GA-IMB370TN

User's Manual

Rev. 1001

For more product details, please visit GIGABYTE's website.

To reduce the impacts on global warming, the packaging materials of this product are recyclable and reusable. GIGABYTE works with you to protect the environment.

Declaration of Conformity

We, Manufacturer/Importer,

G.B.T. Technology Trading GMbH

Address: Bullenkoppel 16, 22047 Hamburg, Germany

Declare that the product

Product Type: Motherboard

Product Name: GA-IMB370TN

conforms with the essential requirements of the following directives:

☒ **EMC Directive 2014/30/EU:**

☒ Conduction & Radiated Emissions:	EN 55032:2012+AC:2013
☒ Immunity:	EN 55024:2010+A1:2015
☒ Power-line harmonics:	EN 61000-3-2:2014
☒ Power-line flicker:	EN 61000-3-3:2013

☒ **Low Voltage Directive 2014/35/EU:**

☒ Safety:	EN60950-1:2006+A11:2009+A12:2011+A2:2013

☒ **RoHS Directive 2011/65/EU**

☒ Restriction of use of certain substances in electronic equipment:	This product does not contain any of the restricted substances listed in Annex II, in concentrations and applications banned by the directive.

☒ **CE marking**

CE

Signature: Timmy Huang

(Stamp) Date: Feb. 25, 2019 Name: Timmy Huang

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2.1077(a)

FC

Responsible Party Name: G.B.T. INC. (U.S.A.)

Address: 17358 Railroad Street
City of Industry, CA 91748

Phone/Fax No: (626) 854-9338/ (626) 854-9326

hereby declares that the product

Product Name: Motherboard

Model Number: GA-IMB370TN

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107(a) and Section 15.109 (a),Class B Digital Device

Supplementary Information:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful and (2) this device must accept any inference received, including that may cause undesired operation.

Representative Person's Name: ERIC LU

Signature: Eric Lu

Date: Feb. 25, 2019

Disclaimer

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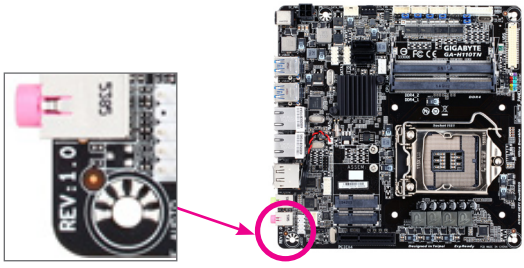
- In order to assist in the use of this product, carefully read the User's Manual.
- For product-related information, check on our website at: https://www.gigabyte.com

Identifying Your Motherboard Revision

The revision number on your motherboard looks like this: "REV: X.X." For example, "REV: 1.0" means the revision of the motherboard is 1.0. Check your motherboard revision before updating motherboard BIOS, drivers, or when looking for technical information.
Example:



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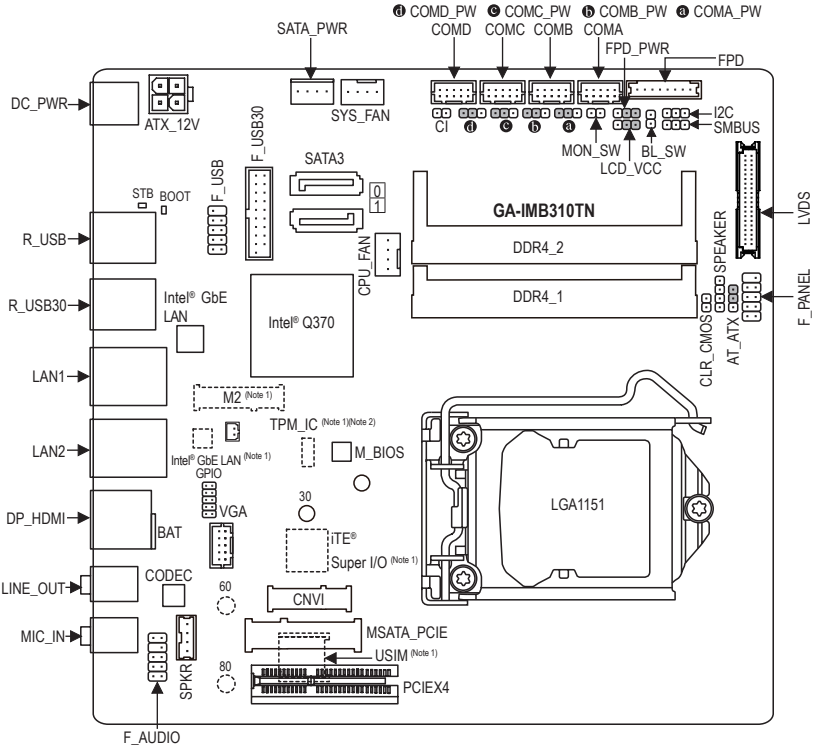
GA-IMB370TN Motherboard Layout



