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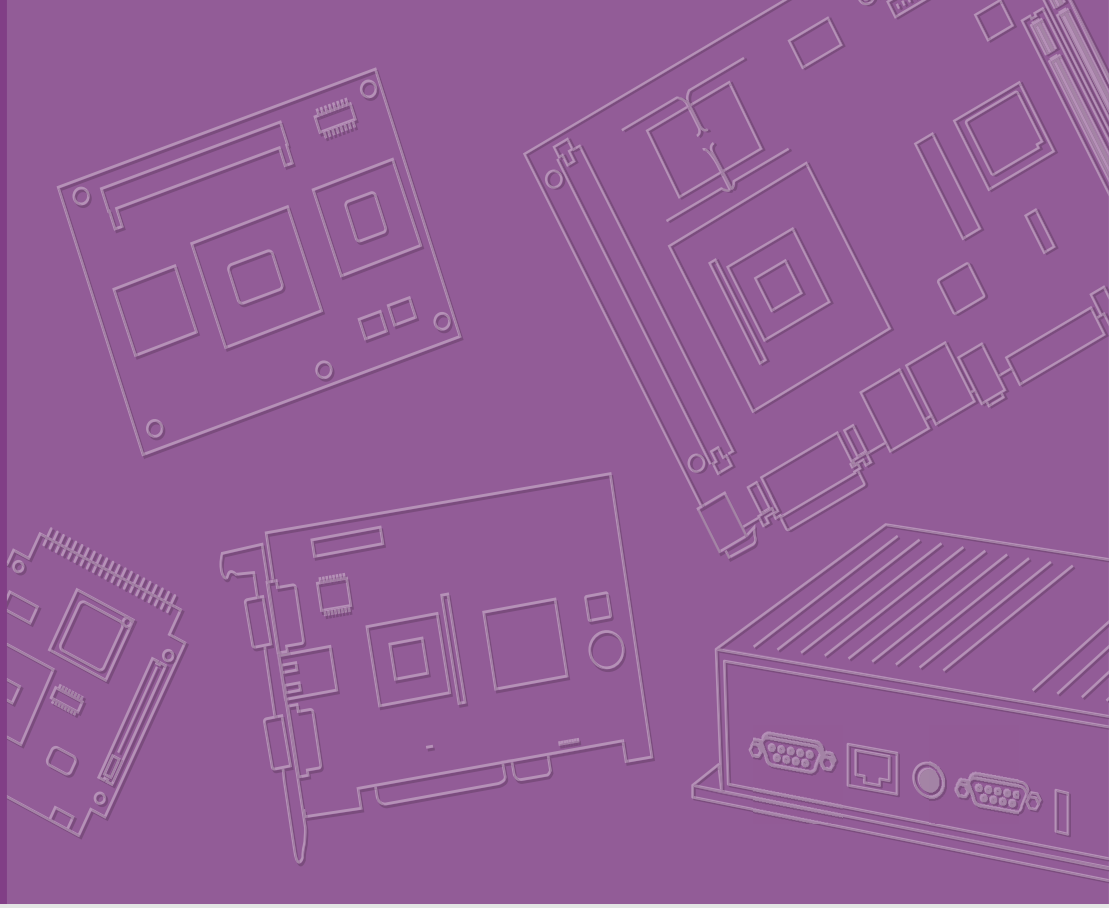

User Manual

AIMB-277

Intel® Core™ i9/i7/i5/i3/Pentium/ Celeron LGA1200 Mini-ITX with HDMI/DP/VGA/LVDS (or eDP), 2 COM & 8 USB, 2 LAN, and M.2 E/M key

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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.

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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. 2006027701 Edition 2

Printed in China 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.

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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.

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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

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.

CPU Compatibility

Processor Number	Max_TDP	Code Name	Cores/Threads	S-Spec	Lithography
i9-10900E	65W	Comet Lake	10/20	SRJFD	14nm
i7-10700E	65W	Comet Lake	8/16	SRJFJ	14nm
i5-10500E	65W	Comet Lake	6/12	SRJFL	14nm
I3-10100E	65W	Comet Lake	4/8	SRH6E	14nm
G6400E	58W	Comet Lake	2/4	SRH6G	14nm
G5900E	58W	Comet Lake	2/2	SRH7T	14nm
i9-10900TE	35W	Comet Lake	10/20	SRJFC	14nm
i7-10700TE	35W	Comet Lake	8/16	SRJFG	14nm
i5-10500TE	35W	Comet Lake	6/12	SRH6D	14nm
I3-10100TE	35W	Comet Lake	4/8	SRH6F	14nm
G5900TE	35W	Comet Lake	2/2	SRH6J	14nm

Memory Compatibility

Category	Speed	Capacity	Vendor	Module_PN	Chip_PN	ADVANTECH P/N	ECC	Result
DDR4	3200	16GB	Advantech	SQR-SD4N16G3K2SNCB	SEC001 K4A8G085WCBCWE	SQR-SD4N16G3K2SNCB	N	PASS
DDR4	2666	16GB	Advantech	AQD-SD4U16N26-SE	SEC 928 K4A8G085WC BCTD	AQD-SD4U16N26-SE	N	PASS
DDR4	2666	32GB	Advantech	SQR-SD4N32G2K6SNME	SEC 849 K4AAG085WM BCTD	SQR-SD4N32G2K6SNME	N	PASS
DDR4	2666	8GB	Advantech	SQR-SD4N8G2K6SNBCB	SEC 837 K4A8G085WC BCTD	SQR-SD4N8G2K6SNBCB	N	PASS
DDR4	2666	4GB	Advantech	SQR-SD4N4G2K6SNEFB	SEC 907 K4A4G085WF BCTD	SQR-SD4N4G2K6SNEFB	N	PASS
DDR4	2400	4GB	Advantech	SQR-SD4N4G2K4SNEFB	SEC007 K4A4G085WFBCTD	SQR-SD4N4G2K4SNEFB	N	PASS
DDR4	3200	32GB	Advantech	AQD-SD4U32GN32-SB	SEC019 K4AAG085WABCWE	AQD-SD4U32GN32-SB	N	PASS
DDR4	2133	8GB	Advantech	AQD-SD4U8GN21-SG	SEC 552 BCPB K4A4G085WD	AQD-SD4U8GN21-SG	N	PASS
DDR4	3200	8GB	Advantech	AQD-SD4U8GN32-SE	SEC001 K4A8G085WCBCWE	AQD-SD4U8GN32-SE	N	PASS

M.2 SSD Compatibility

Dimension	Interface	Bandwidth Performance	Category	Vendor	Model	ADVANTECH P/N	Result
2280	M.2 Key B+M	PCIe v3.0	NVMe PCIe SSD	Advantech	SQF-CM8V4-512G-E8E	SQF-CM8V4-512G-E8E	PASS
2280	M.2 Key M	PCIe v3.0	NVMe PCIe SSD	LITE-ON	CA3-8D512	96FD80-P512-LIS	PASS
2280	M.2 Key B+M	SATA3	SSD	Advantech	CV1-8B256	96FD80-N256-LIS	PASS
2242	M.2 Key B+M	SATA3	SSD	Advantech	SQF-SM4M2-512G-SBE	SQF-SM4M2-512G-SBE	PASS
2242	M.2 Key B+M	SATA3	SSD	Advantech	SQF-SM4V2-512G-SBC	SQF-SM4V2-512G-SBC	PASS
2280	M.2 Key B+M	SATA3	SSD	Advantech	SQF-SM8M4-512G-SBE	SQF-SM8M4-512G-SBE	PASS
2280	M.2 Key M	PCIe v3.0	NVMe PCIe SSD	Advantech	S1TR191176010 00002	SQF-CM8V4-960G-ECE	PASS
2230	M.2 Key A+E	PCIe v3.0	NVMe PCIe SSD	Advantech	SQF-CM3V1-512G-EDC	SQF-CM3V1-512G-EDC	PASS

M.2 WiFi Compatibility

Dimension	Interface	Bandwidth Performance	Category	Vendor	Model	ADVANTECH P/N	Result
2230	M.2 Key A+E	PCIE	Wireless LAN + Bluetooth	Advantech	EWM-W192M201E	EWM-W192M201E	PASS
2230	M.2 Key A+E	PCI-E / USB	Wireless LAN + Bluetooth	Advantech	EWM-W163M201E	EWM-W163M201E	PASS
2230	M.2 Key E	PCI-E / USB	Wireless LAN + Bluetooth	Advantech	EWM-W162M201E	EWM-W162M201E	PASS

Ordering Information

P/N	Chipset	DP	LVDS /eDP	VGA	HDMI 2.0a	GbE LAN	COM	SATAIII	USB3.2 Gen2	USB3.2 Gen1	USB 2.0	M.2 M key	M.2 E key	PCIe x16	TPM	AMP
AIMB-277G2-FLA1E	Q470E	1	1 / (1)	1	1	2	2	3	4	4	0	1	1	1	1	1
AIMB-277G2-00A1E	Q470E	1	0 / (1)	0	1	2	2	3	4	4	0	1	1	1	0	0

*() Supports by BOM options

Note! ***USB power current delivery under S5 Max. 1.8A.***

Initial Inspection

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

- 1 x AIMB-277 Intel Core™ i9/i7/i5/i3 LGA1200 Mini-ITX motherboard
- 1 x SATA HDD cable
- 1-to-2 serial port cables, 20 cm
- 1 x I/O port bracket
- 1 x startup manual
- 1 x warranty card

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the AIMB-277 mechanically and electrically before shipment. It should be free of marks and scratches and in perfect working order upon receipt. As you unpack the AIMB-277, 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 your 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.

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Chapter 1

General Information

1.1 Introduction

AIMB-277 is designed with the Intel® Q470E PCH for industrial applications that require both performance computing and enhanced power management capabilities. The motherboard supports Intel desktop Corei9/i7/i5/i3/Pentium/Celeron processors, up to 20 MB SmartCache, and 2 x DDR4 2933MHz SO-DIMM, up to 64 GB. Multiple I/O connectivity of 2 x serial ports, 4 x USB 3.2 Gen 2 + 4 x USB 3.2 Gen 1, 2 x GbE LAN, 3 x SATA III, 1 x NGFF (M.2_E key), 1 x NGFF (M.2_M Key) connector, and 1 x PCIe x16 slot are also supported.

1.2 Features

- **I/O connectivity:** 2 x serial ports, 4 x USB 3.2 Gen 2 + 4 x USB 3.2 Gen 1, 3 x SATAIII, 1 M.2 M key & 1 M.2 E key, 2 GbE LAN, 1 PCIe x16
- **Standard Mini-ITX form factor with industrial features:** The AIMB-277 is a full-featured Mini-ITX motherboard with balanced expandability and performance.
- **Wide selection of storage devices:** SATA HDD, M.2 (M key), customers benefit from the flexibility of using the most suitable storage device for larger capacity.
- **Optimized integrated graphics solution:** With Intel® Graphics flexible, it supports versatile display options and a 32/64 bit 3D graphics engine.

1.3 Specifications

1.3.1 System

- **CPU:** LGA1200 Intel desktop Core i9/i7/i5/i3/Pentium/Celeron processors compliant.
- **BIOS:** AMI EFI 256 Mbit SPI BIOS.
- **System chipset:** Intel® Q470E.
- **SATA hard disk drive interface:**
  - Three on-board SATA connector with data transmission rates up to 600 MB
  - One M.2 M key to support PCIe/NVMe x4 M.2 2280.

1.3.2 Memory

- **RAM:** 2 x 260-pins SODIMM socket support dual channel DDR4 2933MHz SDRAM, up to 64GB Max.

1.3.3 Input/Output

- **Serial ports:** Two serial ports; support RS-232/422/485.
- **USB port:** Supports four USB 3.2 Gen 2 with a transmission rates of up to 10 Gbps and four USB 3.2 Gen 1 with transmission rates of up to 5 Gbps.
- **GPIO connector:** 8-bit general purpose Input/Output.

1.3.4 Graphics

- **Controller:** Intel® HD graphics
- **eDP:** Supports max. resolution 4096 x 2160 @ 60Hz, colay LVDs
- **DP1.4:** Supports max. resolution 4096 x 2304 @ 60 Hz
- **HDMI2.0a:** Supports max. resolution 4096 x 2160 @ 60 Hz
- **VGA:** Supports max. resolution 1920 x 1200 @ 60 Hz
- **LVDs:** Supports single/dual channel 18/24-bit with maximum resolution up to 1920 x 1200 @ 60 Hz (LVDs colay with eDP)

1.3.5 Ethernet LAN

- Supports dual 10/100/1000 Mbps Ethernet port (s) via PCI Express x1 bus which provides 500 MB/s data transmission rates.
- **Controller:**
  - GbE LAN1: Intel i219LM
  - GbE LAN2: Intel i211AT

1.3.6 Industrial Features

- **Watchdog timer:** Can generate a system reset. The watchdog timer is programmable, with each unit equal to one second or one minute (255 levels).

1.3.7 Mechanical and Environmental Specifications

- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F, depending on CPU).
- **Storage temperature:** -40 ~ 85° C (-40 ~ 185° F).
- **Humidity:** 5 ~ 95% non-condensing.
- **Power supply voltage:** +3.3V, +5V, +12V, -12V, +5VSB
- **Power consumption:**

  Intel Core i9-10900E 2.8GHz, 2pcs 32GB DDR4 3200MHz SDRAM, Boost: 117.882W; Typical: 102W
- **Board size:** 170 mm x 170 mm (6.69" x 6.69").
- **Board weight:** 0.365 kg.

1.4 Jumpers and Connectors

Connectors on the AIMB-277 motherboard link it to devices such as hard disk drives and a keyboard. In addition, the board has a number of jumpers used to configure the system for your application.

The tables below list the function of each of the board jumpers and connectors. Later sections in this chapter give instructions on setting jumpers. Chapter 2 gives instructions for connecting external devices to your motherboard.

Table 1.1: Connector and Header List

	Description	Location Name
1	SYSTEM FAN Power Connector	SYSFAN1
2	CPU FAN Power Connector	CPUFAN1
3	CML CPU Socket	CPU1
4	ATX 12V Power Supply Connector	ATX12V1
5	VGA connector	VGA1
6	DisplayPort+ High Definition Multimedia Interface	DP1+HDMI1
7	USB 3.2+2.0 pin header	USB56
8	USB 3.2+2.0 pin header	USB78
9	eDP/LVDS Panel Connector	LVDS_EDP3
10	USB3.2+RJ45 1 port	LAN2_USB34
11	USB3.2+RJ45 1 port	LAN1_USB12
12	Audio amplifier output pin header	AMP1
13	Front panel audio pin header	AUDIO1
14	LVDS Backlight inverter power connector	INV3
15	PCI Express X16 Slot	PCIEX16_1
16	NGFF M.2 M-Key connector for 2280 module	M2M1
17	COM Port	COM12
18	SATA Signal Connector	SATA3
19	SATA Signal Connector	SATA1
20	SATA Signal Connector	SATA2
21	SPI BIOS Flash Socket	SPI1
22	ESPI debug card Pin Header	ESPI1
23	Battery Wafer Box	BAT1
24	8-bits General Purpose I/O Pin Header	GPIO1
25	Power Switch/HDD LED/SMBUS/Speaker Pin Header	JFP1
26	Case-Open Detect Connector	JCASE2
27	Power LED Pin Header	JFP2
28	ATX 12/5V/3V/5VSBV Power Supply Connector	EATXPWR1
29	SYSTEM FAN Power Connector	SYSFAN2
30	DDR4 SO-DIMM Socket	DIMMB1
31	DDR4 SO-DIMM Socket	DIMMA1
32	NGFF M.2 E-Key connector for 2242 module	M2E1

1.5 Board Layout: Jumper and Connector Locations

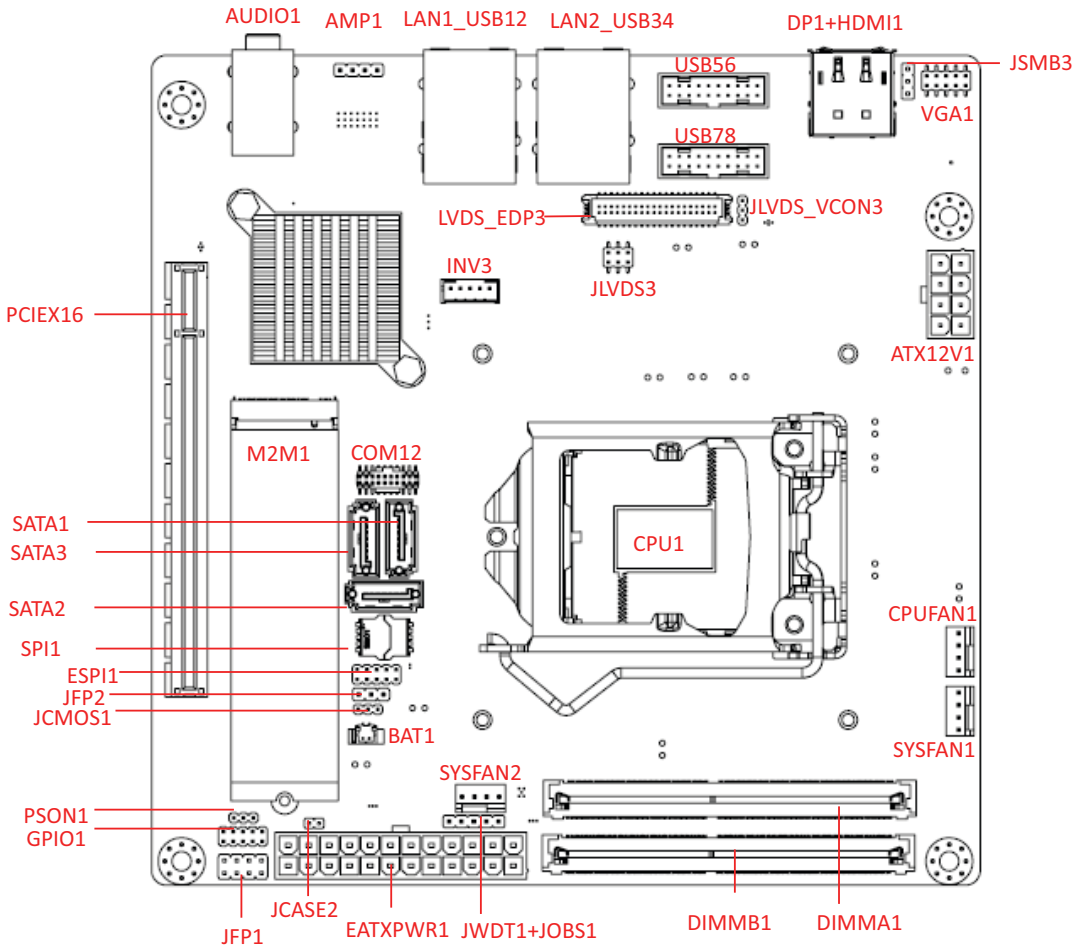


Figure 1.1 Jumper and Connector Location (Top Side)

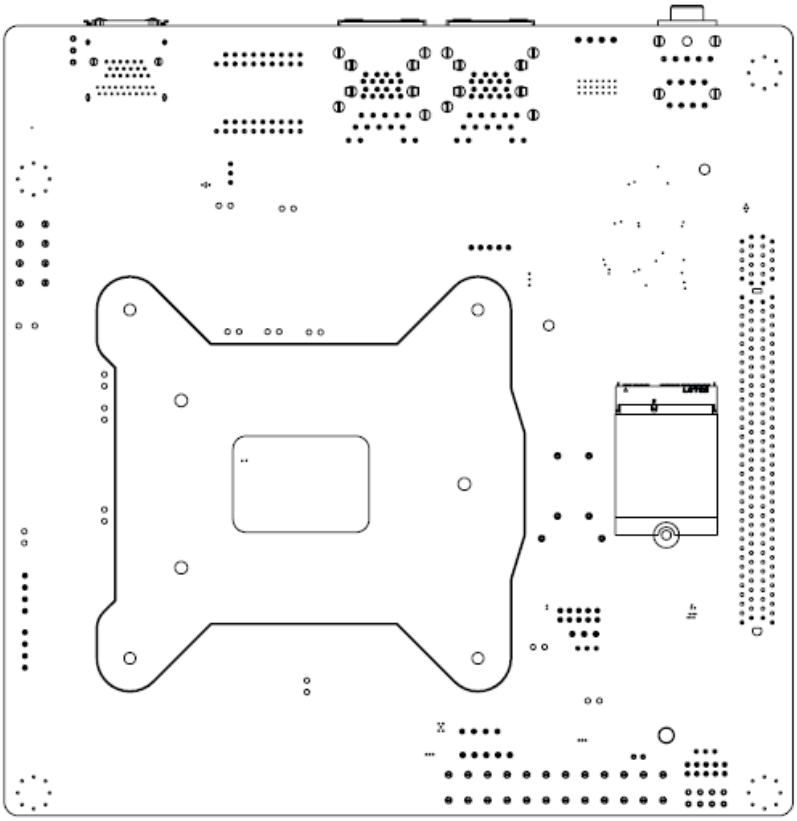


Figure 1.2 Jumper and Connector Location (Bottom Side)

1.6 AIMB-277 Board Diagram

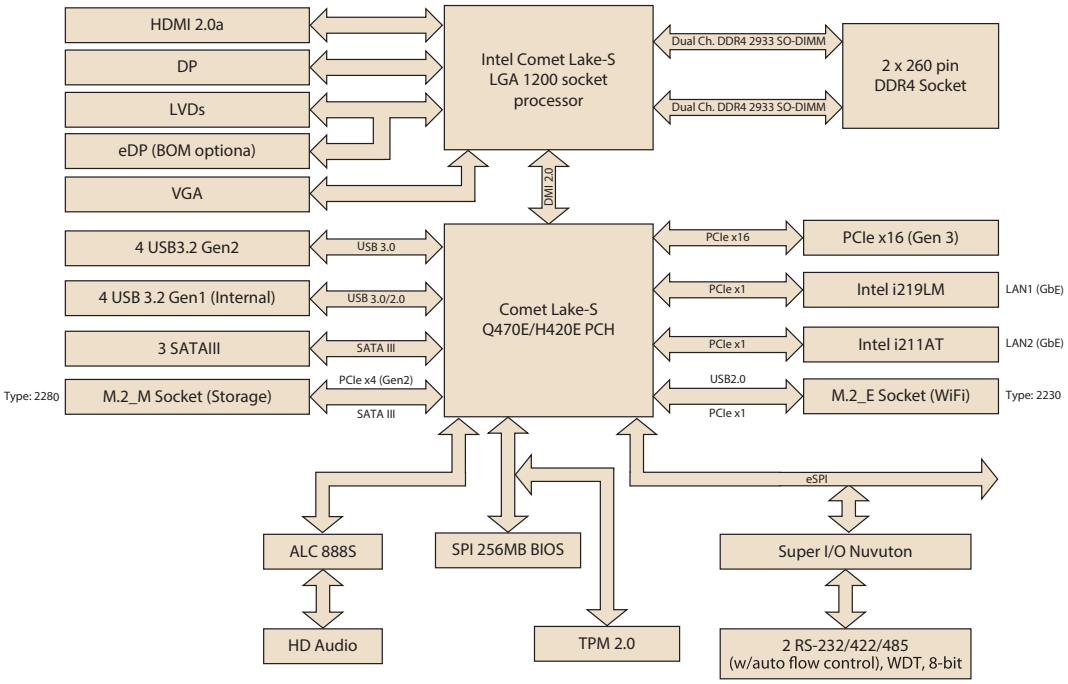


Figure 1.3 AIMB-277 Board Diagram

1.7 Safety Precautions

Warning! *Always completely disconnect the power cord from chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.*

Caution! *Always ground yourself to remove any static charge before touching the motherboard. Modern electronic devices are very sensitive to electro-static discharges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.*

Caution! *The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacturer. Discard used batteries according to manufacturer's instructions.*

Caution! *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.*

1.8 Jumper Settings

This section provides instructions on how to configure your motherboard by setting the jumpers. It also includes the motherboard's default settings and your options for each jumper.

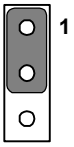
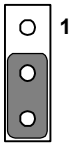
1.8.1 How to Set Jumpers

You can configure your motherboard to match the needs of your application by setting the jumpers. A jumper is a metal bridge that closes an electrical circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" (or turn ON) a jumper, you connect the pins with the clip. To "open" (or turn OFF) a jumper, you remove the clip. Sometimes a jumper consists of a set of three pins, labeled 1, 2, and 3. In this case you connect either pins 1 and 2, or 2 and 3. A pair of needle-nose pliers may be useful when setting jumpers.

1.8.2 CMOS Clear (JCMOS1)

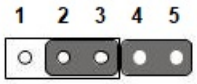
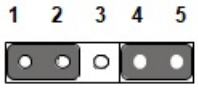
The AIMB-277 motherboard contains a jumper that can erase CMOS data and reset the system BIOS information. Normally this jumper should be set with pins 1-2 closed. If you want to reset the CMOS data, set CMOS1 to 2-3 closed for just a few seconds, and then move the jumper back to 1-2 closed. This procedure will reset the CMOS to its default setting.

Table 1.2: JCMOS1

Function	Jumper Settings	
Keep CMOS data (Default)		1-2 closed
Clear CMOS data		2-3 closed

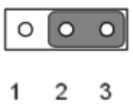
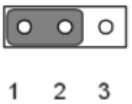
1.8.3 Watchdog Timer Output and OBS Beep (JWDT1+JOBS1)

Table 1.3: Watchdog Timer Output and OBS Beep (JWDT1+JOBS1)

Function	Jumper Setting
Watchdog Timer Output (2-3) (Default) OBS BEEP(4-5) (Default)	 (2 and 3)+(4 and 5)
Watchdog Timer Disable (1-2) OBS BEEP(4-5) (Default)	 (1 and 2)+(4 and 5)

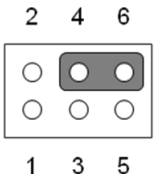
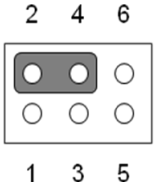
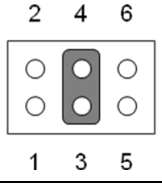
1.8.4 ATX/AT Mode Selection (PSON1)

Table 1.4: ATX/AT Mode Selection (PSON1)

Function	Jumper Setting
ATX Mode (Default)	
AT Mode	

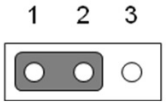
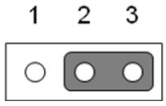
1.8.5 LVDS/eDP Panel Voltage Selection (JLVDS3)

Table 1.5: LVDS/eDP Panel Voltage Selection (JLVDS3)

Function	Jumper Setting
Jumper position for +3.3V (Default)	
Jumper position for +5V	
Jumper position for +12V	

1.8.6 LVDS VESA, JEIDA Format Selection Pin Header (JLVDS_VCON3)

Table 1.6: LVDS VESA, JEIDA Format Selection Pin Header (JLVDS_VCON3)

Function	Jumper Setting
JEIDA mode Setting: +V3.3	
VESA mode Setting: GND (Default)	

Pin	Signal Pin Definition
1	+3.3V
2	LVDS1_VCON
3	GND

1.9 System Memory

AIMB-277 has two sockets for a 260-pin DDR4 SO-DIMM. These sockets use a 1.2 V unbuffered double data rate synchronous DRAM (DDR SDRAM). DRAM is available in capacities of 4GB, 8GB, 16GB and 32GB. The sockets can take any combination with SODIMMs of any size, giving a total memory size between 4GB, 8GB, 16GB, and up to max 64GB. AIMB-277 does NOT support error checking and correction (ECC).

1.10 Memory Installation Procedures

To install SODIMMs, first make sure the two handles of the SODIMM socket are in the “open” position, i.e., the handles lean outward. Slowly slide the SODIMM module along the plastic guides on both ends of the socket. Then firmly but gently (avoid pushing down too hard) press the SODIMM module well down into the socket, until you hear a click when the two handles have automatically locked the memory module into the correct position of the SODIMM socket. To remove the memory module, just push both handles outward, and the memory module will be ejected by the mechanism.

1.11 Cache Memory

The AIMB-277 supports a CPU with one of the following built-in full speed last level caches:

20MB for Inter Core i9-10900E/i9-10900TE

16MB for Inter Core i7-10700E/i7-10700TE

12MB for Inter Core i5-10500E/i7-10500TE

6MB for Inter Core i3-10100E/i7-10100TE

6MB for Inter Core i3-10100E/i7-10100TE

4MB Pentium G6400E/G6400TE

2MB Celeron G5900E/G5900TE

The built-in second-level cache in the processor yields much higher performance than conventional external cache memories.

1.12 Processor Installation

The AIMB-277 is designed to supported Intel 10th Gen LGA1200, Core i9/Core i7/ Core i5/Core i3, Pentium, Celeron processor.

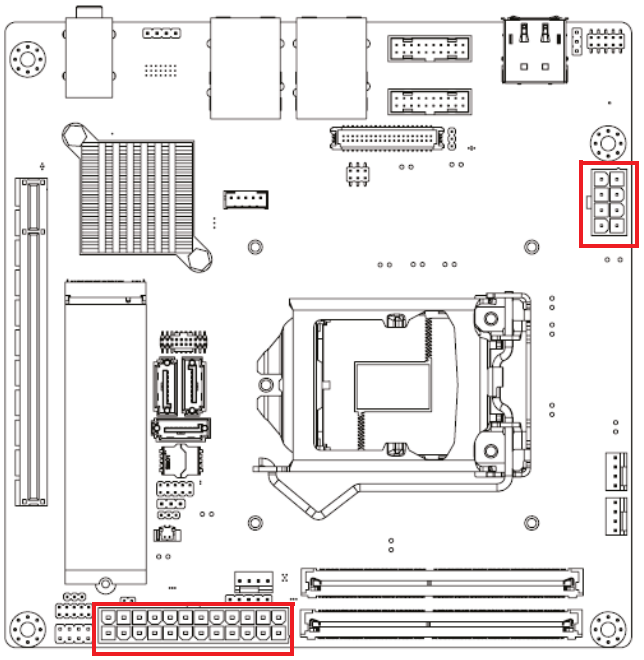
Chapter 2

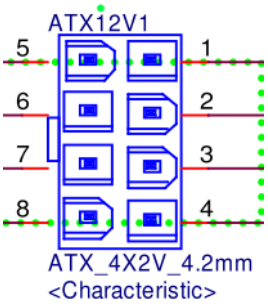
Connecting Peripherals

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 or have a packed chassis, you may need to partially remove the card to make all the connections.

