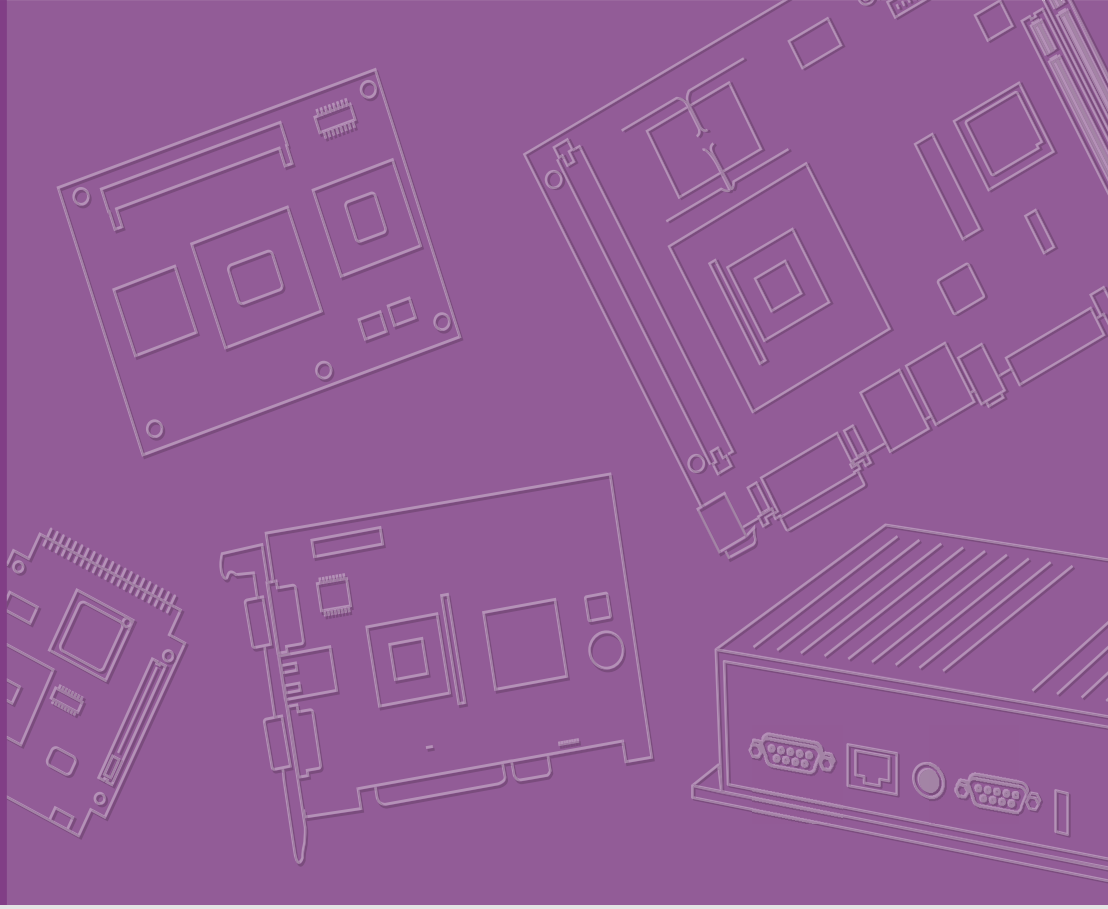

User Manual

SOM-7568

ADVANTECH

Enabling an Intelligent Planet

Copyright

Acknowledgements

Intel and Pentium are trademarks of Intel Corporation.

Microsoft Windows and MS-DOS are registered trademarks of Microsoft Corp.

All other product names or trademarks are properties of their respective owners.

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 merchandize 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.

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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@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-7568 CPU module
- 1 x Heatspreader (1960072329N001)

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 gives background information on the SOM-7568 CPU Computer on Module

Sections include:

- Introduction
- Specification
- Functional Block Diagram

1.1 Introduction

Advantech, a leading embedded computing solution provider, today announced the release of its new, low power, fanless COM Express Mini Module—SOM-7568. SOM-7568 is equipped with the latest Intel® Pentium® N3710, Celeron® N3160 and Celeron® N3010 single-chip processors, which are manufactured on new 14-nm process technology. SOM-7568 supports up to 4GB dual channel DDR3L 1600 MT/s non-ECC onboard memory, with higher memory bandwidth for better performance. In addition, this mini module supports 4GB to 32GB eMMC onboard storage; it is suitable for lower power handheld applications such as in the in-vehicle, medical, military, and transportation fields.

SOM-7568 features low power Intel® gen. 8 graphics integrated in the SoC, with up to 16 Execution Units, and has 2x the graphics performance compared with the previous platform. Based on this new Intel® platform, SOM-7568 is the first product that supports H.265 HW decoder and includes the latest 3D acceleration DX 11.1, OpenGL 4.2 function. In addition, this mini module provides multiple display interfaces–one channel LVDS or eDP, and HDMI/DisplayPorts, which are able to support dual displays. SOM-7568 boasts 4K2K display resolution, well beyond previous platforms.

Featuring business-card sized dimensions (84 x55 mm), SOM-7568 offers higher performance with TDP, down to 4W/6W. Furthermore, this product is designed to support wide-range voltage input from 4.75 to 20V; this provides flexible options to fulfill various application requirements. Meanwhile, SOM-7568 adopts a rich array of I/O interfaces including 3 PCIe x1 for better data transmission, and offers one Intel® i211 LAN controller, 3 SATA Gen3, 8 USB 2.0, 2 USB 3.0, 2 COM ports, SMBus, I2C, and HD audio interface functions.

Advantech iManager 2.0 was designed to satisfy many 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, etc. Combining Advantech SUSI Access, it can remotely monitor and control devices through the internet for easy maintenance. All Advantech COM Express modules integrate iManager and SUSI Access.

1.2 Specifications

1.2.1 Board Information

- **Pin Definition:** PICMG COM.0 R2.1 Type 10 pin-out definition
- **Form Factor:** PICMG COM.0 R2.1 Compact Module 84x55 mm

1.2.2 System Information

- **CPU:** Intel® Pentium®/Celeron® N3000 & Atom Series

CPU	CPU Stepping	Base Freq. (GHz)	Burst Freq. (GHz)	Core	Cache (MB)	TDP(W)
Pentium® N3700	C	1.6	2.4	4	2	6
Pentium® N3710	D	1.6	2.56	4	2	6
Celeron® N3160	D	1.6	2.24	4	2	6
Celeron® N3060	D	1.6	2.48	2	2	6
Celeron® N3010	D	1.04	2.24	2	2	4
Atom™ X5-E8000	D	1.04	2	4	2	5

Note! *Intel C stepping CPU might be EOL after Intel D stepping CPU ready.*

- **Chipset:** N/A
- **Memory:** Onboard DDR3L 1600 Dual Channel Up to 8GB
- **BIOS:** AMI UEFI BIOS @ 64Mb
- **Power management:** Supports power saving modes including Normal / Standby / Suspend modes. ACPI 2.0 compliant

1.2.3 Display

- **Graphic Core:** Intel® HD Graphic Series supports DX 11.1, OpenGL 4.2, OpenGL ES 3.0, OpenCL 1.2
  HW Decode: HEVC (H.265) @ L5, H.264 @ 5.2, MPEG2, MVC, VC-1, WMV9, JPEG/MJPEG, VP8
  HW Encode: H.264 @ 5.1, MVC, JPEG/MJPEG

CPU	Graphics Core	Base Freq. (MHz)	Burst Freq. (MHz)
Pentium® N3700	Intel® HD graphics	400	700
Pentium® N3710	Intel® HD graphics	400	700
Celeron® N3160	Intel® HD graphics	320	640
Celeron® N3060	Intel® HD graphics	320	640
Celeron® N3010	Intel® HD graphics	320	600
Atom™ X5-E8000	Intel® HD graphics	320	600

- **LVDS:** Single channel 18/24-bit, up to 1366 x 768
  Optional eDP: Up to 3840 x 2160 @ 30Hz or 2560 x 1600 @ 60Hz; eDP Version 1.4
- **HDMI/DP:** Up to 3840 x 2160 @ 30Hz or 2560 x 1600 @ 60Hz, 24 bpp; HDMI Version 1.4b; DisplayPort Version 1.1a Resolution: HDMI up to 4096x2304 @ 24Hz

- **Dual Display:**
  LVDS + HDMI (default)
  LVDS + DP
  LVDS + DVI
  eDP + HDMI
  eDP + DP
  eDP + DVI

1.2.4 Expansion Interface

- **PCI Express x1:** Supports 3 ports PCIe x1. Several configurable combinations may need BIOS modification. Please contact Advantech sales or FAE for more details.

	x4	x2	x1	LAN
Default	0	0	3	1
Option 1	1	0	0	0

- **Audio Interface:** HD Audio interface
- **LPC Bus:** Yes
- **SMBus:** Yes
- **I2C Bus:** Up to 1MB/s
- **SPI:** Supports SPI BIOS only

1.2.5 I/O

- **Ethernet:** Intel I211AT Gigabit LAN supports 10/100/1000 Mbps Speed
- **SATA:** 2 Ports, supports Gen3 (6Gb/s) and Gen2 (3 Gb/s) or Gen 1(1.5 Gb/s)
- **USB Interface:** Supports 2 ports USB3.0, 8 ports USB 2.0
- **Panel Control:** Supports panel backlight on/off control, brightness control
- **Thermal Protection:** Supports thermal shutdown or CPU throttling
- **Watchdog Timer:** 65536 level timer interval, from 0~65535 sec, multi-level, multi-option watchdog timer
- **Smart Fan:** 2 Ports; 1 Port on COM Module. supports 12V Fan, 1 Port on Carrier Board
- **GPIO:** 8-bit GPIO
- **Hardware Monitor:** Vin: 4.75 (5-5%) ~ 20V (19+5%), VSB: 5V±5%
- **TPM:** N/A

1.2.6 Onboard Storage

- **eMMC/SATA SSD:** eMMC4.51, 4GB to 32GB

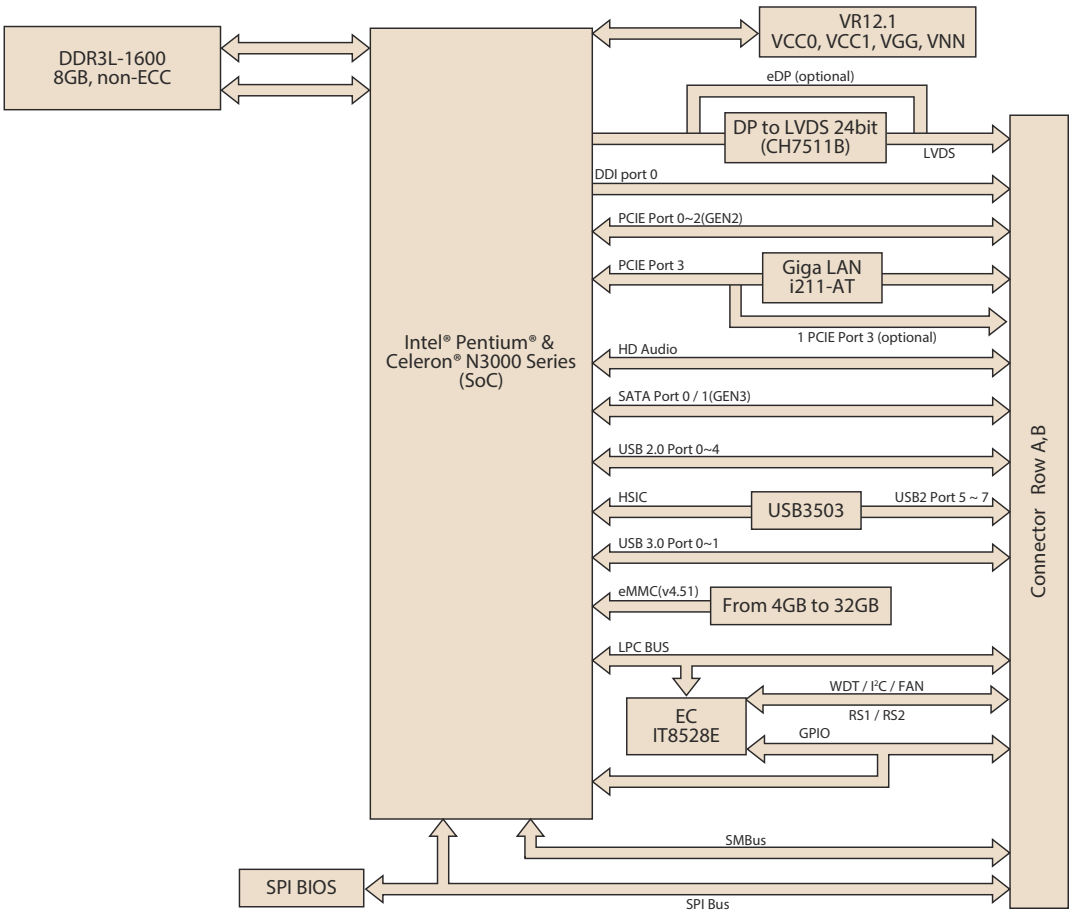
1.2.7 iManager

Refer to section 4.3.

1.2.8 Mechanical and Environmental Specification

- **Dimensions:** 84 x 55 mm (3.3" x 2.17")
- **Power Type and Supply Voltage:**
  ATX (Vin 8.5-20V, Vsb 4.75-5.25V)
- **Power Requirement:**
  Test condition: Intel(R) Celeron(R) N3700 @1.60 GHz
  Samsung_K4B4G1646D-BYK0 4GB
  WIN8.1 Pro, rated voltage DC +12.0V, +5.0V and +20V
  Idle: 2.64 W
  Max: 6.99 W
- **Temperature Specification:**
  Operating: 0 ~ 60° C (32 ~ 140° F)
  Storage: -40 ~ 85° C (-40 ~ 185° F)
- **Humidity Specification:**
  Operating: 40° C @ 95% relative humidity, non-condensing
  Storage: 60° C @ 95%relative humidity, non-condensing

1.3 Functional Block Diagram



Chapter 2

Mechanical Information

This chapter gives mechanical information on the SOM-7568 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-7568 Computer-on-Module. Please be aware of these locations while designing your own carrier board to avoid mechanical and thermal problems.

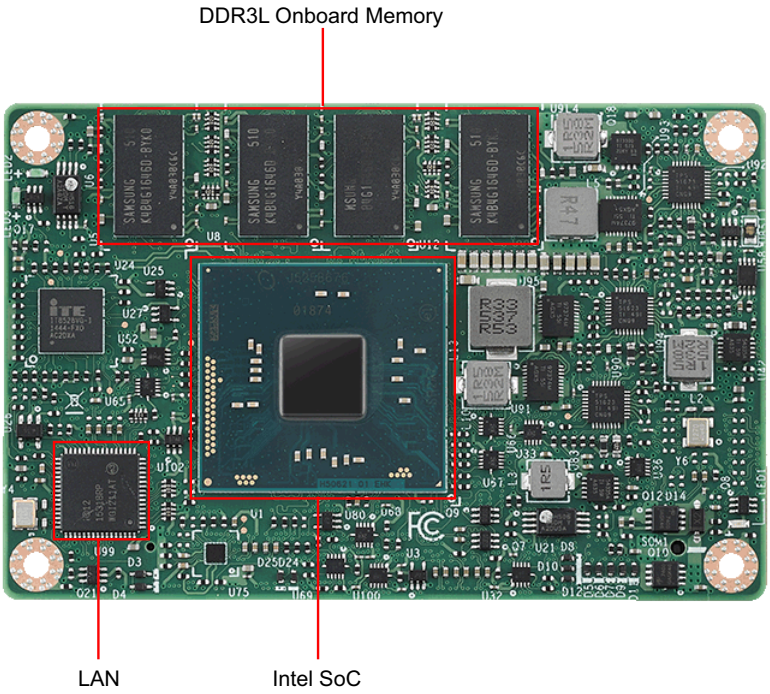


Figure 2.1 Board Chips Identify - Front

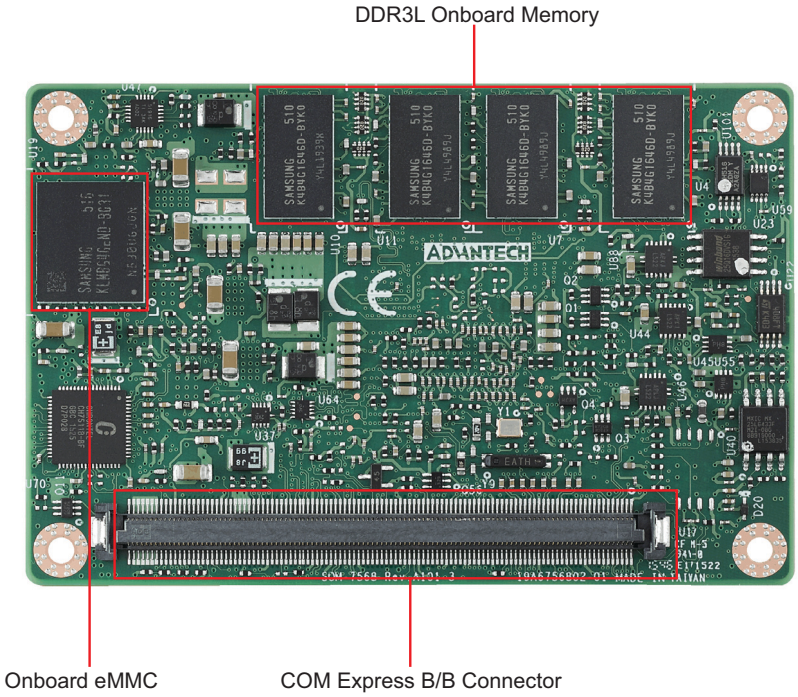


Figure 2.2 Board Chips Identify - Back

2.2 Mechanical Drawing

For more details of 2D/3D models, please go to Advantech's COM support service website: http://com.advantech.com

