DFI

CMS311-W480E/Q470E

microATX Industrial Motherboard
User's Manual

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FCC and DOC Statement on Class B

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

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and the receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio TV technician for help.

Notice:

- The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

- Shielded interface cables must be used in order to comply with the emission limits.

Table of Contents

About this Manual

This manual can be downloaded from the website.

The manual is subject to change and update without notice, and may be based on editions that do not resemble your actual products. Please visit our website or contact our sales representatives for the latest editions.

Warranty

- Warranty does not cover damages or failures that occur from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.

- The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.

- Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.

- We will not be liable for any indirect, special, incidental or consequential damages to the product that has been modified or altered.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

- To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.

- Wear an antistatic wrist strap.

- Do all preparation work on a static-free surface.

- Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.

- Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.

> **Important:**
> Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Safety Measures

- To avoid damage to the system, use the correct AC input voltage range.

- To reduce the risk of electric shock, unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.

About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- 1 CMS311 motherboard
- 1 COM port cables (Length: 300mm, 2 x COM ports) A81-015026-023G
- 1 Serial ATA data cable (Length: 500mm) 332-553001-005G
- 1 I/O shield (4LAN), A49-CMS311-000G
- 1 I/O shield (2LAN), A49-CMS311-100G

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Optional Items

USB 2.0 port cable (Length: 350/398mm)	A81-001066-016G
USB 3.2 Gen2 port cable (Length: 350mm)	A81-001075-017G
COM port cable (Length: 300mm, 2 x COM ports)	A81-015026-023G
Serial ATA data cable (Length: 500mm, W/LOCK)	332-553001-005G
Thermal solution (For 35W, Height: 37.3mm)	A71-101107-000G
Thermal solution (For 65W, Height: 72.8mm)	552-200049-000G
Thermal solution (For 95W/125W, Height: 69.3mm)	761-103001-000G
DP to HDMI Dongle	612-D2H13M-000G
EXT-RS232 (4 ports RS-232 LPC module)	770-EXTRS1-000G
EXT-RS485 (4 ports RS-485 LPC module)	770-EXTRS1-100G
M.2-COM4 (M.2 serial port module)	770-M2COM1-000G
M.2-2LAN (M.2 LAN port module)	770-M22LN1-000G
M.2-2PSE (M.2 PSE module)	770-M22PS1-000G

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Before Using the System Board

When installing the system board in a new system, you will need at least the following internal components.

- Memory module
- Storage device such as a hard disk drive.
- Power supply

External system peripherals may also be required for navigation and display, including at least a keyboard, a mouse and a video display monitor.

Chapter 1 - Introduction

▶ Specifications

System	Processor	10th Gen Intel® LGA 1200 Socket Processors, TDP support up to 125W
		Intel® Xeon® W-1290E (10 Cores, 20M Cache, up to 4.8 GHz; 95W (ECC support on W480E SKU only) Intel® Xeon® W-1290TE (10 Cores, 20M Cache, up to 4.5 GHz); 35W (ECC support on W480E SKU only) Intel® Xeon® W-1270E (8 Cores, 16M Cache, up to 4.8 GHz); 80W (ECC support on W480E SKU only) Intel® Xeon® W-1270TE (8 Cores, 16M Cache, up to 4.4 GHz); 35W (ECC support on W480E SKU only) Intel® Xeon® W-1250E (6 Cores, 12M Cache, up to 4.7 GHz); 80W (ECC support on W480E SKU only) Intel® Xeon® W-1250TE (6 Cores, 12M Cache, up to 3.8 GHz); 35W (ECC support on W480E SKU only) Intel® Core™ i9-10900E (10 Cores, 20M Cache, up to 4.7 GHz); 65W
		Intel® Core™ i9-10900TE (10 Cores, 20M Cache, up to 4.5 GHz); 35W Intel® Core™ i7-10700E (8 Cores, 16M Cache, up to 4.5 GHz); 65W Intel® Core™ i7-10700TE (8 Cores, 16M Cache, up to 4.4 GHz); 35W Intel® Core™ i5-10500E (6 Cores, 12M Cache, up to 4.2 GHz); 65W Intel® Core™ i5-10500TE (6 Cores, 12M Cache, up to 3.7 GHz); 35W Intel® Core™ i3-10100E (4 Cores, 6M Cache, 3.8 GHz); 65W (ECC support on W480E SKU only) Intel® Core™ i3-10100TE (4 Cores, 6M Cache, to 3.6 GHz); 35W (ECC support on W480E SKU only) Intel® Pentium® G6400E (2 Cores, 4M Cache, 3.8 GHz); 58W (Not support on W480E SKU)
		Intel® Celeron® G5900E (2 Cores, 2M Cache, 3.2 GHz); 58W (Not support on W480E SKU)
		Intel® Celeron® G5900TE (2 Cores, 2M Cache, 3.0 GHz); 35W (Not support on W480E SKU)
	Chipset	Intel® W480E/Q470E Chipset
	Memory	Four 288-pin UDIMM up to 128GB
		Dual Channel DDR4 2400/2666/2933 MHz (ECC support: W480E only)
	BIOS	AMI SPI 256Mbit

Graphics	Controller	Intel® HD Gen 9 Graphics	
	Feature	OpenGL 4.5, DirectX 12, OpenCL 2.1	
		HW Decode: AVC/H.264, MPEG2, VC1/WMV9, JPEG/MJPEG, HEVC/H265, VP8, VP9	
		HW Encode: MPEG2, AVC/H264, JPEG, HEVC/H265, VP8, VP9	
	Display	1 x VGA	VGA: resolution up to 1920x1200 @ 60Hz
		1 x DP++	DP++: resolution up to 4096x2160 @ 60Hz
		1 x HDMI 1.4b	HDMI: resolution up to 4096x2160 @ 24Hz
	Multiple Displays	VGA + DP++ + HDMI	
Expansion	Interface	2 x PCIe x16 (Gen 3) (1 x16 signals or 2 x8 signals)	
		1 x PCIe x4 (Gen 3)	
		1 x PCIe x1 (Gen3)	
		1 x M.2 2242/2260/2280 M key (PCIe x4 NVMe with intel RST/Intel Optane Memory support)	
Audio	Audio Codec	Realtek ALC888	
Ethernet	Controller	1 x Intel® i219LM PCIe (10/100/1000Mbps) (only Xeon, Core i9/i7/i5 support iAMT)	
		1 x Intel® i210AT PCIe (10/100/1000Mbps), Co-lay i210AT	
		1 x Intel® x550-AT2 (2 x 10GbE)	
Rear I/O	Ethernet	2 x GbE (RJ-45) 2 x 10GbE (RJ-45)	
	USB	2 x USB 3.2 Gen 2	
		4 x USB 3.2 Gen 1	
	Display	1 x VGA 1 x DP++ 1 x HDMI 1.4b	
	Audio	1 x Line-out 1 x Mic-in	1 x Line-in (opt. by request, MOQ required)
Internal I/O	Serial	2 x RS-232/422/485 (RS-232 w/ power) (2.54mm pitch)	
	USB	2 x USB 3.2 Gen 2	
		2 x USB 3.2 Gen 1	
		4 x USB 2.0 (2.54mm pitch) (colay vertical Type A, MOQ required)	
	Audio	1 x Front Audio Header 1 x S/PDIF	
	SATA	5 x SATA 3.0 (up to 6Gb/s), RAID 0/1/5/10	
	DIO	1 x 16-bit DIO	
	LPC	1 x LPC	
	SMBus	1 x SMBus	
Watchdog Timer	Output & Interval	System Reset, Programmable via Software from 1 to 255 Seconds	
Security	TPM	Infineon TPM2.0 (opt., MOQ required)	

Power	Type	ATX
	Connector	8-pin ATX 12V power
		24-pin ATX power

	Consumption	Typical: i9-10900K: 3.3V @ 0.64A (2.11W);
		   5V @ 1.28A (6.4W); 12V @ 1.19A (14.28W)
		Max.: i9-10900K 3.3V @ 0.9A (2.97W);
		   5V @ 3.11A (15.55W); 12V @ 27.2A (326.4W)

	RTC Battery	CR2032 Coin Cell
OS Support	Microsoft	Windows 10 IoT Enterprise 64-bit
	Linux	Linux
Environment	Temperature	Operating: -5 to 65°C
		Storage: -30 to 60°C with RTC Battery; -40 to 85°C without RTC Battery
	Humidity	Operating: 5 to 95% RH
		Storage: 5 to 95% RH
	MTBF	502,666 hrs @ 25°C ; 281,214 hrs @ 45°C ; 175,117 hrs @ 60°C ; 127,127 hrs @ 70°C Calculation Model: Telcordia Issue 4 Environment: GB, GC - Ground Benign, Controlled
Mechanism	Dimensions	micro ATX Form Factor
		244mm (9.6") x 244mm (9.6")
	Height	PCB: 1.6mm
		Top Side: 38.5mm Bottom Side: 4.4mm
Certifications	Certifications	CE, FCC Class B, RoHS

▶ Features

Watchdog Timer

The Watchdog Timer function allows your application to regularly "clear" the system at the set time interval. If the system hangs or fails to function, it will reset at the set time interval so that your system will continue to operate.

DDR4

DDR4 delivers increased system bandwidth and improves performance. The advantages of DDR4 provide an extended battery life and improve the performance at a lower power than DDR3/DDR2.

Serial ATA

Serial ATA is a storage interface that is compliant with SATA 1.0a specification. With speed of up to 6Gb/s (SATA 3.0), it improves hard drive performance faster than the standard parallel ATA whose data transfer rate is 100MB/s.

Gigabit LAN

Gigabit LAN controllers support up to 1Gbps data transmission.

Wake-On-LAN

This feature allows the network to remotely wake up a Soft Power Down (Soft-Off) PC. It is supported via the onboard LAN port or via a PCI LAN card that uses the PCI PME (Power Management Event) signal. However, if your system is in the Suspend mode, you can power-on the system only through an IRQ or DMA interrupt.

Wake-On-USB

This function allows you to use a USB keyboard or USB mouse to wake up a system from the S3 (STR - Suspend To RAM) state.

PCI Express

PCI Express is a high bandwidth I/O infrastructure that possesses the ability to scale speeds by forming multiple lanes. The x4 PCI Express lane supports transfer rate of 4 Gigabyte per second (2 directions). The PCI Express architecture also supports high performance graphics infrastructure by enhancing the capability of a PCIe x16 Gen 3 at 16GB/s bandwidth (8GB/s in each direction).

ACPI STR

The system board is designed to meet the ACPI (Advanced Configuration and Power Interface) specification. ACPI has energy saving features that enables PCs to implement Power Management and Plug-and-Play with operating systems that support OS Direct Power Management. ACPI when enabled in the Power Management Setup will allow you to use the Suspend to RAM function.

With the Suspend to RAM function enabled, you can power-off the system at once by pressing the power button or selecting "Standby" when you shut down Windows® without having to go through the sometimes tiresome process of closing files, applications and operating system. This is because the system is capable of storing all programs and data files during the entire operating session into RAM (Random Access Memory) when it powers-off. The operating session will resume exactly where you left off the next time you power-on the system.

Power Failure Recovery

When power returns after an AC power failure, you may choose to either power-on the system manually or let the system power-on automatically.

RTC Timer

The Real Time Clock (RTC) installed on the system board allows your system to automatically power-on on the set date and time.

▶ **Block Diagram**
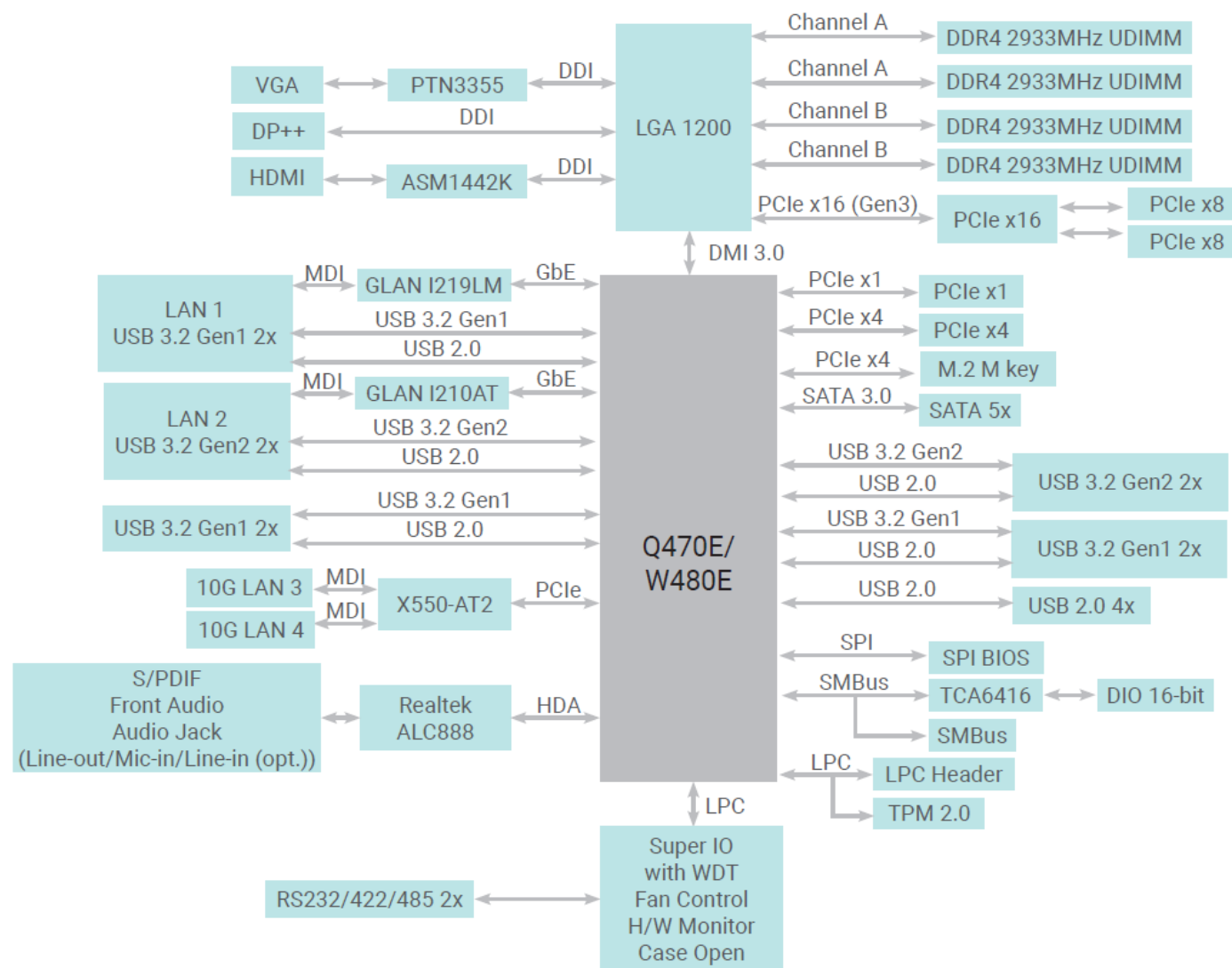
Chapter 2 - Hardware Installation

▶ Board Layout
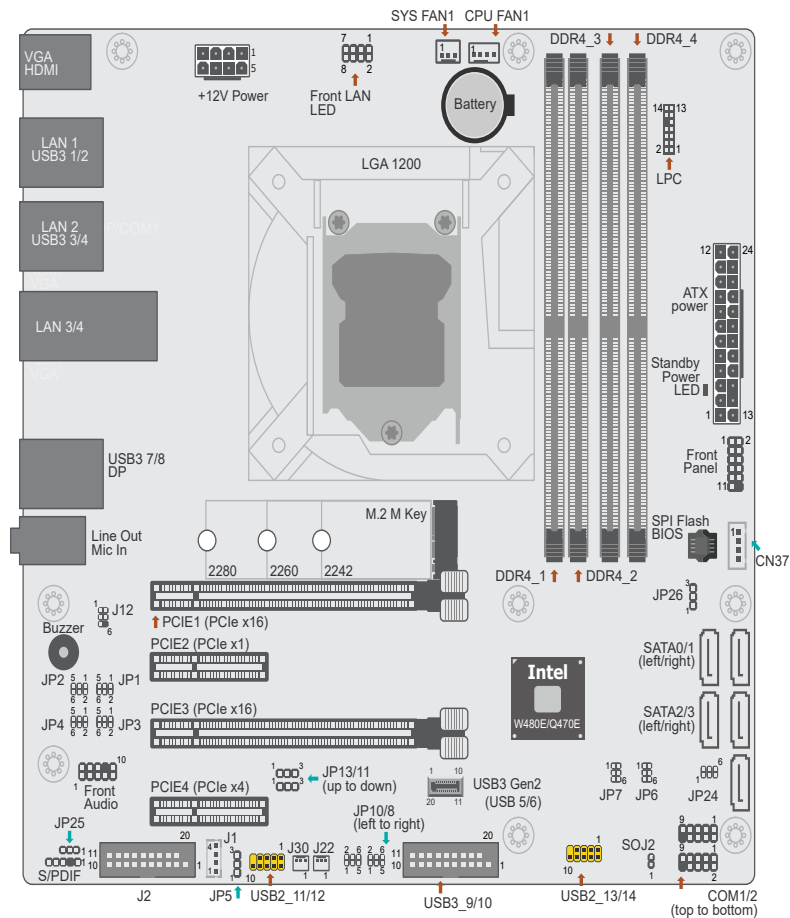
> **Note:**
> Some components are optional and only available upon request.

