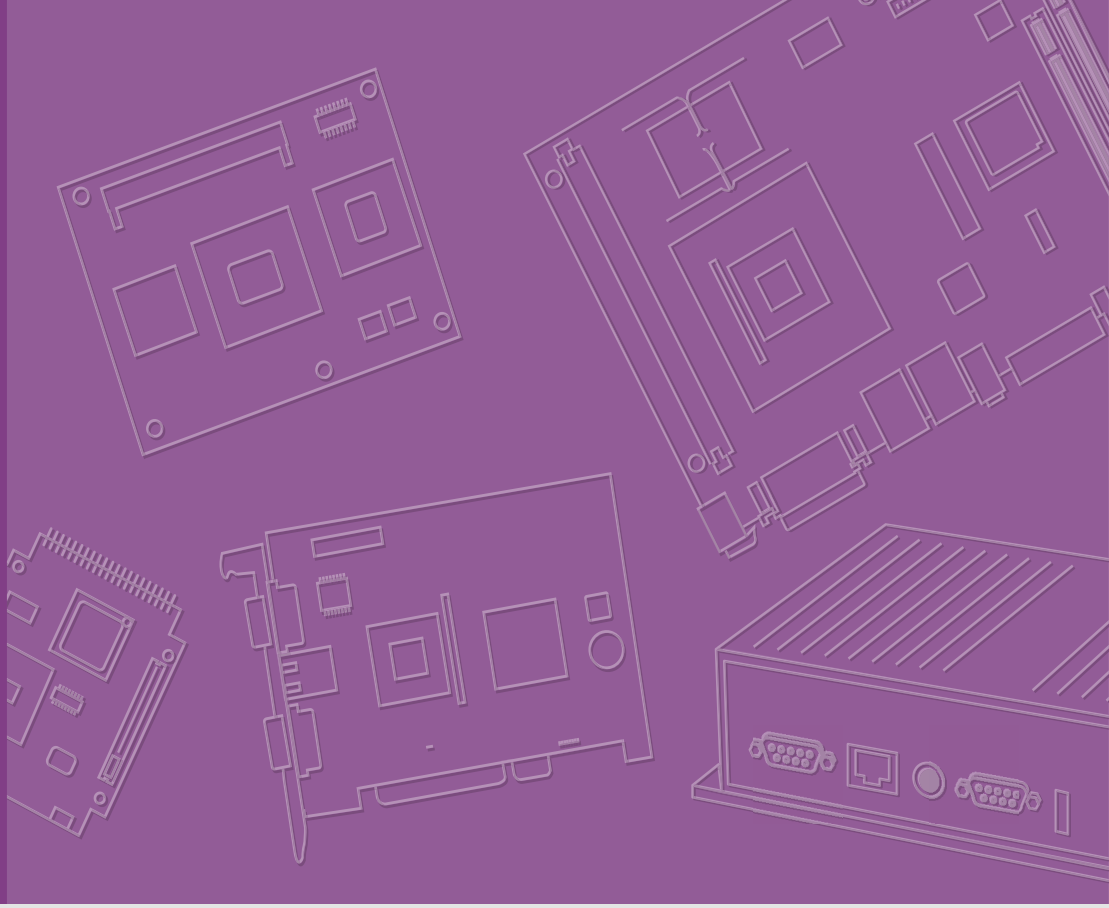

User Manual

SOM-6832

CPU Computer on Module

ADVANTECH

Enabling an Intelligent Planet

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Acknowledgments

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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. 2006683200 Edition 1

Printed in Taiwan February 2023

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 the 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 that could cause personal injury if not observed!*

Caution! *Cautions are included to help prevent hardware damage and data loss. 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 additional and/or optional 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.

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.

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 over-voltage.
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: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

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Chapter 1

General Information

This chapter details background information on the SOM-6832 CPU Computer on Module.

Sections include:

- Introduction
- Functional Block Diagram
- Product Specifications

1.1 Introduction

The Advantech SOM-6832 is a COM Express Compact module with type-6 pin-out that fully complies with the PCI Industrial Computer Manufactures Group (PICMG) COM R3.0 specifications. The CPU modules are Intel® Pentium®/Celeron® and Atom® x6000 Series Processors (Elkhart Lake) — in basic 95 x 95 mm size COM Express form factors — that feature 12-watt thermal design power (TDP) ratings.

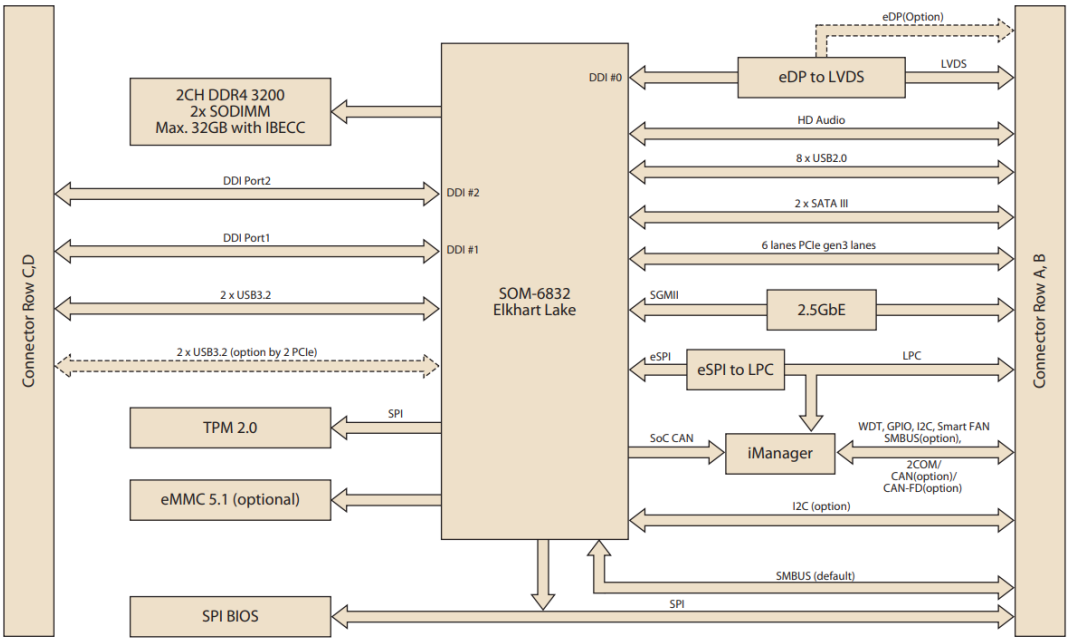
SOM-6832 delivers a 1.7-fold increase in CPU performance, and double the graphics performance of previous generation solutions. SOM-6832 also supports up to 32GB dual channel DDR4 3200MT/s memory, with higher memory bandwidth for better performance. In addition, it supports myriad high-speed I/O interfaces — including PCIe Gen3 (8.0GT/s) and 2.5Gbase-T, USB 3.2 Gen2 (10Gbps), and CAN-FD. This solution supports 4 x independent displays at up to 4K via 3 x DisplayPort 1.4/HDMI 2.0 and 1 x optional eDP or LVDS. It also supports optional eMMC, TPM2.0 on-board design, 8.5 ~ 20V power input feature, and wide operating temperatures (-40 - 85 °C).

Advantech iManager (SUSI 4) provides solutions that meet diverse embedded application requirements. These include multi-level watchdog timers, voltage & temperature monitoring, thermal protection & mitigation through processor throttling, and LCD backlight on/off & brightness control; as well as embedded storage for customized information. By combining Advantech WISE-PaaS/RMM, it supports remote device monitoring and control over the Internet for easy maintenance. In addition, all Advantech modules integrate iManager and WISE-PaaS/RMM as a value-added feature for customer's applications.

Acronyms

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

1.2 Functional Block Diagram



1.3 Product Specifications

1.3.1 Compliance

- PICMG COM.0 (COM Express) Revision 3.0
- Basic Size - 95 x 95 mm
- Pin-out Type 6 compatible

1.3.2 Feature List

Table 1.1: Feature

Type	Connector Row	Feature	Type 6 Define		SOM-6832
			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	0
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
I/O	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	2
	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	1
	A-B	Watchdog Timer Output	1	0	1
	A-B	Speaker Out	1	1	1
	A-B	External BIOS ROM Support	2	0	1
	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	2
I/O	C-D	PEG (PCI Express x16)	1	0	0
	C-D	PCI Express x1	2	0	0
	C-D	USB 3.0	4	0	2+2
	C-D	Rapid Shutdown	1	0	1

1.3.3 Processor System

CPU	Std. Freq.	Max. Turbo Freq.	Core	Cache (MB)	TDP(W)
Pentium J6426	2.0 GHz	3.0 GHz	4	4	10W
Atom x6413E	1.5 GHz	3.0 GHz	4	4	9W
Atom x6425E	2.0 GHz	3.0 GHz	4	4	12W
Atom x6414RE	1.5 GHz	-	4	4	9W
Atom x6425RE	1.9 GHz	-	4	4	12W

1.3.4 Memory

There are a total of 2 x memory sockets on SOM-6832. These support max 32GB capacity (IBECC supported via Specific CPU SKUs) with 260pin SO-DIMM sockets (dual-channel).

1.3.5 Graphics/Audio

Graphics Core: Intel® Gen10 UHD/P630 Graphic supports DX12, OGL5.0, OCL2.1, and MPEG2, HEVC/H265, VC1/WMV9 HW decode/encode/transcode acceleration.

CPU	Graphic Core	Base Freq.	Max Freq.
Pentium J6426	Gen10 UHD Graphic	400	850
Atom x6413E	Gen10 UHD Graphic	500	750
Atom x6425E	Gen10 UHD Graphic	500	750
Atom x6414RE	Gen10 UHD Graphic	400	-
Atom x6425RE	Gen10 UHD Graphic	400	-

1.3.6 Expansion Interfaces

1.3.6.1 PCIe x1

PCI Express x1: Supports default 8 x ports PCIe x1 compliant to PCIe Gen3 (8.0 GT/s) specifications, configurable to PCIe x4 or PCIe x2. Several configurable combinations may need BIOS modification. Please contact the Advantech sales or FAE for more details.

Type 6		Row A,B						Row C,D	
		P0	P1	P2	P3	P4	P5	P6	P7
Default	Config	X1	X1	X1	X1	X1	X1	X1	X1
Option 1		X2		X1	X1	X2		X1	X1
Option 2		X2		X2		X2		X2	
Option 3		X4				X4			

1.3.6.2 LPC

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

1.3.7 Serial Bus

1.3.7.1 SMBus

Support SMBus 2.0 specifications.

1.3.7.2 I²C Bus

Supports I²C bus 7-bit and 10-bit address modes. Supports standard mode up to 100 Kb/s & fast mode up to 400 Kb/s.

1.3.8 I/O

1.3.8.1 Gigabit Ethernet

- **Ethernet:** Maxlinear GPY215 Gigabit LAN supports 10/100/1000 Mbps & 2.5 Gbps Speed.

1.3.8.2 SATA

Supports 4 x ports SATA Gen3 (6.0 Gb/s), backward compliant to SATA Gen2 (3.0 Gb/s) and Gen1 (1.5 Gb/s). The maximum data rate is 600 MB/s. Supports AHCI 1.3.1 mode (does not support IDE mode).

1.3.8.3 USB 3.2 /USB 2.0

COM-Express supports USB 3.0. SOM-6832 supports 2 x by default & 2 x via optional USB 3.2 Gen 2 (10 Gbps) ports, 2 x by optional USB 3.2 Gen2 ports are shared with PCIe. And 8 x USB 2.0 (480 Mbps) ports are reverse compatible to USB1.x. The solution supports USB 3.2 via LPM (U0, U1, U2, and U3) for power efficiency.

Notice: Advantech strongly recommends using a certified cable to maximize USB 3.2 Gen 2 performance,.

1.3.8.4 USB 3.2

Type 6	P0	P1	P2	P3
SoC	P0	P1	P2	P3
Type 6	OC_01		OC_23	
SoC USB_OC#	OC_0		OC_2	

1.3.8.5 USB 2.0

Type 6	P0	P1	P2	P3	P4	P5	P6	P7
SoC	P0	P1	P2	P3	P4	P5	P6	P7
Type 6	OC_01		OC_23		OC_45		OC_67	
SoC USB_OC#	OC_0		OC_3		OC_3		OC_1	

1.3.8.6 SPI Bus

Supports BIOS flash only. SPI clock is set to 20MHz, with capacity of up to 128Mb.

1.3.8.7 GPIO

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

1.3.8.8 Watchdog Timer

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

1.3.8.9 Serial Port

2 x 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

1.3.8.10 TPM

Supports TPM 2.0 module by option.

1.3.8.11 Smart Fan

Supports 2 x Fan PWM control signals and 2 x tachometer input for fan speed detection. Provides 1 x on module with connector and the other to the carrier board following PICMG COM Express R3.0 specifications.

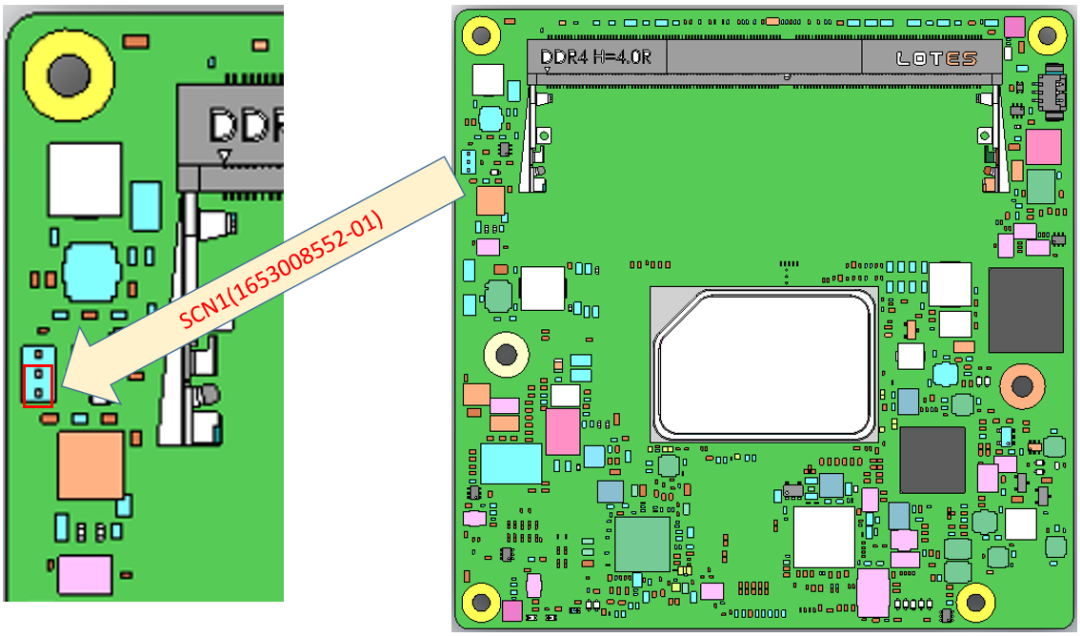
1.3.8.12 BIOS

The BIOS chip is on module by default. Users can place BIOS chip on the carrier board with appropriate design and jumper setting in BIOS_DIS#[1:0].

BIOS_DIS#0	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 system COMS is cleared, Advantech strongly suggests going to the BIOS setup menu and loading default settings on the first boot up.*

The standard module has no jumper at SCN1. Therefore, BIOS settings are kept without a RTC coin battery. If you need to restore to BIOS default settings follow the steps below:



1. Remove the coin battery.
2. Put jumper on SCN1 to pin1-2.
3. Turn on the power supply.
4. The system will boot up a few times.
5. The BIOS will load default settings successfully.

1.3.9 Power Management

1.3.9.1 Power Supply

Supports both ATX and AT power modes. VSB is for suspended power and can be optional if not required by standby (suspend-to-RAM) support. RTC battery may be optional if date/timekeeping is not required.

- VCC: 8.5V (9V-5%) – 20V (19V+5%)
- VSB: 5V +/- 5% (Suspend power)
- RTC Battery Power: 2.0V – 3.3V

1.3.9.2 PWROK

Power-good from the main power supply. A high value indicates the power level is good. This signal can be used to postpone module startup allowing carrier-based FPGAs or other configurable devices time to be programmed.

1.3.9.3 Power Sequence

According to PICMG COM Express COM.0 R 3.0 specifications.

1.3.9.4 Wake Event

Various wake event support allows users to apply different scenarios.

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

1.3.9.5 Advantech S5 ECO Mode (Deep Sleep Mode)

Advantech iManager provides additional features allowing the system to enter a very low suspended power mode – S5 ECO mode. In this mode, the module will cut all power, including suspended and active power to the chipset, and keep an on-module controller active. Only power under 50MW will be consumed, meaning user battery packs can last longer. While this mode is enabled in the BIOS, the system (or module) only allows power button boot instead of other methods such as WOL.

1.3.10 Environment

1.3.10.1 Temperature

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

1.3.10.2 Humidity

- **Operating:** 40 °C @95% relative humidity, non-condensing
- **Storage:** 60 °C @95% relative humidity, non-condensing

1.3.10.3 Vibrations

IEC60068-2-64: Random vibration test under operation mode, 3.5 Grms.

1.3.10.4 Drop Test (Shock)

Federal Standard 101 Method 5007 test procedure with standard packing.

1.3.10.5 EMC

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

1.3.11 MTBF

Please refer Advantech SOM-6832 Refresh Series Reliability Prediction report on the website: Link: http://com.advantech.com

1.3.12 OS Support

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 distributors) for projects. Our goal is to make Windows Embedded software solutions easily and widely available to the embedded computing community.

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

1.3.13 Advantech iManager

Supports APIs for GPIO, smart fan control, multi-stage watchdog timer, temperature sensor, and hardware monitoring. Follows PICMG EAPI 1.0 specifications with backward compatibility.

1.3.14 Power Consumption

Power Consumption Table (Watt.)						
VCC=12V, VSB=5V	Active Power Domain			Suspend Power Domain		Mechanical off
Power State	S0 Max. Load	S0 Burn-in	S0 Idle	S5	S5 Deep Sleep	RTC (uA)
SOM-6832A4-U0A1	TBD. Will be updated after finished.					

Hardware Configurations:

1. MB: SOM-6832A4-U0A1
2. DRAM: 16GB DDR4 3200MHz x 2pcs
3. Carrier board: SOM-DB5830-00A2

Test Condition:

1. Test temperature: room temperature (about 25 °C)
2. Test voltage: rated voltage DC +12.0V
3. Test loading:
   - Maximum load mode: According to Intel thermal/power test tools.
   - Burn-in mode: Burn-in test V8.1 Pro (1023) for 64 bit Windows. (CPU, RAM, 2D&3D Graphics and Disk with 100%)
   - Idle mode: DUT power management off and not running any program.
4. OS: Windows 10 Enterprise

1.3.15 Performance

To compare performance or benchmark data with other modules, please refer to “Advantech COM Performance & Power Consumption Table.”

1.3.16 Selection Guide w/ P/N

Part No.	CPU	Core	Graphics	Base Freq.	Max. Boost Freq.	GFX HFM	GFX Burst Mode	CPU TDP	eMMC (Option)	IBECC	TPM (Option)	Thermal solution	Operating Temp.
SOM-6832P4-U0A1	Pentium J6426	4	32EU	2.0GHz	3.0GHz	400MHz	850MHz	10W	N/A	No	N/A	Passive	0-60 °C
SOM-6832A4-S5A1	Atom x6413E	4	16EU	1.5GHz	3.0GHz	500MHz	750MHz	9W	N/A	Yes	N/A	Passive	0-60 °C
SOM-6832A4-U0A1	Atom x6425E	4	16EU	2.0GHz	3.0GHz	500MHz	750MHz	12W	32GB	Yes	N/A	Passive	0-60 °C
SOM-6832A4-S4A1	Atom x6414RE	4	16EU	1.5GHz	N/A	400MHz	N/A	9W	N/A	Yes	N/A	Passive	0-60 °C
SOM-6832A4-S9A1	Atom x6425RE	4	32EU	1.9GHz	N/A	400MHz	N/A	12W	N/A	Yes	N/A	Passive	0-60 °C
SOM-6832A4X-S9A1	Atom x6425RE	4	32EU	1.9GHz	N/A	400MHz	N/A	12W	N/A	Yes	N/A	Passive	-40-85 °C

1.3.17 Packing list

Part No.	Description	Quantity
-	SOM-6832 COM module	1 x
1970005489T001/ 1970005489T011	Heatspreader IHS/Heatspreader NON-I of SOM-6832	1 x

1.3.18 Development Board

Part No.	Description
SOM-DB5830-00A2	COMe Devel. Board COMe R3.0 Type6 pin-out (LVDS) 0 - 60 °C
SOM-DB5830A-00A2	COMe Devel. Board COMe R3.0 Type6 pin-out (eDP) 0 - 60 °C
SOM-DB5830X-00A2	COMe Devel. Board COMe R3.0 Type6 pin-out (LVDS) -40 - 85 °C

1.3.19 Optional Accessory

Part No.	Description
1960048815N001	Semi-Heatsink 95 x 95 x 16.25 mm

1.3.19.1 Pin Description

Advantech provides useful checklists for schematic design and layout routing. The schematic checklist specifies details about each pin's electrical properties and how to connect it in different scenarios. The layout checklist will specify the layout constraints and recommendations for trace length & impedance — alongside other information during design.

Please contact an Advantech branch office to receive design documents and/or further advanced support.

