DFI

WL171/WL173

Mini-ITX 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

Chapter 1 - Introduction 6
- Specifications 6
- Features 7
  - DDR4 7

Chapter 2 - Hardware Installation 8
- Board Layout 8
- LEDs 8
- System Memory 9
  - Installing the SO-DIMM Module 9
- Heatsink 10
- Jumper Settings 12
  - Clear CMOS (JP1) 12
  - LCD/Inverter Power Select (JP5) 12
  - Panel Power Select (JP4) 13
  - Backlight Brightness Select (JP3) 13
  - COM1 Power Select 14
  - Auto Power-on Select (JP6) 14
- Rear I/O Ports 15
  - DC In 15
  - USB Ports 16
  - Graphics Display 16
  - RJ45 LAN 17
  - Audio 17
- Internal I/O Connectors 18
  - COM (Serial) Port 18
  - USB Ports 18
  - Front Audio 19
  - SATA (Serial ATA) 19
  - Chassis Intrusion 20
  - CPU FAN & SYS_FAN 20
  - Front Panel 21
  - SMBus 21
  - Battery 22
  - Digital I/O 22
  - LVDS Panel 23
  - eDP 24
  - Expansion Slots 25
  - Installing the M.2 Module 25
  - LPC 26

Chapter 3 - BIOS Settings 27
- Overview 27
- Main 28
- Advanced 28
  - RC ACPI Configuration 29
  - CPU Configuration 29
  - Power & Performance 30
  - PCH-FW Configuration 30
  - Trusted Computing 31
  - PTN3460 Configuration 31
  - NCT6116D Super IO Configuration 32
  - NCT6116D HW Monitor 33
  - Serial Port Console Redirection 34
  - USB Configuration 35
  - CSM Configuration 36
  - USB Power Control 36
  - Network Stack Configuration 37
- Chipset 38
  - Graphics Configuration 38
  - PCH-IO Configuration 39
  - PCI Express Configuration 39
  - SATA And RST Configuration 40
  - HD Audio Configuration 40
- Security 41
  - Secure Boot 41
- Boot 43
- Save & Exit 43
- Updating the BIOS 44
- Notice: BIOS SPI ROM 44

Chapter 4 - RAID 45
- Setup Procedure 45

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 consequential damages to the product that has been modified or altered.

Static Electricity Precautions

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

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.

- One WL171/WL173 board
- One COM port cable (Length: 250mm, 2*5 pin headers to DB9)
- One Serial ATA data with power cable (Length: 300mm)
- One Heatsink (Height: 25mm)
- An RS232 extension part is integrated on the board.
- Heatsink A71-008155-010G, 141.2*82*36mm, SPRING-SCREW TYPE, FOR WL171 Wide Temp
- Heatsink A71-008155-000G, 141.2*82*26mm, SPRING-SCREW TYPE, FOR WL171

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

Optional Items

- USB 2.0 cable
- COM cable
- SATA cable
- Heatsink (Height: 32mm)
- I/O Shield

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

Before Using the System Board

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

- Memory module
- Storage device such as hard disk drive, CD-ROM, etc.
- 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 Generation Intel® Core™ Processors, BGA 1528 i7-8665UE, Quad Core, 8M Cache, 1.7GHz (4.4GHz), 15W i5-8365UE, Quad Core, 6M Cache, 1.6GHz (4.1GHz), 15W i3-8145UE, Dual Core, 4M Cache, 2.2GHz (3.9GHz), 15W Celeron® 4305UE, Dual Core, 2M Cache, 2.0GHz (2.0GHz), 15W
	Memory	2 x 260-pin SODIMM up to 64GB DDR4 2400MHz/DDR4 2133MHz (for Celeron 4305UE)
	BIOS	AMI SPI 128Mbit
GRAPHICS	Controller	Intel® UHD Graphics 620/ Intel® UHD Graphics 610 (for Celeron 4305UE)
	Feature	OpenGL 4.4, DirectX 12, OpenCL 2.1 HW Decode: AVC/H.264, MPEG2, VC1/WMV9, JPEG/MJPEG, HEVC/H265, VP8, VP9 HW Encode: AVC/H.264, MPEG2, JPEG, HEVC/H265, VP8, VP9
	Display	1 x LVDS resolution up to 1920x1200 @ 60Hz 2 x DP++, resolution up to 4096x2160 @ 30Hz
	Triple Displays	DP++ + DP++ + LVDS
EXPANSION	Interface	1 x PCIe x4 (Gen 3) 1 x M.2 2242/2260/2280 M key (SATA3.0/PCIe x4) 1 x M.2 2230 E key (PCIe x1/USB 2.0)
AUDIO	Codec	Realtek ALC888S-VD2-GR
ETHERNET	Controller	1 x Intel® I210AT PCIe (10/100/1000Mbps) 1 x Intel® I219LM PCIe with iAMT11.6 and vPro (10/100/1000Mbps) (only Core i7/i5 supports iAMT)
REAR I/O	Ethernet	2 x GbE (RJ-45)
	USB	4 x USB 3.1 Gen2
	Display	2 x DP++
	Audio	1 x Line-out 1 x Mic-in
INTERNAL I/O	Serial	1 x RS-232/422/485 (RS-232 w/ power) (2.0mm pitch) 1 x RS-232 (2.0mm pitch)
	USB	4 x USB 2.0 (2.0mm pitch)
	Display	1 x LVDS Box Header or 1 x eDP Header
	Audio	1 x S/PDIF 1 x Front Audio Header
	SATA	2 x SATA 3.0 (up to 6Gb/s) 2 x SATA Power RAID 0/1
	DIO	1 x 8-bit DIO
	LPC	1 x LPC
	SMBus	1 x SMBus
WATCHDOG TIMER	Output & Interval	System Reset, Programmable via Software from 1 to 255 Seconds
SECURITY	TPM	TPM 2.0 (Opt.)
POWER	Type	Single 12V +/-10% DC (WL171) Wide Range 9~36V (WL173)
	Connector	DC-in Jack Right Angle Connector (4-pin) (available upon request) Straight Type Connector (4-pin) (available upon request)
	RTC Battery	CR2032 Coin Cell
OS SUPPORT	Microsoft/ Linux	Windows 10 IoT Enterprise 64-bit Debian 8 (with VESA graphic driver) Fedpra CentOS 7 (with VESA graphic driver) Yocto 2.6 Linux
MECHANICAL	Humidity	Operating: 5 to 90% RH
	Dimensions	Mini-ITX Form Factor: 170mm (6.7") x 170mm (6.7")
	Height	PCB: 1.6mm; Top Side: 16.5mm, Bottom Side: 3.5mm

The specifications listed here may be based on editions that do not resemble your actual products. Please visit the download page at go.dfi.com/WL17x, or via the 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® I210AT Gigabit Ethernet Controllers support data transmission at 1Gbps.

Audio

The Realtek ALC888 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

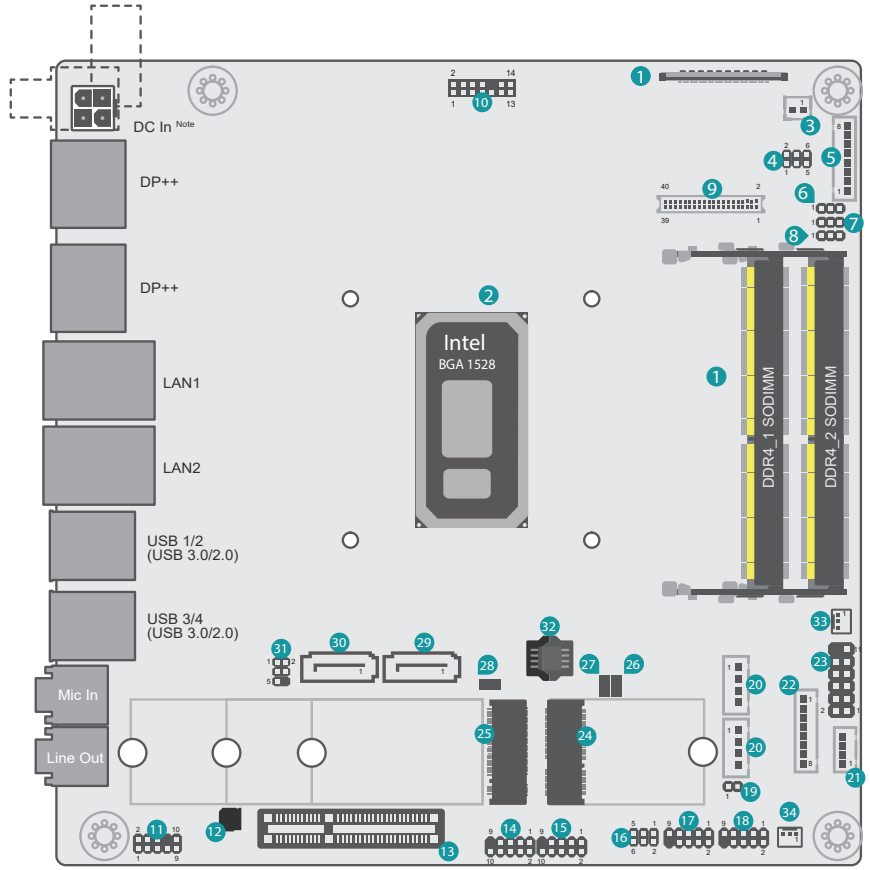
The system board supports the new USB 3.1 Gen 2. It is capable of running at a maximum transmission speed of up to 10 Gbit/s (1.2 GB/s) and is faster than USB 3.1 Gen 1 (5 Gbit/s, or 625 MB/s), USB 2.0 (480 Mbit/s, or 60 MB/s) and USB 1.1 (12Mb/s). USB 3.1 reduces the time required for data transmission, 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

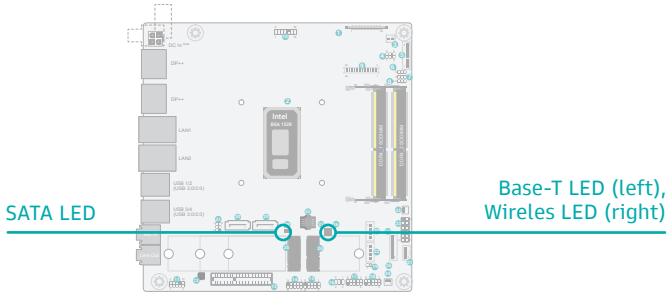


1. eDP(opt.)
2. CPU
3. Battery
4. JP4
5. LVDS Inverter Power
6. JP1
7. JP5
8. JP3
9. LVDS
10. LPC
11. Front Audio
12. Buzzer
13. PCIE1 (PCIe x4)
14. USB 7/8 (USB 2.0)
15. USB 5/6 (USB 2.0)
16. JP2
17. COM1
18. COM2
19. Chassis Intrusion
20. SATA Power
21. DIO Power
22. DIO
23. Front Panel
24. M.2 E Key
25. M.2 M Key
26. LED2
27. LED1
28. LED3
29. SATA1
30. SATA0
31. SMBUS
32. SPI Flash BIOS
33. CPU FAN
34. SYS FAN

Note:
Some of the components are model-specific. Please refer to the specifications for detail.

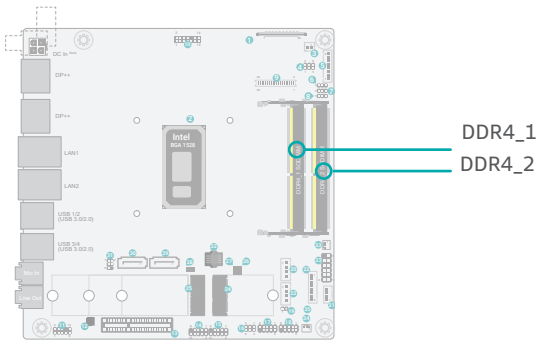
Important:
Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching 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.

▶ LEDs



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



The system board supports the following memory interface.

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

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

Single Channel	DIMMs are on the same channel. DIMMs in a channel can be identical or completely different. However, we highly recommend using identical DIMMs. Not all slots need to be populated.
Dual Channel	DIMMs of the same memory configuration are on different channels.

