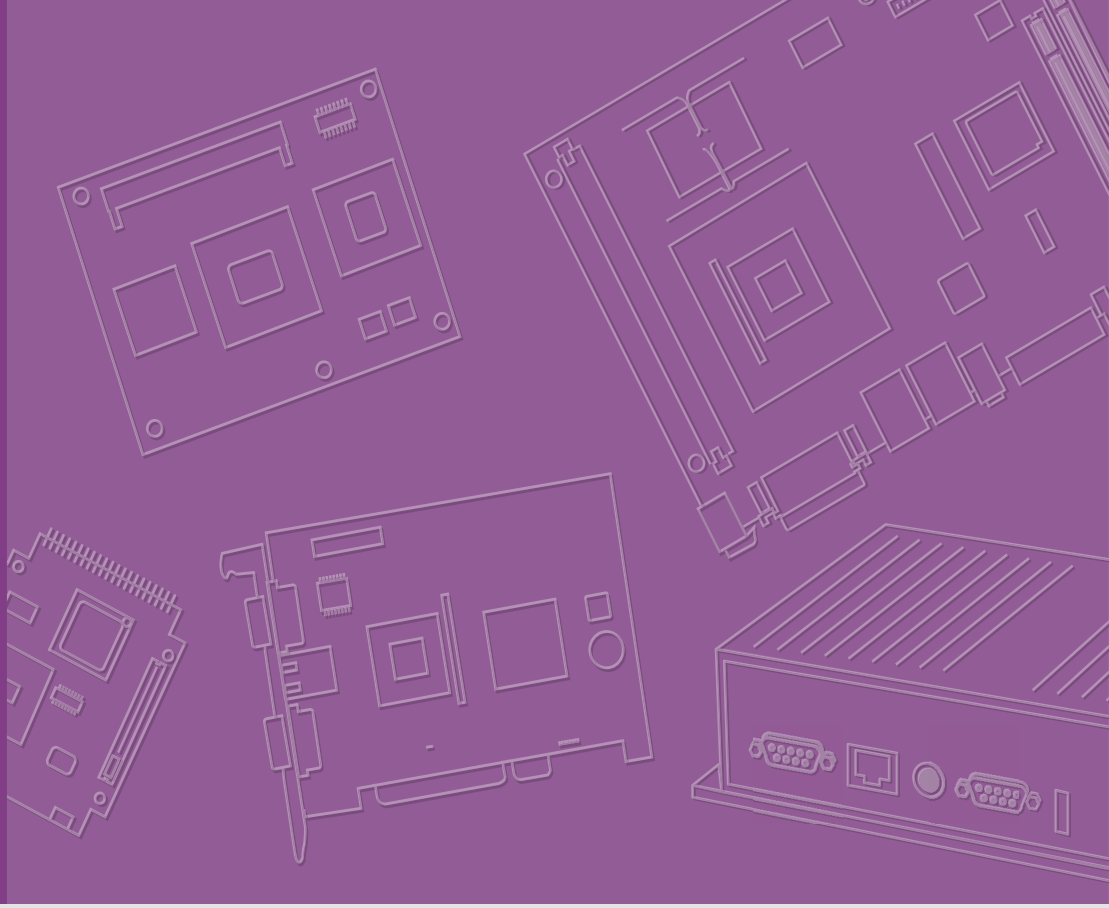

User Manual

ASMB-816 Series

LGA 4189 Intel® 3rd Gen Xeon® Scalable ATX Server Board with 8 x DDR4, 3x PCIe x 16, 8 x SATA 3, 6 x USB 3.0, Dual 10GbE and IPMI

ADVANTECH

Enabling an Intelligent Planet

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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. 2001081600 Edition 1

August 2021

A Message to the Customer

Advantech Customer Services

Each and every Advantech product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new Advantech equipment is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name Advantech has come to be known. Your satisfaction is our primary concern. Here is a guide to Advantech's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support

We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone.

So please consult this manual first. If you still cannot find the answer, gather all the information or questions that apply to your problem, and with the product close at hand, call your dealer. Our dealers are well trained and ready to give you the support you need to get the most from your Advantech products. In fact, most problems reported are minor and are easily solved over the phone.

In addition, free technical support is available from Advantech engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products.

Declaration of Conformity

FCC Class B

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

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

Initial Inspection

Before installing motherboard, please make sure that the following materials have been shipped:

- 1 x ASMB-816 ATX motherboard
- 1 x ASMB-816 Startup Manual
- 2 x Serial ATA HDD data cables
- 1 x I/O port bracket
- 1 x CPU carrier
- 2 x CPU power cable (8P)
- 2 x SATA power cable
- 1 x Front panel convert cable
- 1 x Screw for M.2 device
- 1 x Warranty card

If any of these items are missing or damaged, contact distributor or sales representative immediately. We have carefully inspected the ASMB-816 mechanically and electrically before shipment. It should be free of marks and scratches and in perfect working order upon receipt. When unpacking the ASMB-816, check it for signs of shipping damage. (For example, damaged box, scratches, dents, etc.) If it is damaged or it fails to meet the specifications, notify our service department or local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection, we will make arrangements to repair or replace the unit.

Order Information

Part Number	Chipset	HDD	Expansion Slot	IPMI	10GbE LAN
ASMB-816-00A1	C621A	8*SATA3+ 1*M.2	3 PCIe x 16 + 2 PCIe x 8 + 1 PCIe x 4 + 1 PCIe x 1	No	No
ASMB-816I-00A1	C621A	8*SATA3+ 1*M.2	3 PCIe x 16 + 2 PCIe x 8 + 1 PCIe x 4 + 1 PCIe x 1	Yes	No
ASMB-816T2-00A1	C621A	8*SATA3+ 1*M.2	3 PCIe x 16 + 2 PCIe x 8 + 1 PCIe x 4 + 1 PCIe x 1	Yes	Yes

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Chapter 1

Overview

1.1 Introduction

The ASMB-816 server board is the most advanced Intel Xeon Processor scalable family series board for server-grade IPC applications that require high-performance computing power & multi-expansion slots. This server board supports Intel Xeon Scalable series processor and DDR4 ECC-REG 2400/2666/2933/3200 MHz memory up to 1024 GB.

ASMB-816 provides three PCIe x16 + two PCIe x8 (one x4 link) from CPU in Gen4, and one PCIe x4 + one PCIe x1 from PCH in Gen3 high speed. In addition, the full ASMB-816 SKU has dual Gigabit and dual 10GbE Ethernet LAN ports that eliminate network bottlenecks. (ASMB-816 I & T2 SKUs only)

A fifth RJ-45 LAN connector (LAN5) is dedicated for IPMI function that allows remote control management. One RJ-45 LAN jack (LAN 4) from 10GbE port can also be used as IPMI LAN. High reliability and outstanding performance makes ASMB-816 the ideal platform for industrial server/networking applications.

By using the Intel C621A chipset, the ASMB-816 offers a variety of features such as 6 x USB3.0 and 7 x USB 2.0 connectivity, 8 x onboard SATA III, and 1 x M.2 (SATA and PCIe) interface. It supports software RAID 0, 1, 10 and 5 (Windows only*), and with the latest Intel® RSTe (Rapid Storage Technology Enterprise) it provides a compelling RAID solution for NVMe SSDs via Intel VROC (Virtual RAID on CPU) HW key.

These powerful I/O capabilities ensure even more reliable data storage capabilities and high-speed I/O peripheral connectivity.

Note!

1. *IPMI module will be included in ASMB-816I and ASMB-816T2 SKUs. Only ASMB-816T2 SKU can support 10GbE LAN ports.*
2. *Please refer to Ordering Information at the front for chipset, IPMI, and LAN support on individual product SKUs.*
3. *Please refer to the release note of each Linux OS for Intel's C621A chipset SATA RAID function support.*

1.2 Features

General

- **Intel Xeon Processor Scalable Family support:** ASMB-816 is equipped with single CPU socket to support Intel Xeon Platinum/Gold/Silver series up to 40-core processors.
- **High performance I/O capability:** 2 x 10GbE + 2 x GbE LAN, 3 PCIe x16 slot + 2 x PCIe x8 (1 x4 link) + 1 x PCIe x4 + 1 PCIe x1, 8 x SATA and 1 x M.2 connector, 6 x USB 3.0 and 7 x USB 2.0 (incl. 1 x Type-A) ports.
- **Standard ATX form factor with industrial features:** ASMB-816 provides industrial features like long product life cycle, reliable operation under wide temperature range, watchdog timer, etc.
- **IPMI 2.0 support:** ASMB-816 (T2 and I SKUs) equipped with ASPEED 2500 BMC chip supports IPMI 2.0 (Intelligent Platform Management Interface 2.0) via dedicated LAN port.
- **KVM over IP:** KVM over IP function allows BIOS level remote control of ASMB-816 (T2 and I SKUs) through your own computer.

1.3 Specifications

Table 1.1: Specifications	
Processor	
CPU	■ Dual Intel LGA4189 Xeon processor sockets ■ Supports Intel 3rd Gen Xeon Scalable family, up to 40 cores ■ Supports the TDP of processor up to 270W (Please consider extended air thermal solution while using CPU > 205W TDP)
System Memory	
Memory Capacity	■ Supports DDR4 ECC-REG memory module ■ Total 8 memory slots provided ■ Supports up to 512 GB RDIMM/1TB LRDIMM ■ One DIMM per channel
Memory Type	Supports DDR4 2666/2933/3200 MHz RDIMM/LRDIMM modules
DIMM Sizes	Each memory slot supports 8GB, 16GB, 32GB, 64GB and 128GB (LRDIMM) memory modules
Memory Voltage	1.2 V
Error Detection	■ Corrects single-bit errors ■ Detects double-bit errors (using ECC memory)
On-Board Devices	
Chipsets	Intel C621A PCH
Network Controllers	■ 2 x Intel X550 10GbE and 2 x Intel I210 Gigabit Ethernet Controller connected to PCH (ASMB-816 I & T2 SKUs) ■ Above network supports 10 GbE Base-T and 100/1000 Base-T, with RJ-45 output
VGA	ASPEED AST2500/2510 controller with 64 MB VGA memory provides basic 2D VGA function
EC	ITE IT8528E chip provide motherboard keyboard mouse, RS-232, and hardware monitor functions
BMC	One Realtek 8201F Gigabit PHY connected to AST2500 for BMC remote management (ASMB-815I & T2 SKUs)
Input/Output	
Storage	■ Total 8 x SATA ports and 1 x M.2 (SATA/PCIe x4 compatible) provide 6 Gb/s and 8 Gb/s bandwidth ■ RAID 0, 1, 5, 10 support (Windows only)
LAN	■ 4 x RJ-45 LAN ports (2 x 10GbE + 2 x 10/100/1000 Base-T LAN) ■ 1 x RJ-45 Dedicated IPMI LAN port (10/100 Mbps) for IPMI only, there is no regular LAN function (ASMB-816 I & T2 SKUs)
USB	■ 4 x USB 3.0 ports + 2 x USB 2.0 ports at rear window ■ 1 x USB 3.0 internal header (2 ports) ■ 2 x USB 2.0 internal headers (4ports) ■ 1 x internal Type-A USB 2.0 port
Graphics	■ 1 x VGA port.
Keyboard/Mouse	■ PS/2 keyboard and mouse internal header (onboard)
Serial Port/Header	■ 1 x RS232 port at rear window, 1 x internal header (2 x 5P pitch: 2.50 mm)

Table 1.1: Specifications	
Power Connector	
System Power	1 x 24-pin SSI EPS 12V power connector (Input 12V, 5V, 3.3V, 5Vsb)
CPU Power	2 x 8-pin SSI EPS 12V power connector for CPU & Memory power (12V)
PCIe slot power	1 x 4-pin 12V power connector for PCIe slot 12V input
Expansion Slots	
PCI-express	■ 3 x PCIe x16 slot – PCIEX16_SLOT2 (Gen4 x16 link, from CPU) – PCIEX16_SLOT4 (Gen4 x16 link, from CPU) – PCIEX16_SLOT6 (Gen4 x16 link, from CPU) ■ 2 x PCIe x8 slot – PCIEX8_SLOT3 (Gen4 x4 link, from CPU) – PCIEX8_SLOT7 (Gen4 x8 link, from CPU) ■ 1 x PCIe x4 slot – PCIEX4_SLOT1 (Gen4 x4 link, from PCH) ■ 1 x PCIe x1 slot – PCIEX1_SLOT5 (Gen4 x2 link, from PCH)
System BIOS	
BIOS Type	256Mb SPI Flash EEPROM with AMI BIOS
PC Health Monitoring	
Voltage	Monitors for CPU Cores, +3.3V, +5V, +12V, +5V Standby, VBAT
FAN	■ One 4-pin header for CPU cooler and five 4-pin headers for system fans (front*4 + rear*1) ■ All fans with tachometer status monitoring ■ Thermal control for all fan connectors
Temperature	■ Monitoring for CPU (PECI) ■ Monitoring for System (EC)
Other Features (Case Open)	■ Chassis intrusion detection ■ Chassis intrusion header
Operating Environment/Compliance	
RoHS	RoHS 6/6 Pb Free Compliant
Environmental Spec.	■ Operating Temperature: 0 to 60° C ■ Non-operating Temperature: -40 to 85° C ■ Operating Relative Humidity: 10% to 95% (non-condensing) ■ Non-operating Relative Humidity: 10% to 95% (non-condensing)

1.4 Board Layout, Jumpers and Connectors

Connectors on the ASMB-816 are linked to external devices such as hard disk drives. In addition, ASMB-816 has a number of jumpers that are used to configure the system for specific applications.

The tables below list the functions of each jumper and connector. Later sections in this chapter give instructions for setting jumpers. Chapter 2 gives instructions for connecting external devices to ASMB-816.

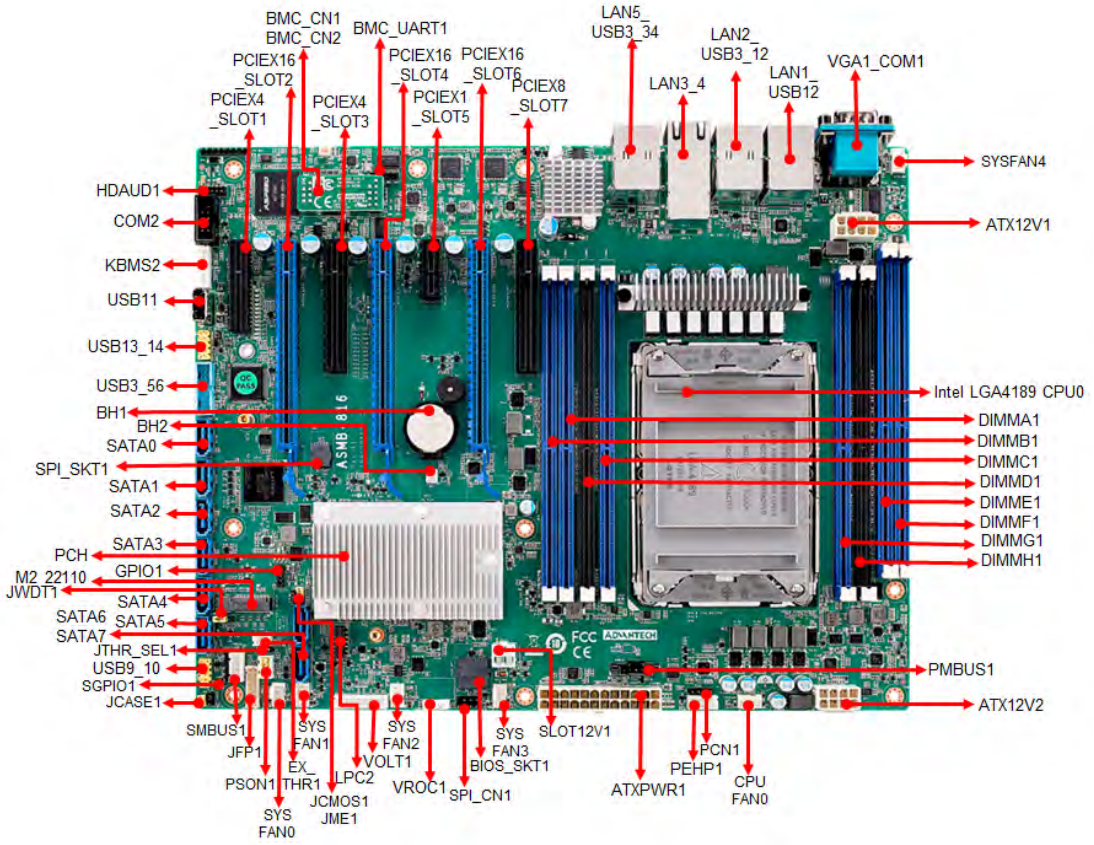


Figure 1.1 Board Layout

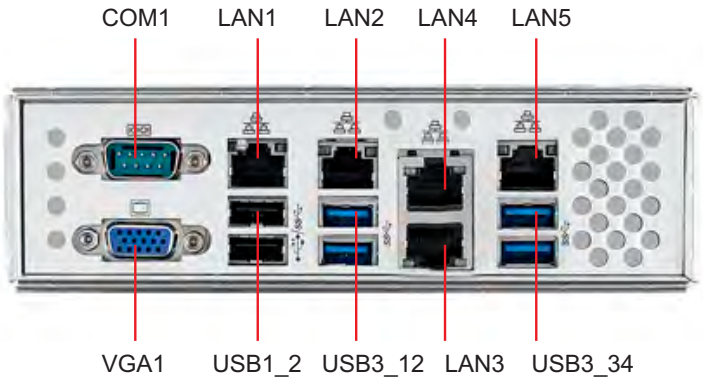
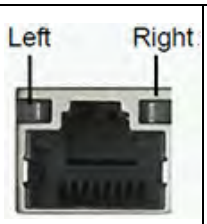


Figure 1.2 Rear I/O of Full SKU (ASMB-816T2-00A1E)

- LAN 4 is shared LAN with BMC.
- LAN 5 is dedicated BMC LAN.

Table 1.2: Onboard LAN LED Color Definition			
10/100/1000 & 10G Mbps LAN Link/Activity LED Scheme			
		LAN3 & LAN4 (10G)	
		Left LED	Right LED
100 Mbps	Link Active	Off Off	Green Blinking green
1G Mbps	Link Active	Amber Amber	Green Blinking green
10G Mbps	Link Active	Green Green	Green Blinking green

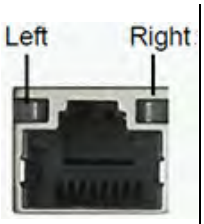
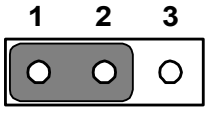
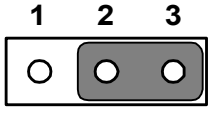
		LAN1 & LAN2 (1G)	
		Left LED	Right LED
10 Mbps	Link Active	Off Off	Green Blinking green
100 Mbps	Link Active	Amber Amber	Green Blinking green
1000 Mbps	Link Active	Green Green	Green Blinking green
No Link		Off	Off

Table 1.3: Jumpers		
Label	**Function**	**Default**
JCMOS1	CMOS Clear	1-2
JME1	ME update	1-2
JWDT1	Watch Dog Reset	1-2
PSON1	AT(1-2)/ATX(2-3)	2-3
JCASE1	Chassis case open alarm	1-2
JTHR_SEL	On board(1-2)/external thermistor(2-3)	1-2
JPRSNT1/2	PCIE slot switch: Auto (1-2)/Manual (2-3)	1-2



Keep CMOS data/Disable ME update



Clear CMOS data/Enable ME update

Table 1.4: Connectors	
Label	**Function**
ATX12V1, ATX12V2	SSI EPS 12V auxiliary power connector (for CPU) and memory
ATXPWR1	SSI EPS 24-pin main power connector (for system)
BH2	For optional battery kit
BIOS_SKT1	BIOS SPI ROM
BMC_CN1, BMC_CN2	IPMI connector (ASMB-816 I & T2 SKUs only)
COM2	Serial port: RS-232
CPU0	Intel LGA4189 CPU0 socket
CPUFAN0	CPU0 fan connector (4-pin)
DIMMA1	Channel A DIMM1
DIMMB1	Channel B DIMM1
DIMMC1	Channel C DIMM1
DIMMD1	Channel D DIMM1
DIMME1	Channel E DIMM1
DIMMF1	Channel F DIMM1
DIMMG1	Channel G DIMM1
DIMMH1	Channel H DIMM1
EX_THR1	Connector for external thermistor
GPIO1	GPIO function for customize usage
HDAUD1	Audio header
JFP1	Front panel pin header
KBMS2	For additional keyboard/mouse
LAN1~LAN5	RJ-45 LAN connector
LPC2	LPC port for debug & TPM module
M2_22110	M.2 connector (SATA & PCIe x4)
PEHP1	NVMe RAID LED control
PMBUS1	PMBUS connector to communicate with power supply
SATA0~SATA7	Serial ATA0~7
SGPIO1	Supports Serial_Link interface for onboard SATA connections
PCIEX4_SLOT1	PCIE x4 slot (x4 link) (PCH)
PCIEX16_SLOT2	PCIE x16 slot (x16 link) (CPU)
PCIEX4_SLOT3	PCIE x8 slot (x4 link) (CPU)
PCIEX16_SLOT4	PCIE x16 slot (x16 link) (CPU)
PCIEX1_SLOT5	PCIE x1 slot (x1 link) (PCH)
PCIEX16_SLOT6	PCIE x16 slot (x16 link) (CPU)
PCIEX8_SLOT7	PCIE x8 slot (x8 link) (CPU)
SLOT12V1	For PCIe slot 12V input only
SMBUS1	SMBus header (SMBus from either BMC or PCH)
SPI_CN1	Connector for BIOS update tool
SPI_SKT1	EC EEPROM
SYSFAN0~SYSFAN4	System FAN connector (4-pin)
USB3_12, USB3_34, USB3_56	USB 3.0 port 1, 2, 3, 4; USB 3.0 port 5, 6 (20-pin header)
USB1_2, USB9_10, USB13_14	USB 2.0 port 1, 2; USB 2.0 port 9, 10, 13, 14 (9-pin header)
USB11	USB 2.0 port 11 (Type-A)
VGA1_COM1	VGA+COM connector
VOLT1	Voltage display
VROC1	Intel Virtual RAID (VROC) key

Table 1.5: Onboard LED			
LED	**Description**	**LED Definition**	
5V_LED1	Power on LED	Off: Power off	On (Green): System is On
5VSB_LED1	Standby LED	Off: No input AC Power	On (Green): System is ON, in sleep mode, or in soft-off mode
LED3	BMC heartbeat LED (ASMB-816 T2 and I SKUs)	Blinking (Green): Controller is working normally	

1.5 Block Diagram

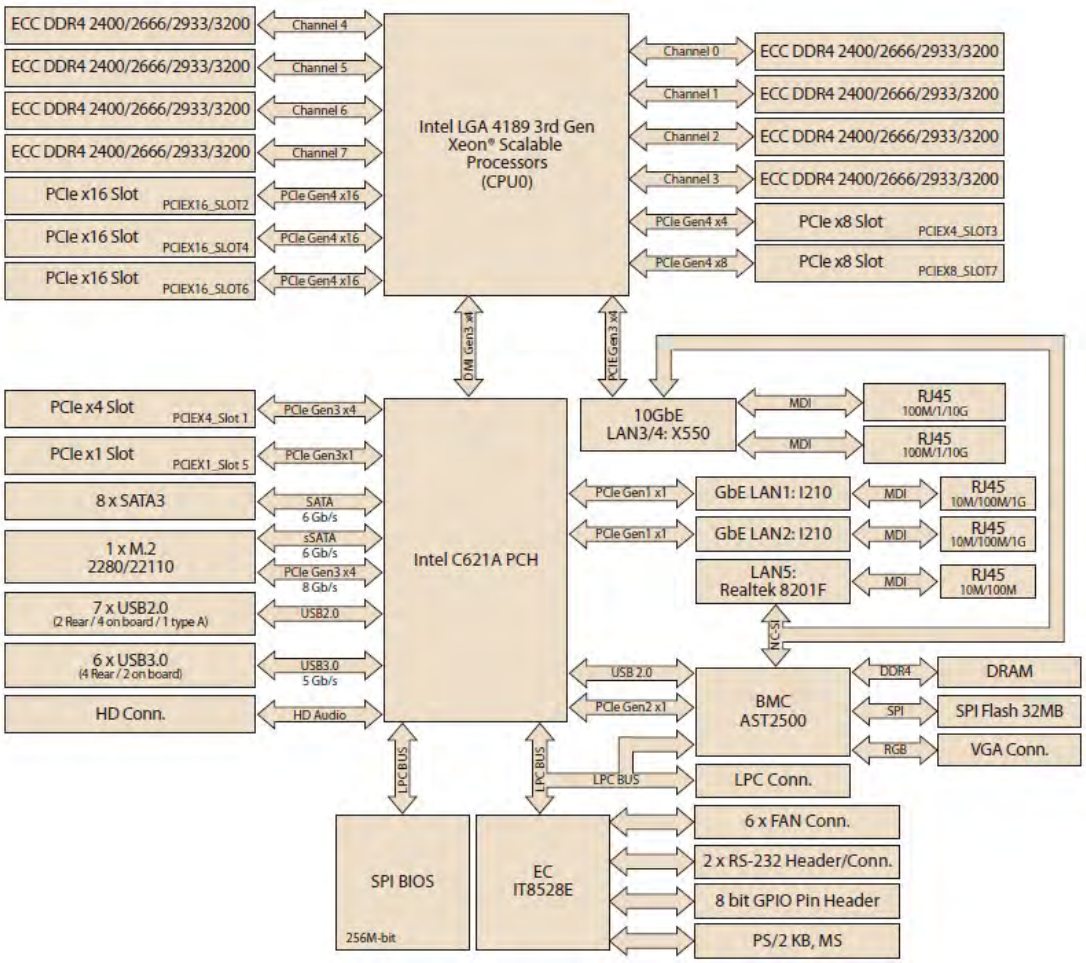


Figure 1.3 Block Diagram

1.6 System Memory

ASMB-816 has eight 288-pin memory slots for DDR4 2400/2666/2933/3200 MHz memory modules with maximum capacity of 1024 GB (Maximum 64 GB for each DIMM or 128GB LRDIMM). ASMB-816 supports registered DIMMs memory module.

Note! *Some 128GB LRDIMM modules can be supported. Please contact Advantech service window when you require higher memory capacity.*

1.7 Memory Installation

Memory performance is affected by different DIMM configurations. To reach optimal memory interleaving, be sure to install identical DIMM types with the same size, speed, and number of ranks on those memory slots corresponding to the correct processor.

The following table indicates recommended DIMM configurations with a single processor, based on the guideline, you may adjust your memory configuration according to your PCIe expansion card configuration.

The 3rd Gen Xeon Scalable (Silver-4xxx, Gold-5xxx/6xxx, Platinum-8xxx) processors support Optane DC persistent memory module (DCPMM).

The DCPMM support configuration is on slot D or H while using 6 DDR4 on other DIMM slot, and only one DCPMM can be used at a time.

Table 1.6: DIMM/DCPMM Configurations with single CPU

Channel		DIMMA1	DIMMB1	DIMMC1	DIMMD1	DIMME1	DIMMF1	DIMMG1	DIMMH1
Quantity of memory/ DCPMM installed	1	V							
			V						
				V					
					V				
						V			
							V		
								V	
									V
	2	V				V			
				V				V	
		V		V					
						V		V	
		V			V				
			V				V		
					V				V
			V		V				
							V		V
	4	V		V		V		V	
		V			V	V			V
			V		V		V		V
			V	V			V	V	
	6	V	V	V		V	V	V	
		V		V	V	V		V	V
		V	V		V	V	V		V
			V	V	V		V	V	V
	7	V	V	V	DCPMM*	V	V	V	
		V	V	V		V	V	V	DCPMM*
	8	V	V	V	V	V	V	V	V

Note! *DCPMM can be supported on slot D or H, one DCPMM at a time is allowed.*

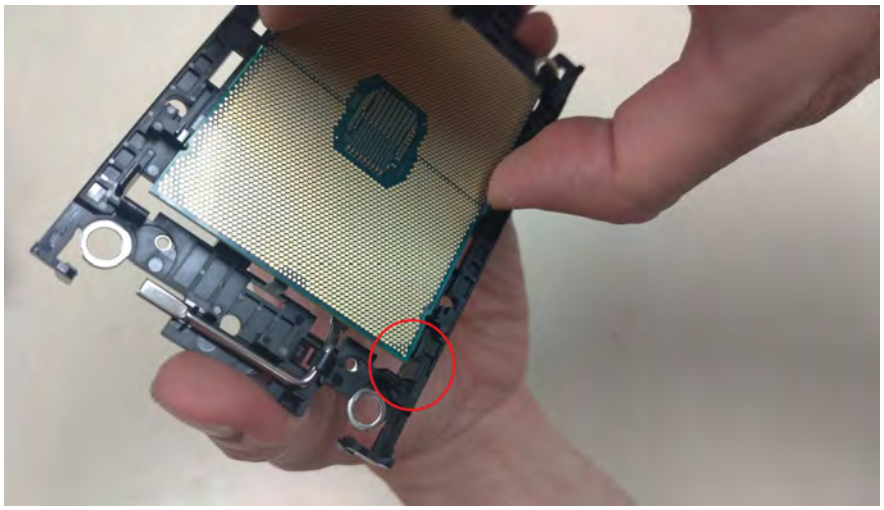
Note! *3, 5 and 7 DIMMs are not recommended DIMM population.*

1.8 Processor Installation

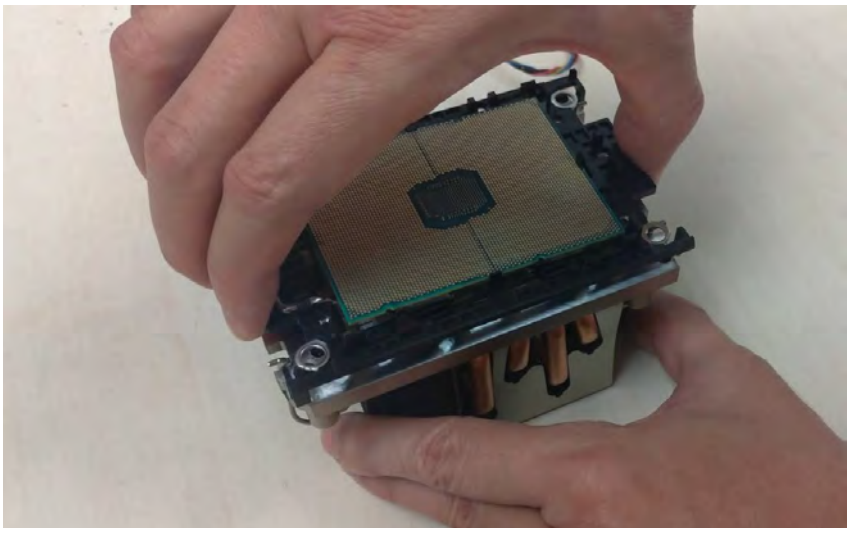
The ASMB-816 is designed for the Intel Xeon processor family.

1. Remove the dust cover.

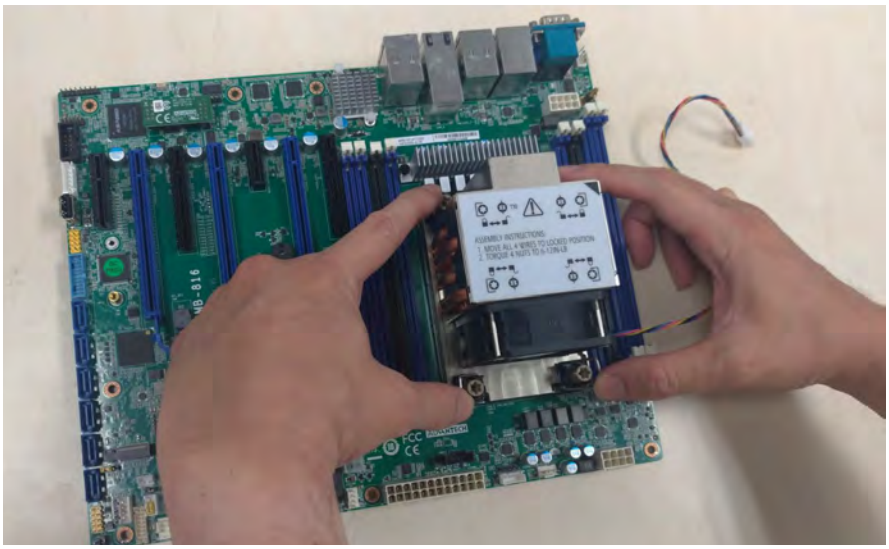
2. Install CPU on CPU carrier and align the pin 1 mark.

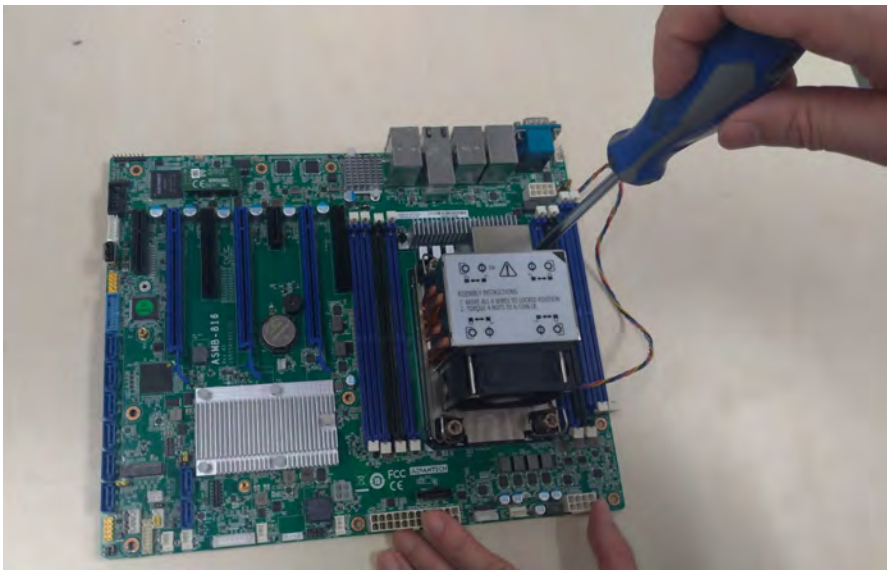


3. Install the CPU clip assembly on the heatsink as a processor + heatsink module.



4. Place the processor heatsink module into the motherboard bolster plate by using a T-30 screwdriver.





Chapter 2

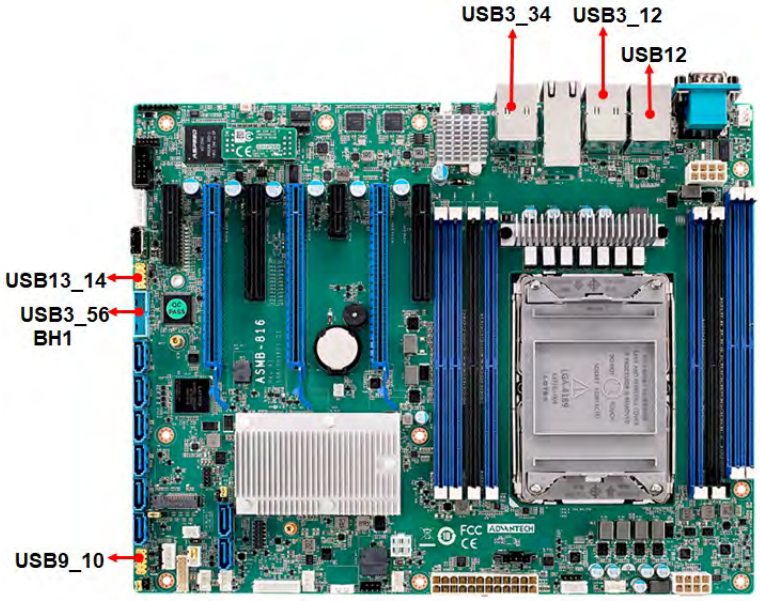
Connections

2.1 Introduction

You can access most of the connectors from the top of the board as it is being installed in the chassis. If you have a number of cards installed, you may need to partially remove a card to make all the connections.

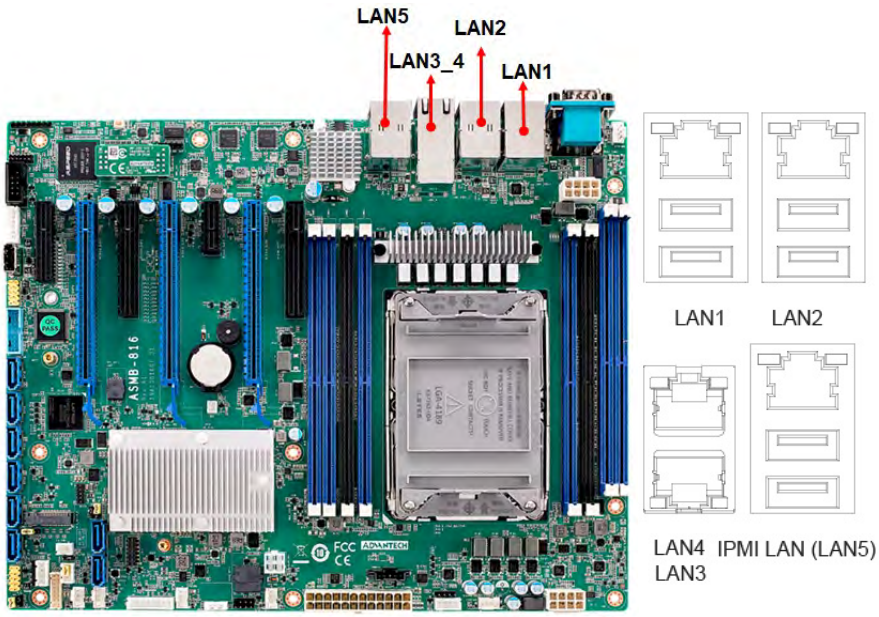
2.2 USB Ports (USB12, USB3_12, USB3_34, USB3_56, USB9_10, USB11, USB13_14)

The four USB 3.0 ports on the rear plate and two USB3.0 on-board ports could reach transmission rates up to 5Gbps, besides the two USB2.0 ports on the rear and four on-board ports and one Type-A ports are with 480 Mbps speed. Fuse protection is supported and the USB interface can be disabled in the system BIOS setup.



