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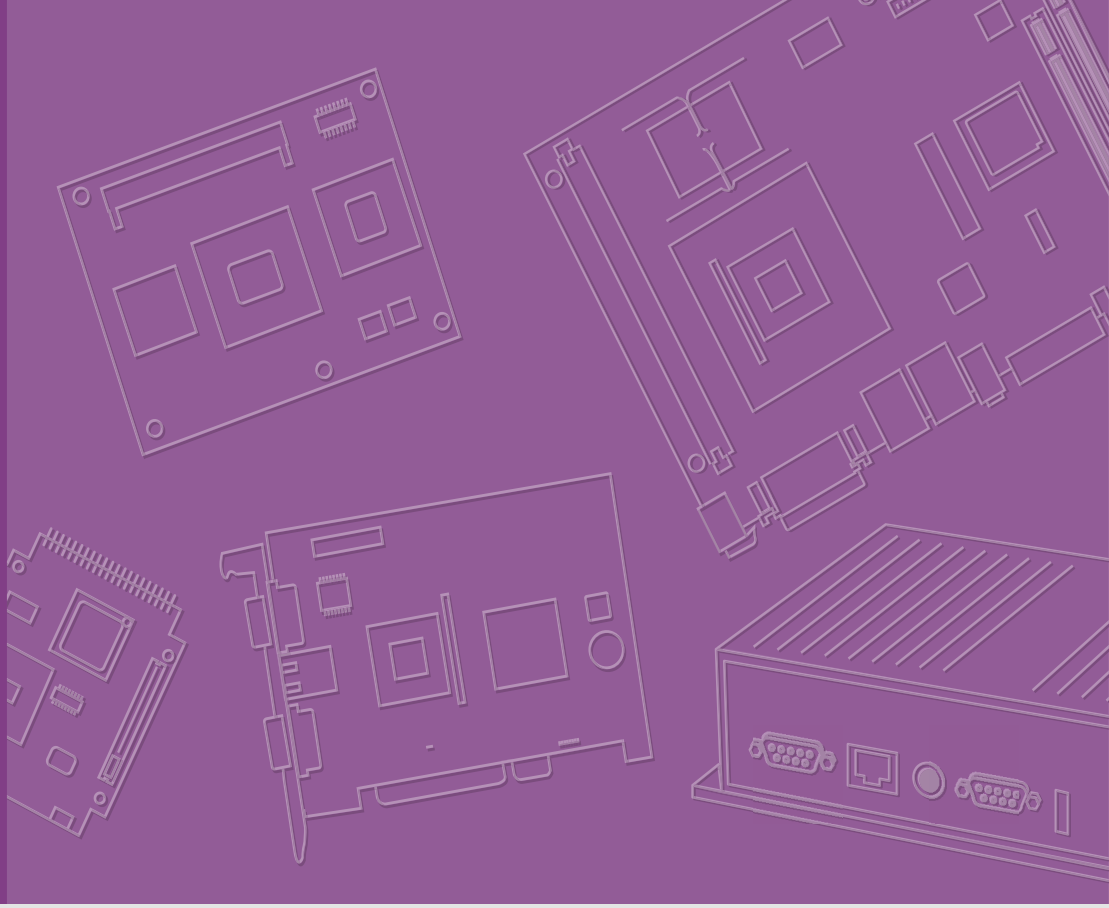

User Manual

SOM-6872

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Product Warranty (2 years)

Advantech warrants 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 that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that 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 customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product to be defective, follow the steps outlined below.

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 displayed 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 a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Part No. 2006M68700 Edition 1

Printed in Taiwan October 2021

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

Test conditions for passing also include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electrostatic discharge (ESD) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class B

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 instruction manual, 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 assistance.

FM

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

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
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 calling:
   - 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 prevent hardware damage and data losses. For example,*

"Batteries are at risk of exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions."

Note! *Notes provide optional additional information.*

Document Feedback

To assist us with improving this manual, we welcome all comments and constructive criticism. Please send all feedback in writing to support@advantech.com.

Packing List

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

- 1 x SOM-6872 CPU module
- 1 x Heatspreader (1960093586N000)

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment 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. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. 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 from transient overvoltage.
12. Never pour 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 any of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture.
    - The equipment is malfunctioning, or does not operate according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of breakage.
15. Do not leave the equipment in an environment with a storage temperature of below -20 °C (-4 °F) or above 60 °C (140 °F) as this may damage the components. The equipment should be kept in a controlled environment.
16. CAUTION: Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
17. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).

DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precautions - 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 the PC chassis before manual handling. Do not touch any components on the CPU card or other cards while the PC is powered on.
- Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

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Chapter 1

General Information

This chapter details background information on the SOM-6872 CPU Computer on Module.

Sections include:

- Introduction
- Functional Block Diagram
- Product Specification

1.1 Introduction

Advantech's SOM-6872 COM Express Type 6 module is equipped with an AMD Ryzen™ Embedded V2000 SoC. This module delivers excellent performance and supports 8 x cores, 16 x threads, turbo boost (up to 4.25GHz), and 4 x independent 4K displays. Advantech's SOM-6872 features built-in I/O interfaces and facilitates excellent graphic performance without requiring additional graphics cards.

This small (95 x 95 mm/3.74 x 3.74 in) module delivers superior performance via 54W high TDP, and uses 24% less space compared to COMe Basic models. Despite being small, it delivers a high CPU Mark score and was tested by PASSMARK Performance Test V10.1, 21716.This solution supports diverse I/O interfaces — including USB 3.2 Gen 2, PCIe Gen 3, GbE, SATA 3, and 4K display interfaces (DP++, HDMI, VGA, and LVDS). In addition, the on board TPM and 64GB ECC/Non-ECC memory improves both security and reliability

Advantech iManager (SUSI4) satisfies diverse embedded application requirements — including 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.

Acronyms

Term	Definition
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 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 microcontrollers to communicate with each other within a vehicle without a host computer.
DDI	Digital Display Interface – containing Display Port, HDMI/DVI, and SDVO.
EAPI	Embedded Application Programmable Interface. Software interface for COM Express® specific industrial function: ■ System information ■ Watchdog timer ■ I2C Bus ■ Flat Panel brightness control ■ User storage area ■ GPIO
GbE	Gigabit Ethernet
GPIO	General purpose input output
HDA	Intel High Definition Audio (HD Audio) refers to the specification released by Intel in 2004 for delivering high definition audio that is capable of playing back more channels at higher quality than AC'97
I2C	Inter Integrated Circuit – 2 wire (clock and data) signaling scheme allowing communication between integrated circuit, primarily used to read and load register values.
ME	Management Engine
PC-AT	"Personal Computer – Advanced Technology" – an IBM trademark term used to refer to Intel based personal computer in 1990s.

PEG	PCI Express Graphics
RTC	Real Time Clock – battery backed circuit in PC-AT systems that keeps system time and date as well as certain system setup parameters.
SPD	Serial Presence Detect – refers to serial EEPROM on DRAMs that has DRAM Module configuration information.
TPM	Trusted Platform Module, chip to enhance the security features of a computer system.
UEFI	Unified Extensible Firmware Interface
WDT	Watch Dog Timer

1.2 Functional Block Diagram

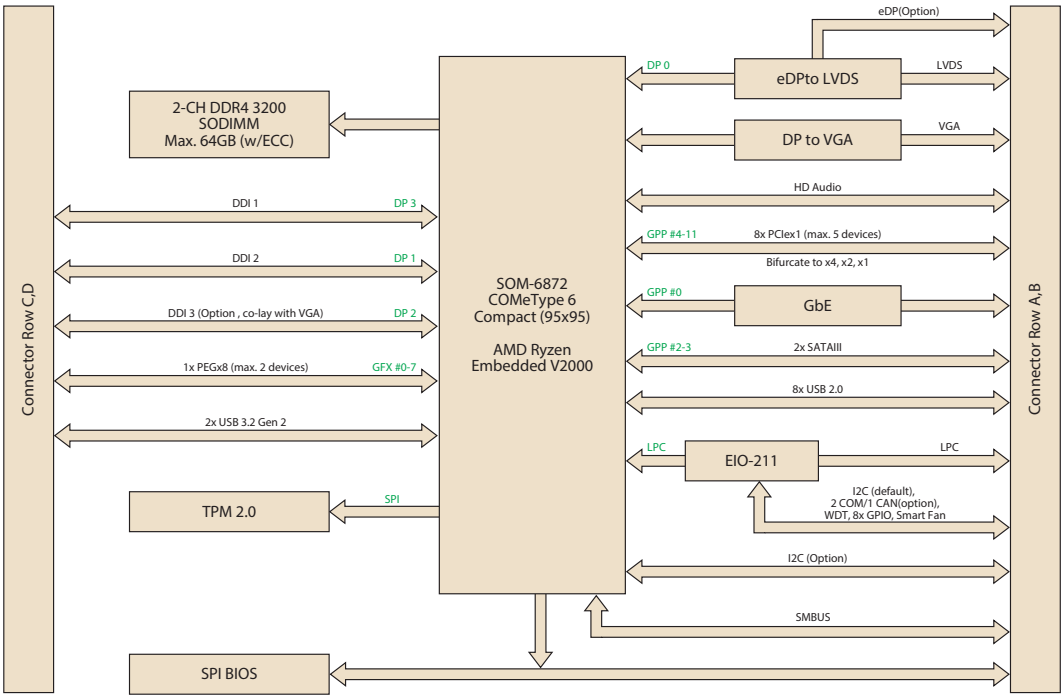


Figure 1.1 Functional block diagram

1.3 Product Specifications

1.3.1 Compliance

- PICMG COM Express R3.0 Compact module
- Compact Size – 95 x 95 mm (3.73 x 3.74 in)
- Pin-out Type 6 compatible

1.3.2 Feature List

Feature Type	Connector Row	Feature	Type 6 Define		SOM-6872
			Max.	Min.	
Display	A-B	LVDS Channel A (18/24-bit)	1	0	1
	A-B	LVDS Channel B (18/24-bit)	1	0	1
	A-B	eDP (muxed on LVDS Channel A)	1	0	1
	A-B	VGA	1	0	1
Expansion	A-B	PCI Express x1	6	1	6
	A-B	LPC	1	1	1
Serial	A-B	SMBus	1	1	1
	A-B	I2C Bus	1	1	1
	A-B	Serial Port	2	0	2
	A-B	CAN Bus (muxed on SER1)	1	0	1

	A-B	LAN Port 0 (Gigabit Ethernet)	1	1	1
	A-B	SATA	4	1	2
	A-B	USB 2.0	8	4	8
	A-B	USB Client	1	0	0
	A-B	HD Audio	1	0	1
	A-B	SPI Bus	2	1	1
	A-B	General Purpose I/O (GPIO)	8	8	8
	A-B	SDIO (muxed on GPIO)	1	0	0
	A-B	Express Card Support	2	1	0
	A-B	Watchdog Timer Output	1	0	1
	A-B	Speaker Out	1	1	1
I/O	A-B	External BIOS ROM Support	2	0	2
	A-B	Power Button Support	1	1	1
	A-B	Power Good	1	1	1
	A-B	VCC_5V_SBY Contacts	4	4	4
	A-B	Sleep	1	0	1
	A-B	Thermal Protection	1	0	1
	A-B	Lid Input	1	0	1
	A-B	Battery Low Alarm	1	0	1
	A-B	Suspend/Wake Signals	3	0	3
	A-B	Fan PWM / Tachometer	2	0	2
	A-B	Trusted Platform Modules	1	0	1
Display	C-D	Digital Display Interfaces 1 - 3	3	0	3
I/O	C-D	PEG (PCI Express x16)	1	0	1(X8)
	C-D	PCI Express x1	2	0	2
	C-D	USB 3.0 (Gen2, 10Gbps)	4	0	2
	C-D	Rapid Shutdown	1	0	1

1.3.3 Processor System

CPU	Std. Freq.	1T Boost Freq.	Core/Thread	L2C/L3C	TDP(W)
V2748	2.9GHz	4.25GHz	8/16	4M/8M	35-54W
V2546	3.0GHz	3.95GHz	6/12	3M/8M	35-54W
V2718	1.7GHz	4.15Ghz	8/16	4M/8M	10-25W
V2516	2.1GHz	3.95GHz	6/12	3M/8M	10-25W

*TDP can be configured up to 25W or down to 12.5W.

1.3.4 Graphics/Audio

AMD Radeon Graphics core with up to 7 x GPU compute units.

- Performance upgrades from V1000 with faster frequency and clocking
- HVEC and H.264 (10-bit) decode and encode support, VP9 Decode
- 4 x Display Pipes supporting up to 4K Resolution
- Up to 4 x DisplayPort 1.4, HDMI™ 2.1 (HDMI 6G), eDP 1.3

V2000 Graphics Implementation • 1 x sDMA Engine • Up to 7 x cores, 2 x Rendered Backend+ (RB+) • 1 MB L2 Cache • System resources are shared. No dedicated memory for the Graphics • Up to 1.43 TFLOPS (FP32) or 2.87 TFLOPS (FP16)

CPU	Graphic Core	Max Freq.
V2748	Radeon 7 units	1.6GHz
V2546	Radeon 6 units	1.5GHz
V2718	Radeon 7 units	1.6GHz
V2516	Radeon 6 units	1.5GHz

- Dual Display:
  - LVDS/eDP + VGA
  - LVDS/eDP + DP (1/2)
  - VGA + DP (1/2)
  - DP1 + DP2

- Triple Display:
  - LVDS/eDP + VGA + DP (1/2)
  - LVDS/eDP + DP1 + DP2
  - VGA + DP1 + DP2

- Quad Display:
  - LVDS/eDP + VGA + DP1 + DP2

1.3.5 Expansion Interfaces

1.3.5.1 PCIe x1

PCI Express x1: Supports default 5 x ports PCIe x1 compliant to PCIe Gen 3 (8.0 GT/s) specifications, configurable to PCIe x4 or PCIe x2. Several configurable combinations may need BIOS modifiers. Please contact the Advantech sales team or FAE for further details.

<table>
<tr><th colspan="2" rowspan="2">Type 6</th><th colspan="6">Row A,B</th><th colspan="2">Row C,D</th></tr>
<tr><th>P0</th><th>P1</th><th>P2</th><th>P3</th><th>P4</th><th>P5</th><th>P6</th><th>P7</th></tr>
<tr><td>Default</td><td rowspan="6">Config.</td><td>X1</td><td>X1</td><td>X1</td><td>X1</td><td colspan="4">X4</td></tr>
<tr><td>Option</td><td>X1</td><td>X1</td><td colspan="2">X2</td><td colspan="4">X4</td></tr>
<tr><td>Option</td><td colspan="2">X2</td><td>X1</td><td>X1</td><td colspan="4">X4</td></tr>
<tr><td>Option</td><td colspan="2">X2</td><td colspan="2">X2</td><td colspan="4">X4</td></tr>
<tr><td>Option</td><td colspan="4">X4</td><td colspan="4">X4</td></tr>
<tr><td>Option</td><td colspan="4">X4</td><td>X1</td><td>X1</td><td>X1</td><td>X1</td></tr>
</table>

1.3.5.2 LPC

Supports Low Pin Count (LPC) 1.1 specification, without DMA or bus mastering. Supports connection to Super I/O, embedded controller, or TPM. LPC clock is 24MHz.

1.3.6 Serial Bus

1.3.6.1 SMBus

Supports SMBus 2.0 specification with Alert pin.

1.3.6.2 I2C Bus

Supports I2C bus 7-bit and 10-bit address modes.

1.3.7 I/O

1.3.7.1 Gigabit Ethernet

Ethernet: Intel® I210IT/AT Gigabit LAN supports 10/100/1000Mbps Speed.

1.3.7.2 SATA

Support up to 2 x ports SATA Gen 3 (6.0 Gb/s), backward compliant to SATA Gen 2 (3.0 Gb/s) and Gen 1 (1.5 Gb/s). Maximum data rate of 600 MB/s. Supports AHCI 1.3 and 1.3.1 modes.

1.3.7.3 USB 3.0 (3.2 Gen2)/USB 2.0

Supports 2 x ports USB 3.2 Gen2 (10 Gbps) and 8 x ports USB 2.0 (480 Mbps) which are backward compatible to USB 1.x. Supports LPM (U0, U1, U2, and U3) manageability that saves USB 3.1 power.

Note! Notice: We strongly recommend using a certified cable to meet USB 3.2 Gen 2 performance requirements.

1.3.7.4 USB 3.2

Type 6	P0	P1	P2	P3
SoC	P0	P1	NA	NA
Type 6	OC_01		OC_23	
SoC USB_OC#	OC_0		NA	

1.3.7.5 SPI Bus

Supports BIOS flash only. SPI clock can be 17, 30, or 48MHz, capacity up to 16MB.

1.3.7.6 GPIO

4 x programmable general purpose input or output (GPIO).

1.3.7.7 Watchdog

Supports multi-level watchdog time-out output.

Provides 1-65536 level, from 0~65535 sec intervals.

1.3.7.8 Serial Ports

2 x ports, 2-wire serial port (Tx/Rx) supports 16550 UART compliance.

- Programmable FIFO or character mode
- 16-byte FIFO buffer on transmitter and receiver in FIFO mode
- Programmable serial-interface characteristics: 5, 6, 7, or 8-bit character
- Even, odd, or no parity bit selectable
- 1, 1.5, or 2 stop bit selectable
- Baud rate up to 115.2K

1.3.7.9 TPM

Supports TPM 2.0 module by default.

1.3.7.10 Smart Fan

Support 2 x Fan PWM control signal and 2 x tachometer input for fan speed detection. Provides 1 x on module with connector and the other to carrier board followed by PICMG COM Express R3.0 specification.

1.3.7.11 BIOS

The BIOS chip is on module by default. This device also allows users to place BIOS chips on the carrier board with appropriate design and jumper settings on BIOS_DIS#[1:0].

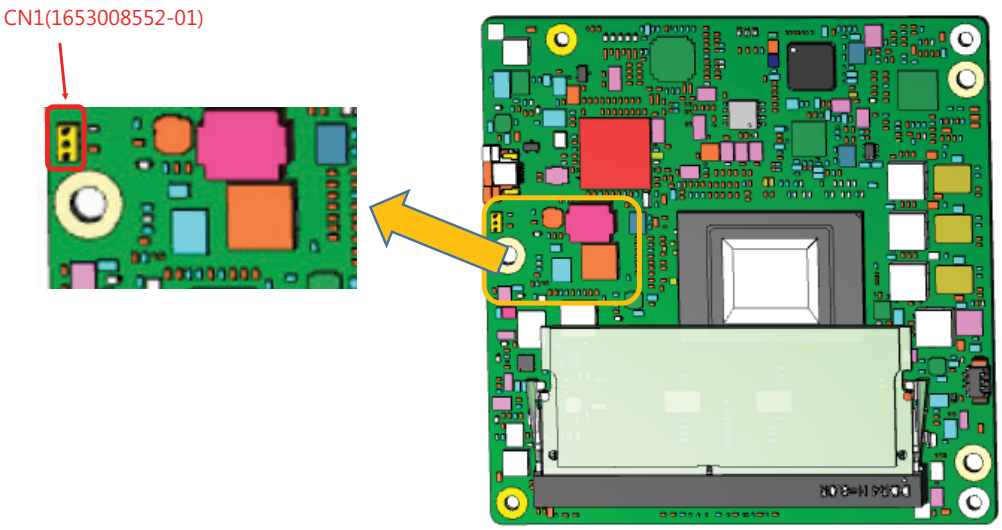
BIOS_DIS0#	BIOS_DIS#1	Boot up destination/function
Open	Open	Boot from Module's SPI BIOS
Open	GND	SPI_CS0# to Carrier Board, SPI_CS1# to Module
GND	GND	SPI_CS0# to Module, SPI_CS1# to Carrier Board

Note! *If the system COMS is cleared, we strongly suggest entering the BIOS setup menu and loading default settings on the first boot up*

Clear CMOS

Setting Type	Jumper Setting	Clear RTC CMOS (Time & Date)	BIOS Setting Load Default
Default Setting	Without jumper	V	N/A
Optional Setting	Jumper 1-2	V	V

Purpose: The standard module has no jumper at CN1, so BIOS settings are maintained without a RTC coin battery. If you need to restore BIOS default settings, please follow the steps below:



1. Remove the Coin Battery
2. Put the jumper on CN1 pin1-2
3. Turn on the power supply
4. The System will boot up a few times
5. BIOS will be load default settings successfully

1.3.8 Power Management

1.3.8.1 Power Supply

Supports both ATX and AT power modes. The VSB is for optional suspend power if the user does not require standby (suspend-to-RAM) support. The RTC Battery is optional if keeping the time/date function is not required.

- **VCC:** 8.5 ~ 20V
- **VSB:** 4.75 ~ 5.25V (Suspend power)
- **RTC Battery Power:** 2.0 ~ 3.3V

1.3.8.2 PWROK

Power OK uses the main power supply. A high value indicates that the power supply is adequate. This signal can be used to hold off module startup and allow carrier based FPGAs or other configurable devices time to be programmed.

1.3.8.3 Power Sequence

According to PICMG COM Express R3.0 specifications.

1.3.8.4 Wake Event

Supports various wake-up events enabling users to apply solution in different scenarios.

- **Wake-on-LAN(WOL):** Wake to S0 from S3/S4/S5
- **USB Wake:** Wake to S0 from S3/S4
- **PCIe Device Wake:** Depends on user inquiry and may need customized BIOS
- **LPC Wake:** Depends on user inquiry and may need customized BIOS

1.3.8.5 Advantech S5 ECO Mode (Deep Sleep Mode)

Advantech iManager provides additional features that allow the system to enter a very low suspend power mode called S5 ECO mode. In this mode, the module will cut all power, including suspend and active power, into chipset and keep an on-module controller active. Under 50mW power is consumed in this mode, which means the user's battery pack can last longer. This mode is enabled in BIOS, the system (or module) will only support boot via a power button. It cant use other methods like WOL.

1.3.9 Environment

1.3.9.1 Temperature

Operating: 0 ~ 60 °C (32 ~ 140 °F)

Storage: -40 ~ 85 °C (-40 ~ 185 °F)

1.3.9.2 Humidity

Operating: 40 °C (104 °F) @ 95% relative humidity, non-condensing

Storage: 60 °C (140 °F) @ 95% relative humidity, non-condensing

1.3.9.3 Vibration Tolerance

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

1.3.9.4 Drop Test (Shock)

Federal Standard 101 Method 5007 test procedure with standard packing.

1.3.9.5 EMC

CE EN55022 Class B and FCC Certifications: Validated with standard development boards in Advantech chassis.

1.3.9.6 MTBF

Please refer to the Advantech SOM-6872 Series Reliability Prediction Report No: TBD. (Release date: 2020 Q1).

1.3.9.7 OS Support (duplicate with SW chapter)

Advantech Embedded Software Services' mission 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 the Internet and browse the website http://support.advantech.com.tw to download the setup file.

1.3.9.8 Advantech iManager

Supports APIs for GPIO, smart fan control, multi-stage watchdog timer, and output, temperature sensor, hardware monitor, etc. Follow the PICMG EAPI 1.0 specifications to provide backwards compatibility.

1.3.10 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-6872C7-S7A1	59.721W	25.493W	4.204W	0.490W	0.176W	4.82uA

Hardware Configuration:

1. MB: SOM-6872VCA-U9A1 (PCB: A101-1)
2. DRAM: 2 x Advantech 32G 2R x8 DDR4 3200 ECC SO
3. Other board: SOM-EA01

Test Conditions:

1. Test temperature: room temperature (about 25 °C/77 °F)
2. Test voltage: rated voltage DC +12.0V
3. Test loading:
   - Maximum load mode: Running programs.
   - Idle mode: DUT power management off and no running any program.
4. OS: Windows 10 Enterprise

1.3.11 Performance

For reference performance or benchmark data in comparison with other modules, please refer to “Advantech COM Performance and Power Consumption Table”.

