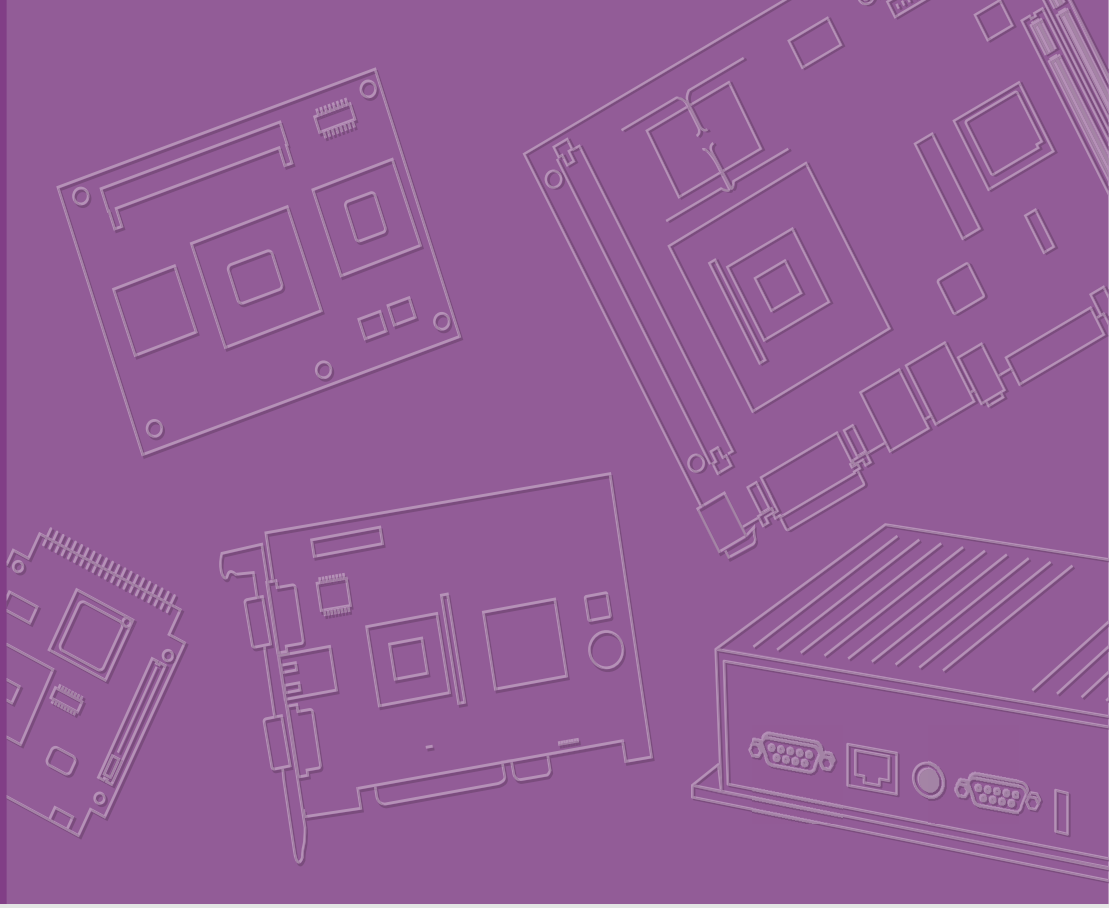

User Manual

SOM-6884

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

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

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

Part No. 2006688400 Edition 1

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Declaration of Conformity

CE

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

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FM

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

Technical Support and Assistance

1. Visit the Advantech website at http://support.advantech.com where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.:*

There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*

Document Feedback

To assist us in making improvements to this manual, we welcome comments and constructive criticism. Please send all such comments 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 your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.

Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20°C (-4°F) OR ABOVE 60°C (140°F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. CAUTION: THERE IS DANGER OF EXPLOSION IF THE BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

The sound pressure level at the operator's position according to IEC 704-1:1982 should be no more than 70 dB (A).

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

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Chapter 1

General Information

This chapter gives background information on the SOM-6884 CPU Computer on Module.

Sections include:

- Introduction
- Functional Block Diagram
- Product Specifications

1.1 Introduction

SOM-6884 is designed for high-performance edge computing applications. The new COM Express Type 6 Compact Module is integrated with a 13th Gen Intel® Core™ processor (formally called Raptor Lake-P). The processor provides fourteen cores of computing performance with TDP under 45 Watts. It also comes with the excellent Intel® Iris® Xe graphics, and the Advantech ready-to-use Edge AI Suite software toolkit. The new SOM-6884 is an ideal solution for medical imaging and AI applications.

SOM-6884 is designed to support up to 64GB of DDR5 4800 RAM for groundbreaking computing and graphics performance. (That's 1.5X performance compared to the previous generation.) In addition, there are numerous ultra-high-speed I/O interfaces included, such as PCIe Gen4 (16GT/s), 2.5Gbase-T, and USB 3.2 Gen2 (10Gbps), for plenty of system expansion options. In particular, for USB, there is a reference design document and development board called SOM-MZ20 to help with USB4 implementation.

The unit has also been developed to easily accommodate four independent displays of up to 4K resolution. There are three DisplayPort 1.4/HDMI 2.0 and one optional eDP or LVDS interface. Furthermore, the device can be configured for up to two 8K HDR outputs. With the optional NVMe SSD, TPM 2.0 on-board design, 8.5~20V power input feature, and -40 to 85°C operating temperature range (Heat spreader & QFCS included.), SOM-6884 is a suitable and reliable solution to readily meet edge computing requirements.

Advantech iManager (SUSI 4) was developed for the requirements of embedded applications and is equipped with a multi-level watchdog timer, voltage and temperature monitoring, thermal protection and mitigation through processor throttling, LCD backlight on/off and brightness control, embedded storage for customized information, and more. With Advantech WISE-PaaS/RMM, it can perform remote monitoring and can control devices through the Internet for easy maintenance. All Advantech COM Express modules integrate iManager and WISE-PaaS/RMM as an add-on feature for customer applications.

Capable of solid performance under extreme conditions, and featuring embedded platform power efficiency and multiple expansion I/O interfaces, SOM-6884 is a product that is compute-centric, thermal sensitive, with robust graphics/media capabilities, and well-suited for demanding I/O applications.

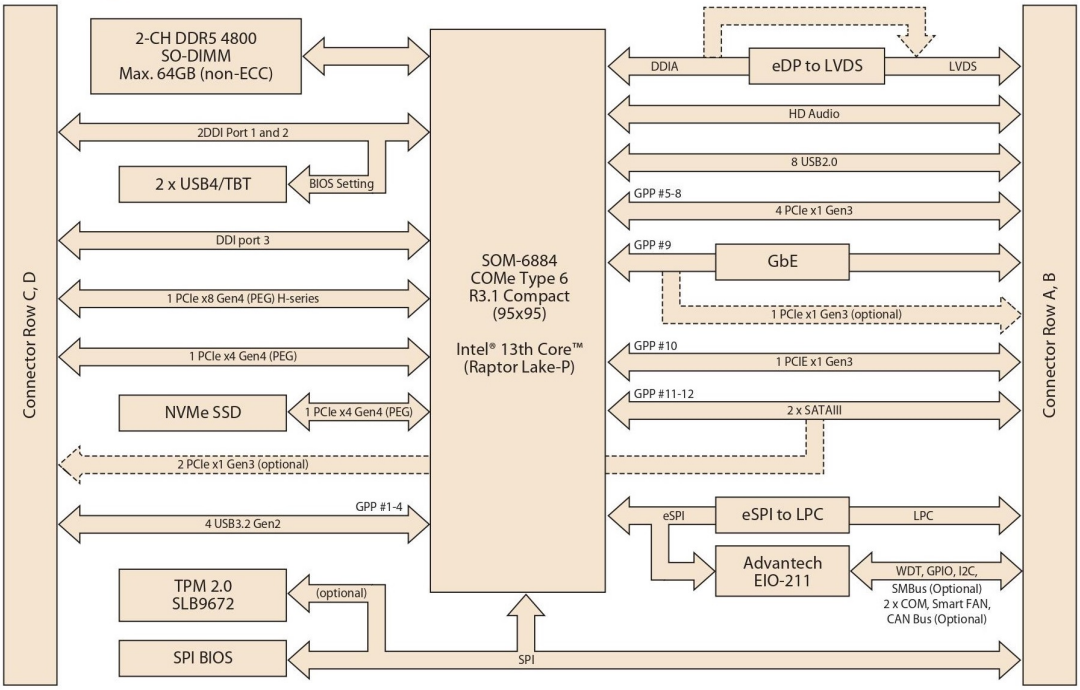
1.1.1 Acronyms

Table 1.1: 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 the 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 microcontrollers to communicate with each other within a vehicle without a host computer.
DDI	Digital Display Interface – containing DisplayPort, HDMI/DVI, and SDVO

Table 1.1: Acronyms	
EAPI	Embedded Application Programmable Interface Software interface for COM Express® for specific industrial functions ■ 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 (Intel ®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 circuits, 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 computers in the 1990s
PEG	PCI Express Graphics
RTC	Real-Time Clock – battery-backed circuit in PC-AT systems that maintains the 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 3.1
- Basic Size - 95 x 95 mm (3.7in x 3.7 in)
- Pin-out Type 6 compatible

1.3.2 Feature List

Table 1.2: Feature List

Feature Type	Connector Row	Feature	Type 6 Defined		SOM-6884
			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	4
	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	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
	A-B	RSMRST_OUT#	1	1	1
	A-B	GP_SPI	1	0	1
Display	C-D	Digital Display Interfaces 1 - 3	3	0	3

Table 1.2: Feature List					
I/O	C-D	PEG (PCI Express x16)	1	0	1
	C-D	PCI Express x1	2	0	2
	C-D	USB 3.0	4	0	4
	C-D	Rapid Shutdown	1	0	1

1.3.3 Processor System

Table 1.3: Processor System					
CPU	**Cores (P+E)**	**P-Cores Base/ Max Freq.**	**E-Cores Base/ Max Freq.**	**Cache (MB)**	**TDP (W)**
i7-13800HE	14C (6+8)	2.5 GHz/5.0 GHz	1.8 GHz /4.0 GHz	24	45W
i5-13600HE	12C (4+8)	2.7 GHz /4.8 GHz	1.9 GHz /3.6 GHz	18	45W
i3-13300HE	8C (4+4)	2.1 GHz /4.6 GHz	1.5 GHz /3.4 GHz	12	45W
i7-13800HRE	14C (6+8)	2.5 GHz /5.0 GHz	1.8 GHz /4.0 GHz	24	45W
i5-13600HRE	12C (4+8)	2.7 GHz /4.8 GHz	1.9 GHz /3.6 GHz	18	45W
i3-13300HRE	8C (4+4)	2.1 GHz /4.6 GHz	1.5 GHz /3.4 GHz	12	45W
i3-13200PRE	8C (4+4)	1.7 GHz /4.9 GHz	1.2 GHz /3.3 GHz	12	28W
i7-1365UE	10C (2+8)	1.4 GHz /4.6 GHz	1.2 GHz /3.7 GHz	12	15W
i5-1345UE	10C (2+8)	1.2 GHz /4.5 GHz	1.1 GHz /3.4 GHz	12	15W
i3-1315UE	6C (2+4)	1.7 GHz /4.9 GHz	0.9 GHz /3.3 GHz	10	15W
i7-1365URE	10C (2+8)	1.4 GHz /4.6 GHz	1.2 GHz /3.7 GHz	12	15W
i5-1345URE	10C (2+8)	1.2 GHz /4.5 GHz	1.1 GHz /3.4 GHz	12	15W
i3-1315URE	6C (2+4)	1.7 GHz /4.9 GHz	0.9 GHz /3.3 GHz	10	15W

1.3.4 Memory

There is a total of 2 memory sockets on SOM-6884: top side 1pcs and bottom side 1pcs by default. There is support for a max of 64GB capacity with 262-pin SO-DIMM sockets (dual-channel).

1.3.5 Graphics/Audio

Graphics Core: 13th Gen Intel® Iris® Xe Graphics Core supports DX12.1, OGL4.6, Vulkan1.2, and MJPEG, HEVC/H265, AVC/VP9 HW decode/encode/transcode acceleration.

Table 1.4: Graphics/Audio		
CPU	**Graphics Core**	**Max Freq.**
i7-13800HE	Iris Xe Graphics	1400
i5-13600HE	Iris Xe Graphics	1400
i3-13300HE	UHD Graphics	1300
i7-13800HRE	Iris Xe Graphics	1400
i5-13600HRE	Iris Xe Graphics	1400
i3-13300HRE	UHD Graphics	1300
i3-13200PRE	UHD Graphics	1350
i7-1365UE	Iris Xe Graphics	1300
i5-1345UE	Iris Xe Graphics	1250
i3-1315UE	UHD Graphics	1200
i7-1365URE	Iris Xe Graphics	1300

Table 1.4: Graphics/Audio		
i5-1345URE	Iris Xe Graphics	1250
i3-1315URE	UHD Graphics	1200

1.3.6 Expansion Interface

1.3.6.1 PCIe x1

PCI Express x1: Supports a default of 8 ports PCIe x1 compliant with PCIe Gen3 (8.0 GT/s) specifications, configurable to PCIe x4 or PCIe x2. Several configurable combinations may be needed.

Table 1.5: PCIe x1

Type 6		Rows A,B						Rows C,D	
		P0	P1	P2	P3	P4	P5	P6	P7
Default	Config	X1	X1	X1	X1	GbE (LAN)	X1	SATA #0	SATA #1
Option 1		X4				X4 (optional)			
Option 2		X2		X2		X4 (optional)			
Option 3		X4				X2 (optional)		X2 (optional)	

1.3.6.2 LPC

Supports the Low Pin Count (LPC) 1.1 specification, 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

Supports 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 and fast mode up to 400 Kb/s.

1.3.8 I/O

1.3.8.1 Gigabit Ethernet

Ethernet: Intel® I226 Gigabit LAN supports 10/100/1000 Mbps & 2.5 Gbps speed.

1.3.8.2 SATA

Supports 2 x SATA Gen3 (6.0 Gb/s), backward compliant with SATA Gen2 (3.0 Gb/s) and Gen1 (1.5 Gb/s). The maximum data rate is 600 MB/s. It supports AHCI 1.3.1 mode (it does not support IDE mode).

1.3.8.3 USB 3.2 / USB 2.0

COM-Express supports USB 3.0, but SOM-6884 supports 4 x USB 3.2 Gen2 (10 Gbps) ports and 8 x USB 2.0 (480 Mbps) ports which are reverse-compatible with USB 1.x. For USB 3.2, the product supports LPM (U0, U1, U2, and U3) for power efficiency. For USB 4.0, please use MZ20 for support.

Notice: To accomodate USB 3.2 Gen2 performance, Advantech strongly recommends using a certified cable.

Table 1.6: USB 3.2				
Type 6	P0	P1	P2	P3
SoC	P0	P1	P2	P3
Type 6	USB_OC#01		USB_OC#23	
SoC USB_OC#	USB_OC0#		USB_OC2#	

Table 1.7: 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_2#			OC_3#	

1.3.8.4 SPI Bus

Supports BIOS flash only. SPI clock can be 20 MHz, with capacity up to 128Mb.

1.3.8.5 GPIO

8 programmable general purpose inputs or outputs (GPIO).

1.3.8.6 Watchdog Timer

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

1.3.8.7 Serial Ports

2 x 2-wire serial ports (Tx/Rx), supporting 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

1.3.8.8 TPM

Supports a TPM 2.0 module by default.

1.3.8.9 Smart Fan

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

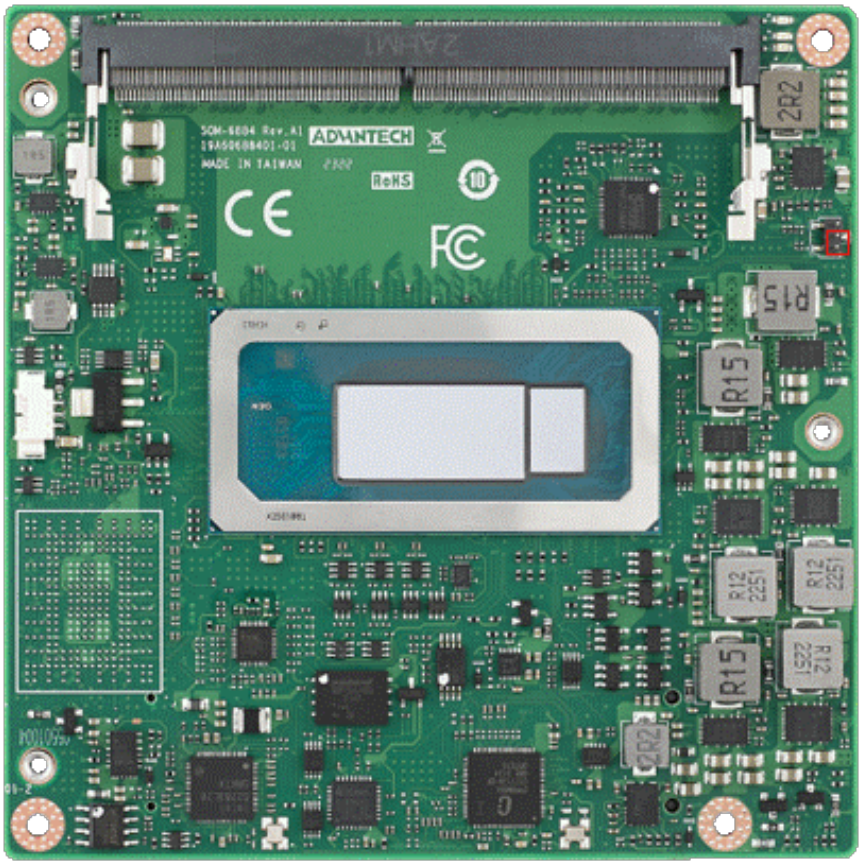
1.3.8.10 BIOS

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

Table 1.8: BIOS		
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! Note: If system CMOS 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, so BIOS settings are kept without an RTC coin battery. If you need to restore to default BIOS settings, follow the steps below:



1. Remove the coin battery.
2. Put a jumper on SCN2 pins 1-2.
3. Turn on the power supply.
4. The system will boot up a few times.
5. BIOS will load the default settings successfully.

1.3.9 Power Management

1.3.9.1 Power Supply

Both ATX and AT power modes are supported. VSB is for suspended power and can be optional if not required by standby (suspend-to-RAM) support. The 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 3.1 specifications.

1.3.9.4 Wake Event

Various wake events are supported to allow users to adapt to 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 50 mW 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), -40 ~ 85°C (-40 ~ 185°F) for industrial SKU
- 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 the Advantech chassis

1.3.11 MTBF

Please refer to the Advantech SOM-6884 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 go 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

Table 1.9: Power Consumption Table (Watts)

VCC=12 V, VSB=5 V	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-6884C7H-U5A1	152.18	67.29	9.69	0.71	0.14	4.43

Hardware Configurations:

1. MB: SOM-6884C7H-U5A1
2. DRAM: 32GB DDR5 3200MHz x 2pcs
3. Carrier board: SOM-DB5830-00A3

Test Conditions:

1. Test temperature: room temperature (about 25°C)
2. Test voltage: rated voltage DC +12.0 V
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 the “Advantech COM Performance & Power Consumption Table”.

1.3.16 Selection Guide w/ P/N

Table 1.10: Selection Guide w/ P/N

Part No.	CPU	Cores (P+E)	P-Cores Freq.	E-Cores Freq.	CPU TDP	LLC	SSD	USB4	Thermal Solution	Operating Temp. Range
SOM-6884C7H-U5A1	Core i7-13800HE	14C (6+8)	2.7 GHz / 4.8 GHz	1.8 GHz/ 4.0 GHz	45W	24 MB	64G	optional	Active	0~60°C
SOM-6884C5H-U7A1	Core i5-13600HE	12C (4+8)	2.1 GHz/ 4.6 GHz	1.9 GHz/ 3.6 GHz	45W	18 MB	N/A	optional	Active	0~60°C
SOM-6884C3H-U1A1	Core i3-13300HE	8C (4+4)	2.5 GHz/ 5.0 GHz	1.5 GHz/ 3.4 GHz	45W	12 MB	N/A	optional	Active	0~60°C
SOM-6884C7HX-U5A1	Core i7-13800HRE	14C (6+8)	2.7 GHz / 4.8 GHz	1.8 GH/ 4.0 GHz	45W	24 MB	64G	optional	Active	-40~85°C
SOM-6884C5HX-U7A1	Core i5-13600HRE	12C (4+8)	2.1 GHz / 4.6 GHz	1.9 GHz/ 3.6 GHz	45W	18 MB	N/A	optional	Active	-40~85°C
SOM-6884C3HX-U1A1	Core i3-13300HRE	8C (4+4)	1.7 GHz/ 4.9 GHz	1.5 GHz/ 3.4 GHz	45W	12 MB	N/A	optional	Active	-40~85°C
SOM-6884C3PX-S7A1	Core i3-1320PRE	8C (4+4)	1.4 GHz/ 4.6 GHz	1.2 GHz/ 3.3 GHz	28W	12MB	N/A	optional	Active	-40~85°C
SOM-6884C7U-S7A1	Core I7-1365UE	10C (2+8)	1.2 GHz/ 4.5 GHz	1.2 GHz/ 3.7 GHz	15W	12 MB	N/A	optional	Active	0~60°C
SOM-6884C5U-S4A1	Core i5-1345UE	10C (2+8)	1.7 GHz/ 4.9 GHz	1.1GHz/ 3.4 GHz	15W	12 MB	N/A	optional	Active	0~60°C
SOM-6884C3U-S2A1	Core i3-1315UE	6C (2+4)	1.4 GHz/ 4.6 GHz	0.9 GHz/ 3.3 GHz	15W	10 MB	N/A	optional	Active	0~60°C
SOM-6884C7UX-S7A1	Core I7-1365URE	10C (2+8)	1.2 GHz/ 4.5 GHz	1.2 GHz/ 3.7 GHz	15W	12 MB	N/A	optional	Active	-40~85°C
SOM-6884C5UX-S4A1	Core i5-1345URE	10C (2+8)	1.7 GHz/ 4.9 GHz	1.1 GHz/ 3.4 GHz	15W	12 MB	N/A	optional	Active	-40~85°C
SOM-6884C3UX-S2A1	Core i3-1315URE	6C (2+4)	2.7 GHz/ 4.8 GHz	0.9 GHz/ 3.3 GHz	15W	10 MB	N/A	optional	Active	-40~85°C

1.3.17 Packing List

Table 1.11: Packing List

Part No.	Description	Quantity
-	SOM-6884 COM module	1
1970005711T000	Heatspreader for SOM-6884	1

1.3.18 Development Board

Table 1.12: Development Board

Part No.	Description
SOM-DB5830-00A3	COMe Devel. Board COMe R3.1 Type 6 pin-out (LVDS) 0 ~ 60°C
SOM-DB5830A-00A3	COMe Devel. Board COMe R3.1 Type 6 pin-out (eDP) 0 ~ 60°C

1.3.19 Optional Accessory

Table 1.13: Optional Accessories

Part No.	Description
1970004870T001	Semi-Cooler 95 x 95 x 33 mm with 12V Fan
1970005709T001	QFCS 95 x 95 x 29.3 mm
SOM-MZ20-00A1	SOM-MZ20 USB4 Card

1.3.20 Pin Description

Advantech provides useful checklists for schematic design and layout routing. In the schematic checklist, it will specify in detail each pin's electrical properties and how to connect them for different user scenarios. In the layout checklist, it will specify the layout constraints and recommendations for trace length, impedance, and other necessary information during design.

