AMS210

Embedded System with MB211

User's Manual

Version 1.0
(March 2020)

iBASE

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Compliance

CE

This product has passed CE tests for environmental specifications and limits. This product is in accordance with the directives of the Union European (EU). If users modify and/or install other devices in this equipment, the CE conformity declaration may no longer apply.

FC

This product has been tested and found to comply with the limits for a Class B 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 manufacturer's instructions, may cause harmful interference to radio communications.

WEEE

This product must not be disposed of as normal household waste, in accordance with the EU directive of for waste electrical and electronic equipment (WEEE - 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

Green IBASE

This product is compliant with the current RoHS restrictions and prohibits use of the following substances in concentrations exceeding 0.1% by weight (1000 ppm) except for cadmium, limited to 0.01% by weight (100 ppm).

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

Important Safety Information

Carefully read the precautions before using the device.

Environmental conditions:

- Lay the device horizontally on a stable and solid surface in case the device may fall, causing serious damage.
- Make sure you leave plenty of space around the device for ventilation.
- Use this product in environments with ambient temperatures -20˚C ~ 55˚C.
- DO NOT LEAVE THIS DEVICE IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20˚C OR ABOVE 80˚C. This could damage the device. The device must be used in a controlled environment.

Care for your IBASE products:

- Before cleaning the device, turn it off and unplug all cables such as power in case a small amount of electrical current may still flow.
- Use neutral cleaning agents or diluted alcohol to clean the device chassis with a cloth. Then wipe the chassis with a dry cloth.
- Vacuum the dust with a computer vacuum cleaner to prevent the air vent or slots from being clogged.

WARNING

Attention during use:

- Do not use this product near water.
- Do not spill water or any other liquids on your device.
- Do not place heavy objects on the top of the device.
- Operate this device from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your distributor or local power company.
- Do not walk on the power cord or allow anything to rest on it.
- If you use an extension cord, make sure that the total ampere rating of the product plugged into the extension cord does not exceed its limits.

Avoid Disassembly

You are not suggested to disassemble, repair or make any modification to the device. Disassembly, modification, or any attempt at repair could generate hazards and cause damage to the device, even bodily injury or property damage, and will void any warranty.

CAUTION

Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warranty Policy

- **IBASE standard products:**

  24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.

- **3rd-party parts:**

  12-month (1-year) warranty from delivery for the 3rd-party parts that are not manufactured by IBASE, such as CPU, memory, HDD, power adapter, panel and touchscreen.

* PRODUCTS, HOWEVER, THAT FAILS DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.
   - Product model name
   - Product serial number
   - Detailed description of the problem
   - The error messages in text or in screenshots if there is any
   - The arrangement of the peripherals
   - Software in use (such as OS and application software, including the version numbers)
3. If repair service is required, please log in to the RMA system of the website or contact your distributor or sales representative for assistance.

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Table of Contents

Chapter 1
General Information

The information provided in this chapter includes:

- Features
- Packing List
- Optional Accessories
- Specifications
- Overview
- Dimensions

1.1 Introduction

The AMS210 embedded system is based on the Intel® 9th/8th Gen. Core™/ Pentium® / Celeron® processors and houses the MB211 motherboard built with two DDR4 memory slots with a 32GB capacity. Measuring 265mm x 247mm, the system has four Gigabit Ethernet connectors, four serial ports, USB 3.1 and USB 2.0 connectors, two DP++ display ports, and 24V DC power input.

Pictures of AMS210

1.2 Features

- With IBASE MB211 customized board
- 9th / 8th Gen Intel® Core™ i7/i5/i3 Desktop Processors
- 2x DDR4 2666/2400 memory slots; Max. 32GB
- 2x DP++ display interface, 4x Gigabit LAN
- 4x USB 3.1, 4x USB 2.0, 2x SATA 3.1, 2x PCI-E(16x)
- 24V DC power input

1.3 Packing List

Your product package should include the items listed below. If any of the items below is missing, contact the distributor or the dealer from whom you have purchased the product.

AMS210

- AMS210 x 1
- Bracket x 2
- Terminal block x 1

- Round Head Screw (for Bracket) x 6

- PCI Power Cable x1

1.4 Optional Accessories

IBASE provide the following optional accessories:

ABP-IP701 riser card: PCI-e(x16) slot + PCI-e(x4) slot	
ABP-IP702 riser card: PCI-e(x16) slot + PCI-e slot (default)	
ABP-IP703 riser card: 2x PCI slots	

1.5 Specifications – AMS210

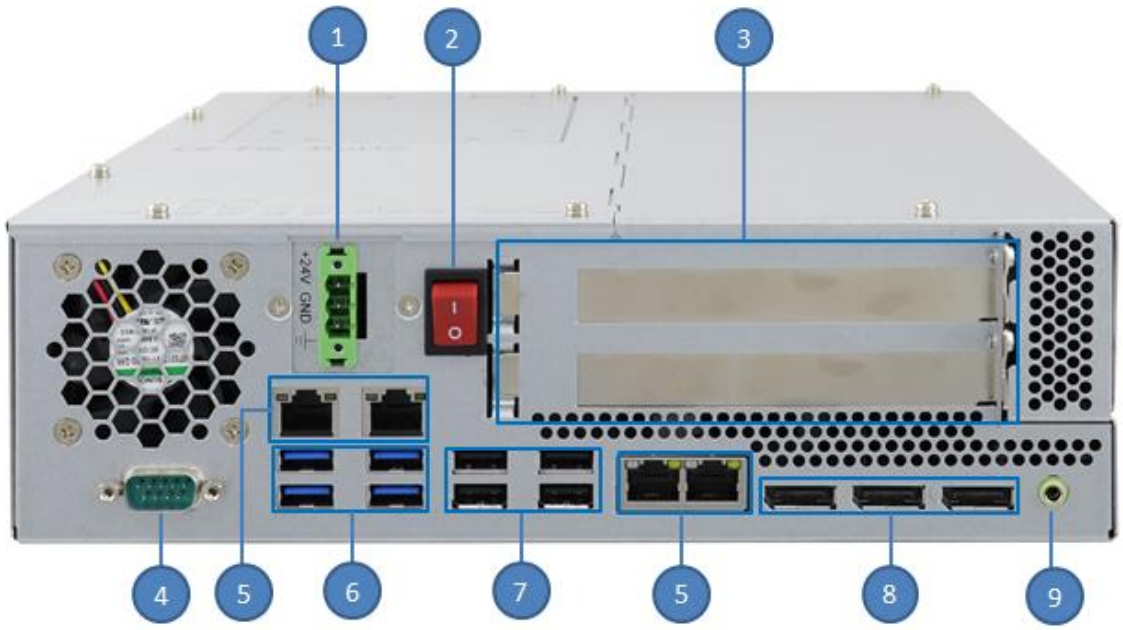
Product Name	AMS210	
System		
Motherboard	MB211	
Operating System	• Windows10 (64-bit) / 7 (32-bit & 64-bit)	
CPU	Intel® 9th/8th Gen. Core™ / Pentium® / Celeron® processors TDP = 35W	
Chipset	Intel® Q370	
Memory	2 x DDR4-2666/2400 SO-DIMM; Max. 32GB (Non-ECC)	
Super I/O	Fintek F81964D -I	
Audio Codec	Realtek ALC662	
Network	• Four Gigabit Ethernet ■ Intel® I219LM GbE PHY, Intel® I210IT GbE, Intel® I210IT GbE, Intel® I210IT GbE	
SATA	• 2x SATA III port (6Gbps) for 2.5" SATA HDD or SSD	
Expansion Slot	- The riser cards ABP-IP701, ABP-IP702, and ABP-IP703 come with two golden fingers to support 2 slots: - 1xPCI-e(x16) slot + 1 xPCIe(x4) slot / ABP-IP701 - 1xPCI-e(x16) slot + 1 xPCI slot (Default) / ABP-IP702 - 2XPCI slots / ABP-IP703	
Front Panel I/O	• 24V Power Input • Power Switch • Expansion Slots • COM1 Serial Port • Line Out	• 4x GbE Ports • 4x USB 3.0 Ports • 4x USB 2.0 Ports • 3x DP Ports • 50x50mm DC fan for PSU
Rear Panel I/O	• 60x60 mm DC fan for CPU • NVRAM Battery Compartment code • Power (red) and HDD (green) LEDs • Space for two optional COM ports	
BIOS	AMI BIOS	
Watchdog	Watchdog Timer 256 segments, 0, 1, 2…255 sec/min	
Other Features	512K SRAM; LPC 80 port	

Mechanical and Environmental	
Dimensions	297.4mm(W) x 265.9mm(D) x 78.5mm(H)
Construction	Aluminum
Chassis color	Silver
Mounting type	Desktop & Wall mount
Operating Temperature	-20°C to 55°C
Storage Temperature	-20°C~80°C
Humidity	5%~90%@45°C (non-condensing)
Vibration	Operating : 0.25Grms / 5~500Hz Non-operating : 1Grms / 5~500Hz
Shock	Operating : 20G / 11ms Non-operating : 40G / 11ms
Certification	CE / FCC Class A / LVD

All specifications are subject to change without prior notice.

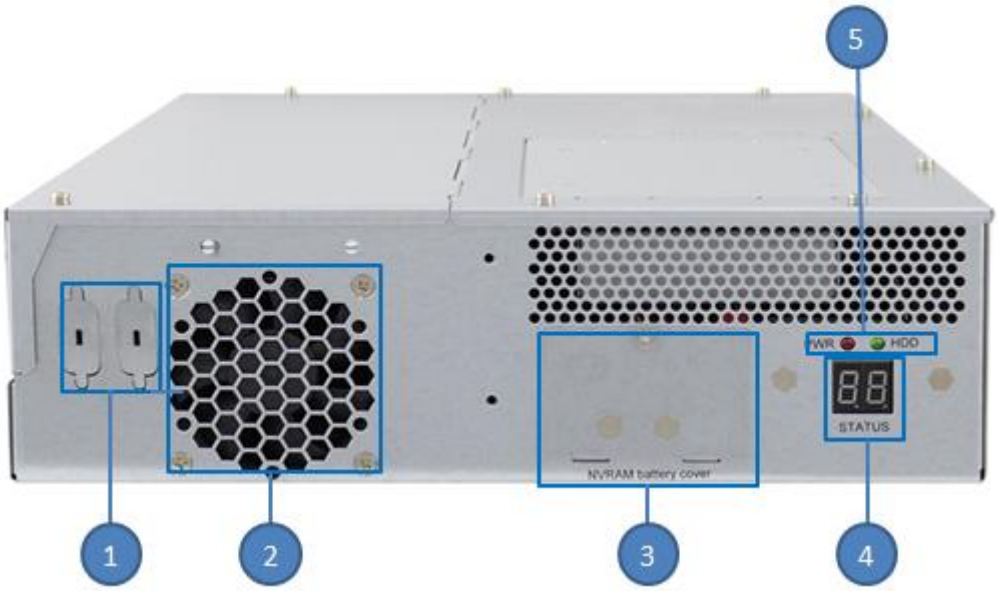
1.6 System View – AMS210

Front View



No.	Name	No.	Name
1	24V Power Input	6	USB 3.0 Ports
2	Power Switch	7	USB 2.0 Ports
3	Expansion Slots	8	DP Ports
4	COM1 Serial Port	9	Line Out
5	GbE Ports		

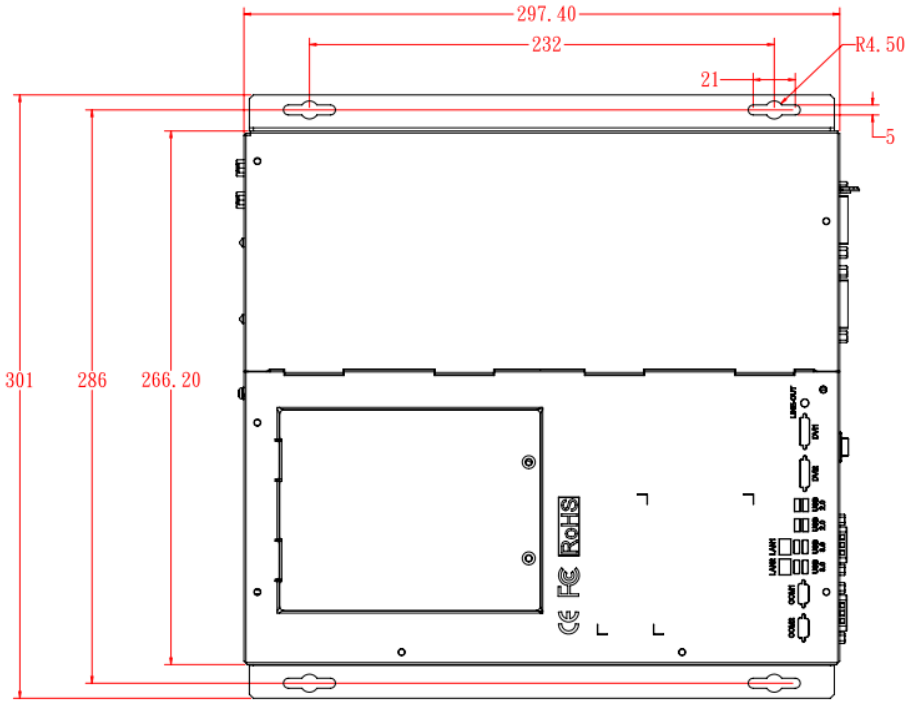
Rear View



No.	Name	No.	Name
1	Optional COM Ports	4	BIOS POST Code
2	DC Fan for PSU	5	Power and HDD LEDs
3	NVRAM Battery Compartment		

1.7 Dimensions – AMS210

Unit: mm



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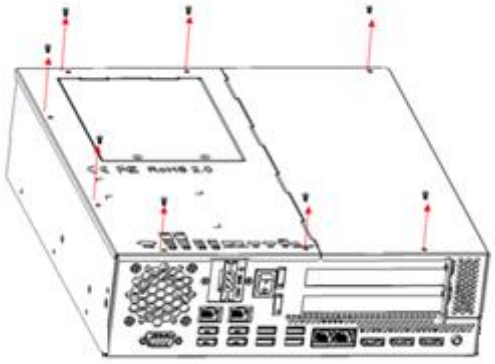
Chapter 2
Hardware Configuration

The information provided in this chapter includes:

- Essential installations before you begin
- Information and locations of connectors

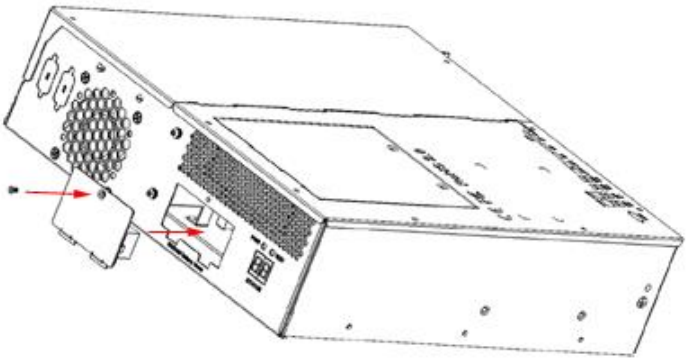
2.1 Essential Installations

The system cover has two parts – the left and the right. To remove the right-side cover, loosen the two screws (M3x6) as shown in the picture below. This is done prior to the installation the PCI-E expansion card. The left-side cover uses six screws (M3x6). To remove or install the HDD, there is no need to remove any of the above-mentioned screws, just the two screws of the HDD compartment cover.