1.3.12 Selection Guide w/ P/N

Part No.	SoC	eDP/ LVDS	Core/ Thread	Base Freq.	1T Boost Freq.	SoC TDP	LLC	DDR4 SODIMM	Thermal solution	Operating Temp.
SOM-6872VC-U9A1	V2748	eDP	8/16	2.9GHz	4.25GHz	35-54W	8MB	3200MT/s	Active	0 ~ 60 °C; 32 ~ 140 °F
SOM-6872VCA-U9A1	V2748	LVDS	8/16	2.9GHz	4.25GHz	35-54W	8MB	3200MT/s	Active	0 ~ 60 °C; 32 ~ 140 °F
SOM-6872VC-H0A1	V2546	eDP	6/12	3.0GHz	3.95GHz	35-54W	8MB	3200MT/s	Active	0 ~ 60 °C; 32 ~ 140 °F
SOM-6872VC-S7A1	V2718	eDP	8/16	1.7GHz	4.15GHz	10-25W	8MB	3200MT/s	Active	0 ~ 60 °C; 32 ~ 140 °F
SOM-6872VC-U1A1	V2516	eDP	6/12	2.1GHz	3.95GHz	10-25W	8MB	3200MT/s	Active	0 ~ 60 °C; 32 ~ 140 °F

1.3.13 Packing List

Part No.	Description	Quantity
-	SOM-6872 CPU module	1 x
1970005034T001	Heatspreader (include in 10W-25W SKUs only)	1 x
1970005033T001	Heatspreader (include in 35W-54W SKUs only)	1 x

1.3.14 Development Board

Part No.	Description
SOM-DB5830-00A2	Development Board SOM-DB5830 A2 (LVDS)
SOM-DB5830A-00A2	Development Board SOM-DB5830 A2 (eDP)

1.3.15 Optional Accessories

Part No.	Description
1970004870T001	Semi-cooler

1.3.16 Pin Description

Advantech provides useful checklists for schematic design and layout routing. The schematic checklist will specify detail about each pins' electrical properties and how to connect it in different circumstances. The layout checklist will specify the layout constraints and recommendations for trace length, impedance, and other necessary information during design.

Please contact your nearest Advantech branch office or call to acquire design documents and further advance support.

Chapter 2

Mechanical Information

This chapter details mechanical information on the SOM-6872 CPU Computer on Module.

Sections include:

- Board Information
- Mechanical Drawing
- Assembly Drawing

2.1 Board Information

The figures below represent the main chips on the SOM-6872 Computer-on-Module.

Please be aware of these positions when designing carrier boards to avoid mechanical problems. Use the thermal solution contacts for best thermal dissipation performance.

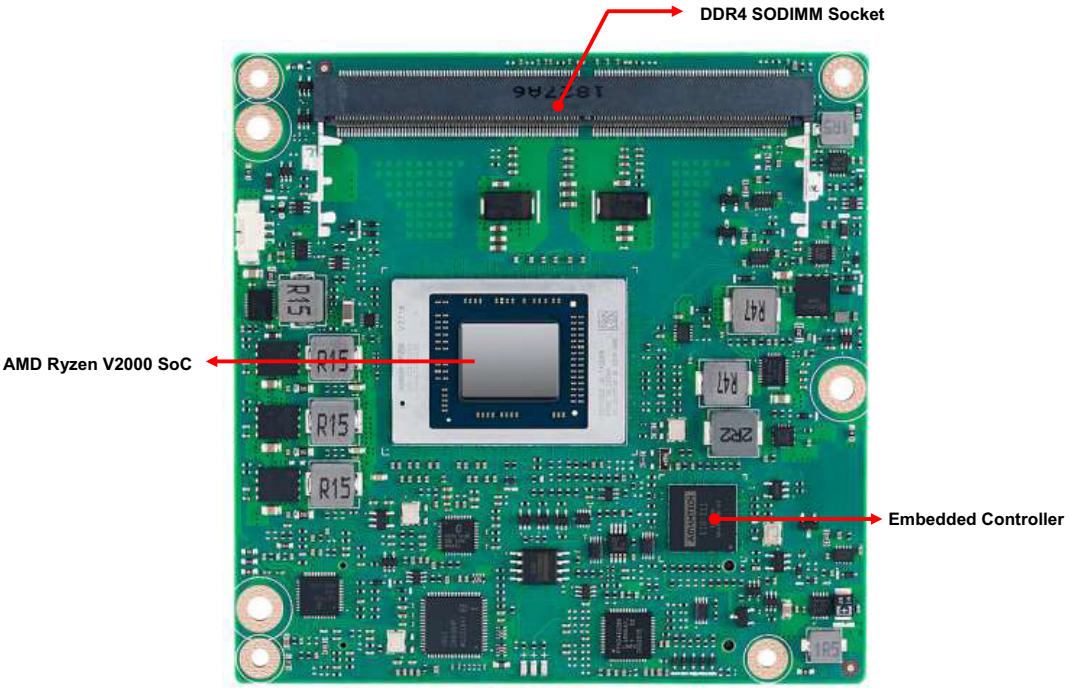


Figure 2.1 Board chip identification – front

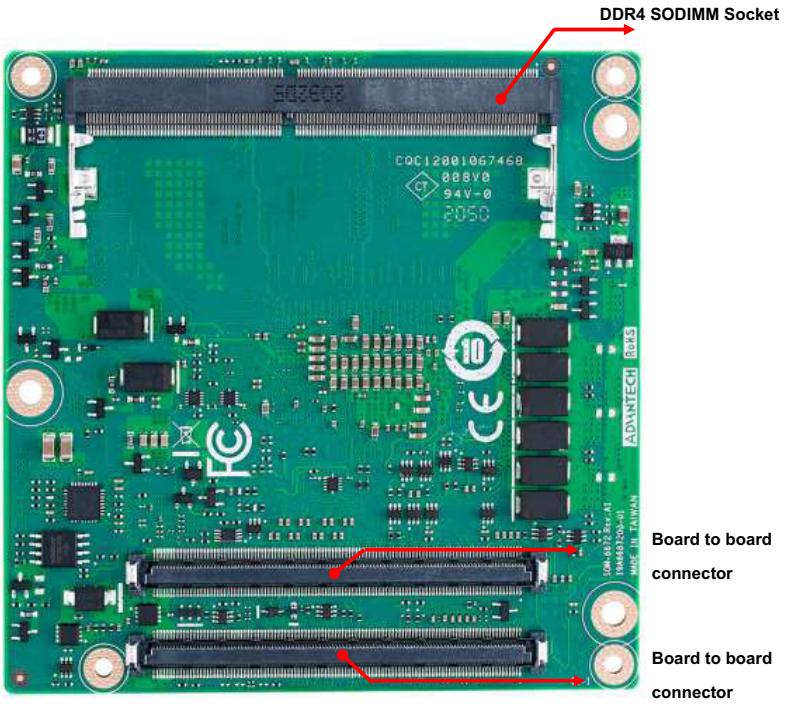
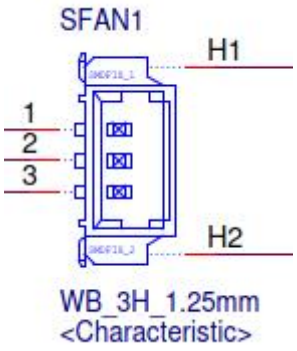


Figure 2.2 Board chip location – rear

2.1.1 Connector List

Table 2.1: SFAN1 Fan	
SFAN1	Fan
Description	Wafer 1 x 3P/1.25mm/(M)/NY46/RA/Sn/S/WH/H3.4mm
Pin	Pin Name
1	Fan Tach0-Input
2	Fan Out
3	GND



2.2 Mechanical Diagram

For more details about 2D/3D models, check out Advantech's COM support service website http://com.advantech.com.

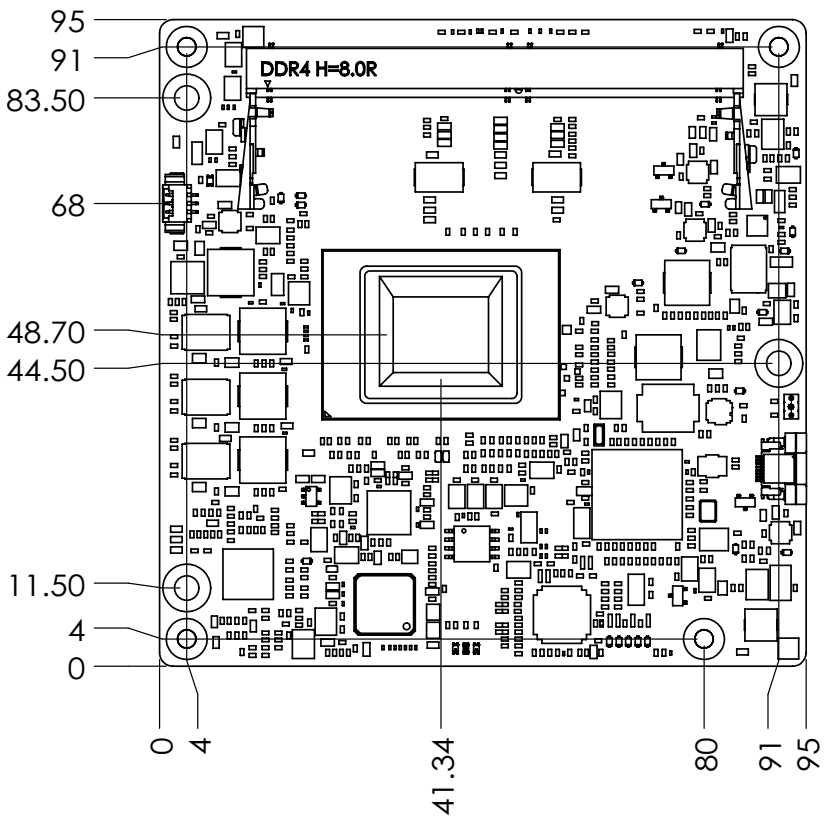


Figure 2.3 Board mechanical diagram - front

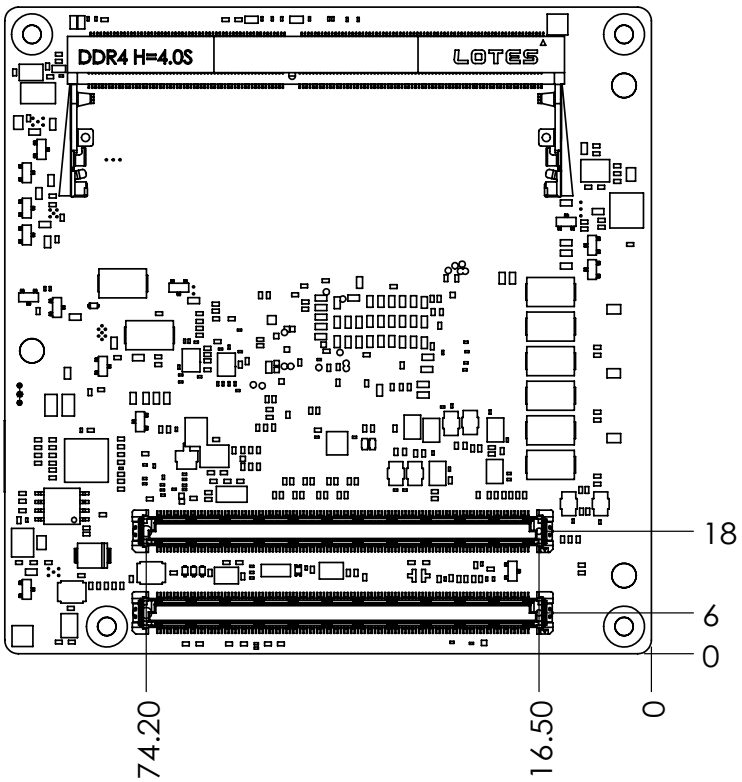


Figure 2.4 Board mechanical diagram - rear

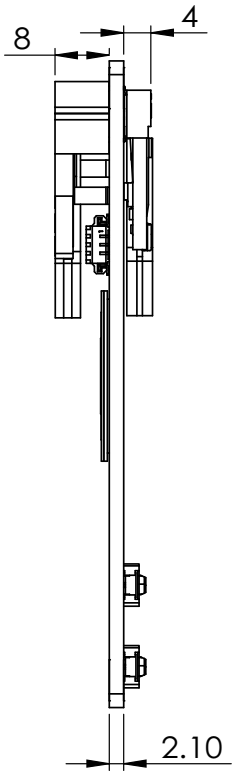


Figure 2.5 Board mechanical diagram - side

2.3 Assembly Drawing

These figures demonstrate the assembly order for the thermal module — it covers attaching the COM module to the carrier board.

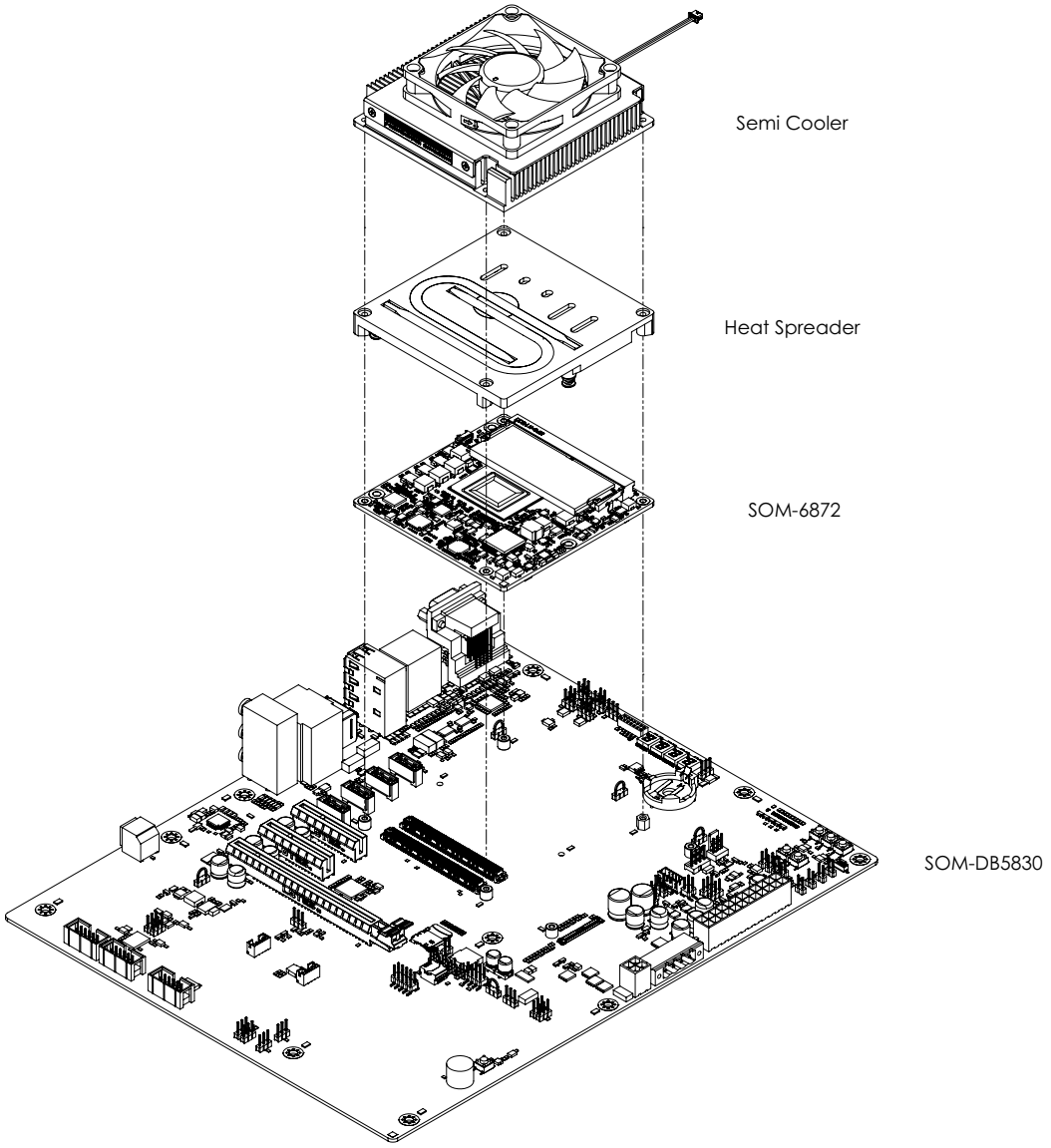


Figure 2.6 Assembly diagram

There are 3 x reserved screw holes for SOM-6872 that are used in pre-assembling it with the heat spreader.

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

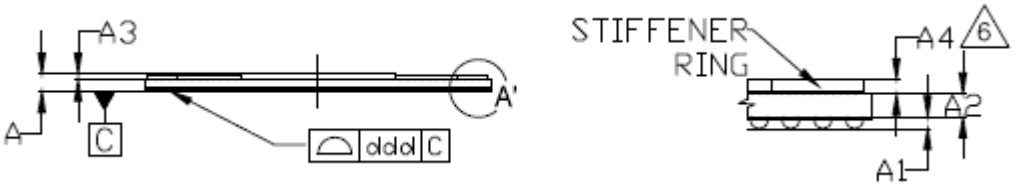


Figure 2.7 AMD FP6 height and tolerance

(For all other SKUs please contact Advantech sales or FAE for more details)

Chapter 3

AMI BIOS

This chapter details BIOS setup information for the SOM-6872 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 <DEL> or <ESC> to enter the Setup menu.

3.3 Main Setup

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

Figure 3.2 Main setup screen

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

- **System time / System date**

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

3.4 Advanced BIOS Features Setup

Select the Advanced tab from the SOM-6872 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.

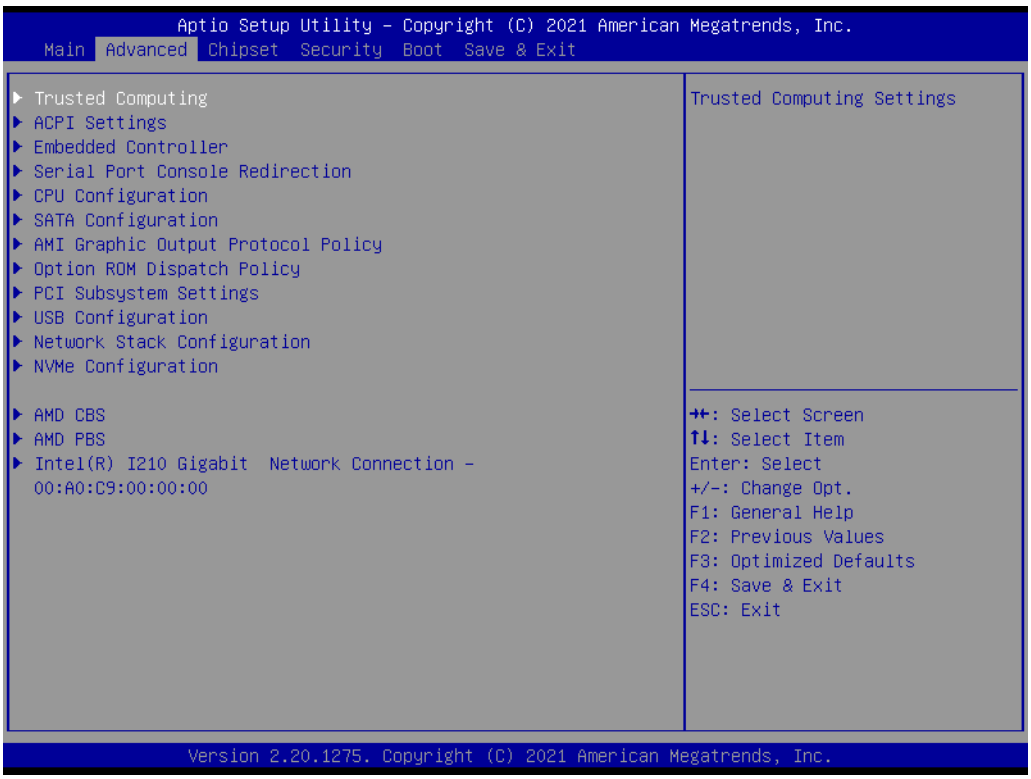


Figure 3.3 Advanced BIOS features setup screen

- **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
- **SATA Configuration**
  SATA Configuration
- **AMI Graphic Output Protocol Policy**
  AMI Graphic Output Protocol Policy
- **Option ROM Dispatch Policy**
  Option ROM Dispatch Policy
- **PCI Subsystem Settings**
  PCI Subsystem Settings
- **USB Configuration**
  USB Configuration Parameters

- **Network Stack Configuration**
  Network Stack Settings
- **NVME Configuration**

3.4.1 Trusted Computing

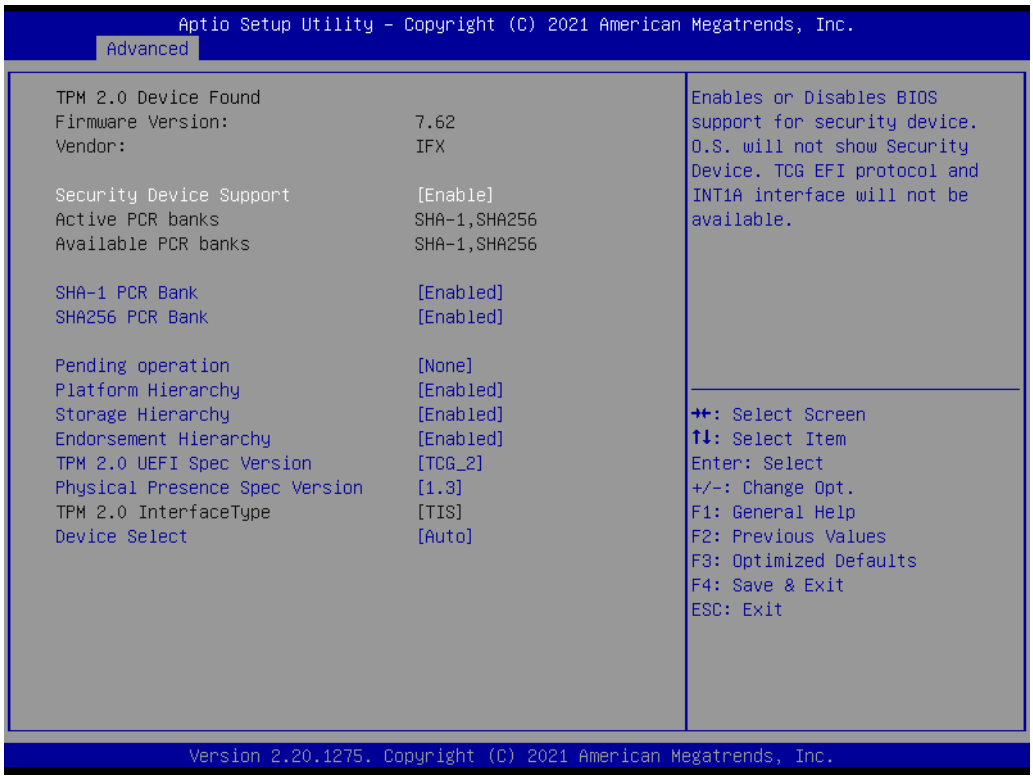


Figure 3.4 Trusted computing screen

- **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
- **SHA-1 PCR Bank**
  Enable or disable SHA-1 PCR Bank
- **SHA256 PCR Bank**
  Enable or disable SHA256 PCR Bank
- **Pending Operation**
  Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device
- **Platform Hierarchy**
  Enable or disable platform hierarchy
- **Storage Hierarchy**
  Enable or disable Storage Hierarchy
- **Endorsement Hierarchy**
  Enable or disable Endorsement Hierarchy
- **TPM2.0 UEFI Spec version**
  Select the TCG2 spec version support, TCG_1_2: the compatible mode for Win8/Win10, TCG_2: Support new TCG2 protocol and event format for Win10 or later
- **Physical Presence Spec Version**
  Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.