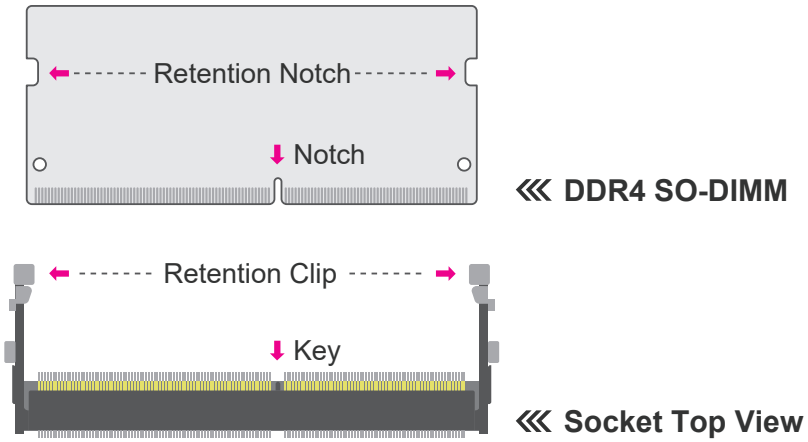
Features

- 2 x 260-pin SODIMM up to 64GB
- DDR4 2400MHz (Celeron 4305UE 2133MHz only)

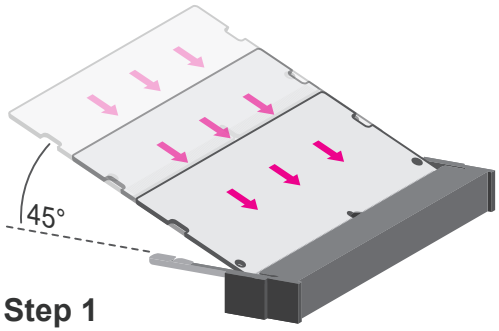
Installing the SO-DIMM Module

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

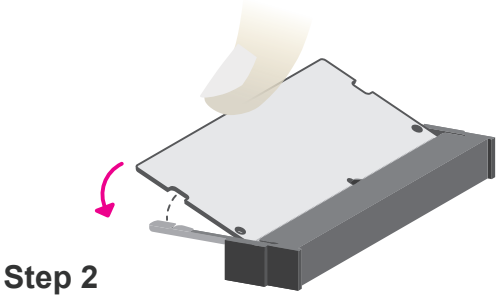
1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the SO-DIMM socket on the system board
4. Make sure the notch on memory card is aligned to the key on the socket.



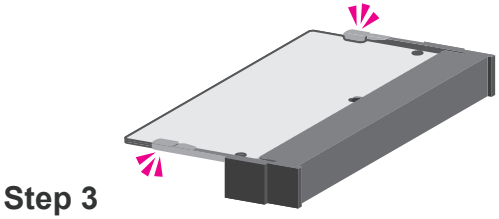
Please follow the steps below to install the memory card into the socket.



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.

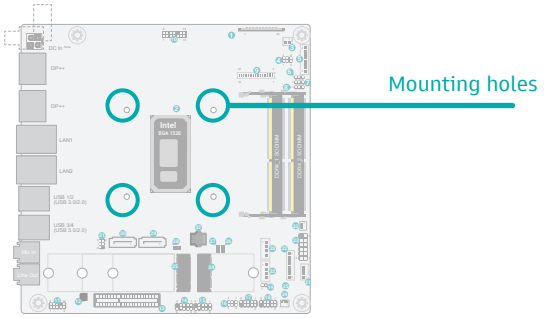
▶ Heatsink

The CPU must be kept cool by using a heatsink, otherwise the CPU will overheat damaging both the CPU and system board.

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

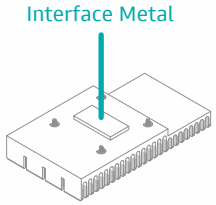
   Some heatsinks come with a patch of pre-applied thermal paste. Do not apply thermal paste if the heatsink already has a patch of thermal paste on its underside. Peel the strip that covers the paste before you place the heatsink on top of the CPU.

2. Place the heatsink on top of the CPU. The 4 spring screws around the heatsink, which are used to secure the heatsink onto the system board, must match the 4 mounting holes around the socket.

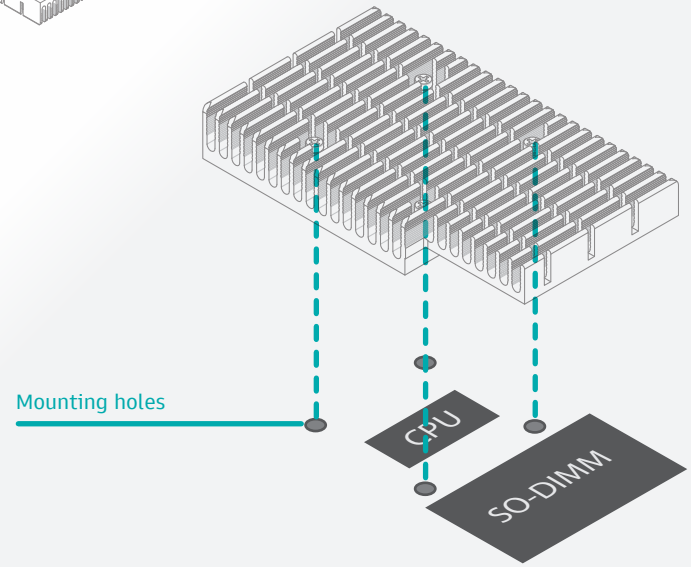


▶ Heatsink

Note:
The standard package of WL171/173 only includes a heatsink.



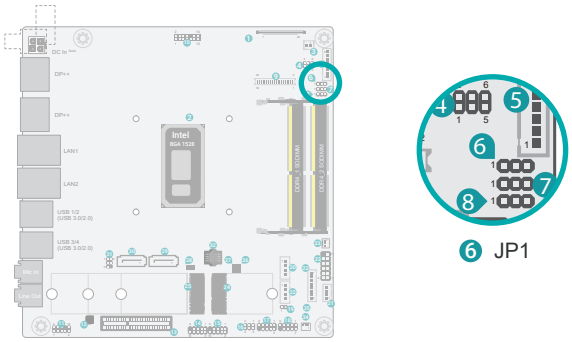
The heatsink included in the standard package is designed to dissipate heat from both the CPU and the memory. Please orient the heatsink so that the interface metal sits on top the CPU and the heatsink also hovers the memory. The heatsink is also attached with four spring screws.



4. Screw tight two of the spring screws at opposite corners into the mounting holes. And then proceed with the other two spring screws.

▶ Jumper Settings

Clear CMOS (JP1)



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

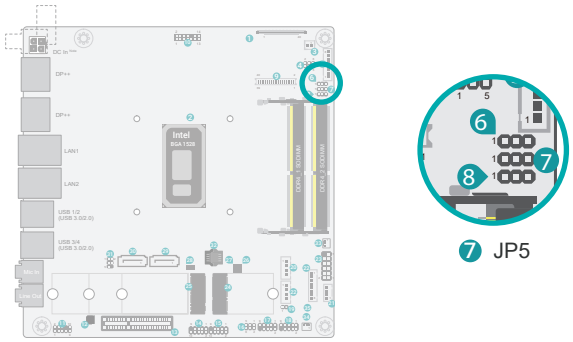
— it is suggested that the system be reconfigured with default values stored in the ROM BIOS. To load the default values stored in the ROM BIOS, please follow the steps below.

1. Power-off the system and unplug the power cord.
2. Put a jumper cap on JP1's pin 2 and pin 3. Wait for a few seconds and set JP1 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

LCD/Inverter Power Select (JP5)



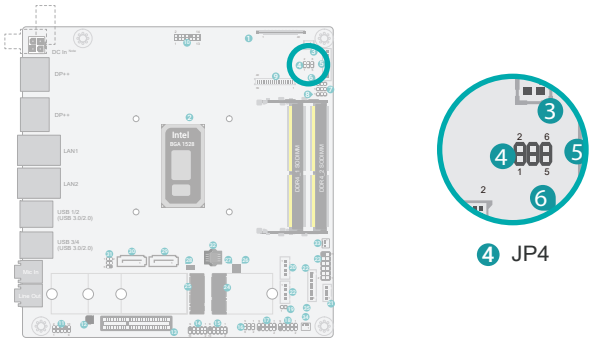
The power level supplied to the LVDS/eDP inverter power connector can be switched between +5V or +12V via JP5.

■ 1-2 On: +12V (default)

■ 2-3 On: +5V

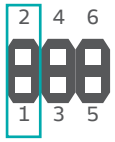
Important:
Before powering-on the system, make sure that the setting of jumper matches the specifications of the LVDS/eDP LCD. Incorrect power voltage may cause irreversible damage to your LCD panel.

Panel Power Select (JP4)

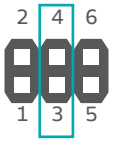


4 JP4

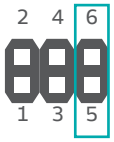
The power level supplied to the LVDS/eDP panel can be switched between +3.3V, +5V or +12V via JP4.



■ 1-2 On: +12V



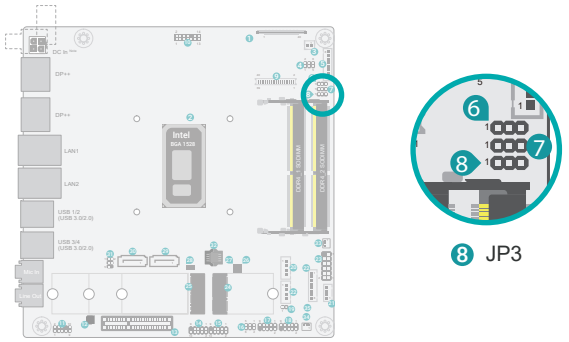
■ 3-4 On: +5V



■ 5-6 On: +3.3V (default)

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.

Backlight Brightness Select (JP3)



8 JP3

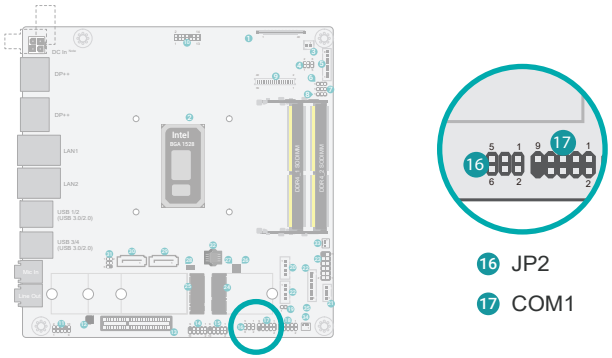
The power level supplied to the LCD backlight can be switched between +3.3V or +5V via JP3.

■ 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 LCD's backlight power. Incorrect power voltage may cause irreversible damage to your LCD's backlight.

COM1 Power Select

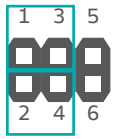


16 JP2
17 COM1

The COM 1 serial port supports RS232 with or without power configured via jumper settings of JP2 (COM 1).

Standard RS232 (default)

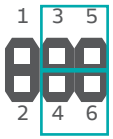
- 2-4 On: Pin 1 = DCD-



- 1-3 On: Pin 9 = RI-

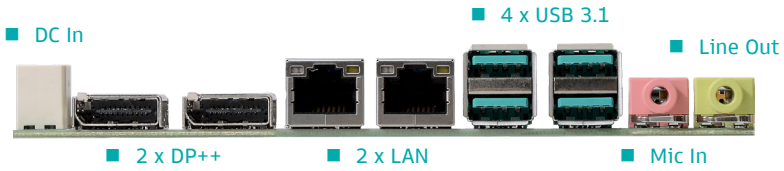
RS232 with Power

- 4-6 On: Pin 1 = +12V



- 3-5 On: Pin 9 = +5V

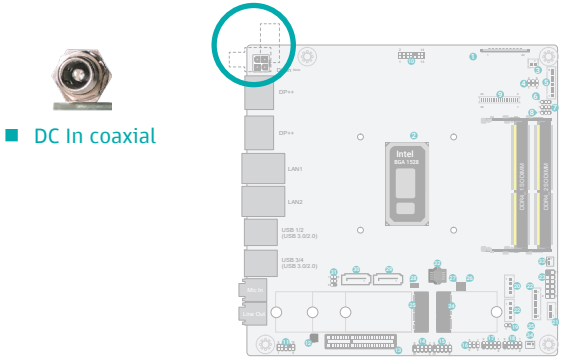
▶ Rear I/O Ports



The rear panel I/O ports consist of the following:

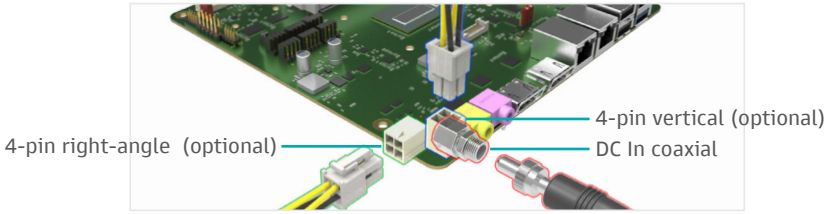
- 2 DP++ ports
- 1 DC-In, 12V(WL171) or 9V~36V (WL173)
- 2 RJ45 LAN ports
- 4 USB 3.1 Gen2 ports

DC In



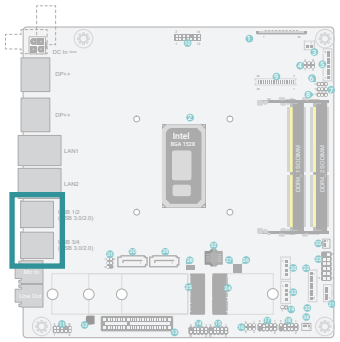
The votalge range is model-specific — 12VDC for WL171, and 9V~36V for WL173.