Chapter 2

Mechanical Information

This chapter details mechanical information on the SOM-6832 CPU Computer on Module

Sections include:

- Board Information
- Mechanical Diagrams
- Assembly Diagrams

2.1 Board Information

The figures below detail the main chips on the SOM-6832 Computer-on-Module.

Be aware of these positions while designing carrier boards to avoid mechanical damage. Be aware of the thermal solutions contacts to optimize the performance of thermal dissipation.

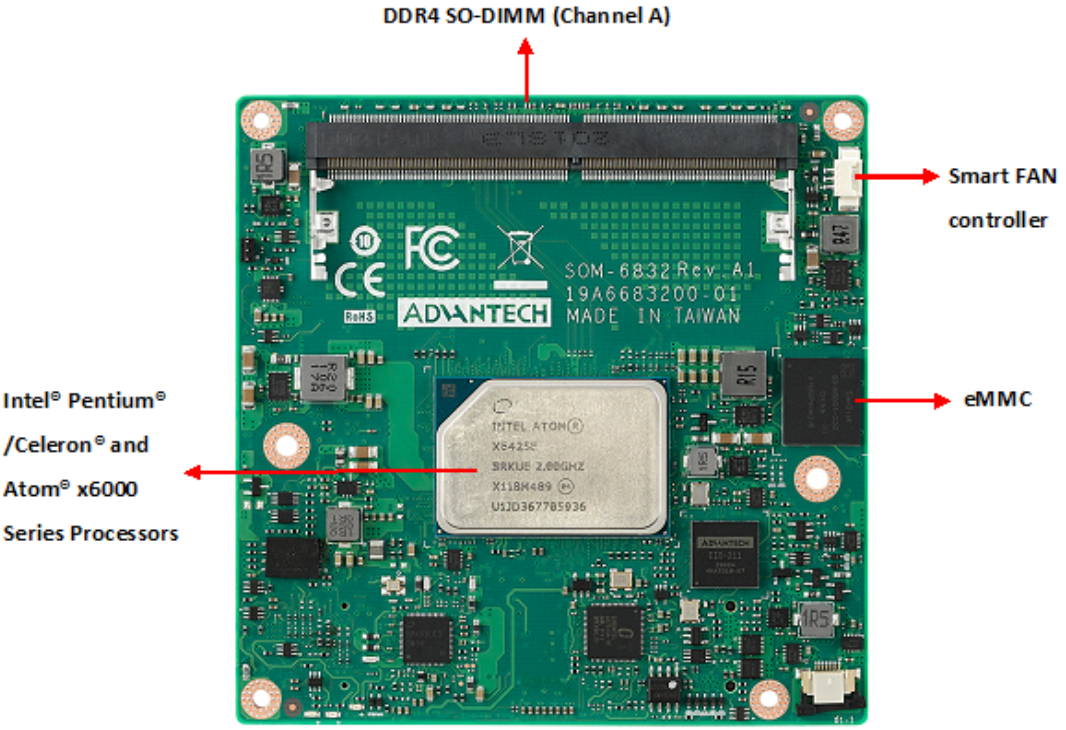


Figure 2.1 Board Chips ID – Front

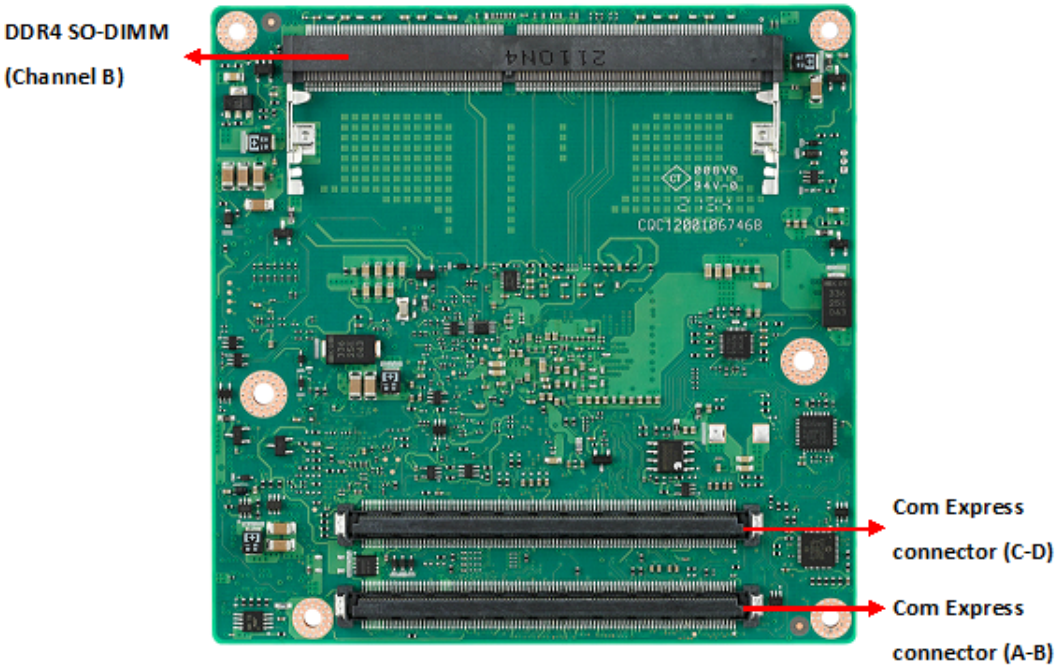


Figure 2.2 Board Chips ID – Rear

2.2 Mechanical Diagram

For more details regarding 2D/3D models, please find on Advantech COM support service website http://com.advantech.com.

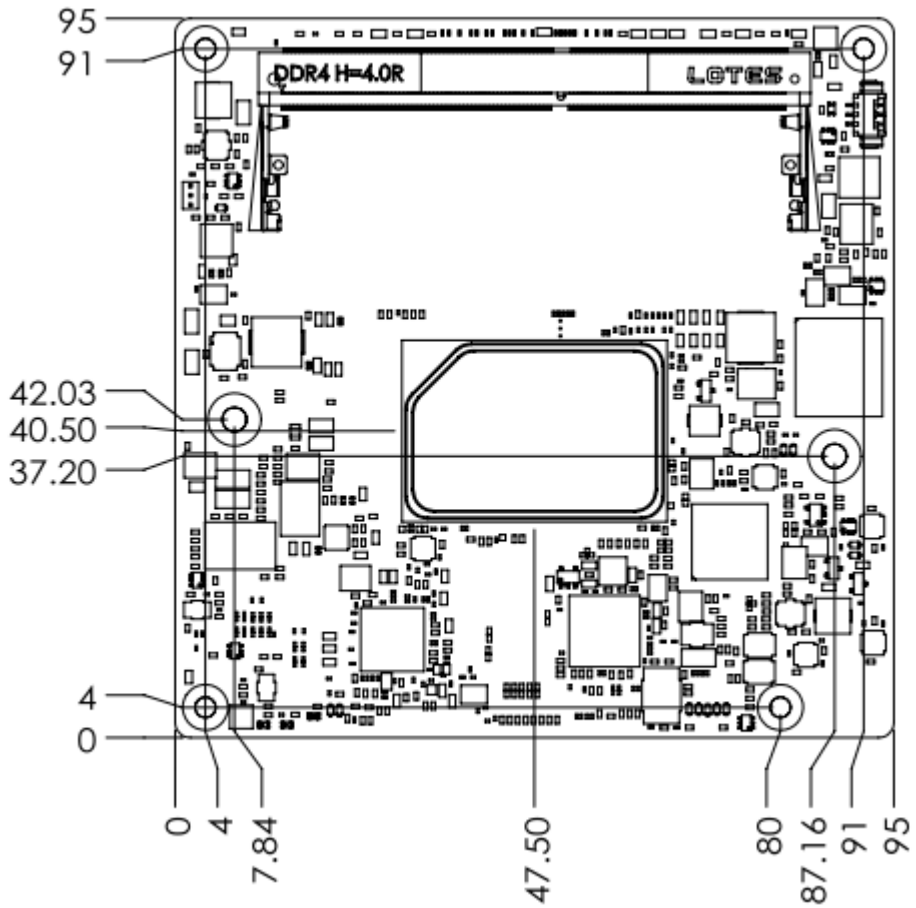


Figure 2.3 Atom Series Board Mechanical Diagram – Front

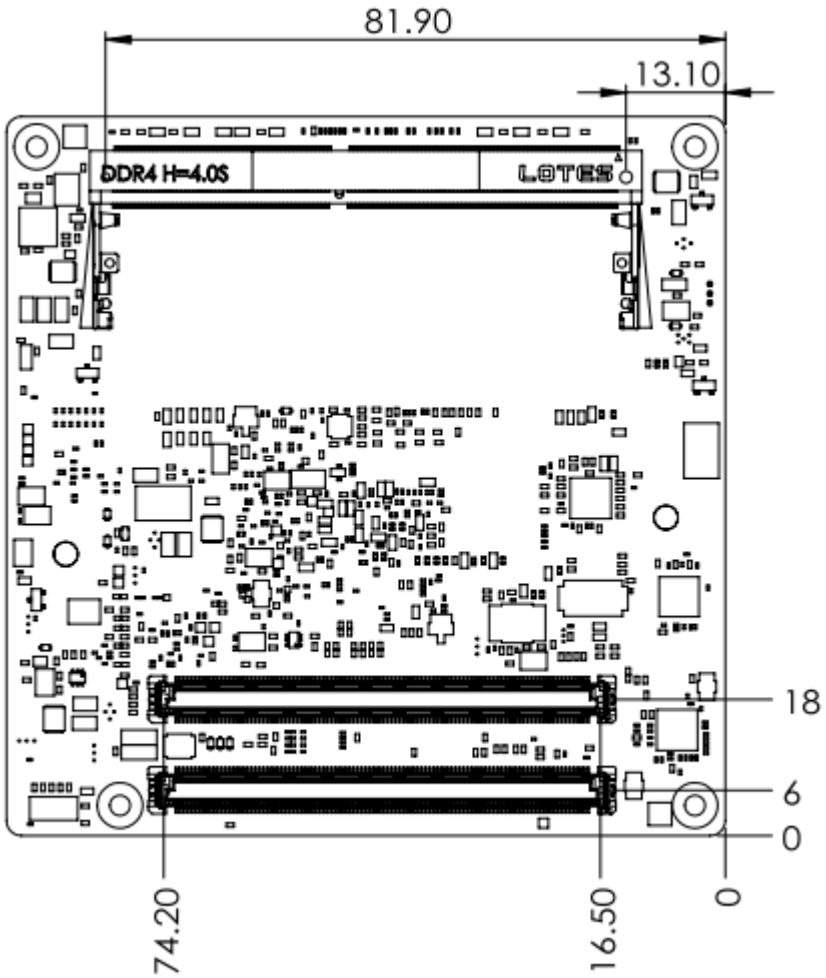


Figure 2.4 Atom Series Board Mechanical Diagram – Rear

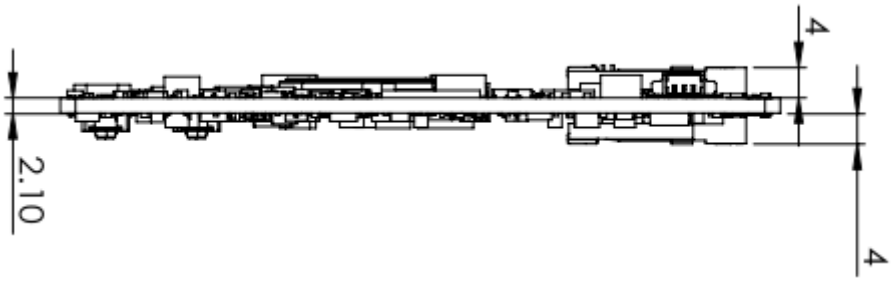


Figure 2.5 Atom Series Board Mechanical Diagram – Side

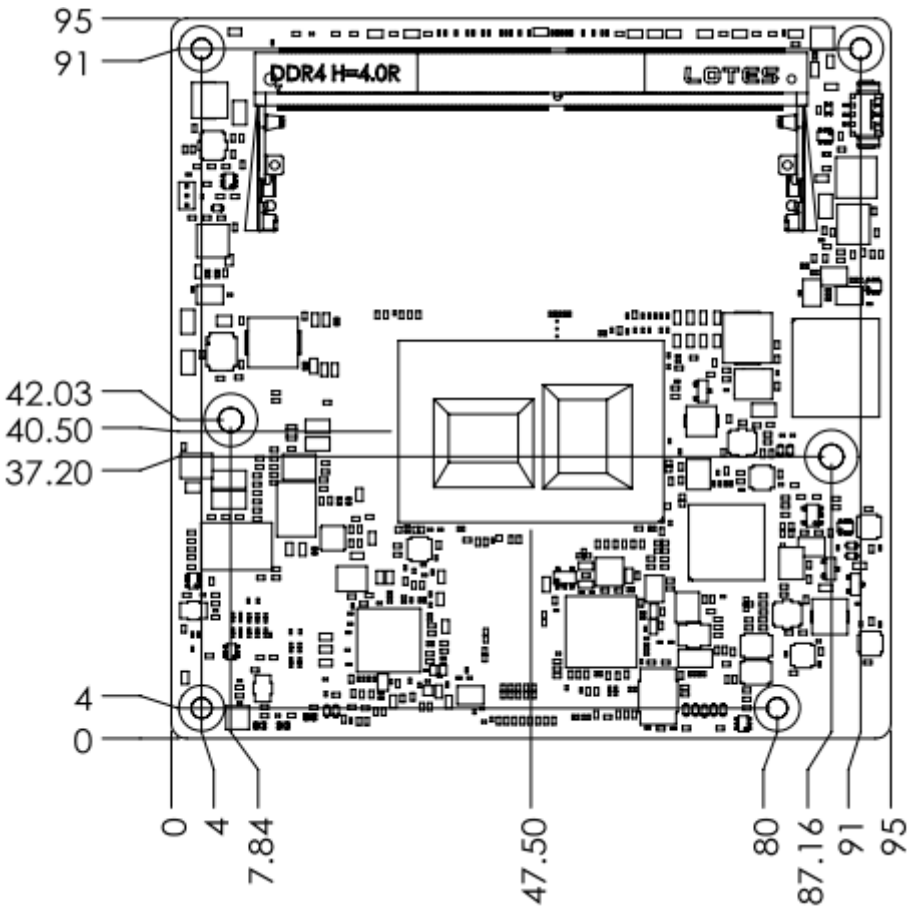


Figure 2.6 Pentium Series Board Mechanical Diagram – Front

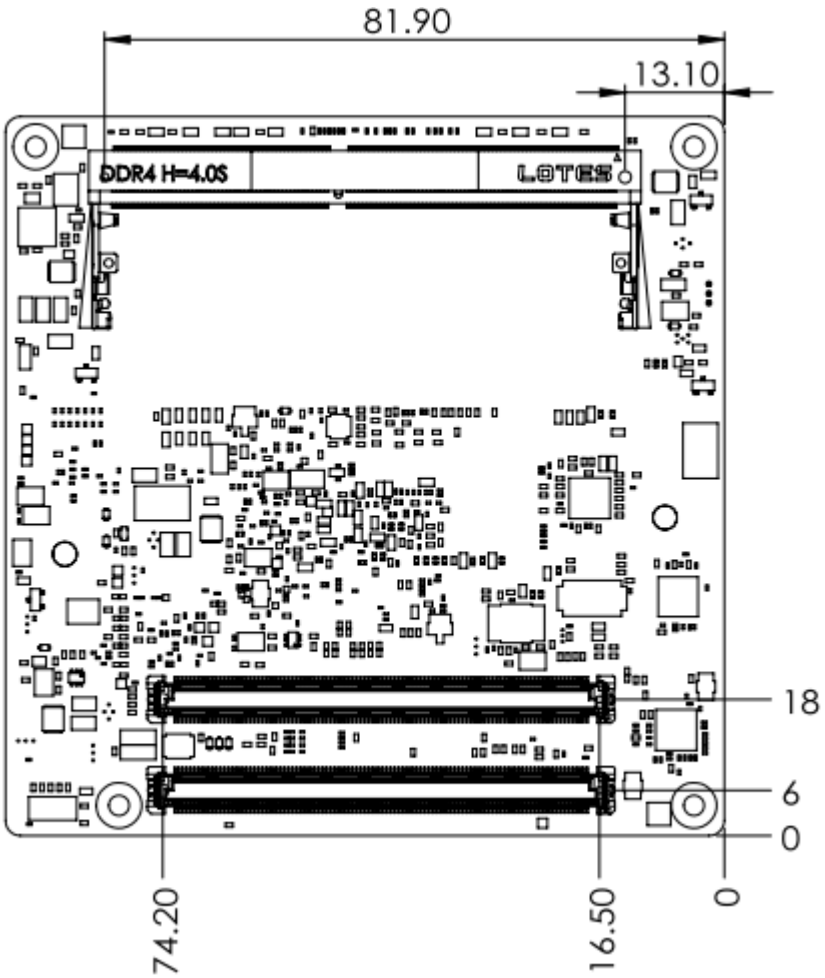


Figure 2.7 Pentium Series Board Mechanical Diagram – Rear

Figure 2.8 Pentium Series Board Mechanical Diagram – Side

2.3 Assembly Diagram

These figures demonstrate the order of assembly when attaching the thermal module and COM module to carrier board.

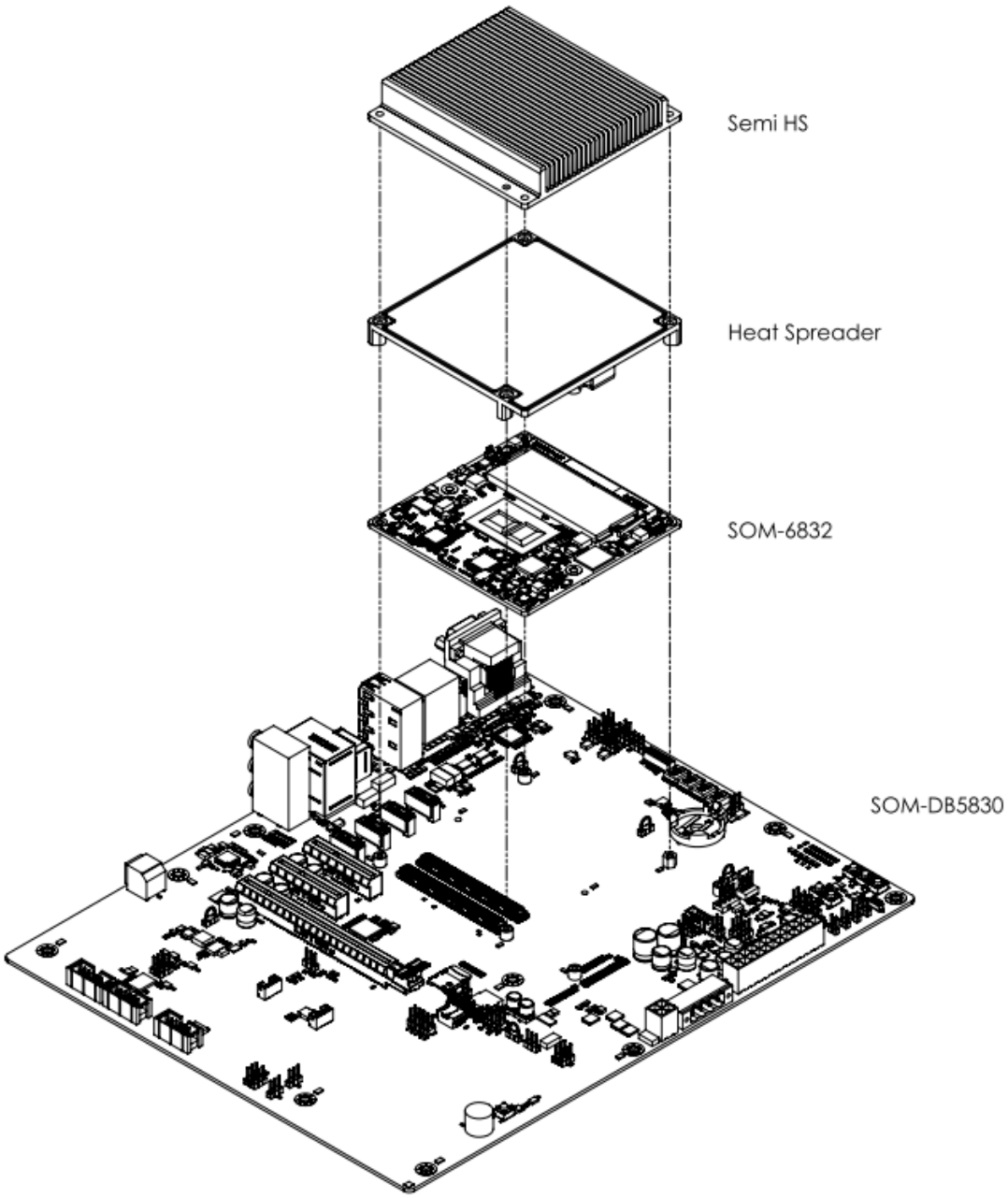
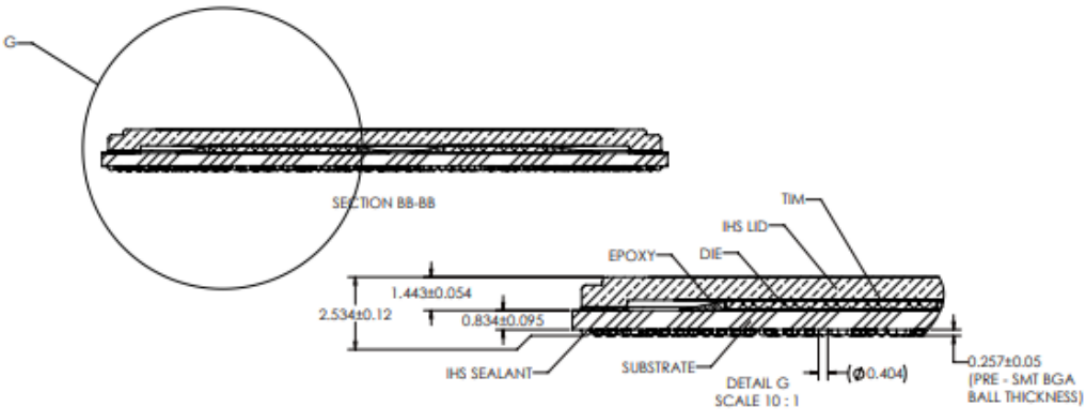


Figure 2.9 Assembly Diagram

There are 4 x reserved screw holes that enable SOM-6832 to be assembled with the heat spreader.