- **TPM2.0 Interface Type**
  Select the communication interface to TPM2.0 device
- **Device select**
  TPM1.2 will restrict support to TPM1.2 devices, TPM2.0 will restrict support to TPM2.0 devices, Auto will support both with the default set to TPM2.0 devices if not found, TPM1.2 devices will enumerated

3.4.2 ACPI Settings

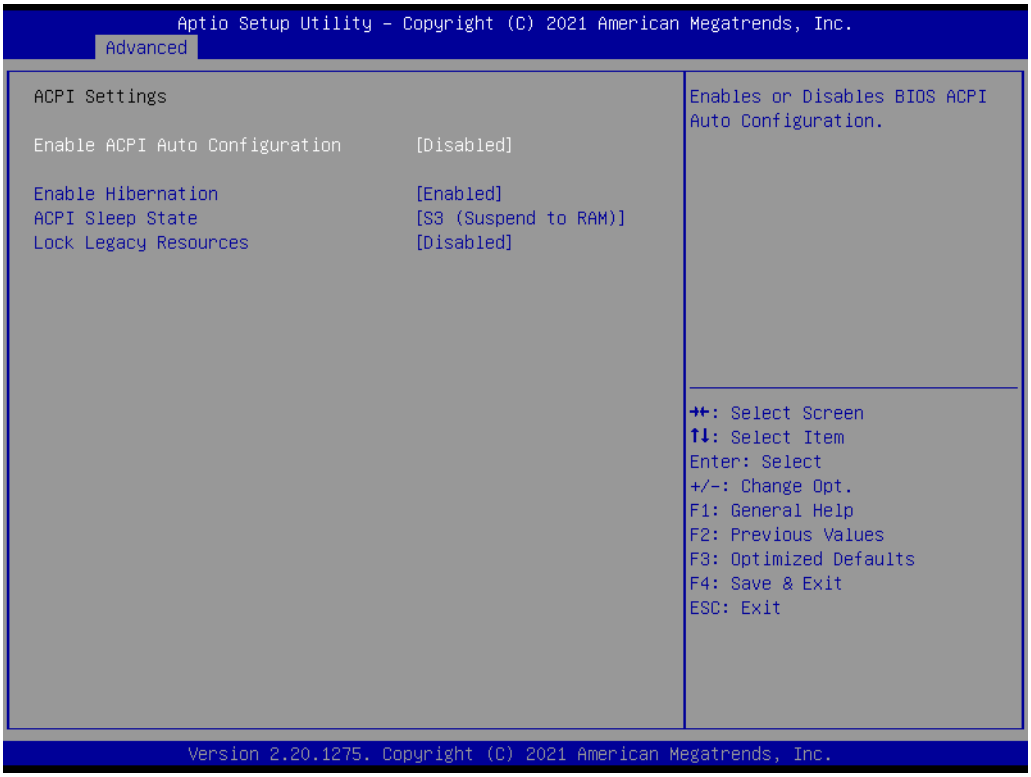


Figure 3.5 ACPI settings screen

- **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

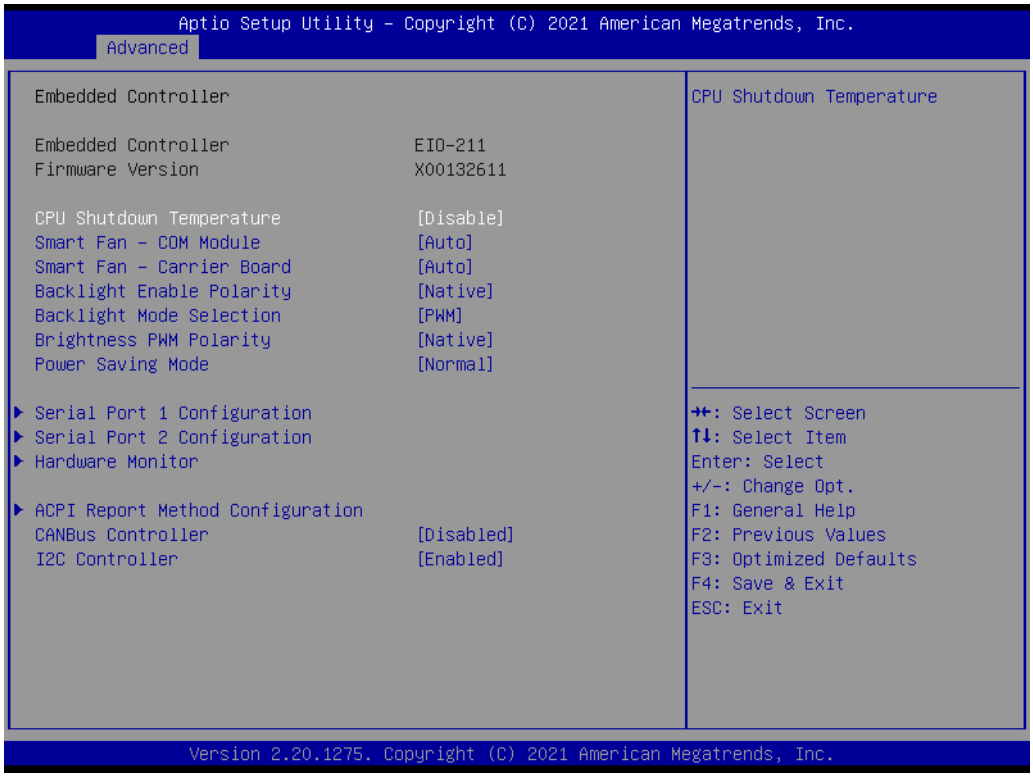


Figure 3.6 Embedded controller screen

- **CPU Shutdown Temperature**
  CPU Shutdown Temperature
- **Smart Fan-COM Module**
  Control COM Module Smart Fan function. Get value from EC and only set value when save changes
- **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
- **Backlight Mode Selection**
  Switch Backlight Control to PWM or DC mode.
- **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
- **ACPI Report Method Configuration**
  Select ACPI Reporting Method for EC Devices
- **CANBus Controller**
  Enable/Disable CANBus controller on RDC-IS200

- **I2C Controller**
  Enable/Disable I2C controller on RDC-IS200

3.4.3.1 Serial Port 1 Configuration

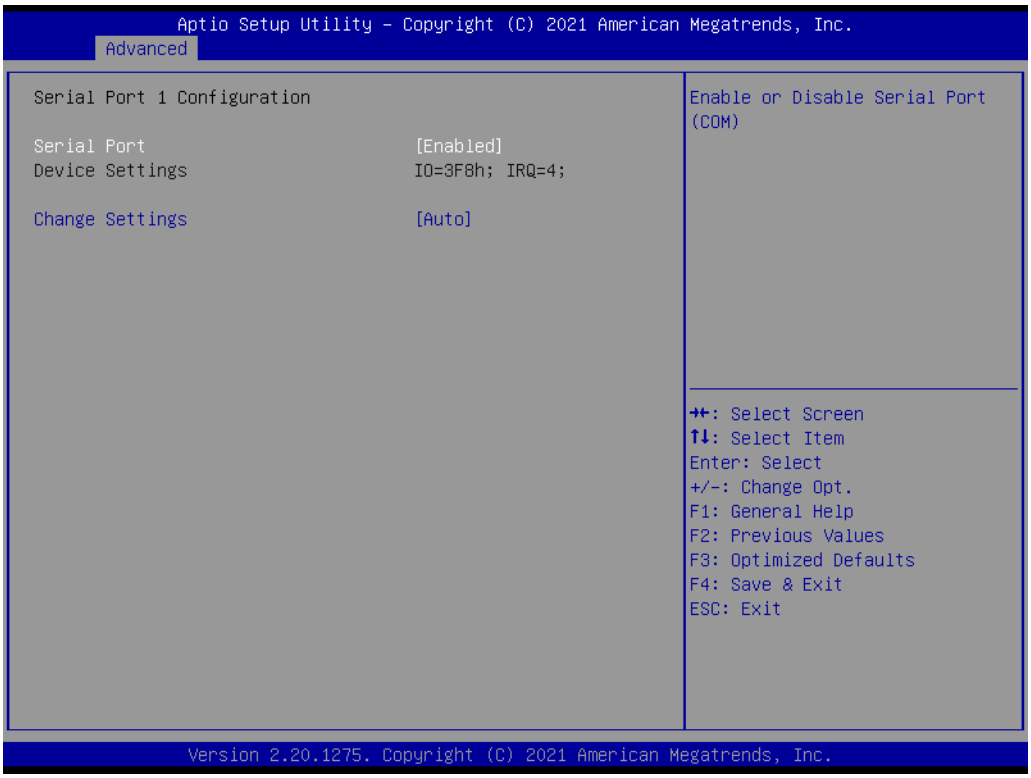


Figure 3.7 Serial port 1 configuration screen

- **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

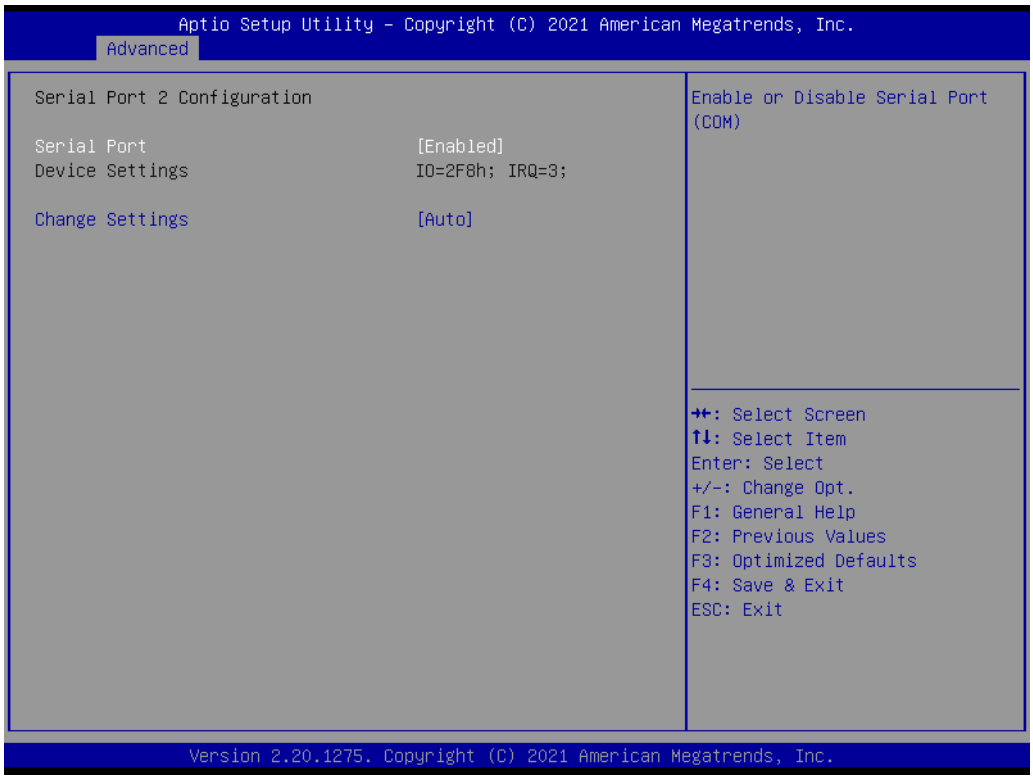


Figure 3.8 Serial port 2 configuration screen

- **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

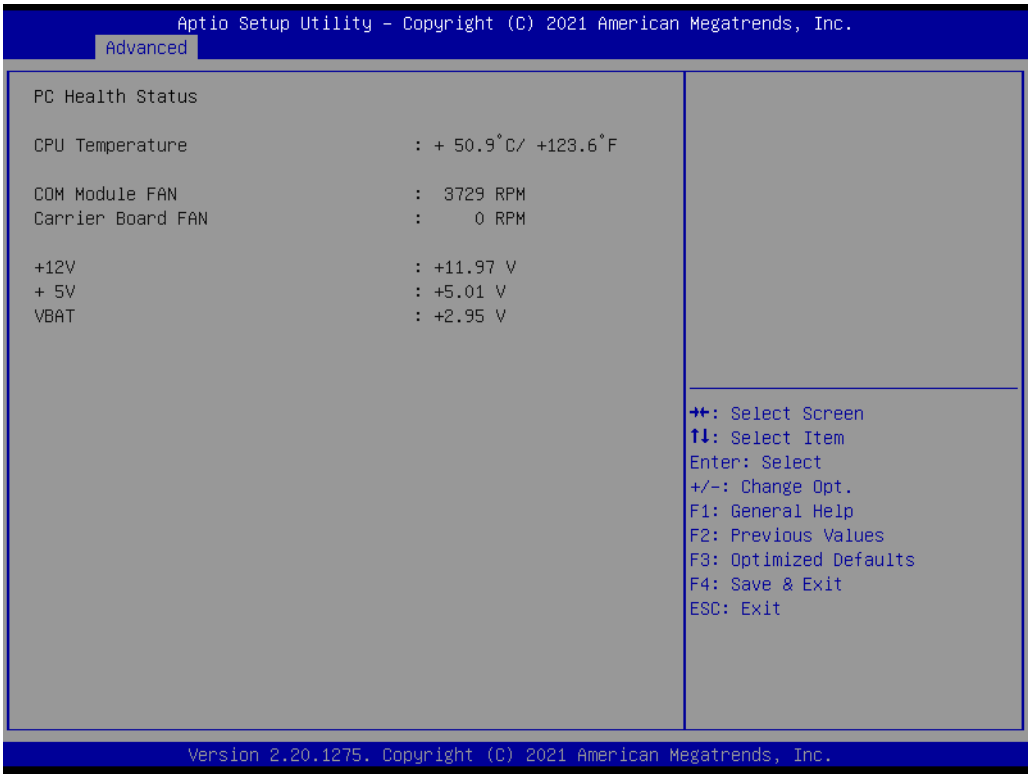


Figure 3.9 Hardware monitor screen

3.4.3.4 ACPI Report Method Configuration

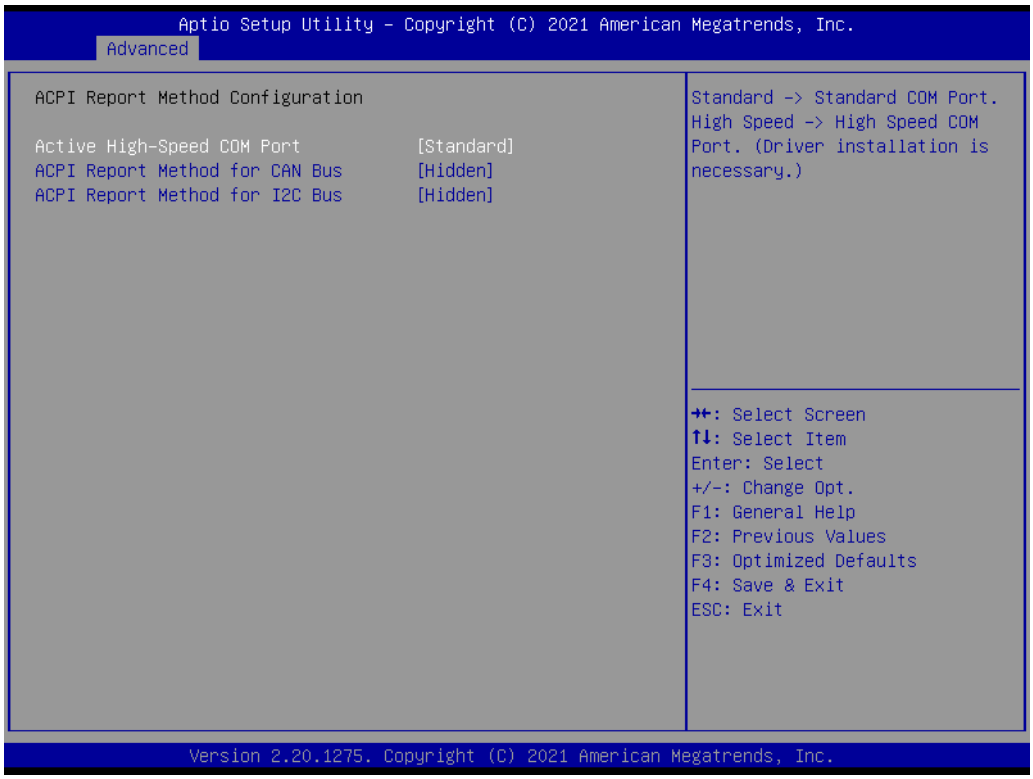


Figure 3.10 ACPI Report method configuration screen

- Active High-Speed COM Port
  Standard -> Standard COM Port. High Speed -> High Speed COM Port(Driver installation is necessary)
- ACPI Report Method for CAN Bus
  Select the ACPI reporting method for EC CAN Bus. Hidden -> Reported as reserved motherboard resource. Exposed -> Reported vendor_HID(Driver installation is necessary)
- ACPI Report Method for I2C Bus
  Select the ACPI reporting method for EC I2C Bus. Hidden -> Reported as reserved motherboard resource. Exposed -> Reported vendor_HID(Driver installation is necessary)

3.4.4 Serial Port Console Redirection

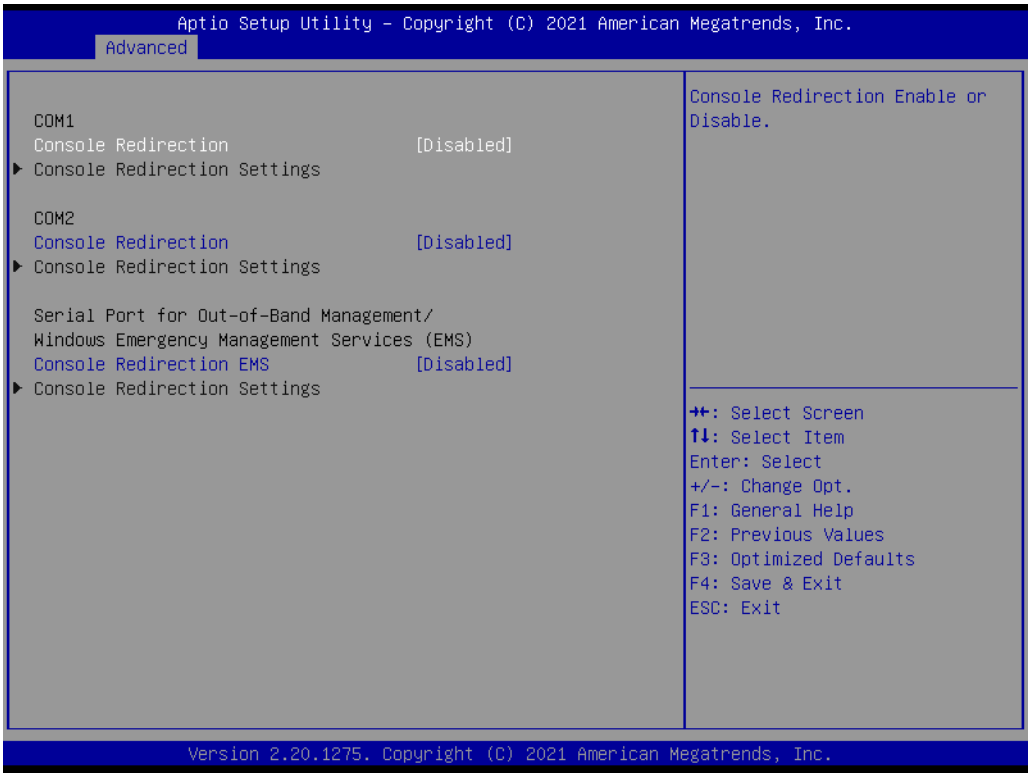


Figure 3.11 Serial port console redirection screen

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 Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS)
- **Console Redirection EMS**
  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.

3.4.4.1 Console Redirection Settings

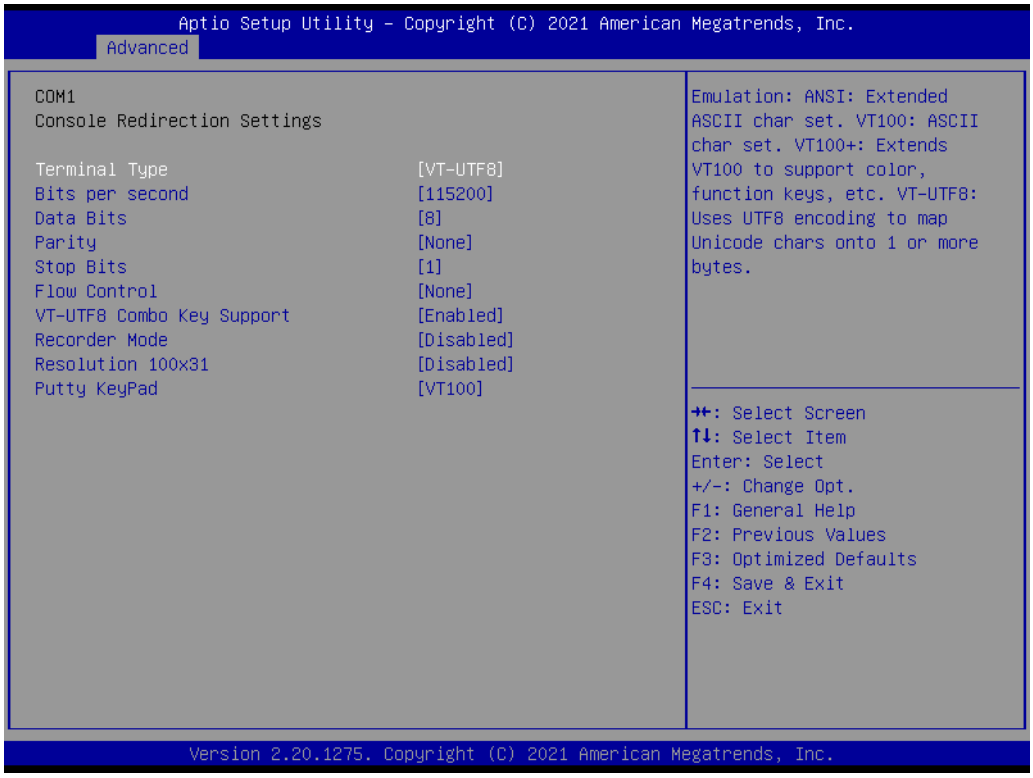


Figure 3.12 Console redirection Settings screen

- **Terminal Type**
  Emulation:ANSI:Extended ASCII char set. VT1000:ASCII char set. V100+:Extends VT100 to support color, function keys, etc. VT-UTF8:Uses UTF8 encoding to map Unicode chars onto 1 or more bytes
- **Bits Per second**
  Select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds
- **Data Bits**
  Data Bits
- **Parity**
  A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection
- **Stop Bits**
  Stop bits indicate the end of a serial data packet.(A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
- **Flow Control**
  Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals
- **VT-UTF8 Combo Key Support**
  Enable VT-UTF8 combination key support for ANSI/VT100 terminals
- **Recorder Mode**
  With this mode enabled only text will be sent. This is to capture terminal data

- **Resolution 100X31**
  Enables or disables extended terminal resolution
- **Putty Keypad**
  Select FunctionKey and KeyPad on Putty