Box Contents

- ☑ GA-IMB370TN motherboard
- ☑ Motherboard driver disk
- ☑ User's Manual
- ☑ Two SATA cables
- ☑ One SATA power cable
- ☑ Two I/O Shields (high/low)
- ☑ One COM port cable
- ☑ One D-Sub port cable

The box contents above are for reference only and the actual items shall depend on the product package you obtain. The box contents are subject to change without notice.

(Note 1) This chip/connector is on the back of the motherboard.
(Note 2) This feature is optional due to different regional policy.

Chapter 1 Hardware Installation

1-1 Installation Precautions

The motherboard contains numerous delicate electronic circuits and components which can become damaged as a result of electrostatic discharge (ESD). Prior to installation, carefully read the user's manual and follow these procedures:

- Prior to installation, make sure the chassis is suitable for the motherboard.
- Prior to installation, do not remove or break motherboard S/N (Serial Number) sticker or warranty sticker provided by your dealer. These stickers are required for warranty validation.
- Always remove the AC power by unplugging the power cord from the power outlet before installing or removing the motherboard or other hardware components.
- When connecting hardware components to the internal connectors on the motherboard, make sure they are connected tightly and securely.
- When handling the motherboard, avoid touching any metal leads or connectors.
- It is best to wear an electrostatic discharge (ESD) wrist strap when handling electronic components such as a motherboard, CPU or memory. If you do not have an ESD wrist strap, keep your hands dry and first touch a metal object to eliminate static electricity.
- Prior to installing the motherboard, please have it on top of an antistatic pad or within an electrostatic shielding container.
- Before connecting or unplugging the power supply cable from the motherboard, make sure the power supply has been turned off.
- Before turning on the power, make sure the power supply voltage has been set according to the local voltage standard.
- Before using the product, please verify that all cables and power connectors of your hardware components are connected.
- To prevent damage to the motherboard, do not allow screws to come in contact with the motherboard circuit or its components.
- Make sure there are no leftover screws or metal components placed on the motherboard or within the computer casing.
- Do not place the computer system on an uneven surface.
- Do not place the computer system in a high-temperature or wet environment.
- Turning on the computer power during the installation process can lead to damage to system components as well as physical harm to the user.
- If you are uncertain about any installation steps or have a problem related to the use of the product, please consult a certified computer technician.
- If you use an adapter, extension power cable, or power strip, ensure to consult with its installation and/or grounding instructions.