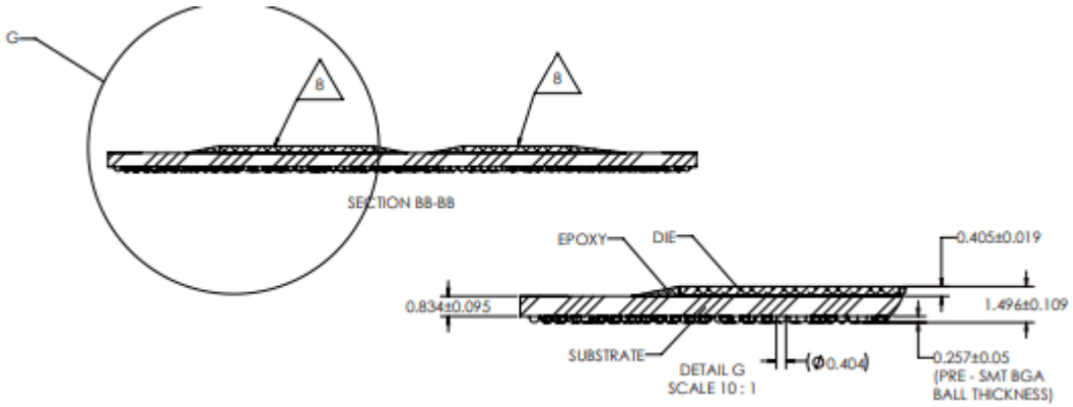
2.4 Assembly Diagram

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



Intel Atom® Processor Series

Figure 2.10 CPU Height and Tolerance



Intel® Pentium and Celeron N and J Series Processors

Figure 2.11 PCH Height and Tolerance

Chapter 3

AMI BIOS

This chapter details BIOS setup information for the SOM-6832 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-6832 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.

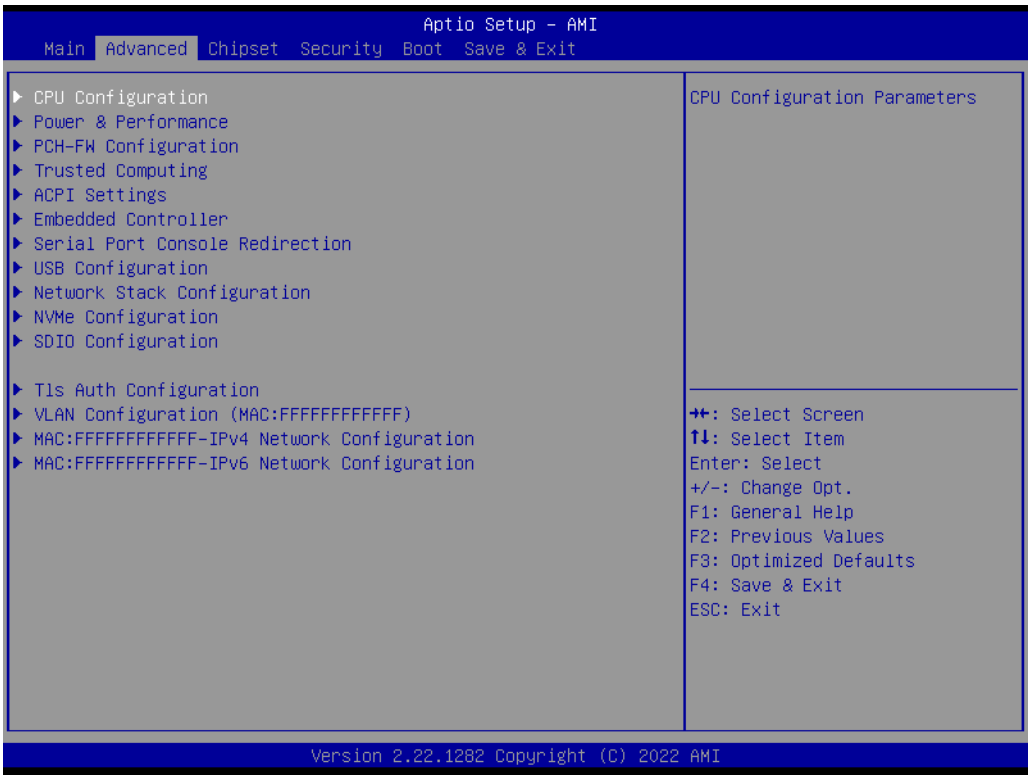


Figure 3.3 Advanced BIOS features setup screen

- **CPU Configuration**
  CPU Configuration Parameters.
- **Power & Performance**
  Power & Performance Options.
- **PCH-FW Configuration**
  Configure Management Engine Technology Parameters.
- **Trusted Computing**
  Trusted Computing Settings.
- **ACPI Settings**
  ACPI Sleep State.
- **Embedded Controller**
  Embedded Controller Parameters.
- **Serial Port Console Redirection**
  Console Redirection Settings.
- **USB Configuration**
  USB Configuration Parameters.
- **Network Stack Configuration**
  Network Stack Settings.
- **NVMe Configuration**
  NVMe controller and Drive information.

- **SDIO Configuration**
  SDIO Configuration Parameters.

3.4.1 CPU Configuration

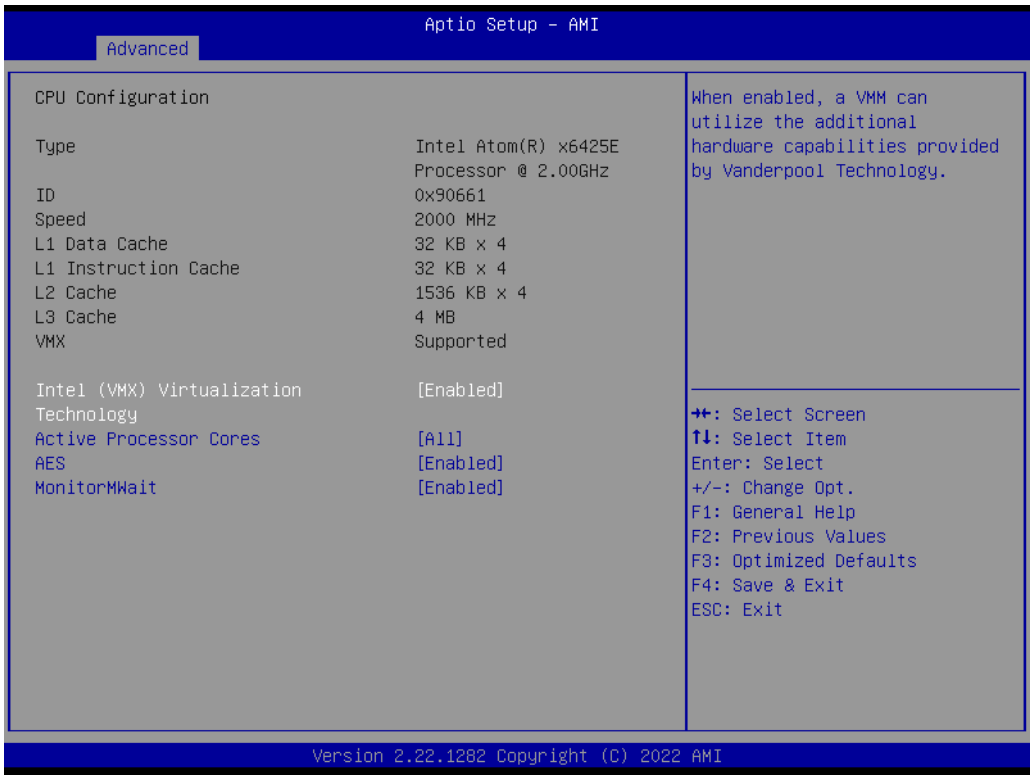


Figure 3.4 CPU Configuration

- **Intel (VMX) Virtualization Technology**
  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **Active Processor Cores**
  Number of cores to enable in each processor package.
- **AES**
  Enable/Disable AES (Advanced Encryption Standard).
- **MonitorMwait**
  Enable/Disable Monitor Mwait.

3.4.2 Power & Performance

Figure 3.5 Power & Performance

- **CPU - Power Management Control**
  CPU - Power Management Control Options.
- **GT - Power Management Control**
  GT - Power Management Control Options.

3.4.2.1 CPU - Power Management Control

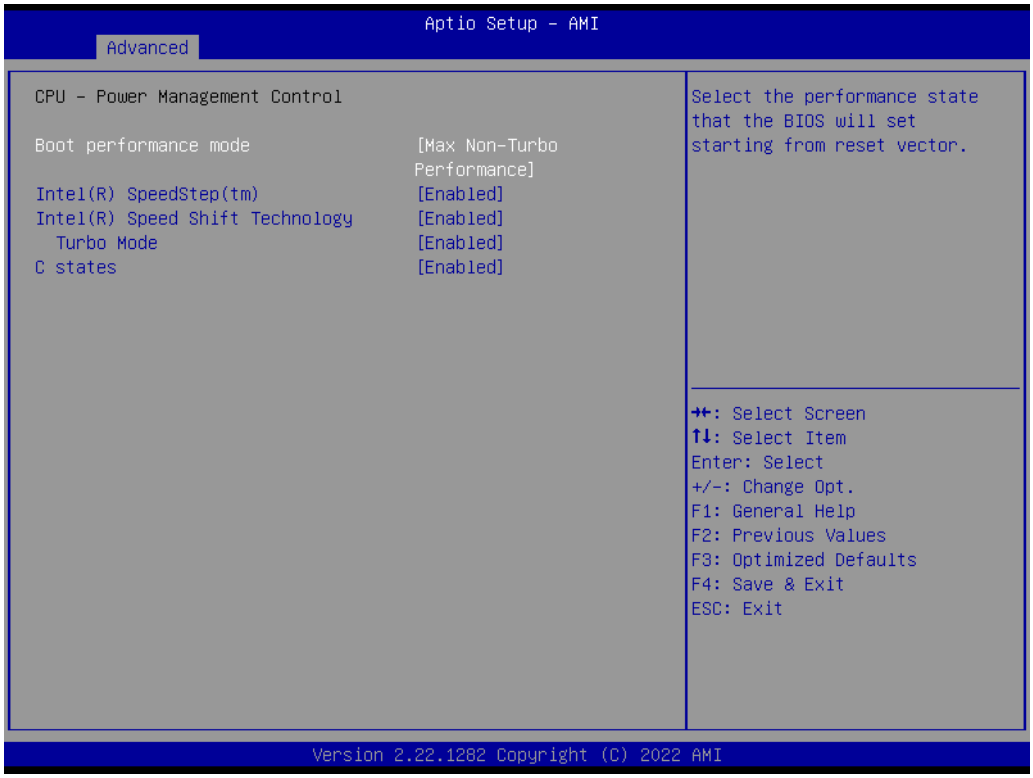


Figure 3.6 CPU - Power Management Control

- **Boot performance mode**
  Select the performance state that the BIOS will set starting from reset vector.
- **Intel(R) SpeedStep(tm)**
  Allows more than two frequency ranges to be supported.
- **Intel(R) Speed Shift Technology**
  Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
- **Turbo Mode**
  Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.
- **C states**
  Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

3.4.2.2 GT - Power Management Control

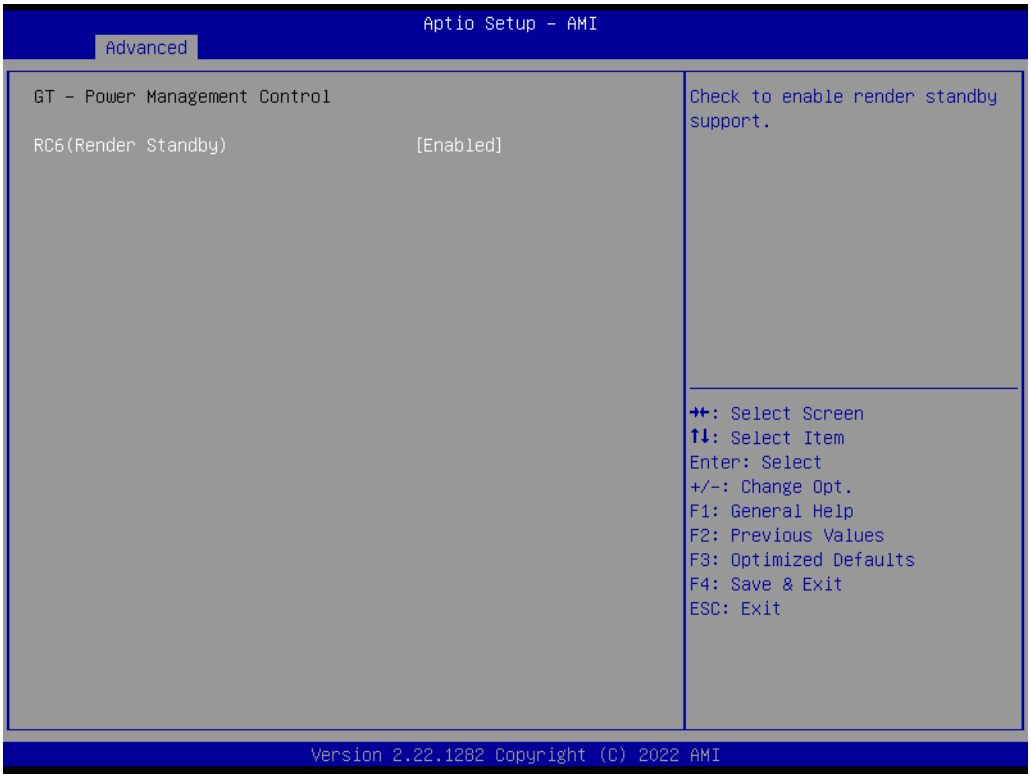


Figure 3.7 GT - Power Management Control

- **RC6(Render Standby)**
  Check to enable render standby support.

3.4.3 PCH-FW Configuration

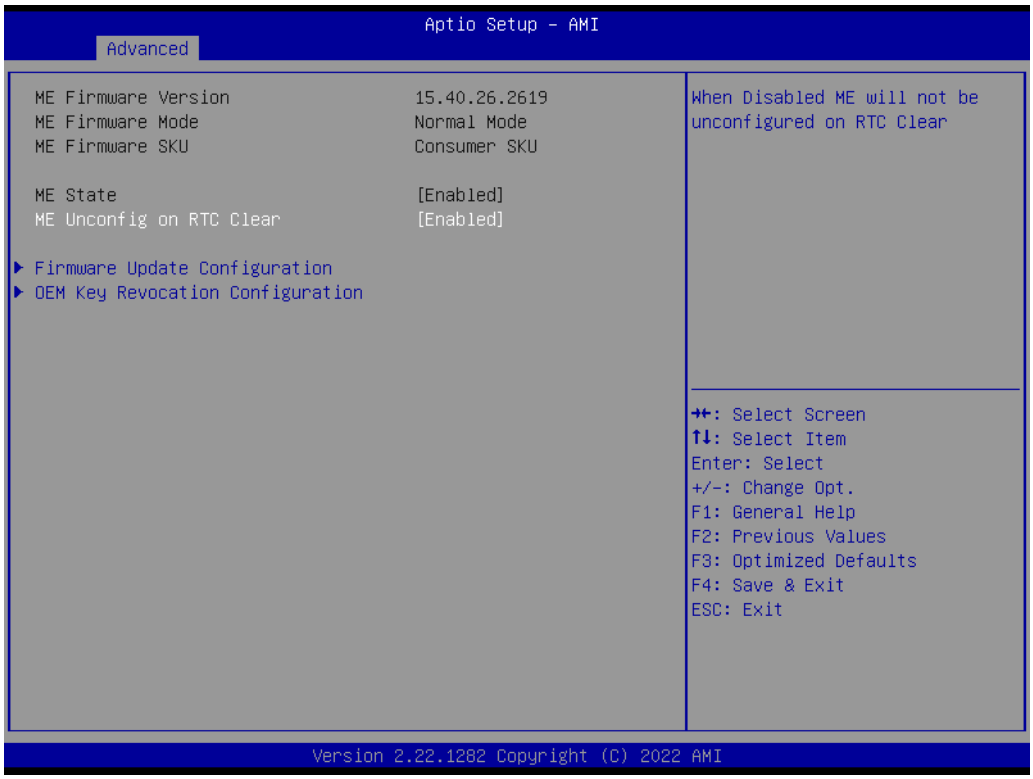


Figure 3.8 PCH-FW Configuration

- **ME Unconfig on RTC Clear**
  When Disabled ME will nor unconfigured on RTC clear.
- **Firmware Update Configuration**
  Configure Management Engine Technology Parameters.
- **OEM Key Revocation Configuration**
  When enabled, BIOS will automatically send HECI command to revoke OEM keys.

3.4.3.1 Firmware Update Configuration

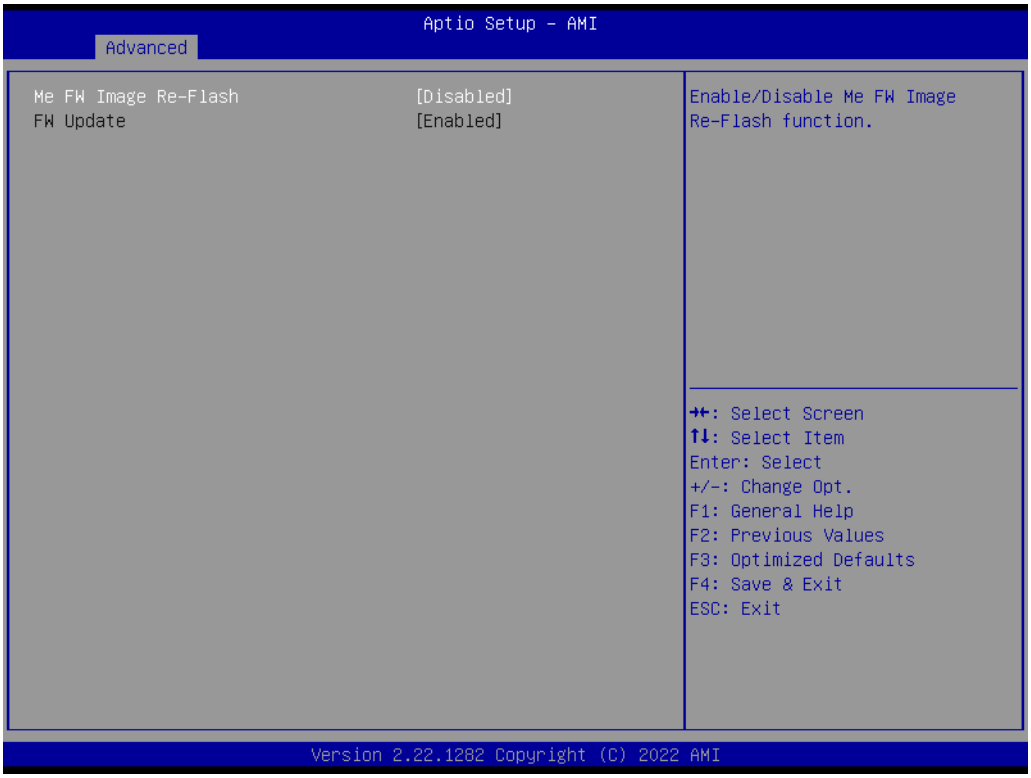


Figure 3.9 Firmware Update Configuration

- **Me FW Image Re-Flash**
  Enable/Disable Me FW Image Re-Flash function.
- **FW Update**
  Enable/Disable ME FW Update function.