3.4.5 CPU Configuration

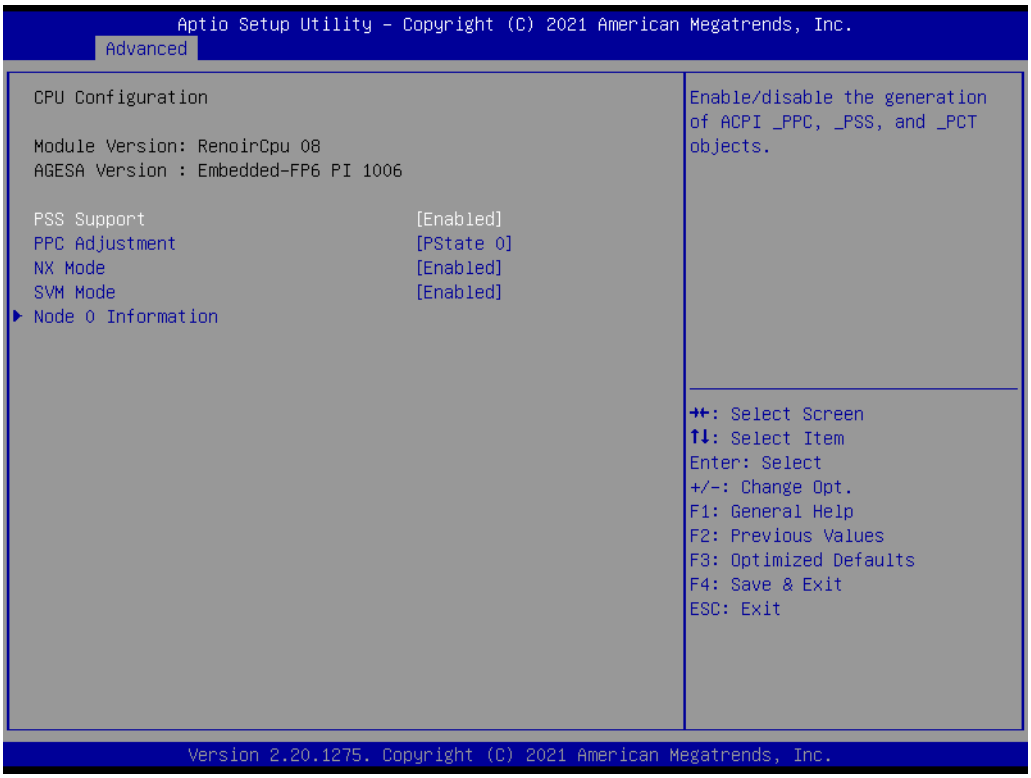


Figure 3.13 CPU configuration screen

- **PSS Support**
  Enable/Disable the generation of ACPI_PPC, _PSS and PCT objects
- **PPC Adjustment**
  Provide to adjust_PPC object
- **NX Mode**
  Enable/Disable no-execute page protection function
- **SVM Mode**
  Enable/Disable CPU virtualization
- **Node 0 Information**
  View Memory Information related to Node 0

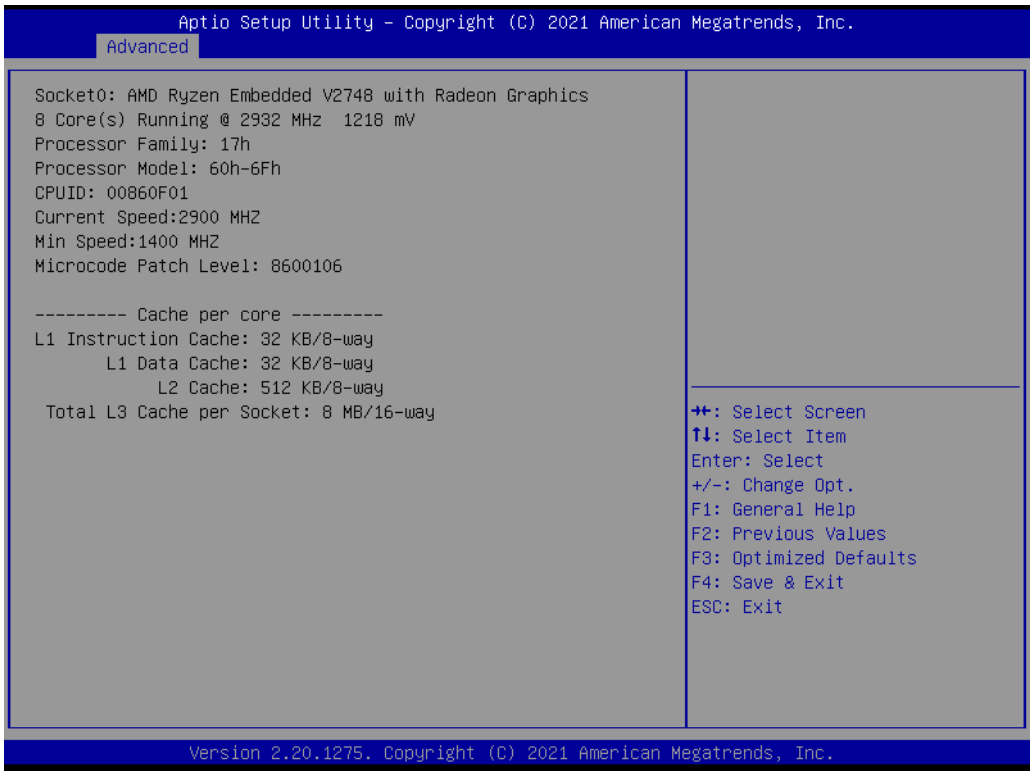


Figure 3.14 Socket0 screen

3.4.6 SATA Configuration

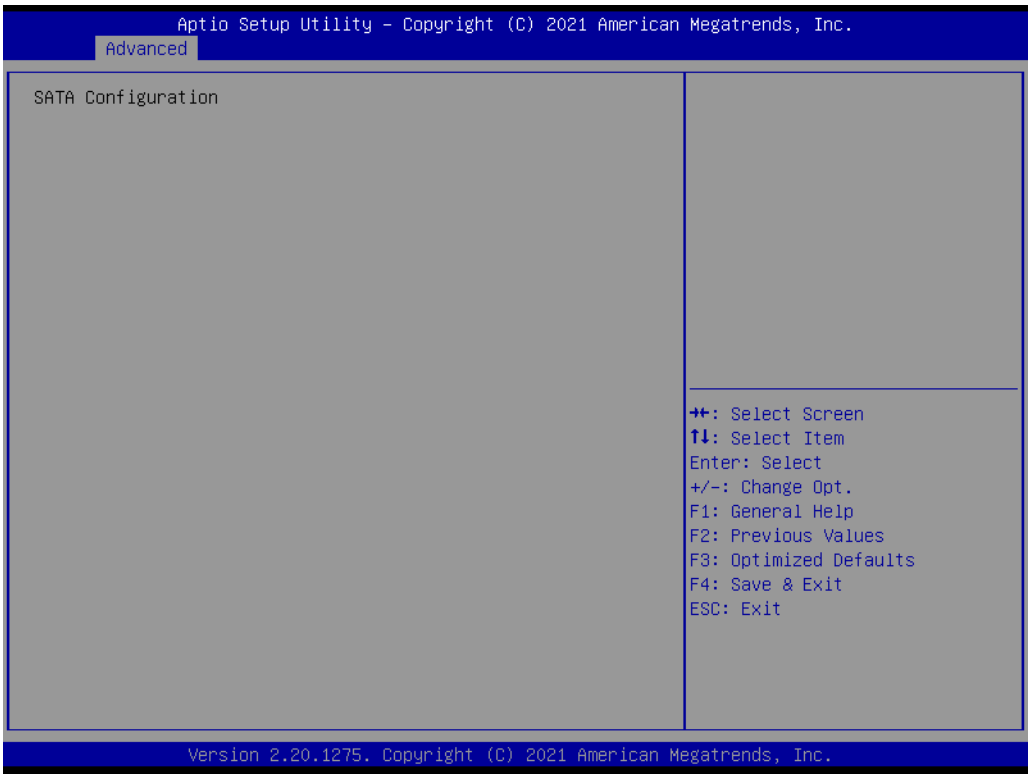


Figure 3.15 SATA configuration screen

3.4.7 USB Configuration

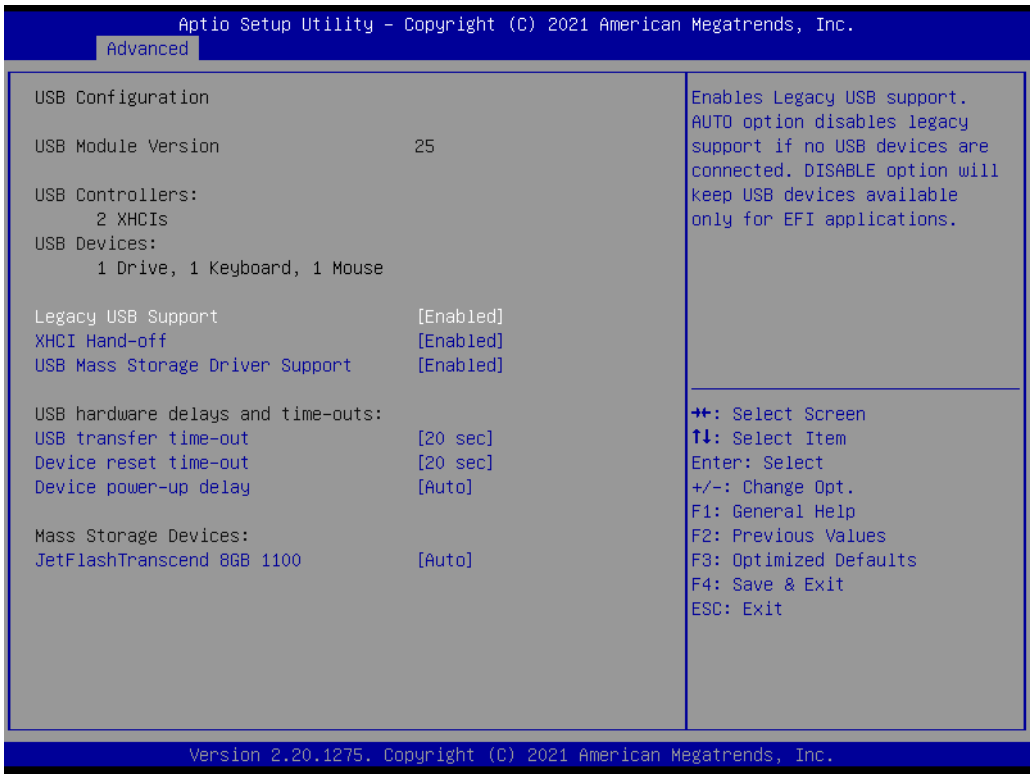


Figure 3.16 USB configuration screen

- **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.
- **JetFlashTranscend 8GB 1100**

3.4.8 AMI ROM Dispatch Policy

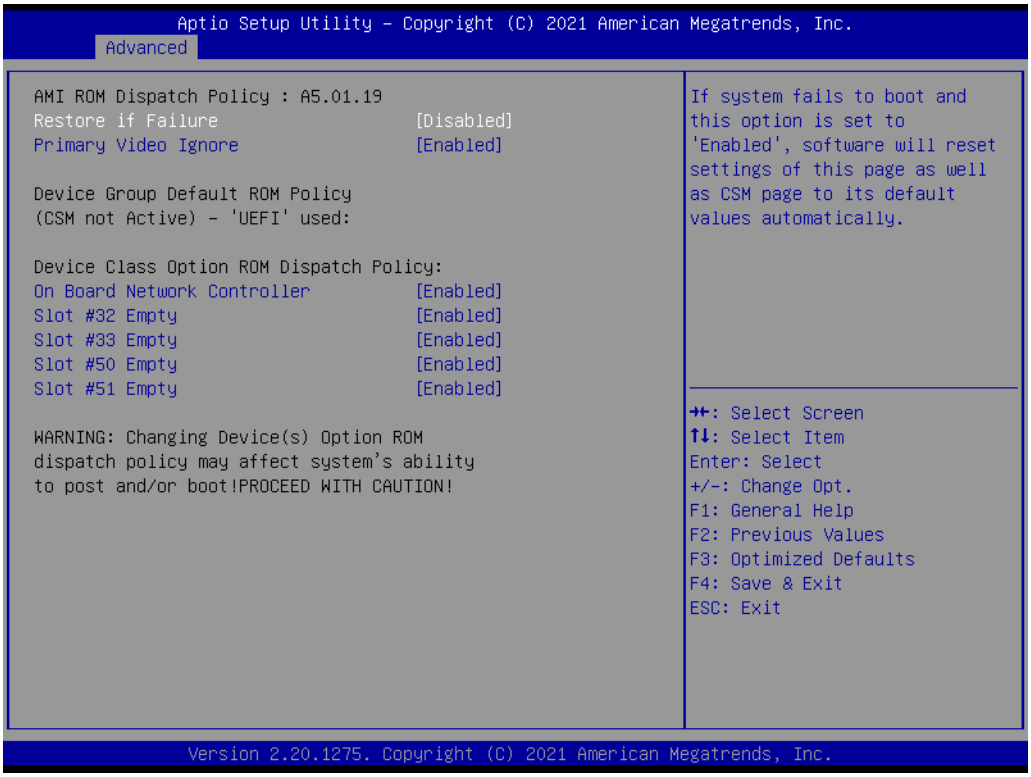


Figure 3.17 AMI ROM dispatch policy screen

- **Restore if Failure**
  If system fails to boot and this option is set to “enabled”, software will reset settings of this page as well as CSH page to its default values automatically
- **Primary Video Ignore**
  If software will detect that due to the policy settings. Option ROM of primary video device will not dispatch, it will ignore this device policy settings, and restore it to “enable” automatically
- **On Board Network Controller**
  Onboard device has:
  UEFI[X]
  Lagacy[X]
  Embedded ROM(s)
  VIDX8086;DIOX1533
  @s0|Bx1|Dx0|Fx0
- **Slot #32 Empty**
  Enable or disable option ROM execution for selected slot
- **Slot #33 Empty**
  Enable or disable option ROM execution for selected slot
- **Slot #50 Empty**
  Enable or disable option ROM execution for selected slot
- **Slot #51 Empty**
  Enable or disable option ROM execution for selected slot

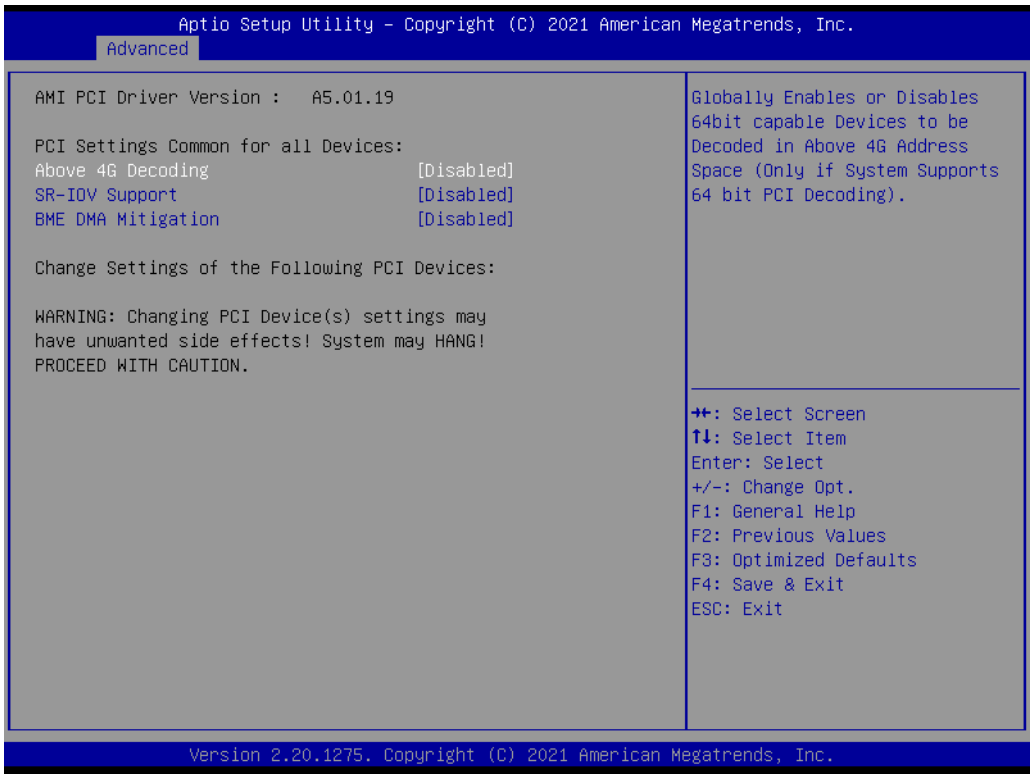


Figure 3.18 AMI PCI driver version screen

- **Above 4G Decoding**
  Globally enables or disables 64bits cable devices to be decoded in above 4G address space (only if system supports 64 bit PCI decoding)
- **SR-IOV support**
  If system has SR-IOV capable PCIe devices, this option enables or disables single root IO virtualization support
- **BHE DNA mitigation**
  Re-enables bus master attribute disabled during Pci enumeration for PCI bridges after SMM locked

3.4.9 Network Stack

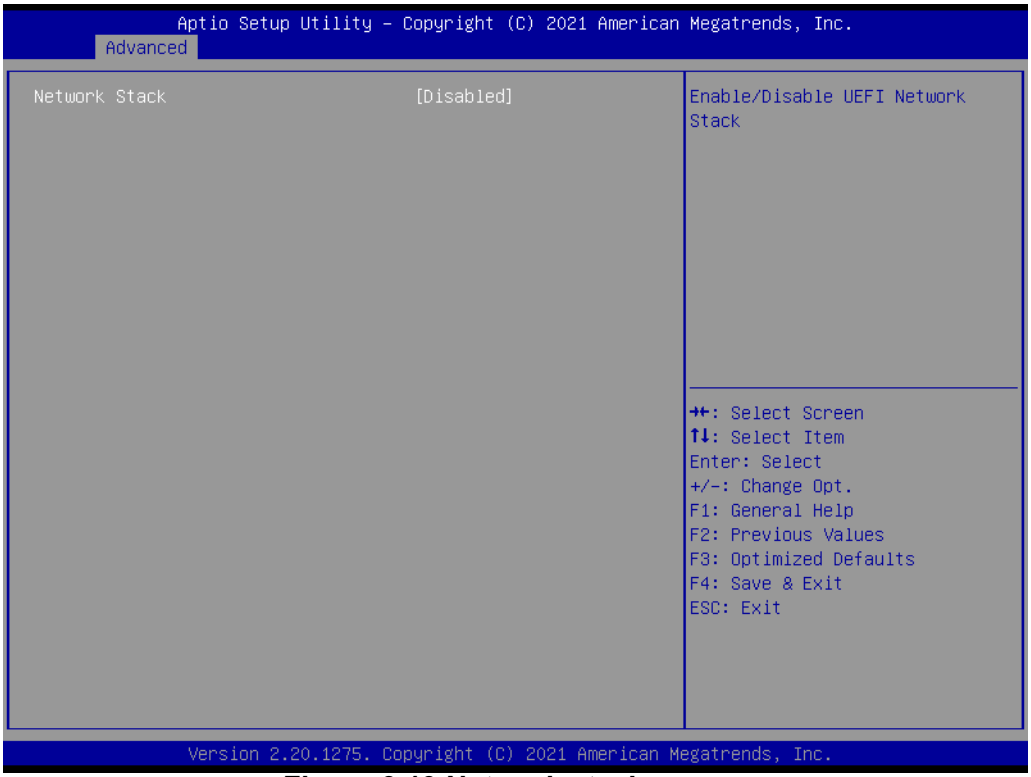


Figure 3.19 Network stack screen

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

3.4.9.1 Network Stack Configuration

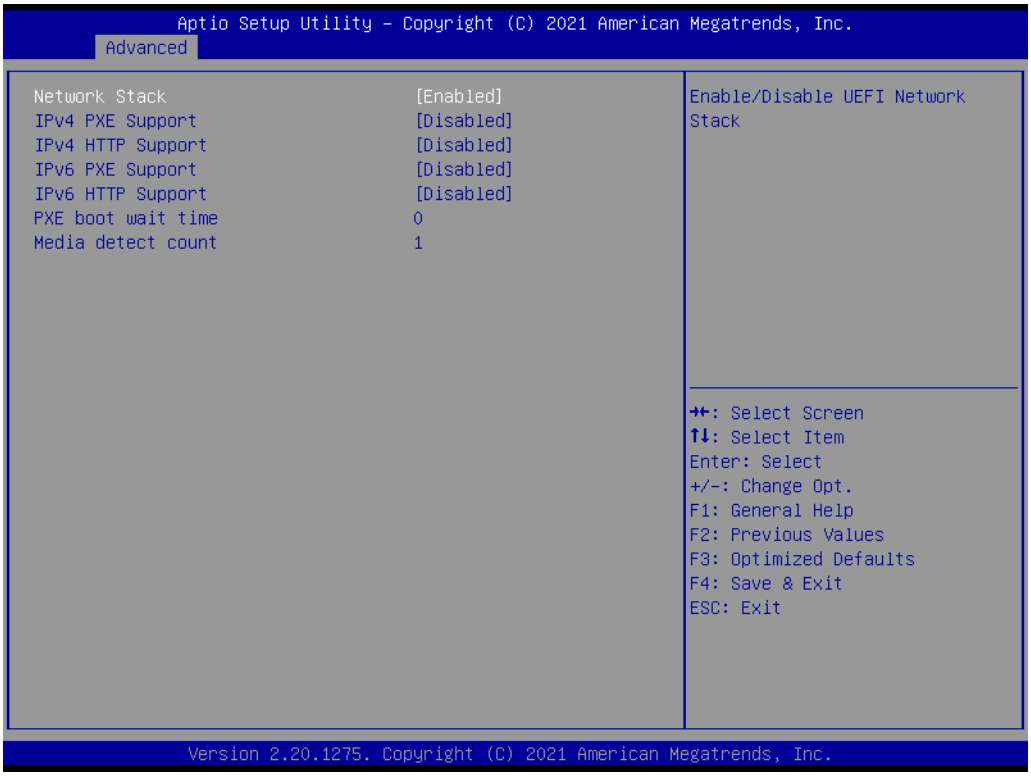


Figure 3.20 Network stack screen

- **Network Stack**
  Enable/Disable UEFI Network Stack
- **IPv4 PXE support**
  Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available
- **IPv4 HTTP Support**
  Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available
- **IPv6 PXE Support**
  Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available
- **IPv6 HTTP Support**
  Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available
- **PXE boor wait time**
  Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value
- **Media detect count|**
  Number of times presence of media will be checked. Use either +/- or numeric keys to set the value