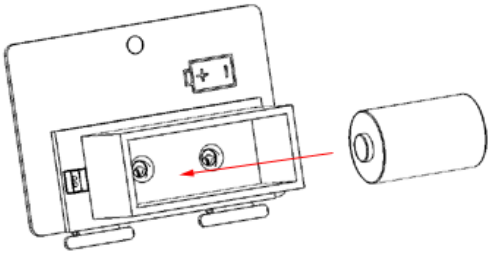


2.1.1 Battery Installation

The battery compartment is secured by one screw (M3x6). Unscrew the compartment cover and install the battery as shown below.

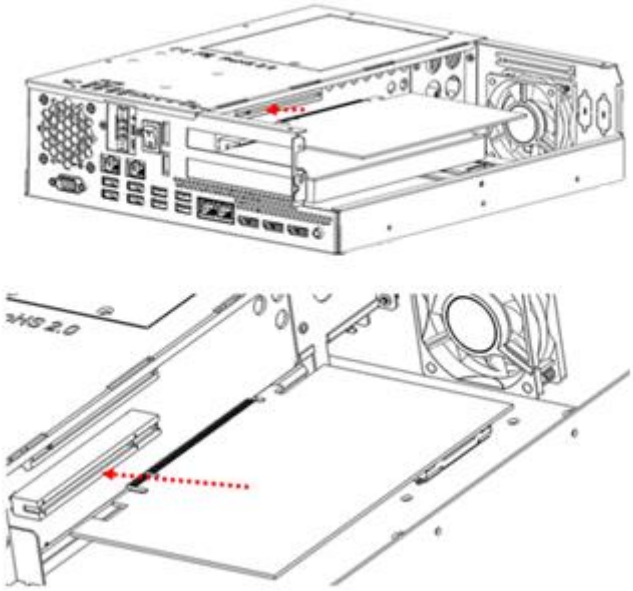


Position the battery by observing the polarity. Replace the cover.

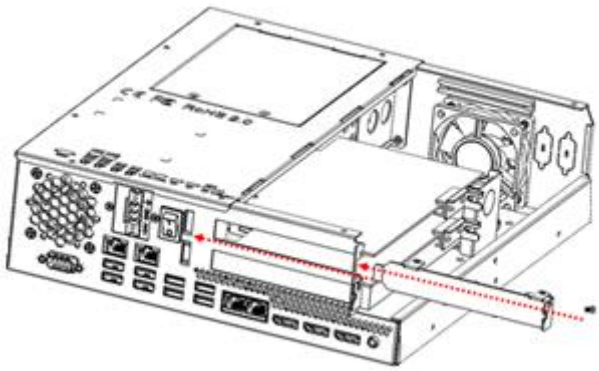


2.1.2 PCI-E Card Installation

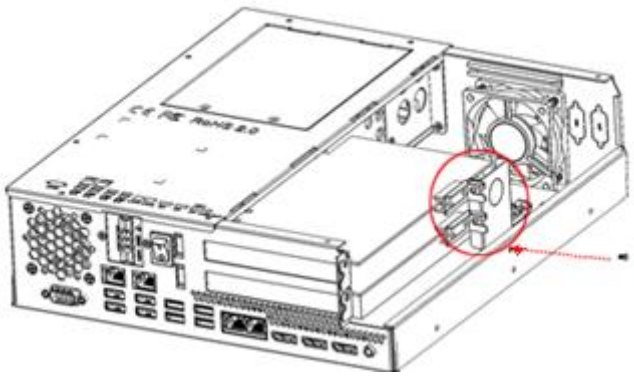
After removing the L-shape chassis cover, install your PCI-E expansion card in the upper empty expansion slot as shown in the pictures below.



After installing the card into place, secure the expansion card slot cover by using one M3*4 screw.

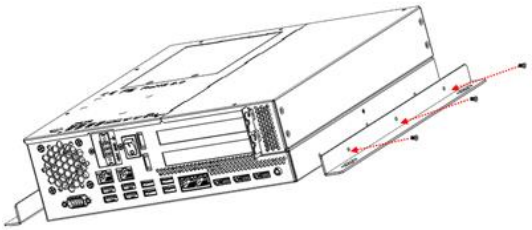


The riser card bracket, as encircled below, can be used to secure the expansion card. Use one M3*4 screw to fasten the bracket. Replace the chassis cover.



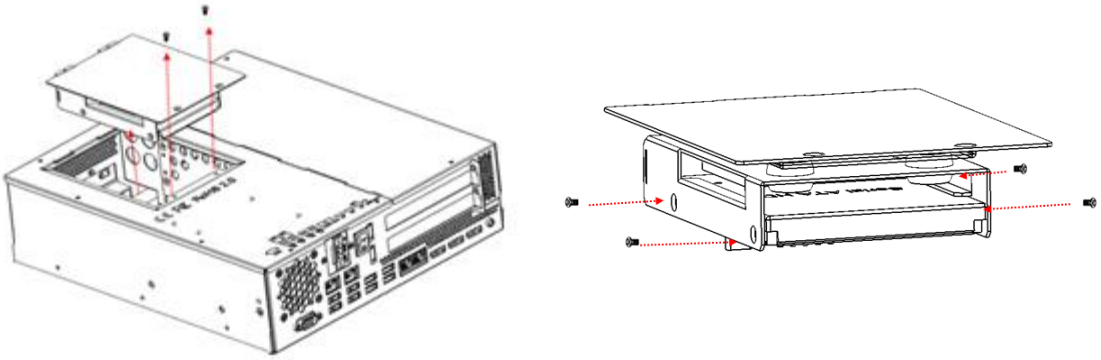
2.1.3 Mounting Bracket Installation

A pair of mounting brackets is supplied with the package. Use the supplied screws (M3*6) to install the mounting brackets.

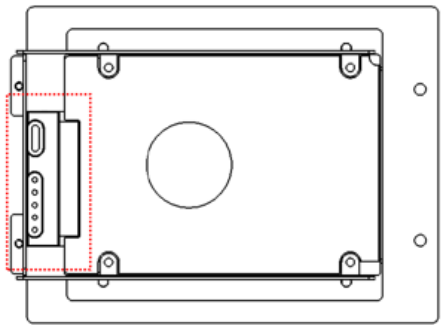


2.1.4 Hard Disk Drive Installation

Remove the (M3*6) screws of the HDD tray cover and pull the tray out. There are four screws securing the hard disk drive as shown below.

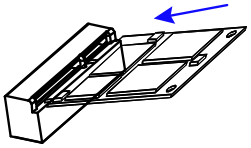


Please note that the SATA interface connector and the HDD power interface are to be connected first during the HDD installation.



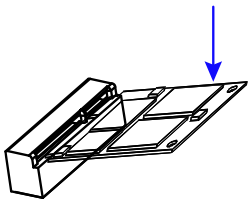
2.1.5 Mini-PCIe Card Installation

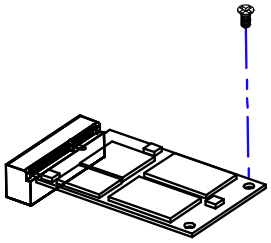
1. If you need to replace or install a Mini-PCIe card, remove the following left chassis cover by loosening the six screws that are securing the cover.
2. Locate the Mini-PCIe slot inside the system.
3. Align the key of the mini-PCIe card to the mini-PCIe interface, and insert the card slantwise.



4. Push the mini-PCIe card down and fix it with the an M2 screw.

Mini PCIe:

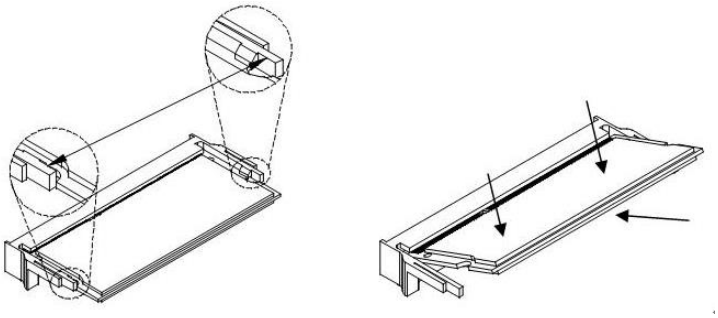




2.1.6 Memory Module Installation

There are two SO-DIMM memory slots inside the system. The maximum memory capacity is 32GB. Follow the instructions below to remove, replace or install memory modules.

1. Remove the left chassis cover by loosening the six screws that are securing the cover.
2. Locate the memory slots inside the system.
3. Align the key of your memory module with that on the memory slot and insert the module slantwise.
4. Gently push the module until the clips of the slot click to hold the module in place when the module touches the bottom of the slot.



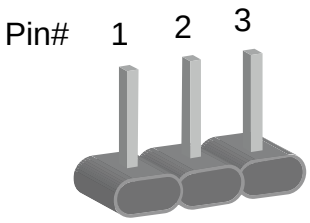
5. To remove the module, press the clips outwards with both hands.

2.2 Setting the Jumpers

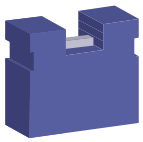
Set up and configure your device by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

2.2.1 How to Set Jumpers

Jumpers are short-length conductors consisting of several metal pins with a non-conductive base mounted on the circuit board. Jumper caps are used to have the functions and features enabled or disabled. If a jumper has 3 pins, you can connect either PIN1 to PIN2 or PIN2 to PIN3 by shorting.

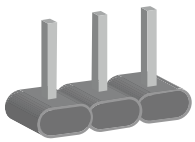
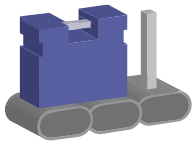
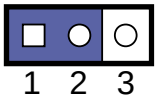
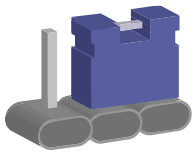
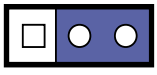


A 3-pin jumper



A jumper cap

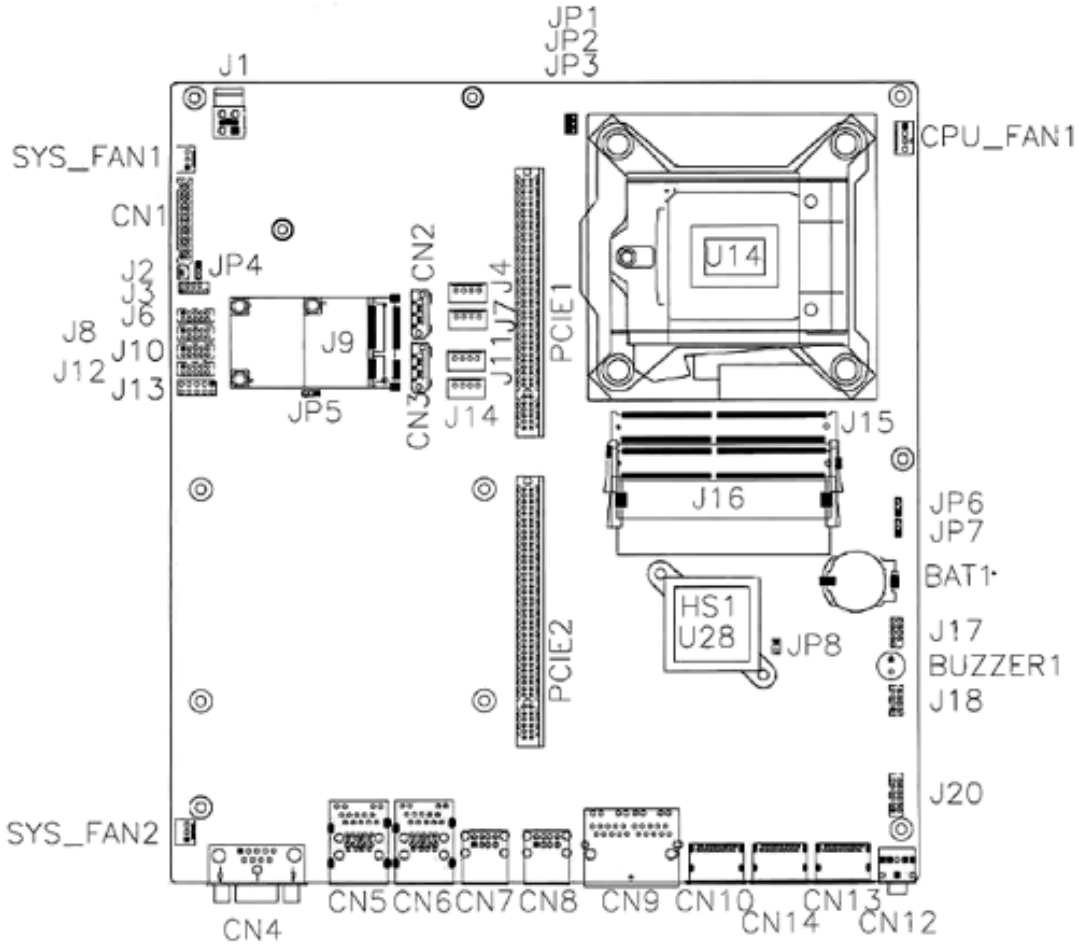
Refer to the illustration below to set jumpers.

Pin closed	Oblique view	Illustration
Open		
1-2		
2-3		

When two pins of a jumper are encased in a jumper cap, this jumper is **closed**, i.e. turned **On**.

When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

2.3 Jumper & Connector Locations on Motherboard

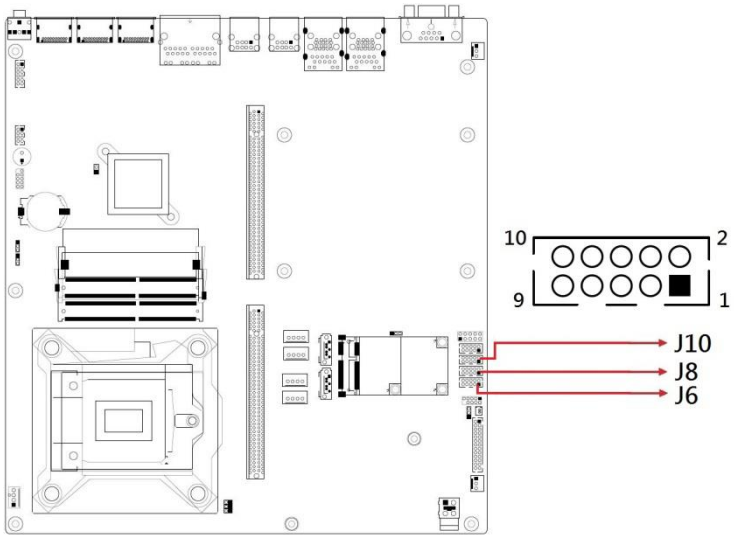


MB211 Motherboard

2.4 Jumpers Quick Reference

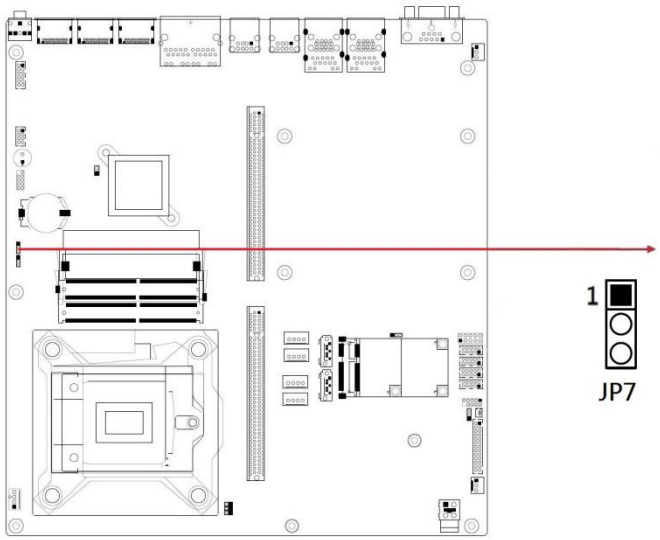
Function	Jumper Name	Page
Clearing CMOS Data	JP6	18
Clearing ME Register	JP7	18
ATX/AT Select	JP4	19
PCIe (x16) Bifurcation Selection	JP1 & JP2	19
PCIe_X16 Reverse	JP3	20
Factory Use Only	JP8	20