Please contact your nearest Advantech branch office to request the design documents and further advanced support.

Chapter 2

Mechanical Information

This chapter gives mechanical information for the SOM-6884 CPU Computer on Module.

Sections include:

- Board Information
- Mechanical Diagrams
- Assembly Diagram

2.1 Board Information

The figures below indicate the main chips on the SOM-6884 Computer-on-Module.

Please be aware of these positions. Customers can design their own carrier boards to avoid mechanical issues and choose thermal solutions with suitable heat dissipation performance.

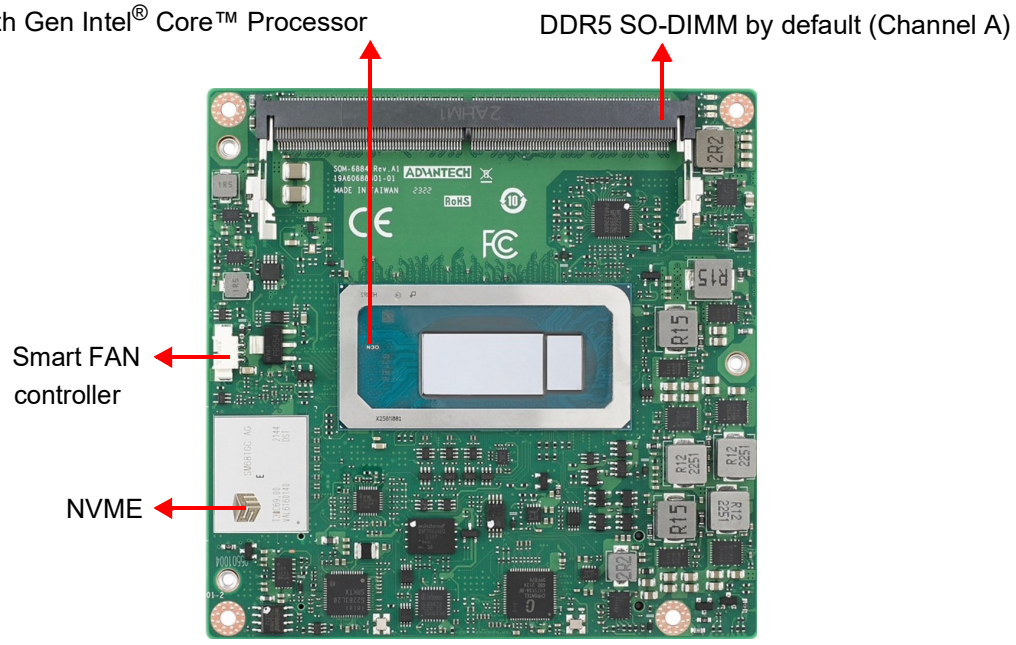


Figure 2.1 Board Chips ID – Front

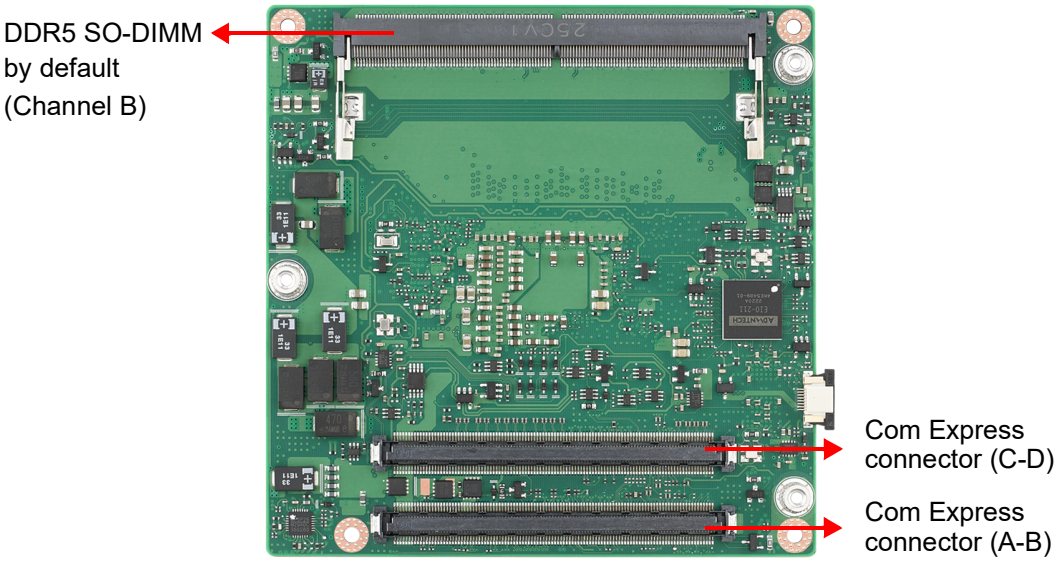


Figure 2.2 Board Chips ID – Rear

2.2 Mechanical Diagrams

For more details and 2D/3D models, please consult the Advantech COM support service website at http://com.advantech.com.

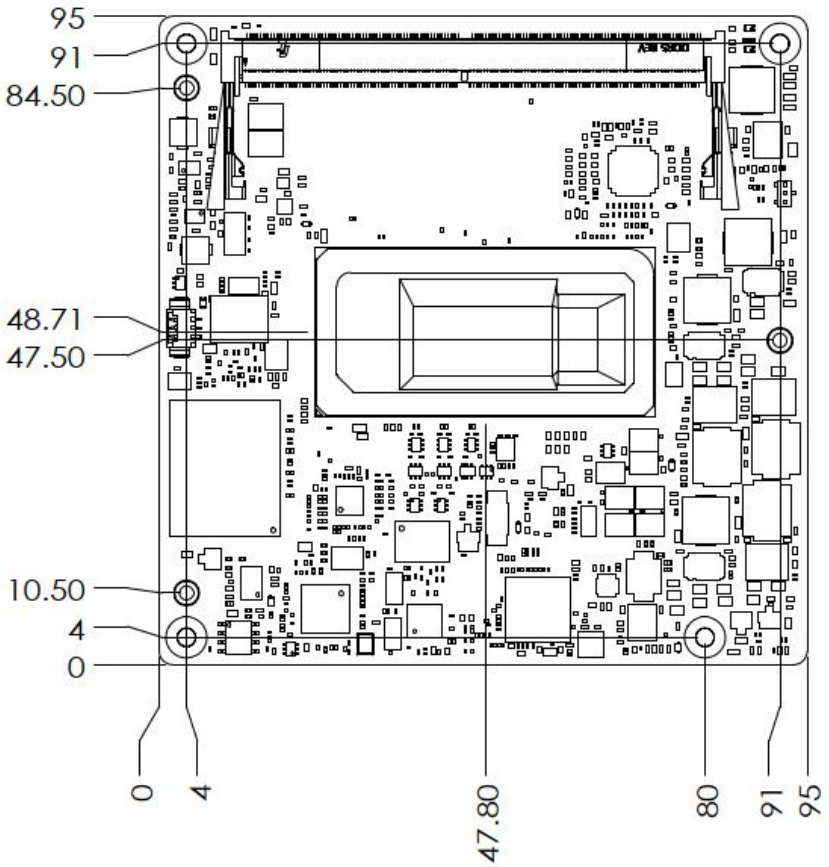


Figure 2.3 Board Mechanical Diagram - Front

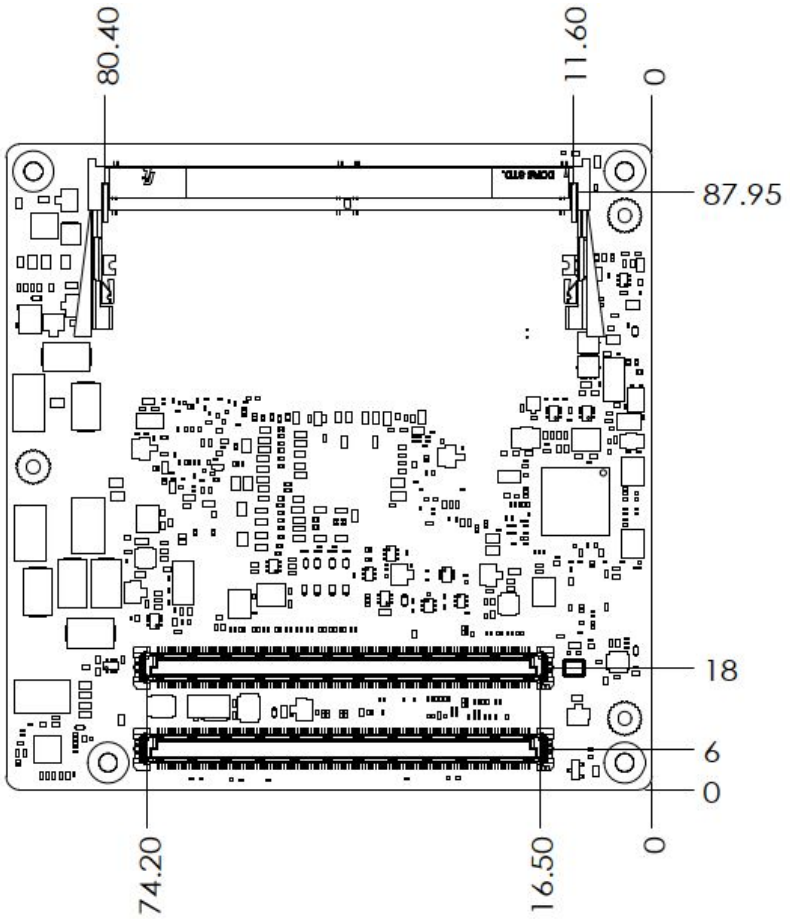


Figure 2.4 Board Mechanical Diagram – Rear

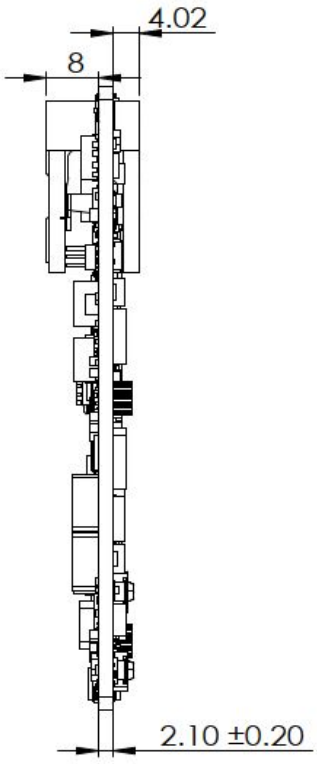


Figure 2.5 Board Mechanical Diagram – Side1

2.3 Assembly Diagram

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

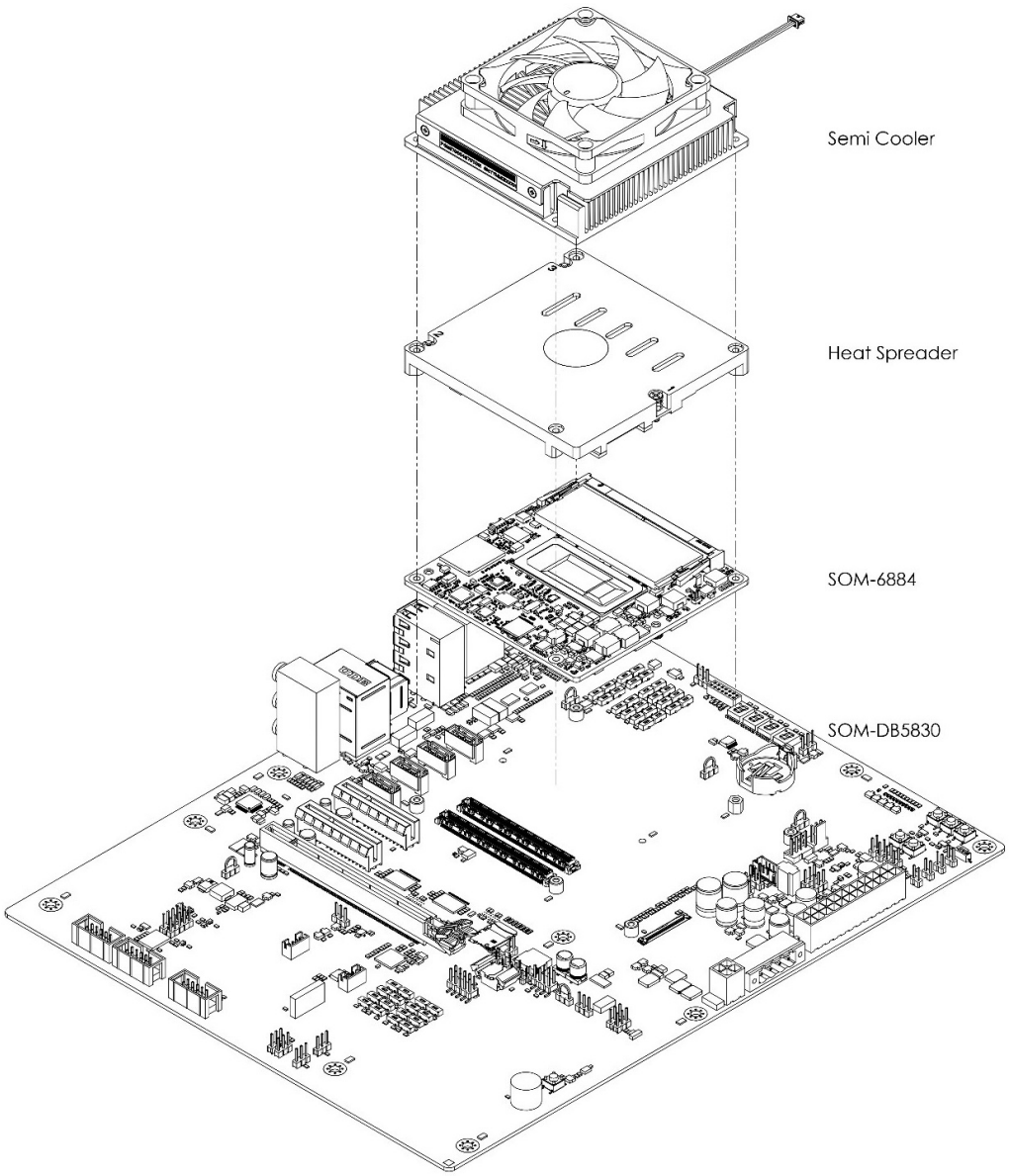


Figure 2.6 Assembly Diagram

There are 5 reserved screw holes for SOM-6884 to be pre-assembled with the heat spreader.

2.4 Assembly Diagram

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

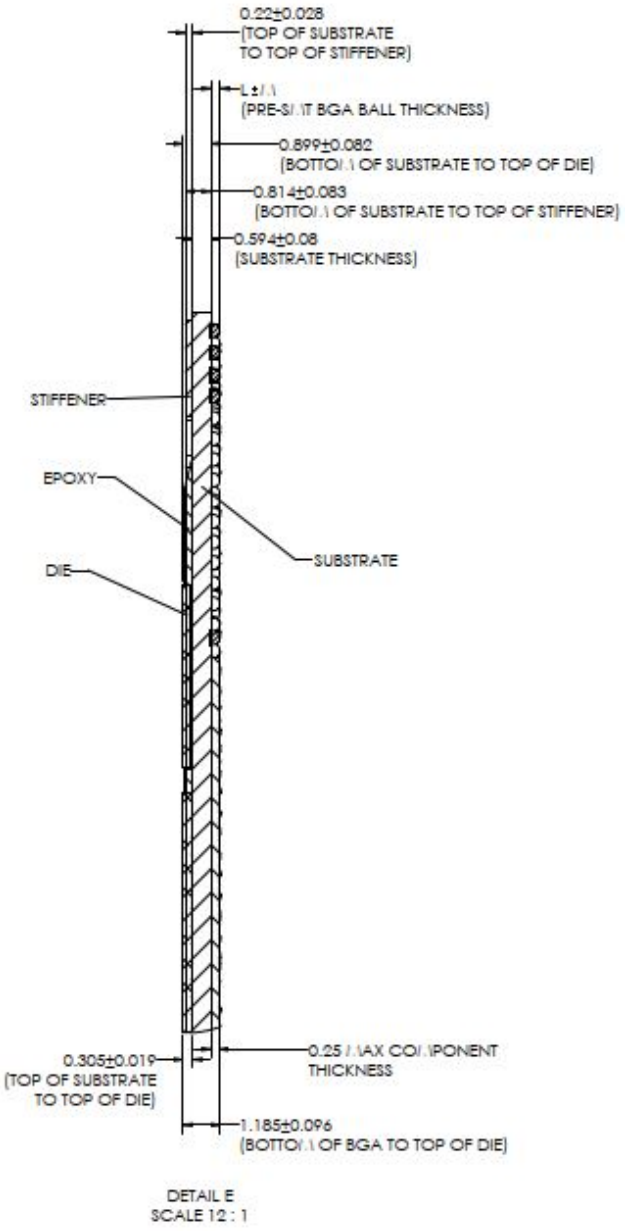


Figure 2.7 CPU Height and Tolerance

Chapter 3

BIOS

This chapter gives BIOS setup information for the SOM-6884 Computer on Module.

Sections include:

- Introduction
- Entering Setup
- Hot/Operation Keys
- 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.

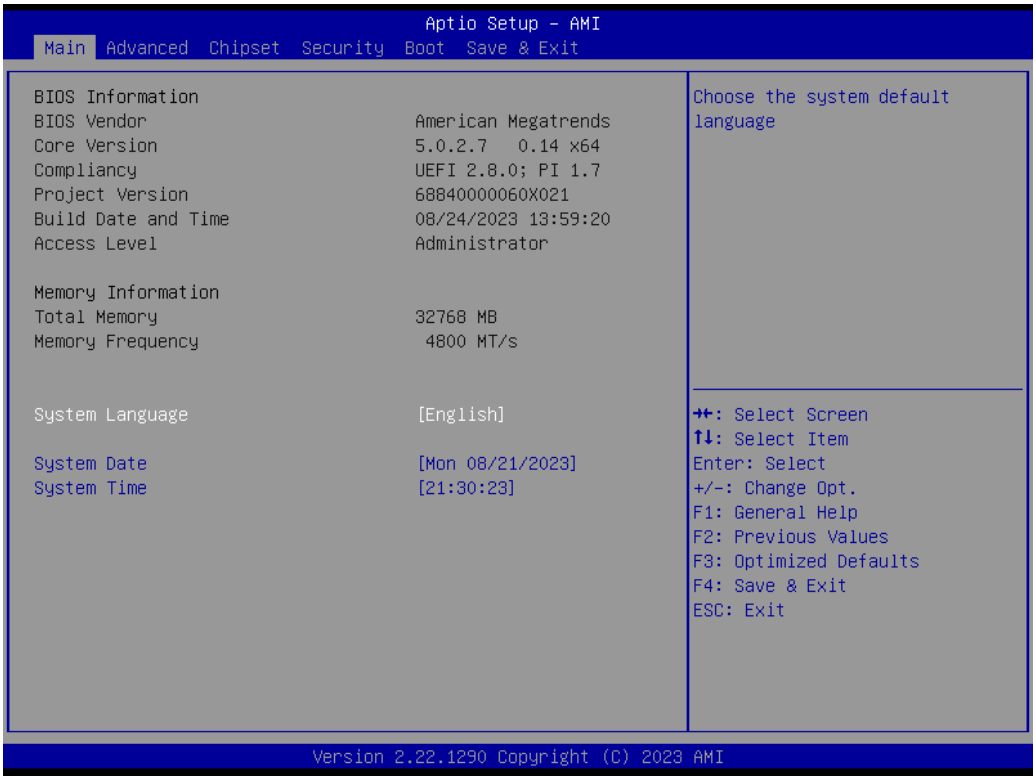


Figure 3.1 Setup Program Initial Screen

AMI BIOS ROM has a built-in setup program that allows users to modify the basic system configuration. This information is stored in flash ROM to retain 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.