2.2 ATX 12V Power Supply Connector (ATX12V1) & ATX Power Supply Connector (EATXPWR1)



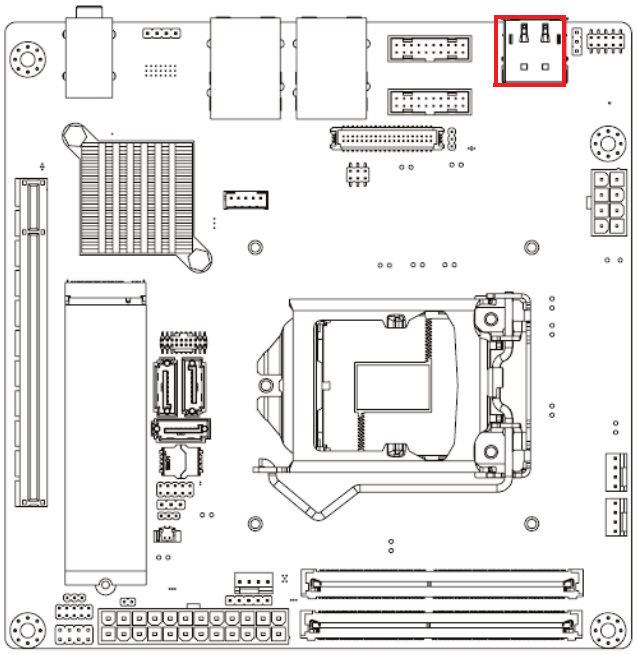


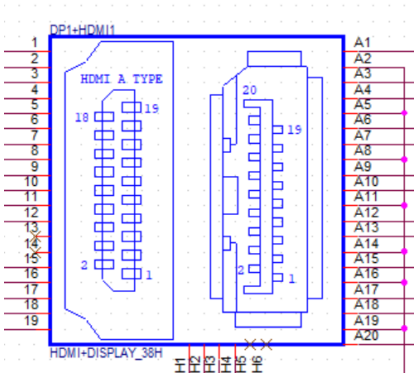
Pin	Signal Pin Definition
1	GND
2	GND
3	GND
4	GND
5	+12V
6	+12V
7	+12V
8	+12V

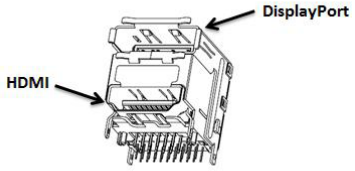
Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	+3.3V_1	13	+3.3V_4
2	+3.3V_2	14	-12V
3	COM_1	15	COM_4
4	+5V_1	16	PS_ON#
5	COM_2	17	COM_5
6	+5V_2	18	COM_6
7	COM_3	19	COM_7
8	PWR_OK	20	NC

9	+5VSB	21	+5V_3
10	+12V1_1	22	+5V_4
11	+12V1_2	23	+5V_5
12	+3.3V_3	24	COM_8

2.3 DisplayPort+ High Definition Multimedia Interface (DP1+HDMI1)

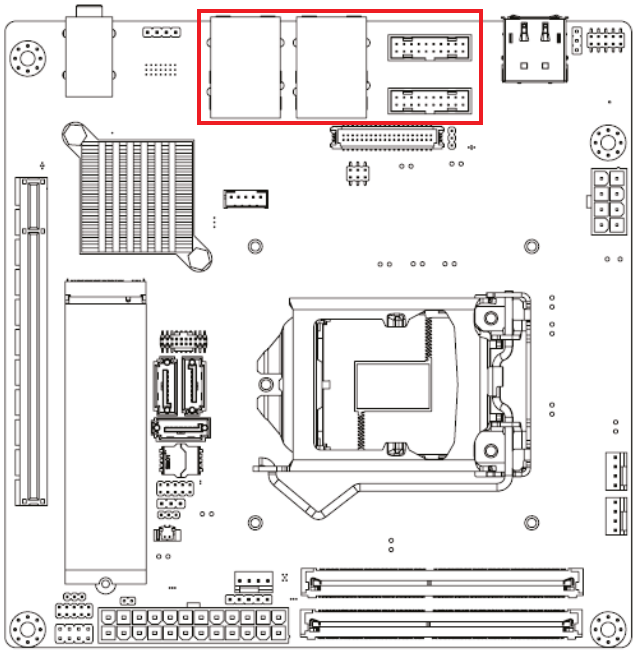


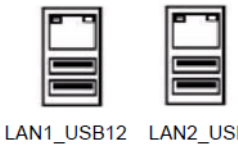


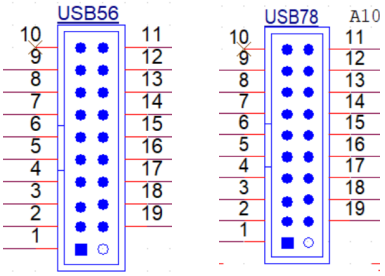


2.4 LAN1_USB12 + LAN2_USB34, USB56, USB78

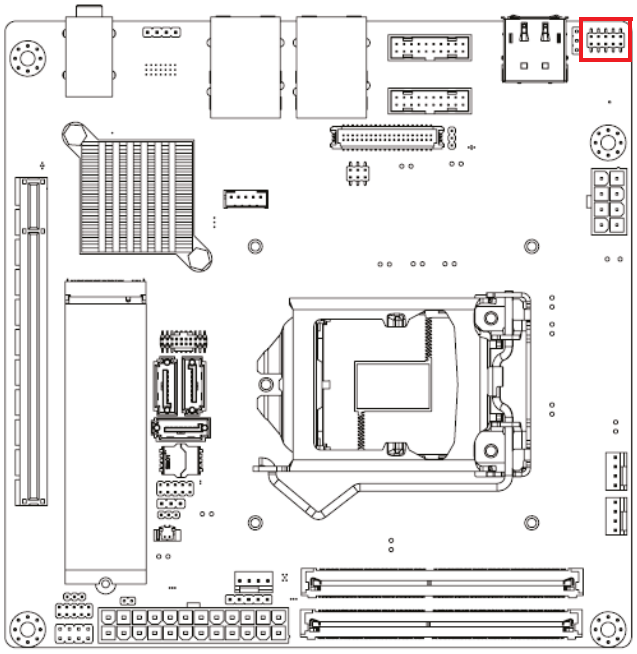
The AIMB-277 provides up to eight USB ports. Four USB3.2 Gen2 on the rear side and two pin header on the board. The USB interface complies with USB specification Rev. 2.0 and Rev. 3.0 supporting transmission rates up to 10 Gbps for USB1234, and up to 5Gbps for USB5678. The USB interface can be disabled in the system BIOS setup. The AIMB-277 is equipped with two high-performance 1000 Mbps Ethernet LAN adapter, which are supported by all major network operating systems. The RJ-45 jacks on the rear panel provides for convenient LAN connection.

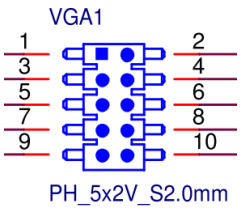






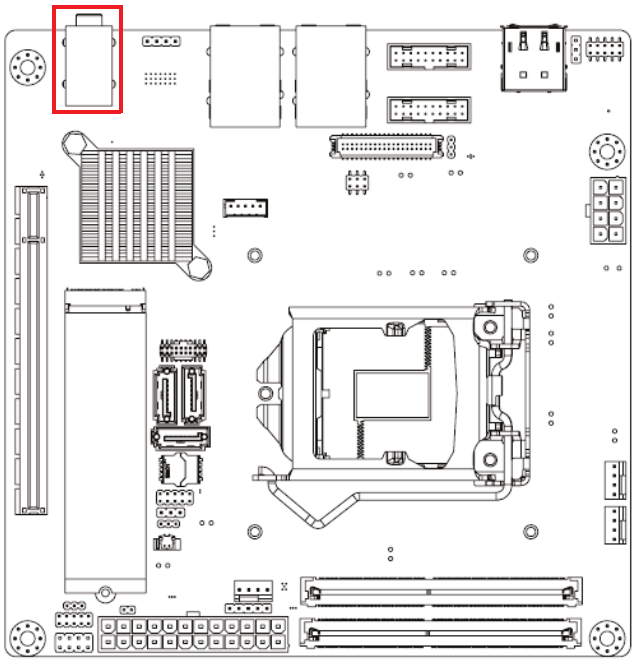
2.5 VGA connector (VGA1)

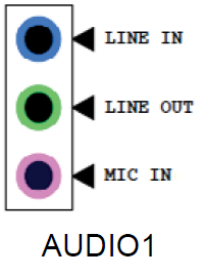




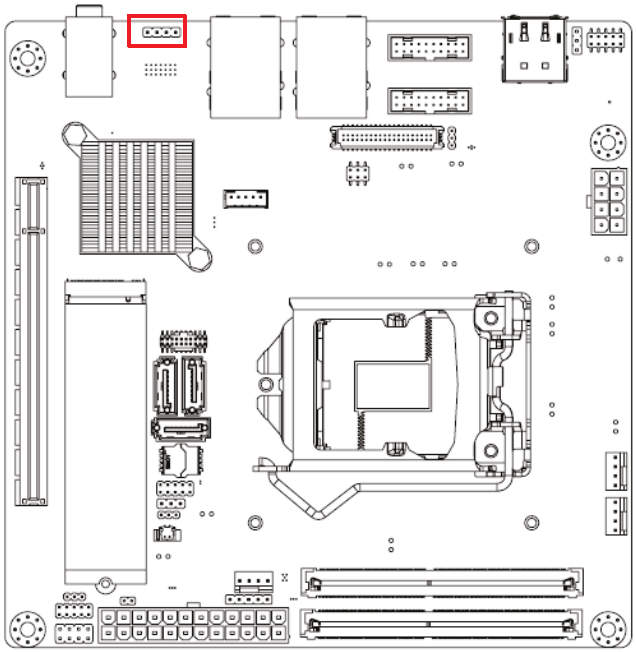
Pin	Signal Pin Definition
1	VGA1_b_R
2	VGA1_a_DCLK
3	VGA1_b_G
4	VGA1_FOC_ON
5	VGA1_b_B
6	VGA1_a_DDAT
7	VGA1_b_VS
8	GND
9	VGA1_b_HS
10	+VCC_TMDS

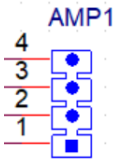
2.6 HD Analog Audio Interface (Audio1)





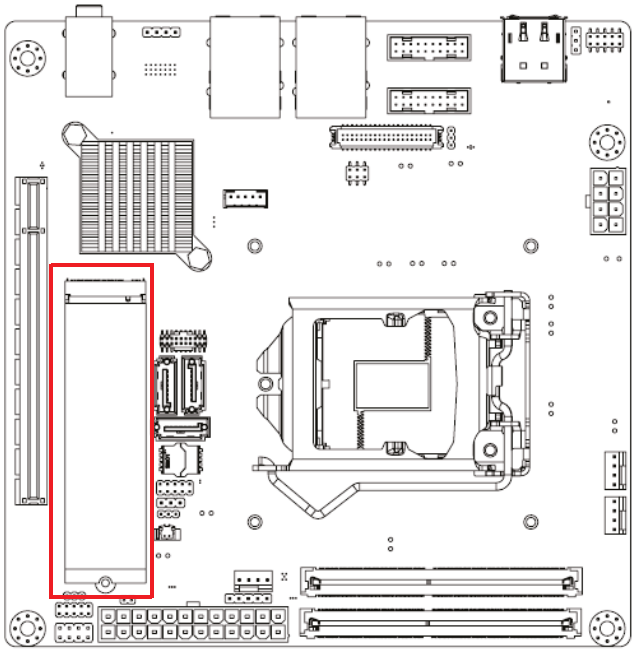
2.7 Amplifier Connector (AMP1)

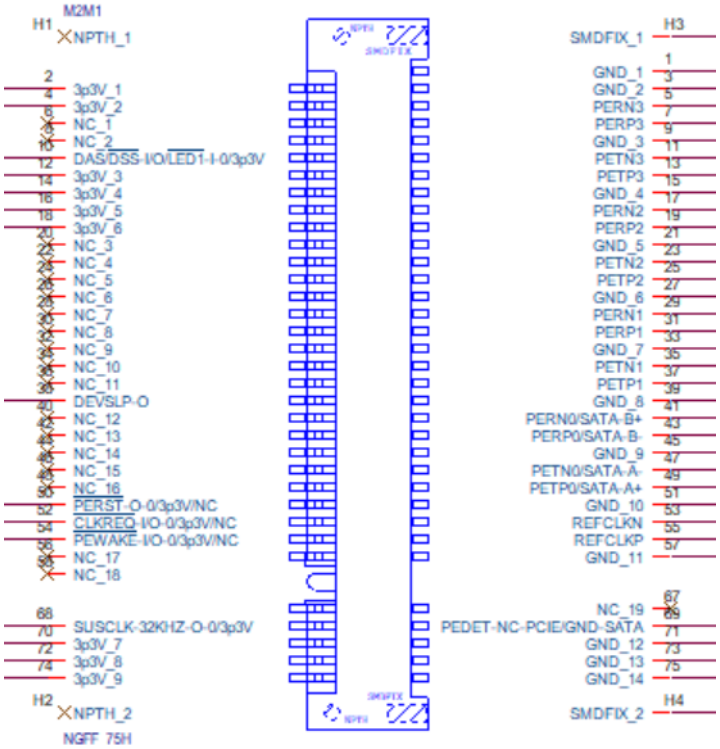




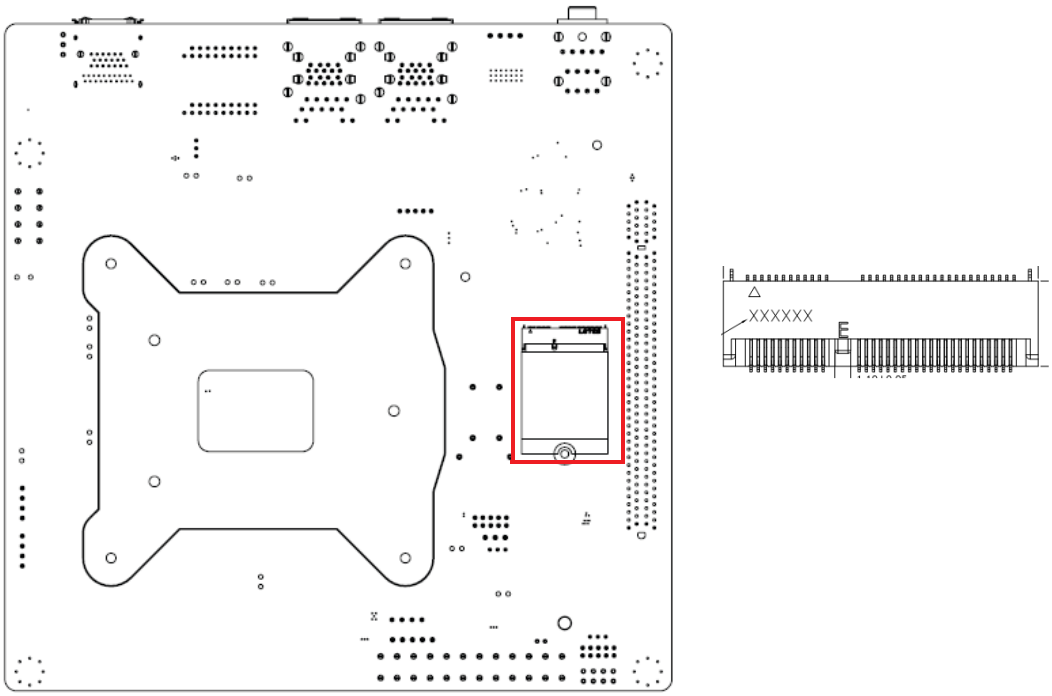
Pin	Signal Pin Definition
1	SPK_R+
2	SPK_R-
3	SPK_L-
4	SPK_L+

2.8 NGFF M.2 M-Key Connector for 2280 Module (M2M1)

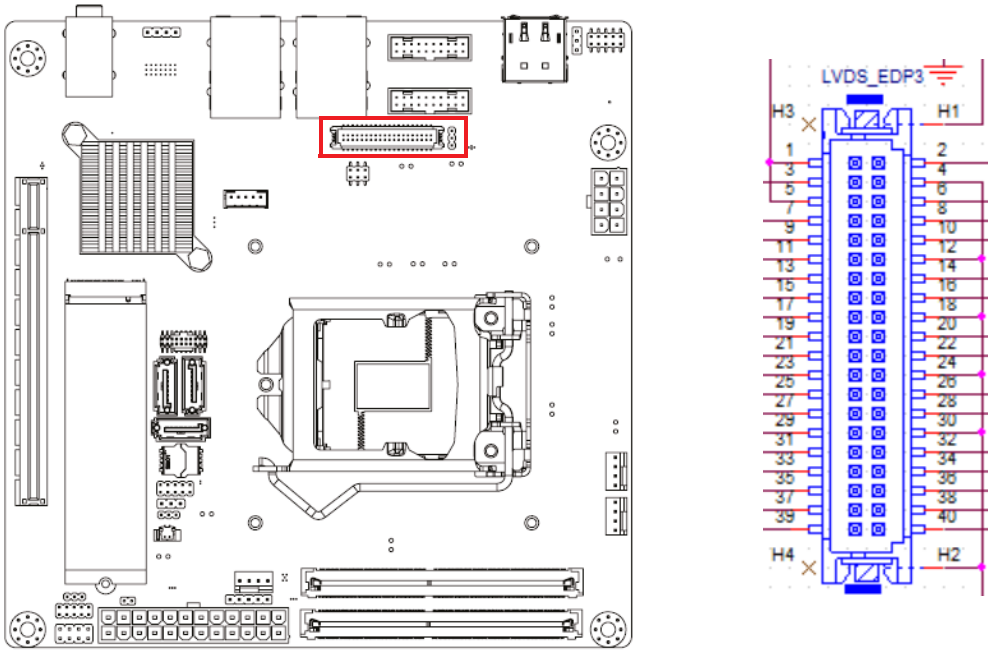




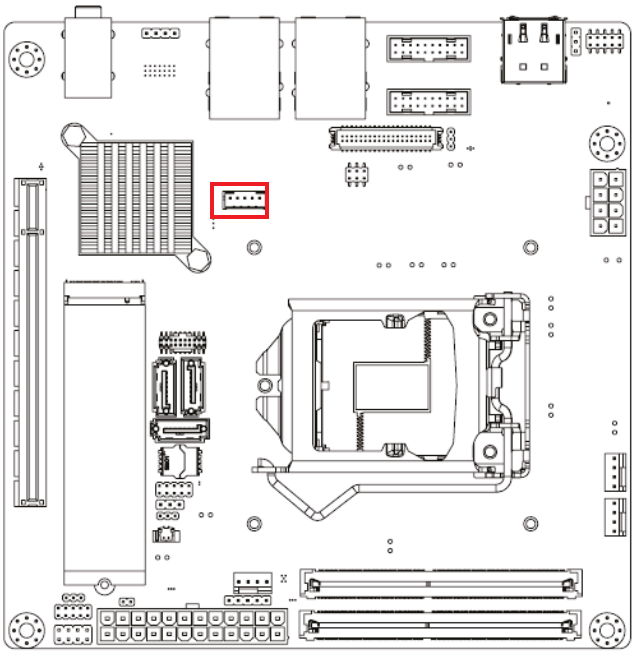
2.9 NGFF M.2 E-Key Connector for 2230 Module (M2E1)

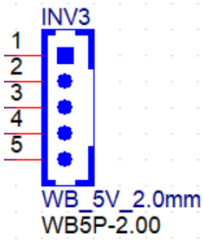


2.10 LVDS/eDP Connector (LVDS_EDP3)



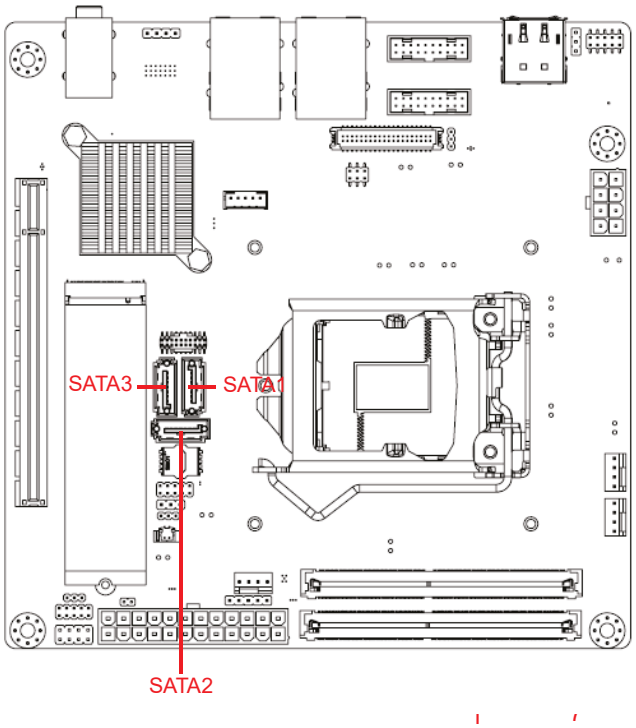
2.11 LVDS Backlight Inverter Power Connector (INV3)

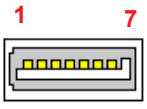




2.12 Serial ATA Interface Connector (SATA1/2/3)

AIMB-286EF features a high performance Serial ATA III interface (up to 600 MB/s) which eases hard drive cabling with thin, space-saving cables.

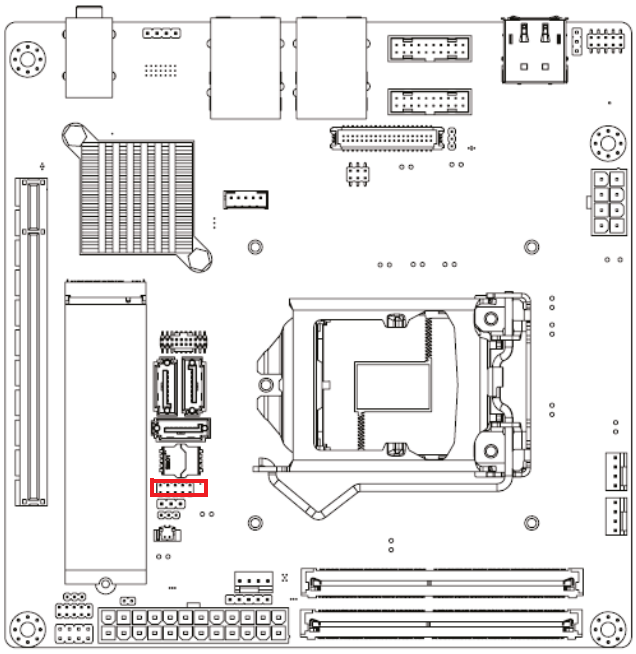


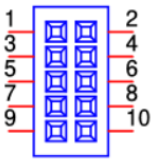


Pin	Signal
1	GND

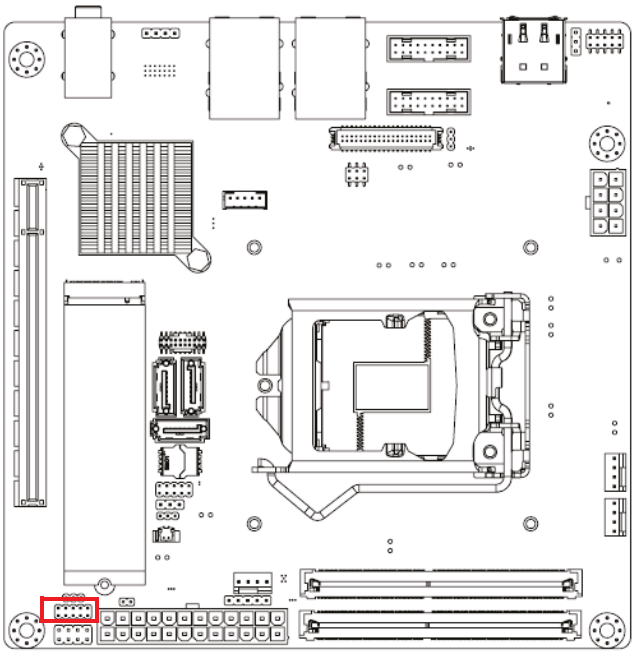
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

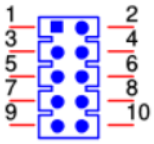
2.13 eSPI Interface Connector (ESPI1)



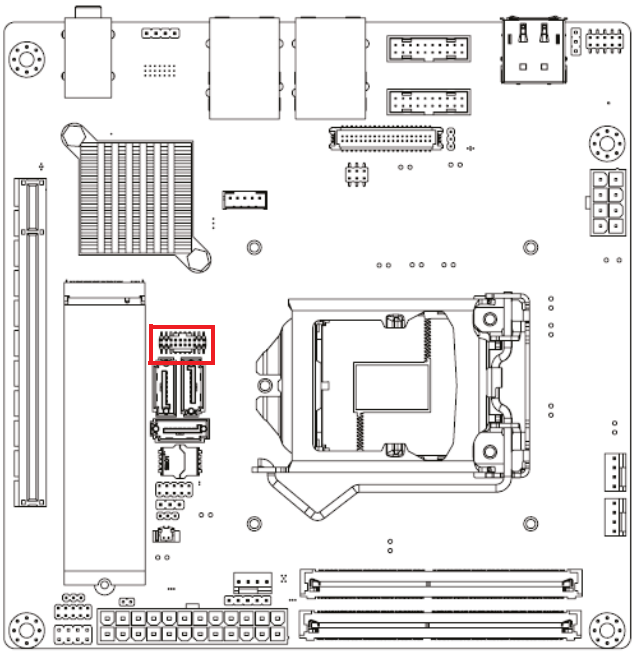


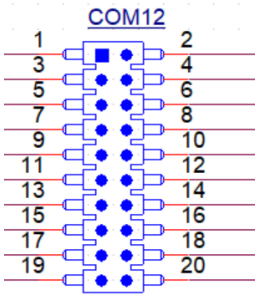
2.14 8-bit General Purpose I/O Pin Header (GPIO1)





2.15 COM Port Pin Header (COM12)

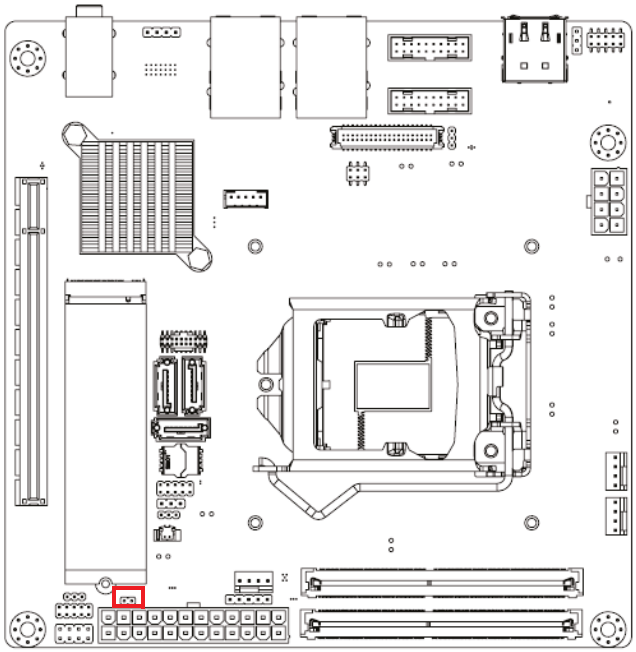




Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	COM1_422_485_TX-	2	COM1_DSR#
3	COM1_422_485_TX+	4	COM1_RTS#
5	COM1_422_RX+	6	COM1_CTS#
7	COM1_422_RX-	8	COM1_RI#
9	GND	10	GND

11	COM2_422_485_TX-	12	COM2_DSR#
13	COM2_422_485_TX+	14	COM2_RTS#
15	COM2_422_RX+	16	COM2_CTS#
17	COM2_422_RX-	18	COM2_RI#
19	GND	20	GND

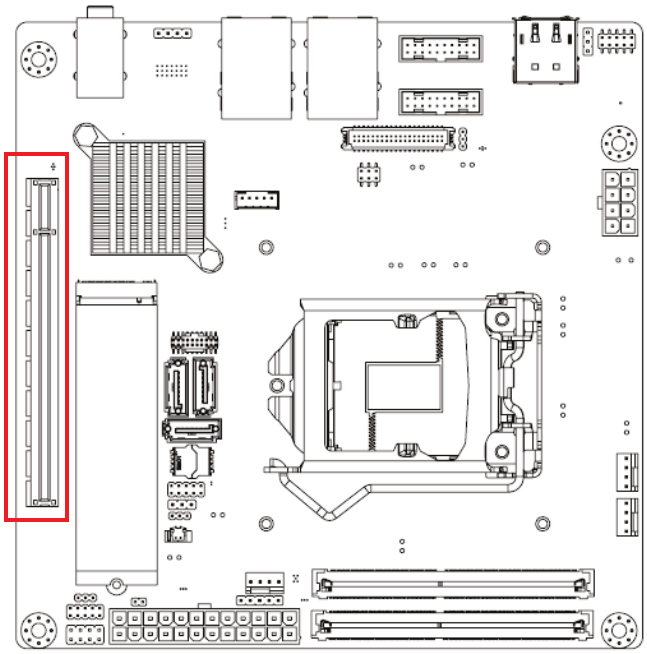
2.16 Case Open Connector (JCASE2)



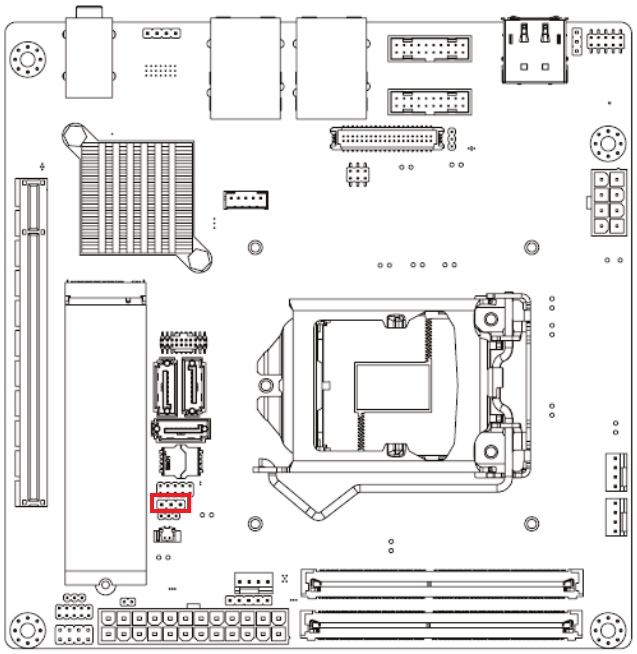
Pin	Signal
1	Case Open
2	GND

2.17 PCI Express X16 Slot (PCIEX16_1)

AIMB-277 provides 1 x PCI express x16 slot.