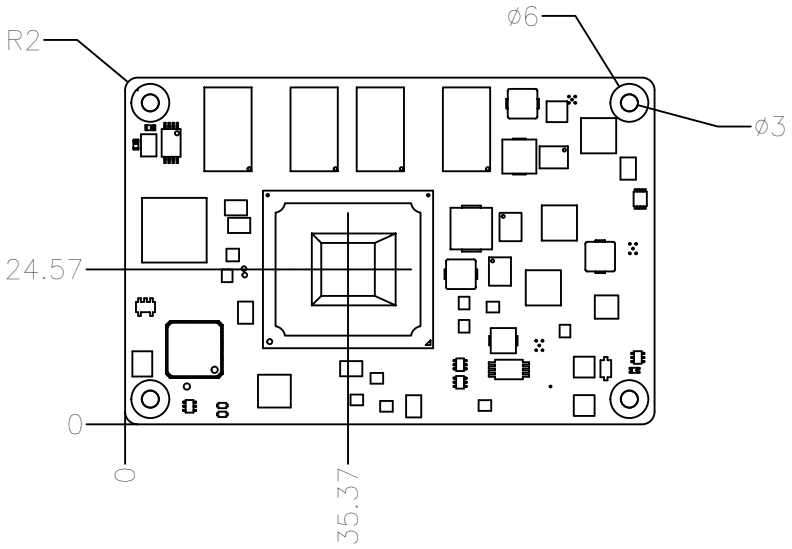


Figure 2.3 Board Mechanical Drawing - Front

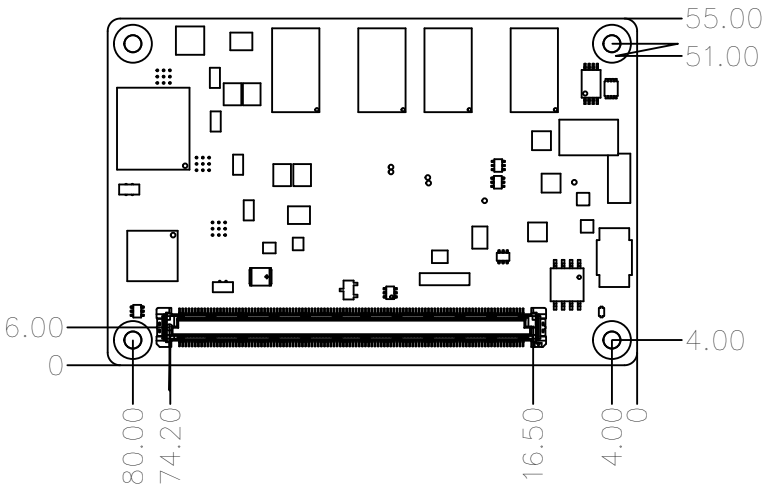


Figure 2.4 Board Mechanical Drawing - Back

2.3 Assembly Drawing

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

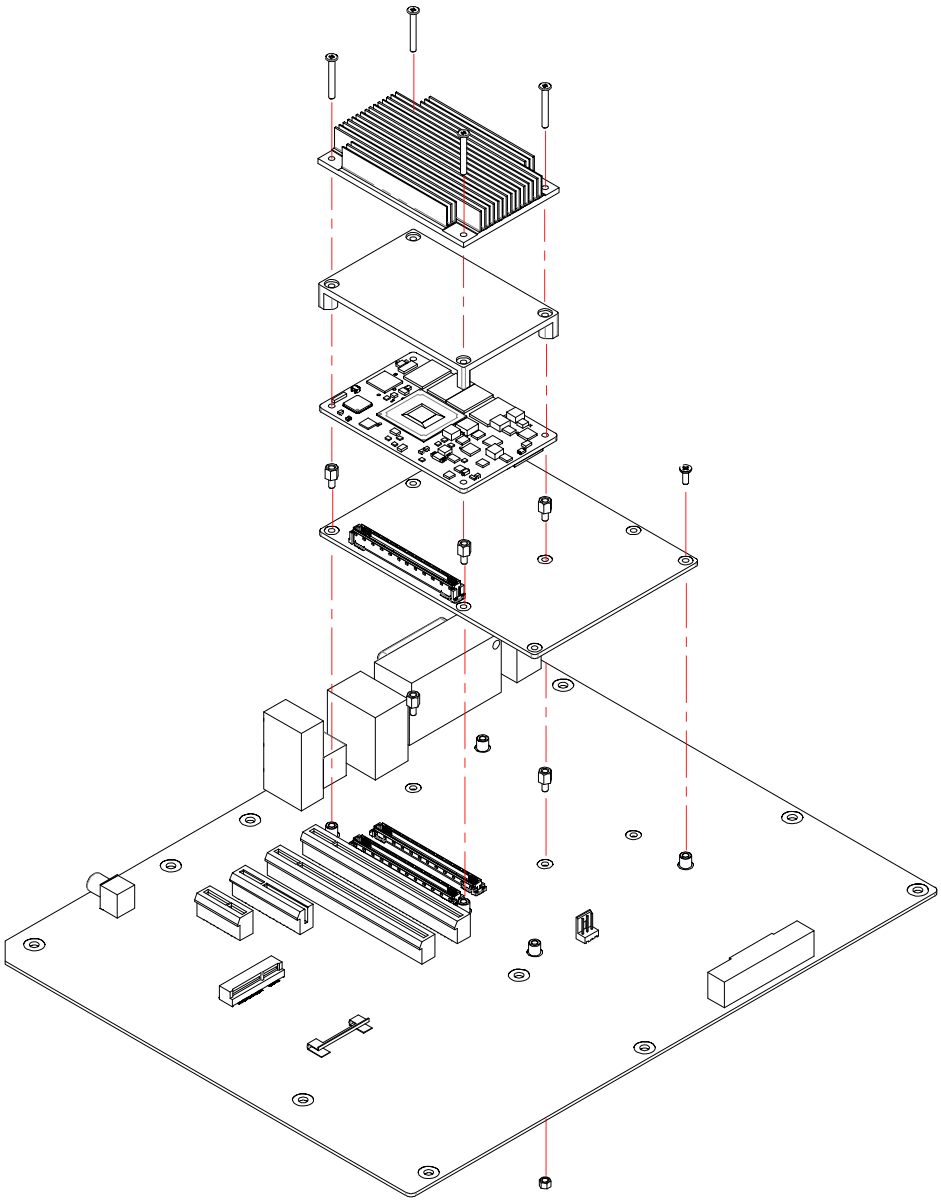
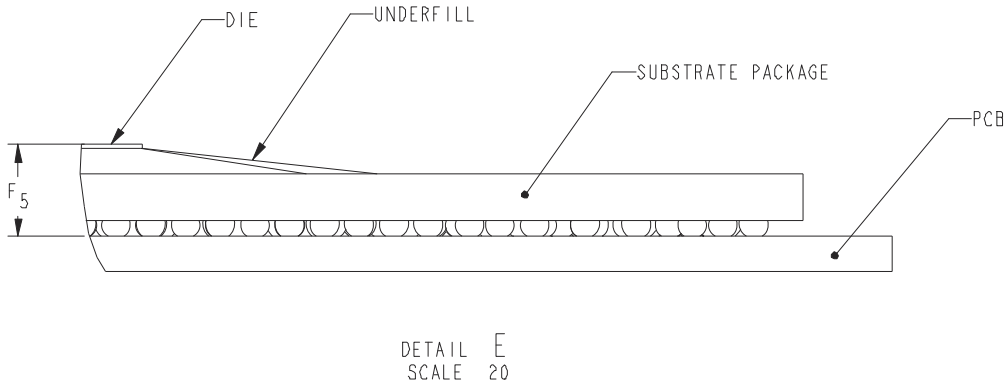


Figure 2.5 Assembly Drawing

2.4 Assembly Drawing

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



*F5=NOM: 1.282 TOL:±0.098 (POST SMT STACKUP HEIGHT BASED ON LIMITED DATA FROM INTEL REFERENCE BOARD DESIGN)

Figure 2.6 Main Chip Height and Tolerance

Chapter 3

AMI BIOS

This chapter gives BIOS setup information for the SOM-7568 CPU computer-on module.

Sections include:

- Introduction
- Entering Setup

3.1 Introduction

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.

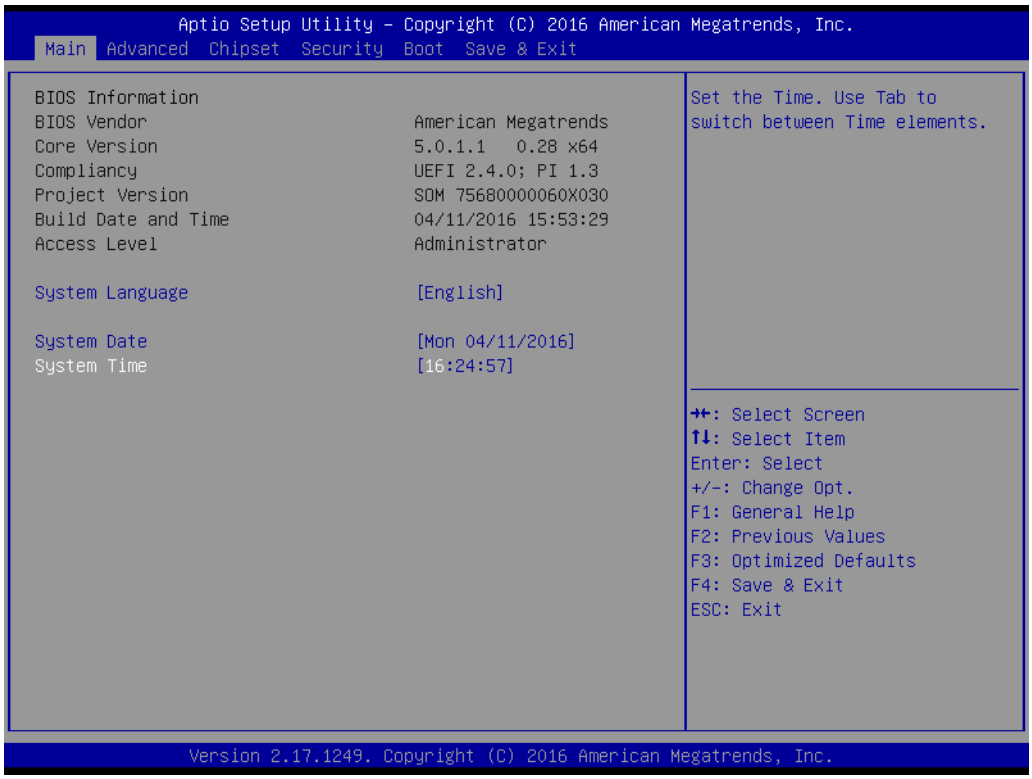


Figure 3.1 Setup Program Initial Screen

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 <F2> or <DEL> to enter Setup menu.

3.2.1 Main Setup

When users first enter the BIOS Setup Utility, users will enter the Main setup screen. Users can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.

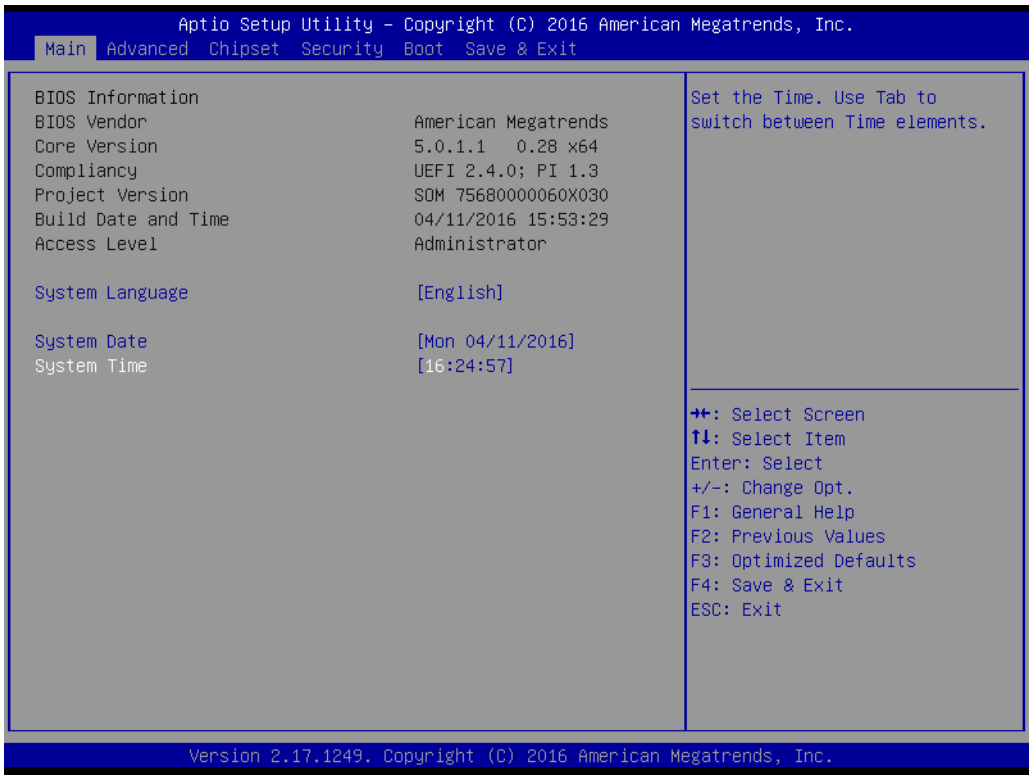


Figure 3.2 Main Setup Screen

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.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the SOM-7568 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.

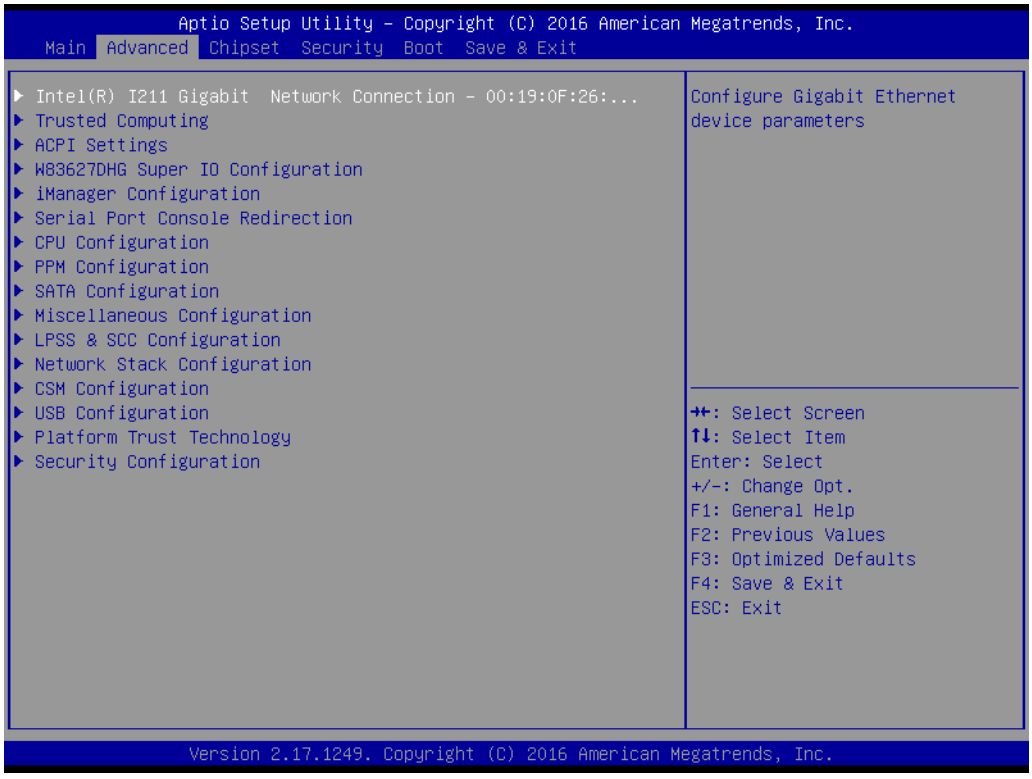


Figure 3.3 Advanced BIOS Features Setup Screen

3.2.2.1 Intel® I211 Gigabit Network Connection- 00:19:0F:26:...

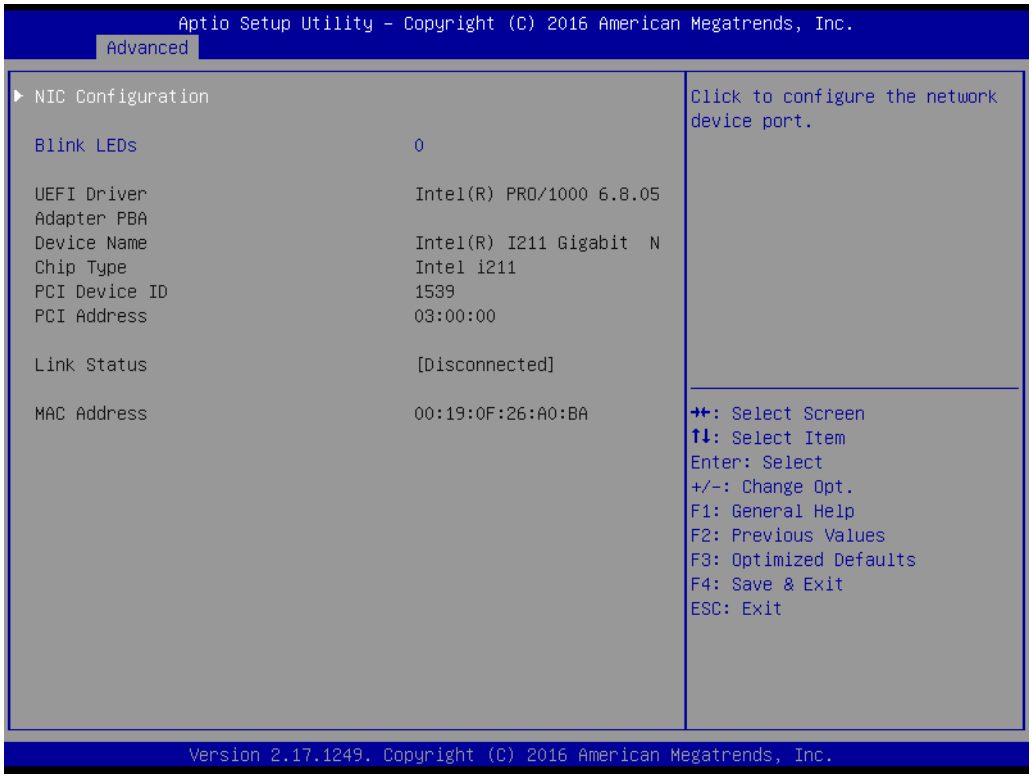


Figure 3.4 Intel® I211 Gigabit Network Connection

- **NIC Configuration**
  Set configuration for network device port.
- **Blink LEDs**
  Identify the physical network port by blinking the associated LED.