> **Important:**
> Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

▶ **System Memory**
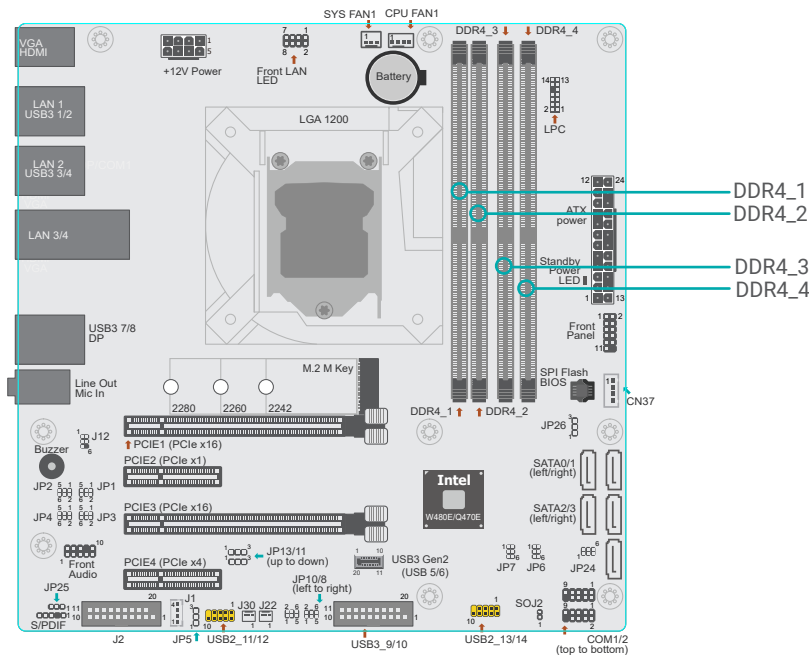
The system board supports the following memory interface.

Single Channel (SC)
Data will be accessed in chunks of 64 bits from the memory channels. DIMMs are on the same channel. DIMMs in a channel can be identical or completely different. However, we highly recommend using identical DIMMs. Not all slots need to be populated.

Dual Channel (DC)
Data will be accessed in chunks of 128 bits from the memory channels. Dual channel provides better system performance because it doubles the data transfer rate.

Features
_____

- Four 288-pin DIMM up to 128GB

- Dual Channel DDR4 2400/2666/2933 MHz (ECC support: W480E only)

Installing the DIMM Module

Before installing the memory module, please make sure that the following safety cautions are well-attended.

- Make sure the PC and all other peripheral devices connected to it has been powered down.

- Disconnect all power cords and cables.

- Locate the DIMM socket on the system board

- Make sure the notch on memory card is aligned to the key on the socket.

⫩ **Memory Module**

↑ Notch

⫩ **Socket Top View**

↑ Key
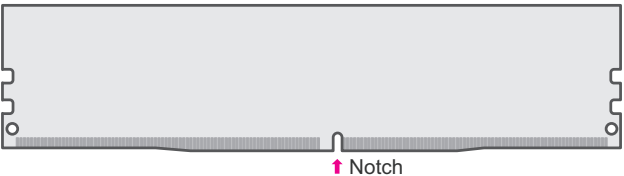
Eject Tab   Eject Tab

⫩ **Socket Side View**

▶ **System Memory** ▶ **Installing the DIMM Module**

Please follow the steps below to install the memory card into the socket.

Step 1:
Press the eject tabs at both ends of the socket outward and downward to release them from the locked position.

Step 2:
Insert the memory card into the slot while making sure the notch and the key are aligned. Press the card down firmly with fingers while applying and maintaining even pressure on both ends.

Step 3:
The tabs snap automatically to the edges of the card and lock the card in place.

Step 1

Step 2

Step 3
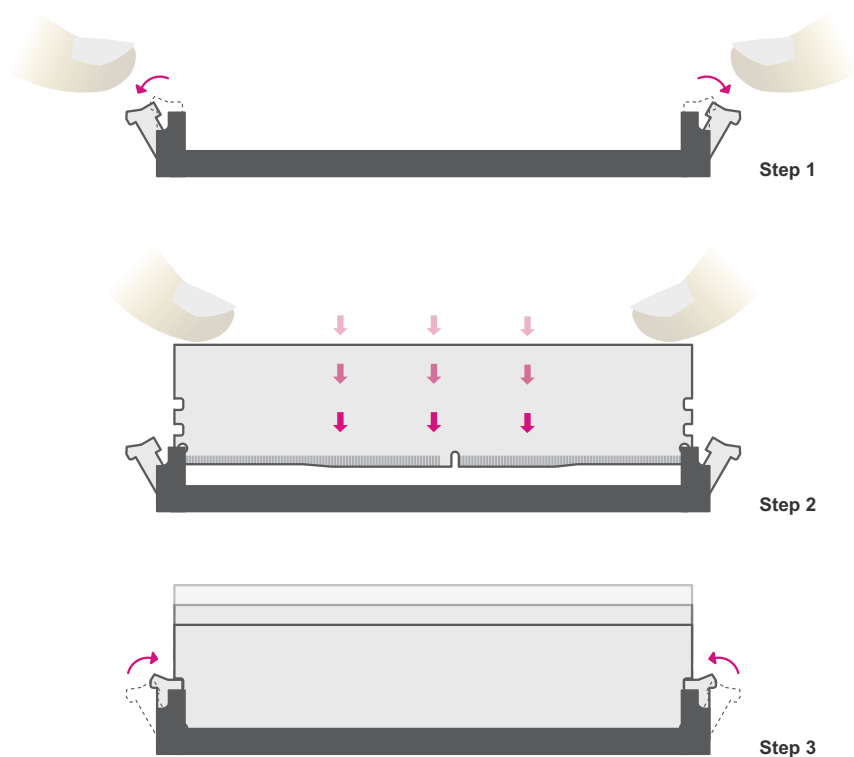
▶ **System Memory**

Removing the DIMM Module

Please follow the steps below to remove the memory card from the socket.

Step 1:
Press the eject tabs at both ends of the socket outward and downward to release them from the locked position.

Step 2:
The memory card ejects from the slot automatically.

Step 3:
Hold the card by its edges and remove it from the slot.

Step 1

Step 2

Step 3
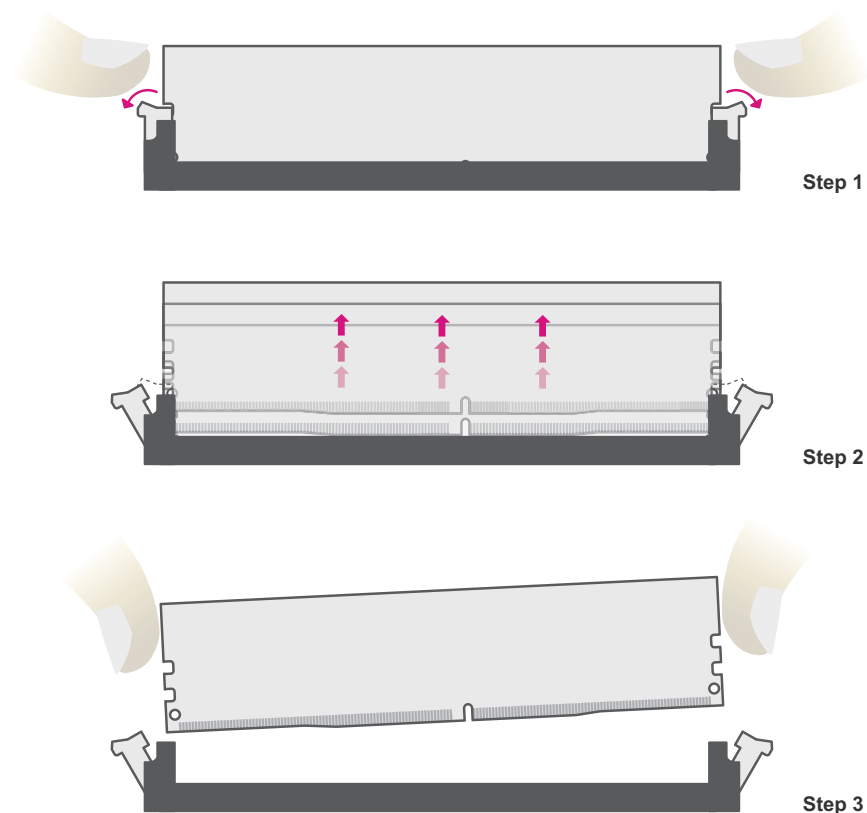
▶ **CPU**

Installing the CPU Fan and Heat Sink

The CPU must be kept cool by using a CPU fan with heat sink. Without sufficient air circulation across the CPU and heat sink, the CPU will overheat damaging both the CPU and system board.

Before you place the heat sink on the CPU, you must apply a thermal paste onto the top of the heat sink. The thermal paste is usually supplied when you purchase the fan with heat sink assembly. Do not spread the paste all over the surface. When you later place the CPU on top of the heat sink, the compound will disperse evenly.

Some heat sinks come with a patch of pre-applied thermal paste. Do not apply thermal paste if the fan with heat sink already has a patch of thermal paste on its underside. Peel the strip that covers the paste before you place the CPU on top of the heat sink.
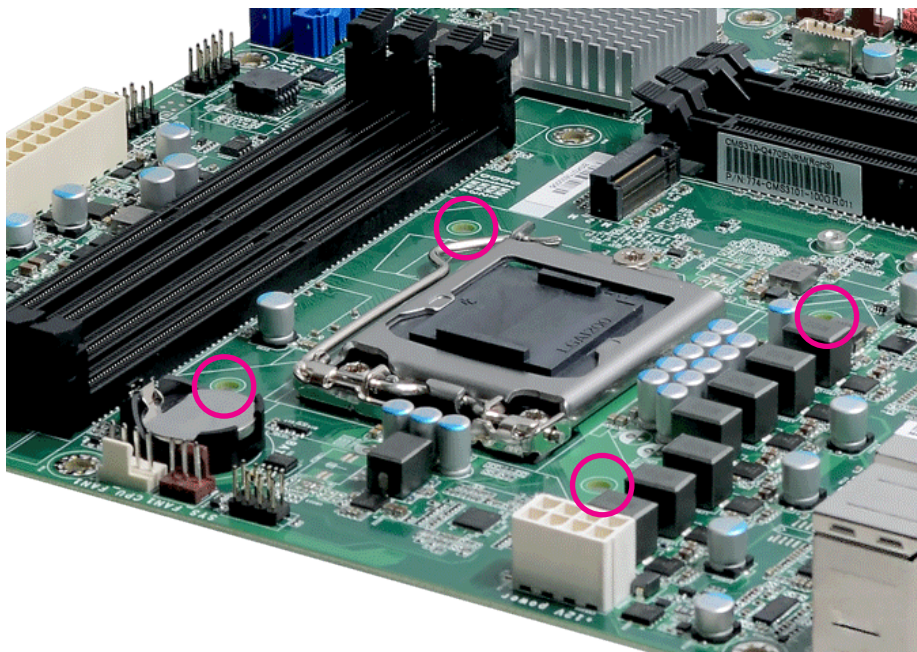
There are 4 screw holes around the CPU for the heat sink to be mounted.
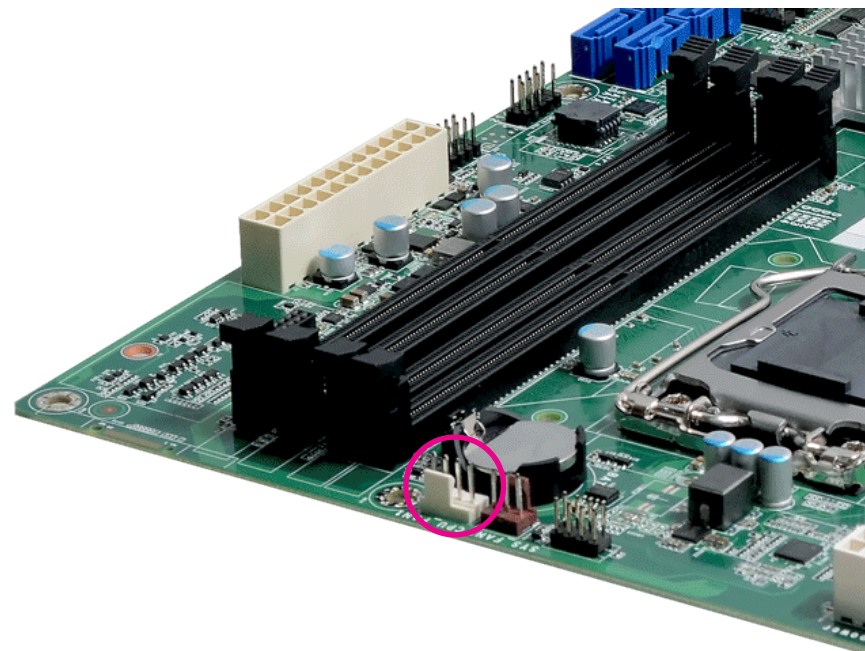
Align the 4 screw holes and tighten the heat sink up by inserting screws, DO remember to connect the fan cable on the board. (The location of fan connector may vary.)

► **Jumper Settings**

CLEAR CMOS Data (JP5)
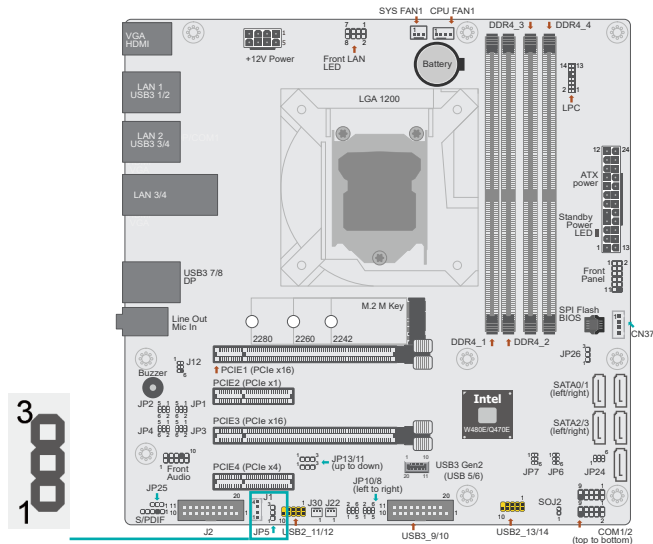
If any anomaly of the followings is encountered —

- a) CMOS data is corrupted;
- b) you forgot the supervisor or user password;
- c) failure to start the system due to BIOS mis-configuration

— it is suggested that the system be reconfigured with default values stored in the ROM BIOS. To load the default values stored in the ROM BIOS, please follow the steps below.

- 1. Power-off the system and unplug the power cord.
- 2. Put a jumper cap on pin 2 and pin 3. Wait for a few seconds and set it back to its default setting, i.e. jumper cap on pin 1 and pin 2.
- 3. Plug the power cord and power-on the system.