Connect a coaxial DC power cord to the rear coaxial connector for DC supply. The 4-pin vertical / right-angle type is avaible upon request.



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.

USB Ports



- USB 2 (USB 3.1)
- USB 1 (USB 3.1)

- USB 4 (USB 3.1)
- USB 3 (USB 3.1)

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 our USB 3.1 Gen2 Type A ports at the rear side. For the internal USB ports, please refer to the next section.

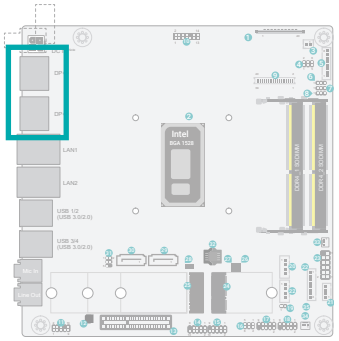
Wake-On-USB Keyboard/Mouse

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

Rear I/O Ports

Graphics Display

- DP++ 1
- DP++ 2

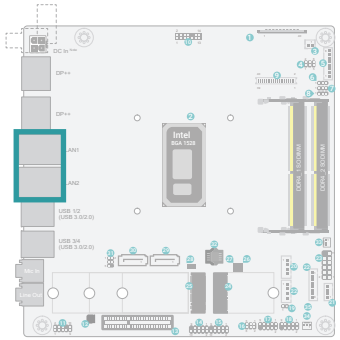


DisplayPort ++

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.

RJ45 LAN

■ LAN 1 ■ LAN 2



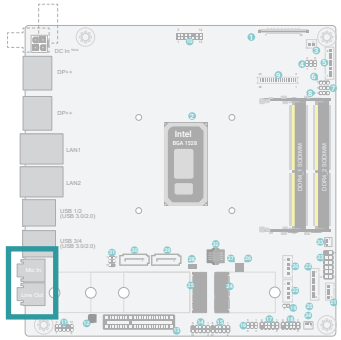
The two LAN ports allow the system board to connect to a local area network.

Features

- LAN1: Intel® I210AT PCIe Gigabit Ethernet LAN Controller
- LAN2: Intel® I219LM LAN PHY

Audio

■ Mic In ■ Line Out



The system board is equipped with two rear audio jacks:

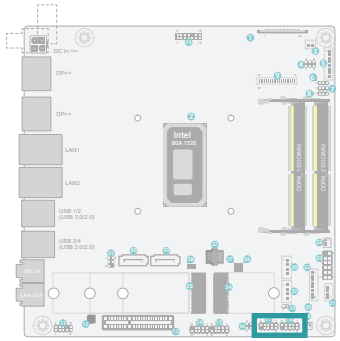
- Line-out Jack (Lime)

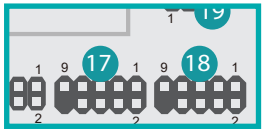
  This jack is used to connect a headphone or external speakers.
- Mic-in Jack (Pink)

  This jack is used to connect an external microphone.

▶ Internal I/O Connectors

COM (Serial) Port





17 COM1

18 COM2

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 (with or without power), RS422, and RS485. COM 2 only supports RS232.

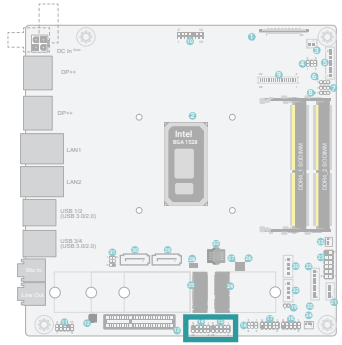
Jumper Setting

RS232 with/without power of COM 1 is configured via jumper settings as previously instructed in this chapter.

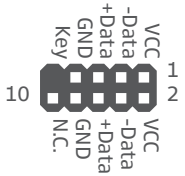
■ COM Pin Assignment

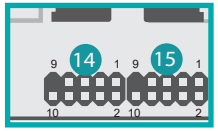
Pin	Standard RS232	RS232 with Power	RS422	RS485
1	DCD-	+12V	RX+	Data+
2	SIN	RD	RX-	Data-
3	SO	TD	TX+	N.C.
4	DTR-	DTR-	TX-	N.C.
5	GND	GND	GND	GND
6	DSR-	DSR-	N.C.	N.C.
7	RTS-	RTS-	N.C.	N.C.
8	CTS-	CTS-	N.C.	N.C.
9	RI-	+5V	N.C.	N.C.

USB Ports



■ USB 2.0 Pin Assignment





14 USB 7/8 (USB 2.0)

15 USB 5/6 (USB 2.0)

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

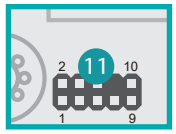
In addition to the rear USB ports as introduced previously in this chapter, the system board is equipped with four internal USB 2.0 ports (two pin headers) as illustrated above.

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.

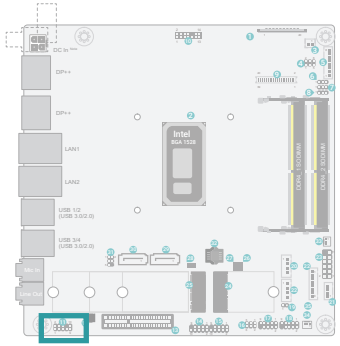
Wake-On-USB Keyboard/Mouse

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).

Front Audio



11 Front Audio

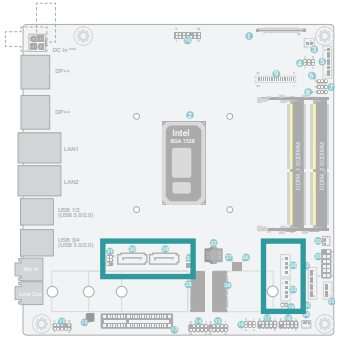


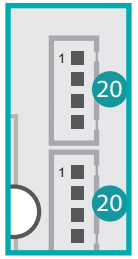
The Front Audio internal connector allows you to connect to the second line-out and mic-in jacks that are at the front panel of your system.

■ Front Audio Pin Assignment

Pin	Assignment	Pin	Assignment
1	Mic-L	2	GND
3	Mic-R	4	N.C.
5	Line2-R	6	Mic-JD (sense)
7	GND	8	KEY
9	Line2-L	10	Line2-JD (sense)

SATA (Serial ATA)

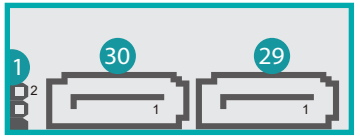




22 SATA Power

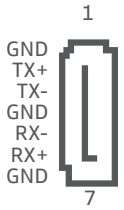
32 SATA1

33 SATA0

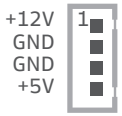


The Serial ATA (SATA) connectors are used to connect the Serial ATA device. The system board supports two SATA ports and each provides data rate up to 6Gb/s. Connect one end of the Serial ATA cable to a SATA connector and the other end to your Serial ATA device.

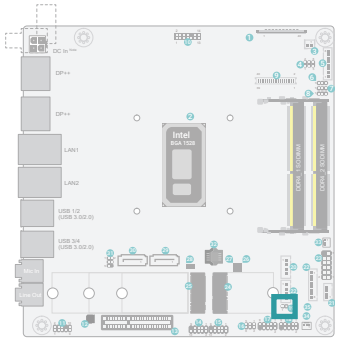
■ SATA Pin Assignment



■ SATA Power Pin Assignment



Chassis Intrusion



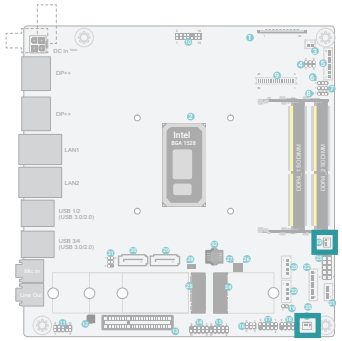
21 Chassis Intrusion

The board supports the chassis intrusion detection function. Connect the chassis intrusion sensor cable from the chassis to this connector. When the system's power is on and a chassis intrusion occurred, an alarm will sound. When the system's power is off and a chassis intrusion occurred, the alarm will sound only when the system restarts.

■ Chassis Intrusion Pin Assignment

Pin	Assignment	Pin	Assignment
1	Signal	2	GND

CPU FAN & SYS_FAN



33 CPU FAN

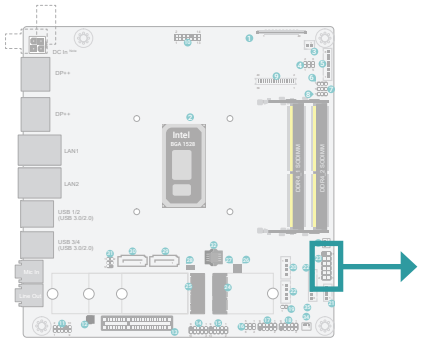
34 SYS FAN

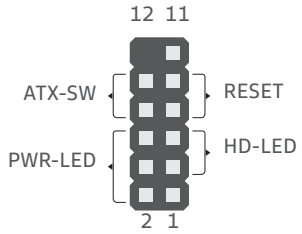
The fan connectors are used to connect cooling fans. The cooling fans will provide adequate airflow throughout the chassis to prevent overheating the CPU and system board components.

■ FAN Pin Assignment

Pin	Assignment
1	GND
2	PWR
3	Sense

Front Panel





■ Front Panel Connector

■ Front Panel Pin Assignment

	Pin	Assignment		Pin	Assignment
	1	N.C.		2	LED Power
HD-LED	3	HDD Power	PWR-LED	4	LED Power
	5	Signal		6	Signal
RESET	7	Ground	ATX-SW	8	Ground
	9	Signal		10	Signal
	11	N.C.		12	---

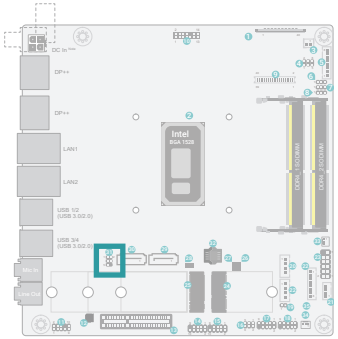
HDD-LED - Hard Disk Drive LED
Lighting of the LED indicates that the hard drive is being accessed.

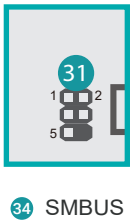
RESET - Reset Switch
This switch allows you to reboot without having to power off the system.

PWR-LED - 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.

ATX-SW - ATX Power Switch
This switch is used to power on or off the system.

SMBus



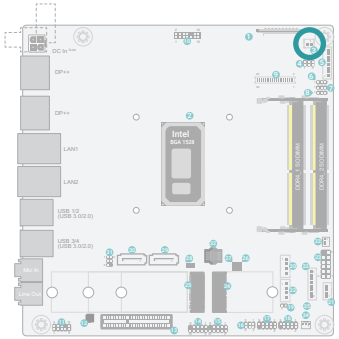


The SMBus (System Management Bus) connector is used to connect the SMBus device. It is a multiple device bus that allows multiple chips to connect to the same bus and enable each one to act as a master by initiating data transfer.

■ SMBus Pin Assignment

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

Battery



■ Battery

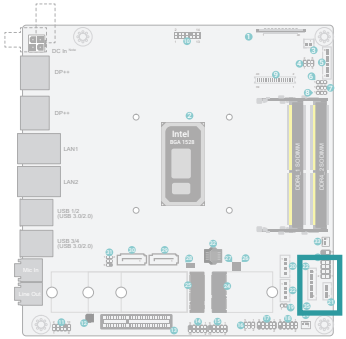
■ External Battery

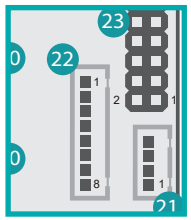
The external lithium ion battery supplies power to the real-time clock and CMOS memory as an auxiliary source of power when the main power is shut off.

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.
- The functionality of reinforced header is time limited if sustained to higher pulling force or non-adequate pulling behaviors.
- The battery is wrapped by an adhesive tape which helps integrator properly places the battery in the system case, a stable position and appropriate temperature will last the functionality of it.

Digital I/O





23 DIO Power

24 DIO

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

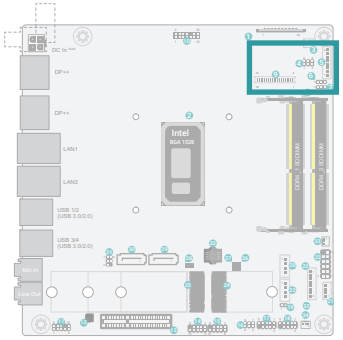
■ Digital I/O Pin Assignment

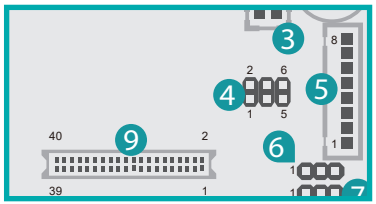
Pin	Assignment
1	DIO_0
2	DIO_1
3	DIO_2
4	DIO_3
5	DIO_4
6	DIO_5
7	DIO_6
8	DIO_7

■ Digital I/O Power Pin Assignment

Pin	Assignment
1	+12V
2	GND
3	5VSB
4	5V

LVDS Panel





5 LVDS Inverter Power

9 LVDS

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, inverter power, and backlight power is configured via jumper settings as previously instructed in this chapter.