NIC Configuration

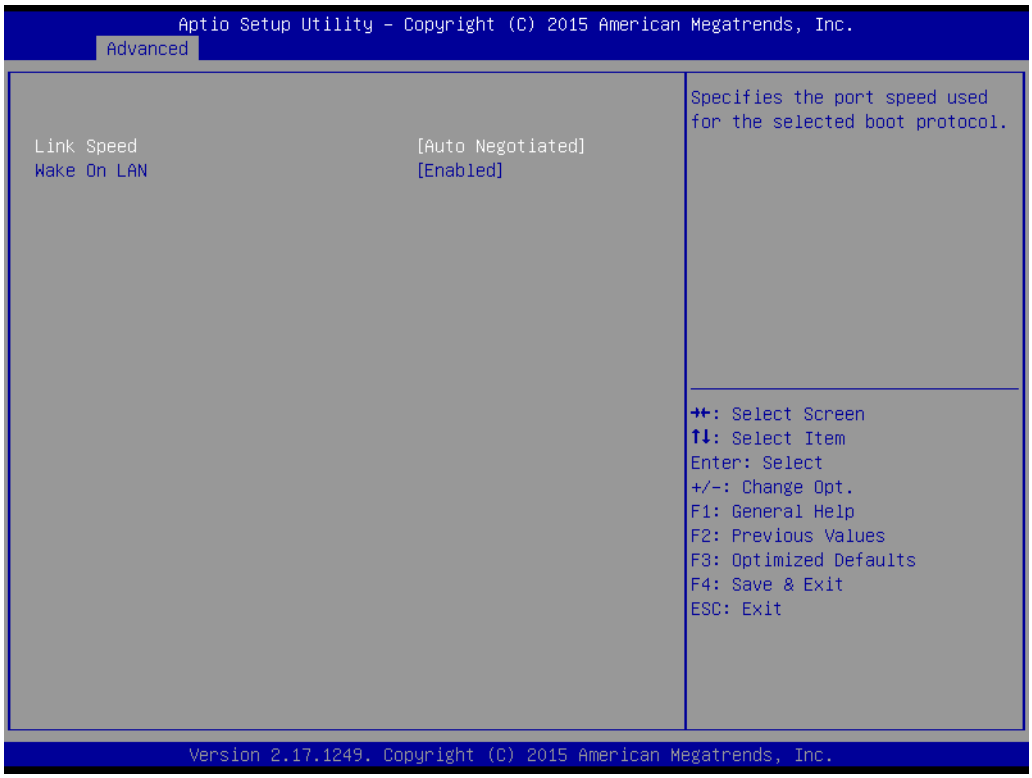


Figure 3.5 NIC Configuration

- **Link Speed**
  Select the boot protocol port speed.
- **Wake On LAN**
  Enables or Disables the server to be powered on using an in-band magic packet.

3.2.2.2 Trusted Computing

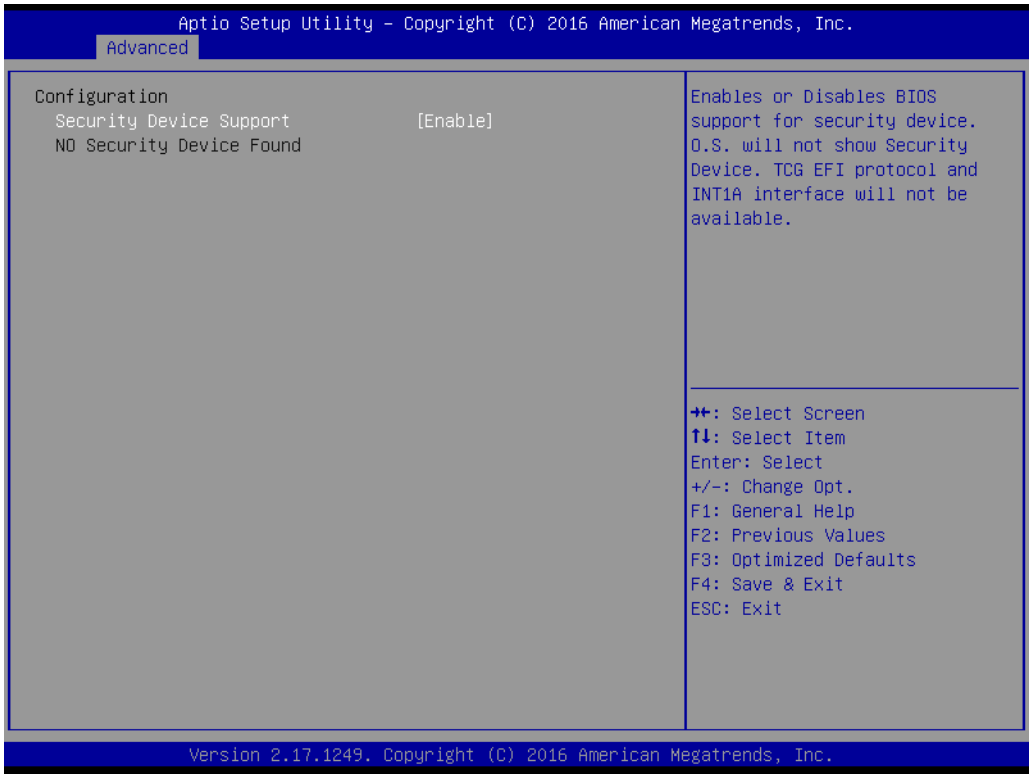


Figure 3.6 Trusted Computing

- **Security Device Support**
  Enable or Disables BIOS support for security device. OS will not show security Device. TCG EFI protocol and INT1A interface will not be available.
- **Device Select**
  Select the device. TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices if no found. TPM 1.2 devices will be enumerated.

3.2.2.3 ACPI Settings

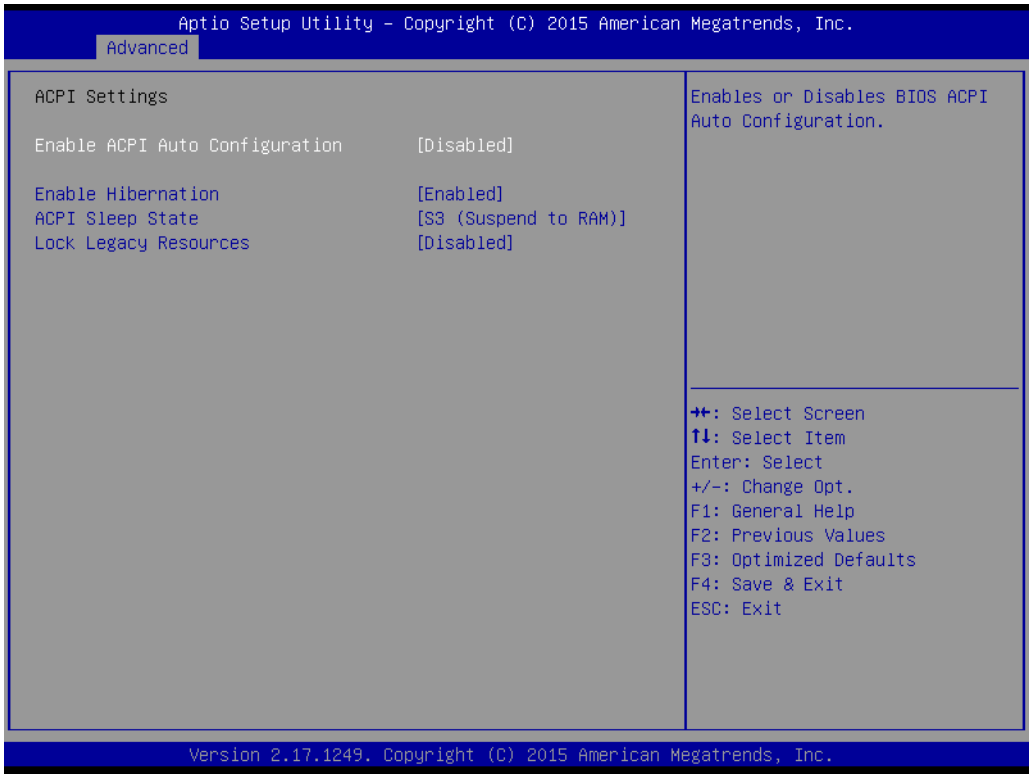


Figure 3.7 ACPI Settings

- **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.

3.2.2.4 W83627DHG Super IO Configuration

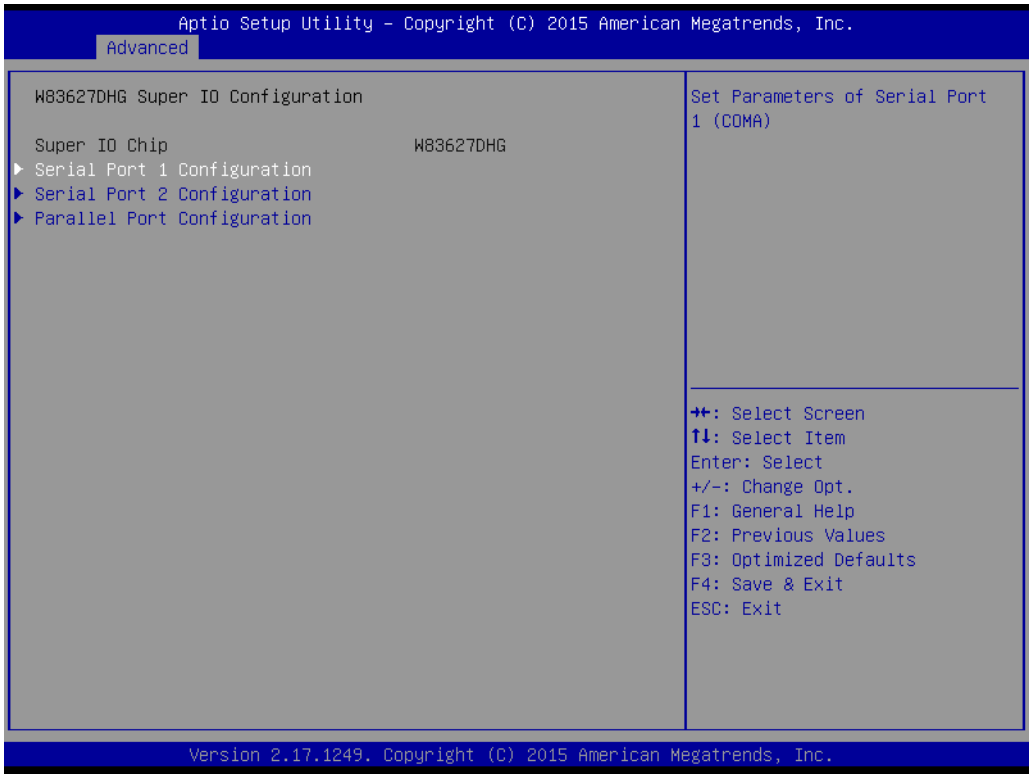


Figure 3.8 W83627DHG Super IO Configuration

- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1 (COM1).
- **Serial Port 2 Configuration**
  Set Parameters of Serial Port 2 (COM2).
- **Parallel Port Configuration**
  Set Parameters of Parallel Port (LPT/LPTE).

Serial Port 1 Configuration

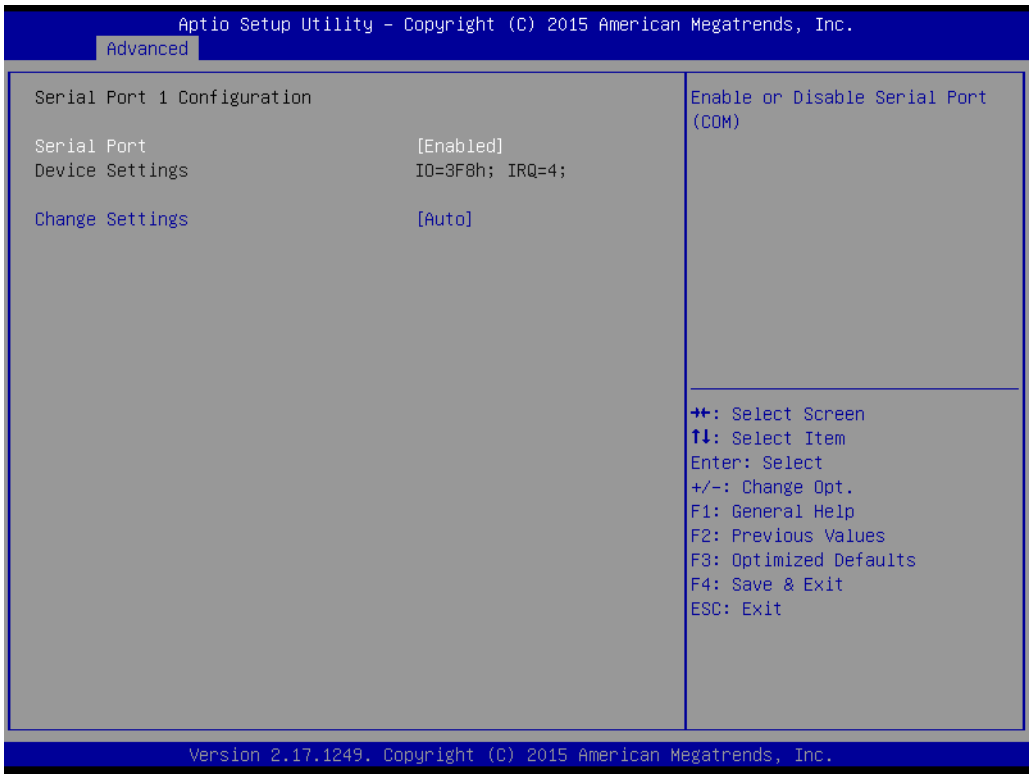


Figure 3.9 Serial Port 1 Configuration

- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select an optimal setting for Super IO device.

Serial Port 2 Configuration

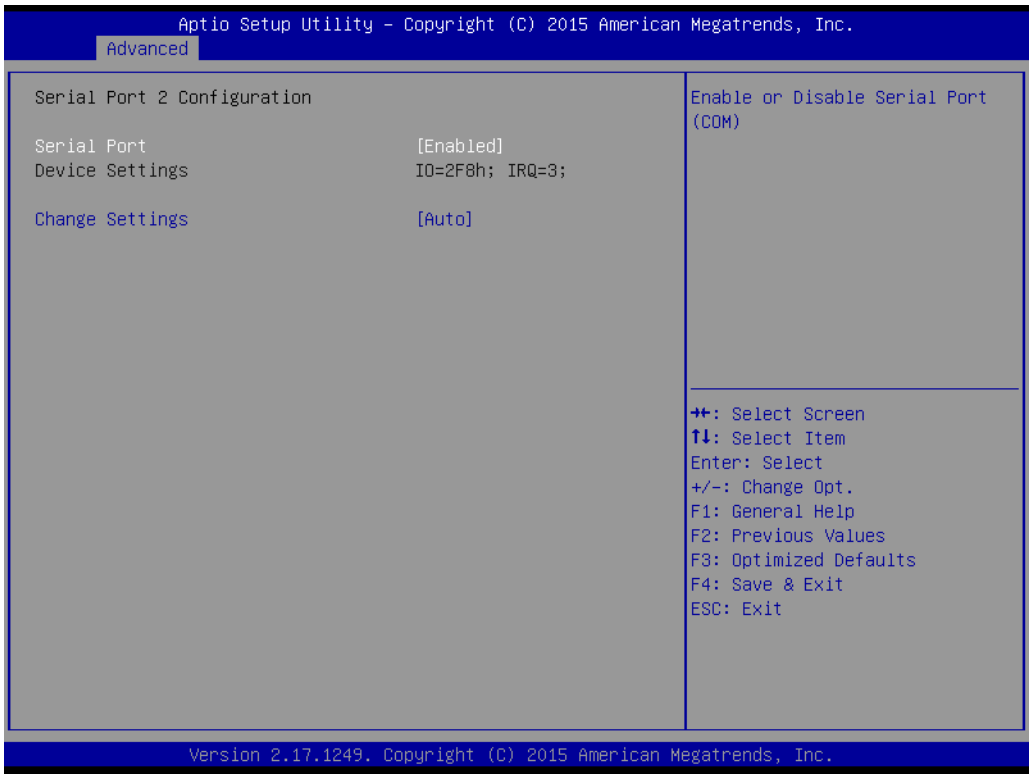


Figure 3.10 Serial Port 2 Configuration

- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select an optimal setting for Super IO device.

