DFI

CS551

Embedded SBC 3.5" 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:

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

2. 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

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

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

3. 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.

4. We will not be liable for any indirect, special, incidental or consequencial 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.

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

2. Wear an antistatic wrist strap.

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

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

5. 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 CS551 board

- 1 COM port cable (Length: 250mm, 1 x COM port) 332-753040-000G

- 1 Serial ATA data cable (Length: 500mm) 332-553001-005G

- 1 Serial ATA power cable (Length: 250mm) A81-004041-016G

- 1 Heat sink (Height: 43.2mm)   A71-001302-030G

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

Item Name	Part Number	Description
USB port cable	A81-001032-016G	Length: 200mm
Power adapter	671-110006-100G 671-106012-000G	100W, 12V, TDP 35W 60W, 12V, DC Jack, TDP 15W
4 pin to DC jack cable	A81-004051-016G	Length: 100mm
Audio cable	A81-022007-016G	Length: 160mm
Cooler fan	A71-101303-010G	Height: 34.6mm
Heater	612-KP4040-000G	

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.

- CPU

- Memory module

- Storage device such as hard disk drive .

- Power adaptor

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	8th Gen Intel® Core™ Processors, LGA 1151 Socket Intel® Core i7-8700T Processor (6C/12T; Max speed 4.0 GHz; TDP 35W) Intel® Core i5-8500T Processor (6C/6T; Max speed 3.5GHz; TDP 35W) Intel® Core i3-8100T Processor (4C/4T; Max speed 3.1GHz; TDP 35W) Intel® Pentium G5400T Processor (2C/4T; Max speed 3.1GHz; TDP 35W) Intel® Pentium G4900T Processor (2C/2T; Max speed 2.9GHz; TDP 35W) 9th Gen Intel® Core™ Processors, LGA 1151 Socket Intel® Core i7-9700TE Processor (8C/8T; Max speed 3.6GHz; TDP 35W) Intel® Core i5-9500TE Processor (6C/6T; Max speed 3.6GHz; TDP 35W) Intel® Core i3-9100TE Processor (4C/4T; Max speed 3.2GHz; TDP 35W) Note: Parts of the CPUs with the limit of 82/88C operating temprature will have cpu-throttling while operate over 65C, it's strongly advised to choose i7/i5 CPU which limited at 100C due to the original design of CS551. Above conditions won't be applied with re-designed thermal module.
	Memory	One 260-pin SODIMM up to 32GB Single Channel DDR4 2666MHz ECC only for C246 with Intel® Core i3-8100T/9100TE/Pentium G5400T/Pentium G4900T
	BIOS	AMI SPI 128Mbit
GRAPHICS	Controller	Intel® UHD 630 Graphics GT Series
	Feature	OpenGL 4.6, DirectX 12, OpenCL 2.1 HW Decode: AVC/H.264, MPEG2 (H.262), VC1, JPEG/MJPEG, HEVC/H.265, VP8, VP9, VP10 HW Encode: AVC/H.264, MPEG2 (H.262), JPEG/MJPEG, HEVC/H.265, VP8, VP9
	Display	1 x LVDS, resolution up to 1920x1200 @ 60Hz 2 x DP++, resolution up to 4096x2304 @ 60Hz
	Triple Displays	LVDS + DP++ + DP++
EXPANSION	Interface	1 x Full-size Mini PCIe (PCIe/USB 2.0, optional USB 3.1 Gen1/USB 2.0) 1 x M.2 2280 M key (C246/Q370: NVMe PCIe x4/SATA 3.0 or H310: NVMe PCIe x2, SATA 3.0) 1 x Nano SIM slot (optional for 3G/4G module)
AUDIO	Audio Codec	Realtek ALC262
ETHERNET	Controller	Intel® I211AT PCIe (10/100/1000Mbps) or Intel® I210IT PCIe (10/100/1000Mbps)
REAR I/O	Ethernet	2 x GbE (RJ-45)
	USB	4 x USB 3.1 Gen2 (C246/Q370) or Gen1 (H310)
	Display	2 x DP++
INTERNAL I/O	Serial	1 x RS-232/422/485 (2.0mm pitch)
	USB	2 x USB 2.0 (2.0mm pitch)
	Display	1 x LVDS LCD Panel Connector 1 x LVDS Backlight
	Audio	1 x Audio (Line-out/Mic-in)
	SATA	1 x SATA 3.0 (up to 6Gb/s) 1 x SATA Power
	DIO	1 x 8-bit DIO
	Heater	1 x heater 12V header, activated below -10°C
	SMBus	1 x SMBus
WATCHDOG TIMER	Output & Interval	System Reset, Programmable via Software from 1 to 255 Seconds
SECURITY	TPM	fTPM 2.0
POWER	Type	12VDC
	Consumption	Typical: i7-8700T: 12V @ 0.86A (10.32Watt) Max: i7-8700T: 12V @ 5.38A (64.56Watt)
	Connector	Vertical Type Connector (4-pin) (default) Coaxial Jack (available upon request)
	RTC Battery	CR2032 Coin Cell
OS SUPPORT	Microsoft	Windows 10 IoT Enterprise 64-bit RS5
	Linux	Linux
ENVIRONMENT	MTBF	(Model: CS551-H310-BCA) 740,203 hrs @ 25°C; 462,070 hrs @ 45°C; 305,215 hrs @ 60°C; 227,949 hrs @ 70°C (Model: CS551-H310-ECA) 742,388 hrs @ 25°C; 464,078 hrs @ 45°C; 3067,73 hrs @ 60°C; 229,188 hrs @ 70°C Calculation Model: Telcordia Issue 4 Environment: GB, GC - Ground Benign, Controlled
	Temperature	Operating: -5 to 65°C for 35W/100C CPU (fanless) and 35W 100C, 82C CPU (fan) -30 to 80°C for 15W TDP down/100C CPU (fanless); 35W/100C CPU (fan) **Note:** For -30°C environments, a heater/polyfilm can be added to heat up. Storage: -40 to 85°C
	Humidity	Operating: 5 to 90% RH; Storage: 5 to 90% RH
MECHANICAL	Dimensions	3.5" SBC Form Factor: 146mm (5.75") x 102mm (4.02")
	Height	PCB: 1.6mm, Top Side: 25.27mm, Bottom Side: 7.68 mm
CERTIFICATIONS		CE, FCC, RoHS

The specifications listed here may be based on editions that do not resemble actual products. Please visit the download page at go.dfi.com/CS551, or QR code to the right for the latest datasheet.

▶ 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.

Graphics

The integrated Intel® UHD graphics engine delivers an excellent blend of graphics performance and features to meet business needs. It provides excellent video and 3D graphics with outstanding graphics responsiveness. These enhancements deliver the performance and compatibility needed for today's and tomorrow's business applications.

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

The Intel® I219LM and Intel® I211AT Gigabit Ethernet Controllers support data transmission at 1Gbps.

Audio

The Realtek ALC887 audio codec provides 7.1 channel High Definition audio output.

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.

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.

USB

The system board supports the new USB 3.1 Gen 2. It is capable of running at a maximum transmission speed of up to 10 Gbit/s (1.2 GB/s) and is faster than USB 3.1 Gen 1 (5 Gbit/s, or 625 MB/s), USB 2.0 (480 Mbit/s, or 60 MB/s) and USB 1.1 (12Mb/s). USB 3.1 reduces the time required for data transmission, reduces power consumption, and is backward compatible with USB 2.0. It is a marked improvement in device transfer speeds between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

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.

Chapter 2 - Hardware Installation

▶ **Board Layout**
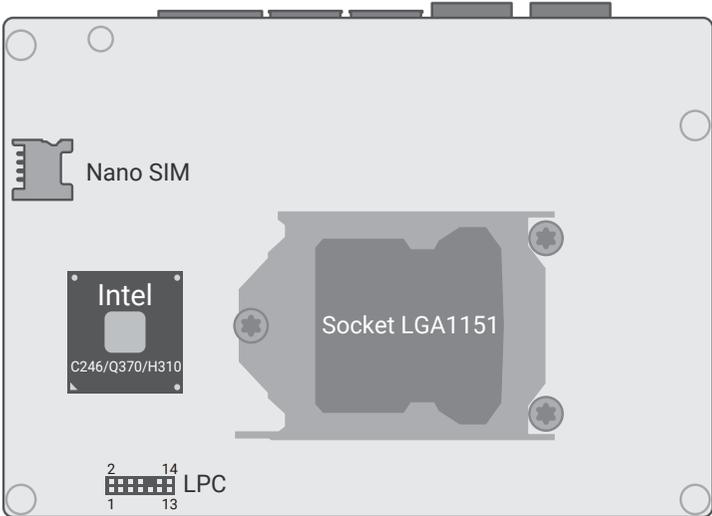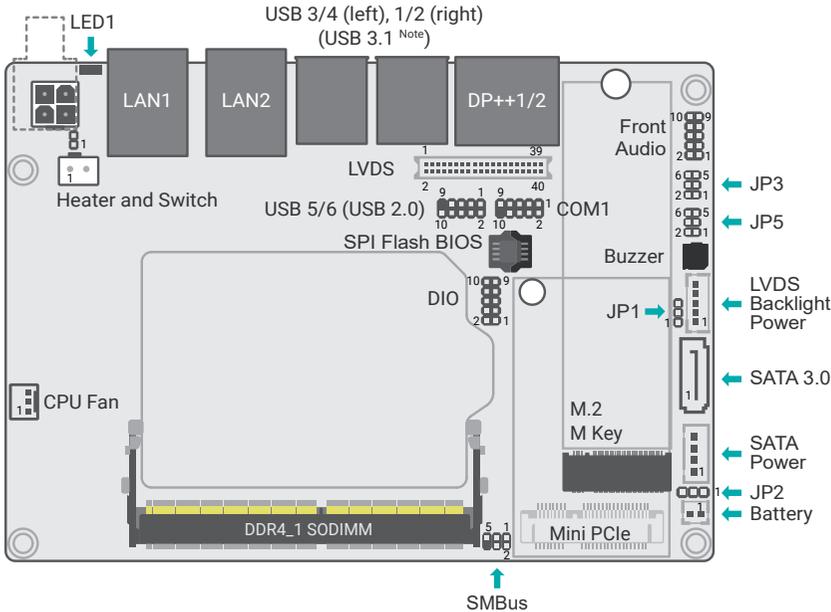
Note:
Specifications of these components are model-specific. Please refer to the specifications for detail.

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.

▶ **Standby Power LED**

Standby Power LED
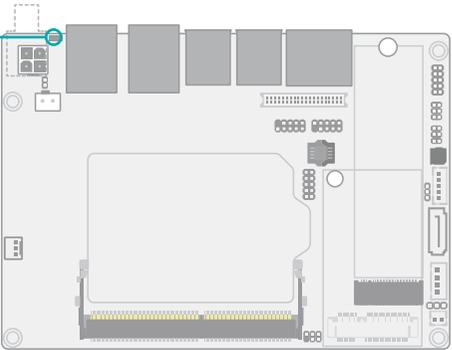
Important:
When the Standby Power LED lights up, it indicates that there is power on the system board. Power-off the PC then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the motherboard and components.