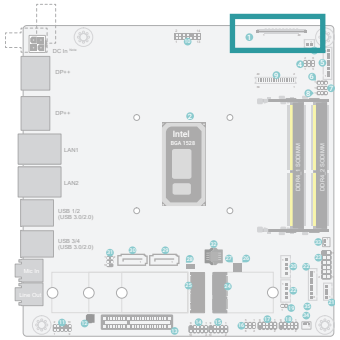
■ Inverter Power Pin Assignment

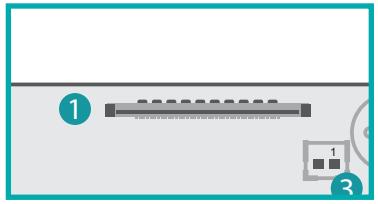
Pin	Function	Pin	Function
1	GND	5	+3.3V
2	GND	6	Panel Backlight On/Off Control
3	Panel Inverter Brightness Voltage Control	7	12V (default)/5V
4	Panel Power	8	12V (default)/5V

■ 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_CLK+	28	LVDSB_CLK+
29	LVDSA_CLK-	30	LVDSB_CLK-
31	GND	32	GND
33	DDC_CLK	34	NC
35	DDC_DATA	36	+3.3V
37	Panel Power	38	Panel Power
39	Panel Power	40	Panel Power

eDP(opt.)





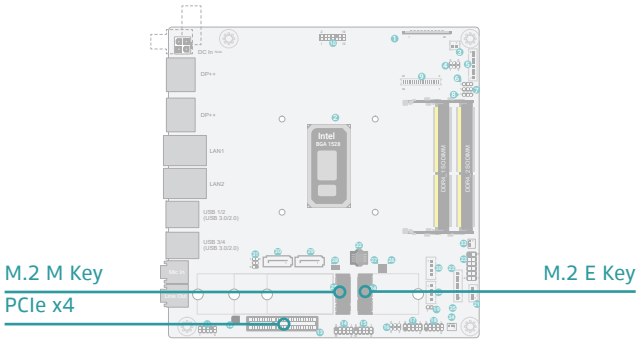
The eDP connector is an embedded displayport which has advanced power-saving features to connect a display device to transmit digital communication of audio and video signals. The table below indicates the pin functions of the eDP connector.

Jumper Settings

Refer to the “Jumper Settings” section in this chapter for settings relevant to the eDP panel.

Pin	Function	Pin	Function
1	N.C.	21	eDP Panel PWR
2	GND	22	N.C.
3	eDP_Lane 3-	23	GND
4	eDP_Lane 3+	24	GND
5	GND	25	GND
6	eDP_Lane 2-	26	GND
7	eDP_Lane 2+	27	Hot Plug
8	GND	28	eDP_GND
9	eDP_Lane 1-	29	eDP_GND
10	eDP_Lane 1+	30	eDP_GND
11	GND	31	eDP_GND
12	eDP_Lane 0-	32	Panel Backlight On/Off Control
13	eDP_Lane 0+	33	Panel Inverter Brightness Voltage Control
14	GND	34	N.C.
15	eDP_AUX+	35	N.C.
16	eDP_AUX-	36	Inverter PWR
17	GND	37	Inverter PWR
18	eDP Panel PWR	38	Inverter PWR
19	eDP Panel PWR	39	Inverter PWR
20	eDP Panel PWR	40	N.C.

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 for the M.2 M key socket (22mm x 42mm or 22mm x 60 mm, or 22mm x 80mm) and the M.2 E key sicket (22mm x 30mm).

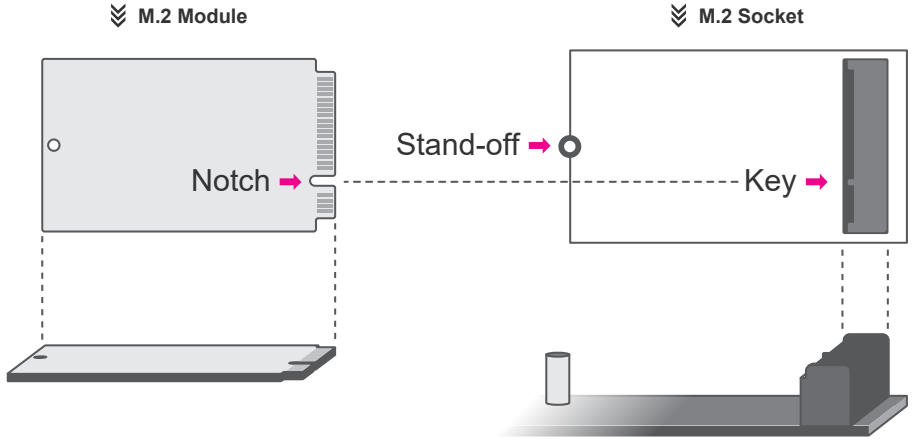
PCI Express x4 Slot

Install PCI Express cards such as network cards or other cards that comply to the PCI Express specifications into the PCI Express x4 slot.

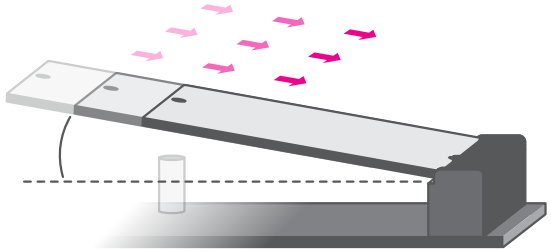
Installing the M.2 Module

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

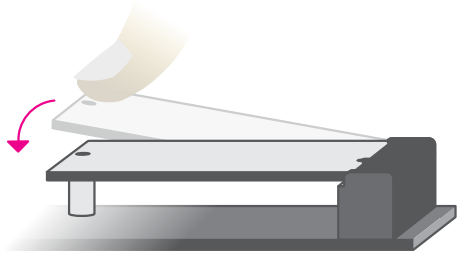
1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the M.2 socket on the system board
4. Make sure the notch on card is aligned to the key on the socket.



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.

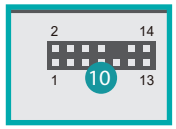


Step 2:
Press the end of the card far from the socket down until against the stand-off.

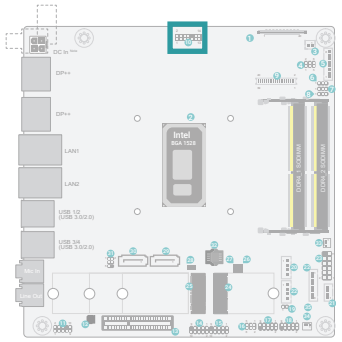
Step 3:
Screw tight the card onto the stand-off with a screw driver and a stand-off screw until the gap between the card and the stand-off closes up. The card should be lying parallel to the board when it's correctly mounted.

LPC

The LPC connector is used for debugging.



10 LPC



■ 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

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

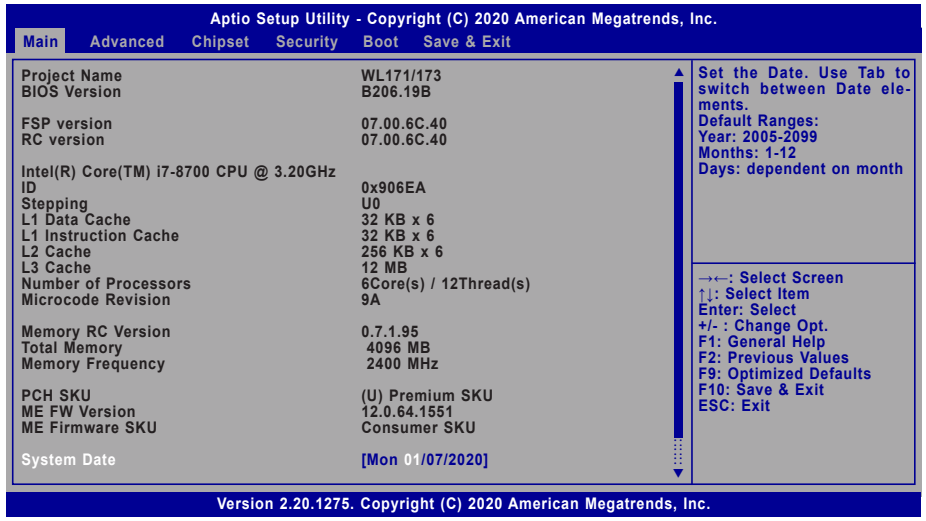
Keys	Function
Right / Left arrow	Move the highlight left or right to select a menu
Up / Down arrow	Move the highlight up or down between submenus or fields
<Enter>	Enter the highlighted submenu
+ (plus key)/F6	Scroll forward through the values or options of the highlighted field
- (minus key)/F5	Scroll 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.



System Date

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

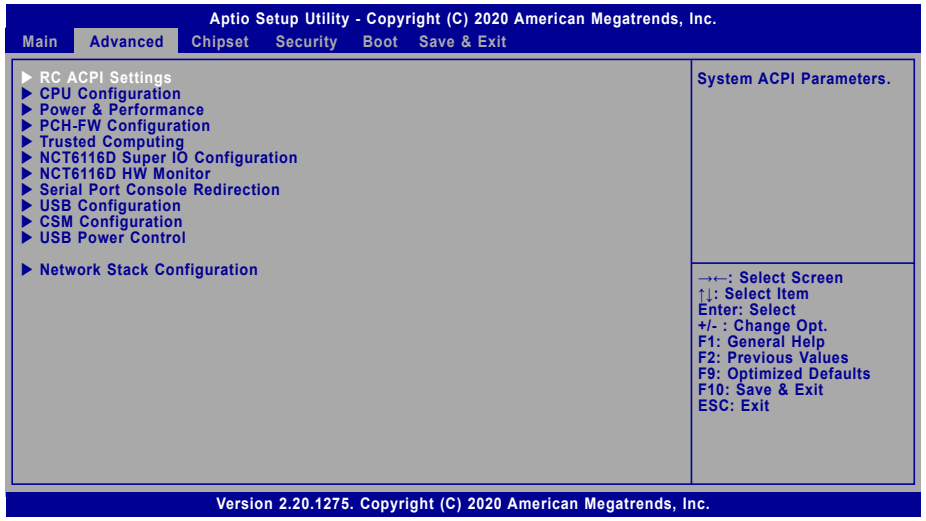
System Time

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.

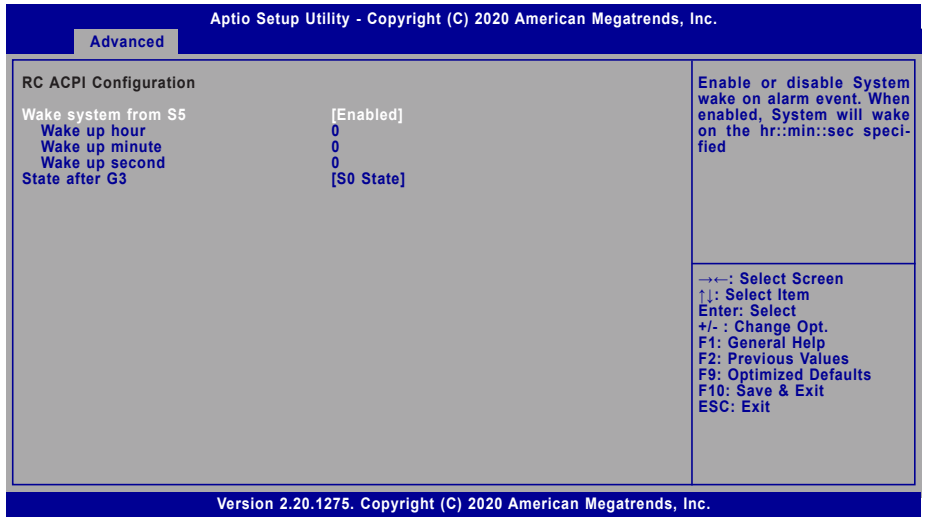
▶ Advanced

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.