3.4.4 Trusted Computing

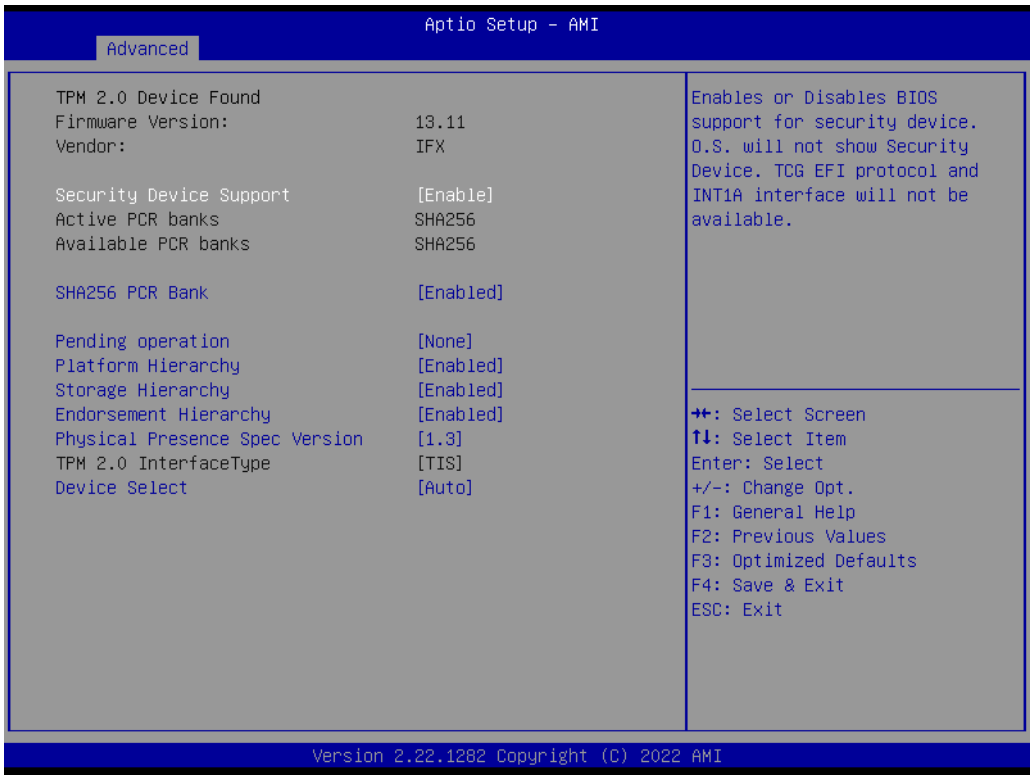


Figure 3.10 Trusted Computing

- **Security Device Support**
  Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
- **SHA256 PCR Bank**
  Enable or Disable SHA256 PCR Bank.
- **Pending operation**
  Pending operation.
- **Platform Hierarchy**
  Enable or Disable Platform Hierarchy.
- **Storage Hierarchy**
  Enable or Disable Storage Hierarchy.
- **Endorsement Hierarchy**
  Enable or Disable Endorsement Hierarchy.
- **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.
- **Device Select**
  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 not found, TPM 1.2 devices will be enumerated.

3.4.5 ACPI Settings

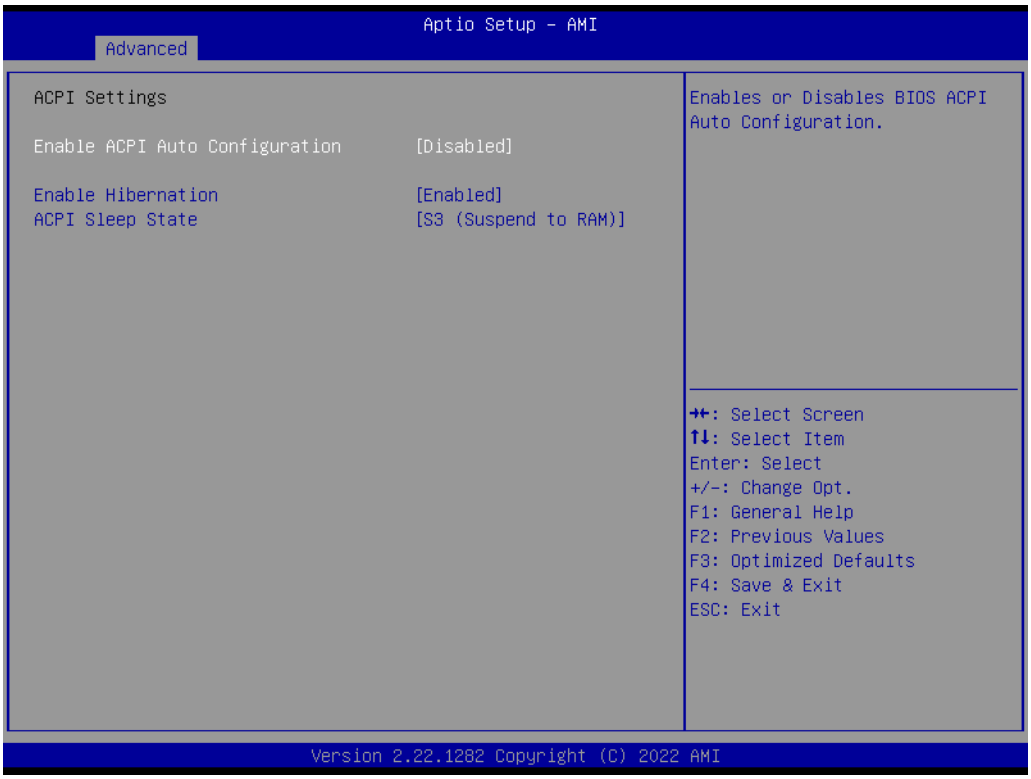


Figure 3.11 ACPI Settings

- **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.

3.4.6 Embedded Controller

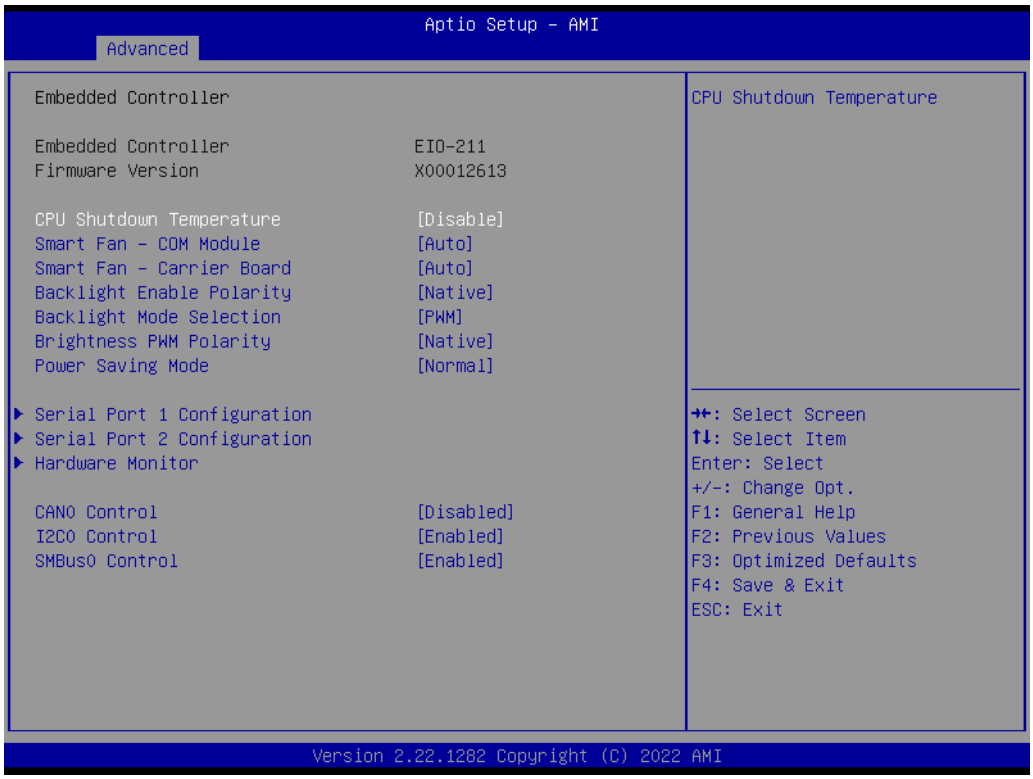


Figure 3.12 Embedded Controller

- **CPU Shutdown Temperature**
  CPU Shutdown Temperature.
- **Smart Fan - COM Module**
  Control COM Module Smart FAN function.
- **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.
- **CAN0 Control**
  Enable/Disable CAN0 controller on RDC EIO-211.

- **I2C0 Control**
  Enable/Disable I2C0 controller on RDC EIO-211.
- **SMBus0 Control**
  Enable/Disable SMBus0 controller on RDC EIO-211.

3.4.6.1 Serial Port 1 Configuration

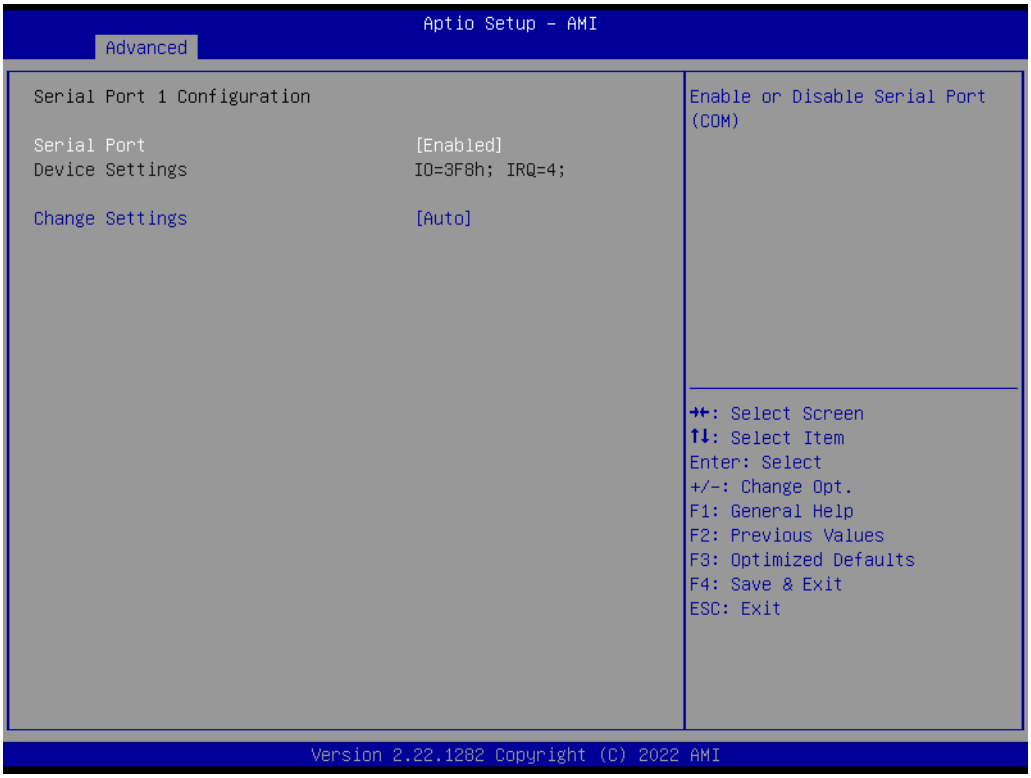


Figure 3.13 Serial Port 1 Configuration

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

3.4.6.2 Serial Port 2 Configuration

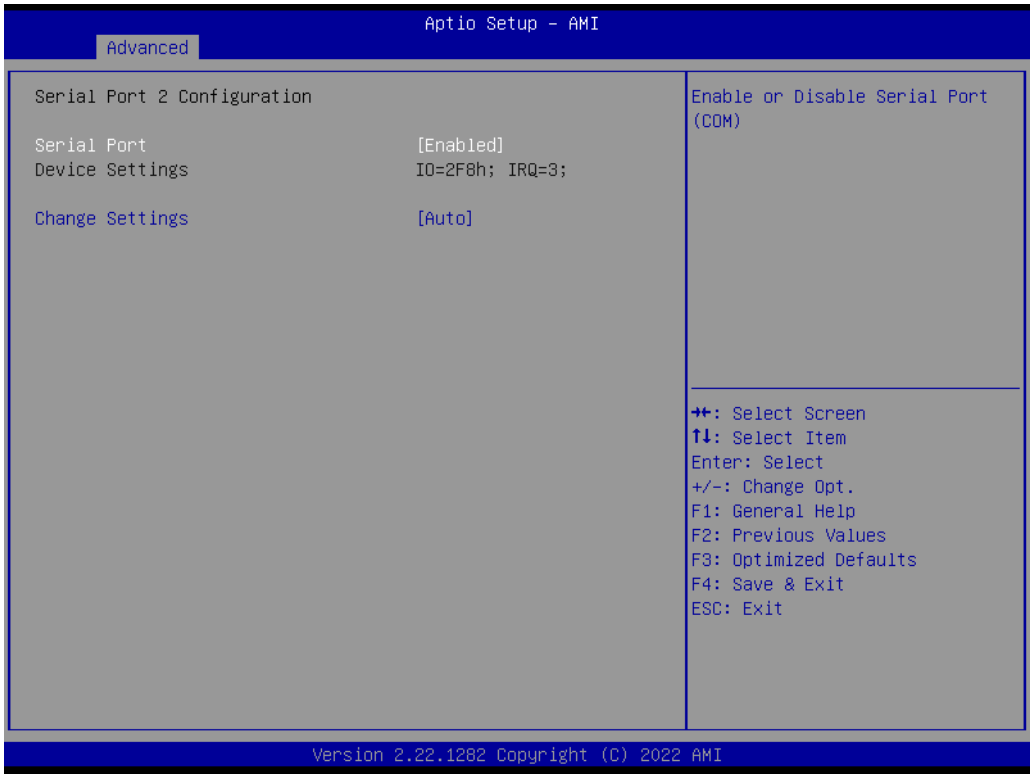


Figure 3.14 Serial Port 2 Configuration

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

3.4.6.3 Hardware Monitor

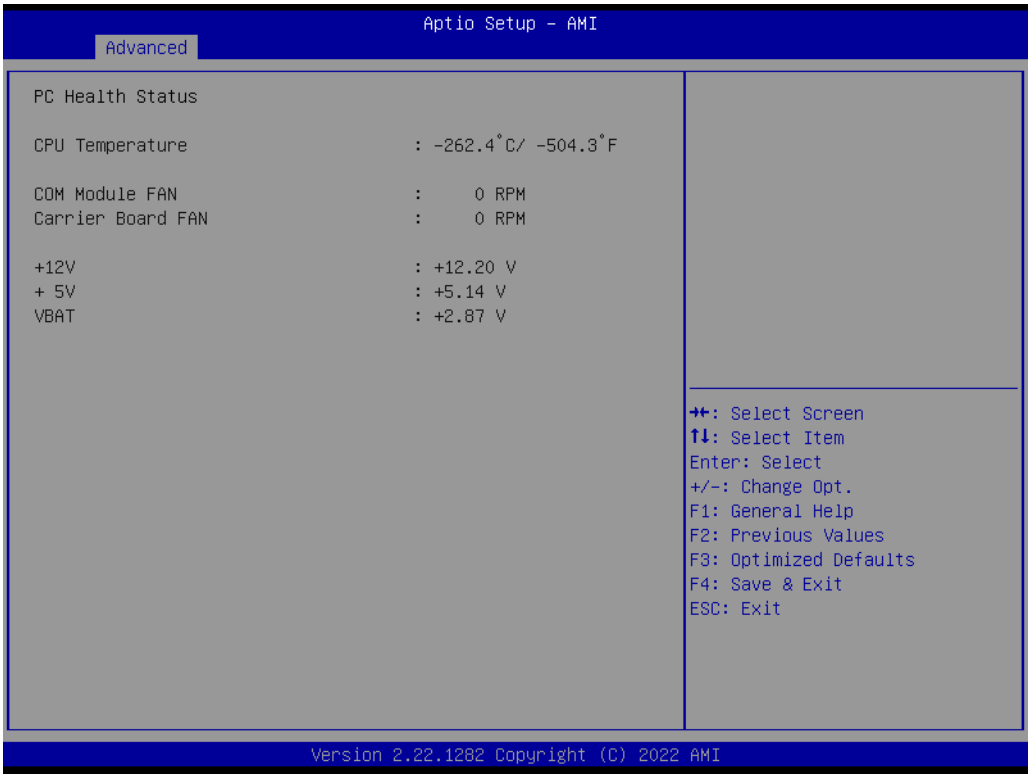


Figure 3.15 Hardware Monitor

3.4.7 Serial Port Console Redirection

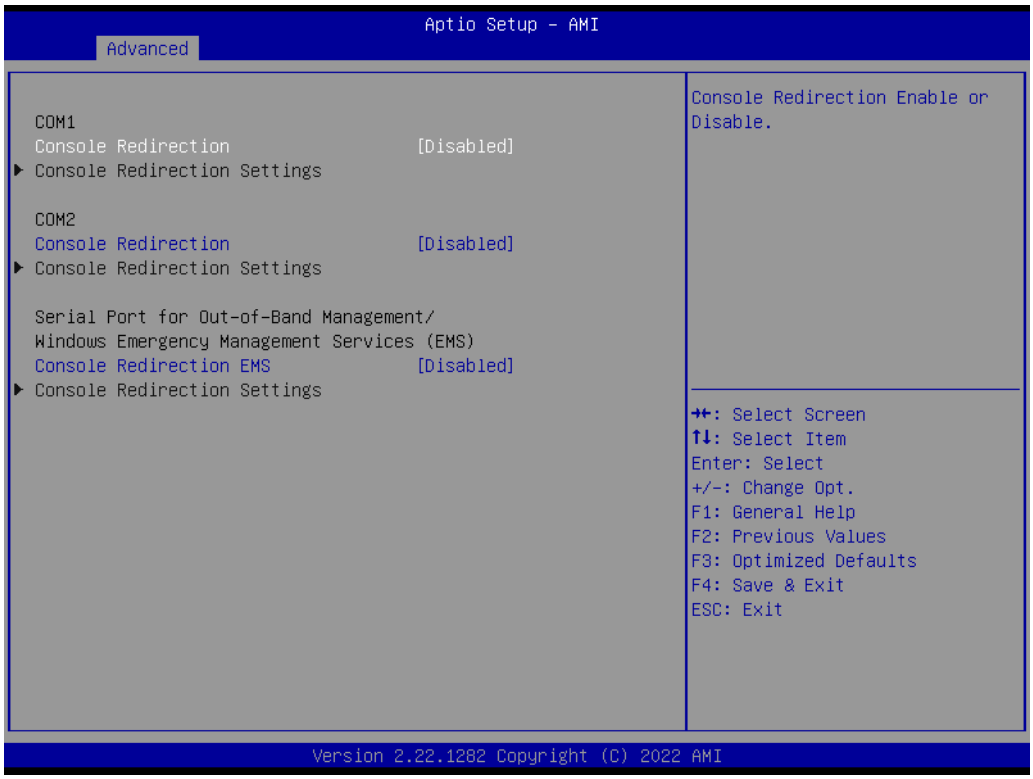


Figure 3.16 Serial Port console Redirection

- **COM1 Console Redirection**
  Console Redirection Enable or Disable.
- **Console Redirection Settings**
  The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.
- **COM2 Console Redirection**
  Console Redirection Enable or Disable.
- **Console Redirection Settings**
  The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.
- **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.