▶ System Memory

DDR4_1
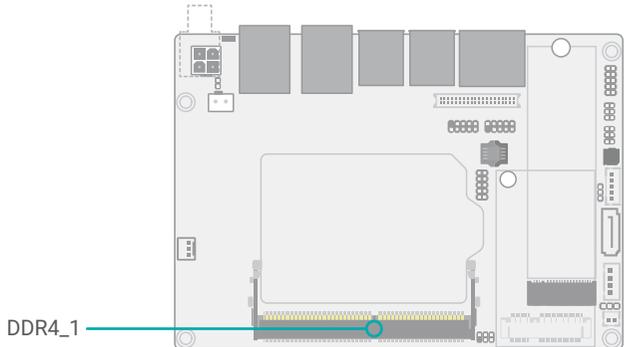
The system board supports one single channel DDR4 SO-DIMM memory module.

Single Channel (SC)
Data will be accessed in chunks of 64 bits from the memory channels.

Features

- 260-pin SO-DIMM up to 32GB
- Single Channel DDR4 2666MHz
- ECC/Non-ECC, ECC only for C246 with Intel® Core i3-8100T/9100TE/Pentium G5400T/Pentium G4900T

Installing the SO-DIMM Module

Before installing the memory module, 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 SO-DIMM socket on the system board
4. Make sure the notch on memory card is aligned to the key on the socket.

←------- Retention Notch -------→

↓ Notch

≪ **DDR4 SO-DIMM**

←------- Retention Clip -------→

↓ Key

≪ **Socket Top View**

▶ **System Memory** ▶ **Installing the SO-DIMM Module**
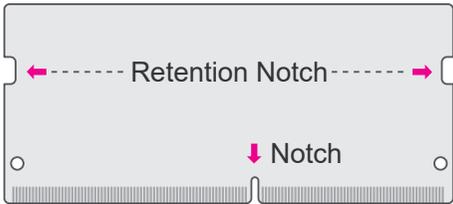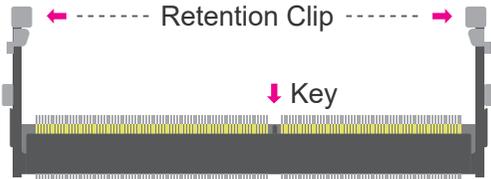
Please follow the steps below to install the memory card into the socket.
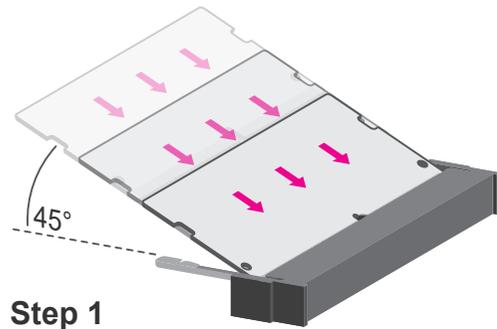
Step 1:
Insert the memory card into the slot while making sure 1) the notch and the key are aligned, and 2) the non-connector end rises approximately 45 degrees horizontally. Press the card firmly into the socket while applying and maintaining even pressure on both ends.
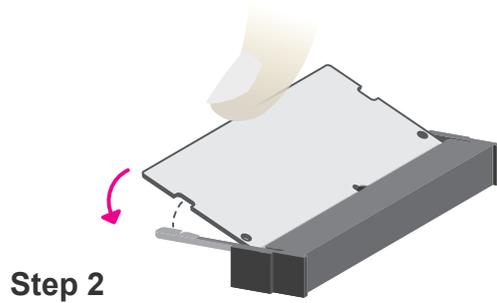
Step 2:
Press the end of the card far from the socket down while making sure the retention notch and the clip align as indicated by the dotted line in the illustration. If the retention notch and the clip do not align, please remove the card and re-insert it. Press the card all the way down.
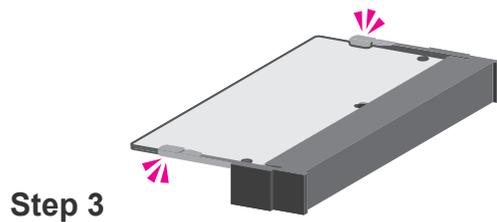
Step 3:
The clips snap automatically and abruptly to the retention notches of the card sounding a distinctive click, and lock the card in place. Inspect that the clip sits in the notch. If not, please pull the clips outward, release and remove the card, and mount it again.

▶ CPU

The system board is equipped with a surface mount LGA 1151 socket. This socket is exclusively designed for installing a LGA 1151 packaged Intel CPU.

> **Important:**
> 1. Before you proceed, make sure (1) the LGA 1151 socket comes with a protective cap, (2) the cap is not damaged and (3) the socket's contact pins are not bent. If the cap is missing or the cap and/or contact pins are damaged, contact your dealer immediately.
> 2. Make sure to keep the protective cap. RMA requests will be accepted and processed only if the LGA 1151 socket comes with the protective cap.

Protective cap

> **Note:**
> The system board used in the following illustrations may not resemble the actual board. These illustrations and photos are for reference only.

Installing the CPU

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

2. Disconnect all power cords and cables.
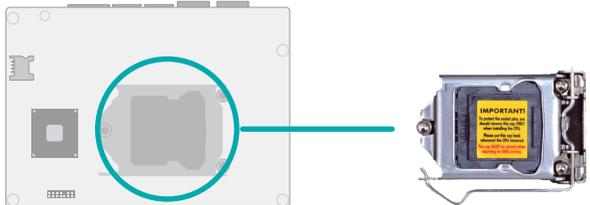
3. Locate the LGA 1151 CPU socket on the system board.

> **Important:**
> The CPU socket must not come in contact with anything other than the CPU. Avoid unnecessary exposure. Remove the protective cap only when you are about to install the CPU.

4. Unlock the socket by pressing the load lever down, moving it sideways until to escape the retention tab. Lift the load lever up when it's released.

Load lever

Retention tab

5. Lift the load lever and the load plate all the way up as shown in the photo.

Load lever

Load plate

6. Remove the protective cap from the CPU socket. The cap is used to protect the CPU socket against dust and harmful particles. Remove the protective cap only when you are about to install the CPU.

Protective cap

7-1. Insert the CPU into the socket. The gold triangular mark on the CPU must align with the chamfer corner of the CPU socket shown in the photo.

Golden triangular mark

Important:
The CPU will fit in only one orientation and can easily be seated without exerting any force.

7-2. Two keys on the socket and notches on the CPU also facilitate alignment.

Alignment key
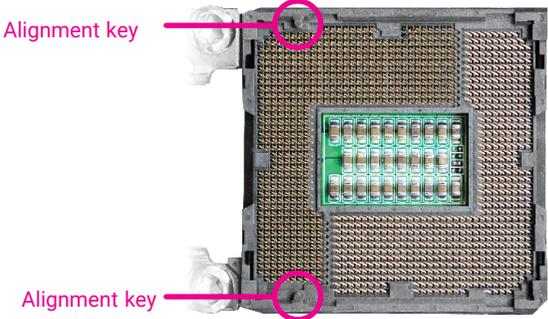
Alignment key

7-3. The CPU's notch will fit into the socket's alignment key when it's seated in the correct orientation.
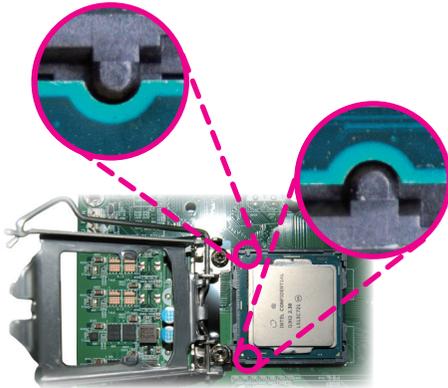
8. Close the load plate then push the load lever down.

   While closing the load plate, make sure the front edge of the load plate slides under the retention knob.

Load lever

Retention knob

9. Press down the load lever and hook it under the retention tab.
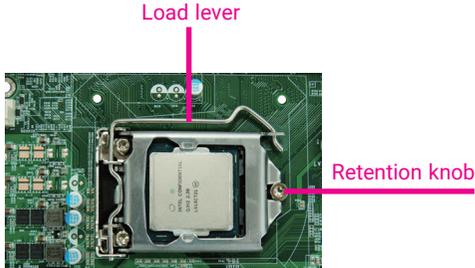
Heater(Optional)

The heater is used to warm up the CPU for the operation in cold environments.
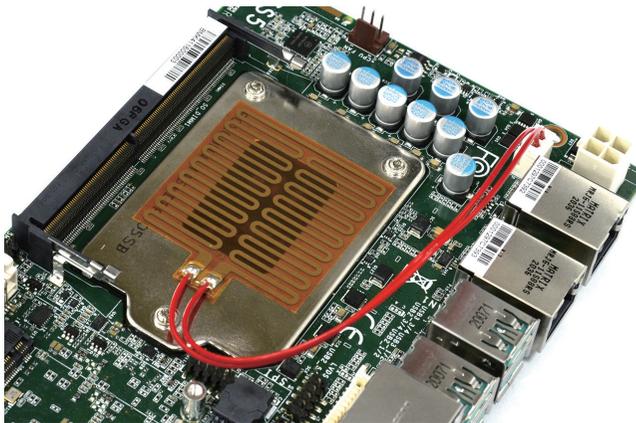
It activates at the temperature between -5~-10°C with LED1 being red on the system board.
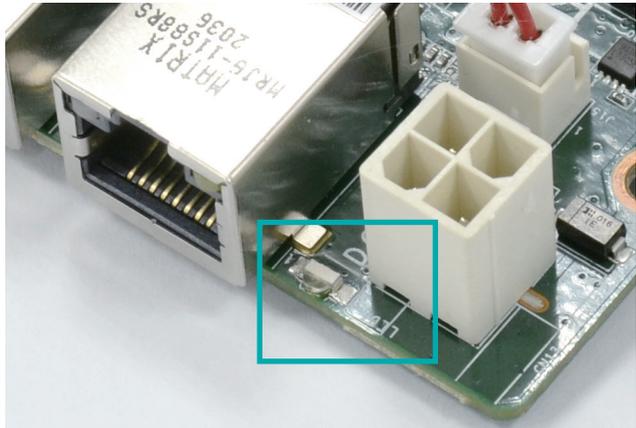
Below table shows various types of the heater condition.

Condition	Power Status	System status	LED	Remark
Heating	Power off	G3	RED	
	Power on	S3-S0	RED	CPU light-loading.
Non-heating	Power off	S5	Green	
	Power on	S0	Green	

▶ **CPU**

Installing the Heatsink or Fan

The system board may come with a heatsink or a cooler (heatsink with fan), including four stand-offs and four stand-off screws to secure the board and heatsink onto the chassis. The assembly is expected to be installed in the manners as illustrated below.