Clear CMOS Data	JP5
Normal (default)	1-2 On
Clear CMOS Data	2-3 On

DIO Power (JP11/13)
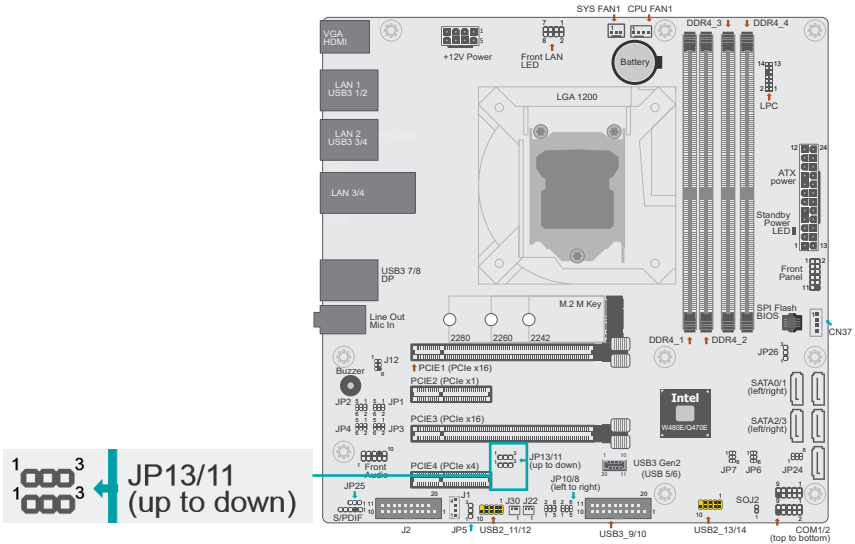
JP13(DIO 8~11 PWR) / JP11(DIO 0~3 PWR)

DIO Power	JP11/13
DIO_PWR	1-2 On
GND	2-3 On

COM1/COM2 RS232/422/485 and Power Select

COM 1 Mode	JP1/JP2	JP3
RS232 (default)	1-3, 2-4	1-3, 4-6
RS422	3-5, 4-6	3-5, 4-6
RS485	3-5, 4-6	3-5, 2-4

COM 1 Power Select	JP4
Standard RS232 (default)	1-3, 2-4 On
RS232 with Power	3-5, 4-6 On

COM 2 Mode	JP6/JP8	JP10
RS232 (default)	1-3, 2-4	1-3, 4-6
RS422	3-5, 4-6	3-5, 4-6
RS485	3-5, 4-6	3-5, 2-4

COM 2 Power Select	JP7
Standard RS232 (default)	1-3, 2-4 On
RS232 with Power	3-5, 4-6 On
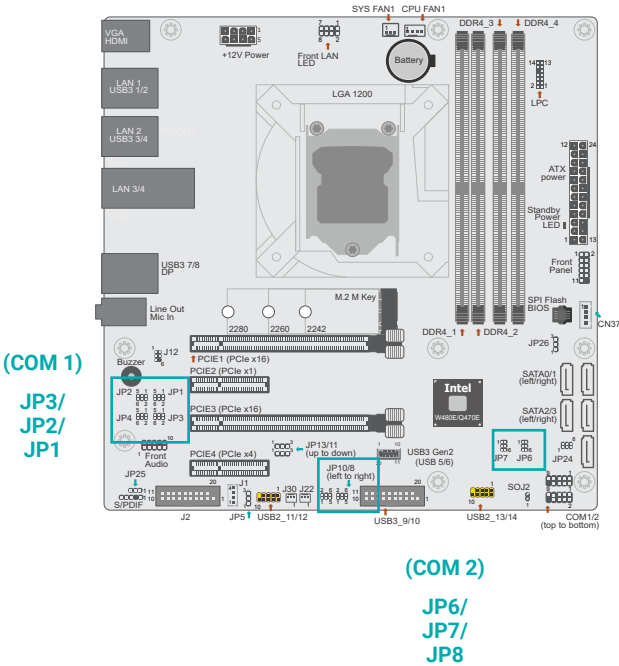
JP1/JP2/JP3 (for COM 1) are used to configure the COM ports to RS232, RS422 (Full Duplex) or RS485. When COM 1 RS232/422/485 is selected, JP1 and JP2 must be set in accordance to JP3. COM 2 uses the same principle applied to the JP6/JP7/JP8.

JP4 (for COM 1) is used to configure Serial COM ports to pure RS232 or RS232 with power. The pin functions of COM 1 vary according to JP4's setting respectively. COM 2 uses JP7 for power select.

▶ **Jumper** Settings

AT/ATX Mode - JP26
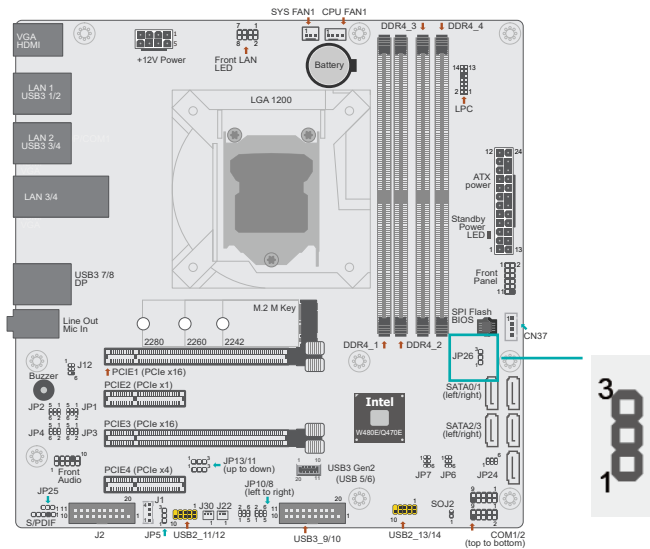
JP26 is used to switch between AT/ATX Mode.

AT/ATX Mode	JP26
GND (default)	1-2 On
3V3SB	2-3 On

▶ **Jumper** Settings

USB Power Control - JP25
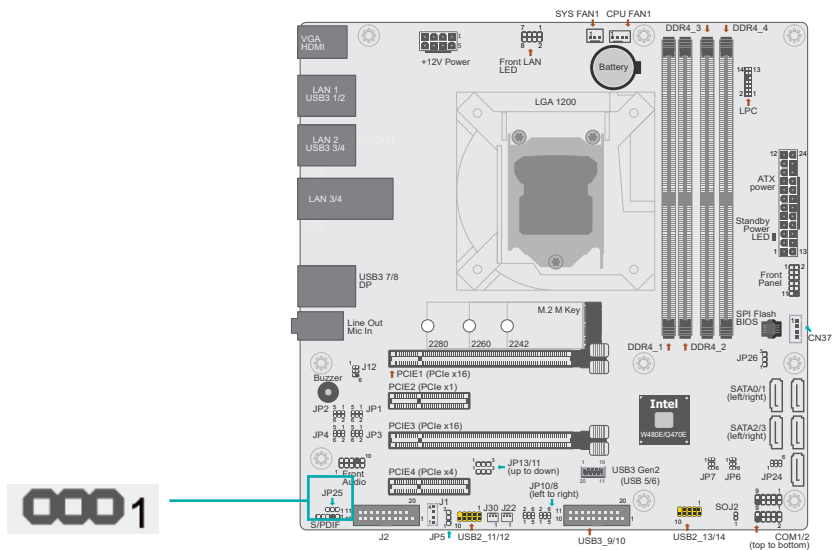
JP25 is used to determine the USB power.

USB 3 Power Select	JP25
5VDU	1-2 On
5V	2-3 On

▶ **Rear I/O Ports**

VGA   LAN 1   LAN 2   10GLAN   USB 3.2 Gen1

Line-out

Mic-in

HDMI   USB 3.2 Gen1   USB 3.2 Gen2   DP++

▶ **Rear I/O Ports**

USB Ports

USB 1/2 (USB 3.2 Gen 1)
USB 3/4 (USB 3.2 Gen 2)
USB 7/8 (USB 3.2 Gen1)

USB 11/12 (USB 2.0)
USB 9/10 (USB 3.2 Gen1/USB 2.0)
USB 5/6 (USB 3.2 Gen2/USB 2.0)
USB 13/14 (USB 2.0)
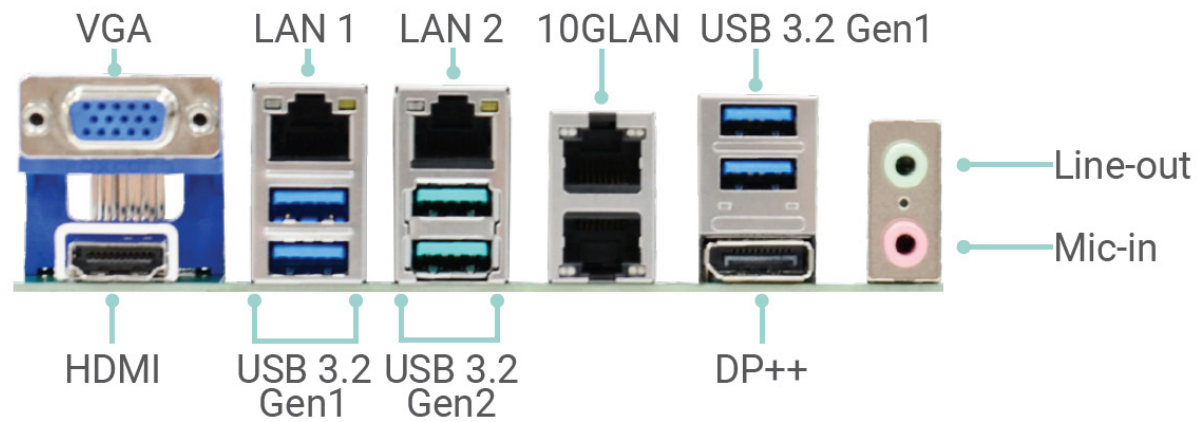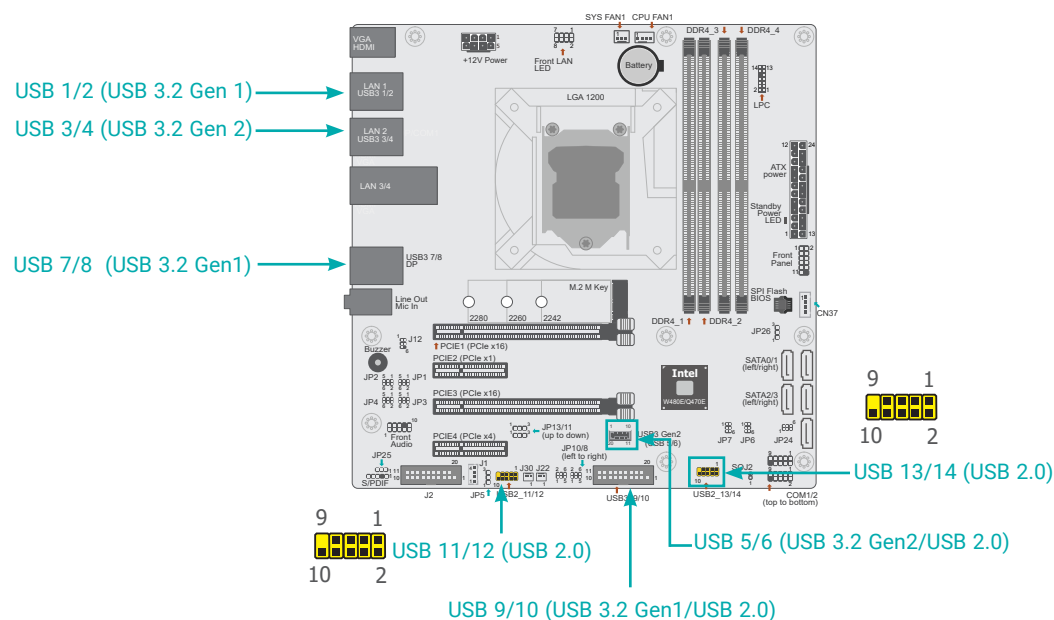
The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

USB2_11/12(UBJ4)

Pin	Assignment	Pin	Assignment
1	SBV6	2	SBV6
3	USBP_C_11N	4	USBP_C_12N
5	USBP_C_11P	6	USBP_C_12P
7	GND	8	GND
9	--	10	N.C.

USB2_13/14(UBJ6)

Pin	Assignment	Pin	Assignment
1	SBV7	2	SBV7
3	USBP_C_13N	4	USBP_C_14N
5	USBP_C_13P	6	USBP_C_14P
7	GND	8	GND
9	--	10	N.C.

USB 3.2 (USB 5/6)
USB 3.2 (USB9/10)

Pin	Assignment	Pin	Assignment
10	5V	11	USBP_C_10P
9	USBP_C_9P	12	USBP_C_10N
8	USBP_C_9N	13	GND
7	GND	14	USB3_TX10_DP
6	USB3_TX9_DP	15	USB3_TX10_DN
5	USB3_TX9_DN	16	GND
4	GND	17	USB3_RX10_DP
3	USB3_RX9_DP	18	USB3_RX10_DN
2	USB3_RX9_DN	19	SBV5
1	SBV5	20	--

The internal USB ports may be mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis and then insert the USB port cables to a connector.

Wake-On-USB Keyboard/Mouse

The Wake-On-USB Keyboard/Mouse function allows you to use a USB keyboard or USB mouse to wake up a system from the S3 (STR - Suspend To RAM) state.

▶ **Rear I/O Ports**

Graphics Interfaces

The display ports consist of the following:

- 1 DP++ Port

- 1 HDMI port

- 1 VGA port

DP++ Port
The DP++ port which carries both digital audio and video signals is used to connect a LCD monitor or a digital TV that has the DP++ port.

HDMI Port
The HDMI port which carries both digital audio and video signals is used to connect a LCD monitor or digital TV that has the HDMI port.

VGA Port
The VGA port is used for connecting a VGA monitor. Connect the monitor's 15-pin D-shell cable connector to the VGA port. After you plug the monitor's cable connector into the VGA port, gently tighten the cable screws to hold the connector in place.
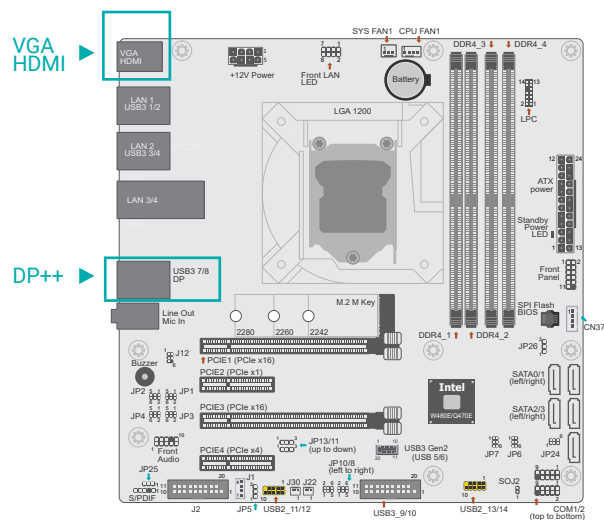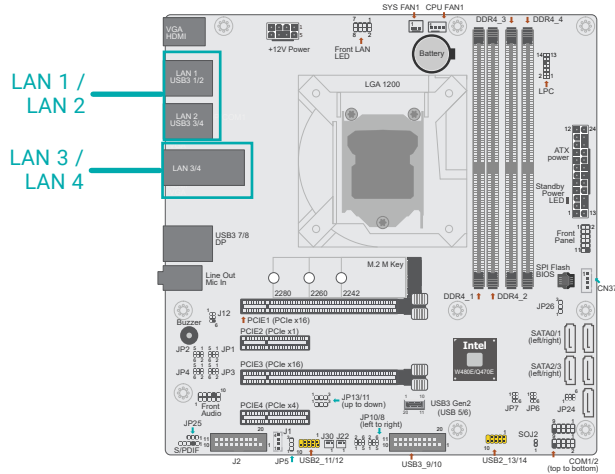
LAN Ports

Features

- 2 x GbE (RJ-45) / 2 x 10GbE

The LAN ports allow the system board to connect to a local area network by means of a network hub.
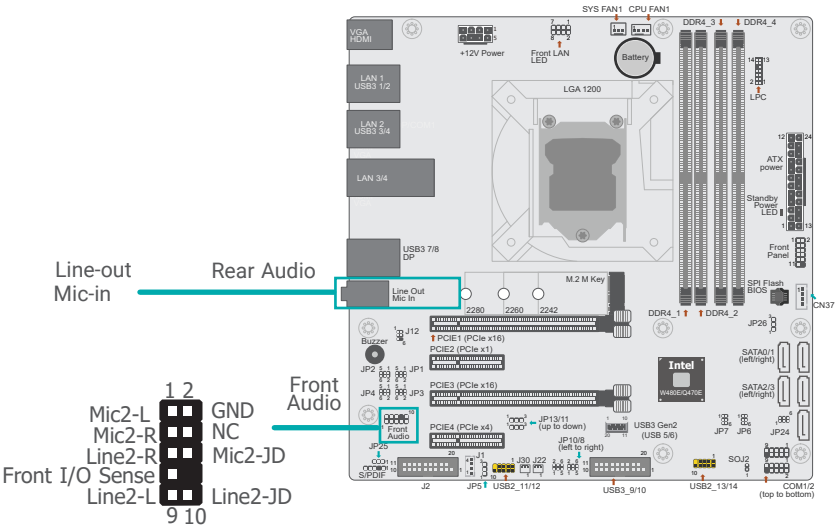
Audio

Rear Audio

The system board is equipped with 2 audio jacks (Line-out and Mic-in). Line-in jack is available upon request. A jack is a one-hole connecting interface for inserting a plug.

- Line-out Jack (Green)

- This jack is used to connect a headphone or external speakers.

- Mic-in Jack (Pink)

- This jack is used to connect an external microphone.

Front Audio

The front audio connector allows you to connect to the second line-out and mic-in jacks that are at the front panel of your system.

Front Audio (AUJ2)

Pin	Assignment	Pin	Assignment
1	Mic2-L	2	GND
3	Mic2-R	4	N.C.
5	Line2-R	6	Mic2-JD
7	GND	8	---
9	Line2-L	10	Line2-JD

▶ **Internal I/O Connectors**

SATA (Serial ATA)
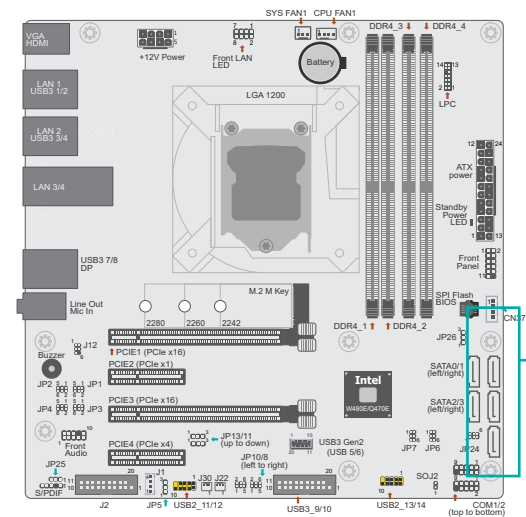
The Serial ATA (SATA) connectors are used to connect the Serial ATA device. SATA 3.0 is supported by the five SATA ports and provides data rate up to 6Gb/s. Connect one end of the Serial ATA cable to a SATA connector and the other end to your Serial ATA device.