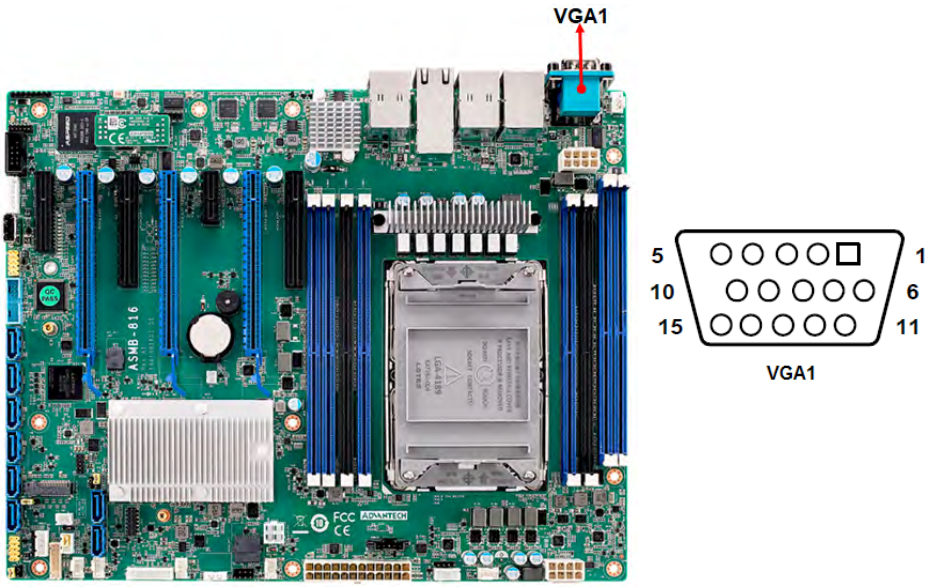
2.3 LAN Ports (LAN1~LAN5)

The ASMB-816 is equipped with two 10GbE (LAN3 and LAN4), two GbE LAN (LAN1,2) ports and one dedicated IPMI LAN (LAN5) port. One of 10 GbE LAN (LAN4) can be used as IPMI LAN as well for system management. They are all with RJ-45 jacks and supported by all major network operating systems.



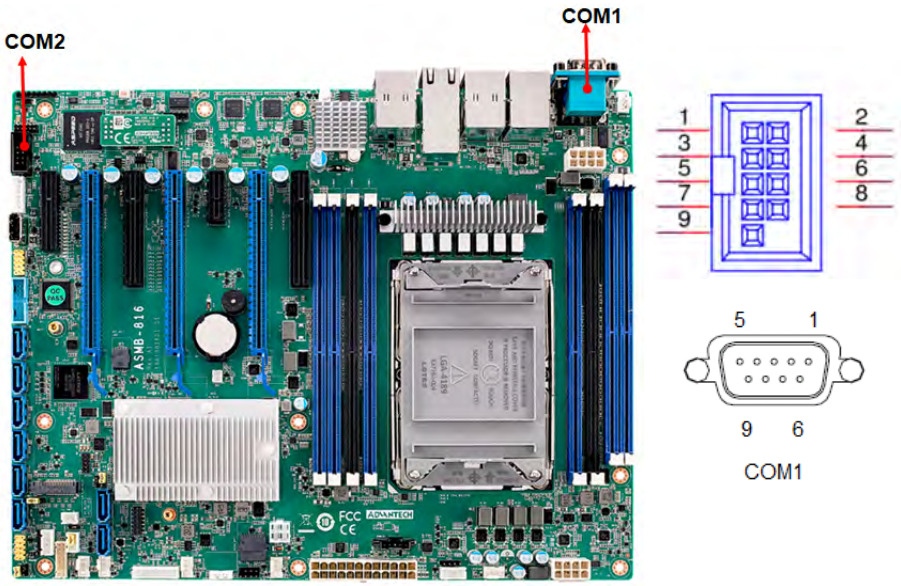
2.4 VGA Connector (VGA1)

The ASMB-816 includes a VGA interface that can drive conventional CRT and LCD displays.



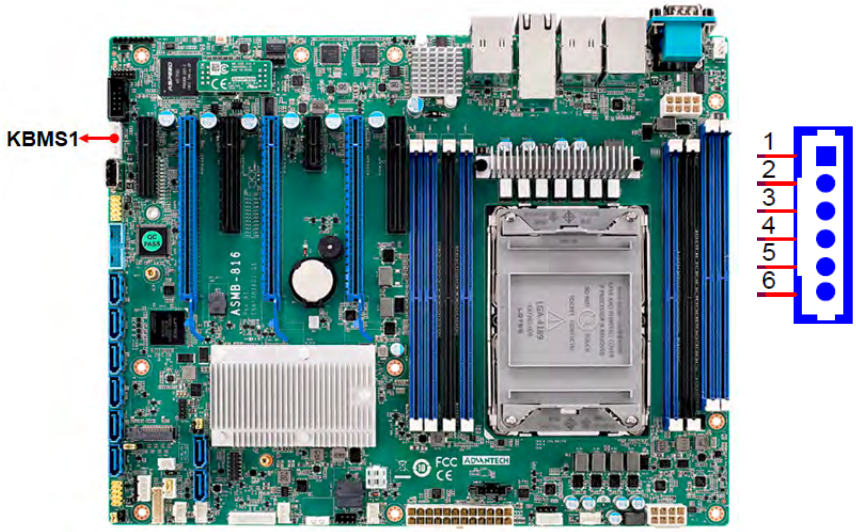
2.5 Serial Ports (COM1~2)

The ASMB-816 offers one serial port on the rear plate and one 2.50mm onboard with 2 x 5-pin pitch.



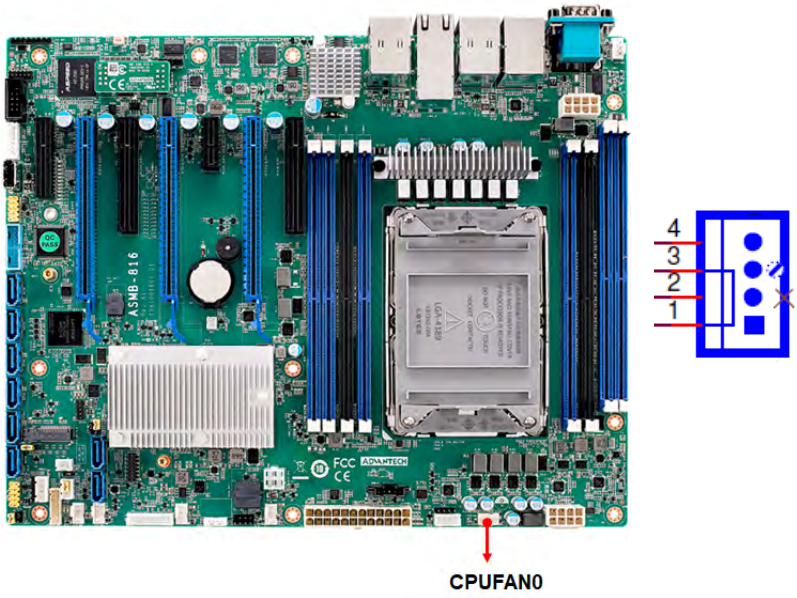
2.6 PS2 Keyboard and Mouse Connectors (KBMS2)

The 6-pin KBMS2 connector is for additional keyboard & mouse device usage.

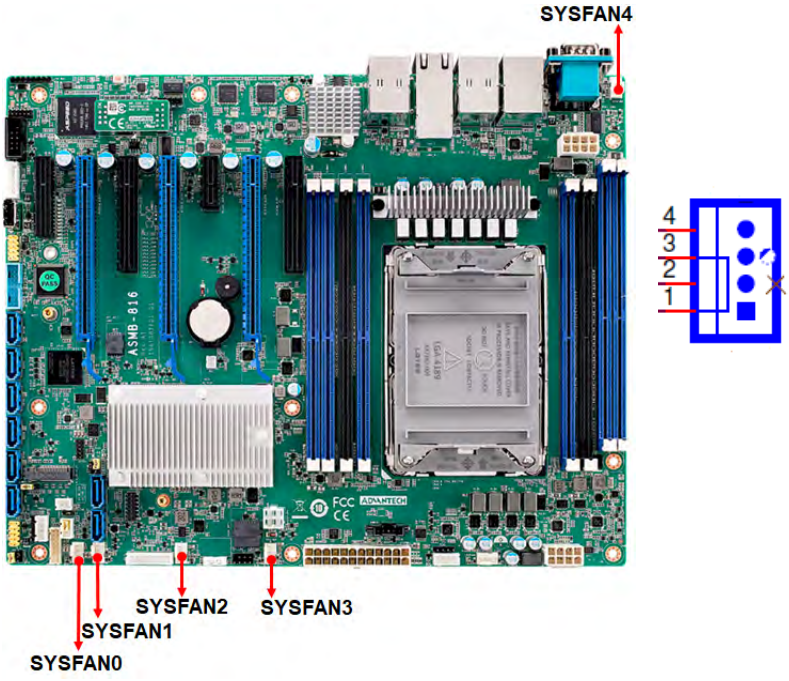


2.7 CPU Fan Connector (CPUFAN0)

If a fan is used, this connector supports cooling fans that draw up to 1.5A (18W).

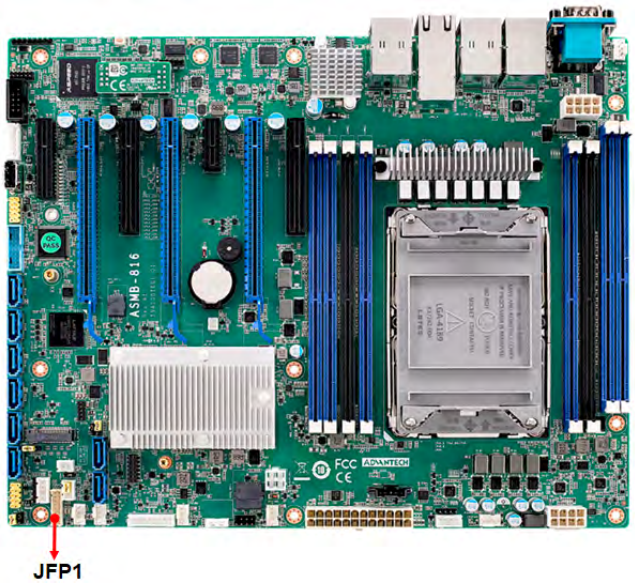


2.8 System Fan Connector (SYSFAN0~4)



2.9 Front Panel Connector (JFP1)

There are several external switches and LEDs to monitor and control the ASMB-816. One front panel convert cable (P/N: 1700031926-11) for the onboard 2.0 to 2.54 mm pitch header is provided in the accessory box.



2.0 mm JFP connector on board

Description	Pin Number		Description
RST BTN	2	▼1	PWD BTN
PWD GND	4	3	PWD GND
LAN1_LED+	6	5	LAN2_LED+
LAN1_LED-	8	7	LAN2_LED-
X	10	9	SYS_LED+
GND	12	11	SYS_LED-
PWR LED+	14	13	HDD_LED+
PWR LED-	16	15	HDD_LED-

2.0 mm JFP connector to 2.54 mm Pitch Header

Description	Pin Number		Description
(Red) PWD BTN	▼1	2	RST BTN (White)
(Black) PWD GND	3	4	PWD GND (Black)
(Blue) LAN1_LED+	5	6	LAN2_LED+(Brown)
(Red) LAN1_LED-	7	8	LAN2_LED-(Black)
		Key	
(Orang) HDD_LED+	13	14	PWR LED+ (Red)
(Black) HDD_LED-	15		
	Key	16	PWR LED- (Black)

2.9.1 Power LED (JFP1 Pins 14, 16)

JFP1 pin 14 and pin 16 are for the power LED. Refer to Appendix B for detailed information on the pin assignments. If an ATX power supply is used, the system's power LED status will be as follows.

Table 2.1: ATX Power Supply LED Status

ACPI Power Mode	LED (ATX power)
System On (S0)	On
System Hibernation (S4)	Slow flashes
System Off (S5)	Off

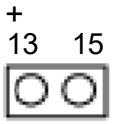
2.9.2 Front Panel LAN Indicator (JFP1 Pins 5~8)

JFP1 pins 5, 6, 7, 8 connect to LAN indicator.

(Blue) LAN1_LED+	5	6	LAN2_LED+(Brown)
(Red) LAN1_LED-	7	8	LAN2_LED-(Black)

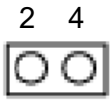
2.9.3 HDD LED Connector (JFP1 Pins 13, 15)

You can connect an LED to connector to indicate when the HDD is active.



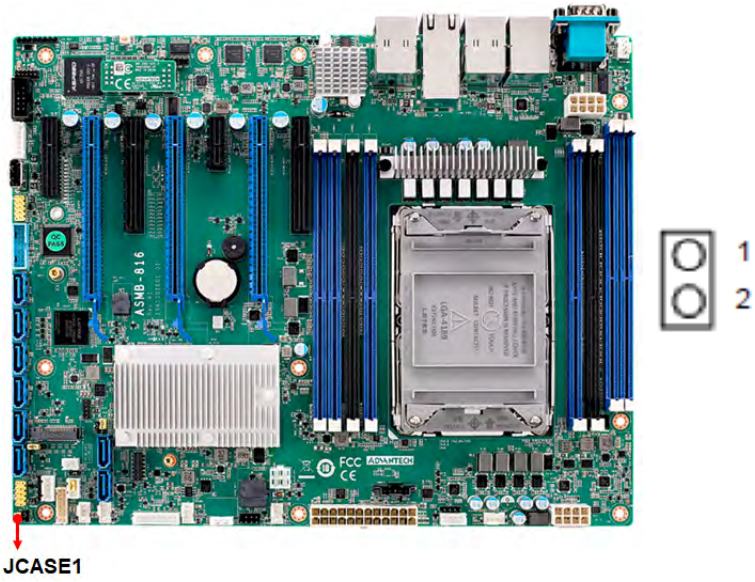
2.9.4 Reset Connector (JFP1 Pins 2, 4)

Many computer cases offer the convenience of a reset button.

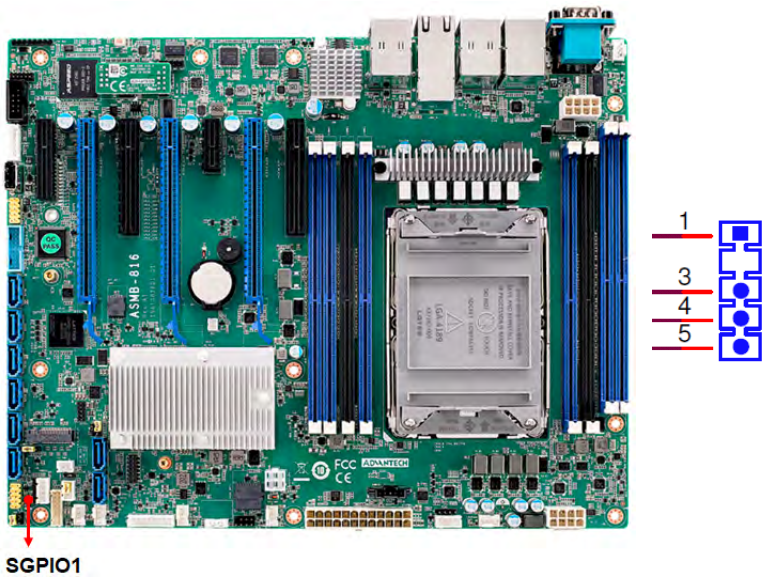


2.9.5 Case Open (JCASE1)

A chassis intrusion header is located at JCASE1 on the motherboard. Attach the appropriate cable from the chassis to be informed of a chassis intrusion when the chassis is opened. The default function is disabled and Pin 1-2 is bridged by a jumper cap.

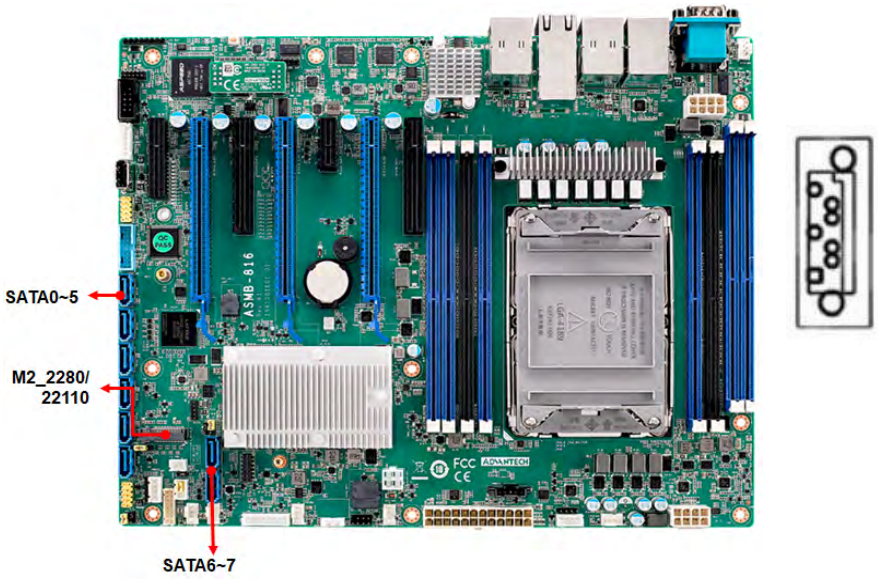


2.10 SATA SGPIO (SGPIO1)



2.11 SATA and M.2 Connector (SATA0~7, M2_22110)

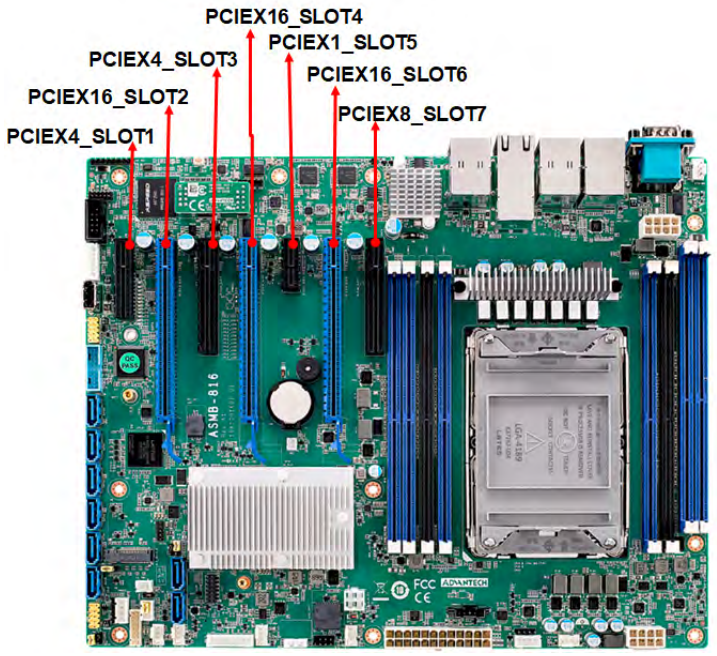
ASMB-816 features eight serial ATA III interfaces (up to 600 MB/s) which eases cabling to hard drives with thin and long cables. The M.2 2280/22110 connector can support both SATA and PCIe SSD devices.



Note! *Please pay attention to one MB screw hole H4 allocated in the M.2 area. It should be unfixed when you prepare to disassemble the system.*

2.12 PCIe Expansion Slots

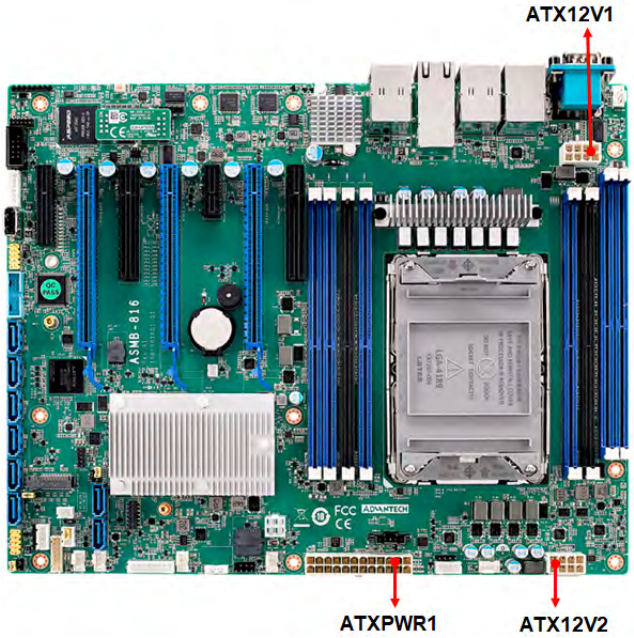
The ASMB-816 provides seven expansion slots. Riser card for 1U or 2U chassis can be used in slot-6 only.



	Slot Length	Link	PCI-E Generation	PCIe link from
SLOT1	PCIe x4	PCIe x4	3	PCH
SLOT2	PCIe x16	PCIe x16	4	CPU
SLOT3	PCIe x8	PCIe x4	4	CPU
SLOT4	PCIe x16	PCIe x16	4	CPU
SLOT5	PCIe x1	PCIe x1	3	PCH
SLOT6	PCIe x16	PCIe x16	4	CPU
SLOT7	PCIe x8	PCIe x8	4	CPU

	Part Number	Description	Remarks
Riser Card	ASMB-RF388-21A1E	ASMB-RF388 (2U riser card)	2*PCI-E x8 or 1*PCI-E x8 + 2*PCI-E x4
	ASMB-RF348-21A1E	ASMB-RF348 (2U riser card)	2*PCI-E x4 + 1*PCI-E x8
	ASMB-RF3X8-21A1E	ASMB-RF3X8 (2U riser card)	1*PCI-Ex4 + 2*PCI-X
	AIMB-RF10F-01A1E	AIMB-RF10F (1U riser card)	1*PCI-E x16
	ASMB-RF1F-10A1E	ASMB-RF1F (2U riser card)	1*PCI-E x16

2.13 Auxiliary Power Connector (ATXPWR1/ ATX12V1/ATX12V2)

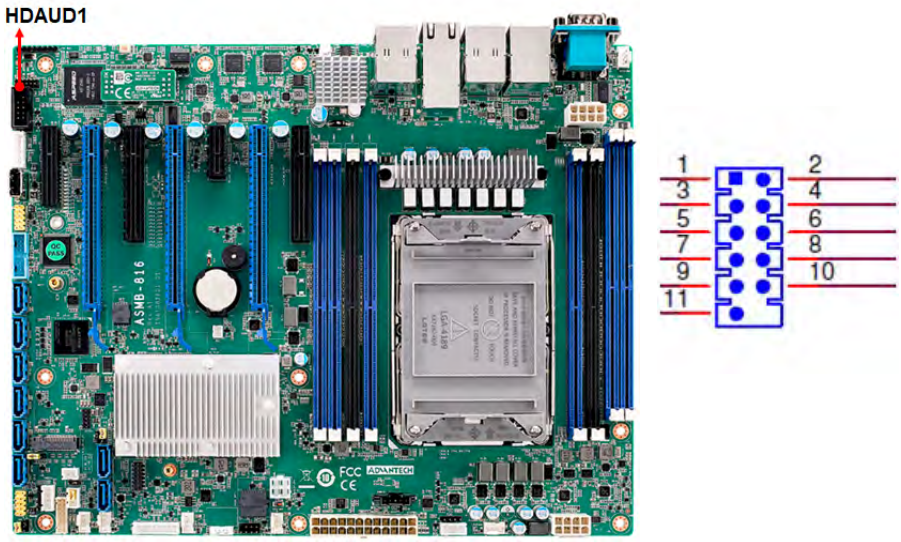


Note!

1. *Please use a power supply which is of SSI type; minimum output should be at least 500W with 5Vsb @2.5A.*
2. *ATXPWR1 & ATX12V1 should be all connected with power supply, otherwise ASMB-816 will not boot up normally.*
3. *ATX12V2 should be connected if CPU TDP is over 207W or total memory capacity is over 512GB.*

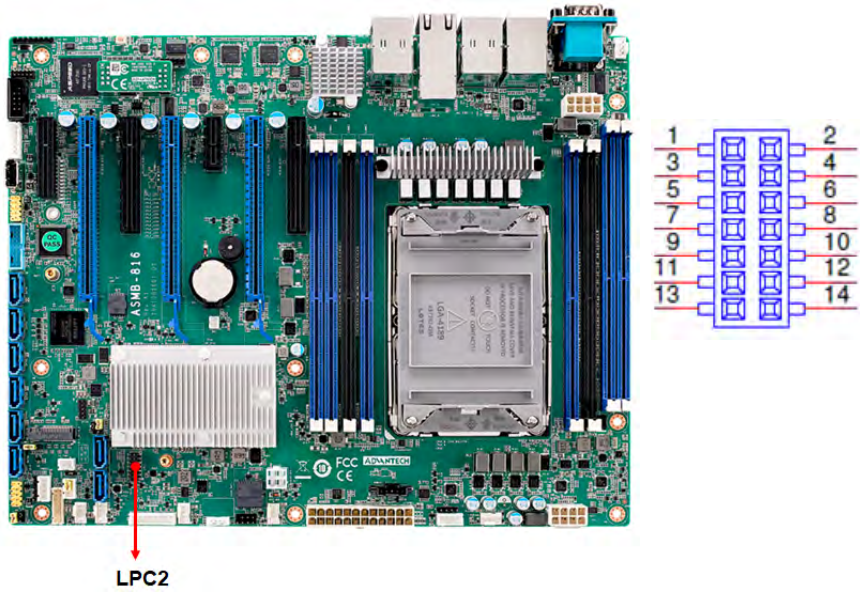
2.14 HD Audio Interface Connector (HDAUD1)

ASMB-816 has one audio connector for Advantech's audio board (P/N: PCA-AUDIO-HDB1E) installation.



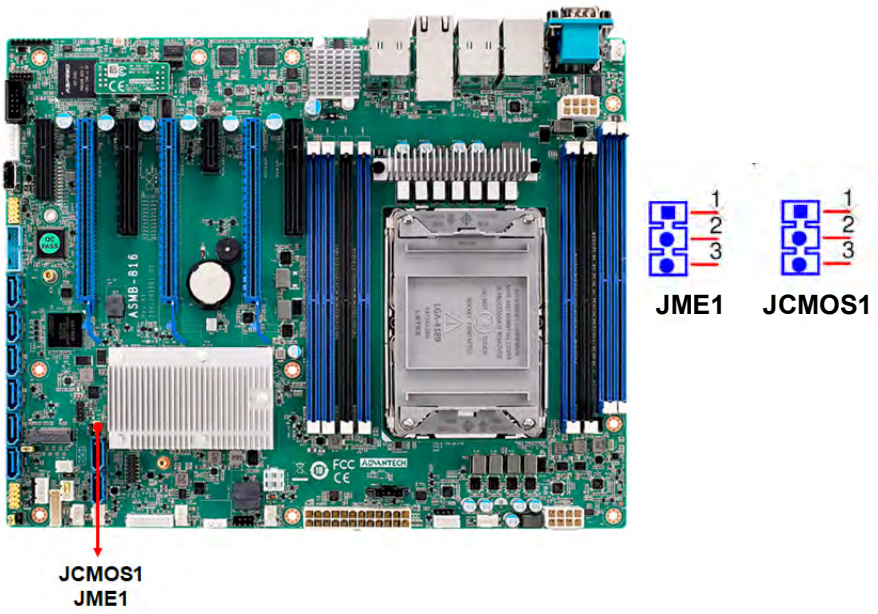
2.15 LPC Connector (LPC2)

ASMB-816 has one LPC connector that can be used for Advantech's TPM Module (P/N: PCA-TPM-00A1E, PCA-TPM-00B1E) for security management.



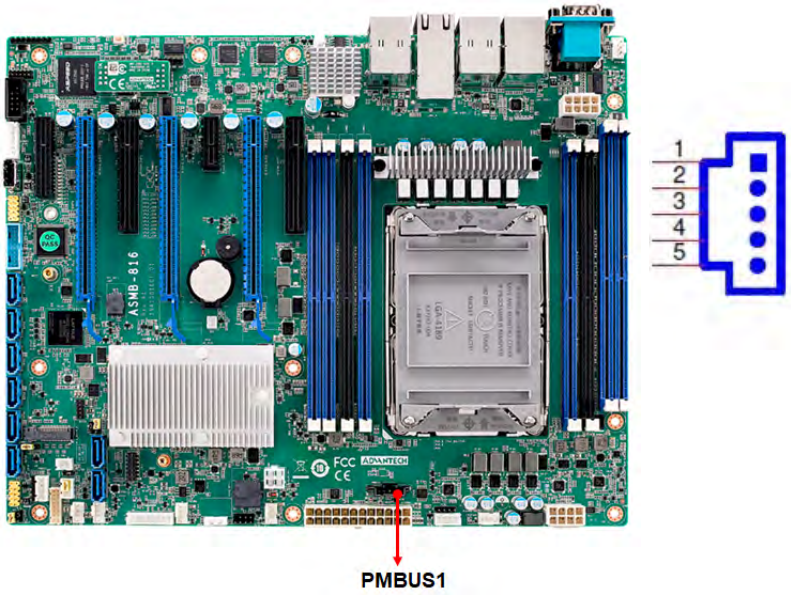
2.16 CMOS Clear and ME Update Connector (JCMOS1, JME1)

Setting jumper from pin 1-2 to pin 2-3, then back to pin 1-2 to reset CMOS data.

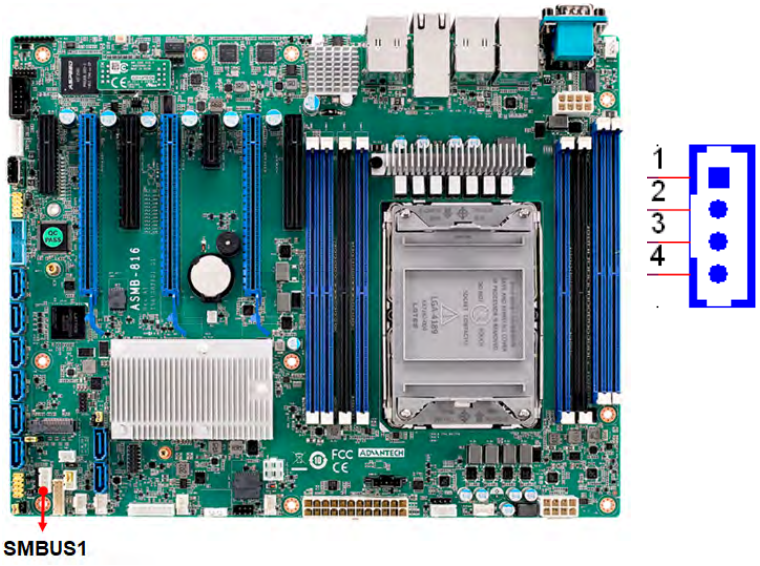


2.17 PMBUS Connector (PMBUS1)

PMBUS connector is reserved for communication with power supply via BMC.

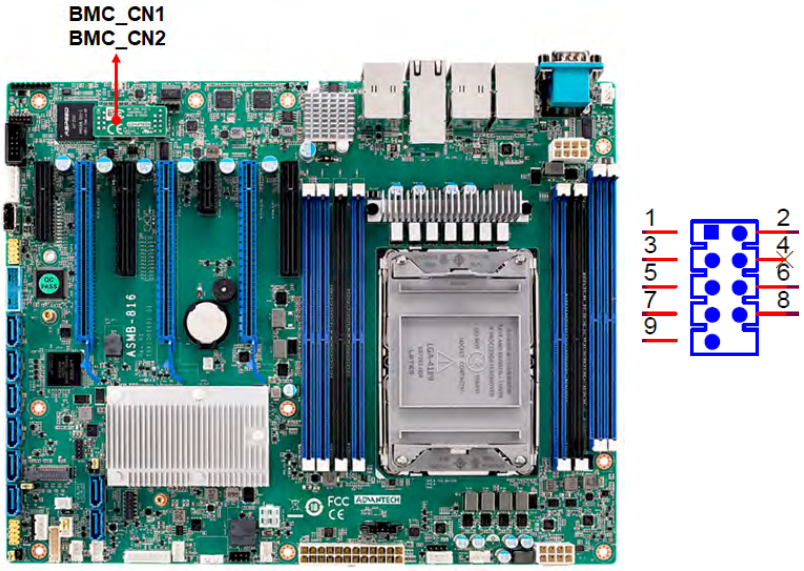


2.18 Front Panel SMBUS Connector (SMBUS1)



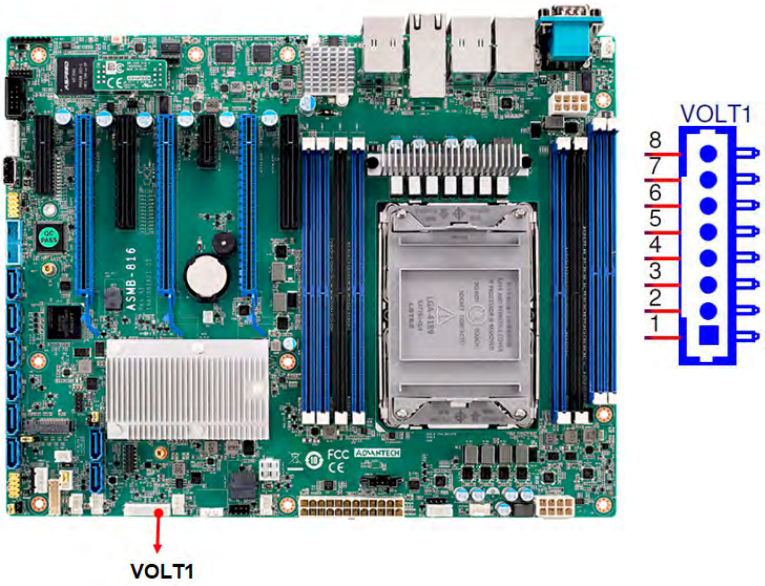
2.19 IPMI Module Connector (BMC_CN1, BMC_CN2)

Enabling IPMI feature through BMC_CN1 and BMC_CN2. The BMC module has already been pre-installed on ASMB-816I and ASMB-816T2 sku.

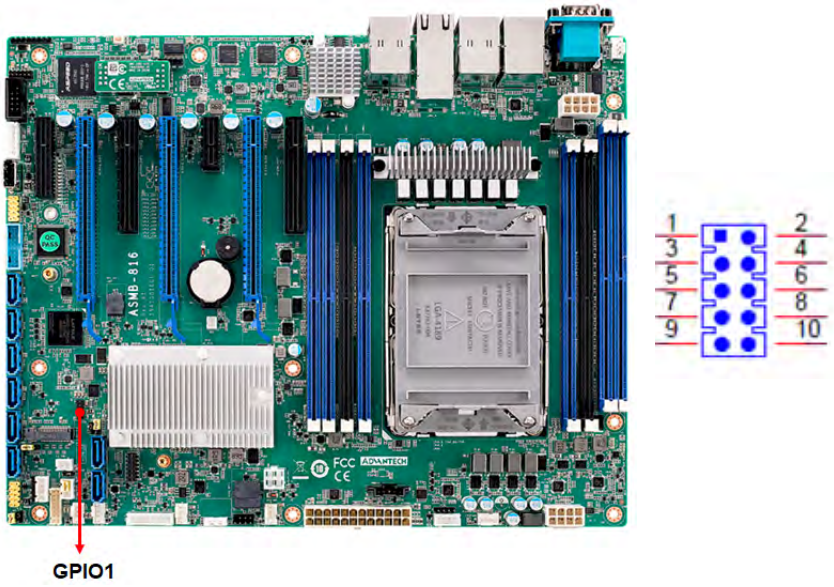


2.20 VOLT1 Connector (VOLT1)

VOLT1 connects to the alarm board on the Advantech chassis. These alarm boards give warnings if a power supply or fan fails, if the chassis overheats, or if the back-plane malfunctions.

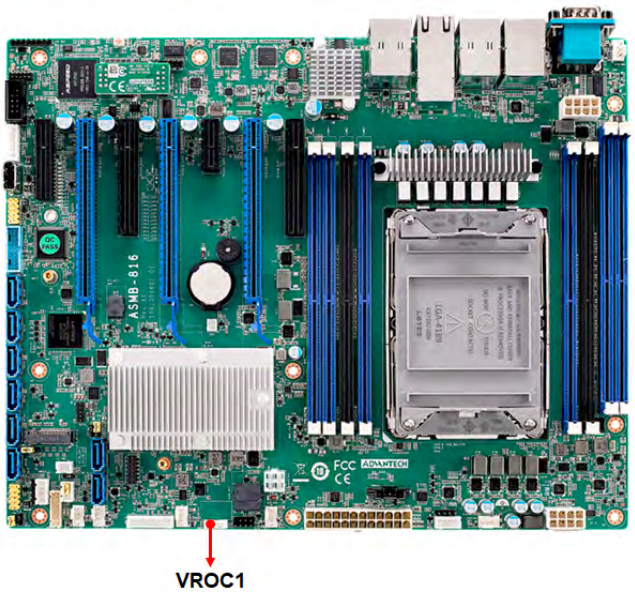


2.21 GPIO Connector (GPIO1)



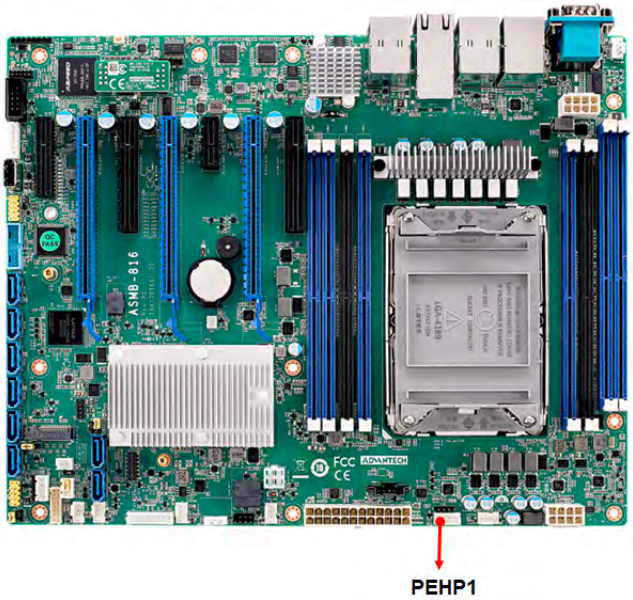
2.22 Intel Virtual RAID (VROC1)

Intel VROC license key of VMD allows NVMe SSDs to connect via PCIe and directly manage the CPU for better RAID performance. Enable NVMe SSD RAID, hot-plug and LED management features via the VROC connector.



2.23 NVMe RAID LED Control (PEHP1)

Connect to the storage chassis to enable NVMe RAID LED control feature.