Heatsink / cooler

System board
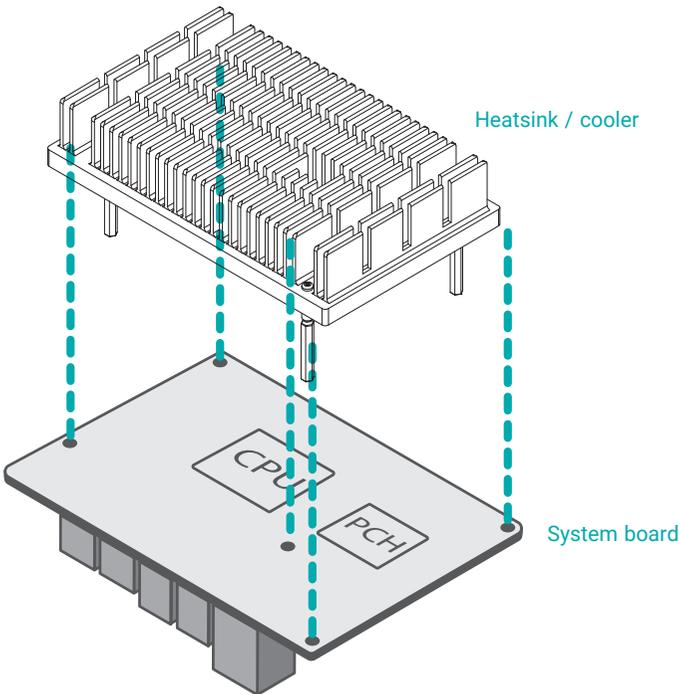
Please make sure the contacting sides of the heat spreader and the module are correct — the CPU side of the module shall be facing the interface metal side and legs of the heat sink. Rotate horozontally so the interface metal sits right on top of the CPU, and align the screw holes on the heatsink to those on the module. Remove any plastic cover on the interface metal and apply thermal paste/adhesive if it is required.
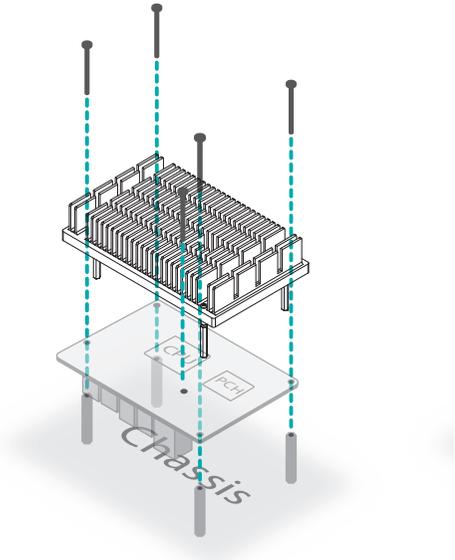
Optional: Connect the CPU fan cable to the CPU fan connector on the top side of the module. This step can be omitted if it is a fanless heatsink.
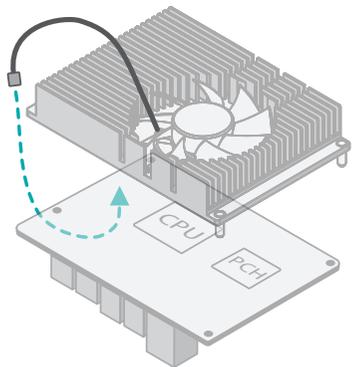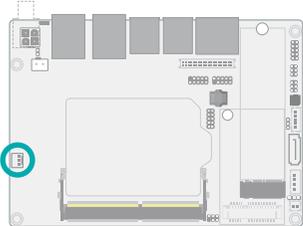
Screw the stand-offs onto the chassis. This step can be omitted if there exist pre-installed stand-offs on the chassis.

Note:
The standard package includes a fanless heatsink. The heatsink with fan is an optional item available upon request.

▶ **CPU** ▶ **Installing the Heatsink and Fan**

Place the heatsink/fan and module combo onto the stand-offs. Make sure the stand-off screw holes on the combo and those on the stand-offs align.
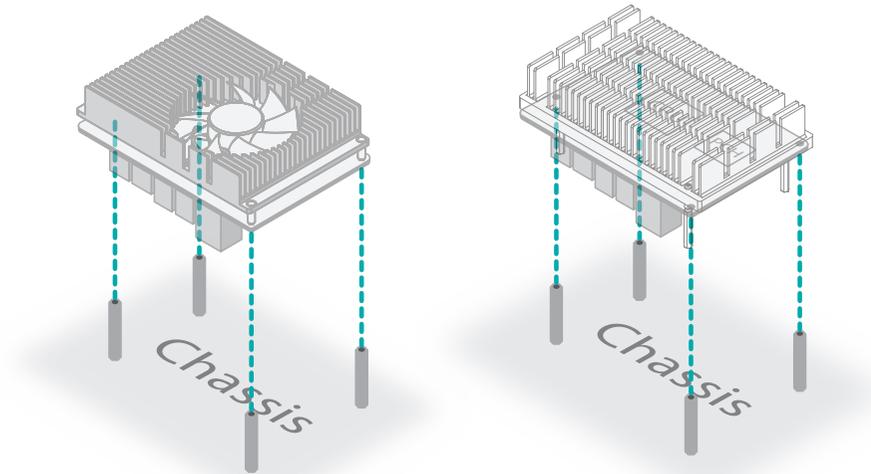
Place the stand-off screws provided in the package into the screw holes of the combo. Use a screwdriver to fasten the screws onto the chassis tight.
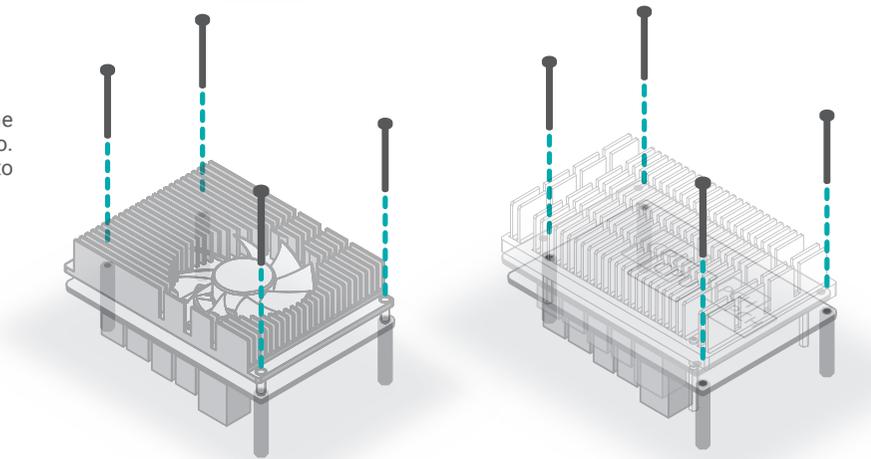
Note:
It is typical that the chassis is customized, in which case the installation shall vary according to the design of the chassis instead of the instructions provided here.

▶ Jumper Settings

Front Panel (JP5)
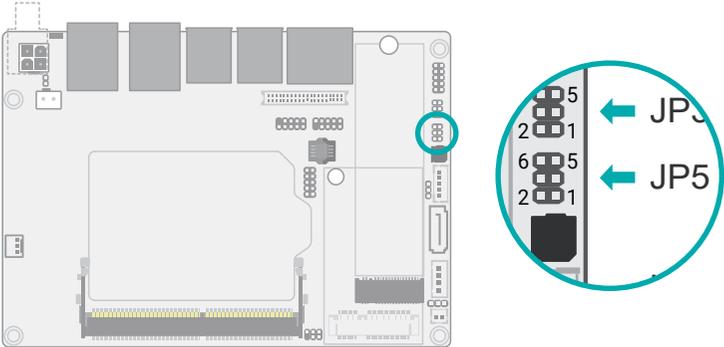
■ Front Panel Pin Assignment

Pin	Assignment	Pin	Assignment
1	Power Button	2	Power LED VCC
3	GND	4	Power LED
5	System Reset	6	HDD LED

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

System Reset
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 Switch
This switch is used to power on or off the system.

Clear CMOS (JP2)
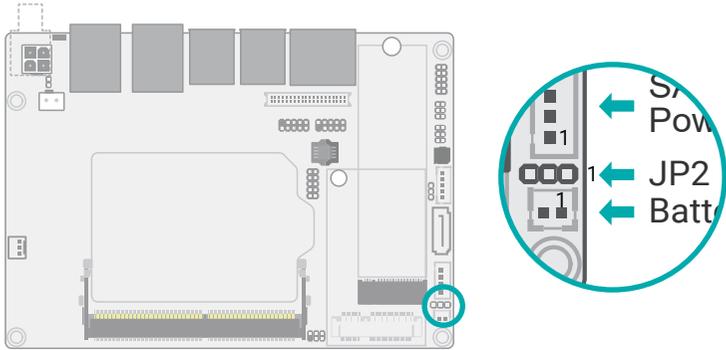
If any anomaly of the followings is encountered —

    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 JP2's pin 2 and pin 3. Wait for a few seconds and set JP2 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.

■ 1-2 On: Normal (default)   ■ 2-3 On: Clear CMOS

Panel Power Select (JP3)

Backlight Power Select (JP1)
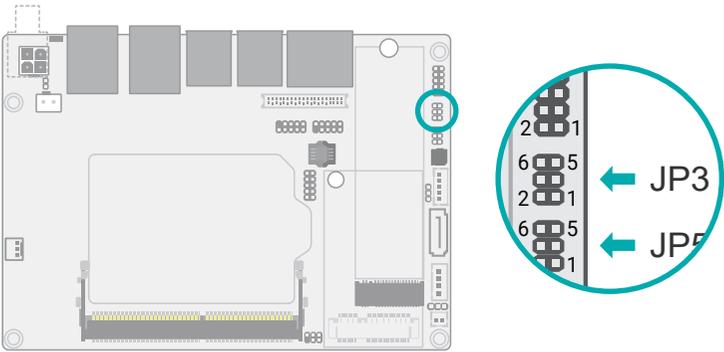
The power level supplied to the LVDS/eDP panel can be switched between +3.3V, +5V or +12V via JP3.
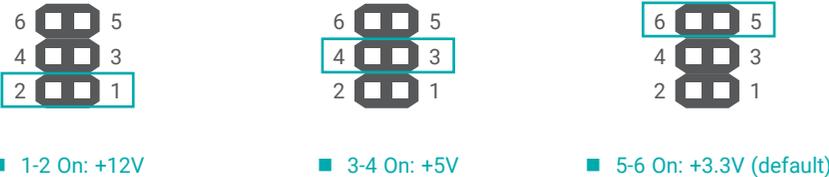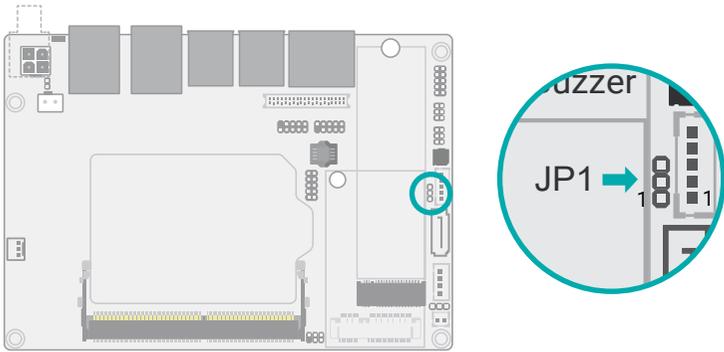
The power level supplied to the LCD backlight can be switched between +3.3V or +5V via JP1.