3.4.10 NVMe Configuration

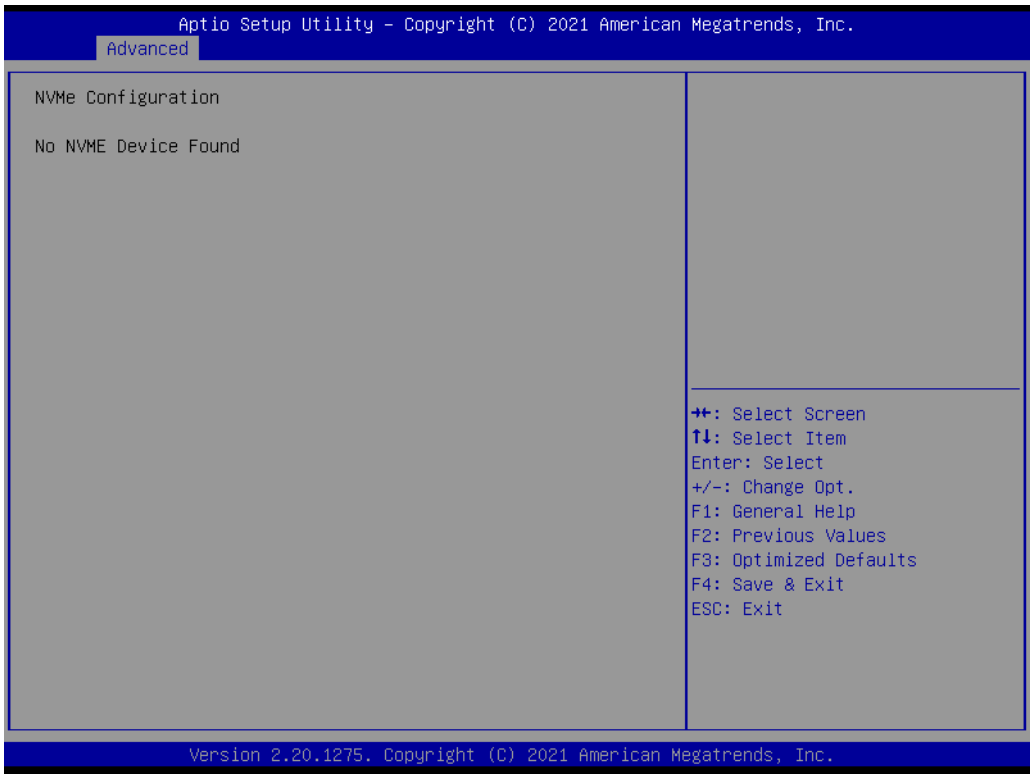


Figure 3.21 NVMe configuration screen

No NVNE Device Found

3.4.11 AMD CBS

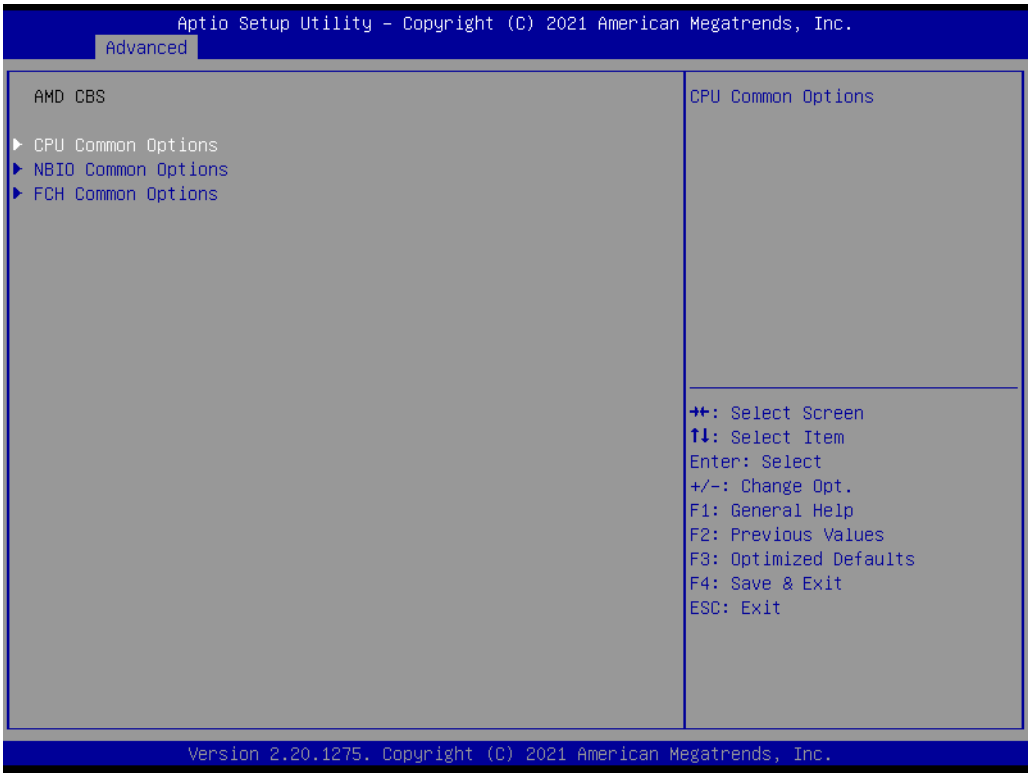


Figure 3.22 CPU Common options screen

- **CPU Common Options**
  CPU common options
- **NBIO Common Options**
  NBIO Common Options
- **FCH Common Options**
  FCH Common Options

3.4.11.1 CPU Common Options

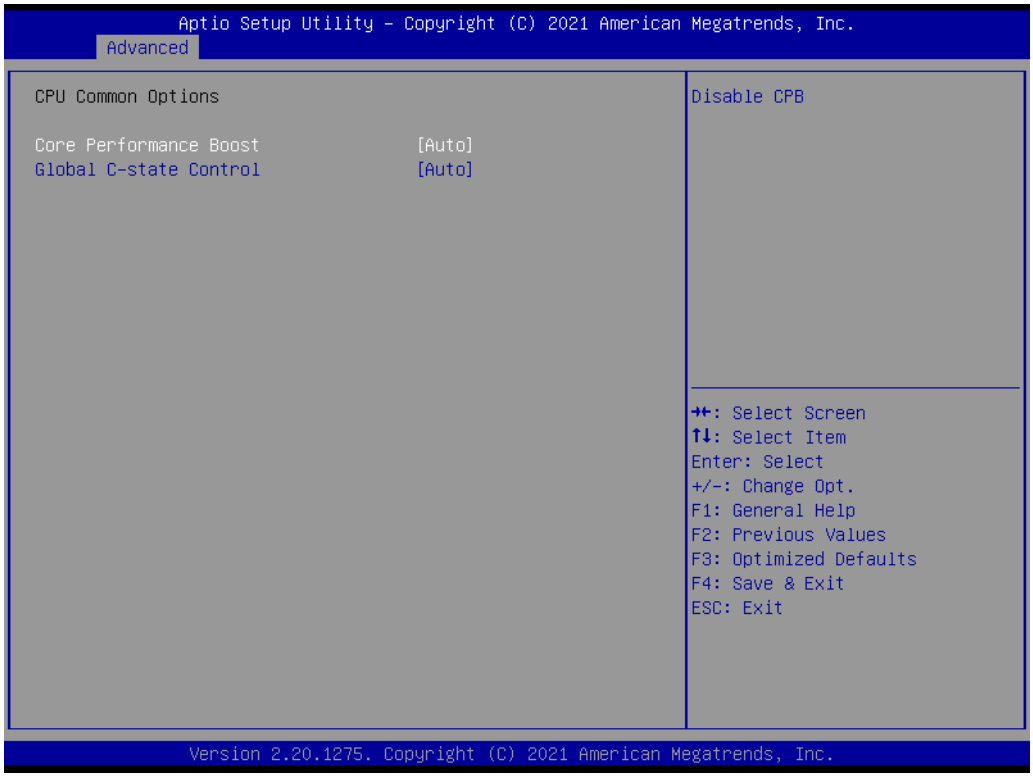


Figure 3.23 CPU Common options screen

- **Core Performance Boost**
  Disable CPB
- **Global C-State Control**
  Control IO based C-state generation and DF C-states. There is another DF Cstate option which will be synchronized with this option if DF Cstate option is auto

3.4.11.2 NBIO Common Options

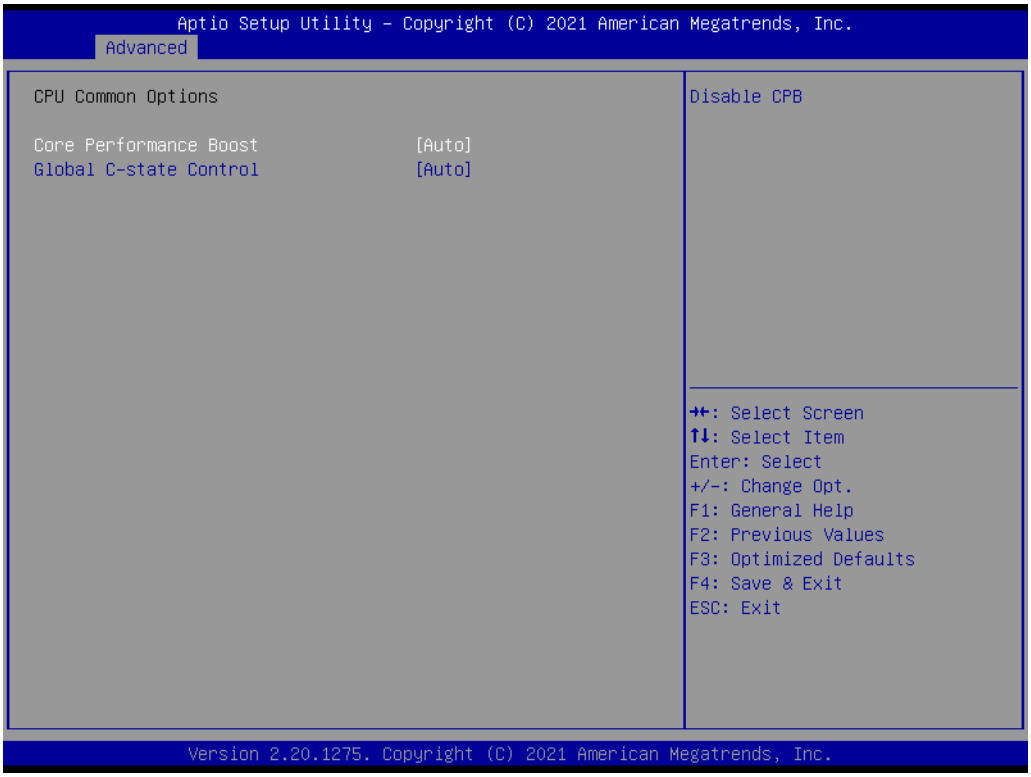


Figure 3.24 NBIO Common options screen

- **IOMMU**
  Enable/Disable IOMMU
- **PCIe ARI Support**
  Enable /Disable ARI
- **PSPP Policy**
  No help string
- **Audio Configuration**
  Audio Configuration
- **SMU Common Options**
  SMU Common Options

Audio Configuration

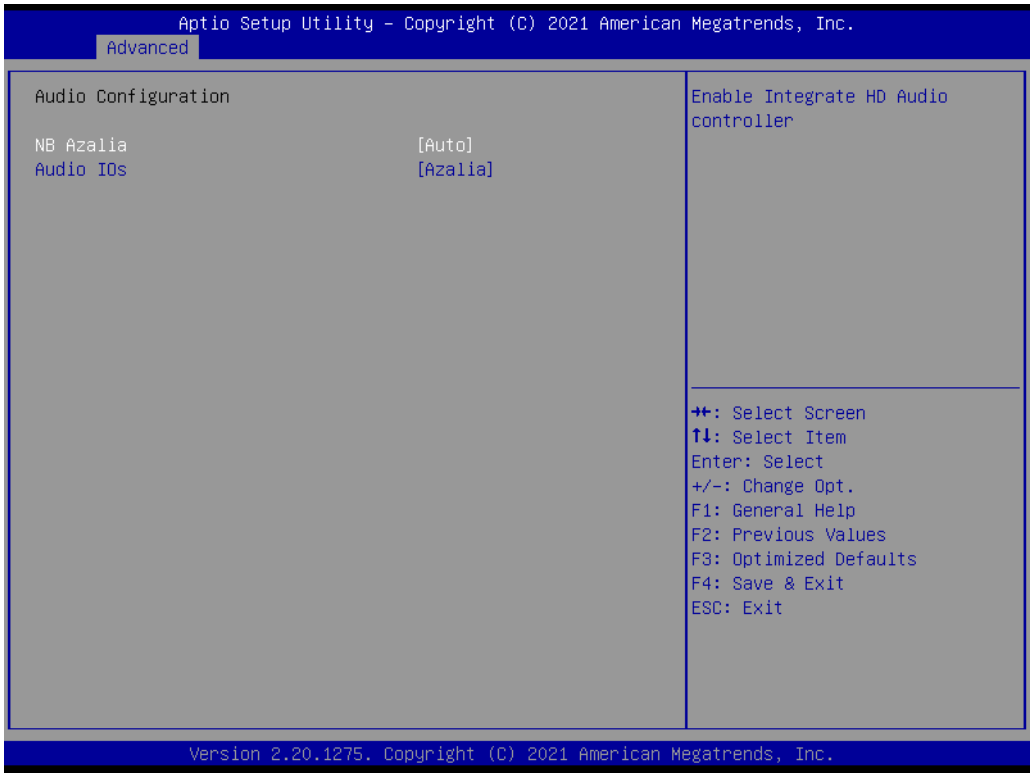


Figure 3.25 Audio configuration screen

- **NB Azalia**
  Enable Integrate HD Audio Controller
- **Audio IOs**
  Audio IOs Control

SMU Common Options

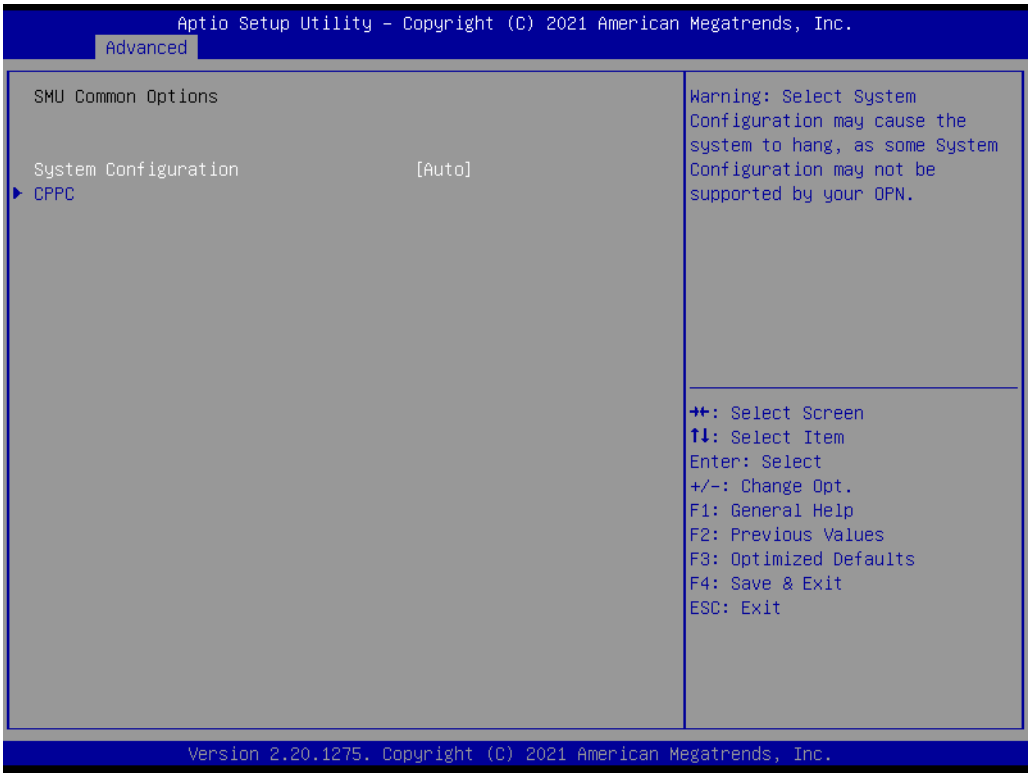


Figure 3.26 SMU Common options screen

- **System Configuration**
  Warning: Select system configuration may cause the system to hang, as some system configuration may not be supported by your OPN
- **CPPC**
  CPPC

CPPC

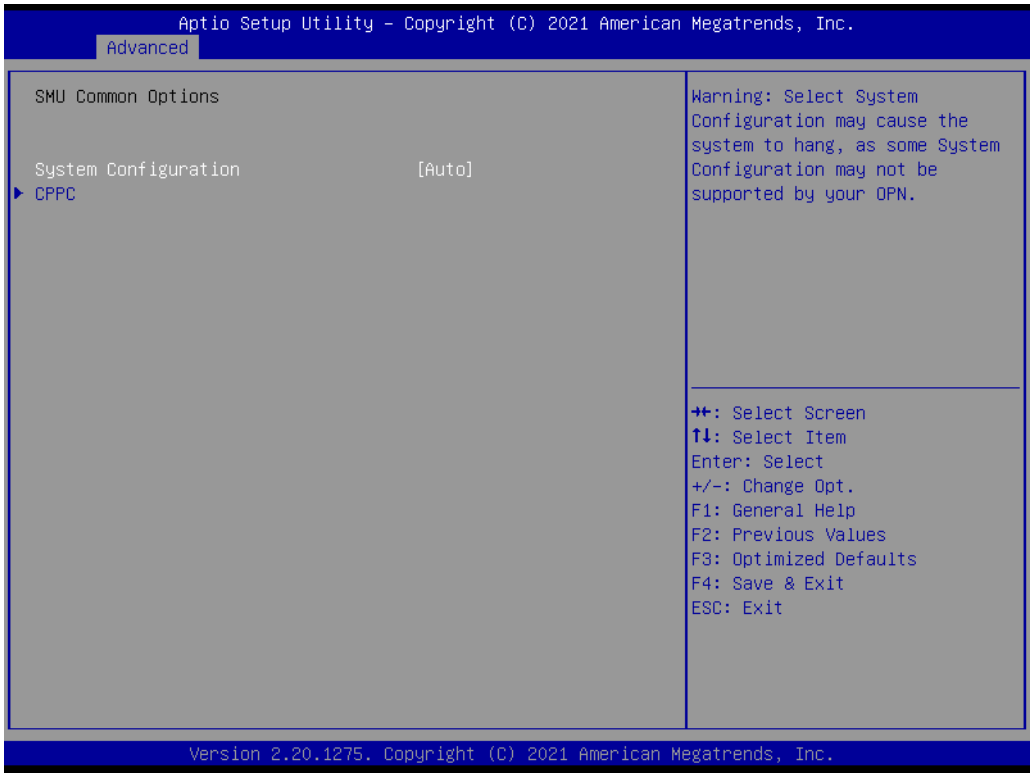


Figure 3.27 CPPC screen

CPPC CTRL

CCPC Control: Enable-Override, Disable-Set default

FCH Common Options

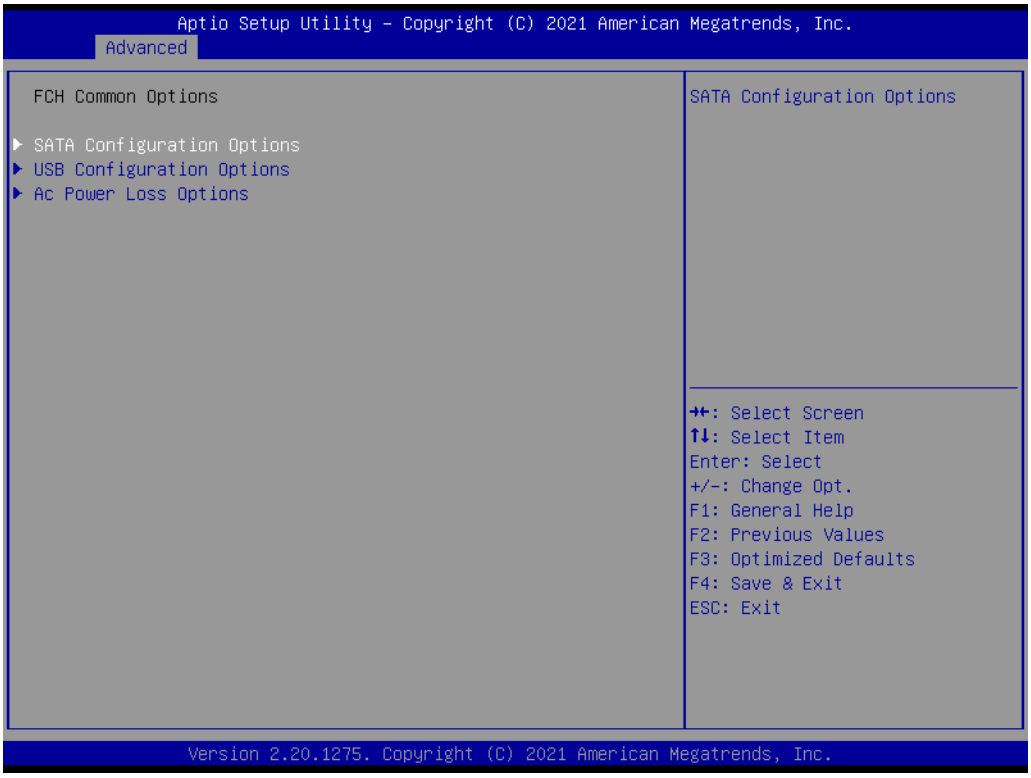


Figure 3.28 FCH Common options screen

- **SATA Configuration Options**
  SATA Configuration Options
- **USB Configuration Options**
  USB Configuration Options
- **Ac Power Loss Options**
  Ac Power Loss Options

SATA Configuration Options

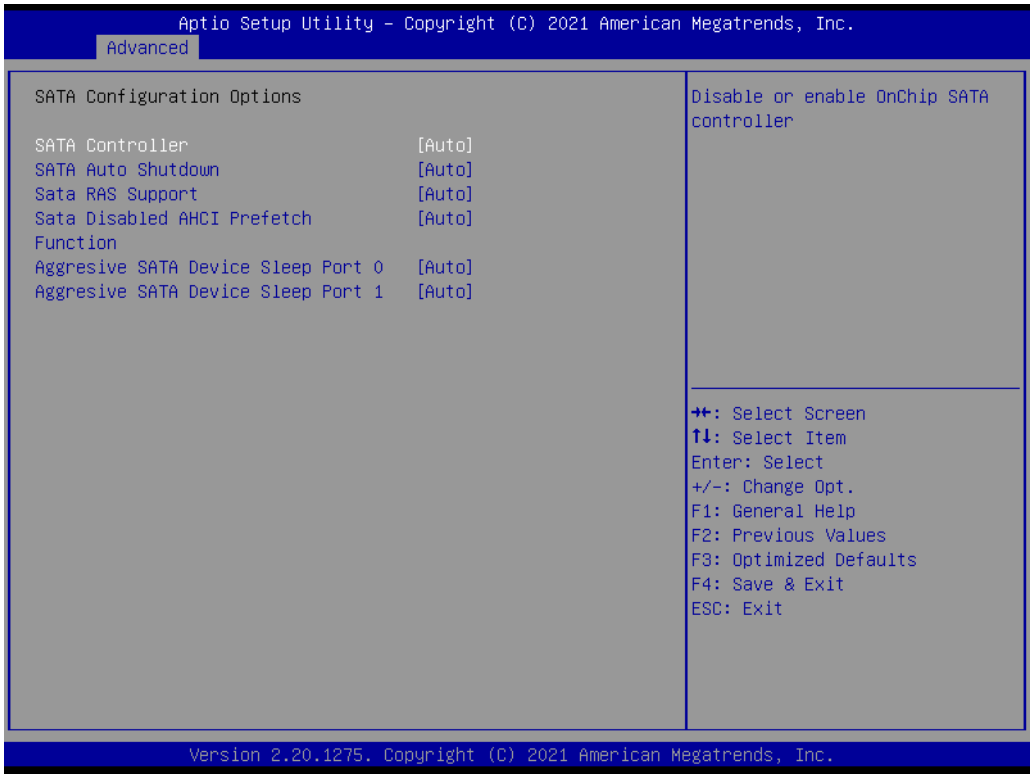


Figure 3.29 SATA Configuration options screen

SATA Controller(s)
Disable or enable onchip SATA controller
SATA Auto Shutdown
Disable SATA controller if there is no port connection
SATA RAS Support
Disable or enable SATA RAS support
SATA Disable AHCI Prefetch Function
Disable or enable SATA
Disabled AHCI Prefetch Function
Aggressive SATA Device Sleep Port0
No help string
Aggressive SATA Device Sleep Port1
No help string