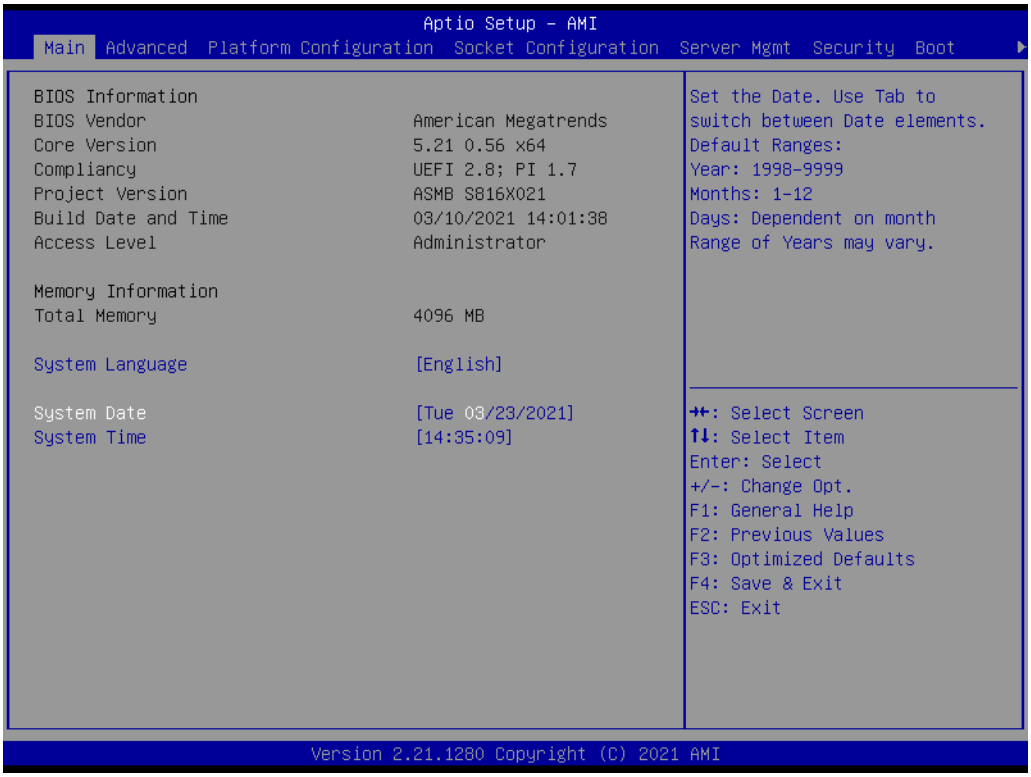


Chapter 3

AMI BIOS

3.1 Introduction

With the AMI BIOS Setup program, you can modify BIOS settings and control the special features of your computer. The Setup program uses a number of menus for making changes and turning the special features on or off. This chapter describes the basic navigation of the ASMB-816 setup screens.



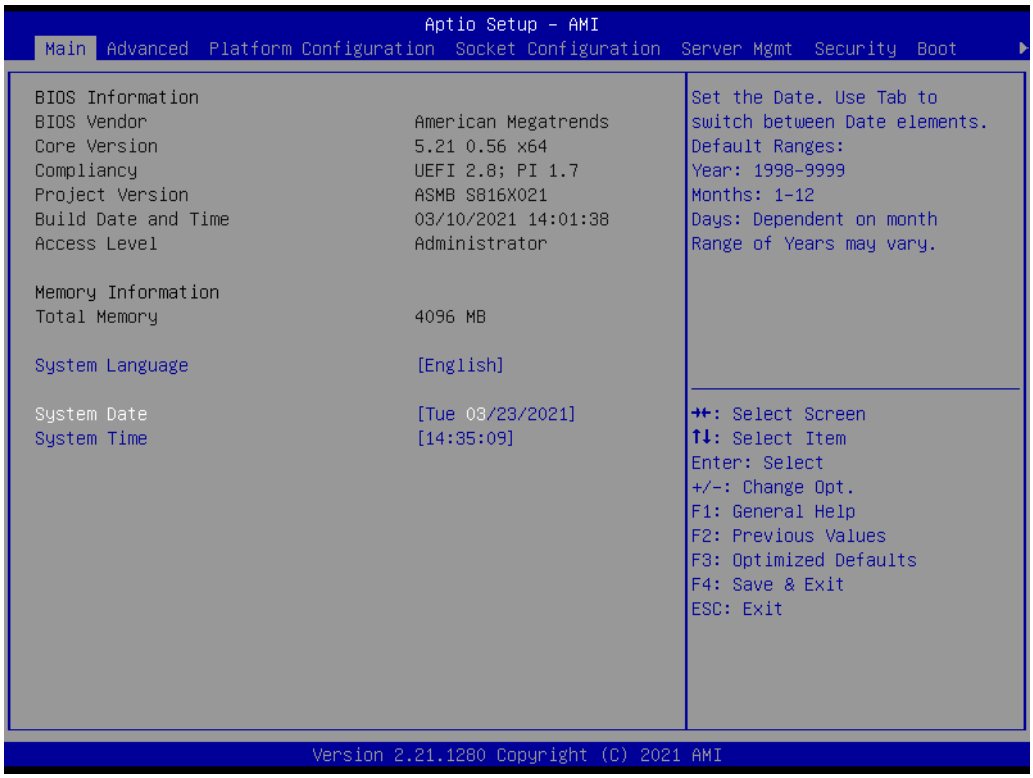
AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed up CMOS so it retains the Setup information when the power is turned off.

Note! *The BIOS setup screens shown in this chapter are for reference only, they may not exactly match what you see on your display devices.*

3.2 BIOS Setup

3.2.1 Main Menu

Press <Del> during bootup to enter AMI BIOS CMOS Setup Utility; the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.



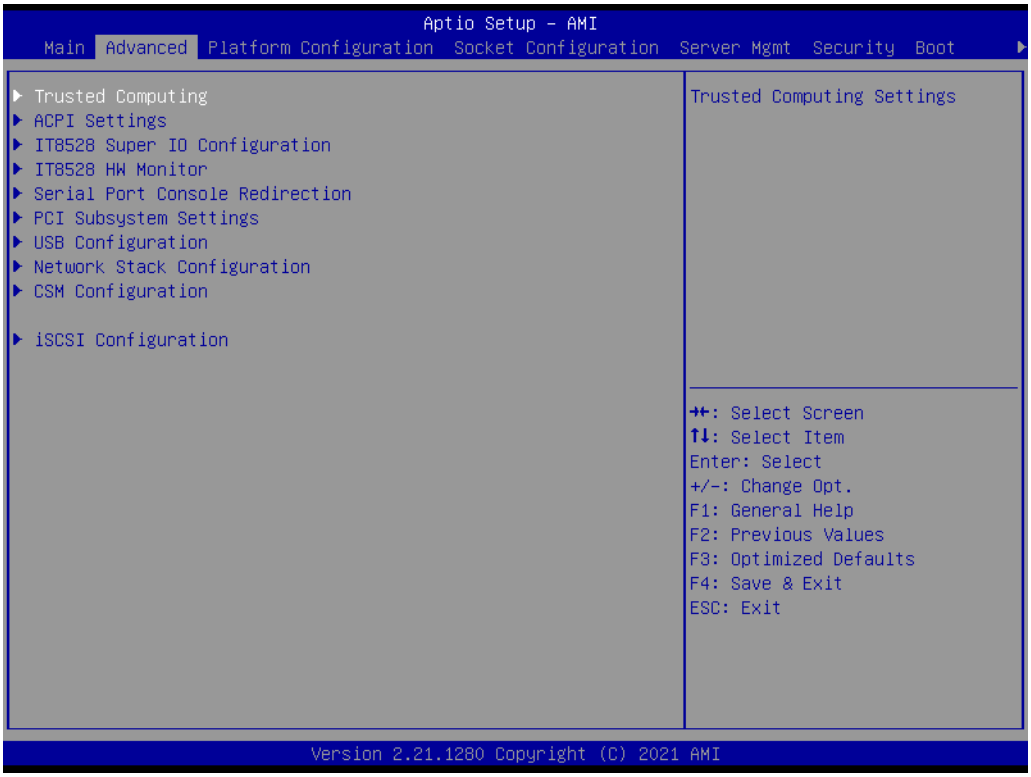
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can be. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

- **System Date/System Time**

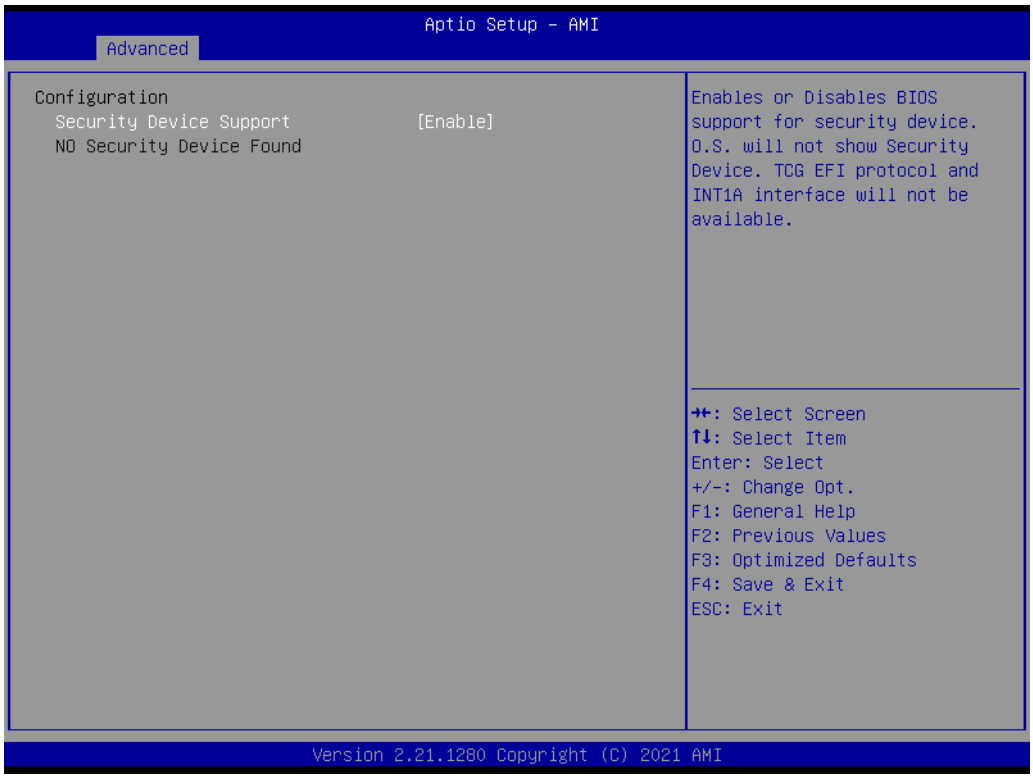
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the ASMB-816 setup screen to enter the Advanced BIOS setup screen. You can select any of the items in the left frame of the screen, such as CPU configuration, to go to the sub menu for that item. You 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.



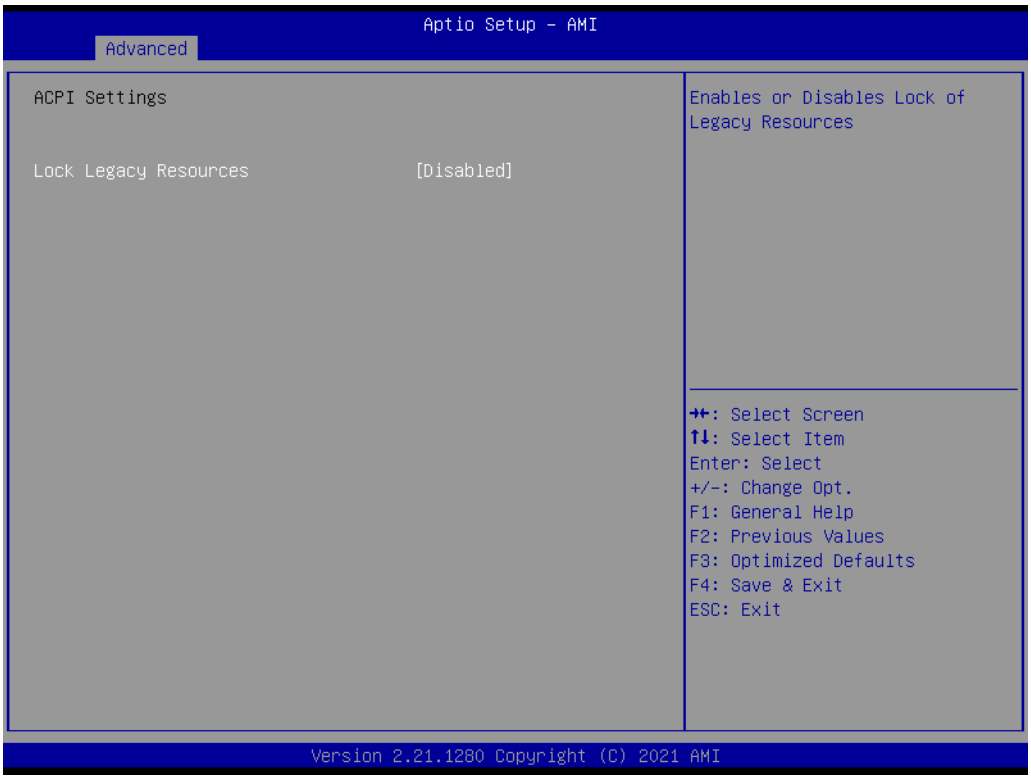
3.2.2.1 Trusted Computing



- **Security Device Support**
  Enables or disables BIOS support for security device.

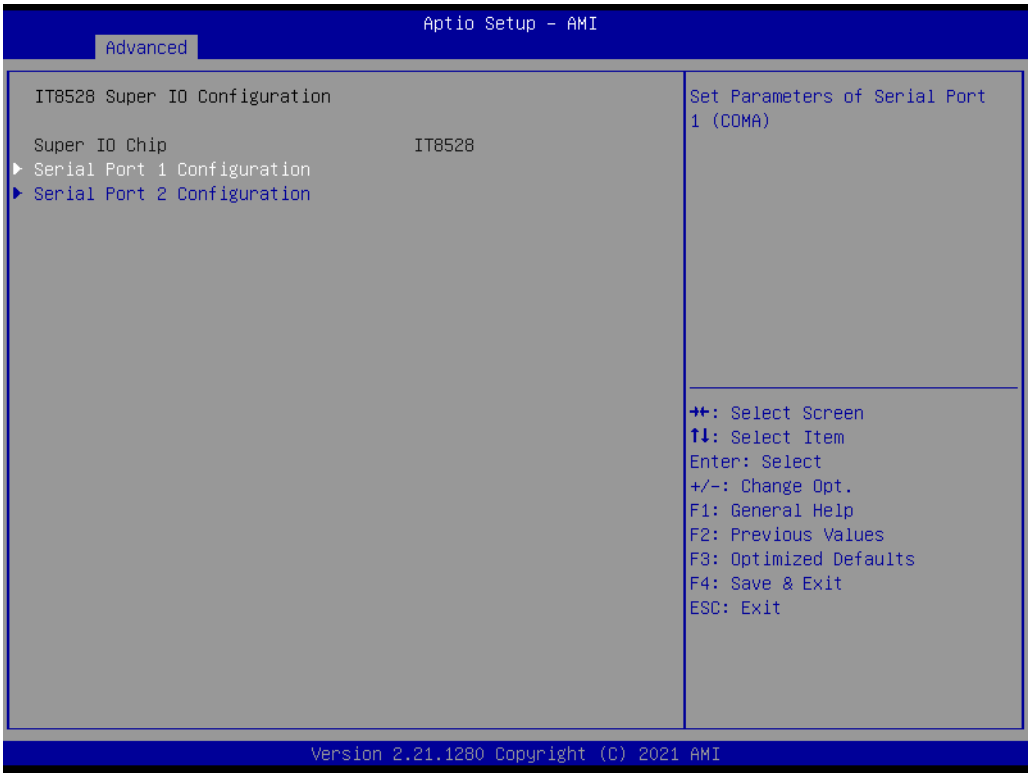
Note! *You need to purchase Advantech LPC TPM module to use TPM function. P/N: PCA-TPM-00A1E/PCA-TPM-00B1E.*

3.2.2.2 ACPI Settings

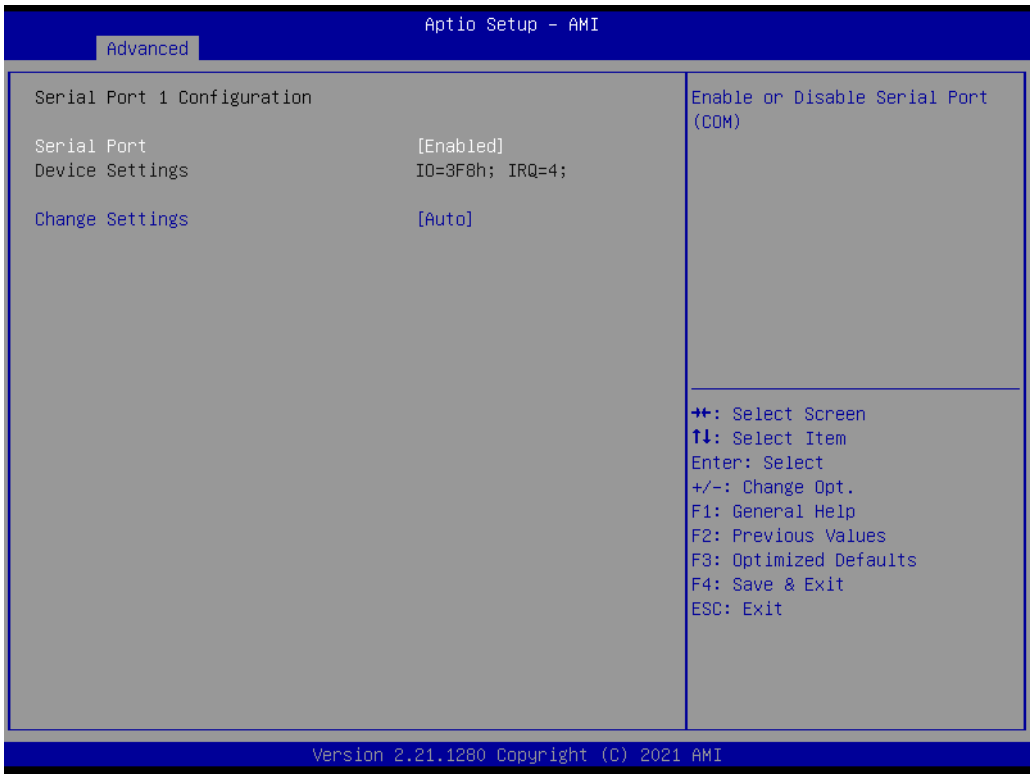


- **Lock Legacy Resources**
  Enable or Disable lock legacy resources feature.

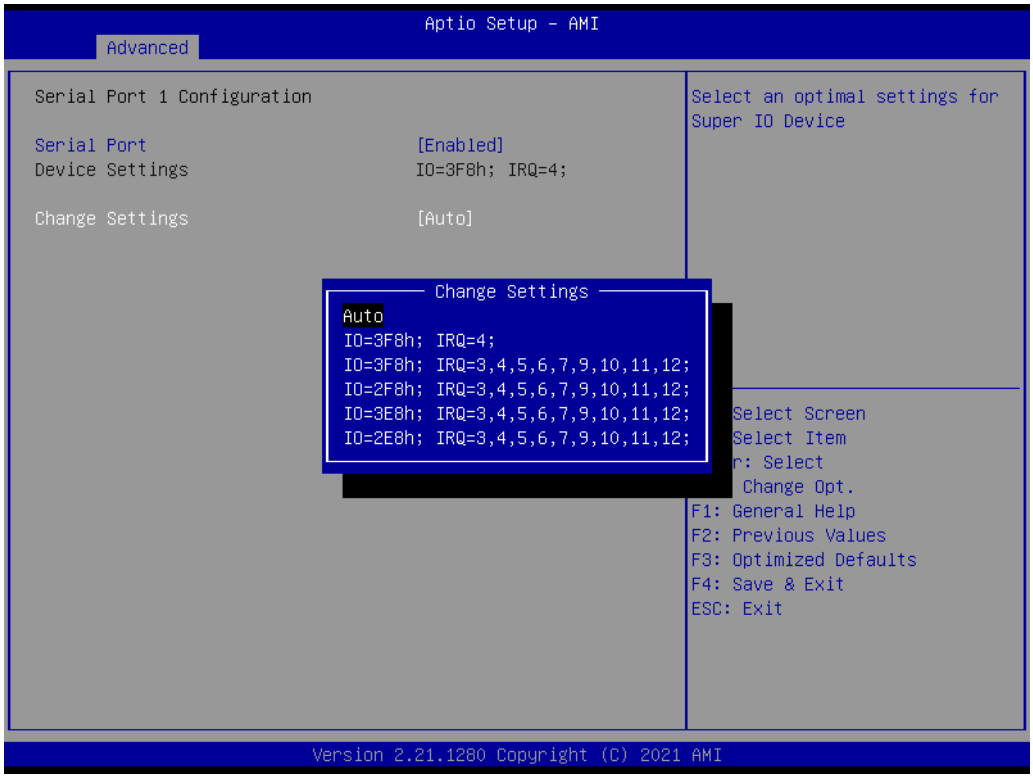
3.2.2.3 IT8528 EC Super IO Configuration



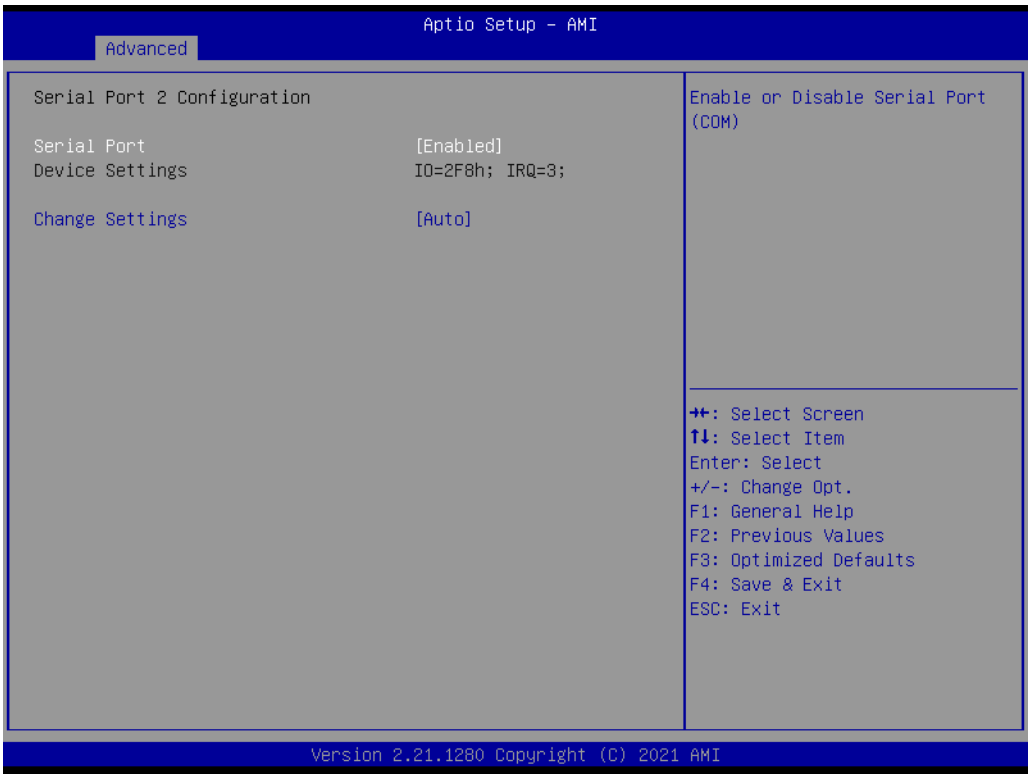
Serial Port 1 Configuration



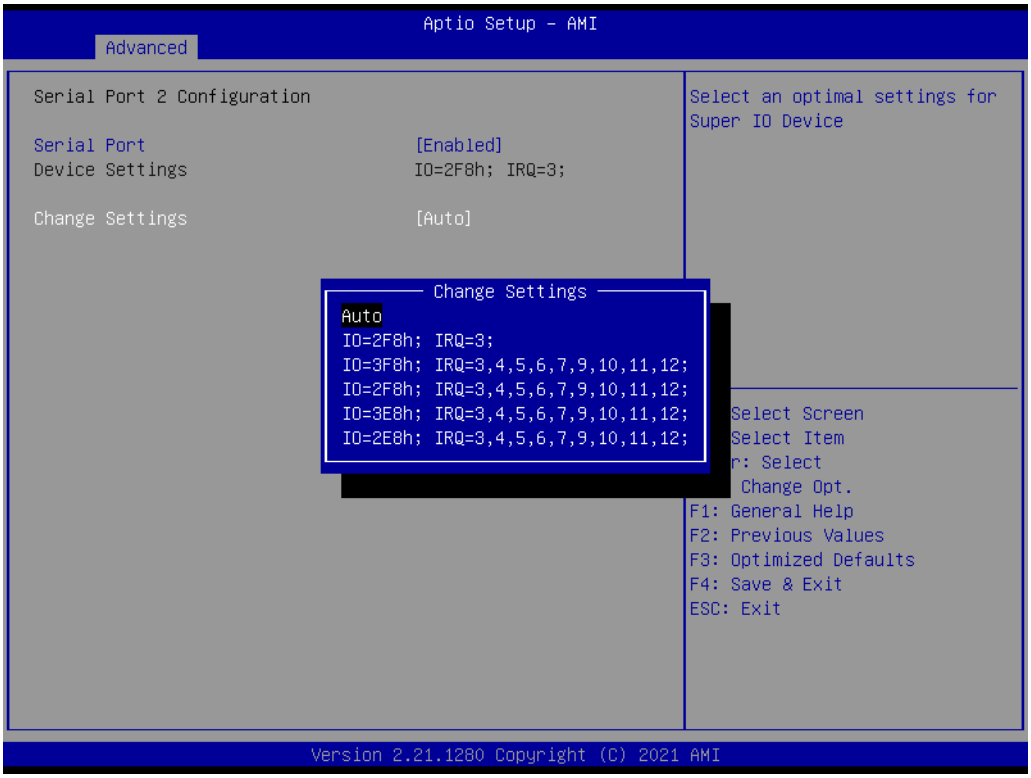
– **Serial Port**
  Enable or Disable serial port 1.
– **Change Settings**
  To select an optimal setting for serial port 1.



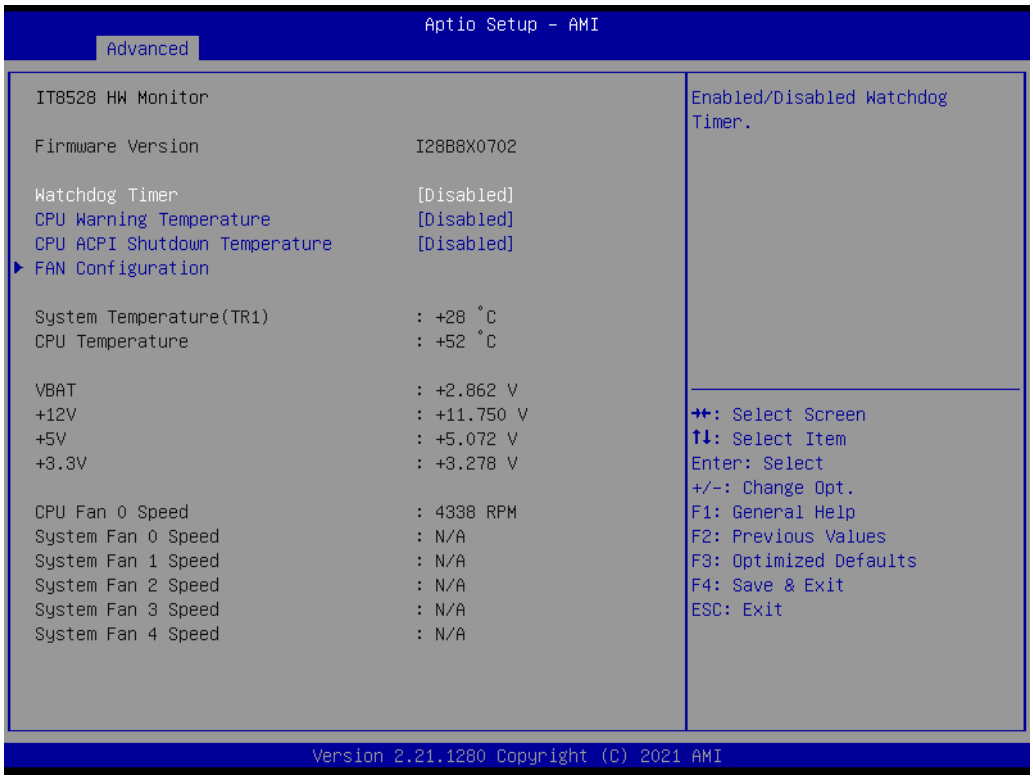
Serial Port 2 Configuration



- **Serial Port**
  Enable or Disable serial Port 2.
- **Change Settings**
  To select an optimal setting for serial port 2.

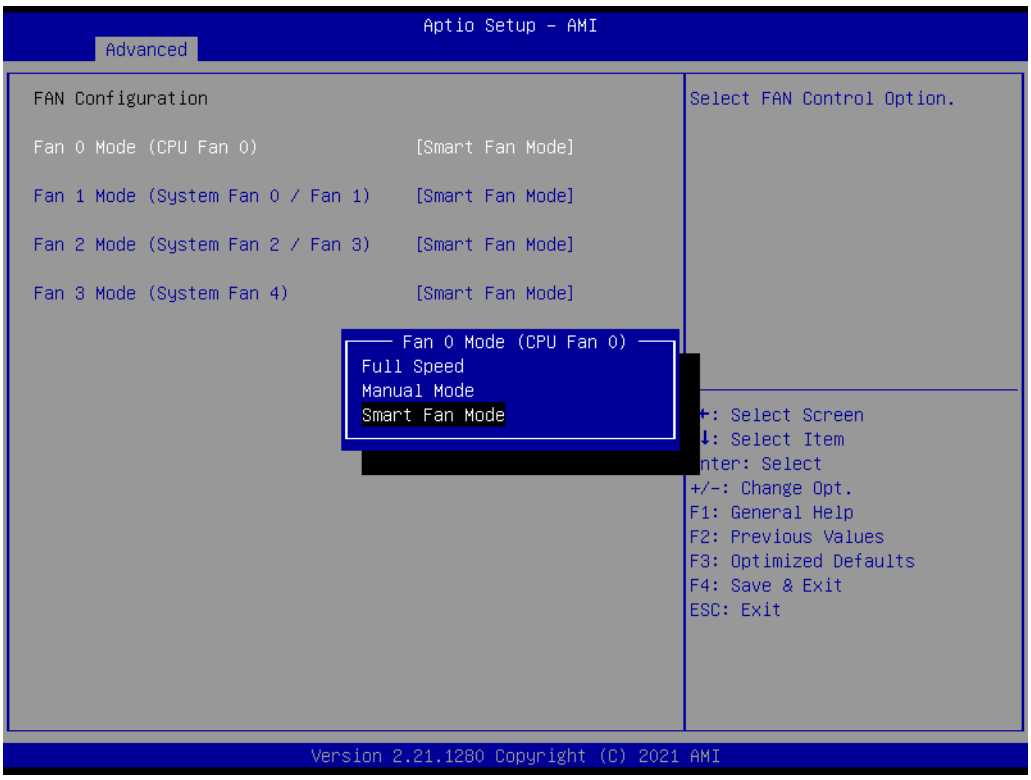


3.2.2.4 IT8528 HW Monitor

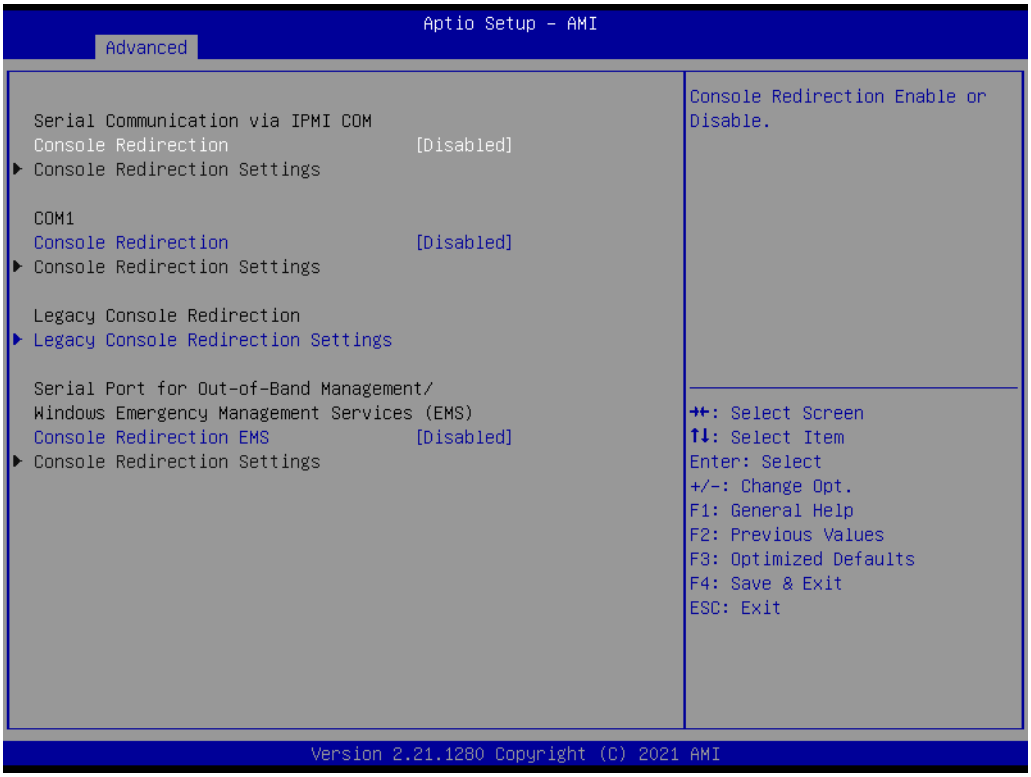


- **Watchdog Timer**
  Enable or Disable the watchdog timer function.
- **CPU ACPI Shutdown Temperature**
  Enable or Disable the ACPI shutdown temperature threshold. When the system reaches the shutdown temperature, it will be automatically shut down by ACPI OS to protect the system from overheat damage.
- **CPU Warning Temperature**
  Enable or Disable the CPU warning temperature threshold. When the system reaches the warning temperature, the speaker will beep.
- **Fan Configuration**
  The default of CPU/System FAN is Smart FAN mode and the BIOS will automatically control the FAN speed by CPU temperature.

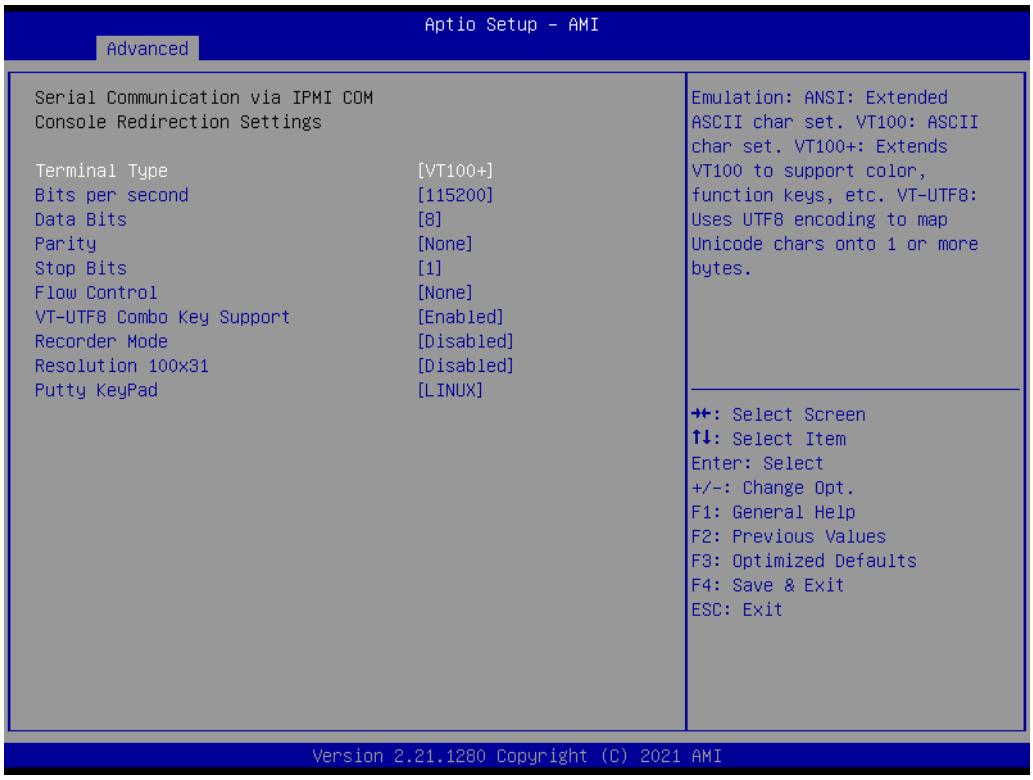
  When set to manual mode, fan duty setting can be changed; the range is from 30%~100%, default setting is 50%.