- ■ 1-2 On: +12V
- ■ 3-4 On: +5V
- ■ 5-6 On: +3.3V (default)

- ■ 1-2 On: +3V3 (default)
- ■ 2-3 On: +5V

Important:
Before powering-on the system, make sure that the setting of the jumper matches the specifications of the LVDS/eDP LCD. Incorrect power voltage may cause irreversible damage to your LCD panel.

Important:
Before powering-on the system, make sure that the setting of the jumper matches the specifications of the LCD's backlight power. Incorrect power voltage may cause irreversible damage to your LCD's backlight.

▶ Rear I/O Ports

Graphics Display

- 2 x DP++   - 4 x USB 3.1   - LAN 2   - LAN 1
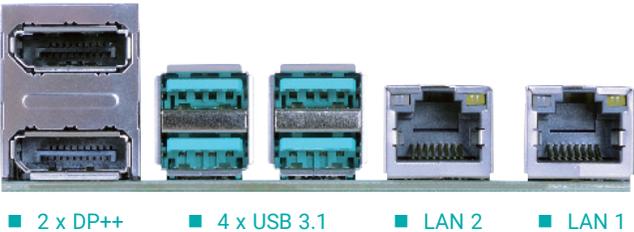
The rear panel I/O ports consist of the following:

- • 2 DP++ ports

- • 1 DC-In, optionally internal vertical 4-pin connector

- • 2 RJ45 LAN ports

- • 4 USB 3.1ports, Gen2 for C246/Q370, Gen1 for H310

- DP++ 1
- DP++ 2
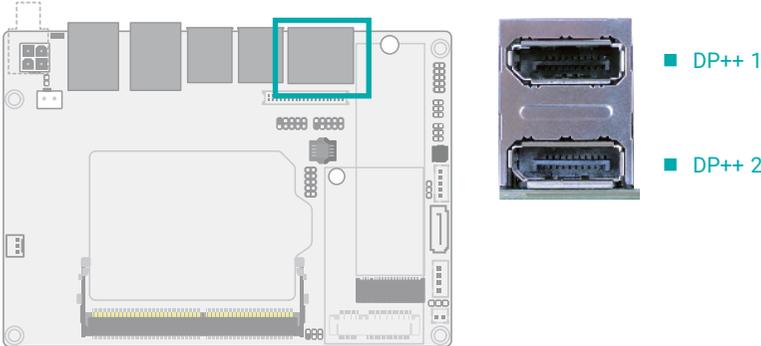
DisplayPort ++
The DisplayPort (DP) is a digital display interface used to connect a display device such as a computer monitor. It is used to transmit audio and video simultaneously. The interface, which is developed by VESA, delivers higher performance features than any other digital interface.

USB Ports

RJ45 LAN Ports

■ LAN 2   ■ LAN 1

■ USB 2 (USB 3.1)   ■ USB 4 (USB 3.1)

■ USB 1 (USB 3.1)   ■ USB 3 (USB 3.1)
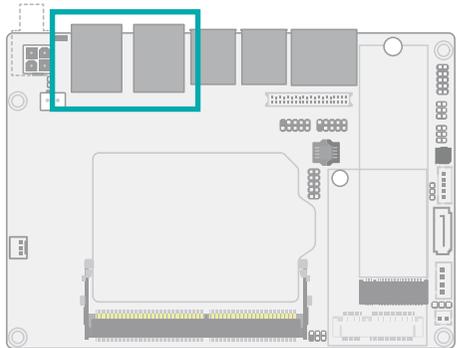
The two LAN ports allow the system board to connect to a local area network by means of a network hub.

USB allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals. The system board is equipped with multiple USB Type A ports at the rear side — four USB 3.1 Gen1 (H310) or Gen2 (C246/Q370) ports. For the internal USB ports, please refer to the next section. Please refer to the next section for internal USB connectors.

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.

Features

• 2 x Intel® I211AT PCIe (10/100/1000Mbps) or Intel® I210IT PCIe (10/100/1000Mbps)

▶ Internal I/O Connectors

12V DC-In
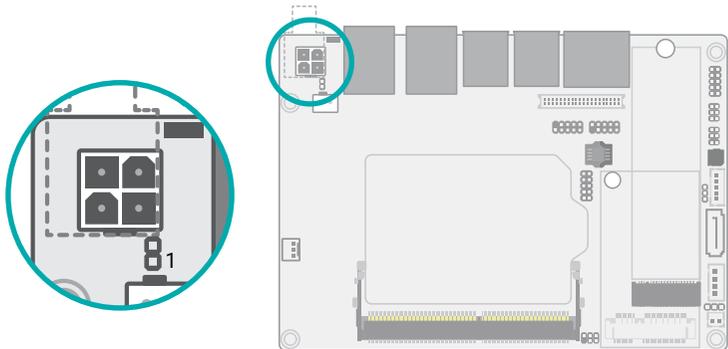
Connect a 4-pin DC power cord to the power connector for DC supply. The coaxial type is avaible upon request.

4-pin vertical

DC In coaxial (optional)
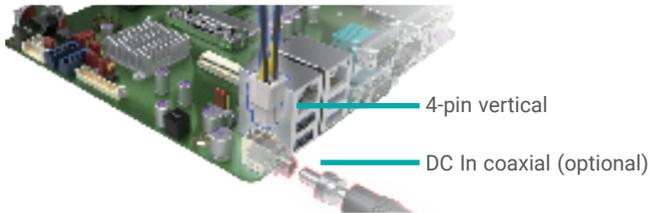
⚠ **Important:**
Using a voltage higher than the recommended range may result in failure in starting and booting the system or causing irreversible damage to the system board. A power adaptor/converter is necessary when the power source on site does not comply with the power specifications of the board.
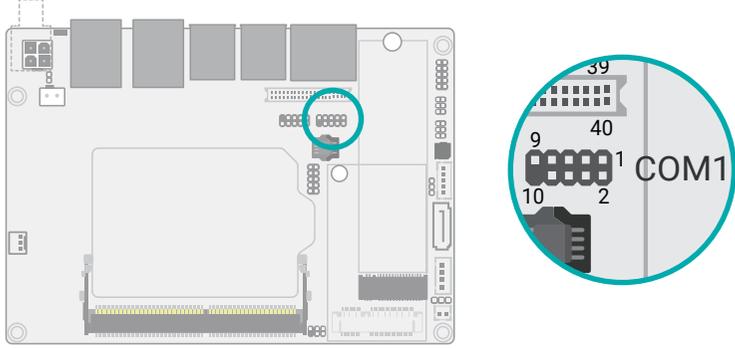
COM (Serial) Port

The serial ports are asynchronous communication ports with 16C550A-compatible UARTs that can be used with modems, serial printers, remote display terminals, and other serial devices.

COM 1 supports three serial modes, i.e. RS232, RS422, and RS485.

■ COM Port Pin Assignment

Pin	RS232	RS422	RS485
1	DCD-	TXD-	Data-
2	RD	TXD+	Data+
3	TD	RXD+	N.C.
4	DTR-	RXD-	N.C.
5	GND	GND	GND
6	DSR-	N.C.	N.C.
7	RTS-	N.C.	N.C.
8	CTS-	N.C.	N.C.
9	RI-	N.C.	N.C.
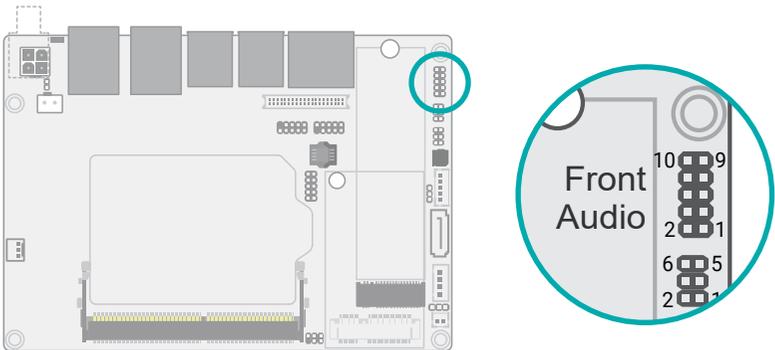
Front Audio

The Front Audio internal 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 Pin Assignment

Pin	Assignment	Pin	Assignment
1	Mic-L	2	GND
3	Mic-R	4	N.C.
5	Line-Out-R	6	Mic-JD (sense)
7	GND	8	KEY
9	Line-Out-L	10	Line-JD (sense)
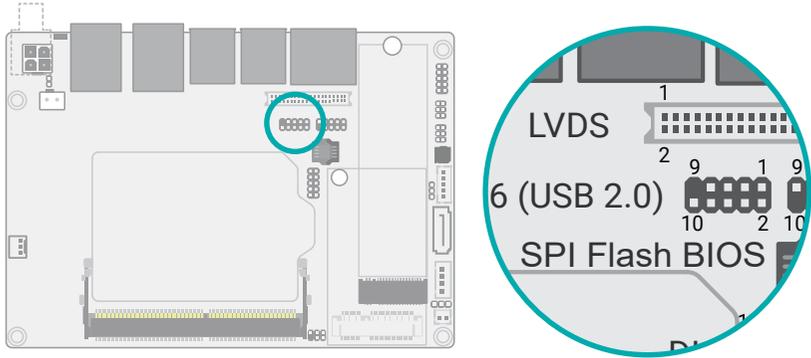
USB Ports

■ USB 2.0 Pin Assignment
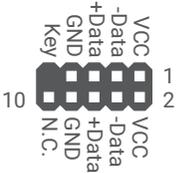
The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

In addition to the rear USB ports as introduced previously in this chapter, the system board is equipped with two internal USB 2.0 ports (one pin-header connector) and as illustrated above. The pin headers for USB 9/10 can also be replaced by a Type A vertical connector.

The internal USB pin headers may be connected to 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 S state(s).

LPC

The LPC connector is used for debugging.
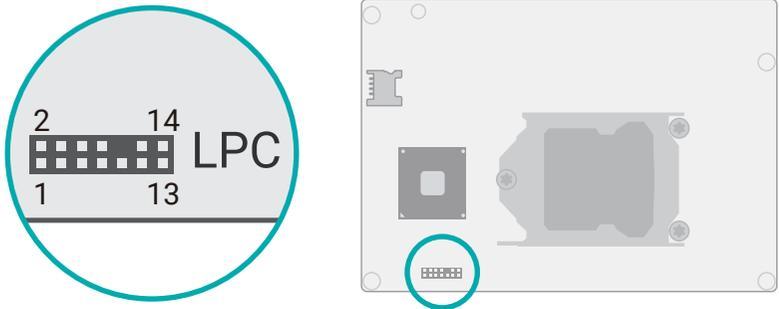
■ LPC Pin Assignment

Pin	Assignment	Pin	Assignment
1	L_CLK	2	L_LAD1
3	L_RST#	4	L_LAD0
5	L_FRAME#	6	3.3V
7	L_LAD3	8	GND
9	L_LAD2	10	---
11	SERIRQ	12	GND
13	5VSB	14	5V
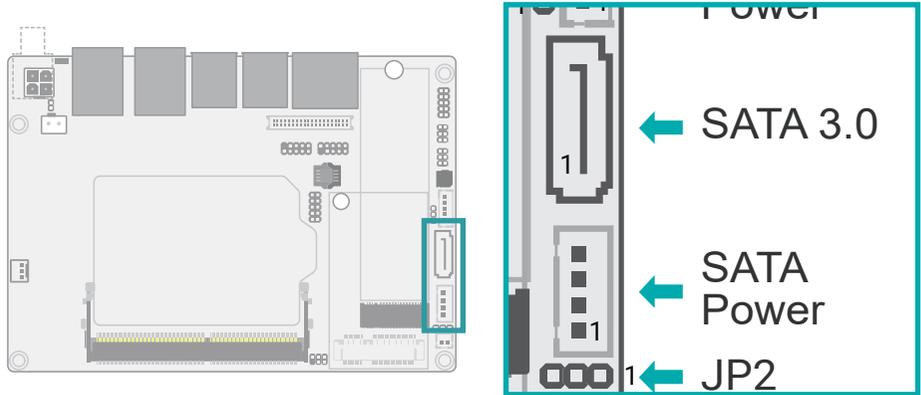
SATA (Serial ATA)

The Serial ATA (SATA) connector is used to connect the Serial ATA device. The system board support one SATA port 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.