Features

- 5 Serial ATA 3.0 ports with data transfer rate up to 6Gb/s

- Integrated Advanced Host Controller Interface (AHCI) controller

- Support RAID 0, RAID 1, RAID 5, RAID 10

Digital I/O Connector (2.0mm pitch)
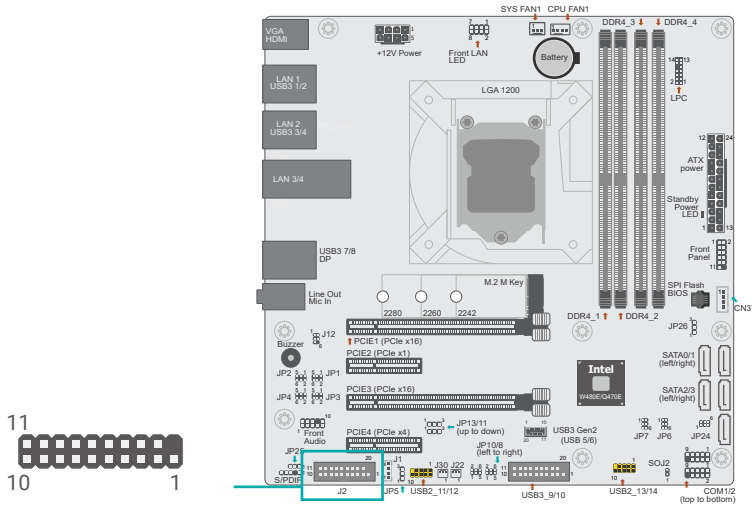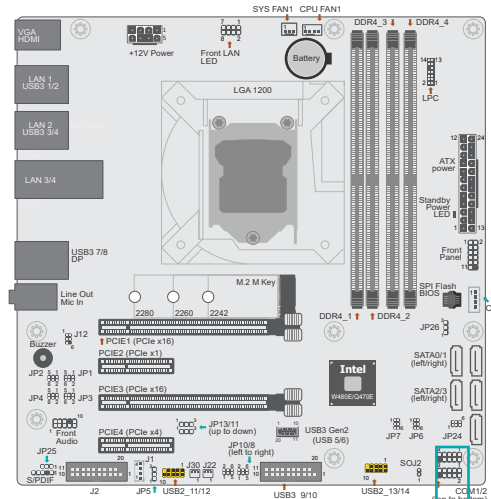
The 16-bit Digital I/O connector provides powering-on function to external devices that are connected to these connectors. The pin functions of the 16-bit digital I/O connector are listed below.

Pin	Assignment	Pin	Assignment
10	D_IOA0_C	11	D_IOA8_C
9	D_IOA1_C	12	D_IOA9_C
8	D_IOA2_C	13	D_IOA10_C
7	D_IOA3_C	14	D_IOA11_C
6	D_IOA4_C	15	D_IOA12_C
5	D_IOA5_C	16	D_IOA13_C
4	D_IOA6_C	17	D_IOA14_C
3	D_IOA7_C	18	D_IOA15_C
2	GND	19	GND
1	GND		---

▶ **Internal I/O Connectors**

COM (Serial) ports

COM 1/2
from top to bottom

Pin	Assignment	Pin	Assignment
1	MDCD1-/RS422_RX+ / RS485_D+	2	MSIN1-/RS422_RX- / RS485_D-
3	MSO1-/RS422_TX+	4	MDTR1-/RS422_TX-
5	GND	6	MDSR1-
7	MRTS-	8	MCTS1-
9	MRI-	10	----

Connecting External Serial Ports

Your COM port may come mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis then insert the serial port cable to the COM connector. Make sure the colored stripe on the ribbon cable is aligned with pin 1 of the COM connector.

▶ **Internal I/O Connectors**

Cooling Fan Connectors

System Fan   CPU Fan

■ CPU Fan
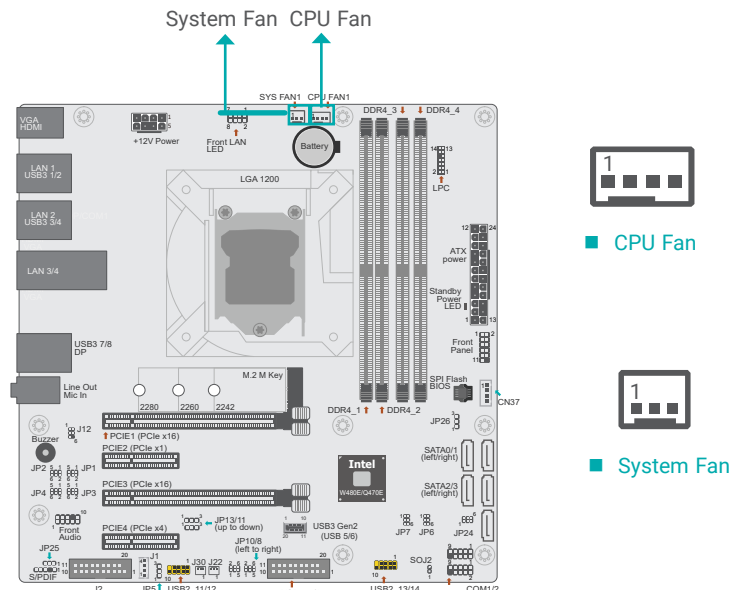
■ System Fan

These fan connectors are used to connect cooling fans. The cooling fans will provide adequate airflow throughout the chassis to prevent overheating the CPU and system board components.

SYSTEM FAN1/2/3 (J7/J22/J30)

Pin	Assignment	Pin	Assignment
1	GND	2	PWM
3	TACH	4	

CPU FAN (J8)

Pin	Assignment	Pin	Assignment
1	GND	2	12V
3	RPM	4	CTRL
5	N.C	6	--

▶ **Internal I/O Connectors**

Power Connector

GND

4 1
8 5

■ ATX 8-pin Power Connectors

+12V

	12 24	
+3.3V		GND
+12V		+5V
+12V		+5V
+5VSB		+5V
PWR_OK		NC
GND		GND
+5V		GND
GND		GND
+5V		PS_ON#
GND		GND
+3.3V		-12V
+3.3V		+3.3V
	1 13	

■ ATX 24-pin Power Connector
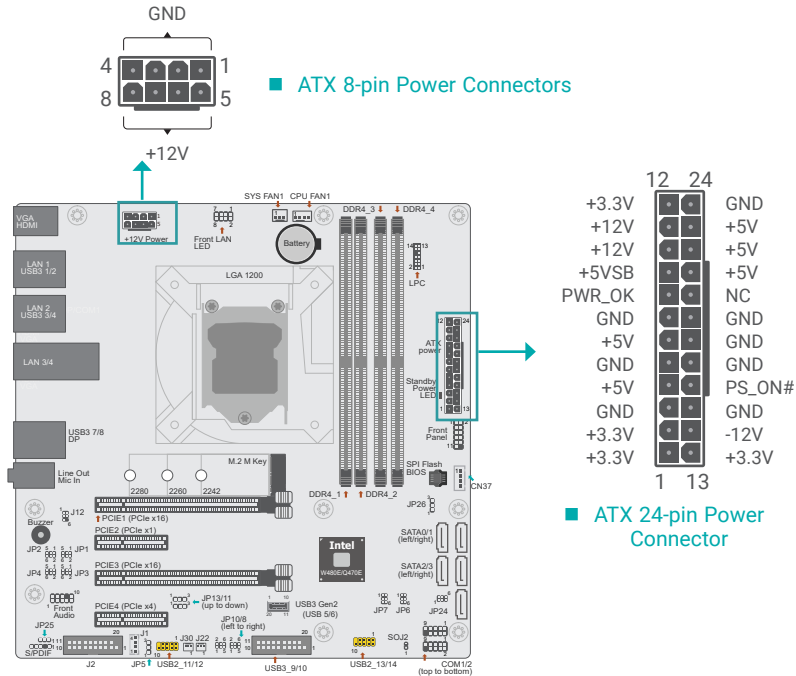
Use a power supply that complies with the ATX12V Power Supply Design Guide Version 1.1. An ATX12V power supply unit has a standard 24-pin ATX main power connector that must be inserted into the 24-pin connector. The 8-pin +12V power connector enables the delivery of more +12VDC current to the processor's Voltage Regulator Module (VRM).

The power connectors from the power supply unit are designed to fit the 24-pin and 8-pin connectors in only one orientation. Make sure to find the proper orientation before plugging the connectors.

The system board requires a minimum of 300 Watt power supply to operate. Your system configuration (CPU power, amount of memory, add-in cards, peripherals, etc.) may exceed the minimum power requirement. To ensure that adequate power is provided, we strongly recommend that the system is supplied with a minimum of 400 Watt power.

> **Important:**
> Insufficient power supplied to the system may result in instability or malfunction of the add-in boards and peripherals. Calculating the system's approximate power usage is important to ensure that the power supply meets the system's consumption requirements.

▶ **Internal I/O Connectors**

Front Panel

■ **Front Panel Connector**
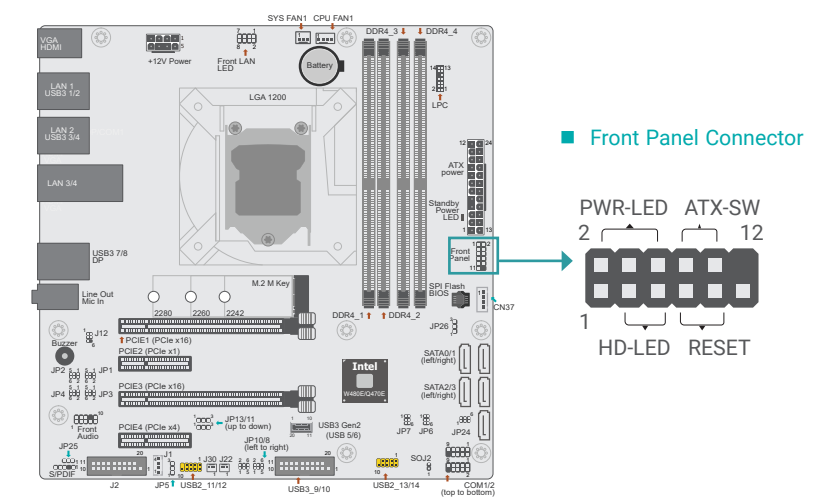
■ **Front Panel Pin Assignment**

	Pin	Assignment		Pin	Assignment
	1	N.C.		2	3V3SB
HD-LED	3	3V3	PWR-LED	4	3V3SB
	5	HD_LED		6	SUS_LED
RESET	7	Ground	ATX-SW	8	Ground
	9	SYS_RST		10	PWR_BTN-
	11	N.C.		12	---

HDD LED - Hard Disk Drive LED
Lighting of the LED indicates that the hard drive is being accessed.

RESET - Reset Switch
This switch allows you to reboot without having to power off the system.

Power/Standby LED
When the system's power is on, this LED will light up. When the system is in the S1 (POS - Power On Suspend) state, it will blink at 1-second intervals. When the system is in the S3 (STR - Suspend To RAM) state, it will blink at 4-second intervals.

Power Button
This button is used to switch the system's power on or off .

▶ **Internal I/O Connectors**

LAN LED Connector
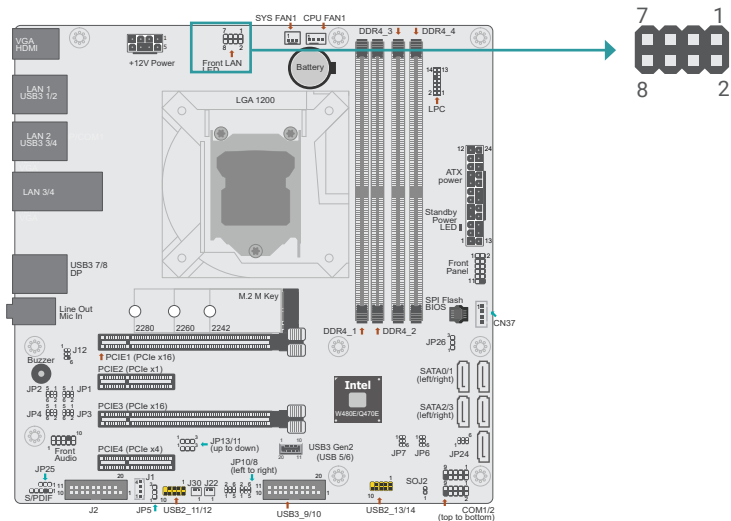
The LAN LED connector is used to detect the connection state of RJ45 LAN ports when the connection is made to an active network via a cable. The pin functions of the LAN LED connector are listed below.

LAN LED (ETJ2, optional)

Pin	Assignment	Pin	Assignment
1	GBE_LED_1000-	2	GBE_LED_100-
3	GBE_LED_LINK_ACT-	4	3V3DU
5	LINK_1000_2	6	LINK_100_2
7	LINK_ACTIVITY_2	8	3V3DU

▶ **Internal I/O Connectors**

S/PDIF Connector
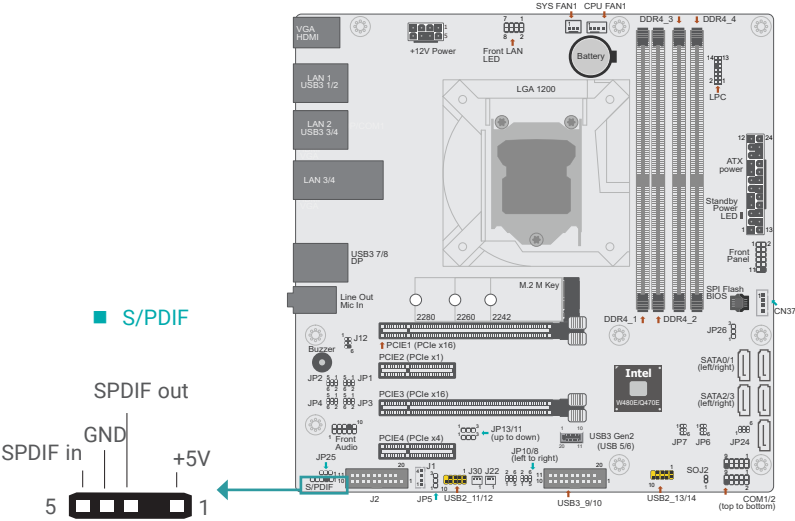
■ S/PDIF

The S/PDIF connector is used to connect an external S/PDIF port. Your S/PDIF port may be mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis then connect the audio cable to the S/PDIF connector. Make sure pin 1 of the audio cable is aligned with pin 1 of the S/PDIF connector.

S/PDIF (AUJ1)

Pin	Assignment	Pin	Assignment
1	5V	4	GND
2	---	5	SPIN
3	SPOUT		
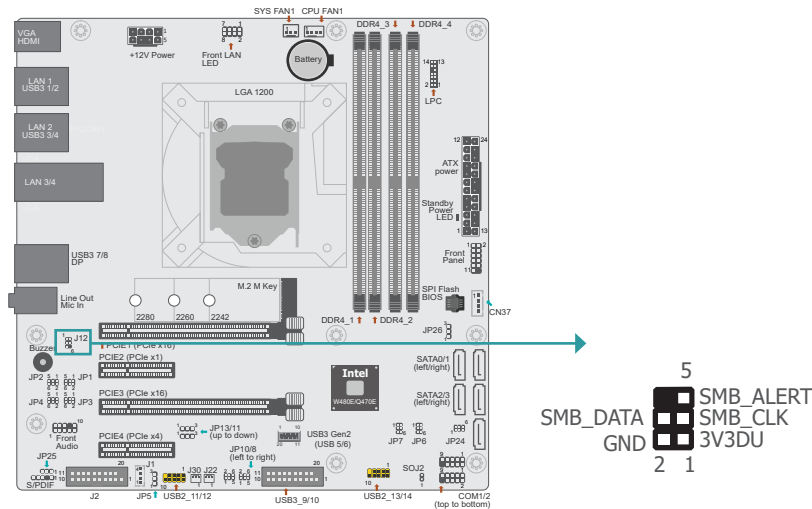
SMBus Connector

The SMBus (System Management Bus) connector is used to connect SMBus devices. It is a multiple device bus that allows multiple chips to connect to the same bus and enable each one to act as a master by initiating data transfer.