2.4.1 Clearing CMOS Data (JP6)



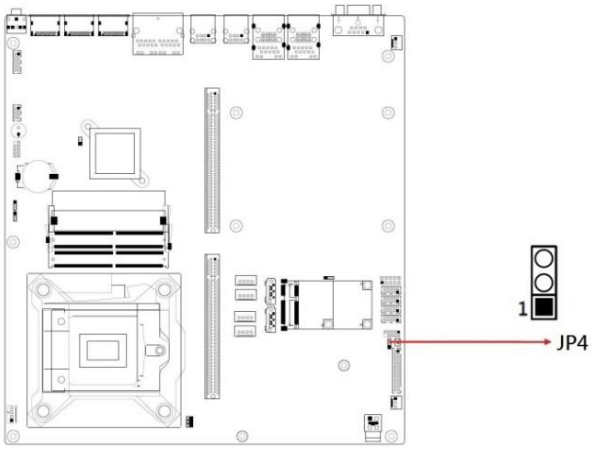
Function	Pin closed	Illustration
Normal (default)	1-2	1
Clear CMOS	2-3	1

2.4.2 JP7: Clearing ME Register



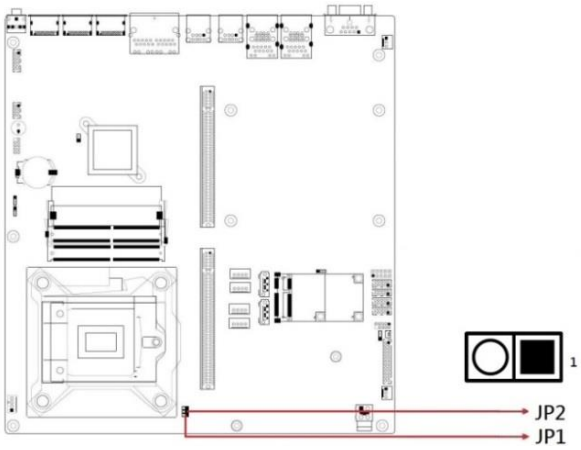
Function	Pin closed	Illustration
Normal (default)	1-2	1
Clear ME	2-3	1

2.4.3 JP4: ATX/AT Select



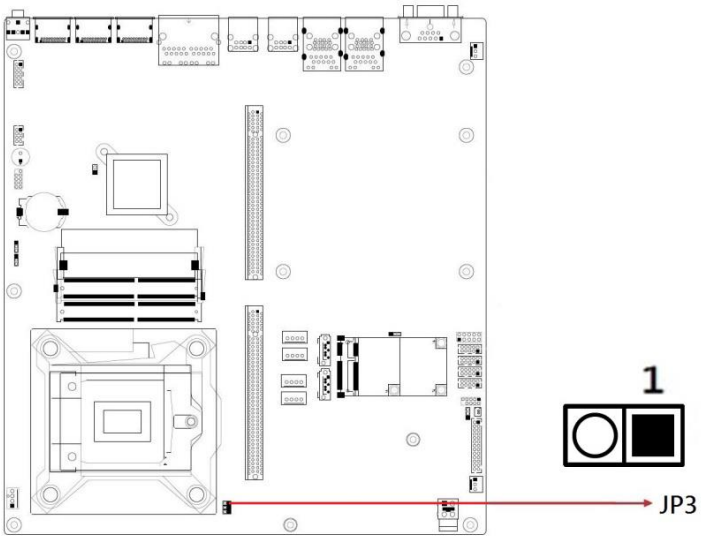
Function	Pin closed	Illustration
ATX(default)	1-2	1
AT Mode	2-3	1

2.4.4 JP1 & JP2: PCIe (x16) Bifurcation Selection



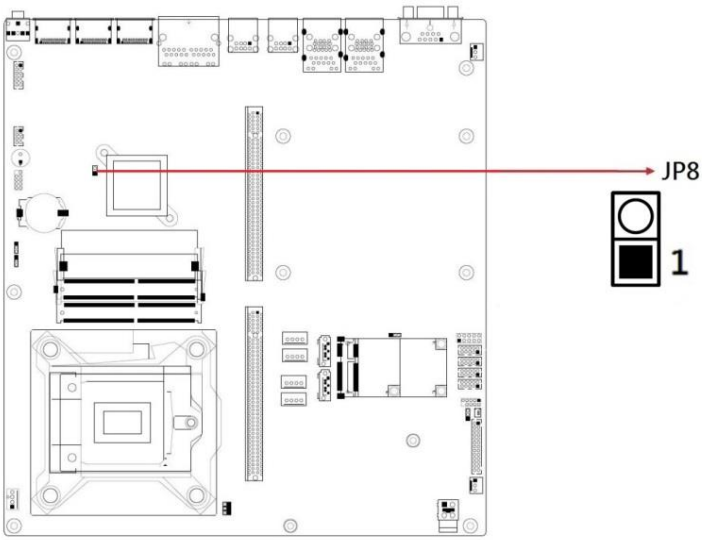
Function	Pin closed	Illustration
1 x PCIe (x16)	**JP1:** Open	1
	JP2: Open	1
2 x PCIe (x8)	**JP1:** Open	1
	JP2: Close	1
1 x PCIe (x8) 2 x PCIe (x4) (default)	**JP1:** Close	1
	JP2: Close	1

2.4.5 JP3: PCIe_X16 Reverse



Function	Pin closed	Illustration
Normal	Open	1
Reverse(default)	Closed	1

2.4.6 JP8: Flash Descriptor Security Override (Factory use only)

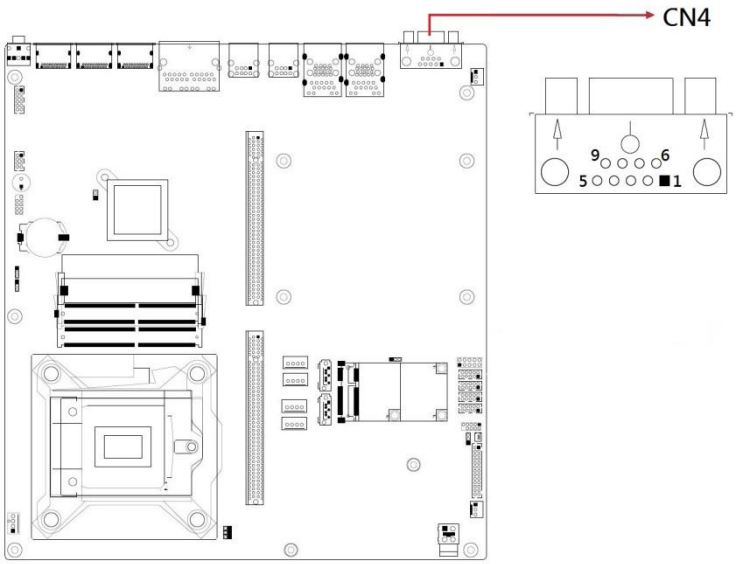


Function	Pin closed	Illustration
Disabled (Default)	Open	1
Enabled	Closed	1

2.5 Connectors Quick Reference

Function	Connector Name	Page
Interface to ABP-ID45	CN1	30
SATA III Port	CN2, CN3	--
COM1 Ports	CN4	--
GbE LAN Port & Dual USB 3.1 Gen1 Ports	CN5, CN6	30
USB 2.0 Connector	CN7, CN8, J18	33
Dual GbE LAN Port	CN9	31
DisplayPort	CN10, CN13, CN14	31
Audio L-OUT Connector	CN12	32
DC_IN Power 2X2 Connector	J1	--
Battery 1/2AA Connector	J2	--
SATA Power Connector	J4,J7	--
COM2 & COM3 & COM4 RS-232 Ports	J10,J8,J6	--
MINI_PCIE Slot	J9	34
PCI Power Connector	J11,J14	--
Digital I/O Connector	J12	--
DDR4 SO-DIMM Slot	J15, J16	--
SPI Flash Header	J17	--
Audio Connector	J20	32
PCIe (x16) Slot	PCIE1	--
PCIe (x16) Combo Slot	PCIE2	--
CPU Fan Connector	CPU_FAN1	--
System Fan Connector	SYS_FAN1 /2	--
Factory Use Only	J3,J13,J19	--

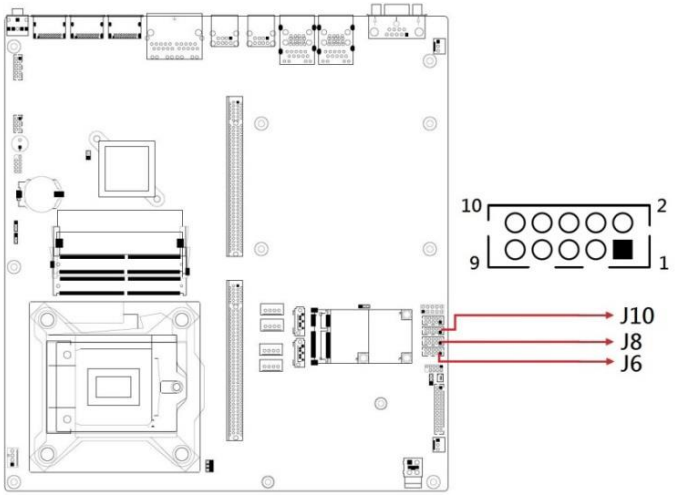
2.5.1 CN4: COM1 RS-232/422/485 Ports



Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	RI, Ring indicator
5	Ground		

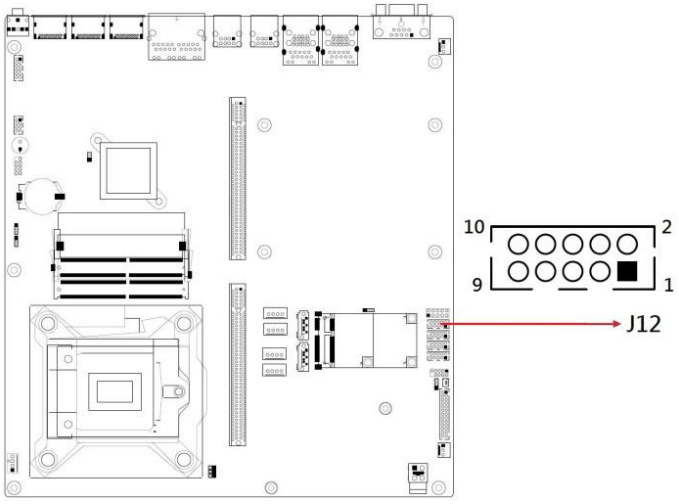
Pin	Signal Name		
	RS-232	RS-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

2.5.2 J6, J8, J10: COM2 & COM3 & COM4 RS-232 Ports



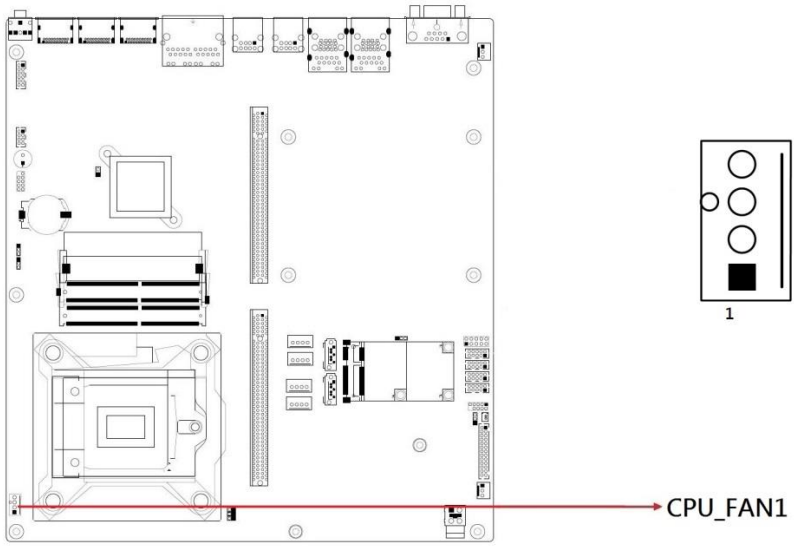
Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	2	RXD, Receive data
3	TXD, Transmit data	4	DTR, Data terminal ready
5	Ground	6	DSR, Data set ready
7	RTS, Request to send	8	CTS, Clear to send
9	RI, Ring indicator	10	Key

2.5.3 J12: Digital I/O Connector



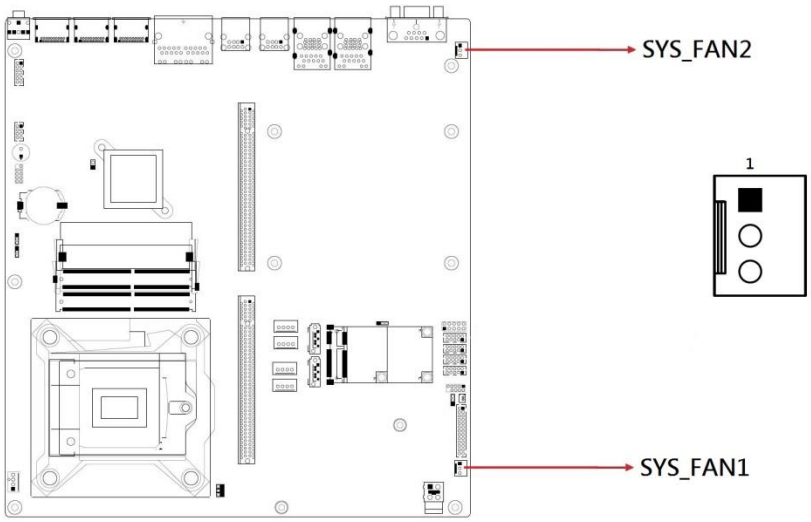
Pin	Signal Name	Pin	Signal Name
1	Ground	2	+5V
3	OUT3	4	OUT1
5	OUT2	6	OUT0
7	IN3	8	IN1
9	IN2	10	IN0

2.5.4 CPU_FAN1: CPU Fan Power Connector



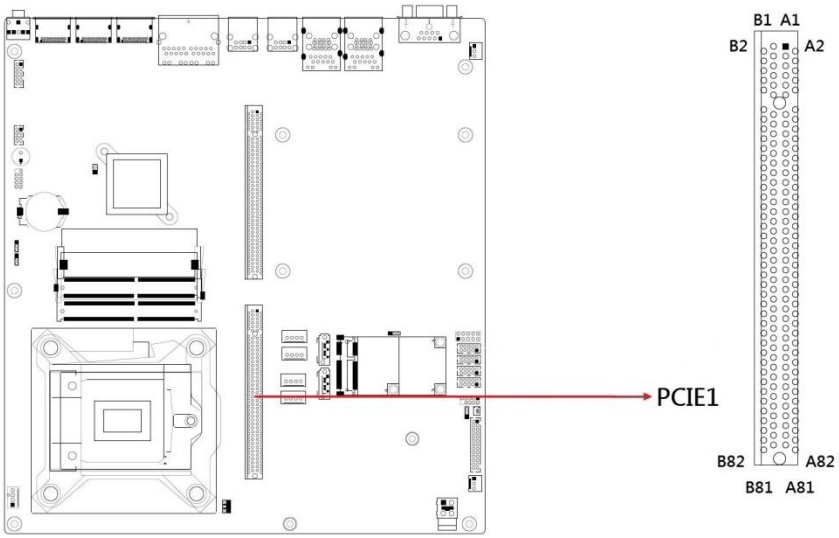
Pin	Signal Name	Pin	Signal Name
1	Ground	3	Rotation detection
2	+12V	4	Control