■ SATA Pin Assignment

7
GND
RX+
RX-
GND
TX-
TX+
GND
1

■ SATA Power Pin Assignment

+5V
GND
GND
N.C.
1

Battery

■ Battery

GND
3.3V

2 1

Connect to board
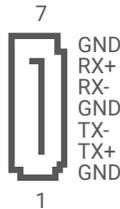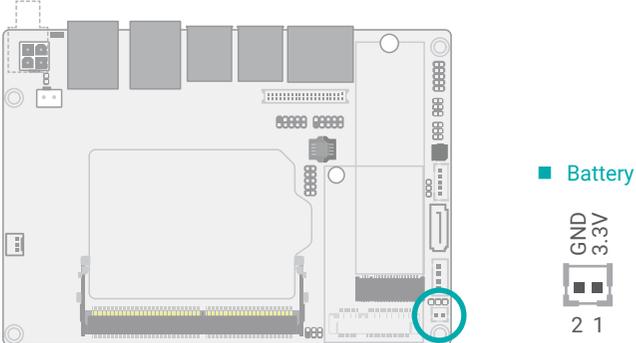
■ External Battery

The external lithium ion battery supplies power to the real-time clock and CMOS memory as an auxiliary source of power when the main power is shut off.

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.

▶ **Internal I/O Connectors**

CPU Fan

CPU Fan

1
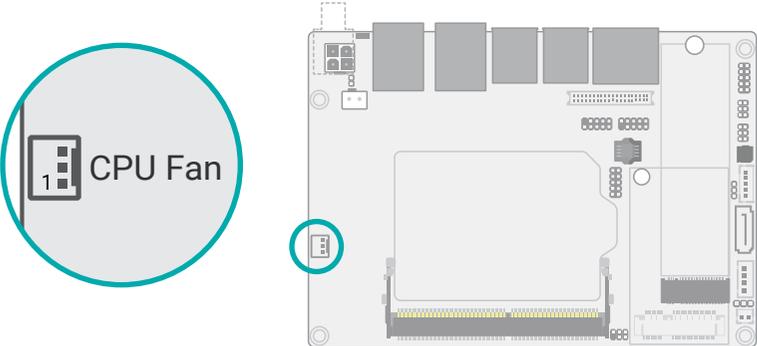
These fan connectors are used to connect to cooling fans. Cooling fans provide adequate air circulation throughout the chassis and dissipate heat to prevent overheating of the system board and components. The 3-pin CPU fan modulates fan speed via voltage modulation.

■ 3-pin Fan Pin Assignment

Pin	Assignment
1	Ground
2	Power
3	Sense
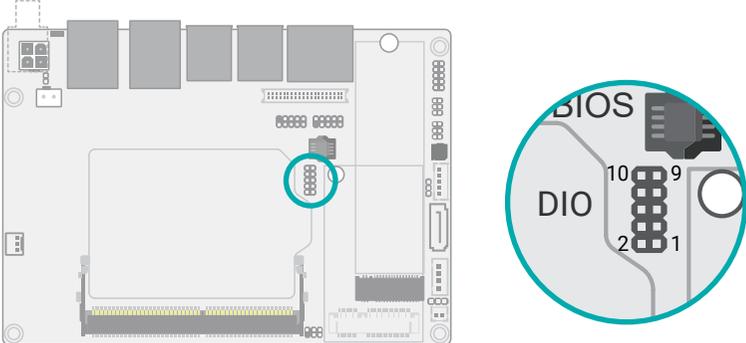
Digital I/O

The 8-bit Digital I/O (DIO) connector allows for input/output signals of digital logical states defined by voltage levels.

■ Digital I/O Pin Assignment

Pin	Assignment	Pin	Assignment
1	DIO_6	2	DIO_7
3	DIO_4	4	DIO_5
5	DIO_2	6	DIO_3
7	DIO_0	8	DIO_1
9	GND	10	5VSB
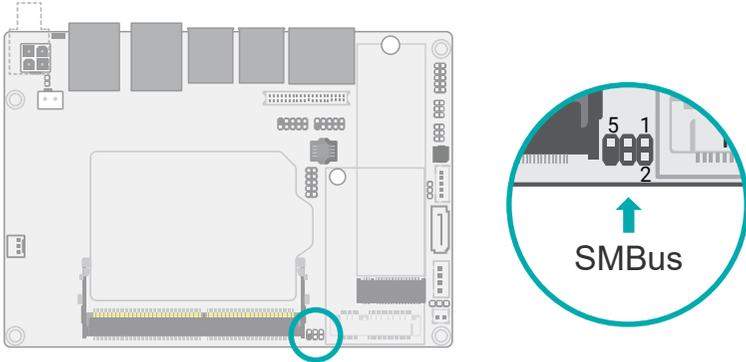
SMBus

The SMBus (System Management Bus) connector is used to connect the SMBus device. 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 Pin Assignment

Pin	Assignment	Pin	Assignment
1	3V3SB	2	GND
3	SMBus_Clock	4	SMBus_DATA
5	SMBus_Alert	6	---

▶ **Internal I/O Connectors**

LVDS Panel

DP++1/2

LVDS

1   39

2   40

(USB 2.0)

9   1   9   1

10   2   10   2

Flash BIOS

JP5

LVDS Backlight Power

1

SATA

■ LVDS LCD Panel Pin Assignment

Pin	Function	Pin	Function
1	GND	2	GND
3	LVDSA_Out3+	4	LVDSB_Out3+
5	LVDSA_Out3-	6	LVDSB_Out3-
7	GND	8	GND
9	LVDSA_Out2+	10	LVDSB_Out2+
11	LVDSA_Out2-	12	LVDSB_Out2-
13	GND	14	GND
15	LVDSA_Out1+	16	LVDSB_Out1+
17	LVDSA_Out1-	18	LVDSB_Out1-
19	GND	20	GND
21	LVDSA_Out0+	22	LVDSB_Out0+
23	LVDSA_Out0-	24	LVDSB_Out0-
25	GND	26	GND
27	LVDSA_CLK1+	28	LVDSB_CLK1+
29	LVDSA_CLK1-	30	LVDSB_CLK1-
31	GND	32	GND
33	LVDS_DDC_CLK	34	NC
35	LVDS_DDC_DATA	36	+3.3V
37	Panel Power	38	Panel Power
39	Panel Power	40	Panel Power

The system board allows you to connect a LCD Display Panel by means of the LVDS LCD panel connector and the LCD/Inverter power connector. These connectors transmit video signals and power from the system board to the LCD Display Panel.

Jumper Setting
The power voltage of the LCD panel and backlight power is configured via jumper settings as previously instructed in this chapter.

■ Backlight Power Pin Assignment

Pin	Function	Pin	Function
1	+12V	4	PWM Brightness Control
2	GND	5	5V
3	Backlight On/Off		
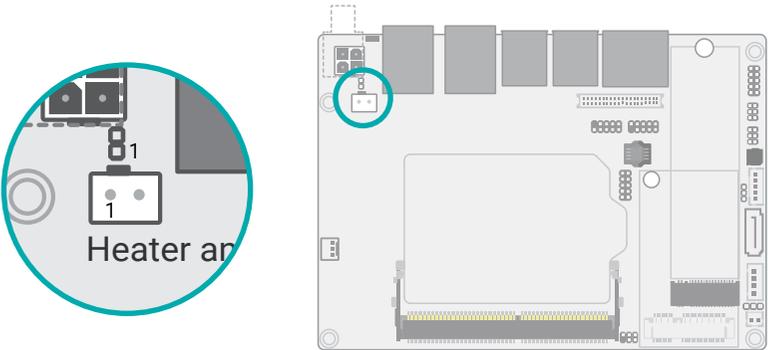
Heater

Heater an

The heater box header provides 12V power to the external heater with a 2-pin pin header for On/Off switch.

■   Heater Box Header

Pin	Assignment	Pin	Assignment
1	12V	2	12VSB_PG_SW

■   Heater Switch Pin Header

Pin	Assignment	Pin	Assignment
1	Manual Reset	2	12VSB_PG_SW

Expansion Slots

M.2 Sockets
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. The board preserves space and two standoffs for the M.2 M Key socket (22mm x 80mm).

Mini PCIe
The Mini PCIe socket allows for a full-size Mini PCIe module, and supports PCIe and USB signals.

Nano SIM (optional)
The Nano SIM socket allows for inserting a Nano SIM card for the system to access the subscribed telecom service.

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.
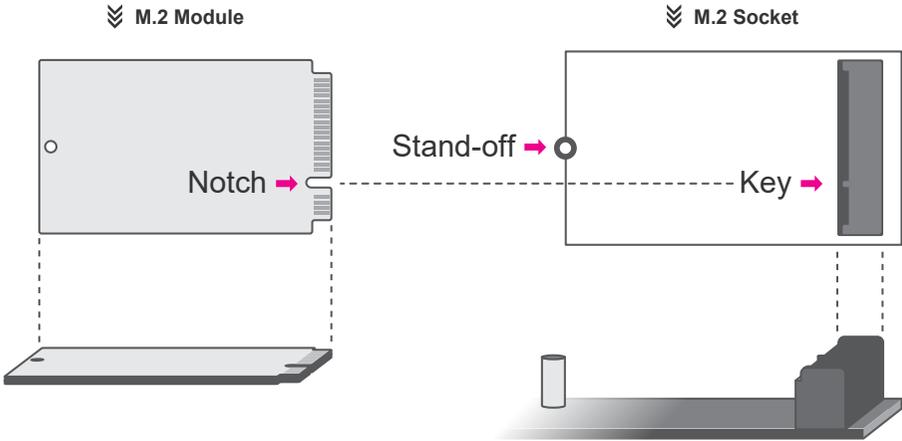
Please follow the steps below to install the card into the socket.
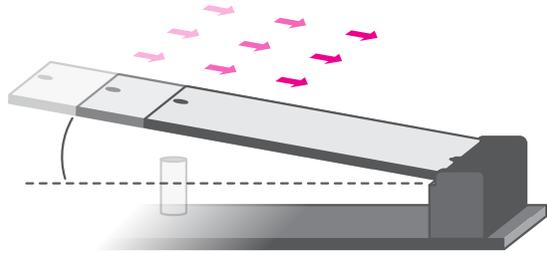
Step 1:
Insert the card into the socket at an angle while making sure the notch and key are perfectly aligned.

