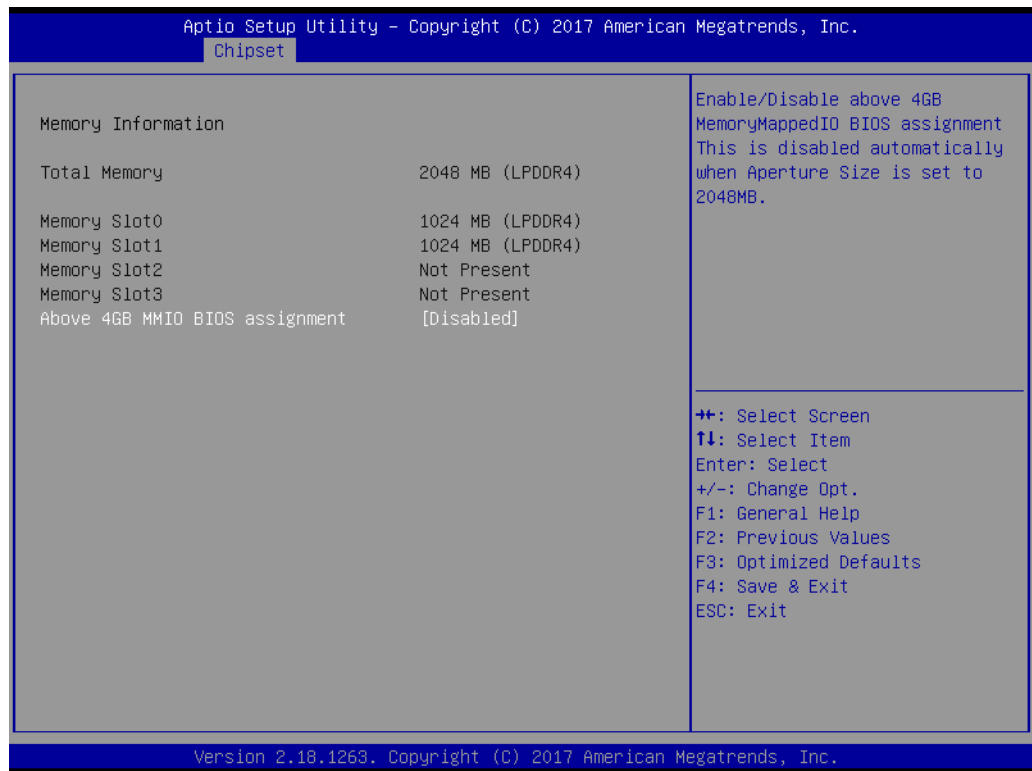


Figure 3.22 North Bridge

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 MemoryMappedIO BIOS assignment. This is disabled automatically when Aperture Size is set to 2048MB.

3.5.2 South Bridge

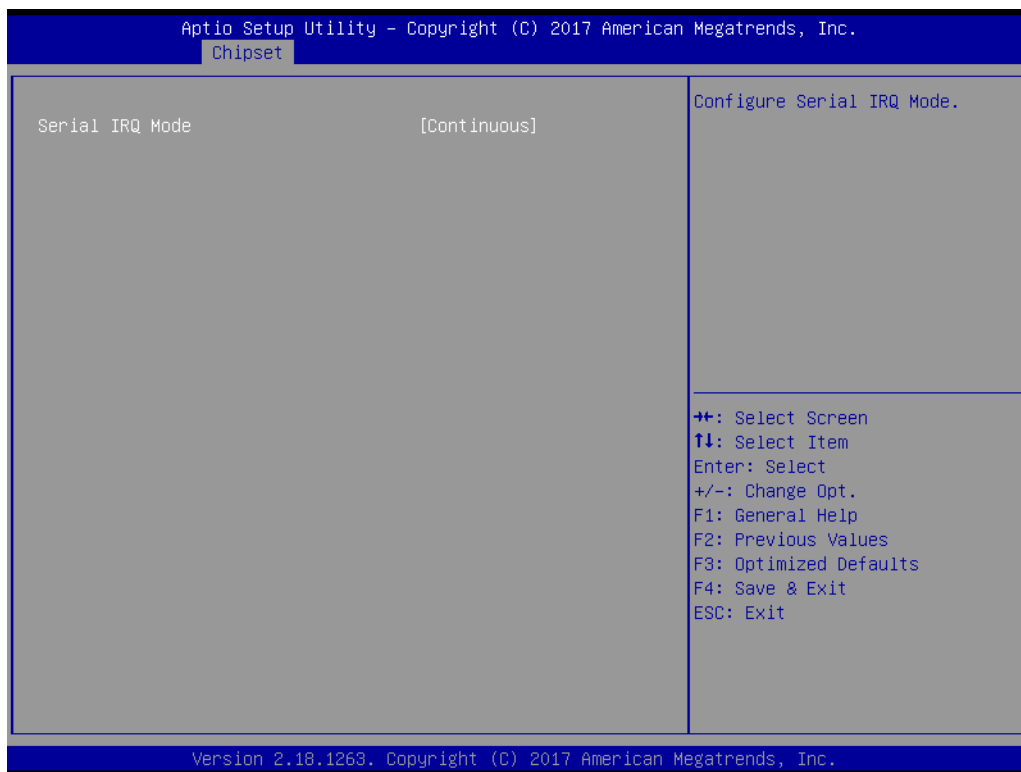


Figure 3.23 South Bridge

Serial IRQ Mode

Configure Serial IRQ Mode.

3.5.3 Uncore Configuration



Figure 3.24 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.