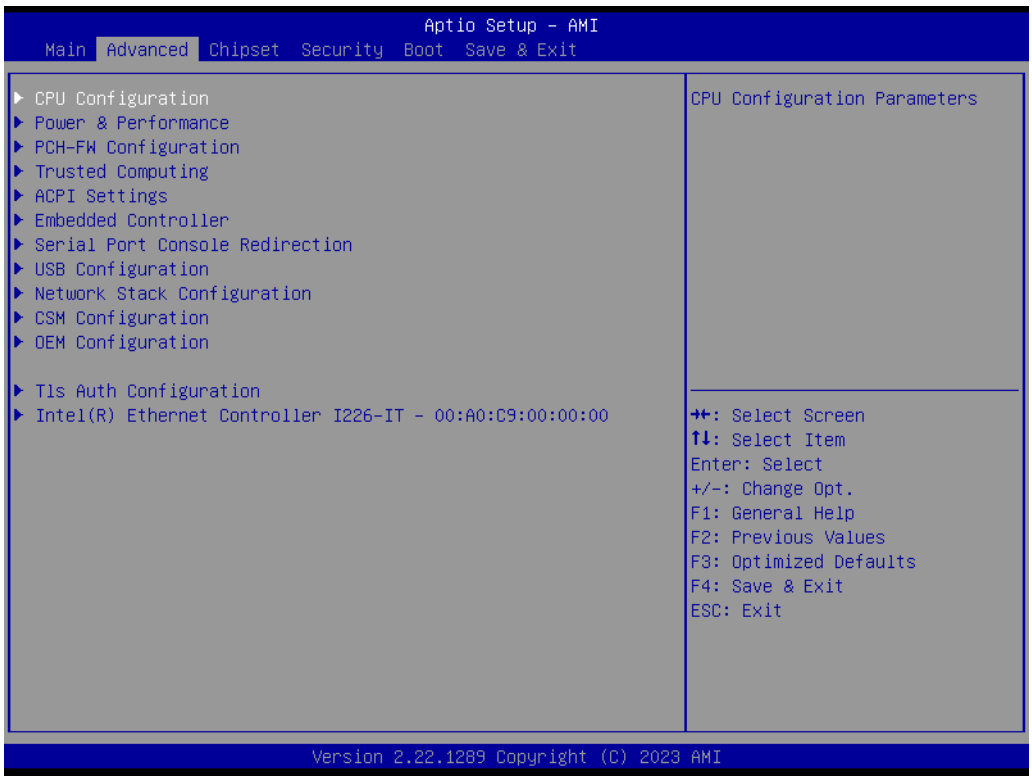


Figure 3.2 Main Setup Screen

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-6884 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.

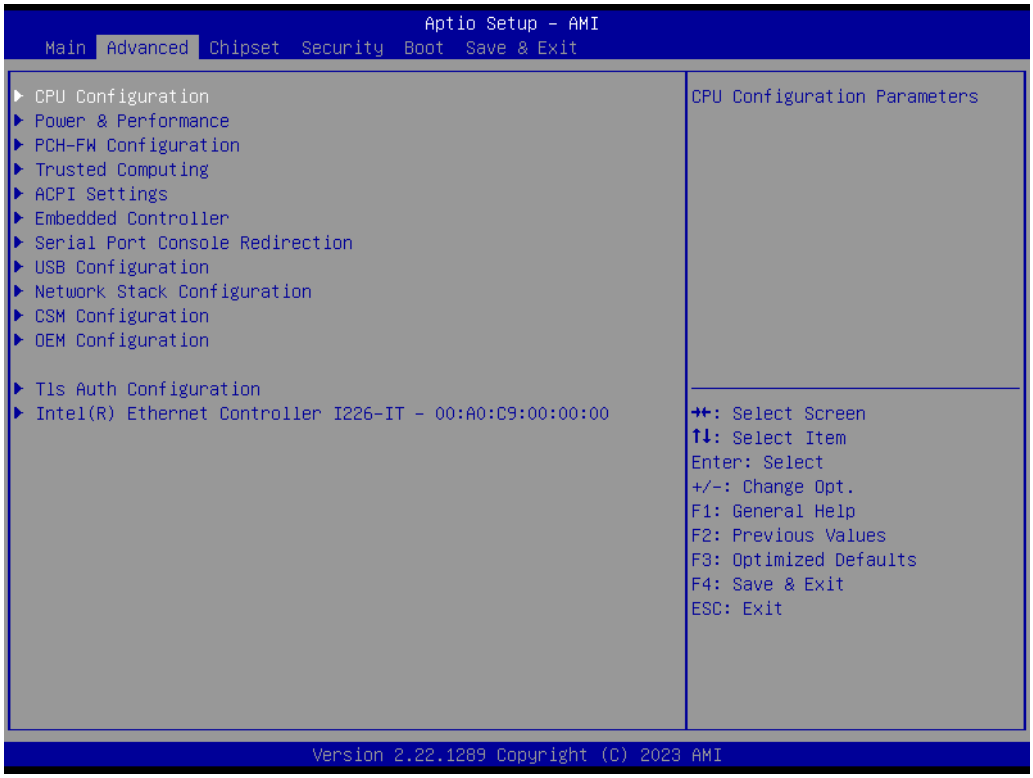


Figure 3.3 Advanced BIOS Features Setup Screen

- **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

- **CSM Configuration**
  Enable/Disable, Option ROM execution settings, etc.
- **OEM Configuration**
  Advanced settings
- **TIs Auth Configuration**
  Press <Enter> to select TIs Auth Configuration.
- **Intel® Ethernet Controller I226-IT -00:A0:C9:00:00:00**
  Configuration of Gigabit Ethernet device parameters.

3.4.1 CPU Configuration

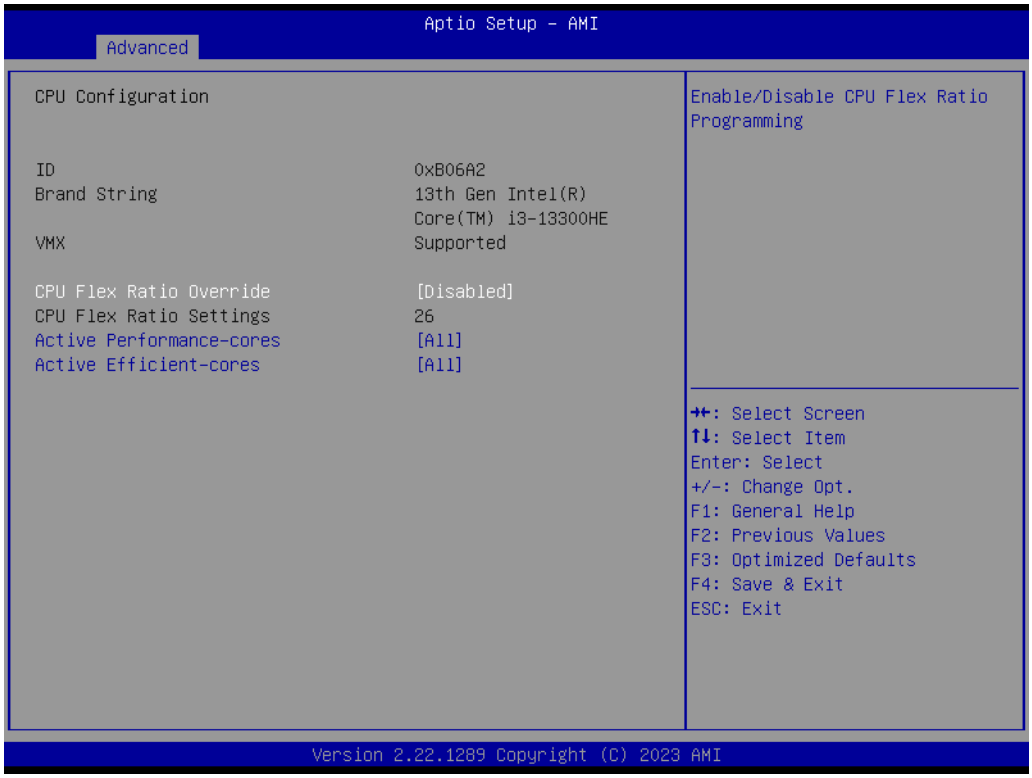


Figure 3.4 CPU Configuration

- **CPU Flex Ratio Override**
  Enabled/Disable CPU Flex Ratio Programming.
- **Active Performance-Cores**
  Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, P-code will enable all cores.
- **Active Efficient-Cores**
  Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, P-code will enable all cores.

3.4.2 Power & Performance

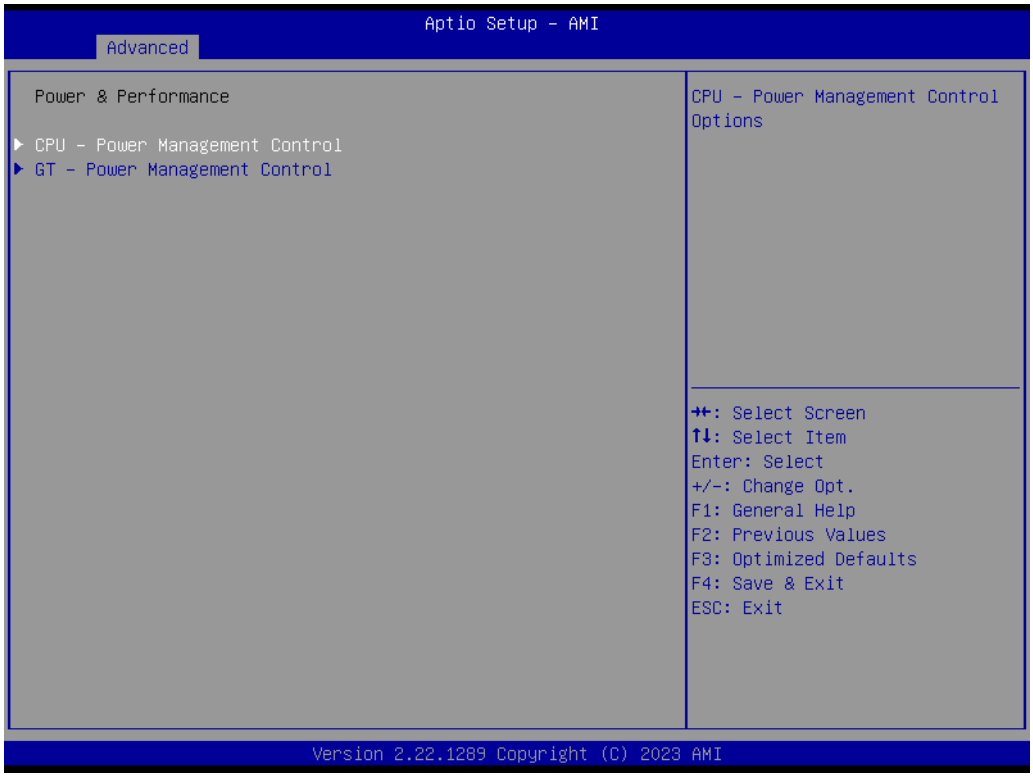


Figure 3.5 Power & Performance

- **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

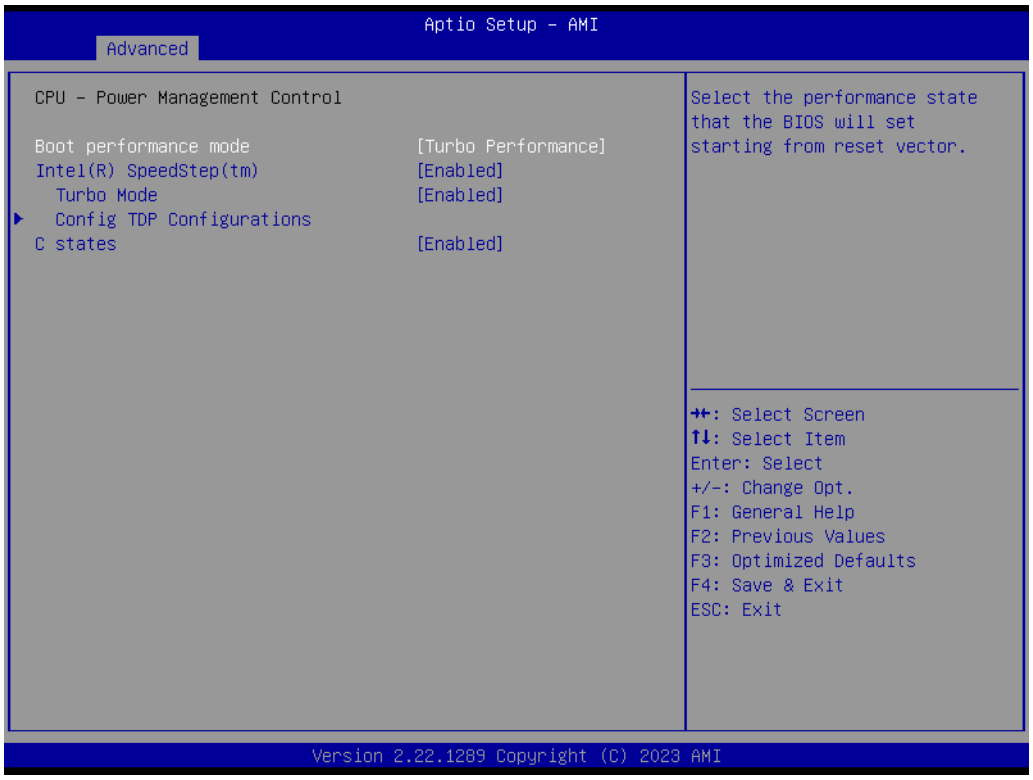


Figure 3.6 Power & Performance

- **Boot Performance Mode**
  Select the performance state that the BIOS will set starting from the reset vector.
- **Intel® SpeedStep™**
  Allows more than two frequency ranges to be supported.
- **Turbo Mode**
  Enable/Disable processor Turbo Mode (requires EMTTM enabled). AUTO means enabled.
- **Config TDP Configurations**
  TDP Configurations.
- **C States**
  Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

3.4.2.2 Config TDP Configurations

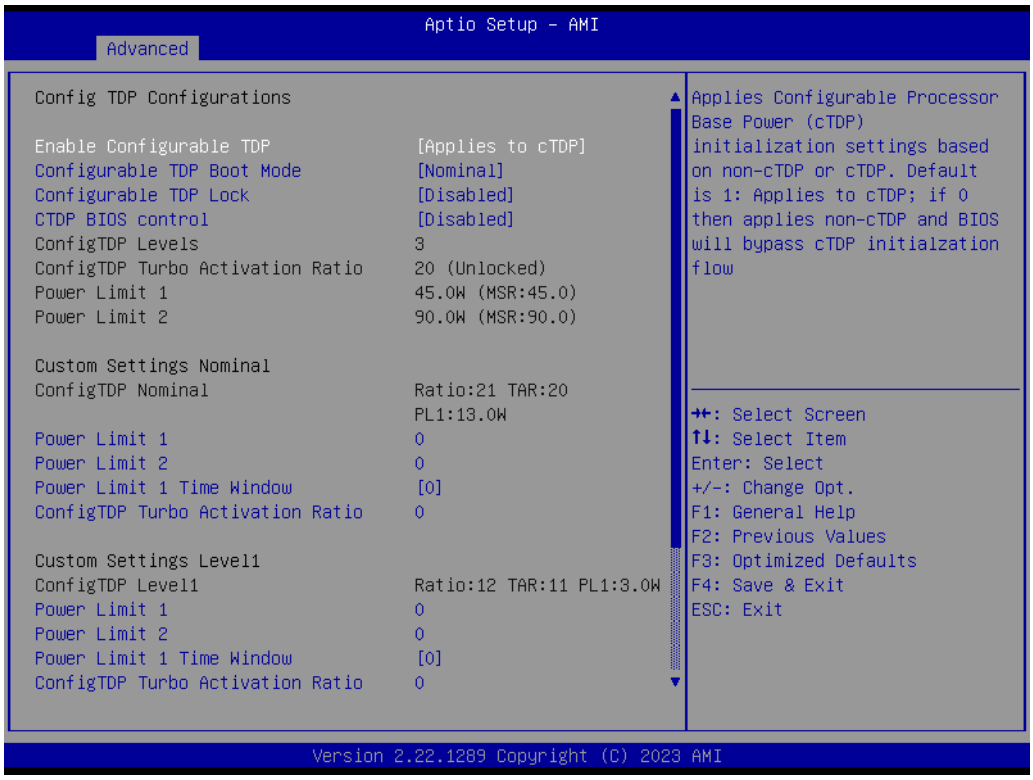


Figure 3.7 Config TDP Configurations

- **Enable Configurable TDP**

  Applies configurable Processor Base Power (cTDP) initialization settings based on non-cTDP or cTDP. Default is 1: Applies to cTDP; if 0, then non-cTDP and BIOS will bypass cTDP initialization flow.

- **Configurable TDP Boot Mode**

  Configurable TDP Mode as Nominal/Up/Down/Deactivate TDP selection. The Deactivate option will set MSR to Nominal and MMIO to Zero.

- **Configurable TDP Lock**

  Configurable Processor Base Power (cTDP) Mode Lock sets the Lock bits on TURBO_ACTIVATION_RATIO and CONFIG_TDP_CONTROL. Note: When CTDP Lock is enabled Custom ConfigTDP Count will be forced to 1 and Custom ConfigTDP Boot Index will be forced to 0.

- **CTDP BIOS Control**

  Enables Configurable Processor Base Power (cTDP) control via runtime ACPI BIOS methods. This “BIOS only” feature does not require EC or driver support.

- **Power Limit 1**

  Power Limit 1 in Milliwatts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Overclocking SKU: Value must be between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). Other SKUs: This value must be between Min Power Limit and Processor Base Power (TDP) Limit.

- **Power Limit 2**

  Power Limit 2 value in Milliwatts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Processor applies control polices such that the package power does not exceed this limit.

- **Power Limit 1 Time Window**
  Power Limit 1 Time Window value in seconds. The value may vary from 0 to 128. 0 = default value (28 sec for Mobile and 8 sec for Desktop). Defines the time window for which Processor Base Power (TDP) value should be maintained.
- **ConfigTDP Turbo Activation Ratio**
  Custom value for Turbo Activation Ratio. Needs to be configured with valid values form LFM to Max Turbo. 0 means to not use a custom value.

3.4.2.3 GT - Power Management Control

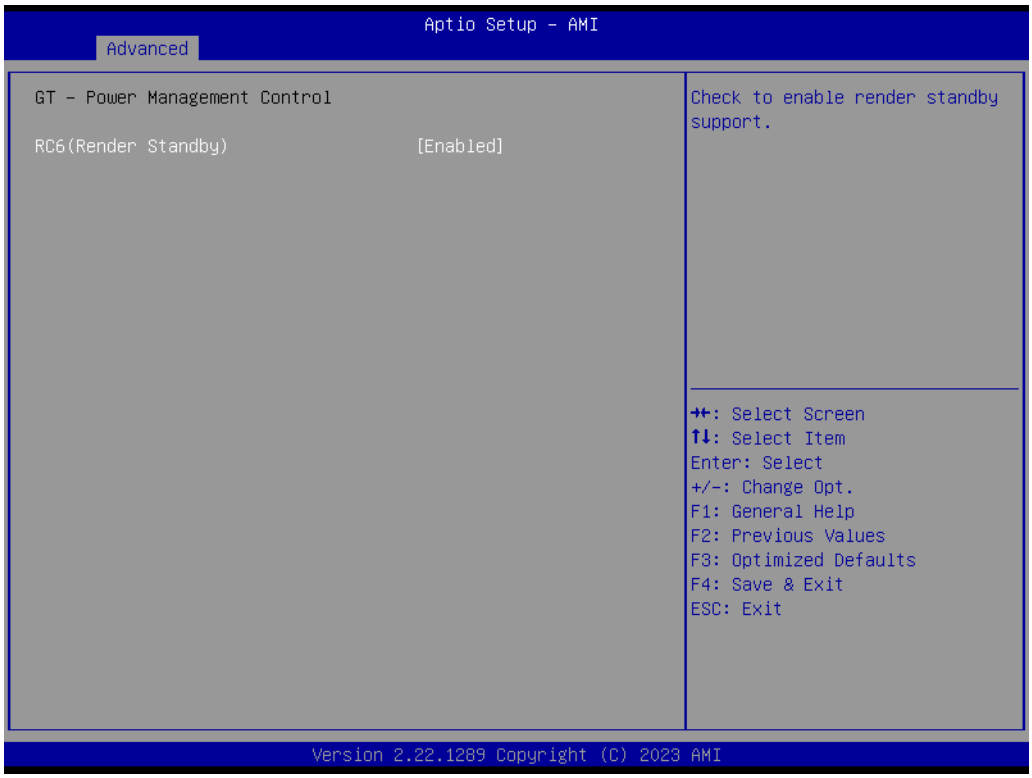


Figure 3.8 GT - Power Management Control

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

3.4.3 PCH-FW Configuration

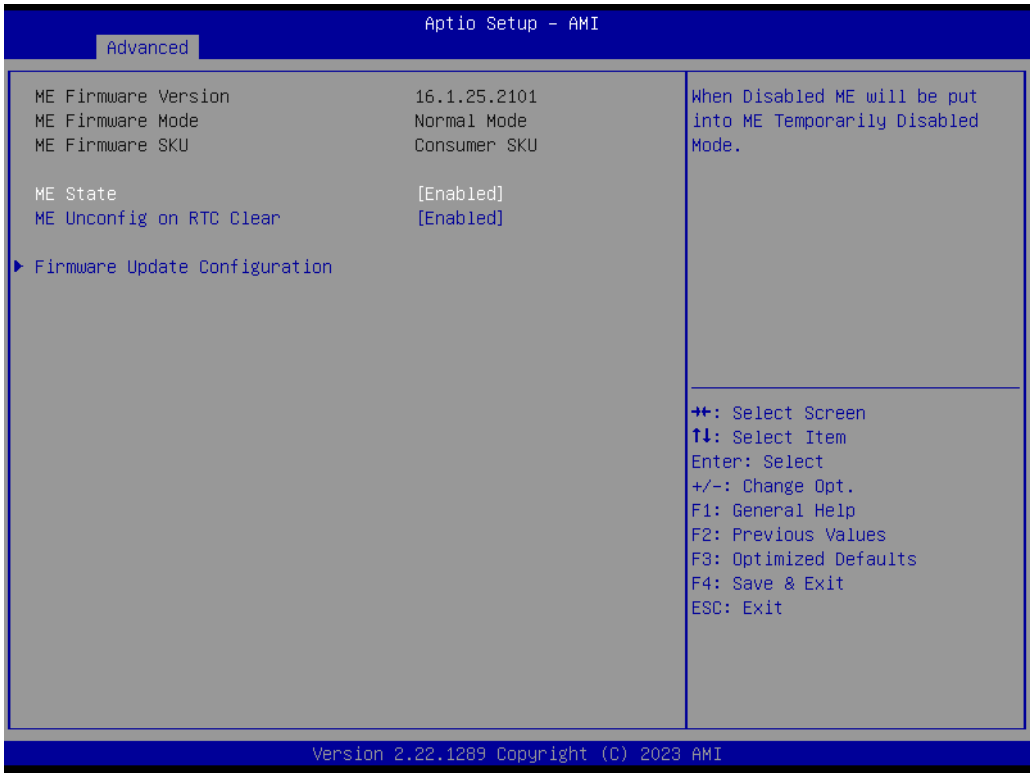


Figure 3.9 ME FW Configuration

- **ME State**
  When Disabled, ME will be put into ME Temporarily Disabled Mode.
- **ME Unconfig on RTC Clear**
  When Disabled, ME will not be unconfigured on RTC clear.
- **Firmware Update Configuration**
  Configure Management Engine Technology Parameters.