Parallel Port Configuration

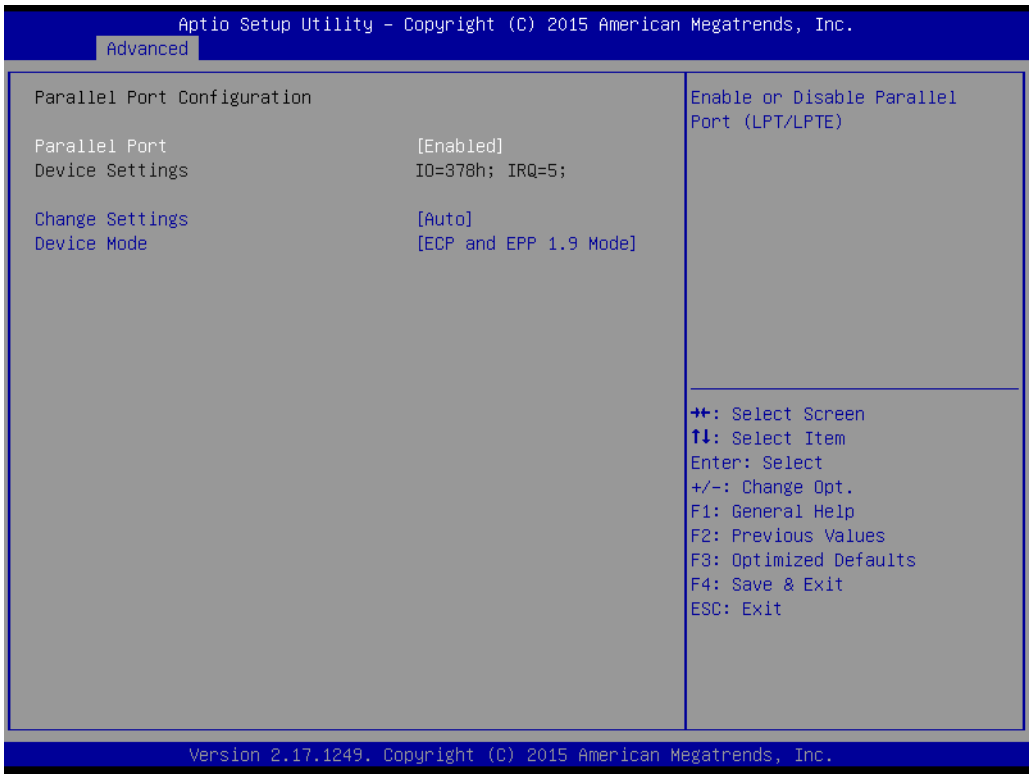


Figure 3.11 Parallel Port Configuration

- **Parallel Port**
  Enable or Disable Parallel Port (LPT/LPTE).
- **Change Settings**
  Select an optimal setting for the Super IO device.
- **Device Mode**
  Change the Printer Port mode.

3.2.2.5 iManager Configuration

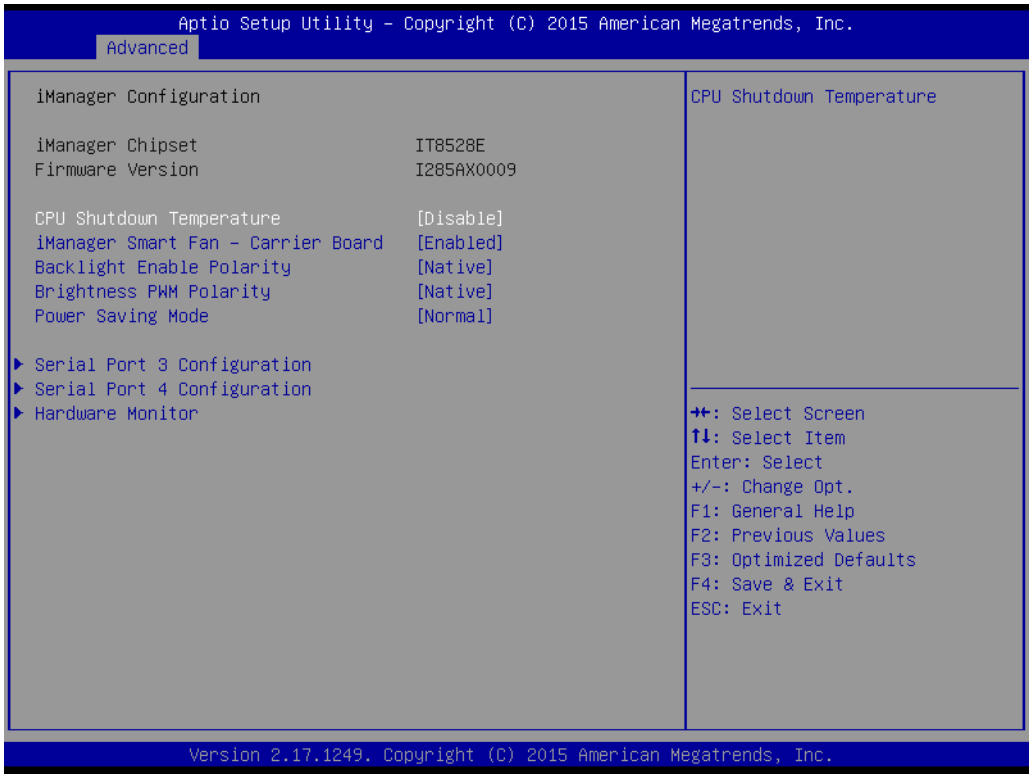


Figure 3.12 iManager Configuration

- **CPU Shutdown Temperature**
  Enable/Disable CPU Shutdown Temperature.
- **iManager Smart Fan – Carrier Board**
  Control iManager Smart FAN Carrier Board function.
- **Backlight Enable Polarity**
  Switch Backlight Enable Polarity for Native or Invert.
- **Brightness PWM Polarity**
  Switch Backlight Control Brightness PWM Polarity for Native or Invert.
- **Power Saving Mode**
  Select Ite8528 Power Saving Mode.
- **Serial Port 3 Configuration**
  Set Parameters of Serial Port 3.
- **Serial Port 4 Configuration**
  Set Parameters of Serial Port 4.
- **Hardware Monitor**
  Monitor hardware status.

Serial Port 3 Configuration

Figure 3.13 Serial Port 3 Configuration

- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select an optimal setting for the Super IO device.

Serial Port 4 Configuration

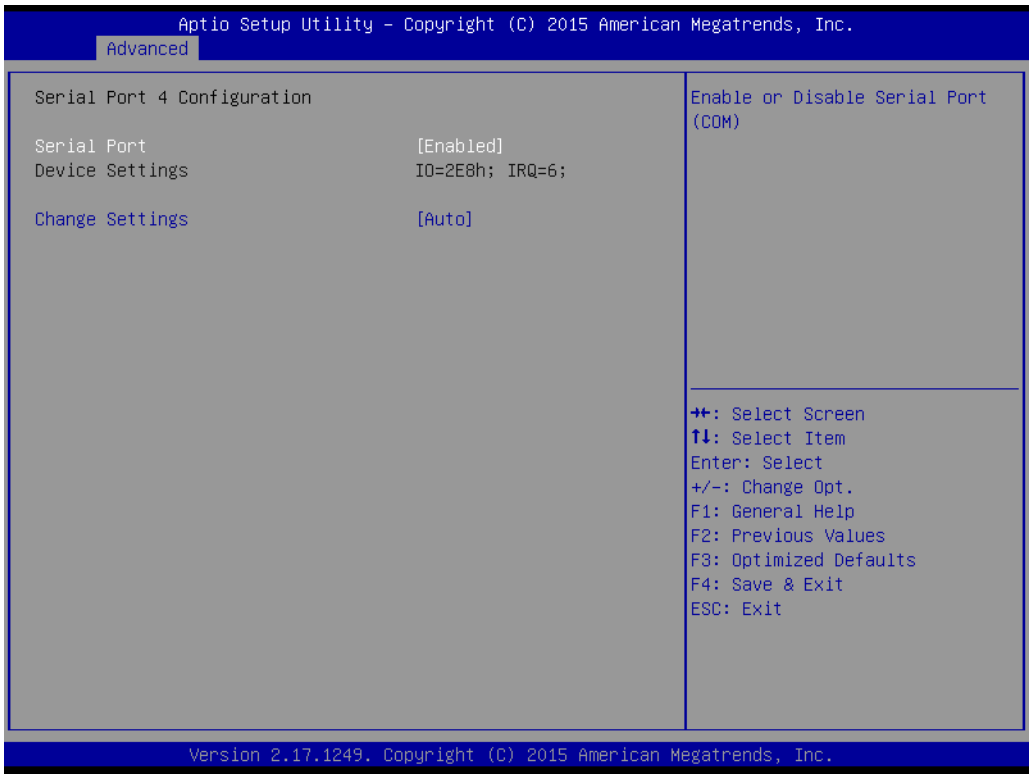


Figure 3.14 Serial Port 4 Configuration

- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select an optimal setting for the Super IO device.

Hardware Monitor

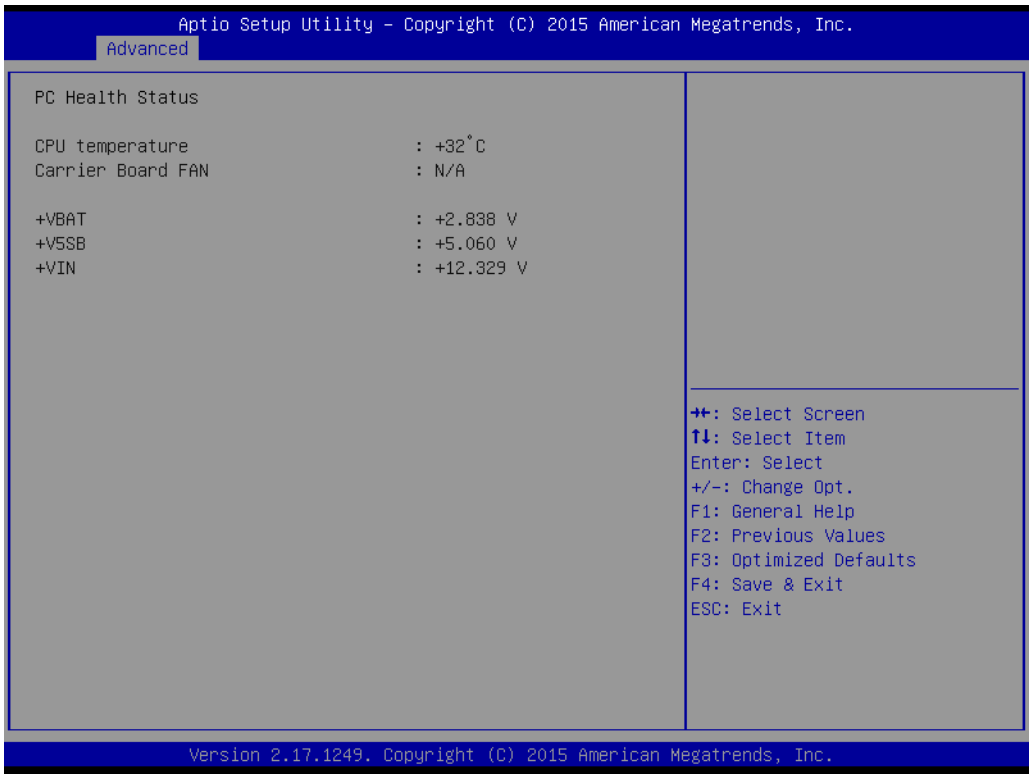


Figure 3.15 Hardware Monitor

- **Hardware Monitor Information**
  This item shows Hardware information parameters.

3.2.2.6 Serial Port Console Redirection

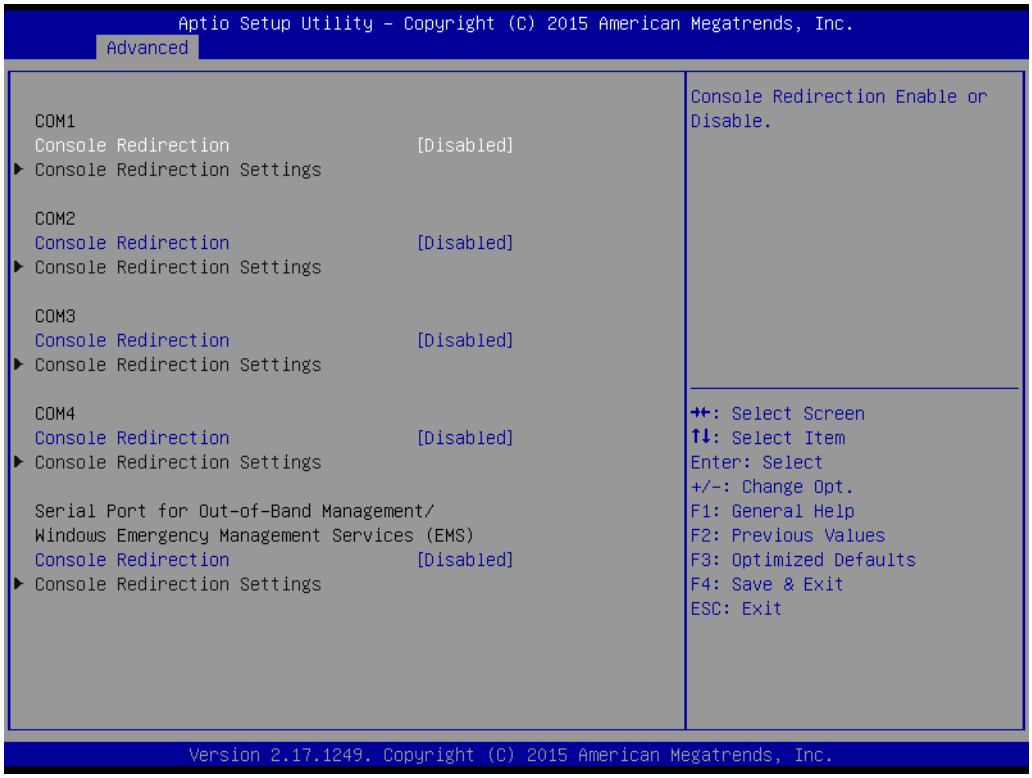


Figure 3.16 Serial Port Console Redirection

- **COM1 Console Redirection**
  Console Redirection Enable or Disable.
- **COM2 Console Redirection**
  Console Redirection Enable or Disable.
- **COM3 Console Redirection**
  Console Redirection Enable or Disable.
- **COM4 Console Redirection**
  Console Redirection Enable or Disable.
- **Serial Port for Out-of-Band Management / Windows Emergency Management Service (EMS) Console Redirection**
  Console Redirection Enable or Disable.

3.2.2.7 CPU Configuration

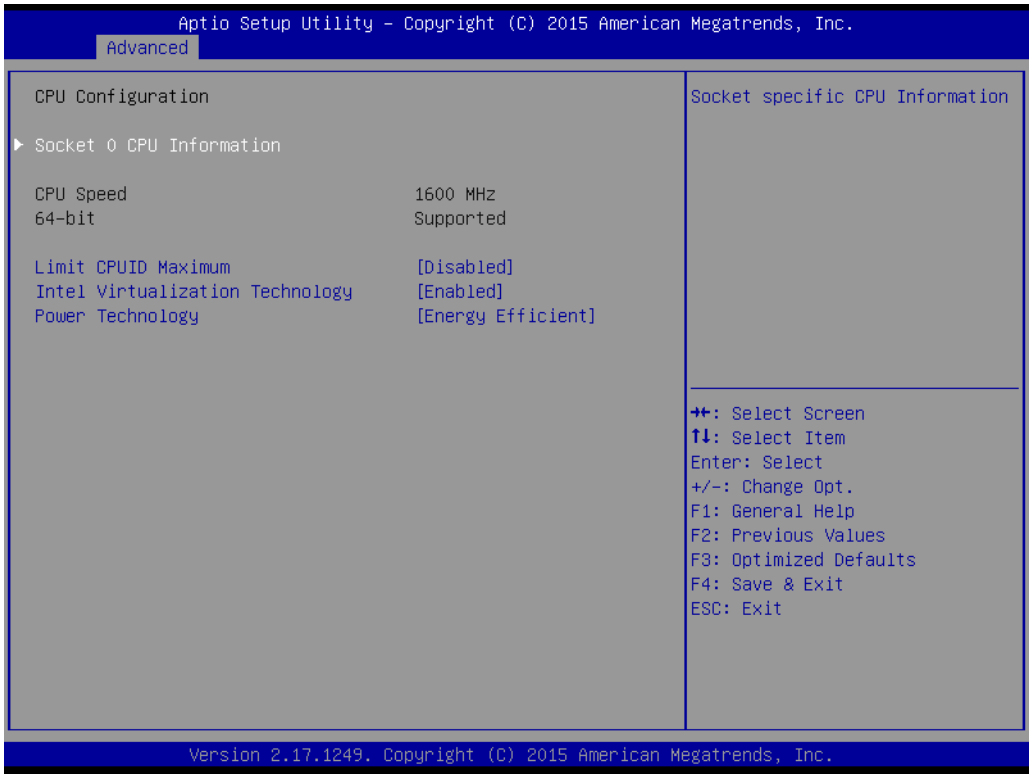


Figure 3.17 CPU Configuration

- **Socket 0 CPU Information**
  Socket specific CPU Information.
- **Limit CPUID Maximum**
  This item is disabled for Windows XP.
- **Intel Virtualization Technology**
  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **Power Technology**
  Enable power management features.