2.5.5 SYS_FAN1/2: System Fan Power Connector



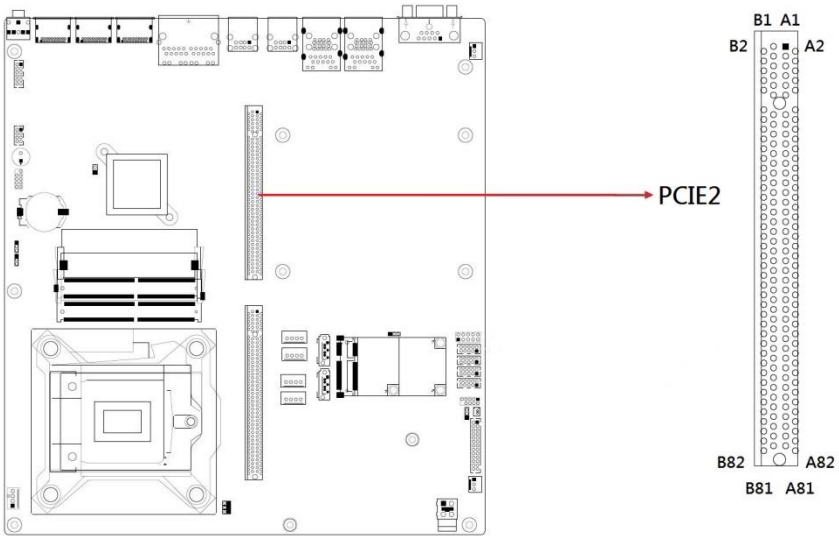
2.5.6 PCIE1: PCIEx16 Slot

(Including PCI-E(x16) signal)

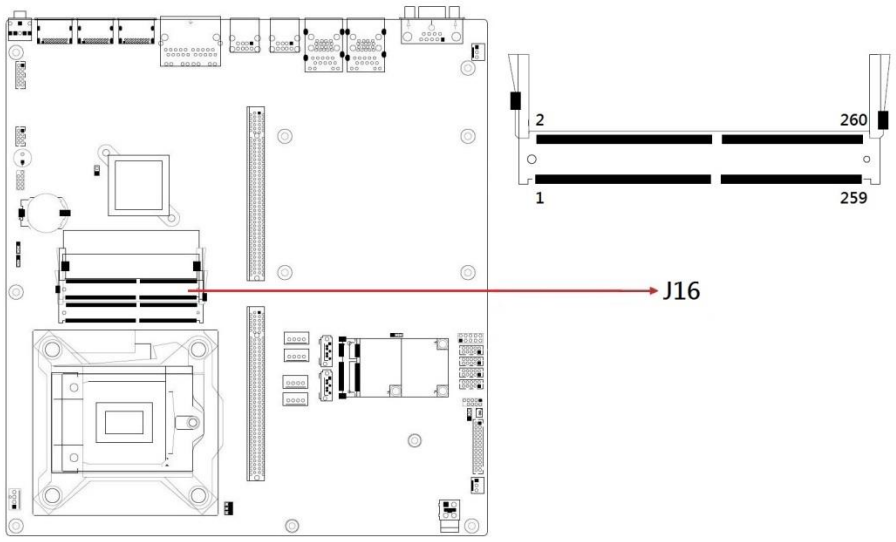


2.5.7 PCIE2: PCIEx16 Slot

(Including PCI-E(x4) & PCI signals)



2.5.8 J16: DDR SO-DIMM Channel A



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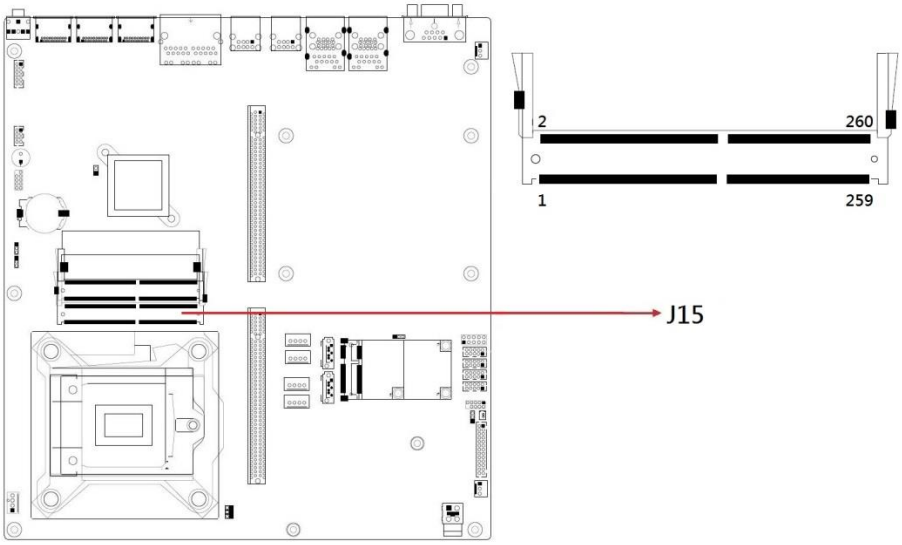
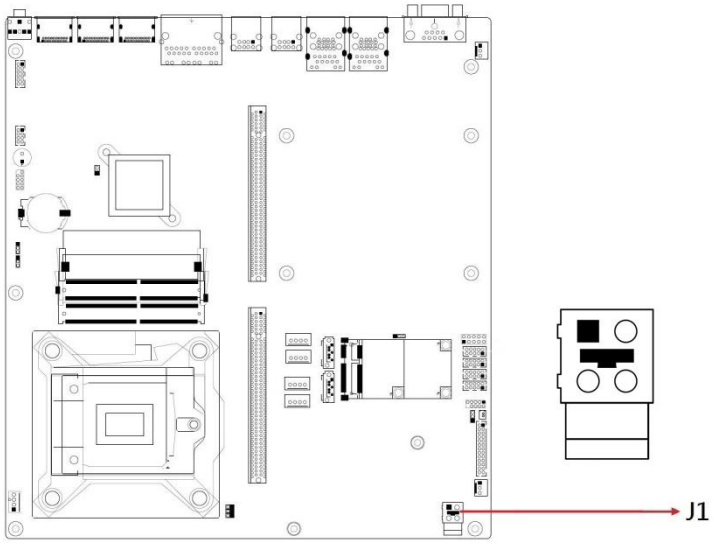
2.5.9 J15: DDR SO-DIMM Channel B

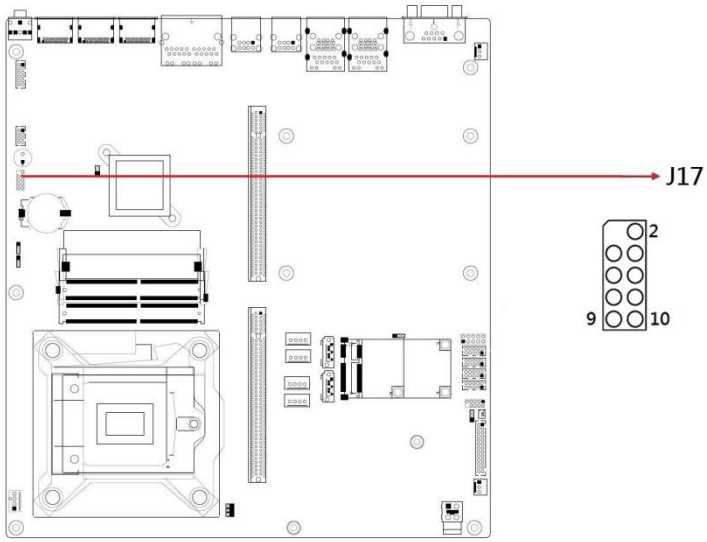


2.5.10 J1: DC-in Connector

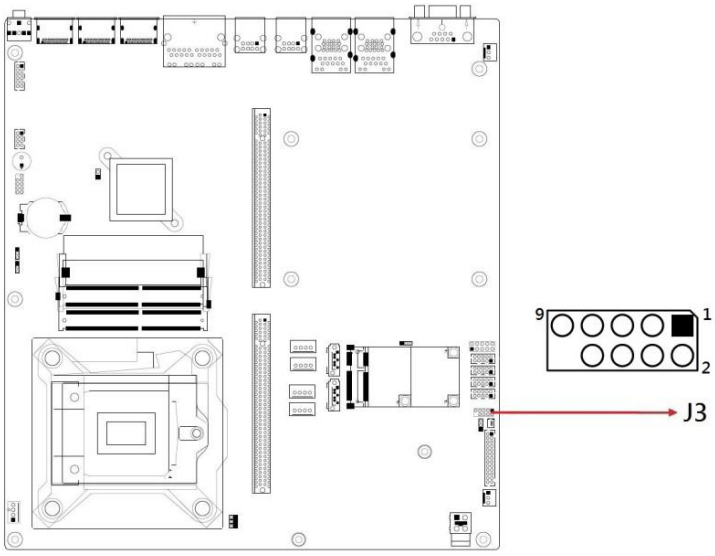


Pin	Signal Name	Pin	Signal Name
1	Power Ground	3	+24V
2	Power Ground	4	+24V

2.5.11 J17: SPI Flash Connector (Factory use only) (2mm)

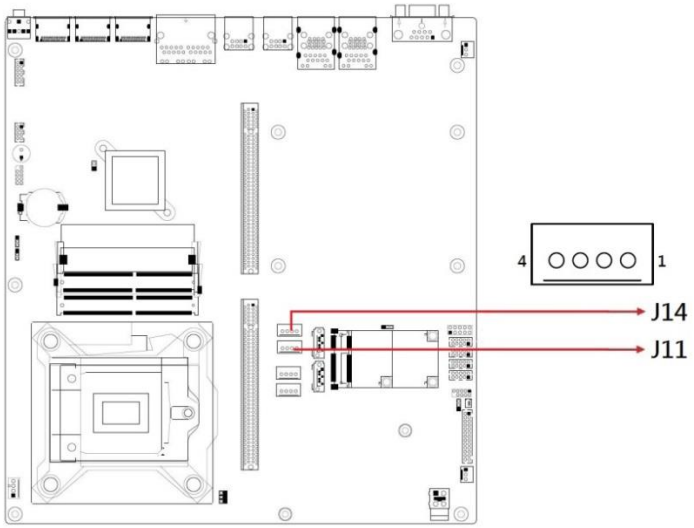


2.5.12 J3: LPC Debug Connector (Factory use only) (2mm)



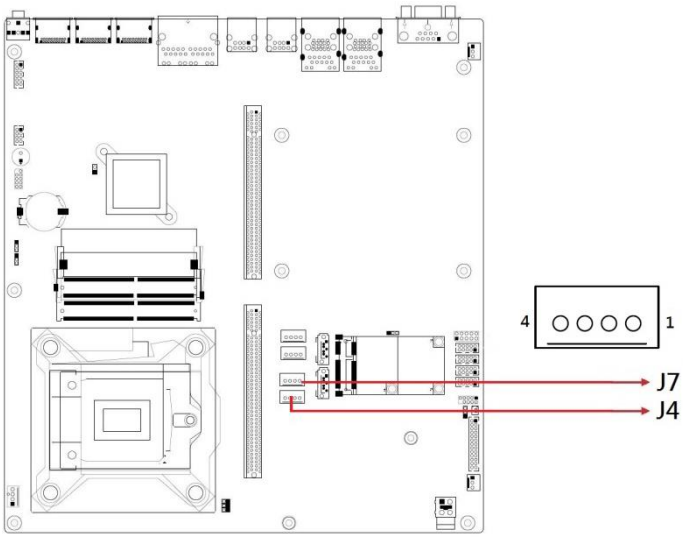
Pin	Signal Name	Pin	Signal Name
1	LPC_AD0	2	Reset#
3	LPC_AD1	4	LPC_FRAME#
5	LPC_AD2	6	+3.3V
7	LPC_AD3	8	Ground
9	CLK_33MHz	10	Protect Pin

2.5.13 J4, J7: SATA Power Connector



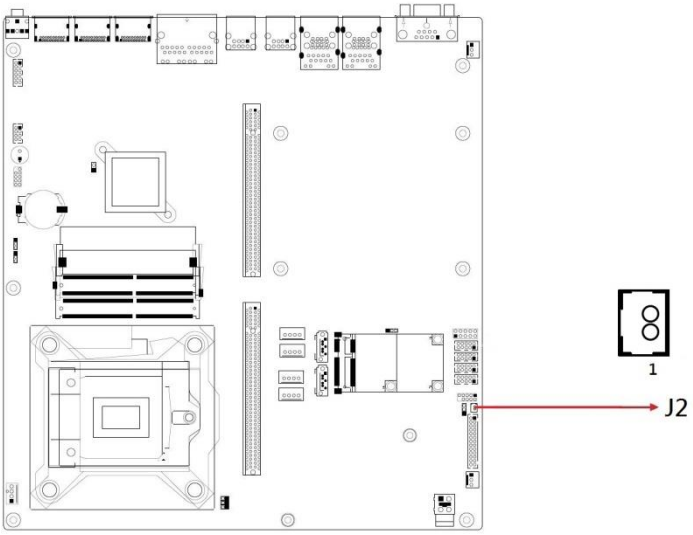
Pin	Signal Name	Pin	Signal Name
1	+5V	3	Ground
2	Ground	4	+12V

2.5.14 J11,J14: PCI Power Connector



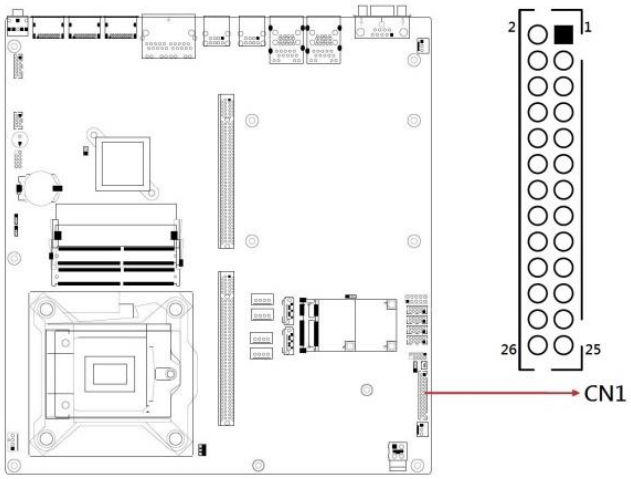
Pin	Signal Name	Pin	Signal Name
1	+5V	3	Ground
2	Ground	4	+12V