3.4.8 USB Configuration

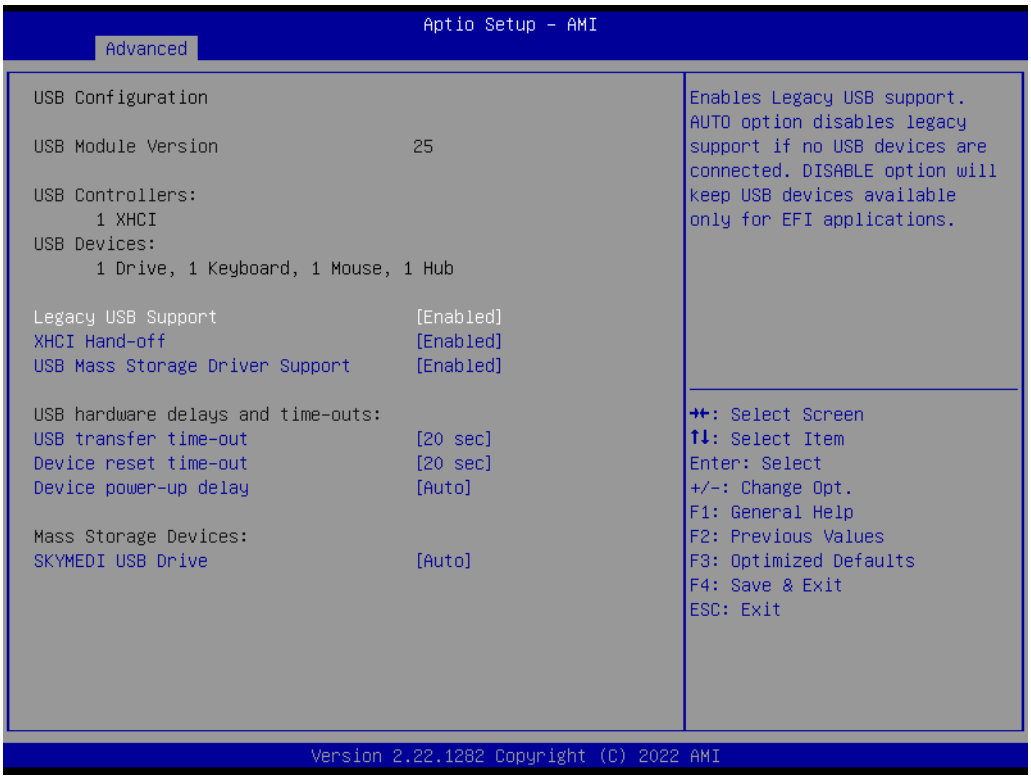


Figure 3.17 USB Configuration

- **Legacy USB Support**
  Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
- **XHCI Hand-off**
  This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage Driver Support.
- **USB transfer time-out**
  The time-out value for Control, Bulk, and Interrupt transfers.
- **Device reset time-out**
  USB mass storage device Start Unit command time-out.
- **Device power-up delay**
  Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

3.4.9 Network Stack Configuration

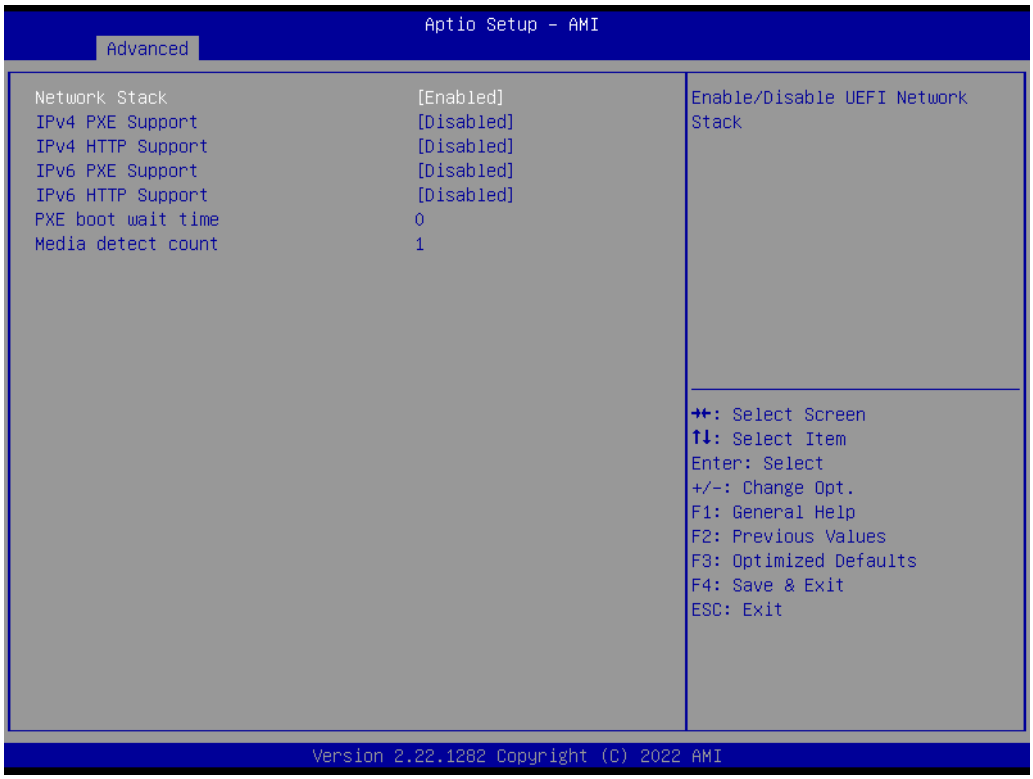


Figure 3.18 Network Stack Configuration

- **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 boot 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

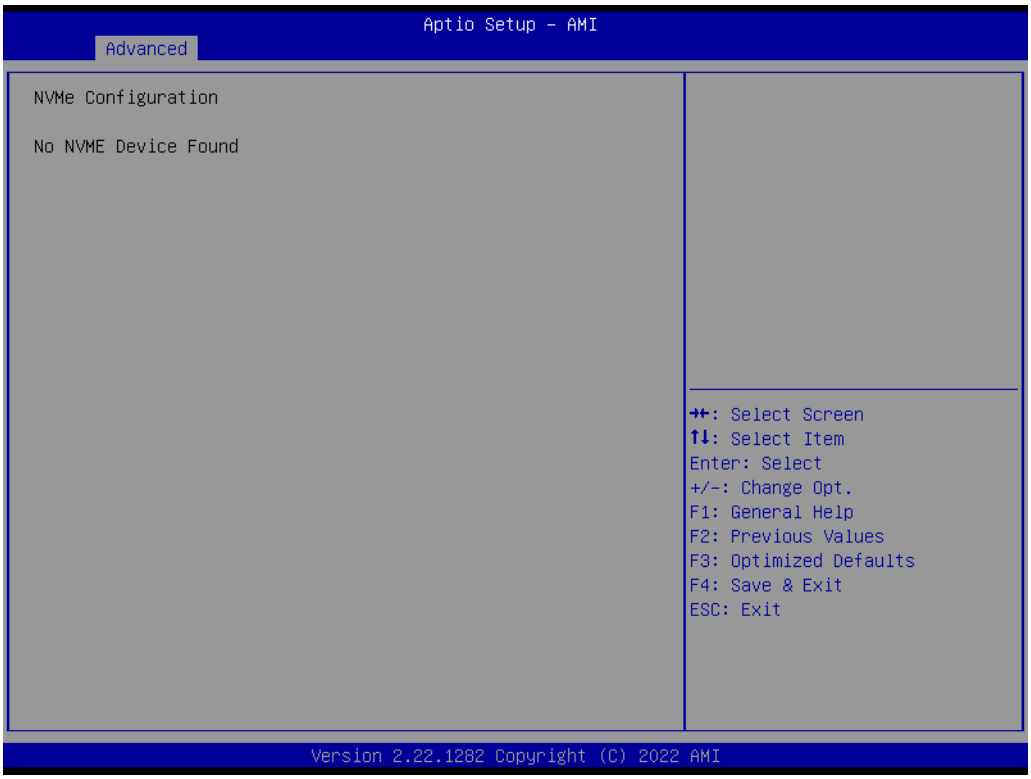


Figure 3.19 NVME Configuration

3.4.11 SDIO Configuration

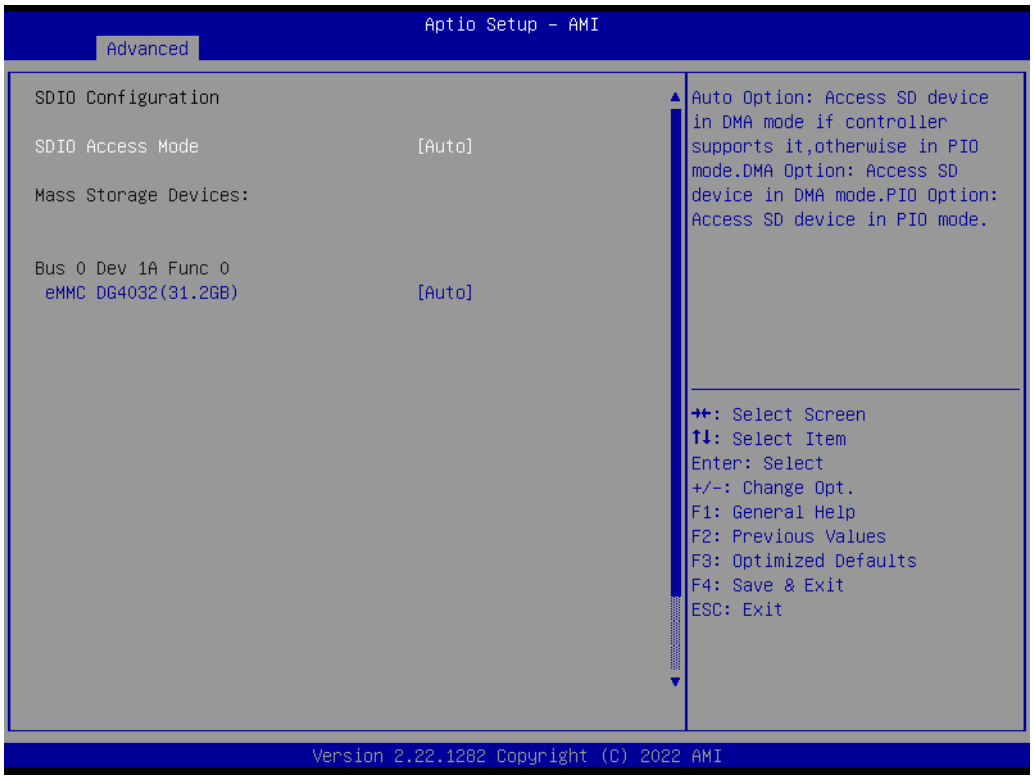


Figure 3.20 SDIO Configuration

- **SDIO Access Mode**
  Auto Option: Access SD device in DMA mode if controller supports it, otherwise in PIO mode.DMA Option: Access SD device in DMA mode.PIO Option: Access SD device in PIO mode.

3.5 Chipset Setup

Figure 3.21 Chipset Setup

- **System Agent (SA) Configuration**
  System Agent Parameters.
- **PCH-I0 Configuration**
  PCH parameters.

3.5.1 System Agent (SA) Configuration

Figure 3.22 System Agent (SA) Configuration

- **Memory Configuration**
  Memory Configuration Parameters.
- **Graphic Configuration**
- **VT-d**
  VT-d capability.
- **Above 4GB MMIO BIOS assignment**
  Enable/Disable above 4GB memory mapped IO BIOS assignment. This is enabled automatically when aperture size is set to 2048MB.

3.5.1.1 Memory Configuration

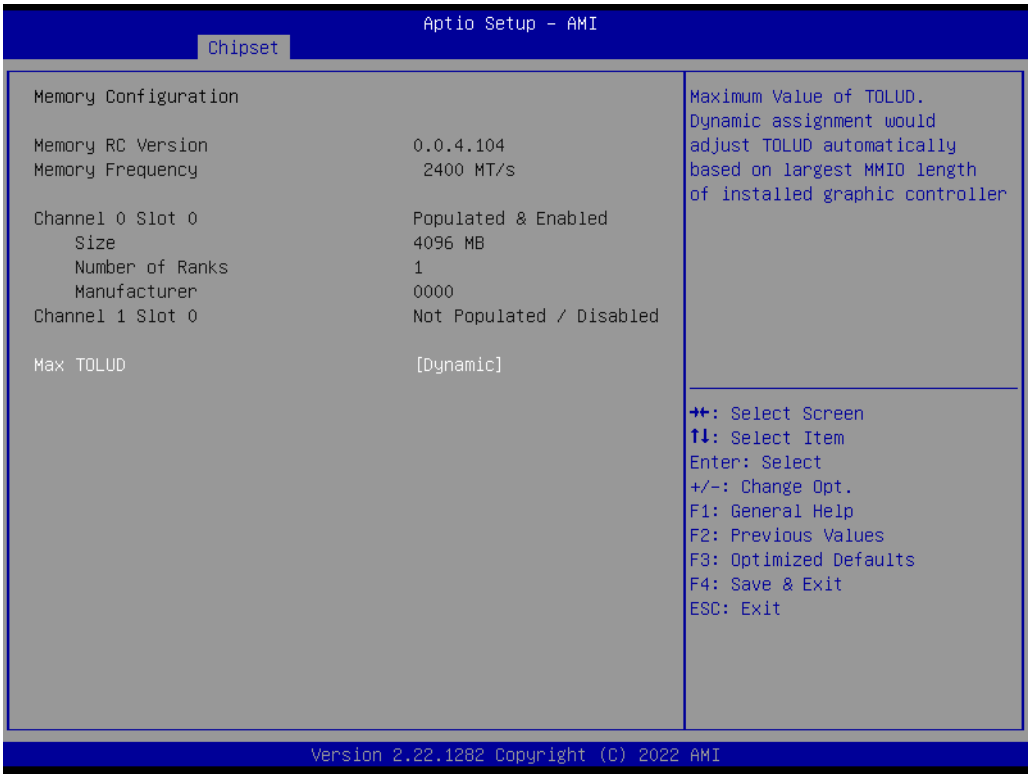


Figure 3.23 Memory Configuration

- **Max TOLUD**
  Maximum value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on the largest MMIO length of installed graphic controller.

3.5.1.2 Graphics Configuration

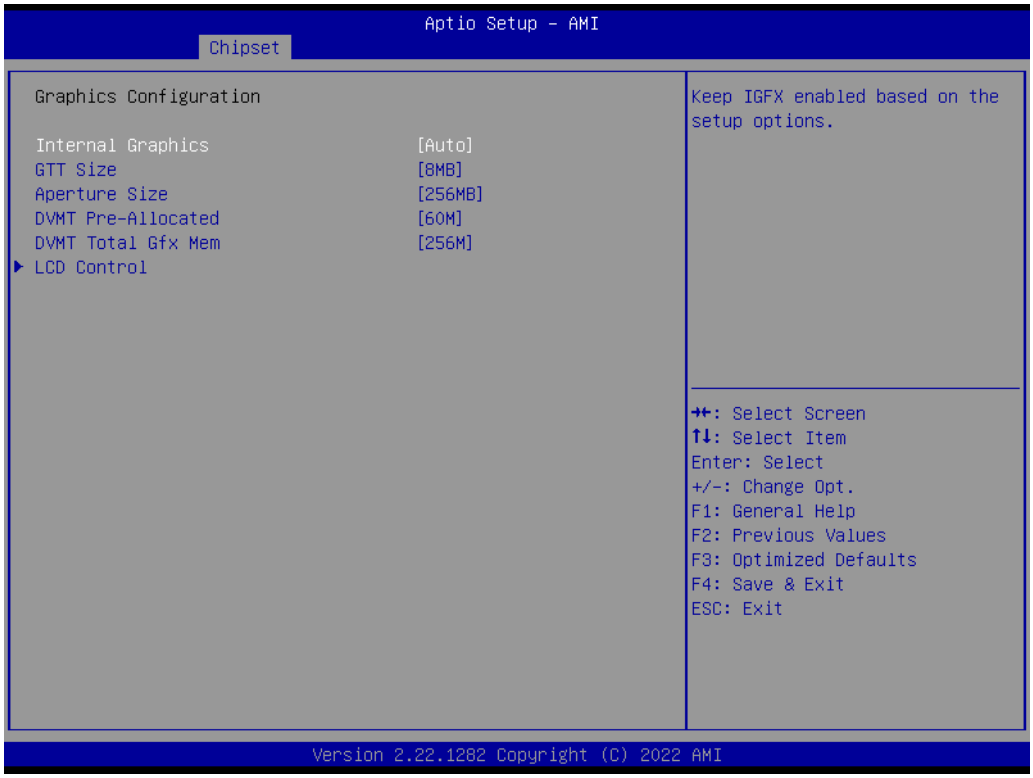


Figure 3.24 Graphics Configuration

- **Internal Graphics**
  Keep IGFX enabled base on the setup options.
- **GTT Size**
  Select the GTT size.
- **Aperture Size**
  Select the aperture size. Note: Above 4GB MMIO BIOS assignment is atomically enabled when selecting 2048MB aperture. To use this feature, please disable CSM support.
- **DVMT Pre-Allocated**
  Select DVMT5.0 pre-allocated(fixed) Graphics Memory size is used by the internal graphics device.
- **DVMT Total Gfx Mem**
  Select DVMT5.0 total graphic memory size is used by the internal graphic device.
- **LCD Control**

LCD Control

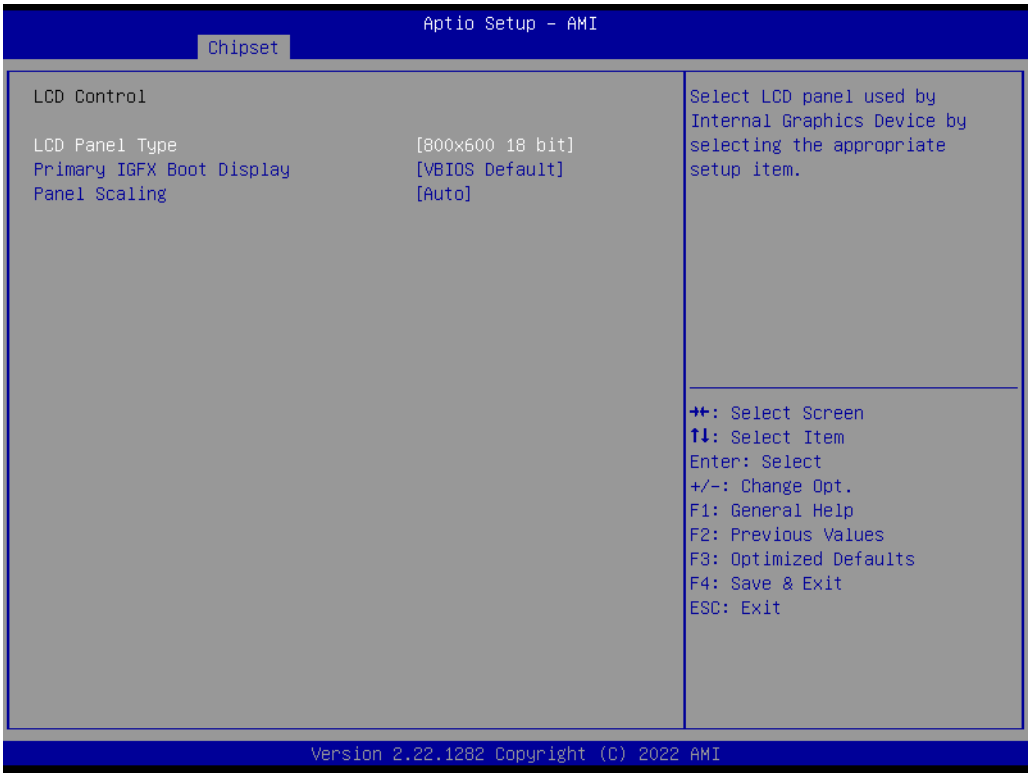


Figure 3.25 LCD Control

- **LCD Panel Type**
  Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.
- **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.
- **Panel Scaling**
  Select the LCD panel scaling option used by the Internal Graphics Device.

3.5.2 PCH-IO Configuration

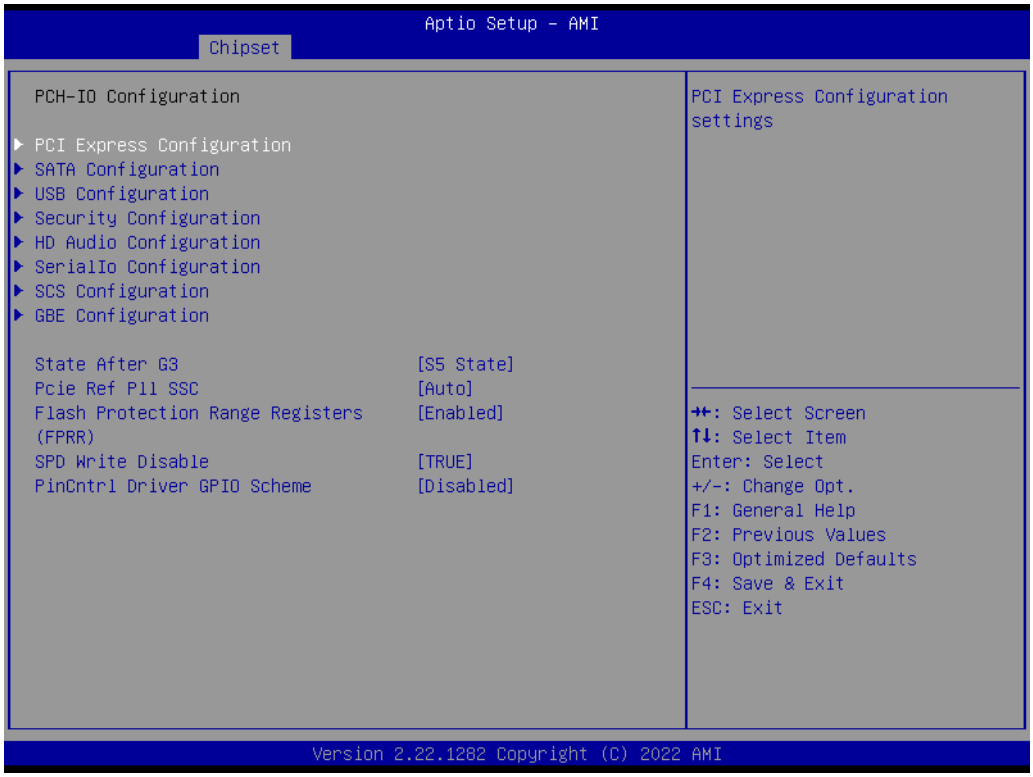


Figure 3.26 PCH-IO Configuration

- **PCI Express Configuration**
  PCI Express Configuration settings.
- **SATA Configuration**
  SATA device option settings.
- **USB Configuration**
  USB Configuration settings.
- **Security Configuration**
  Security Configuration settings.
- **HD Audio Configuration**
  HD audio subsystem configuration settings.
- **Seriallo Configuration**
  Seriallo configuration settings.
- **SCS Configuration**
  Storage and Communication Subsystem (SCS) Configuration.
- **GBE Configuration**
  Time Sensitive Network GBE Configuration.
- **State After G3**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **Pcie Ref Pll SSC**
  Pcie Ref Pll SSC Percentatge. AUTO - Keep hw default, no BIOS override. Range is 0.0%-0.5%.
- **Flash Protection Range Registers (FPRR)**
  Enable Flash Protection Range Registers.
- **SPD Write Disable**
  Enable/Disable setting SPD Write Disable. For security recommendations, SPD write disable bit must be set.