Socket 0 CPU Configuration

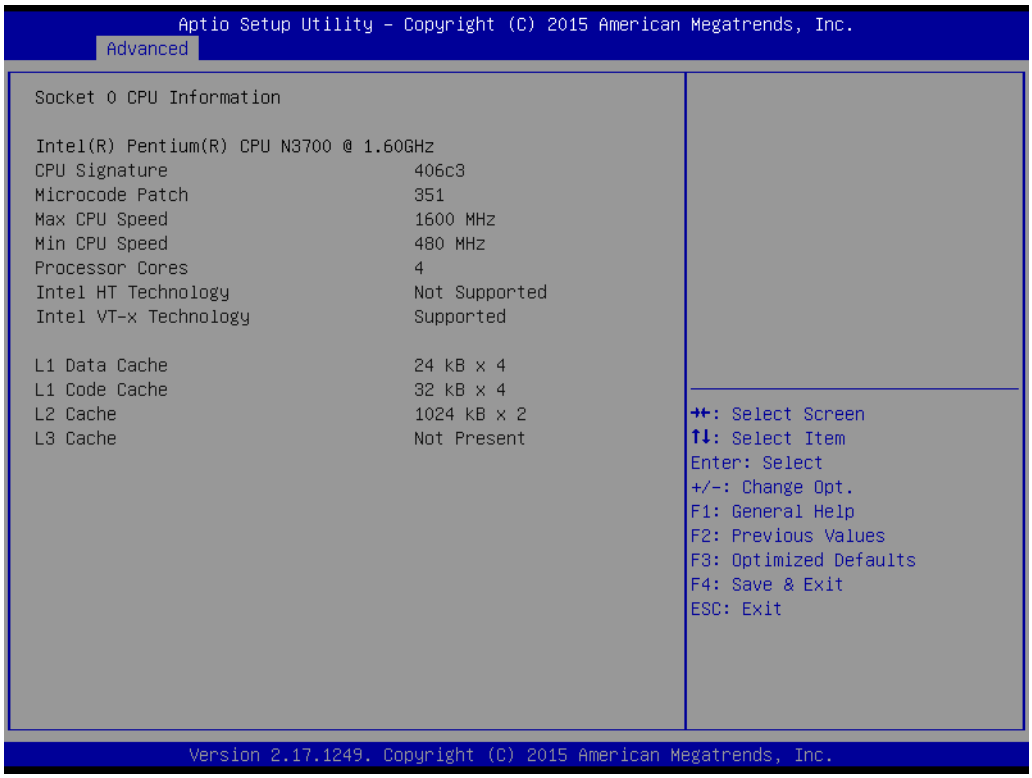


Figure 3.18 Socket 0 CPU Configuration

- **Socket 0 CPU Information**
  Socket specific CPU Information.

PPM Configuration

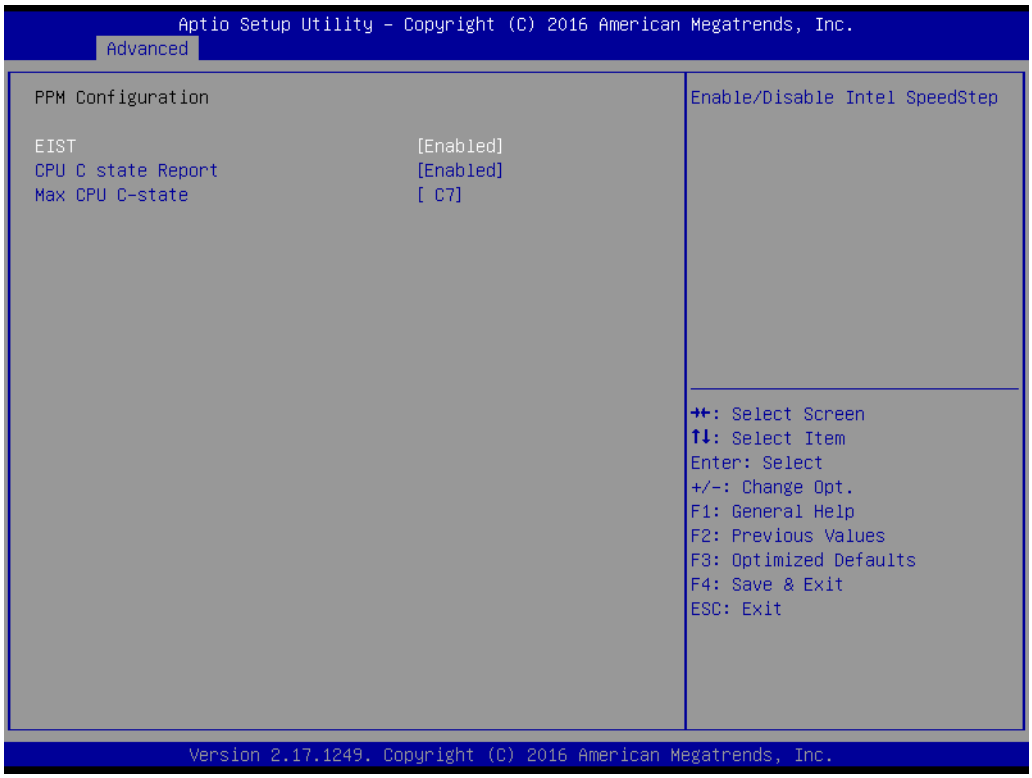


Figure 3.19 PPM Configuration

- **EIST**
  Enable/Disable Intel SpeedStep.
- **CPU C state Report**
  Enable or disable CPU C states (only available for N3700 SKU).
- **MAX CPU C-state**
  Select C-state level (only available for N3700 SKU).

3.2.2.8 SATA Configuration

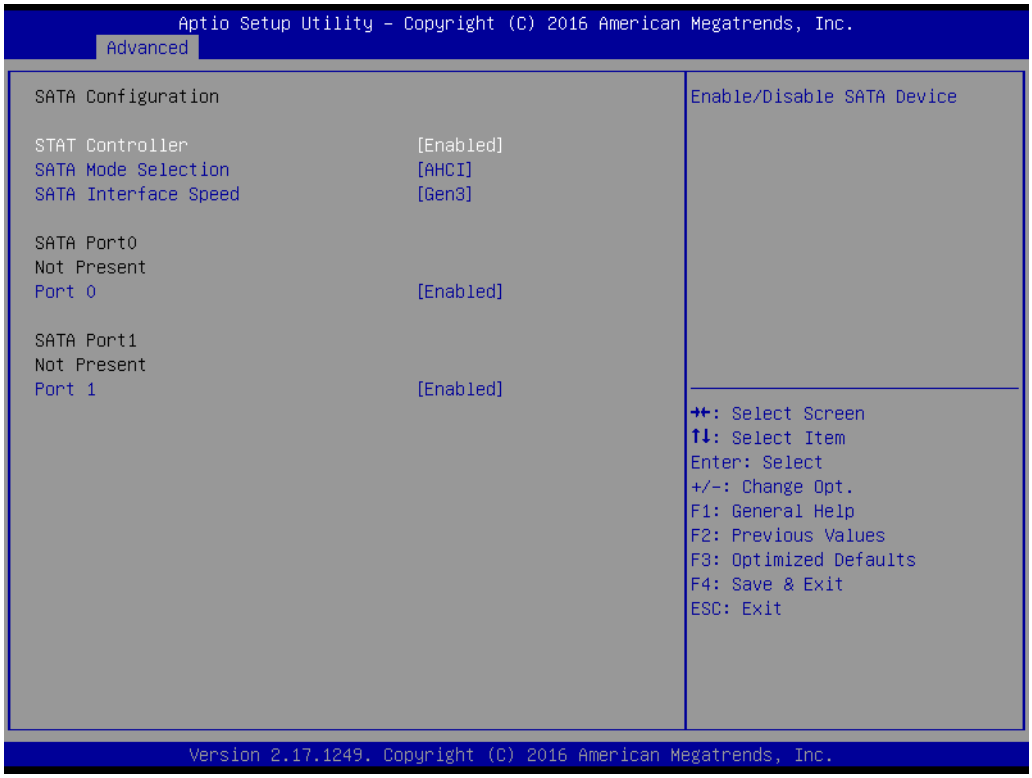


Figure 3.20 SATA Configuration

- **SATA Controller**
  Enable or disable SATA Device.
- **SATA Mode Selection**
  Determines how the SATA controller operate.
- **SATA Interface Speed**
  Select SATA Interface Speed, CHV A1 always with Gen1 Speed.
- **Port 0**
  Enable or Disable SATA Port.
- **Port 1**
  Enable or Disable SATA Port.

3.2.2.9 Miscellaneous Configuration

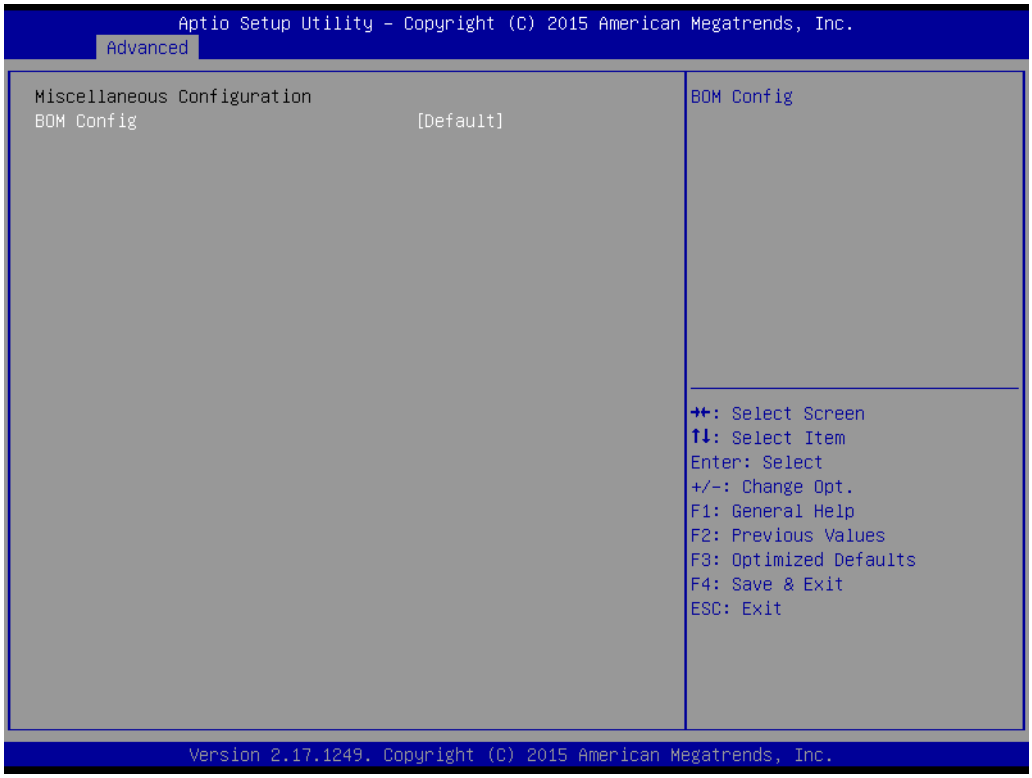


Figure 3.21 BOM Config

- **BOM Config**
  Select BOM config.

3.2.2.10 LPSS & SCC Configuration

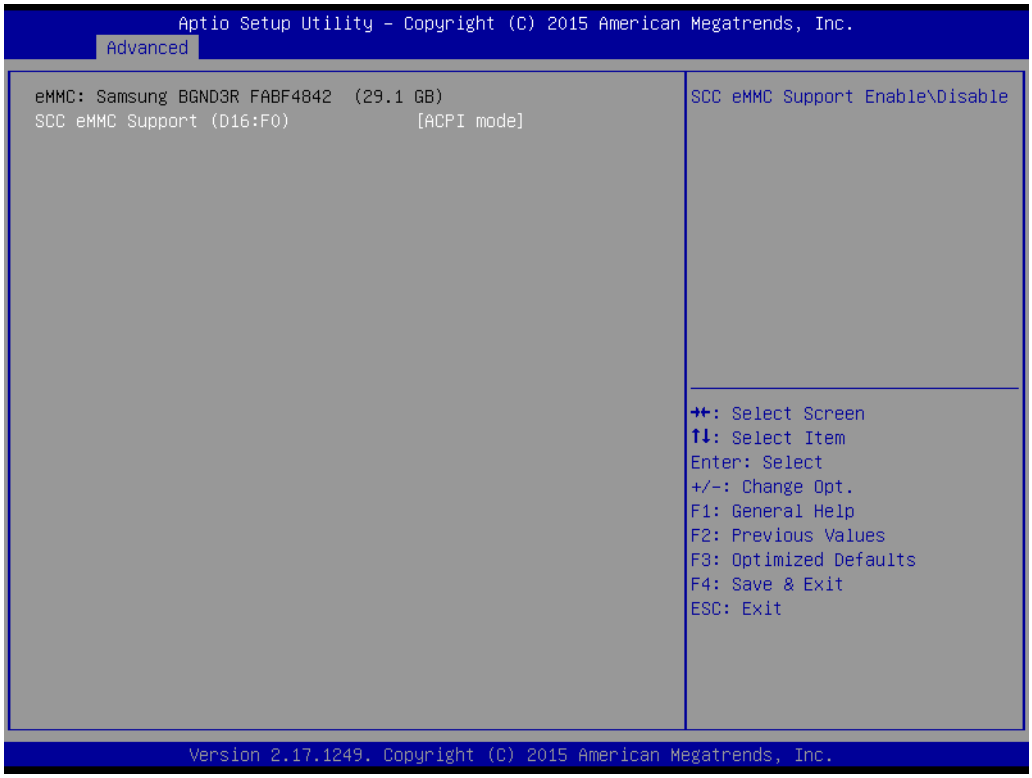


Figure 3.22 LPSS & SCC Configuration

- **SCC eMMC Support (D16:F0)**
  Enable or Disable SCC eMMC support Mode.

3.2.2.11 Network Stack Configuration

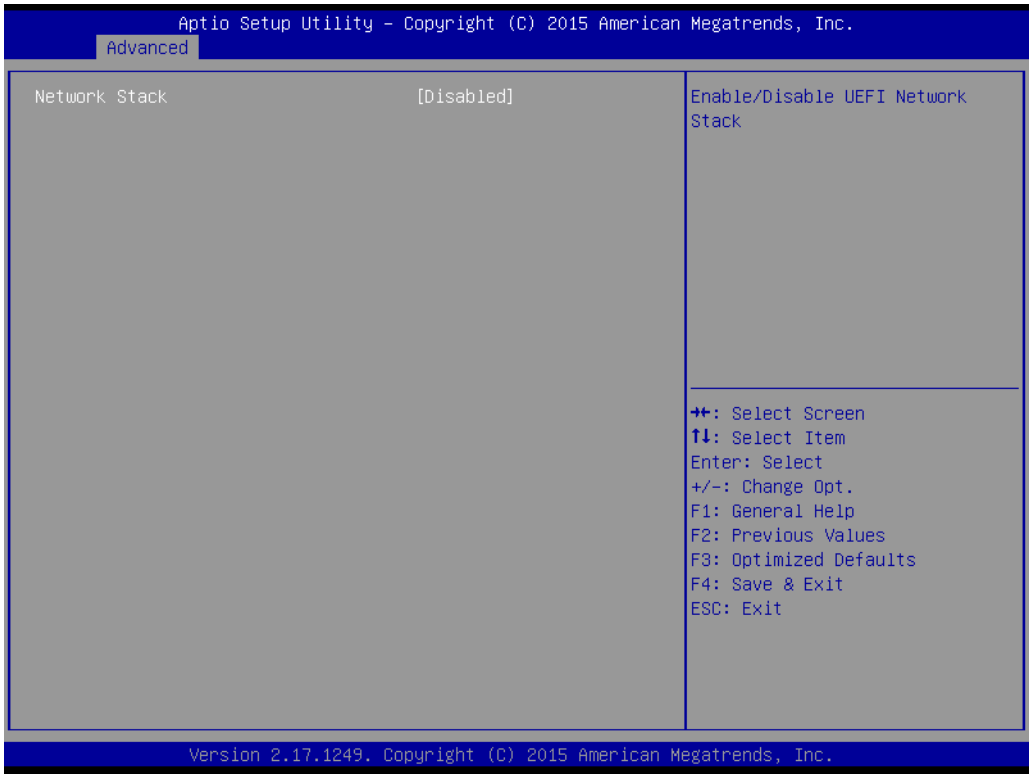


Figure 3.23 Network Stack Configuration

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

3.2.2.12 CSM Configuration

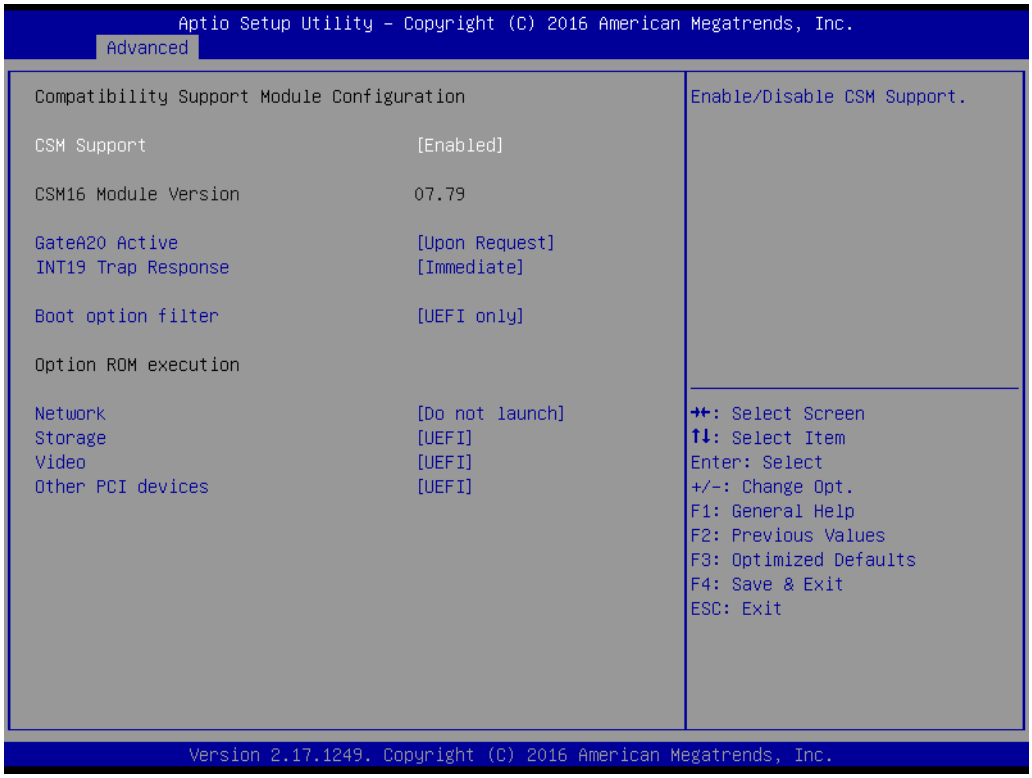


Figure 3.24 CSM Configuration

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

3.2.2.13 USB Configuration

Figure 3.25 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 ownership, change should be claimed by XHCI driver.
- **USB Mass Storage Driver Support**
  Enable or Disable USB Mass Storage Driver support.
- **Mass Storage Devices**
  Choose device function status Auto/Floppy/Forced FDD/Hard Disk/CD-ROM.