2.5.15 J2: Battery 1/2AA Connector

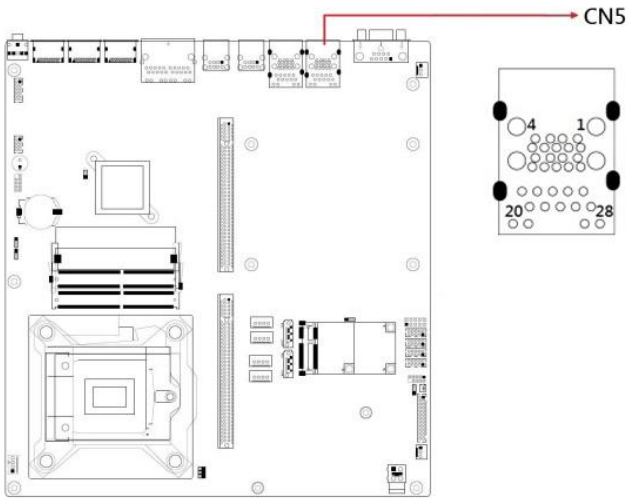


Pin	Signal Name
1	BAT
2	Ground

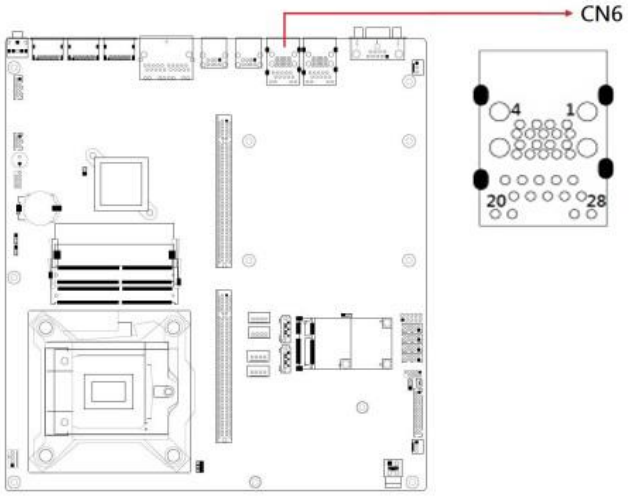
2.5.16 CN1: Interface to ABP-ID45



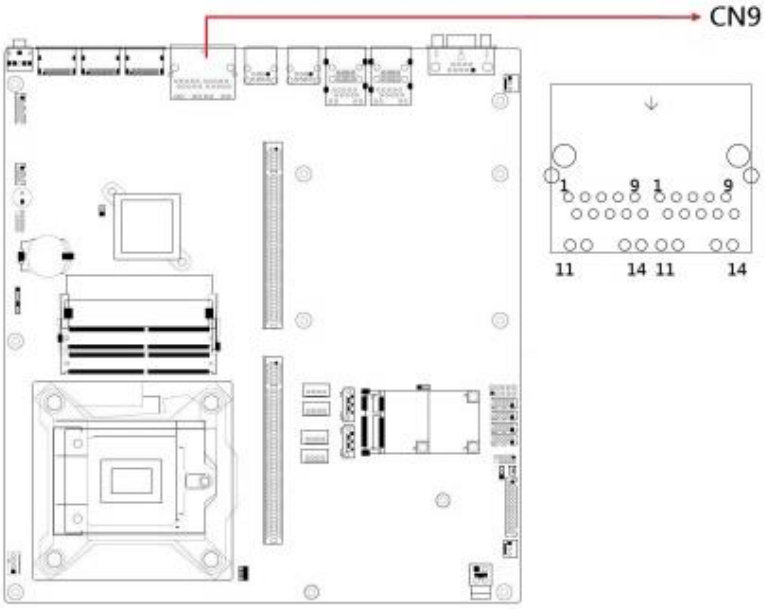
2.5.17 CN5 : RJ45 (I219LM) + USB3.1 Gen1 Connector



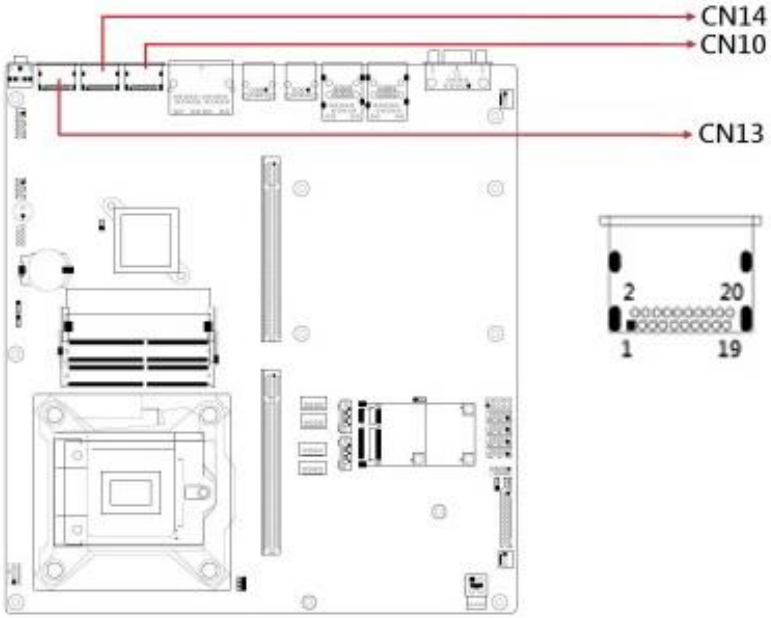
2.5.18 CN6 : RJ45 (I210IT) + USB3.1 Gen1 Connector



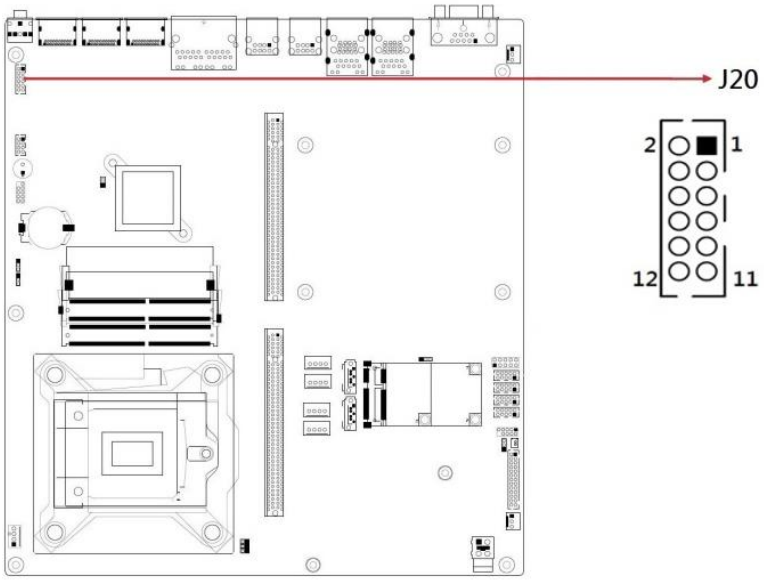
2.5.19 CN9 : Dual RJ45 I210IT Connector



2.5.20 CN10, CN13, CN14 : DP Connector

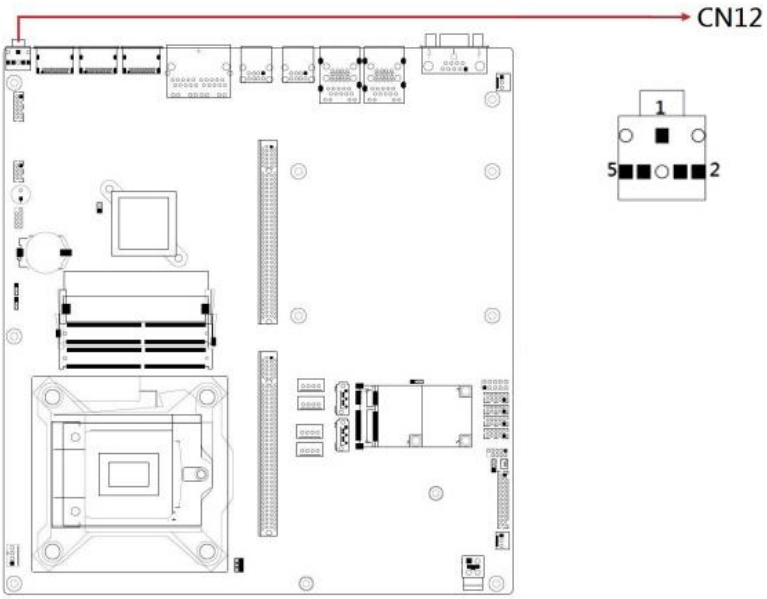


2.5.21 Audio Connector (J20)

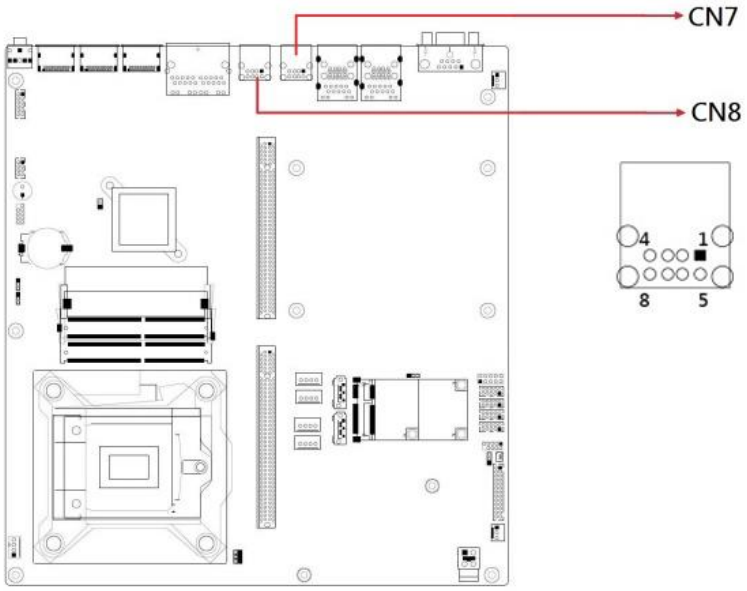


Pin	Assignment	Pin	Assignment
1	Lineout_L	2	Lineout_R
3	JD_FRONT	4	Ground
5	LINEIN_L	6	Linein_R
7	JD_LINEIN	8	Ground
9	MIC_L	10	MIC-R
11	JD_MIC1	12	Ground

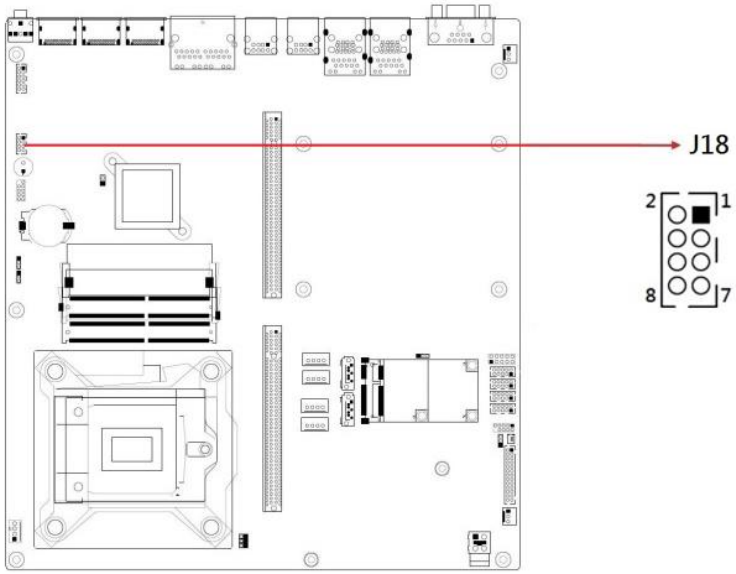
2.5.22 Audio Line-OUT Connector CN12



2.5.23 USB 2.0 Connector CN7 / CN8

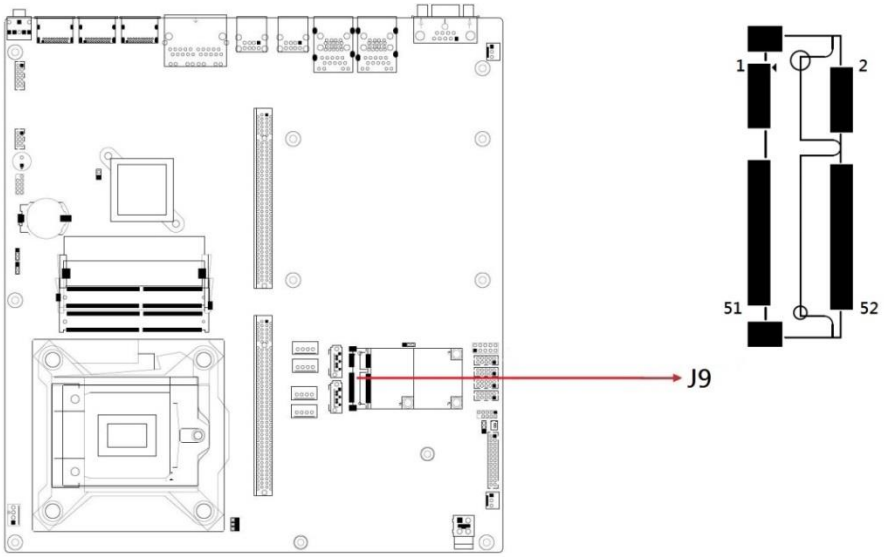


2.5.24 USB 2.0 DF11 Pin Header J18



Pin	Assignment	Pin	Assignment
2	Ground	1	Vcc
4	D+	3	D-
6	D-	5	D+
8	Vcc	7	Ground

2.5.25 Mini-PCIE Connector and mSATA J9



Function	Connector Name	Page
COM1 & COM2 Ports	CN11	21
COM3 & COM4 RS-232 Ports	CN10	22
Digital I/O Connector	J10	22
CPU Fan Connector	CPU_FAN1	23
PCIe (x16) Slot	PCIE2	23
PCIe (x4) Slot	PCIE1	23
DC_IN Power 2X2 Connector	J14	24
DC_IN Connector DINKLE	J15	24
ISMART Debug Connector (factory use)	J1	24-
SPI Flash Connector (factory use)	J2	24
LPC Debug Connector (factory use)	J12	25
SATA Power Connector	J8,J9	25
Reset Button Connector	J11	26
Power Button	SW1/ CN7	26
GbE LAN Port & Dual USB 3.1 Gen1 Ports	CN2, CN3	26
PSE LAN (I210IT)	CN13, CN14	27
Audio Connector	J5	27
SATA III Port	CN8, CN9	--
DDR4 SO-DIMM Slot	J3, J16	--
M.2 M2280 Slot	J7	--
M.2 E2230 Slot	J6	--
M.2 B3042 Slot	J4	--

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Chapter 3
Driver Installation

The information provided in this chapter includes:

- Intel® Chipset Software Installation Utility
- Graphics Driver Installation
- HD Audio Driver Installation
- LAN Driver Installation
- Intel® Management Engine Driver Installation

3.1 Introduction

This section describes the installation procedures for software and drivers. The contents of this section include the following:

Note:

1. After installing your operating system, you must install the Intel® Chipset Software Installation Utility first before proceeding with the drivers installation.
2. Drivers are supported under Microsoft Windows 10 64-bit (RS3/RS4/ RS5) and Server 2016 (RS1) only.

3.1 Intel® Chipset Software Installation Utility

1. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run “CDGuide” to go to the main drivers page as shown. Click **Intel** on the left pane and then **Intel(R) Coffeelake Chipset Drivers** on the right pane.

2. Click **Intel(R) Chipset Software Installation Utility**.

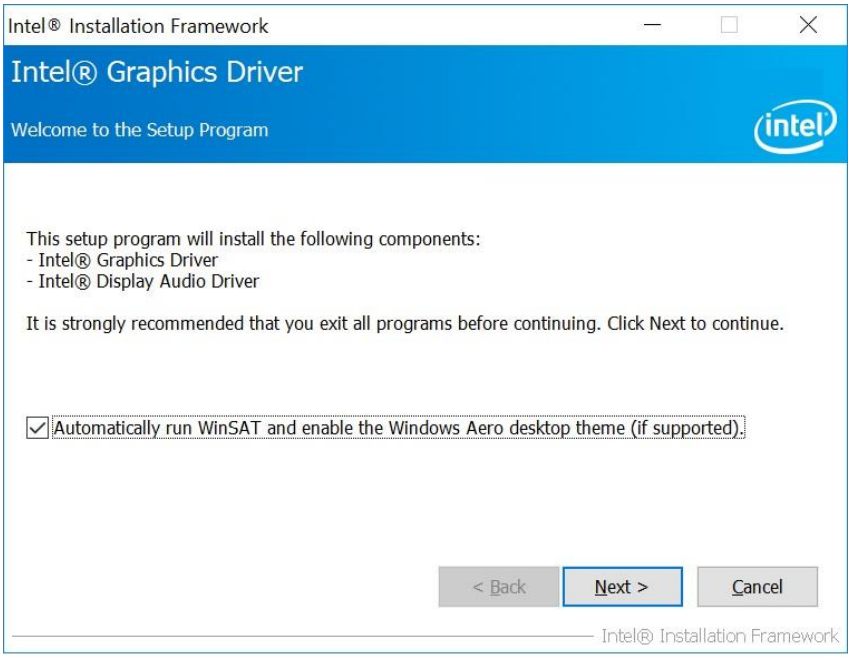
3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.
4. Accept the software license agreement and proceed with the installation process.
5. On the *Readme File Information* screen, click **Install** for installation.
6. When the driver is completely installed, restart the computer for changes to take effect.