3.5.4 South Cluster Configuration

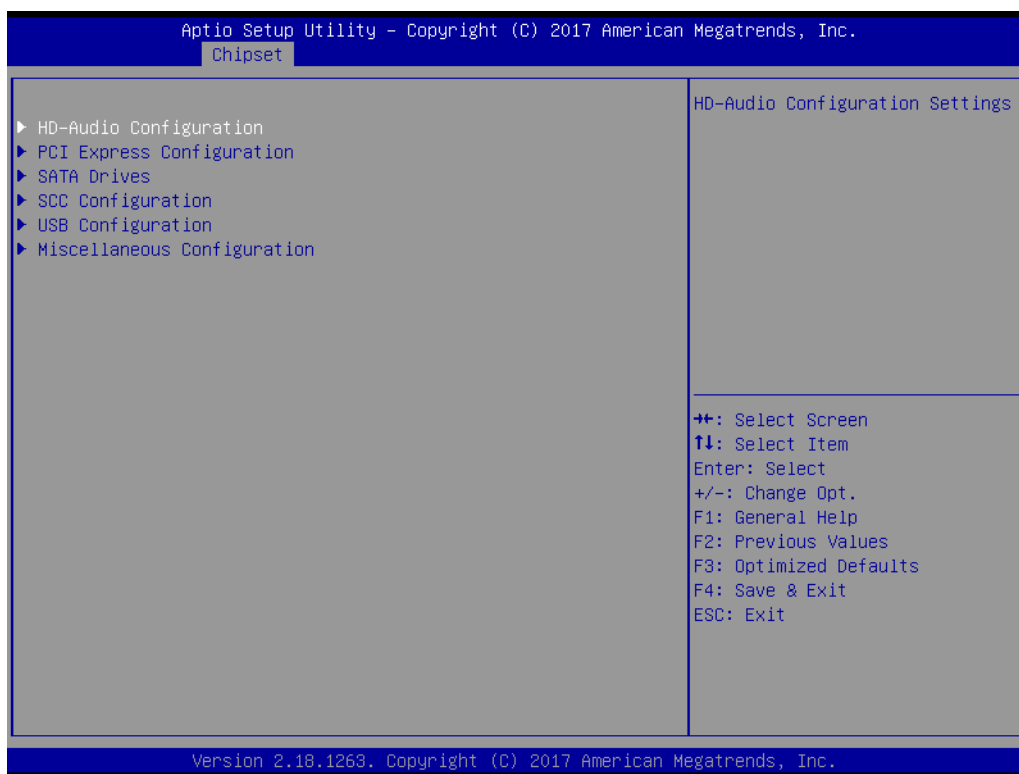


Figure 3.25 South Cluster Configuration

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

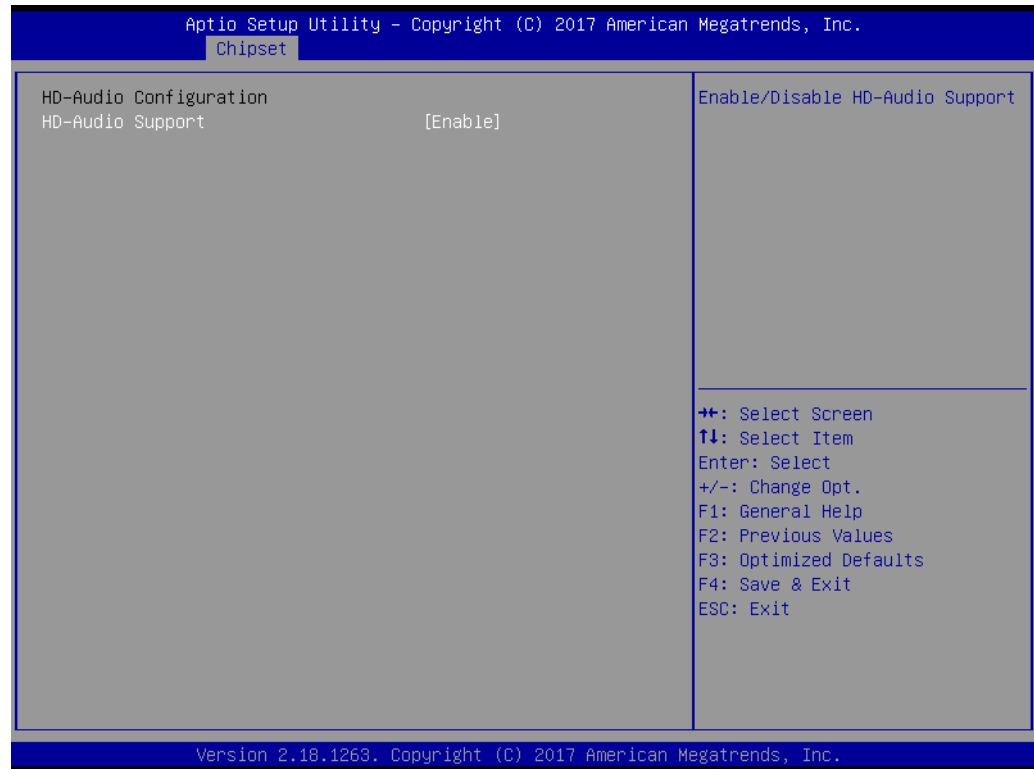


Figure 3.26 HD-Audio Configuration

HD-Audio Support

Enable/Disable HD-Audio Support

3.5.4.2 PCI Express Configuration

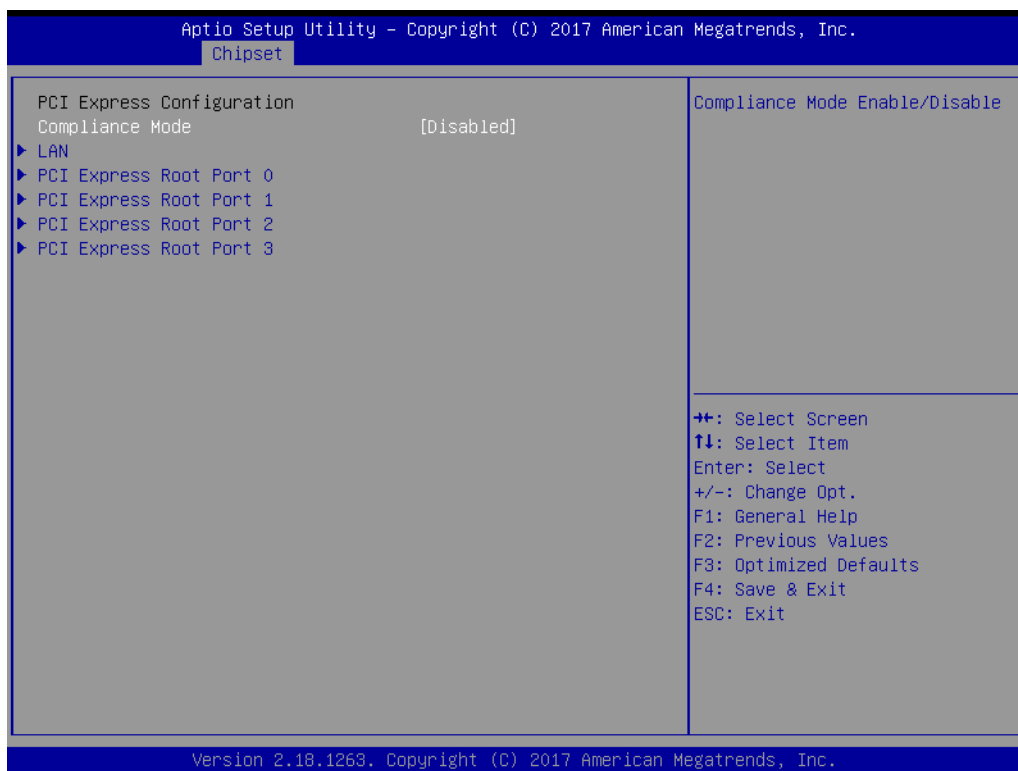


Figure 3.27 PCI Express Configuration

Compliance Mode

Compliance Mode Enable/Disable