3.2.2.14 Platform Trust Technology

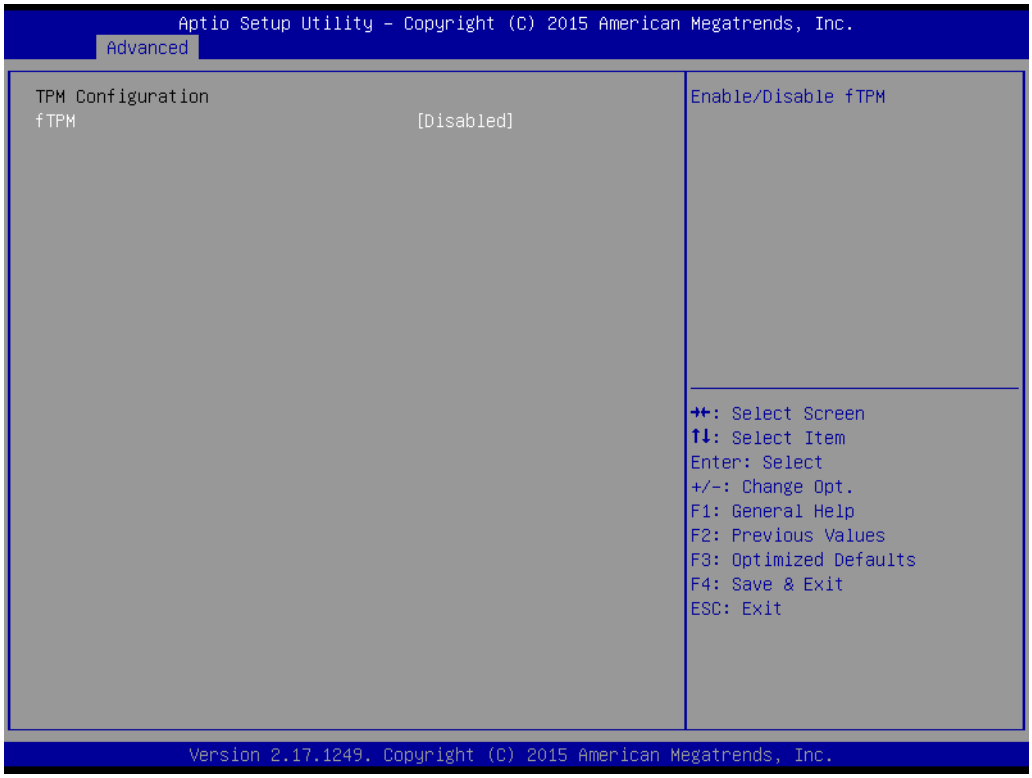


Figure 3.26 Platform Trust Technology

- **fTPM**
  Enable or Disable fTPM function.

3.2.2.15 Security Configuration

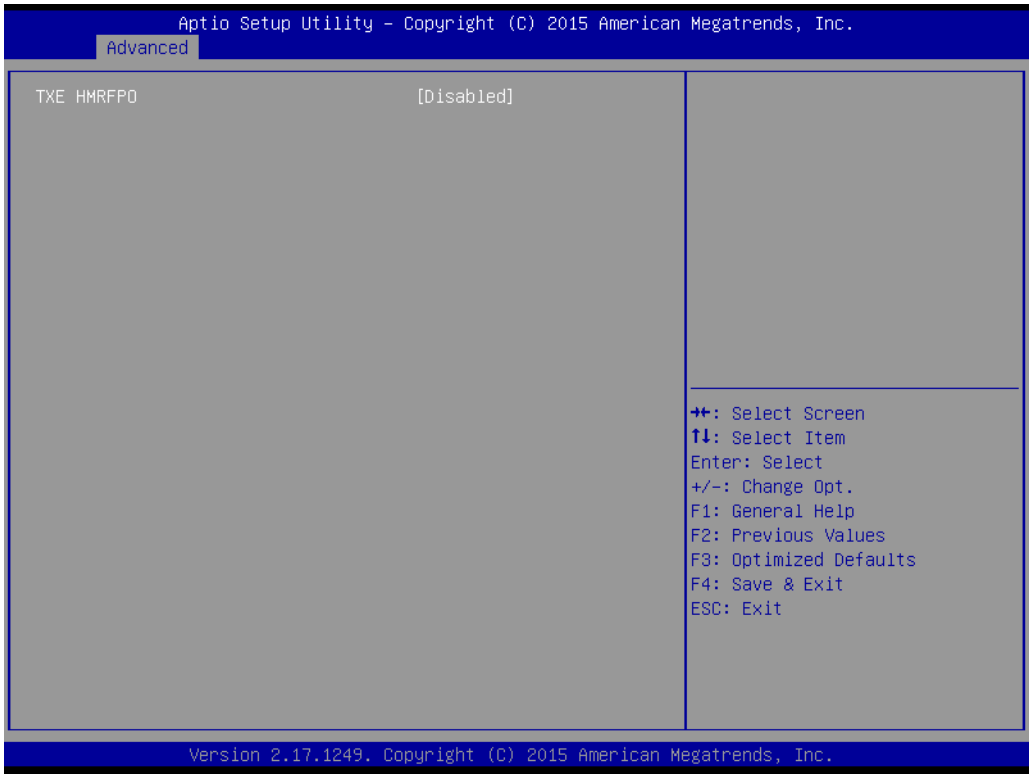


Figure 3.27 Security Configuration

- **TXE HMRFPO**
  Enable or Disable TXE HMRFPO function.

3.2.3 Chipset

Select the Chipset tab from the SOM-7568 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

Figure 3.28 Chipset Setup

- **North Bridge**
  North Bridge Parameters.
- **South Bridge**
  South Bridge Parameters.

3.2.3.1 North Bridge

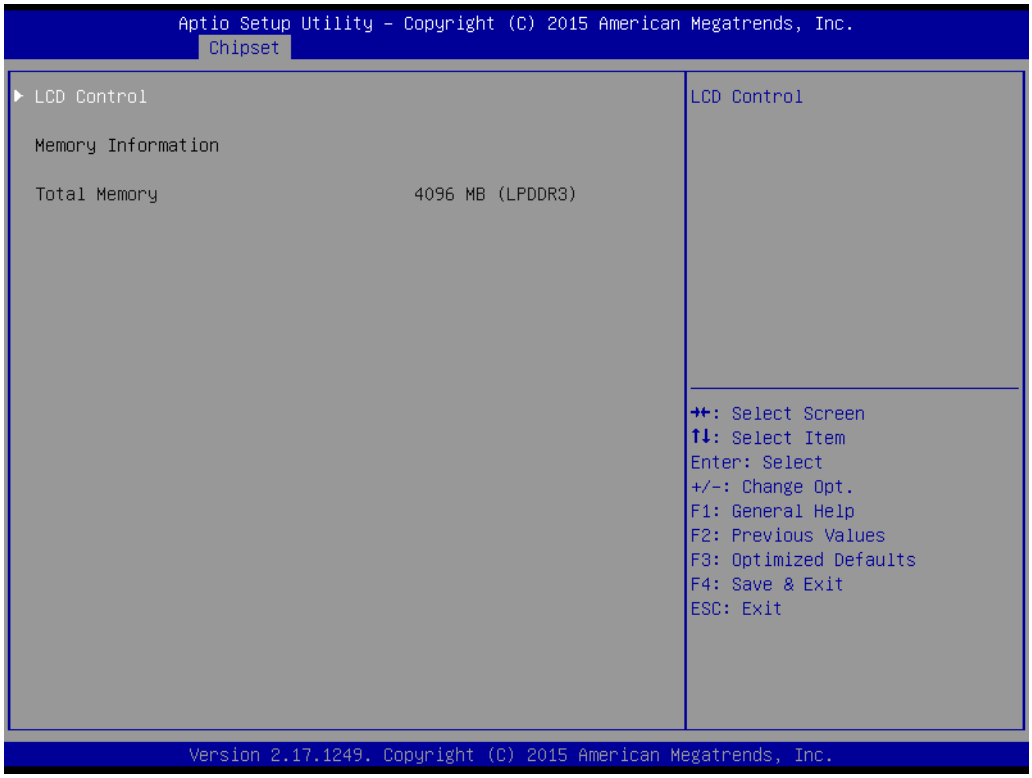


Figure 3.29 North Bridge

- **LCD Control**
  LCD control settings.

LCD Control

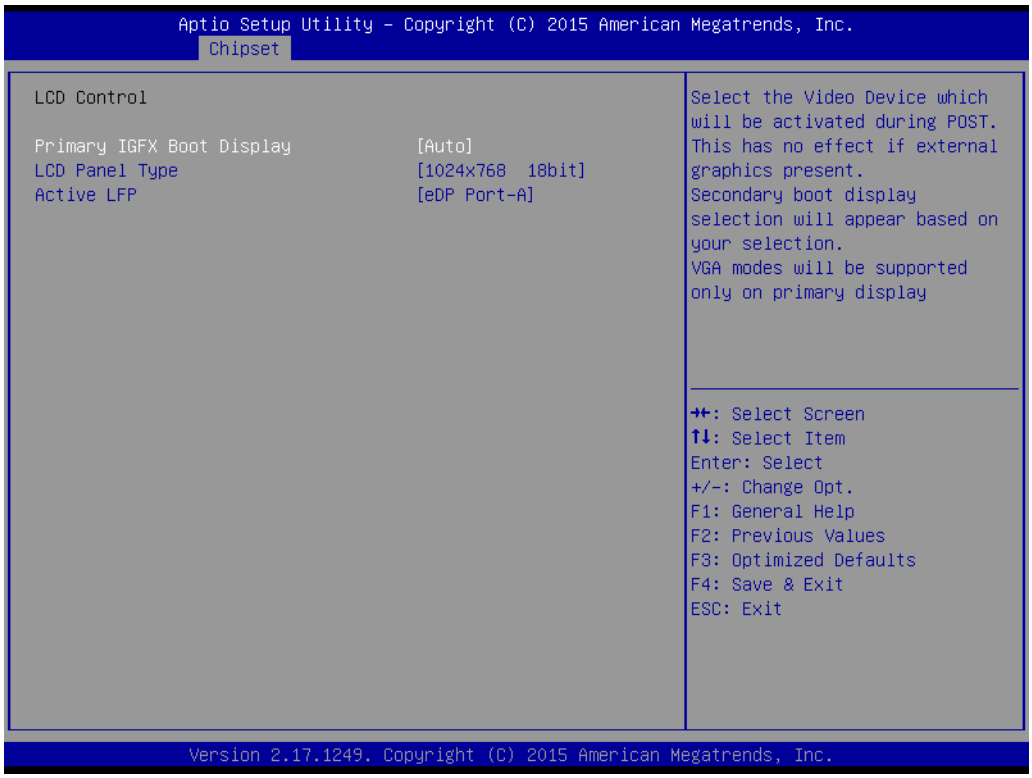


Figure 3.30 LCD Control

- **Primary IGFX Boot Display**

  Select the Video Device which will be activated during POST. This has no effect if external graphics present.

  Secondary boot display selection will appear based on your selection.

  VGA modes will be supported only on primary display.

- **LCD Panel Type**

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

- **Active LFP**

  Select the Active LFP Configuration.

  No LVDS: VBIOS does not enable LVDS.

  eDP Port-A: LFP Driver by Int-DisplayPort encoder from Port-A.

3.2.3.2 South Bridge

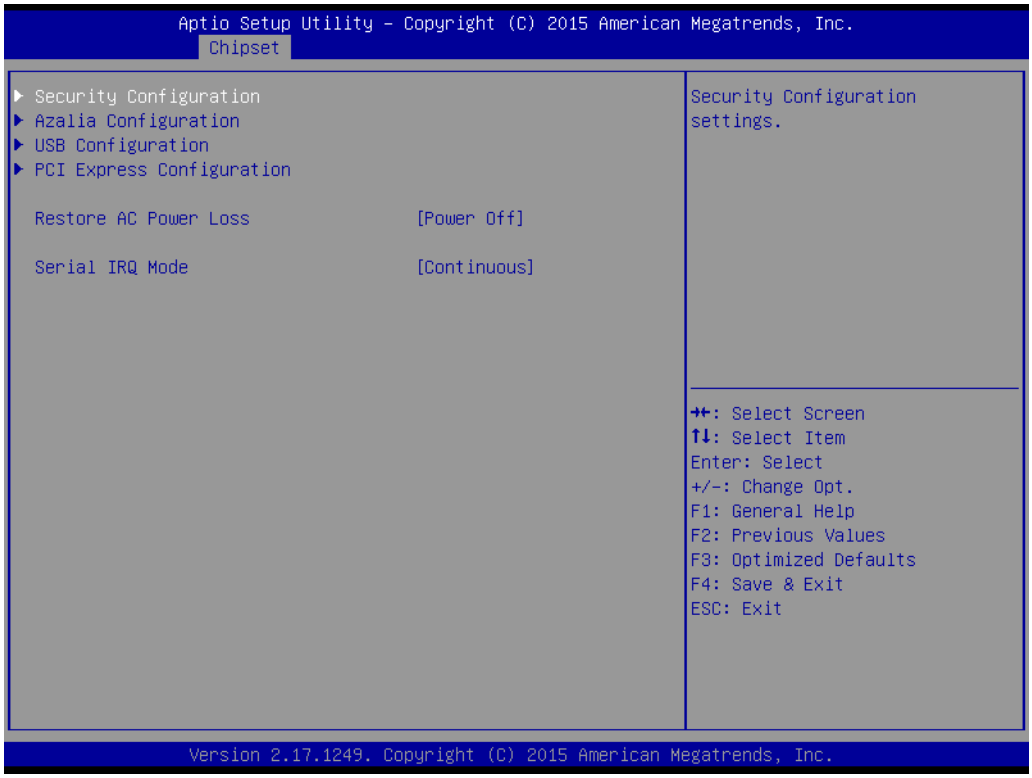


Figure 3.31 South Bridge

- **Security Configuration**
  Security configuration settings.
- **Azalia Configuration**
  Azalia HD Audio Options.
- **USB Configuration**
  USB Configuration Settings.
- **PCI Express Configuration**
  PCI Express Configuration Settings.
- **Restore AC Power Loss**
  Select AC power state when power is re-applied after a power failure.
- **Serial IRQ Mode**
  Configure Serial IRQ Mode.