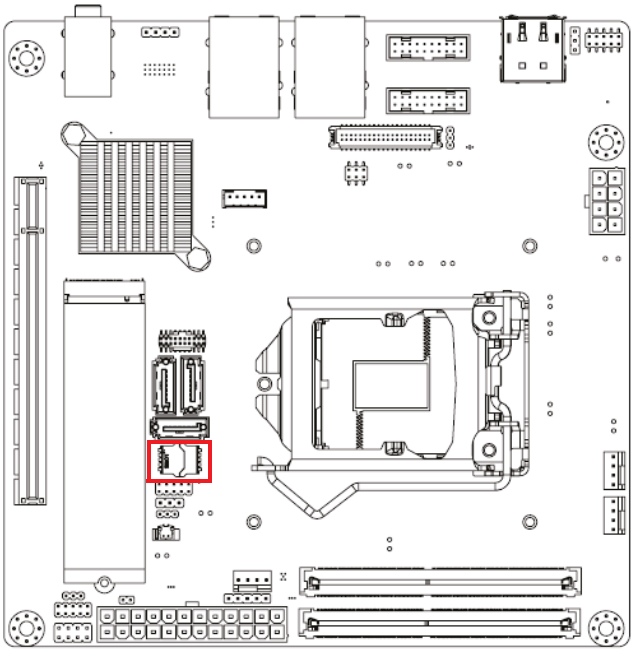


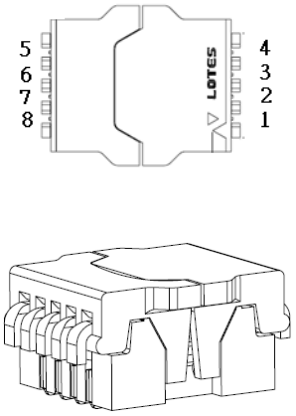
2.18 Power LED Pin Header (JFP2)



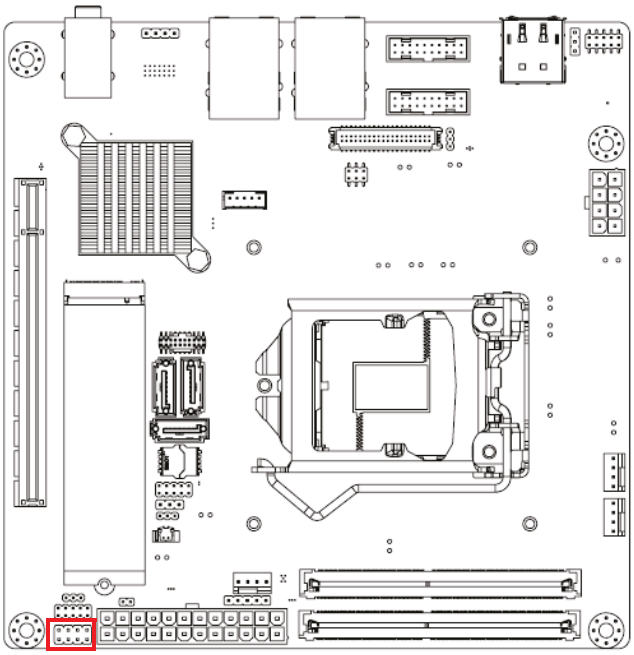
Pin	Signal Pin Definition
1	SIO_SUSLED_R
2	NC
3	SIO_SUSLED

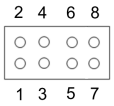
2.19 SPI BIOS Flash Socket (SPI1)





2.20 Power Switch/HDD LED/SMBUS/Speaker Pin Header (JFP1)

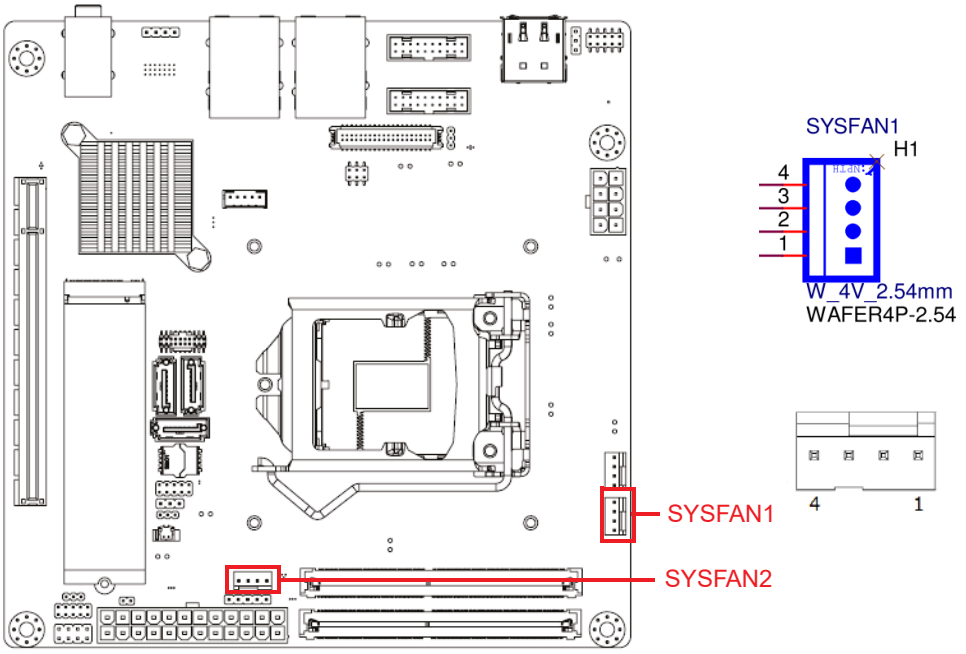




Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	FP_HDD_LED	2	PWR_BTN
3	FP_HDD_LED#	4	GND
5	SMB_DAT_JFP1	6	FP_SYS_RESET#
7	SMB_CLK_JFP1	8	GND

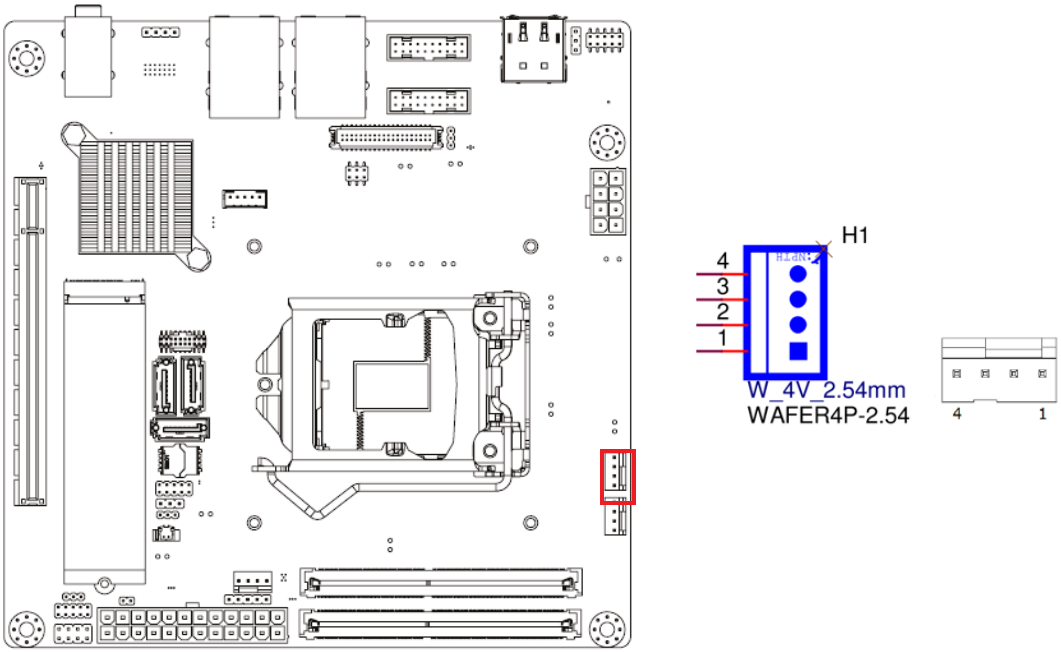
2.21 System Fan #1 Connector /System Fan #2 Connector (SYSFAN1/2)

If a fan is used, this connector supports cooling fans of 500 mA (6 W) or less.

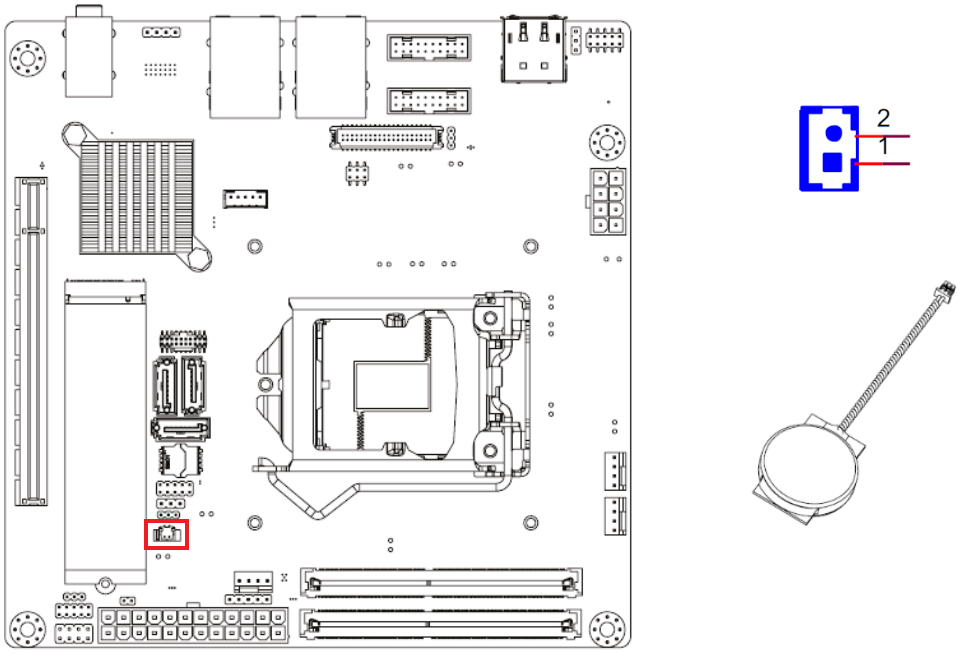


2.22 CPU FAN Connector (CPUFAN1)

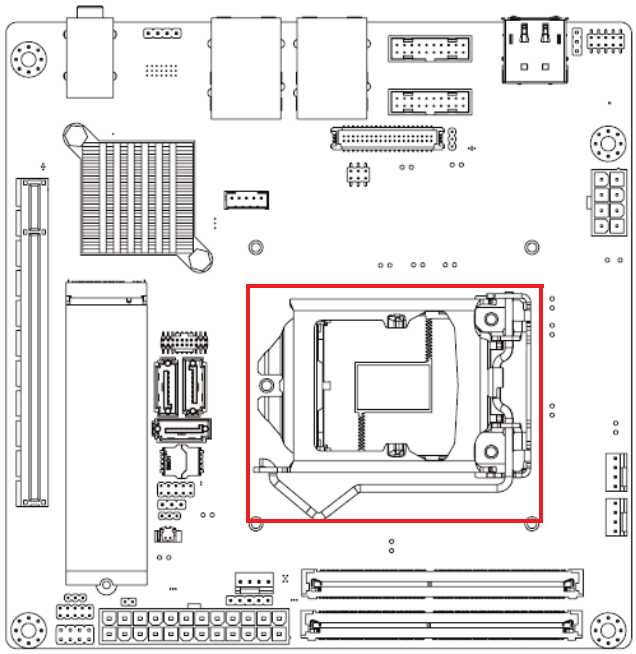
If a fan is used, this connector supports cooling fans of 500 mA (6 W) or less.



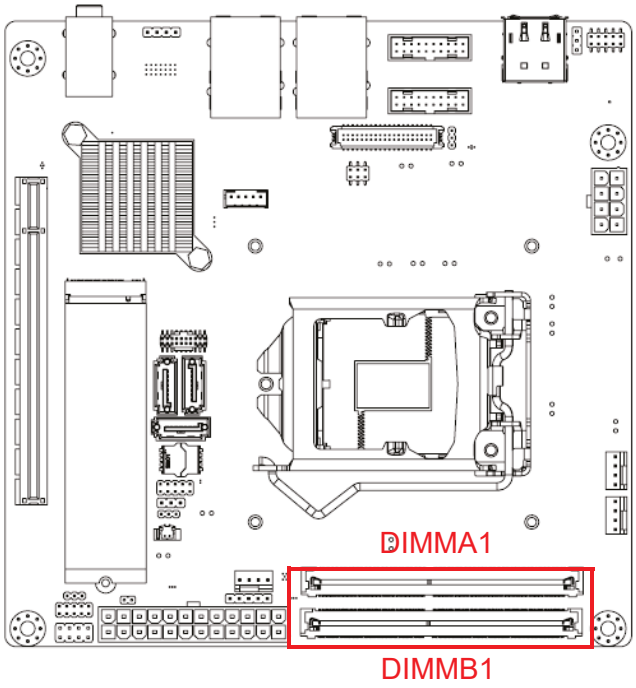
2.23 CMOS Battery Connector (BAT1)



2.24 CPU Socket (CPU1)



2.25 DDR4 SO-DIMM Socket (DIMMA1, DIMMB1)



Chapter 3

BIOS Operation

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 special features on or off. This chapter describes the basic navigation of the AIMB-277 setup screens.

3.2 BIOS Setup

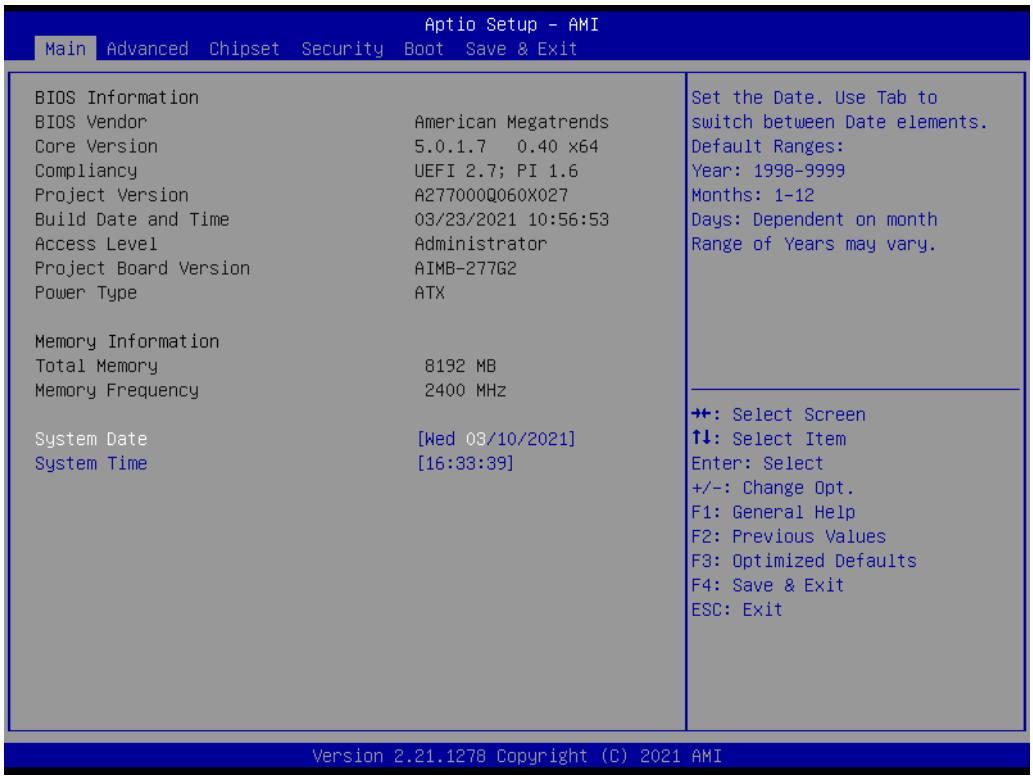
The AIMB-277 Series system has AMI BIOS built in, with a CMOS SETUP utility that allows users to configure required settings or to activate certain system features. The CMOS SETUP saves the configuration in the CMOS RAM of the motherboard. When the power is turned off, the battery on the board supplies the necessary power to preserve the CMOS RAM.

When the power is turned on, press the <Del> button during the BIOS POST (Power-On Self Test) to access the CMOS SETUP screen.

Control Keys	
< ↑ >< ↓ >< ← >< → >	Move to select item
<Enter>	Select item
<Esc>	Main Menu - Quit without saving changes to the CMOS Sub Menu - Exit current page and return to the Main Menu
<Page Up/+>	Increase the numeric value or make changes
<Page Down/->	Decrease the numeric value or make changes
<F1>	General help, for Setup Sub Menu
<F2>	Item help
<F5>	Loads previous values
<F7>	Loads setup defaults
<F10>	Saves all CMOS changes

3.2.1 Main Menu

Press <Del> 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.



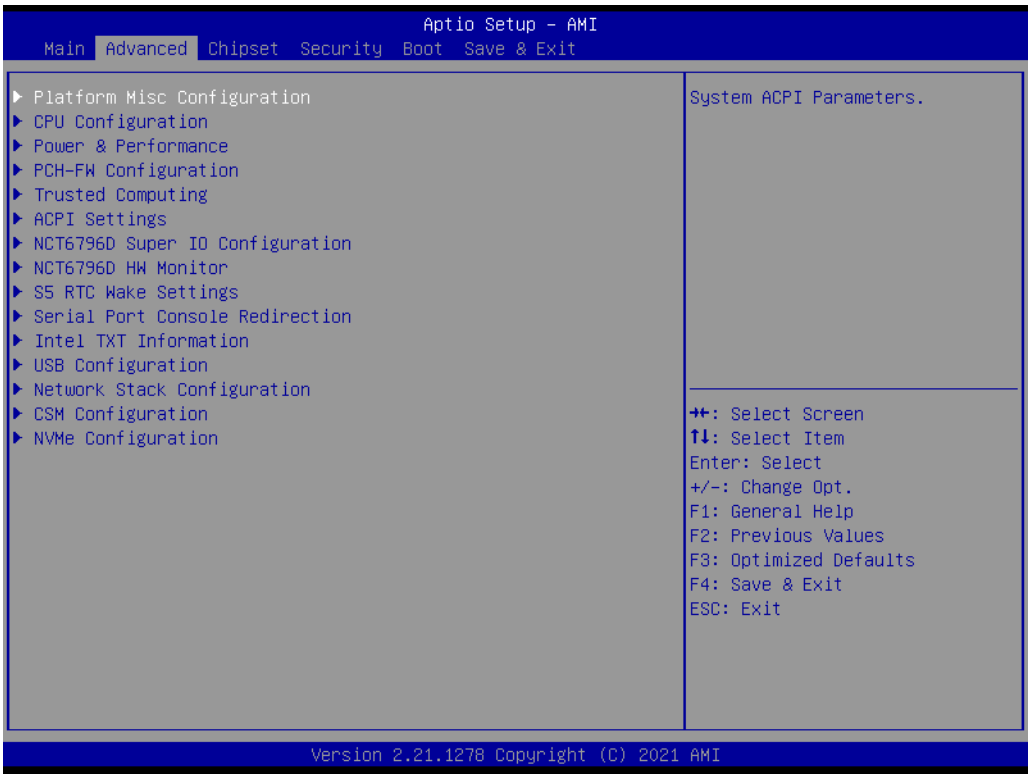
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

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.

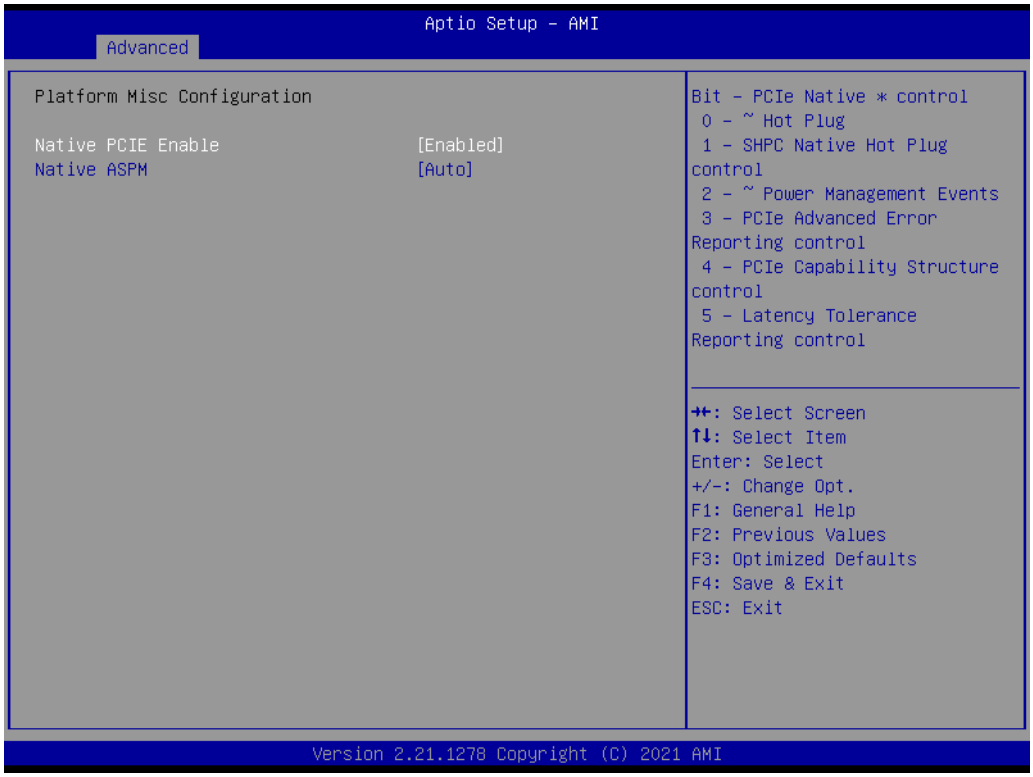
- **System Time/System Date**
  Use this option to change the system time and date. Highlight the System Time or System Date using the <Arrow> keys. Enter new values via the keyboard. Press the <Tab> or <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be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

3.2.2 Advanced BIOS Features

Select the Advanced tab from the AIMB-277 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 screen is shown below. The sub menus are described on the following pages.

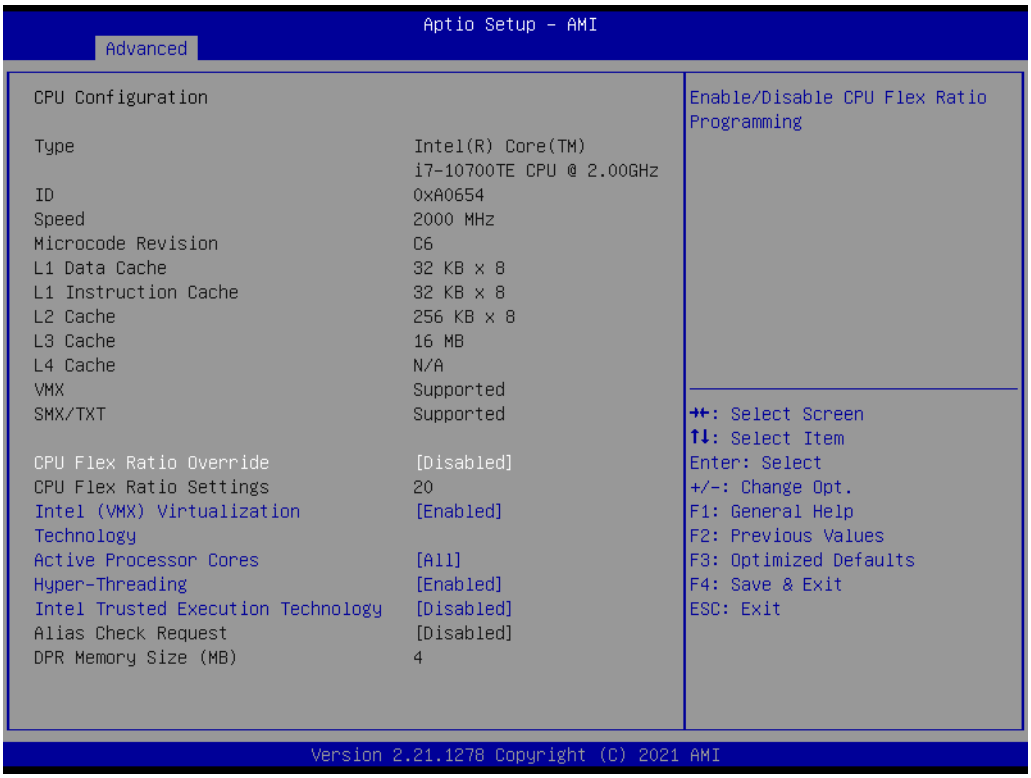


3.2.2.1 Platform Misc Configuration



- **Native PCIE Enable [Enable]**
- **Native ASPM [Auto]**

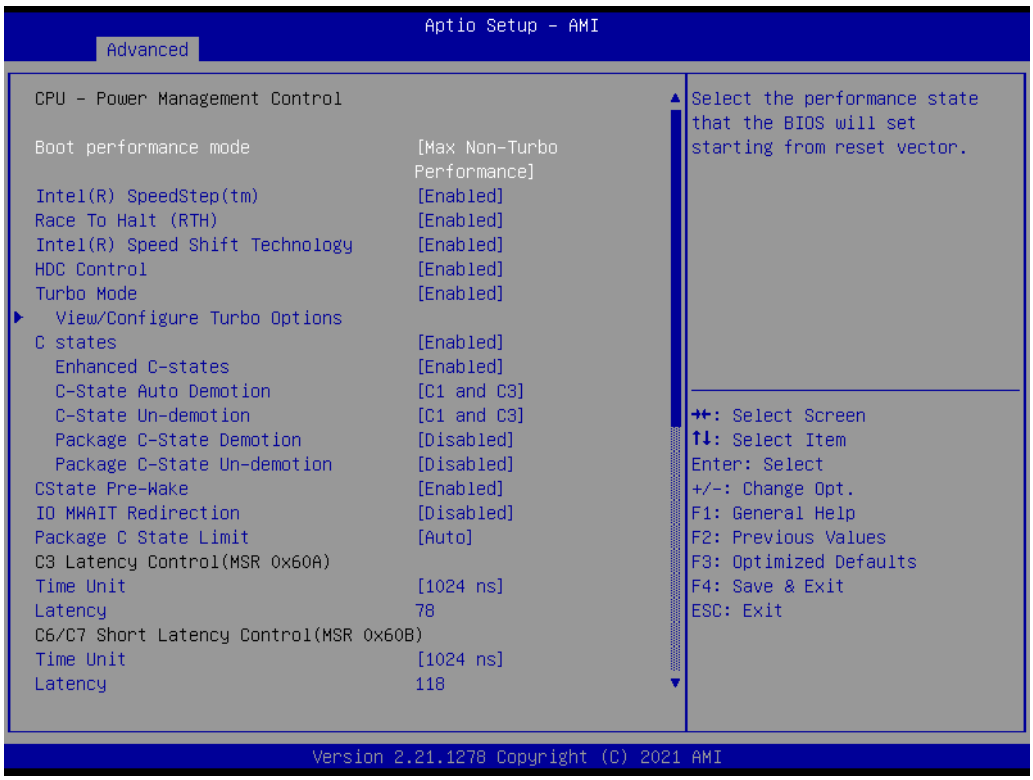
3.2.2.2 CPU Configuration

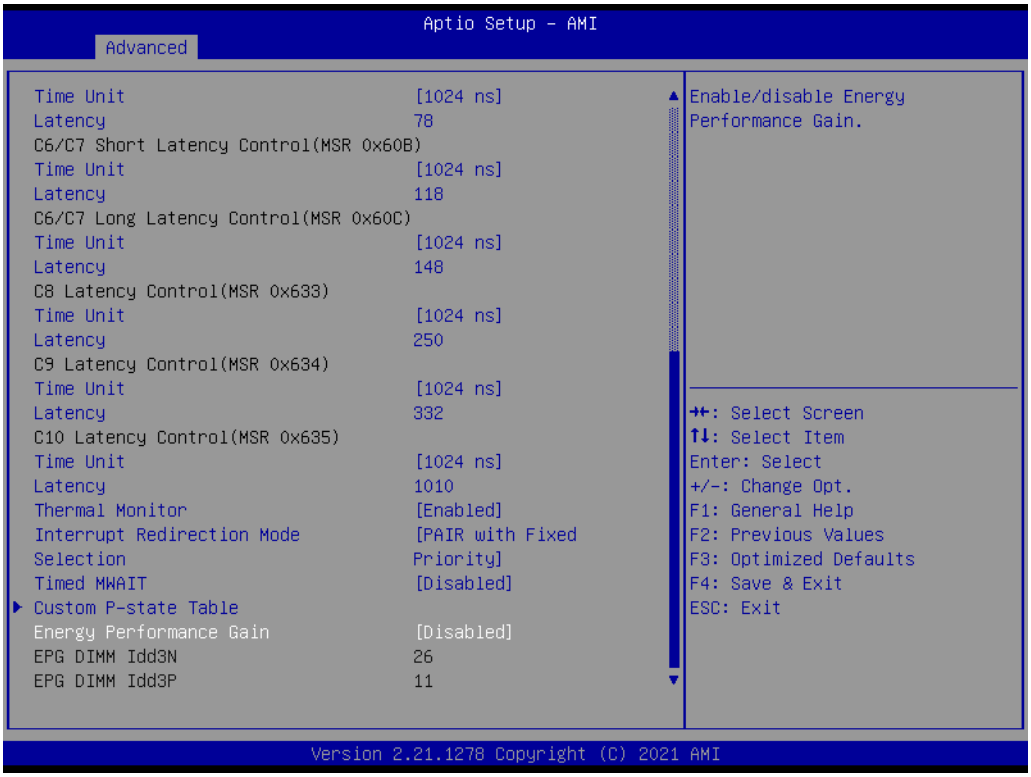


- **CPU Flex Ratio Override [Disabled]**
- **Intel (VMX) Virtualization [Enabled]**
- **Active Processor Cores [All]**
- **Hyper-Threading [Enabled]**
- **Intel Trusted Execution Technology [Disabled]**
- **Alias Check Request [Disabled]**