3.2 HD Graphics Driver Installation

1. Click **Intel(R) Coffeelake Chipset Drivers** on the right pane.

2. Click **Intel(R) HD Graphics Driver**.

3. When the *Welcome* screen appears, click **Next** to continue.



4. Accept the license agreement and click **Next**.
5. On the *Readme File Information* screen, click **Next** until the installation starts.
6. When the driver is completely installed, restart the computer for changes to take effect.

3.3 HD Audio Driver Installation

1. Click **Intel(R) Coffeelake Chipset Drivers** on the right pane.

2. Click **Realtek High Definition Audio Driver**.

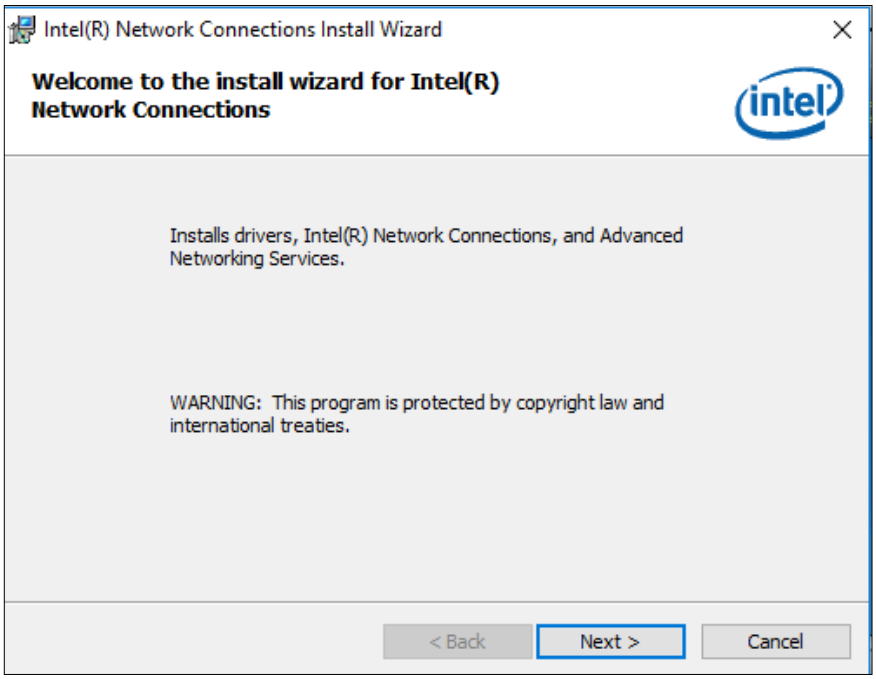
3. On the *Welcome* screen of the InstallShield Wizard, click **Next**.
4. Click **Next** until the installation starts.
5. When the driver is completely installed, restart the computer for changes to take effect.

3.4 LAN Driver Installation

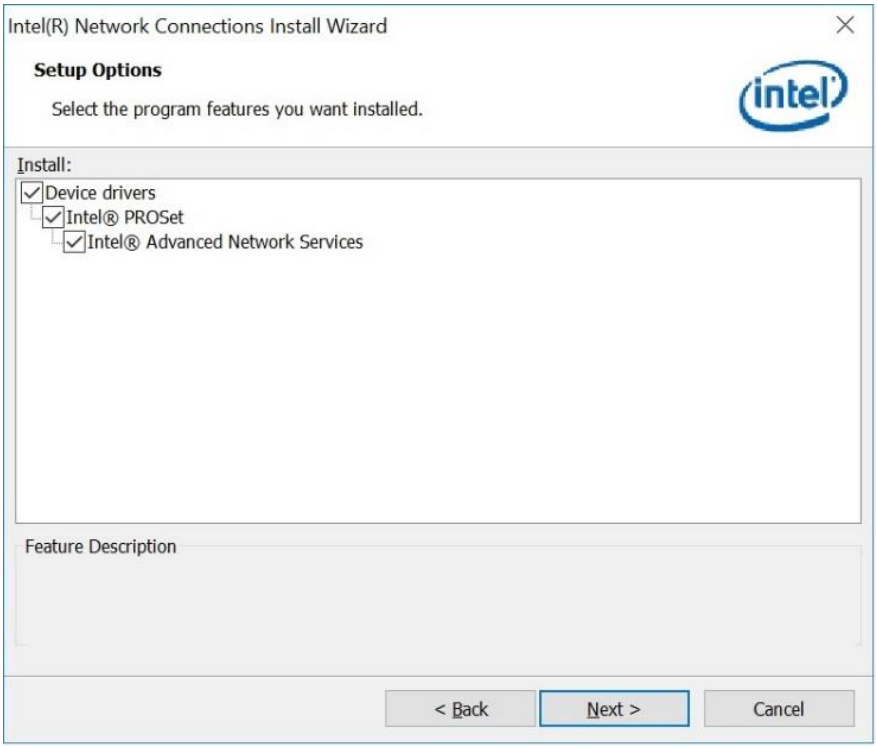
1. Click **Intel(R) Coffeelake Chipset Drivers** on the right pane.

2. Click **Intel(R) PRO LAN Network Drivers**..

3. When the *Welcome* screen appears, click **Next**.



4. Accept the license agreement and click **Next**.
5. On the *Setup Options* screen, click the checkbox to select the desired driver(s) for installation. Then click **Next** to continue.



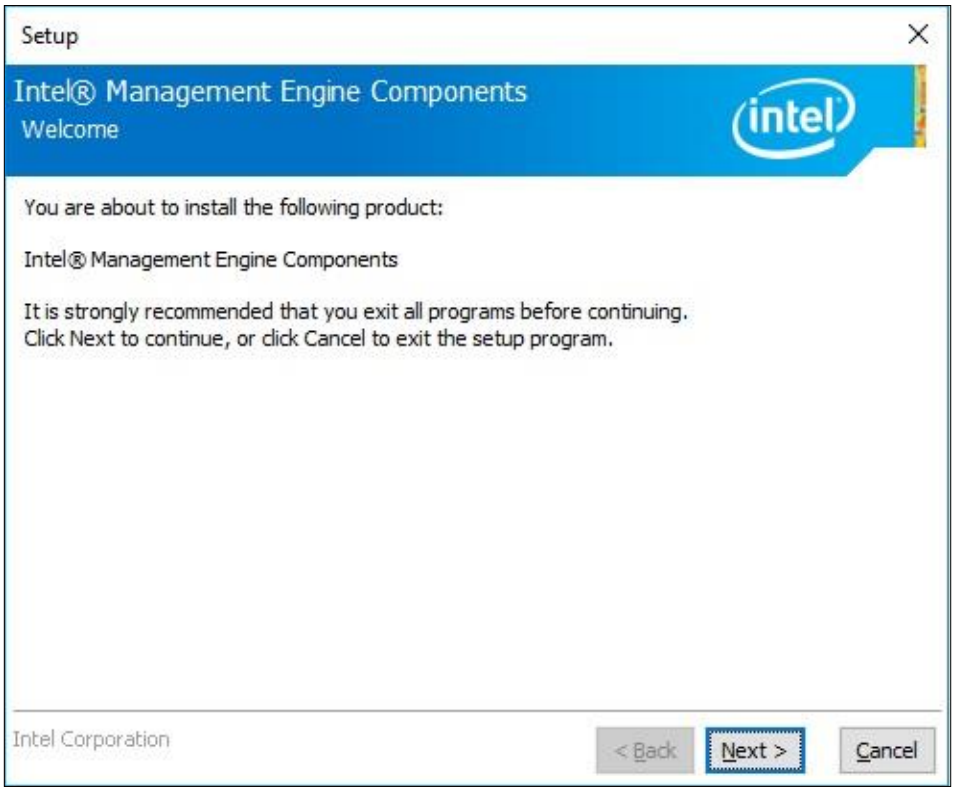
6. The wizard is ready for installation. Click **Install**.
7. As the installation is complete, restart the computer for changes to take effect.

3.5 Intel® Management Engine Drivers Installation

1. Click **Intel(R) Coffeelake Chipset Drivers** on the right pane.

2. Click **Intel(R) ME 12.x Drivers**.

3. When the *Welcome* screen appears, click **Next**.



4. Accept the license agreement, choose a destination folder and click **Next** until the installation starts.
5. Restart the computer when installation is complete.

Chapter 4
BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

- Main Settings
- Advanced Settings
- Chipset Settings
- Security Settings
- Boot Settings
- Save & Exit

4.1 Introduction

The BIOS (Basic Input/Output System) installed in the ROM of your computer system supports Intel® processors. The BIOS provides critical low-level support for standard devices such as disk drives, serial ports and parallel ports. It also provides password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

4.2 BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Press the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. You can also press <F7> to call the pop-up Boot menu immediately.

If you still need to enter Setup, restart the system by pressing the ”Reset” button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again.

The following message will appear on the screen:

```
Press <DEL> to Enter Setup
```

In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

When you enter the BIOS Setup utility, the *Main Menu* screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Warning: It is strongly recommended that you avoid making any changes to the chipset defaults.

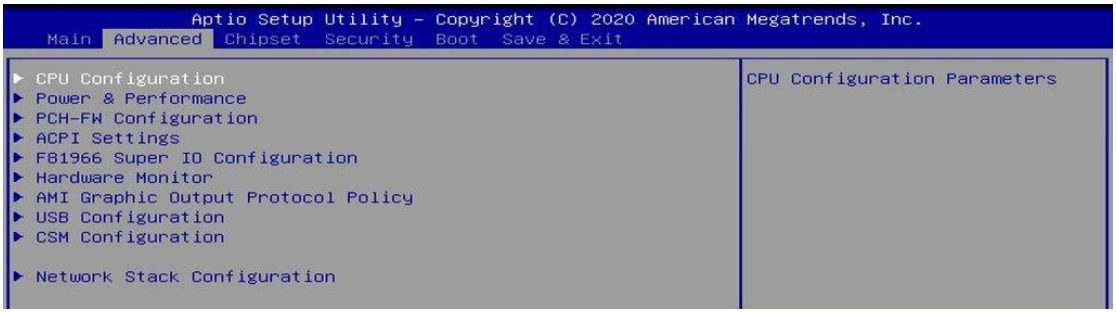
These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could make the system unstable and crash in some cases.

4.3 Main Settings

BIOS Setting	Description
System Language	Choose the system default language.
System Date	Sets the date. Use the <Tab> key to switch between the date elements.
System Time	Set the time. Use the <Tab> key to switch between the time elements.

4.4 Advanced Settings

This section allows you to configure, improve your system and allows you to set up some system features according to your preference.



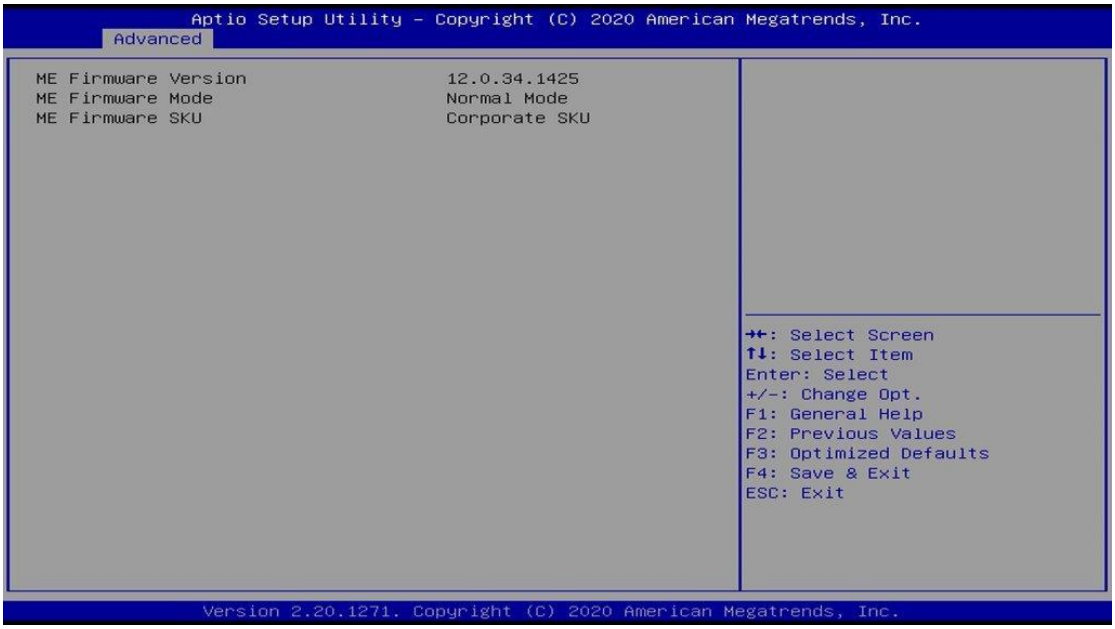
4.4.1 CPU Configuration

BIOS Setting	Description
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	Number of cores to enable in each processor package.
AES	Enable/Disable AES (Advanced Encryption Standard)
Intel Trusted Execution Technology	Enables utilization of additional hardare capabilities provided by Intel (R) Trusted Execution Technology. Changes require a full power cycle to take effect.