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

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

LAN

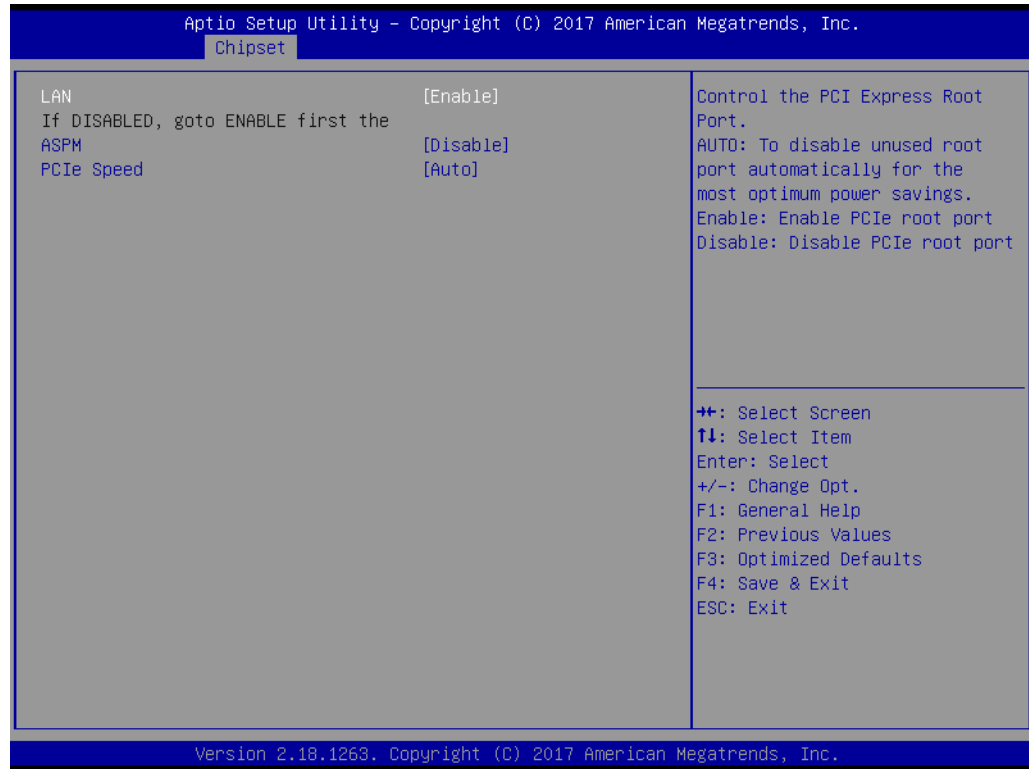


Figure 3.28 LAN

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

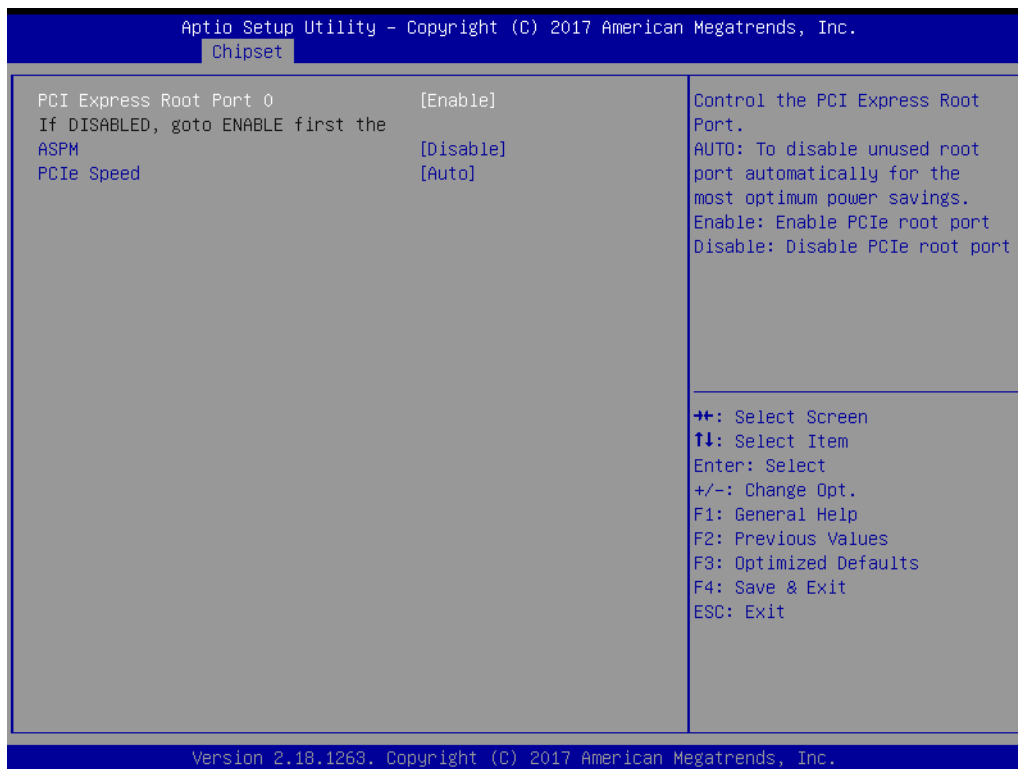


Figure 3.29 PCI Express Root Port 0

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

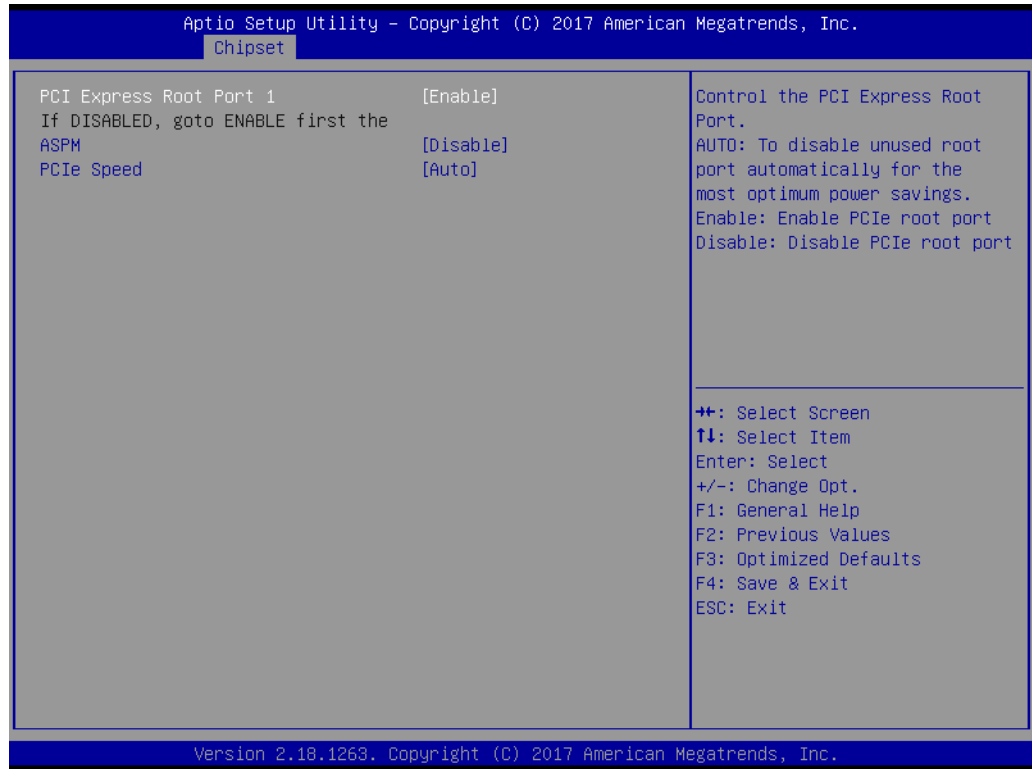


Figure 3.30 PCI Express Root Port 1

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