1-2 Product Specifications

CPU	◆ Support for 9th and 8th Generation Intel® Core™ i9 processors/Intel® Core™ i7 processors/Intel® Core™ i5 processors/Intel® Core™ i3 processors/Intel® Pentium® processors/Intel® Celeron® processors in the LGA1151 package (Go to GIGABYTE's website for the latest CPU support list.) ◆ L3 cache varies with CPU
Chipset	◆ Intel® Q370 Express Chipset
Memory	◆ 2 x DDR4 SO-DIMM socket supporting up to 32 GB of system memory ◆ Support for DDR4 2133 MHz memory modules (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)
Onboard Graphics	◆ Integrated Graphics Processor-Intel® HD Graphics support: - 1 x DisplayPort, supporting a maximum resolution of 4096x2304@60 Hz * Support for DisplayPort 1.2 version, HDCP 2.2, and HDR. - 1 x HDMI port, supporting a maximum resolution of 4096x2160@60 Hz * Support for HDMI 2.0 version, HDCP 2.2, and HDR. ◆ Maximum shared memory of 1 GB
Audio	◆ Realtek® ALC887 codec ◆ High Definition Audio ◆ 2/4/5.1-channel
LAN	◆ 2 x Intel® GbE LAN chips (10/100/1000 Mbit)
TPM (Note)	◆ Infineon chip, supporting TPM 2.0
Expansion Slots	◆ 1 x PCI Express x4 slot (The PCI Express x4 slot conforms to PCI Express 3.0 standard.) ◆ 1 x M.2 Socket 1 connector for an Intel® CNVi or a PCIe wireless module (CNVI) ◆ 1 x full size Mini PCIe connector (MSATA_PCIE) * The MSATA_PCIE connector can also be used as an MSATA connector. (The Mini PCIe connector conforms to PCI Express 2.0 standard.)
Storage Interface	◆ Chipset: - 1 x M.2 connector on the back of the motherboard (Socket 3, M key, type 2260/2280 SATA and PCIe x2/x4 SSD support) - 2 x SATA 6Gb/s connectors - Support for RAID 0 and RAID 1 ◆ Intel® Optane™ Memory Ready
USB	◆ Chipset: - 4 x USB 3.0 ports (2 ports on the back panel, 2 ports available through the internal USB header) - 4 x USB 2.0/1.1 ports (2 ports on the back panel, 2 ports available through the internal USB header)

(Note) This feature is optional due to different regional policy.

Internal Connectors	◆ 1 x 4-pin ATX 12V power connector ◆ 1 x AT/ATX mode switch jumper ◆ 1 x CPU fan header ◆ 1 x system fan header ◆ 1 x M.2 Socket 3 connector on the back of the motherboard ◆ 2 x SATA 6Gb/s connectors ◆ 1 x MSATA connector ◆ 1 x USIM connector on the back of the motherboard ◆ 1 x SATA power connector ◆ 1 x front panel header ◆ 1 x front panel audio header ◆ 1 x battery power cable connector ◆ 1 x USB 3.1 Gen 1 header ◆ 1 x USB 2.0/1.1 header ◆ 4 x serial port headers ◆ 4 x serial port power select jumpers ◆ 1 x D-Sub port header ◆ 1 x GPIO header ◆ 1 x LVDS header ◆ 1 x LVDS drive voltage jumper (LCD_VCC) ◆ 1 x flat panel display header (FPD) ◆ 1 x flat panel display power select jumper (FPD_PWR) ◆ 1 x flat panel display switch header (MON_SW) ◆ 1 x backlight switch header (BL_SW) ◆ 1 x speaker header (SPKR) ◆ 1 x buzzer header (SPEAKER) ◆ 1 x Clear CMOS jumper ◆ 1 x chassis intrusion header ◆ 1 x I2C ◆ 1 x SMBUS
Back Panel Connectors	◆ 1 x DC-In power connector ◆ 1 x HDMI port ◆ 1 x DisplayPort ◆ 2 x USB 3.0 ports ◆ 2 x USB 2.0/1.1 ports ◆ 2 x RJ-45 ports ◆ 2 x audio jacks
I/O Controller	◆ iTE® I/O Controller Chip
Hardware Monitor	◆ System voltage detection ◆ CPU/System temperature detection ◆ CPU/System fan speed detection ◆ CPU/System overheating warning ◆ CPU/System fan fail warning ◆ CPU/System fan speed control * Whether the fan speed control function is supported will depend on the cooler you install.