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.

≫ M.2 Module   **≫ M.2 Socket**

Stand-off ➡

Notch ➡   Key ➡

▶ **Internal I/O Connectors** ▶ **Expansion** Slots
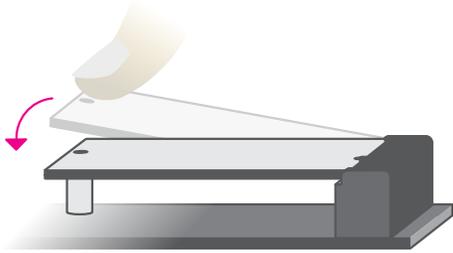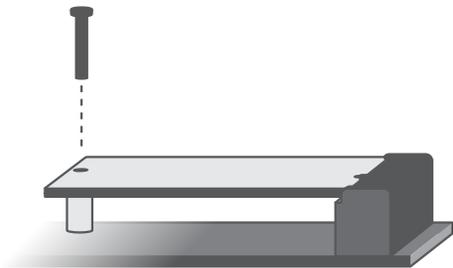
Installing the Mini PCIe Module

Before installing the Mini PCIe module into the Mini PCIe 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 Mini PCIe socket on the system board
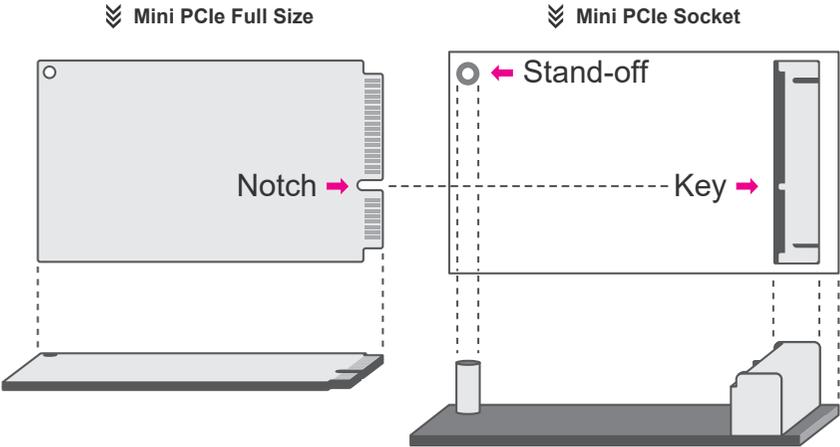
4. Make sure the notch on card is aligned to the key on the socket.

⩗ Mini PCIe Full Size   **⩗ Mini PCIe Socket**

Please follow the steps below to install the card into the socket.
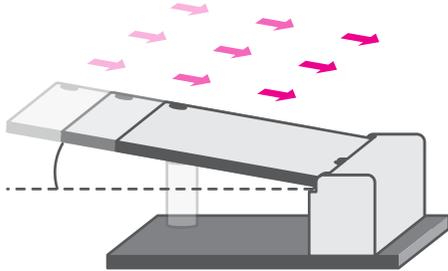
Step 1:
Insert the card into the socket at an angle while making sure the notch and key are perfectly aligned.
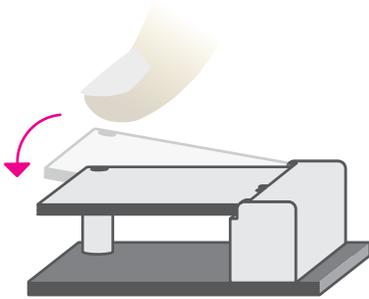
Step 2:
Press the end of the card far from the socket down until against the stand-off.
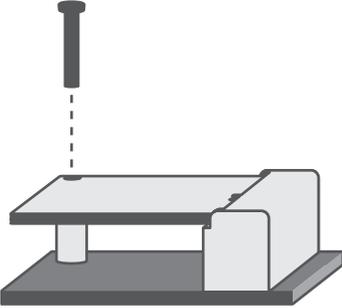
Step 3:
Screw tight the card onto the stand-off with a screw driver and a stand-off screw until the gap between the card and the stand-off closes up. The card should be lying parallel to the board when it's correctly mounted.

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) 2019 American Megatrends, Inc.
  Main    Advanced   Chipset   Security   Boot   Save & Exit
 ┌─────────────────────────────────────────────────┬──────────────────────────┐
 │ Project Name                CS551                ▲│ Set the Date. Use Tab to │
 │ BIOS Version                B18C.26A             │ switch between Date ele-  │
 │                                                  │ ments.                    │
 │ FSP version                 07.00.4E.20          │ Default Ranges:           │
 │ RC version                  07.00.4E.20          │ Year: 2005-2099           │
 │                                                  │ Months: 1-12              │
 │ Intel(R) Core(TM) i5-8500 CPU @ 3.00GHz          │ 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           0.7.1.95             │ 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               12.0.7.1122          │                           │
 │ ME Firmware SKU             Corporate SKU        │                           │
 │                                                  │                           │
 │ System Date                 [Mon 01/07/2019]    ▼│                           │
 └─────────────────────────────────────────────────┴──────────────────────────┘
          Version 2.20.1271. Copyright (C) 2019 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) 2019 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                              │                           │
 │ ▶ PTN3460 Configuration                          │                           │
 │ ▶ NCT5525D Super IO Configuration                │                           │
 │ ▶ NCT5525D HW Monitor                            │                           │
 │ ▶ Serial Port Console Redirection                │                           │
 │ ▶ USB Configuration                              │                           │
 │ ▶ CSM Configuration                              │                           │
 │                                                  ├──────────────────────────┤
 │ ▶ Network Stack 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) 2019 American Megatrends, Inc.
```

▶ **Advanced**

RC ACPI Configuration

```
                Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
   ┌─────────────┐
   │  Advanced   │
   └─────────────┘

   RC ACPI Configuration                              Enable or disable System
                                                      wake on alarm event. When
   Wake system from S5 via RTC      [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) 2019 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

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.

▶ **Advanced**

CPU Configuration

```
                Aptio Setup Utility - Copyright (C) 2019 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]
   Power Limit 1                    [35W]


                                                      →←: 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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```

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: all or 1.

Power Limit 1

To set the power limit of different temperatures, if the temperature is under 65C, the limit will be 35W . If the temperature reaches 80C, the option will be default at 15W.

> **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) 2019 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) 2019 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) 2019 American Megatrends, Inc.
  ┌──────────────────────────────────────────────────────────────────────┐
  │  Advanced                                                              │
  ├──────────────────────────────────────────┬─────────────────────────── │
  │ ME State                      [Enabled]   │ When Disabled ME  will  be  │
  │                                           │ put  into  ME  Temporarily  │
  │                                           │ Disabled Mode.              │
  │                                           │                             │
  │                                           │ →←: 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) 2019 American Megatrends, Inc.  │
  └──────────────────────────────────────────────────────────────────────┘
```
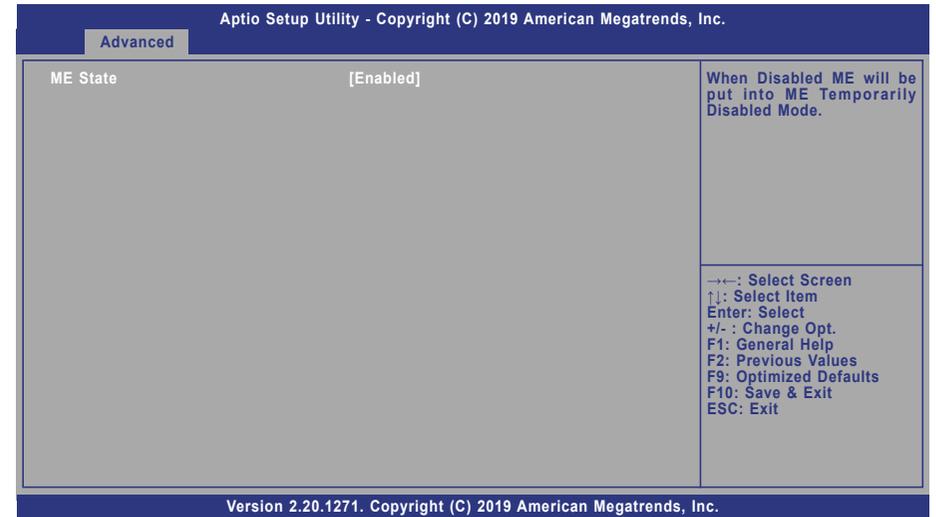
Me FW Image Re-Flash

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) 2019 American Megatrends, Inc.
      ┌──────────┐
      │ Advanced │
      └──────────┘
   TPM20 Device Found                                    Enables or Disables BIOS
   Firmware Version           5.62                       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) 2019 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**

PTN3460 Configuration

```
                    Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
      ┌──────────┐
      │ Advanced │
      └──────────┘
   PTN3460 Function           [Enable]
   LCD Panel Type             [1920x1080]
   LCD Panel Color Depth      [48 Bit]
   Backlight Type             [Normal+PWM Mode]




                                                         →←: 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) 2019 American Megatrends, Inc.
```
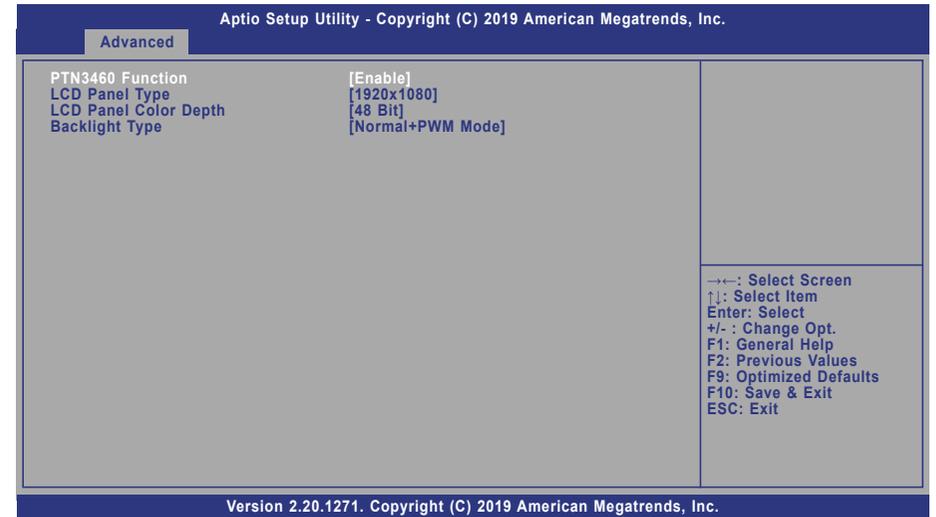
PTN3460 Function

Enable or Disable PTN3460 LCD Features. When this field is disabled, the following fields will remain hidden.

LCD Panel Type

Select the resolution of the LCD Panel — 800X480, 800X600, 1024X768, 1366X768, 1280X1024, 1920X1080, or 1920X1200.

LCD Panel Color Depth

Select the color depth of the LCD Panel — 18 Bit, 24 Bit, 36 Bit, 48 Bit.

Backlight Type

Select the backlight type of the LCD Panel —
Normal + PWM
Normal + DC
Invert + PWM
Invert + DC

> **Note:**
> The configuration must match the specifications of your LCD Panel in order for the LCD Panel to display properly.