SMBus (J12)

Pin	Assignment	Pin	Assignment
1	3V3DU	2	GND
3	SMB_CLK_RESUME	4	SMB_DATA_RESUME
5	SMBALERT_PCH-	6	--

LPC Connector

■ LPC Connector
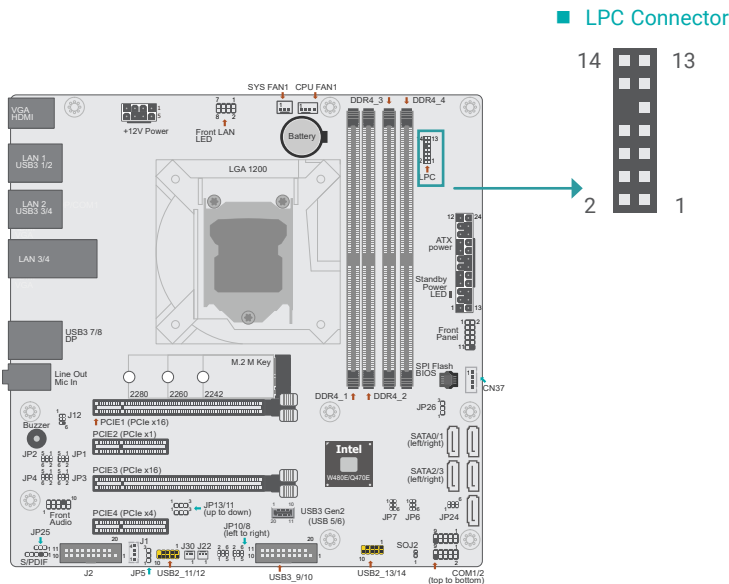
The Low Pin Count Interface was defined by Intel® Corporation to facilitate the industry's transition towards legacy free systems. It allows the integration of low-bandwidth legacy I/O components within the system, which are typically provided by a Super I/O controller. Furthermore, it can be used to interface firmware hubs, Trusted Platform Module (TPM) devices and embedded controller solutions. Data transfer on the LPC bus is implemented over a 4 bit serialized data interface, which uses a 33MHz LPC bus clock. For more information about LPC bus refer to the Intel® Low Pin Count Interface Specification Revision 1.1'. The table below indicates the pin functions of the LPC connector.

LPC (J21)

Pin	Assignment	Pin	Assignment
1	CLK	2	LAD1
3	RST#	4	LAD0
5	FRAME#	6	VCC3
7	LAD3	8	GND1
9	LAD2	10	---
11	SERIRQ	12	GND2
13	5VSB	14	5V

Chassis Intrusion Connector
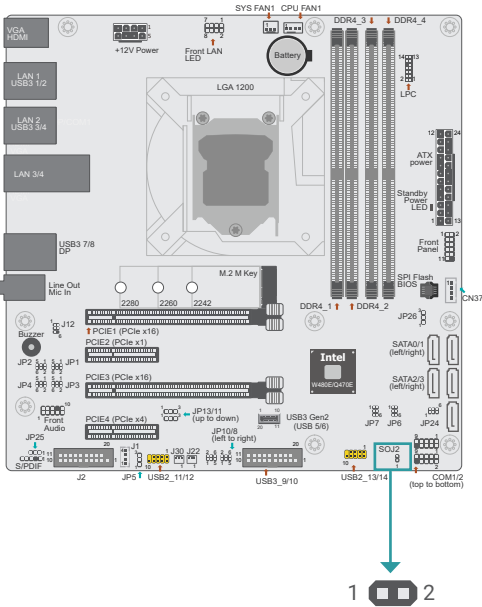
Case Open (SOJ2)

Pin	Assignment	Pin	Assignment
1	CASEOPEN-	2	GND

InnoAGE HDR1 (JP24)

InnoAGE HDR1 (JP24)

Pin	Assignment	Pin	Assignment
1	PCRST#	2	RECOV#
3	PWRLED#	4	HDDLED#
5	PWRBTN#	6	GND

▶ **Internal I/O Connectors**

InnoAGE HDDPWR
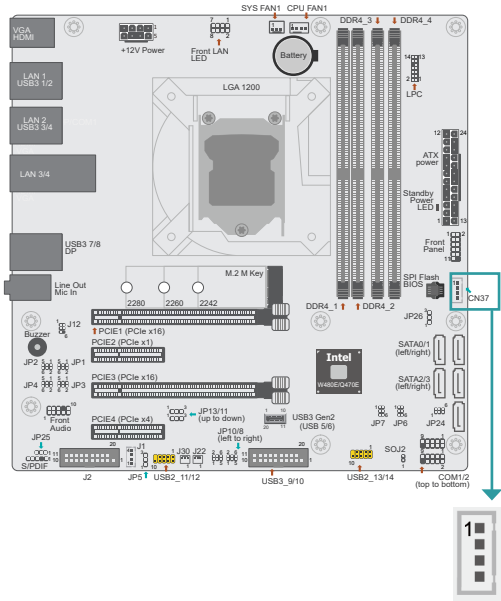
InnoAGE HDDPWR (CN37)

Pin	Assignment	Pin	Assignment
1	+12V_SATA	2	GND
3	GND	4	5V_SATA

Expansion Slots

a PCIe 1 (PCIe x16)

b PCIe 2 (PCIe x1)

c PCIe 3 (PCIe x16)

d PCIe 4 (PCIe x4)

e M.2-M

f M.2-E
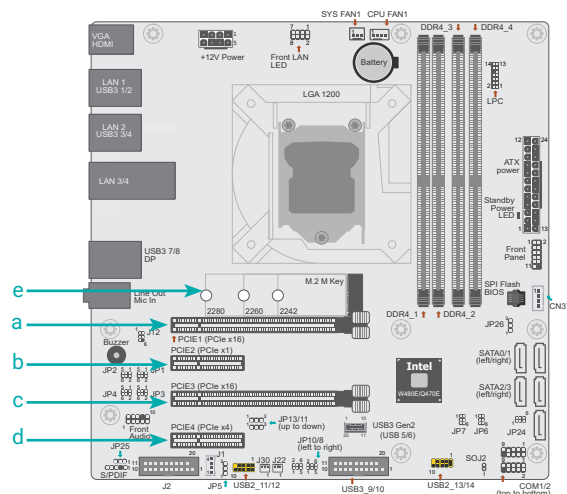
PCI Express x16 Slot
Install a PCI Express x16 graphics card that complies to the PCI Express specifications into the PCI Express x16 slot. To install a graphics card into the x16 slot, align the graphics card to the socket and perpendicularly to the board, be cautious in aligning the locations of notch and key, and then press the card down firmly until it is completely seated. The retaining clip of the slot will close up automatically to hold the graphics card in place.

PCI Express x4 Slots
Install PCI Express cards such as network cards or other expansion cards

M.2 Socket
The M.2 socket is the Next Generation Form Factor (NGFF) which is designed to support multiple modules and make the M.2 more suitable in application for solid-state storage.

Installing the M.2 Module

Before installing the M.2 module into the M.2 socket, please make sure that the following safety cautions are well-attended.

1. Make sure the PC and all other peripheral devices connected to it has been powered down.

2. Disconnect all power cords and cables.

3. Locate the M.2 socket on the system board

4. Make sure the notch on card is aligned to the key on the socket.

5. Make sure the standoff screw is removed from the standoff.

M.2 Module   Stand-off   M.2 Socket   Notch   Key
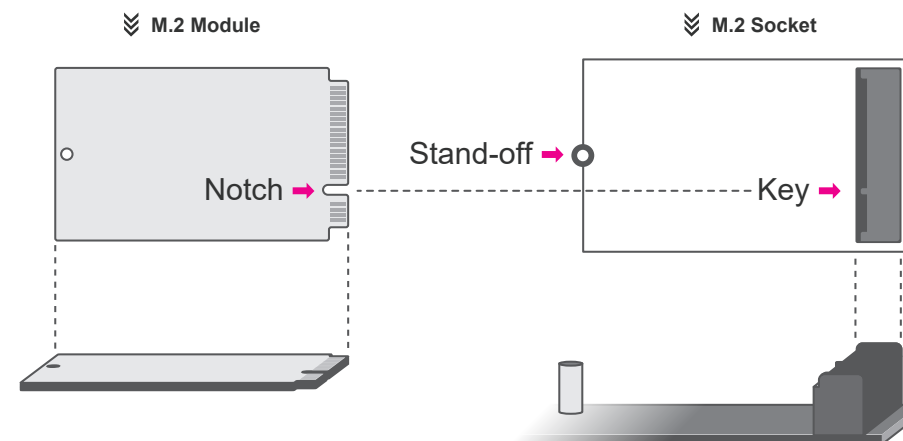
Please follow the steps below to install the card into the socket.
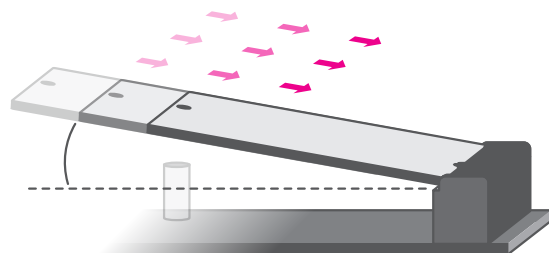
Step 1:
Insert the card into the socket at an angle while making sure the notch and key are perfectly aligned.

Step 2:
Press the end of the card far from the socket down until against the stand-off.
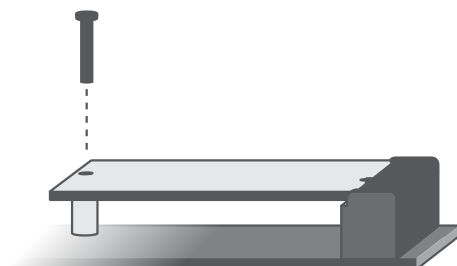
Step 3:
Screw tight the card onto the stand-off with a screw driver and a stand-off screw until the gap between the card and the stand-off closes up. The card should be lying parallel to the board when it's correctly mounted.
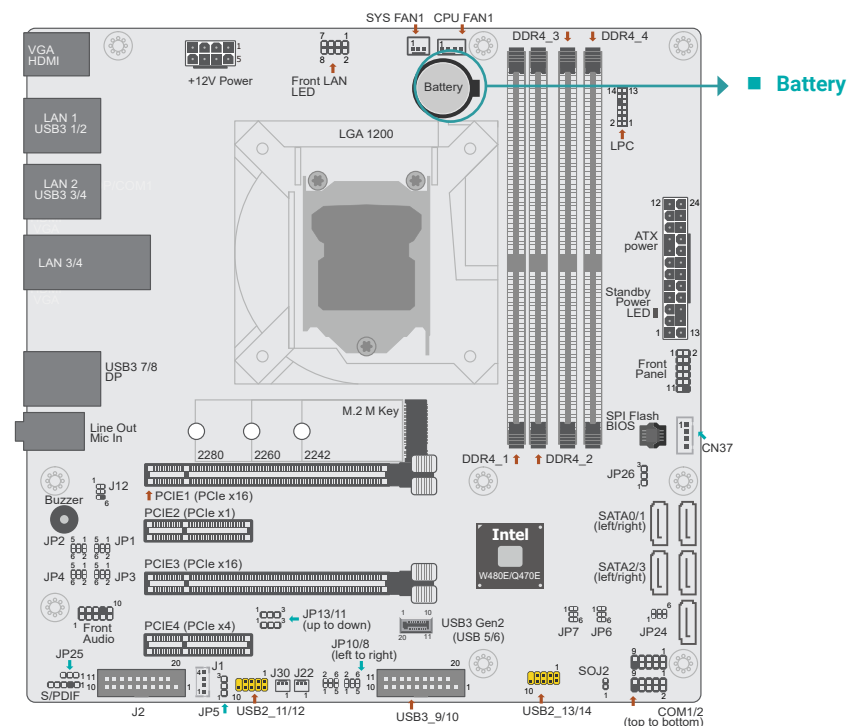
Battery

■ **Battery**

The lithium ion battery addendum supplies power to the real-time clock and CMOS memory as an auxiliary source of power when the main power is shut off. Insert a coin cell battery into the holder and make sure the polarities are correctly oriented — the cap side (rimmed rounded edge) is negative and should be facing the holder; the flat side with a + mark is positive and should be facing away from the holder.

Safety Measures

• There exists explosion hazard if the battery is incorrectly installed.

• Replace only with the same or equivalent type recommended by the manufacturer.

• Dispose of used batteries according to local ordinances.

Chapter 3 - BIOS Settings

▶ Overview

The BIOS is a program that takes care of the basic level of communication between the CPU and peripherals. It contains codes for various advanced features found in this system board.

The BIOS allows you to configure the system and save the configuration in a battery-backed CMOS so that the data retains even when the power is off. In general, the information stored in the CMOS RAM of the EEPROM will stay unchanged unless a configuration change has been made such as a hard drive replaced or a device added.

It is possible that the CMOS battery will fail causing CMOS data loss. If this happens, you need to install a new CMOS battery and reconfigure the BIOS settings.

> **Note:**
> The BIOS is constantly updated to improve the performance of the system board; therefore the BIOS screens in this chapter may not appear the same as the actual one. These screens are for reference purpose only.

Default Configuration

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

Entering the BIOS Setup Utility

The BIOS Setup Utility can only be operated from the keyboard and all commands are keyboard commands. The commands are available at the right side of each setup screen.

The BIOS Setup Utility does not require an operating system to run. After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the message "Press DEL to run setup" will appear on the screen. If the message disappears before you respond, restart the system or press the "Reset" button. You may also restart the system by pressing the <Ctrl> <Alt> and <Del> keys simultaneously.

Legends

Keys	Function
Right / Left arrow	Move the highlight left or right to select a menu
Up / Down arrow	Move the highlight up or down between submenus or fields
<Enter>	Enter the highlighted submenu
+ (plus key)/F6	Scroll forward through the values or options of the highlighted field
- (minus key)/F5	Scroll backward through the values or options of the highlighted field
<F1>	Display general help
<F2>	Display previous values
<F9>	Optimized defaults
<F10>	Save and Exit
<Esc>	Return to previous menu

Scroll Bar

When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

Submenu

When "▶" appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>.

▶ Main

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.

```
          Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
 Main   Advanced   Chipset   Security   Boot   Save & Exit

 Project Name                    CMS311               Set the Date. Use Tab to
 BIOS Version                    B19C.12A             switch between Date ele-
                                                      ments.
 FSP version                     07.00.6C.40          Default Ranges:
 RC version                      07.00.6C.40          Year: 2005-2099
                                                      Months: 1-12
 Intel(R) Core(TM) i7-8700 CPU @ 3.20GHz              Days: dependent on month
 ID                              0x906EA
 Stepping                        U0
 L1 Data Cache                   32 KB x 6
 L1 Instruction Cache            32 KB x 6
 L2 Cache                        256 KB x 6
 L3 Cache                        12 MB                →←: Select Screen
 Number of Processors            6Core(s) / 12Thread(s)  ↑↓: Select Item
 Microcode Revision              9A                   Enter: Select
                                                      +/- : Change Opt.
 Memory RC Version               0.7.1.111            F1: General Help
 Total Memory                    4096 MB              F2: Previous Values
 Memory Frequency                2400 MHz             F9: Optimized Defaults
                                                      F10: Save & Exit
 PCH SKU                         C246                 ESC: Exit
 ME FW Version                   12.0.55.1521
 ME Firmware SKU                 Corporate SKU

 System Date                     [Mon 01/07/2020]

          Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.
```

System Date

The date format is <month>, <date>, <year>. Press "Tab" to switch to the next field and press "-" or "+" to modify the value.

System Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

▶ Advanced

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.

> **Important:**
> Setting incorrect field values may cause the system to malfunction.

```
          Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
 Main   Advanced   Chipset   Security   Boot   Save & Exit

 ▶ RC ACPI Settings                                   System ACPI Parameters.
 ▶ CPU Configuration
 ▶ Power & Performance
 ▶ PCH-FW Configuration
 ▶ Trusted Computing
 ▶ NCT6126D Super IO Configuration
 ▶ NCT6126D HW Monitor
 ▶ Serial Port Console Redirection
 ▶ USB Configuration
 ▶ Network Stack Configuration
 ▶ CSM Configuration
 ▶ USB Power Control

                                                      →←: Select Screen
 ▶ Intel(R) Ethernet Controller X550 - 00:01:29:A0:9E:80  ↑↓: Select Item
 ▶ Intel(R) Ethernet Controller X550 - 00:01:29:A0:9E:7F  Enter: Select
                                                      +/- : Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit
                                                      ESC: Exit

          Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.
```

▶ **Advanced**

RC ACPI Configuration

```
           Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  ┌──────────────────────────────────────────────────────────────────────────┐
  │  Advanced                                                                  │
  ├──────────────────────────────────────────────────────────────────────────┤
  │  RC ACPI Configuration                            Enable or disable System │
  │                                                   wake on alarm event. When│
  │  Wake system from S5          [Enabled]           enabled, System will wake│
  │     Wake up hour              0                    on the hr::min::sec speci│
  │     Wake up minute            0                    fied                     │
  │     Wake up second            0                                            │
  │  State After G3               [S0 State]                                   │
  │                                                                            │
  │                                                                            │
  │                                                   →←: Select Screen        │
  │                                                   ↑↓: Select Item          │
  │                                                   Enter: Select            │
  │                                                   +/- : Change Opt.        │
  │                                                   F1: General Help         │
  │                                                   F2: Previous Values      │
  │                                                   F9: Optimized Defaults   │
  │                                                   F10: Save & Exit         │
  │                                                   ESC: Exit                │
  │                                                                            │
  └──────────────────────────────────────────────────────────────────────────┘
           Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.
```

Wake system from S5

When Enabled, the system will automatically power up at a designated time every day. Once it's switched to [Enabled], please set up the time of day — hour, minute, and second — for the system to wake up.