4.4.2 Power & Performance

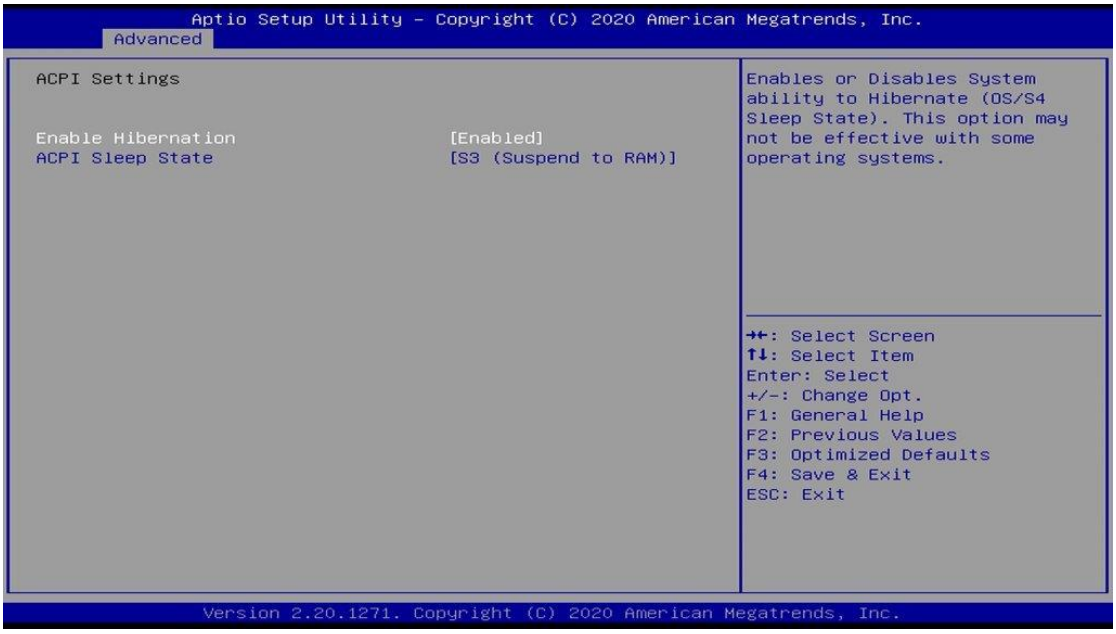
BIOS Setting	Description
CPU – Power Management Control	CPU – Power Management Control Options

4.4.3 PCH-FN Configuration



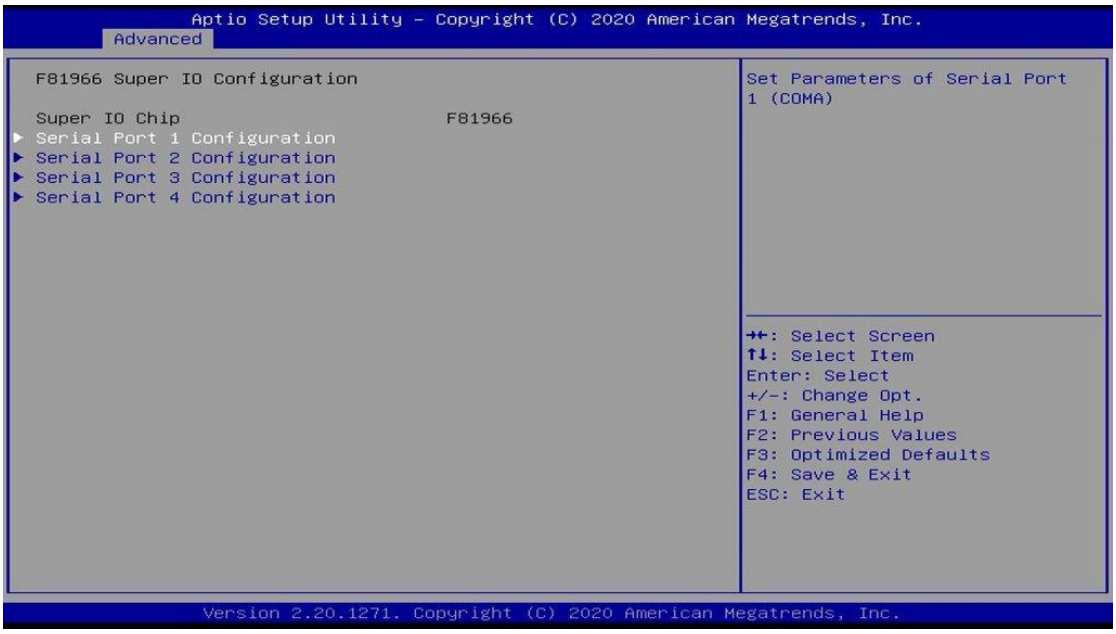
- Configure Management Engine Technology Parameters

4.4.4 ACPI Settings



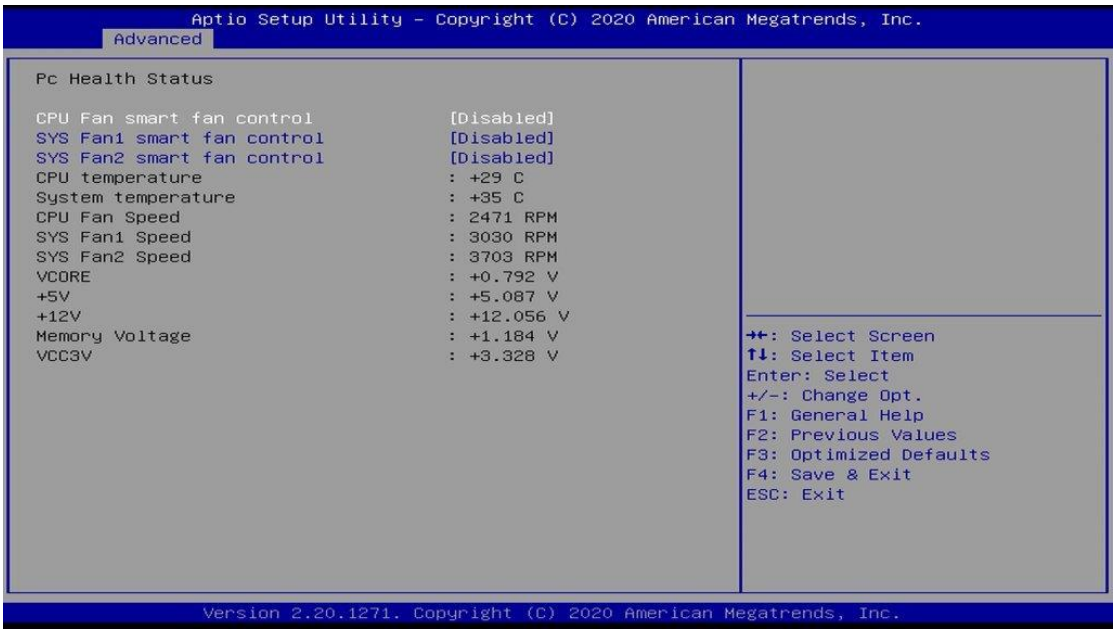
BIOS Setting	Description
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
ACPI Sleep State	Selects the highest ACPI sleep state for the system will enter when the SUSPEND button is pressed. Options: Suspend Disabled S3 (Suspend to RAM)

4.4.5 F81966 Super IO Configuration



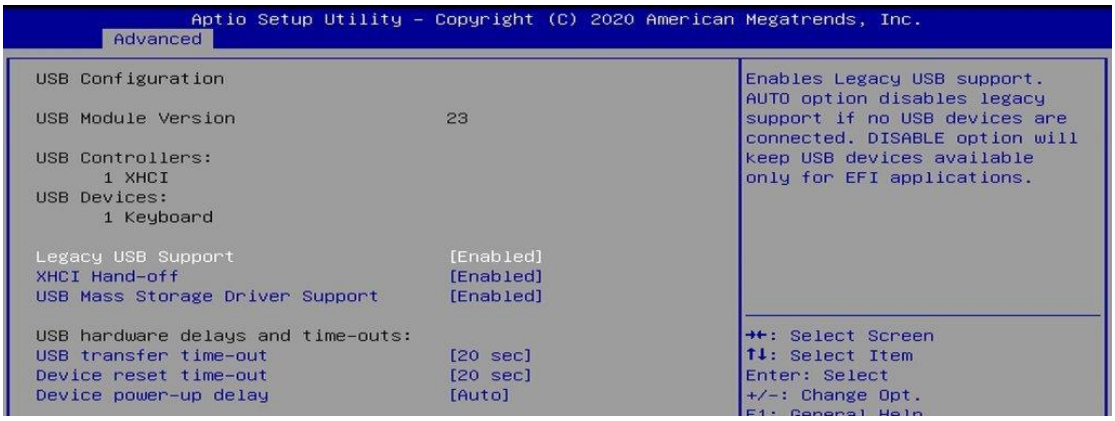
BIOS Setting	Description
Serial Port Configuration	Sets parameters of Serial Ports. Enables / Disables the serial port and select an optimal setting for the Super IO device.

4.4.6 Hardware Monitor



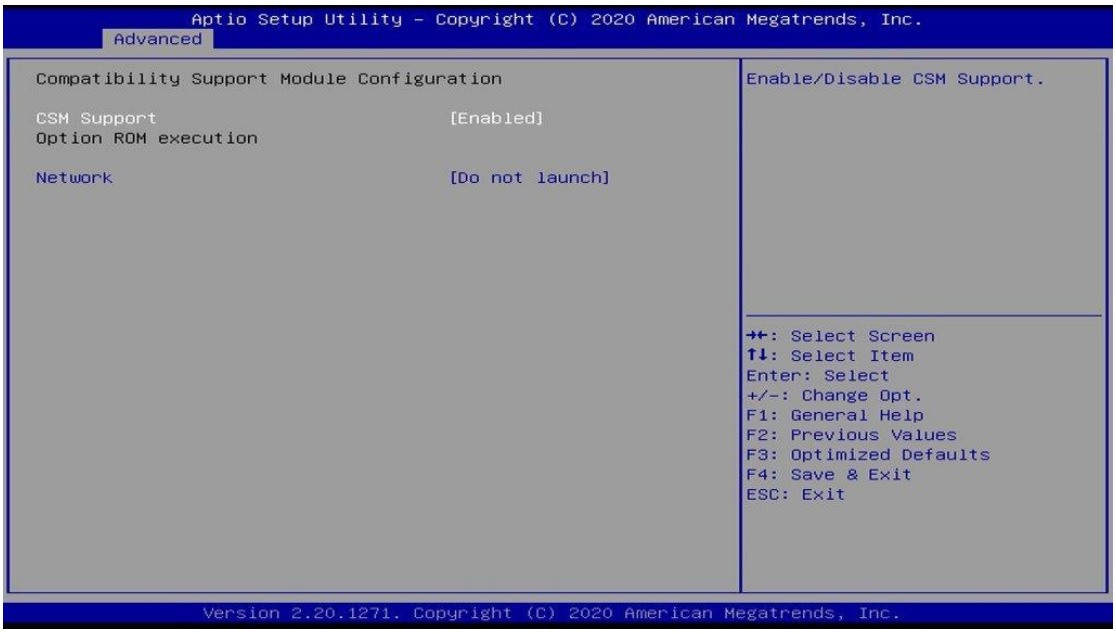
BIOS Setting	Description
CPU Smart Fan Control	Enables / Disables the CPU smart fan feature. Options: Disabled / 50°C / 60°C / 70°C / 80°C / 90°C
System Fan Smart Fan Control	Enables / Disables the system smart fan feature. Options: Disabled / 50°C / 60°C / 70°C / 80°C / 90°C
Temperatures / Voltages	These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

4.4.7 USB Configuration



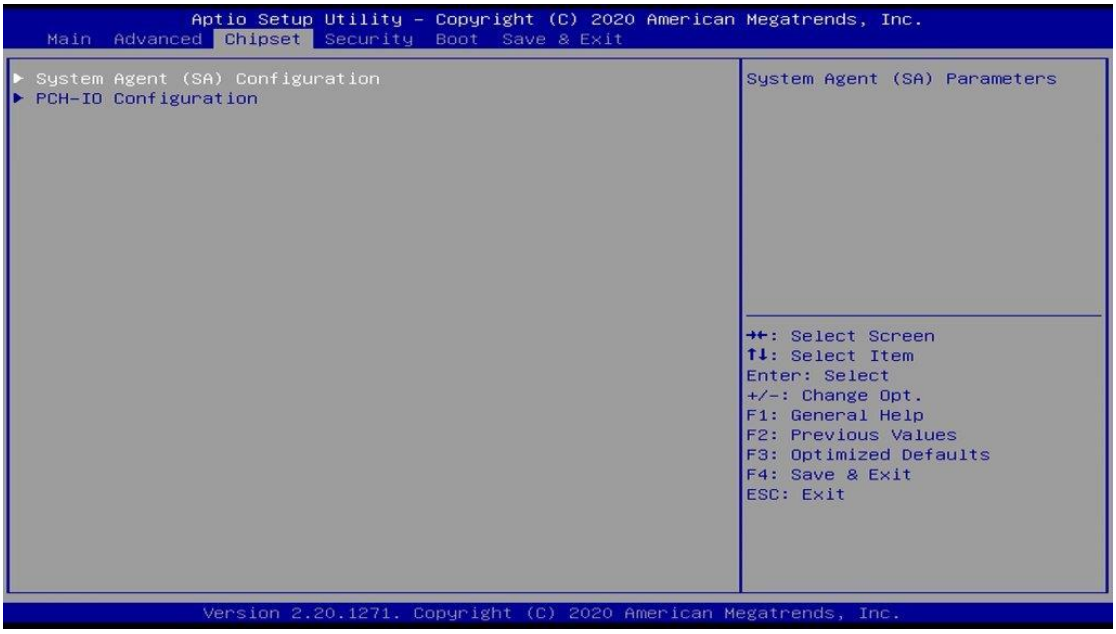
BIOS Setting	Description
Legacy USB Support	Enables Legacy USB support. • **Auto** disables legacy support if there is no USB device connected. • **Disable** keeps USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables the support for USB mass storage driver.
USB Transfer time-out	The time-out value for control, bulk, and Interrupt transfers. Options: 1 sec / 5 sec / 10 sec / 20 sec
Device reset time-out	Seconds of delaying execution of start unit command to USB mass storage device. Options: 10 sec / 20 sec / 30 sec / 40 sec
Device power-up delay	The maximum time the device will take before it properly reports itself to the Host Controller. Auto uses default value for a Root port it is 100ms. But for a Hub port, the delay is taken from Hub descriptor. Options: Auto / Manual

4.4.8 CSM Configuration



BIOS Setting	Description
CSM Support	Enables / Disables CSM support.
Network	Controls the execution of UEFI and Legacy Network OpROM. Options: Do not launch UEFI, Legacy

4.5 Chipset Settings

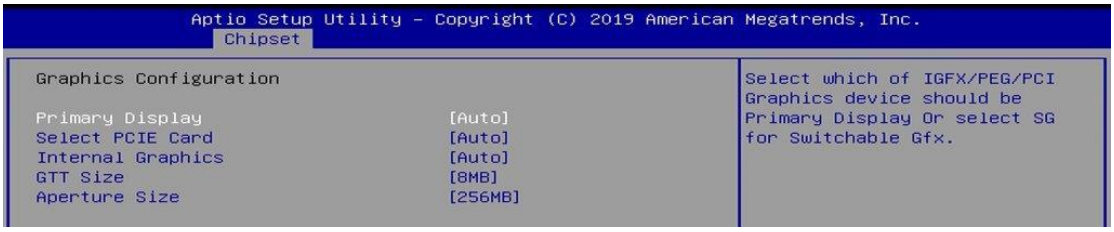


BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters

4.5.1 System Agent (SA) Configuration

BIOS Setting	Description
VT-d	Checks if VT-d function on MCH is supported.
Graphics Configuration	Configures the graphics settings.

4.5.1.1. Graphics Configuration

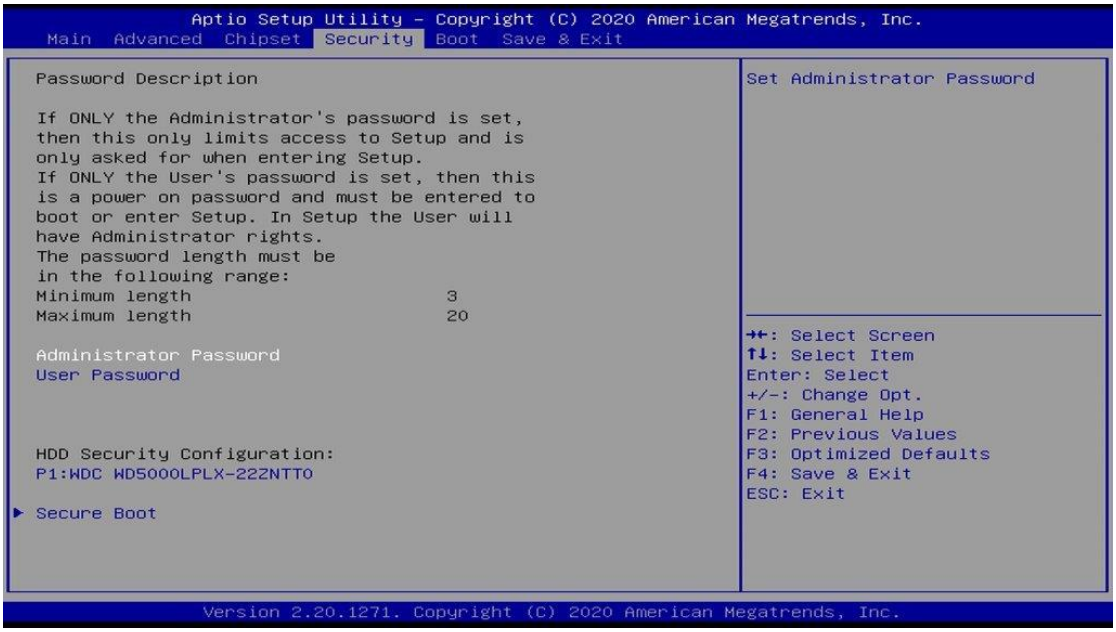


BIOS Setting	Description
Primary Display	Selects which of IGFX/PEG/PCI graphics device should be primary display, or selects SG for switchable Gfx.
Select PCIE Card	Select the card used on the platform. **Auto:** Skip GPIO based Power Enable to dGPU. **Elk Creek 4:** DGPU Power Enable = ActiveLow. **PEG Eval:** DGPU Power Enable = ActiveHigh
Internal Graphics	Keep IGFX enabled based on the setup options.
GTT Size	Sets the GTT size as 2 MB, 4 MB, or 8 MB.
Aperture Size	Select the aperture size. Note: Above 4 GB MMIO BIOS assignment is automatically enabled when selecting 2048 MB aperture. To use this feature, disable CSM support.