NCT5525D Super IO Configuration

```
                    Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
     Advanced

  NCT5525D Super IO Configuration                                    WatchDog Timer Unit Se-
                                                                     lection
  Super IO Chip                      NCT5525D

  WatchDog Timer Unit                [Second]
     SuperIO WatchDog Timer          0
  ▶ Serial Port 1 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 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   ▶ NCT5525D 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;
  Electrical Interface Mode          [RS232]



                                                                     →←: 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) 2019 American Megatrends, Inc.
```

Serial Port

Enable or disable the current serial COM port.

Electrical Interface Mode

Choose mode between RS232 / RS485 / RS422

▶ **Advanced**

NCT5525D HW Monitor

```
                Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
     ┌──────────────┐
     │  Advanced    │
     └──────────────┘

  Pc Health Status                                        Smart Fan function setting

  ▶ Smart Fan Function


     System temperature          : +37 oC
     CPU temperature             : +33 oC
     CPU_Fan Speed               : N/A
     VBAT                        : +3.040 V
     VCORE                       : +0.896 V
     5V                          : +5.200 V
     3V3SB                       : +3.116 V
     3V3                         : +3.144 V                →←: 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) 2019 American Megatrends, Inc.
```

▶ Advanced   ▶ NCT5525D HW Monitor

▶ **Smart Fan Function**

```
                Aptio Setup Utility - Copyright (C) 2019 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]
                                                          →←: 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) 2019 American Megatrends, Inc.
```

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.

▼ **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**   ►   **NCT6116D HW Monitor**

► **Smart Fan Function**

```
           Aptio Setup Utility - Copyright (C) 2019 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]

           Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc.
```

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) 2019 American Megatrends, Inc.
    ┌──────────┐
    │ Advanced │
    └──────────┘
   COM1                                                  Console Redirection En-
   Console Redirection         [Enabled]                 able or Disable.
   ► 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



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```

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) 2019 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) 2019 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.

▶ **Advanced**

USB Configuration

```
              Aptio Setup Utility - Copyright (C) 2019 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         │
     ├──────────────────────────────────────────────────────┴───────────────────┤
     │            Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc. │
     └──────────────────────────────────────────────────────────────────────────┘
```

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**

Network Stack Configuration

```
                    Aptio Setup Utility - Copyright (C) 2019 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                │
    │                                                                                │
    ├──────────────────────────────────────────────────────────────────────────────┤
    │         Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc.        │
    └──────────────────────────────────────────────────────────────────────────────┘
```

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**

CSM Configuration

```
                    Aptio Setup Utility - Copyright (C) 2019 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                │
    ├──────────────────────────────────────────────────────────────────────────────┤
    │         Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc.        │
    └──────────────────────────────────────────────────────────────────────────────┘
```
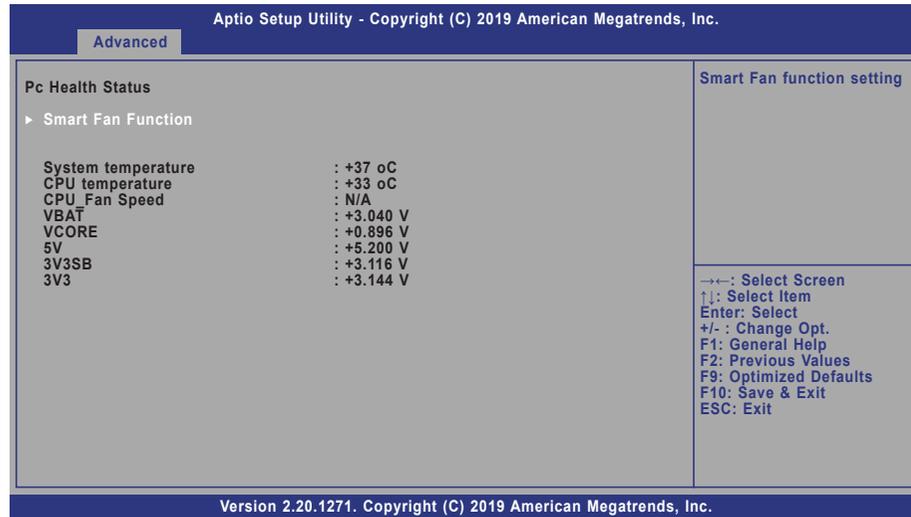
CSM Support

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.

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.

▶ Chemical Chipset

```
Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
  Main    Advanced    Chipset    Security    Boot    Save & Exit

▶ Graphics Configuration                        Graphics Configuration
▶ PCI-IO 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) 2019 American Megatrends, Inc.
```

Graphics Configuration

```
Aptio Setup Utility - Copyright (C) 2019 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


      Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc.
```
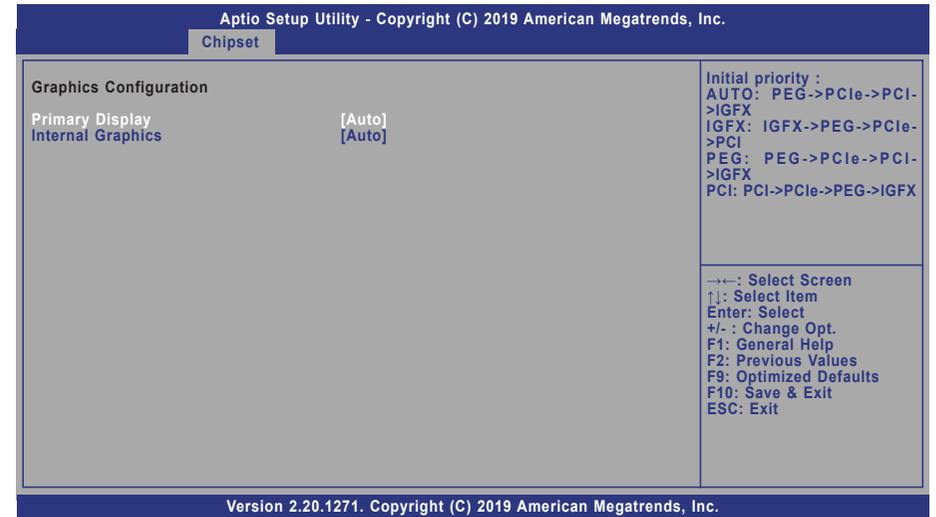
Primary Display

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

Internal Graphics

Keep IGFX enabled based on the setup options.

▶ **Chipset**

PCH-IO Configuration

```
                Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
         Chipset

   PCH-IO Configuration                                       PCI Express Configuration
                                                              settings
 ▶ PCI Express Configuration
 ▶ SATA And RST Configuration
 ▶ HD Audio 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) 2019 American Megatrends, Inc.
```
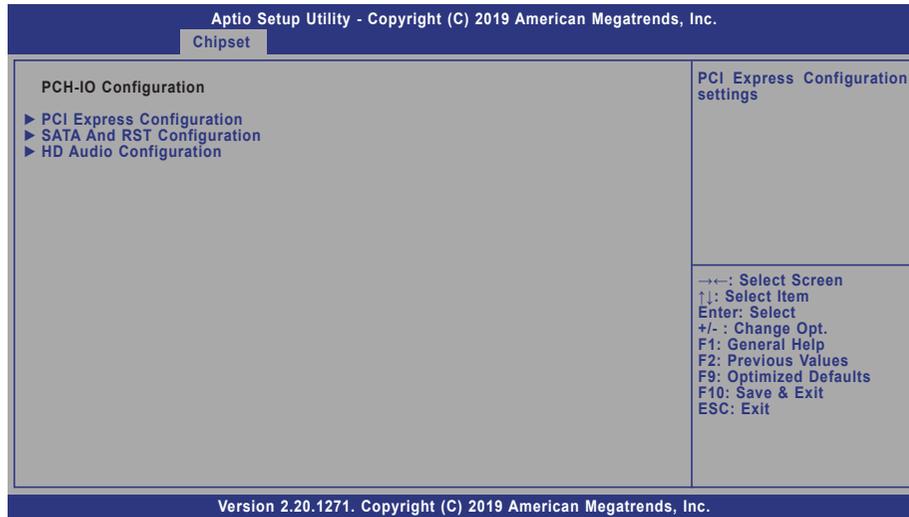
> **Note:**
> The sub-menus are detailed in following sections.

▶ **Chipset**

PCI Express Configuration

```
                Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
         Chipset

   PCI Express Configuration                                  PCI Express Root Port Set-
                                                              tings.
 ▶ Mini PCIe (Q370/C246)
 ▶ LAN1
 ▶ LAN2
 ▶ M.2-M



                                                              →←: 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) 2019 American Megatrends, Inc.
```
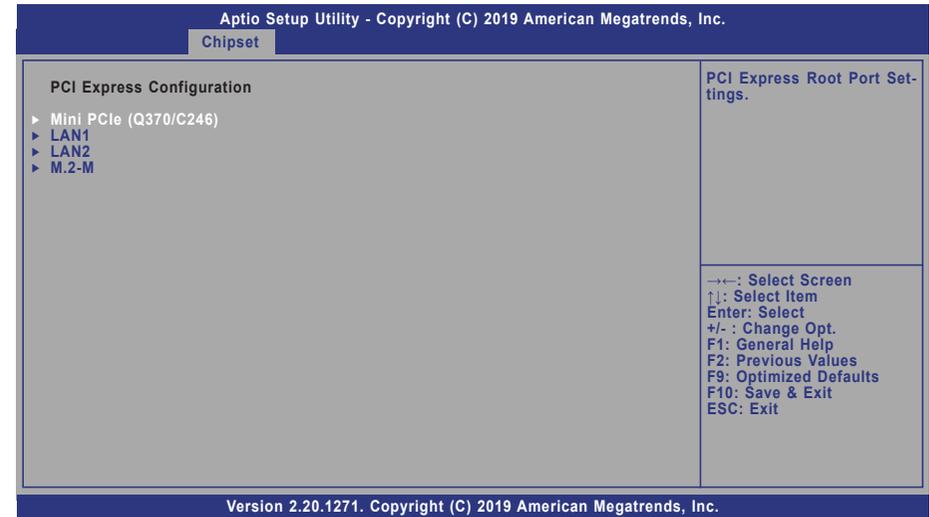
Select one of the PCI Express channels and press enter to configure the following settings.

M.2-M/Mini PCIe/LAN2/LAN1

Enable or disable the PCI Express Root Port.

PCIe Speed

Select PCIe Speed of the current port — AUTO, Gen1, Gen 2, or Gen3. Gen 3 is only available for the PCIE1 port. 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.

▶ **Advanced**

SATA And RST Configuration

```
                Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
         Chipset

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


Serial ATA Port 1 (M.2-M)         Empty
    Port 1                        [Enabled]
    Hot Plug                      [Disabled]
Serial ATA Port 2 (SATA0(R2))     Empty
    Port 2                        [Enabled]
    Hot Plug                      [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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```

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.

Port and Hot Plug

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

▶ Chipset

HD Audio Configuration

```
                Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
    Chipset

HD Audio Subsystem Confi guration 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) 2019 American Megatrends, Inc.
  Main    Advanced   Chipset   Security   Boot   Save & Exit

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

  Administrator Password
  User 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.