USB Configuration Options

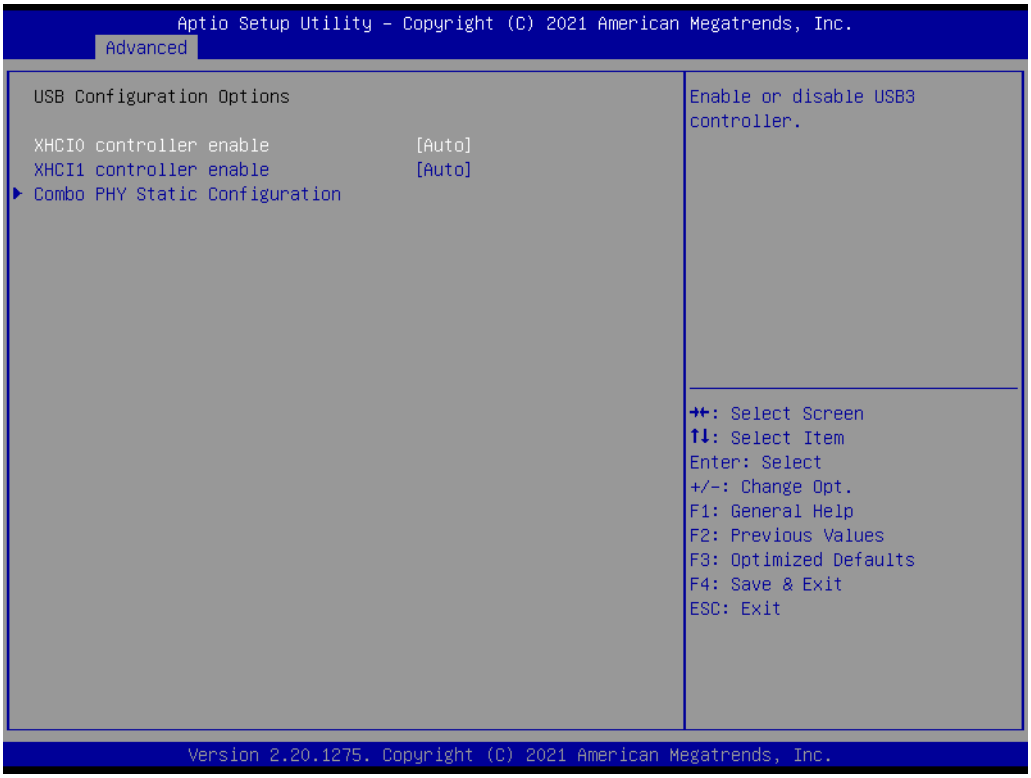


Figure 3.30 USB Configuration options screen

xHCI0 controller enable
Enable or disable USB3 controller
xHCI1 controller enable
Enable or disable USB3 controller
Combo Phy Static Configuration
Combo Phy Static Configuration

Combo PHY Static Configuration

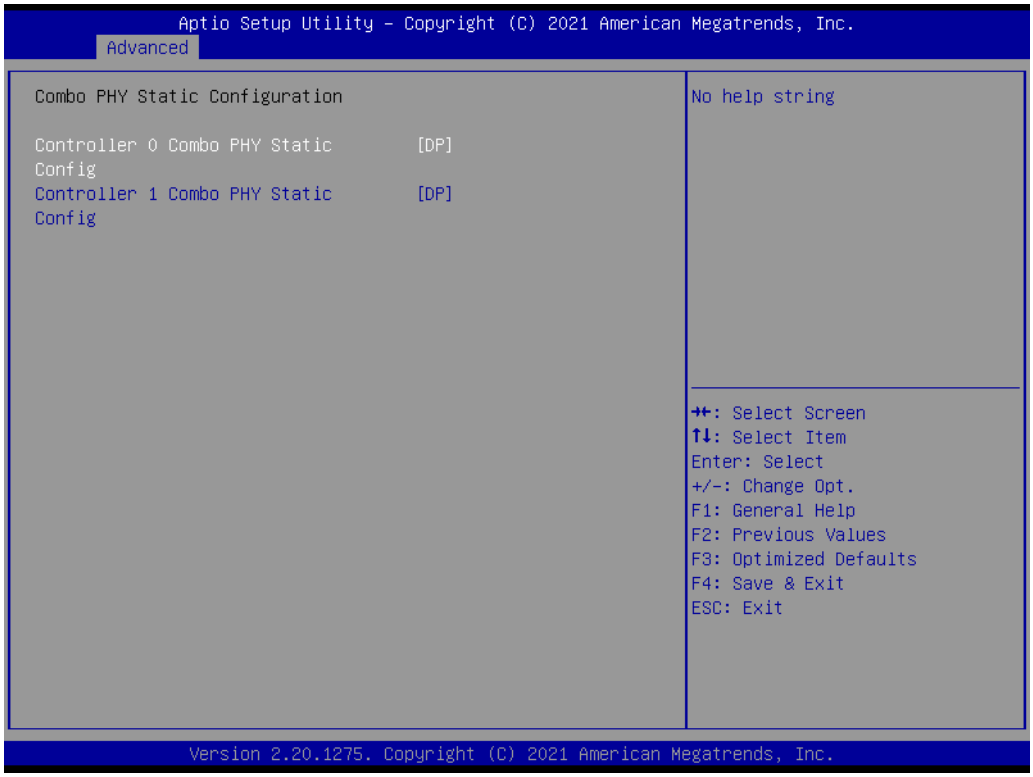


Figure 3.31 Combo PHY static configuration screen

- **Controller 0 Combo PHY Static Config**
  No help string
- **Controller 1 Combo PHY Static Config**
  No help string

Ac Power Loss Options

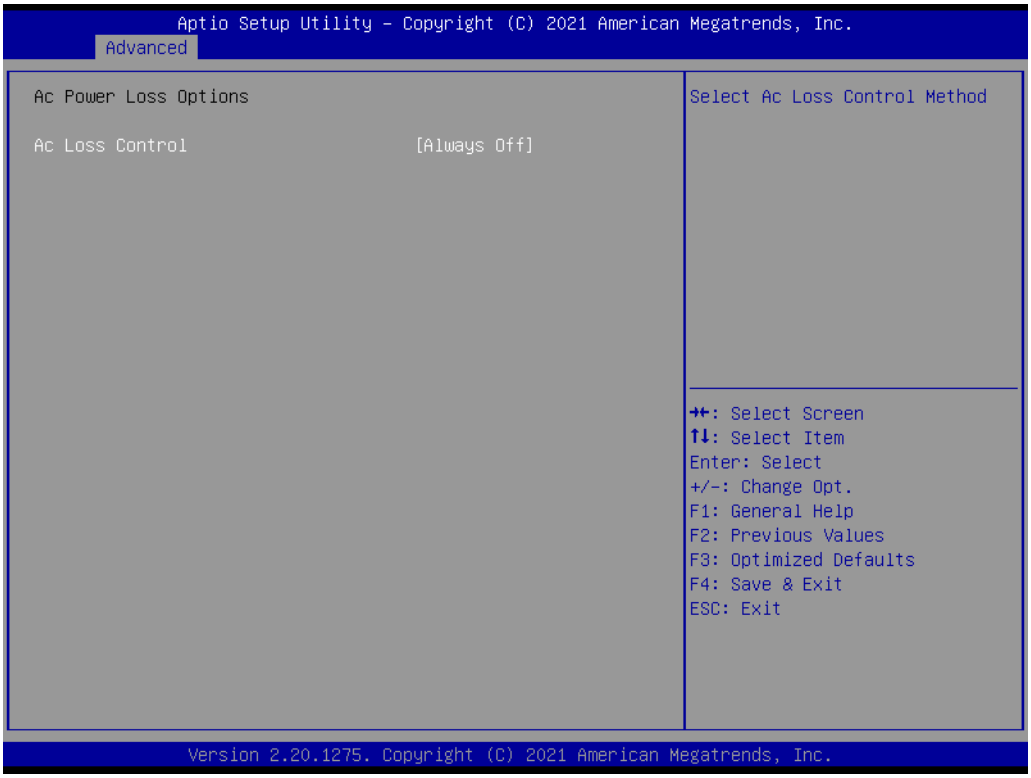


Figure 3.32 Ac Power loss options screen

Ac Loss Control

Select Ac Loss Control Method

3.4.12 AMD PBS

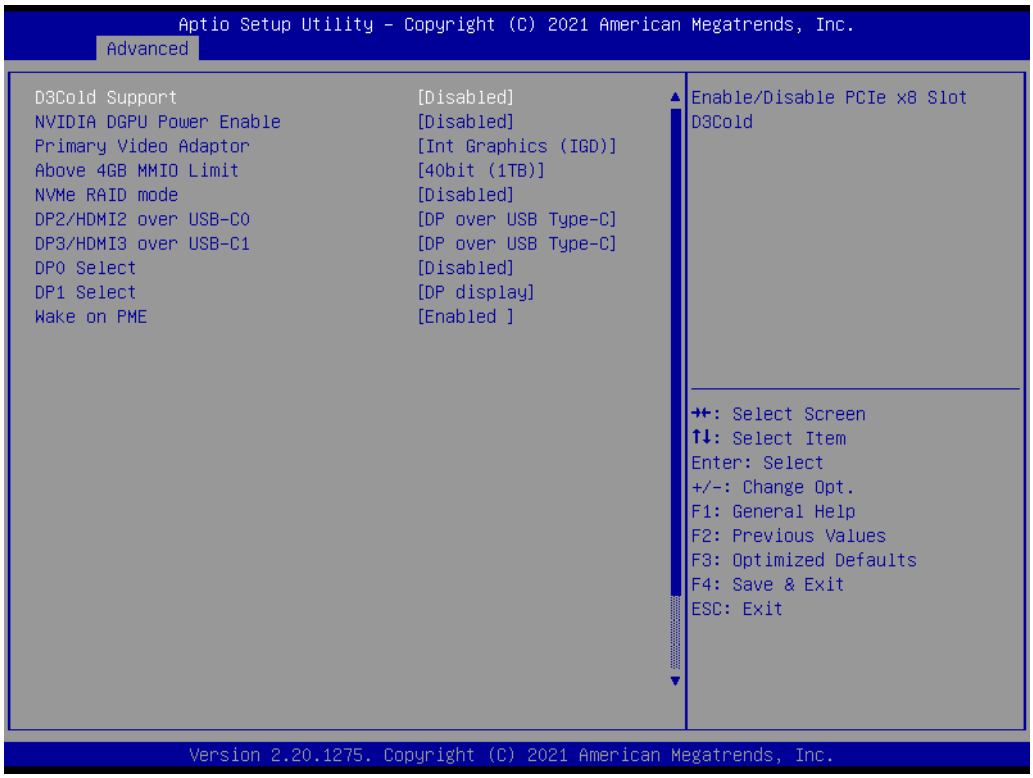


Figure 3.33 AMD PBS screen

- **D3cold Support**
  Enable/Disable PCIeX8 Slot D3Cold
- **NVIDA DGPU Power Enable**
  For NVDIA mobile DGPU card only. Output DGPU_EN# S9 pin and DGPU_-SEL# B17 pin to high at every power on state
- **Primary Video Adaptor**
  Select internal/external graphics
- **Above 4GB MMIO Limit**
  Select above 4GB MMIO limit to 35-48 bits limit
- **NVMe RAID mode**
  Enable or disable NVMe RAID mode. Please setting the "PCIe/GFX lans configuration" item according to the RAID configuration
- **DP2 Select**
  Config Display port 2 to Display Port, HDMI or Disable
- **DP3 Select**
  Config Display port 3 to Display Port, HDMI or Disable
- **DP0/eDP LVDS**
  Config Display port 0 to eDP or Disable
- **DP1 Select**
  Config Display port 1 to Display Port, HDMI or Disable
- **Make on PME**
  Determines the action taken when the system power is off and a PCI power management. Enable wake up event occurs.

3.4.13 NIC Configuration

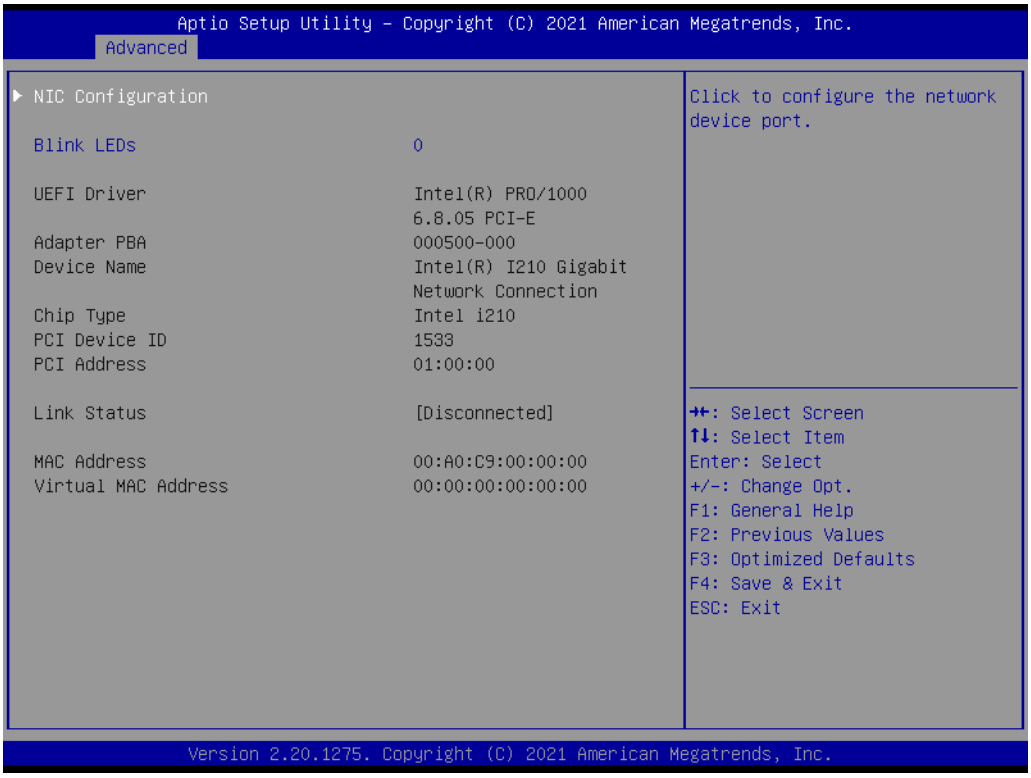


Figure 3.34 NIC configuration screen

- **NIC configuration**
  Click to configuration the network device port
- **Blink LEDs**
  Identify the physical network port by blinking the associated LED

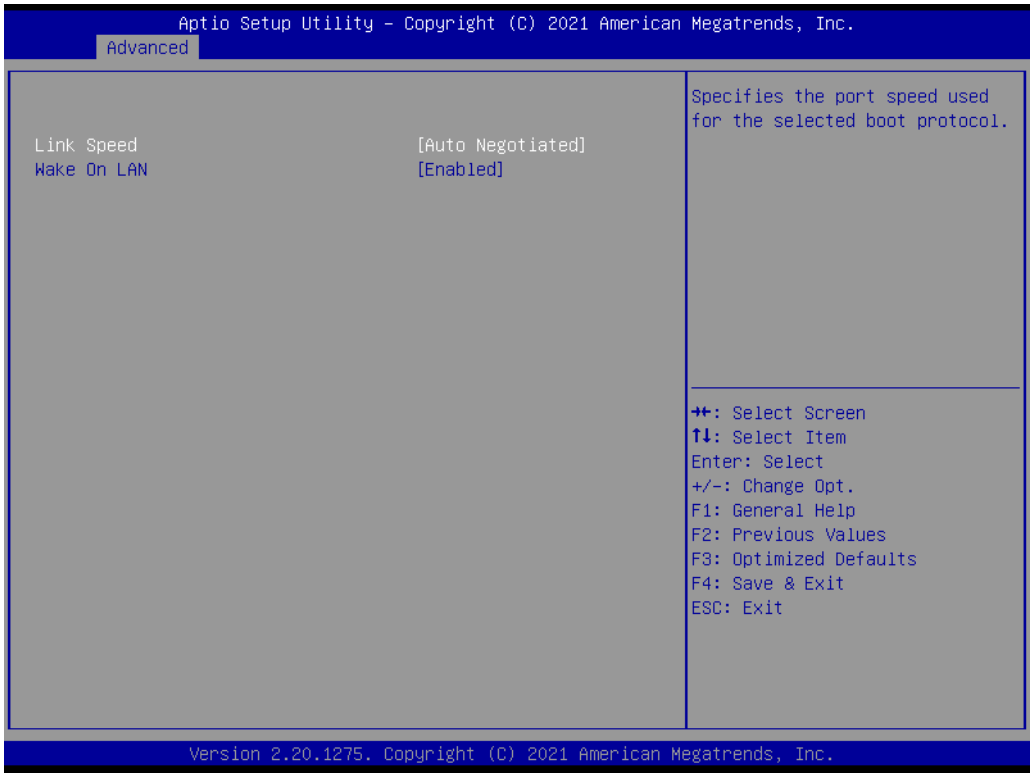


Figure 3.35 Link speed screen

- **Link Speed**
  Specifies the port speed used for the selected boot protocol
- **Wake On Lan**
  Enables the server to be powered on using an in-band magic paket

3.5 Chipset Settings

Select the chipset tab from the SOM-6872 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.

3.5.1 South Bridge

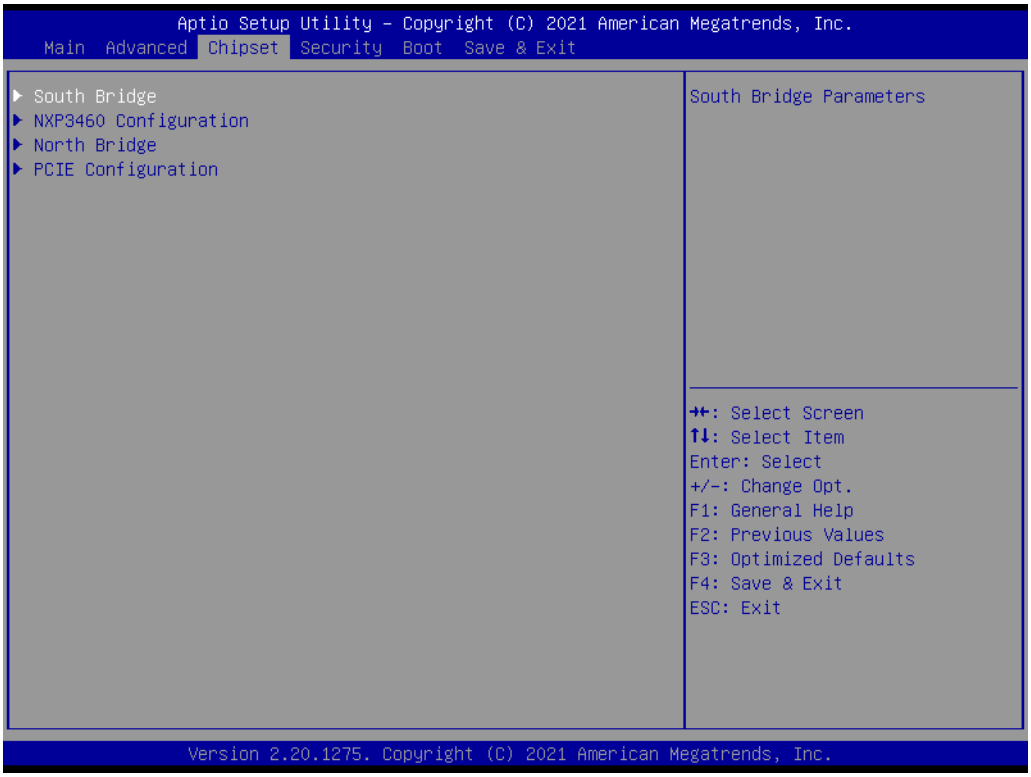


Figure 3.36 South bridge screen

- **South Bridge**
  South Bridge parameters
- **NXP3460 Configuration**
  NXP3460 parameters
- **North Bridge**
  North bridge parameters
- **PCIE Configuration**
  PCIE Configuration parameters

3.5.1.1 SB USB Configuration

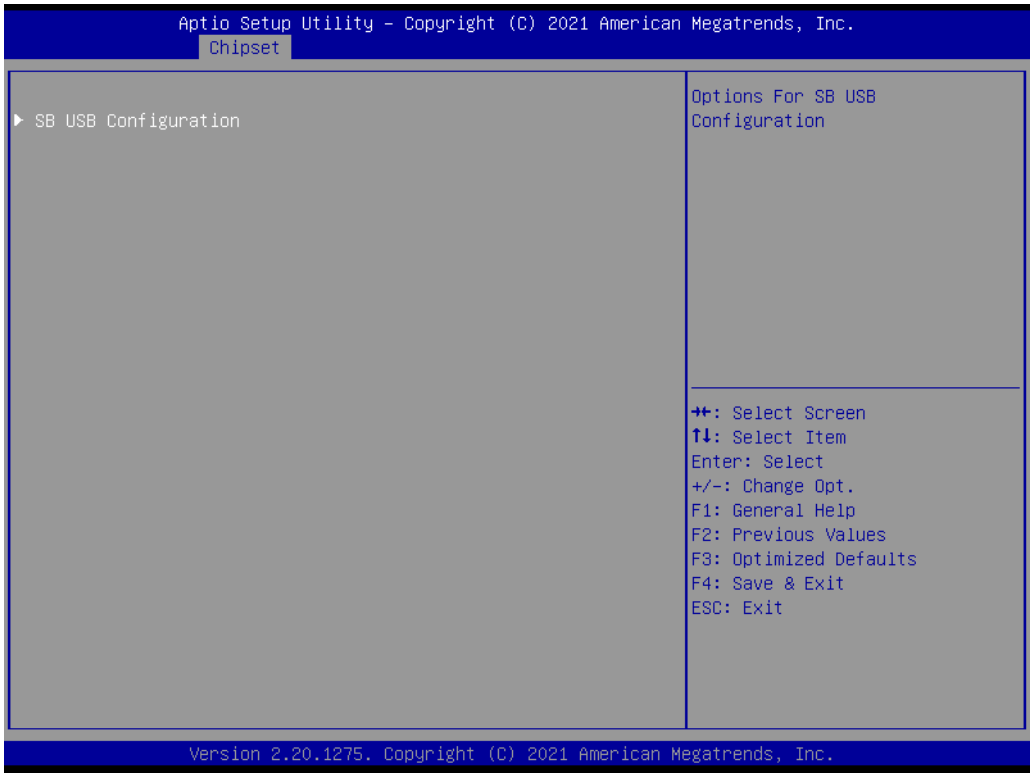


Figure 3.37 SB USB Configuration screen

SB USB Configuration

Options For SB USB Configuration

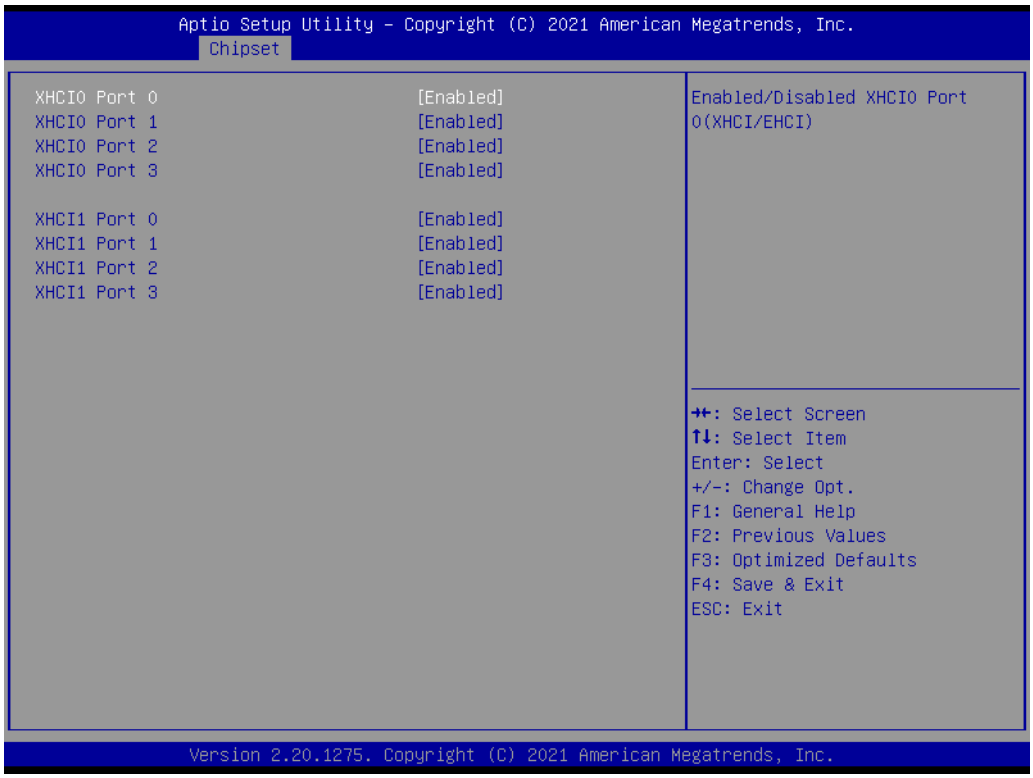


Figure 3.38 XHCI0/XHCI1 screen

- **XHCI0 Port0**
  Enable/Disable XHCI0 Port0(XHCI/EHCI)
- **XHCI0 Port1**
  Enable/Disable XHCI0 Port1(XHCI/EHCI)
- **XHCI0 Port2**
  Enable/Disable XHCI0 Port2(XHCI/EHCI)
- **XHCI0 Port3**
  Enable/Disable XHCI0 Port3(XHCI/EHCI)