State After G3

Select between S0 State, and S5 State. This field is used to specify what state the system is set to return to when power is re-applied after a power failure (G3 state).

- **S0 State** The system automatically powers on after power failure.
- **S5 State** The system enter soft-off state after power failure. Power-on signal input is required to power up the system.
- **Last State** The system returns to the last state right before power failure.

▶ **Advanced**

CPU Configuration

```
           Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  ┌──────────────────────────────────────────────────────────────────────────┐
  │  Advanced                                                                  │
  ├──────────────────────────────────────────────────────────────────────────┤
  │  CPU Configuration                                When enabled, a VMM can  │
  │                                                   utilize the additional hard-│
  │  Intel (VMX) Virtualization   [Enable]            ware capabilities provided│
  │  Technology                                       by Vanderpool Technology.│
  │  Active Processor Cores       [All]                                        │
  │  Hyper-Threading              [Enable]                                     │
  │                                                                            │
  │                                                                            │
  │                                                   →←: Select Screen        │
  │                                                   ↑↓: Select Item          │
  │                                                   Enter: Select            │
  │                                                   +/- : Change Opt.        │
  │                                                   F1: General Help         │
  │                                                   F2: Previous Values      │
  │                                                   F9: Optimized Defaults   │
  │                                                   F10: Save & Exit         │
  │                                                   ESC: Exit                │
  │                                                                            │
  └──────────────────────────────────────────────────────────────────────────┘
           Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.
```

Intel (VMX) Virtualization Technology

When this field is set to Enabled, the VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Active Processor Cores

Select number of cores to enable in each processor package.

Hyper-threading

Enables this field for Windows XP and Linux which are optimized for Hyper-Threading technology. Select disabled for other OSes not optimized for Hyper-Threading technology. When disabled, only one thread per enabled core is enabled.

> **Note:**
> Some of the fields may not be available when the features are not supported by the equipped CPU.

▶ **Advanced**

Power & Performance

```
Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
┌──────────────────────────────────────────────────────────────────────────┐
│  Advanced                                                                  │
├──────────────────────────────────────────────────────────────────────────┤
│  Power & Performance                              Allows  more  than  two fre-  │
│                                                   quency  ranges  to  be  sup-  │
│  Intel(R) SpeedStep(tm)        [Enabled]          ported.                   │
│  Turbo Mode                    [Enabled]                                    │
│  C states                      [Enabled]                                    │
│                                                                            │
│                                                   →←: Select Screen          │
│                                                   ↑↓: Select Item            │
│                                                   Enter: Select              │
│                                                   +/- : Change Opt.          │
│                                                   F1: General Help           │
│                                                   F2: Previous Values        │
│                                                   F9: Optimized Defaults     │
│                                                   F10: Save & Exit           │
│                                                   ESC: Exit                  │
│                                                                            │
├──────────────────────────────────────────────────────────────────────────┤
│        Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.      │
└──────────────────────────────────────────────────────────────────────────┘
```

Intel(R) SpeedStep(tm)

This field is used to enable or disable the Intel SpeedStep® Technology, which helps optimize the balance between system's power consumption and performance. After it is enabled in the BIOS, EIST features can then be enabled via the operating system's power management.

Turbo Mode

Enable or disable turbo mode of the processor. This field will only be displayed when EIST is enabled.

C states

Enable or disable CPU Power Management. It allows CPU to enter "C states" when it's idle and nothing is executing.

▶ **Advanced**

PCH-FW Configuration

```
Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
┌──────────────────────────────────────────────────────────────────────────┐
│  Advanced                                                                  │
├──────────────────────────────────────────────────────────────────────────┤
│  ME State                                         When  Disabled  ME  will  be  │
│  Manageability Features State  [Enabled]          put  into  ME  Temporarily  │
│  AMT BIOS Features             [Enabled]          Disabled Mode.            │
│  ▶ AMT Configuration           [Enabled]                                    │
│  ME Unconfig on RTC Clear      [Enabled]                                    │
│                                                                            │
│  ▶ Firmware Update Configuration                                            │
│                                                   →←: Select Screen          │
│                                                   ↑↓: Select Item            │
│                                                   Enter: Select              │
│                                                   +/- : Change Opt.          │
│                                                   F1: General Help           │
│                                                   F2: Previous Values        │
│                                                   F9: Optimized Defaults     │
│                                                   F10: Save & Exit           │
│                                                   ESC: Exit                  │
│                                                                            │
├──────────────────────────────────────────────────────────────────────────┤
│        Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.      │
└──────────────────────────────────────────────────────────────────────────┘
```

ME State

When this field is set to Disabled, ME will be put into ME Temporarily Disabled Mode.

Manageability Features State

Enable or disable Intel(R) Manageability features. This option disables/enables Manageability Features support in FW. To disable, support platform must be in an unprovisioned state first.

AMT BIOS Features

When disabled, AMT BIOS features are no longer supported and user is no longer able to access MEBx Setup. This option does not disable manageability features in FW.

ME Unconfig on RTC Clear

When disabled, ME will not be unconfigured on RTC Clear.

> **Note:**
> The sub-menus are detailed in following sections.

► **Advanced** ► **PCH-FW Configuration**

► **AMT Configuration**

```
                Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  ┌─────────────┐
  │  Advanced   │
  └─────────────┘

   USB Provisioning of AMT          [Disabled]          Enable/Disable of AMT USB
 ► Secure Erase Configuration                           Provisioning.
 ► OEM Flags Settings



                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/- : Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F9: Optimized Defaults
                                                        F10: Save & Exit
                                                        ESC: Exit


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```

USB Provisioning of AMT

Enable or disable AMT USB Provisioning.

► **Advanced** ► **PCH-FW Configuration**

► **AMT Configuration** ► **Secure Erase Configuration**

```
                Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  ┌─────────────┐
  │  Advanced   │
  └─────────────┘

   Secure Erase mode               [Simulated]         Change Secure Erase mod-
   Force Secure Erase              [Disabled]          ule behavior:
                                                       Simulated:  Performs  SE
                                                       flow without erasing SSD
                                                       Real: Erase SSD.



                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/- : Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F9: Optimized Defaults
                                                        F10: Save & Exit
                                                        ESC: Exit


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```

Secure Erase Mode

Select Secure Erase module behavior: Simulated or Real.

Force Secure Erase

Enable or disable Force Secure Erase on next boot.

► Advanced ► PCH-FW Configuration

► AMT Configuration ► OEM Flags Settings

```
Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  Advanced

 Hide Unconfigure ME Confirmation    [Disabled]        OEMFlag Bit 6:
 Prompt                                                Hide Unconfigure ME con-
 Unconfigure ME                      [Disabled]        firmation prompt when at-
                                                       tempting ME unconfigura-
                                                       tion.




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/- : Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F9: Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit

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```

Hide Unconfigure ME Confirmation Prompt

Enable or disable to hide unconfigure ME confirmation prompt when attempting ME unconfiguration.

Unconfigure ME

Enable or disable to unconfigure ME with resetting MEBx password to default.

► Advanced ► PCH-FW Configuration

► Firmware Update Configuration

```
Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  Advanced

 Me FW Image Re-Flash                [Disable]         Enable/Disable Me FW Im-
                                                       age Re-Flash function.




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/- : Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F9: Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit

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```

Me FW Image Re-Flash

This field is used to enable or disable the ME FW Image Re-Flash function, which allows the user to update the ME firmware.

▶ **Advanced**

Trusted Computing

```
                 Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
    Advanced

 TPM2.0 Device Found                                       Enables or Disables BIOS
 Firmware Version              7.85                         support for security de-
 Vendor:                       IFX                          vice. O.S will not show
                                                            Security Device. TCG EFI
 Security Device Support       [Enable]                     protocol and INT1A inter-
 Pending operation             [None]                       face will not be available.


                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/- : Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F9: Optimized Defaults
                                                            F10: Save & Exit
                                                            ESC: Exit


                 Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.
```

Security Device Support

This field is used to enable or disable BIOS support for the security device such as an TPM 2.0 to achieve hardware-level security via cryptographic keys.

Pending operation

To clear the existing TPM encryption, select "TPM Clear" and restart the system. This field is not available when "Security Device Support" is disabled.

▶ Advanced

NCT6126D Super IO Configuration

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
   ┌─────────────┐
   │  Advanced   │
   └─────────────┘
   NCT6126D Super IO Configuration                                    WatchDog  Timer  Unit  Se-
                                                                      lection
   Super IO Chip                    NCT6126D

   WatchDog Output Options          [Mode1]
     WatchDog Timer Unit            [Second]
       SuperIO WatchDog Timer       0
   ▶ Serial Port 1 Configuration
   ▶ Serial Port 2 Configuration
                                                                      →←: Select Screen
                                                                      ↑↓: Select Item
                                                                      Enter: Select
                                                                      +/- : Change Opt.
                                                                      F1: General Help
                                                                      F2: Previous Values
                                                                      F9: Optimized Defaults
                                                                      F10: Save & Exit
                                                                      ESC: Exit


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```

WatchDog Output Options

To switch the option between Mode1 & Mode3.

Mode1(System Reset) = A Watchdog Timout causes the system to be reset.

Mode3(General NMI)=Generate NMI upon timeout of the watchdog timer.

WatchDog Timer Unit

Select WatchDog Timer Unit — Second or Minute.

SuperIO WatchDog Timer

Set SuperIO WatchDog Timer Timeout value. The range is from 0 (disabled) to 255.

Note:
The sub-menus are detailed in following sections.

▶ Advanced   ▶ NCT6126D Super IO Configuration

▶ **Serial Port Configuration**

```
              Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
   ┌─────────────┐
   │  Advanced   │
   └─────────────┘
   Serial Port 1 Configuration                                       Enable  or  Disable  Serial
                                                                     Port (COM)
   Serial Port                      [Enabled]
   Device Settings                  IO=3F8h; IRQ=4;
   RS485 Auto Flow                  [Disabled]



                                                                     →←: Select Screen
                                                                     ↑↓: Select Item
                                                                     Enter: Select
                                                                     +/- : Change Opt.
                                                                     F1: General Help
                                                                     F2: Previous Values
                                                                     F9: Optimized Defaults
                                                                     F10: Save & Exit
                                                                     ESC: Exit


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```

Serial Port

Enable or disable the current serial COM port.

RS485 Auto Flow

Enable or disable RS485 auto flow. This field is only available for COM ports that support RS485 mode.

▶ Advanced ▶ NCT6126D HW Monitor

▶ **Smart Fan Function**

```
                    Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  ┌──────────────┐
  │   Advanced   │
  └──────────────┘

  Smart Fan Function                                    Enable CPU SmartFan

  CPU Smart Fan Control          <Enable>
     Boundary 1                  [30]
     Boundary 2                  [40]
     Boundary 3                  [50]
     Boundary 4                  [60]
     Fan Speed Count 1           [35]
     Fan Speed Count 2           [60]
     Fan Speed Count 3           [80]
     Fan Speed Count 4           [100]
  SYS Smart Fan (1) Control      <Enable>
     Boundary 1                  [30]              →←: Select Screen
     Boundary 2                  [40]              ↑↓: Select Item
     Boundary 3                  [50]              Enter: Select
     Boundary 4                  [60]              +/- : Change Opt.
     Fan Speed Count 1           [35]              F1: General Help
     Fan Speed Count 2           [60]              F2: Previous Values
     Fan Speed Count 3           [80]              F9: Optimized Defaults
     Fan Speed Count 4           [100]             F10: Save & Exit
  SYS Smart Fan (2) Control      <Enable>          ESC: Exit
     Boundary 1                  [30]
     Boundary 2                  [40]
     Boundary 3                  [50]

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```

Smart Fan is a fan speed moderation strategy dependent on the current system temperature. When the system temperature goes higher than the Boundary setting, the fan speed will be turned up to the setting of the Fan Speed Count that bears the same index as the Boundary field.

▼ **SYS Smart Fan/CPU Smart Fan Control = [Enabled]**

Boundary 1 to Boundary 4

Set the boundary temperatures that determine the fan speeds accordingly, the value ranging from 0-127℃. For example, when the system temperature reaches Boundary 1 setting, the fan speed will be turned up to the designated speed of the Fan Speed Count 1 field.

Fan Speed Count 1 to Fan Speed Count 4

Set the fan speed, the value ranging from 1-100%, 100% being full speed. The fans will operate according to the specified boundary temperatures above-mentioned.

▼ **SYS Smart Fan/CPU Smart Fan Control = [Disabled]**

Fix Fan Speed Count

Set the fan speed, the value ranging from 1-100%, 100% being full speed. The fans will always operate at the specified speed regardless of gauged temperatures.

▶ **Advanced**

Serial Port Console Redirection

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
 ┌────────────────────────────────────────────────────────────────────────────────┐
 │    Advanced                                                                      │
 ├────────────────────────────────────────────────────┬───────────────────────────┤
 │  COM1                                               │  Console Redirection En-  │
 │  Console Redirection        [Enabled]               │  able or Disable.         │
 │  ▶ Console Redirection Settings                     │                           │
 │                                                     │                           │
 │  COM2                                               │                           │
 │  Console Redirection        [Enabled]               │                           │
 │  ▶ Console Redirection Settings                     │                           │
 │                                                     ├───────────────────────────┤
 │                                                     │ →←: Select Screen         │
 │                                                     │ ↑↓: Select Item           │
 │                                                     │ Enter: Select             │
 │                                                     │ +/- : Change Opt.         │
 │                                                     │ F1: General Help          │
 │                                                     │ F2: Previous Values       │
 │                                                     │ F9: Optimized Defaults    │
 │                                                     │ F10: Save & Exit          │
 │                                                     │ ESC: Exit                 │
 │                                                     │                           │
 ├────────────────────────────────────────────────────┴───────────────────────────┤
 │        Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.           │
 └────────────────────────────────────────────────────────────────────────────────┘
```

Console Redirection

By enabling Console Redirection of a COM port, the sub-menu of console redirection settings will become available for configuration as detailed in the following.

▶ **Advanced**   ▶ **Serial Port Console Redirection**

▶ **Console Redirection Settings**

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
 ┌────────────────────────────────────────────────────────────────────────────────┐
 │    Advanced                                                                    ▲ │
 ├────────────────────────────────────────────────────┬───────────────────────────┤
 │  COM1                                               │  Enable CPU SmartFan      │
 │  Console Redirection Settings                       │                           │
 │                                                     │                           │
 │  Terminal Type              [VT100+]                │                           │
 │  Bits per second            [115200]                │                           │
 │  Data Bits                  [8]                     │                           │
 │  Parity                     [None]                  │                           │
 │  Stop Bits                  [1]                     │                           │
 │  Flow Control               [None]                  │                           │
 │                                                     ├───────────────────────────┤
 │                                                     │ →←: Select Screen         │
 │                                                     │ ↑↓: Select Item           │
 │                                                     │ Enter: Select             │
 │                                                     │ +/- : Change Opt.         │
 │                                                     │ F1: General Help          │
 │                                                     │ F2: Previous Values       │
 │                                                     │ F9: Optimized Defaults    │
 │                                                     │ F10: Save & Exit          │
 │                                                     │ ESC: Exit                 │
 │                                                   ▼ │                           │
 ├────────────────────────────────────────────────────┴───────────────────────────┤
 │        Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.           │
 └────────────────────────────────────────────────────────────────────────────────┘
```

Configure the serial settings of the current COM port.

Terminal Type

Select terminal type: VT100, VT100+, VT-UTF8 or ANSI.

Bits per second

Select serial port transmission speed: 9600, 19200, 38400, 57600 or 115200.

Data Bits

Select data bits: 7 bits or 8 bits.

Parity

Select parity bits: None, Even, Odd, Mark or Space.

Stop Bits

Select stop bits: 1 bit or 2 bits.

Flow Control

Select flow control type: None or Hardware RTS/CTS. Flow Control is for RS485 mode and is only supported by Serial Port 1 (COM1).