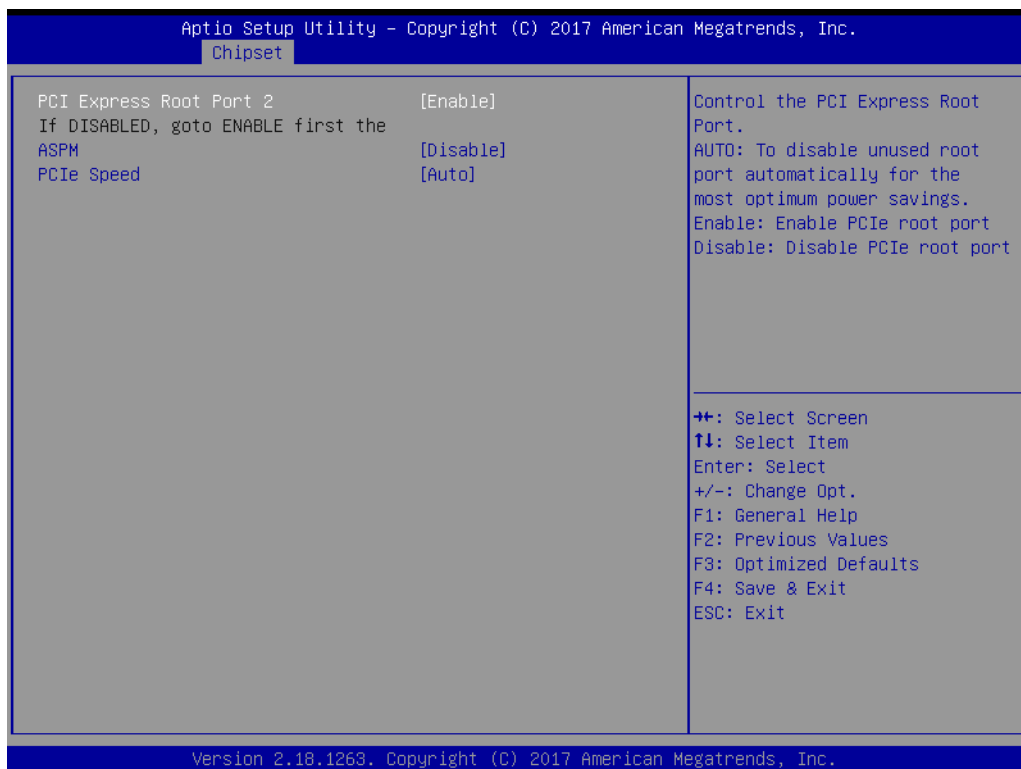


Figure 3.31 PCI Express Root Port 2

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

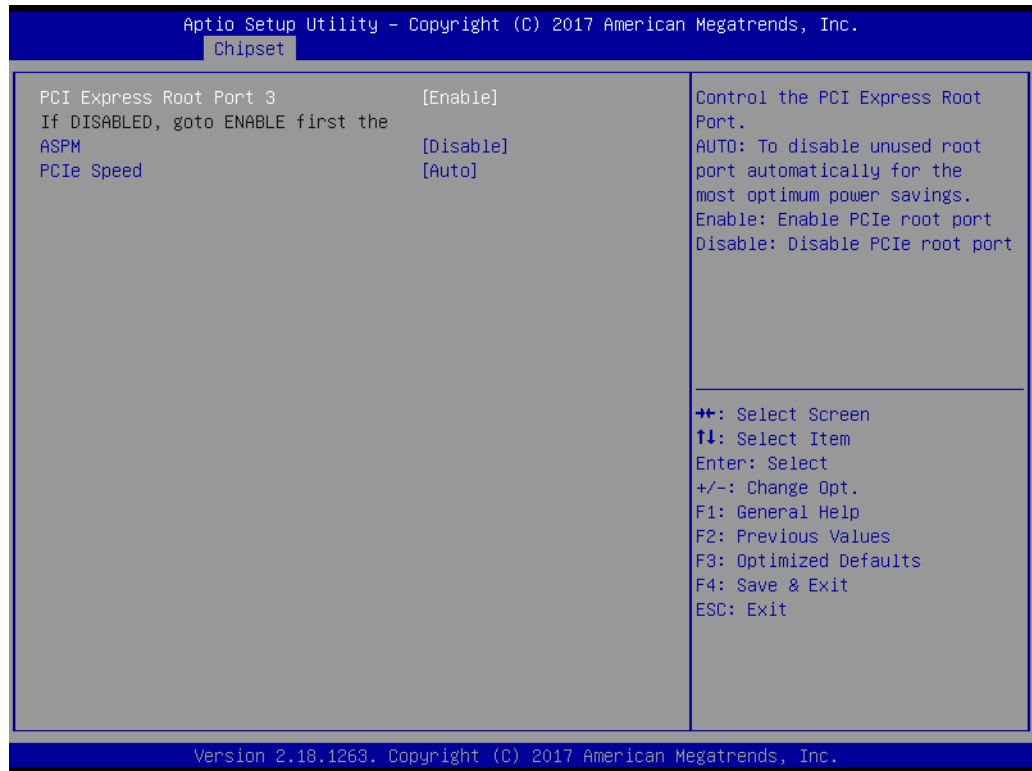


Figure 3.32 PCI Express Root Port 3

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

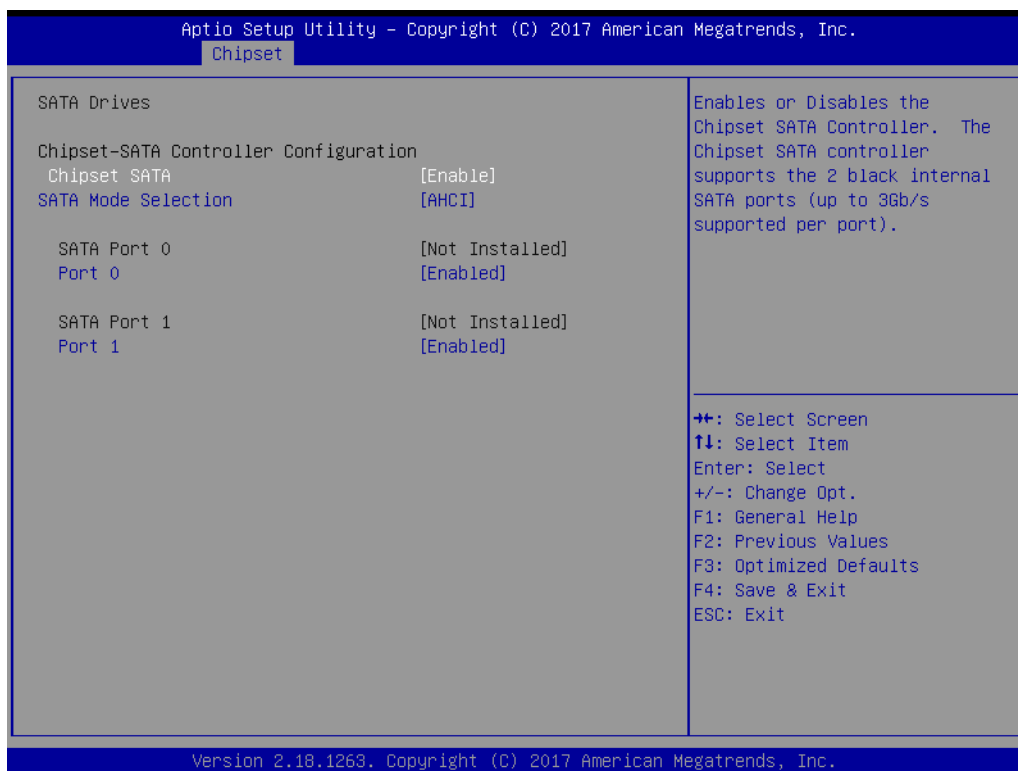


Figure 3.33 SATA Drives

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 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