3.5.2.1 PCI Express Configuration

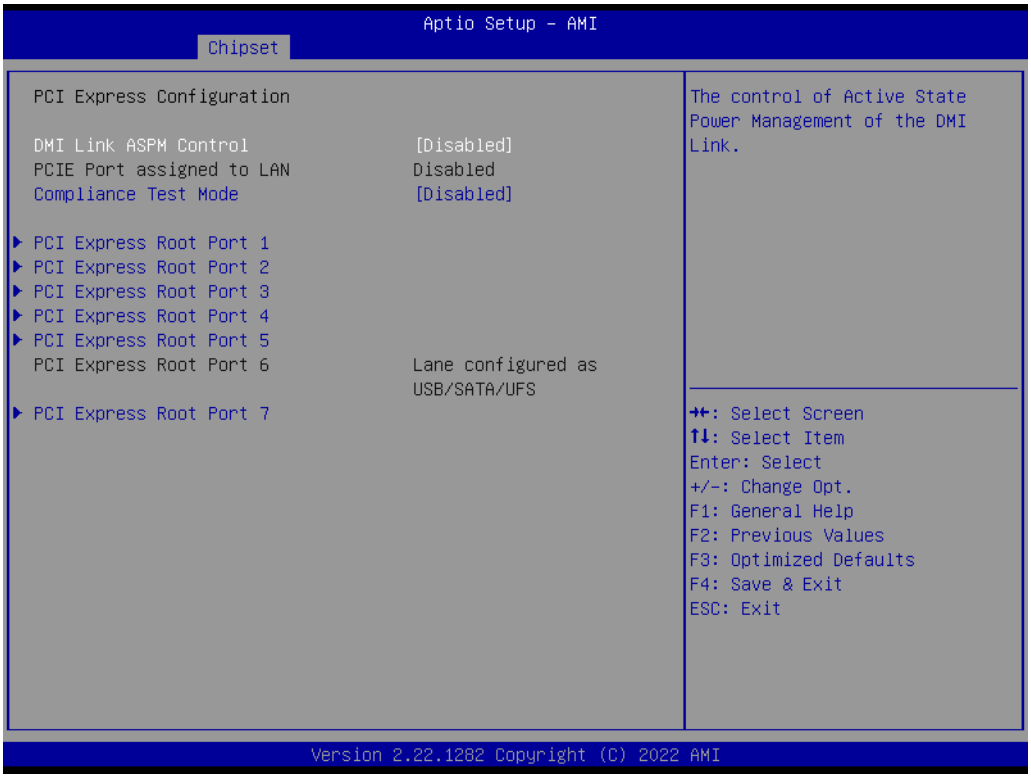


Figure 3.27 PCI Express Configuration

- **DMI Link ASPM Control**
  The control of Active State Power Management of the DMI Link.
- **Compliance Test Mode**
  Enable when using Compliance Load Board.
- **PEG PCIe Port Config**
  Config PEG PCIe Lane 0~15 setting.
- **PCI Express Root Port 1**
- **PCI Express Root Port 2**
- **PCI Express Root Port 3**
- **PCI Express Root Port 4**
- **PCI Express Root Port 5**
- **PCI Express Root Port 6**
- **PCI Express Root Port 7**

PCI Express Root Port 1

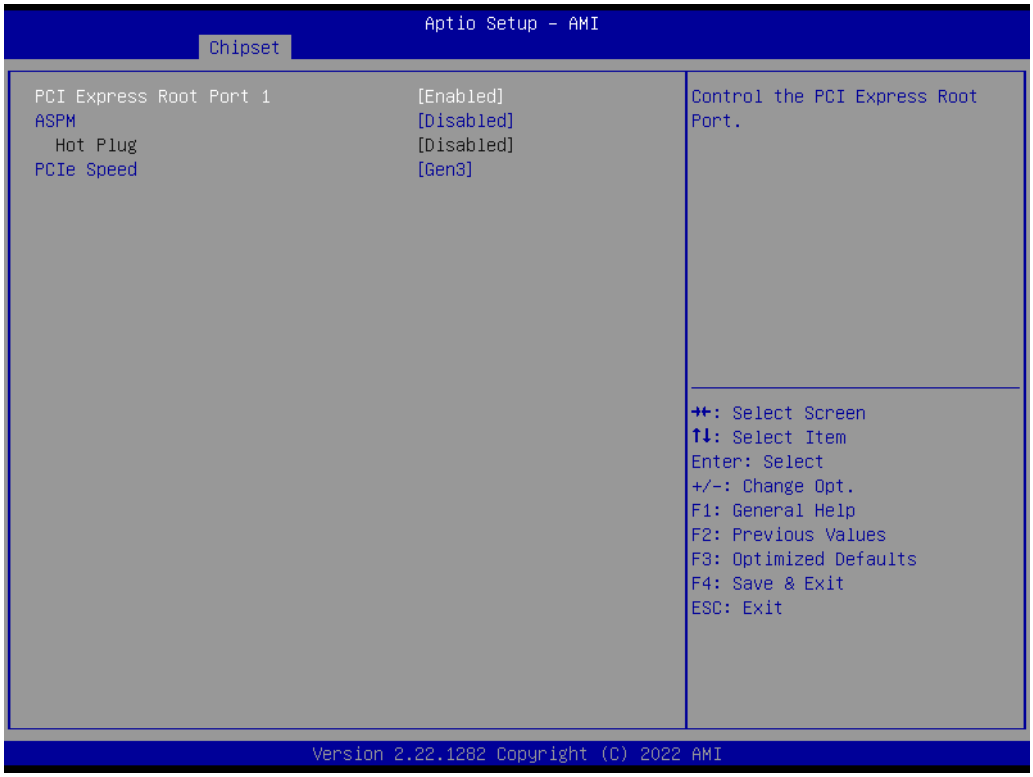


Figure 3.28 PCI Express Root Port 1

- **PCI Express Root Port 1**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **Hot Plug**
  PCI Express Hot Plug Enable/Disable.
- **PCIe Speed**
  Configure PCIe Speed.

PCI Express Root Port 2

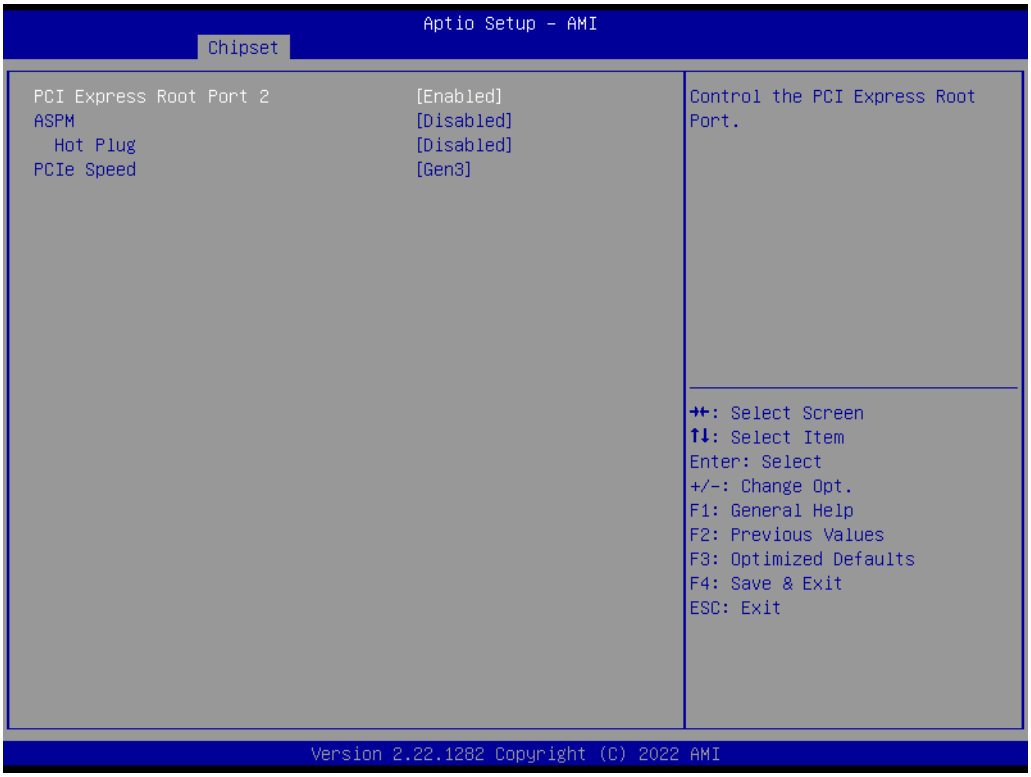


Figure 3.29 PCI Express Root Port 2

- **PCI Express Root Port 2**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **Hot Plug**
  PCI Express Hot Plug Enable/Disable.
- **PCIe Speed**
  Configure PCIe Speed.

PCI Express Root Port 3

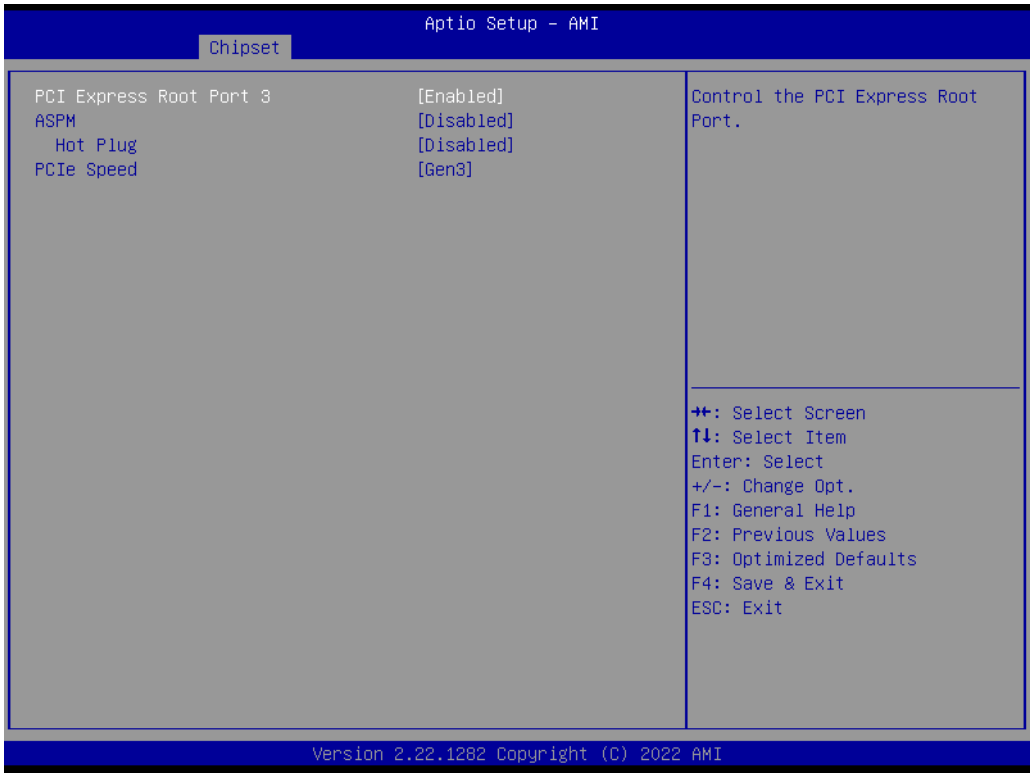


Figure 3.30 PCI Express Root Port 3

- **PCI Express Root Port 3**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings
- **Hot Plug**
  PCI Express Hot Plug Enable/Disable.
- **PCIe Speed**
  Configure PCIe Speed.

PCI Express Root Port 4

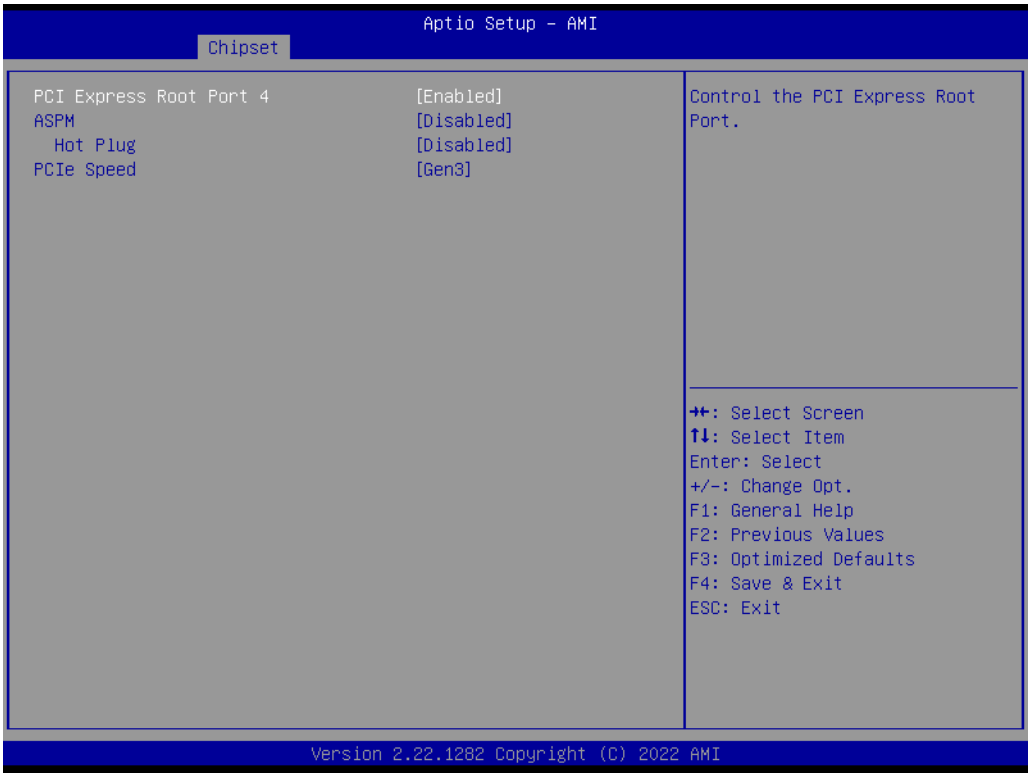


Figure 3.31 PCI Express Root Port 4

- **PCI Express Root Port 4**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **Hot Plug**
  PCI Express Hot Plug Enable/Disable.
- **PCIe Speed**
  Configure PCIe Speed.

PCI Express Root Port 5

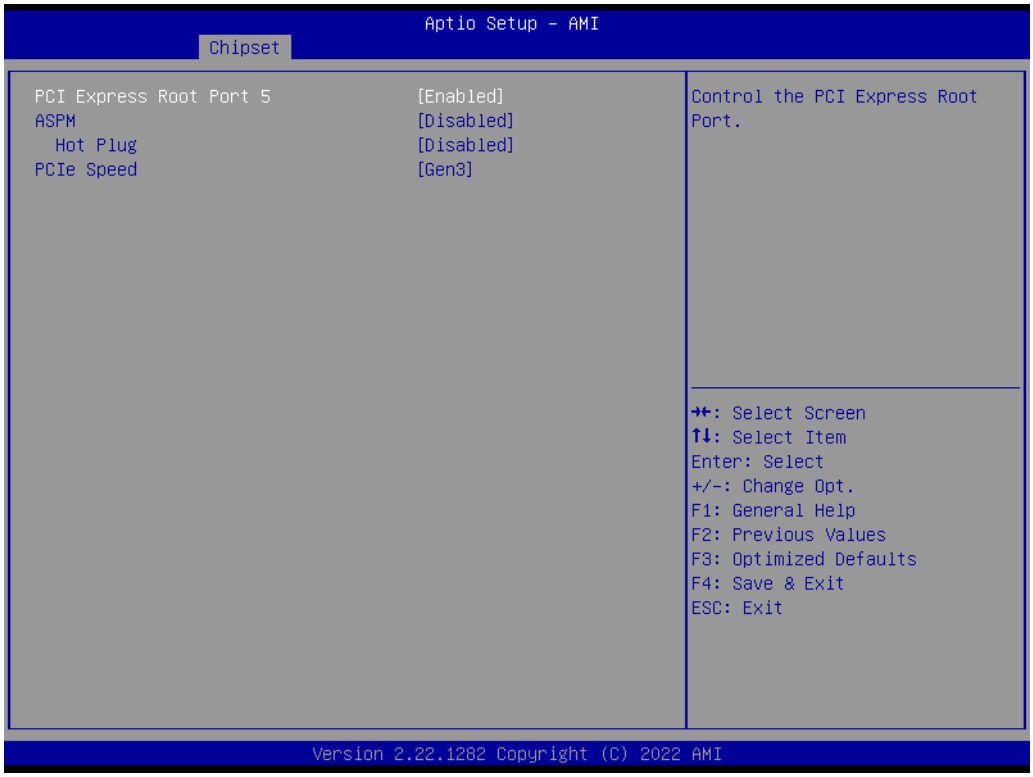


Figure 3.32 PCI Express Root Port 5

- **PCI Express Root Port 5**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **Hot Plug**
  PCI Express Hot Plug Enable/Disable.
- **PCIe Speed**
  Configure PCIe Speed.

PCI Express Root Port 7

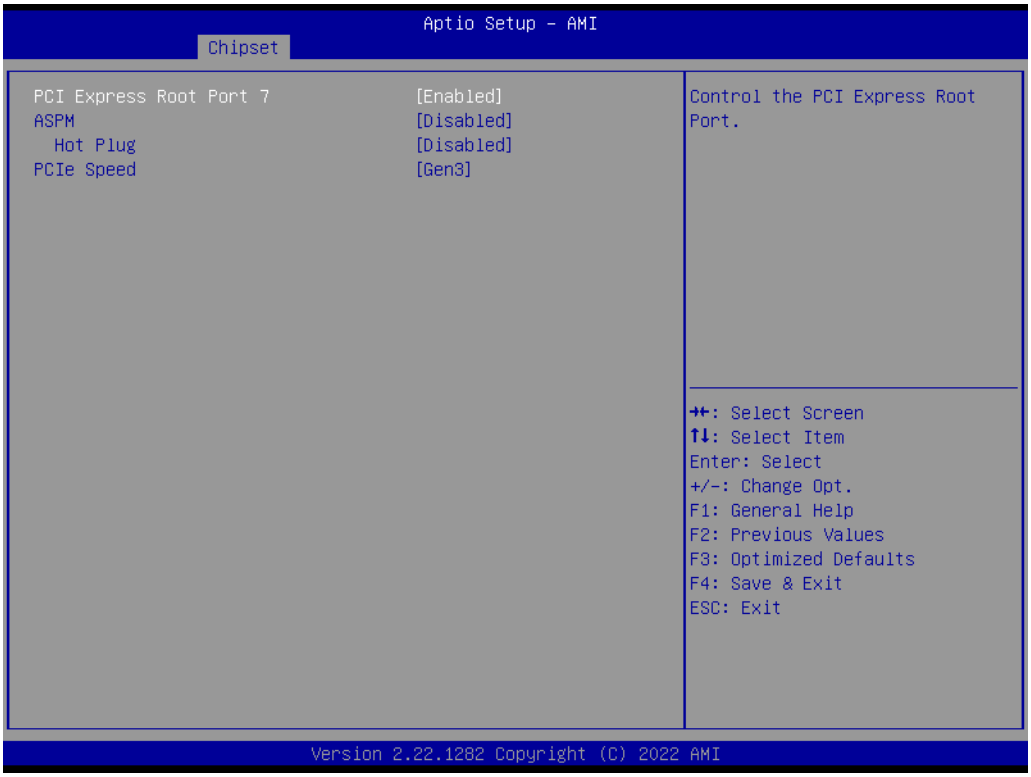


Figure 3.33 PCI Express Root Port 7

- **PCI Express Root Port 7**
  Control the PCI Express Root Port.
- **ASPM**
  PCI Express Active State Power Management settings.
- **Hot Plug**
  PCI Express Hot Plug Enable/Disable.
- **PCIe Speed**
  Configure PCIe Speed.

3.5.2.2 SATA Configuration

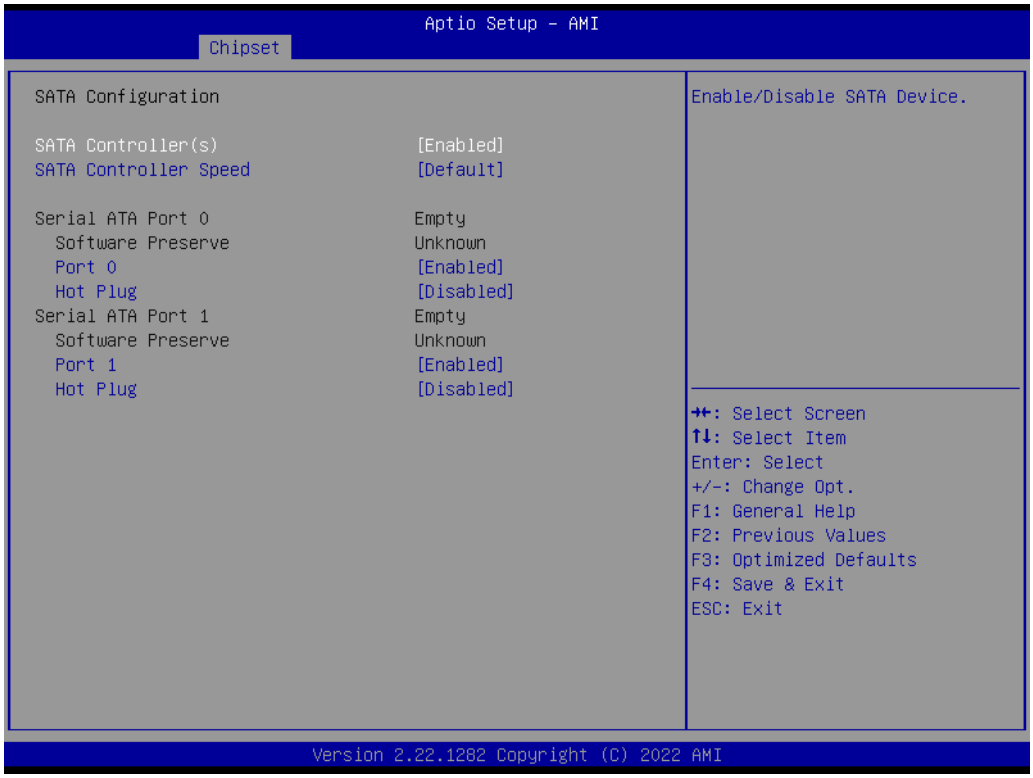


Figure 3.34 SATA Configuration

- **SATA Controller(s)**
  Enable/Disable SATA Device.
- **SATA Controller Speed**
  Indicates the maximum speed the SATA controller can support.
- **Port 0**
  Enable or Disable SATA Port.
- **Port 1**
  Enable or Disable SATA Port.