3.4.3.1 Firmware Update Configuration

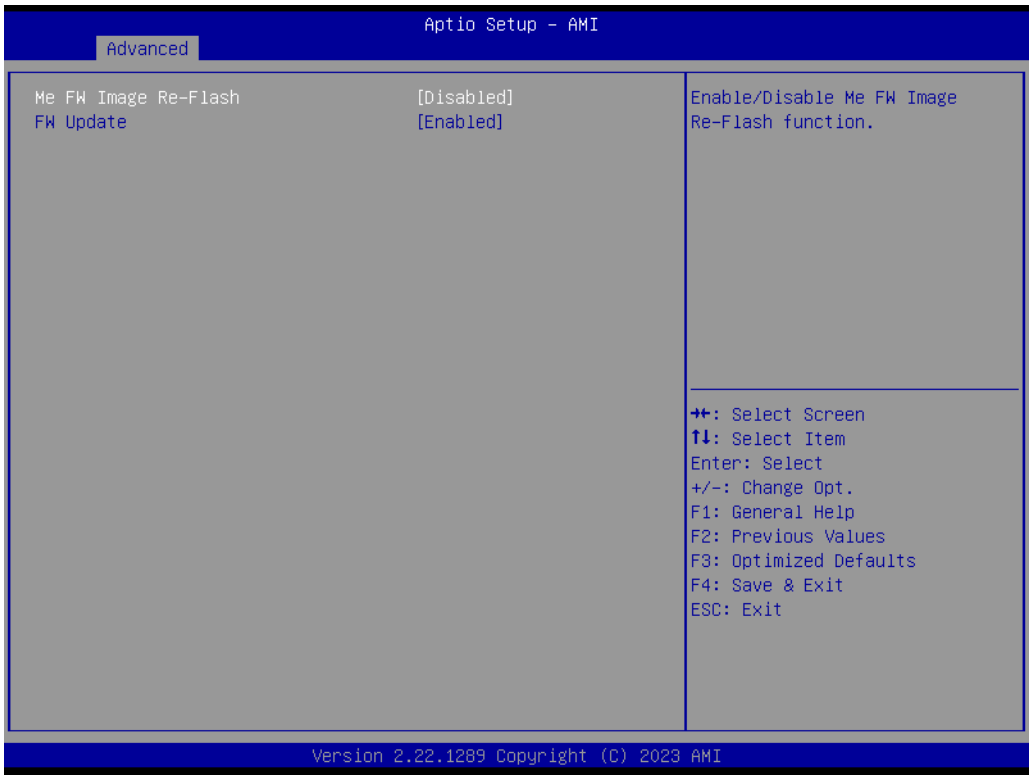


Figure 3.10 FW Update Configuration

- **ME FW Image Re-Flash**
  Enable/Disable the ME FW Image Re-Flash Function.
- **FW Update**
  Enable/ Disable the ME FW update function.

3.4.4 Trusted Computing

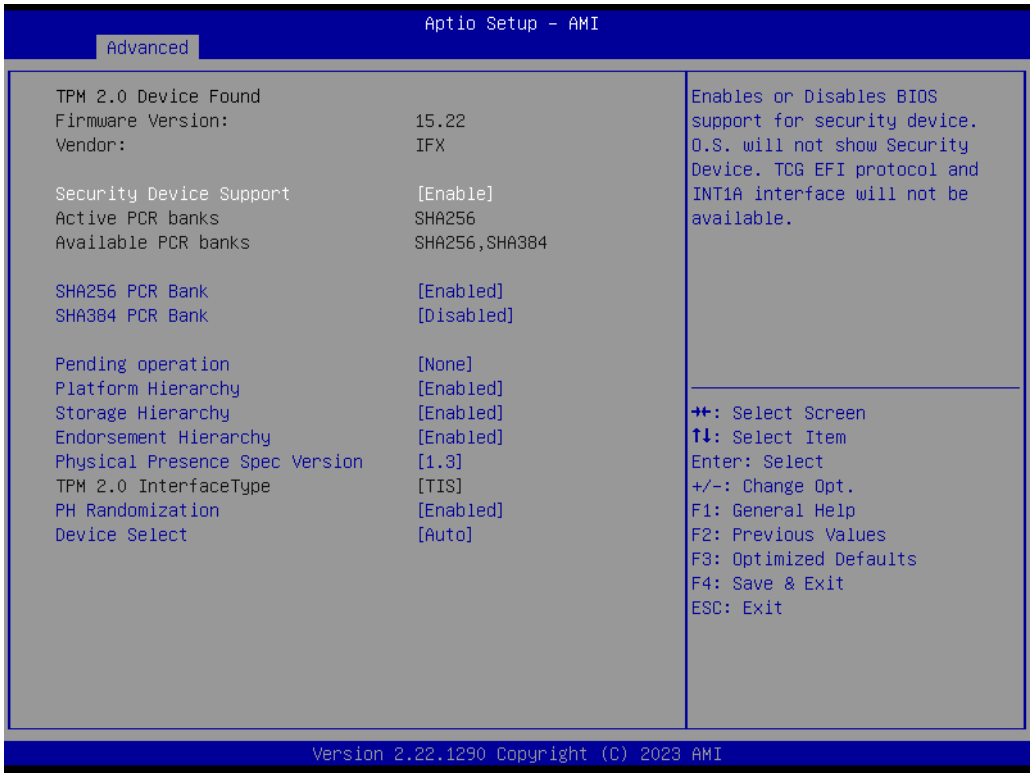


Figure 3.11 Trusted Computing

- **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 the OS 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.
- **Disable Block Sid**
  Override to allow SID authentication in TCG Storage device.

3.4.5 ACPI Settings

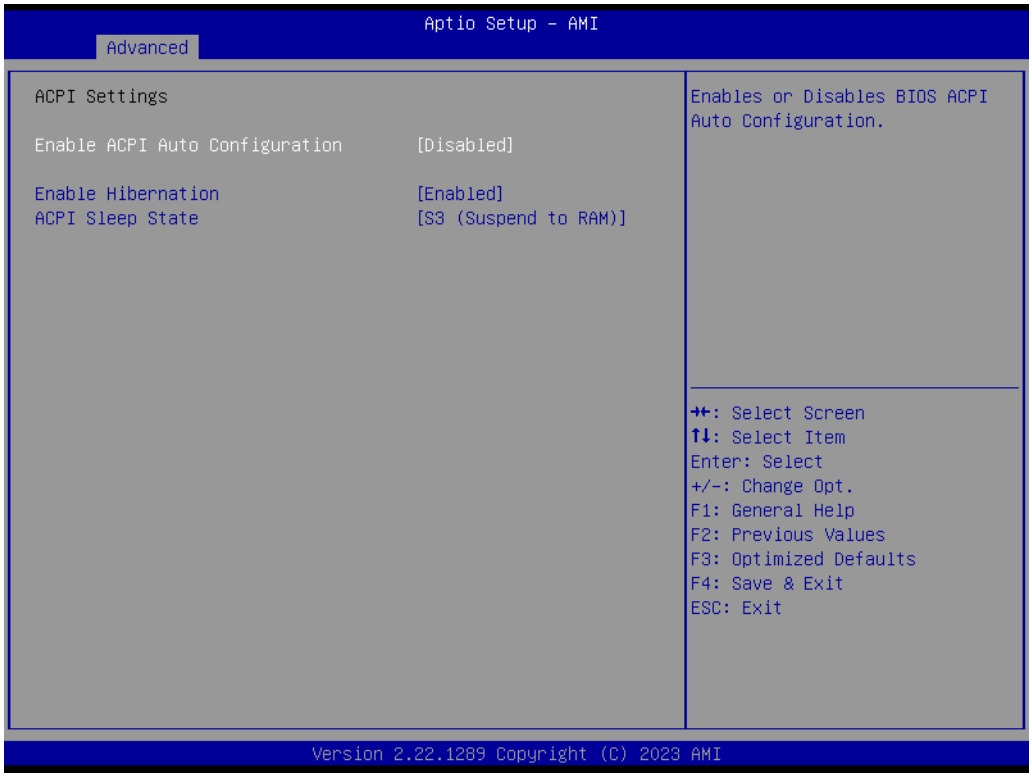


Figure 3.12 ACPI Settings

- **Enable ACPI Auto Configuration**
  Enables or Disables BIOS ACPI Auto Configuration.
- **Enable Hibernation**
  Enables or Disables the system's ability to hibernate (OS/S4 Sleep State). This option may not be 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

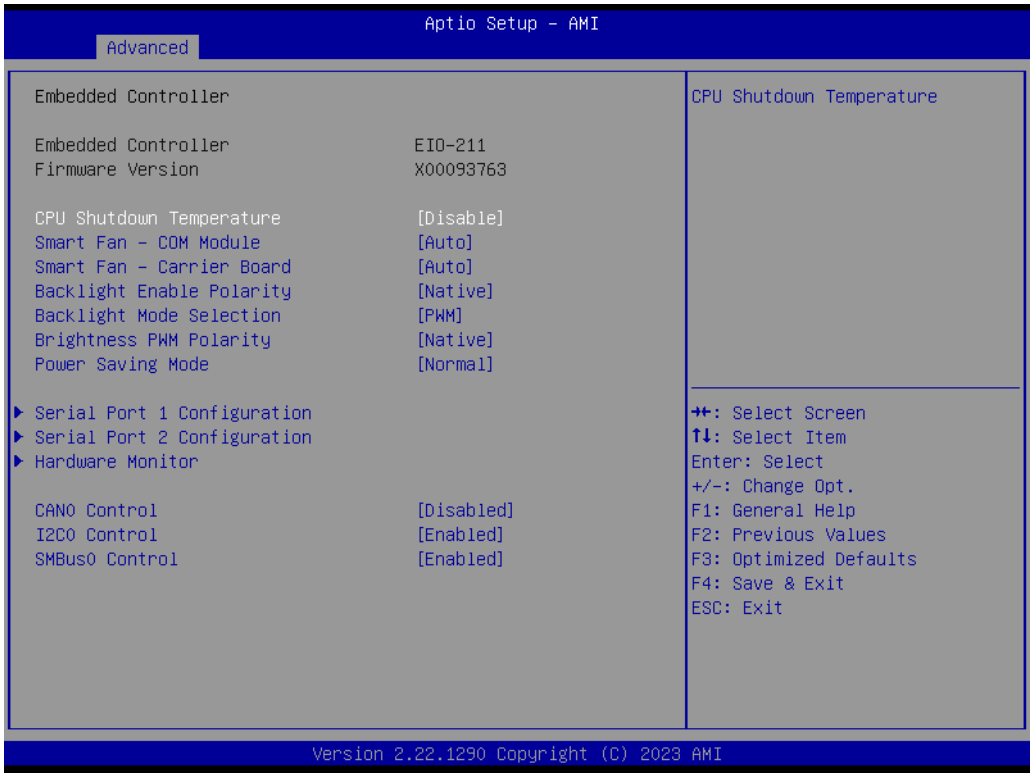


Figure 3.13 Embedded Controller

- **CPU Shutdown Temperature**
  CPU Shutdown Temperature
- **Smart Fan - COM Module**
  Control the COM Module Smart FAN function.
- **Smart Fan - Carrier Board**
  Control the Carrier Board Smart FAN function. Get the value from EC and only set the value when saving changes.
- **Backlight Enable Polarity**
  Switch Backlight Enable Polarity to 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.
- **CAN0 Control**
  Enable/Disable CAN0 controller on RDC-IS200.

- **I2C0 Control**
  Enable/Disable I2C0 controller on RDC-IS200.
- **SMBus0 Control**
  Enable/Disable SMBus0 controller on RDC-IS200.

3.4.6.1 Serial Port 1 Configuration

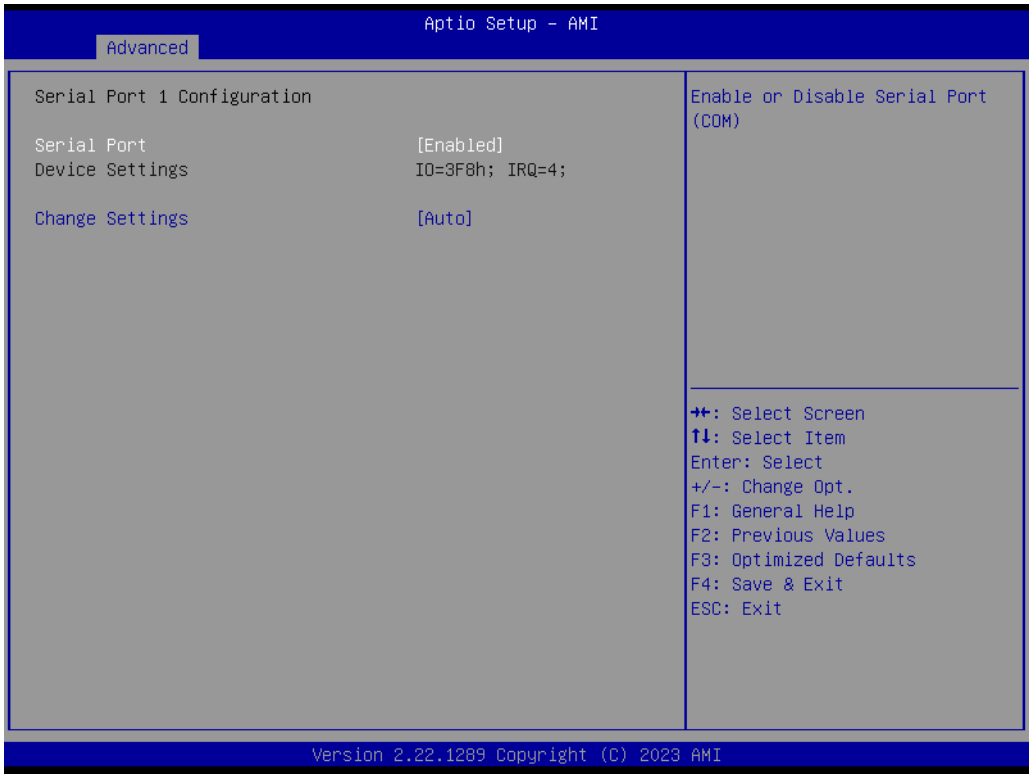


Figure 3.14 Serial Port 1 Configuration

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

3.4.7 Serial Port Console Redirection

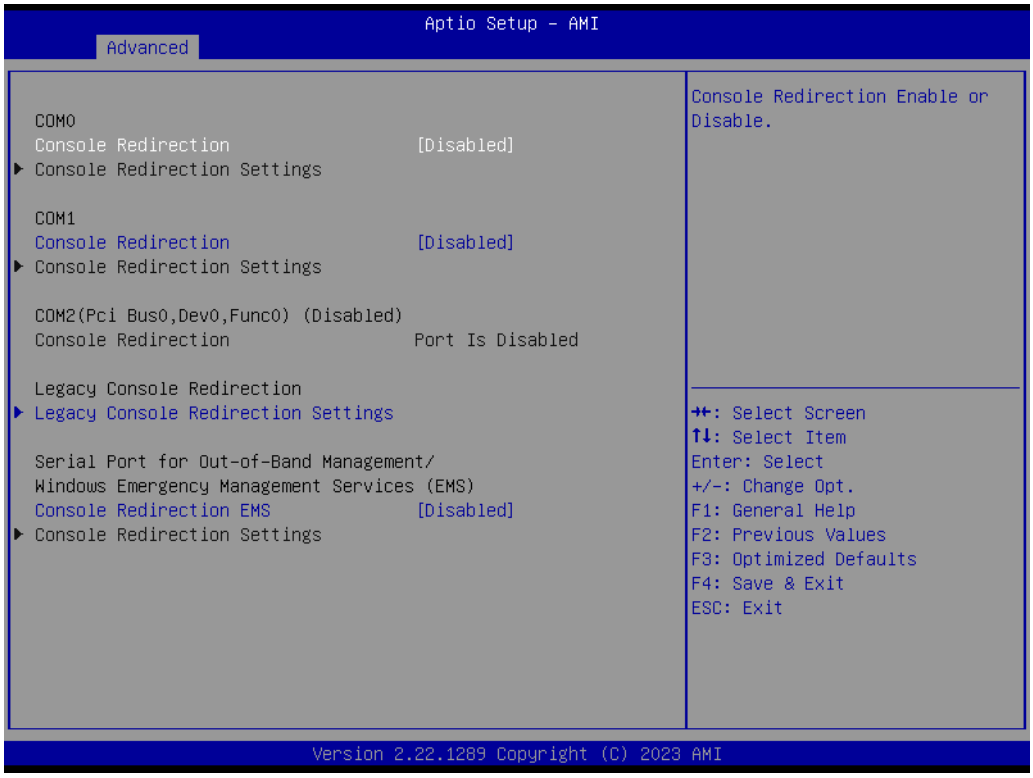


Figure 3.15 Serial Port Console Redirection

- **Console Redirection**
  Console Redirection Enable or Disable.
- **Legacy Console Redirection**
  Legacy Console Redirection Settings.
- **Console Redirection EMS**
  Console Redirection Enable or Disable.

3.4.7.1 Legacy Console Redirection Settings

Figure 3.16 Legacy Console Redirection Settings

- **Redirection COM Port**
  Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.
- **Resolution**
  On Legacy OS, the Number of Rows and Columns supported for redirection.
- **Redirect After POST**
  When Bootloader is selected, then Legacy Console Redirection is disabled before booting to the legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled for the legacy OS. Default setting for this option is set to Always Enable.

3.4.8 USB Configuration

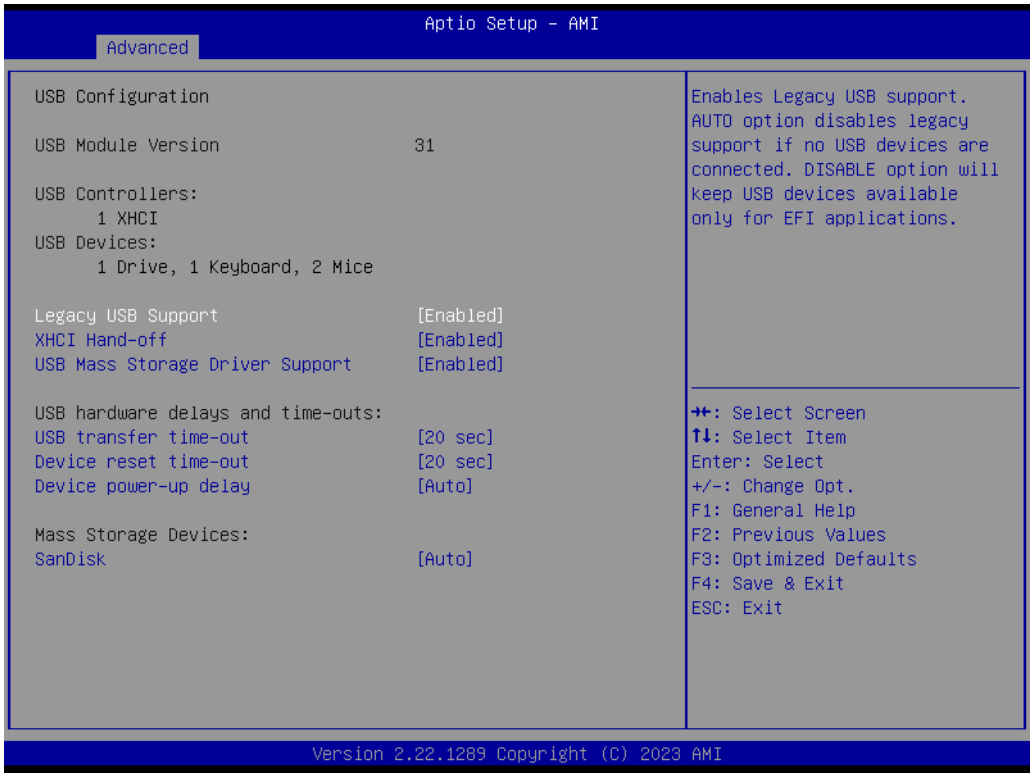


Figure 3.17 USB Configuration

- **Legacy USB Support**
  Enables Legacy USB support. The AUTO option disables legacy support if no USB devices are connected. The 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 the 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 the default value: for a Root port it is 100 ms, for a Hub port the delay is taken from the Hub descriptor.