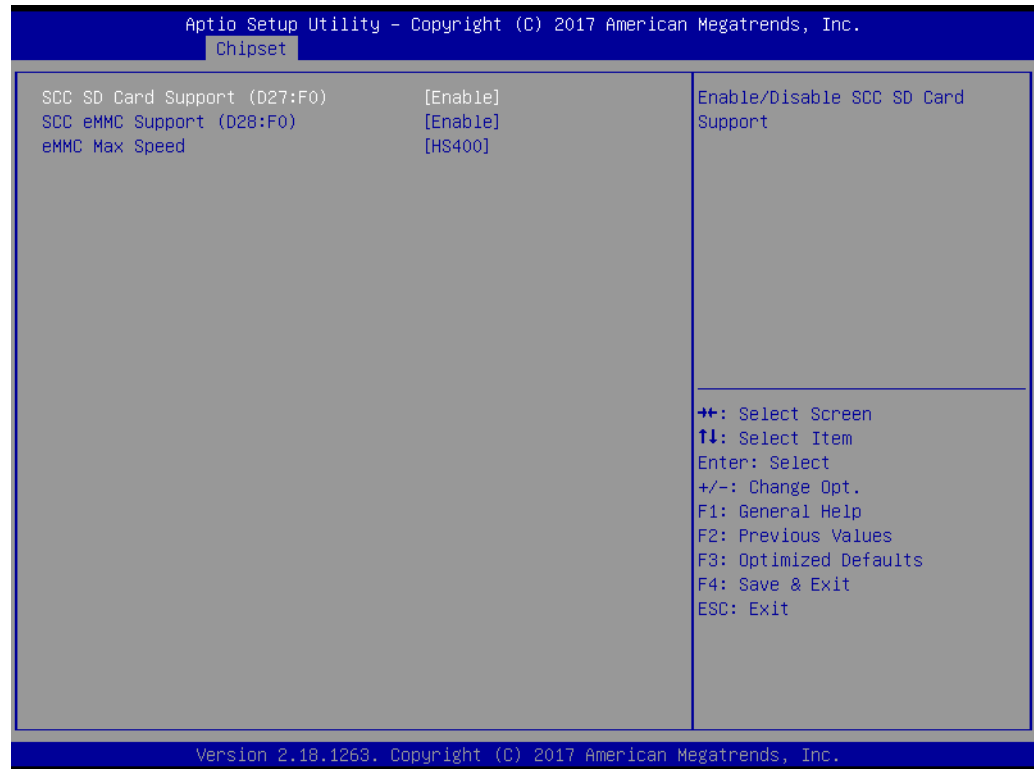


Figure 3.34 SCC Configuration

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

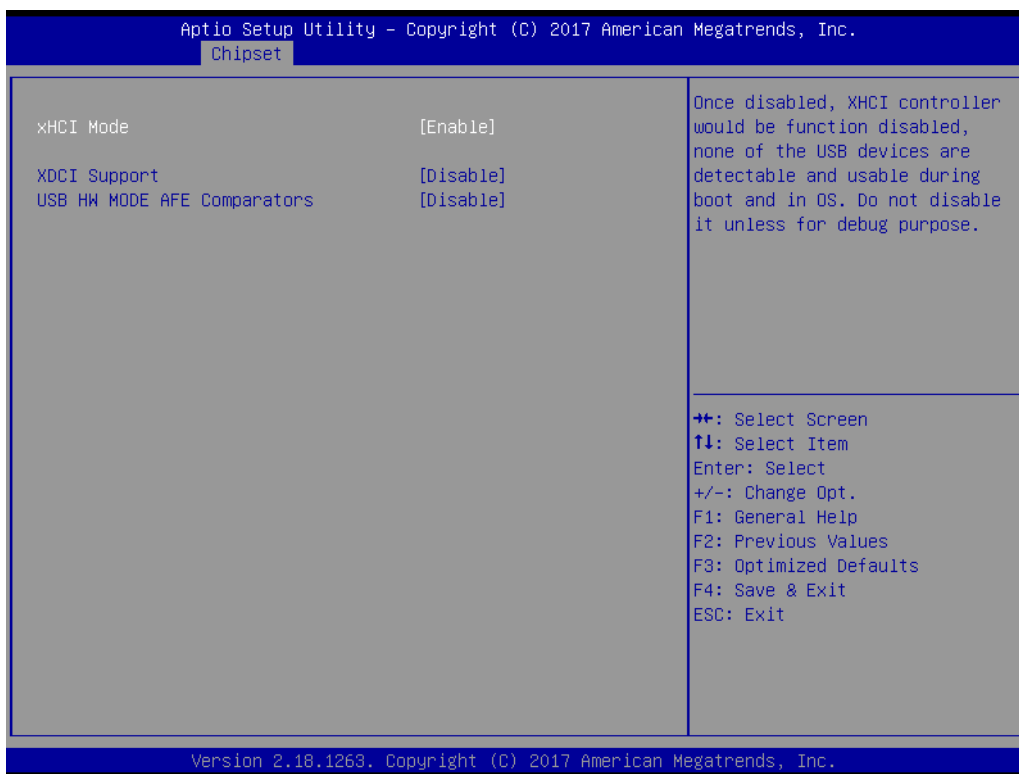


Figure 3.35 USB Configuration

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 debug purpose.