3.2.2.5 Serial Port Console Redirection



Console Redirection Settings

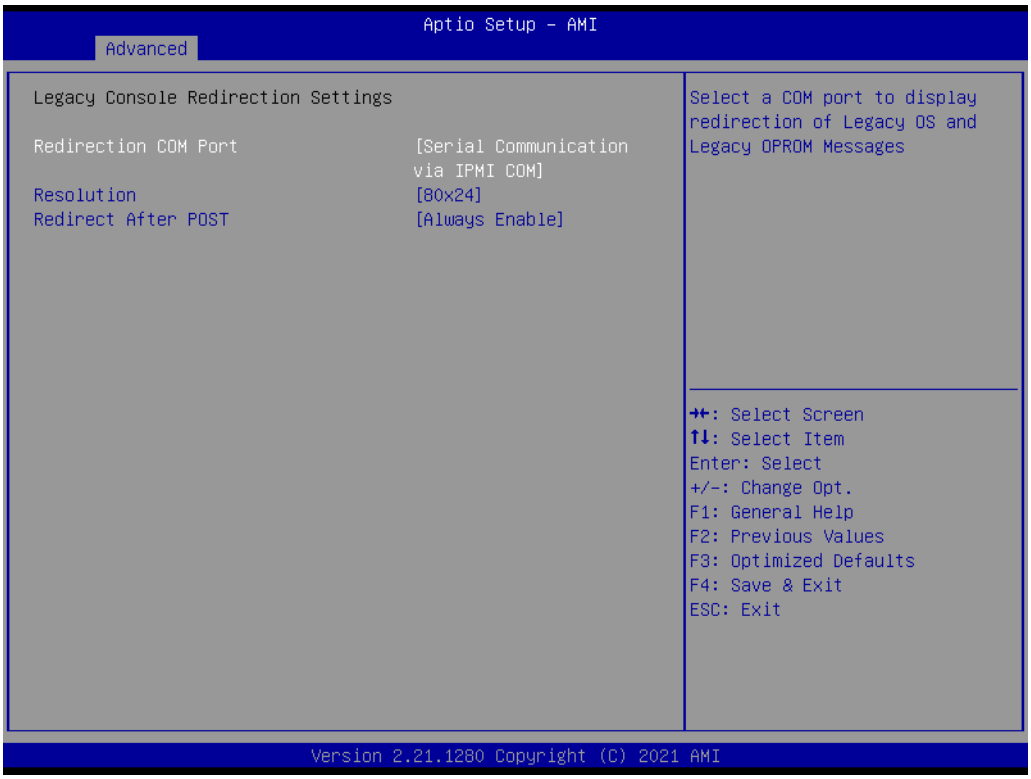


- **Terminal Type**
  Select a terminal type to be used for console redirection.
  Options available: VT100/VT100+/ANSI/VT-UTF8.
- **Bits Per Second**
  Select the baud rate for console redirection.
  Options available: 9600/19200/57600/115200.
- **Data Bits**
- **Parity**
  A parity bit can be sent with the data bits to detect some transmission errors.
  Even: parity bit is 0 if the number of 1's in the data bits is even.
  Odd: parity bit is 0 if number of 1's the data bits is odd.
  Mark: parity bit is always 1. Space: Parity bit is always 0.
  Mark and Space Parity do not allow for error detection.
  Options available: None/Even/Odd/Mark/Space.
- **Stop Bits**
  Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
  Options available: 1/2.
- **Flow Control**
  Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
  Options available: None/Hardware RTS/CTS.
- **VT-UTF8 Combo Key Support**
  Enable VT-UTF8 combination key support for ANSI/VT100 terminals.

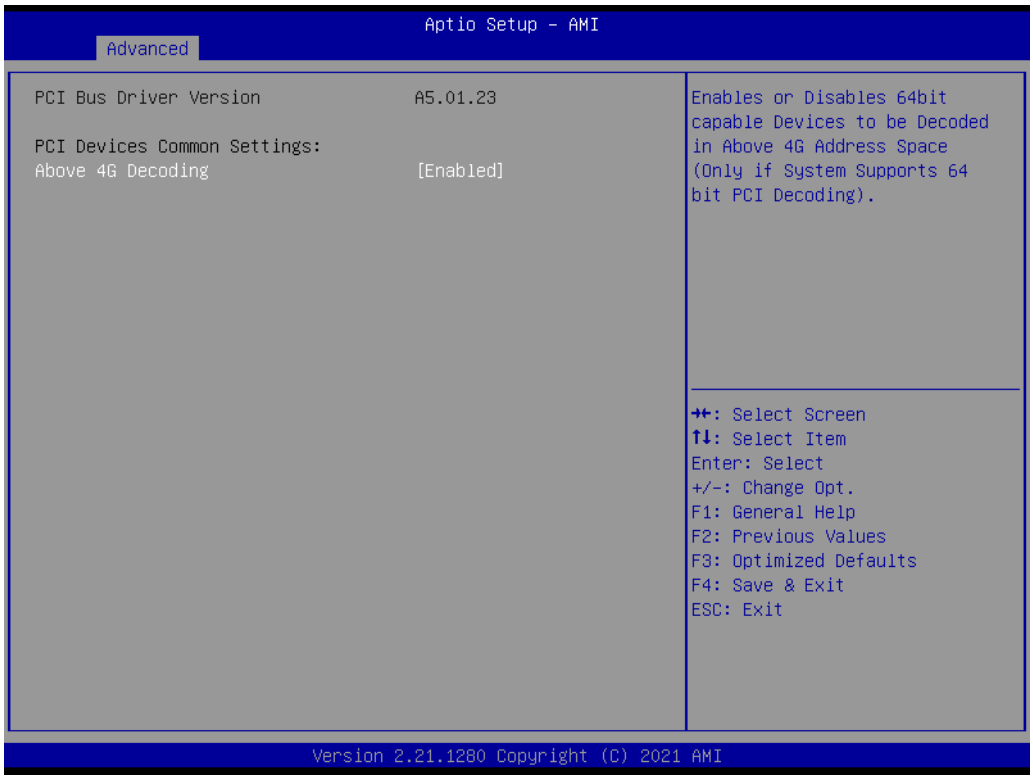
- **Recorder Mode**
  When this mode enabled, only text will be send. This is to capture Terminal data.
  Options available: Enabled/Disabled.
- **Resolution 100x31**
  Enables or disables extended terminal resolution.
- **Putty Keypad**
  Select function key and keypad on putty.

Legacy Console Redirection Settings

Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.



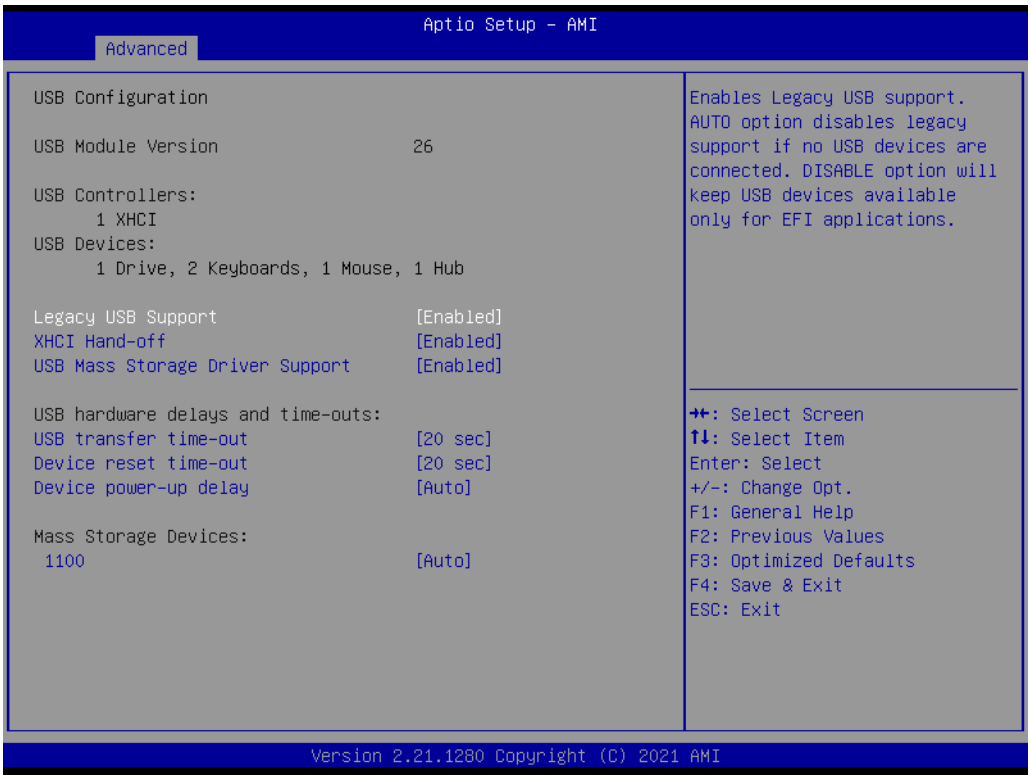
3.2.2.6 PCI Subsystem Settings



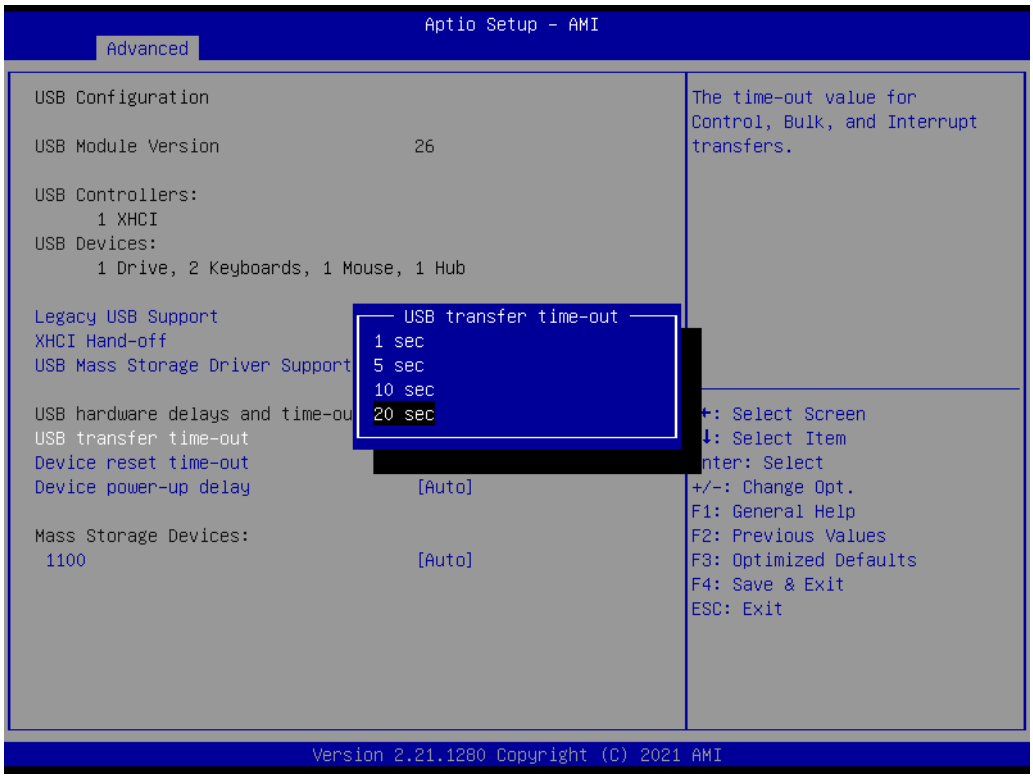
- **Above 4G Decoding**
  Enable or Disable 64-bit capability. Devices to be decoded in above 4G address space (only if the system supports 64-bit PCI decoding).

Note! *Some graphic or GPU cards need to enable 4G Decoding.*

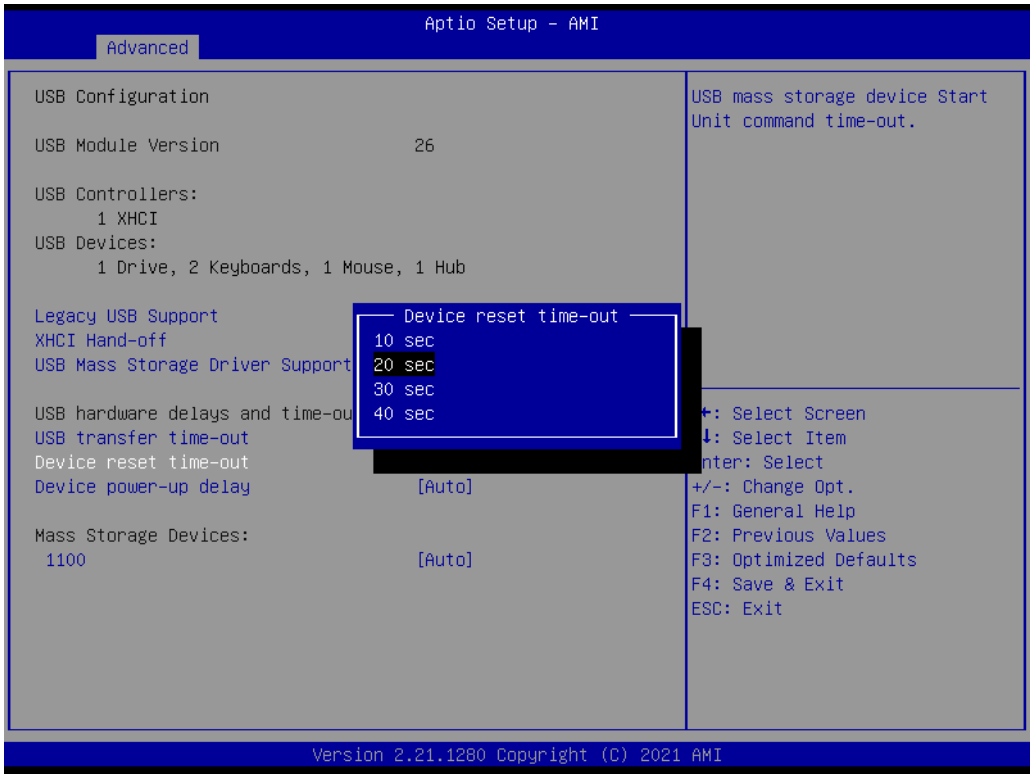
3.2.2.7 USB Configuration



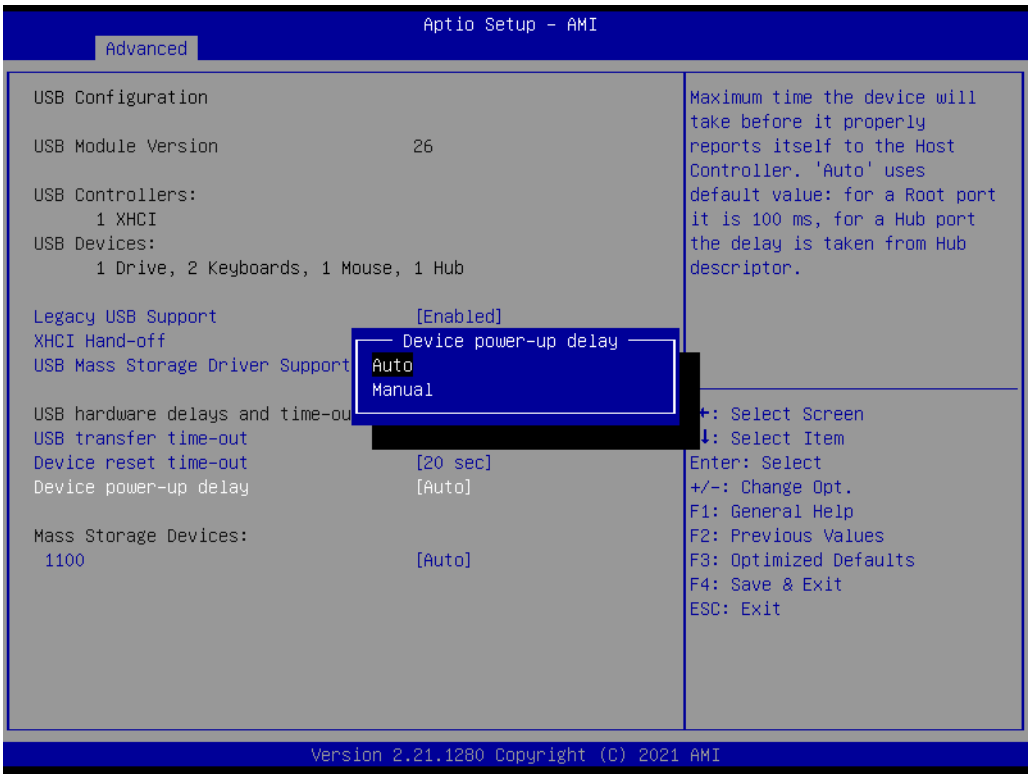
- **Legacy USB Support**
  This is for supporting USB device under a legacy OS such as DOS. When choosing “Auto”, the system will automatically detect if any USB device is plugged into the computer and enable USB legacy mode when a USB device is plugged, or disable USB legacy mode when no USB device is attached.
- **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 or Disable USB mass storage driver support.
- **USB Transfer Time-out**
  Selects the USB transfer time-out value. [1,5,10,20sec]



- **Device Reset Time-out**
  Selects the USB device reset time-out value. [10,20,30,40 sec]

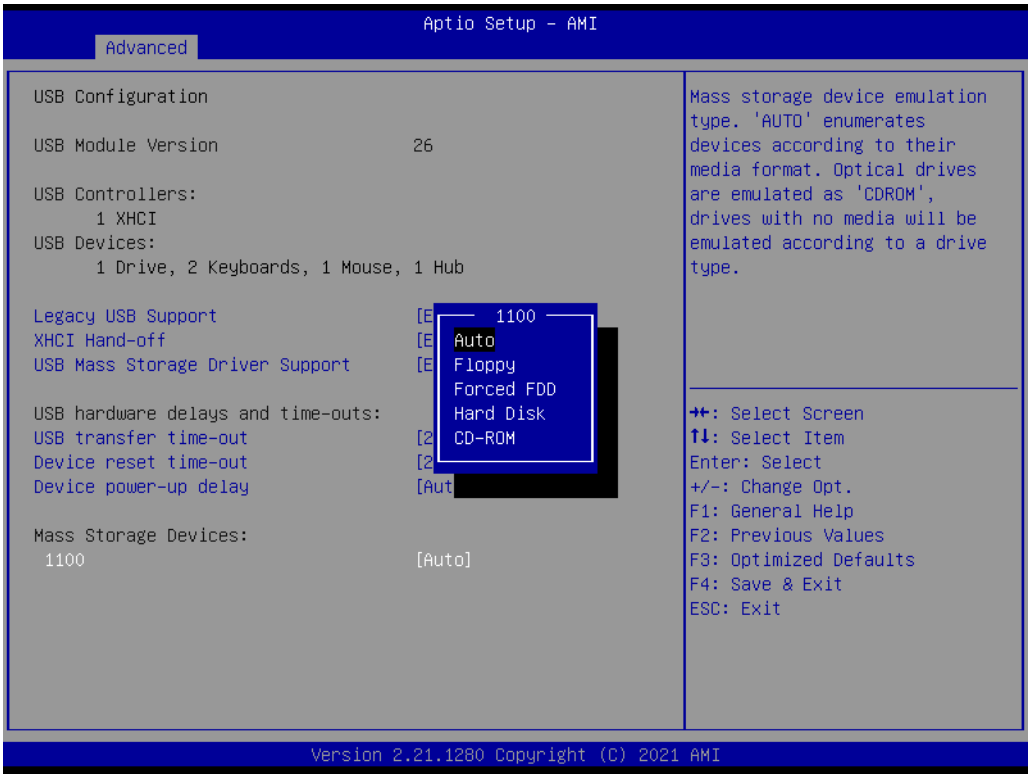


- **Device Power-up Delay**
  This item appears only when Device power-up delay item is set to [manual].

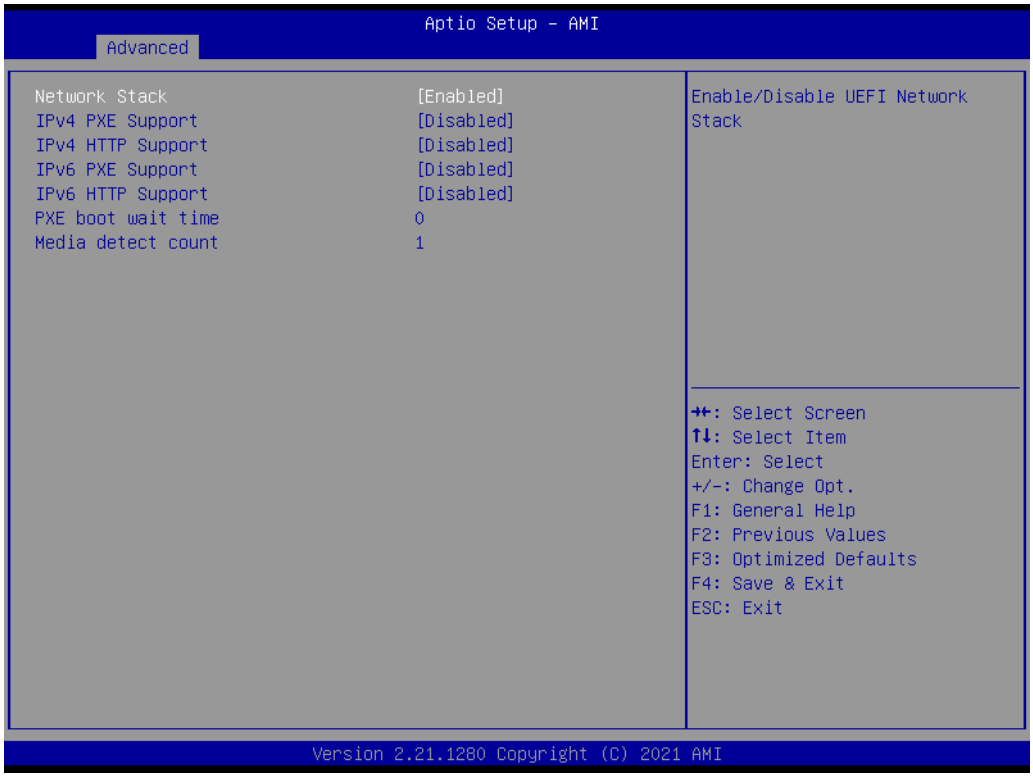


- **Mass Storage Devices**

  Default is “Auto” to enumerate mass storage devices according to media format.

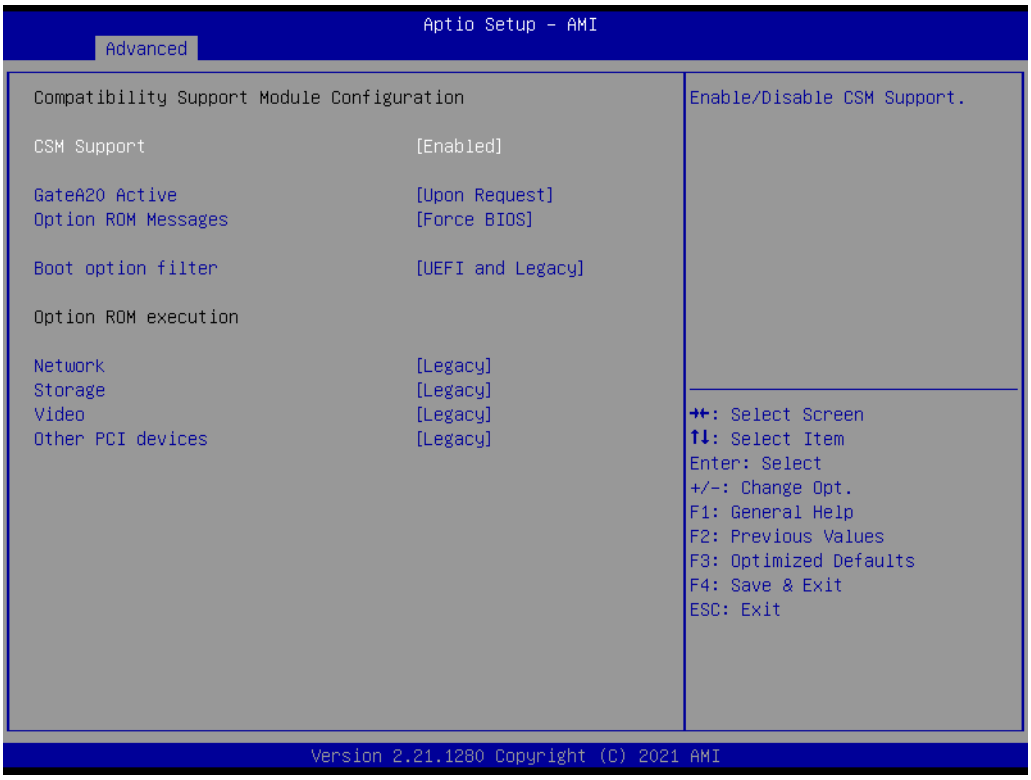


3.2.2.8 Network Stack Configuration

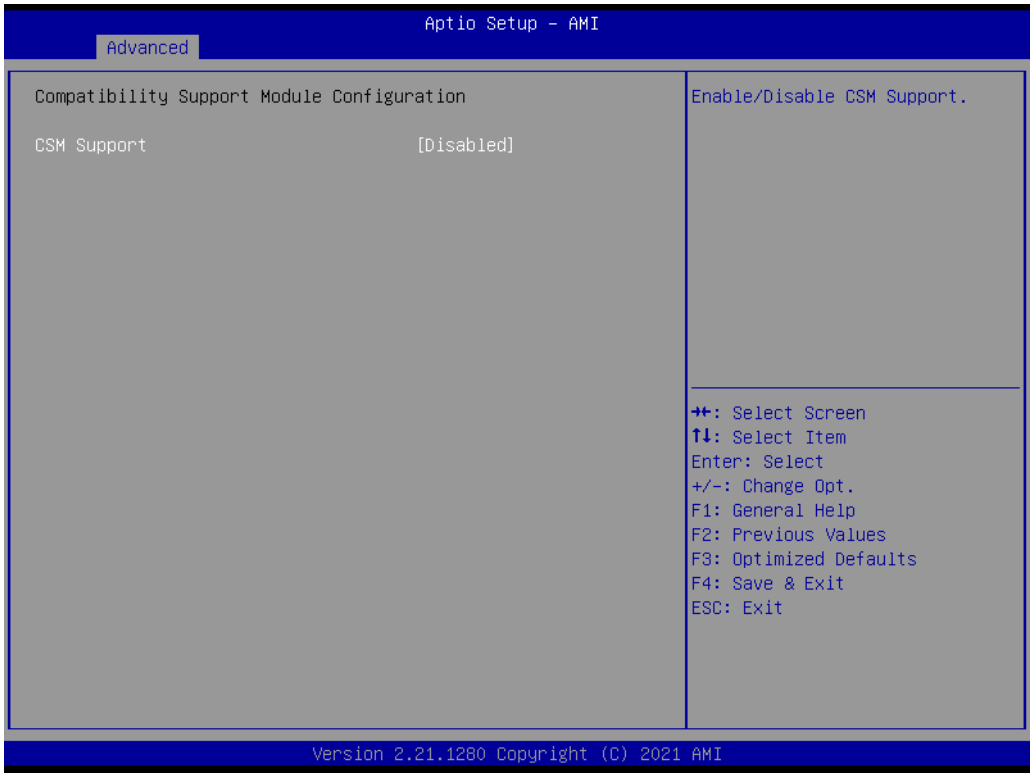


Enable or Disable UEFI network stack function.

3.2.2.9 CSM Configuration

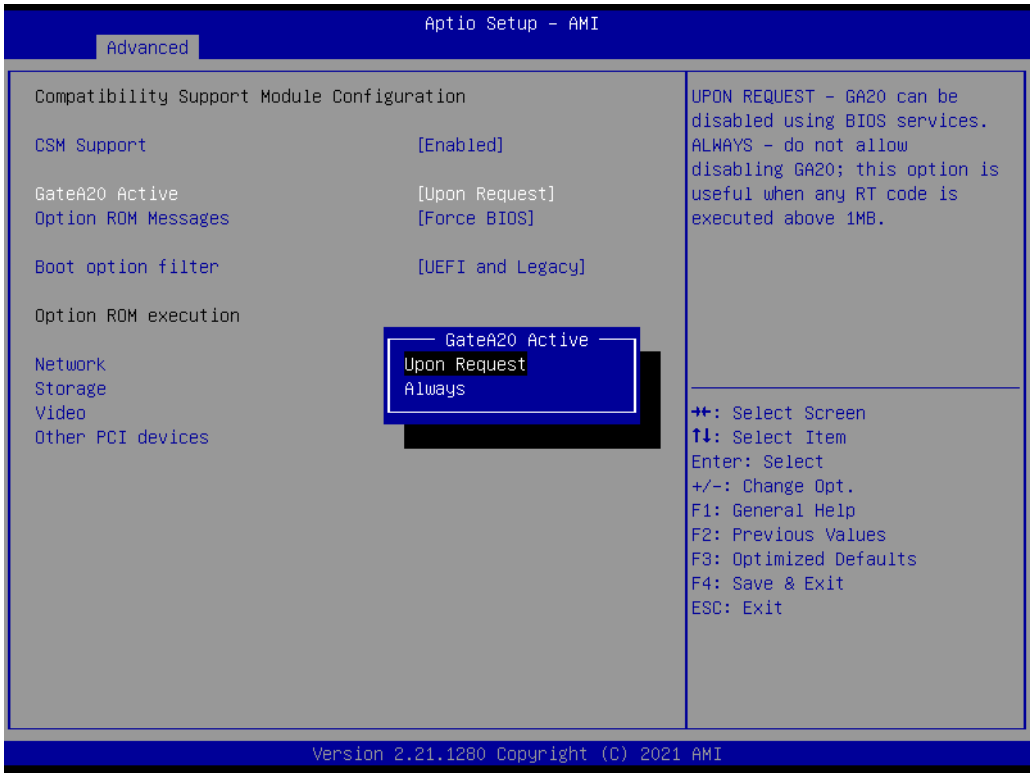


- **CSM Support**
  Enables or Disables UEFI CSM (Compatibility Support Module) to support a legacy PC boot process. Default is Disabled.



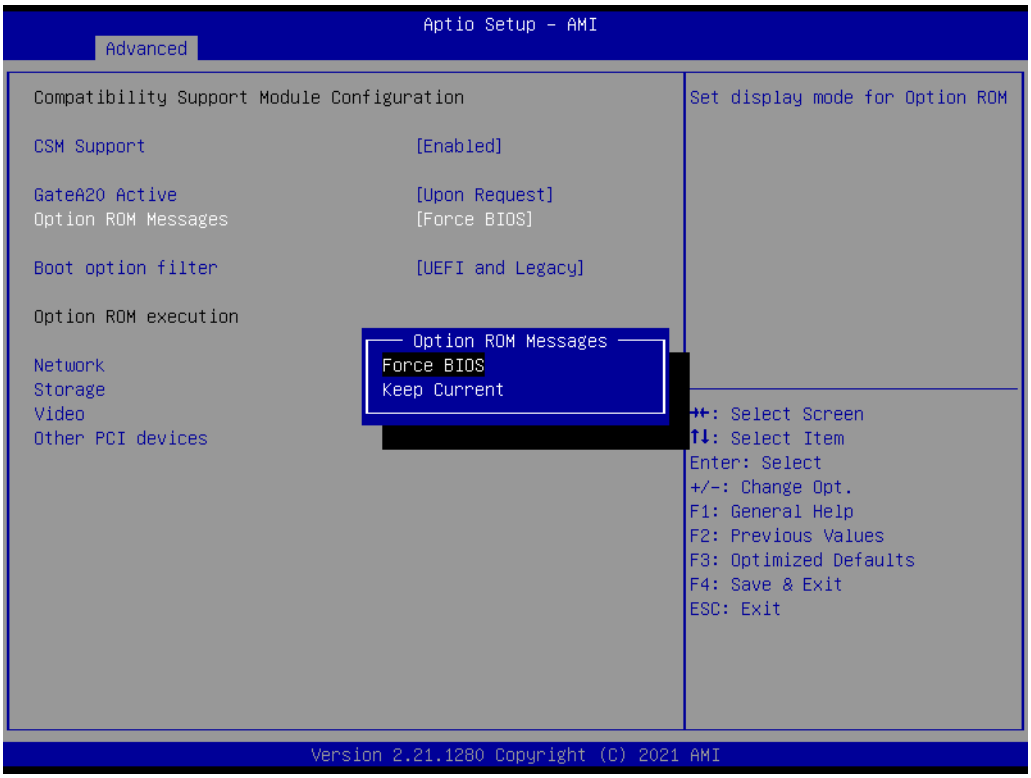
- **GateA20 Active**

  This item is useful when RT code is executed above 1MB. When it's set as "Upon Request", GA20 can be disabled using BIOS services. When it's set as "Always", it does not allow disabling of GA20.



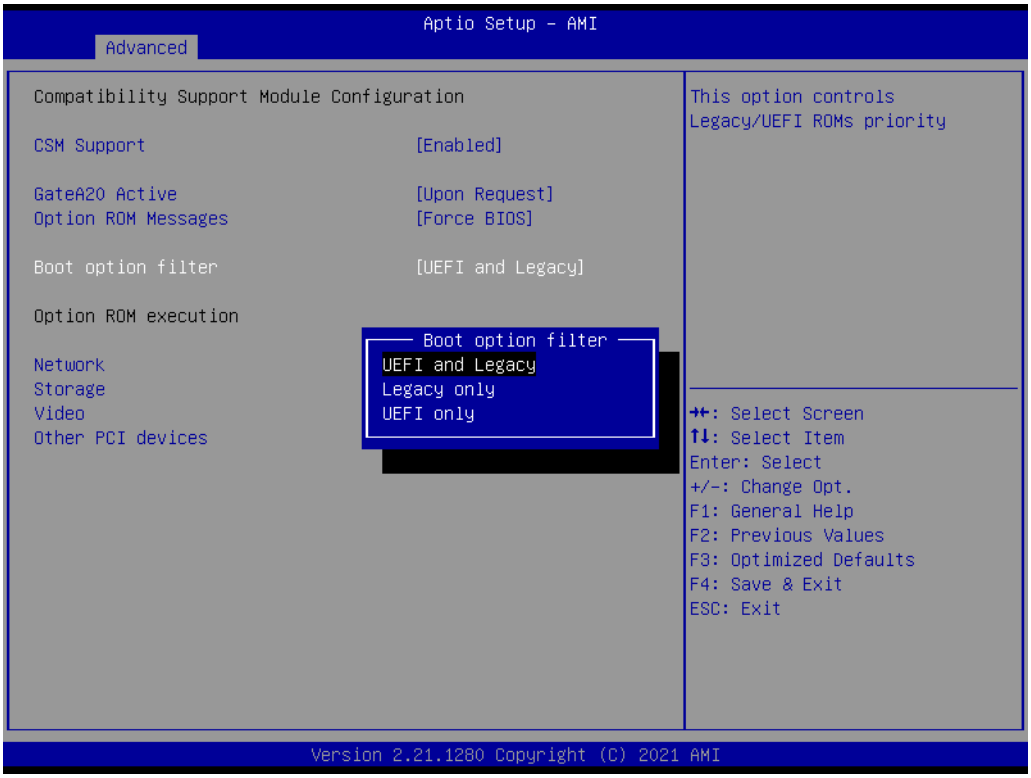
Option ROM Messages

To “Force BIOS or keep current” to set the display mode for Option ROM.

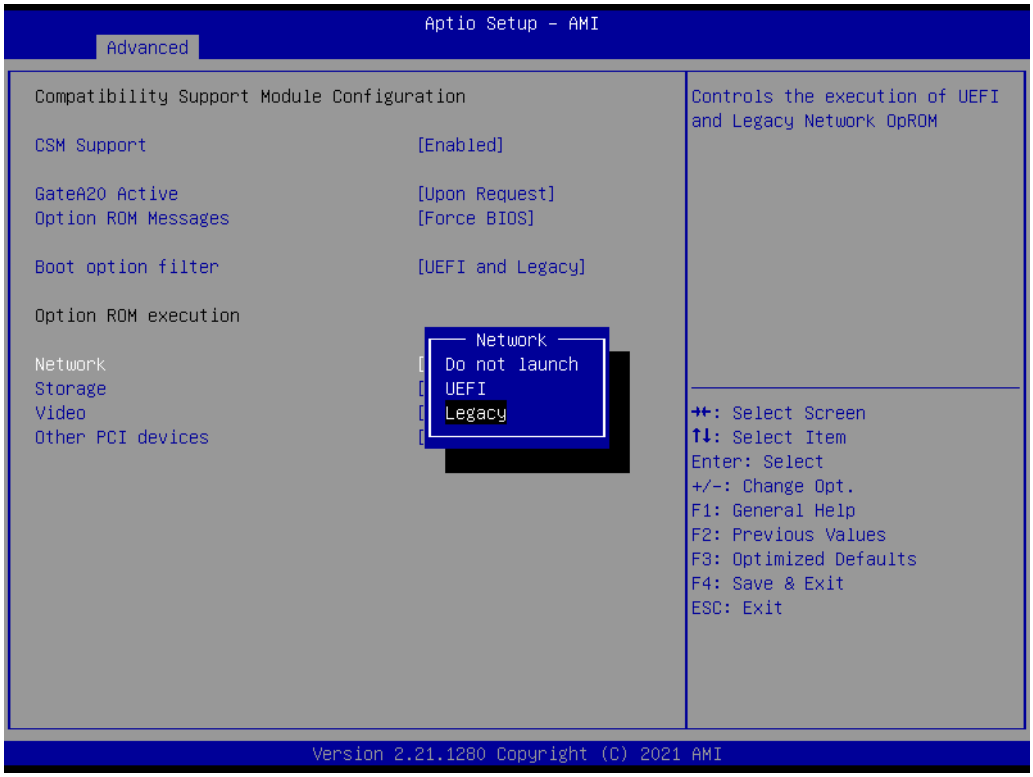


Boot option filter

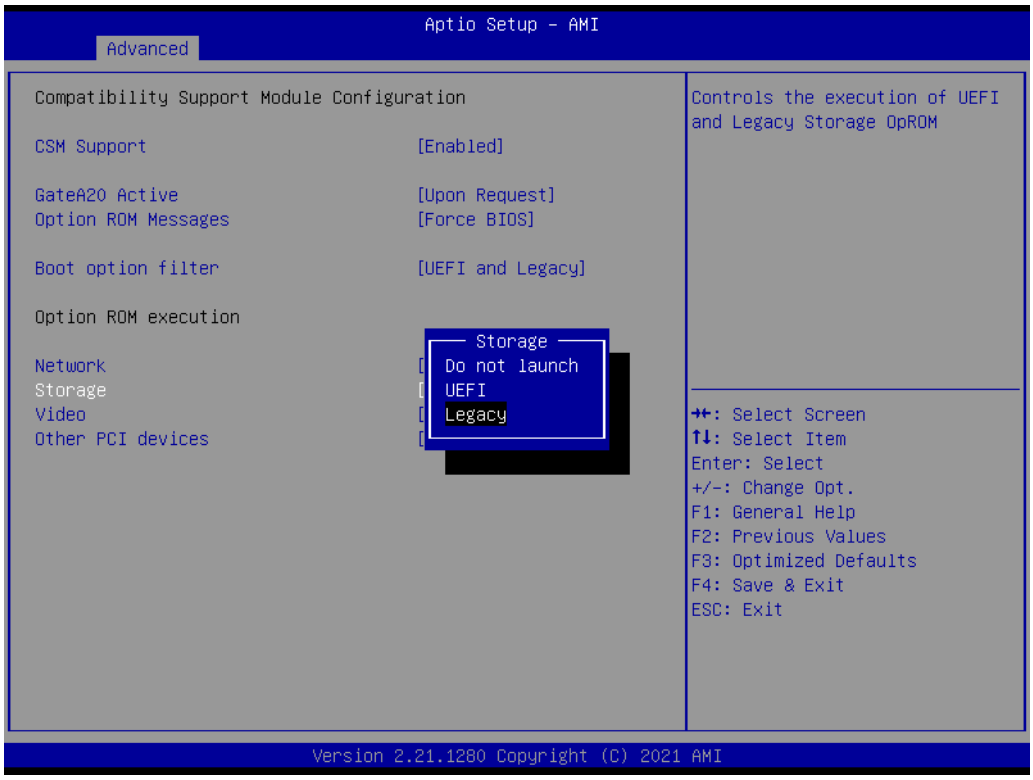
Change UEFI/legacy ROM priority for boot option.