RC ACPI Configuration



Wake system from S5

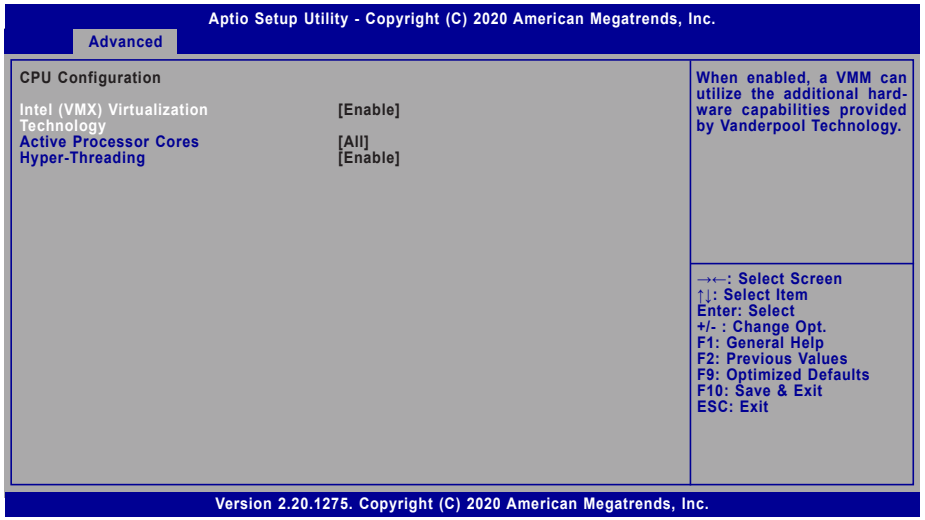
When Enabled, the system will automatically power up at a designated time every day. Once it's switched to [Enabled], please set up the time of day — hour, minute, and second — for the system to wake up.

State after G3

This field is to specify what state to go when power is re-applied after a power failure (G3 state).

S0 State - The system working state.
S5 State - Off, except for trickle current to devices such as the power button
Last State - The state before G3.

CPU Configuration



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.

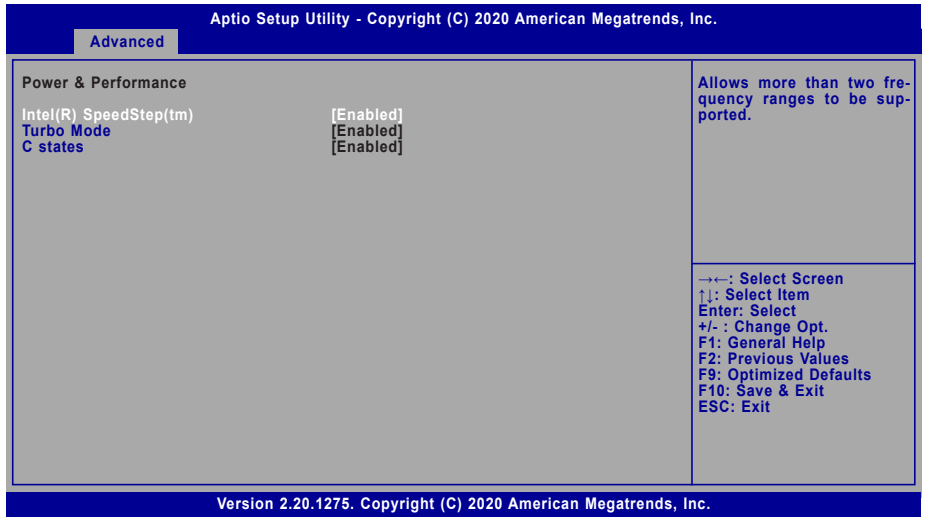
Hyper-threading

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

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

▶ Advanced

Power & Performance



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

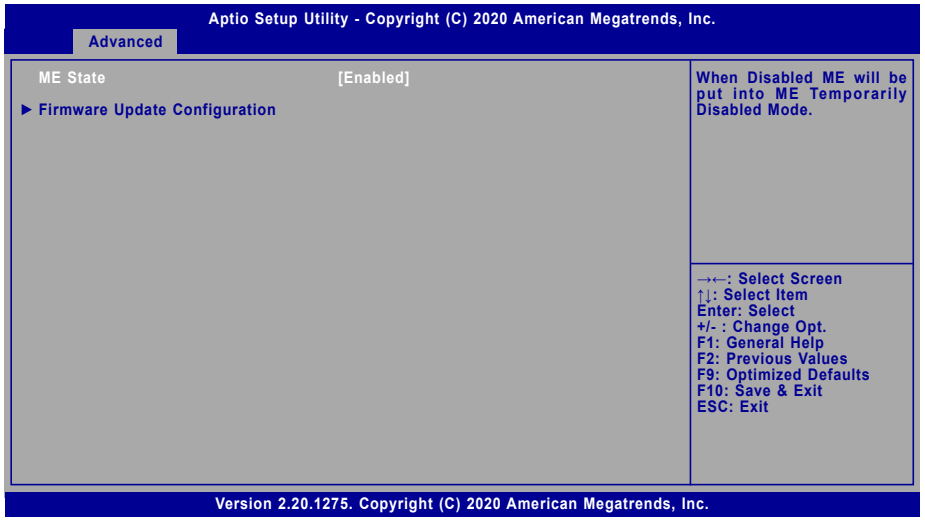
Enable or disable turbo mode of the processor. This field will only be displayed when EIST is enabled.

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



ME State

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

Firmware Update Configuration

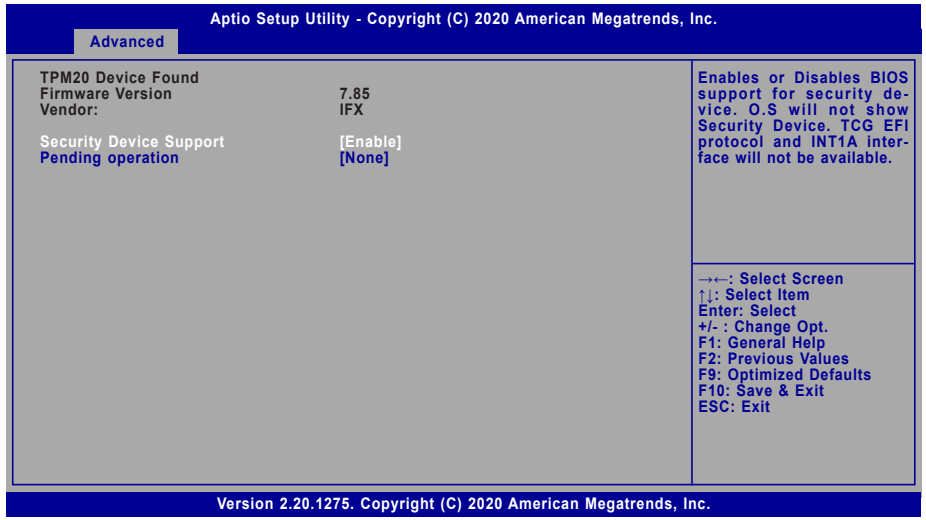
Configure Management Engine Parameters.

Firmware Update Configuration > Me FW Image Re-Flash

Enable or disable Me FW Image Re-Flash function.

▶ Advanced

Trusted Computing



Security Device Support

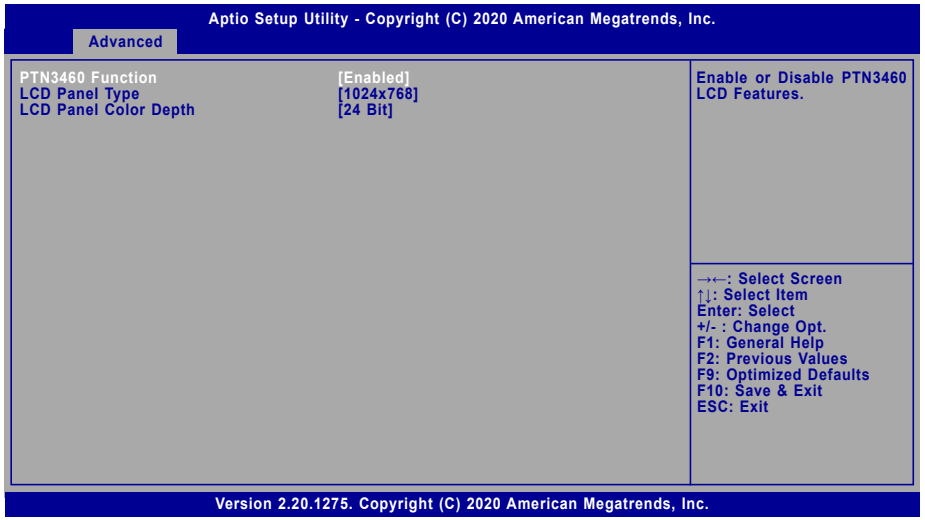
This field is used to enable or disable BIOS support for the security device such as an TPM 2.0 to achieve hardware-level security via cryptographic keys.

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



PTN3460 Function

Enable or disable PTN3460 LCD features. The following fields are only configurable when this field is enabled.

LCD Panel Type

Select the resolution of the LCD Panel — 800X480, 800X600, 1024X768, 1366X768, 1280X1024,
1280X768, 1920X1080, or 1600X900.

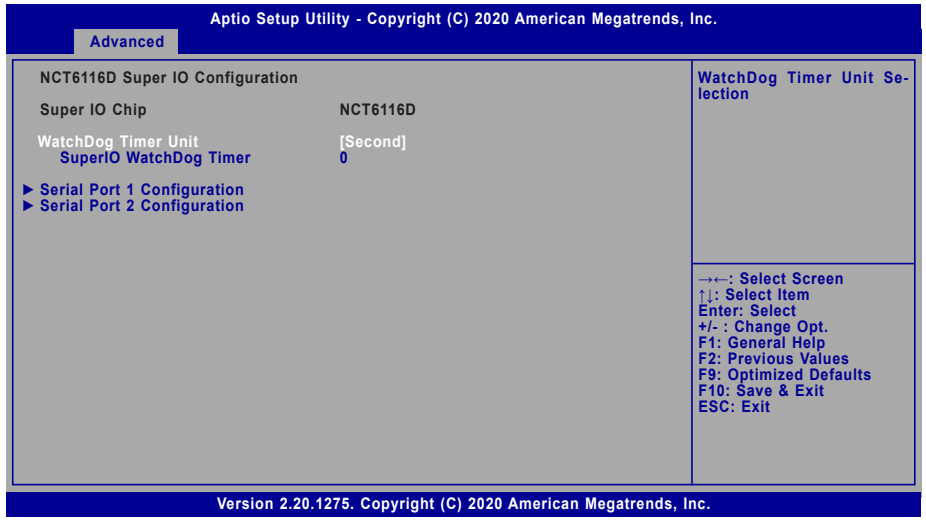
LCD Panel Color Depth

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

Backlight Type

Select the inverter polarity and brightness control — PWM Mdde, DC Mdde

NCT6116D Super IO Configuration



WatchDog Timer Unit

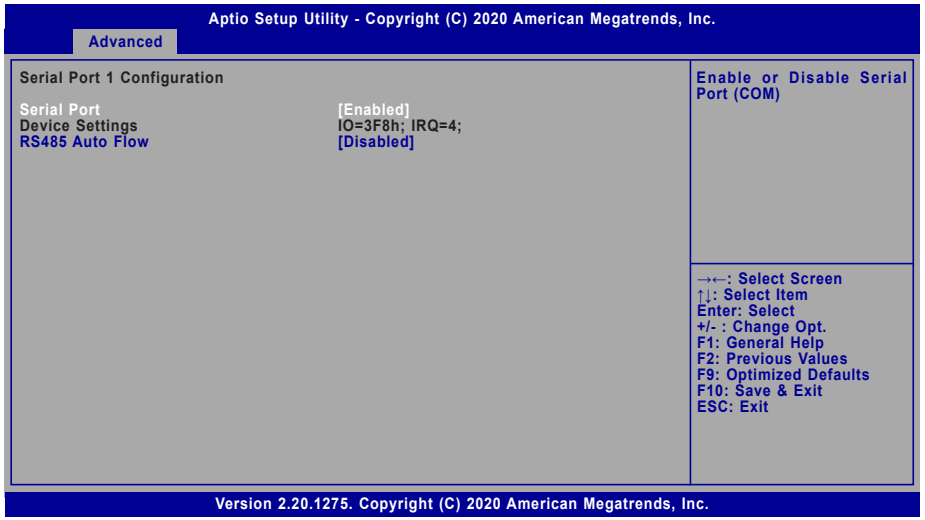
Select WatchDog Timer Unit — Second or Minute.

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.

▶ Serial Port Configuration



Serial Port

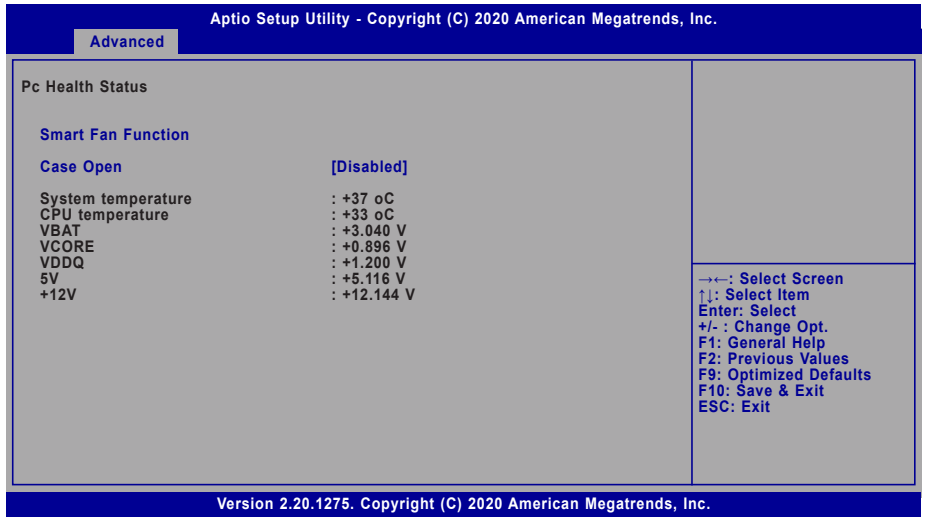
Enable or disable the current serial COM port.