3.5.2 NXP3460 Configuration

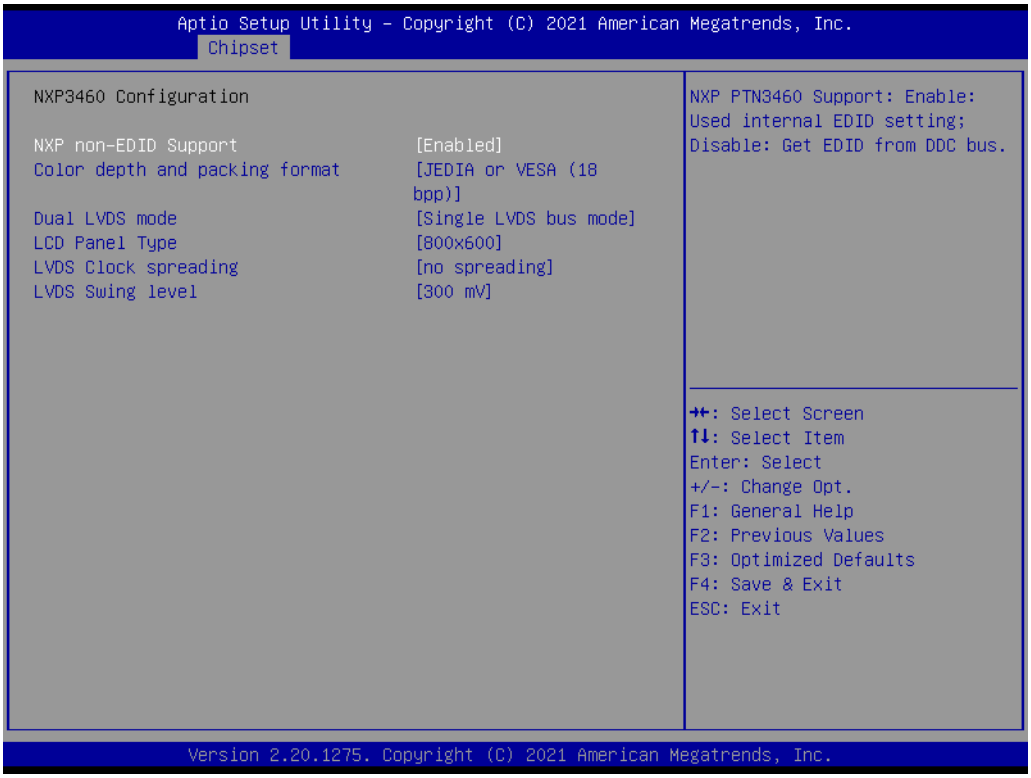


Figure 3.39 NXP3460 Configuration screen

- **NXP non-EDID Support**
  NXP PTN3460 Support: Enable: Used internal EDID setting; Disable: Get EDID from DDC bus
- **Color depth and packing format**
  Select LCD panel
- **Dual LVDS mode**
  Dual LVDS mode
- **LCD panel type**
  Select LCD panel
- **LVDS Clock spreading**
  LVDS Clock spreading
- **LVDS Swing level**
  LVDS Swing level

3.5.3 North Bridge

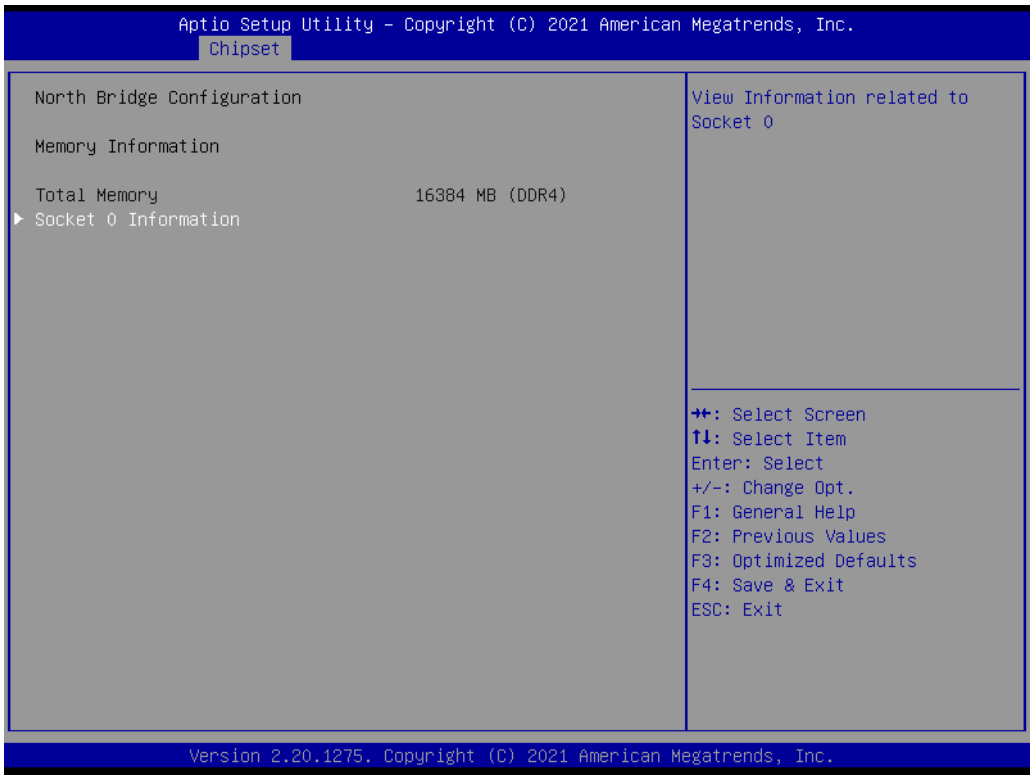


Figure 3.40 North bridge screen

- **Total memory**
  Total memory in the system
- **Socket0 Information**
  View information related to Socket0

3.5.3.1 Socket 0 Information

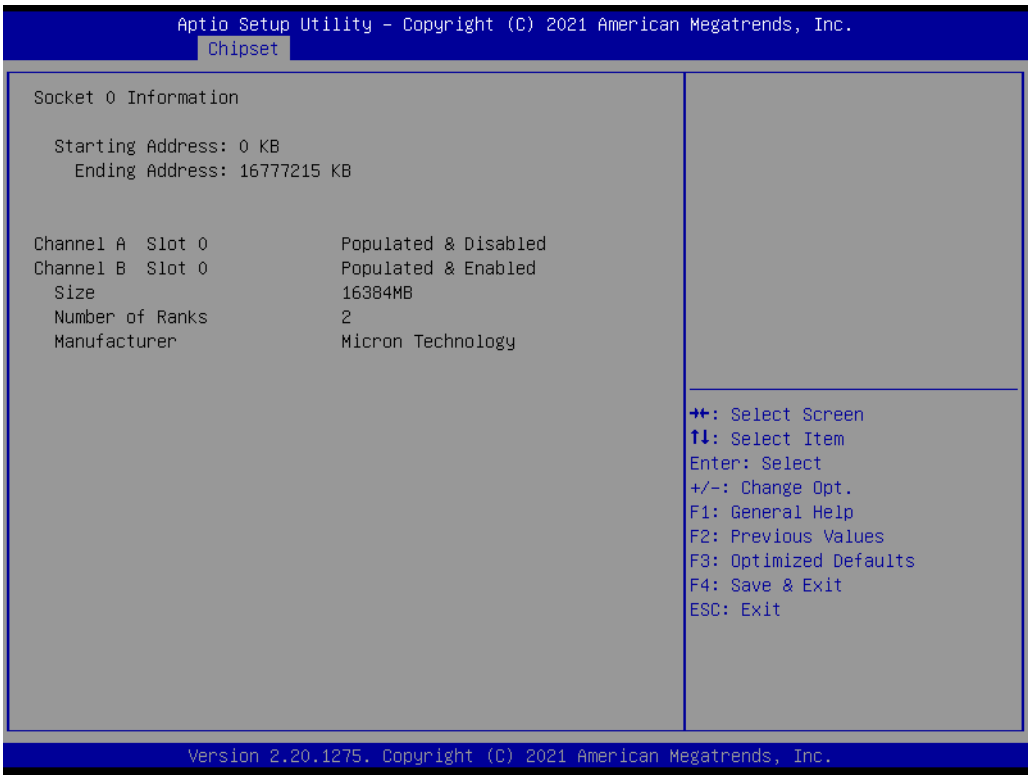


Figure 3.41 Socket 0 information screen

3.5.4 PCIE Lanes Configuration

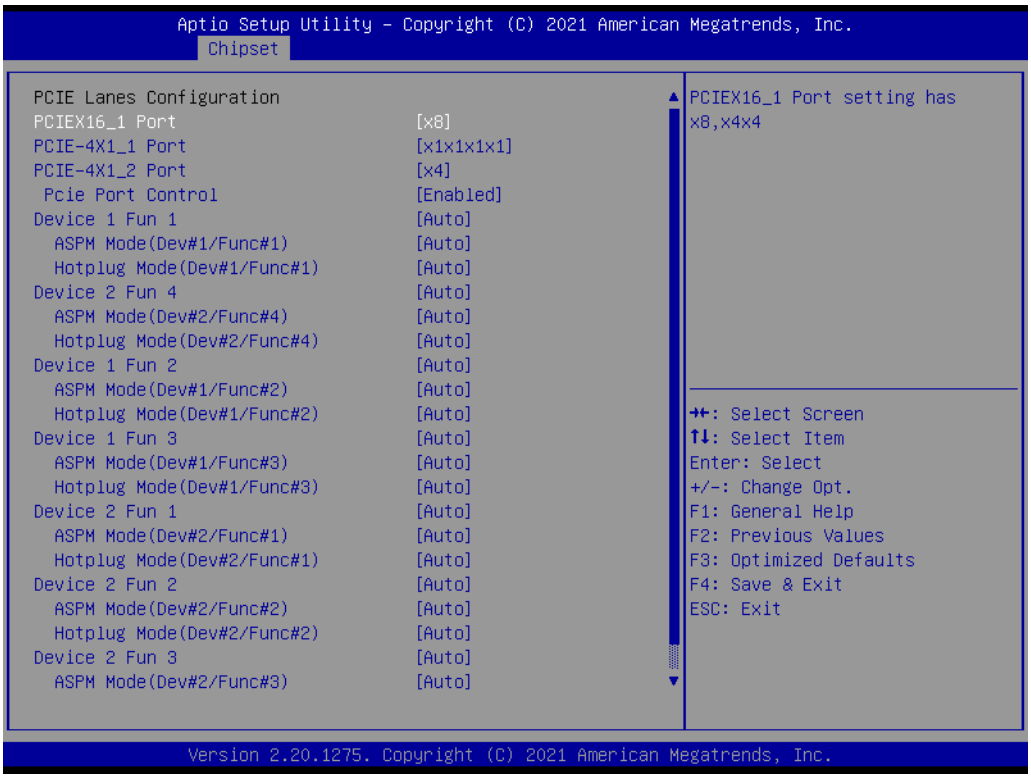


Figure 3.42 PCIE Lanes Configuration screen

- **PCIEX16_1 Port**
  PCIEX16_1 port setting has x8, x4x4
- **PCIE-4X1_1 Port**
  PCIE-4X1_1 Port setting has x4, x2, x1 Max RP number:6 and Onboard LAN
- **PCIE-4X1_2 Port**
  PCIE-4X1_2 Port setting has x4, x1 Max RP number:6 and Onboard LAN
- **Pcie Port Control**
  Disabled: Skip this page setup item, and use the default CRB setting
- **Device1 Fun 1**
  Enable/Disable/Auto, Auto used board default setting
- **ASPM mode(Dev#1/Func#1)**
  NB root port ASPM Mode Control
- **Hotplug Mode(Dev#1/Func#1)**
  NB Root Port Hotplug Mode Control
- **Device2 Fun 4**
  Enable/Disable/Auto, Auto used board default setting
- **ASPM mode(Dev#2/Func#4)**
  NB root port ASPM Mode Control
- **Hotplug Mode(Dev#2/Func#4)**
  NB Root Port Hotplug Mode Control
- **Device1 Fun 2**
  Enable/Disable/Auto, Auto used board default setting
- **ASPM mode(Dev#1/Func#2)**
  NB root port ASPM Mode Control
- **Hotplug Mode(Dev#1/Func#2)**
  NB Root Port Hotplug Mode Control
- **Device1 Fun 3**
  Enable/Disable/Auto, Auto used board default setting
- **ASPM mode(Dev#1/Func#3)**
  NB root port ASPM Mode Control
- **Hotplug Mode(Dev#1/Func#3)**
  NB Root Port Hotplug Mode Control
- **Device2 Fun 1**
  Enable/Disable/Auto, Auto used board default setting
- **ASPM mode(Dev#2/Func#1)**
  NB root port ASPM Mode Control
- **Hotplug Mode(Dev#2/Func#1)**
  NB Root Port Hotplug Mode Control
- **Device2Fun 2**
  Enable/Disable/Auto, Auto used board default setting
- **ASPM mode(Dev#2/Func#2)**
  NB root port ASPM Mode Control
- **Hotplug Mode(Dev#2/Func#2)**
  NB Root Port Hotplug Mode Control
- **Device2Fun 3**
  Enable/Disable/Auto, Auto used board default setting
- **ASPM mode(Dev#2/Func#3)**
  NB root port ASPM Mode Control
- **Hotplug Mode(Dev#2/Func#3)**
  NB Root Port Hotplug Mode Control

3.6 Security Settings

Select Security Setup from the SOM-6872 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>:

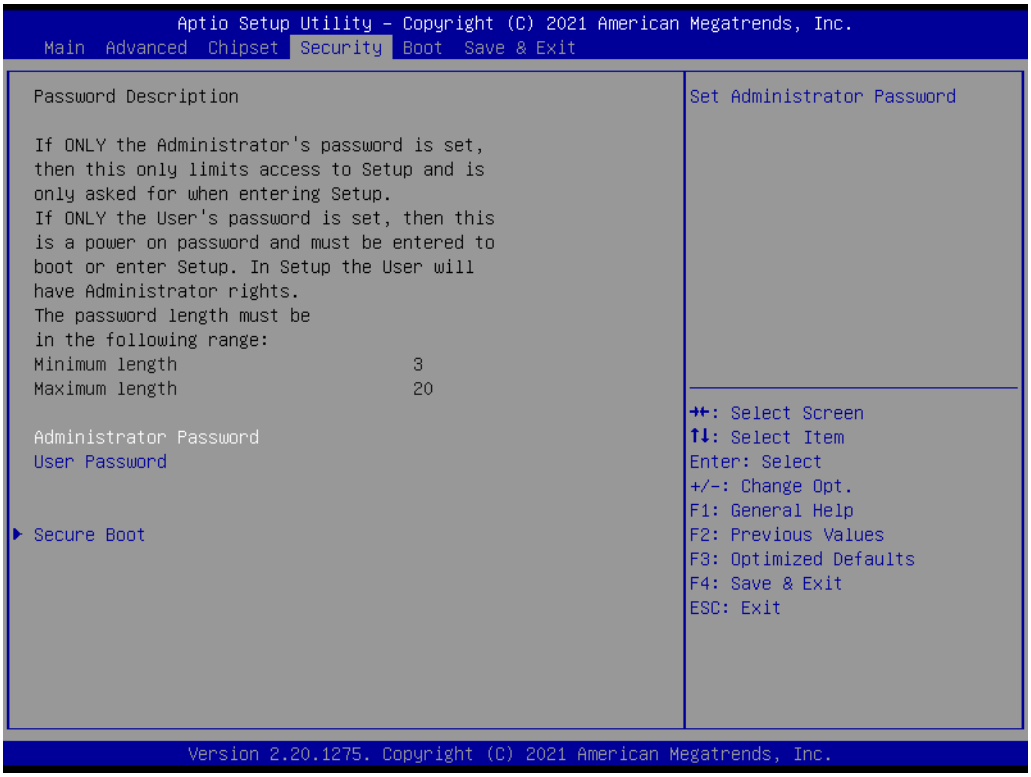


Figure 3.43 Security setting screen

- **Administrator Password**
  Set Setup Administrator Password
- **User Password**
  Set User Password
- **Secure Boot**
  Secure Boot Configuration

3.6.1 Secure Boot

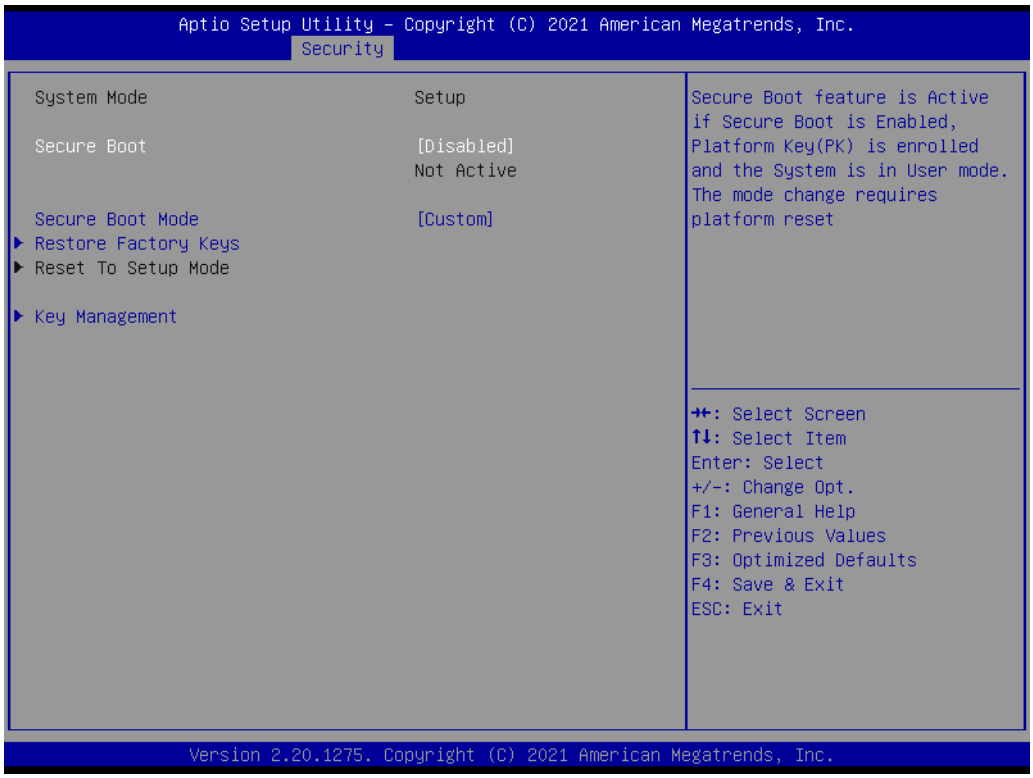


Figure 3.44 Secure boot screen

- **Secure boot mode**
  Secure boot mode options: Standard or Custom. In custom mode, secure boot policy variables can be configured by a physically present user without full authentication
- **Restore Factory Keys**
  Force system to user mode. Install factory default secure boot key databases
- **Reset To Setup Mode**
  Delete all secure boot key databases from NVRAM
- **Key management**
  Enables expert users to modify secure boot policy variables without full authentication

3.6.2 Vendor Keys

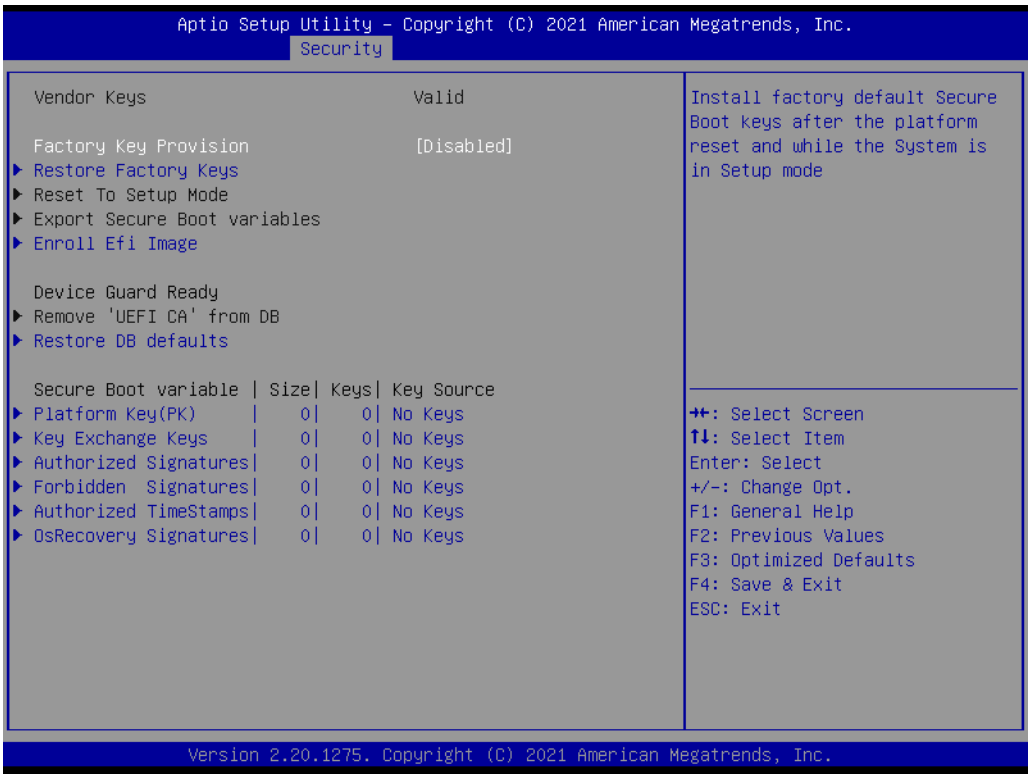


Figure 3.45 Vendor keys screen

- Factory Key Provision
  Install factory default secure boot keys after the platform reset and while the system is in setup mode
- Restore Factory Keys
  Force system to user mode. Install factory default secure boot key databases
- Reset To Setup Mode
  Delete all secure boot key databases from NVRAM
- Export Secure Boot variables
  Copy NVRAM content of secure boot variables to files in a root folder on a file system device
- Enroll Efi Image
  Allow the image to run in secure boot mode. Enroll SHA256 hash certificate of a PE image into authorized signature database(db)
- Remove ‘UEFI CA’ from DB
  Device guard ready system must not list “Microsoft UEFI CA” certificate in authorized signature database(db)
- Restore DB defaults
  Restore DB variable to factory defaults

3.6.3 Boot Configuration

Figure 3.46 Boot Configuration screen

- **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.