3.4.9 Network Stack Configuration

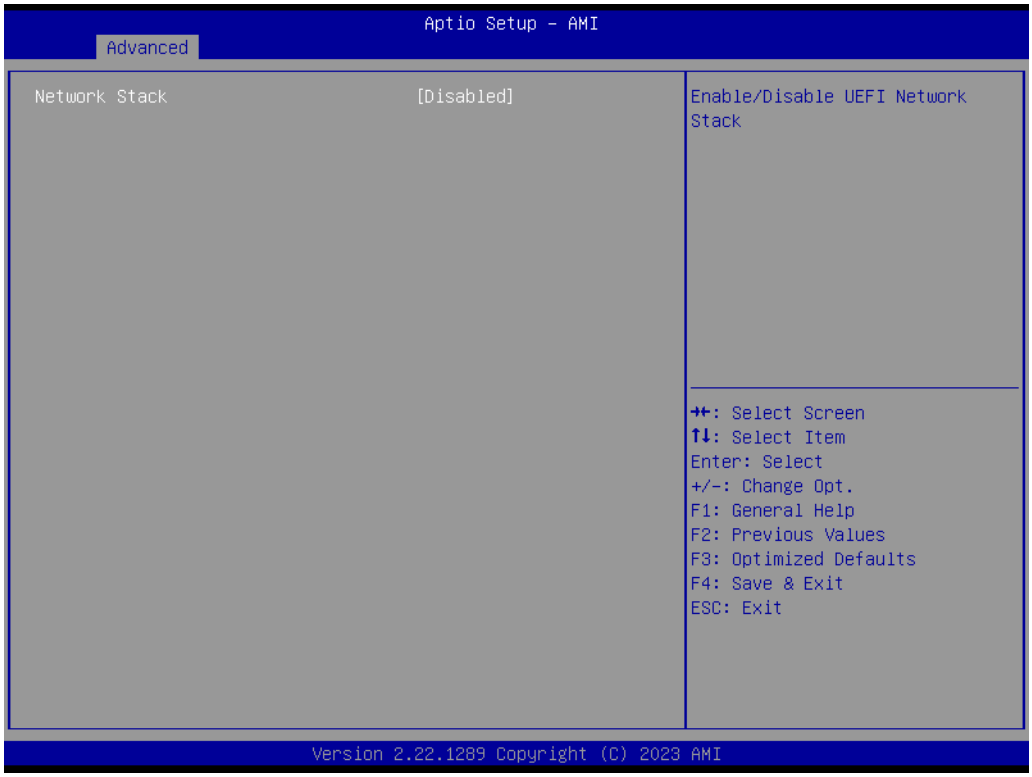


Figure 3.18 Network Stack Configuration

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

3.4.10 CSM Configuration

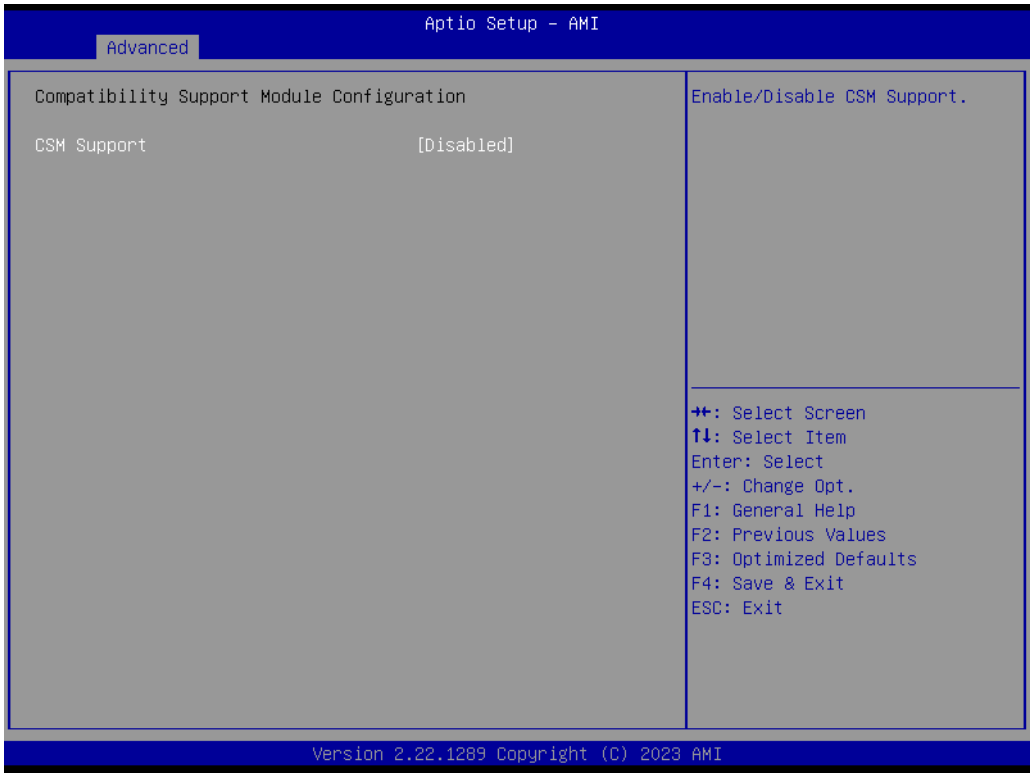


Figure 3.19 CSM Configuration

- **CSM Support**
  Enable/Disable CSM support.

3.4.11 OEM Configuration

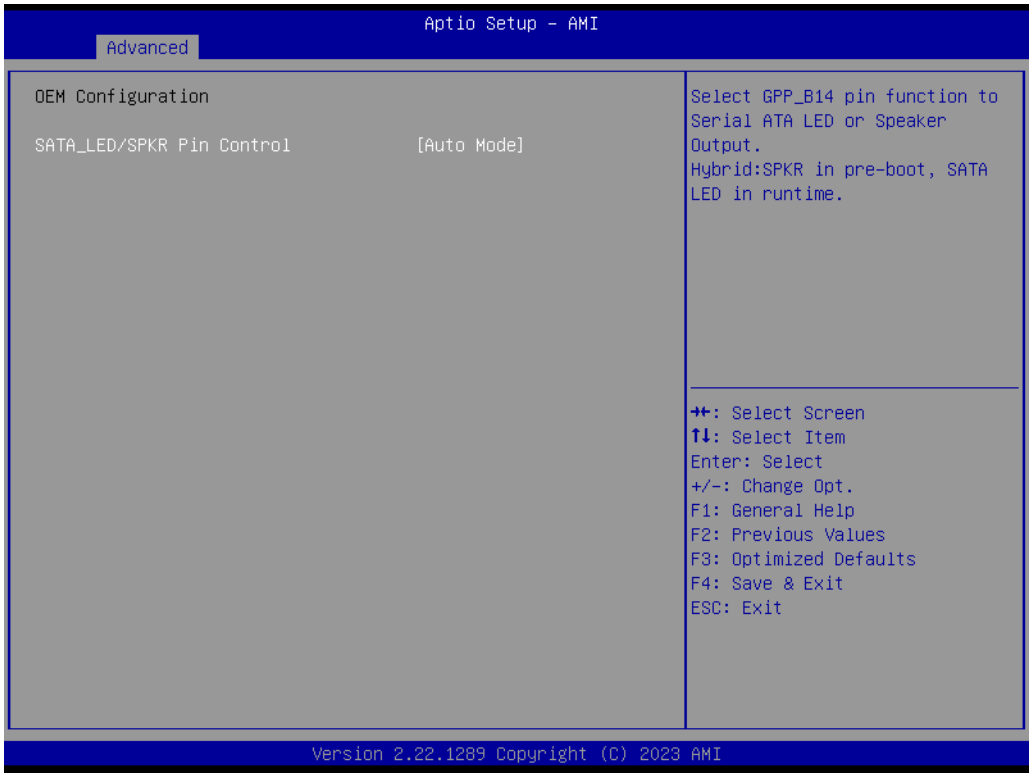


Figure 3.20 OEM Configuration

- **SATA_LED/SPKR Pin Control**
  Select the GPP_B14 pin function to Serial ATA LED or Speaker Output. Hybrid: SPKR in pre-boot, SATA LED in runtime.

3.4.12 Tls Auth Configuration

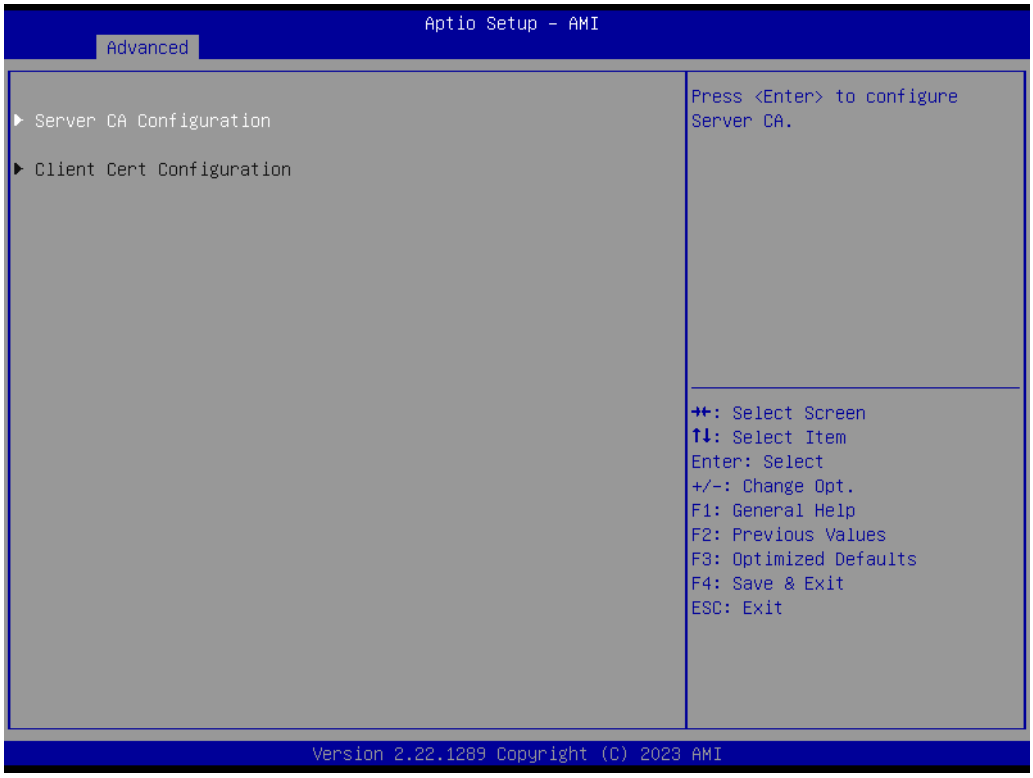


Figure 3.21 Tls Auth Configuration

- **Server CA Configuration**
  Press <Enter> to configure Sever CA.
- **Client Cert Configuration**

3.4.13 Intel® Ethernet Controller I226-IT -00:A0:C9:00:00:00

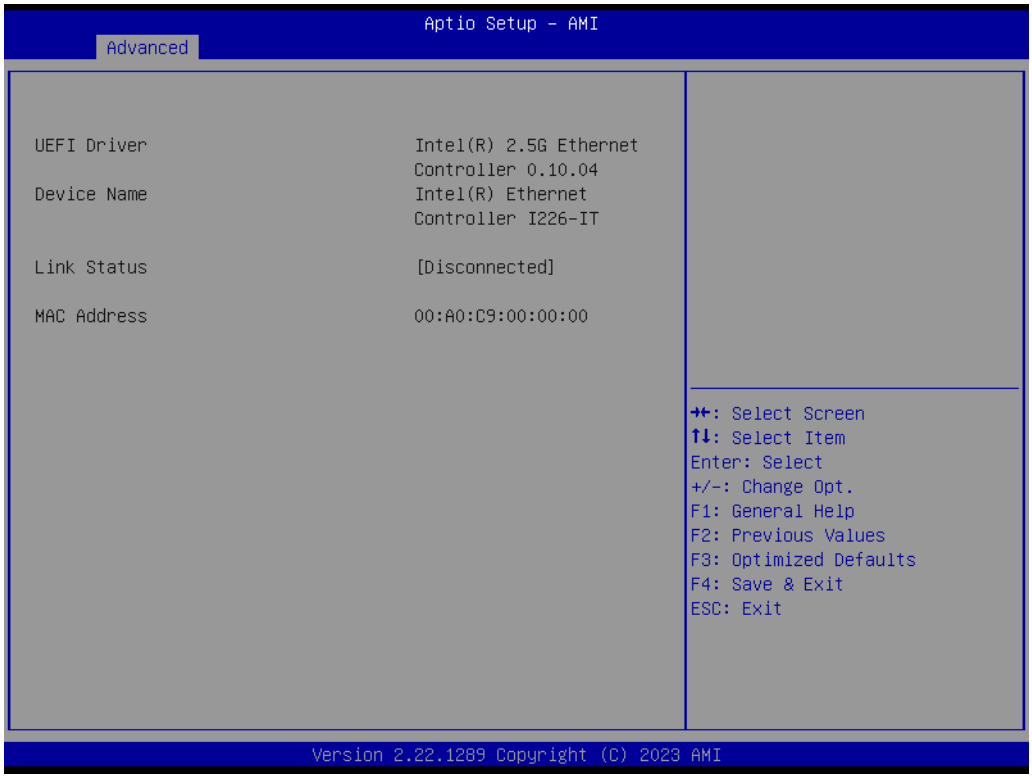


Figure 3.22 Intel® Ethernet Controller I226-IT

3.5 Chipset Setup

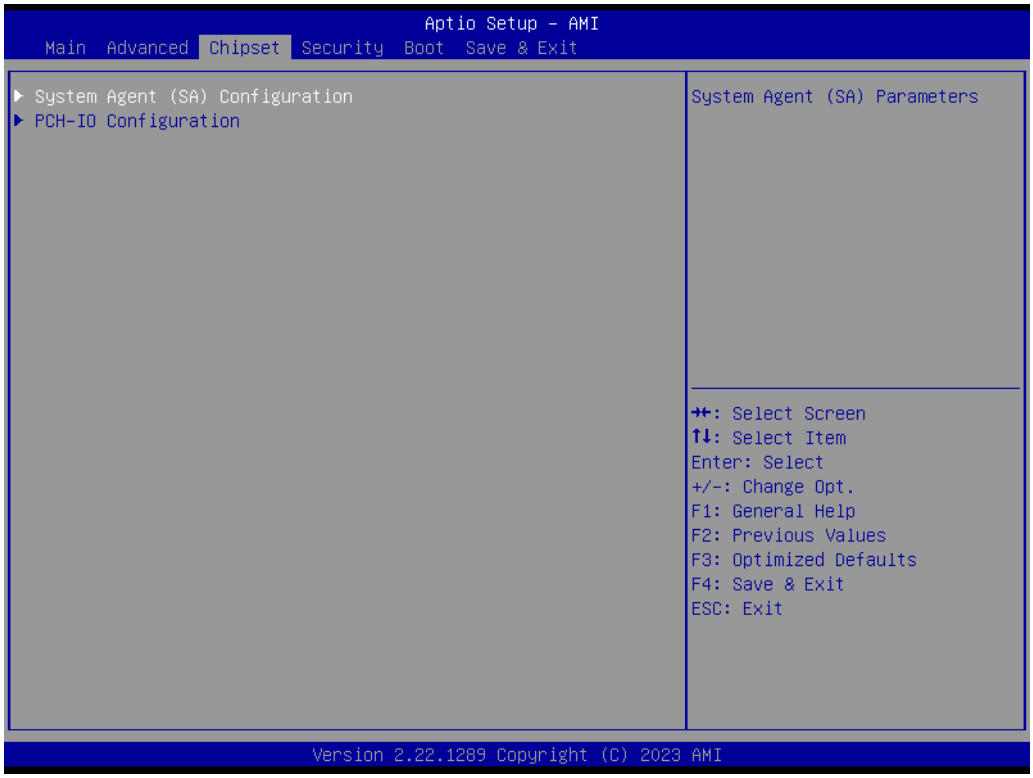


Figure 3.23 Chipset Setup

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

3.5.1 System Agent (SA) Configuration

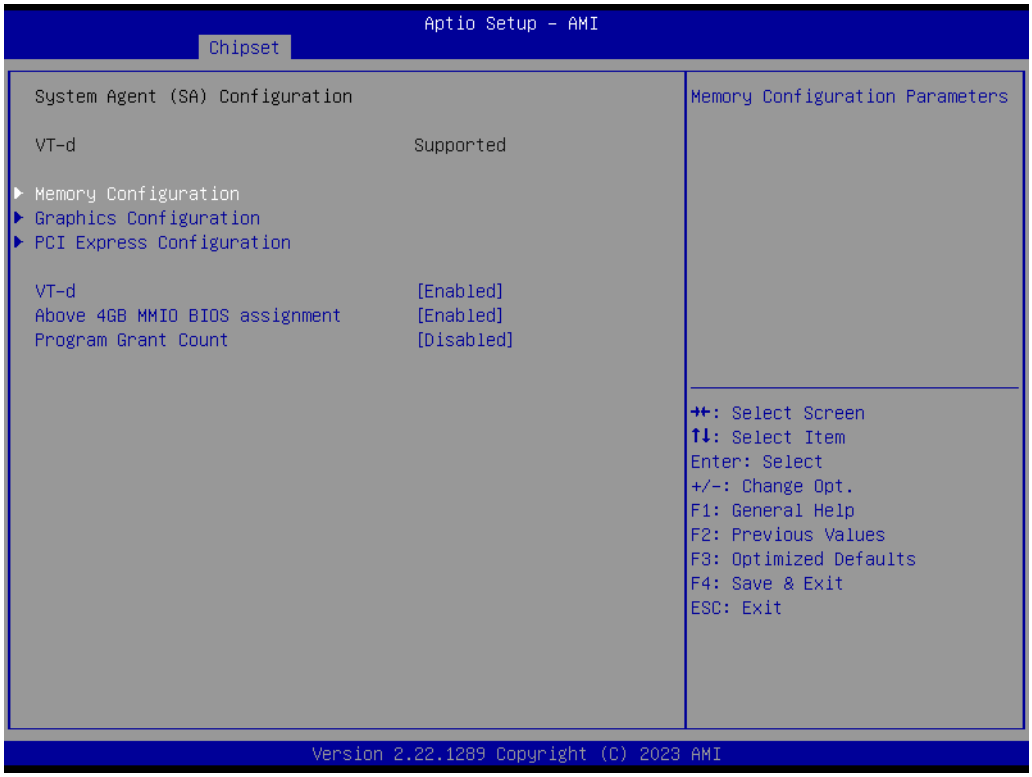


Figure 3.24 System Agent (SA) Configuration

- **Memory Configuration**
  Memory Configuration Parameters
- **Graphics Configuration**
  Graphics Configuration
- **PCI Express Configuration**
  PCI Express Configuration settings
- **VT-d**
  VT-d capability
- **Above 4GB MMIO BIOS Assignment**
  Enable/Disable above 4GB memory mapped IO BIOS assignment. This is enabled automatically when the aperture size is set to 2048MB.
- **Program Grant Count**
  Enable/Disable Programming of Grant Count.

3.5.1.1 Memory Configuration

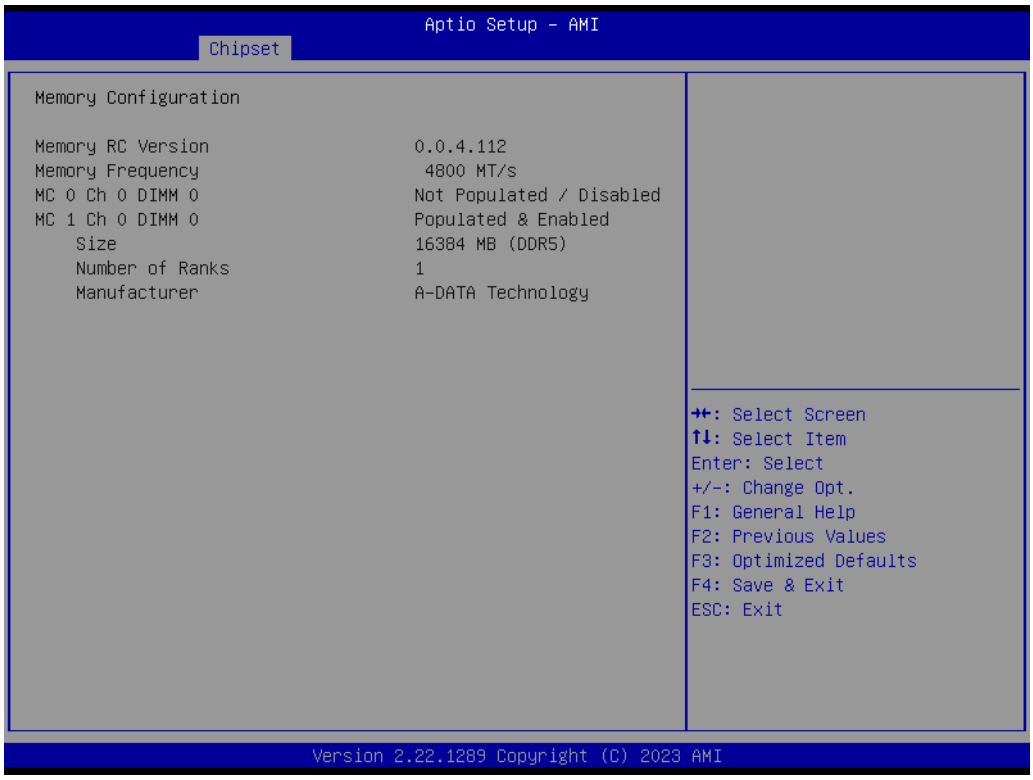


Figure 3.25 Memory Configuration

3.5.1.2 Graphics Configuration

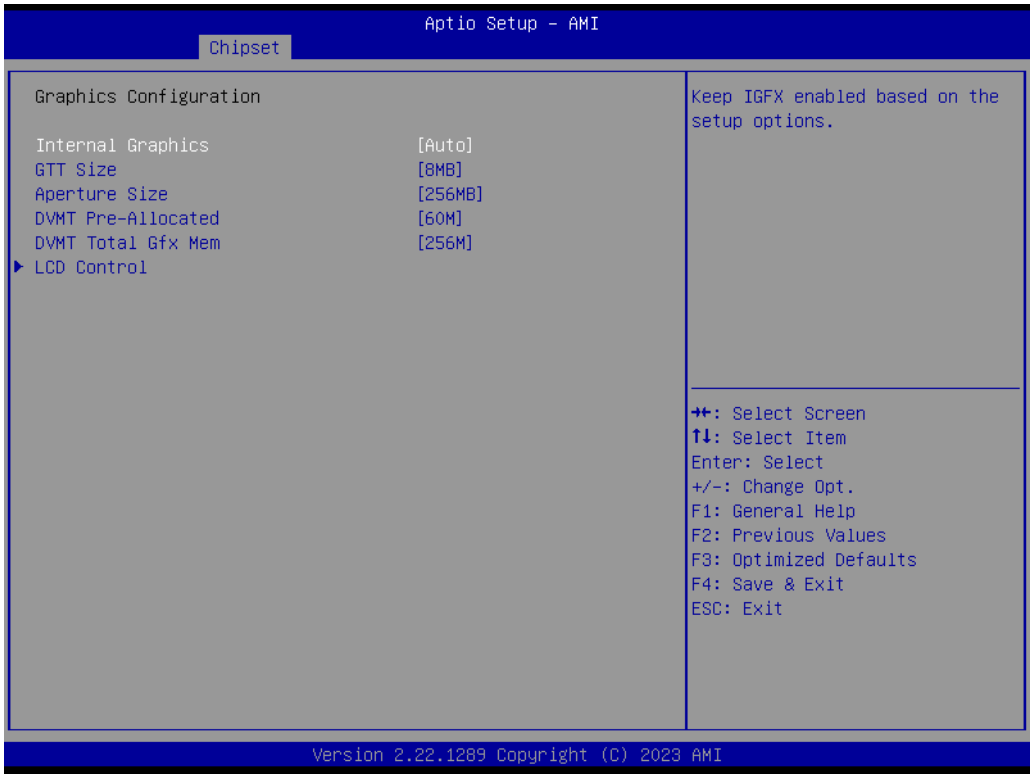


Figure 3.26 Graphics Configuration

- **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 automatically enabled when selecting the 2048MB aperture. To use this feature, please disable CSM support.
- **DVMT Pre-Allocated**
  Select DVMT5.0 pre-allocated (fixed) Graphics Memory size to be used by the internal graphics device.
- **DVMT Total Gfx Mem**
  Select DVMT5.0 total graphics memory size is used by the internal graphics device.
- **LCD Control**