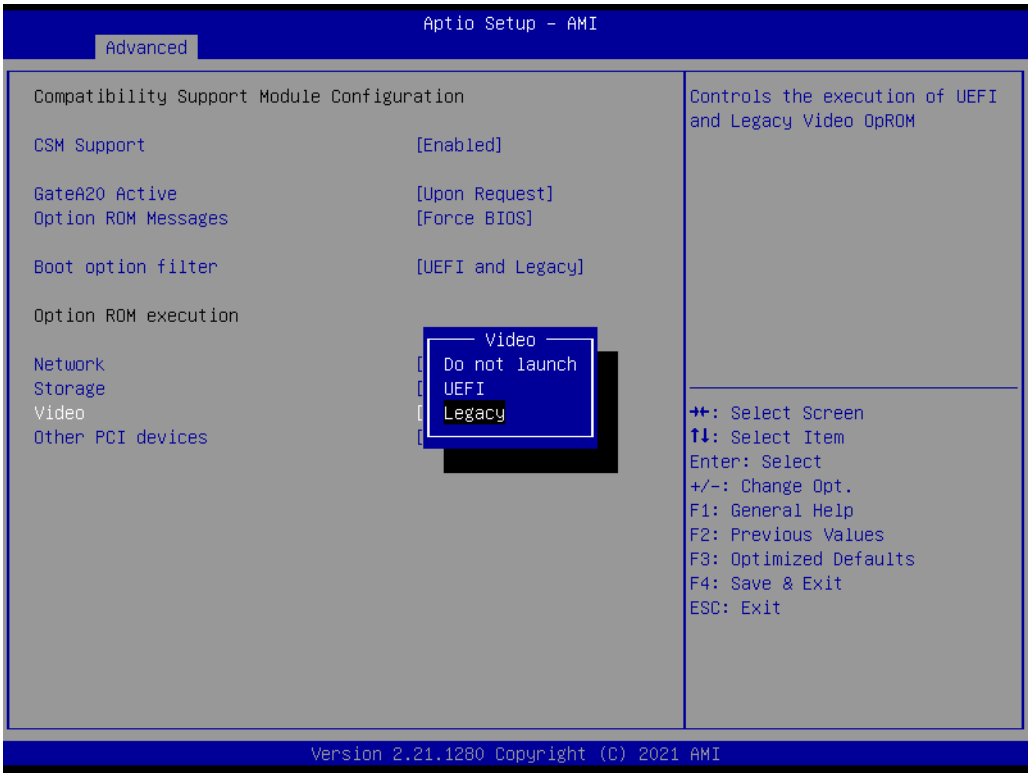
- **Network**
  Control the execution of UEFI and legacy PXE OpROM.



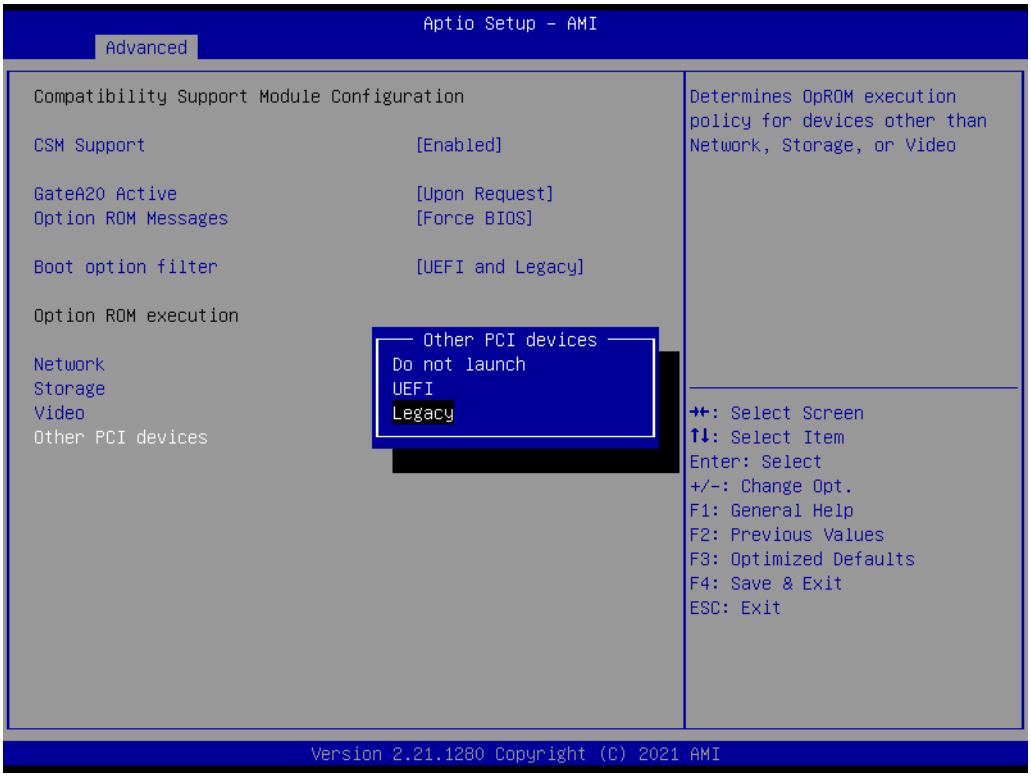
- **Storage**
  Control the execution of UEFI and legacy storage OpROM.



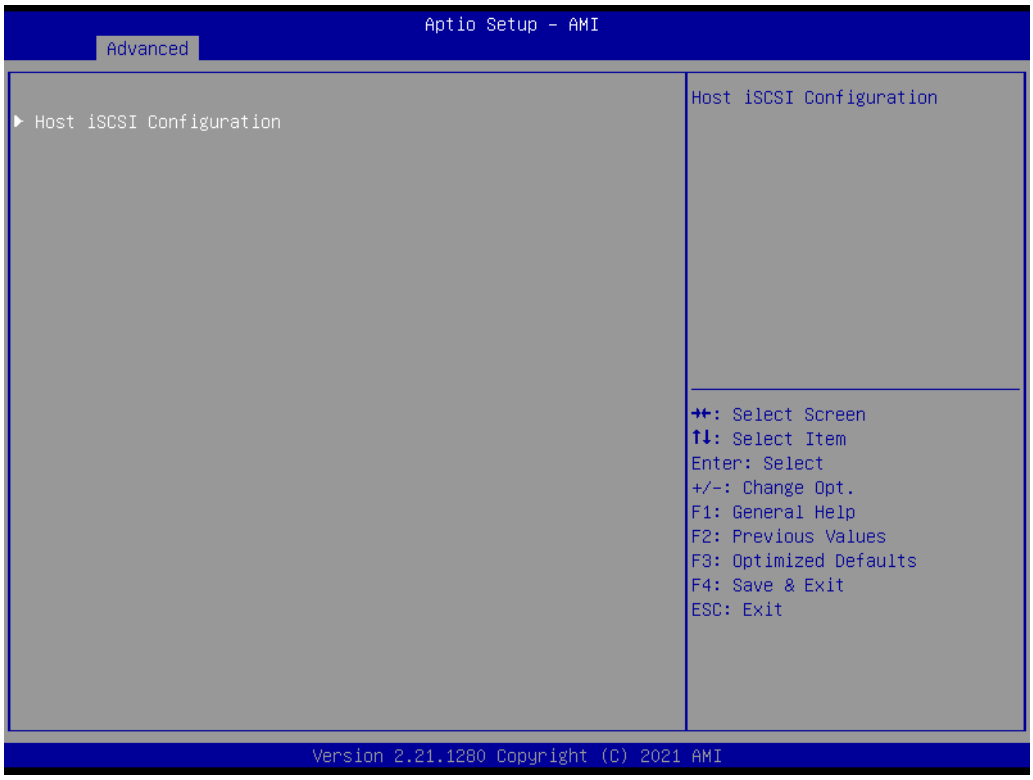
- **Video**
  Control the execution of UEFI and Legacy Video OpROM.



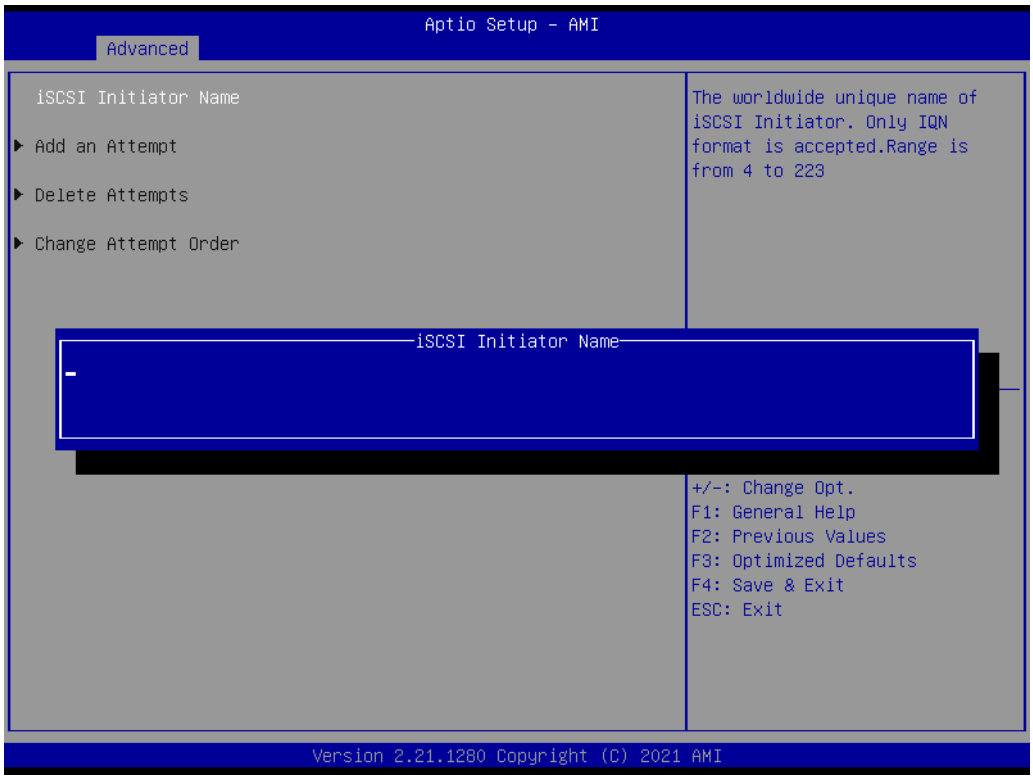
- **Other PCI devices**
  Determines OpROM execution policy for devices other than Network., Storage, or Video.



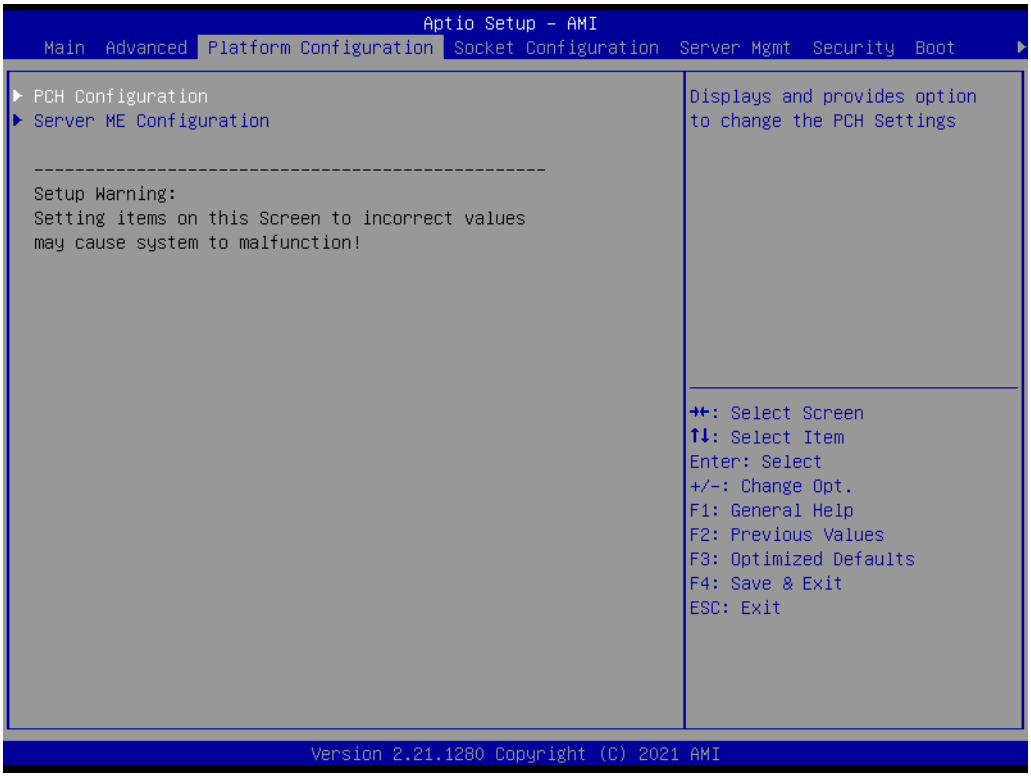
3.2.2.10 iSCSI Configuration



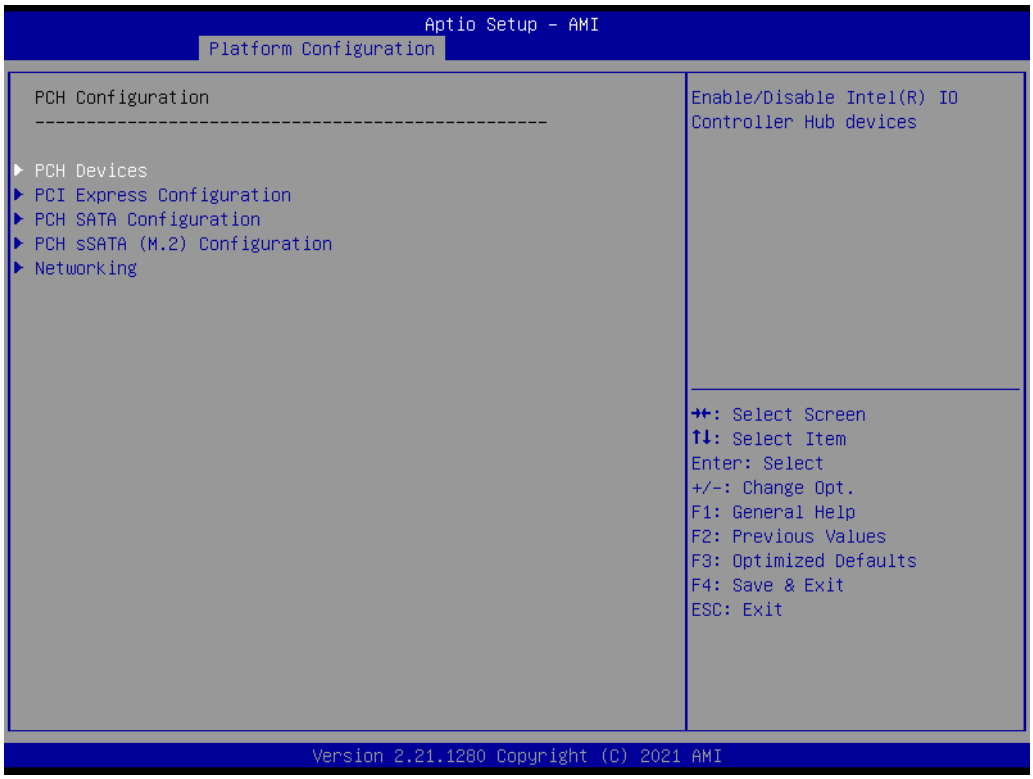
- **Host iSCSI Configuration**
  The worldwide unique name of iSCSI Initiator. Only IQN format is accepted. Range is from 4 to 223.



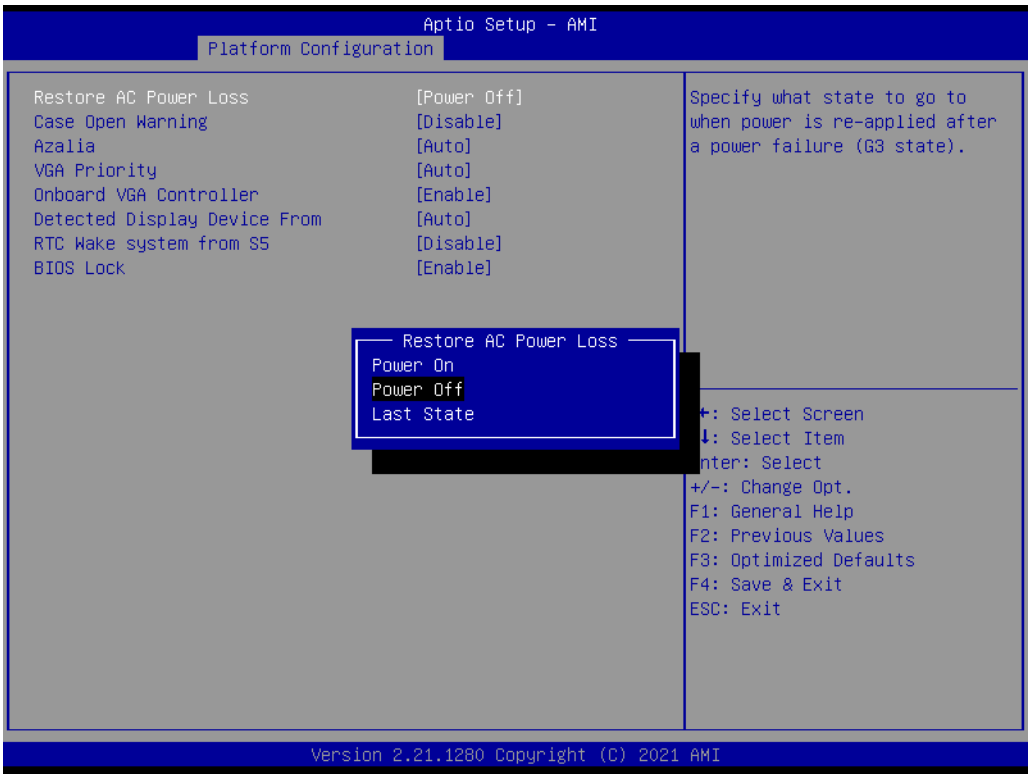
3.2.3 Platform Configuration



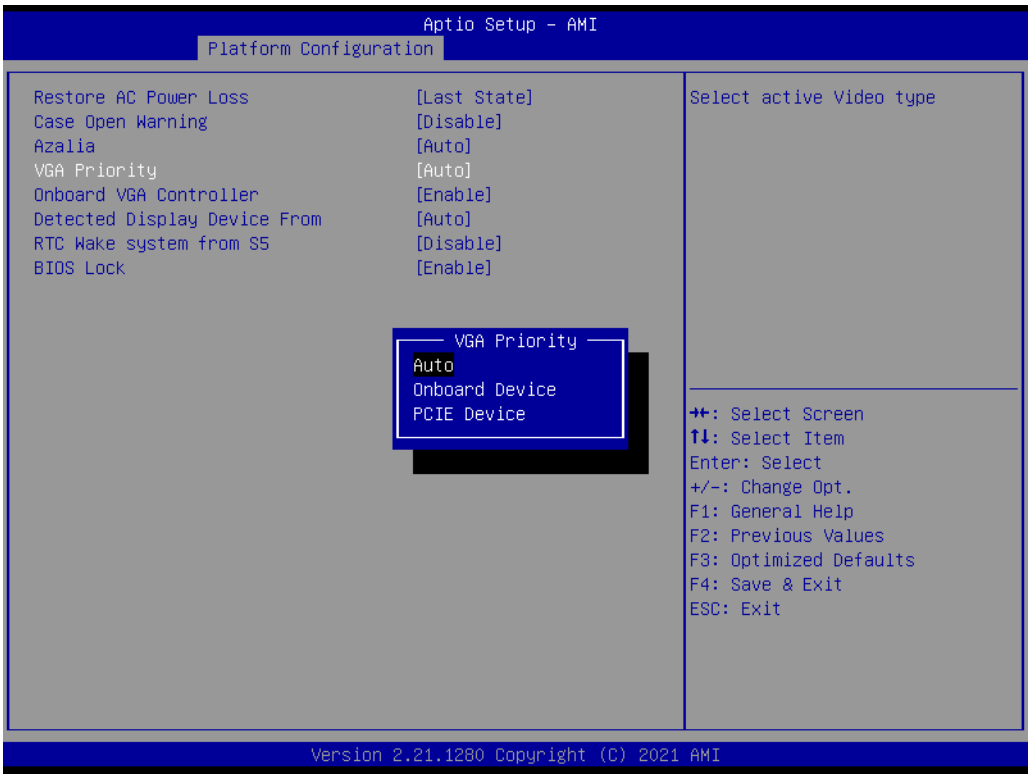
3.2.3.1 PCH Configuration



- **PCH Devices**
  This item is to set up IO Controller Hub devices.
- **Restore AC Power Loss**
  Specify what state to go to when power is re-applied after a power failure (G3 state).

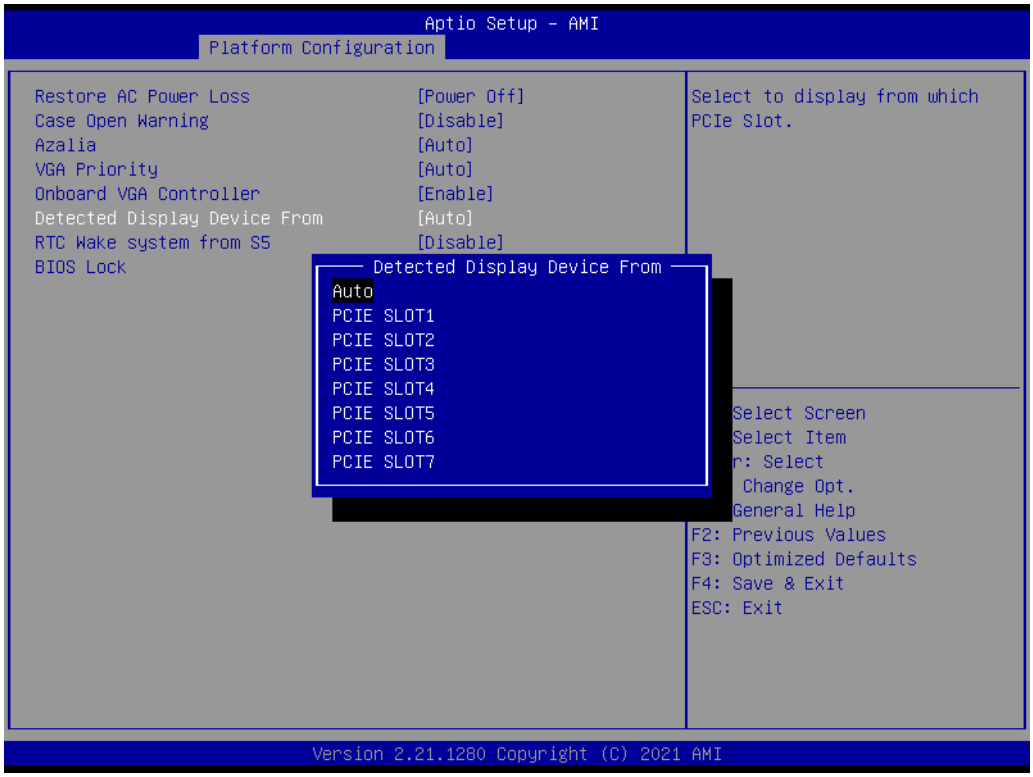


– **VGA Priority**
Determines priority between onboard and 1st off-board video device found.



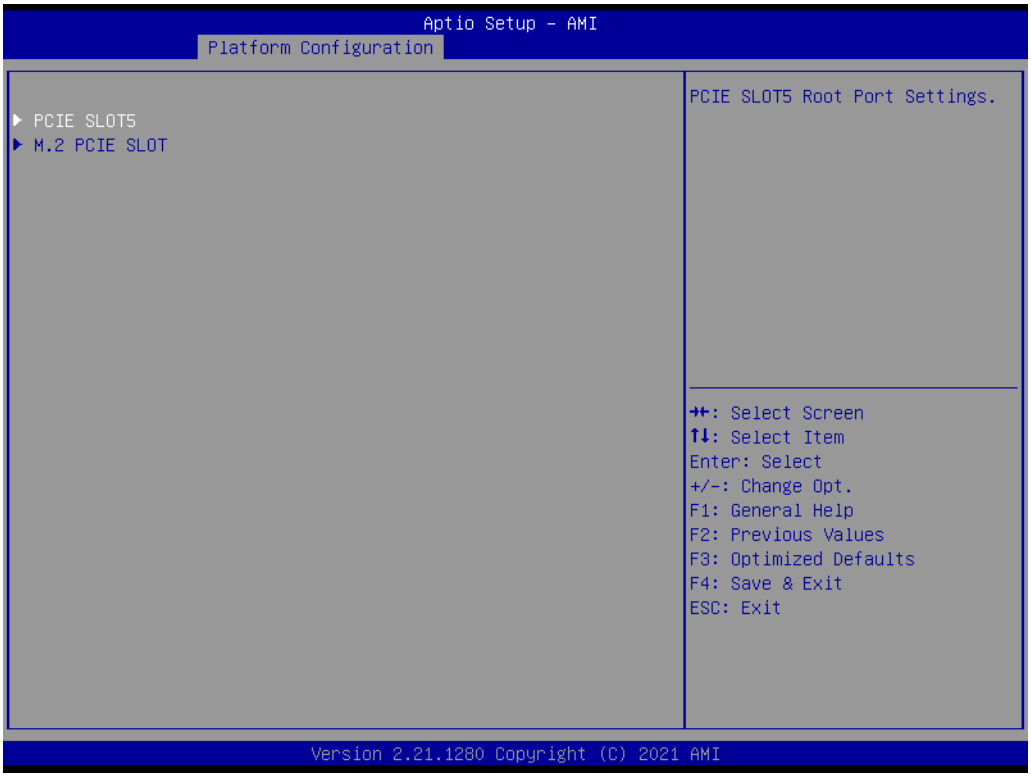
■ **Onboard VGA Controller**
Enable/Disable Onboard VGA Controller (ASPEED AST2500).

- **Detected Display Device From**
  Select to display from which PCIe Slot.



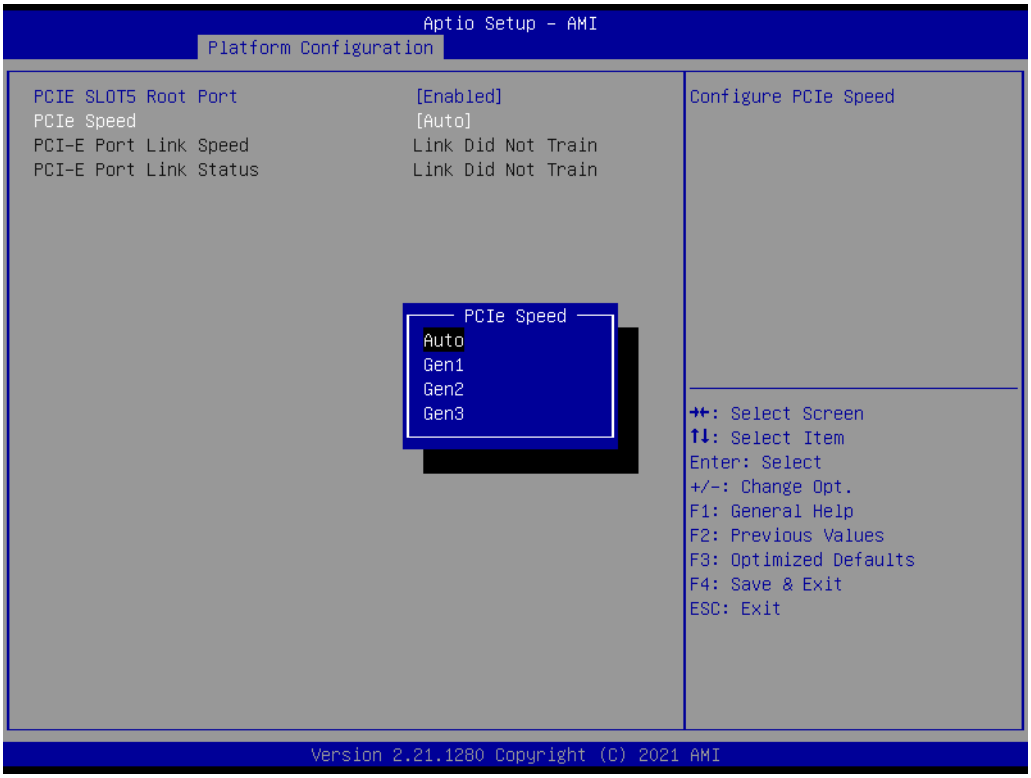
- **RTC Wake system from S5**
  Enable or Disable system wake on alarm event.

PCI Express Configuration



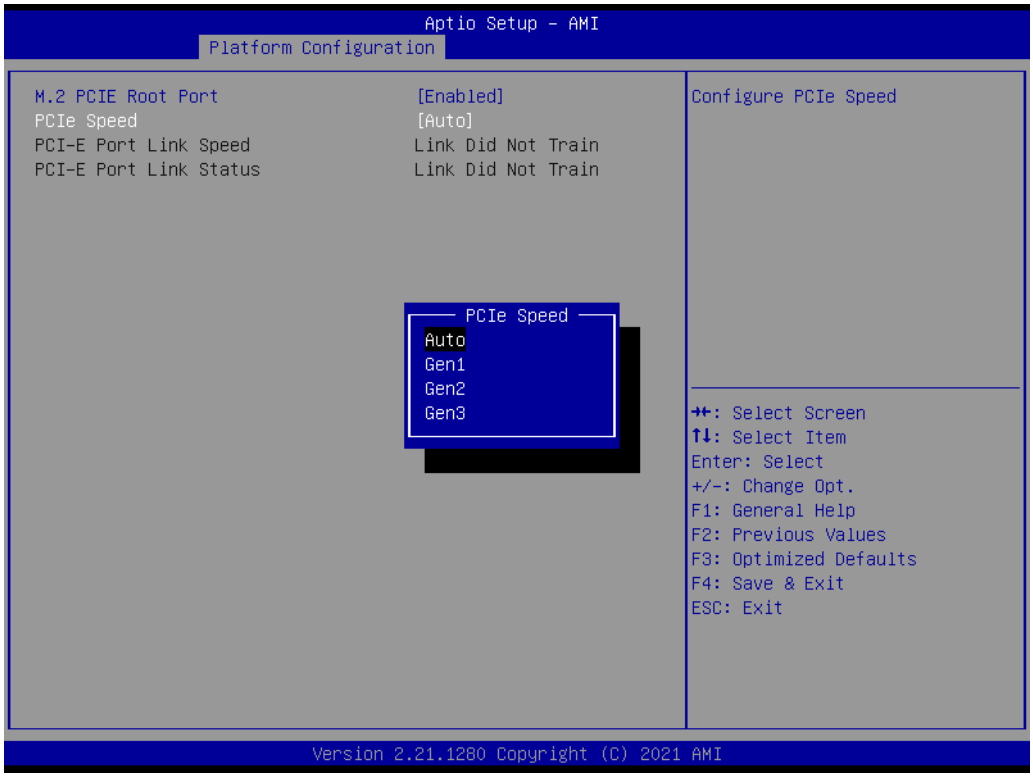
PCIE SLOTS

PCIE SLOTS Root Port Settings.

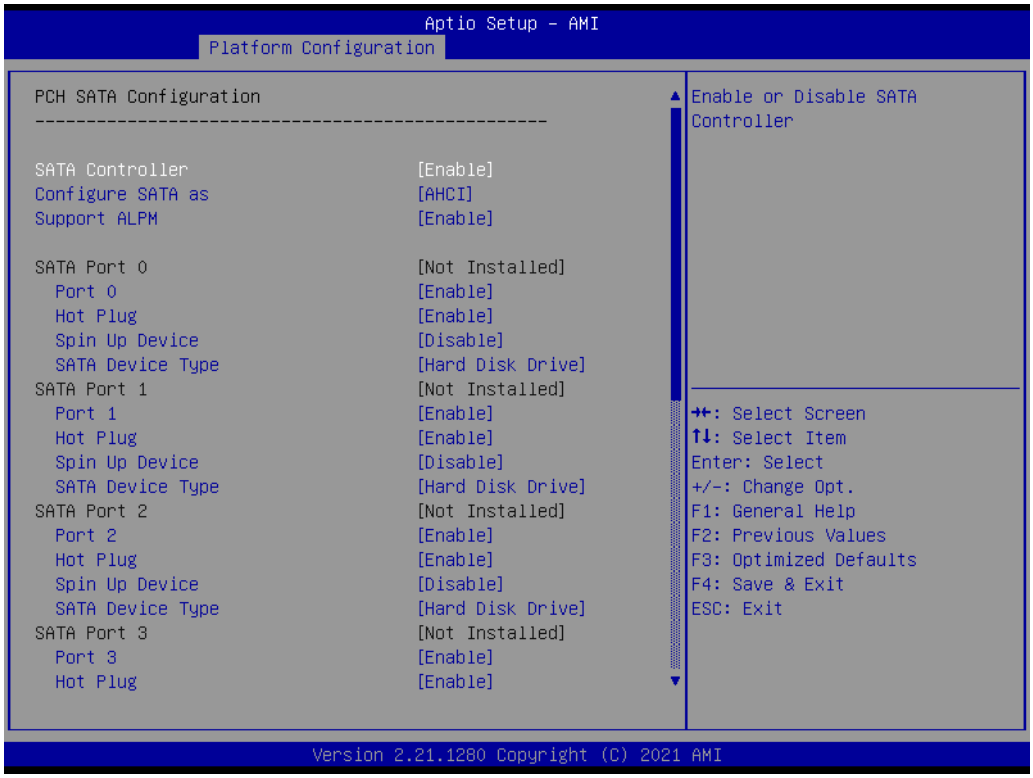


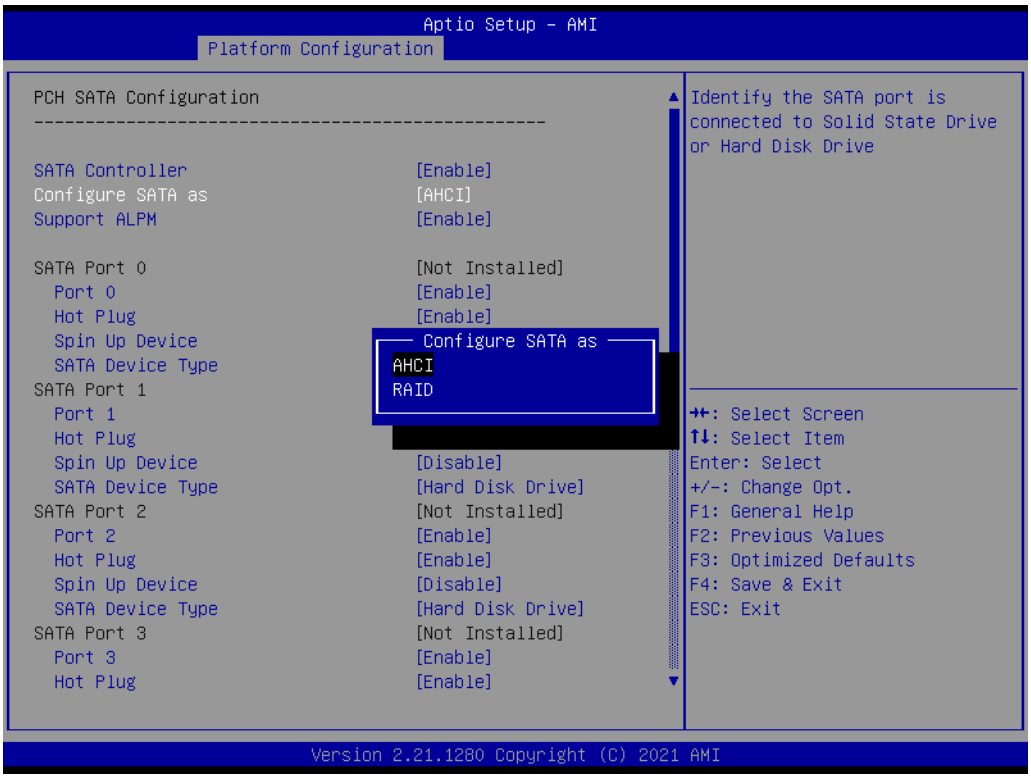
PCIe M.2 Slot

M.2 PCIE SLOT Root Port Settings.