3.2.2.3 Power & Performance

CPU - Power Management Control



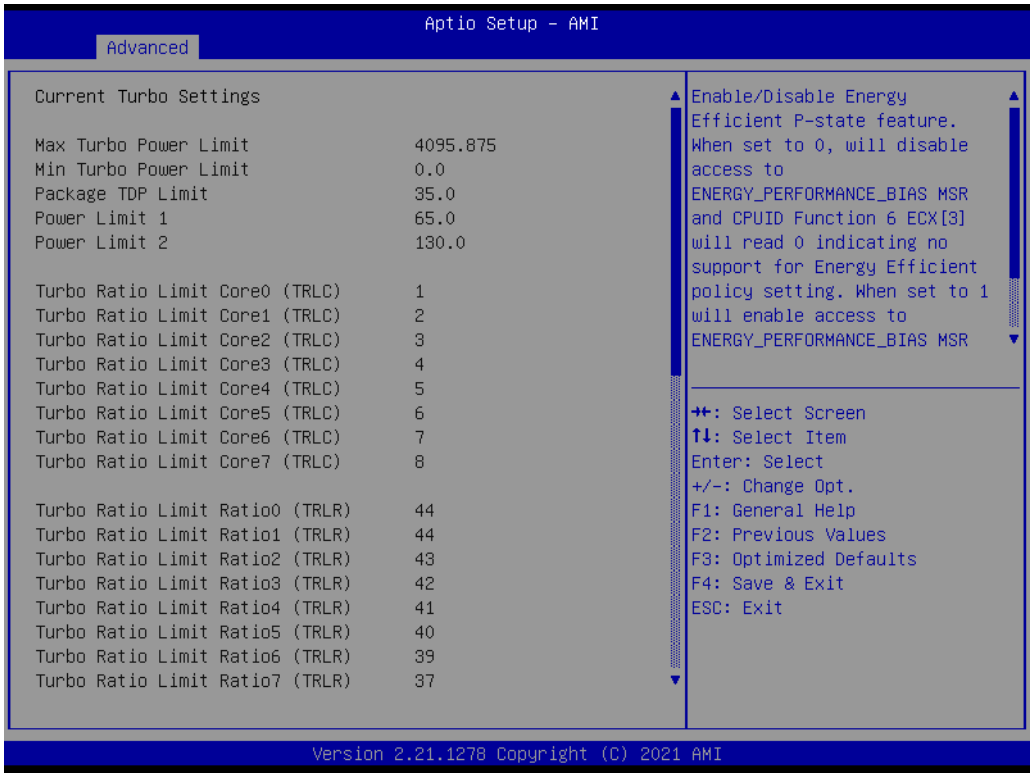


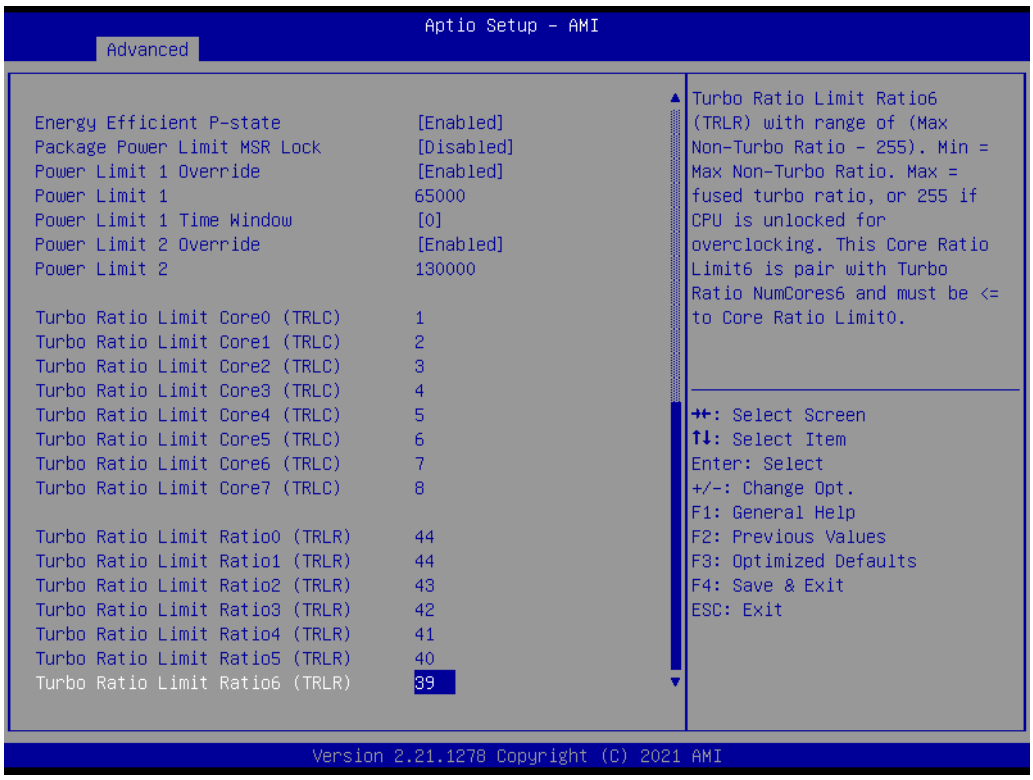
- **Boot Performance Mode [Max Non-Turbo Performance]**
- **Intel® SpeedStep (tm) [Enabled]**
- **Race To Halt (RTH) [Enabled]**
- **Intel (R) Speed Shift Technology [Enabled]**
- **HDC Control [Enabled]**
- **Turbo Mode [Enabled]**

View/Configure Turbo Options

- **Enhanced C states [Enabled]**
- **Enhanced C-states [Enabled]**
- **C-state Auto Demotion [C1 and C3]**
- **C-state Un- demotion [C1 and C3]**
- **Package C-state Demotion [Disabled]**
- **Package C-state Un-demotion [Disabled]**
- **C-State Pre-Wake [Enabled]**
- **IO MWAIT Redirection [Disabled]**
- **Package C-state Limit [Auto]**
- **Time Unit [1024 ns]**
- **Thermal Monitor [Enabled]**
- **Interrupt Redirection Mode Selection [PAIR with Fixed Priority]**
- **Timed MWAIT [Disabled]**
- **Energy Performance Gain [Disabled]**

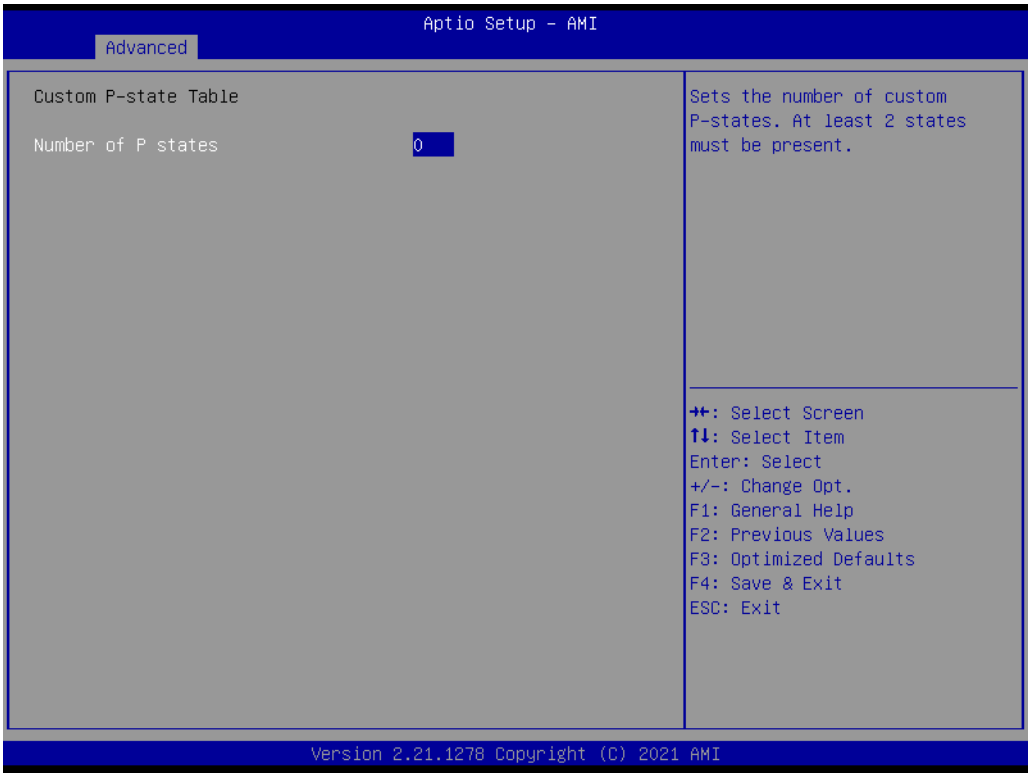
Current Turbo Settings



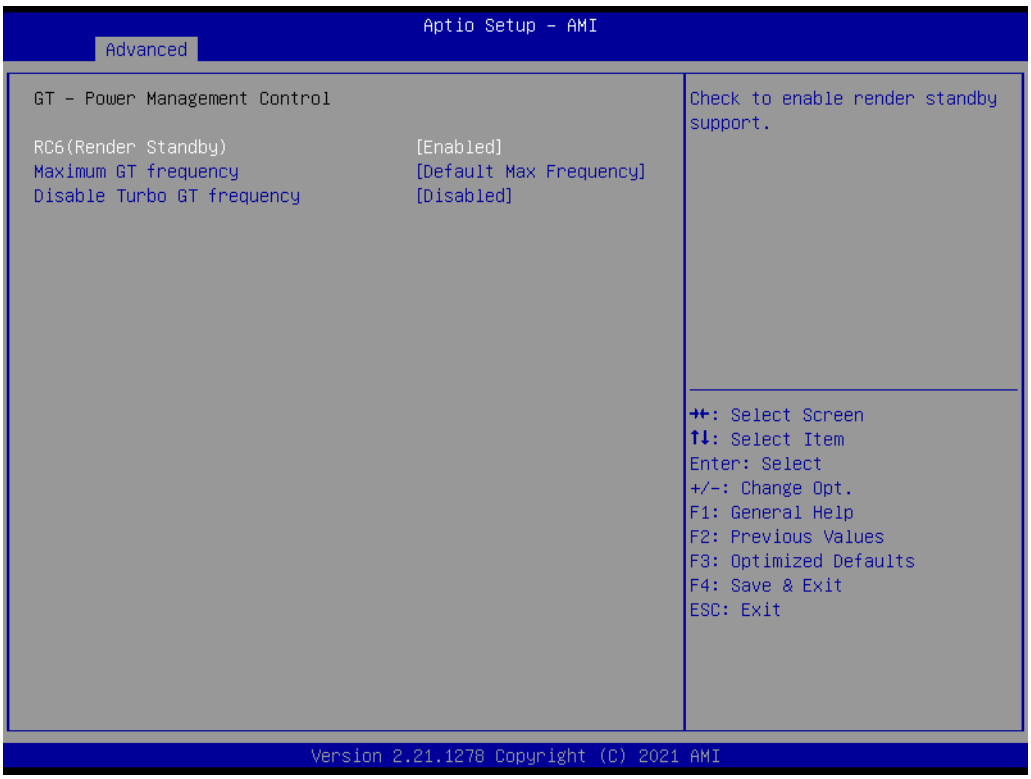


- **Energy Efficient P-state [Enabled]**
- **Package Power Limit MSR Lock [Disabled]**
- **Power Limit 1 Override [Enabled]**
- **Power Limit 1 Time Window [0]**
- **Power Limit 2 Override [Enabled]**
- **Energy Efficient Turbo [Auto]**

Custom P-State Table

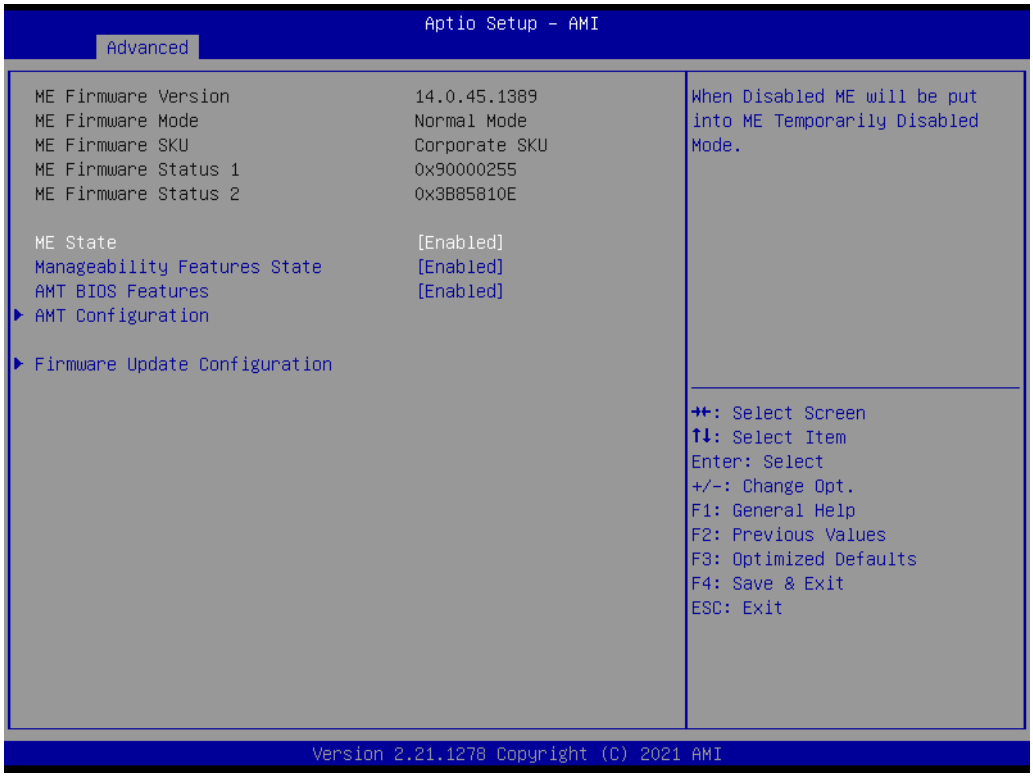


GT - Power Management Control



- **RC6 (Render Standby) [Enabled]**
- **Maximum GT frequency [Default Max Frequency]**
- **Disable Turbo GT frequency [Disabled]**

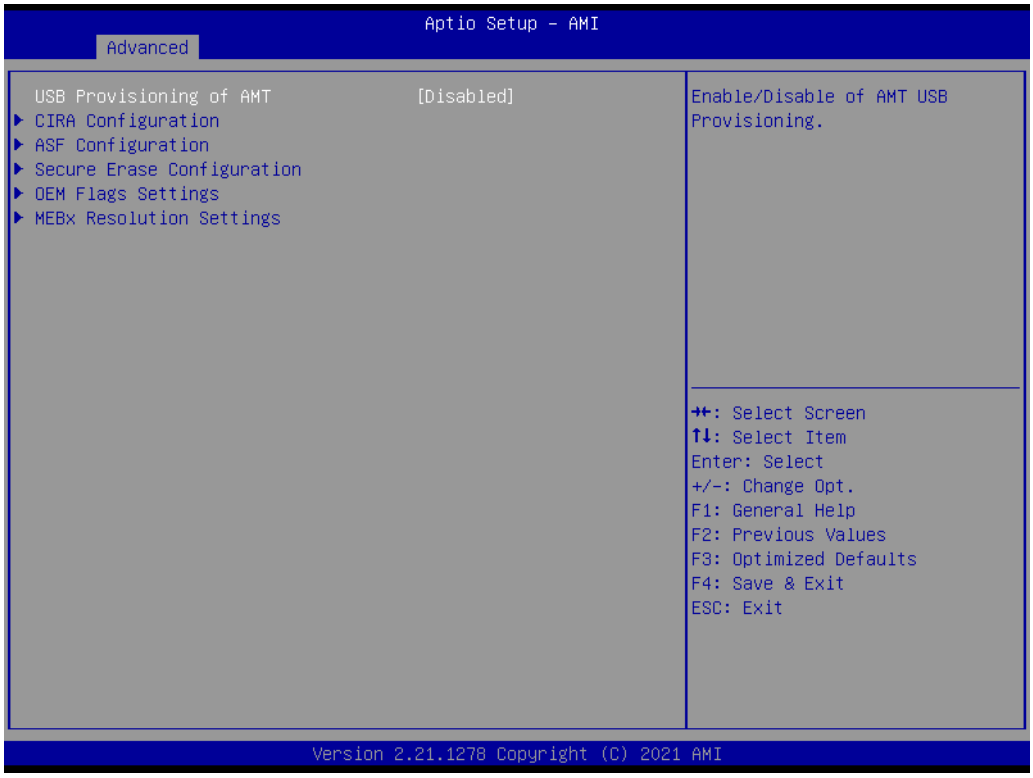
3.2.2.4 PCH-FW Configuration



- **ME State [Enabled]**
- **Manageability Features Stage [Enabled]**
- **AMT BIOS Features [Enabled]**

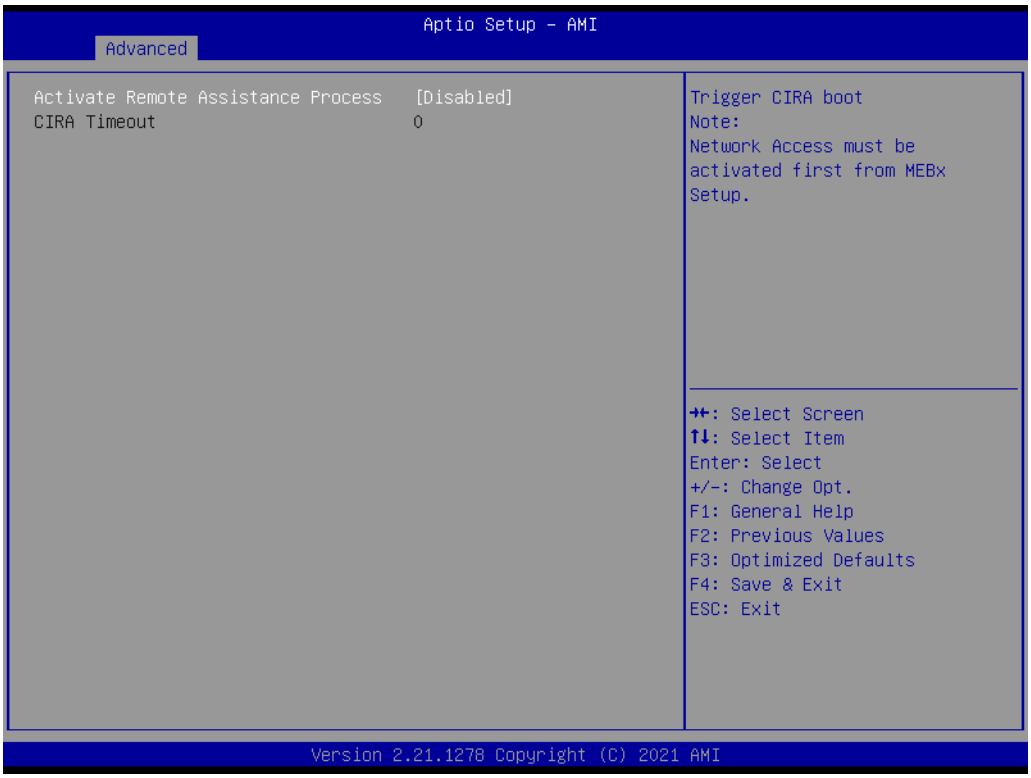
AMT Configuration

Firmware Update Configuration



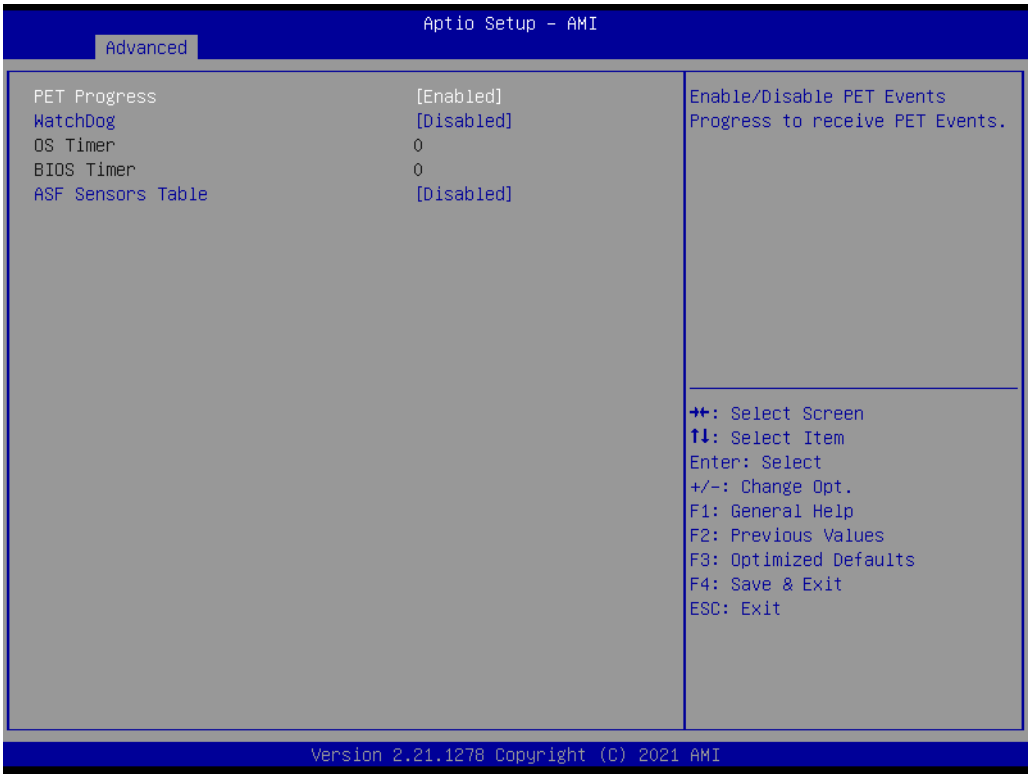
- **USB Provisioning of AMT [Disabled]**

CIRA Configuration



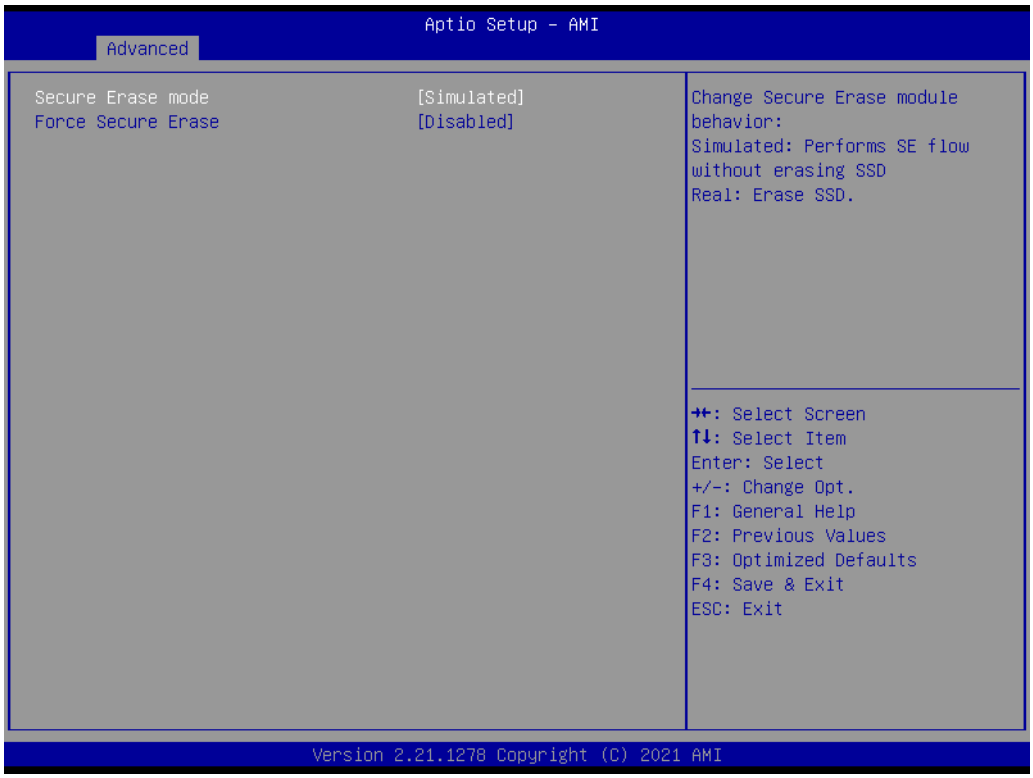
- **Activate Remote Assistance Process [Disabled]**

ASF Configuration



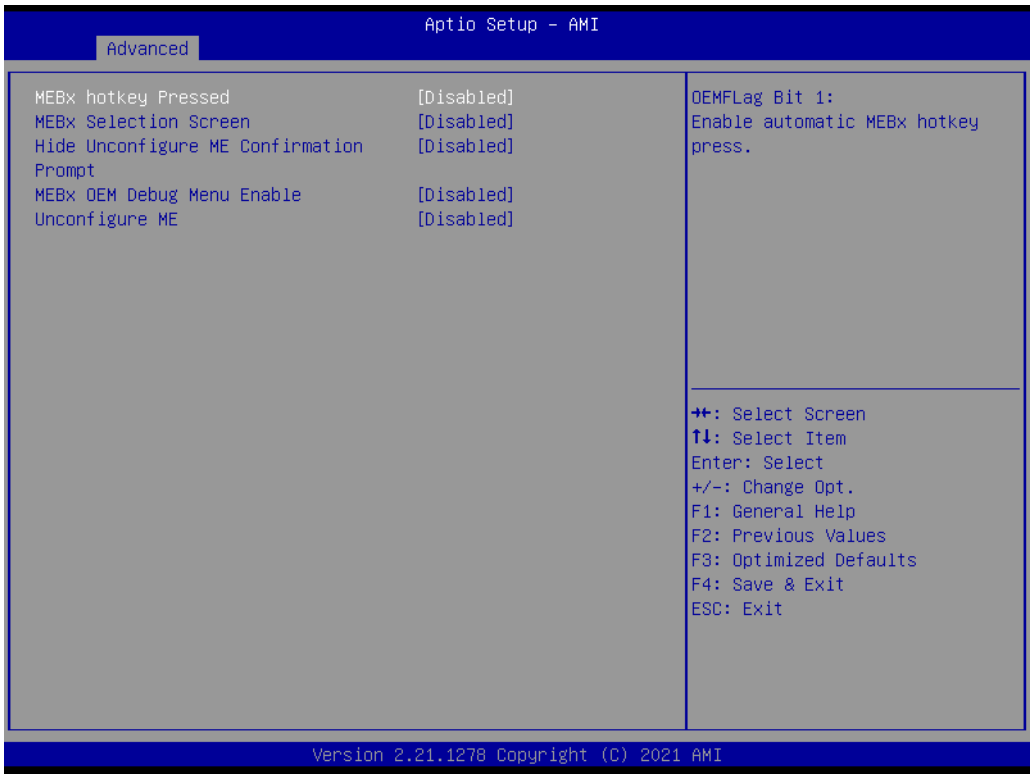
- **PET Progress [Enabled]**
- **WatchDog [Disabled]**
- **ASF Sensors Table [Disabled]**

Secure Erase Configuration



- **Secure Erase mode [Simulated]**
- **Force Secure Erase [Disabled]**

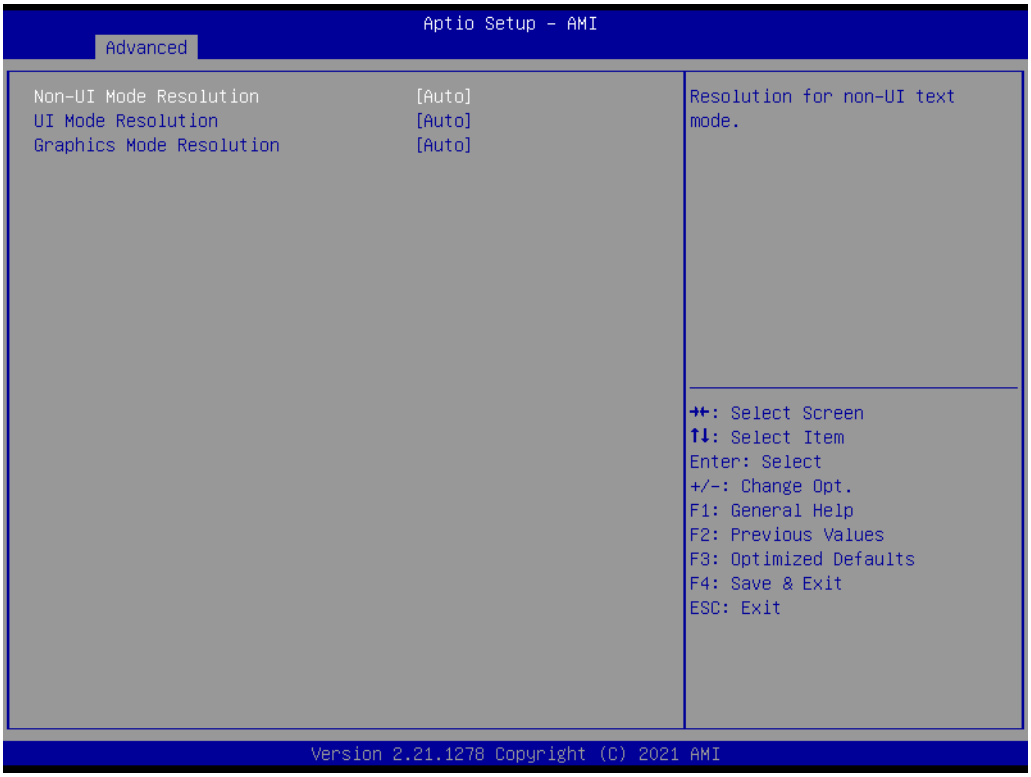
OEM Flags Settings



- **MEBx Hotkey Pressed [Disabled]**
- **MEBx Selection Screen [Disabled]**

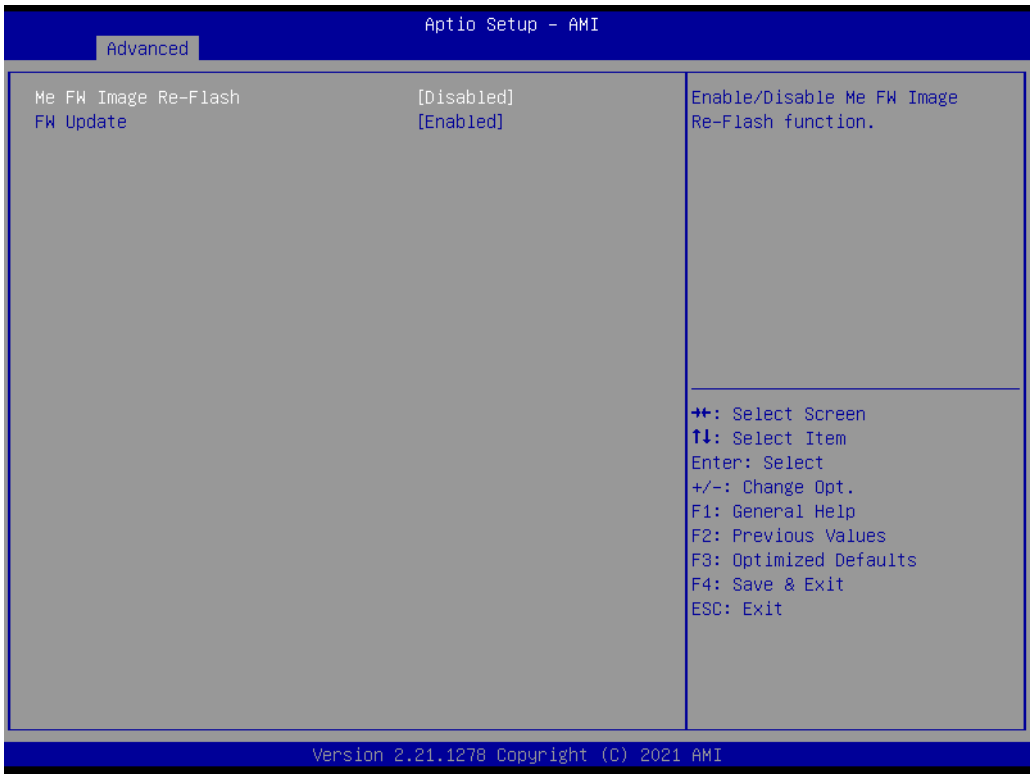
- **Hide Unconfigured ME Confirmation Prompt [Disabled]**
- **MEBx OEM Debug Menu Enable [Disabled]**
- **Unconfigure ME [Disabled]**