Security Configuration

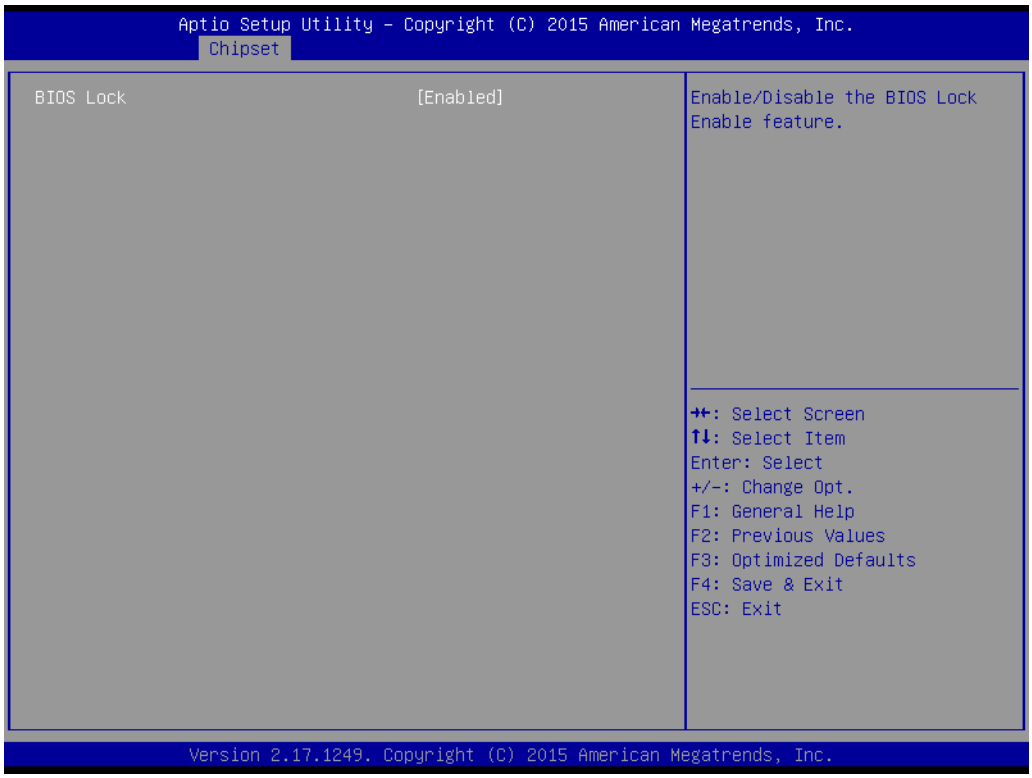


Figure 3.32 Security Configuration

- **BIOS Lock**
  Enable or Disable the BIOS Lock Enable feature.

Azalia Configuration

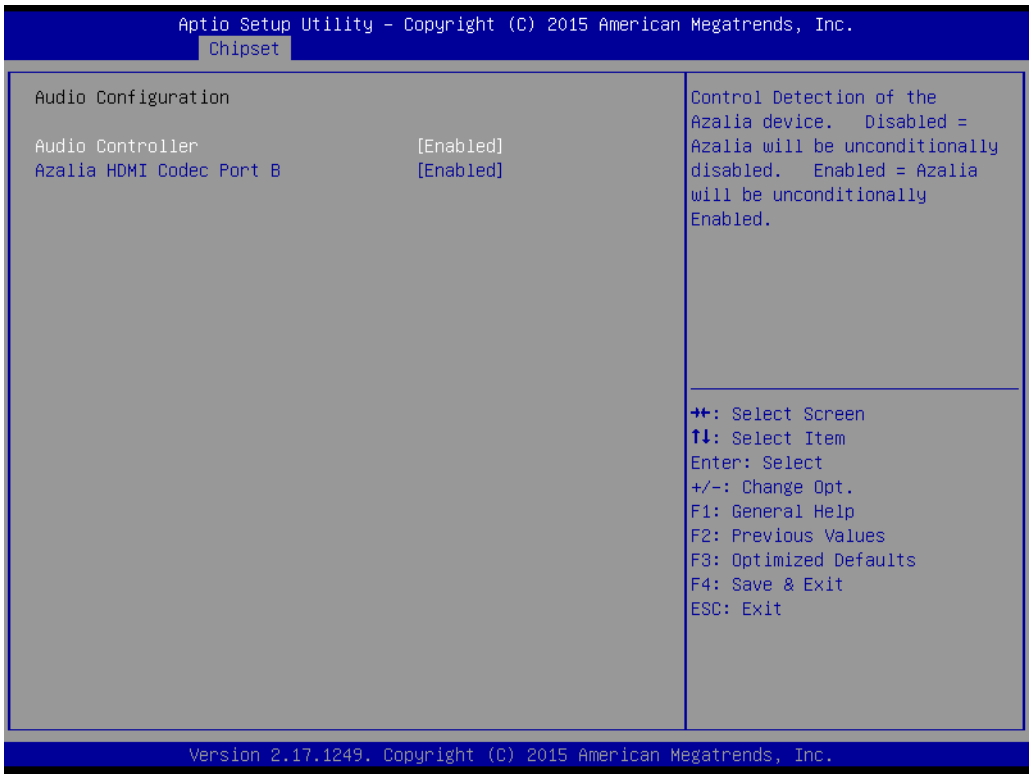


Figure 3.33 Azalia Configuration

- **Audio Controller**
  Control detection of the Azalia device.
  Disable: Azalia will be unconditionally disabled.
  Enable: Azalia will be unconditionally enabled.
- **Audio HDMI Codec Port B**
  Enable or Disable internal HDMI Port codec for Azalia.

PCI Express Configuration

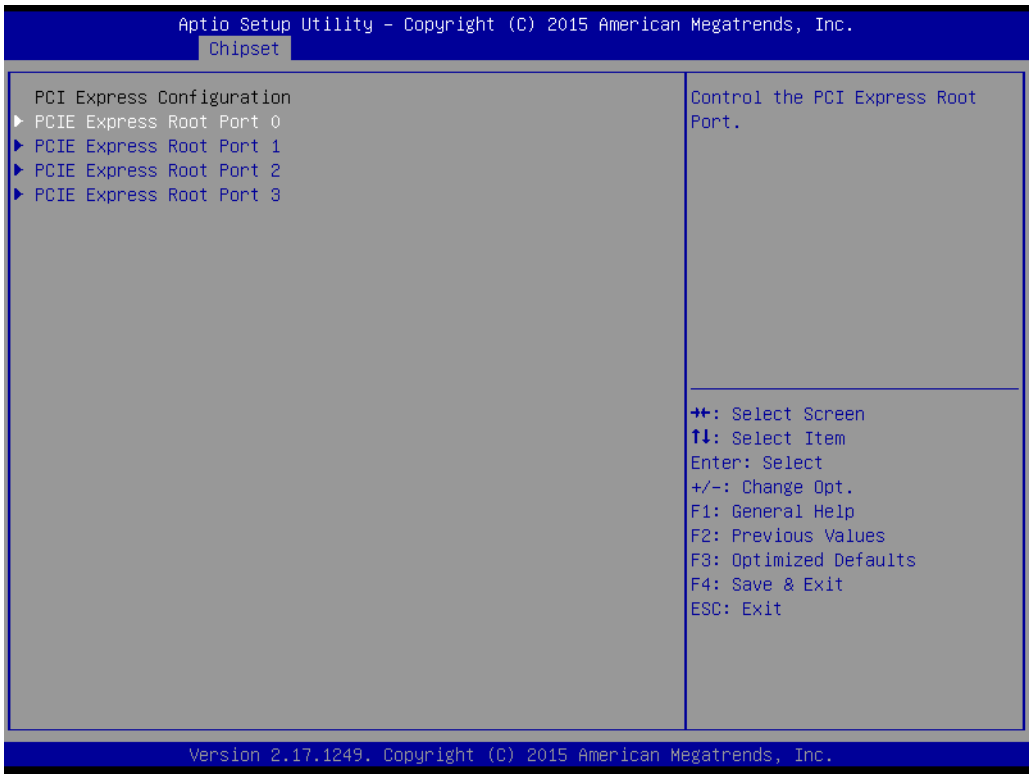


Figure 3.34 PCI Express Configuration

- **PCI Express Root Port 0**
  Control the PCI Express Root Port.
- **PCI Express Root Port 1**
  Control the PCI Express Root Port.
- **PCI Express Root Port 2**
  Control the PCI Express Root Port.
- **PCI Express Root Port 4**
  Control the PCI Express Root Port.

– PCI Express Root Port 0 Configuration

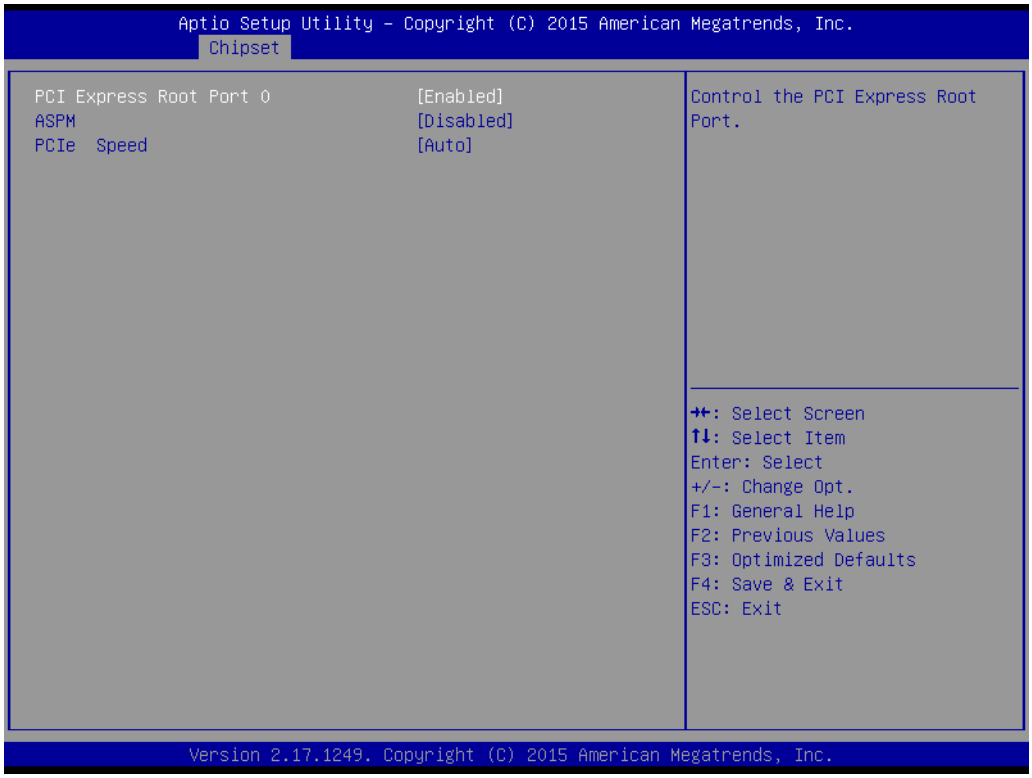


Figure 3.35 PCI Express Root Port 0 Configuration

- **PCI Express Root Port 0**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **PCIe Speed**
  Configure PCIe Speed. CHV A1 always with Gen1 speed.

– PCI Express Root Port 1 Configuration

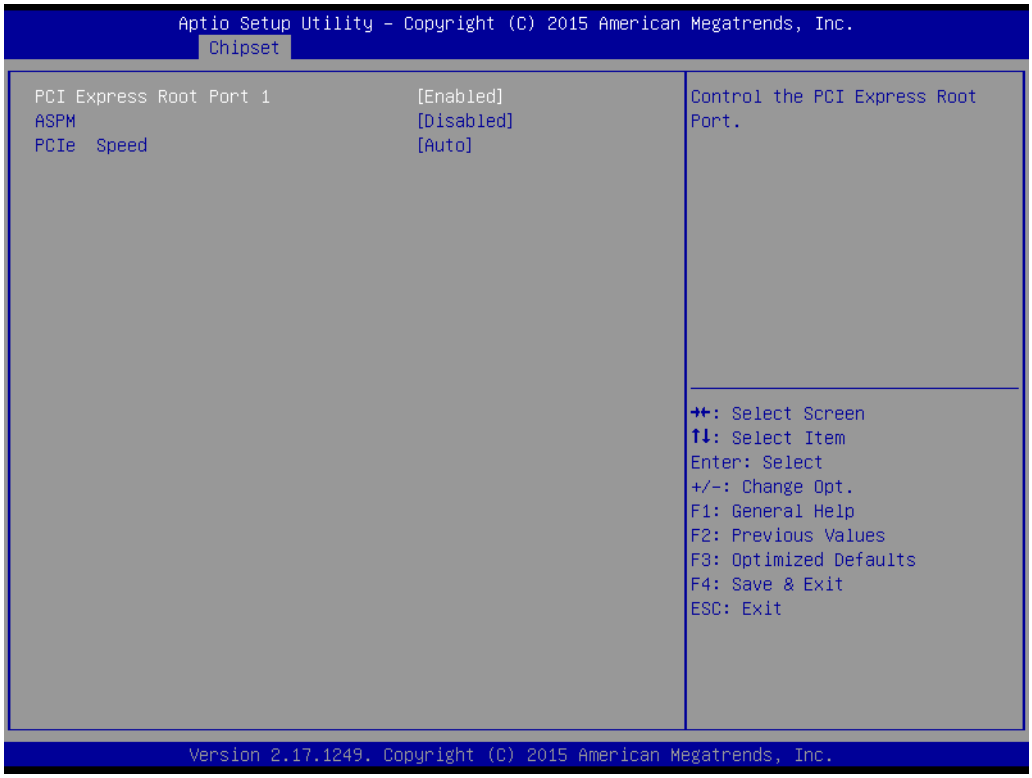


Figure 3.36 PCI Express Root Port 1 Configuration

- **PCI Express Root Port 1**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **PCIe Speed**
  Configure PCIe Speed. CHV A1 always with Gen1 speed.

– PCI Express Root Port 2 Configuration

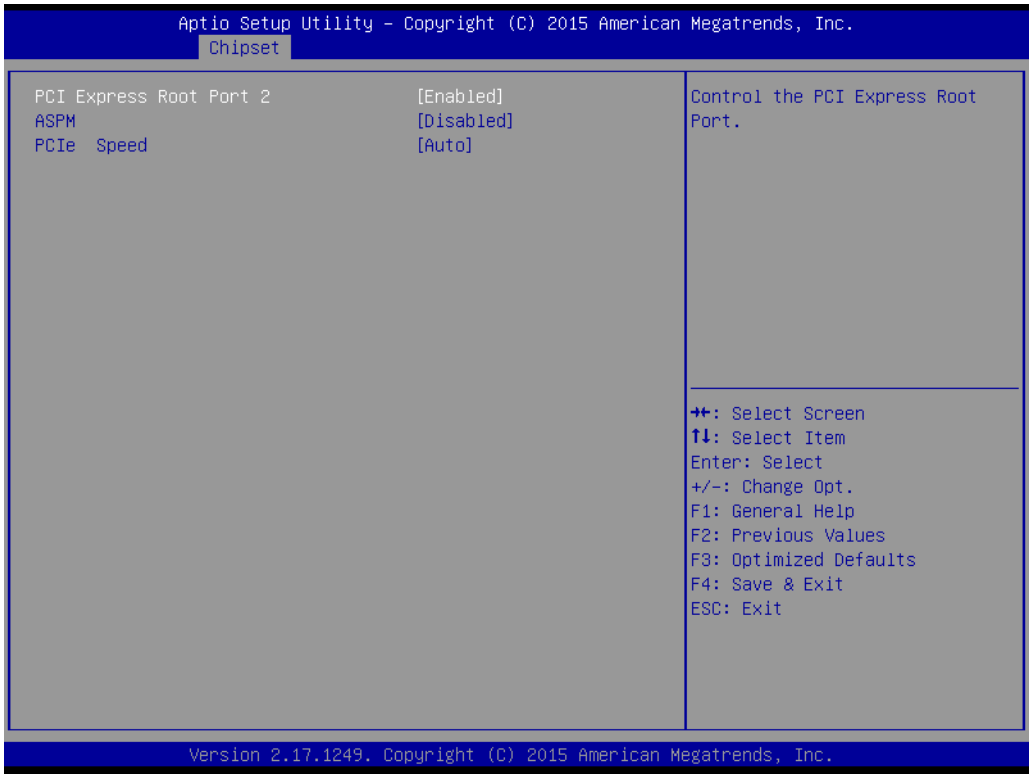


Figure 3.37 PCI Express Root Port 2 Configuration

- **PCI Express Root Port 2**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **PCIe Speed**
  Configure PCIe Speed. CHV A1 always with Gen1 speed.

– PCI Express Root Port 3 Configuration

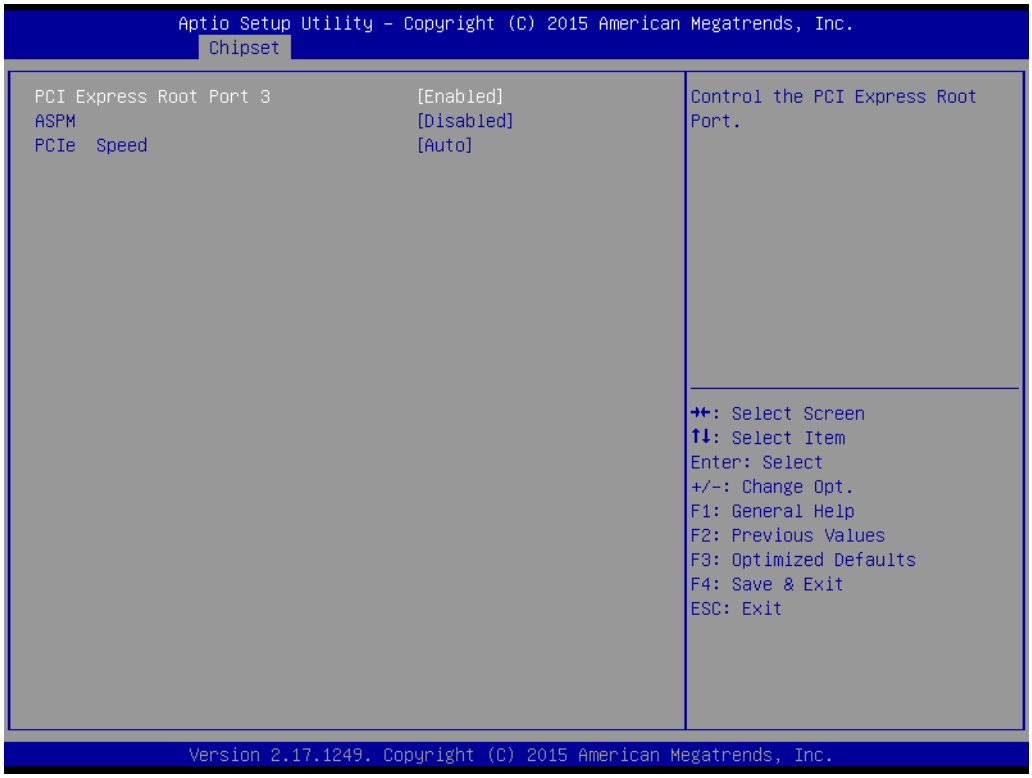


Figure 3.38 PCI Express Root Port 3 Configuration

- **PCI Express Root Port 3**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **PCIe Speed**
  Configure PCIe Speed. CHV A1 always with Gen1 speed.