XDCI Support

Enable/Disable XDCI

USB HW MODE AFE Comparators

Enable/Disable USB HW MODE AFE Comparators

3.5.4.6 Miscellaneous Configuration

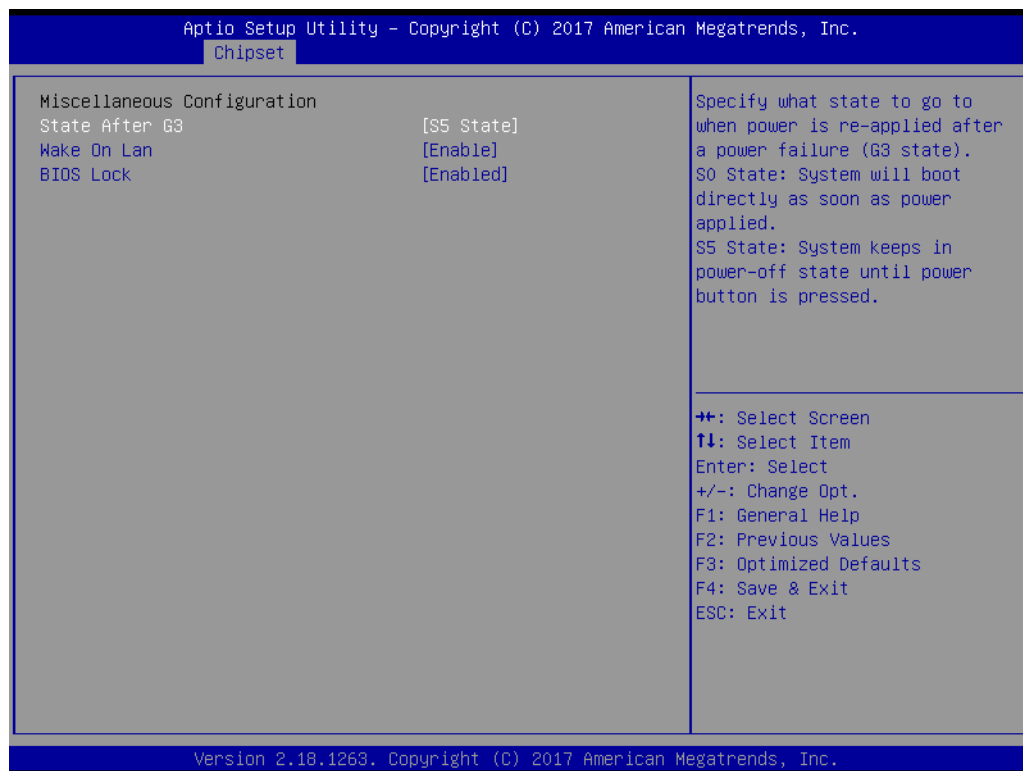


Figure 3.36 Miscellaneous Configuration

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

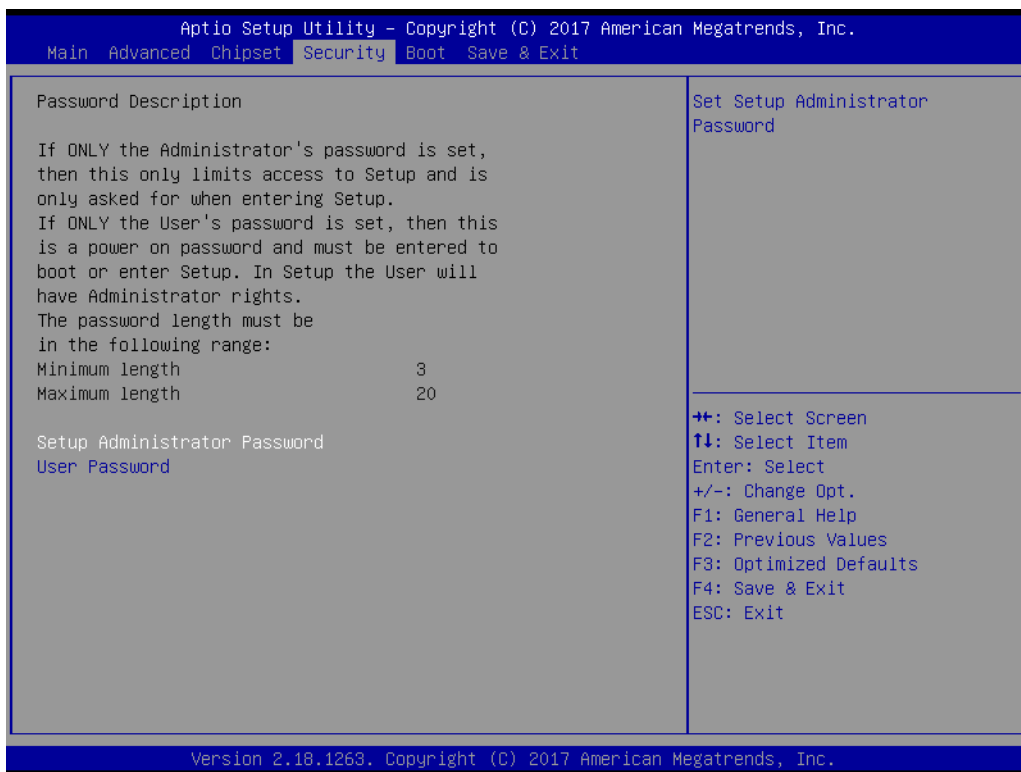


Figure 3.37 Security Chipset

Setup Administrator Password

Set Setup Administrator Password

User Password

Set User Password

3.7 Boot Setup

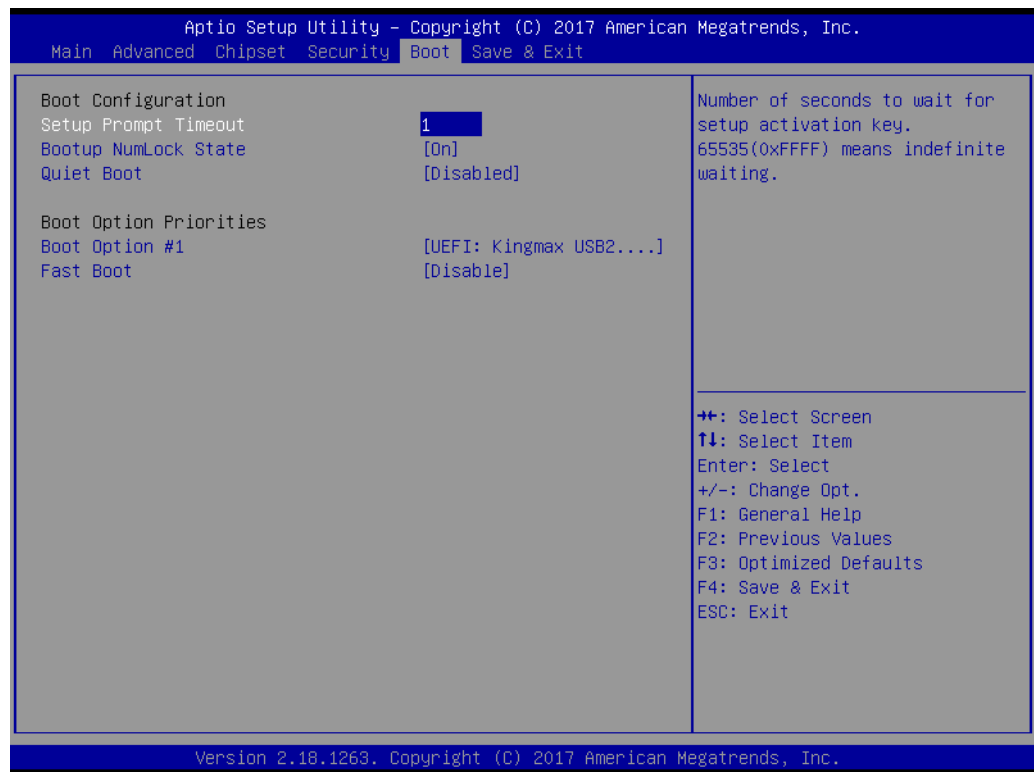


Figure 3.38 Boot Setup

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 Exit

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

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 operation system, please connect to internet and browse the website <http://support.advantech.com.tw> and download the drivers that you want to install and follow Driver Setup instructions to complete the installation.

4.2.2 Other OS

SOM-3569 supports Linux.

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. More detail of how to use the APIs and utilities, please refer to Advantech iManager 2.0 Software API User Manual.

Control**GPIO**

General Purpose Input/Output is a flexible parallel interface that allows a variety of custom connections. It allows users to monitor the level of signal input or set the output status to switch on/off a device. Our API also provides Programmable GPIO, which allows developers to dynamically set the GPIO input or output status.

**SMBus**

SMBus is the System Management Bus defined by Intel® Corporation in 1995. It is used in personal computers and servers for low-speed system management communications. The SMBus API allows a developer to interface an embedded system environment and transfer serial messages using the SMBus protocols, allowing multiple simultaneous device control.

**I2C**

I2C is a bi-directional two-wire bus that was developed by Philips for use in their televisions in the 1980s. The I2C API allows a developer to interface with an embedded system environment and transfer serial messages using the I2C protocols, allowing multiple simultaneous device control.

Display**Brightness Control**

The Brightness Control API allows a developer to interface with an embedded device to easily control brightness.

**Backlight**

The Backlight API allows a developer to control the backlight (screen) on/off in an embedded device.

Monitor**Watchdog**

A watchdog timer (WDT) is a device that performs a specific operation after a certain period of time if something goes wrong and the system does not recover on its own. A watchdog timer can be programmed to perform a warm boot (restarting the system) after a certain number of seconds.

**Hardware Monitor**

The Hardware Monitor (HWM) API is a system health supervision API that inspects certain condition indexes, such as fan speed, temperature and voltage.

**Hardware Control**

The Hardware Control API allows developers to set the PWM (Pulse Width Modulation) value to adjust fan speed or other devices; it can also be used to adjust the LCD brightness.