MEBx Resolution Settings



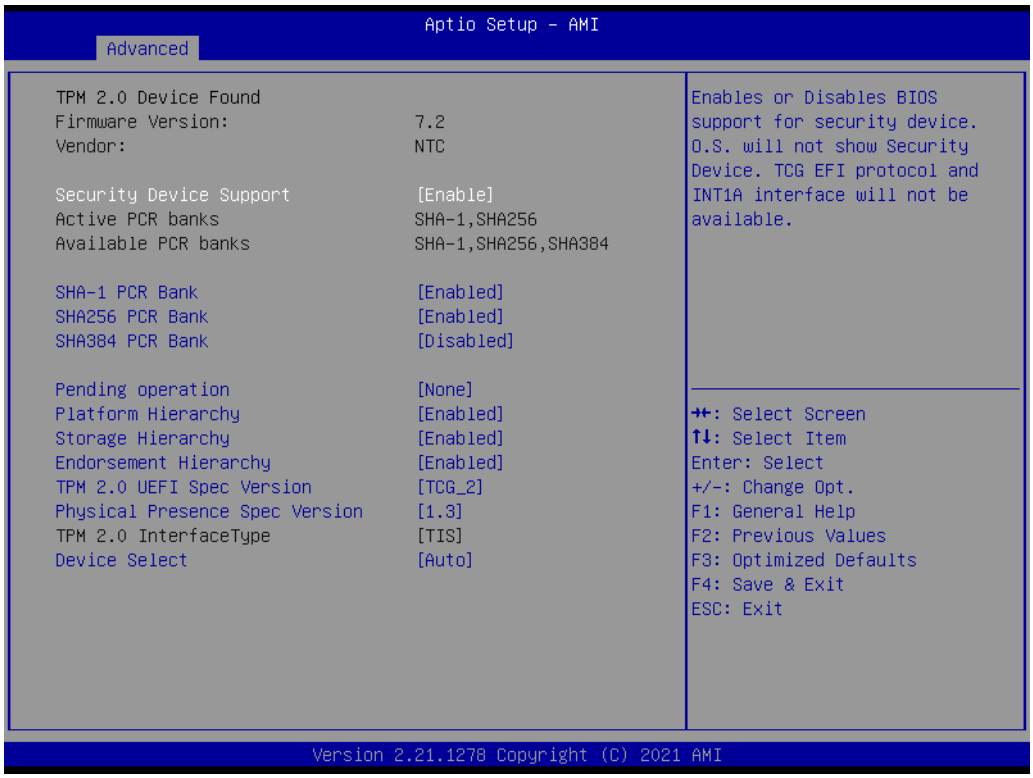
- **Non-UI Mode Resolution [Auto]**
- **UI Mode Resolution [Auto]**
- **Graphics Mode Resolution [Auto]**

Firmware Update Configuration



- **Me FW Image Re-Flash [Disabled]**
- **FW Update [Enabled]**

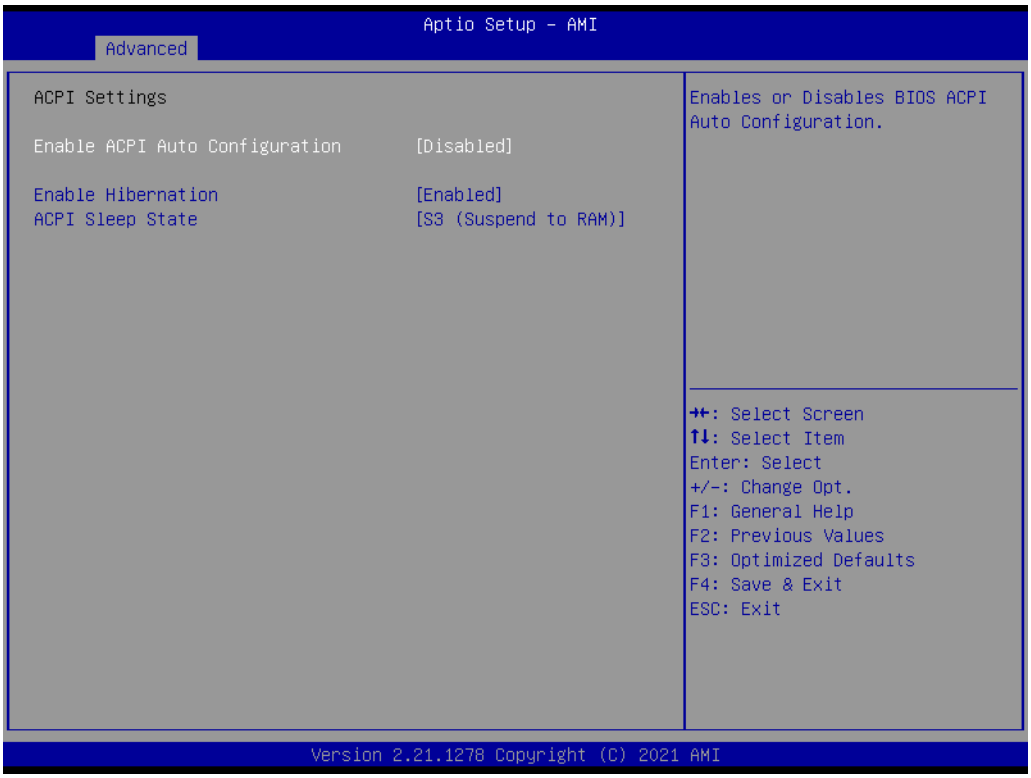
3.2.2.5 Trusted Computing



- **Security Device Support [Enabled]**
- **SHA-1 PCR Bank [Enabled]**

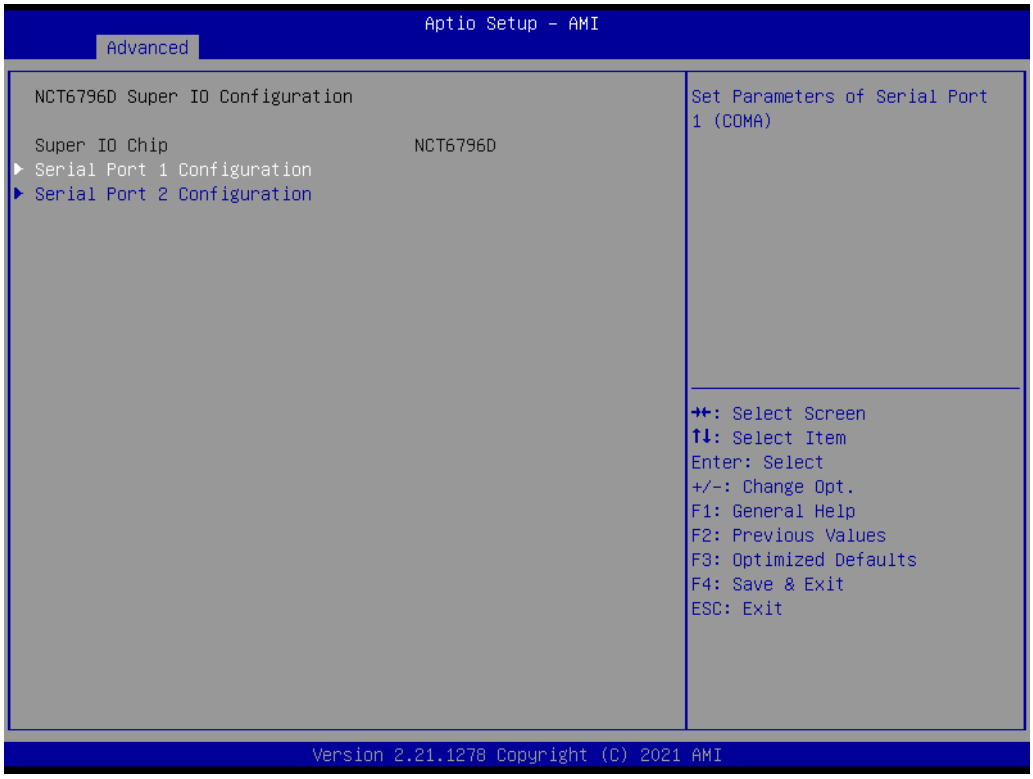
- SHA256 PCR Bank [Enabled]
- SHA384 PCR Bank [Disabled]
- Pending operation [None]
- Platform Hierarchy [Enabled]
- Storage Hierarchy [Enabled]
- Endorsement Hierarchy [Enabled]
- TPM 2.0 UEFI Spec Version [TCG_2]
- Physical Presence Spec Version [1.3]
- TPM 2.0 InterfaceType [TIS]
- Device Select [Auto]

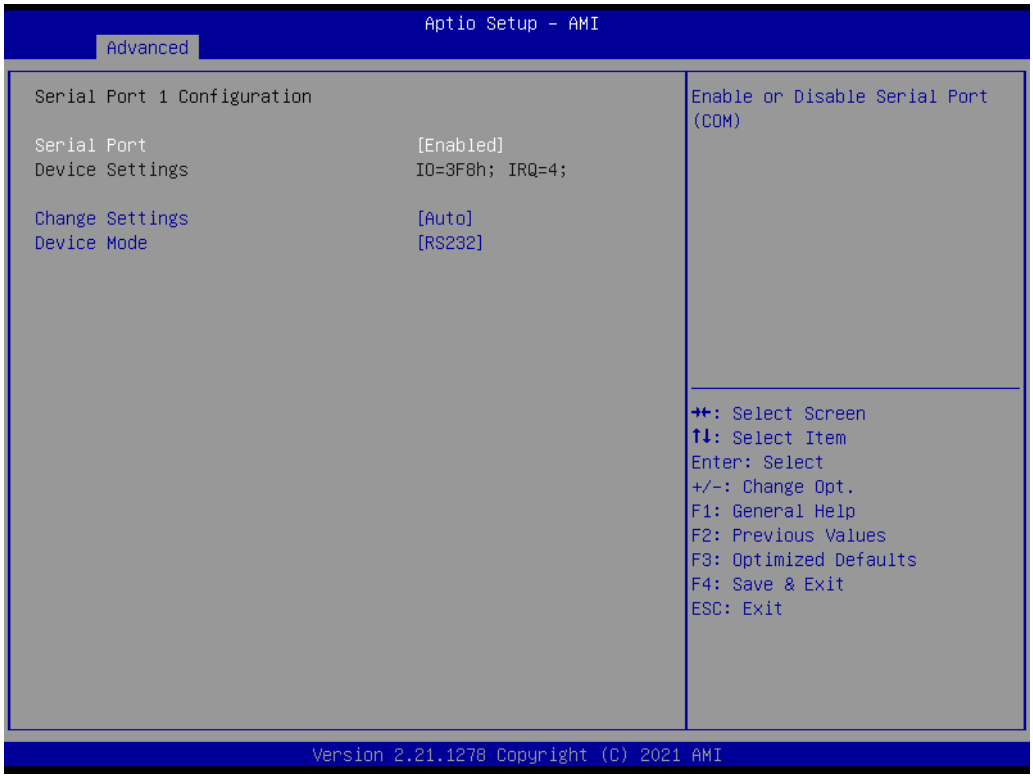
3.2.2.6 ACPI Settings



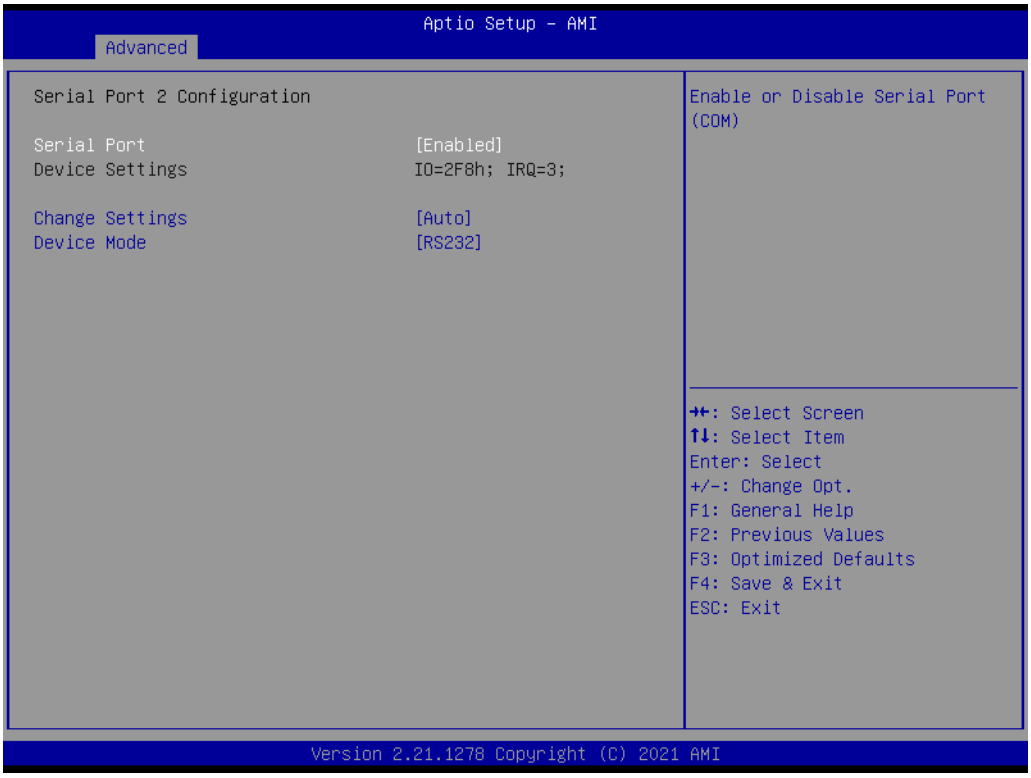
- Enable ACPI Auto Configuration [Disabled]
- Enable Hibernation [Enabled]
- ACPI Sleep State [S3 (Suspend to RAM)]

3.2.2.7 NCT6796D Super IO Configuration



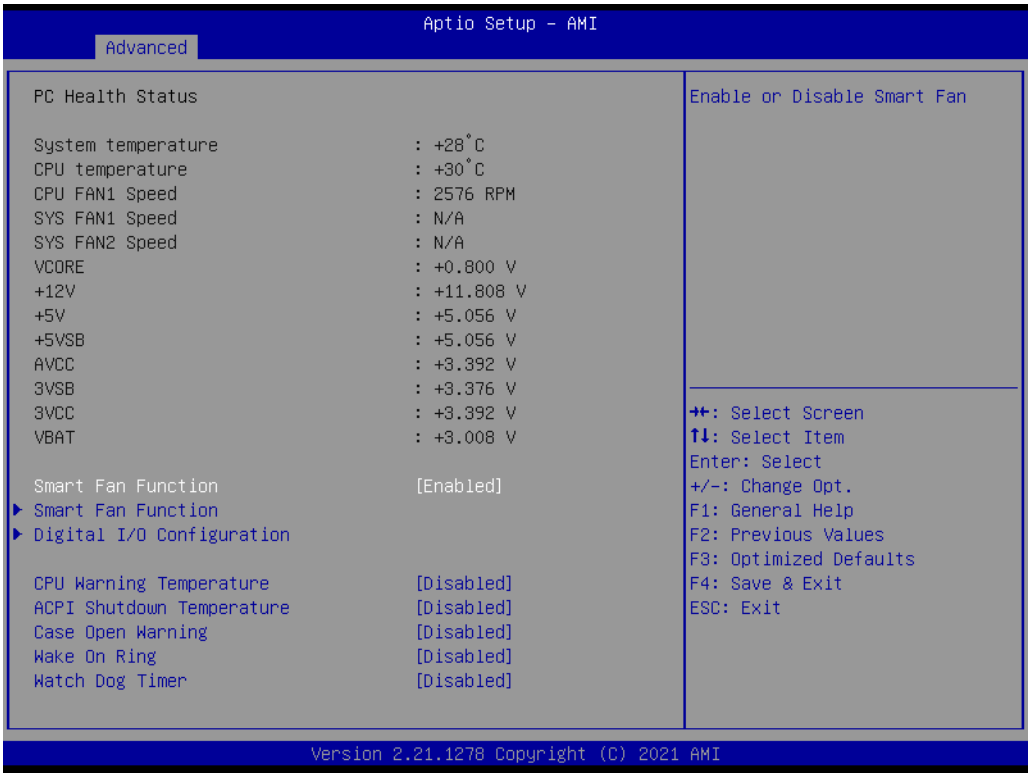


- **Serial Port [Enabled]**
- **Change Settings [Auto]**
- **Device Mode [RS232]**



- **Serial Port [Enabled]**
- **Change Settings [Auto]**
- **Device Mode [RS232]**

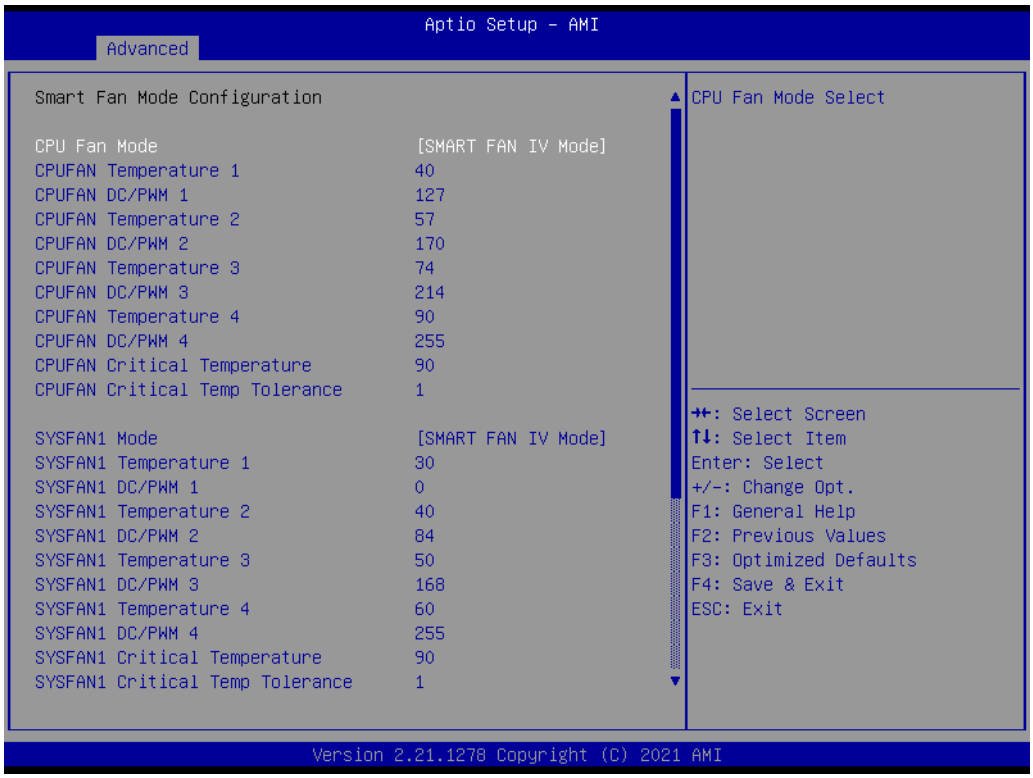
3.2.2.8 NCT6796D HW Monitor



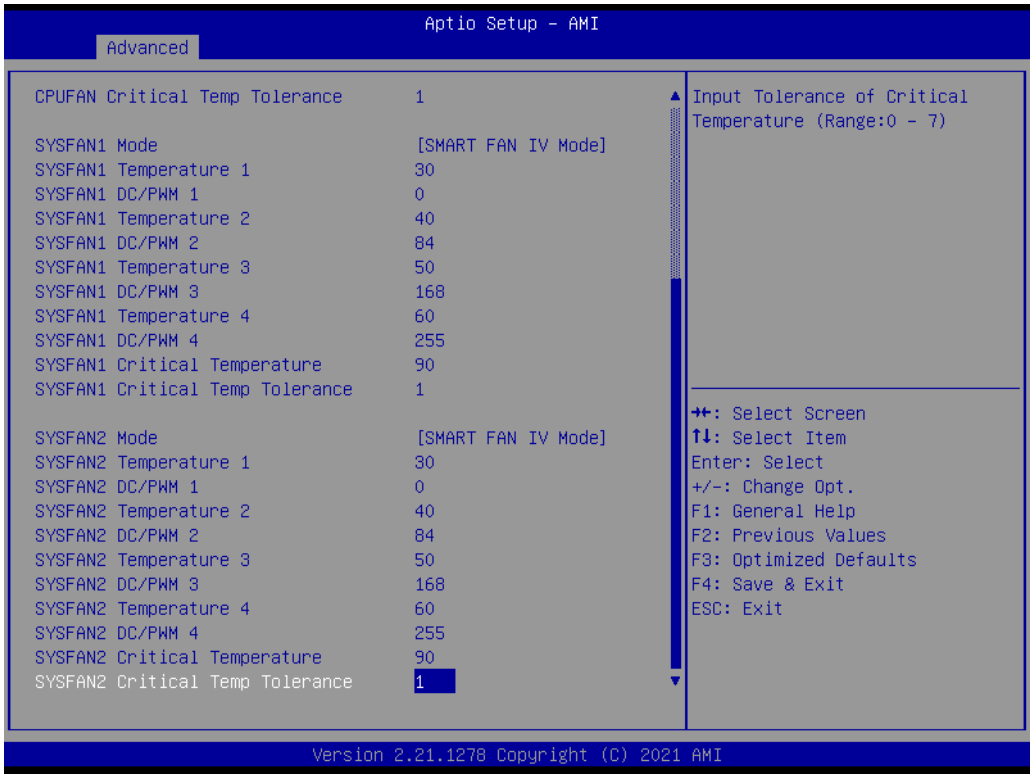
- **Smart Fan Function [Enabled]**
- **CPU Warning Temperature [Disabled]**

- **ACPI Shutdown Temperature [Disabled]**
- **Case Open Warning [Disabled]**
- **Wake On Ring [Disabled]**
- **Watch Dog Timer [Disabled]**

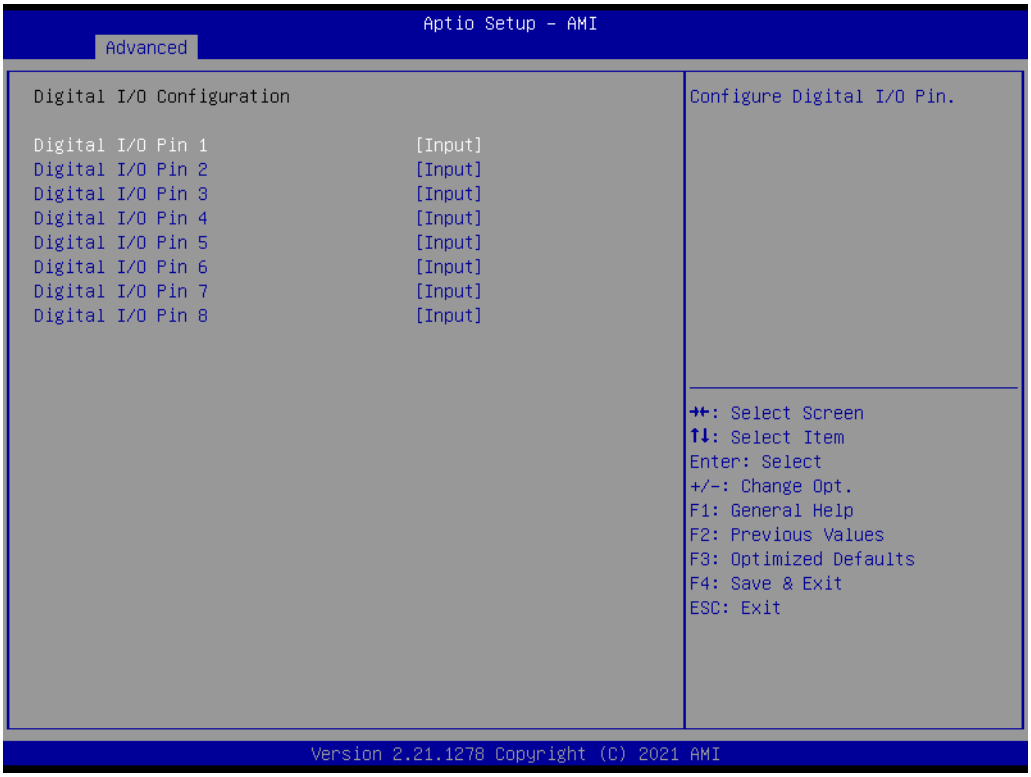
Smart Fan Function



- **CPU Fan Mode [SMART FAN IV Mode]**



Digital I/O Configuration

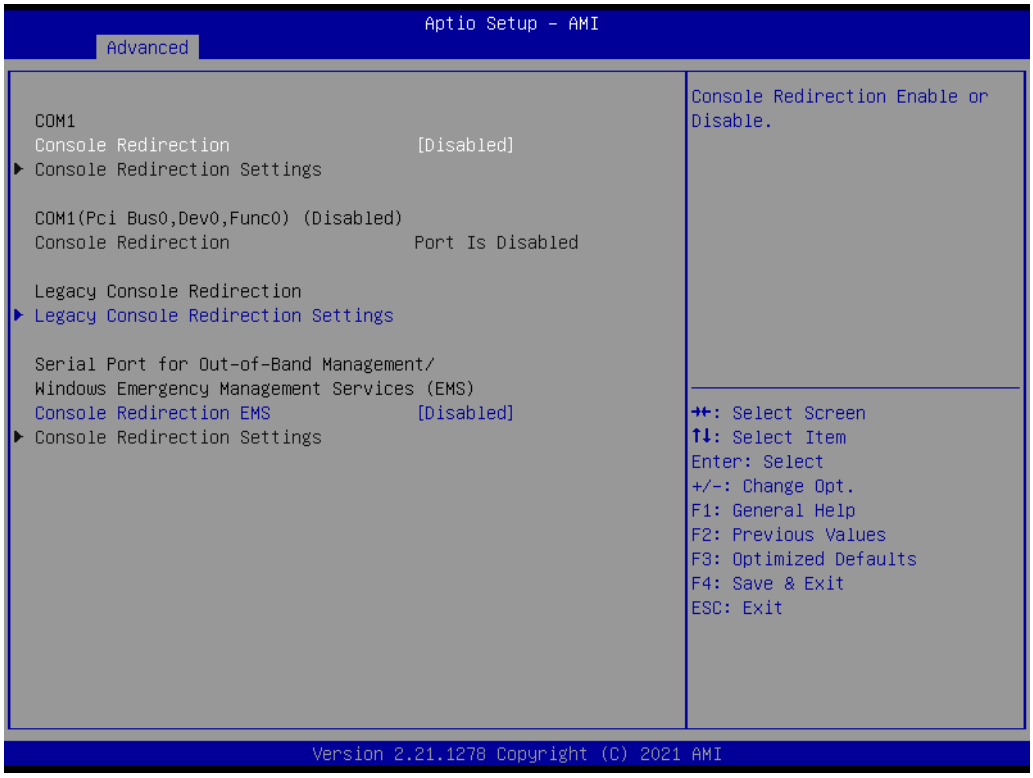


- **Digital I/O Pin 1~8 [Input]**

3.2.2.9 S5 RTC Wake Settings

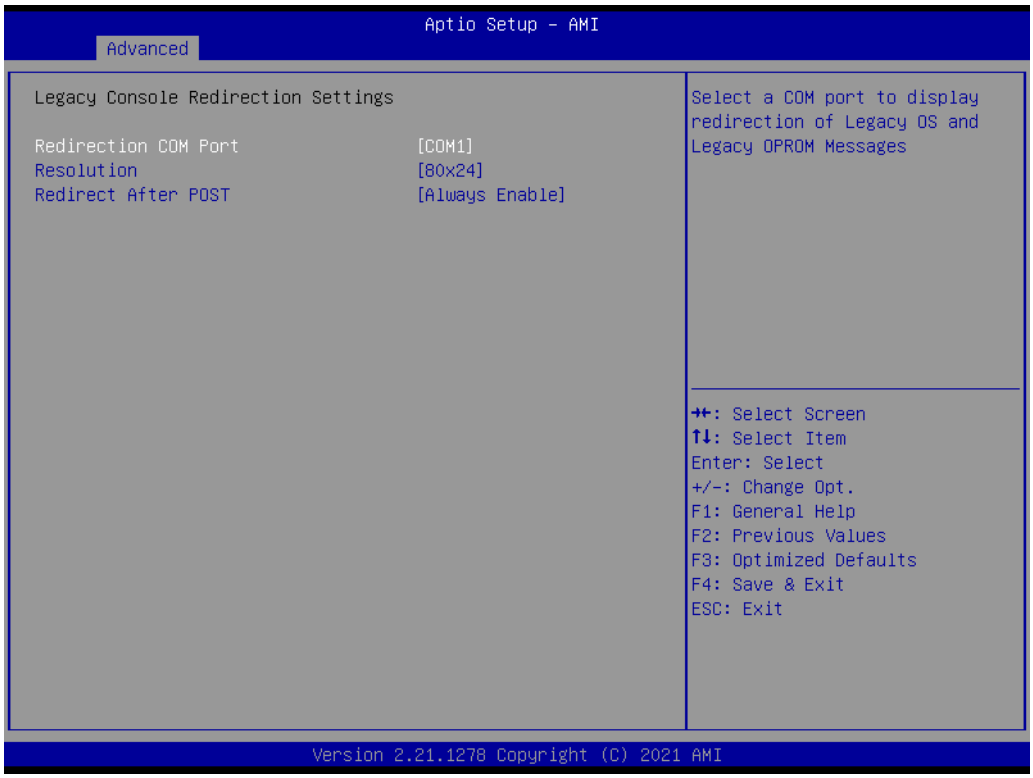
- **Wake system from S5 [Disabled]**

3.2.2.10 Serial Port Console Redirection



- **Console Redirection [Disabled]**
- **Console Redirection EMS [Disabled]**

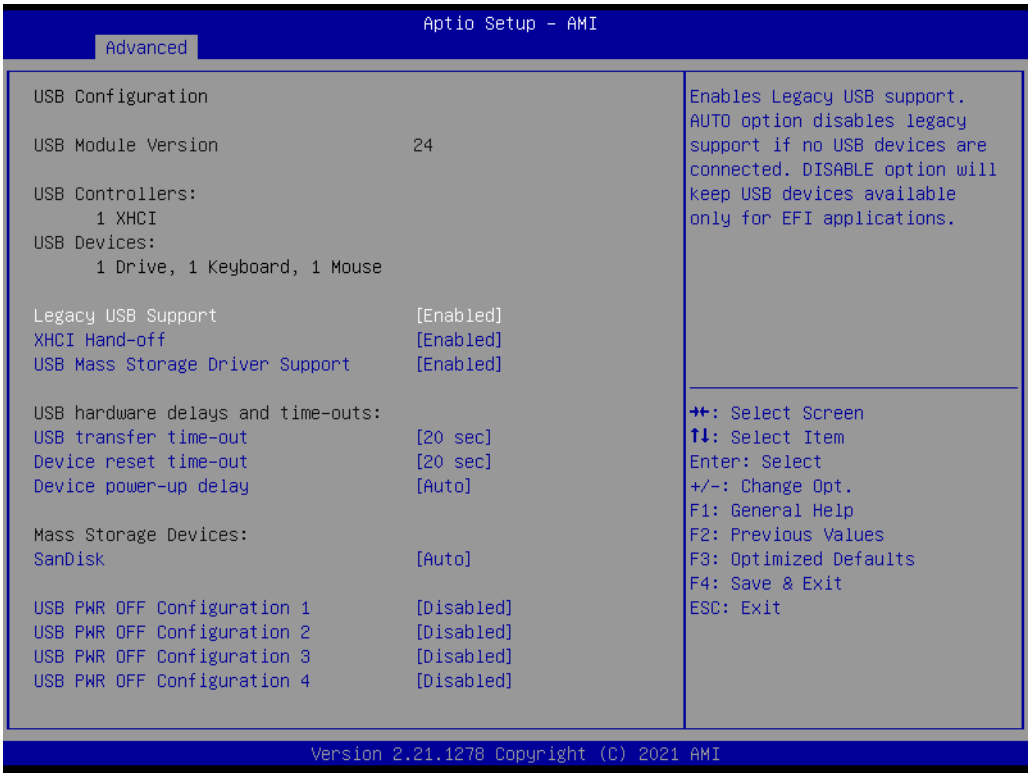
Legacy Console Redirection Settings



- **Redirection COM Port [COM1]**
- **Resolution [80x24]**
- **Redirect After POST [Always Enable]**