RS485 Auto Flow

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

▶ Advanced

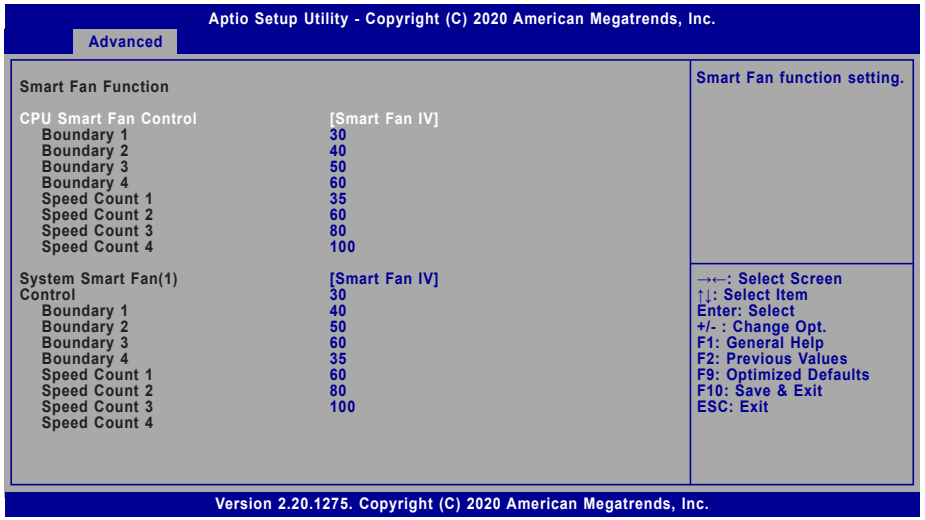
NCT6116D HW Monitor



This section displays the system's health information, i.e. voltage readings, CPU and system temperatures.

Case Open

Enable or disable the case open detection function.



Smart Fan Function

This section is for smart fan function setting.

CPU Smart Fan/System Smart Fan(1) Control

Switch the CPU smart fan/system smart fan(1) between Manual and Smart Fan IV mode.

Boundary 1 to Boundary 4

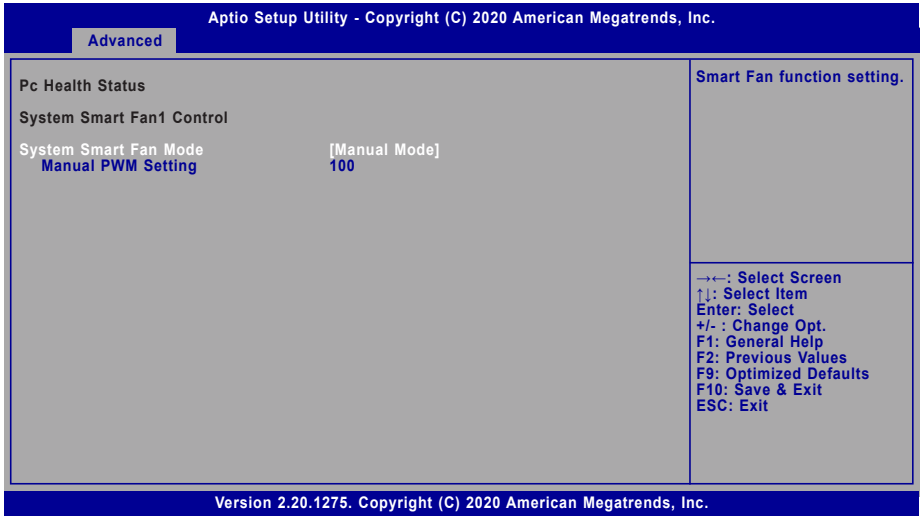
Set the boundary temperatures that determine the operation of the fan with different fan speeds accordingly. For example, when the system or the CPU temperature reaches boundary temperature 1, the system or CPU fan should be turned on and operate at the designated speed. The range is from 0-127 degress of Celsus.

Speed Count 1 to Speed Count 4

Set the fan speed. The range is from 1-100% (full speed).

Note:

CPU Smart Fan Control, System Smart Fan(1) Control can be switched to [Disabled]. When they are disabled, "Fix Fan Speed Count" will appear for configuration.

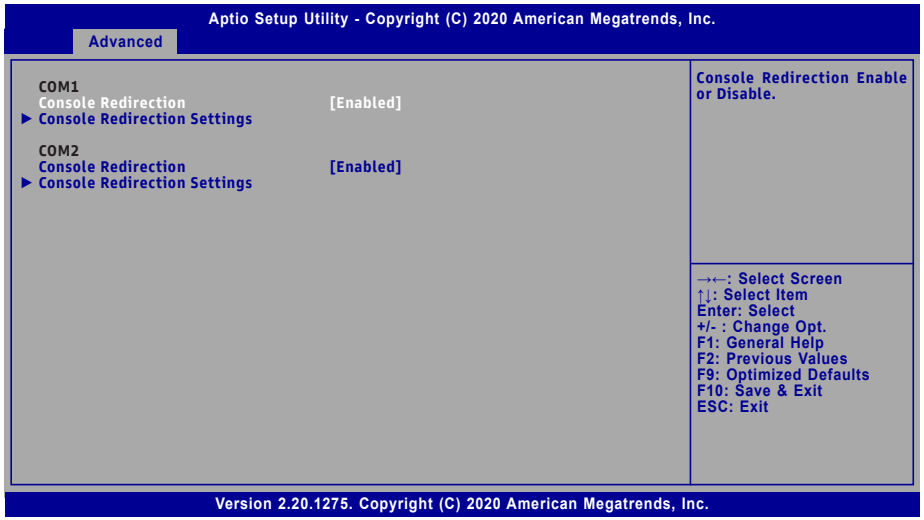


Manual PWM Setting

Choose a value from 1~100 of fan speed.

▶ Advanced

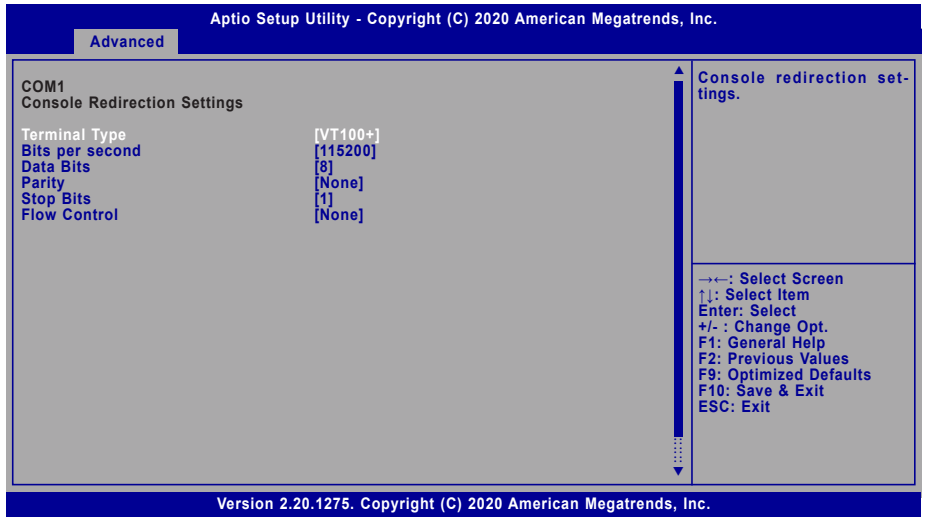
Serial Port Console Redirection



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.

▶ Console Redirection Settings



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.

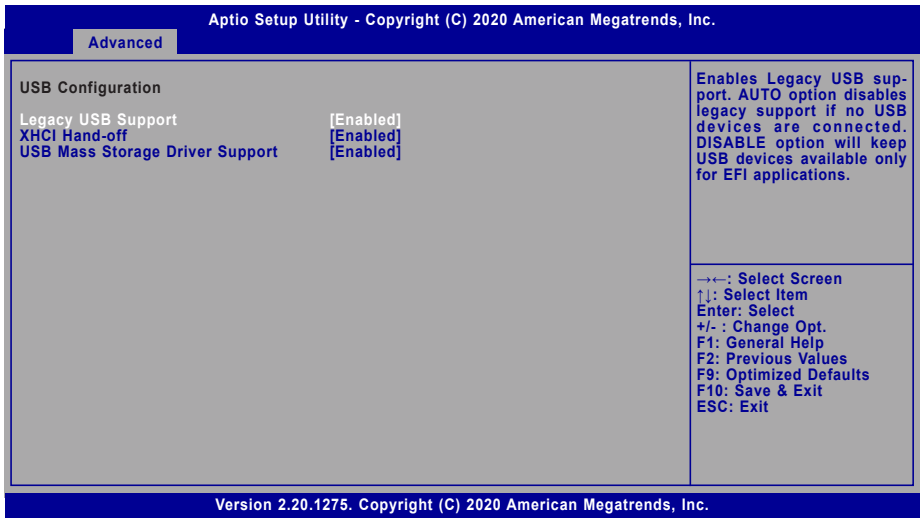
Stop Bits

Select stop bits: 1 bit or 2 bits.

Flow Control

Select flow control type: None or Hardware RTS/CTS.

USB Configuration



Legacy USB Support

Enabled	Enable Legacy USB support.
Disabled	Keep USB devices available only for EFI applications.
Auto	Disable Legacy support if no USB devices are connected.

XHCI Hand-off

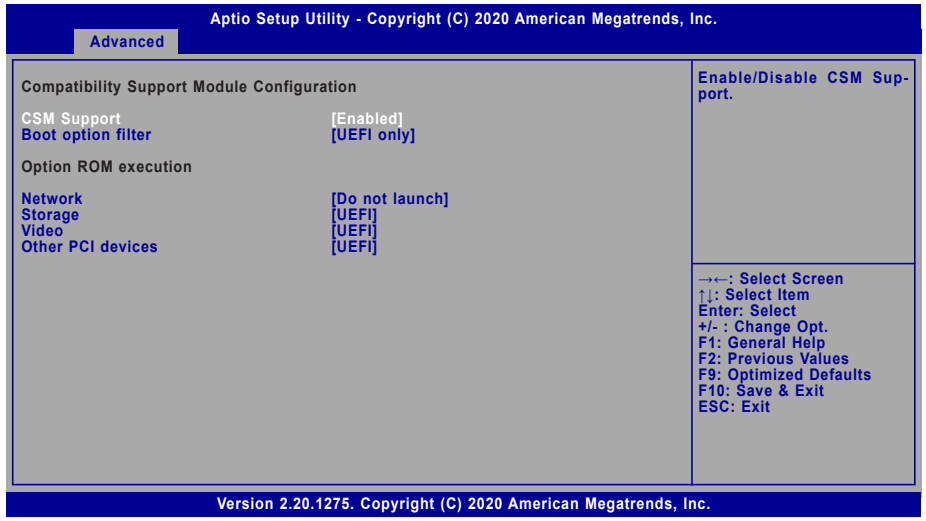
Enable or disable XHCI Hand-off.

USB Mass Storage Driver Support

Enable or disable USB Mass Storage Driver Support.

▶ Advanced

CSM Configuration



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

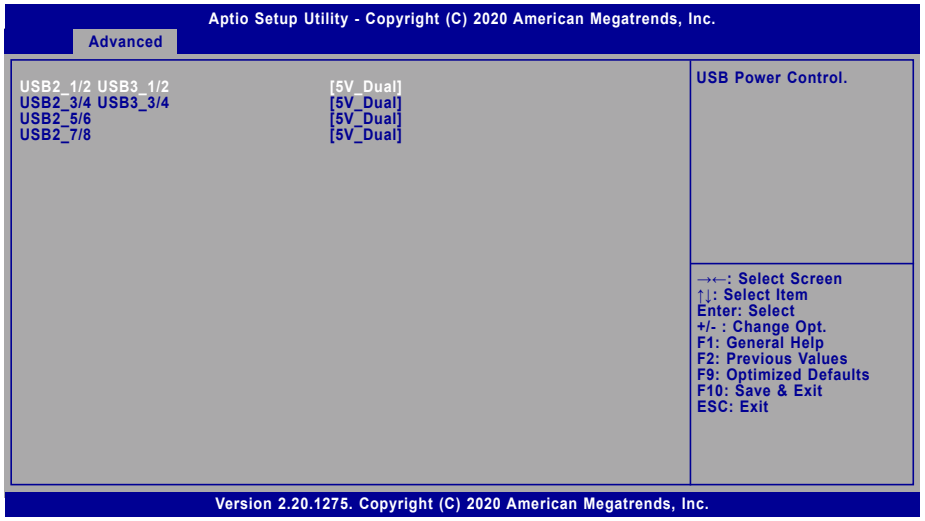
This field controls the execution of UEFI and Legacy Video OpROM.