Power Saving**CPU Speed**

Make use of Intel® SpeedStep technology to reduce power consumption. The system will automatically adjust the CPU Speed depending on system loading.

**System Throttling**

Refers to a series of methods for reducing power consumption in computers by lowering the clock frequency. These APIs allow the user to lower the clock from 67.5% to 12.5%.

Appendix **A**

Pin Assignment

This appendix gives you the information about the hardware pin assignment of the SOM-3569 CPU System on Module

Sections include:

- SOM-3569 Qseven R2.1 Pin Assignment

A.1 SOM-3569 Qseven R2.1 Pin Assignment

This section gives SOM-3569 pin assignment on Qseven golden finger which compliant with Qseven R2.1 pin-out definitions. More details about how to use these pins and get design reference. Please contact to Advantech for design guide, checklist, reference schematic, and other hardware/software supports.

| Odd number | R2.1 SOM-3569 A101-2 | Even number | R2.1 SOM-3569 A101-2 |
|------------|----------------------|-------------|----------------------|
| 1 | GND | 2 | GND |
| 3 | GBE_MDI3- | 4 | GBE_MDI2- |
| 5 | GBE_MDI3+ | 6 | GBE_MDI2+ |
| 7 | GBE_LINK100# | 8 | GBE_LINK1000# |
| 9 | GBE_MDI1- | 10 | GBE_MDI0- |
| 11 | GBE_MDI1+ | 12 | GBE_MDI0+ |
| 13 | GBE_LINK# | 14 | GBE_ACT# |
| 15 | NC | 16 | SUS_S4# |
| 17 | WAKE# | 18 | SUS_S3# |
| 19 | GPO0 | 20 | PWRBTN# |
| 21 | SLP_BTN# | 22 | LID_BTN# |
| 23 | GND | 24 | GND |
| | KEY | | KEY |
| 25 | GND | 26 | PWGIN |
| 27 | BATLOW# | 28 | RSTBTN# |
| 29 | SATA0_TX+ | 30 | SATA1_TX+ |
| 31 | SATA0_TX- | 32 | SATA1_TX- |
| 33 | SATA_ACT# | 34 | GND |
| 35 | SATA0_RX+ | 36 | SATA1_RX+ |
| 37 | SATA0_RX- | 38 | SATA1_RX- |
| 39 | GND | 40 | GND |
| 41 | BIOS_DISABLE# | 42 | SDIO_CLK# |
| 43 | SDIO_CD# | 44 | NC |
| 45 | SDIO_CMD | 46 | SDIO_WP |
| 47 | SDIO_PWR# | 48 | SDIO_DAT1 |
| 49 | SDIO_DAT0 | 50 | SDIO_DAT3 |
| 51 | SDIO_DAT2 | 52 | NC |
| 53 | NC | 54 | NC |
| 55 | NC | 56 | USB_OTG_PEN |
| 57 | GND | 58 | GND |
| 59 | HDA_SYNC | 60 | SMB_CLK |
| 61 | HDA_RST# | 62 | SMB_DAT |
| 63 | HDA_BITCLK | 64 | SMB_ALERT# |
| 65 | HDA_SDI | 66 | I2C_CLK |
| 67 | HDA_SDO | 68 | I2C_DAT |
| 69 | THRM# | 70 | WDTRIG# |

| | | | |
|-----|-------------------------|-----|---------------|
| 71 | THRMTRIP# | 72 | WDOOUT |
| 73 | GND | 74 | GND |
| 75 | USB_SSTX0- | 76 | USB_SSRX0- |
| 77 | USB_SSTX0+ | 78 | USB_SSRX0+ |
| 79 | USB_6_7_OC# | 80 | USB_4_5_OC# |
| 81 | USB_P5- | 82 | USB_P4- |
| 83 | USB_P5+ | 84 | USB_P4+ |
| 85 | USB_2_3_OC# | 86 | USB_0_1_OC# |
| 87 | USB_P3- | 88 | USB_P2- |
| 89 | USB_P3+ | 90 | USB_P2+ |
| 91 | USB_VBUS | 92 | USB_ID |
| 93 | USB_P1- | 94 | USB_P0- |
| 95 | USB_P1+ | 96 | USB_P0+ |
| 97 | GND | 98 | GND |
| 99 | eDP0_TX0+ / LVDS_A0+ | 100 | LVDS_B0+ |
| 101 | eDP0_TX0- / LVDS_A0- | 102 | LVDS_B0- |
| 103 | eDP0_TX1+ / LVDS_A1+ | 104 | LVDS_B1+ |
| 105 | eDP0_TX1- / LVDS_A1- | 106 | LVDS_B1- |
| 107 | eDP0_TX2+ / LVDS_A2+ | 108 | LVDS_B2+ |
| 109 | eDP0_TX2- / LVDS_A2- | 110 | LVDS_B2- |
| 111 | LVDS_PPEN | 112 | LVDS_BLEN |
| 113 | eDP0_TX3+ / LVDS_A3+ | 114 | LVDS_B3+ |
| 115 | eDP0_TX3- / LVDS_A3- | 116 | LVDS_B3- |
| 117 | GND | 118 | GND |
| 119 | eDP0_AUX+ / LVDS_A_CLK+ | 120 | LVDS_B_CLK+ |
| 121 | eDP0_AUX- / LVDS_A_CLK- | 122 | LVDS_B_CLK- |
| 123 | LVDS_BLT_CTRL | 124 | NC |
| 125 | LVDS_DID_DAT | 126 | eDP0_HPD# |
| 127 | LVDS_DID_CLK | 128 | NC |
| 129 | CAN0_TX | 130 | CAN0_RX |
| 131 | DP_LANE3+ | 132 | USB_SSTX1- |
| 133 | DP_LANE3- | 134 | USB_SSTX1+ |
| 135 | GND | 136 | GND |
| 137 | DP_LANE1+ | 138 | DP_AUX+ |
| 139 | DP_LANE1- | 140 | DP_AUX- |
| 141 | GND | 142 | GND |
| 143 | DP_LANE2+ | 144 | USB_SSRX1- |
| 145 | DP_LANE2- | 146 | USB_SSRX1+ |
| 147 | GND | 148 | GND |
| 149 | DP_LANE0+ | 150 | HDMI_CTRL_DAT |
| 151 | DP_LANE0- | 152 | HDMI_CTRL_CLK |
| 153 | HDMI_HPD# | 154 | DP_HPD# |
| 155 | PCIE_CLK_REF+ | 156 | PCIE_WAKE# |
| 157 | PCIE_CLK_REF- | 158 | PCIE_RST# |
| 159 | GND | 160 | GND |
| 161 | PCIE3_TX+ | 162 | PCIE3_RX+ |
| 163 | PCIE3_TX- | 164 | PCIE3_RX- |
| 165 | GND | 166 | GND |