LCD Control

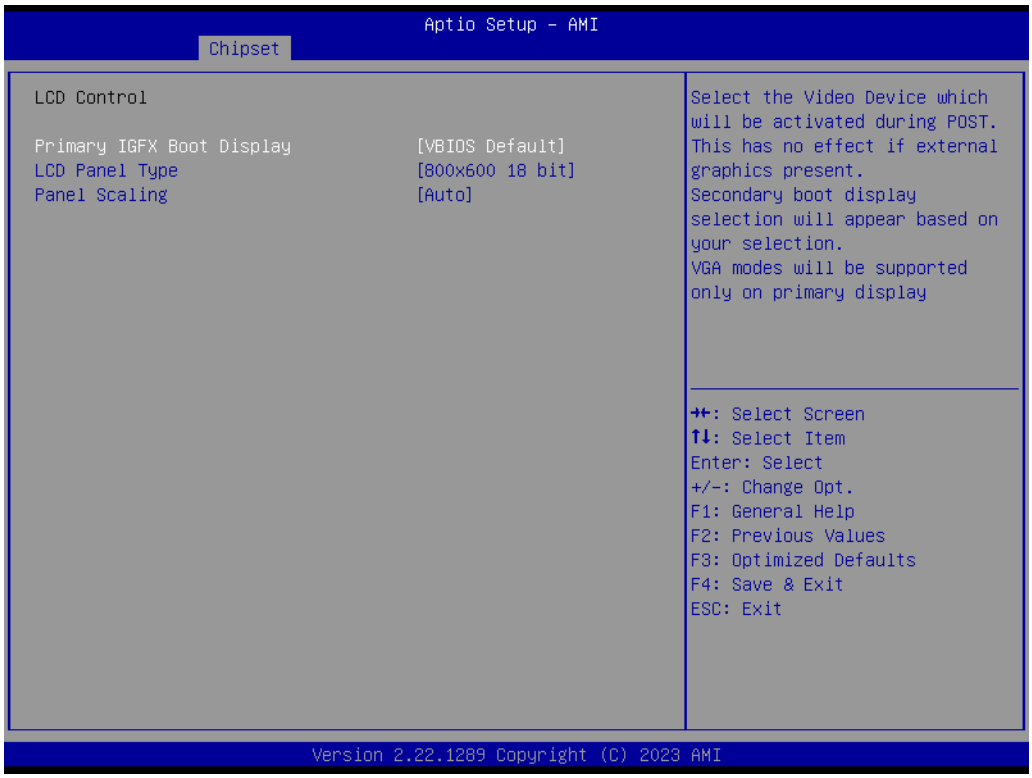


Figure 3.27 LCD Control

- **Primary IGFX Boot Display**
  Select the Video Device which will be activated during POST. This has no effect if external graphics are present. The Secondary Boot display selection will appear based on your selection. VGA modes will be supported only on the primary display.
- **LCD Panel Type**
  Select the LCD panel used by the Internal Graphics Device by selecting the appropriate setup item.
- **Panel Security**

Select the LCD panel scaling option used by the Internal Graphics Device.

3.5.1.3 PCI Express Configuration

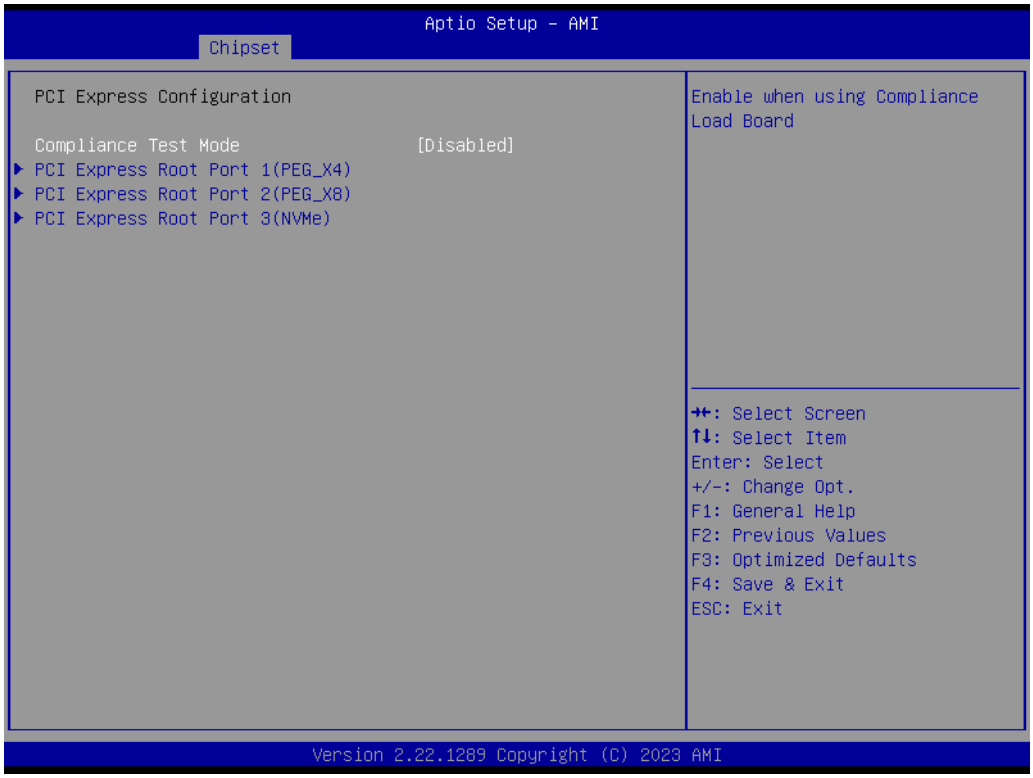


Figure 3.28 PCI Express Configuration

- **Compliance Test Mode**
  Enable when using the Compliance Load board.
- **PCI Express Root Port 1 (PEG_4)**
- **PCI Express Root Port 2 (PEG_8)**
- **PCI Express Root Port 3 (PEG_NVMe)**

PCI Express Root Port 1 (PEG_4)

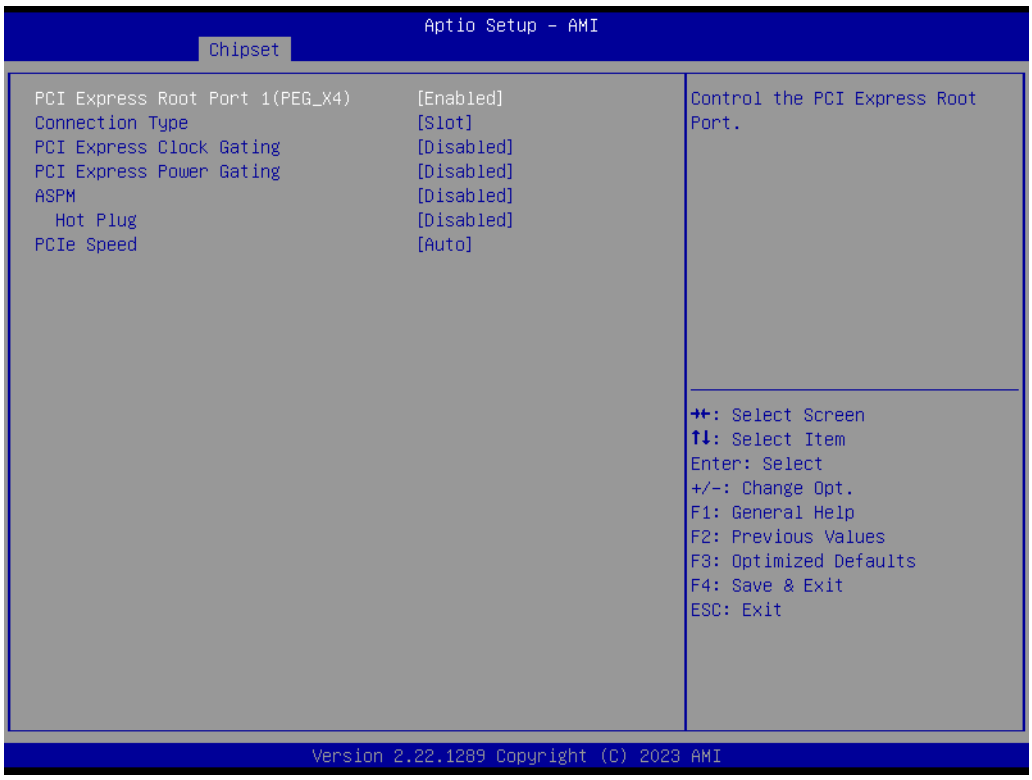


Figure 3.29 PCI Express Root Port 1 (PEG_4)

- **PCI Express Root Port 1 (PEG_4)**
  Control the PCI Express Root Port.
- **Connection Type**
  Built-In: a built-in device is connected to this rootport. The SlotImplemented bit will be clear. Slot: this rootport connects to user-accessible slot. SlotImplemented bit will be set.
- **PCIe Express Clock Gating**
  Enable/Disable for each root port.
- **PCIe Express Power Gating**
  Enable/Disable for each root port.
- **ASPM**
  Set the ASPM Level:
  Force L0s- Force all links to L0s State
  AUTO – BIOS auto configure
  DISABLE – Disables ASPM
- **Hot Plug**
  PCI Express Hot Plug Enable/Disable.
- **PCIe Speed**
  Configure PCIe Speed.

PCI Express Root Port 2 (PEG_8)

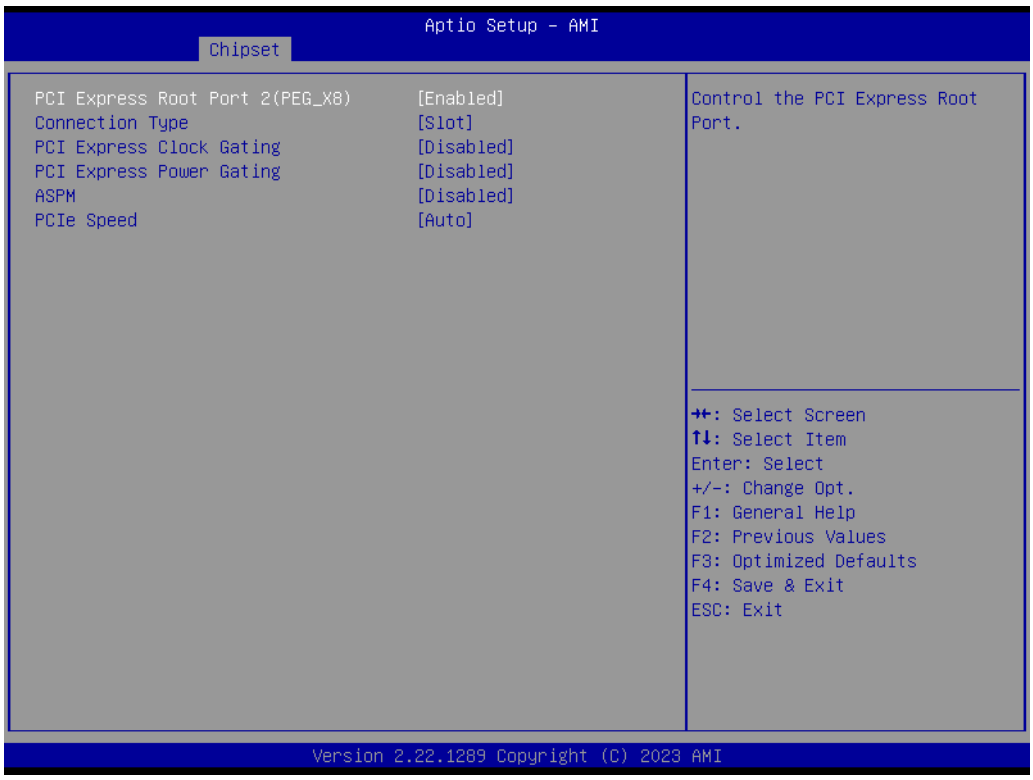


Figure 3.30 PCI Express Root Port 2 (PEG_8)

- **PCI Express Root Port 1 (PEG_4)**
  Control the PCI Express Root Port.
- **Connection Type**
  Built-In: a built-in device is connected to this rootport. The SlotImplemented bit will be clear. Slot: this rootport connects to user-accessible slot. The SlotImplemented bit will be set.
- **PCIe Express Clock Gating**
  Enable/Disable for each root port.
- **PCIe Express Power Gating**
  Enable/Disable for each root port.
- **ASPM**
  Set the ASPM Level:
  Force L0s- Force all links to L0s State
  AUTO – BIOS auto configure
  DISABLE – Disables ASPM
- **PCIe Speed**
  Configure PCIe Speed.

PCI Express Root Port 3 (PEG_NVMe)

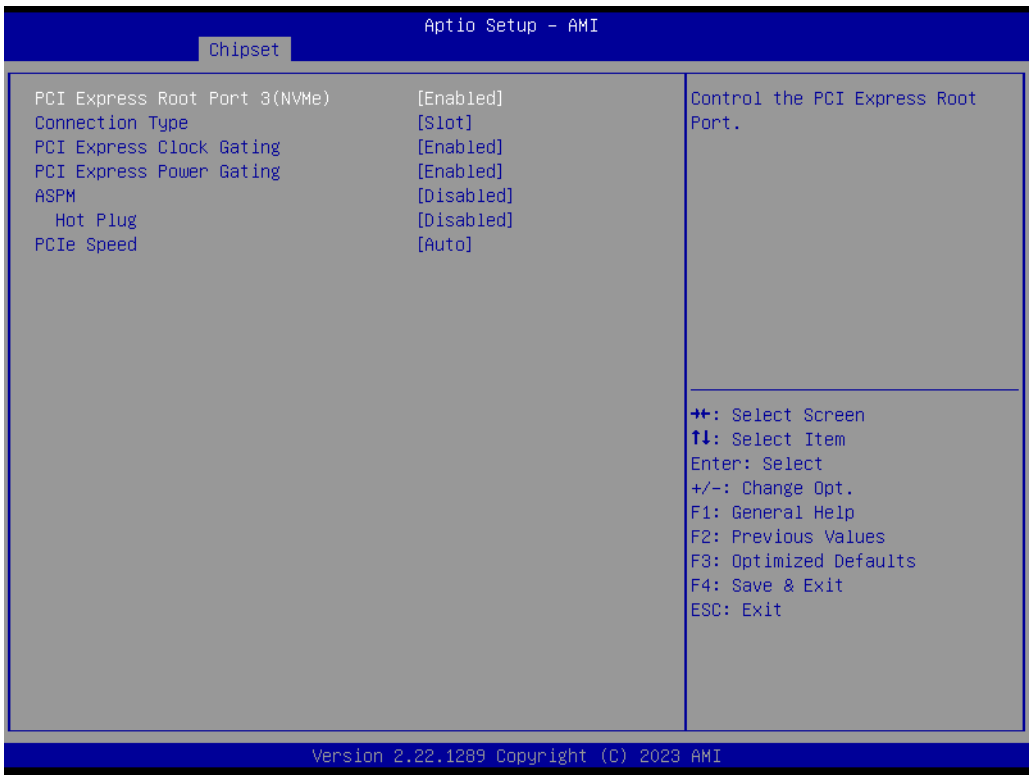


Figure 3.31 PCI Express Root Port 3 (NVME)

- **PCI Express Root Port 3 (NVME)**
  Control the PCI Express Root Port.
- **Connection Type**
  Built-In: a built-in device is connected to this rootport. The SlotImplemented bit will be clear. Slot: this rootport connects to user-accessible slot. The SlotImplemented bit will be set.
- **PCIe Express Clock Gating**
  Enable/Disable for each root port.
- **PCIe Express Power Gating**
  Enable/Disable for each root port.
- **ASPM**
  Set the ASPM Level:
  Force L0s- Force all links to L0s State
  AUTO – BIOS auto configure
  DISABLE – Disables ASPM
- **Hot Plug**
  PCI Express Hot Plug Enable/Disable.
- **PCIe Speed**
  Configure PCIe Speed.

3.5.2 PCH-IO Configuration

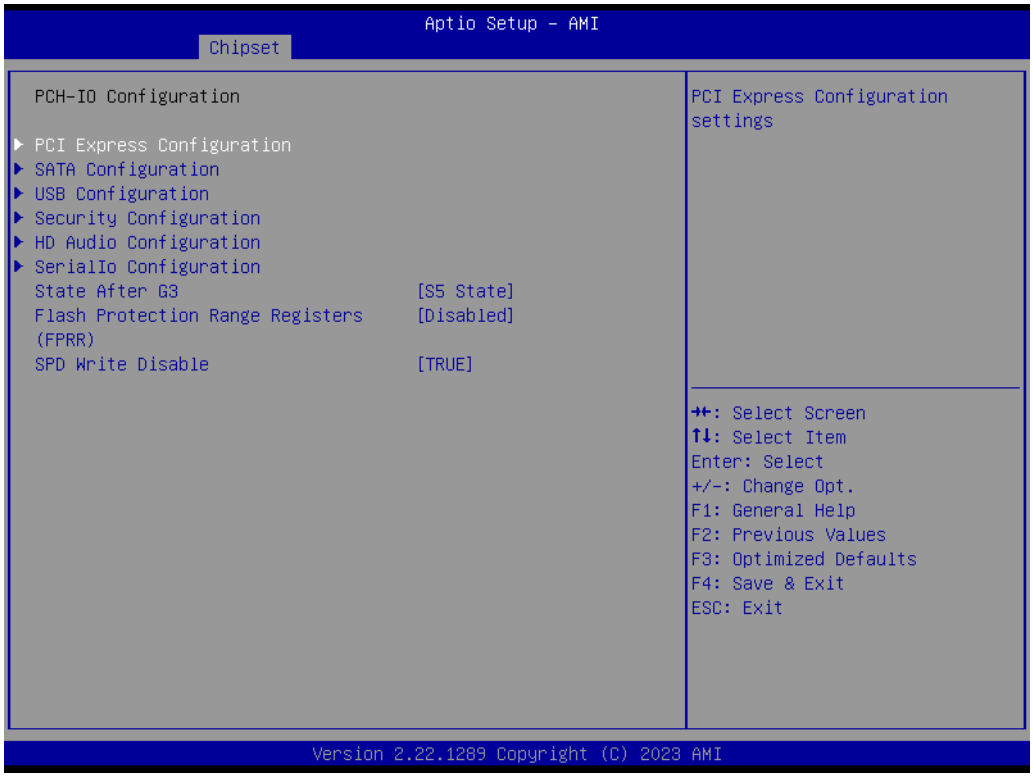


Figure 3.32 PCH-IO Configuration

- **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
- **State After G3**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **Flash Protection Range Register (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