3.7 Save & Exit

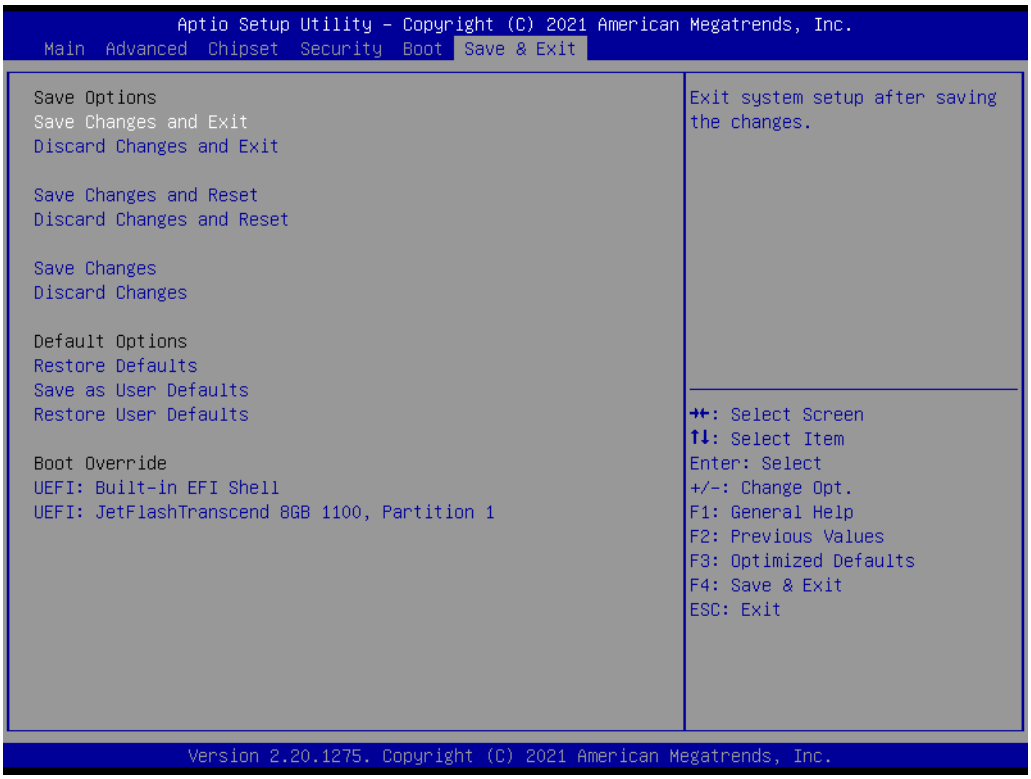


Figure 3.47 Security setup

- **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.

Chapter 4

S/W Introduction and Installation

- S/W Introduction
- Driver Installation
- Advantech iManager

4.1 S/W Introduction

Advantech Embedded Software Services' mission 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 distributors) 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

SOM-6872 supports Windows* 10 Enterprise. 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-6872 supports Linux:

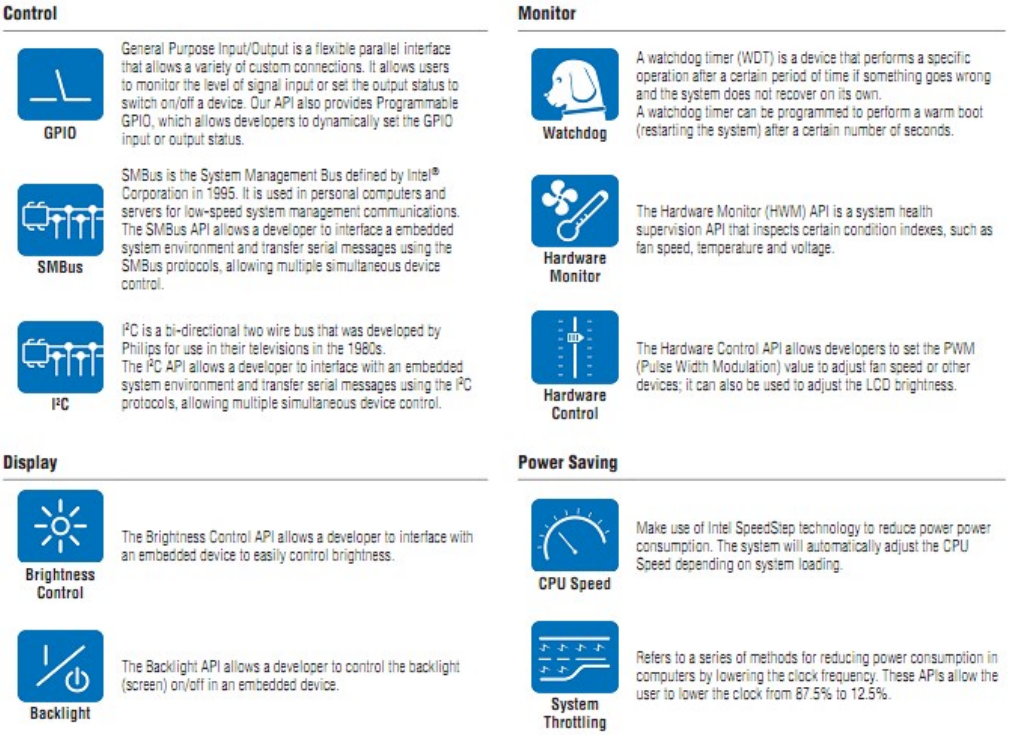
Ubuntu (by Request)

Wind River VxWorks* 7.0 (by Request)

4.3 Advantech iManager

Advantech's platforms come equipped with iManager, a micro controller that delivers embedded features to system integrators. Embedded features have been moved from the OS/BIOS level to the board level — increasing reliability and simplifying 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 details of how to use the APIs and utilities, please refer to Advantech iManager 2.0 Software API User Manual.



Appendix A

Pin Assignment

This appendix provides information regarding the SOM-6872 CPU System on Module hardware pin assignment.

Sections include:

- SOM-6872 Type 6 Pin Assignment

A.1 SOM-6872 Type 6 Pin Assignment

This section provides the SOM-6872 pin assignment on COM Express connector. This is compliant with COMR.0 R3.0 Type 6 pin-out definitions. For more details regarding the use of these pins and/or to acquire design reference, please contact Advantech. Advantech can provide a design guide, checklist, reference schematic, an/or hardware/software support.

SOM-6872 Row A,B			
A1	GND (FIXED)	B1	GND (FIXED)
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 (FIXED)	B11	GND (FIXED)
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_S5#	B18	SUS_STAT#
A19	SATA0_RX+	B19	SATA1_RX+
A20	SATA0_RX-	B20	SATA1_RX-
A21	GND (FIXED)	B21	GND (FIXED)
A22	N/A	B22	N/A
A23	N/A	B23	N/A
A24	SUS_S5#	B24	PWR_OK
A25	N/A	B25	N/A
A26	N/A	B26	N/A
A27	BATLOW#	B27	WDT
A28	(S)ATA_ACT#	B28	HDA_SDIN2
A29	HDA_SYNC	B29	HDA_SDIN1
A30	HDA_RST#	B30	HDA_SDIN0
A31	GND (FIXED)	B31	GND (FIXED)
A32	HDA_BITCLK	B32	SPKR
A33	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 (FIXED)	B41	GND (FIXED)
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	N/A
A48	RSVD	B48	N/A
A49	GBE0_SDP	B49	SYS_RESET#
A50	LPC_SERIRQ	B50	CB_RESET#
A51	GND (FIXED)	B51	GND (FIXED)
A52	PCIE_TX5+	B52	PCIE_RX5+
A53	PCIE_TX5-	B53	PCIE_RX5-
A54	GPI0	B54	GPO1
A55	PCIE_TX4+	B55	PCIE_RX4+
A56	PCIE_TX4-	B56	PCIE_RX4-
A57	GND	B57	GPO2
A58	PCIE_TX3+	B58	PCIE_RX3+
A59	PCIE_TX3-	B59	PCIE_RX3-
A60	GND (FIXED)	B60	GND (FIXED)
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 (FIXED)	B70	GND (FIXED)
A71	LVDS_A0+	B71	LVDS_B0+
A72	LVDS_A0-	B72	LVDS_B0-
A73	LVDS_A1+	B73	LVDS_B1+
A74	LVDS_A1-	B74	LVDS_B1-
A75	LVDS_A2+	B75	LVDS_B2+
A76	LVDS_A2-	B76	LVDS_B2-
A77	LVDS_VDD_EN	B77	LVDS_B3+
A78	LVDS_A3+	B78	LVDS_B3-
A79	LVDS_A3-	B79	LVDS_BKLT_EN
A80	GND (FIXED)	B80	GND (FIXED)
A81	LVDS_A_CK+	B81	LVDS_B_CK+
A82	LVDS_A_CK-	B82	LVDS_B_CK-
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY
A85	GPI3	B85	VCC_5V_SBY
A86	N/A	B86	VCC_5V_SBY
A87	eDP_HPD	B87	VCC_5V_SBY
A88	PCIE_CLK_REF+	B88	BIOS_DIS1#

A89	PCIE_CLK_REF-	B89	VGA_RED
A90	GND (FIXED)	B90	GND (FIXED)
A91	SPI_POWER	B91	VGA_GRN
A92	SPI_MISO	B92	VGA_BLU
A93	GPO0	B93	VGA_HSYNC
A94	SPI_CLK	B94	VGA_VSYNC
A95	SPI_MOSI	B95	VGA_I2C_CK
A96	TPM_PP	B96	VGA_I2C_DAT
A97	N/A	B97	SPI_CS#
A98	SER0_TX	B98	N/A
A99	SER0_RX	B99	N/A
A100	GND (FIXED)	B100	GND (FIXED)
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 (FIXED)	B110	GND (FIXED)
SOM-6872 Row C,D			
C1	GND (FIXED)	D1	GND (FIXED)
C2	GND	D2	GND
C3	USB_SSRX0-	D3	USB_SSTX0-
C4	USB_SSRX0+	D4	USB_SSTX0+
C5	GND	D5	GND
C6	USB_SSRX1-	D6	USB_SSTX1-
C7	USB_SSRX1+	D7	USB_SSTX1+
C8	GND	D8	GND
C9	N/A	D9	N/A
C10	N/A	D10	N/A
C11	GND (FIXED)	D11	GND (FIXED)
C12	N/A	D12	N/A
C13	N/A	D13	N/A
C14	GND	D14	GND
C15	N/A	D15	DDI1_CTRLCLK_AUX+
C16	N/A	D16	DDI1_CTRLDATA_AUX-
C17	N/A	D17	N/A
C18	N/A	D18	N/A
C19	PCIE_RX6+	D19	PCIE_TX6+
C20	PCIE_RX6-	D20	PCIE_TX6-
C21	GND (FIXED)	D21	GND (FIXED)
C22	PCIE_RX7+	D22	PCIE_TX7+
C23	PCIE_RX7-	D23	PCIE_TX7-
C24	DDI1_HPD	D24	N/A

C25	N/A	D25	N/A
C26	N/A	D26	DDI1_PAIR0+
C27	N/A	D27	DDI1_PAIR0-
C28	N/A	D28	N/A
C29	N/A	D29	DDI1_PAIR1+
C30	N/A	D30	DDI1_PAIR1-
C31	GND (FIXED)	D31	GND (FIXED)
C32	DDI2_CTRLCLK_AUX+	D32	DDI1_PAIR2+
C33	DDI2_CTRLDATA_AUX-	D33	DDI1_PAIR2-
C34	DDI2_DDC_AUX_SEL	D34	DDI1_DDC_AUX_SEL
C35	N/A	D35	N/A
C36	N/A	D36	DDI1_PAIR3+
C37	N/A	D37	DDI1_PAIR3-
C38	N/A	D38	N/A
C39	N/A	D39	DDI2_PAIR0+
C40	N/A	D40	DDI2_PAIR0-
C41	GND (FIXED)	D41	GND (FIXED)
C42	N/A	D42	DDI2_PAIR1+
C43	N/A	D43	DDI2_PAIR1-
C44	N/A	D44	DDI2_HPD
C45	N/A	D45	N/A
C46	N/A	D46	DDI2_PAIR2+
C47	N/A	D47	DDI2_PAIR2-
C48	N/A	D48	N/A
C49	N/A	D49	DDI2_PAIR3+
C50	N/A	D50	DDI2_PAIR3-
C51	GND (FIXED)	D51	GND (FIXED)
C52	PEG_RX0-	D52	PEG_TX0+
C53	PEG_RX0-	D53	PEG_TX0-
C54	N/A	D54	N/A
C55	PEG_RX1+	D55	PEG_TX1+
C56	PEG_RX1-	D56	PEG_TX1-
C57	N/A	D57	TYPE2# (GND)
C58	PEG_RX2+	D58	PEG_TX2+
C59	PEG_RX2-	D59	PEG_TX2-
C60	GND (FIXED)	D60	GND (FIXED)
C61	PEG_RX3+	D61	PEG_TX3+
C62	PEG_RX3-	D62	PEG_TX3-
C63	N/A	D63	N/A
C64	N/A	D64	N/A
C65	PEG_RX4+	D65	PEG_TX4+
C66	PEG_RX4-	D66	PEG_TX4-
C67	RAPID_SHUTDOWN	D67	GND
C68	PEG_RX5+	D68	PEG_TX0+
C69	PEG_RX5-	D69	PEG_TX0-
C70	GND(FIXED)	D70	GND(FIXED)
C71	PEG_RX6+	D71	PEG_TX6+
C72	PEG_RX6-	D72	PEG_TX6-

C73	GND	D73	GND
C74	PEG_RX7+	D74	PEG_TX7+
C75	PEG_RX7-	D75	PEG_TX7-
C76	GND	D76	GND
C77	N/A	D77	N/A
C78	N/A	D78	N/A
C79	N/A	D79	N/A
C80	GND (FIXED)	D80	GND (FIXED)
C81	N/A	D81	N/A
C82	N/A	D82	N/A
C83	N/A	D83	N/A
C84	GND	D84	GND
C85	N/A	D85	N/A
C86	N/A	D86	N/A
C87	GND	D87	GND
C88	N/A	D88	N/A
C89	N/A	D89	N/A
C90	GND (FIXED)	D90	GND (FIXED)
C91	N/A	D91	N/A
C92	N/A	D92	N/A
C93	GND	D93	GND
C94	N/A	D94	N/A
C95	N/A	D95	N/A
C96	GND	D96	GND
C97	N/A	D97	RSVD
C98	N/A	D98	N/A
C99	N/A	D99	N/A
C100	GND (FIXED)	D100	GND (FIXED)
C101	N/A	D101	N/A
C102	N/A	D102	N/A
C103	GND	D103	GND
C104	VCC_12V	D104	VCC_12V
C105	VCC_12V	D105	VCC_12V
C106	VCC_12V	D106	VCC_12V
C107	VCC_12V	D107	VCC_12V
C108	VCC_12V	D108	VCC_12V
C109	VCC_12V	D109	VCC_12V
C110	GND (FIXED)	D110	GND (FIXED)

Appendix B

Watchdog Timer

This appendix provides information regarding the watchdog timer programming for the SOM-6872 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	Support
Power Off	Support
H/W Restart	Support
WDT Pin Activate	Support

** WDT new driver support automatically selects available IRQ number from BIOS, and then sets the EC. Only Windows 10 supports this feature.

For other OS it uses the IRQ number from BIOS settings as usual.

For details, please refer to iManager and/or the software API's user manual.

Appendix C

Programming GPIO

This appendix details the General Purpose Input and Output pin settings

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 and Software API User Manual.

Appendix D

System Assignments

This appendix details the system resource allocation on the SOM-6872 CPU System on Module.

Sections include:

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

D.1 System I/O Ports

Table D.1: System I/O ports

Addr.Range(Hex)	Device
0x00000299-0x0000029A	Motherboard resources
0x000002C0-0x000002DF	Motherboard resources
0x000002A0-0x000002BF	Motherboard resources
0x000002A0-0x000002BF	Motherboard resources
0x00000290-0x0000029F	Motherboard resources
0x0000029E-0x000002AD	Motherboard resources
0x00000060-0x0000006F	Motherboard resources
0x00000200-0x0000027F	Motherboard resources
0x00000200-0x0000027F	Motherboard resources
0x00000300-0x0000037F	Motherboard resources
0x00000280-0x0000028F	Motherboard resources
0x00000280-0x0000028F	Motherboard resources
0x000002F0-0x000002F7	Motherboard resources
0x00000062-0x00000062	Microsoft ACPI-Compliant Embedded Controller
0x00000066-0x00000066	Microsoft ACPI-Compliant Embedded Controller
0x00000070-0x00000071	System CMOS/real time clock
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x0000EF00-0x0000EFFF	AMD Radeon™ Graphics
0x00000020-0x00000021	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x00000000-0x000003AF	PCI Express Root Complex
0x00000000-0x000003AF	Direct memory access controller
0x000003E0-0x00000CF7	PCI Express Root Complex
0x000003B0-0x000003DF	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000040-0x00000043	System timer
0x0000E000-0x0000EFFF	PCI Express Root Port
0x00000010-0x0000001F	Motherboard resources
0x00000022-0x0000003F	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x0000006F	Motherboard resources
0x00000072-0x0000007F	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000084-0x00000086	Motherboard resources
0x00000088-0x00000088	Motherboard resources
0x0000008C-0x0000008E	Motherboard resources
0x00000090-0x0000009F	Motherboard resources
0x000000A2-0x000000BF	Motherboard resources
0x000000B1-0x000000B1	Motherboard resources
0x000000E0-0x000000EF	Motherboard resources
0x000004D0-0x000004D1	Motherboard resources

Table D.1: System I/O ports	
0x0000040B-0x0000040B	Motherboard resources
0x000004D6-0x000004D6	Motherboard resources
0x00000C00-0x00000C01	Motherboard resources
0x00000C14-0x00000C14	Motherboard resources
0x00000C50-0x00000C51	Motherboard resources
0x00000C52-0x00000C52	Motherboard resources
0x00000C6C-0x00000C6C	Motherboard resources
0x00000C6F-0x00000C6F	Motherboard resources
0x00000CD0-0x00000CD1	Motherboard resources
0x00000CD2-0x00000CD3	Motherboard resources
0x00000CD4-0x00000CD5	Motherboard resources
0x00000CD6-0x00000CD7	Motherboard resources
0x00000CD8-0x00000CDF	Motherboard resources
0x00000800-0x0000089F	Motherboard resources
0x00000B00-0x00000B0F	Motherboard resources
0x00000B20-0x00000B3F	Motherboard resources
0x00000900-0x0000090F	Motherboard resources
0x00000910-0x0000091F	Motherboard resources
0x00000061-0x00000061	System speaker
0x0000F000-0x0000FFFF	PCI Express Root Port
0x00000081-0x00000083	Direct memory access controller
0x00000087-0x00000087	Direct memory access controller
0x00000089-0x0000008B	Direct memory access controller
0x0000008F-0x0000008F	Direct memory access controller
0x000000C0-0x000000DF	Direct memory access controller

D.2 Interrupt Assignments

Table D.2: Interrupt Assignments	
Interrupt#	**Interrupt Source**
IRQ 0	High precision event timer
IRQ 0	System timer
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 6	Motherboard resources
IRQ 6	Motherboard resources
IRQ 6	Motherboard resources
IRQ 7	AMD GPIO Controller
IRQ 8	High precision event timer
IRQ 10	AMD I2C Controller
IRQ 36	High Definition Audio Controller
IRQ 37	AMD Sensor Fusion Hub
IRQ 39	AMD Audio CoProcessor
IRQ 39	High Definition Audio Controller
IRQ 1024	Trusted Platform Module 2.0
IRQ 4294967282	Intel® I210 Gigabit Network Connection #4

Table D.2: Interrupt Assignments	
IRQ 4294967281	Intel® I210 Gigabit Network Connection #4
IRQ 4294967280	Intel® I210 Gigabit Network Connection #4
IRQ 4294967279	Intel® I210 Gigabit Network Connection #4
IRQ 4294967278	Intel® I210 Gigabit Network Connection #4
IRQ 4294967277	Intel® I210 Gigabit Network Connection #4
IRQ 4294967276	Intel® I210 Gigabit Network Connection #4
IRQ 4294967275	Intel® I210 Gigabit Network Connection #4
IRQ 4294967274	Intel® I210 Gigabit Network Connection #4
IRQ 4294967273	Intel® I210 Gigabit Network Connection #4
IRQ 4294967291	Standard SATA AHCI Controller
IRQ 4294967268	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967267	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967266	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967265	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967264	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967263	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967262	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967261	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967272	AMD Radeon™ Graphics
IRQ 4294967271	AMD Radeon™ Graphics
IRQ 4294967270	AMD Radeon™ Graphics
IRQ 4294967269	AMD Radeon™ Graphics
IRQ 4294967290	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967289	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967288	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967287	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967286	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967285	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967284	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967283	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967260	AMD PSP 10.0 Device
IRQ 4294967259	AMD PSP 10.0 Device
IRQ 4294967293	PCI Express Root Port
IRQ 4294967292	PCI Express Root Port
IRQ 4294967294	PCI Express Root Port

D.3 1st MB Memory Map

Table D.3: 1st MB Memory Map

Addr. Range (Hex)	Device
0xFED00000-0xFED003FF	High precision event timer
0xFEA00000-0xFEA7FFFF	Intel® I210 Gigabit Network Connection #4
0xFEA00000-0xFEA7FFFF	PCI Express Root Port
0xFEA80000-0xFEA83FFF	Intel® I210 Gigabit Network Connection #4
0xFED81500-0xFED818FF	AMD GPIO Controller
0xFED81200-0xFED812FF	AMD GPIO Controller
0xFE900000-0xFE9007FF	Standard SATA AHCI Controller
0xFE900000-0xFE9007FF	PCI Express Root Port
0xFE600000-0xFE6FFFFF	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
0xD0000000-0xDFFFFFFF	AMD Radeon™ Graphics
0xD0000000-0xDFFFFFFF	PCI Express Root Complex
0xD0000000-0xDFFFFFFF	PCI Express Root Port
0xE0000000-0xE01FFFFF	AMD Radeon™ Graphics
0xFE800000-0xFE87FFFF	AMD Radeon™ Graphics
0xFE500000-0xFE5FFFFF	AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft)
0xFE700000-0xFE7FFFFF	AMD PSP 10.0 Device
0xFE8B2000-0xFE8B3FFF	AMD PSP 10.0 Device
0xFE8C0000-0xFE8FFFFF	AMD Audio CoProcessor
0xFE8B4000-0xFE8B7FFF	High Definition Audio Controller
0xF0000000-0xF7FFFFFF	System board
0xA0000-0xBFFFF	PCI Express Root Complex
0xC0000-0xDFFFF	PCI Express Root Complex
0xFEE00000-0xFFFFFFFF	PCI Express Root Complex
0xFEE00000-0xFFFFFFFF	Motherboard resources
0xFED40000-0xFED44FFF	Trusted Platform Module 2.0
0xFEB80000-0xFEBFFFFF	Motherboard resources
0xFE400000-0xFE4FFFFF	AMD Sensor Fusion Hub
0xFE400000-0xFE4FFFFF	PCI Express Root Port
0xFE8B0000-0xFE8B1FFF	AMD Sensor Fusion Hub
0xFE8B8000-0xFE8BFFFF	High Definition Audio Controller
0xFEDC2000-0xFEDC2FFF	AMD I2C Controller
0xFEC00000-0xFEC00FFF	Motherboard resources
0xFEC01000-0xFEC01FFF	Motherboard resources
0xFEDC0000-0xFEDC0FFF	Motherboard resources
0xFED80000-0xFED8FFFF	Motherboard resources
0xFEC10000-0xFEC10FFF	Motherboard resources
0xFF000000-0xFFFFFFFF	Motherboard resources
0xFD000000-0xFDFFFFFF	Motherboard resources

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