| | | | |
|-----|---------------|-----|---------------|
| 167 | PCIE2_TX+ | 168 | PCIE2_RX+ |
| 169 | PCIE2_TX- | 170 | PCIE2_RX- |
| 171 | UART0_TX | 172 | UART0_RTS# |
| 173 | PCIE1_TX+ | 174 | PCIE1_RX+ |
| 175 | PCIE1_TX- | 176 | PCIE1_RX- |
| 177 | UART0_RX | 178 | UART0_CTS# |
| 179 | PCIE0_TX+ | 180 | PCIE0_RX+ |
| 181 | PCIE0_TX- | 182 | PCIE0_RX- |
| 183 | GND | 184 | GND |
| 185 | LPC_AD0 | 186 | LPC_AD1 |
| 187 | LPC_AD2 | 188 | LPC_AD3 |
| 189 | LPC_CLK | 190 | LPC_FRAME# |
| 191 | SERIRQ | 192 | NC |
| 193 | VCC_RTC | 194 | SPKR |
| 195 | FAN_TACHOIN | 196 | FAN_PWMOUT |
| 197 | GND | 198 | GND |
| 199 | SPI_MOSI | 200 | SPI_CS0# |
| 201 | SPI_MISO | 202 | SPI_CS1# |
| 203 | SPI_SCK | 204 | PULL LOW |
| 205 | VCC_5V_SB | 206 | VCC_5V_SB |
| 207 | RDC_COM2_CTS# | 208 | RDC_COM2_SIN |
| 209 | RDC_COM2_SOUT | 210 | RDC_COM2_RTS# |
| 211 | NC | 212 | NC |
| 213 | NC | 214 | NC |
| 215 | NC | 216 | NC |
| 217 | NC | 218 | NC |
| 219 | VCC | 220 | VCC |
| 221 | VCC | 222 | VCC |
| 223 | VCC | 224 | VCC |
| 225 | VCC | 226 | VCC |
| 227 | VCC | 228 | VCC |
| 229 | VCC | 230 | VCC |

Appendix **B**

Watchdog Timer

This appendix gives you the information about the watchdog timer programming on the SOM-3569 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 automatically select available IRQ number from BIOS, and then set to EC. Only Win10 support 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 gives you the information about the system resource allocation on the SOM-3569 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

Table C.1: System I/O ports

| Resource | Device |
|-----------------------|---|
| 0x00000299-0x0000029A | Motherboard resources |
| 0x000002C0-0x000002DF | Motherboard resources |
| 0x000002A0-0x000002BF | Motherboard resources |
| 0x00000290-0x0000029F | Motherboard resources |
| 0x0000029E-0x000002AD | Motherboard resources |
| 0x00000060-0x0000006F | Motherboard resources |
| 0x00000280-0x0000028F | Motherboard resources |
| 0x000002F0-0x000002F7 | 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 |
| 0x0000F040-0x0000F05F | Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4 |
| 0x000003F8-0x000003FF | Communications Port (COM1) |
| 0x000002F8-0x000002FF | Communications Port (COM2) |
| 0x00000200-0x0000027F | FuncDrv_CANController_IO for ACPI PNP1070 |
| 0x00000000-0x0000006F | PCI Express Root Complex |
| 0x00000078-0x00000CF7 | PCI Express Root Complex |
| 0x00000D00-0x0000FFFF | PCI Express Root Complex |
| 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 |
| 0x0000F000-0x0000F03F | Intel(R) HD Graphics |
| 0x0000E000-0x0000EFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD7 |
| 0x0000F090-0x0000F097 | Standard SATA AHCI Controller |
| 0x0000F080-0x0000F083 | Standard SATA AHCI Controller |
| 0x0000F060-0x0000F07F | Standard SATA AHCI Controller |
| 0x00000040-0x00000043 | System timer |
| 0x00000050-0x00000053 | System timer |

C.2 Interrupt Assignments

Table C.2: Interrupt Assignments

| Resource | Device |
|-----------------------------------|---|
| IRQ 0 | System timer |
| IRQ 3 | Communications Port (COM2) |
| IRQ 4 | Communications Port (COM1) |
| IRQ 6 | FuncDrv_CANController_IO for ACPI PNP1070 |
| IRQ 8 | System CMOS/real time clock |
| IRQ 14 | Intel(R) Serial IO GPIO Host Controller - INT3452 |
| IRQ 14 | ApolloLake SD Card - 5ACA |
| IRQ 25 | High Definition Audio Controller |
| IRQ 31 | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| IRQ 39 | ApolloLake eMMC - 5ACC |
| IRQ 1024 | ApolloLake SD Card - 5ACA |
| IRQ 4294967279 | Intel(R) Imaging Signal Processor 2600 |
| IRQ 4294967280 | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft) |
| IRQ 4294967281~ IRQ 4294967286 | Intel(R) I211 Gigabit Network Connection |
| IRQ 4294967287 | Intel(R) Trusted Execution Engine Interface |
| IRQ 4294967288 | Intel(R) HD Graphics |
| IRQ 4294967289 | Standard SATA AHCI Controller |
| IRQ 4294967290 | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD7 |
| IRQ 4294967291 | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADB |
| IRQ 4294967292 | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5ADA |
| IRQ 4294967293 | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
| IRQ 4294967294 | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |

C.3 1st MB Memory Map

| Table C.3: 1st MB Memory Map | |
|------------------------------|---|
| Resource | Device |
| 0xE0000000-0xFFFFFFFF | Motherboard resources |
| 0xE0000000-0xFFFFFFFF | PCI Express Root Complex |
| 0xFE000000-0xFE000000 | Motherboard resources |
| 0xFED01000-0xFED01FFF | Motherboard resources |
| 0xFED03000-0xFED03FFF | Motherboard resources |
| 0xFED06000-0xFED06FFF | Motherboard resources |
| 0xFED08000-0xFED09FFF | Motherboard resources |
| 0xFED80000-0xFED80FFF | Motherboard resources |
| 0xFED1C000-0xFED1CFFF | Motherboard resources |
| 0xFEE00000-0xFEE00000 | Motherboard resources |
| 0x82210000-0x82213FFF | High Definition Audio Controller |
| 0x82000000-0x82000000 | High Definition Audio Controller |
| 0x82216000-0x822160FF | Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4 |
| 0x82218000-0x82218FFF | ApolloLake eMMC - 5ACC |
| 0x82217000-0x82217FFF | ApolloLake eMMC - 5ACC |
| 0x8221C000-0x8221CFFF | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| 0x8221B000-0x8221BFFF | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| 0xFED00000-0xFED0003F | High precision event timer |
| 0x82200000-0x82200000 | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft) |
| 0xA0000-0xBFFFF | PCI Express Root Complex |
| 0xC0000-0xDFFFF | PCI Express Root Complex |
| 0xE0000-0xFFFF | PCI Express Root Complex |
| 0x7C000001-0x7C000001 | PCI Express Root Complex |
| 0x7B800001-0x7B800001 | PCI Express Root Complex |
| 0x80000000-0xCFFFFFFF | PCI Express Root Complex |
| 0x82221000-0x82221FFF | Intel(R) Trusted Execution Engine Interface |
| 0x81000000-0x81000000 | Intel(R) HD Graphics |
| 0x90000000-0x90000000 | Intel(R) HD Graphics |
| 0xD0C00000-0xD0C00653 | Intel(R) Serial IO GPIO Host Controller - INT3452 |
| 0x82100000-0x82100000 | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD7 |
| 0x82100000-0x82100000 | Intel(R) I211 Gigabit Network Connection |
| 0x8221A000-0x8221AFFF | ApolloLake SD Card - 5ACA |
| 0x82219000-0x82219FFF | ApolloLake SD Card - 5ACA |
| 0x82214000-0x82215FFF | Standard SATA AHCI Controller |
| 0x8221E000-0x8221E0FF | Standard SATA AHCI Controller |
| 0x8221D000-0x8221D7FF | Standard SATA AHCI Controller |
| 0x82120000-0x82123FFF | Intel(R) I211 Gigabit Network Connection |
| 0xCF000000-0xCFFFFFFF | Intel(R) Imaging Signal Processor 2600 |

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