4.5.2 PCH-IO Configuration

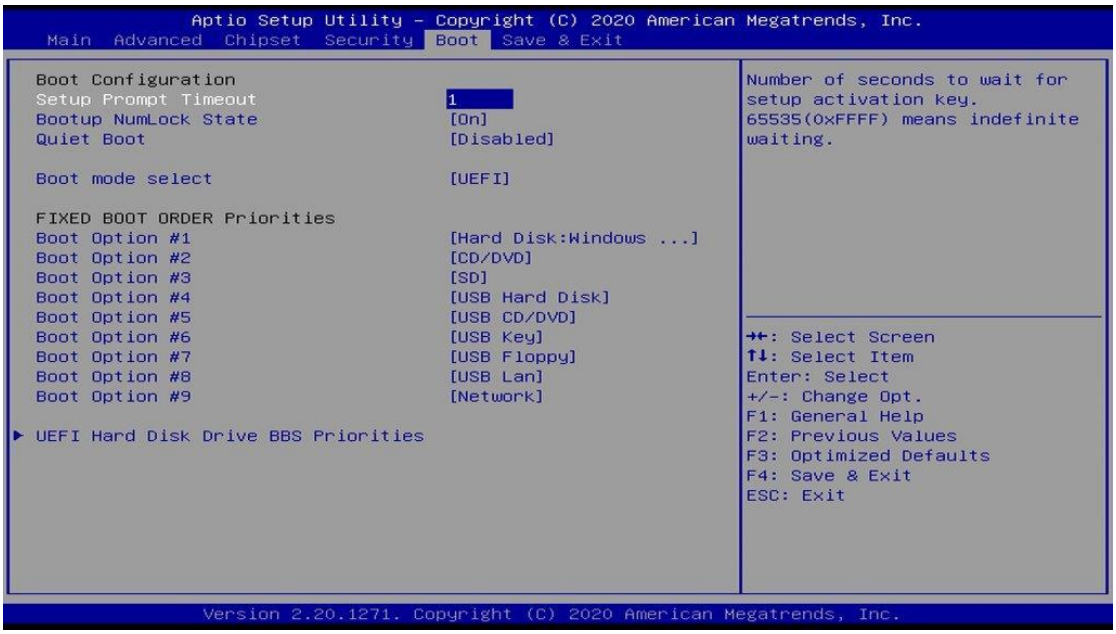
BIOS Setting	Description
SATA and RST Configuration	Configures SATA devices.
PCH LAN Controller	Enables / Disables onboard NIC.
Wake on LAN	Enables / Disables integrated LAN to wake the system.

4.6 Security Settings



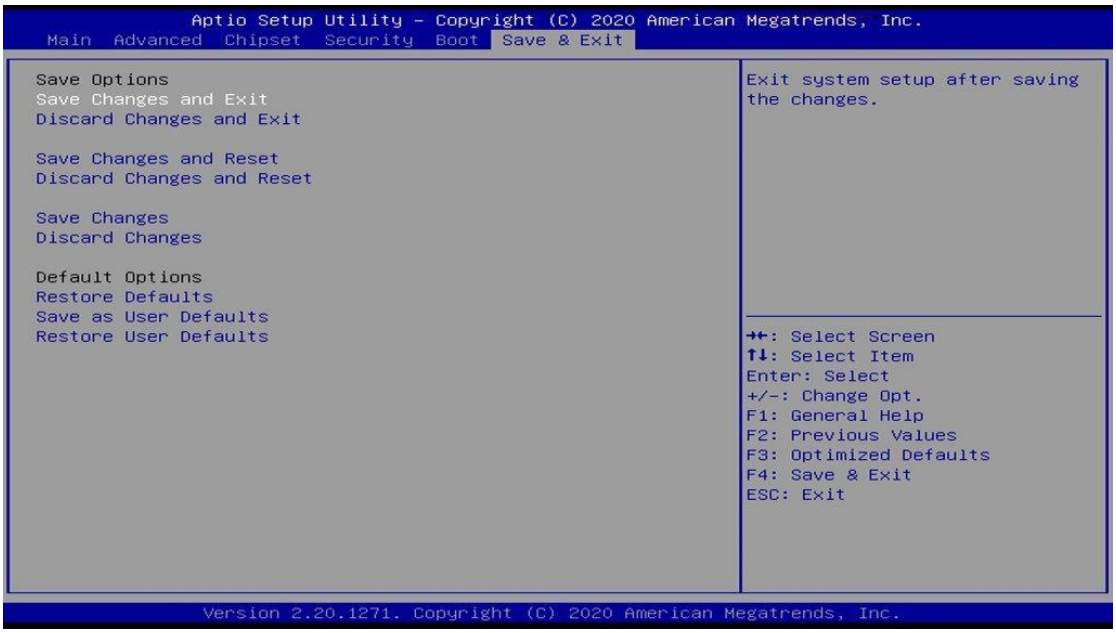
BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
HDD Security Configuration	HDD Security Configuration for selected drive
Secure Boot	Secure Boot feature is Active if Secure Boot is Enabled. Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset.

4.7 Boot Settings



BIOS Setting	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State	Selects the keyboard NumLock state.
Quiet Boot	Enables / Disables Quiet Boot option.
Boot mode select	Selects a Boot mode, Legacy / UEFI.
Fixed Boot Order Priorities	Sets the system boot order.
UEFI Hard Disk Drive BBS Priorities	Specifies the Boot Device Priority sequence from available UEFI Hard Disk Drives

4.8 Save & Exit Settings



BIOS Setting	Description
Save Changes and Exit	Exits system setup after saving the changes.
Discard Changes and Exit	Exits system setup without saving any changes.
Save Changes and Reset	Resets the system after saving the changes.
Discard Changes and Reset	Resets system setup without saving any changes.
Save Changes	Saves changes done so far to any of the setup options.
Discard Changes	Discards changes done so far to any of the setup options.
Restore Defaults	Restores / Loads defaults values for all the setup options.
Save as User Defaults	Saves the changes done so far as user defaults.
Restore User Defaults	Restores the user defaults to all the setup options.

Appendix

This section provides the mapping addresses of peripheral devices and the sample code of watchdog timer configuration.

- I/O Port Address Map
- Interrupt Request Lines (IRQ)
- Watchdog Timer Configuration

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x0000002E-0x0000002F	Motherboard resources
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x00000040-0x00000043	System timer
0x0000004E-0x0000004F	Motherboard resources
0x00000050-0x00000053	System timer
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000064-0x00000064	Standard PS/2 Keyboard
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B2-0x000000B3	Motherboard resources
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller

Address	Device Description
0x000000F0-0x000000F0	Numeric data processor
0x000002E8-0x000002EF	Communications Port (COM4)
0x000002D8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000003F8-0x000003FF	Communications Port (COM1)
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000680-0x0000069F	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x0000164E-0x0000164F	Motherboard resources
0x00001800-0x000018FE	Motherboard resources
0x00001854-0x00001857	Motherboard resources
0x00002000-0x000020FE	Motherboard resources
0x00003000-0x00003FFF	Intel(R) PCI Express Root Port #12 - A333
0x00004000-0x00004FFF	Intel(R) PCI Express Root Port #11 - A332
0x00005000-0x00005FFF	Intel(R) PCI Express Root Port #10 - A331
0x00006000-0x00006FFF	PCI-to-PCI Bridge
0x00006000-0x00006FFF	PCI Standard RAM contoller
0x00006000-0x00006FFF	Intel(R) PCI Express Root Port #5 - A33C
0x00006010-0x0000601F	PCI Standard RAM contoller
0x00007000-0x0000703F	Intel(R) UHD Graphics 630
0x00007060-0x0000707F	Standard SATA AHCI Controller
0x00007080-0x00007083	Standard SATA AHCI Controller
0x00007090-0x00007097	Standard SATA AHCI Controller
0x0000EFA0-0x0000EFBF	Intel(R) SMBus - A323
0x0000FFF8-0x0000FFFF	Intel(R) Active Management Technology - SOL (COM5)

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ 0	System timer
IRQ 1	Standard PS/2 Keyboard
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 5	Communications Port (COM3)
IRQ 7	Communications Port (COM4)
IRQ 11	PCI Standard RAM Controller
IRQ 11	Intel(R) Thermal Subsystem - A379
IRQ 11	Intel(R) SMBus - A323
IRQ 12	Microsoft PS/2 Mouse
IRQ 13	Numeric data processor
IRQ 14	Intel(R) Serial IO GPIO Host Controller - INT3450
IRQ 16	High Definition Audio Controller
IRQ 19	Intel(R) Active Management Technology - SOL (COM5)
IRQ 55~ IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967260	Intel(R) Management Engine Interface
IRQ 4294967261-70	Intel(R) I210 Gigabit Network Connection #3
IRQ 4294967271-80	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967281-90	Intel(R) I210 Gigabit Network Connection
IRQ 4294967291	Intel(R) USB 3.1 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967292	Intel(R) UHD Graphics 630
IRQ 4294967293	Intel(R) Ethernet Connection (7) I219-LM
IRQ 4294967294	Standard SATA AHCI Controller

C. Watchdog Timer Configuration

The Watchdog Timer (WDT) is used to generate a variety of output signals after a user programmable count. The WDT is suitable for the use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven.

Under normal circumstance, you will need to restart the WDT at regular intervals before the timer counts to zero.

Sample Code:

```
//-----------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "F81966.H"
//-----------------------------------------------------------------------------
int main (int argc, char *argv[]);
void EnableWDT(int);
void DisableWDT(void);
//-----------------------------------------------------------------------------
int main (int argc, char *argv[])
{
        unsigned char bBuf;
        unsigned char bTime;
        char **endptr;

        char SIO;

        printf("Fintek 81966 watch dog program\n");
        SIO = Init_F81966();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81966, program abort.\n");
                return(1);
        }//if (SIO == 0)

        if (argc != 2)
        {
                printf(" Parameter incorrect!!\n");
                return (1);
        }

        bTime = strtol (argv[1], endptr, 10);
        printf("System will reset after %d seconds\n", bTime);

        if (bTime)
        {  EnableWDT(bTime); }
        else
        {  DisableWDT(); }
        return 0;
}
//-----------------------------------------------------------------------------
void EnableWDT(int interval)
{
        unsigned char bBuf;
```

```
		bBuf = Get_F81966_Reg(0x2B);
		bBuf &= (~0x20);
		Set_F81966_Reg(0x2B,	bBuf);//Enable WDTO

		Set_F81966_LD(0x07);		//switch to logic device  7
		Set_F81966_Reg(0x30,	0x01);//enable timer

		bBuf = Get_F81966_Reg(0xF5);
		bBuf &= (~0x0F);
		bBuf |= 0x52;
		Set_F81966_Reg(0xF5,	bBuf);//count mode is second

		Set_F81966_Reg(0xF6,	interval);	//set timer

		bBuf = Get_F81966_Reg(0xFA);
		bBuf |= 0x01;
		Set_F81966_Reg(0xFA,	bBuf);//enable WDTO output

		bBuf = Get_F81966_Reg(0xF5);
		bBuf |= 0x20;
		Set_F81966_Reg(0xF5,	bBuf);//start counting
}
//-----------------------------------------------------------------------------
void DisableWDT(void)
{
		unsigned char bBuf;

		Set_F81966_LD(0x07);		//switch to logic device 7

		bBuf = Get_F81966_Reg(0xFA);
		bBuf &= ~0x01;
		Set_F81966_Reg(0xFA,	bBuf);//disable WDTO output

		bBuf = Get_F81966_Reg(0xF5);
		bBuf &= ~0x20;
		bBuf |= 0x40;
		Set_F81966_Reg(0xF5,	bBuf);//disable WDT
}
//-----------------------------------------------------------------------------


//-----------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#include "F81966.H"
#include <dos.h>
//-----------------------------------------------------------------------------
unsigned int F81966_BASE;
void Unlock_F81966 (void);
void Lock_F81966 (void);
//-----------------------------------------------------------------------------
unsigned int Init_F81966(void)
{
		unsigned int result;
		unsigned char ucDid;

		F81966_BASE = 0x4E;
		result = F81966_BASE;

		ucDid = Get_F81966_Reg(0x20);
		if	(ucDid == 0x07)		//Fintek 81966
		{	goto	Init_Finish;	}

		F81966_BASE = 0x2E;
		result = F81966_BASE;

		ucDid = Get_F81966_Reg(0x20);
		if	(ucDid == 0x07)		//Fintek 81966
		{	goto	Init_Finish;	}
```

```
		F81966_BASE = 0x00;
		result = F81966_BASE;

Init_Finish:
		return (result);
}
//-----------------------------------------------------------------------------
void Unlock_F81966 (void)
{
		outportb(F81966_INDEX_PORT, F81966_UNLOCK);
		outportb(F81966_INDEX_PORT, F81966_UNLOCK);
}
//-----------------------------------------------------------------------------
void Lock_F81966 (void)
{
		outportb(F81966_INDEX_PORT, F81966_LOCK);
}
//-----------------------------------------------------------------------------
void Set_F81966_LD( unsigned char LD)
{
		Unlock_F81966();
		outportb(F81966_INDEX_PORT, F81966_REG_LD);
		outportb(F81966_DATA_PORT, LD);
		Lock_F81966();
}
//-----------------------------------------------------------------------------
void Set_F81966_Reg( unsigned char REG, unsigned char DATA)
{
		Unlock_F81966();
		outportb(F81966_INDEX_PORT, REG);
		outportb(F81966_DATA_PORT, DATA);
		Lock_F81966();
}
//-----------------------------------------------------------------------------
unsigned char Get_F81966_Reg(unsigned char REG)
{
		unsigned char Result;
		Unlock_F81966();
		outportb(F81966_INDEX_PORT, REG);
		Result = inportb(F81966_DATA_PORT);
		Lock_F81966();
		return Result;
}
//-----------------------------------------------------------------------------


//-----------------------------------------------------------------------------
//
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// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#ifndef	F81966_H
#define	F81966_H		1
//-----------------------------------------------------------------------------
#define F81966_INDEX_PORT		(F81966_BASE)
#define F81966_DATA_PORT (F81966_BASE+1)
//-----------------------------------------------------------------------------
#define F81966_REG_LD		0x07
//-----------------------------------------------------------------------------
#define F81966_UNLOCK		0x87
#define F81966_LOCK 0xAA
//-----------------------------------------------------------------------------
unsigned int Init_F81966(void);
void Set_F81966_LD( unsigned char);
void Set_F81966_Reg( unsigned char,
unsigned char); unsigned char
Get_F81966_Reg( unsigned char);
//-----------------------------------------------------------------------------
#endif	//	F81966_H
```