3.2.4 Security Setting

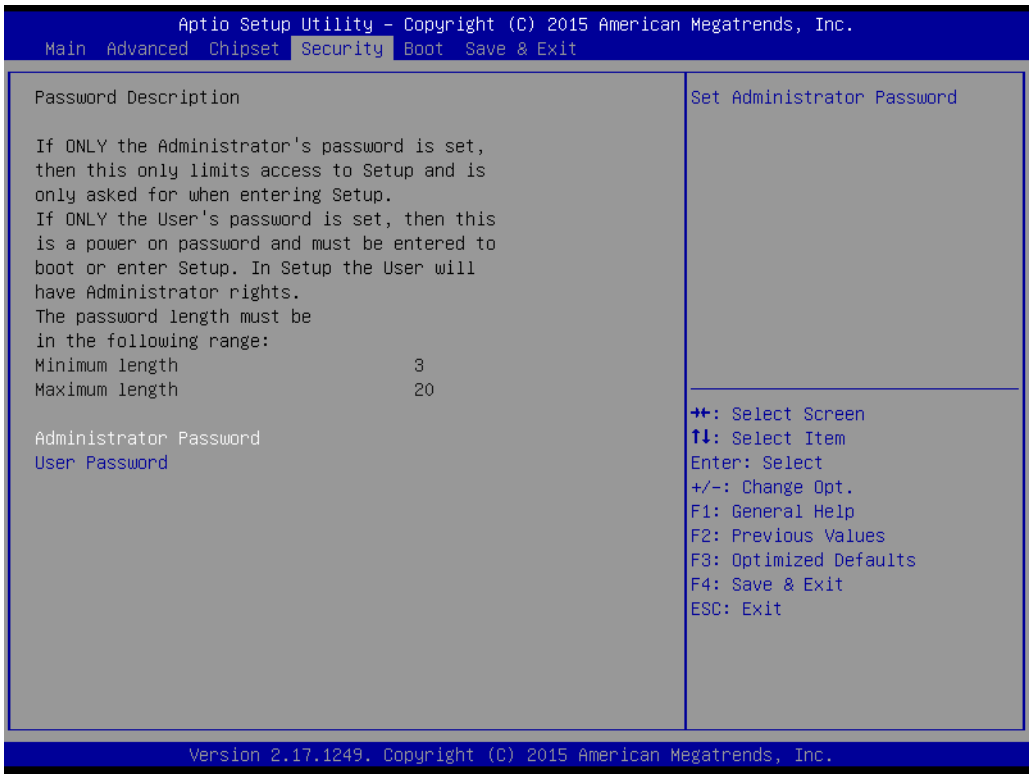


Figure 3.39 Security Setup

Select Security Setup from the SOM-7568 Setup main BIOS setup menu. All Security Setup options, such as password protection is described in this section. To access the sub menu for the following items, select the item and press <Enter>:

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

3.2.5 Boot Settings

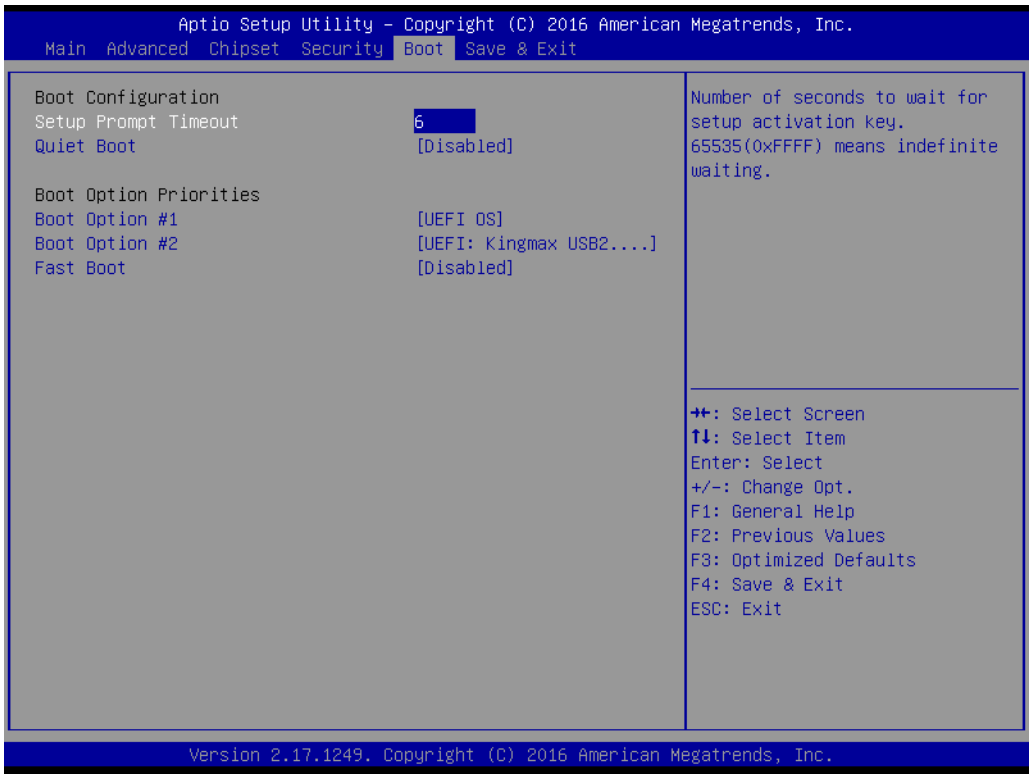


Figure 3.40 Boot Setting

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

3.2.6 Save & Exit

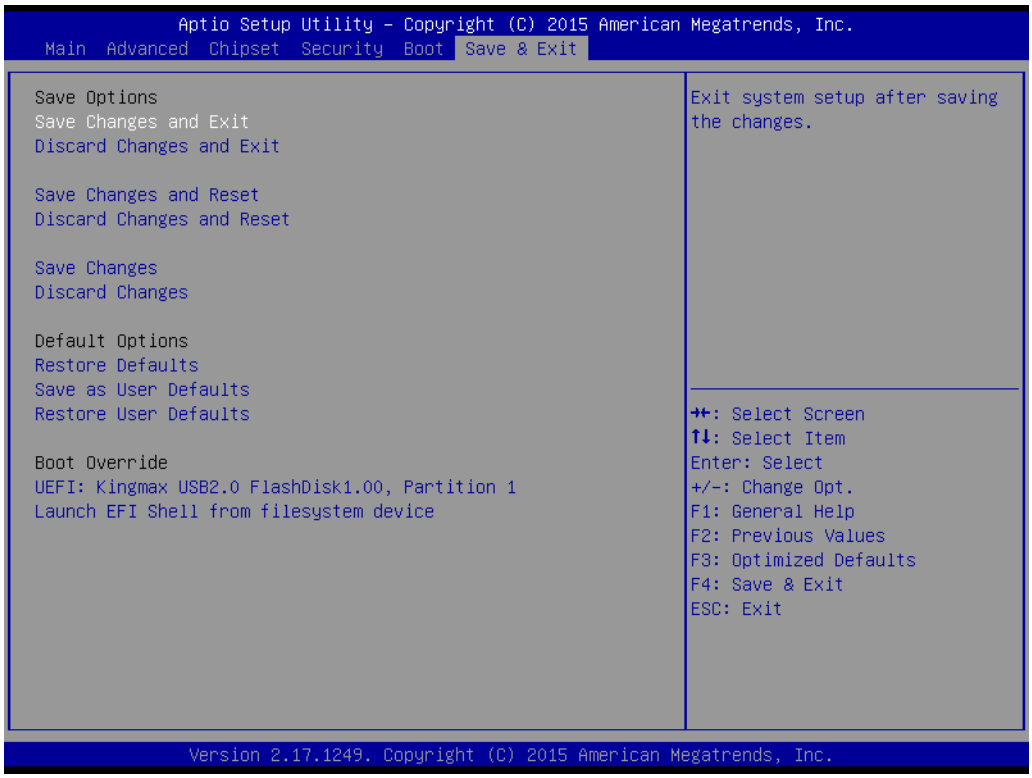


Figure 3.41 Save & Exit

- **Save Changes and Exit**
  When users have completed system configuration, select this option to save changes, exit BIOS setup menu and reboot the computer if necessary to take effect of all system configuration parameters.
- **Discard Changes and Exit**
  Select this option to quit Setup without making any permanent changes to the system configuration.
- **Save Changes and Reset**
  When users have completed system configuration, select this option to save changes, exit BIOS setup menu and reboot the computer to take effect of all system configuration parameters.
- **Discard Changes and Reset**
  Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer.
- **Save Changes**
  When users have completed system configuration, select this option to save changes without exit BIOS setup menu.
- **Discard Changes**
  Select this option to discard any current changes and load previous system configuration.
- **Restore Defaults**
  The SOM-7568 automatically configures all setup items to optimal settings when users select this option. Optimal Defaults are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use Optimal Defaults if the user's computer is experiencing system configuration problems.

- **Save as User Defaults**
  When users have completed system configuration, select this option to save changes as user defaults without exit BIOS setup menu.
- **Restore User Defaults**
  Restore User Defaults to all the setup options.
- **Launch EFI Shell from file system device**
  This item attempts to Launch EFI Shell application (Shell.efi) from one of the available file system devices.

Chapter 4

S/W Introduction & Installation

Sections include:

- 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

To install the drivers for Linux or other OS, please connect to internet and browse the browse the website http://support.advantech.com.tw to download the setup file.

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 as they happen. iManager also comes with a secure & encrypted EEPROM for storing important security keys or other customer defined information. All the embedded functions are configured through the API and we provide corresponding demo utilities to learn from. These APIs comply with the PICMG EAPI (Embedded Application Programmable Interface) specification and makes embedded features easier to integrate.For more details of how to use the APIs and utilities, please refer to Advantech's 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 a 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 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 87.5% to 12.5%.

Appendix A

Pin Assignment

This appendix gives you the information about the hardware pin assignment of the SOM-7568 CPU System on Module.

Sections include:

- SOM-7568 Type 10 Pin Assignment

A.1 SOM-7568 Type 10 Pin Assignment

This section gives SOM-7568 pin assignment on COM Express connector which compliant with COMR.0 R2.1 Type 10 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 support.

SOM-7568 Row A,B			
A1	GND	B1	GND
A2	GBE0_MDI3-	B2	GBE0_ACT#
A3	GBE0_MDI3+	B3	LPC_FRAME#
A4	GBE0_LINK100#	B4	LPC_AD0
A5	GBE0_LINK1000#	B5	LPC_AD1
A6	GBE0_MDI2-	B6	LPC_AD2
A7	GBE0_MDI2+	B7	LPC_AD3
A8	GBE0_LINK#	B8	N/A
A9	GBE0_MDI1-	B9	N/A
A10	GBE0_MDI1+	B10	LPC_CLK
A11	GND	B11	GND
A12	GBE0_MDI0-	B12	PWRBTN#
A13	GBE0_MDI0+	B13	SMB_CK
A14	N/A	B14	SMB_DAT
A15	SUS_S3#	B15	SMB_ALERT#
A16	SATA0_TX+	B16	SATA1_TX+
A17	SATA0_TX-	B17	SATA1_TX-
A18	SUS_S4#	B18	SUS_STAT#
A19	SATA0_RX+	B19	SATA1_RX+
A20	SATA0_RX-	B20	SATA1_RX-
A21	GND	B21	GND
A22	USB_SSRX0-	B22	USB_SSTX0-
A23	USB_SSRX0+	B23	USB_SSTX0+
A24	SUS_S4#	B24	PWR_OK
A25	USB_SSRX1-	B25	USB_SSTX1-
A26	USB_SSRX1+	B26	USB_SSTX1+
A27	BATLOW#	B27	WDT
A28	(S)ATA_ACT#	B28	N/A
A29	AC/HDA_SYNC	B29	AC/HDA_SDIN1
A30	AC/HDA_RST#	B30	AC/HDA_SDIN0
A31	GND	B31	GND
A32	AC/HDA_BITCLK	B32	SPKR
A33	AC/HDA_SDOUT	B33	I2C_CK
A34	BIOS_DIS0#	B34	I2C_DAT
A35	THRMTRIP#	B35	THRM#
A36	USB6-	B36	USB7-
A37	USB6+	B37	USB7+
A38	USB_6_7_OC#	B38	USB_4_5_OC#
A39	USB4-	B39	USB5-
A40	USB4+	B40	USB5+

A41	GND	B41	GND
A42	USB2-	B42	USB3-
A43	USB2+	B43	USB3+
A44	USB_2_3_OC#	B44	USB_0_1_OC#
A45	USB0-	B45	USB1-
A46	USB0+	B46	USB1+
A47	VCC_RTC	B47	EXCD1_PERST#
A48	EXCD0_PERST#	B48	EXCD1_CPPE#
A49	EXCD0_CPPE#	B49	SYS_RESET#
A50	LPC_SERIRQ	B50	CB_RESET#
A51	GND	B51	GND
A52	MIPI-CSI CLK+	B52	MIPI-CSI D1+
A53	MIPI-CSI CLK-	B53	MIPI-CSI D1-
A54	GPI0	B54	GPO1
A55	MIPI-CSI D0+	B55	MIPI-CSI D2+
A56	MIPI-CSI D0-	B56	MIPI-CSI D2-
A57	GND	B57	GPO2
A58	N/A (option PCIE_TX3+)	B58	N/A (option PCIE_RX3+)
A59	N/A (option PCIE_TX3-)	B59	N/A (option PCIE_RX3-)
A60	GND	B60	GND
A61	PCIE_TX2+	B61	PCIE_RX2+
A62	PCIE_TX2-	B62	PCIE_RX2-
A63	GPI1	B63	GPO3
A64	PCIE_TX1+	B64	PCIE_RX1+
A65	PCIE_TX1-	B65	PCIE_RX1-
A66	GND	B66	WAKE0#
A67	GPI2	B67	WAKE1#
A68	PCIE_TX0+	B68	PCIE_RX0+
A69	PCIE_TX0-	B69	PCIE_RX0-
A70	GND	B70	GND
A71	LVDS_A0+	B71	DDI0_PAIR0+
A72	LVDS_A0-	B72	DDI0_PAIR0-
A73	LVDS_A1+	B73	DDI0_PAIR1+
A74	LVDS_A1-	B74	DDI0_PAIR1-
A75	LVDS_A2+	B75	DDI0_PAIR2+
A76	LVDS_A2-	B76	DDI0_PAIR2-
A77	LVDS_VDD_EN	B77	N/A
A78	LVDS_A3+	B78	N/A
A79	LVDS_A3-	B79	LVDS_BKLT_EN
A80	GND	B80	GND
A81	LVDS_A_CK+	B81	DDI0_PAIR3+
A82	LVDS_A_CK-	B82	DDI0_PAIR3-
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY
A85	GPI3	B85	VCC_5V_SBY
A86	RSVD	B86	VCC_5V_SBY
A87	N/A	B87	VCC_5V_SBY
A88	PCIE_CLK_REF+	B88	BIOS_DIS1#

A89	PCIE_CLK_REF-	B89	DDI0_HPD
A90	GND	B90	GND
A91	SPI_POWER	B91	N/A
A92	SPI_MISO	B92	N/A
A93	GPO0	B93	N/A
A94	SPI_CLK	B94	N/A
A95	SPI_MOSI	B95	DDI0_DDC_AUX_SEL
A96	TPM_PP	B96	RSVD
A97	TYPE10#	B97	SPI_CS#
A98	SER0_TX	B98	DDI0_CTRLCLK_AUX+
A99	SER0_RX	B99	DDI0_CTRLCLK_AUX-
A100	GND	B100	GND
A101	SER1_TX	B101	FAN_PWMOUT
A102	SER1_RX	B102	FAN_TACHIN
A103	LID#	B103	SLEEP#
A104	VCC_12V	B104	VCC_12V
A105	VCC_12V	B105	VCC_12V
A106	VCC_12V	B106	VCC_12V
A107	VCC_12V	B107	VCC_12V
A108	VCC_12V	B108	VCC_12V
A109	VCC_12V	B109	VCC_12V
A110	GND	B110	GND

Appendix B

Watchdog Timer

This appendix gives you the information about the watchdog timer programming on the SOM-7568 CPU System on Module

Sections include:

- Watchdog Timer Programming

B.1 Programming the Watchdog Timer

Trigger Event	Note
IRQ	IRQ5, 7, 14 (BIOS setting default disable)**
NMI	N/A
SCI	Power button event
Power Off	Supported
H/W Restart	Supported
WDT Pin Activate	Supported

** WDT new driver support automatically selects available IRQ number from BIOS, and then set to EC. Only Win XP, Win7 and Win8 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

Programming GPIO

This Appendix gives the illustration of the General Purpose Input and Output pin setting.

Sections include:

- System I/O ports

C.1 GPIO Register

GPIO Byte Mapping	H/W Pin Name
BIT0	GPO0
BIT1	GPO1
BIT2	GPO2
BIT3	GPO3
BIT4	GPI0
BIT5	GPI1
BIT6	GPI2
BIT7	GPI3

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

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