(Note) The connector is on the back of the motherboard.

BIOS	◆	1 x 128 Mbit flash ◆ Use of licensed AMI UEFI BIOS ◆ PnP 1.0a, DMI 2.7, WfM 2.0, SM BIOS 2.7, ACPI 5.0
Unique Features	◆	Support for @BIOS ◆ Support for Q-Flash
Bundled Software	◆	Norton® Internet Security (OEM version)
Operating System	◆	Support for Windows 10 64-bit ◆ cFosSpeed
Form Factor	◆	Thin Mini-ITX; 17.0cm x 17.0cm

* GIGABYTE reserves the right to make any changes to the product specifications and product-related information without prior notice.

Please visit GIGABYTE's website for support lists of CPU, memory modules, SSDs, and M.2 devices.

Please visit the **Support\Utility List** page on GIGABYTE's website to download the latest version of apps.

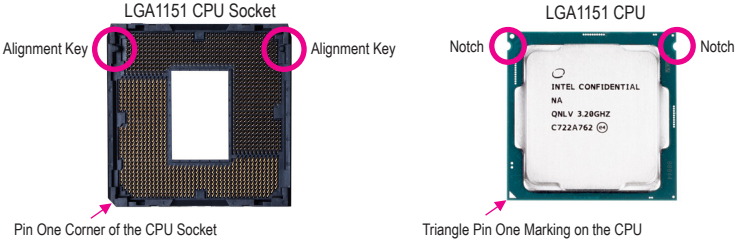
1-3 Installing the CPU

Read the following guidelines before you begin to install the CPU:

- Make sure that the motherboard supports the CPU.
  (Go to GIGABYTE's website for the latest CPU support list.)
- Always turn off the computer and unplug the power cord from the power outlet before installing the CPU to prevent hardware damage.
- Locate the pin one of the CPU. The CPU cannot be inserted if oriented incorrectly. (Or you may locate the notches on both sides of the CPU and alignment keys on the CPU socket.)
- Apply an even and thin layer of thermal grease on the surface of the CPU.
- Do not turn on the computer if the CPU cooler is not installed, otherwise overheating and damage of the CPU may occur.
- Set the CPU host frequency in accordance with the CPU specifications. It is not recommended that the system bus frequency be set beyond hardware specifications since it does not meet the standard requirements for the peripherals. If you wish to set the frequency beyond the standard specifications, please do so according to your hardware specifications including the CPU, graphics card, memory, hard drive, etc.

Installing the CPU

Locate the alignment keys on the motherboard CPU socket and the notches on the CPU.



1-4 Installing the Memory

Read the following guidelines before you begin to install the memory:

- Make sure that the motherboard supports the memory. It is recommended that memory of the same capacity, brand, speed, and chips be used.
  (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)
- Always turn off the computer and unplug the power cord from the power outlet before installing the memory to prevent hardware damage.
- Memory modules have a foolproof design. A memory module can be installed in only one direction. If you are unable to insert the memory, switch the direction.

Dual Channel Memory Configuration

This motherboard provides two memory sockets and supports Dual Channel Technology. After the memory is installed, the BIOS will automatically detect the specifications and capacity of the memory. Enabling Dual Channel memory mode will double the original memory bandwidth.

The two memory sockets are divided into two channels and each channel has one memory socket as following:

- Channel A: DDR4_1
- Channel B: DDR4_2

Due to CPU limitations, read the following guidelines before installing the memory in Dual Channel mode.

1. Dual Channel mode cannot be enabled if only one memory module is installed.
2. When enabling Dual Channel mode with two memory modules, it is recommended that memory of the same capacity, brand, speed, and chips be used.

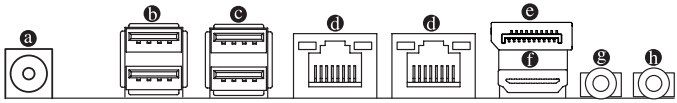
Please visit GIGABYTE's website for details on hardware installation.