3.2.2.11 Intel TXT Information

3.2.2.12 USB Configuration

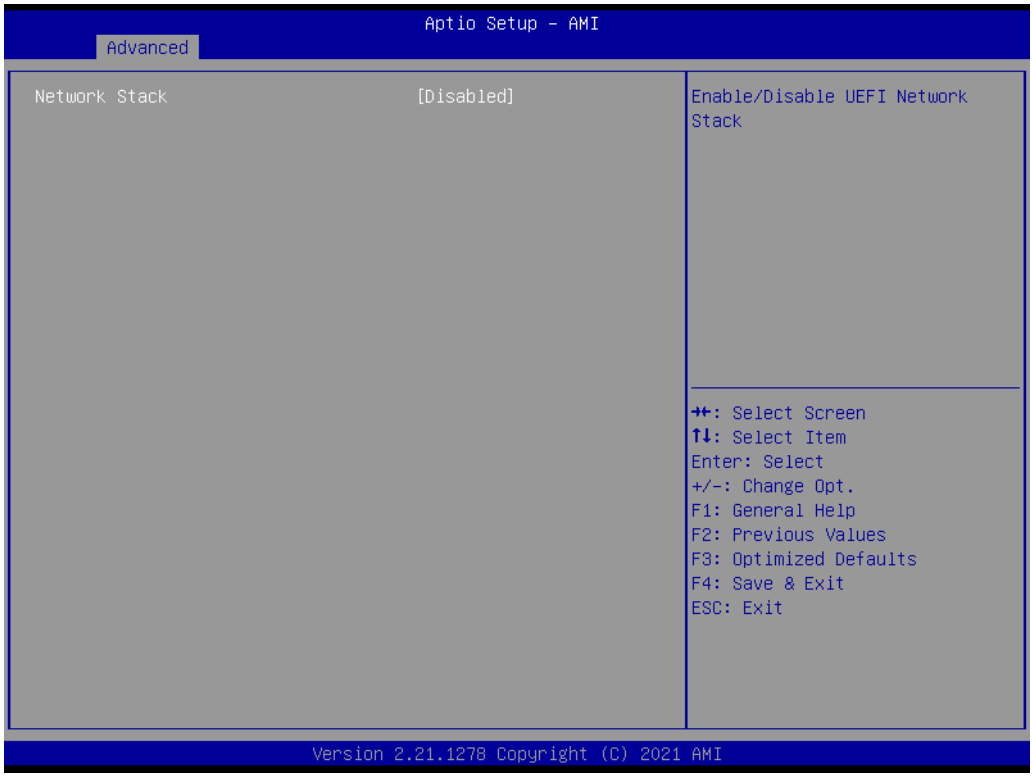


- **Legacy USB Support [Enabled]**
- **XHCI Hand-off [Enabled]**
- **USB Mass Storage Driver Support [Enabled]**
- **USB transfer time-out [20 sec]**
- **Device reset time-out [20 sec]**

- **Device power-up delay [Auto]**
- **SanDisk [Auto]**
- **USB PWR OFF Configuration1 [Disabled]**
- **USB PWR OFF Configuration2 [Disabled]**
- **USB PWR OFF Configuration3 [Disabled]**
- **USB PWR OFF Configuration4 [Disabled]**

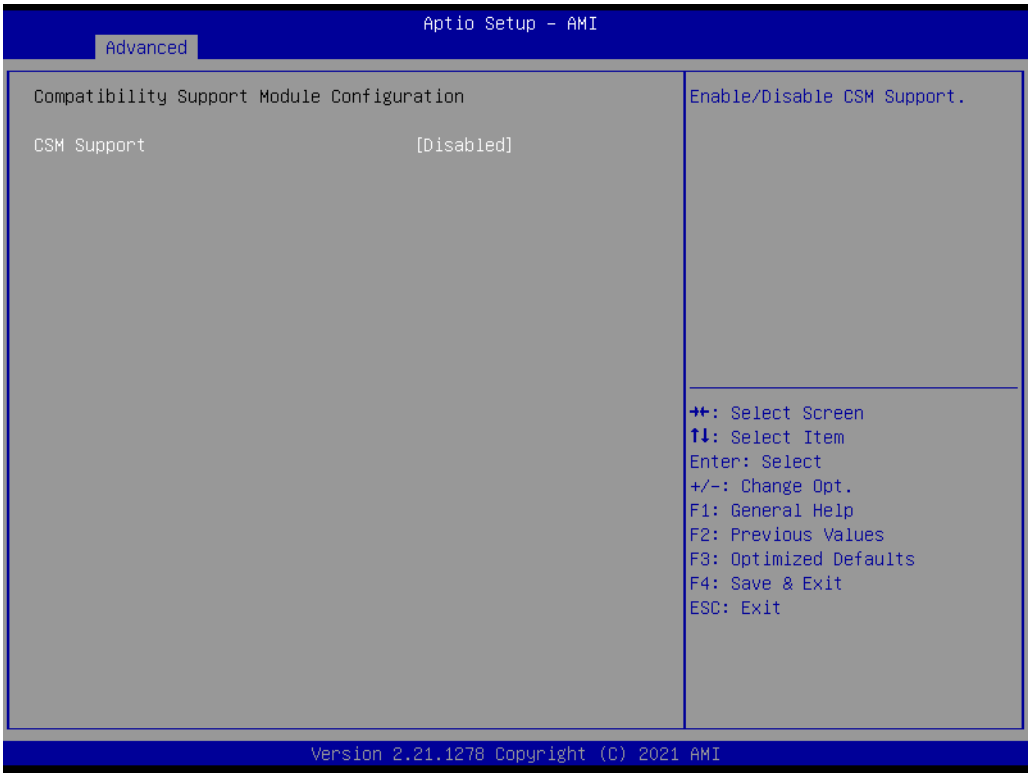
Note! ***USB power current delivery under S5 Max. 1.8A.***

3.2.2.13 Network Stack Configuration



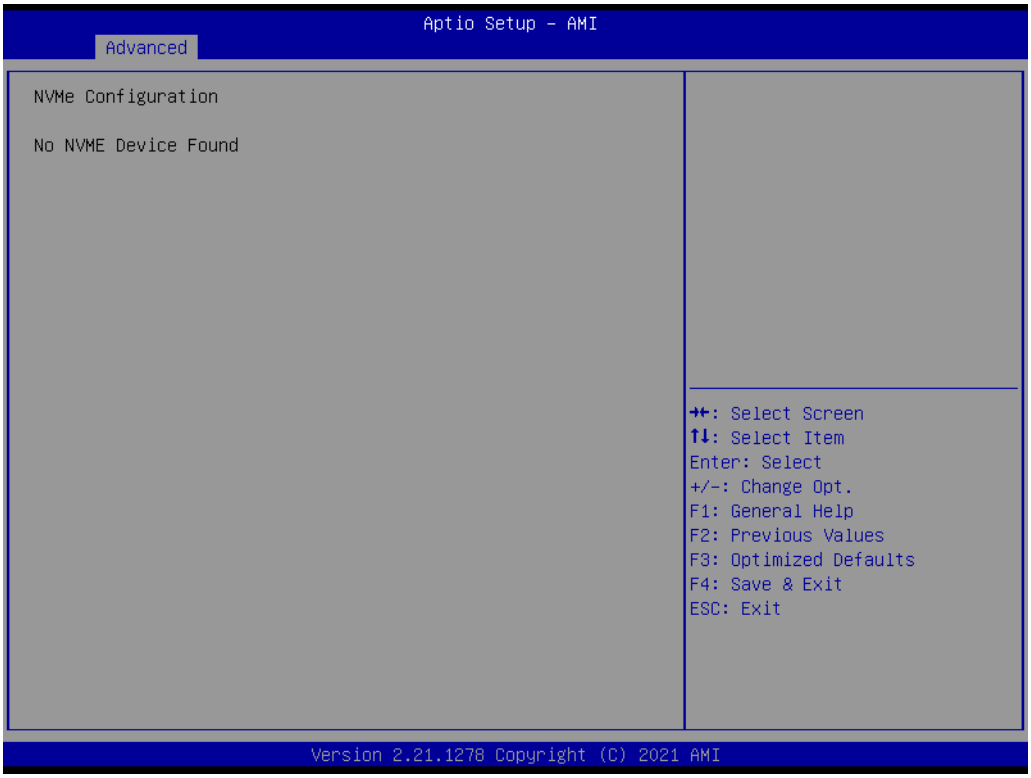
- **Network Stack [Disabled]**

3.2.2.14 CSM Configuration



- **CSM Support [Disabled]**

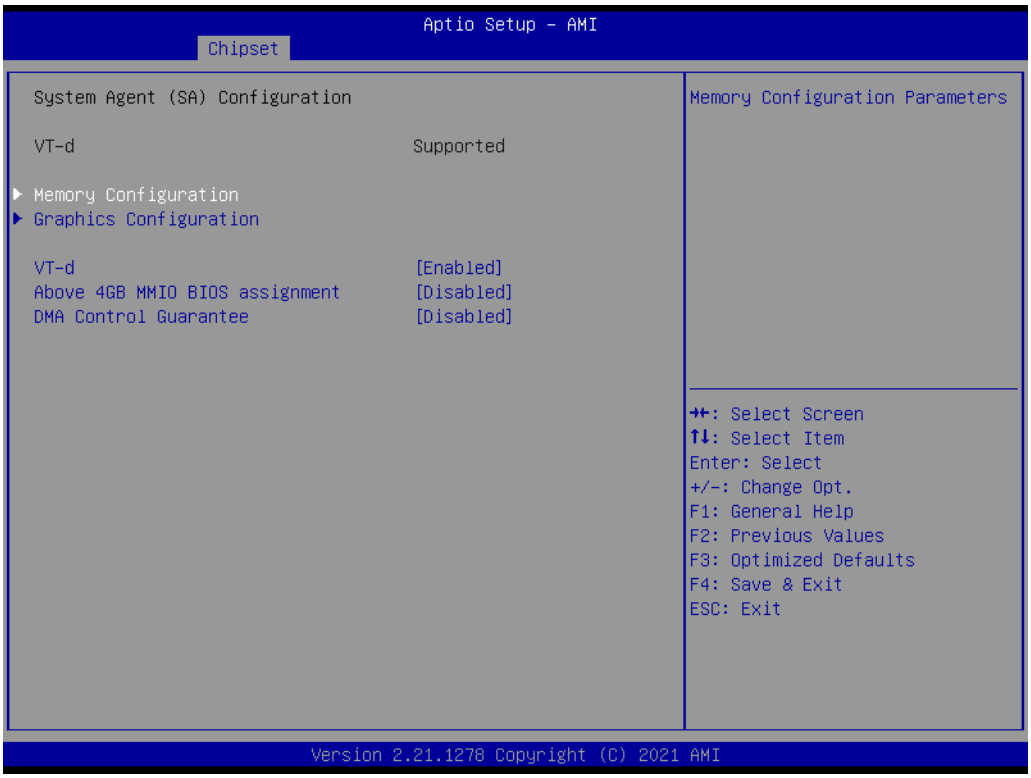
3.2.2.15 NVMe Configuration



3.3 Chipset Configuration Setting

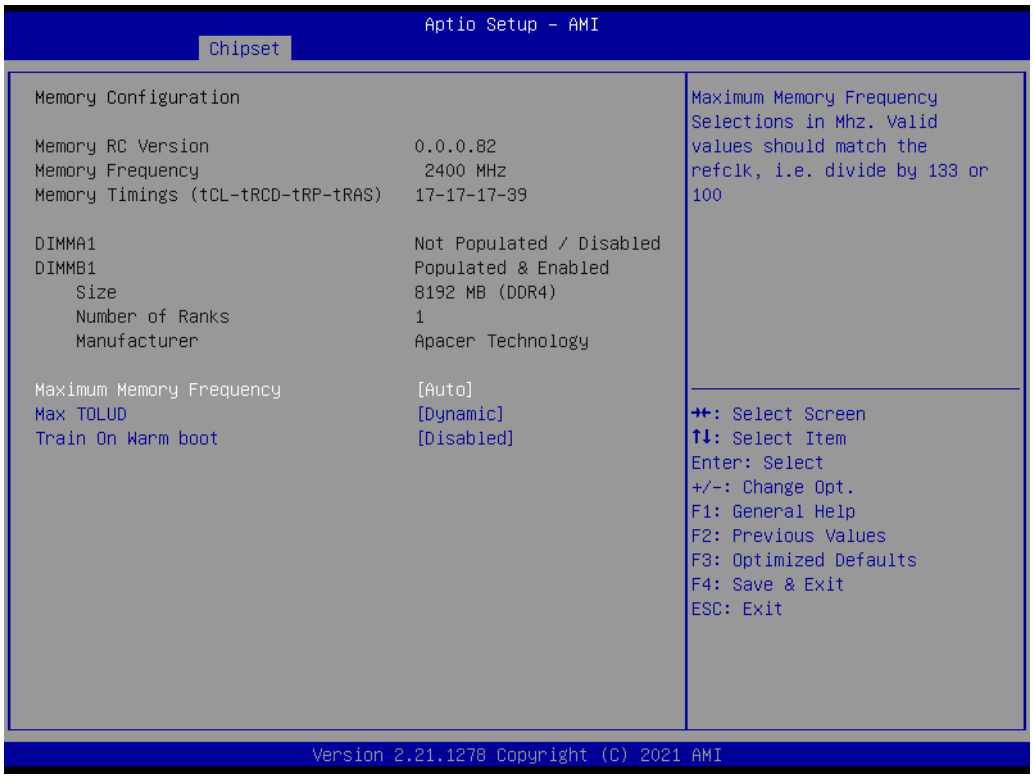
Select the chipset tab from the BIOS setup screen to enter the Chipset Setup screen. Users can select any item in the left frame of the screen, such as PCI express Configuration, to go to the sub menu for that item. Users can display a Chipset Setup option by highlighting it using the <Arrow> keys. All Chipset Setup options are described in this section. The Chipset Setup screens are shown below. The sub menus are described on the following pages.

3.3.1 System Agent (SA) Configuration



- **VT-d [Enabled]**
- **Above 4GB MMIO BIOS assignment [Disabled]**
- **DMA Control Guarantee [Disabled]**

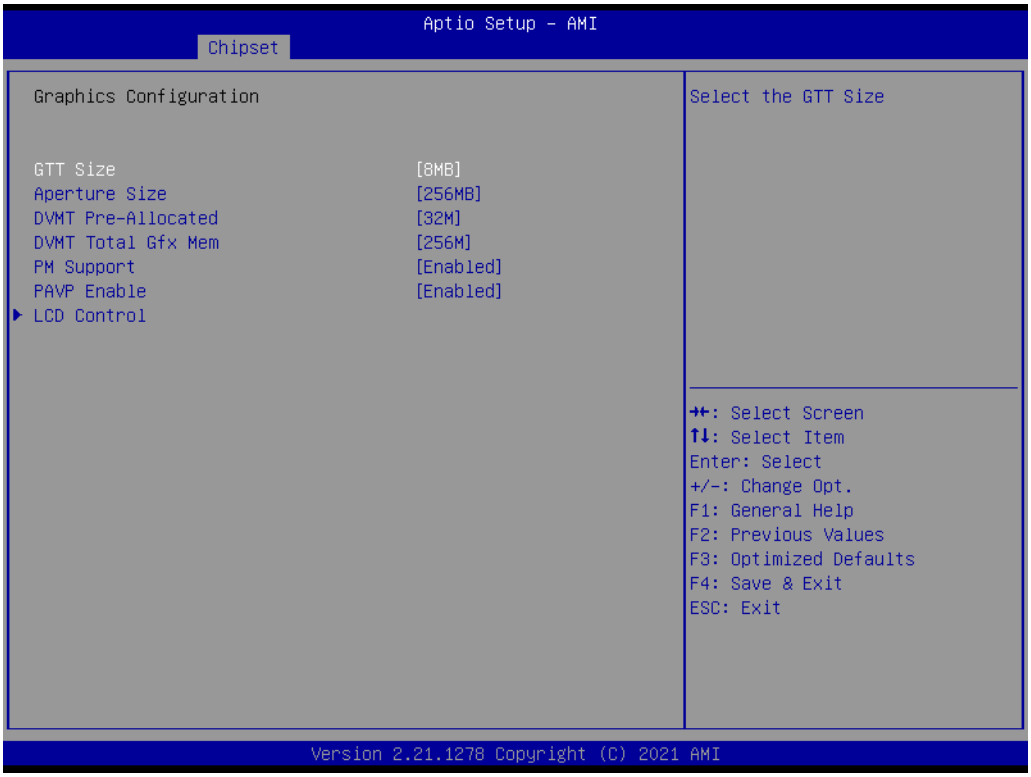
3.3.1.1 Memory Configuration



The item shows you memory specification included RC version, frequency, size and voltage information etc.

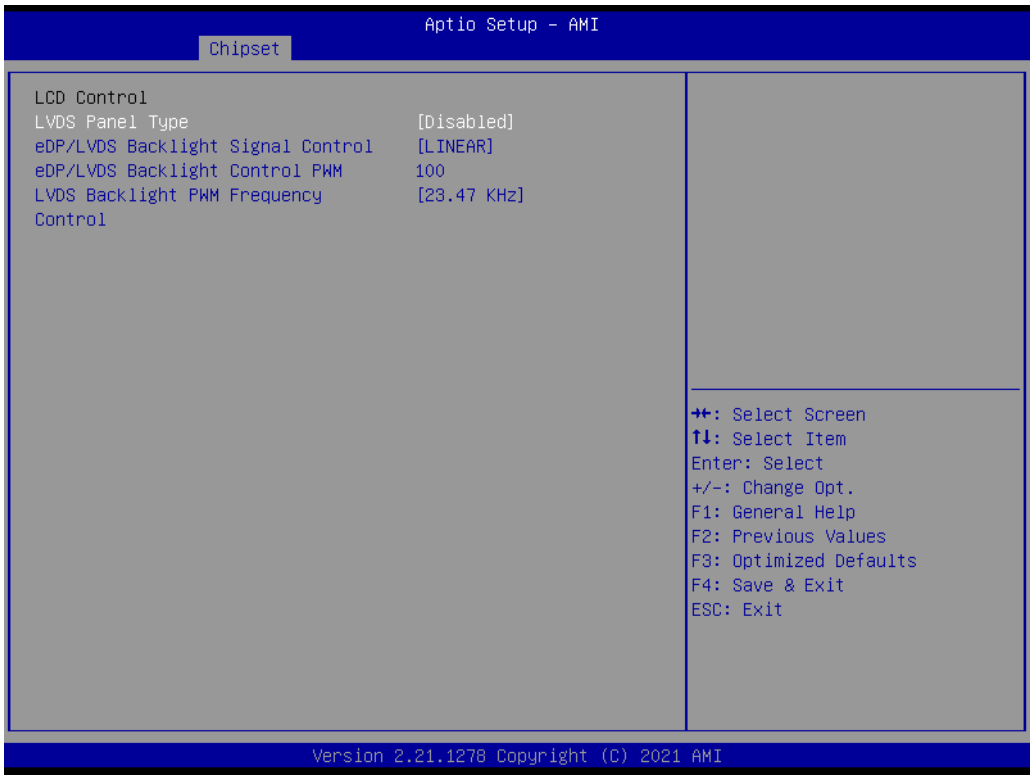
- **Maximum Memory Frequency (Auto)**
- **Max TOLUD [Dynamic]**
- **Train On Warm boot [Disabled]**

3.3.1.2 Graphics Configuration



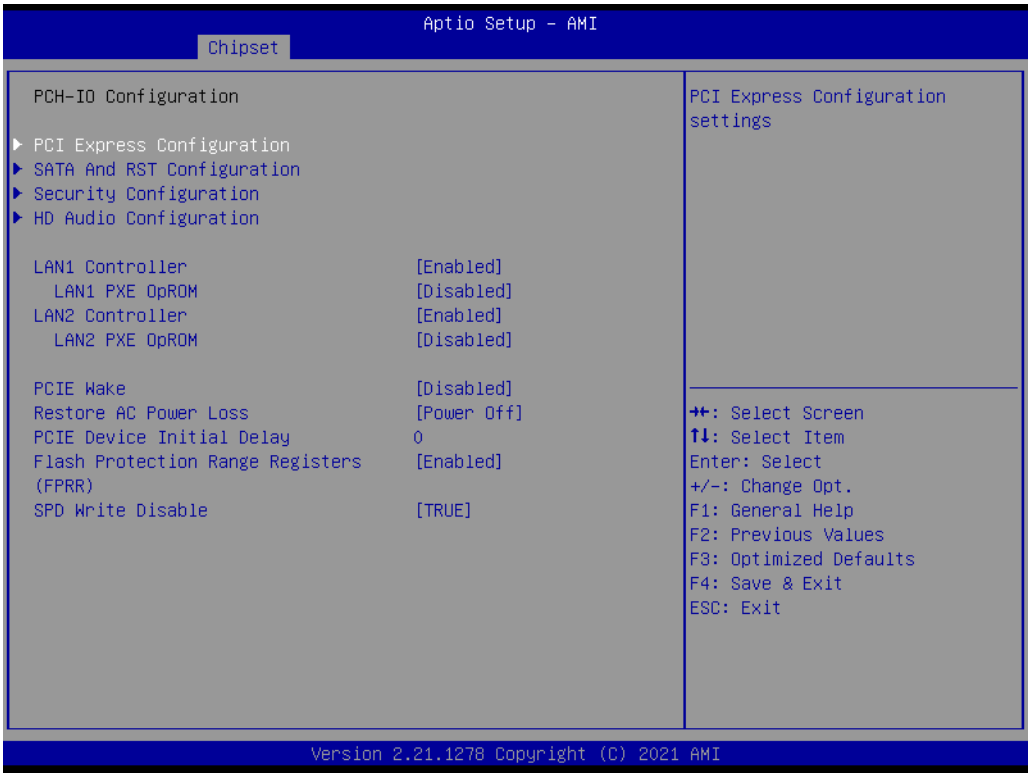
- **GTT size [8MB]**
- **Aperture Size [256MB]**
- **DVMT Pre-Allocated [32M]**
- **DVMT Total Gfx Mem [256M]**
- **PM Support [Enabled]**
- **PAVP Enable [Enabled]**

3.3.1.3 LCD Control

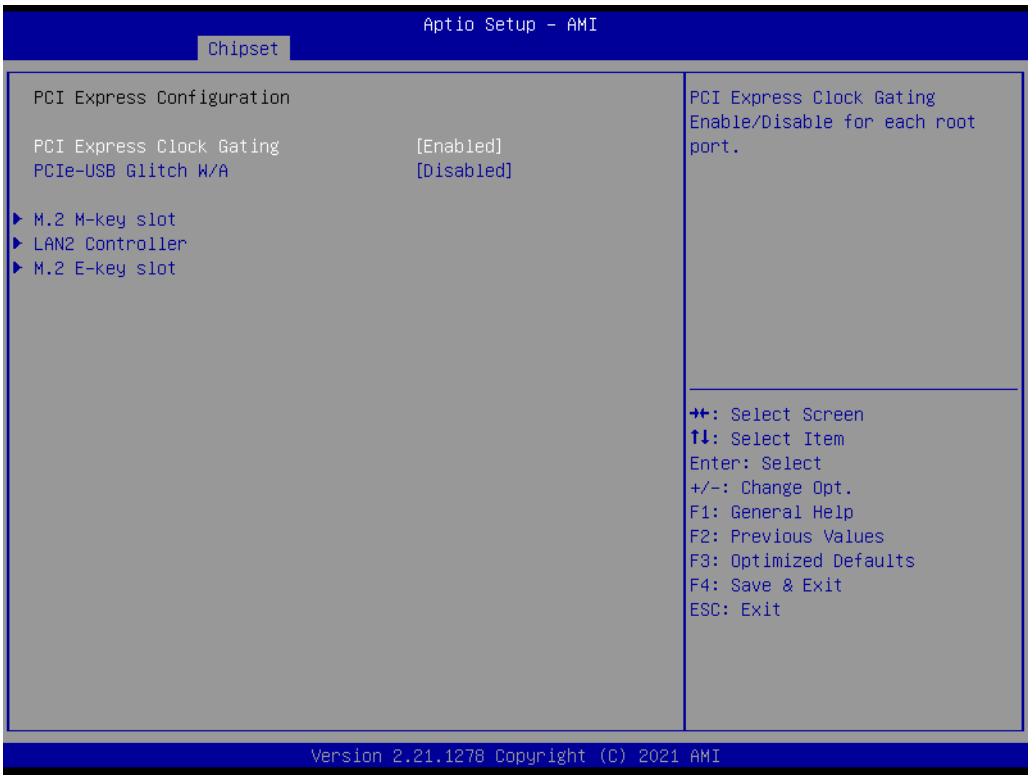


- **LVDS Panel Type [Disabled]**
- **eDP/LVDS Backlight Signal Control [LINEAR]**
- **LVDS Backlight PWM Frequency Control [23.47 KHz]**

3.3.2 PCH-I/O Configuration



3.3.2.1 PCI Express Configuration



- **PCI Express Clock Gating [Enabled]**
- **PCIe-USB Glitch W/A [Disabled]**

M.2 M-key slot

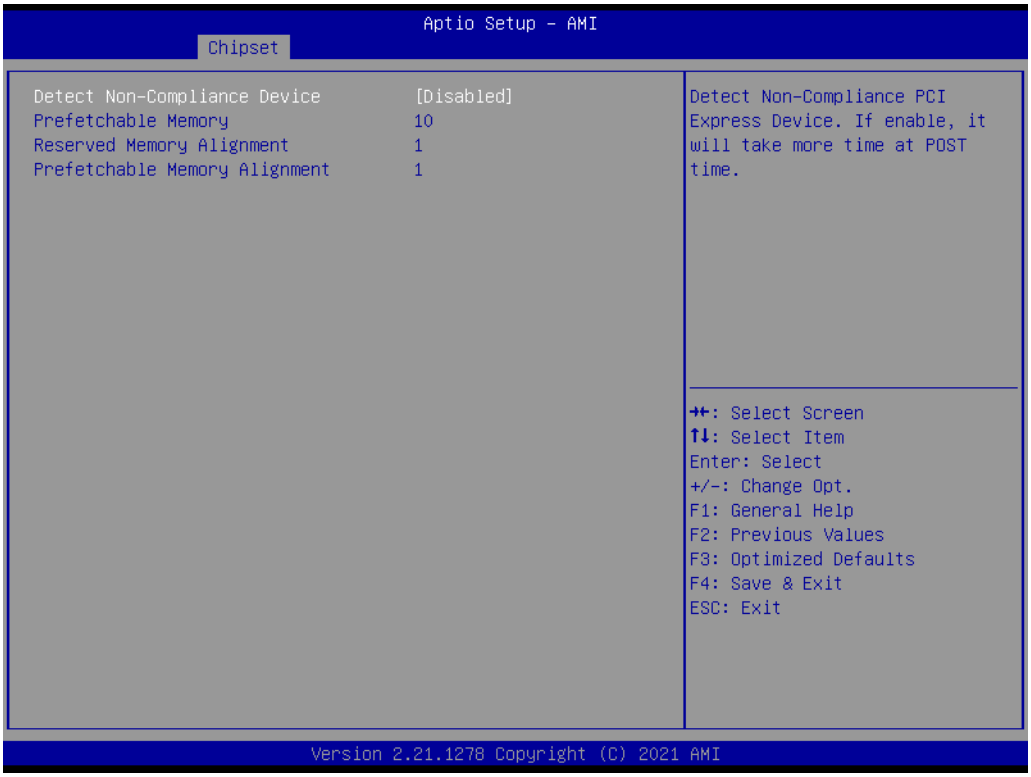
- **M.2 M-key slot [Enabled]**
- **ASPM 4 [Auto]**
- **L1 Substates [L1.1 & L1.2]**
- **Advanced Error Reporting [Enabled]**
- **PCIe Speed [Auto]**