► **Advanced**

USB Configuration

```
                    Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
     Advanced

  USB Configuration                                          Enables Legacy USB sup-
                                                             port. AUTO option disables
  Legacy USB Support            [Enabled]                    legacy support if no USB
  XHCI Hand-off                 [Enabled]                    devices are connected.
  USB Mass Storage Driver Support   [Enabled]                DISABLE option will keep
                                                             USB devices available only
                                                             for EFI applications.


                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/- : Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F9: Optimized Defaults
                                                             F10: Save & Exit
                                                             ESC: Exit



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```

Legacy USB Support

- **Enabled** Enable Legacy USB support.

- **Disabled**   Keep USB devices available only for EFI applications.

- **Auto**   Disable Legacy support if no USB devices are connected.

XHCI Hand-off

Enable or disable XHCI Hand-off.

USB Mass Storage Driver Support

Enable or disable USB Mass Storage Driver Support.

▶ Advanced

CSM Configuration

```
                    Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
   Advanced

   Compatibility Support Module Configuration        Enable/Disable  CSM  Sup-
                                                     port.
   CSM Support                    [Enabled]

   Boot option filter             [UEFI only]
   Option ROM execution

   Network                        [Do not launch]
   Storage                        [UEFI]
   Video                          [UEFI]
   Other PCI devices              [UEFI]            →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/- : Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit


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```

CSM Support

This section is used to enable or disable CSM Support. The following fields are only available when "CSM Support" is enabled.

Boot option filter

This field controls Legacy/UEFI ROMs priority. Select among UEFI and Legacy, Legacy only or UEFI only.

Network

This field controls the execution of UEFI and Legacy Network OpROM.

Storage

This field controls the execution of UEFI and Legacy Storage OpROM.

Video

This field controls the execution of UEFI and Legacy Video OpROM.

Other PCI devices

This field determines OpROM execution policy for devices other than Network, Storage or Video.

▶ Advanced

Network Stack Configuration

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
    ┌────────────┐
    │  Advanced  │
    └────────────┘

     Network Stack                    [Enabled]                 Enable/Disable UEFI Net-
     Ipv4 PXE Support                 [Disabled]                work Stack
     Ipv6 PXE Support                 [Disabled]
     PXE boot wait time               0
     Media detect count               1



                                                                →←: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/- : Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F9: Optimized Defaults
                                                                F10: Save & Exit
                                                                ESC: Exit


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```
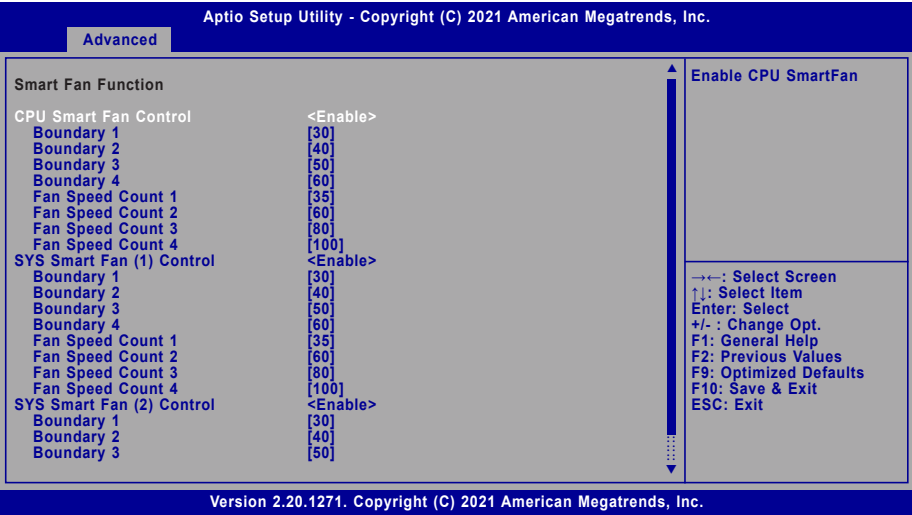
Network Stack

Enable or disable UEFI network stack. The following fields will appear when this field is enabled.

Ipv4 PXE Support

Enable or disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.

Ipv6 PXE Support

Enable or disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.

PXE boot wait time

Set the wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.

Media detect count

Set the number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

▶ Advanced

USB Power Control

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
    ┌────────────┐
    │  Advanced  │
    └────────────┘

     USB2_1/2 USB3_1/2                [5V_Dual]                 Switch USB Power between
     USB2_3/4 USB3_3/4                [5V_Dual]                 5V_Dual and 5V.
     USB2_5/6 USB3_5/6                [5V_Dual]
     USB2_7/8 USB3_7/8                [5V_Dual]
     USB2_9/10 USB3_9/10              [5V_Dual]
     USB2_11/12                       [5V_Dual]
     USB2_13/14                       [5V_Dual]



                                                                →←: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/- : Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F9: Optimized Defaults
                                                                F10: Save & Exit
                                                                ESC: Exit


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```

USB Power Switch

Switch USB Power between 5V_Dual and 5V.

▶ Advanced

Intel(R) Ethernet Controller X550

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
           Advanced

 ▶ Firmware Image Properties                              View device firmware
 ▶ NIC Configuration                                      information

    Blink LEDs                    0

    UEFI Driver                   Intel(R) 10GbE Driver
                                  7.6.13 x64
    Adapter PBA                   000000-000
    Device Name                   Intel(R) Ethernet
                                  Controller X550
    Chip Type                     Intel X550
    PCI Device ID                 1563
    PCI Address                   03:00:00                →←: Select Screen
                                                          ↑↓: Select Item
    Link Status                   [Disconnected]          Enter: Select
                                                          +/- : Change Opt.
    MAC Address                   00:01:29:A0:9E:80       F1: General Help
    Virtual MAC Address           00:00:00:00:00:00       F2: Previous Values
                                                          F9: Optimized Defaults
                                                          F10: Save & Exit
                                                          ESC: Exit


              Version 2.21.1278. Copyright (C) 2021 AMI
```

Firmware Image Properties

View device firmware information

NIC Configuration

Configure network interface port.

Blink LEDs

Blink LEDs for a duration up to 15 seconds.

▶ **Chipset**

```
                Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  Main    Advanced    Chipset    Security    Boot    Save & Exit
  ┌─────────────────────────────────────────────────┬─────────────────────────────┐
  │ ▶ Graphics Configuration                          │ Graphics Configuration      │
  │ ▶ PEG Port Configuration                          │                             │
  │ ▶ PCH-IO Configuration                            │                             │
  │                                                   │                             │
  │                                                   │                             │
  │                                                   │                             │
  │                                                   ├─────────────────────────────┤
  │                                                   │ →←: Select Screen           │
  │                                                   │ ↑↓: Select Item             │
  │                                                   │ Enter: Select               │
  │                                                   │ +/- : Change Opt.           │
  │                                                   │ F1: General Help            │
  │                                                   │ F2: Previous Values         │
  │                                                   │ F9: Optimized Defaults      │
  │                                                   │ F10: Save & Exit            │
  │                                                   │ ESC: Exit                   │
  └─────────────────────────────────────────────────┴─────────────────────────────┘
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```

Please select a submenu and press Enter. The submenus are detailed in the following pages.

▶ Chipset

Graphics Configuration

```
                Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
                                   Chipset
  ┌─────────────────────────────────────────────────┬─────────────────────────────┐
  │ Graphics Configuration                            │ Initial priority :          │
  │                                                   │ AUTO:  PEG->PCIe->PCI-      │
  │ Primary Display              [Auto]               │ >IGFX                       │
  │ Internal Graphics            [Auto]               │ IGFX:  IGFX->PEG->PCIe-     │
  │                                                   │ >PCI                        │
  │                                                   │ PEG:   PEG->PCIe->PCI-      │
  │                                                   │ >IGFX                       │
  │                                                   │ PCI: PCI->PCIe->PEG->IGFX   │
  │                                                   ├─────────────────────────────┤
  │                                                   │ →←: Select Screen           │
  │                                                   │ ↑↓: Select Item             │
  │                                                   │ Enter: Select               │
  │                                                   │ +/- : Change Opt.           │
  │                                                   │ F1: General Help            │
  │                                                   │ F2: Previous Values         │
  │                                                   │ F9: Optimized Defaults      │
  │                                                   │ F10: Save & Exit            │
  │                                                   │ ESC: Exit                   │
  └─────────────────────────────────────────────────┴─────────────────────────────┘
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```

Primary Display

Select which of IGFX/PEG/PCI Graphics device to be the primary display.

Internal Graphics

Keep IGFX "Enabled" or "Disabled" based on the setup options, or select "Auto" for auto-detection.

▶ Chipset

PEG Port Configuration

```
            Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
              Chipset

    PEG Port Configuration                                        Enable or Disable the Root
                                                                  Port
    PEG 0:1:0                        Not Present
      Enable Root Port               [Enabled]
      Max Link Speed                 [Auto]
    PEG 0:1:1                        Not Present
      Enable Root Port               [Enabled]
      Max Link Speed                 [Auto]

    ▶ PEG Port Feature Configuration
                                                                  →←: Select Screen
                                                                  ↑↓: Select Item
                                                                  Enter: Select
                                                                  +/- : Change Opt.
                                                                  F1: General Help
                                                                  F2: Previous Values
                                                                  F9: Optimized Defaults
                                                                  F10: Save & Exit
                                                                  ESC: Exit


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```
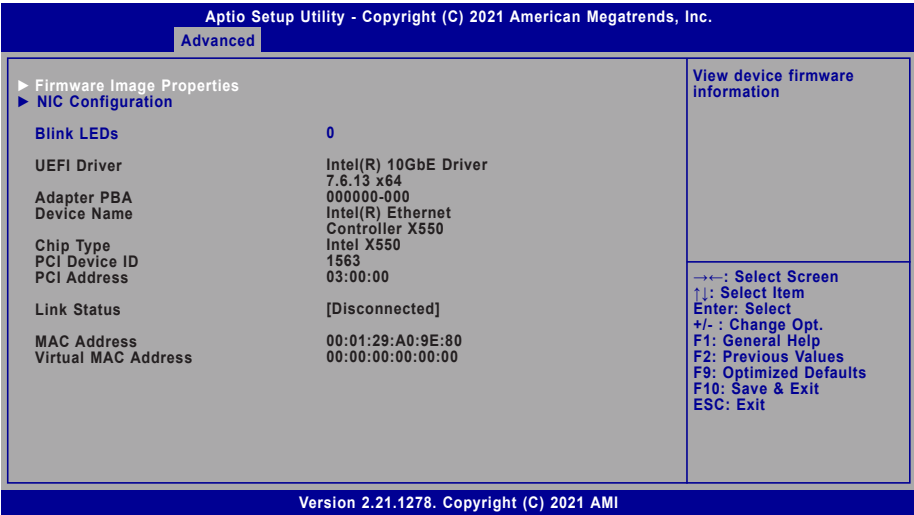
Enable Root Port

Enable or disable the root port, or select "Auto" for auto-detection.

Max Link Speed

Configure PCIE2/PCIE4 port's Max Speed: Auto, Gen1, Gen2 or Gen3.

▶ **PEG Port Feature Configuration**

```
            Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
              Chipset

    PEG Port Feature Configuration                                Detect Non-Compliance PCI
                                                                  Express Device in PEG
    Detect Non-Compliance Device          [Enabled]


                                                                  →←: Select Screen
                                                                  ↑↓: Select Item
                                                                  Enter: Select
                                                                  +/- : Change Opt.
                                                                  F1: General Help
                                                                  F2: Previous Values
                                                                  F9: Optimized Defaults
                                                                  F10: Save & Exit
                                                                  ESC: Exit


            Version 2.20.1271. Copyright (C) 2021 American Megatrends, Inc.
```

Detect Non-Compliance Device

Enable or disable this field to detect non-compliance PCIe devices in the PEG.

▶ Chipset

PCH-IO Configuration

```
        Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
       Chipset

   PCH-IO Configuration                                           PCI Express Configuration
                                                                  settings
 ▶ PCI Express Configuration
 ▶ SATA And RST Configuration
 ▶ HD Audio Configuration

   LAN1(I219)                    [Enabled]
     Wake on LAN Enable          [Enabled]
   Above 4GB MMIO BIOS assignment [Disabled]
   Max TOLUD                     [Dynamic]
   VT-d                          [Disabled]
   DMA Control Guarantee         [Disabled]
   Hybrid Storage Mode           [Dynamic Configuration    →←: Select Screen
                                 for Hybrid Storage        ↑↓: Select Item
                                 Device Enable]            Enter: Select
                                                           +/- : Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F9: Optimized Defaults
                                                           F10: Save & Exit
                                                           ESC: Exit



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```

LAN1(I219)

Enable or disable onboard NIC.

Wake on LAN Enable

Enable or disable integrated LAN to wake the system.

Above 4GB MMIO BIOS assignment

Enable/Disable above 4GB MemoryMappedIO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

Max TOLUD

Assign the maximum value of Top Of Lower Usable DRAM (TOLUD). Select to specify a fixed value, or select "Dynamic" so that the assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.

VT-d

VT-d capability.

DMA Control Guarantee

Enable or disable DMA_Control_Guarantee bit.

Hybrid Storage Mode

Enable or disable Dynamic Configuration for Hybrid Storage Device.

▶ Chipset   ▶ PCH-IO Configuration

PCI Express Configuration

```
        Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
       Chipset

   PCI Express Configuration                                     PCI Express Root Port Set-
                                                                 tings.
 ▶ x550
 ▶ M.2-M
 ▶ PCIe2
 ▶ i210AT
 ▶ PCIe4

                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/- : Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F9: Optimized Defaults
                                                           F10: Save & Exit
                                                           ESC: Exit



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```

Select one of the PCI Express channels and press enter to configure the following settings.

PCIE Devices

Enable or disable the PCI Express Root Port. The following fields are only available when the PCIe root port is enabled.

PCIe Speed

Select PCIe Speed of the current port — AUTO, Gen1, Gen 2, or Gen3. This field may not appear when the speed of the port is not configurable.

Hot Plug

Enable or disable hot plug function of the port. This field may not appear when the port does not support hot plug.

Detect Non-Compliance Device

Enable or disable this field to detect non-compliance PCIe devices in the PEG. This field may not appear when the port does not support Non-compliant device detection.

▶ **Chipset** ▶ **PCH-IO Configuration**

SATA And RST Configuration

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
                    Chipset

 SATA And RST Configuration                                         Enable or disable SATA
                                                                    Device.
 SATA Controller(s)                   [Enabled]
 SATA Mode Selection                  [AHCI]

 SATA 4(R1B)                          Empty
    Port 0                            [Enabled]
    Hot Plug                          [Disabled]
 SATA 0(R2)                           Empty
    Port 1                            [Enabled]
    Hot Plug                          [Disabled]
 SATA 1(R3)                           Empty
    Port 2                            [Enabled]                     →←: Select Screen
    Hot Plug                          [Disabled]                    ↑↓: Select Item
 SATA 2(R4)                           Empty                         Enter: Select
    Port 3                            [Enabled]                     +/- : Change Opt.
    Hot Plug                          [Disabled]                    F1: General Help
 SATA 3(R5)                           Empty                         F2: Previous Values
    Port 4                            [Enabled]                     F9: Optimized Defaults
    Hot Plug                          [Disabled]                    F10: Save & Exit
                                                                    ESC: Exit



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```

SATA Controller(s)

This field is used to enable or disable the Serial ATA controller.

SATA Speed

This field is used to select SATA speed generation limit: Auto, Gen1, Gen2 or Gen3.

SATA Mode Selection

The mode selection determines how the SATA controller(s) operates.

- **AHCI** This option allows the Serial ATA controller(s) to use AHCI (Advanced Host Controller Interface).

- **Intel RST Premium With Intel Optane System Acceleration** This option allows you to create RAID or Intel Rapid Storage configuration along with Intel® Optane™ system acceleration on Serial ATA devices.

Use RST Legacy OROM

This field shows up when SATA Mode Selection is set to Intel RST Premium With Intel Optane System Acceleration. Enable or disable to use RST Legacy OROM when CSM is enabled.

Ports and Hot Plug

Enable or disable the Serial ATA port and its hot plug function.

▶ **Chipset** ▶ **PCH-IO Configuration**

HD Audio Configuration

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
                    Chipset

 HD Audio Subsystem Configuration Settings                         Control Detection of the
                                                                   HD-Audio device.
 HD Audio                             [Enabled]                    Disabled = HDA will be un-
                                                                   conditionally disabled
                                                                   Enabled = HDA will be un-
                                                                   conditionally enabled.




                                                                   →←: Select Screen
                                                                   ↑↓: Select Item
                                                                   Enter: Select
                                                                   +/- : Change Opt.
                                                                   F1: General Help
                                                                   F2: Previous Values
                                                                   F9: Optimized Defaults
                                                                   F10: Save & Exit
                                                                   ESC: Exit



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```

HD Audio

Control the detection of the HD Audio device.

- **Disabled** HDA will be unconditionally disabled.

- **Enabled** HDA will be unconditionally enabled.