Other PCI devices

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

▶ Advanced

USB Power Control

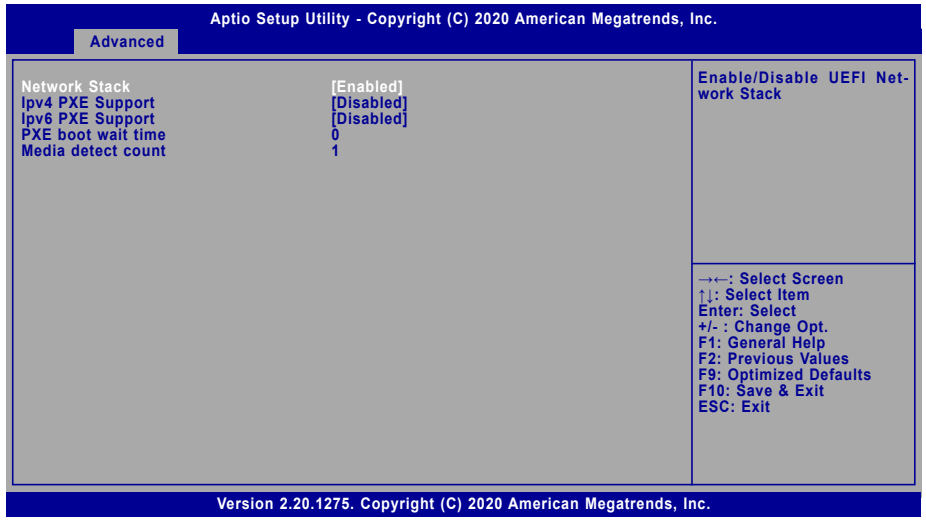


5V_Dual / 5V

5V_Dual Support system wake up from S3/S4 by USB keyboard or mouse while 5V doesn't.

▶ Advanced

Network Stack Configuration



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.

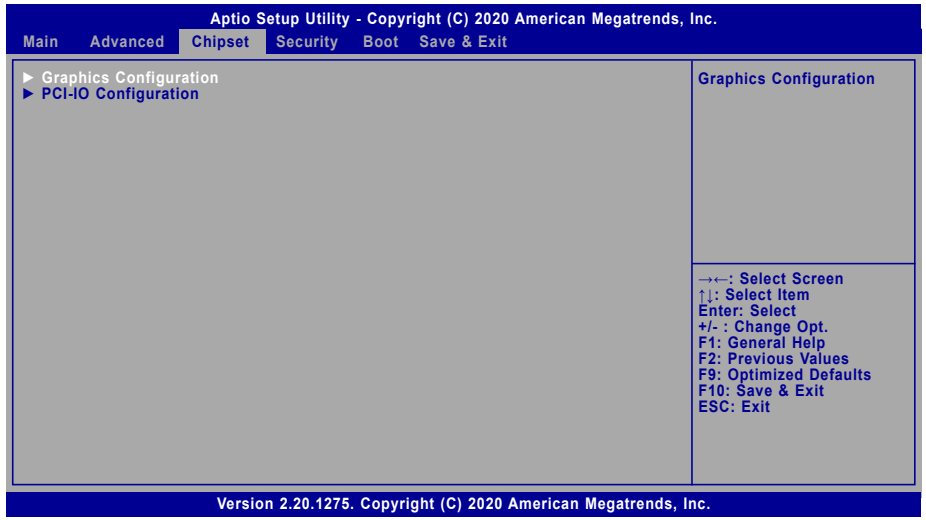
PXE boot wait time

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

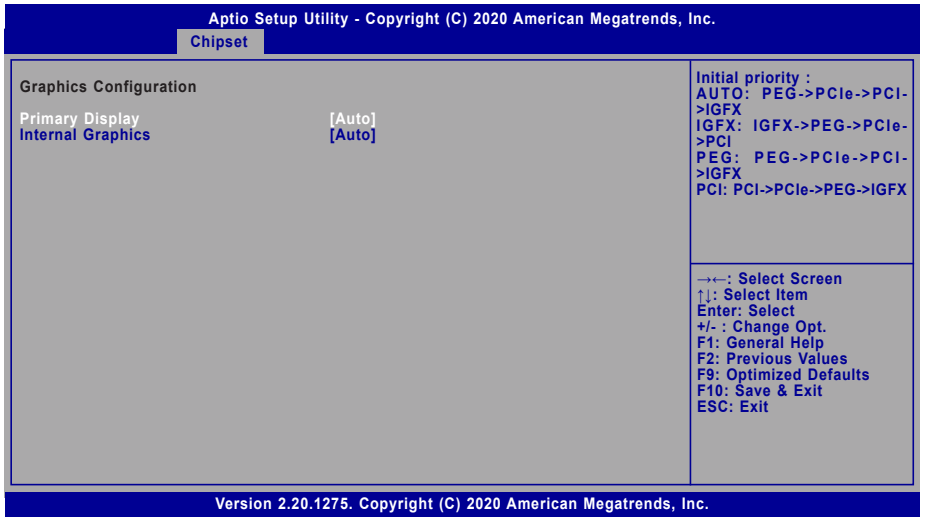
Media detect count

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

▶ Chipset



Graphics Configuration



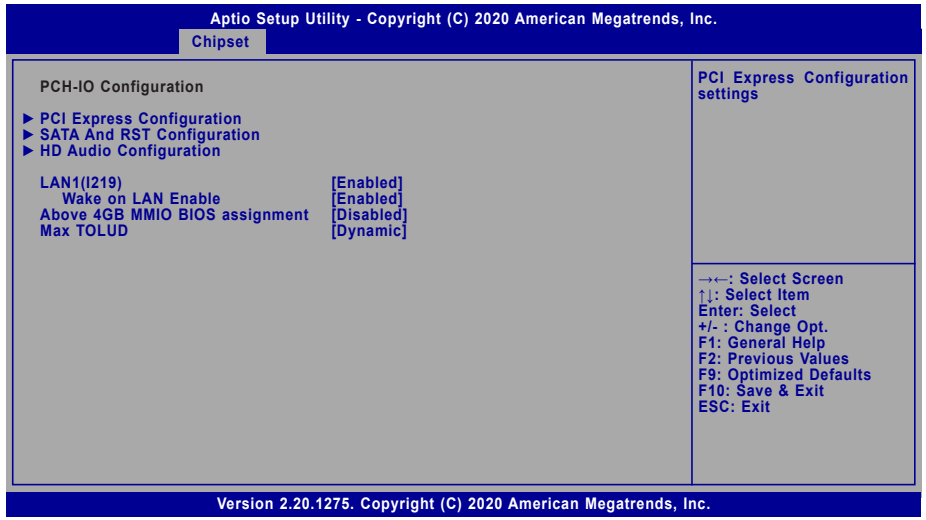
Primary Display

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

Internal Graphics

Keep IGFX enabled based on the setup options.

PCH-IO Configuration



LAN1(I219)

Enable or disable onboard NIC.

Wake on LAN Enable

Enable or disable integrated LAN to wake the system.

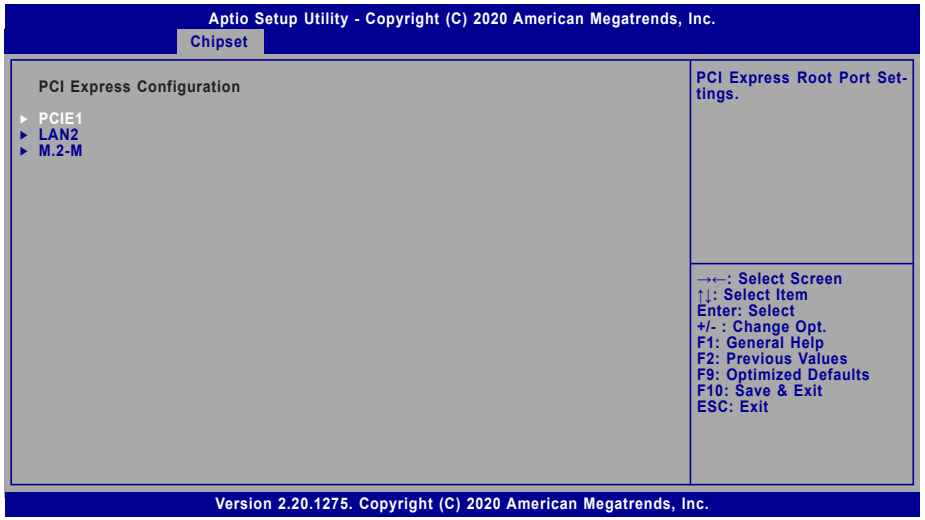
Above 4GB MMIO BIOS assignment

Switch MemoryMappedIO BIOS assignment above 4GB.

Max TOLUD

Assign a value or set “Dynamic” to automatically adjust TOLUD based on largest MMIO length

PCI Express Configuration



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

PCIE1

Enable or disable the PCI Express Root Port.

PCIe Speed

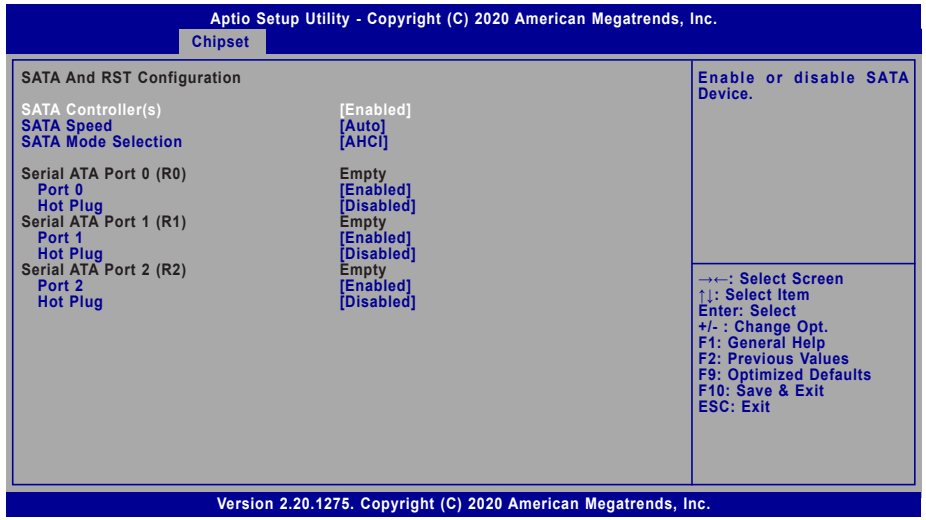
Select PCIe Speed of the current port — AUTO, Gen1, Gen 2, or Gen3. Gen 3 is only available for the PCIE1 port. This field may not appear when the speed of the port is not configurable.

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



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

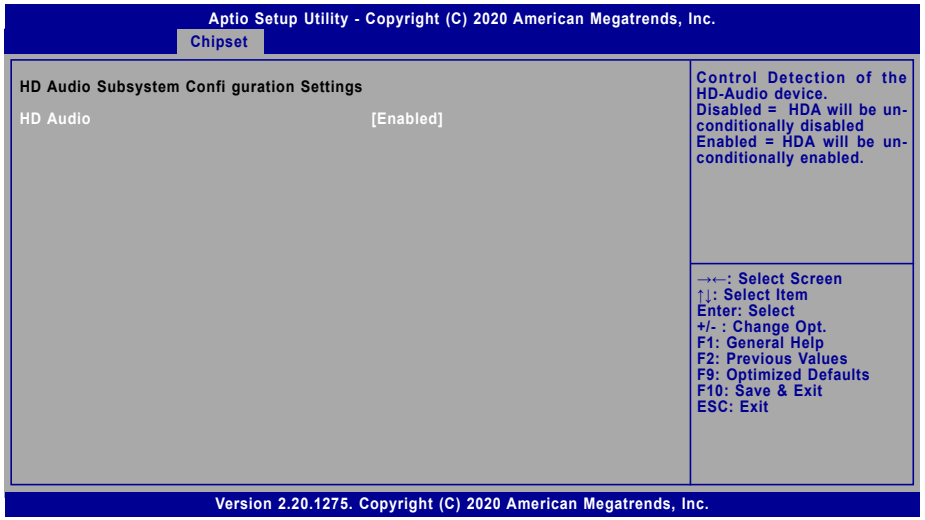
This field shows up when SATA Mode Selection is set to Intel RST Premium With Intel Optane System Acceleration. Enable or disable to use RST Legacy OROM when CSM is enabled.