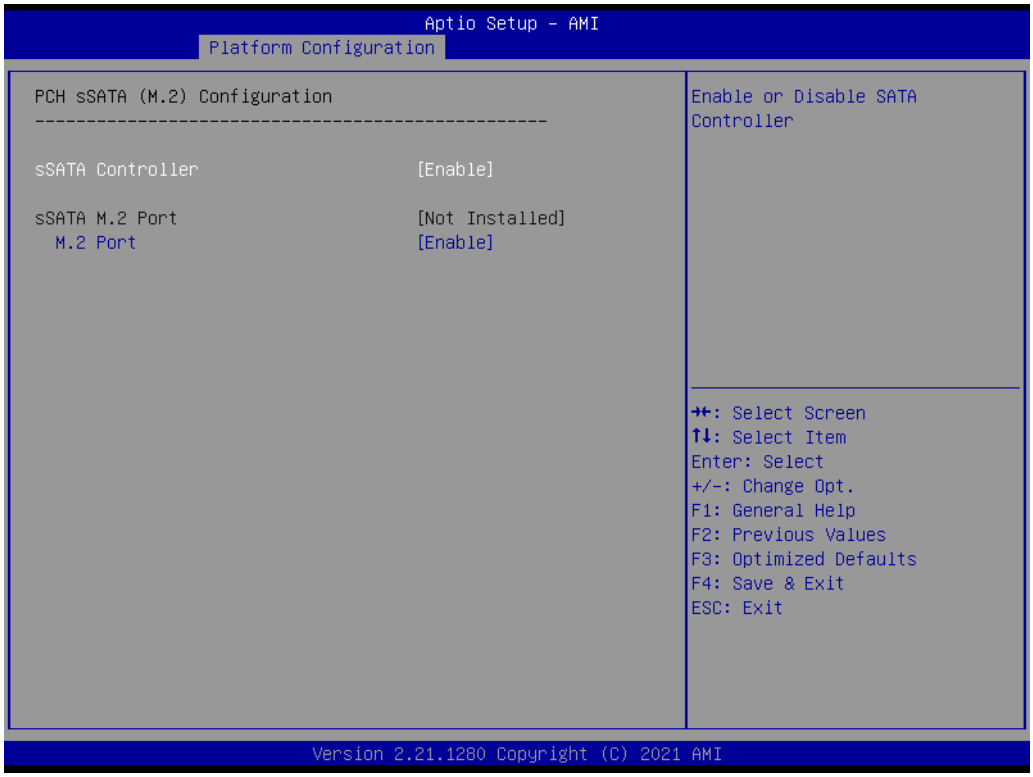
PCH SATA Configuration





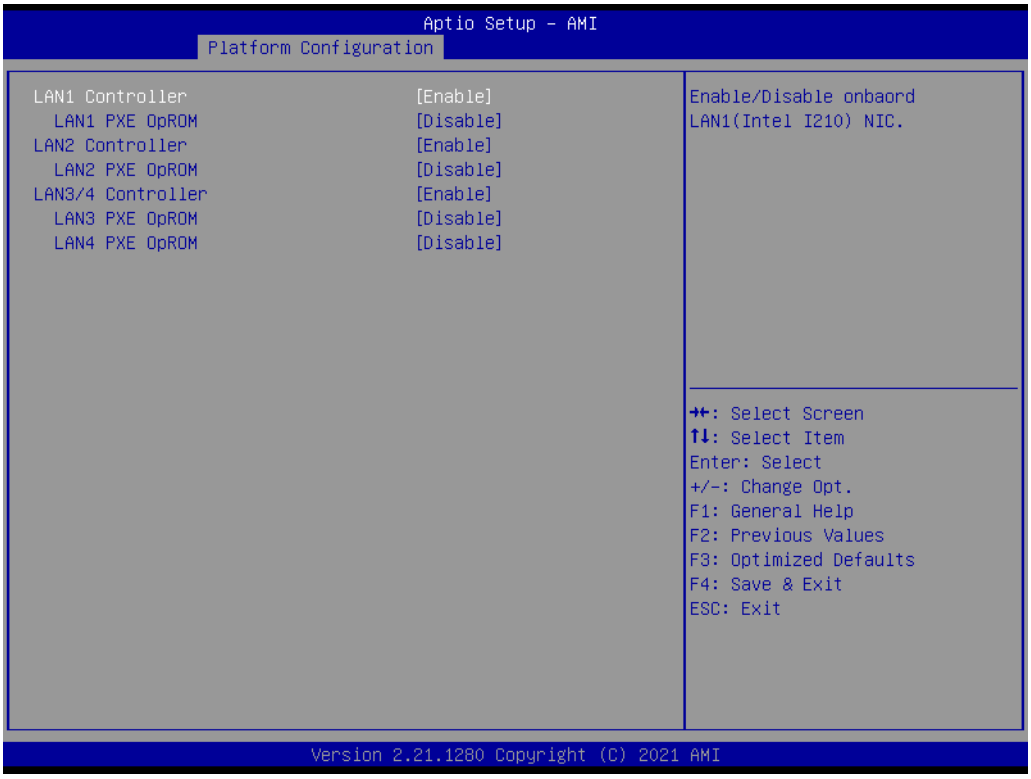
- **SATA Controller**
  Enable or Disable SATA devices.
- **Configure SATA as**
  Set as AHCI or RAID when SATA controllers are enabled.
- **Support ALPM**
  Enable or Disable Aggressive Link Power Management (ALPM) protocol for Advanced Host Controller Interface-compliant (AHCI) Serial ATA (SATA) devices.
- **SATA Port 0~7**
  Enable or Disable SATA port 0~7.
- **Hot Plug Port 0~7**
  Designates SATA port 0~7 as hot pluggable.
- **SATA Port 0~7 Spin Up Device**
  On an edge detect from 0 to 1, the PCH starts a COMRESET initialization sequence to the device.
- **SATA Port 0~7 Device Type**
  To identify the SATA is connected to Solid State Drive or Hard Disk Drive.

PCH sSATA (M.2) Configuration



- **sSATA M.2 Controller**
  Enable or Disable SATA Controller.
- **sSATA M.2 Port**
  Enable or Disable SATA port.

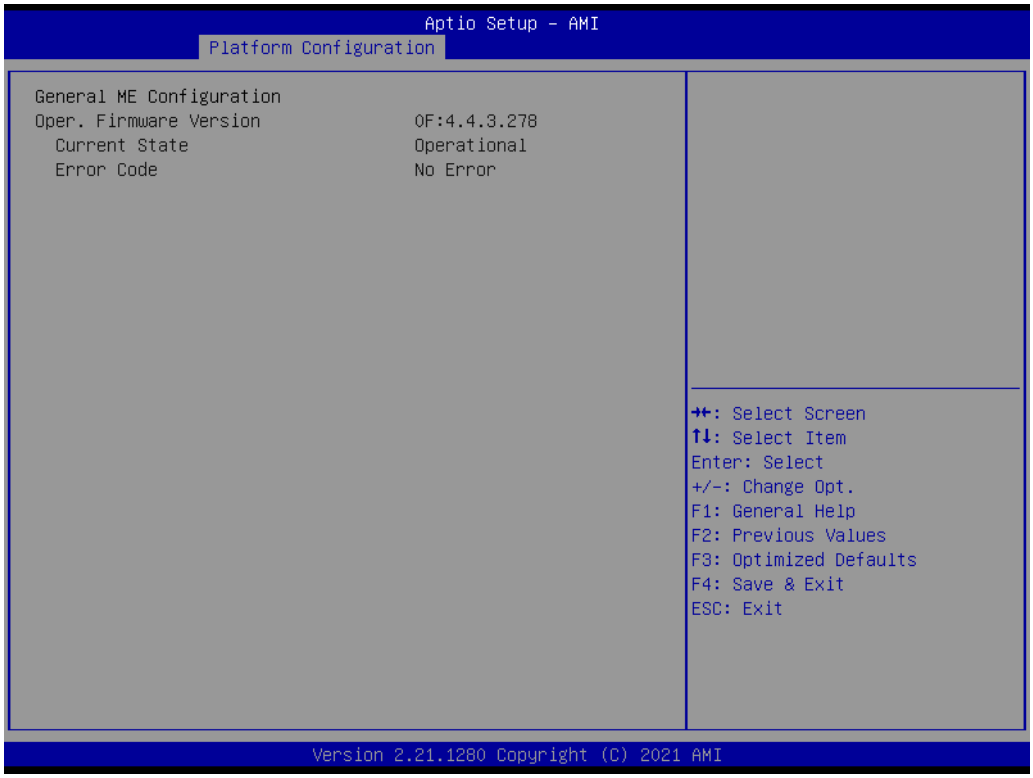
Networking



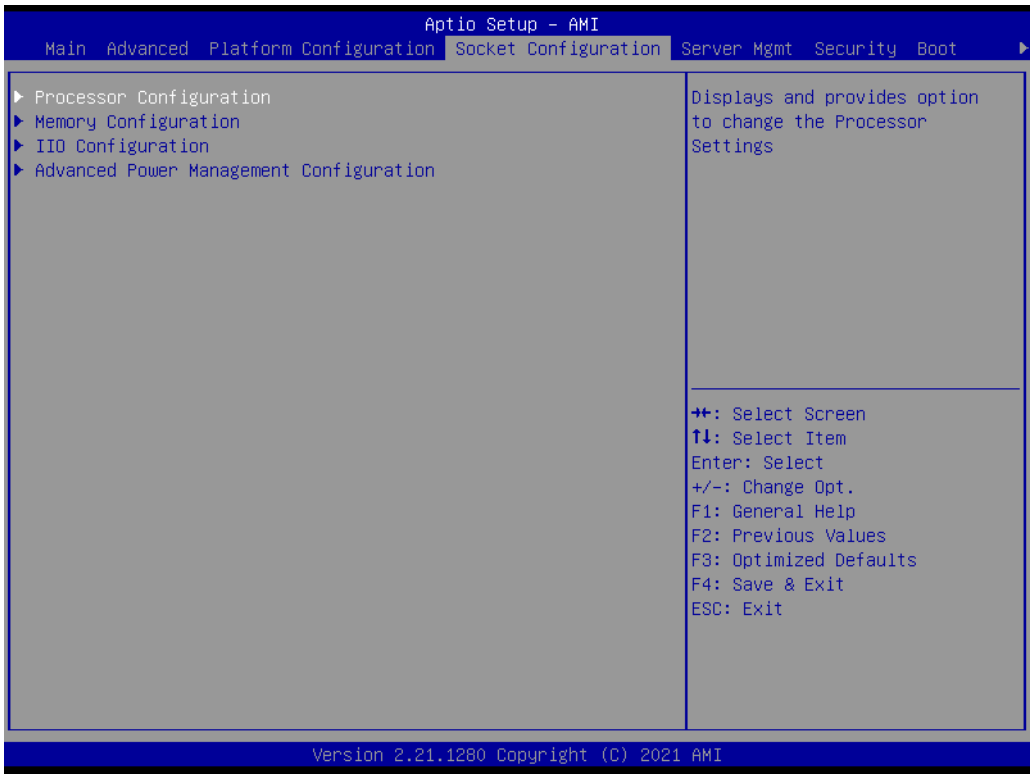
- **LAN1 Controller**
  Enable or Disable Intel I210 Controller support.
- **LAN1 PXE OpROM**
  Enable or Disable Boot option for Intel I210 controller.
- **LAN2 Controller**
  Enable or Disable Intel I210 Controller support.
- **LAN2 PXE OpROM**
  Enable or Disable Boot option for Intel I210 controller.
- **LAN3/LAN4 Controller**
  Enable or Disable Intel X550 controller support.
- **LAN3 PXE OpROM**
  Enable or Disable boot option for Intel X550 controller.
- **LAN4 PXE OpROM**
  Enable or Disable boot option for Intel X550 controller.

3.2.3.2 Server ME Configuration

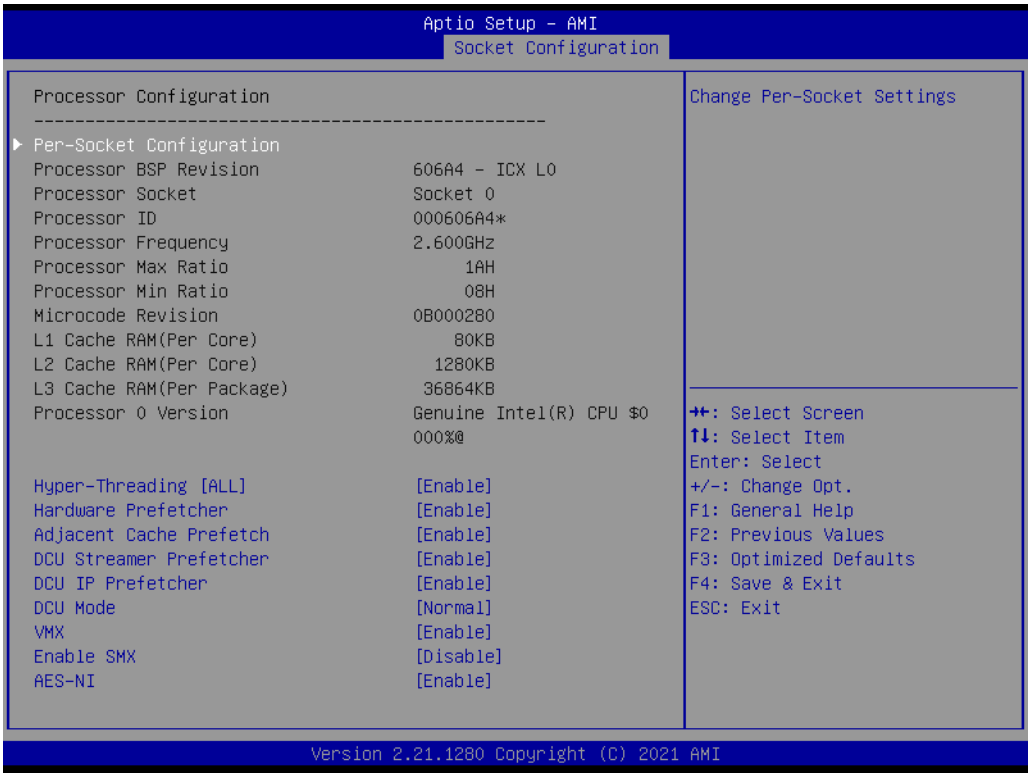
This page shows the Server ME configuration information.



3.2.4 Socket Configuration



3.2.4.1 Processor Configuration



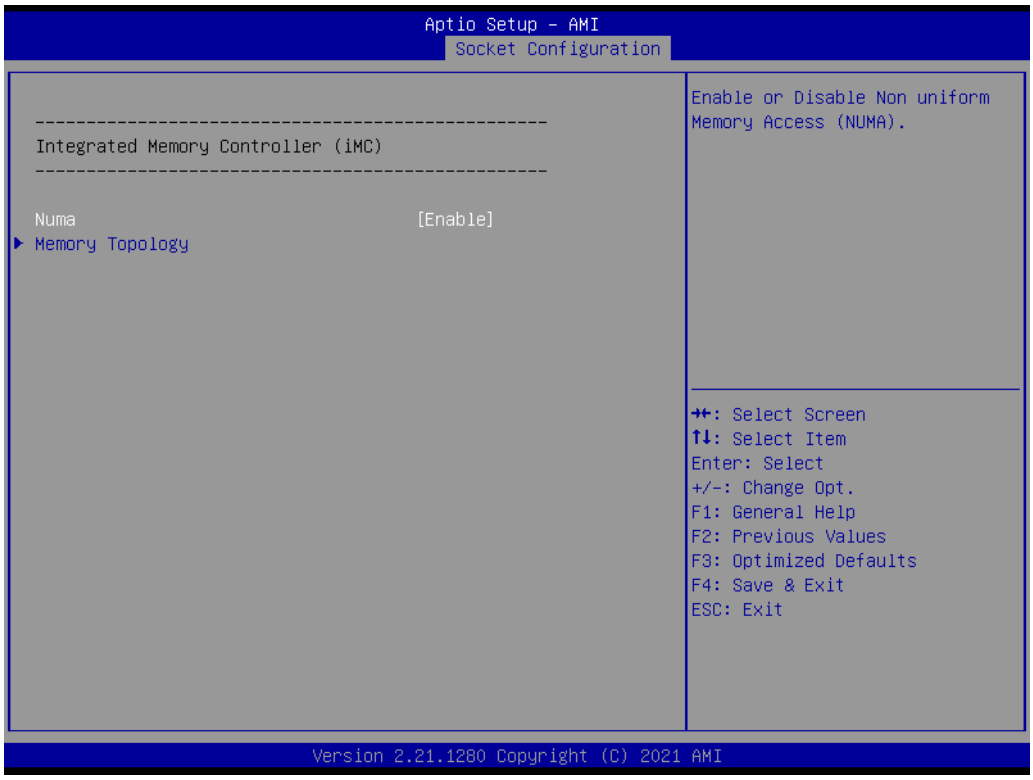
- **Per-Socket Configuration**
  Use this to select how many processor cores you want to activate when you are using a dual or quad core processor.
- **Hyper-threading [All]**
  Enable or Disable Intel Hyper Threading technology.
- **Hardware Prefetcher**
  Hardware Prefetcher is a technique that fetches instructions and/or data from memory into the CPU cache memory well before the CPU needs it, so that it can improve the load-to-use latency.
- **Adjacent Cache Prefetch**
  The Adjacent Cache-Line Prefetch mechanism, like automatic hardware prefetch, operates without programmer intervention. When enabled through the BIOS, two 64-byte cache lines are fetched into a 128-byte sector, regardless of whether the additional cache line has been requested or not.
- **DCU Streamer Prefetcher**
  Enable prefetch of next L1 data line based upon multiple loads in same cache line.
- **DCU IP Prefetcher**
  Enable prefetch of next L1 line based upon sequential load history.
- **DCU Mode**
  Change the data cache unit mode.
- **VMX**
  Enable or disable Intel Virtual Machine Extensions (VMX) for IA-32 processors that support Intel® Vanderpool Technology
- **Enable SMX**

Enable or Disable the Safer Mode Extensions. Safer Mode Extensions (SMX) provide a means for system software to launch an MLE and establish a measured environment within the platform to support trust decisions by end users.

- **AES-NI**

  This item is Enables or Disables CPU advanced encryption standard instructions.

3.2.4.2 Memory Configuration



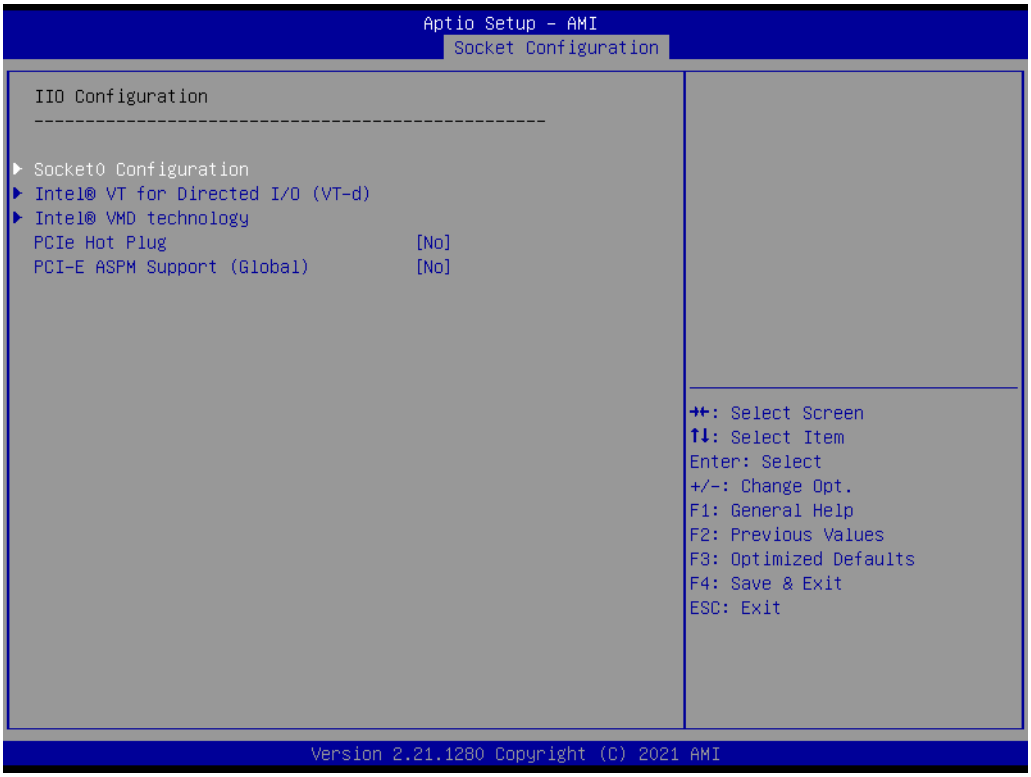
- **NUMA**

  Enable or Disable non-uniform memory access (NUMA).

- **Memory Technology**

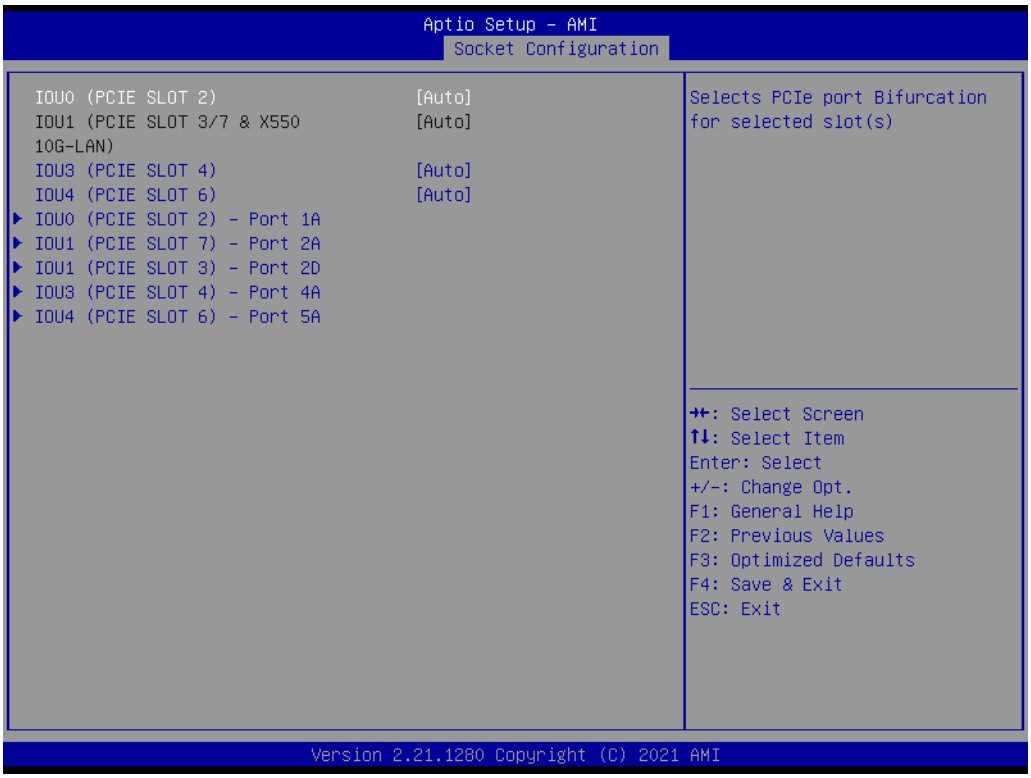
  Display memory topology with DIMM population information.

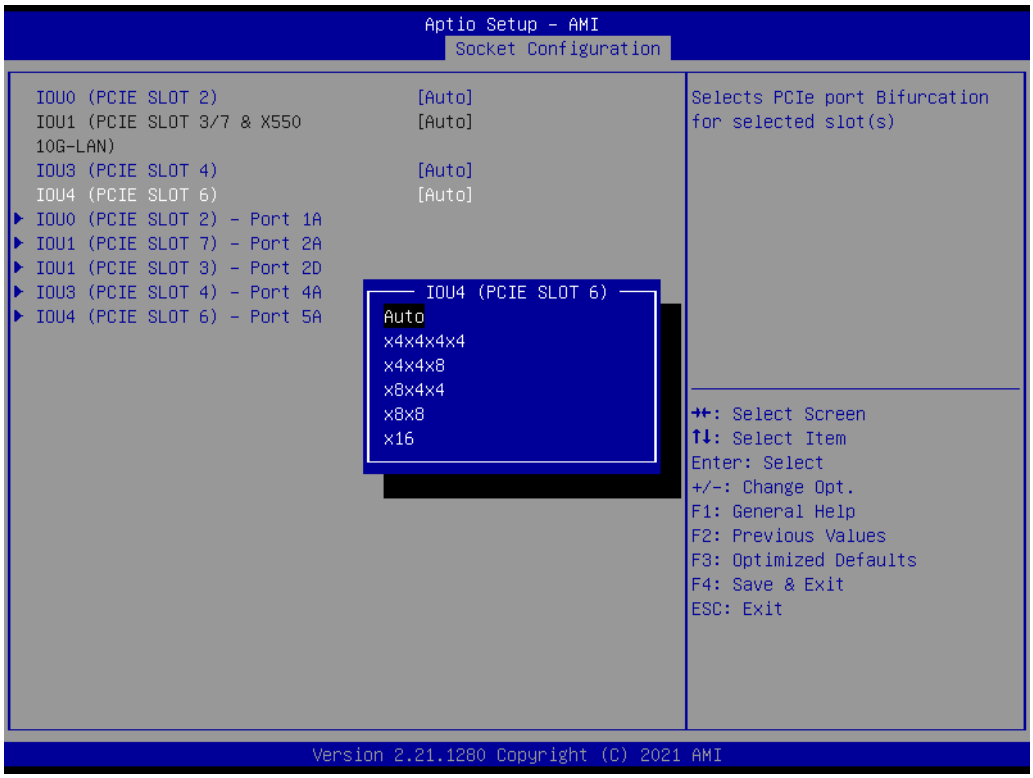
3.2.4.3 IIO Configuration

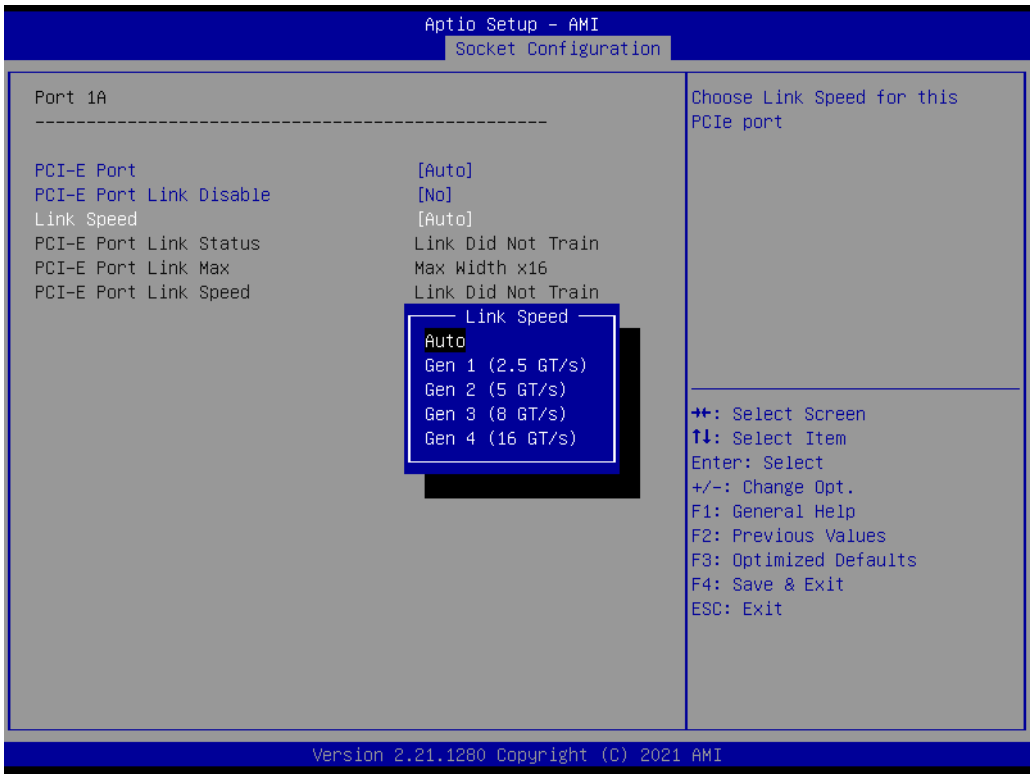


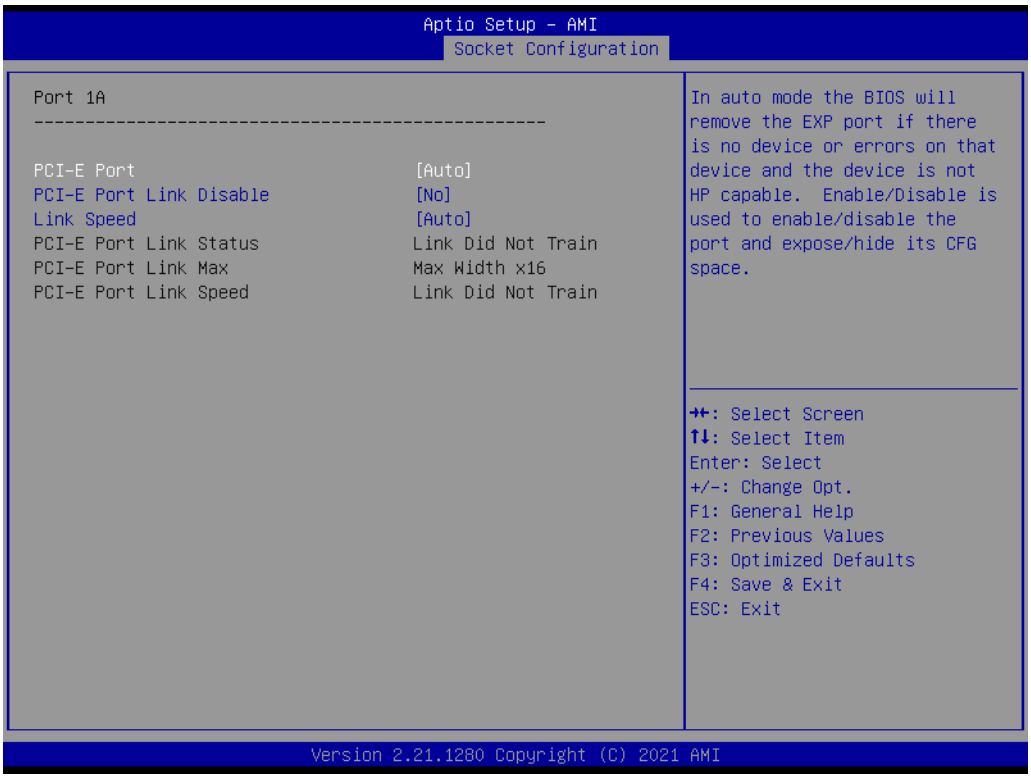
- **Socket0 PCIe Configuration**

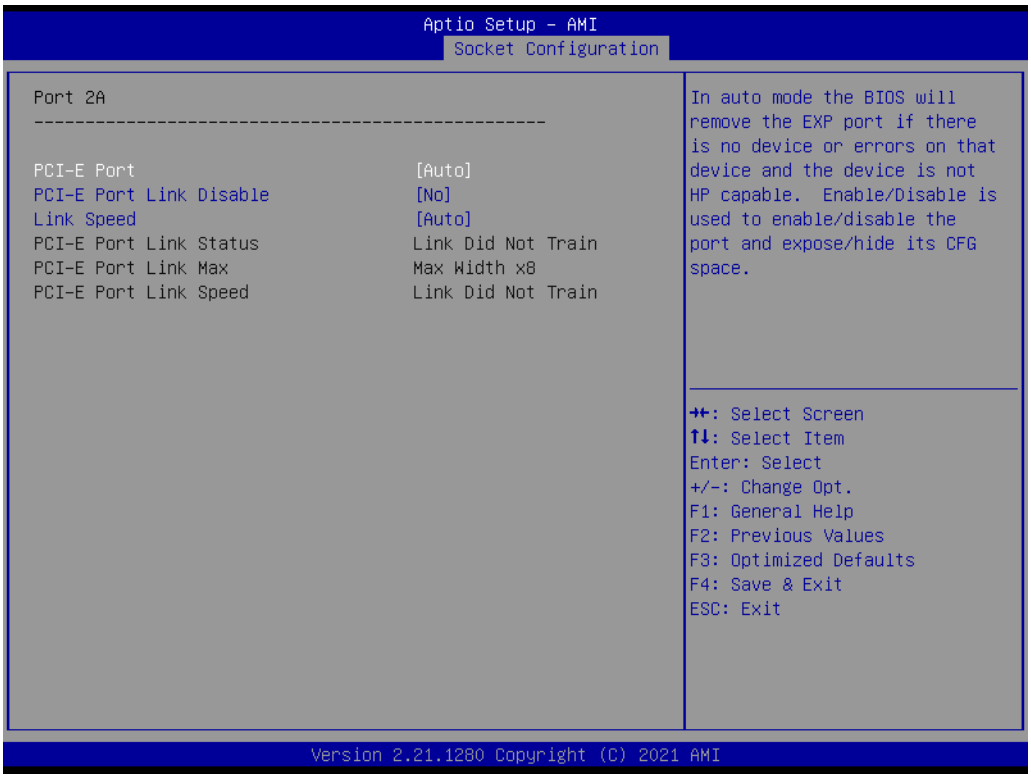
  PCIe port bifurcation control and select target link speed as Gen1, Gen2, Gen3, Gen4 and Auto.

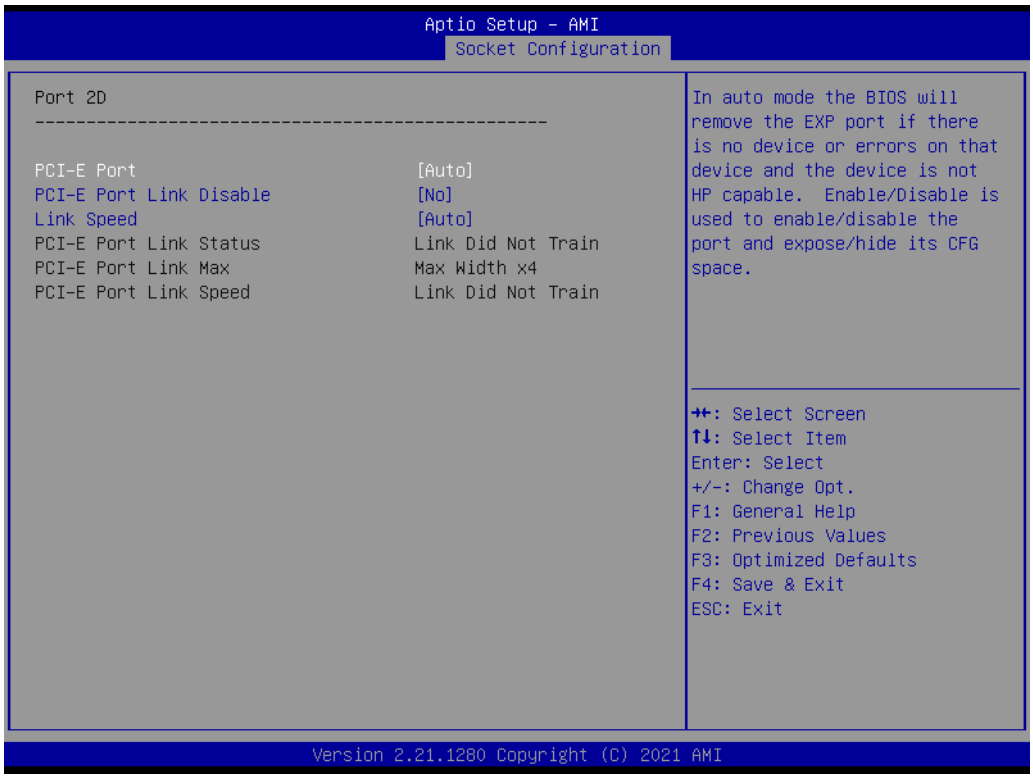


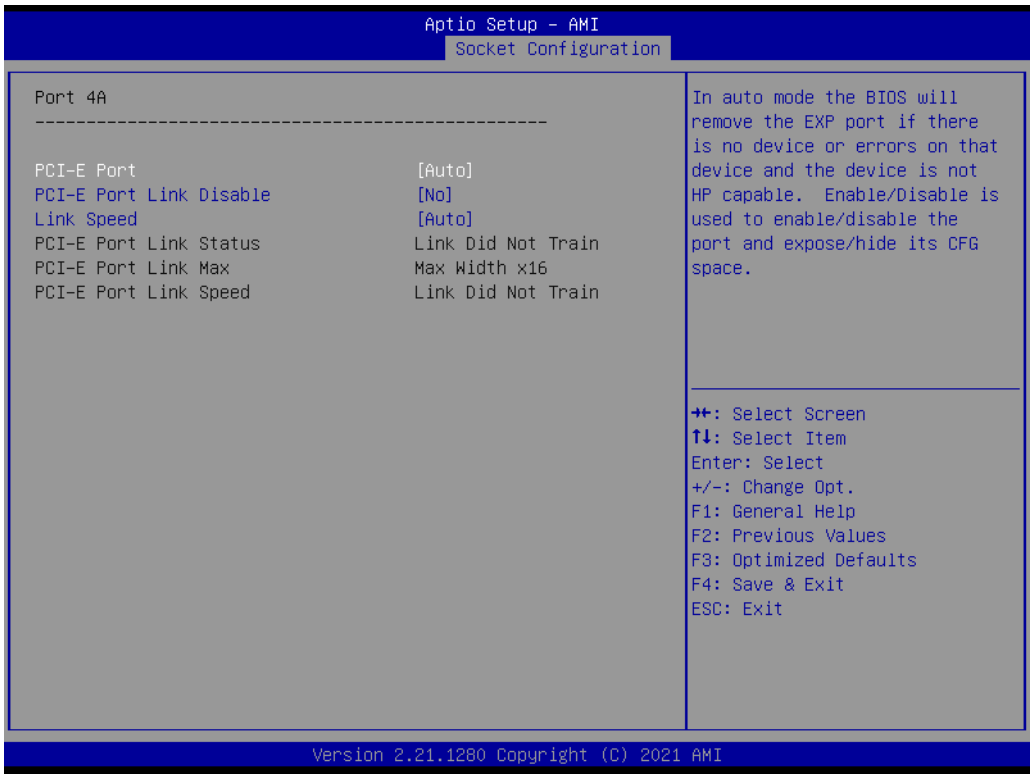

Aptio Setup - AMI
Socket Configuration
IOU0 (PCIE SLOT 2) [Auto]
IOU1 (PCIE SLOT 3/7 & X550 10G-LAN) [Auto]
IOU3 (PCIE SLOT 4) [Auto]
IOU4 (PCIE SLOT 6) [Auto]
IOU0 (PCIE SLOT 2) - Port 1A
IOU1 (PCIE SLOT 7) - Port 2A
IOU1 (PCIE SLOT 3) - Port 2D
IOU3 (PCIE SLOT 4) - Port 4A
IOU4 (PCIE SLOT 6) - Port 5A
IOU4 (PCIE SLOT 6)
Auto
x4x4x4x4
x4x4x8
x8x4x4
x8x8
x16
Selects PCIe port Bifurcation for selected slot(s)
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI

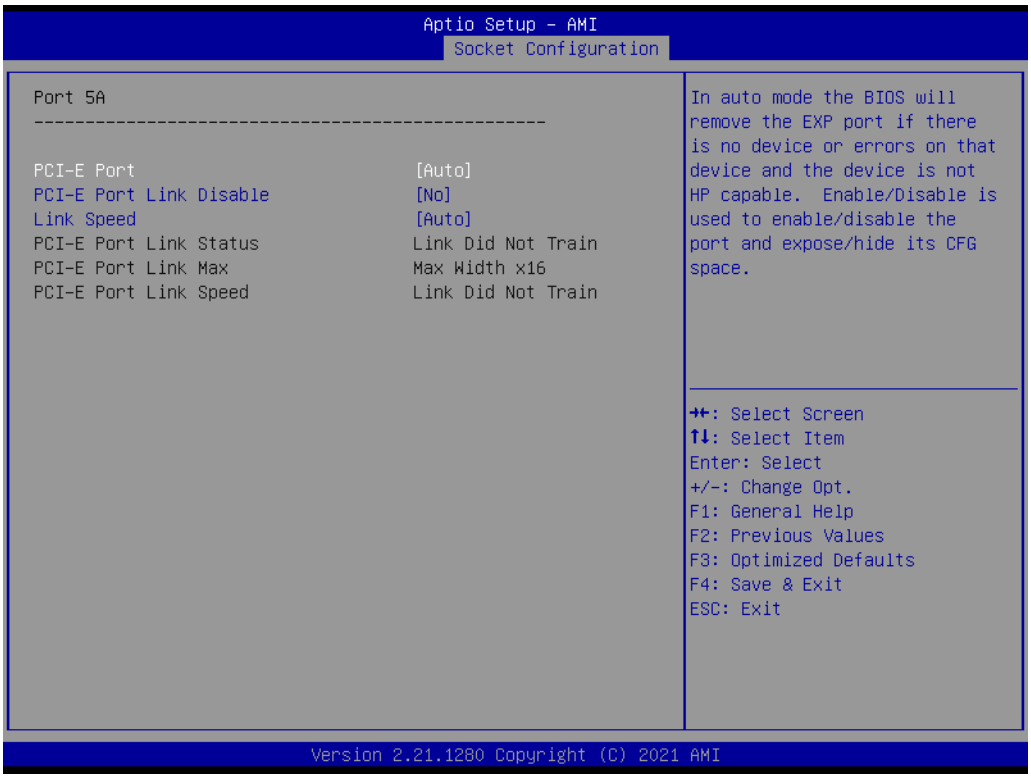

Aptio Setup - AMI
Socket Configuration
Port 1A
PCI-E Port [Auto]
PCI-E Port Link Disable [No]
Link Speed [Auto]
PCI-E Port Link Status Link Did Not Train
PCI-E Port Link Max Max Width x16
PCI-E Port Link Speed Link Did Not Train
Link Speed
Auto
Gen 1 (2.5 GT/s)
Gen 2 (5 GT/s)
Gen 3 (8 GT/s)
Gen 4 (16 GT/s)
Choose Link Speed for this PCIe port
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI


Aptio Setup – AMI
Socket Configuration
Port 1A
PCI-E Port [Auto]
PCI-E Port Link Disable [No]
Link Speed [Auto]
PCI-E Port Link Status Link Did Not Train
PCI-E Port Link Max Max Width x16
PCI-E Port Link Speed Link Did Not Train
In auto mode the BIOS will remove the EXP port if there is no device or errors on that device and the device is not HP capable. Enable/Disable is used to enable/disable the port and expose/hide its CFG space.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI

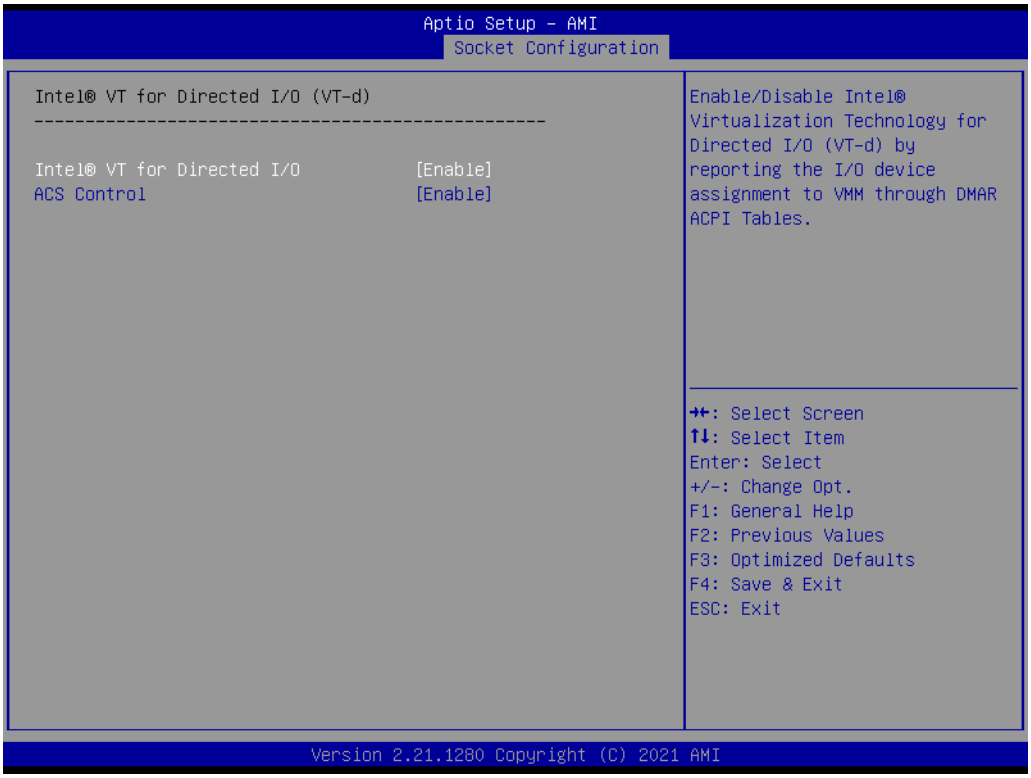

Aptio Setup – AMI
Socket Configuration
Port 2A
PCI-E Port [Auto]
PCI-E Port Link Disable [No]
Link Speed [Auto]
PCI-E Port Link Status Link Did Not Train
PCI-E Port Link Max Max Width x8
PCI-E Port Link Speed Link Did Not Train
In auto mode the BIOS will remove the EXP port if there is no device or errors on that device and the device is not HP capable. Enable/Disable is used to enable/disable the port and expose/hide its CFG space.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI


Aptio Setup – AMI
Socket Configuration
Port 2D
PCI-E Port [Auto]
PCI-E Port Link Disable [No]
Link Speed [Auto]
PCI-E Port Link Status Link Did Not Train
PCI-E Port Link Max Max Width x4
PCI-E Port Link Speed Link Did Not Train
In auto mode the BIOS will remove the EXP port if there is no device or errors on that device and the device is not HP capable. Enable/Disable is used to enable/disable the port and expose/hide its CFG space.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI

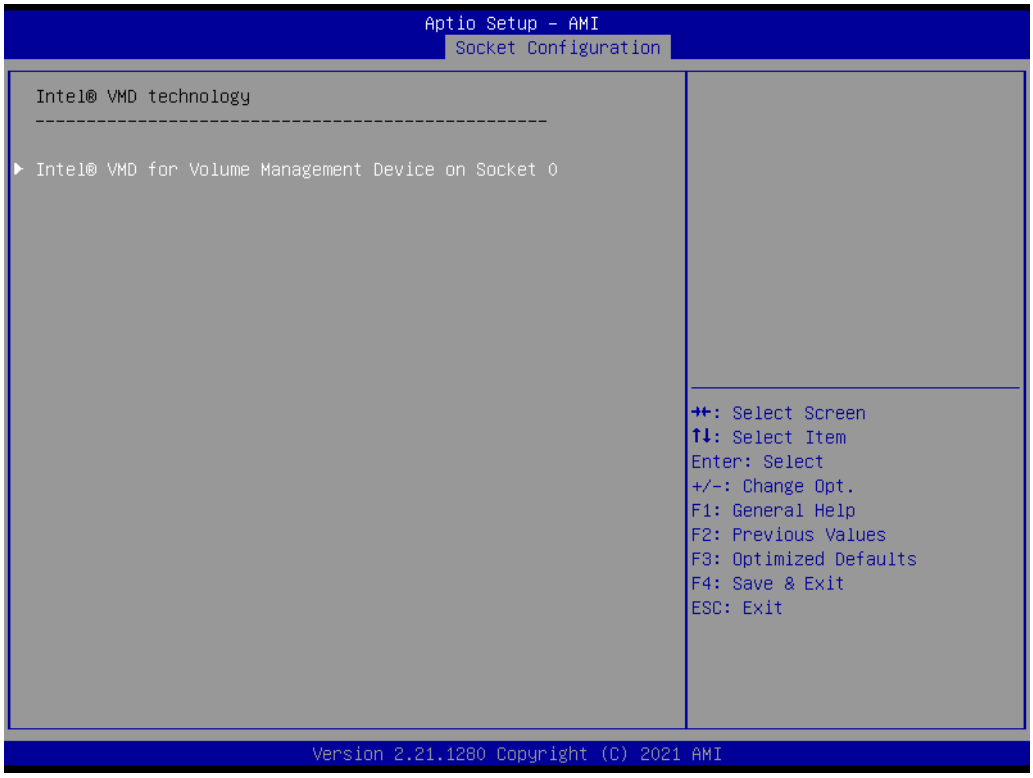

Aptio Setup – AMI
Socket Configuration
Port 4A
PCI-E Port [Auto]
PCI-E Port Link Disable [No]
Link Speed [Auto]
PCI-E Port Link Status Link Did Not Train
PCI-E Port Link Max Max Width x16
PCI-E Port Link Speed Link Did Not Train
In auto mode the BIOS will remove the EXP port if there is no device or errors on that device and the device is not HP capable. Enable/Disable is used to enable/disable the port and expose/hide its CFG space.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI



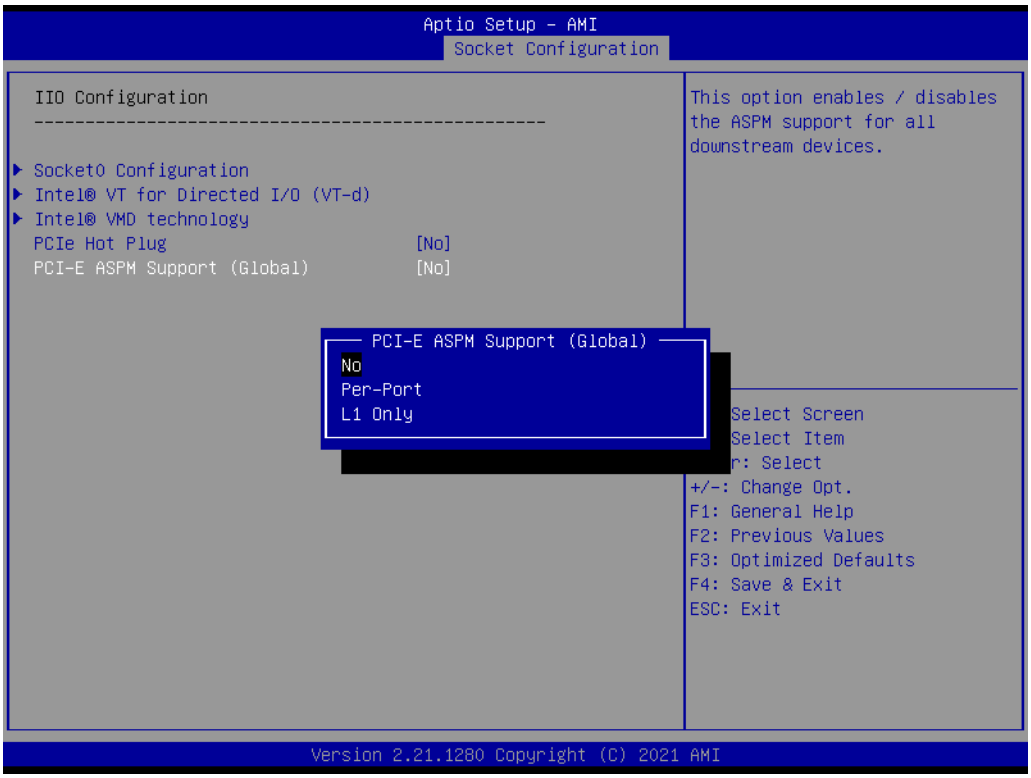
- **Intel VT for Directed I/O (VT-d)**
  Enable or Disable Intel Virtualization Technology for Directed I/O.



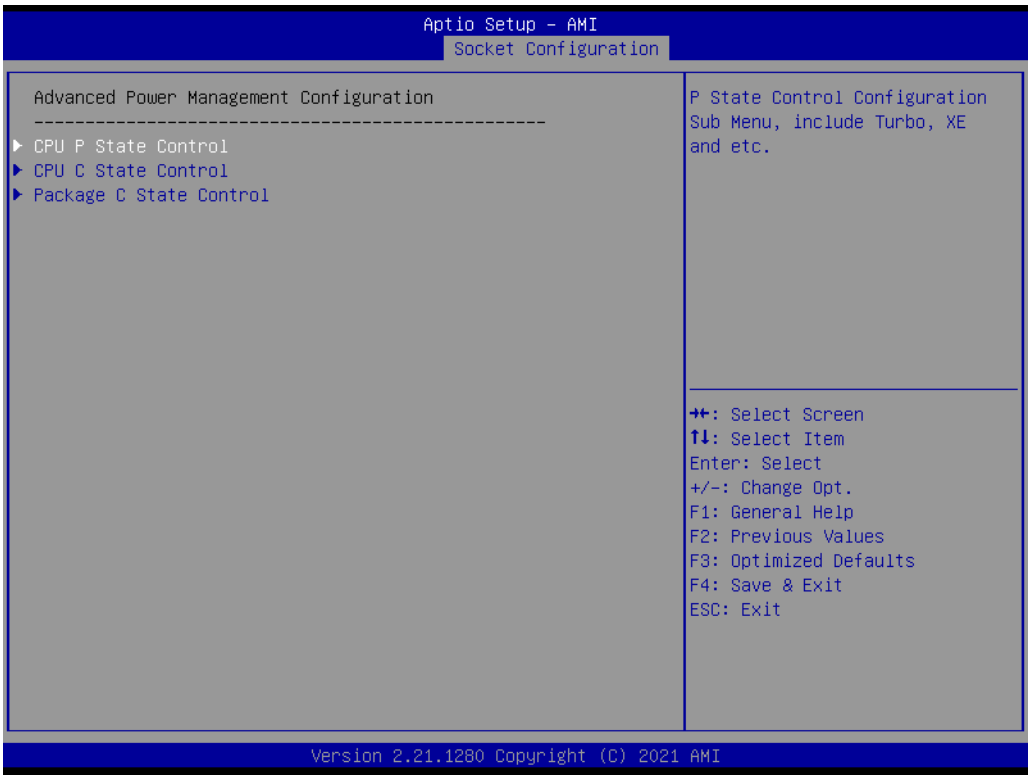
- **Intel VMD technology**
  Enable or Disable Intel Volume Management Device Technology.



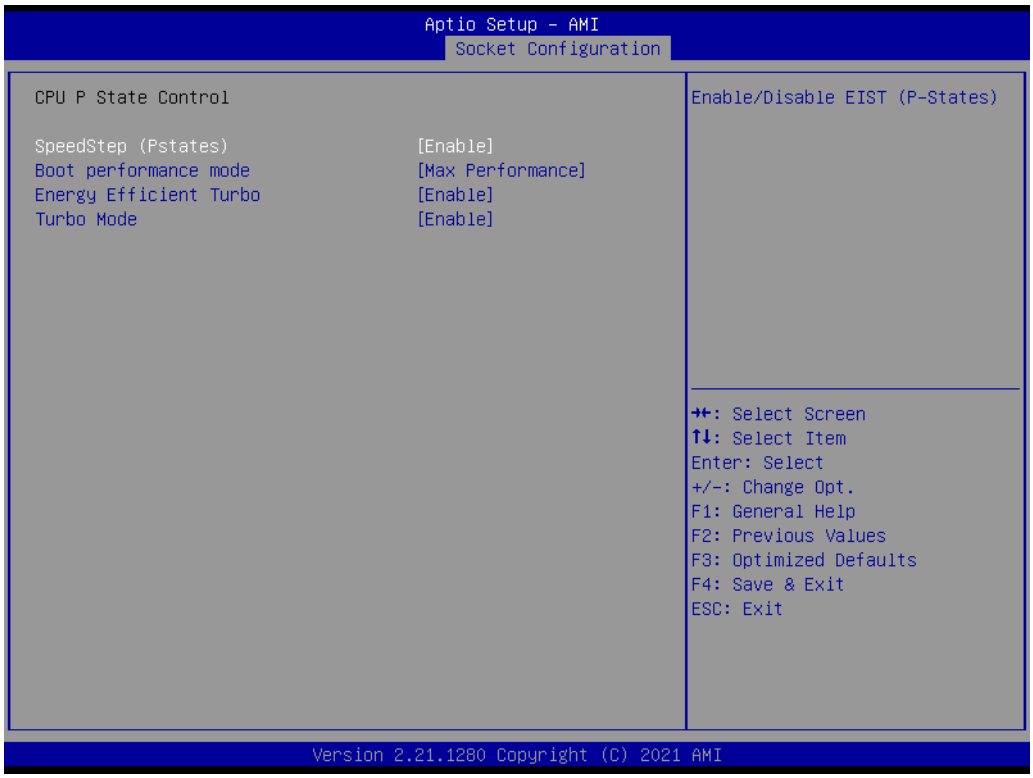
- **PCIe Hot Plug**
  Enable or Disable PCIe hot plug for Intel VROC, while using Intel VROC, please enable this item.
- **PCI-E ASPM Support (Global)**
  Set the ASPM level to Disable, Per-Port or L1 state only.

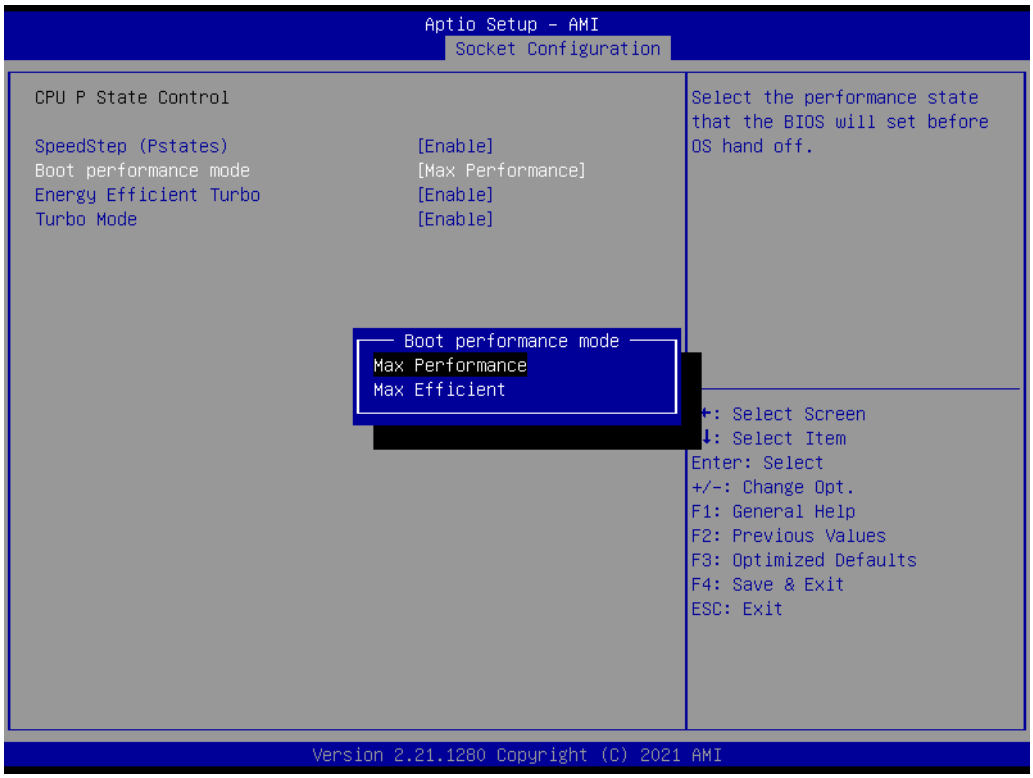


3.2.4.4 Advanced Power Management Configuration

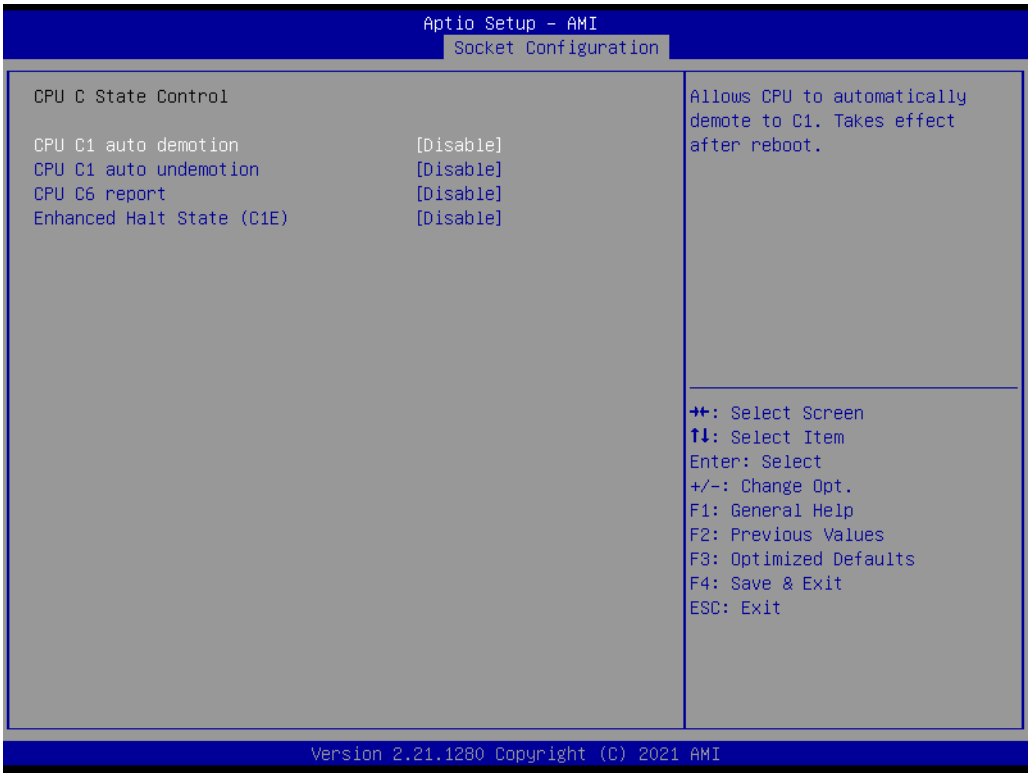


- **CPU P State Control**

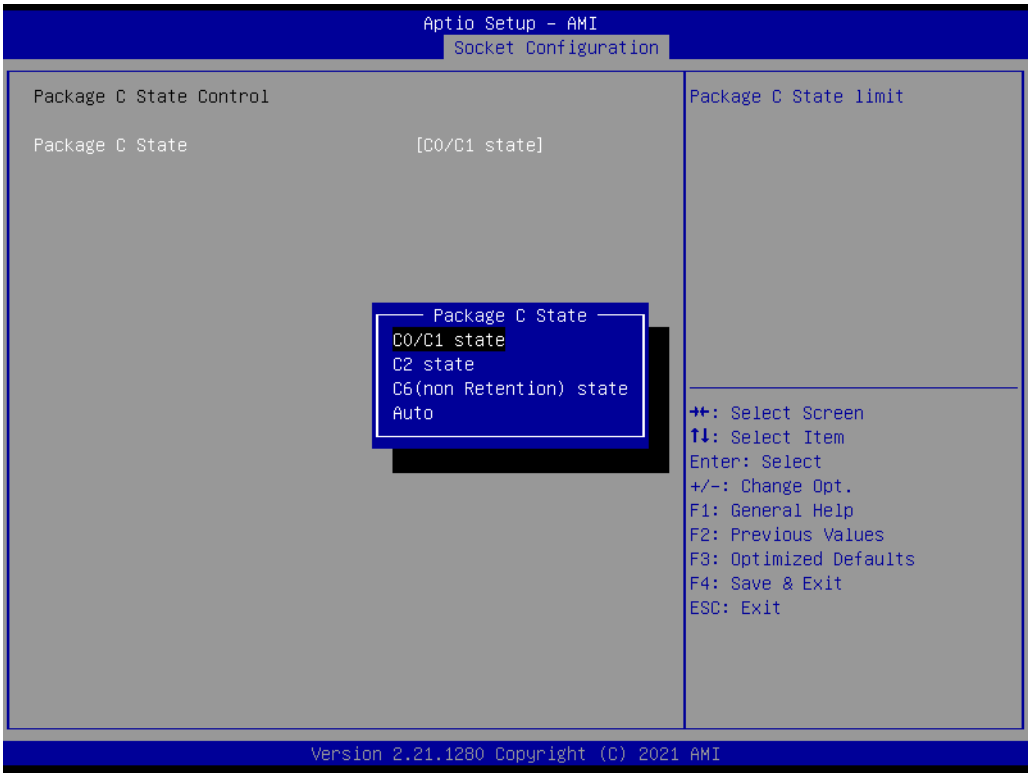

Aptio Setup – AMI
Socket Configuration
CPU P State Control
SpeedStep (Pstates) [Enable]
Boot performance mode [Max Performance]
Energy Efficient Turbo [Enable]
Turbo Mode [Enable]
Enable/Disable EIST (P-States)
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI


Aptio Setup – AMI
Socket Configuration
CPU P State Control
SpeedStep (Pstates) [Enable]
Boot performance mode [Max Performance]
Energy Efficient Turbo [Enable]
Turbo Mode [Enable]
Select the performance state that the BIOS will set before OS hand off.
Boot performance mode
Max Performance
Max Efficient
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI

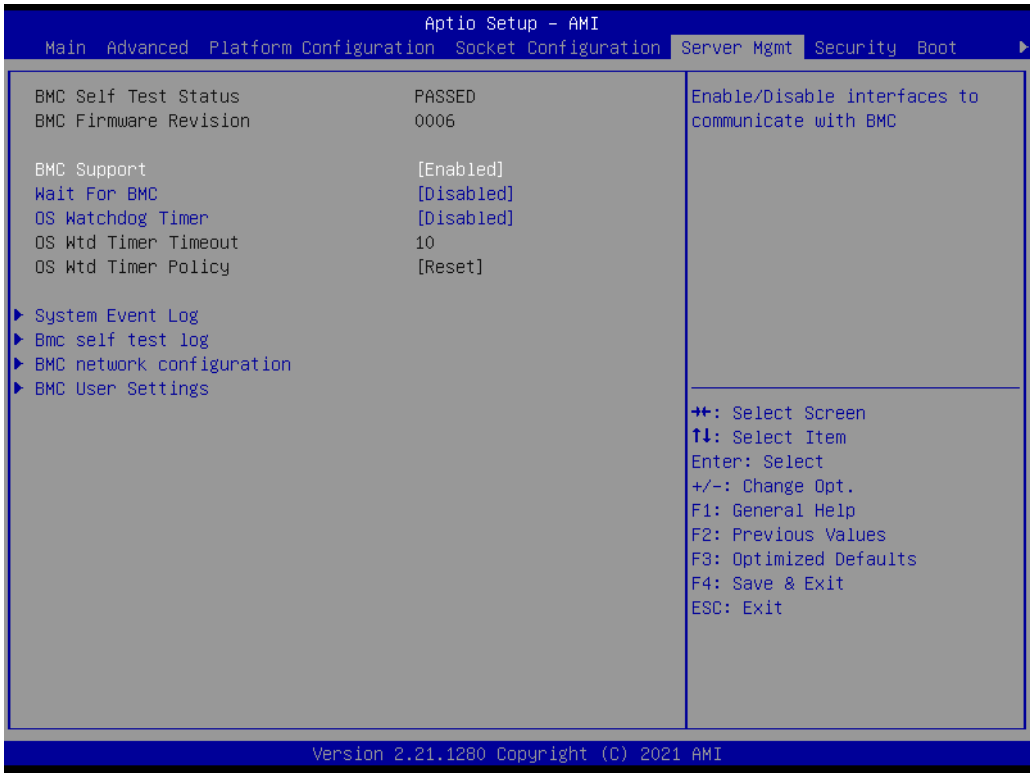
CPU C State Control



Package C State Control

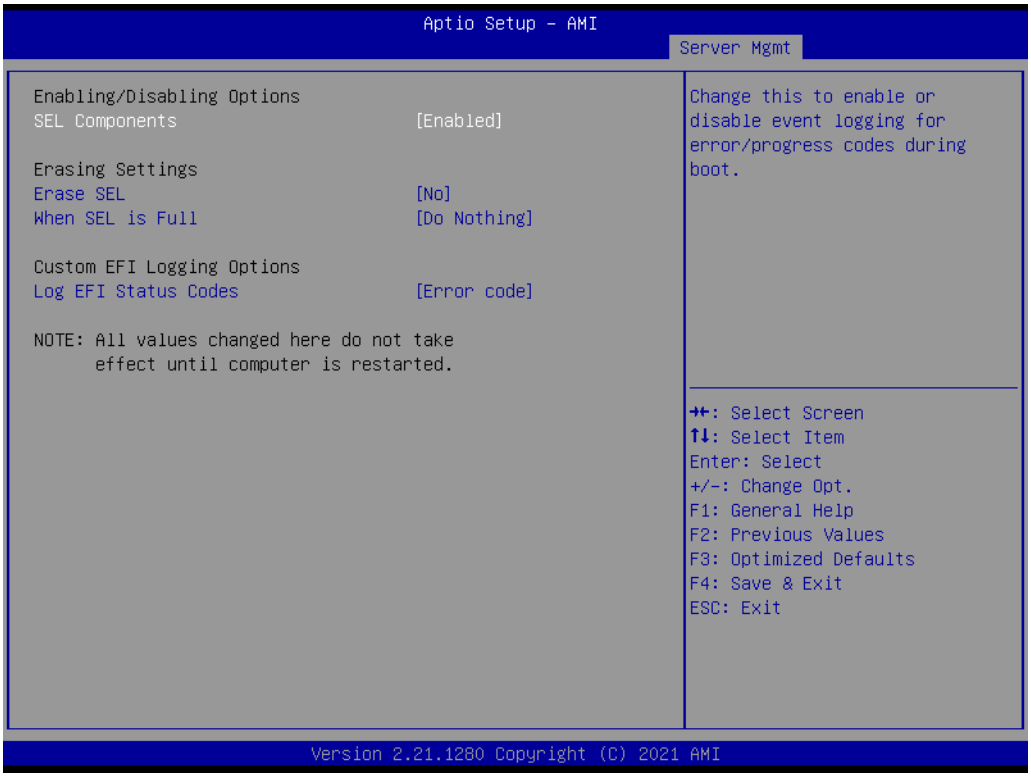


3.2.5 Server Management

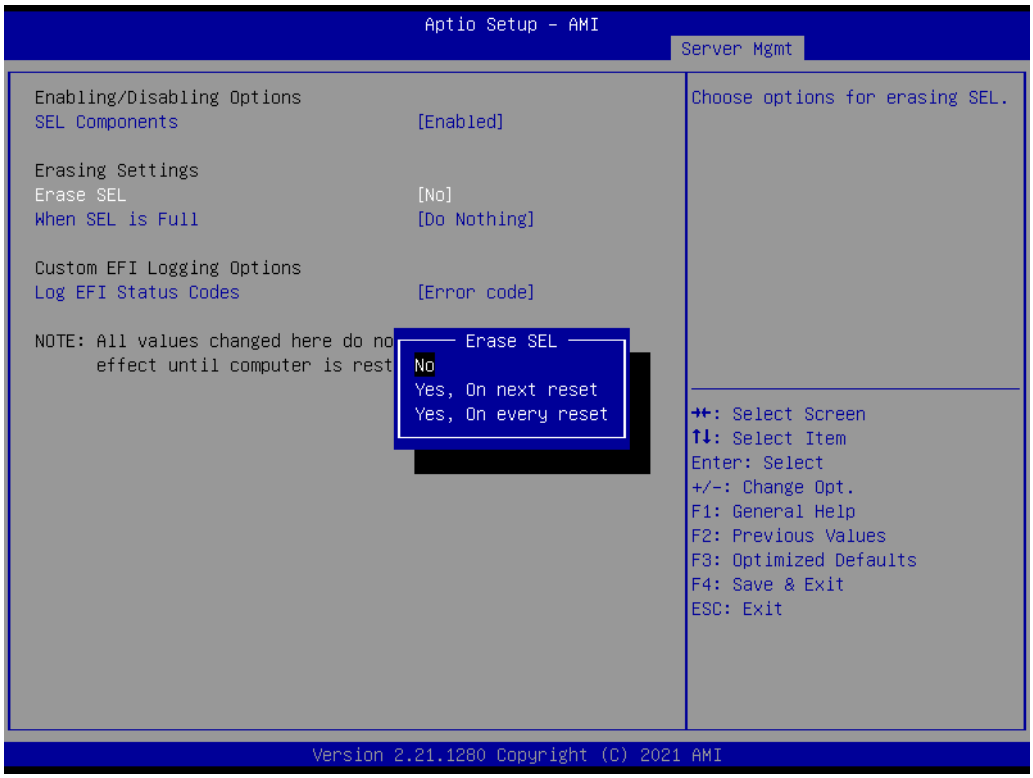


- **BMC Support**
  Enable or Disable interfaces to communicate with BMC.
- **Wait for BMC**
  If enabled, motherboard will wait 30 ~ 60 seconds until BMC module boots up completely. After that, the normal BIOS post screen will be displayed.
  If disabled, motherboard will not wait for BMC module's response.
- **OS Watchdog Timer**
  If enabled, starts a BIOS timer which can only be shut off by Management Software after the OS loads.

3.2.5.1 System Event Log



- **SEL Components**
  Enable/Disable all features of system event logging during boot.
- **Erase SEL**
  Choose options for erasing SEL.
- **When SEL is Full**
  Choose options for reactions to a full SEL.
- **Log EFI Status Codes**
  Disable the logging of EFI status codes or log only error code or only progress code or both.