▶ **Security**

```
                    Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
   Main    Advanced   Chipset   Security   Boot   Save & Exit

   Password Description                                    Set Administrator Pass-
                                                           word
   Minimum length                  3
   Maximum length                  20

   Administrator Password


 ▶ Secure Boot
                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/- : Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F9: Optimized Defaults
                                                           F10: Save & Exit
                                                           ESC: Exit


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```

Administrator Password

Set the administrator password. To clear the password, input nothing and press enter when a new password is asked. Administrator Password will be required when entering the BIOS.

User Password

Set the user password. To clear the password, input nothing and press enter when a new password is asked. User Password will be required when powering up the system.

Secure Boot

```
                    Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
                                                Security

   System Mode                    Setup                   Secure Boot activated
                                                           when: Secure Boot is ena-
   Secure Boot                    [Disabled]              bled Platform Key(PK) is
                                  Not Active               enrolled, System mode is
                                                           User/Deployed, and CSM is
   Secure Boot Mode               [Custom]                 disabled
 ▶ Restore Factory Keys
 ▶ Reset To Setup Mode

                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/- : Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F9: Optimized Defaults
                                                           F10: Save & Exit
                                                           ESC: Exit


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```

Secure Boot

The Secure Boot store a database of certificates in the firmware and only allows the OSes with authorized signatures to boot on the system. To activate Secure Boot, please make sure that "Secure Boot" is "[Enabled]", Platform Key (PK) is enrolled, "System Mode" is "User", and CSM is disabled. After enabling/disabling Secure Boot, please save the configuration and restart the system. When configured and activated correctly, the Secure Boot status will be "Active".

Secure Boot Customization

Select the secure boot mode — Standard or Custom. When set to Custom, the following fields will be configurable for the user to manually modify the key database.
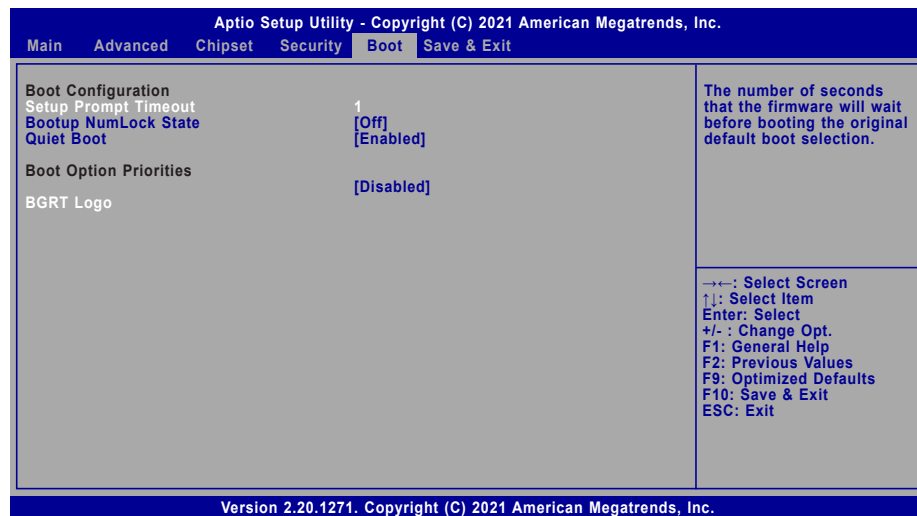
Restore Factory Keys

Force system to User Mode. Load OEM-defined factory defaults of keys and databases onto the Secure Boot. Press Enter and a prompt will show up for you to confirm.

Reset To Setup Mode

Clear the database from the NVRAM, including all the keys and signatures installed in the Key Management menu. Press Enter and a prompt will show up for you to confirm.

▶ Boot

```
                    Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
    Main    Advanced    Chipset    Security    Boot    Save & Exit

    Boot Configuration                                      The number of seconds
    Setup Prompt Timeout          1                         that the firmware will wait
    Bootup NumLock State          [Off]                     before booting the original
    Quiet Boot                    [Enabled]                 default boot selection.

    Boot Option Priorities

    BGRT Logo                     [Disabled]

                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/- : Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F9: Optimized Defaults
                                                            F10: Save & Exit
                                                            ESC: Exit

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```

Setup Prompt Timeout

Set the number of seconds to wait for the setup activation key. 65535 (0xFFFF) denotes indefinite waiting.

Bootup NumLock State

Select the keyboard NumLock state: On or Off.

Quiet Boot

This section is used to enable or disable quiet boot option.

Boot Option Priorities

Rearrange the system boot order of available boot devices.

BGRT Logo

It is used to enable or disable to support display logo with ACPI BGRT table.

> **Note:**
> If "Boot option filter" of "CSM Configuration" is set to "UEFI and Legacy" or "UEFI only", and "Quiet Boot" is set to enabled, "BGRT Logo" will show up for configuration. Refer to the Advanced > CSM Configuration submenu for more information.

▶ Save & Exit

```
                    Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
    Main    Advanced    Chipset    Security    Boot    Save & Exit

    Save Options                                            Reset the system after
    Save Changes and Reset                                  saving the changes
    Discard Changes and Reset
    Restore Defaults

    Boot Override

    ▶ Save Setting to file
    ▶ Restore Setting from file

                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/- : Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F9: Optimized Defaults
                                                            F10: Save & Exit
                                                            ESC: Exit

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```

Save Changes and Reset

To save the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system after saving all changes made.

Discard Changes and Reset

To discard the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system setup without saving any changes.

Restore Defaults

To restore and load the optimized default values, select this field and then press <Enter>. A dialog box will appear. Select Yes to restore the default values of all the setup options.

Boot Override

Move the cursor to an available boot device and press Enter, and then the system will immediately boot from the selected boot device. The Boot Override function will only be effective for the current boot. The "Boot Option Priorities" configured in the Boot menu will not be changed.

▶ Save Setting to file

Select this option to save BIOS configuration settings to a USB flash device.

▶ Restore Setting from file

This field will appear only when a USB flash device is detected. Select this field to restore setting from the USB flash device.

▶ Updating the BIOS

To update the BIOS, you will need the new BIOS file and a flash utility. Please contact technical support or your sales representative for the files and specific instructions about how to update BIOS with the flash utility. For updating AMI BIOS in UEFI mode, you may refer to the how-to video at https://www.dfi.com/Knowledge/Video/5.

▶ Notice: BIOS SPI ROM

- 1. The Intel® Management Engine has already been integrated into this system board. Due to the safety concerns, the BIOS (SPI ROM) chip cannot be removed from this system board and used on another system board of the same model.

- 2. The BIOS (SPI ROM) on this system board must be the original equipment from the factory and cannot be used to replace one which has been utilized on other system boards.

- 3. If you do not follow the methods above, the Intel® Management Engine will not be updated and will cease to be effective.

> **Note:**
> a. You can take advantage of flash tools to update the default configuration of the BIOS (SPI ROM) to the latest version anytime.
> b. When the BIOS IC needs to be replaced, you have to populate it properly onto the system board after the EEPROM programmer has been burned and follow the technical person's instructions to confirm that the MAC address should be burned or not.

Chapter 4 - RAID

The system board allows configuring RAID on Serial ATA drives. It supports RAID 0, RAID 1, RAID 5, RAID 10. (Q470E)

▶ RAID Levels Explanation

RAID 0 (Striped Disk Array without Fault Tolerance)

RAID 0 uses two new identical hard disk drives to read and write data in parallel, interleaved stacks. Data is divided into stripes and each stripe is written alternately between two disk drives. This improves the I/O performance of the drives at different channel; however it is not fault tolerant. A failed disk will result in data loss in the disk array.

RAID 1 (Mirroring Disk Array with Fault Tolerance)

RAID 1 copies and maintains an identical image of the data from one drive to the other drive. If a drive fails to function, the disk array management software directs all applications to the other drive since it contains a complete copy of the drive's data. This enhances data protection and increases fault tolerance to the entire system. Use two new drives or an existing drive and a new drive but the size of the new drive must be the same or larger than the existing drive.

RAID 5

RAID 5 stripes data and parity information across hard drives. It is fault tolerant and provides better hard drive performance and more storage capacity.

RAID 10 (Mirroring and Striping)

RAID 10 is a combination of data striping and data mirroring providing the benefits of both RAID 0 and RAID 1. Use four new drives or an existing drive and three new drives for this configuration.

RAID Level	Min. Drives	Protection	Description
RAID 0	2	None	Data striping without redundancy
RAID 1	2	Single Drive Failure	Disk mirroring
RAID 5	3	Single Drive Failure	Block-level data striping with distributed parity
RAID 10	4	1 Disk Per Mirrored Stripe (not same mirror)	Combination of RAID 0 (data striping) and RAID 1 (mirroring)
SPAN	2	None	Extends capacity to the sum of total drives, the second drive won't be used until the first one is full.

▶ Setup Procedure

To enable the RAID function, the following settings are required.

1. Install SATA drives.

2. Enter the RAID menu

3. Create RAID 0/RAID 1/SPAN

Step 1: Install SATA Drives

Refer to chapter 2 for details on connecting the Serial ATA drives.

> **Important:**
> 1. Please make sure the SATA drives that you are to create a RAID volume with are connected and powered, and are able to be detected by the system. Otherwise, the RAID BIOS utility would not be accessible.
> 2. While creating a RAID volume, please make sure the system, drives, and cables are perfectly steady and mounted correctly. Disturbance during creating a RAID volume will result in irreversible data corruption sorted on the drive.
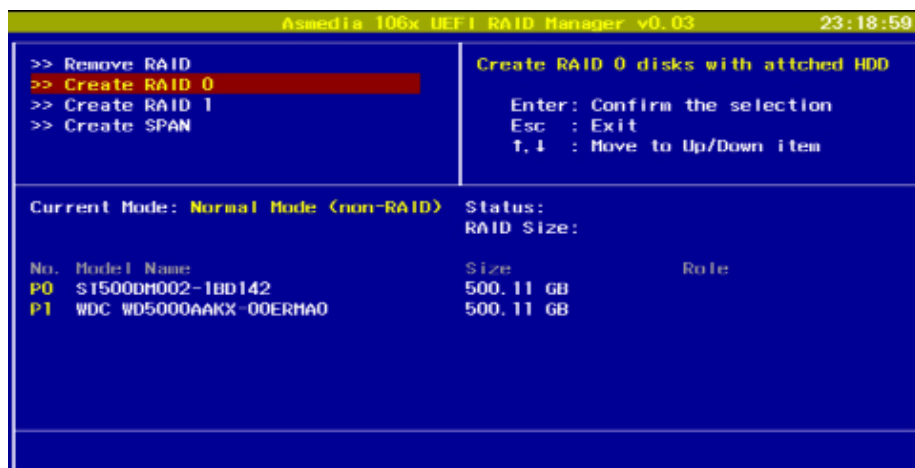
Step 2: Enter the RAID Menu

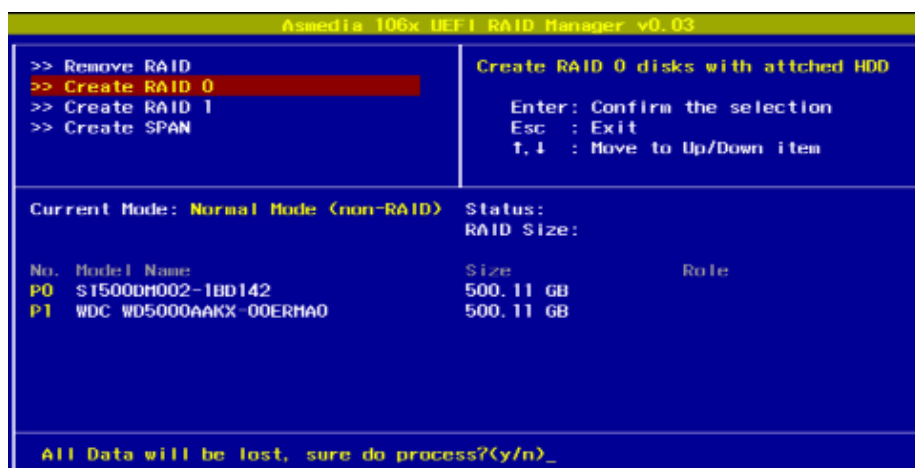1. Power-on the system then press 'Ctrl-R' to enter the RAID menu.

```
Asmedia 106x SATA Controller UEFI Ver 1.11 AHCI Mode
Copyright (C) Asmedia Technologies, Inc. All Right reserved.
Firmware version: 190920_00_00_00
Press 'Ctrl-r' to enter RAID menu...
```

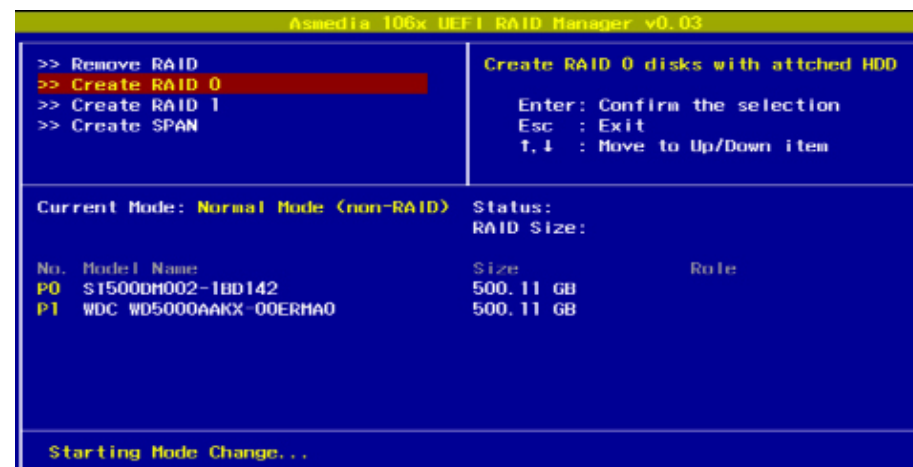### Step 3: Create RAID 0/RAID 1/ SPAN

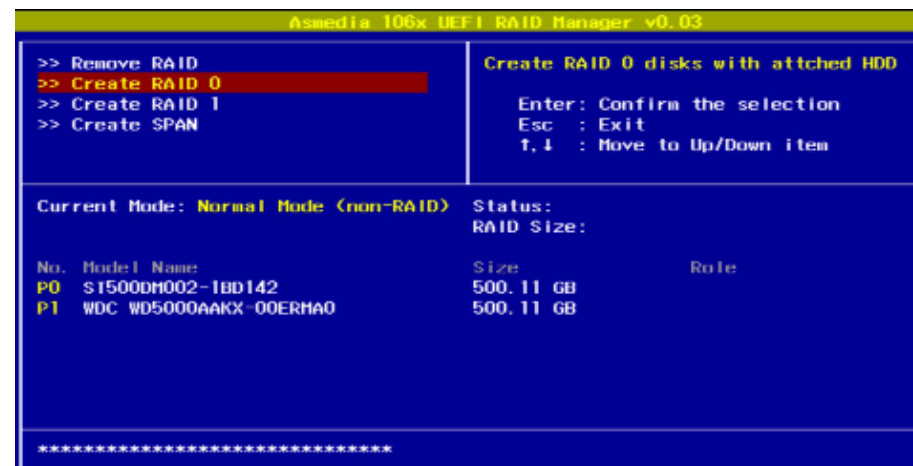1. Select the desired mode and press <Enter>.

2. Press <Y> to confirm the process.

3. Wait the process to start, the whole process takes about several seconds depends on the volume amounts.
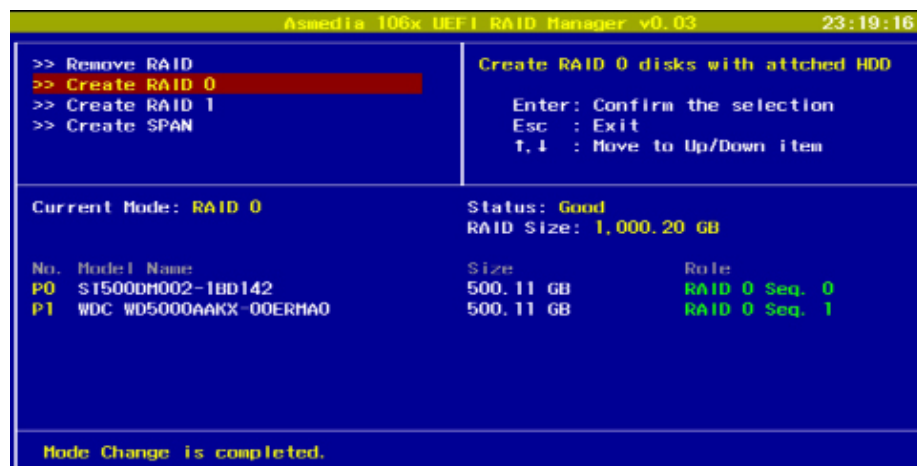
4. "*" shown on bottom indicates the progress.

5. Relevant information will appear with the message "Mode change is completed." on bottom.

```
        Asmedia 106x UEFI RAID Manager v0.03          23:19:16

>> Remove RAID              Create RAID 0 disks with attched HDD
>> Create RAID 0
>> Create RAID 1               Enter: Confirm the selection
>> Create SPAN                 Esc  : Exit
                               ↑,↓  : Move to Up/Down item

Current Mode: RAID 0        Status: Good
                           RAID Size: 1,000.20 GB

No.  Model Name             Size              Role
P0   ST500DM002-1BD142      500.11 GB         RAID 0 Seq. 0
P1   WDC WD5000AAKX-00ERMA0 500.11 GB         RAID 0 Seq. 1




Mode Change is completed.
```

Other RAID modes follow the same procedure as well.