1-5 Installing an Expansion Card

Read the following guidelines before you begin to install an expansion card:

- Make sure the motherboard supports the expansion card. Carefully read the manual that came with your expansion card.
- Always turn off the computer and unplug the power cord from the power outlet before installing an expansion card to prevent hardware damage.

1-6 Back Panel Connectors



a DC In Power Connector

Connect the DC power to this port. This port supports 12V/19V/24V power adapter of up to 150w. Note: The DC power jack cannot be used with the 4-pin ATX 12V power connector simultaneously as a source of power input.

b USB 2.0/1.1 Port

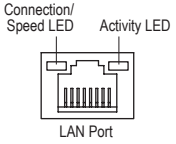
The USB port supports the USB 2.0/1.1 specification. Use this port for USB devices.

c USB 3.0 Port

The USB port supports the USB 3.0/2.0 specification. Use this port for USB devices.

d RJ-45 LAN Port

The Gigabit Ethernet LAN port provides Internet connection at up to 1 Gbps data rate. The following describes the states of the LAN port LEDs.



Connection/Speed LED:

State	Description
Orange	1 Gbps data rate
Green	100 Mbps data rate
Off	10 Mbps data rate

Activity LED:

State	Description
Blinking	Data transmission or receiving is occurring
On	No data transmission or receiving is occurring

e DisplayPort

DisplayPort delivers high quality digital imaging and audio, supporting bi-directional audio transmission. DisplayPort can support both DPCP and HDCP 2.2 content protection mechanisms. It provides improved visuals supporting Rec. 2020 (Wide Color Gamut) and High Dynamic Range (HDR) for Blu-ray UHD playback. You can use this port to connect your DisplayPort-supported monitor. Note: The DisplayPort Technology can support a maximum resolution of 4096x2304@60 Hz but the actual resolutions supported depend on the monitor being used.

- When removing the cable connected to a back panel connector, first remove the cable from your device and then remove it from the motherboard.
- When removing the cable, pull it straight out from the connector. Do not rock it side to side to prevent an electrical short inside the cable connector.

ⓕ HDMI Port

The HDMI port supports HDCP 2.2 and Dolby TrueHD and DTS HD Master Audio formats. It also supports up to 192KHz/16bit 8-channel LPCM audio output. You can use this port to connect your HDMI-supported monitor. The maximum supported resolution is 4096x2160@60 Hz, but the actual resolutions supported are dependent on the monitor being used.

After installing the DisplayPort/HDMI device, make sure to set the default sound playback device to DisplayPort/HDMI. (The item name may differ depending on your operating system.)

ⓖ Line Out (Green)

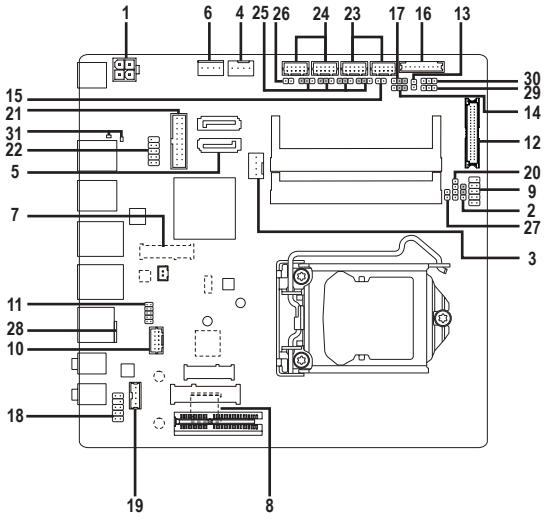
The line out jack. Use this audio jack for a headphone or 2-channel speaker.

ⓗ Mic In (Pink)

The Mic in jack.

Please visit GIGABYTE's website for details on configuring the audio software.