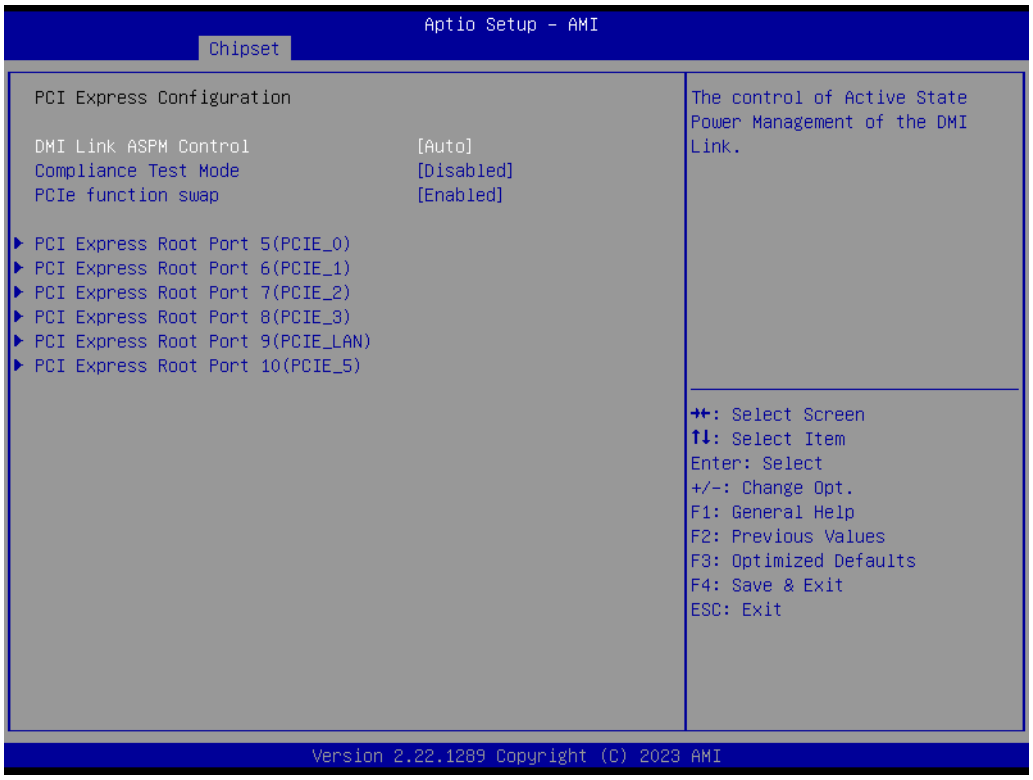


Figure 3.33 PCI Express Configuration

- **DMI Link ASPM Control**
  The control of Active State Power Management of the DMI Link.
- **Compliance Test Mode**
  Enable when using Compliance Load Board.
- **PCIe Function Swap**
  When Disabled, prevents PCIE rootport function swap. If any function other than 0th is enabled, 0th will become visible.
- **PCI Express Root Port 5 (PCIE_0)**
- **PCI Express Root Port 6 (PCIE_1)**
- **PCI Express Root Port 7 (PCIE_2)**
- **PCI Express Root Port 8 (PCIE_3)**
- **PCI Express Root Port 9 (PCIE_LAN)**
- **PCI Express Root Port 10 (PCIE_5)**

PCI Express Root Port 5 (PCIE_0)

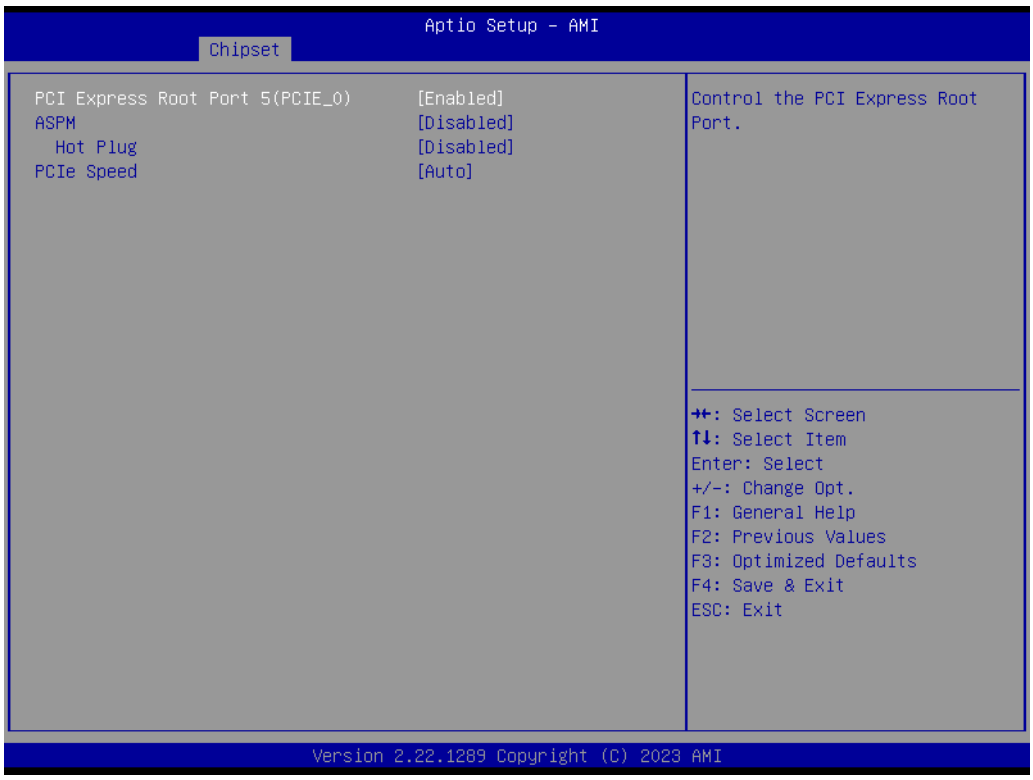


Figure 3.34 PCI Express Root Port 0

- **PCI Express Root Port 0**
  Control the PCI Express Root Port.
- **ASPM**
  Set the ASPM Level:
  Force L0s- Force all links to L0s State
  AUTO – BIOS auto configure
  DISABLE – Disables ASPM
- **Hot Plug**
  PCI Express hot plug enable/disable
- **PCIe Speed**
  Configure PCIe Speed.

3.5.2.2 SATA Configuration

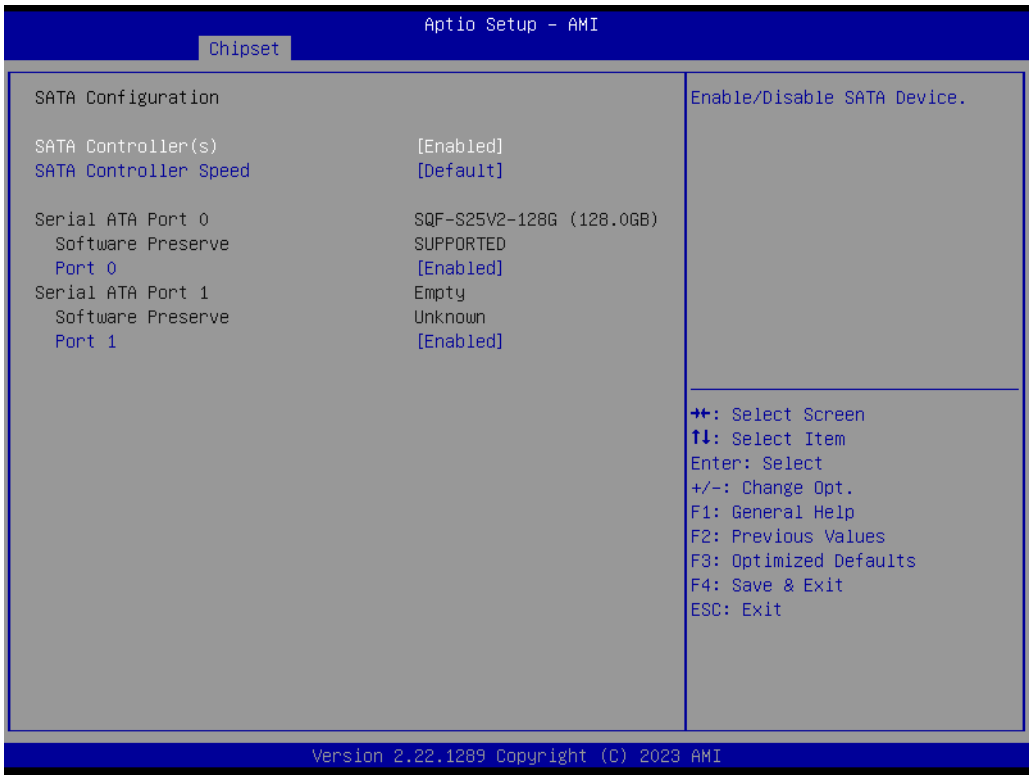


Figure 3.35 SATA Drives

- **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 3.36 USB Configuration

- **xDCI Support**
  Enable/Disable Xdci (USB OTG Device).
- **USB Port Disable Override**
  Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.

3.5.2.4 Security Configuration

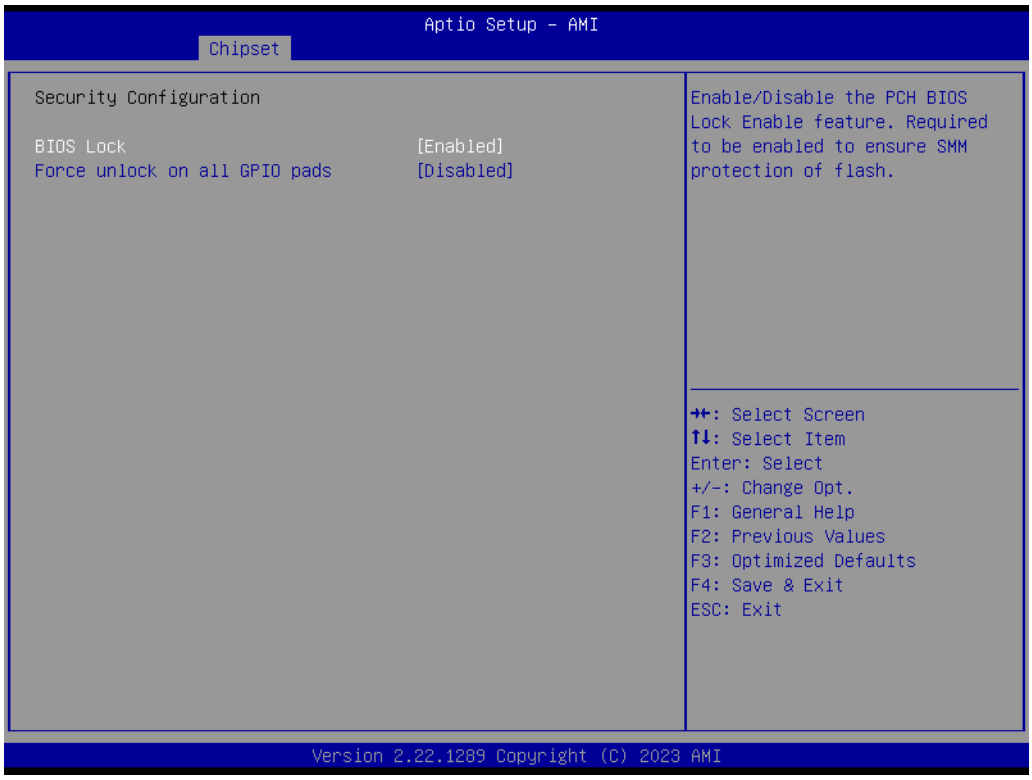


Figure 3.37 Security Configuration

- **BIOS Lock**
  Enable/Disable the PCH BIOS lock enable feature. Required to be Enabled to ensure SMM protection of flash.
- **Force Unlock on All GPIO Pads**
  If Enabled, BIOS will force all GPIO pads to be in the unlocked state.

3.5.2.5 HD Audio Subsystem Configuration Settings

Figure 3.38 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 3.39 Seriallo Configuration

- **I2C1 Controller**

  Enables/Disables Seriallo Controller

  If a given device's Function 0 PSF disabling is skipped, the PSF default will remain and the device PCI CFG Space will still be visible. This is needed to allow the PCI enumerator to 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)

- **SPIO Controller**

  Enables/Disables the Seriallo Controller

  If a given device's Function 0 PSF disabling is skipped, the PSF default will remain and the 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 I2C0 Settings**
  Configure SerialIO Controller.
- **Serial IO I2C1 Settings**
  Configure SerialIO Controller.
- **Serial IO SPIO Settings**
  Configure SerialIO Controller.

3.6 Security Chipset

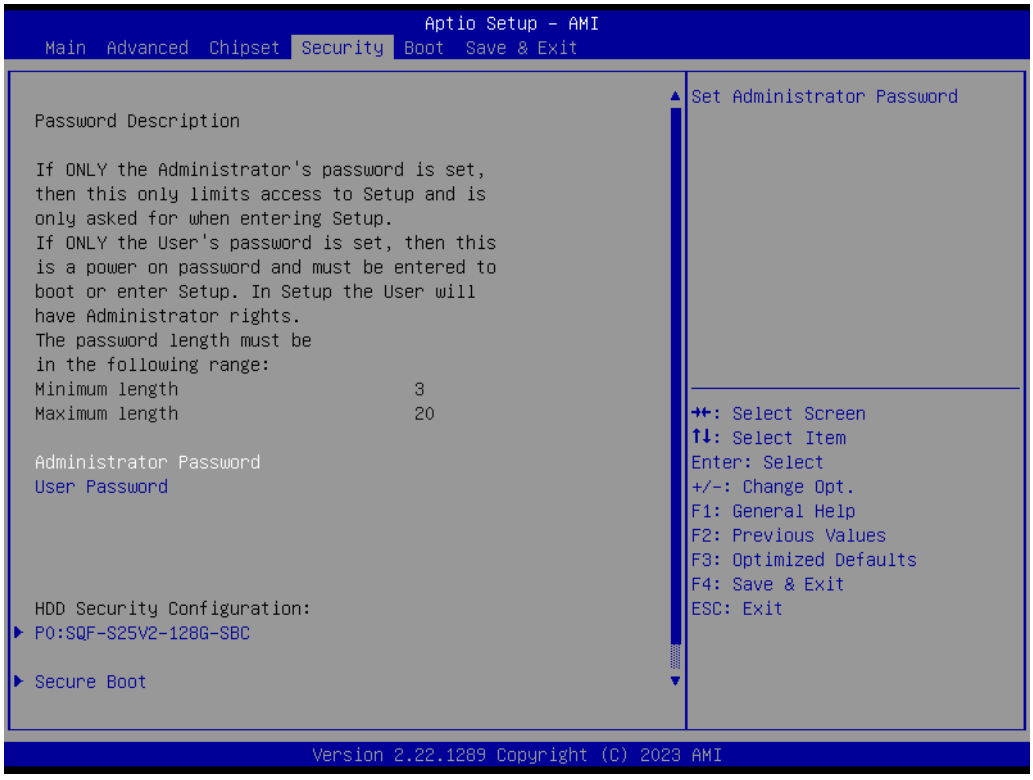


Figure 3.40 Security Chipset

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

3.6.1 Secure Boot

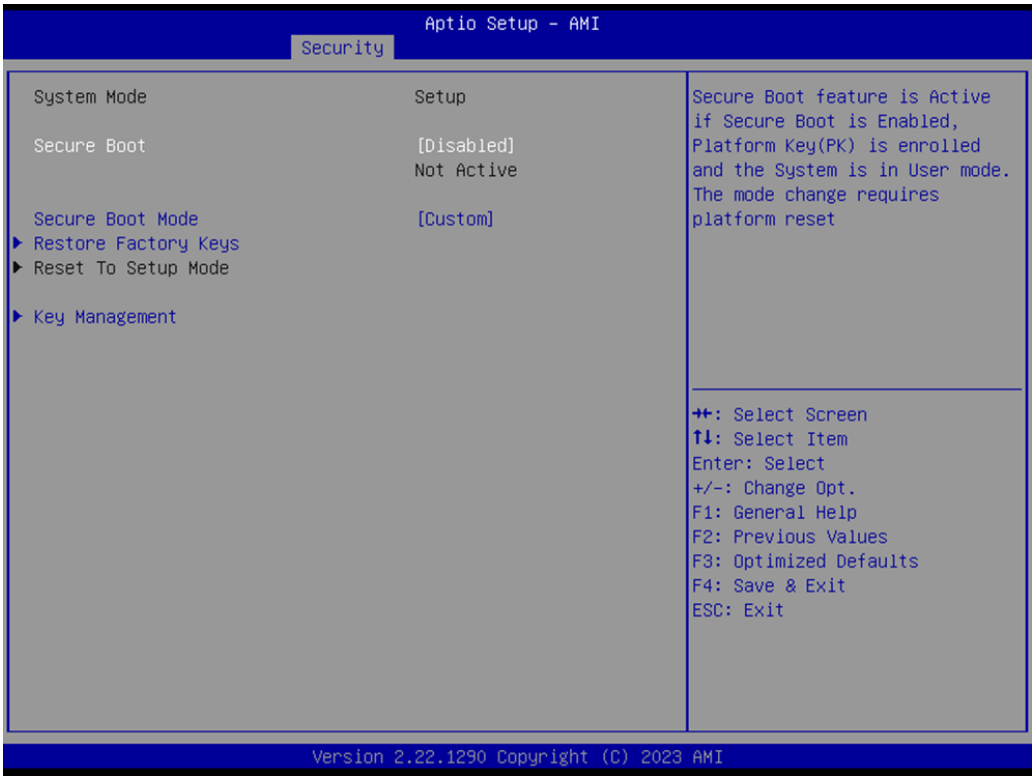


Figure 3.41 Secure Boot

- **Secure Boot**
  The 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 a 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.
- **Restore Factory Keys**
  Force System to User Mode. Install factory default Secure Boot Key databases.
- **Key Management**
  Enables expert users to modify Secure Boot Policy variables without variable authentication.

3.6.2 Boot Setup

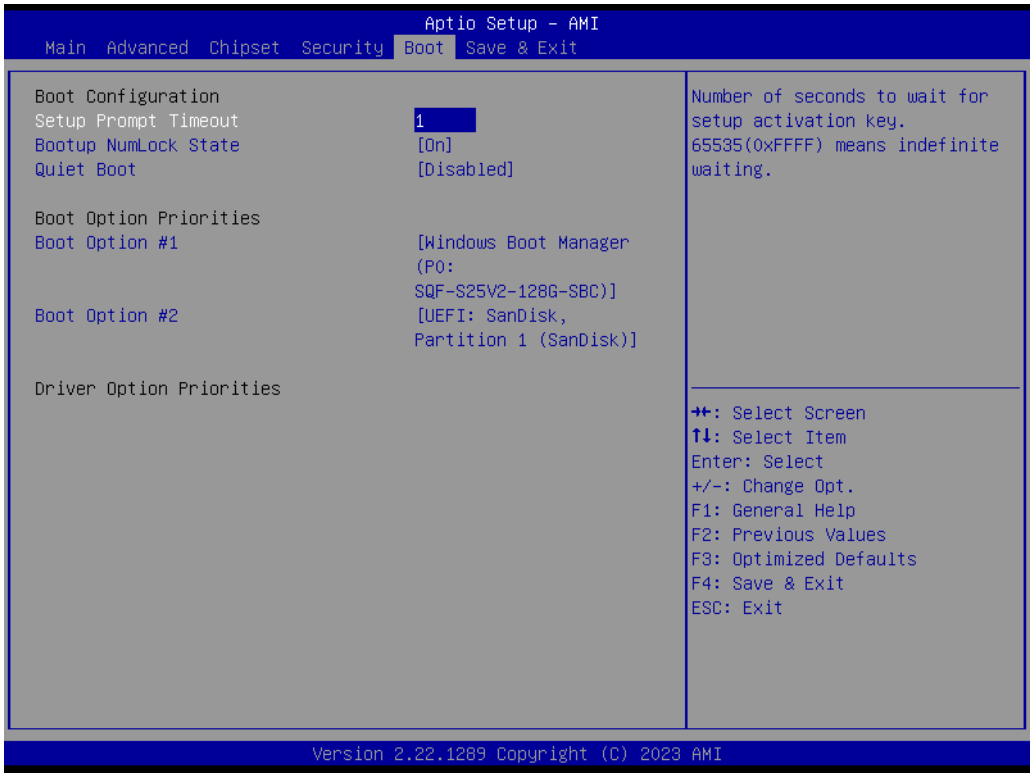


Figure 3.42 Boot Setup

- **Setup Prompt Timeout**
  Number of seconds to wait for the 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.
- **Boot Option #2**
  Sets the system boot order.

3.7 Save & Exit

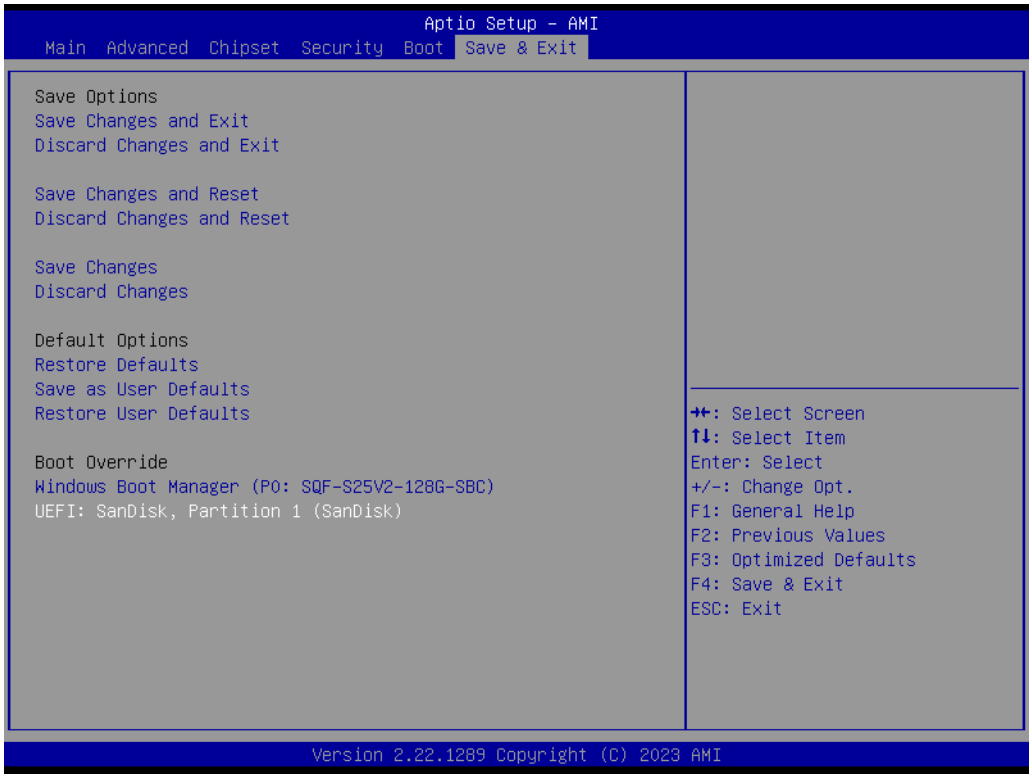


Figure 3.43 Save & Exit

- **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**
  (005B) 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 & Installation

Sections include:

- S/W Introduction
- Driver Installation
- Advantech iManager

4.1 S/W Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft Windows embedded technology". We enable Windows Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (hardware suppliers, system integrators, embedded OS 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 operating system, please connect to the Internet and go to the website http://support.advantech.com.tw and download the drivers that you want to install and follow the Driver Setup instructions to complete the installation.