LAN2 Controller

M.2 E-key slot

- **M.2 E-key slot [Enabled]**
- **ASPM 11 [Auto]**
- **L1 Substates [L1.1 & L1.2]**
- **Advanced Error Reporting [Enabled]**
- **PCIe Speed [Auto]**

Extra options



- **Detect Non-Compliance Device [Disabled]**

3.3.2.2 SATA and RST Configuration

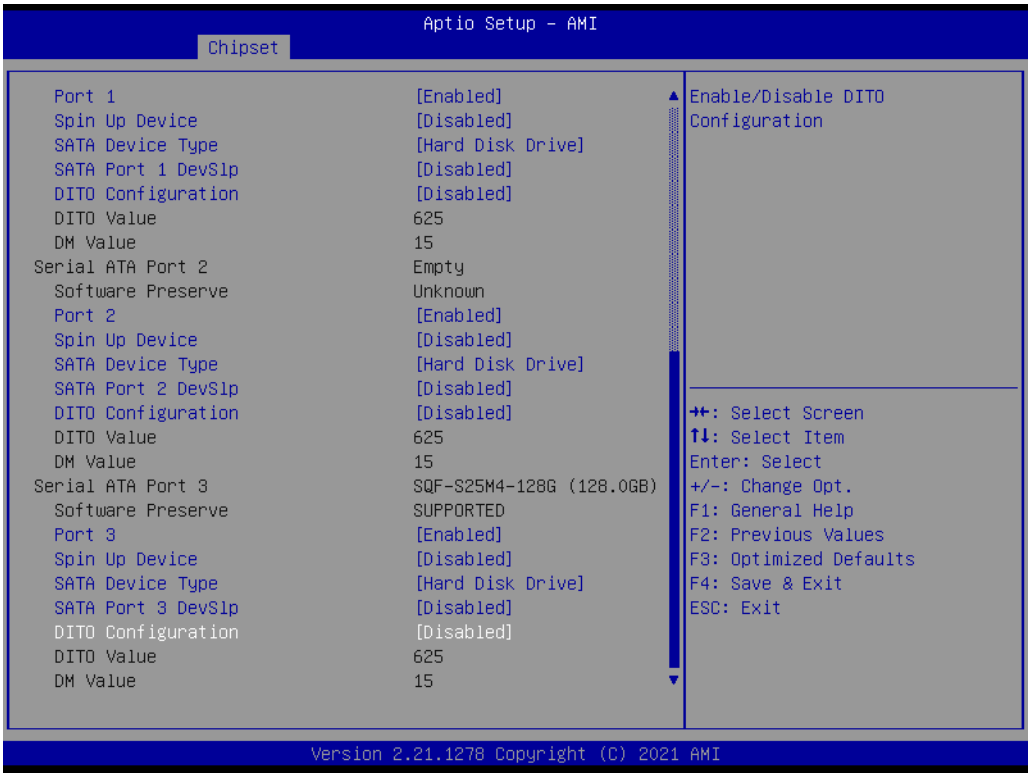
- **SATA Controller(s) [Enabled]**
- **SATA Mode Selection [AHCI]**
- **Aggressive LPM Support [Enabled]**
- **SATA Controller Speed [Default]**

M.2 M-key slot (SATA)

- **Port 0 [Enabled]**
- **Spin Up Device [Disabled]**
- **SATA Device Type [Hard Disk Drive]**
- **SATA Port 0 DevS1p [Disabled]**
- **DITO Configuration [Disabled]**

Serial ATA Port 1 (SATA)

- **Port 1 [Enabled]**
- **Spin Up Device [Disabled]**
- **SATA Device Type [Hard Disk Drive]**
- **SATA Port 1 DevS1p [Disabled]**
- **DITO Configuration [Disabled]**



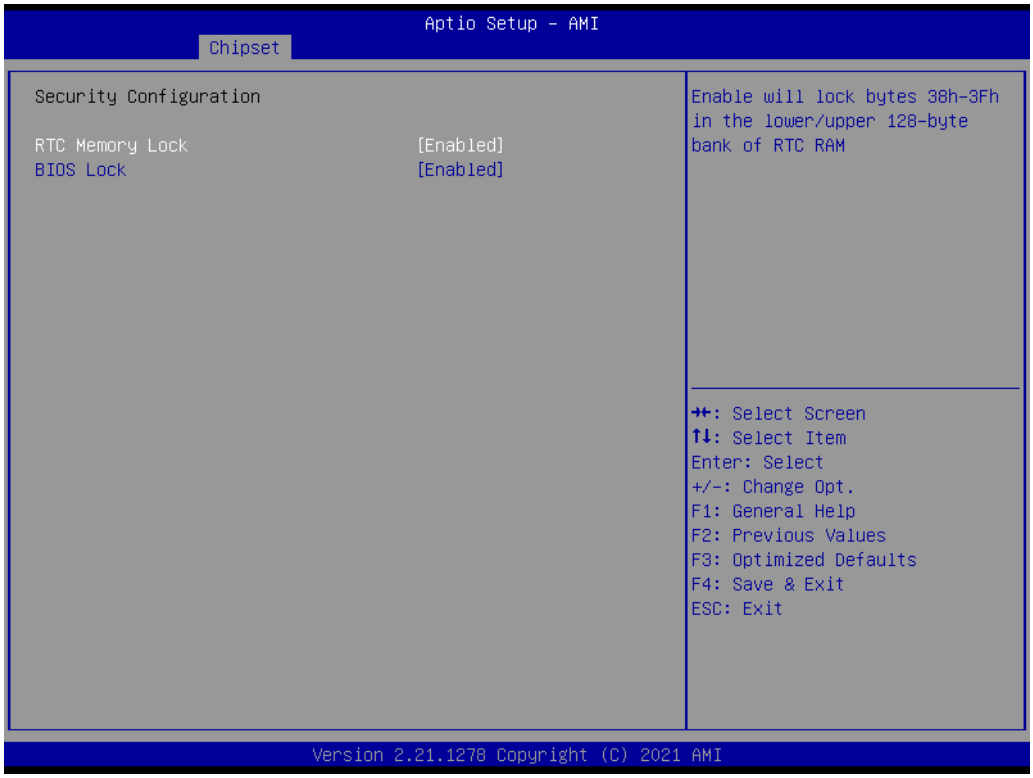
Serial ATA Port 2 (SATA)

- **Port 2 [Enabled]**
- **Spin Up Device [Disabled]**
- **SATA Device Type [Hard Disk Drive]**
- **SATA Port 2 DevS1p [Disabled]**
- **DITO Configuration [Disabled]**

Serial ATA Port 3 (SATA)

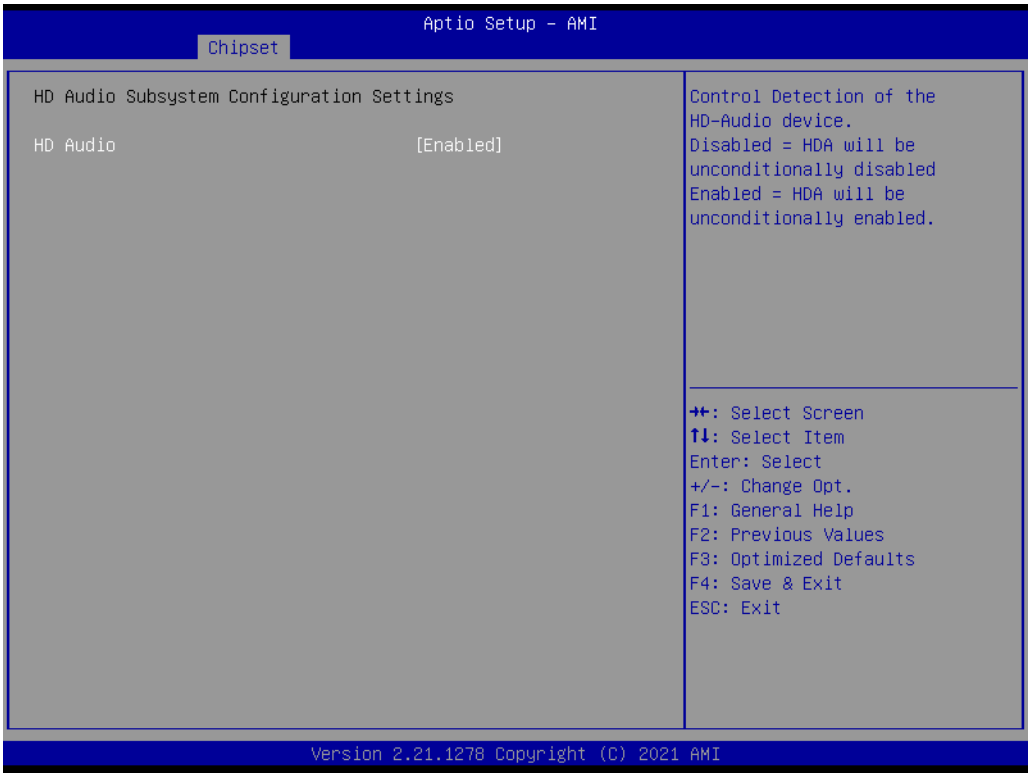
- **Port 3 [Enabled]**
- **Spin Up Device [Disabled]**
- **SATA Device Type [Hard Disk Drive]**
- **SATA Port 3 DevS1p [Disabled]**
- **DITO Configuration [Disabled]**

3.3.2.3 Security Configuration



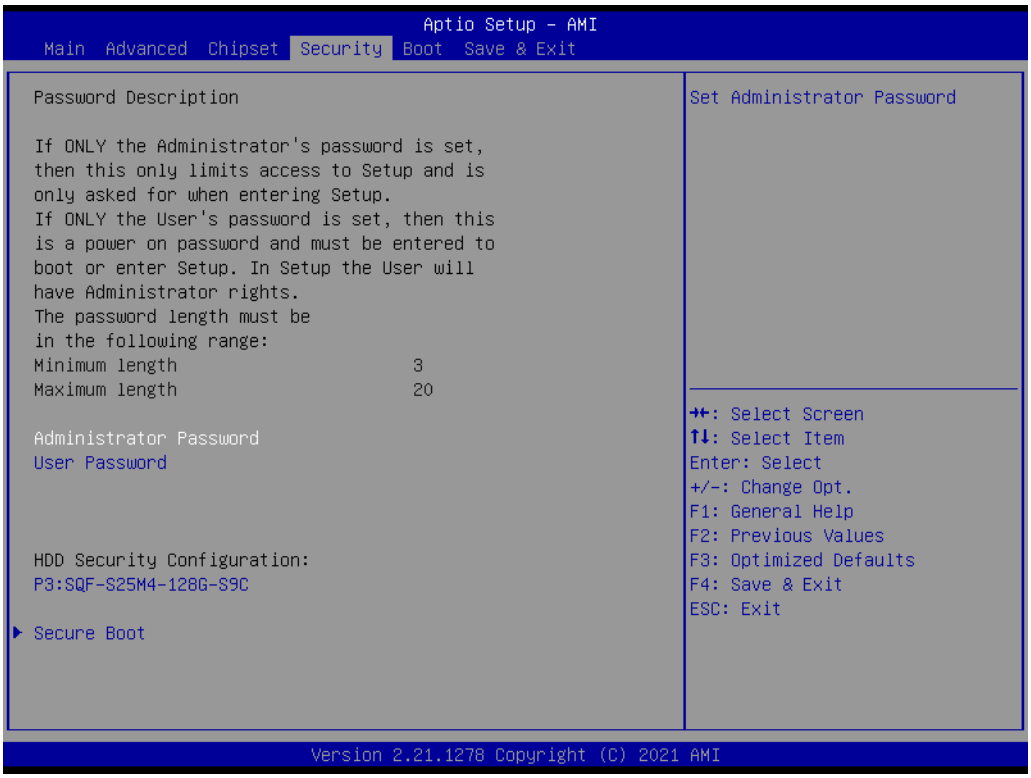
- **RTC Memory Lock [Enabled]**
- **BIOS Lock [Enabled]**

3.3.2.4 HD Audio Configuration

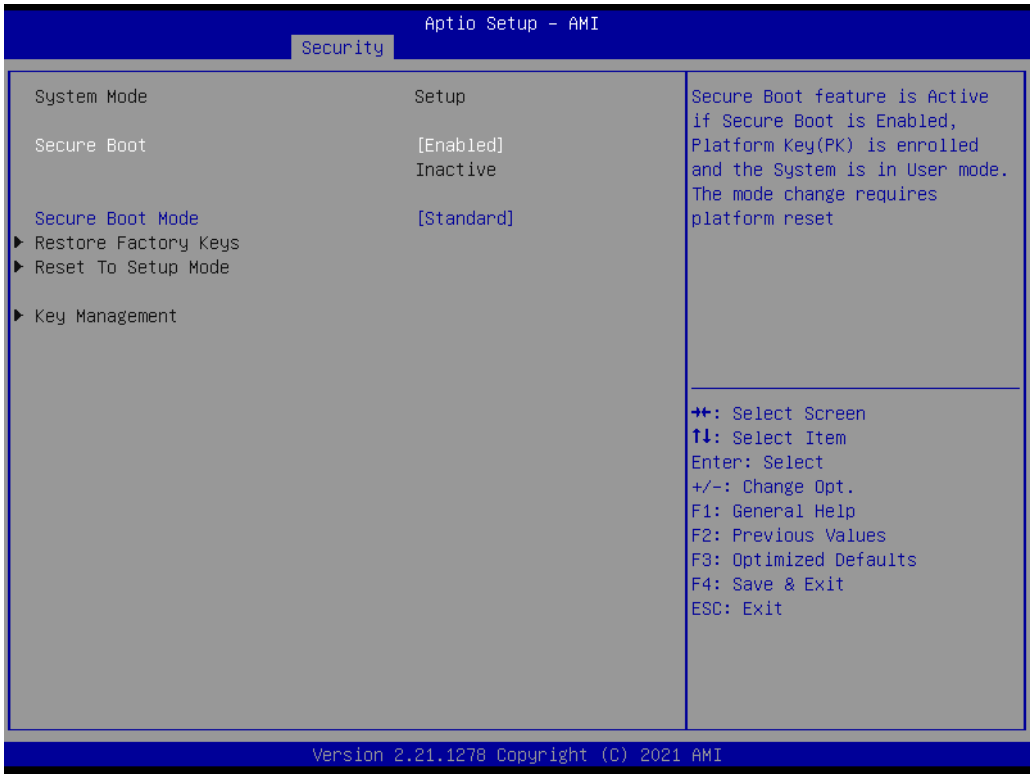


- **HD Audio [Enabled]**

3.4 Security

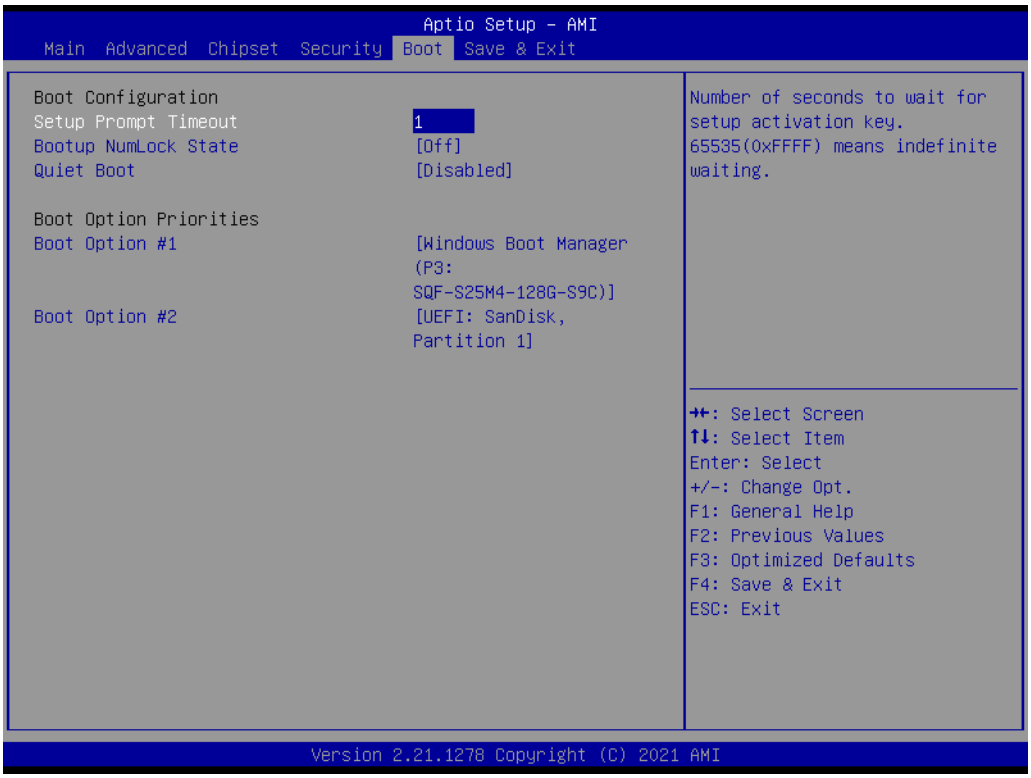


- **Administrator Password**
  Select this option and press <ENTER> to access the sub menu, and then type in the password to set the Administrator password.
- **User Password**
  Select this option and press <ENTER> to access the sub menu, and then type in the password to set the User Password.



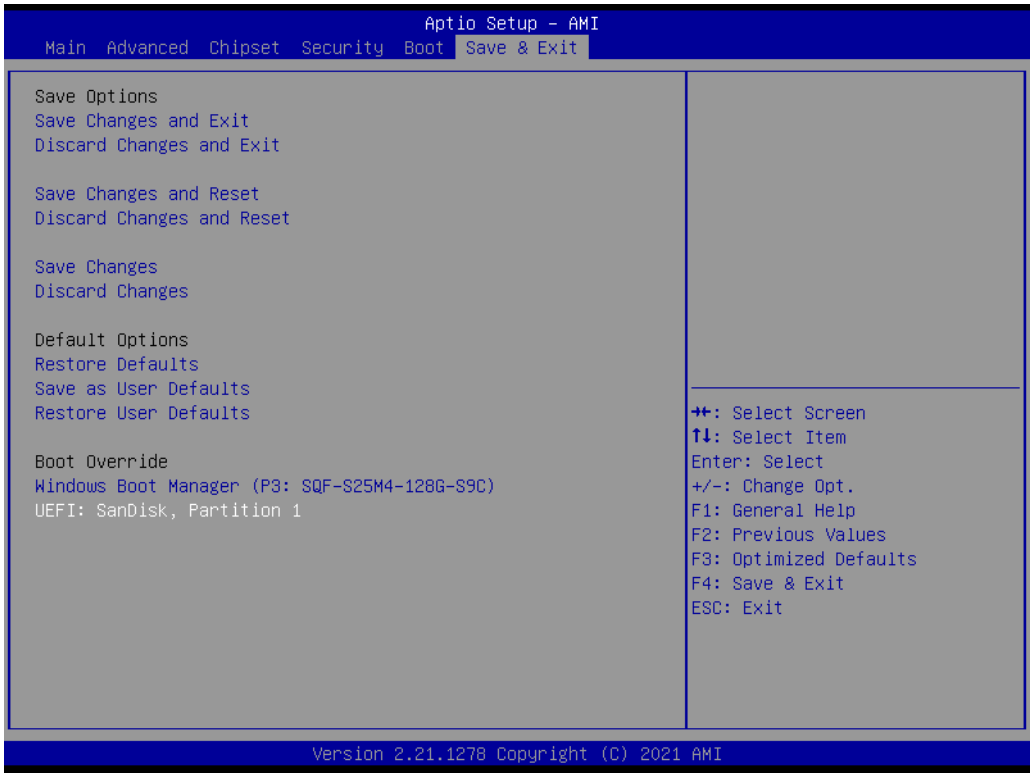
- **Secure Boot [Enabled]**
- **Secure Boot Mode [Standard]**

3.5 Boot Setting



- **Setup Prompt Timeout**
  User the <+> and <-> keys to adjust the number of seconds to wait for setup activation key.
- **Bootup NumLock State [Off]**
  On or off power on state for the NumLock.
- **Quiet Boot [Disabled]**
  If this option is set to disabled, the BIOS displays normal POST messages. If enabled, an OEM logo is shown instead of POST messages.

3.6 Save & Exit Configuration



- **Save Changes and Exit**
  Exit system setup after saving the changes.
- **Discard Changes and Exit**
  Exit system setup without saving the changes.
- **Save Changes and Reset**
  Reset the system after saving the changes.
- **Discard Changes and Reset**
  Reset system setup without saving any changes.
- **Save Changes**
  Save changes done so far to any of the setup options.
- **Discard Changes**
  Discard changes done so far to any of the setup options.
- **Restore Default**
  Restore/Load default values for all the setup options.
- **Save as User Default**
  Save the changes done so far as user defaults.
- **Restore User Default**
  Restore the user defaults to all the setup options.

Chapter 4

Software Introduction & Service

4.1 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 Value-Added Software Services

Software API: An interface that defines the ways by which an application program may request services from libraries and/or operating systems. Provides not only the underlying drivers required but also a rich set of user-friendly, intelligent and integrated interfaces, which speeds development, enhances security and offers add-on value for Advantech platforms. It plays the role of catalyst between developer and solution, and makes Advantech embedded platforms easier and simpler to adopt and operate with customer applications.

4.2.1 Software API

4.2.1.1 Control

GP I/O

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 the device. Our API also provide 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.

4.2.1.2 Display

Brightness Control

The Brightness Control API allows a developer to access embedded devices and easily control brightness.

4.2.1.3 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.

Chapter 5

Chipset Software Installation Utility

5.1 Before You Begin

To facilitate the installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for the AIMB-277 are located on the Advantech support website: http://support.advantech.com/Support/. The drivers on the support website will guide and link you to the utilities and drivers under a Windows system. Updates are provided via Service Packs from Microsoft*.

Note! *The driver files on the website are compressed. Do not attempt to install the drivers by copying the files manually. You must download the files and decompress them first. Also, please use the supplied SETUP program to install the drivers.*

Before you begin, it is important to note that most display drivers need to have the relevant software application already installed in 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.

5.2 Introduction

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 support
- Identification of Intel® chipset components in the Device Manager

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

- *Windows 10 (64-bit)*

Chapter 6

VGA Setup

6.1 Introduction

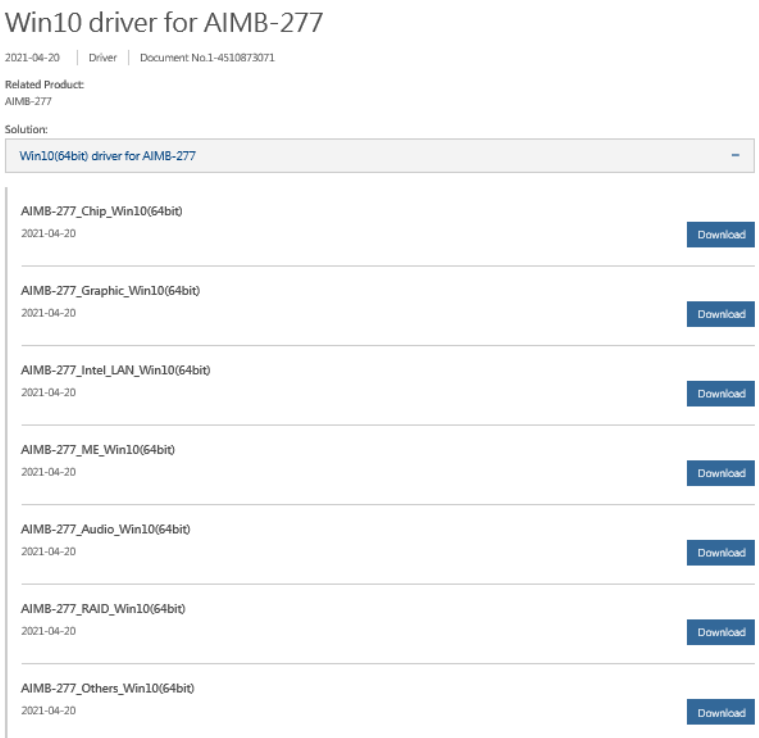
The 10th Gen Intel Core i processors are embedded with an integrated graphics controller.You need to install the VGA driver to enable the function.

Optimized integrated graphic solution: Intel Graphics Flexible supports versatile display options and a 3D graphics engine. Dual independent displays include enhanced display modes for widescreen flat panels for, extended, twin, clone and dual display modes, and optimized 3D support delivers an intensive and realistic visual experience.

6.2 Windows 10 VGA Driver Installation

Note! *Before installing this driver, make sure the CSI utility has been installed in your system. See Chapter 5 for information on installing the CSI utility.*

Download the driver from website on your computer. Navigate to the "AIMB-277_Graphic_Win10 (64-bit)" folder and click "setup.exe" to complete the installation of the drivers for Windows 10.



Chapter 7

LAN Configuration

7.1 Introduction

The AIMB-277 has two Gigabit Ethernet LANs via dedicated PCI Express x1 lanes Intel i211AT and I219LM (Phi) that offer bandwidth of up to 500 MB/sec, eliminating the bottleneck of network data flow and incorporating Gigabit Ethernet at 1000 Mbps.

7.2 Features

- Integrated 10/100/1000 Mbps transceiver
- 10/100/1000 Mbps triple-speed MAC
- High-speed RISC core with 24-KB cache
- On-chip voltage regulation
- Wake-on-LAN (WOL) support
- PCI Express X1 host interface

7.3 Installation

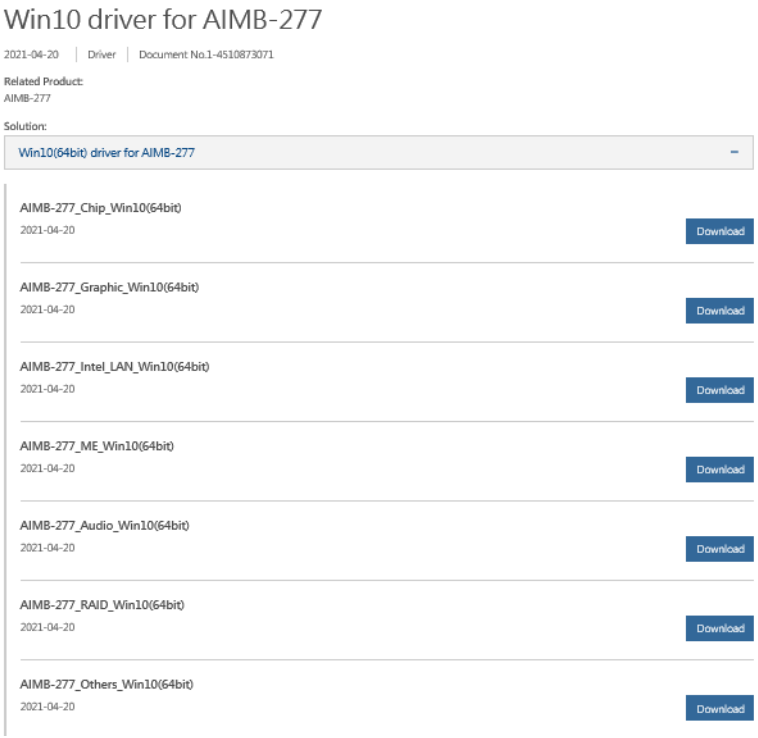
Note! *Before installing this driver, make sure the CSI utility has been installed in your system. See Chapter 5 for information on installing the CSI utility.*

The AIMB-277's Intel i211AT and Intel i219LM Gigabit integrated controllers support all major network operating systems. However, the installation procedure varies from system to system. Please find and use the section that provides the driver setup procedure for the OS you are using.

7.4 Windows® 10 Driver Setup (Intel i219LM&Intel i211AT)

Download the driver from support website on your computer and decompressed the file. Select the “Autorun” then navigate to the directory for your OS.