Aptio Setup – AMI
Server Mgmt
Enabling/Disabling Options
SEL Components [Enabled]
Erasing Settings
Erase SEL [No]
When SEL is Full [Do Nothing]
Custom EFI Logging Options
Log EFI Status Codes [Error code]
NOTE: All values changed here do no
effect until computer is rest
Erase SEL
No
Yes, On next reset
Yes, On every reset
Choose options for erasing SEL.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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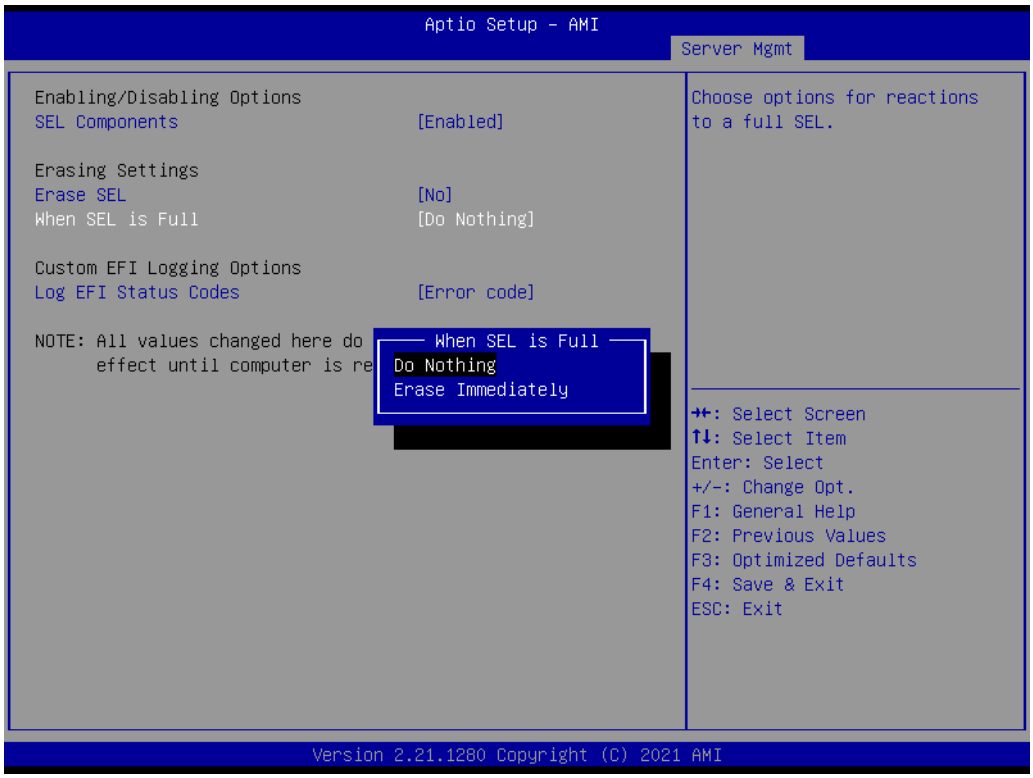
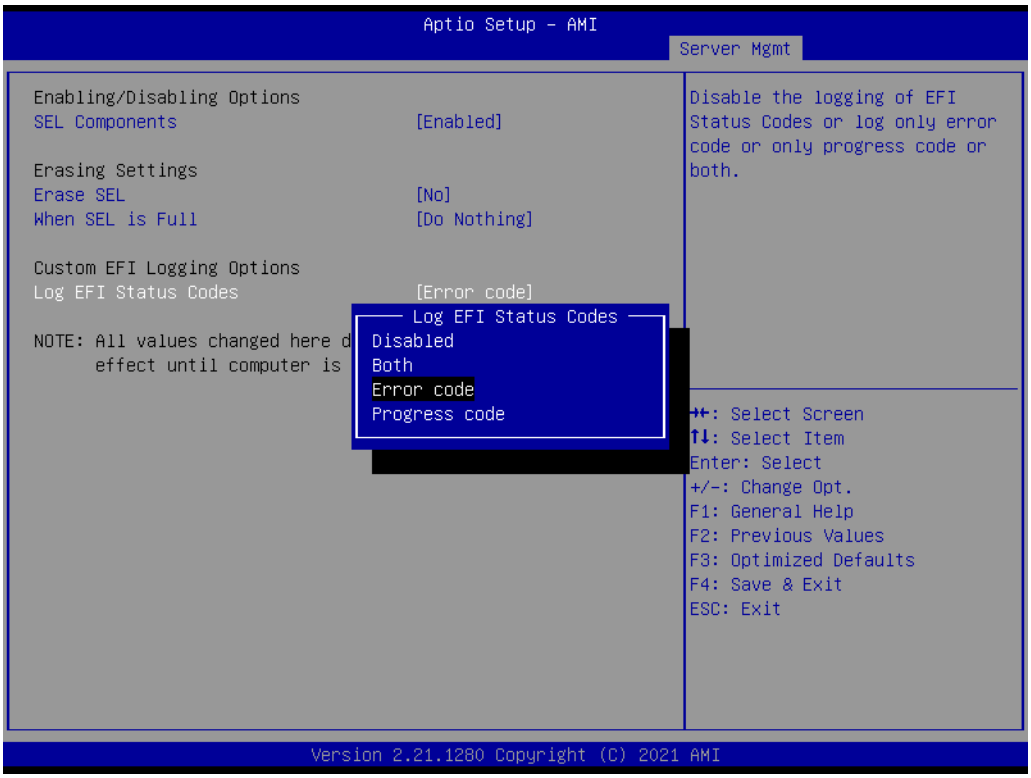
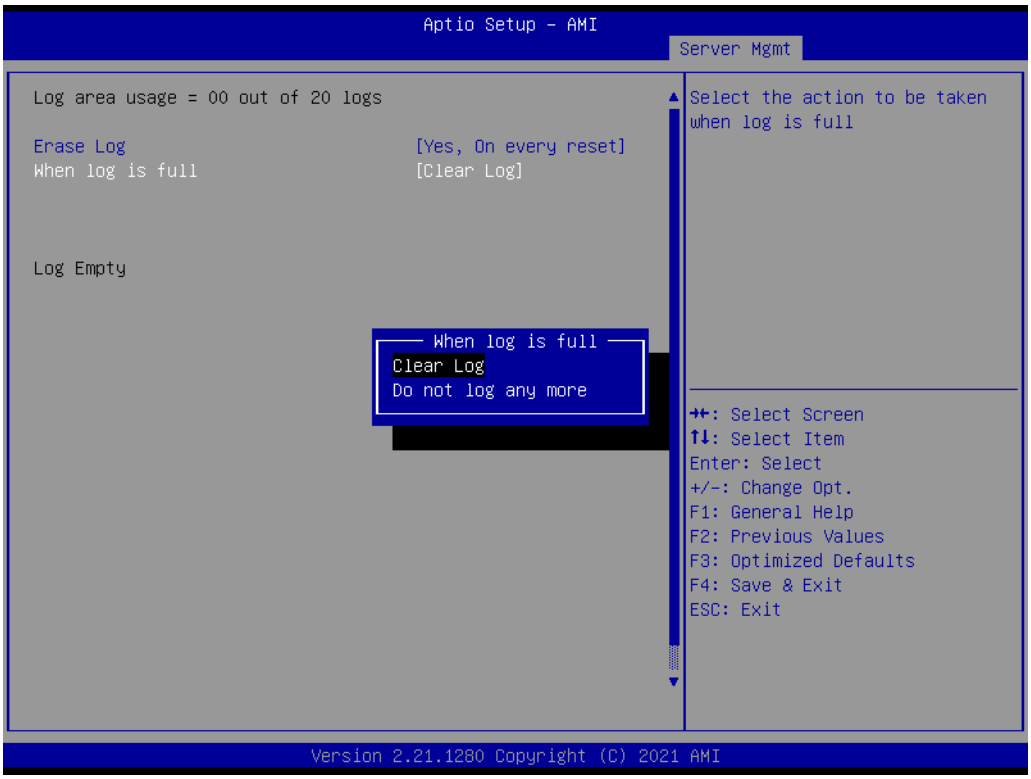

Aptio Setup – AMI
Server Mgmt
Enabling/Disabling Options
SEL Components [Enabled]
Erasing Settings
Erase SEL [No]
When SEL is Full [Do Nothing]
Custom EFI Logging Options
Log EFI Status Codes [Error code]
NOTE: All values changed here do
effect until computer is re
When SEL is Full
Do Nothing
Erase Immediately
Choose options for reactions
to a full SEL.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1280 Copyright (C) 2021 AMI

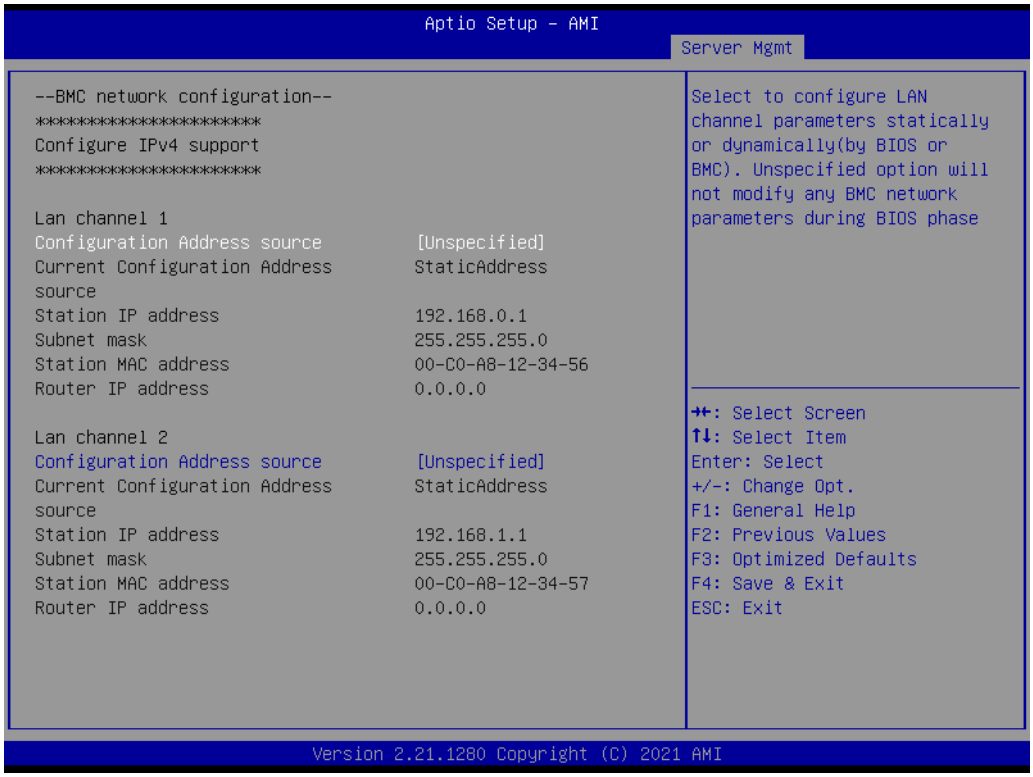


3.2.5.2 BMC Self Test Log

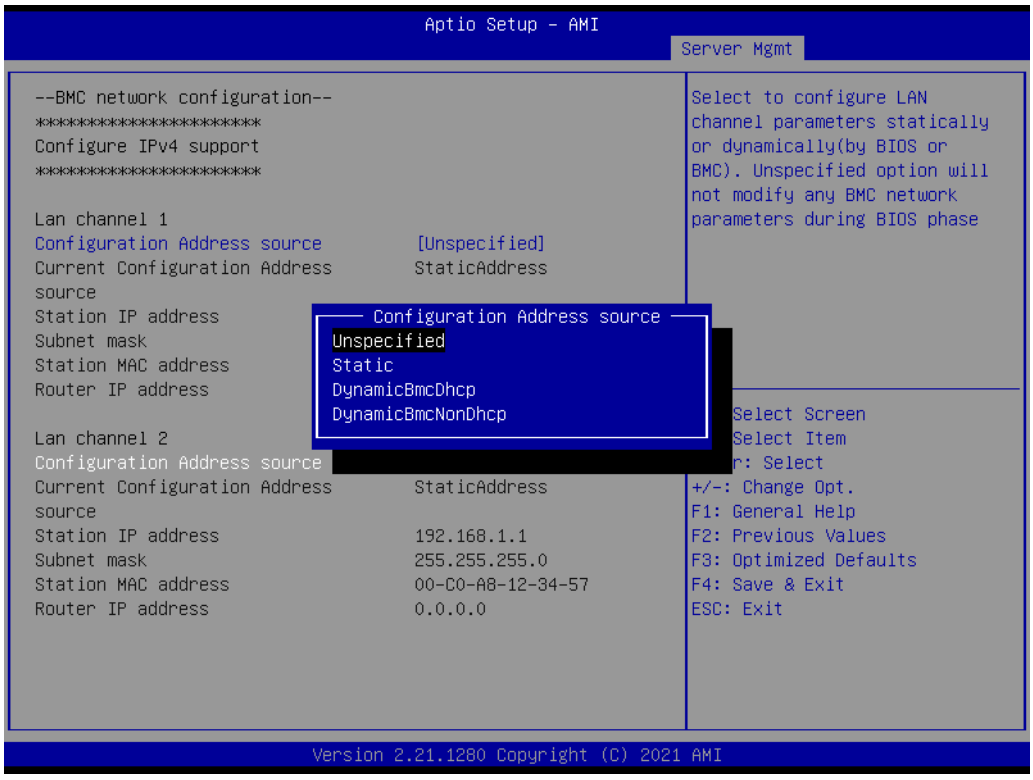


- **Erase Log**
  Erase log options.
- **When Log is Full**
  Select the action to be taken when log is full.

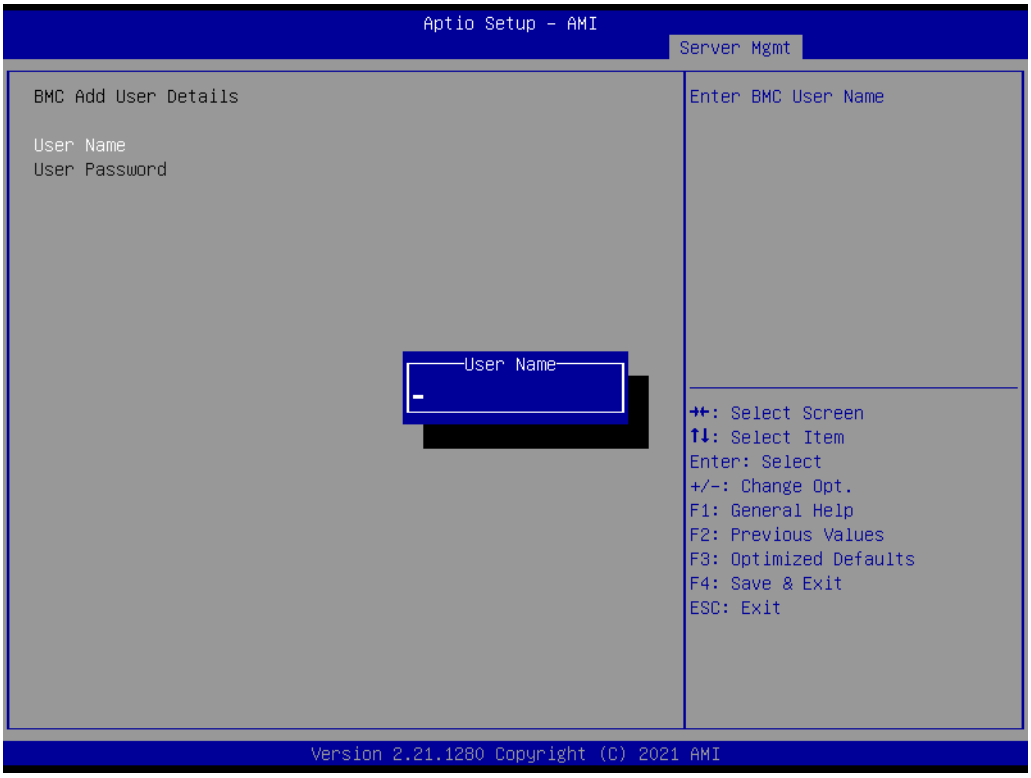
3.2.5.3 BMC Network Configuration



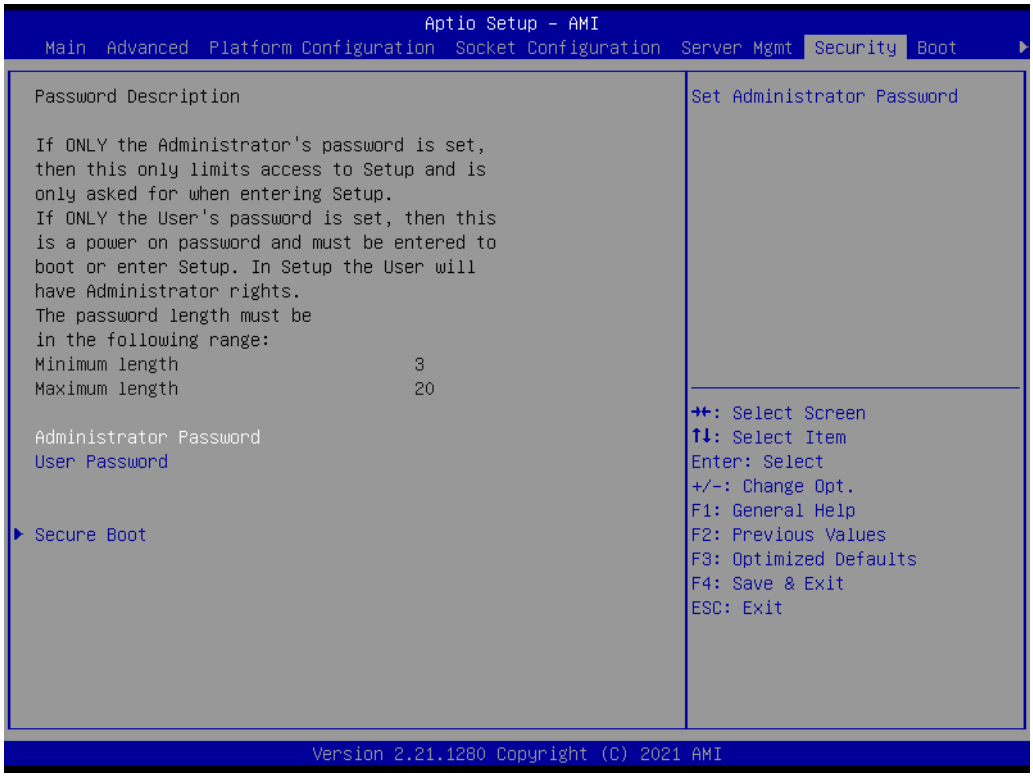
- **Configuration Address Source**
  Select to configure LAN channel parameters statically or dynamically (by BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.



3.2.5.4 BMC User Settings



3.2.6 Security



Note! ***With AC power & Battery. Short CMOS1 Jumper:***

Date/Time & Password: Keep

Setting: reset to default

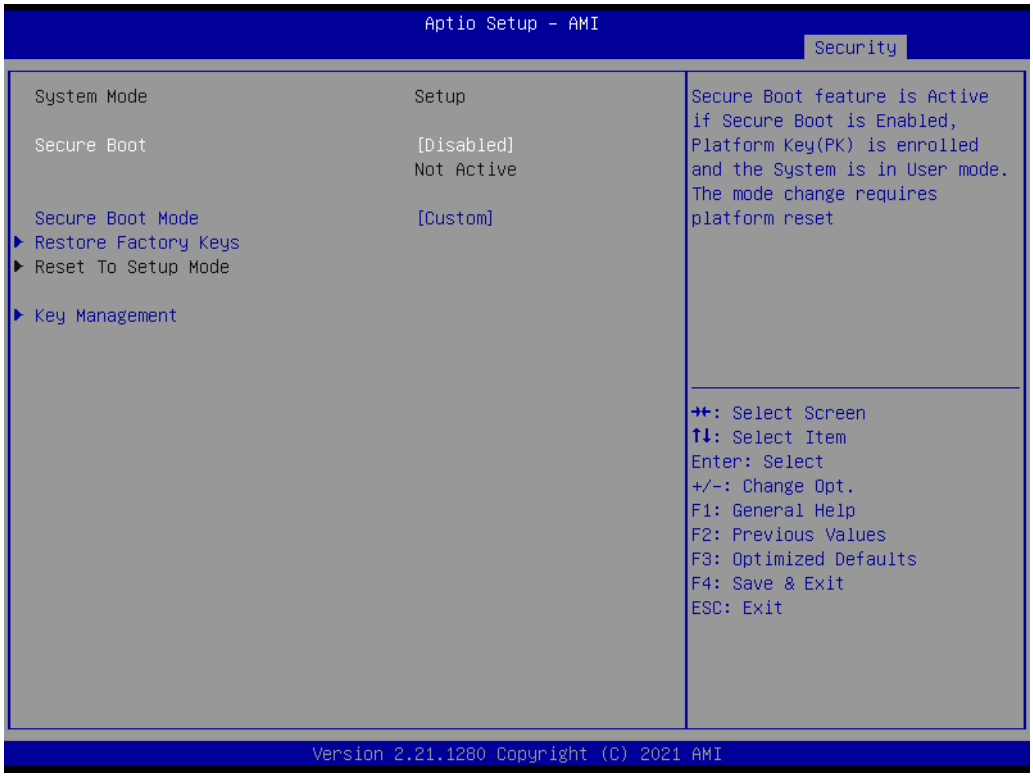
AC power and CMOS battery are removed. Short CMOS1 Jumper:

Date/Time: reset to default

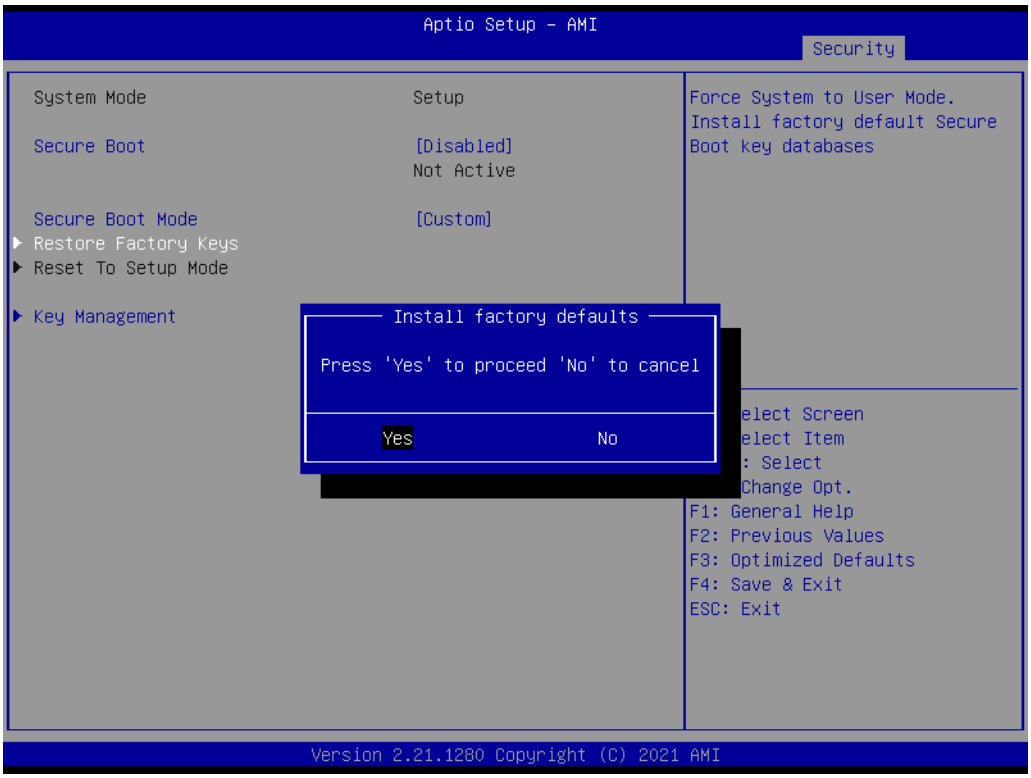
Password: Keep

Setting: reset to default

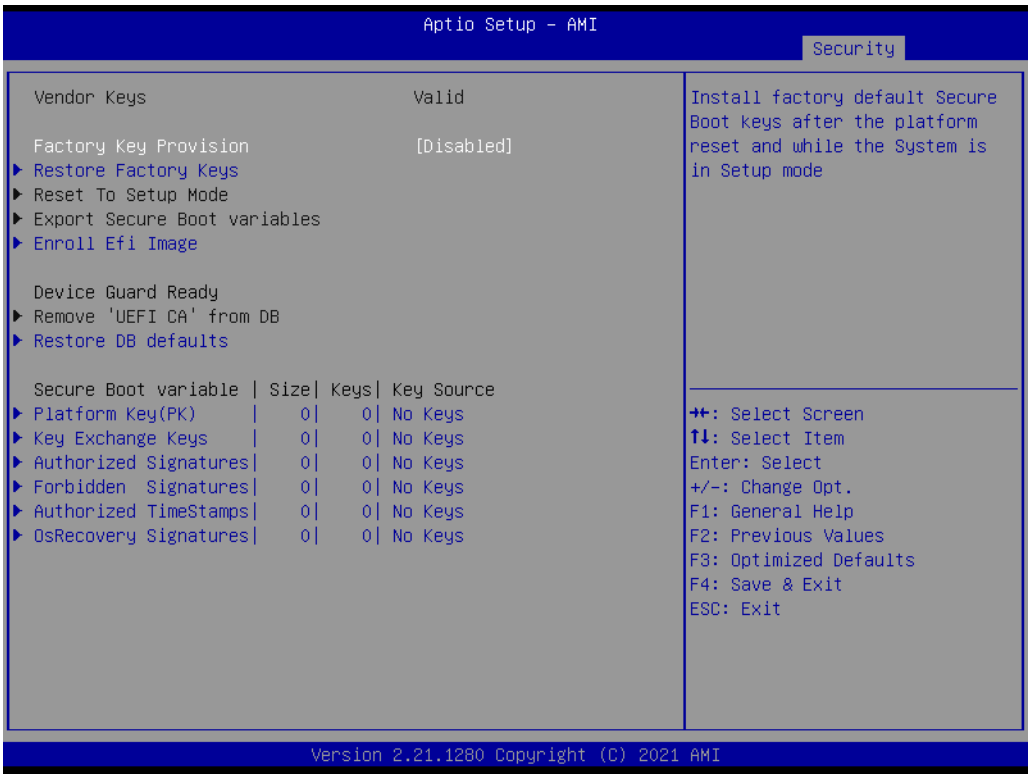
Secure Boot



– **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.

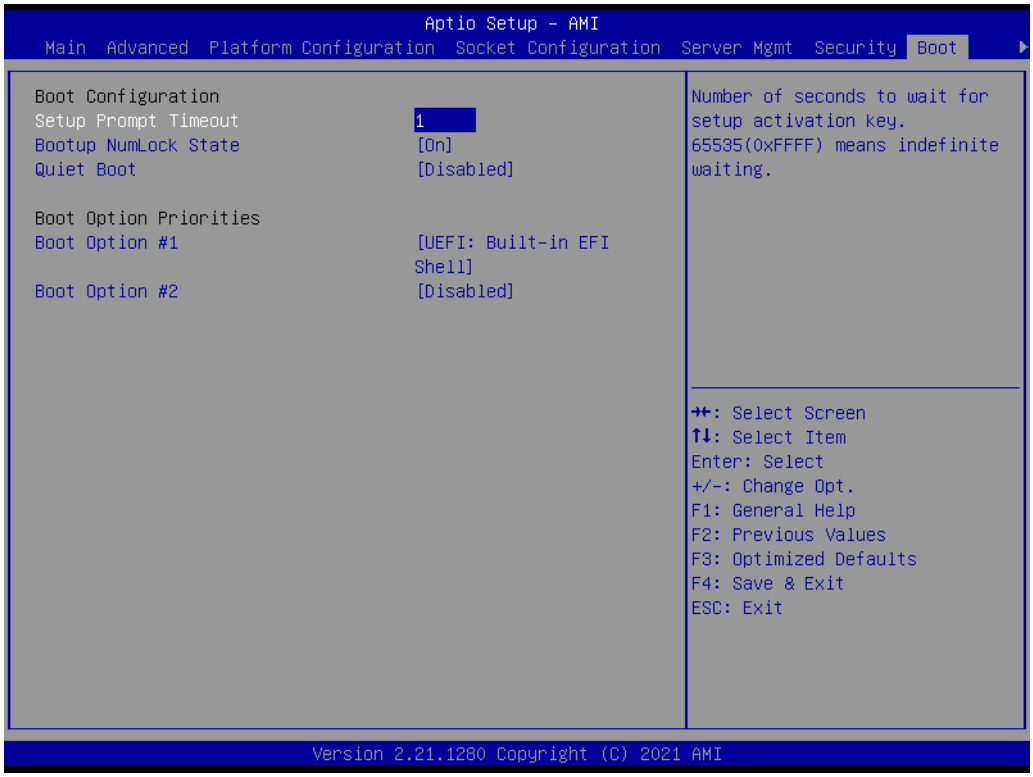


– **Restore Factory Keys**
Force System to User Mode.



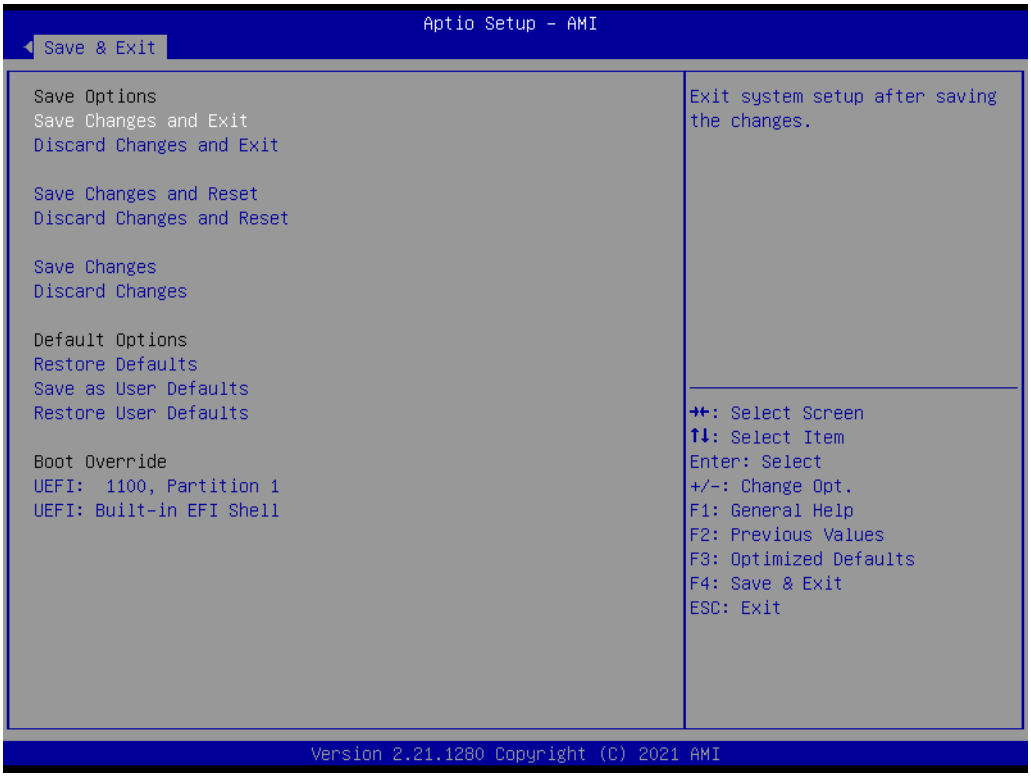
– **Key Management**
Enables expert users to modify Secure Boot Policy variables without full authentication.

3.2.7 Boot



- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key.
- **Bootup NumLock State**
  Select the keyboard NumLock state as "On" or "Off".
- **Quiet Boot**
  Enable or Disable quiet boot option.
- **Boot Option Priorities**
  Sets the system boot priorities.

3.2.8 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 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

Driver Installation

4.1 Before Beginning

To facilitate the installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for the ASMB-816 are available online for download from the Advantech support website at https://advt.ch/searc8f16d.

Before beginning, it is important to note that most display drivers need to have the relevant software application already installed on the system prior to installing the enhanced display drivers. In addition, many of the installation procedures assume that you are familiar with both the relevant software applications and operating system commands. Review the relevant operating system commands and the pertinent sections of your application software's user manual before performing the installation.

4.2 Introduction

4.2.1 Chipset

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. This is needed for the proper functioning of the following features:

- Core PCI PnP services
- Serial ATA interface support
- USB 1.1/2.0/3.0 support
- Identification of Intel chipset components in the Device Manager

Note! *The chipset driver is used for the following versions of Windows, and it has to be installed before installing all the other drivers:*

Windows Server 2019 Standard	
Windows Server 2016 Standard	*x64*
Windows 10 Ultimate	*x64*

Note! *It is necessary to update all the latest Microsoft hot fix files when using this OS.*

4.2.2 Introduction

Install the ASPEED VGA driver to enable this function, which includes the following features:

- 32-bit 2D graphics engine on board for normal use.
- 64 MB RAM for this chip, the highest resolution is 1920x1200.

4.2.3 LAN Configuration

The ASMB-816 has two Gigabit Ethernet LAN connections via dedicated PCI Express x1 lanes: GbE LAN1 - Intel I210 and GbE LAN2 - I210; two 10G Base-T LAN connectors LAN3 and LAN4 - Intel X550 PHY. They eliminate bottlenecks in network data flow when incorporating Gigabit Ethernet at 10Gbps.

- 10/100/1000 & 10G Base-T Ethernet controller
- 10/100/1000 & 10G Base-T triple-speed MAC
- Full duplex at 10/100/1000 Mbps or 10 Gbps and half duplex at 10/100/1000 Mbps
- Wake-on-LAN (WOL) support
- PCIe x1 host and PHY interface

The integrated Intel gigabit Ethernet controller supports all major network operating systems. However, the installation procedure varies with different operating systems.

4.2.4 SATA & PCIe SSD RAID

Intel 621A PCH chip offers SATA & PCIe SSD RAID under Windows operating system.

Note!

1.Please visit the Intel download center for "Intel Rapid Storage Technology enterprise for Microsoft Windows Operating System Software User's Guide" file download,

2.For the hotfix file download, please visit the Microsoft website.

Appendix A

Programming the Watchdog Timer

The ASMB-816's watchdog timer can be used to monitor system software operation and take corrective action if the software fails to function within the programmed period. This section describes the operation of the watchdog timer and how to program it.

A.1 Watchdog Timer Overview

The watchdog timer is built in to the EC controller IT8528E. It provides the following functions for user programming:

- Can be enabled and disabled by user's program
- Timer can be set from 1 to 255 seconds
- Generates an interrupt or reset signal if the software fails to reset the timer before time-out

A.2 Programming the Watchdog Timer

The I/O port address of the watchdog timer is as below:

Address	Description	
0x57	Event - Warm Reset: 0x04	
0x5E	Warm Reset Timer (High BYTE)	Based 100ms
0x5F	Warm Reset Timer (Low BYTE)	

Here is an example to step by step program the Watchdog Timer.

Step	Action	Description
00	Read 0x299 port	Clear I/O port
	Wait IBF clear	0x29A, BIT1, = 0
01	Write 0x89 to 0x29A	
	Wait IBF clear	0x29A, BIT1, = 0
02	Write 0x5E to 0x299 port	
	Wait IBF clear	0x29A, BIT1, = 0
03	Write 0x00 to 0x299 port	Set 10 sec (high byte)
	Wait IBF clear	0x29A, BIT1, = 0
04	Write 0x89 to 0x29A	
	Wait IBF clear	0x29A, BIT1, = 0
05	Write 0x5F to 0x299 port	
	Wait IBF clear	0x29A, BIT1, = 0
06	Write 0x64 to 0x299 port	Set 10 sec (low byte)
	Wait IBF clear	0x29A, BIT1, = 0
07	Write 0x89 to 0x29A	
	Wait IBF clear	0x29A, BIT1, = 0
08	Write 0x57 to 0x299 port	Watchdog Event

	Wait IBF clear	0x29A, BIT1, = 0
09	Write 0x04 to 0x299 port	(Warm) Reset event
	Wait IBF clear	0x29A, BIT1, = 0
10	Write 0x28 to 0x29A	Start watchdog
Wait 1 ~ 9 sec		
	Wait IBF clear	0x29A, BIT1, = 0
11	Write 0x29 to 0x29A	Stop watchdog
	Wait IBF clear	0x29A, BIT1, = 0
12	Go to Step 07	

Appendix B

I/O Pin Assignments

B.1 USB2.0 Header (USB9_10, USB13_14)

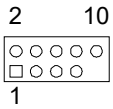


Table B.1: USB Header (USB9_10, USB13_14)

Pin	Signal	Pin	Signal
1	USB_VCC5	2	USB_VCC5
3	USB_D-	4	USB_D-
5	USB_D+	6	USB_D+
7	GND	8	GND
		10	NC

B.2 USB3.0 Header (USB3_56)

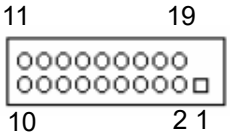


Table B.2: USB Header (USB3_56)

Pin	Signal	Pin	Signal
1	+5 V	2	STDA_SSRX-
3	STDA_SSRX+	4	GND
5	STDA_SSRX-TX-	6	STDA_SSRX+TX+
7	GND	8	D-
9	D+	10	NC (reserved for OC pin)
11	D+	12	D-
13	GND	14	STDA_SSRX+TX+
15	STDA_SSRX-TX-	16	GND
17	STDA_SSRX+	18	STDA_SSRX-
19	+5 V	20	

B.3 VGA Connector (VGA1)

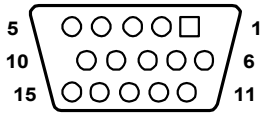


Table B.3: VGA Connector (VGA1)			
Pin	**Signal**	**Pin**	**Signal**
1	RED	9	VCC
2	GREEN	10	GND
3	BLUE	11	NC
4	NC	12	SDT
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	SCK
8	GND		

B.4 RS-232 Interface (COM2)

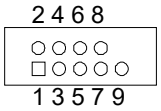


Table B.4: RS-232 Connector (COM2)	
Pin	**Signal**
1	DCD
2	DSR
3	RXD
4	RTS
5	TXD
6	CTS
7	DTR
8	RI
9	GND

B.5 External Keyboard Connector (KBMS2)

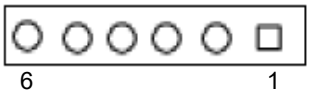


Table B.5: External Keyboard Connector (KBMS2)	
Pin	**Signal**
1	KB CLK
2	KB DATA
3	MS DATA
4	GND
5	VCC
6	MS CLK

B.6 System & CPU Fan Power Connector (SYSFAN0~4, CPUFAN0)

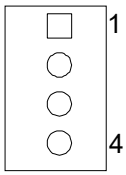


Table B.6: CPU FAN Connector (CPUFAN0)	
	CPUFAN0
1	GND
2	+12V
3	CPU_TACH
4	CPU0_PWM

Table B.7: SYS FAN Connector (SYSFAN0~4)					
	SYS FAN0	**SYS FAN1**	**SYS FAN2**	**SYSFAN3**	**SYSFAN4**
1	GND	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V	+12V
3	FAN0_TACH	FAN1_TACH	FAN2_TACH	FAN3_TACH	FAN4_TACH
4	FAN0_PWM	FAN1_PWM	FAN2_PWM	FAN3_PWM	FAN4_PWM

B.7 SMBus Connector (SMBUS1)

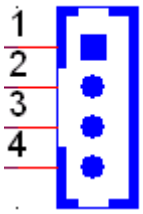


Table B.8: Front panel SMBus Connector (SMBUS1)	
Pin	**Signal**
1	+5V
2	SMB_SCL_FRU
3	SMB_SDA_FRU
4	GND

B.8 LAN Ports (LAN1~5)

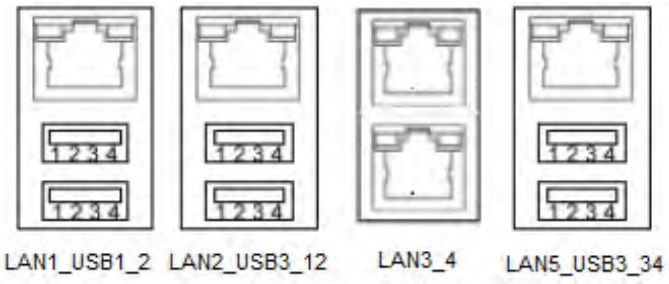


Table B.9: LAN RJ-45 Port (LAN1~2, LAN3_4, LAN5)			
Pin	**Signal**	**Pin**	**Signal**
1	MID0+	4	MID2+
2	MID0-	5	MID2-
3	MID1+	7	MID3+
6	MID1-	8	MID3-

B.9 Audio Connector (HDAUD1)

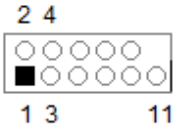


Table B.10: Front Panel Audio Connector (HDAUD1)

Pin	Signal	Pin	Signal
1	ACZ_VCC	2	GND
3	ACZ_SYNC	4	ACZ_BITCLK
5	ACZ_SDOUT	6	ACZ_SDIN0
7	ACZ_SDIN1	8	ACZ_RST
9	ACZ_12V	10	GND
11	GND	12	x

B.10 Alarm Board Connector (VOLT1)

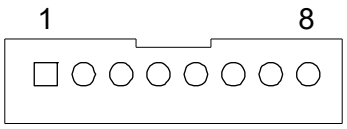


Table B.11: Alarm Board Connector (VOLT1)

Pin	Signal	Pin	Signal
1	5VSB	5	+5V
2	GND	6	+3.3V
3	GND	7	-12V
4	-5V	8	+12V

B.11 Case Open Connector (JCASE1)

Table B.12: Case Open Connector (JFP1)

Pin	Signal
1	CASEOP
2	GND

B.12 SATA SGPIO Connector (SGPIO1)

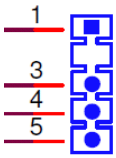


Table B.13: SATA SGPIO Connector (SGPIO1)

Pin	Signal
1	SCLOCK_PCH
2	x
3	SLOAD_PCH
4	SDATAOUT0_PCH
5	SDATAOUT1_PCH

B.13 LPC Connector (LPC2)

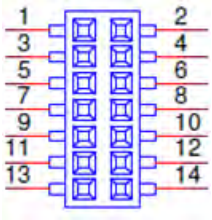


Table B.14: LPC Connector (LPC1)

Pin	Signal	Pin	Signal
1	CLK_24M_LPCCN	2	LPC_AD1
3	PLTRST_LPC	4	LPC_AD0
5	LPC_FRAME	6	+3.3V
7	LPC_AD3	8	GND
9	LPC_AD2	10	SMB_SCL_LPC
11	SERIRQ_PCH	12	SMB_SDA_LPC
13	+5V_AUX	14	+5V

B.14 Clear CMOS Connector (JCMOS1, JME1)

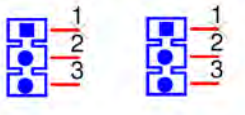


Table B.15: Clear CMOS Connector (JCMOS1, JME1)

	JCMOS1	JME1
Pin	**Signal**	**Signal**
1	NC	NC
2	RTC_RST_PCH	HDA_SDOUT_PCH
3	GND	+3.3V_AUX

B.15 PMBUS Connector (PMBUS1)

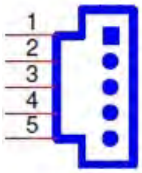


Table B.16: PMBUS Connector (PMBUS1)

Pin	Signal
1	SMB_SCL_PM
2	SMB_SDA_PM
3	SMB_ALT_PM
4	GND
5	+3.3V

B.16 GPIO Connector (GPIO1)

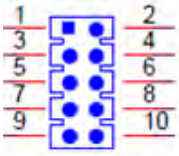


Table B.17: GPIO Connector (GPIO1)

Pin	Signal	Pin	Signal
1	EC_GPIO0	2	EC_GPIO4
3	EC_GPIO1	4	EC_GPIO5
5	EC_GPIO2	6	EC_GPIO6
7	EC_GPIO3	8	EC_GPIO7
9	VCC_GPIO	10	GND

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