3.5.2.3 USB Configuration

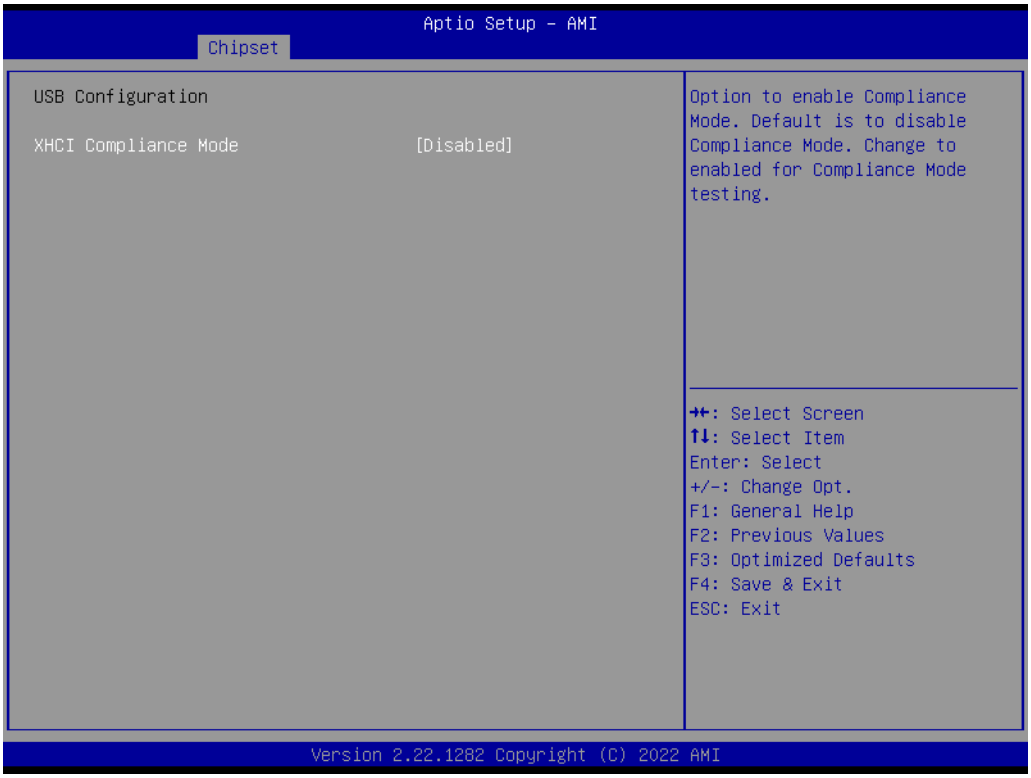


Figure 3.35 USB Configuration

- **XHCI Compliance Mode**
  Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing.

3.5.2.4 Security Configuration

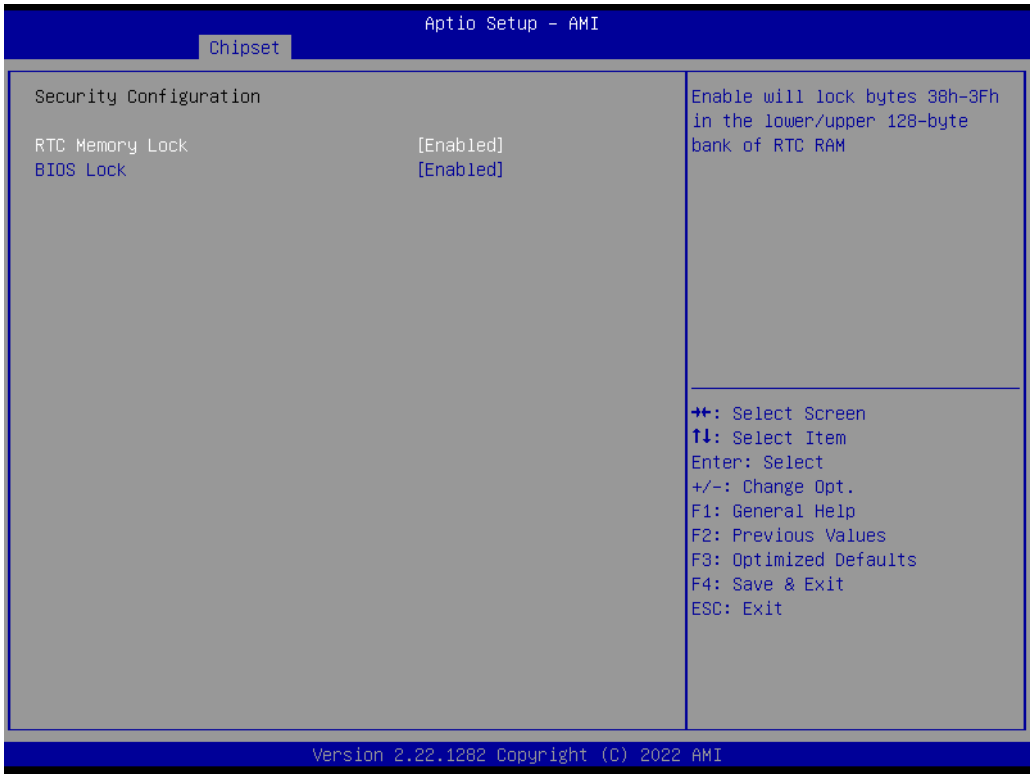


Figure 3.36 Security Configuration

- **RTC Memory Lock**
  Enable will lock bytes 38h-3Fh in the lower/upper 126 –byte bank of RTC RAM.
- **BIOS Lock**
  Enable/Disable the PCH BIOS lock enable feature. Required to be enabled to ensure SMM protection of flash.

3.5.2.5 HD Audio Subsystem Configuration Settings

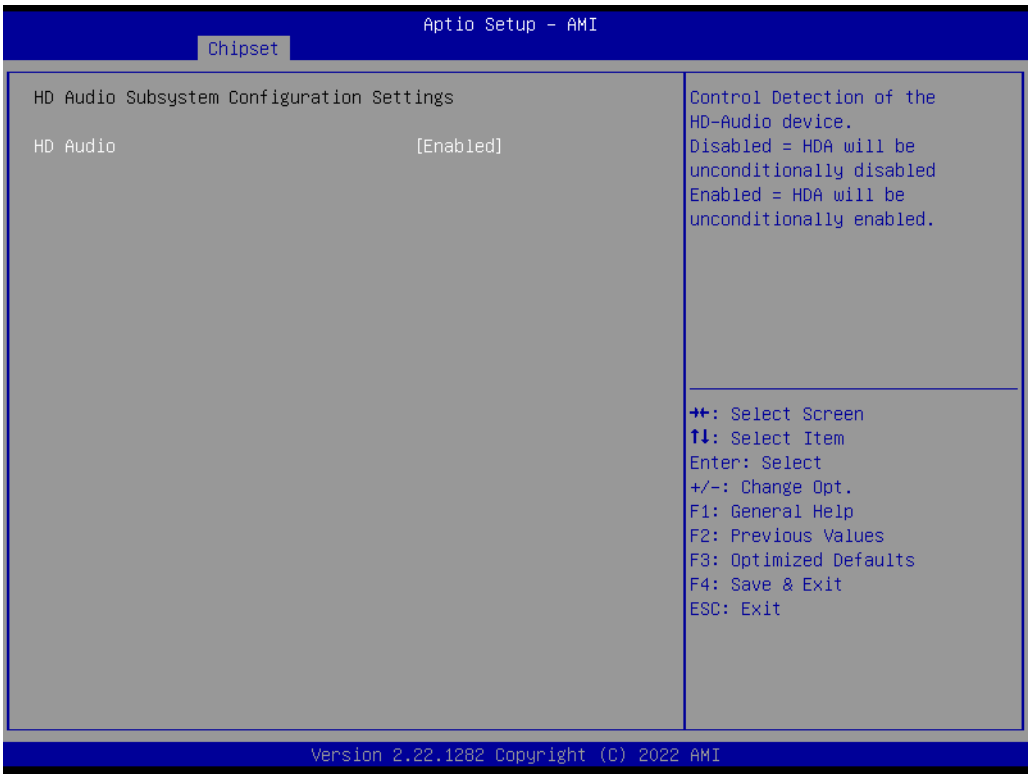


Figure 3.37 HD Audio Subsystem Configuration Settings

- **HD Audio**
  Control Detection of the HD-Audio device. Disabled=HDA will be unconditionally disabled. Enabled=HDA will be unconditionally enabled.

3.5.2.6 Seriallo Configuration

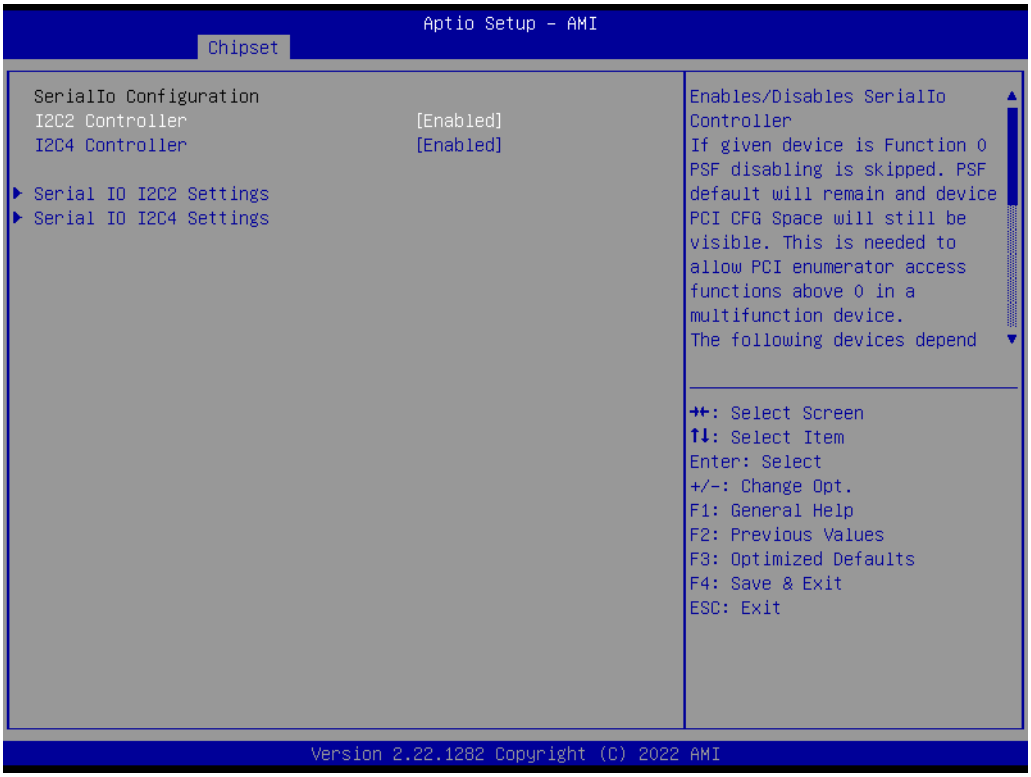


Figure 3.38 Seriallo Configuration

- **I2C2 Controller**
  Enables/Disables Seriallo Controller
  If given device is Function 0 PSF disabling is skipped. PSF default will remain and device PCI CFG Space will still be visible. This is needed to allow PCI enumerator access functions above 0 in a multifunction device.
  The following devices depend on each other:
  I2C0 and I2C1,2,3
  UART0 and UART1,SPI0,1
  UART2 and I2C4,5

  UART 0 (00:30:00) cannot be disabled when:
  1. Child device is enabled like CNVi Bluetooth (_SB.PC00.UA00.BTH0)
  UART 0 (00:30:00) cannot be enabled when:
  1. I2S Audio codec is enabled (_SB.PC00.I2C0.HDAC)
- **I2C4 Controller**
  Enables/Disables Seriallo Controller
  If given device is Function 0 PSF disabling is skipped. PSF default will remain and device PCI CFG Space will still be visible. This is needed to allow PCI enumerator access functions above 0 in a multifunction device.
  The following devices depend on each other:
  I2C0 and I2C1,2,3
  UART0 and UART1,SPI0,1
  UART2 and I2C4,5

  UART 0 (00:30:00) cannot be disabled when:
  1. Child device is enabled like CNVi Bluetooth (_SB.PC00.UA00.BTH0)
  UART 0 (00:30:00) cannot be enabled when:
  1. I2S Audio codec is enabled (_SB.PC00.I2C0.HDAC)
- **Serial IO I2C2 Settings**
- **Serial IO I2C4 Settings**

Serial IO I2C2 Settings

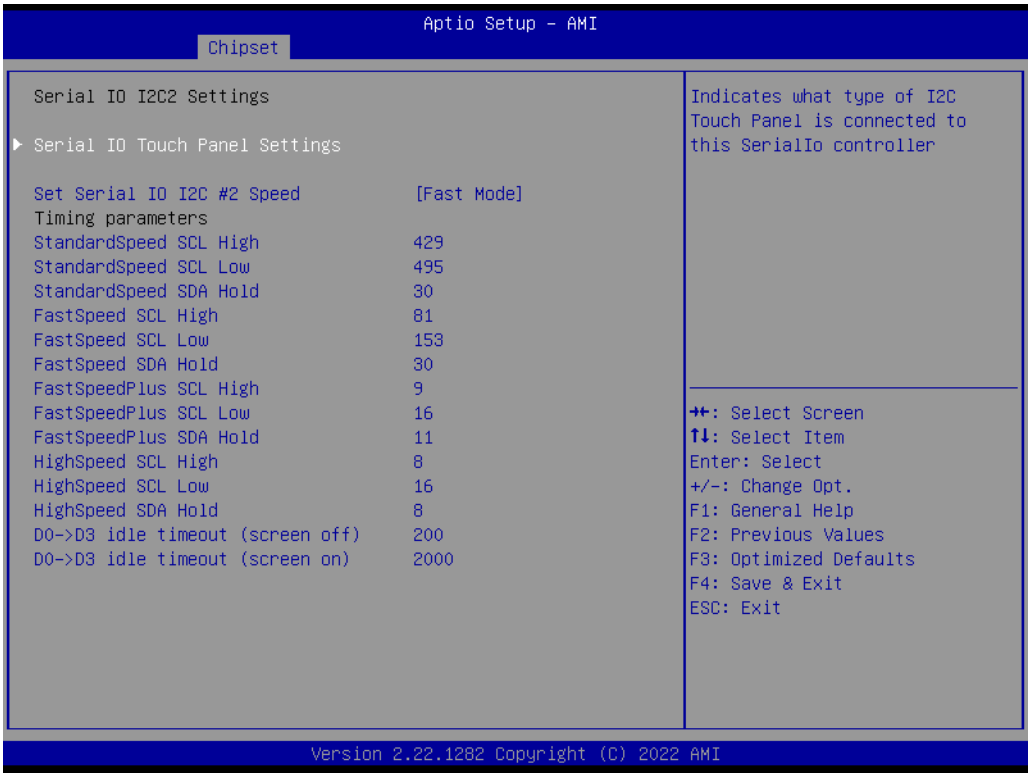


Figure 3.39 Serial IO I2C2 Settings

- **Serial IO Touch Pad Settings**
  Indicates what type of I2C Touch Pad is connected to this Seriallo controller.
- **Set Serial IO I2C #2 Speed**
  Select Serial IO I2C #2 Speed.
- **StandardSpeed SCL High**
- **StandardSpeed SCL Low**
- **StandardSpeed SDA Hold**
- **FastSpeed SCL High**
- **FastSpeed SCL Low**
- **FastSpeed SDA Hold**
- **FastSpeedPlus SCL High**
- **FastSpeedPlus SCL High**
- **FastSpeedPlus SCL Low**
- **FastSpeedPlus SDA Hold**
- **HighSpeed SCL High**
- **HighSpeed SCL Low**
- **HighSpeed SDA Hold**
- **D0->D3 idle timeout (screen off)**
- **D0->D3 idle timeout (screen on)**

Serial IO I2C4 Settings

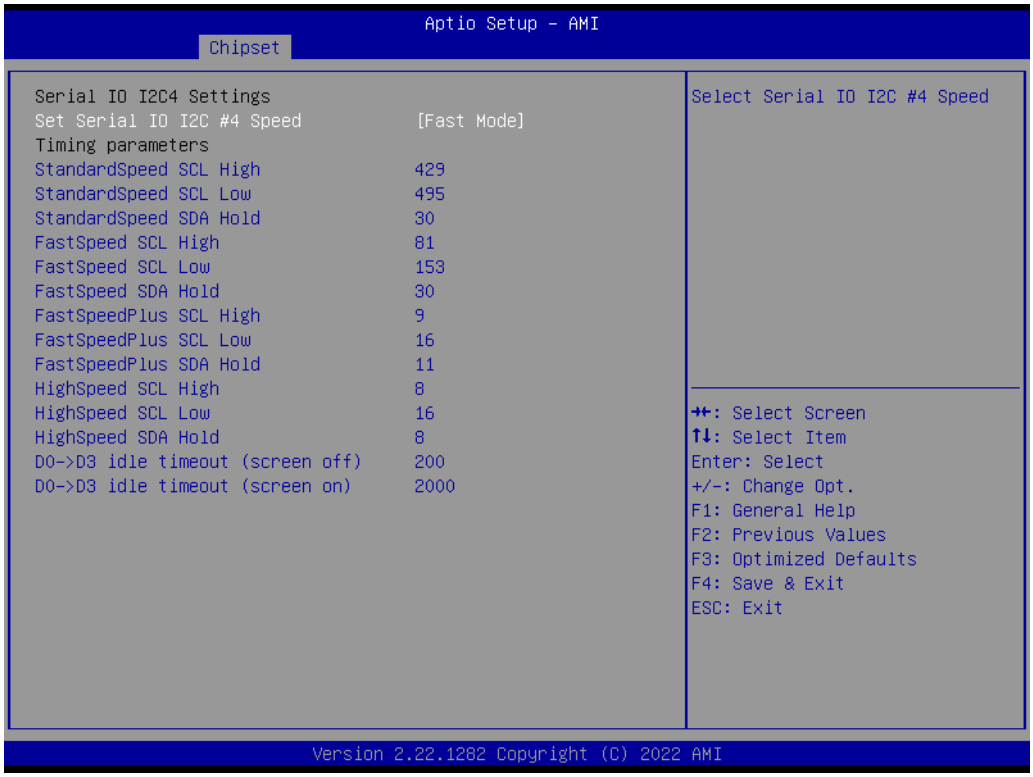


Figure 3.40 Serial IO I2C4 Settings

- **Set Serial IO I2C #4 Speed**
  Select Serial IO I2C #4 Speed.
- **StandardSpeed SCL High**
- **StandardSpeed SCL Low**
- **StandardSpeed SDA Hold**
- **FastSpeed SCL High**
- **FastSpeed SCL Low**
- **FastSpeed SDA Hold**
- **FastSpeedPlus SCL High**
- **FastSpeedPlus SCL High**
- **FastSpeedPlus SCL Low**
- **FastSpeedPlus SDA Hold**
- **HighSpeed SCL High**
- **HighSpeed SCL Low**
- **HighSpeed SDA Hold**
- **D0->D3 idle timeout (screen off)**
- **D0->D3 idle timeout (screen on)**

3.5.2.7 SCS Configuration

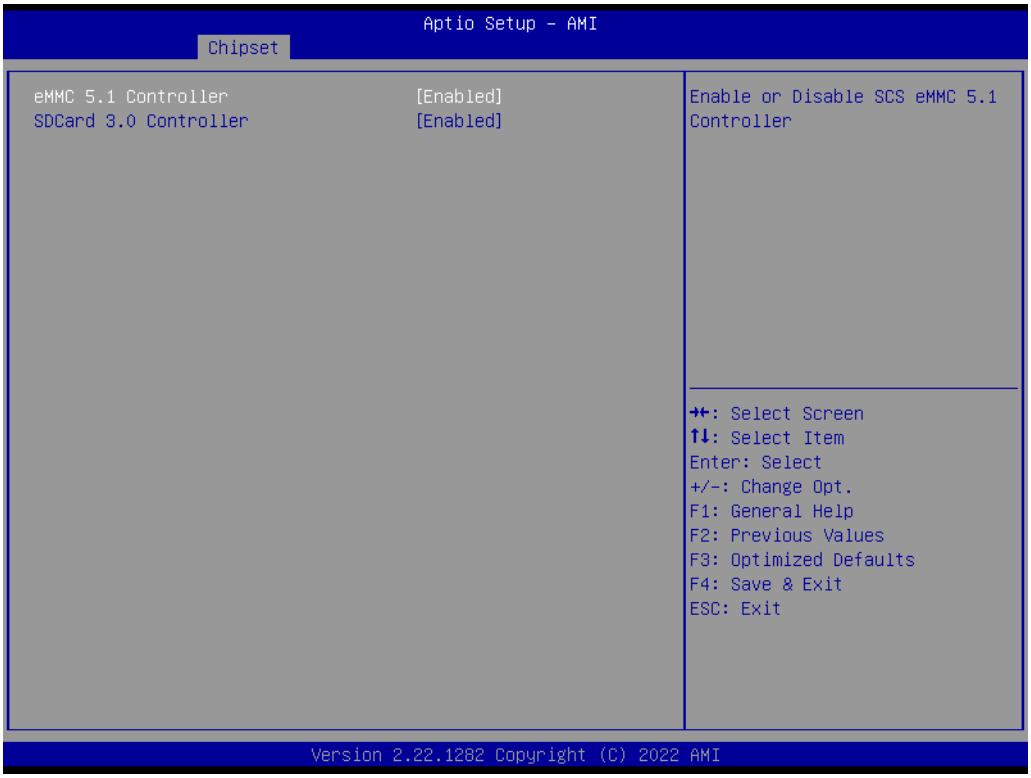


Figure 3.41 SCS Configuration

- **eMMC 5.1 Controller**
  Enable or Disable SCS eMMC 5.1 Controller.
- **SDCard 3.0 Controller**
  Enable or Disable SCS SDHC 3.0 Controller.