Note! *Before installing this driver, make sure the CSI utility has been installed in your system. See Chapter 5 for information on installing the CSI utility.*



Appendix A

I/O Pin Assignments

A.1 Connector and Header List Description:

A.1.1 SYSTEM FAN Power Connector (SYSFAN1)

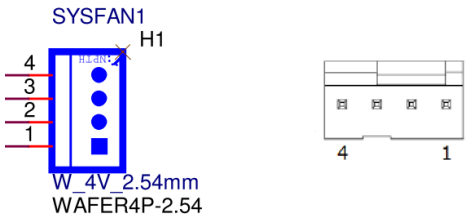


Table A.1: SYSTEM FAN Power Connector (SYSFAN1)

Pin	Signal Pin Definition
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

A.1.2 CPU FAN Power Connector (CPUFAN1)

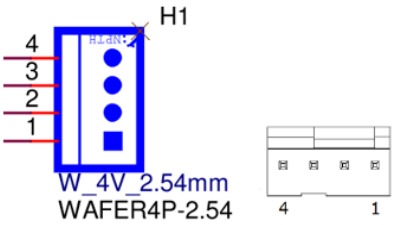


Table A.2: CPU FAN Power Connector (CPUFAN1)

Pin	Signal Pin Definition
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

A.1.3 CML CPU Socket (CPU1)

A.1.4 ATX 12V Power Supply Connector (ATX12V1)

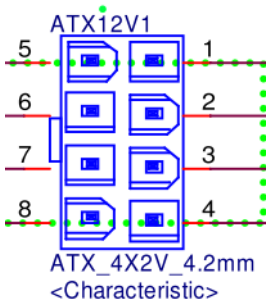


Table A.3: ATX 12V Power Supply Connector (ATX12V1)

Pin	Signal Pin Definition
1	GND
2	GND
3	GND
4	GND
5	+12V
6	+12V
7	+12V
8	+12V

A.1.5 VGA connector (VGA1)

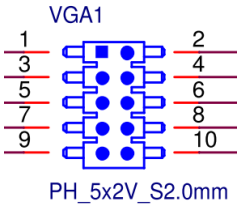
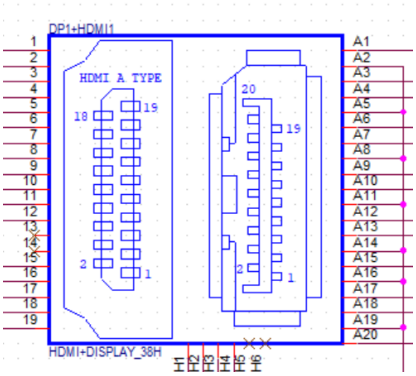


Table A.4: VGA connector (VGA1)

Pin	Signal Pin Definition
1	VGA1_b_R
2	VGA1_a_DCLK
3	VGA1_b_G
4	VGA1_FOC_ON
5	VGA1_b_B
6	VGA1_a_DDAT
7	VGA1_b_VS
8	GND
9	VGA1_b_HS
10	+VCC_TMDS

A.1.6 DisplayPort+ High Def Multimedia Interface (DP1+HDMI1)



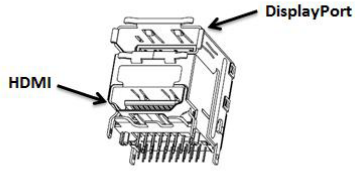


Table A.5: DisplayPort+ High Definition Multimedia Interface (DP1+HDMI1)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	HDMI2_Z_D2+	A1	DP1_0+
2	GND	A2	GND
3	HDMI2_Z_D2-	A3	DP1_0-
1	HDMI2_Z_D1+	11	DP1_1+
2	GND	12	GND
3	HDMI2_Z_D1-	13	DP1_1-
4	HDMI2_Z_D0+	14	DP1_2+
5	GND	15	GND
6	HDMI2_Z_D0-	16	DP1_2-
7	HDMI2_Z_CLK+	17	DP1_3+
8	GND	18	GND
9	HDMI2_Z_CLK-	19	DP1_3-
10			

A.1.7 USB 3.2 Gen1+2.0 pin header (USB56)

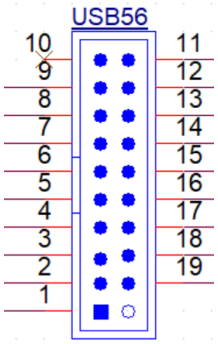


Table A.6: USB 3.2 Gen1+2.0 pin header (USB56)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	+USBV3	11	USB2_D6+
2	USB31_P5_z_RX-	12	USB2_D6-

Table A.6: USB 3.2 Gen1+2.0 pin header (USB56)			
3	USB31_P5_z_RX+	13	GND
4	GND	14	USB31_P6_z_TX+
5	USB31_P5_z_TX-	15	USB31_P6_z_TX-
6	USB31_P5_z_TX+	16	GND
7	GND	17	USB31_P6_z_RX+
8	USB2_D5-	18	USB31_P6_z_RX-
9	USB2_D5+	19	+USBV3
10			

A.1.8 USB 3.2 Gen1+2.0 pin header (USB78)

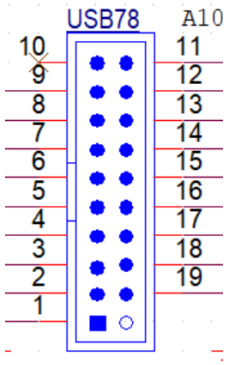


Table A.7: USB 3.2 Gen1+2.0 pin header (USB78)			
Pin	**Signal Pin Definition**	**Pin**	**Signal Pin Definition**
1	+USBV4	11	USB2_D8+
2	USB31_P7_z_RX-	12	USB2_D8-
3	USB31_P7_z_RX+	13	GND
4	GND	14	USB31_P8_z_TX+
5	USB31_P7_z_TX-	15	USB31_P8_z_TX-
6	USB31_P7_z_TX+	16	GND
7	GND	17	USB31_P8_z_RX+
8	USB2_D7-	18	USB31_P8_z_RX-
9	USB2_D7+	19	+USBV4
10			

A.1.9 eDP/LVDS Panel Connector (LVDS_EDP3)

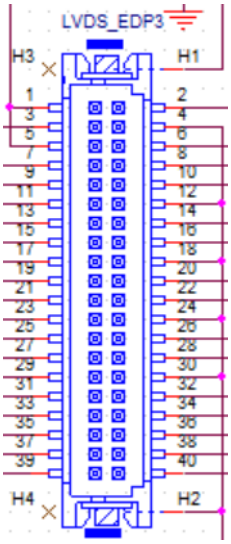


Table A.8: eDP/LVDS Panel Connector (LVDS_EDP3)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	+VDD_LVDS1	2	+VDD_LVDS1
3	LVDS_DET#	4	GND
5	+VDD_LVDS1	6	+VDD_LVDS1
7	LVDS1_A0N	8	LVDS1_A4N
9	LVDS1_A0P	10	LVDS1_A4P
11	GND	12	GND
13	LVDS1_A1N	14	LVDS1_A5N
15	LVDS1_A1P	16	LVDS1_A5P
17	GND	18	GND
19	LVDS1_A2N	20	LVDS1_A6N
21	LVDS1_A2P	22	LVDS1_A6P
23	GND	24	GND
25	LVDS1_CLK1N	26	LVDS1_CLK2N
27	LVDS1_CLK1P	28	LVDS1_CLK2P
29	GND	30	GND
31	LVDS1_SCD	32	LVDS1_SDD
33	GND	34	GND
35	LVDS1_A3N	36	LVDS1_A7N
37	LVDS1_A3P	38	LVDS1_A7P
39	ENBKL	40	LVDS1_VCON

A.1.10 USB 3.2 Gen2+RJ45 1 port (LAN2_USB34)

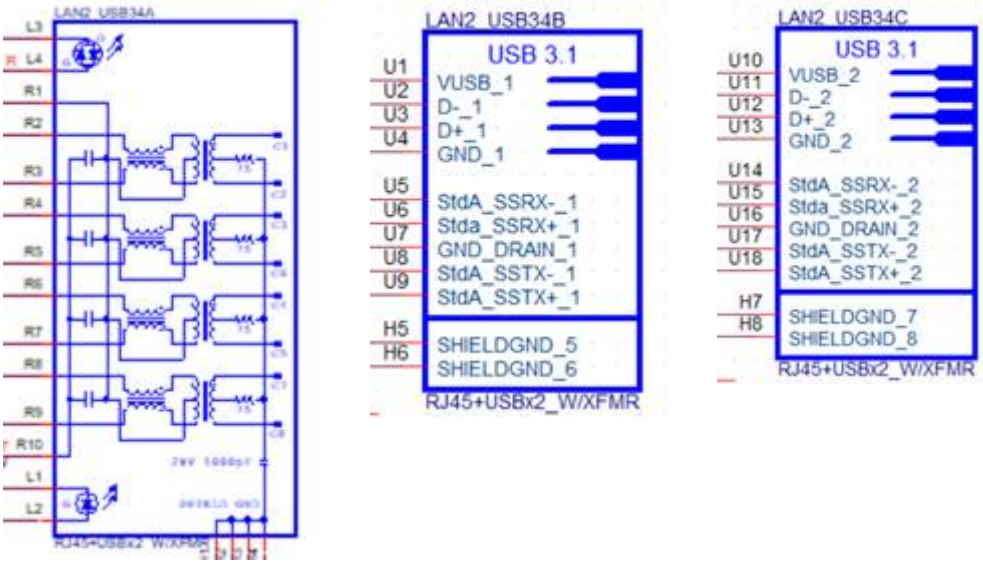


Table A.9: USB 3.2 Gen2+RJ45 1 port (LAN2_USB34)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
L3	LAN2_LED2_1G#_R	U1	+USBV2
L4	LAN2_LED0_100M#_R	U2	USB2_D3-
R1	LAN2_VCT	U3	USB2_D3+
R2	LAN2_MDI0+	U4	GND
R3	LAN2_MDI0-	U5	USB31_P3_z_RX-
R4	LAN2_MDI1+	U6	USB31_P3_z_RX+
R5	LAN2_MDI1-	U7	GND
R6	LAN2_MDI2+	U8	USB31_P3_z_TX-
R7	LAN2_MDI2-	U9	USB31_P3_z_TX+
R8	LAN2_MDI3+	U10	+USBV2
R9	LAN2_MDI3-	U11	USB2_D4-
R10	LAN2_CT	U12	USB2_D4+
L1	LAN2_LED1_ACT#_R	U13	GND
L2	+V3.3_DUAL	U14	USB31_P4_z_RX-
		U15	USB31_P4_z_RX+
		U16	GND
		U17	USB31_P4_z_TX-
		U18	USB31_P4_z_TX+

A.1.11 USB 3.2 Gen2+RJ45 1 port (LAN1_USB12)

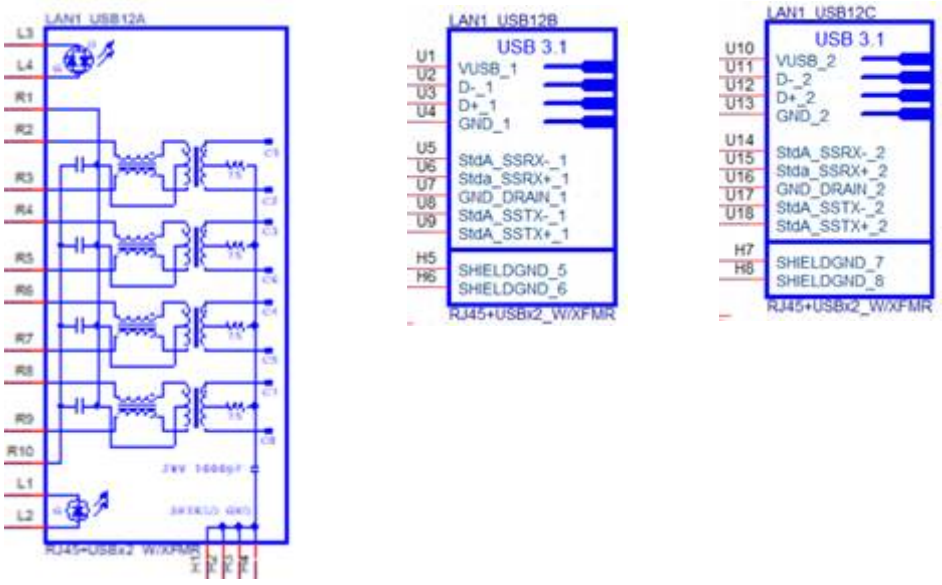


Table A.10: USB 3.2 Gen2+RJ45 1 port (LAN1_USB12)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
L3	LAN1_LED2_1G#_R	U1	+USBV1
L4	LAN1_LED0_100M#_R	U2	USB2_D1-
R1	LAN1_VCT	U3	USB2_D1+
R2	LAN1_MDI0+	U4	GND
R3	LAN1_MDI0-	U5	USB31_P1_z_RX-
R4	LAN1_MDI1+	U6	USB31_P1_z_RX+
R5	LAN1_MDI1-	U7	GND
R6	LAN1_MDI2+	U8	USB31_P1_z_TX-
R7	LAN1_MDI2-	U9	USB31_P1_z_TX+
R8	LAN1_MDI3+	U10	+USBV1
R9	LAN1_MDI3-	U11	USB2_D2-
R10	LAN1_CT	U12	USB2_D2+
L1	LAN1_LED1_ACT#_R	U13	GND
L2	+V3.3_DUAL	U14	USB31_P2_z_RX-
		U15	USB31_P2_z_RX+
		U16	GND
		U17	USB31_P2_z_TX-
		U18	USB31_P2_z_TX+

A.1.12 Audio amplifier output pin header (AMP1)

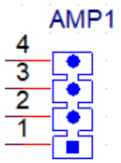


Table A.11: Audio amplifier output pin header (AMP1)	
Pin	**Signal Pin Definition**
1	SPK_R+
	SPK_R-
	SPK_L-
	SPK_L+

A.1.13 Front panel audio pin header (AUDIO1)

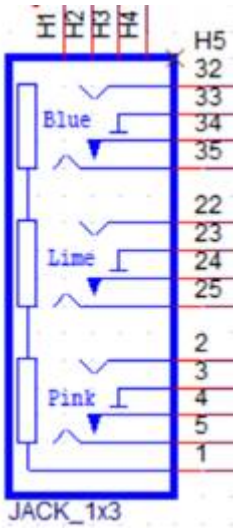


Table A.12: Front panel audio pin header (AUDIO1)	
Pin	**Signal Pin Definition**
1	GND_A
2	A_z_MIC1-L
3	GND_A
4	A_MIC1-JD
5	A_z_MIC1-R
22	A_z_LINEO-L
23	GND_A
24	A_FRONT-JD
25	A_z_LINEO-R
32	A_z_LINE1-L
33	GND_A
34	A_LINE1-JD
35	A_z_LINE1-R

A.1.14 LVDS backlight inverter power connector (INV3)

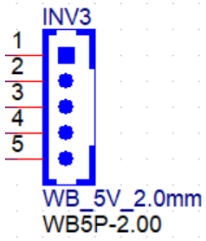


Table A.13: LVDS Backlight inverter power connector (INV3)

Pin	Signal Pin Definition
1	+V12_INV1
2	GND
3	INV1_ENBKL
4	INV1_VBR
5	+V5_INV1

A.1.15 PCI Express X16 Slot (PCIEX16_1)

Table A.14: PCI Express X16 Slot (PCIEX16_1)

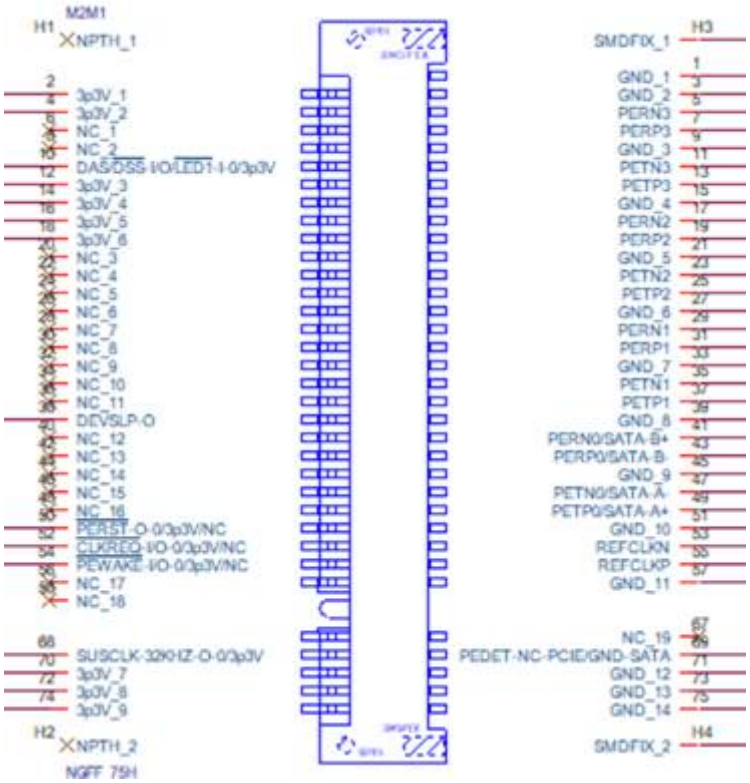
Pin	Signal Pin Definition	Pin	Signal Pin Definition
B1	12V_1	A1	PRSNT1

Table A.14: PCI Express X16 Slot (PCIEX16_1)			
B2	12V_2	A2	12V_4
B3	12V_3	A3	12V_5
B4	GND_1	A4	GND_3
B5	SMCLK	A5	JTAG2
B6	SMDAT	A6	JTAG3
B7	GND_2	A7	JTAG4
B8	3_3V_1	A8	JTAG5
B9	JTAG1	A9	3_3V_2
B10	3_3VAUX	A10	3_3V_3
B11	WAKE	A11	PWRGD
B12	RSVD_1	A12	GND_7
B13	GND_4	A13	REFCLK+
B14	HSOP0	A14	REFCLK-
B15	HSON0	A15	GND_8
B16	GND_5	A16	HSIP0
B17	PRSNT2_1	A17	HSIN0
B18	GND_6	A18	GND_9
B19	HSOP1	A19	RSVD_3
B20	HSON1	A20	GND_16
B21	GND_10	A21	HSIP1
B22	GND_11	A22	HSIN1
B23	HSOP2	A23	GND_17
B24	HSON2	A24	GND_18
B25	GND_12	A25	HSIP2
B26	GND_13	A26	HSIN2
B27	HSOP3	A27	GND_19
B28	HSON3	A28	GND_20
B29	GND_14	A29	HSIP3
B30	RSVD_2	A30	HSIN3
B31	PRSNT2_2	A31	GND_21
B32	GND_15	A32	RSVD_4
B33	HSOP4	A33	RSVD_5
B34	HSON4	A34	GND_30
B35	GND_22	A35	HSIP4
B36	GND_23	A36	HSIN4
B37	HSOP5	A37	GND_31
B38	HSON5	A38	GND_32
B39	GND_24	A39	HSIP5
B40	GND_25	A40	HSIN5
B41	HSOP6	A41	GND_33
B42	HSON6	A42	GND_34
B43	GND_26	A43	HSIP6
B44	GND_27	A44	HSIN6
B44	GND_27	A45	GND_35
B46	HSON7	A46	GND_36
B47	GND_28	A47	HSIP7
B48	PRSNT2_3	A48	HSIN7

Table A.14: PCI Express X16 Slot (PCIEX16_1)			
B49	GND_29	A49	GND_37
B50	HSOP8	A50	RSVD_7
B51	HSON8	A51	GND_53
B52	GND_38	A52	HSIP8
B53	GND_39	A53	HSIN8
B54	HSOP9	A54	GND_54
B55	HSON9	A55	GND_55
B56	GND_40	A56	HSIP9
B57	GND_41	A57	HSIN9
B58	HSOP10	A58	GND_56
B59	HSON10	A59	GND_57
B60	GND_42	A60	HSIP10
B61	GND_43	A61	HSIN10
B62	HSOP11	A62	GND_58
B63	HSON11	A63	GND_59
B64	GND_44	A64	HSIP11
B65	GND_45	A65	HSIN11
B66	HSOP12	A66	GND_60
B67	HSON12	A67	GND_61
B68	GND_46	A68	HSIP12
B69	GND_47	A69	HSIN12
B70	HSOP13	A70	GND_62
B71	HSON13	A71	GND_63
B72	GND_48	A72	HSIP13
B73	GND_49	A73	HSIN13
B74	HSOP14	A74	GND_64
B75	HSON14	A75	GND_65
B76	GND_50	A76	HSIP14
B77	GND_51	A77	HSIN14
B78	HSOP15	A78	GND_66
B79	HSON15	A79	GND_67
B80	GND_52	A80	HSIP15
B81	PRSNT2_4	A81	HSIN15
B82	RSVD_6	A82	GND_68

A.1.16 NGFF M.2 M-Key connector for 2280 module (M2M1)

Table A.15: NGFF M.2 M-Key conn for 2280 module (M2M1)			
Pin	**Signal Pin Definition**	**Pin**	**Signal Pin Definition**
1	DCD# [1]	2	DSR# [1]
3	RXD [1]	4	RST# [1]
5	TXD [1]	6	CTS# [1]
7	DTR# [1]	8	RI# [1]
9	GND	10	GND
11	DCD# [2]	12	DSR# [2]
13	RXD [2]	14	RST# [2]
15	TXD [2]	16	CTS# [2]
17	DTR# [2]	18	RI# [2]
19	GND	20	GND



Pin	Signal Pin Definition6	Pin	Signal Pin Definition
1	GND_1	2	3p3V_1
3	GND_2	4	3p3V_2
5	PERN3	6	NC_1
7	PERP3	8	NC_2
9	GND_3	10	DAS/DSS-I/O/LED1-I-03p3V
11	PETN3	12	3p3V_3
13	PETP3	14	3p3V_4
15	GND_4	16	3p3V_5
17	PERN2	18	3p3V_6

19	PERP2	20	NC_3
21	GND_5	22	NC_4
23	PETN2	24	NC_5
25	PETP2	26	NC_6
27	GND_6	28	NC_7
29	PERN1	30	NC_8
31	PERP1	32	NC_9
33	GND_7	34	NC_10
35	PETN1	36	NC_11
37	PETP1	38	DEVSLP-O
39	GND_8	40	NC_12
41	PERN0/SATA-B+	42	NC_13
43	PERP0/SATA-B-	44	NC_14
45	GND_9	46	NC_15
47	PETN0/SATA-A-	48	NC_16
49	PETP0/SATA-A+	50	PERST-O-0/3p3V/NC
51	GND_10	52	CLKREQ-I/O-0/3p3V/NC
53	REFCLKN	54	PEWAKE-I/O-0/3p3V/NC
55	REFCLKP	56	NC_17
57	GND_11	58	NC_18
59		60	
61		62	
63		64	
65		66	
67	NC_19	68	SUSCLK-32KHZ-O-0/3p3V
69	PEDET-NC-PCIE/GND-SATA	70	3p3V_7
71	GND_12	72	3p3V_8
73	GND_13	74	3p3V_9
75	GND_14		

A.1.17 COM Port (COM12)

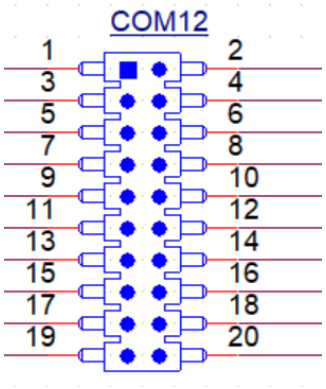


Table A.16: COM Port (COM12)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	COM1_422_485_TX-	2	COM1_DSR#
3	COM1_422_485_TX+	4	COM1_RTS#
5	COM1_422_RX+	6	COM1_CTS#
7	COM1_422_RX-	8	COM1_RI#
9	GND	10	GND
11	COM2_422_485_TX-	12	COM2_DSR#
13	COM2_422_485_TX+	14	COM2_RTS#
15	COM2_422_RX+	16	COM2_CTS#
17	COM2_422_RX-	18	COM2_RI#
19	GND	20	GND

A.1.18 SATA Signal Connector (SATA1~3)

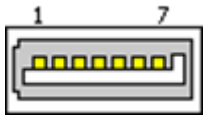
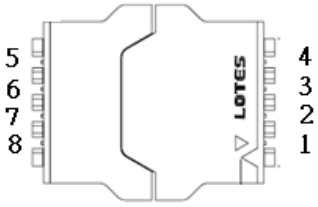


Table A.17: SATA Signal Connector (SATA1~3

Pin	Signal Pin Definition
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

A.1.19 SPI BIOS Flash Socket (SPI1)



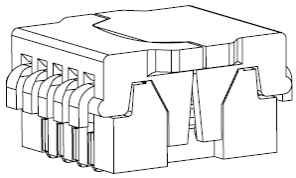


Table A.18: SPI BIOS Flash Socket (SPI1)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	CS#	5	MOSI
2	MISO	6	SCK
3	WP# / IO2	7	HOLD# / IO3
4	GND	8	+3.3V

A.1.20 ESPI debug card Pin Header (ESPI1)

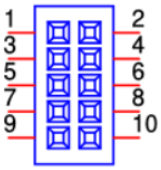


Table A.19: ESPI debug card Pin Header (ESPI1)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	SIO_LED_A	2	SIO_LED_F
3	SIO_LED_B	4	SIO_LED_G
5	SIO_LED_C	6	SIO_DGL0#
7	SIO_LED_D	8	SIO_DGR0#
9	SIO_LED_E	10	GND

A.1.21 Battery Wafer Box (BAT1)

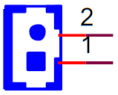


Table A.20: Battery Wafer Box (BAT1)

Pin	Signal Pin Definition
1	VBAT
2	GND

A.1.22 8-bit General Purpose I/O Pin Header (GPIO1)

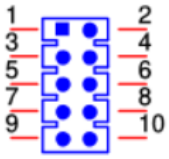


Table A.21: 8-bit General Purpose I/O Pin Header (GPIO1)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	+V5_DUAL	10	GND

A.1.23 Power Switch/HDD LED/SMBUS/Speaker Pin Header (JFP1)

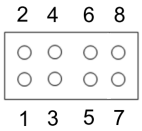


Table A.22: Power Switch/HDD LED/SMBUS/Speaker Pin Header (JFP1)

Pin	Signal Pin Definition	Pin	Signal Pin Definition
1	FP_HDD_LED	2	PWR_BTN
3	FP_HDD_LED#	4	GND
5	SMB_DAT_JFP1	6	FP_SYS_RESET#
7	SMB_CLK_JFP1	8	GND

A.1.24 Case-Open Detect Connector (JCASE2)

Table A.23: Case-Open Detect Connector (JCASE2)

Pin	Signal Pin Definition
1	Case Open
2	GND

A.1.25 Power LED Pin Header (JFP2)

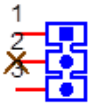


Table A.24: Power LED Pin Header (JFP2)	
Pin	**Signal Pin Definition**
1	**SIO_SUSLED_R**
2	**NC**
3	**SIO_SUSLED**

A.1.26 ATX 12/5V/3V/5VSBV Power Supply Connector (EATXPWR1)

Table A.25: ATX 12/5V/3V/5VSBV Power Supply Connector (EATXPWR1)			
Pin	**Signal Pin Definition**	**Pin**	**Signal Pin Definition**
1	+3.3V_1	13	+3.3V_4
2	+3.3V_2	14	-12V
3	COM_1	15	COM_4
4	+5V_1	16	PS_ON#
5	COM_2	17	COM_5
6	+5V_2	18	COM_6
7	COM_3	19	COM_7
8	PWR_OK	20	NC
9	+5VSB	21	+5V_3
10	+12V1_1	22	+5V_4
11	+12V1_2	23	+5V_5
12	+3.3V_3	24	COM_8

A.1.27 SYSTEM FAN Power Connector (SYSFAN2)

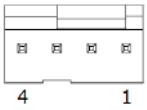
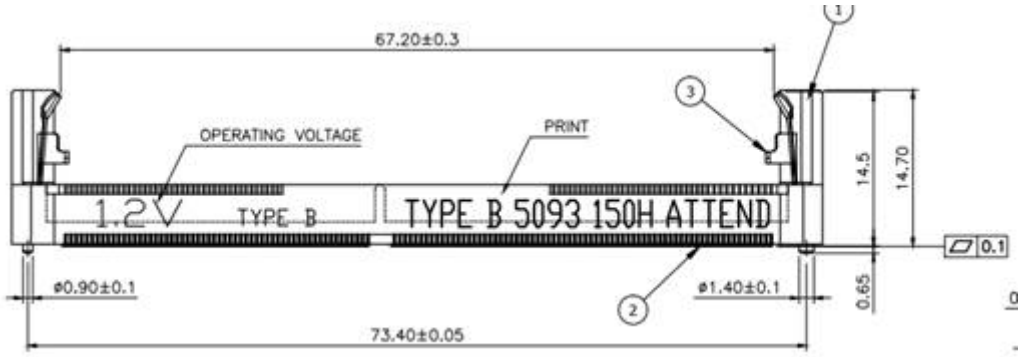


Table A.26: SYSTEM FAN Power Connector (SYSFAN2)

Pin	Signal Pin Definition
1	GND
2	SYS2_FAN_PWMOUT_R
3	SYS2_FAN_SPEED
4	SYS2_FAN_PWMOUT_R

A.1.28 DDR4 SO-DIMM Socket (DIMMB1)

A.1.29 DDR4 SO-DIMM Socket(DIMMA1)



(Please see JEDEC STANDARD Pin Definition)

A.1.30 NGFF M.2 E-Key connector for 2242 module (M2E1)

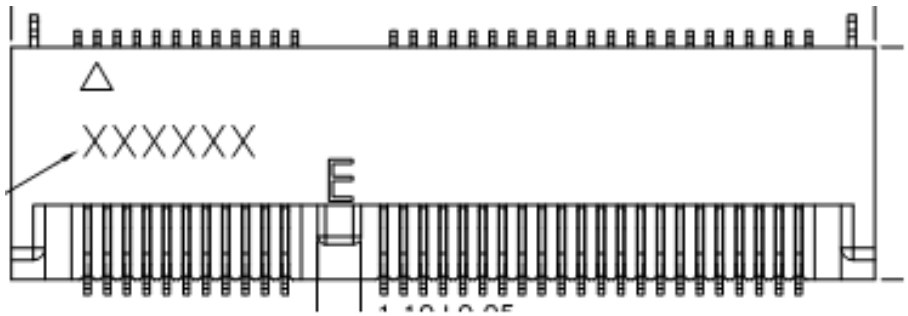


Table A.27: NGFF M.2 E-Key conn for 2242 module (M2E1)			
Pin	**Signal Pin Definition**	**Pin**	**Signal Pin Definition**
1	GND	2	+3.3V
3	USB_D+	4	+3.3V
5	USB_D-	6	WiFi_LED# (I)(OD)
7	GND	8	I2S SCK (O/I)(0/1.8V)
9	NC	10	I2S WS (I/O)(0/1.8V)
11	NC	12	I2S SD_IN (I)(0/1.8V)
13	NC	14	I2S SD_OUT (O)(0/1.8V)
15	NC	16	BT_LED# (I)(OD)
17	NC	18	GND
19	NC	20	UART WAKE# (I)(0/3.3V)
21	NC	22	UART RXD (I)(0/1.8V)
23	NC	24	Connector KEY
25	Connector KEY	26	Connector KEY
27	Connector KEY	28	Connector KEY
29	Connector KEY	30	Connector KEY
31	Connector KEY	32	UART TXD
33	GND	34	UART CTS
35	PETp0	36	UART RTS
37	PETn0	38	NC
39	GND	40	NC
41	PERp0	42	NC
43	PERn0	44	COEX3
45	GND	46	COEX2
47	REFCLKp0	48	COEX1
49	REFCLKn0	50	SUSCLK(32kHz) (O)(0/3.3V)
51	GND	52	PERST0# (O)(0/3.3V)
53	CLKREQ0#	54	W_DISABLE2# (O)(0/3.3V)
55	PEWAKE0#	56	W_DISABLE1# (O)(0/3.3V)
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	RESERVED
65	NC	66	RESERVED
67	NC	68	NC
69	GND	70	PCIE_WAKE#
71	NC	72	+3.3V
73	NC	74	+3.3V

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