▶ **Security**

Secure Boot

```
                 Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
                                    Security

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

  ▶ Key Management
                                                         →←: 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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```
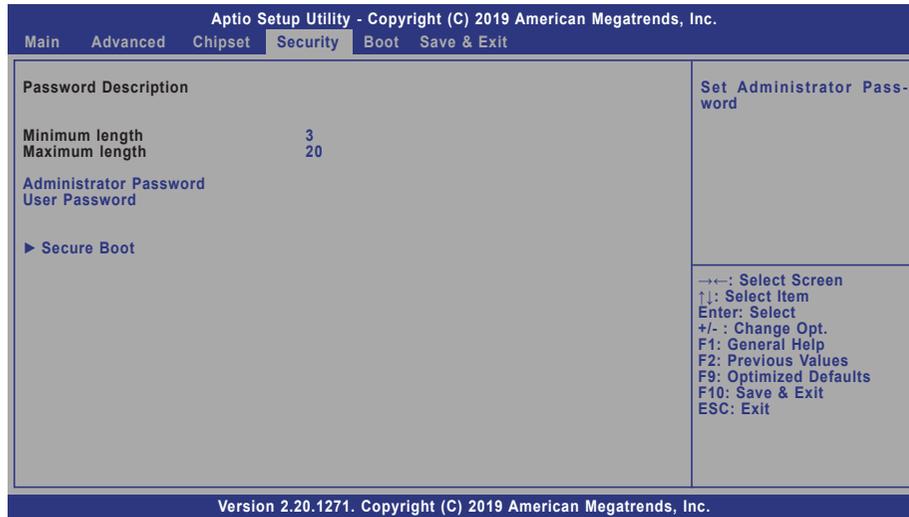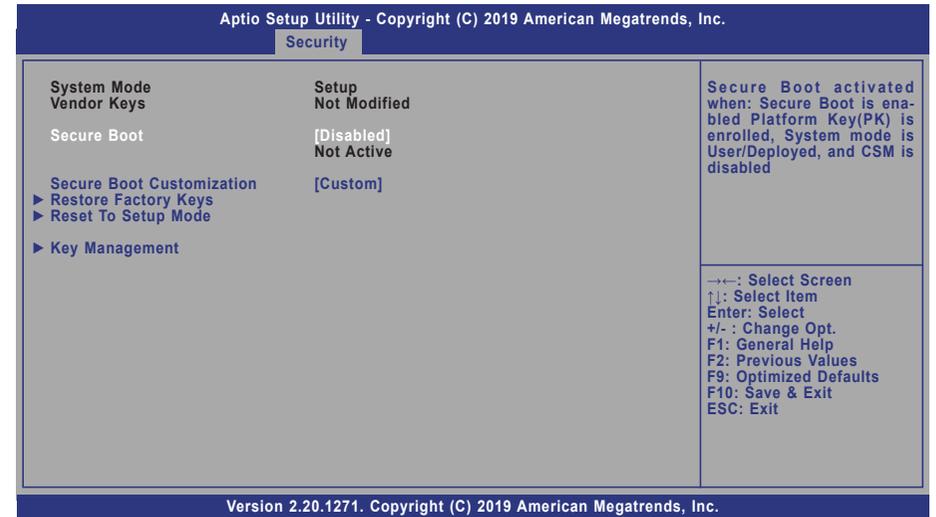
Secure Boot

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.
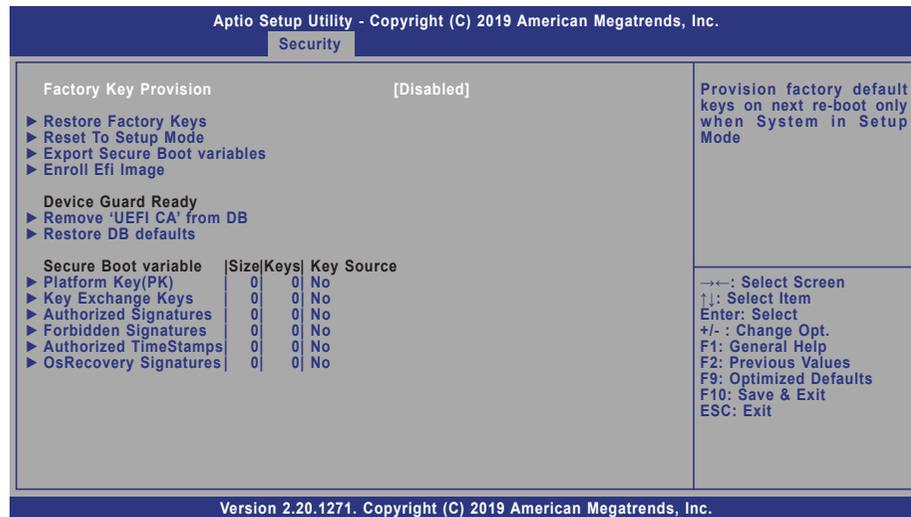
Restore Factory Keys

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.

▶ Security   ▶ Secure Boot

▶ **Key Management**

```
            Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
                                  Security

    Factory Key Provision              [Disabled]            Provision factory default
                                                             keys on next re-boot only
  ▶ Restore Factory Keys                                     when System in Setup
  ▶ Reset To Setup Mode                                      Mode
  ▶ Export Secure Boot variables
  ▶ Enroll Efi Image

    Device Guard Ready
  ▶ Remove 'UEFI CA' from DB
  ▶ Restore DB defaults

    Secure Boot variable    |Size|Keys| Key Source
  ▶ Platform Key(PK)        |  0 |  0 | No             →←: Select Screen
  ▶ Key Exchange Keys       |  0 |  0 | No             ↑↓: Select Item
  ▶ Authorized Signatures   |  0 |  0 | No             Enter: Select
  ▶ Forbidden Signatures    |  0 |  0 | No             +/- : Change Opt.
  ▶ Authorized TimeStamps   |  0 |  0 | No             F1: General Help
  ▶ OsRecovery Signatures   |  0 |  0 | No             F2: Previous Values
                                                       F9: Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit



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```

Factory Key Provision

Enable or disable the provision factory default keys on next re-start. This will only take place when the "System Mode" in the previous menu is in "Setup", which can be achieved by moveing the cursor to the "Reset To Setup Mode" and press Enter.

Restore Factory Keys

Force system to User Mode. Configure NVRAM to contain OEM-defined factory default Secure Boot keys.
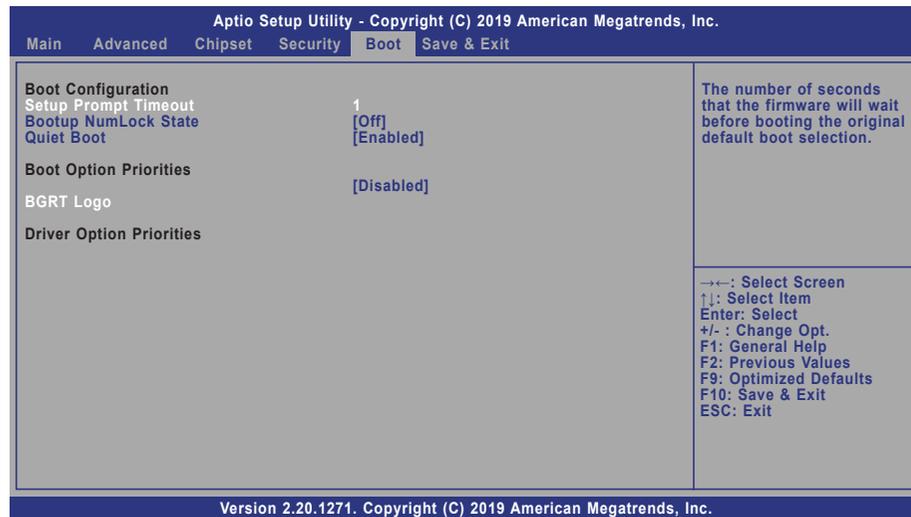
Reset To Setup Mode

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.

Export Secure Boot variables

Export the Secure Boot settings (i.e. all keys and signatures) as files to the root directory of a file system device. Press Enter and select a storage device listed in the pop-up menu. The saved files will be named automatically according to the type of key/signature as listed below.

- • "PK" for Platform Keys

- • "KEK" for Key Exchange Keys

- • "db" for Authorized Signatures

- • "dbx" for Forbidden Signatures

Enroll Efi Image

Allow the image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db). Press Enter and select a storage device listed in the pop-up menu, select a directory, and then select the EFI Image document.

Remove 'UEFI CA' from DB

Remove Microsoft UEFI CA from the Authorized Signature database. For systems that support Device Guard, Microsoft UEFI CA must NOT be included in the Authorized Signature database.

Restore DB defaults

Press Enter to restore the database variable to factory defaults.

Manually configure the following keys and signatures. Move the cursor to the field and press Enter, and then a pop-up menu will show up.

Platform Key(PK), Key Exchange Keys, Authorized Signatures, Forbidden Signatures, Authorized TimeStamps, OsRecovery Signatures

Details	List the information of enrolled keys and signatures
Export	Save the key or signature as a file to the root directory of a file system. The saved files will be named automatically according to the type of key/signature as previously listed in the "Export Secure Boot Variables".
Update	Load factory default database
Append	Enroll keys and signatures from a file system
Delete	Delet keys and signatures

▶ Boot

```
              Aptio Setup Utility - Copyright (C) 2019 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
                                 [Disabled]
   BGRT Logo

   Driver Option Priorities
                                                       →←: 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.
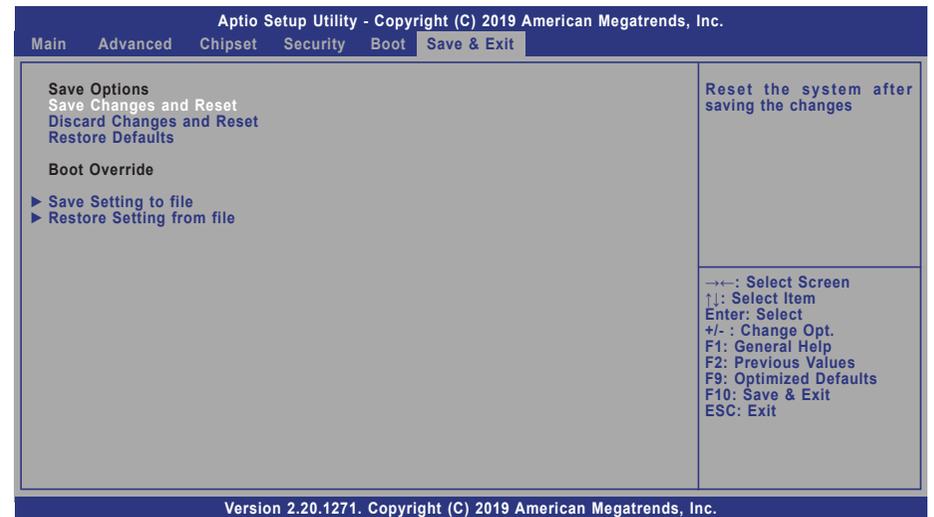
Driver Option Priorities

Rearrange the order of available drivers to be loaded.

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 for more information.

▶ Save & Exit

```
              Aptio Setup Utility - Copyright (C) 2019 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.