3.5.2.8 GBE Configuration

Figure 3.42 GBE Configuration

- **PSE GBE 0 SGMII Support**
  Enable/Disable Modphy support for SGMII mode for PSE TSN GBE 0. Ports in SGMII mode with the same PLL common lane must use the same link speed. UFS will need to be disabled as this TSN port uses the same PLL common lane. Please make sure IFWI has proper straps set for SGMII. Make sure Flex IO Lane Assignment is not NONE.
- **PSE GBE 0 Link Speed**
  PSE TSN GBE 0 Link Speed configuration.

3.6 Security Chipset

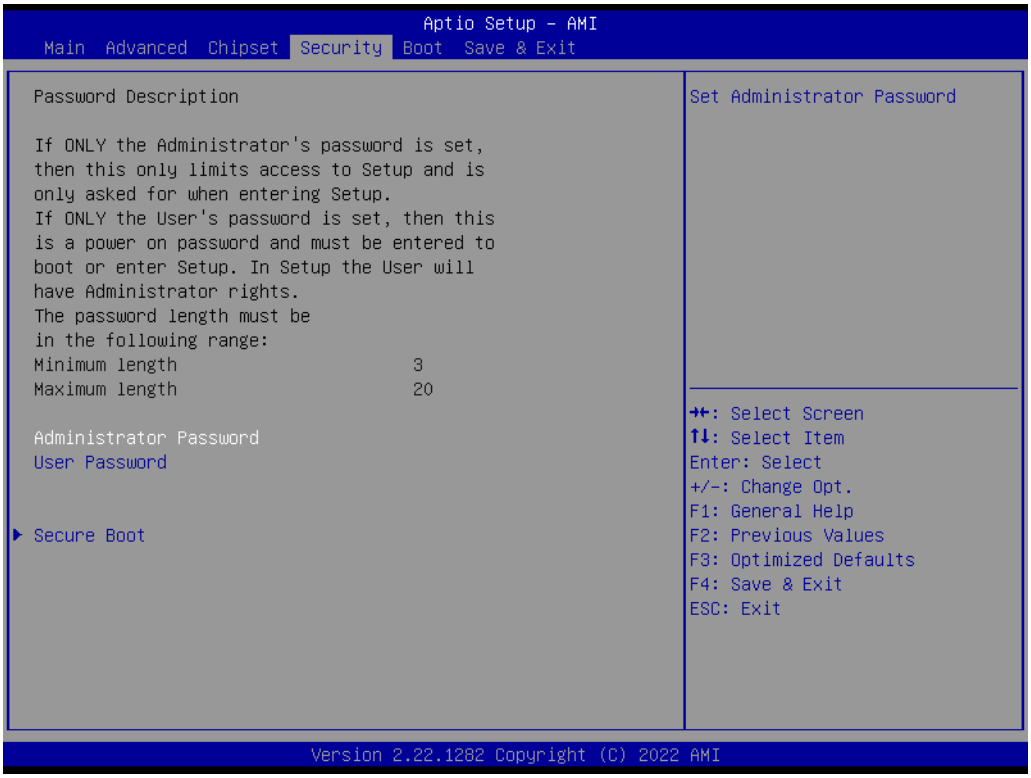


Figure 3.43 Security Chipset

- **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

- **Secure Boot**
  Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset.
- **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.

3.7 Boot Setup

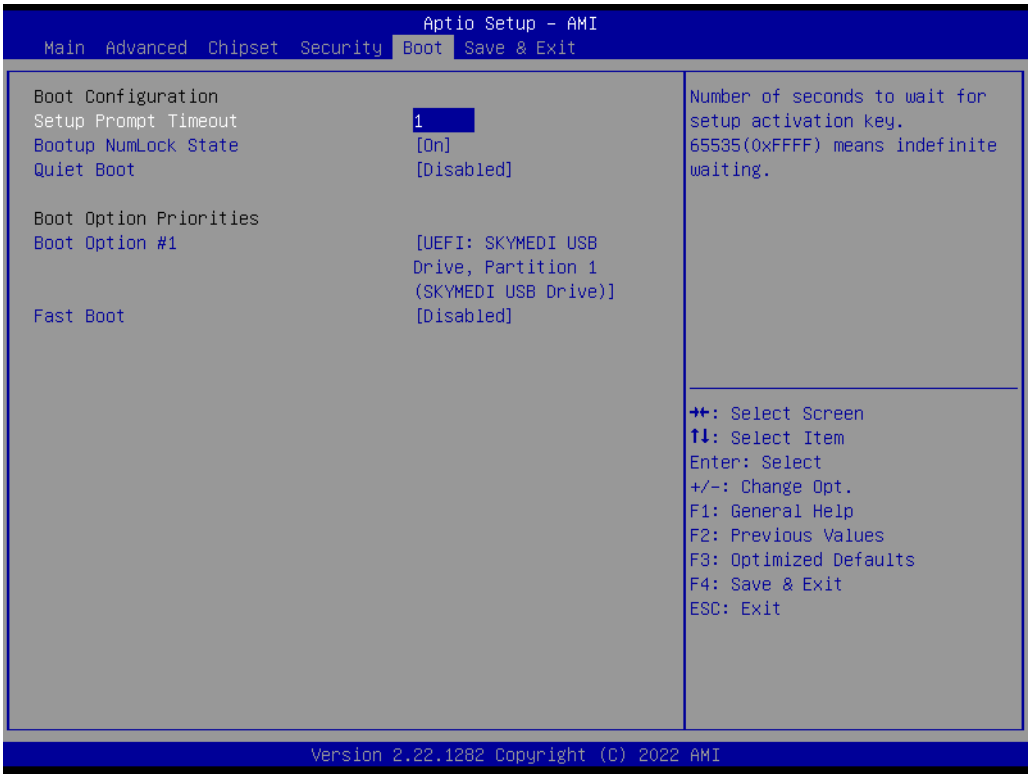


Figure 3.45 Boot Setup

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

3.8 Save & Exit

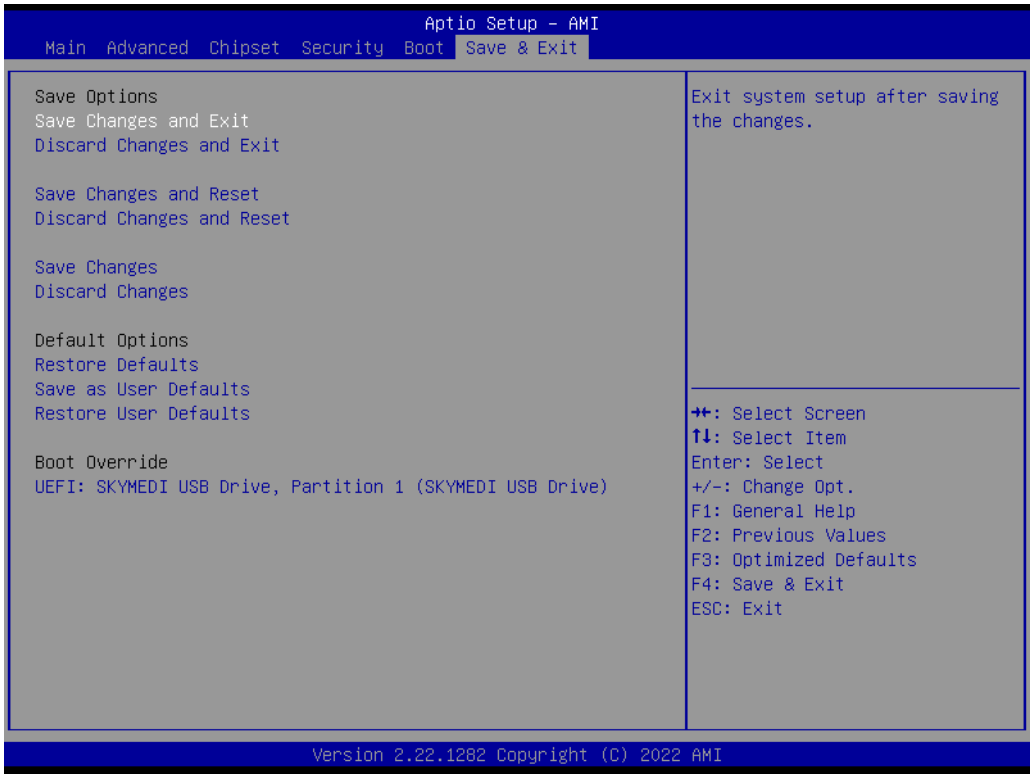


Figure 3.46 Save & Exit

- **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.
- **Save Changes**
  Save Changes done so far to any of the setup options.
- **Discard Changes**
  Discard Changes done so far to any of the setup options.
- **Restore Defaults**
  Restore/Load Default values for all the setup options.
- **Save as User Defaults**
  Save the changes done so far as User Defaults.
- **Restore User Defaults**
  Restore the User Defaults to all the setup options.
- **Boot Override**

Chapter 4

S/W Introduction and Installation

- S/W Introduction
- Driver Installation
- Advantech iManager

4.1 S/W Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft Windows embedded technology." We enable Windows Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (hardware suppliers, system integrators, embedded OS 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

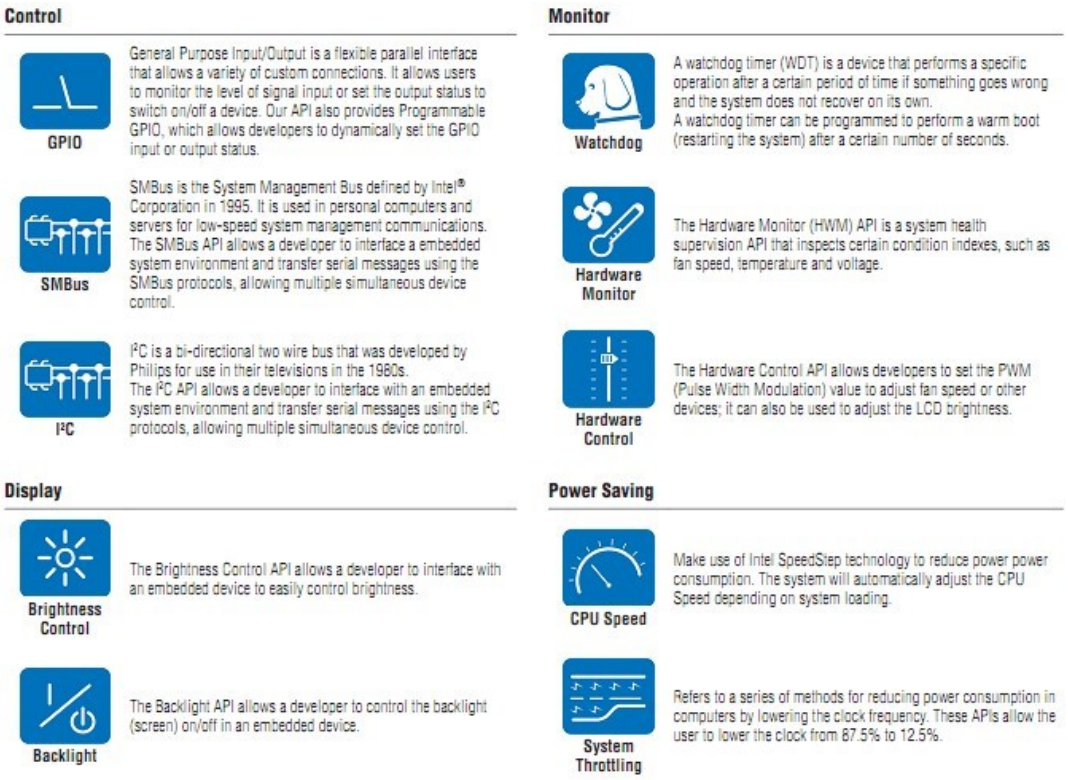
To install the drivers on a windows-based operation system, please connect to internet and browse the website http://support.advantech.com.tw and download the drivers that you want to install and follow Driver Setup instructions to complete the installation.

4.2.2 Other OS

Linux Ubuntu & Yocto

4.3 Advantech iManager

Advantech 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 API and provide corresponding utilities. These APIs comply with PICMG EAPI (Embedded Application Programmable Interface) specifications and unify in the same structures. These features are easier to integrate, reduce time to market, and provide software continuity while upgrading hardware. To find more information on using the APIs and utilities see the Advantech iManager 2.0 Software API User Manual.



Appendix A

Pin Assignment

This appendix details information about the hardware pin assignment for the SOM-6832 CPU System on Module.

Sections include:

- SOM-6832 Type 6 Pin Assignment

A.1 SOM-6832 Pin Assignment

This section gives SOM-6832 pin assignment on COM Express connector which is compliant with COMR.0 R3.0 Type 6 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-6832 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	ESPI_ALER0#
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_S4#	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	N/A
A29	HDA_SYNC	B29	AC/HDA_SDIN1
A30	HDA_RST#	B30	AC/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	ESPI_EN#
A48	N/A	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	SD_PWR_EN_3.3	B86	VCC_5V_SBY
A87	eDP_HPD	B87	VCC_5V_SBY
A88	PCIE_CLK_REF+	B88	BIOS_DIS1#

A89	PCIE_CLK_REF-	B89	N/A
A90	GND (FIXED)	B90	GND (FIXED)
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	N/A
A96	TPM_PP	B96	N/A
A97	N/C	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-6832 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	USB_SSRX2-	D9	USB_SSTX2-
C10	USB_SSRX2+	D10	USB_SSTX2+
C11	GND (FIXED)	D11	GND (FIXED)
C12	USB_SSRX3-	D12	USB_SSTX3-
C13	USB_SSRX3+	D13	USB_SSTX3+
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	N/A	D19	N/A
C20	N/A	D20	N/A
C21	GND (FIXED)	D21	GND (FIXED)
C22	N/A	D22	N/A
C23	N/A	D23	N/A
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	N/A	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	N/A	D52	N/A
C53	N/A	D53	N/A
C54	N/A	D54	N/A
C55	N/A	D55	N/A
C56	N/A	D56	N/A
C57	N/A	D57	GND (FIXED)
C58	N/A	D58	N/A
C59	N/A	D59	N/A
C60	GND (FIXED)	D60	GND (FIXED)
C61	N/A	D61	N/A
C62	N/A	D62	N/A
C63	N/A	D63	N/A
C64	N/A	D64	N/A
C65	N/A	D65	N/A
C66	N/A	D66	N/A
C67	RAPID_SHUTDOWN	D67	GND
C68	N/A	D68	N/A
C69	N/A	D69	N/A
C70	GND (FIXED)	D70	GND (FIXED)
C71	N/A	D71	N/A
C72	N/A	D72	N/A
C73	GND	D73	GND

C74	N/A	D74	N/A
C75	N/A	D75	N/A
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	N/A
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 details information on the watchdog timer programming for the SOM-6832 CPU System on Module.

Sections include:

- Watchdog Timer Programming

B.1 Programming the Watchdog Timer

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

** WDT new driver support automatically select available IRQ number from BIOS, and then set to EC. Only Win10 support it.

In other OS, it will still use IRQ number from BIOS setting as usual.

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

Appendix C

Programming GPIO

This Appendix illustrates the General Purpose Input and Output pin settings.

Sections include:

- GPIO Register

C.1 GPIO Register

GPIO Byte Mapping	H/W Pin Name
BIT0	GPIO0
BIT1	GPIO1
BIT2	GPIO2
BIT3	GPIO3
BIT4	GPI0
BIT5	GPI1
BIT6	GPI2
BIT7	GPI4

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

Appendix D

System Assignments

This appendix details information about the system resource allocation of the SOM-6832 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
0x00000300-0x0000037F	Motherboard resources
0x00000280-0x0000028F	Motherboard resources
0x00000280-0x0000028F	Motherboard resources
0x000002F0-0x000002F7	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x00000062-0x00000062	Microsoft ACPI-Compliant Embedded Controller
0x00000066-0x00000066	Microsoft ACPI-Compliant Embedded Controller
0x0000EFA0-0x0000EFBF	Intel(R) SMBus – 4B23
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x00001800-0x000018FE	Motherboard resources
0x00003090-0x00003097	Standard SATA AHCI Controller
0x00003080-0x00003083	Standard SATA AHCI Controller
0x00003060-0x0000307F	Standard SATA AHCI Controller
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller

Table D.1: System I/O Ports	
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x00002000-0x000020FE	Motherboard resources
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x00003000-0x0000303F	Intel(R) UHD Graphics
0x00001854-0x00001857	Motherboard resources

D.2 Interrupt Assignments

Table D.2: Interrupt Assignments	
Interrupt#	**Interrupt Source**
IRQ0	System timer
IRQ 4294967294	Intel(R) PCI Express Root Port #0 – 4B38
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 6	Motherboard resources
IRQ 4294967293	Standard SATA AHCI Controller
IRQ55-511	Microsoft ACPI-Compliant System
IRQ13	Numeric data processor
IRQ 14	Intel(R) Serial IO GPIO Host Controller - INTC1020
IRQ 19	Intel(R) Active Management Technology - SOL (COM3)
IRQ 16	High Definition Audio Controller
IRQ 16	Intel SD Host Controller
IRQ 17	Intel SD Host Controller
IRQ 1024	Intel SD Host Controller
IRQ 4294967281	Intel(R) Ethernet Controller (3) I225-LM
IRQ 4294967291	Intel(R) UHD Graphics
IRQ 4294967280	Intel(R) Management Engine Interface #1
IRQ 4294967288	Intel(R) EC1000S 1.0GbE Connection
IRQ 4294967289	Intel(R) Integrated Sensor Solution
IRQ 4294967290	Intel(R) Management Engine Interface #1
IRQ 4294967292	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)

D.3 1st MB Memory Map

Table D.3: 1st MB Memory Map

Addr. Range (Hex)	Device
0xFEC80000-0xFECFFFFF	Motherboard resources
0xFEDA0000-0xFEDA0FFF	Motherboard resources
0xFEDA1000-0xFEDA1FFF	Motherboard resources
0xC0000000-0xCFFFFFFF	Motherboard resources
0xFED20000-0xFED7FFFF	Motherboard resources
0xFED90000-0xFED93FFF	Motherboard resources
0xFED45000-0xFED8FFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0x135B000-0x135BFFF	Intel SD Host Controller
0xFFEFC000-0xFFEFFFFF	High Definition Audio Controller
0xFFF00000-0xFFFFFFFF	High Definition Audio Controller
0xFED00000-0xFED003FF	High precision event timer
0xFE000000-0xFE01FFFF	Motherboard resources
0xFD6B0000-0xFD6CFFFF	Motherboard resources
0xFE032000-0xFE032FFF	Motherboard resources
0xFE033000-0xFE033FFF	Motherboard resources
0xFE200000-0xFE7FFFFF	Motherboard resources
0xFF000000-0xFFFFFFFF	Motherboard resources
0xFD000000-0xFD68FFFF	Motherboard resources
0xFD6F0000-0xFDFFFFFF	Motherboard resources
0xFD6B0000-0xFD6CFFFF	Intel(R) Serial IO GPIO Host Controller - INTC1020
0xFD6D0000-0xFD6DFFFF	Intel(R) Serial IO GPIO Host Controller - INTC1020
0xFD6E0000-0xFD6EFFFF	Intel(R) Serial IO GPIO Host Controller - INTC1020
0xFD6A0000-0xFD6AFFFF	Intel(R) Serial IO GPIO Host Controller - INTC1020
0xFD690000-0xFD69FFFF	Intel(R) Serial IO GPIO Host Controller - INTC1020
0x7FC00000-0x7FC01FFF	Standard SATA AHCI Controller
0x7FC03000-0x7FC030FF	Standard SATA AHCI Controller
0x7FC02000-0x7FC027FF	Standard SATA AHCI Controller
0xA0000-0xBFFFF	PCI Express Root Complex
0xE0000-0xE3FFF	PCI Express Root Complex
0xE4000-0xE7FFF	PCI Express Root Complex
0xE8000-0xEBFFF	PCI Express Root Complex
0xEC000-0xEFFFF	PCI Express Root Complex
0xF0000-0xFFFFF	PCI Express Root Complex
0x7FC00000-0x7FC01FFF	PCI Express Root Complex
0xFE010000-0xFE010FFF	Intel(R) SPI (flash) Controller – 4B24
0x0000-0xFFFFFF	Intel(R) UHD Graphics
0x0000-0xFFFFFFF	Intel(R) UHD Graphics
0xFFEFB000-0xFFEFBFFF	Intel(R) Management Engine Interface #1
0x1340000-0x134FFFF	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
0x1300000-0x133FFFF	Intel(R) EC1000S 1.0GbE Connection
0x135A000-0x135AFFF	Intel SD Host Controller

Table D.3: 1st MB Memory Map	
0x1358000-0x13580FF	Intel(R) SMBus Controller - 4B23
0x1300200-0x1300203	Intel(R) Ethernet PCS - 1033
0x1300204-0x1300207	Intel(R) Ethernet PCS - 1033
0xFFC00000-0xFFDFFFFF	Intel(R) Integrated Sensor Solution

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