Port and Hot Plug

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

▶ Chipset ▶ PCH-IO Configuration

HD Audio Configuration



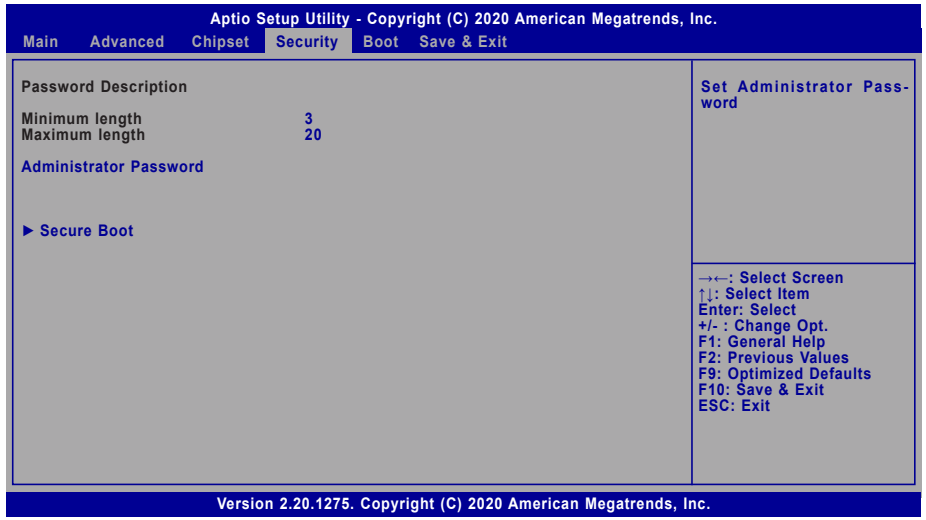
HD Audio

Control the detection of the HD Audio device.

Disabled HDA will be unconditionally disabled.

Enabled HDA will be unconditionally enabled.

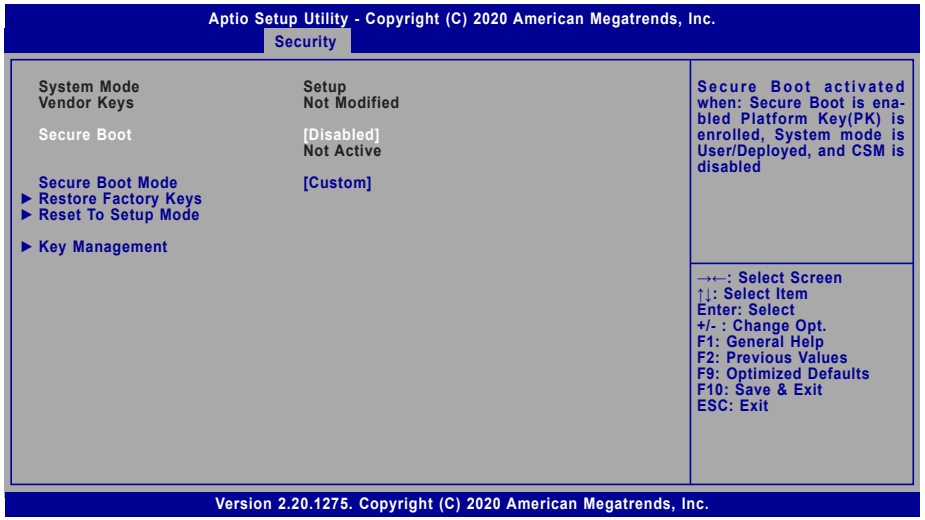
▶ Security



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.

Secure Boot



Secure Boot Mode

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

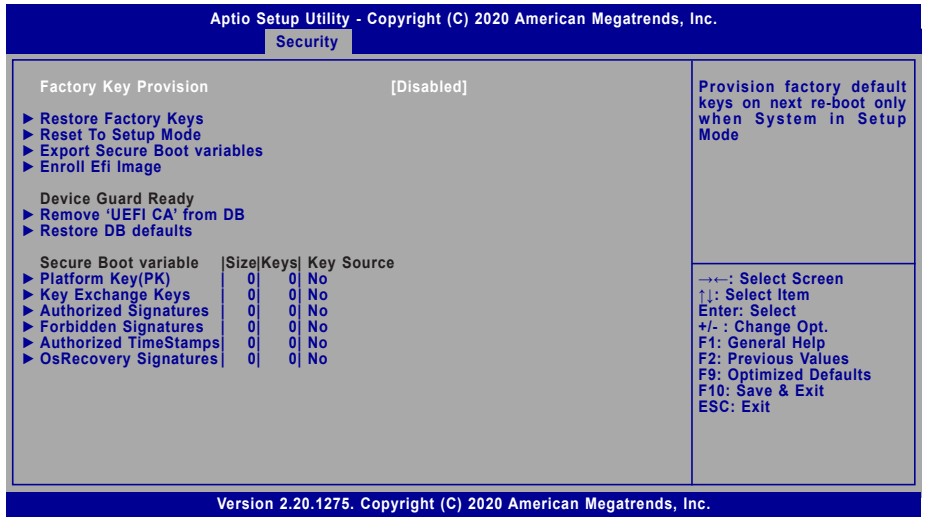
Force system to User Mode. Load OEM-defined factory defaults of keys and databases onto the Secure Boot. Press Enter and a prompt will show up for you to confirm.

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



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

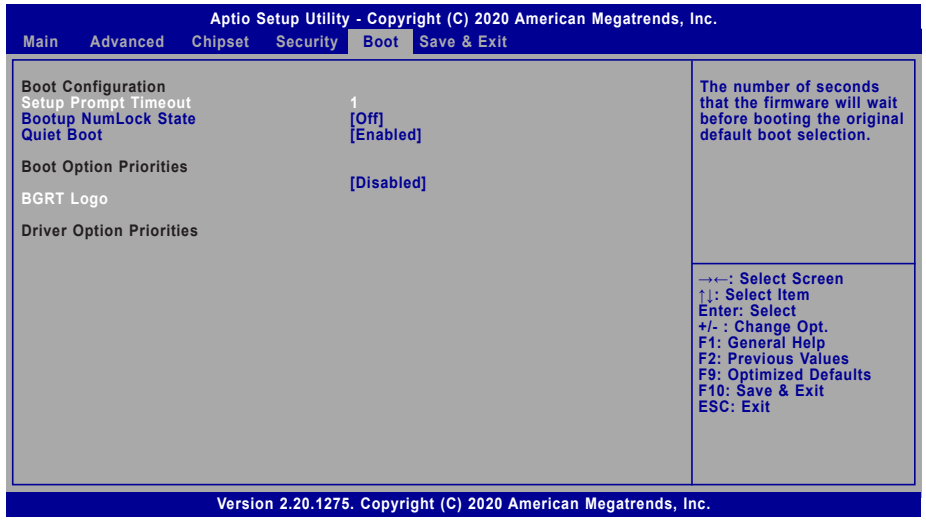
Press Enter to restore the database variable to factory defaults.

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



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

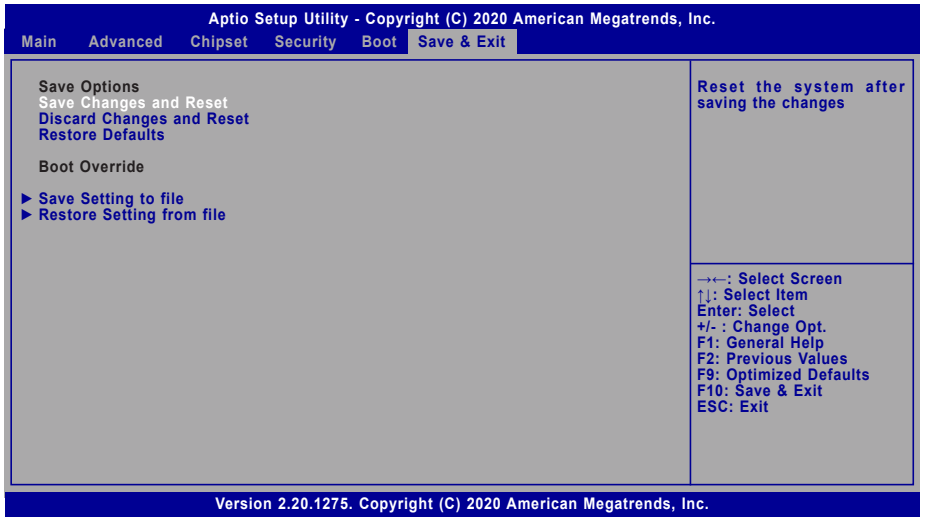
It is used to enable or disable to support display logo with ACPI BGRT table.

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



Save Changes and Reset

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

Discard Changes and Reset

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

Restore Defaults

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

Boot Override

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

▶ Save Setting to file

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

▶ Restore Setting from file

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

▶ Updating the BIOS

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

▶ Notice: BIOS SPI ROM

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

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

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

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

Chapter 4 - RAID

The system board allows configuring RAID on Serial ATA drives. It supports RAID 0, RAID 1.

▶ RAID Levels Knowledge

RAID 0 (Striped Disk Array without Fault Tolerance)

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

RAID 1 (Mirroring Disk Array with Fault Tolerance)

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

RAID 5

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

RAID 10 (Mirroring and Striping)

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

RAID Level	Min. Drives	Protection	Description
RAID 0	2	None	Data striping without redundancy
RAID 1	2	Single Drive Failure	Disk mirroring
RAID 5	3	Single Drive Failure	Block-level data striping with distributed parity
RAID 10	4	1 Disk Per Mirrored Stripe (not same mirror)	Combination of RAID 0 (data striping) and RAID 1 (mirroring)

▶ Setup Procedure

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

1. Install SATA drives.
2. Enable RAID in the Insyde BIOS.
3. Create a RAID volume.
4. Install the Intel Rapid Storage Technology Utility.

Step 1: Install SATA Drives

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

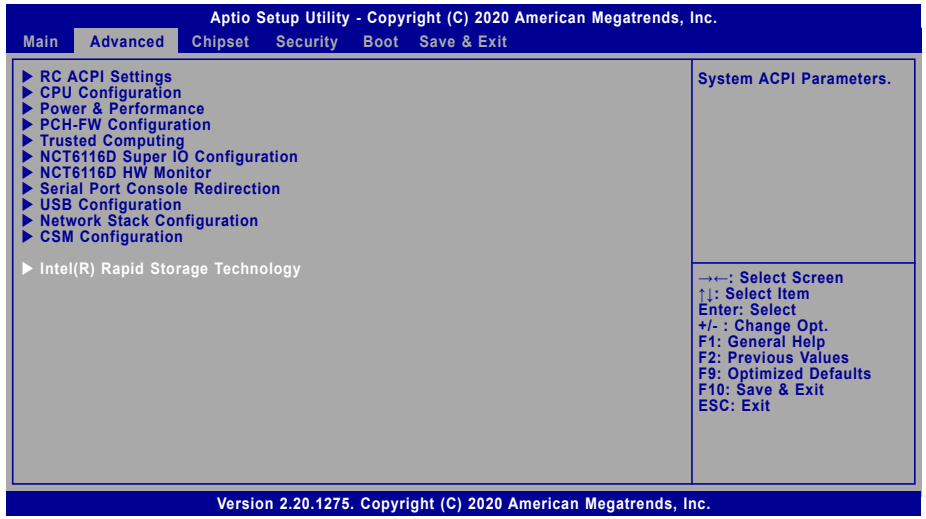
Important:
1. Please make sure the SATA drives that you are to create a RAID volume with are connected and powered, and are able to be detected by the system. Otherwise, the RAID BIOS utility would not be accessible.
2. While creating a RAID volume, please make sure the system, drives, and cables are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

Step 2: Enable RAID in the AMI BIOS

1. Power-on the system then press <Del> to enter the main menu of the AMI BIOS.
2. Go to "Chipset" menu and select the "PCH-IO Configuration" menu then "SATA And RST Configuration" menu.
3. Change the "SATA Mode Selection" to "Intel RST Premium With Intel Optane System Acceleration" mode.
4. Press F10 to save the changes.
5. Reboot the system.

Step 3: Create a RAID Volume

1. Go to the “Advanced” menu of the AMI BIOS and select “Intel(R) Rapid Storage Technology”.



2. The screen displays all available drives. Select “Create RAID volume” to create a RAID volume”.
3. Use the up or down arrow keys to select the RAID level and press <Enter>.
4. Use the up or down arrow keys to scroll through the list of hard drives and press <Enter> to select the drive.
5. Press <Enter>.
6. Use the up or down arrow keys to select the strip size and press <Enter>.
7. Enter the volume size and press <Enter>.
8. At the prompt, press <Y> to confirm volume creation.

Step 4: Install the Intel Rapid Storage Technology Utility

The Intel Rapid Storage Technology Utility can be installed from within Windows. It allows RAID volume management (create, delete, migrate) from within the operating system. It will also display useful SATA device and RAID volume information. The user interface, tray icon service and monitor service allow you to monitor the current status of the RAID volume and/or SATA drives. It enables enhanced performance and power management for the storage subsystem.

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