4.2.2 Other OS

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

4.3 Advantech iManager

Advantech's platforms come equipped with iManager, a microcontroller that provides embedded features for system integrators. Embedded features have been moved from the OS/BIOS level to the board level to increase reliability and simplify integration. iManager runs whether the operating system is running or not; it can count the boot times and running hours of the device, monitor device health, and provide an advanced watchdog to handle errors just as they happen. iManager also comes with a secure & encrypted EEPROM for storing important security keys or other customer-defined 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) specifications and are unified in the same structures. It makes these embedded features easier to integrate, speed up development schedules, and provide the customer with software continuity when upgrading hardware. For more details on how to use the APIs and utilities, please refer to the Advantech iManager 2.0 Software API User Manual.

Control

GPIO

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

SMBus

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

I²C

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

Display

Brightness Control

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

Backlight

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

Monitor

Watchdog

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

Hardware Monitor

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

Hardware Control

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

Power Saving

CPU Speed

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

System Throttling

Refers to a series of methods for reducing power consumption in computers by lowering the clock frequency. These APIs allow the user to lower the clock from 87.5% to 12.5%.

Appendix A

Pin Assignments

A.1 SOM-6884 Pin Assignments

This section gives SOM-6884 pin assignments on the COM Express connector which is compliant with COMR.0 R3.1 Type 6 pin-out definitions. More details on how to use these pins and for design reference, please contact Advantech for a design guide, checklist, reference schematic, and other hardware/software support.

Table A.1: SOM-6884 Pin Assignments

SOM-6884 Rows A,B			
A1	GND (FIXED)	B1	GND (FIXED)
A2	GBE0_MDI3-	B2	GBE0_ACT#
A3	GBE0_MDI3+	B3	LPC_FRAME#/ESPI_CS0#
A4	GBE0_LINK100#	B4	LPC_AD0/ESPI_IO_0
A5	GBE0_LINK1000#	B5	LPC_AD1/ESPI_IO_1
A6	GBE0_MDI2-	B6	LPC_AD2/ESPI_IO_2
A7	GBE0_MDI2+	B7	LPC_AD3/ESPI_IO_3
A8	GBE0_LINK#	B8	LPC_DRQ0#/ESPI_ALERT0#
A9	GBE0_MDI1-	B9	LPC_DRQ1#/ESPI_ALERT1#
A10	GBE0_MDI1+	B10	LPC_CLK/ESPI_CK
A11	GND (FIXED)	B11	GND (FIXED)
A12	GBE0_MDI0-	B12	PWRBTN#
A13	GBE0_MDI0+	B13	SMB_CK
A14	GBE0_CTREF	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#/ESPI_RESET#
A19	SATA0_RX+	B19	SATA1_RX+
A20	SATA0_RX-	B20	SATA1_RX-
A21	GND (FIXED)	B21	GND (FIXED)
A22	SATA2_TX+	B22	SATA3_TX+
A23	SATA2_TX-	B23	SATA3_TX-
A24	SUS_S5#	B24	PWR_OK
A25	SATA2_RX+	B25	SATA3_RX+
A26	SATA2_RX-	B26	SATA3_RX-
A27	BATLOW#	B27	WDT
A28	(S)ATA_ACT#	B28	HDA_SDIN2/SNDW0_CLK
A29	HDA_SYNC	B29	HDA_SDIN1/SNDW0_DAT
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#/ESPI_SAFS	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+

Table A.1: SOM-6884 Pin Assignments			
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	RSMRST_OUT#	B48	USB0_HOST_PRSNT
A49	GBE0_SDP	B49	SYS_RESET#
A50	LPC_SERIRQ/ESPI_CS1#	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-
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	GP_SPI_MOSI	B86	VCC_5V_SBY
A87	eDP_HPD	B87	VCC_5V_SBY
A88	PCIE_CLK_REF+	B88	BIOS_DIS1#

Table A.1: SOM-6884 Pin Assignments			
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	TYPE10#	B97	SPI_CS#
A98	SER0_TX	B98	GP_SPI_MISO
A99	SER0_RX	B99	GP_SPI_CK
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-6884 Rows 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	USB4_1_LSTX	D15	DDI1_CTRLCLK_AUX+/ USB4_1_AUX+
C16	USB4_1_LSRX	D16	DDI1_CTRLCLK_AUX-/ USB4_1_AUX-
C17	USB4_RT_ENA	D17	USB4_PD_I2C_ALERT#
C18	GND	D18	PMCALERT#
C19	PCIE_RX6+	D19	PCIE_TX6+
C20	PCIE_RX6-	D20	PCIE_TX6-
C21	GND (FIXED)	D21	GND (FIXED)
C22	PCIE_RX7+	D22	PCIE_TX7+

Table A.1: SOM-6884 Pin Assignments			
C23	PCIE_RX7-	D23	PCIE_TX7-
C24	DDI1_HPD	D24	GND
C25	SML0_CLK	D25	GND
C26	SML0_DAT	D26	DDI1_PAIR0+/USB4_1_SSTX0+
C27	SML1_CLK	D27	DDI1_PAIR0-/USB4_1_SSTX0-
C28	SML1_DAT	D28	GND
C29	USB4_PD_I2C_CLK	D29	DDI1_PAIR1+/USB4_1_SSRX0+
C30	USB4_PD_I2C_DAT	D30	DDI1_PAIR1-/USB4_1_SSRX0-
C31	GND (FIXED)	D31	GND (FIXED)
C32	DDI2_CTRLCLK_AUX+/ USB4_2_AUX+	D32	DDI1_PAIR2+/USB4_1_SSTX1+
C33	DDI2_CTRLDATA_AUX-/ USB4_2_AUX-	D33	DDI1_PAIR2-/USB4_1_SSTX1-
C34	DDI2_DDC_AUX_SEL	D34	DDI1_DDC_AUX_SEL
C35	USB4_2_LSTX	D35	USB4_2_LSRX
C36	DDI3_CTRLCLK_AUX+	D36	DDI1_PAIR3+/USB4_1_SSRX1+
C37	DDI3_CTRLDATA_AUX-	D37	DDI1_PAIR3-/USB4_1_SSRX1-
C38	DDI3_DDC_AUX_SEL	D38	GND
C39	DDI3_PAIR0+	D39	DDI2_PAIR0+/USB4_2_SSTX0+
C40	DDI3_PAIR0-	D40	DDI2_PAIR0-/USB4_2_SSTX0-
C41	GND (FIXED)	D41	GND (FIXED)
C42	DDI3_PAIR1+	D42	DDI2_PAIR1+/USB4_2_SSRX0+
C43	DDI3_PAIR1-	D43	DDI2_PAIR1-/USB4_2_SSRX0-
C44	DDI3_HPD	D44	DDI2_HPD
C45	GP_SPI_CS#	D45	GND
C46	DDI3_PAIR2+	D46	DDI2_PAIR2+/USB4_2_SSTX1+
C47	DDI3_PAIR2-	D47	DDI2_PAIR2-/USB4_2_SSTX1-
C48	RSVD	D48	GND
C49	DDI3_PAIR3+	D49	DDI2_PAIR3+/USB4_2_SSRX1+
C50	DDI3_PAIR3-	D50	DDI2_PAIR3-/USB4_2_SSRX1-
C51	GND (FIXED)	D51	GND (FIXED)
C52	PEG_RX0+	D52	PEG_TX0+
C53	PEG_RX0-	D53	PEG_TX0-
C54	TYPE0#	D54	PEG_LANE_RV#
C55	PEG_RX1+	D55	PEG_TX1+
C56	PEG_RX1-	D56	PEG_TX1-
C57	TYPE1#	D57	TYPE2#
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	RSVD	D63	GND
C64	RSVD	D64	GND
C65	PEG_RX4+	D65	PEG_TX4+
C66	PEG_RX4-	D66	PEG_TX4-
C67	RAPID_SHUTDOWN	D67	GND

Table A.1: SOM-6884 Pin Assignments			
C68	PEG_RX5+	D68	PEG_TX5+
C69	PEG_RX5-	D69	PEG_TX5-
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	GND	D77	GND
C78	PEG_RX8+	D78	PEG_TX8+
C79	PEG_RX8-	D79	PEG_TX8-
C80	GND (FIXED)	D80	GND (FIXED)
C81	PEG_RX9+	D81	PEG_TX9+
C82	PEG_RX9-	D82	PEG_TX9-
C83	GND	D83	GND
C84	GND	D84	GND
C85	PEG_RX10+	D85	PEG_TX10+
C86	PEG_RX10-	D86	PEG_TX10-
C87	GND	D87	GND
C88	PEG_RX11+	D88	PEG_TX11+
C89	PEG_RX11-	D89	PEG_TX11-
C90	GND (FIXED)	D90	GND (FIXED)
C91	PEG_RX12+	D91	PEG_TX12+
C92	PEG_RX12-	D92	PEG_TX12-
C93	GND	D93	GND
C94	PEG_RX13+	D94	PEG_TX13+
C95	PEG_RX13-	D95	PEG_TX13-
C96	GND	D96	GND
C97	GND	D97	GND
C98	PEG_RX14+	D98	PEG_TX14+
C99	PEG_RX14-	D99	PEG_TX14-
C100	GND (FIXED)	D100	GND (FIXED)
C101	PEG_RX15+	D101	PEG_TX15+
C102	PEG_RX15-	D102	PEG_TX15-
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 gives you information for the watchdog timer programming on the SOM-6884 CPU System on Module.

Sections include:

- Programming the Watchdog Timer

B.1 Programming the Watchdog Timer

Table 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 selects the available IRQ number from BIOS, and then sets to EC. Only Win10 supports this.

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

For details, please refer to the 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

Table C.1: GPIO Register	
GPIO Byte Mapping	**H/W Pin Name**
BIT0	GPI0
BIT1	GPI1
BIT2	GPI2
BIT3	GPI3
BIT4	GPO0
BIT5	GPO1
BIT6	GPO2
BIT7	GPO3

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

Appendix D

System Assignments

This appendix gives you information about the system resource allocation on the SOM-6884 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
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
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-x000000AD	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
0x00003090-0x00003097	Standard SATA AHCI Controller

Table D.1: System I/O ports	
0x00003080-0x00003083	Standard SATA AHCI Controller
0x00003060-0x0000307F	Standard SATA AHCI Controller
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x00001854-0x00001857	Motherboard resources
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x00003000-0x0000303F	Intel® Iris® Xe Graphics
0x00002000-0x000020FE	Motherboard resources
0x0000EFA0-0x0000EFBF	Intel® SMBus - 51A3

D.2 Interrupt Assignments

Table D.2: Interrupt Assignments

Interrupt#	Interrupt Source
IRQ 16	Intel® Serial IO UART Host Controller - 51A8
IRQ 4294967291	Standard SATA AHCI Controller
IRQ 14	Intel® Serial I/O GPIO Host Controller - INTC1055
IRQ 4294967274	Intel® USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 4294967294	PCI Express Root Port
IRQ 4294967290	Standard NVM Express Controller
IRQ 4294967289	Standard NVM Express Controller
IRQ 4294967288	Standard NVM Express Controller
IRQ 4294967287	Standard NVM Express Controller
IRQ 4294967286	Standard NVM Express Controller
IRQ 4294967285	Standard NVM Express Controller
IRQ 4294967284	Standard NVM Express Controller
IRQ 4294967283	Standard NVM Express Controller
IRQ 4294967282	Standard NVM Express Controller
IRQ 4294967281	Standard NVM Express Controller
IRQ 4294967280	Standard NVM Express Controller
IRQ 4294967279	Standard NVM Express Controller
IRQ 4294967278	Standard NVM Express Controller
IRQ 4294967277	Standard NVM Express Controller
IRQ 4294967276	Standard NVM Express Controller
IRQ 4294967275	Standard NVM Express Controller
IRQ 40	Intel® Serial I/O I2C Host Controller - 51E9
IRQ 4294967257	Intel® Smart Sound Technology BUS
IRQ 4294967293	Intel® PCI Express Root Port #9 - 51B0
IRQ 6	Motherboard resources
IRQ 0	System timer
IRQ 55	Microsoft ACPI-Compliant System
IRQ 56	Microsoft ACPI-Compliant System
IRQ 57	Microsoft ACPI-Compliant System
IRQ 58	Microsoft ACPI-Compliant System
IRQ 59	Microsoft ACPI-Compliant System
IRQ 60	Microsoft ACPI-Compliant System
IRQ 61	Microsoft ACPI-Compliant System
IRQ 62	Microsoft ACPI-Compliant System
IRQ 63	Microsoft ACPI-Compliant System
IRQ 64	Microsoft ACPI-Compliant System
IRQ 65	Microsoft ACPI-Compliant System
IRQ 66	Microsoft ACPI-Compliant System
IRQ 67	Microsoft ACPI-Compliant System
IRQ 68	Microsoft ACPI-Compliant System
IRQ 69	Microsoft ACPI-Compliant System

Table D.2: Interrupt Assignments	
IRQ 70	Microsoft ACPI-Compliant System
IRQ 71	Microsoft ACPI-Compliant System
IRQ 72	Microsoft ACPI-Compliant System
IRQ 73	Microsoft ACPI-Compliant System
IRQ 74	Microsoft ACPI-Compliant System
IRQ 75	Microsoft ACPI-Compliant System
IRQ 76	Microsoft ACPI-Compliant System
IRQ 77	Microsoft ACPI-Compliant System
IRQ 78	Microsoft ACPI-Compliant System
IRQ 79	Microsoft ACPI-Compliant System
IRQ 80	Microsoft ACPI-Compliant System
IRQ 81	Microsoft ACPI-Compliant System
IRQ 82	Microsoft ACPI-Compliant System
IRQ 83	Microsoft ACPI-Compliant System
IRQ 84	Microsoft ACPI-Compliant System
IRQ 85	Microsoft ACPI-Compliant System
IRQ 86	Microsoft ACPI-Compliant System
IRQ 87	Microsoft ACPI-Compliant System
IRQ 88	Microsoft ACPI-Compliant System
IRQ 89	Microsoft ACPI-Compliant System
IRQ 90	Microsoft ACPI-Compliant System
IRQ 91	Microsoft ACPI-Compliant System
IRQ 92	Microsoft ACPI-Compliant System
IRQ 93	Microsoft ACPI-Compliant System
IRQ 94	Microsoft ACPI-Compliant System
IRQ 95	Microsoft ACPI-Compliant System
IRQ 96	Microsoft ACPI-Compliant System
IRQ 97	Microsoft ACPI-Compliant System
IRQ 98	Microsoft ACPI-Compliant System
IRQ 99	Microsoft ACPI-Compliant System
IRQ 100	Microsoft ACPI-Compliant System
IRQ 101	Microsoft ACPI-Compliant System
IRQ 102	Microsoft ACPI-Compliant System
IRQ 103	Microsoft ACPI-Compliant System
IRQ 104	Microsoft ACPI-Compliant System
IRQ 105	Microsoft ACPI-Compliant System
IRQ 106	Microsoft ACPI-Compliant System
IRQ 107	Microsoft ACPI-Compliant System
IRQ 108	Microsoft ACPI-Compliant System
IRQ 109	Microsoft ACPI-Compliant System
IRQ 110	Microsoft ACPI-Compliant System
IRQ 111	Microsoft ACPI-Compliant System
IRQ 112	Microsoft ACPI-Compliant System
IRQ 113	Microsoft ACPI-Compliant System
IRQ 114	Microsoft ACPI-Compliant System
IRQ 115	Microsoft ACPI-Compliant System
IRQ 116	Microsoft ACPI-Compliant System

Table D.2: Interrupt Assignments	
IRQ 117	Microsoft ACPI-Compliant System
IRQ 118	Microsoft ACPI-Compliant System
IRQ 119	Microsoft ACPI-Compliant System
IRQ 120	Microsoft ACPI-Compliant System
IRQ 121	Microsoft ACPI-Compliant System
IRQ 122	Microsoft ACPI-Compliant System
IRQ 123	Microsoft ACPI-Compliant System
IRQ 124	Microsoft ACPI-Compliant System
IRQ 125	Microsoft ACPI-Compliant System
IRQ 126	Microsoft ACPI-Compliant System
IRQ 127	Microsoft ACPI-Compliant System
IRQ 128	Microsoft ACPI-Compliant System
IRQ 129	Microsoft ACPI-Compliant System
IRQ 130	Microsoft ACPI-Compliant System
IRQ 131	Microsoft ACPI-Compliant System
IRQ 132	Microsoft ACPI-Compliant System
IRQ 133	Microsoft ACPI-Compliant System
IRQ 134	Microsoft ACPI-Compliant System
IRQ 135	Microsoft ACPI-Compliant System
IRQ 136	Microsoft ACPI-Compliant System
IRQ 137	Microsoft ACPI-Compliant System
IRQ 138	Microsoft ACPI-Compliant System
IRQ 139	Microsoft ACPI-Compliant System
IRQ 140	Microsoft ACPI-Compliant System
IRQ 141	Microsoft ACPI-Compliant System
IRQ 142	Microsoft ACPI-Compliant System
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Table D.2: Interrupt Assignments	
IRQ 164	Microsoft ACPI-Compliant System
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Table D.2: Interrupt Assignments	
IRQ 262	Microsoft ACPI-Compliant System
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Table D.2: Interrupt Assignments	
IRQ 309	Microsoft ACPI-Compliant System
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Table D.2: Interrupt Assignments	
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Table D.2: Interrupt Assignments	
IRQ 403	Microsoft ACPI-Compliant System
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Table D.2: Interrupt Assignments	
IRQ 450	Microsoft ACPI-Compliant System
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Table D.2: Interrupt Assignments	
IRQ 497	Microsoft ACPI-Compliant System
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IRQ 510	Microsoft ACPI-Compliant System
IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967256	Intel® Management Engine Interface #1
IRQ 41	Trusted Platform Module 2.0
IRQ 27	Intel® Serial I/O I2C Host Controller - 51E8
IRQ 4294967292	PCI Express Root Port
IRQ 4294967273	Intel® Iris® Xe Graphics
IRQ 36	Intel® Serial I/O SPI Host Controller - 51AA
IRQ 4294967272	Intel® Ethernet Controller I226-IT
IRQ 4294967271	Intel® Ethernet Controller I226-IT
IRQ 4294967270	Intel® Ethernet Controller I226-IT
IRQ 4294967269	Intel® Ethernet Controller I226-IT
IRQ 4294967268	Intel® Ethernet Controller I226-IT
IRQ 4294967267	Intel® Ethernet Controller I226-IT
IRQ 4294967266	Intel® Ethernet Controller I226-IT
IRQ 4294967265	Intel® Ethernet Controller I226-IT
IRQ 4294967264	Intel® Ethernet Controller I226-IT
IRQ 4294967263	Intel® Ethernet Controller I226-IT
IRQ 4294967262	Intel® Ethernet Controller I226-IT
IRQ 4294967261	Intel® Ethernet Controller I226-IT
IRQ 4294967260	Intel® Ethernet Controller I226-IT
IRQ 4294967259	Intel® Ethernet Controller I226-IT
IRQ 4294967258	Intel® Ethernet Controller I226-IT

D.3 1st MB Memory Map

Table D.3: 1st MB Memory Map

Addr. Range (Hex)	Device
0xFFEF7000-0xFFEF7FFF	Intel® Serial I/O UART Host Controller - 51A8
0xFEDC0000-0xFEDC7FFF	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
0x50800000-0x50801FFF	Standard SATA AHCI Controller
0x50803000-0x508030FF	Standard SATA AHCI Controller
0x50802000-0x508027FF	Standard SATA AHCI Controller
0xFD6E0000-0xFD6EFFFF	Intel® Serial IO GPIO Host Controller - INTC1055
0xFD6D0000-0xFD6DFFFF	Intel® Serial IO GPIO Host Controller - INTC1055
0xFD6A0000-0xFD6AFFFF	Intel® Serial IO GPIO Host Controller - INTC1055
0xFD690000-0xFD69FFFF	Intel® Serial IO GPIO Host Controller - INTC1055
0x1110000-0x1117FFF	Intel® Crashlog - A77D
0x1100000-0x110FFFF	Intel® USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
0xFED00000-0xFED003FF	High precision event timer
0x50700000-0x507FFFFF	PCI Express Root Port
0x50700000-0x507FFFFF	Standard NVM Express Controller
0xFFEF9000-0xFFEF9FFF	Intel® Serial IO I2C Host Controller - 51E9
0xFFEFC000-0xFFEFFFFF	Intel® Smart Sound Technology BUS
0xFFF00000-0xFFFFFFFF	Intel® Smart Sound Technology BUS
0x50400000-0x506FFFFF	Intel® PCI Express Root Port #9 - 51B0
0x50400000-0x506FFFFF	PCI Express Root Complex
0xFE010000-0xFE010FFF	Intel® SPI (flash) Controller - 51A4
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
0xFFEF8000-0xFFEF8FFF	Intel® Management Engine Interface #1
0xFED40000-0xFED44FFF	Trusted Platform Module 2.0
0xFFEFA000-0xFFEFAFFF	Intel® Serial IO I2C Host Controller - 51E8
0x0000-0xFFFFFF	Intel® Iris® Xe Graphics
0x0000-0xFFFFFFF	Intel® Iris® Xe Graphics
0xFFEFB000-0xFFEFBFFF	Intel® Serial I/O SPI Host Controller - 51AA
0x50500000-0x505FFFFF	Intel® Ethernet Controller I226-IT
0x50600000-0x50603FFF	Intel® Ethernet Controller I226-IT
0x1128000-0x11280FF	Intel® SMBus - 51A3

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