1-7 Internal Connectors



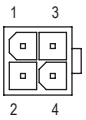
1)	ATX_12V	17)	FPD_PWR
2)	AT_ATX	18)	F_AUDIO
3)	CPU_FAN	19)	SPKR
4)	SYS_FAN	20)	SPEAKER
5)	SATA3_0/1	21)	F_USB30
6)	SATA_PWR	22)	F_USB
7)	M2	23)	COMA/COMB
8)	USIM	24)	COMC/COMD
9)	F_PANEL	25)	COMA/B/C/D_PW
10)	VGA	26)	CI
11)	GPIO	27)	CLR_CMOS
12)	LVDS	28)	BAT
13)	BL_SW	29)	SMBUS
14)	LCD_VCC	30)	I2C
15)	MON_SW	31)	STB/BOOT
16)	FPD		

Read the following guidelines before connecting external devices:

- First make sure your devices are compliant with the connectors you wish to connect.
- Before installing the devices, be sure to turn off the devices and your computer. Unplug the power cord from the power outlet to prevent damage to the devices.
- After installing the device and before turning on the computer, make sure the device cable has been securely attached to the connector on the motherboard.

1) ATX_12V (2x2 12V Power Connector)

This connector can be used to input power when the DC power jack on the rear panel is not connected. However, if the DC power jack is connected, this connector can only be used to output power.



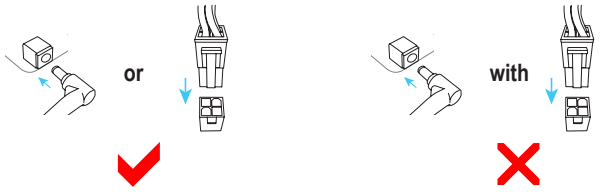
When used to input power:

Pin No.	Definition
1	GND
2	GND
3	+12V
4	+12V

When used to output power:

Pin No.	Definition
1	GND
2	GND
3	DC_OUT
4	DC_OUT

Note: The two connectors cannot be used simultaneously as a source of power input.



2) AT_ATX (ATX Power Switch Jumper)

This jumper allows you to select AT or ATX power mode.

1-2 Close: AT mode.

2-3 Close: ATX mode. (Default)

3/4) CPU_FAN/SYS_FAN (Fan Headers)

All fan headers on this motherboard are 4-pin. Most fan headers possess a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). The speed control function requires the use of a fan with fan speed control design. For optimum heat dissipation, it is recommended that a system fan be installed inside the chassis.

CPU_FAN

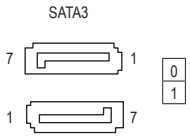
SYS_FAN

Pin No.	Definition
1	GND
2	Voltage Speed Control
3	Sense
4	PWM Speed Control

- Be sure to connect fan cables to the fan headers to prevent your CPU and system from overheating. Overheating may result in damage to the CPU or the system may hang.
- These fan headers are not configuration jumper blocks. Do not place a jumper cap on the headers.

5) SATA3 0/1 (SATA 6Gb/s Connectors)

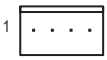
The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standard. Each SATA connector supports a single SATA device. The Intel® Chipset supports RAID 0 and RAID 1. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.



Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

6) SATA_PWR (SATA Power Connector)

This connector provides power to installed SATA devices.



Pin No.	Definition
1	VCC
2	GND
3	GND
4	+12V

7) M2 (M.2 Socket 3 Connector)(Note)

The M.2 connector supports M.2 SATA SSDs and M.2 PCIe SSDs. Please note that an M.2 PCIe SSD cannot be used to create a RAID set either with an M.2 SATA SSD or a SATA hard drive. To create a RAID array with an M.2 PCIe SSD, you must set up the configuration in UEFI BIOS mode. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.

Follow the steps below to correctly install an M.2 SSD in the M.2 connector.
Step 1:
Use a screw driver to unfasten the screw and nut from the motherboard. Locate the proper mounting hole for the M.2 SSD to be installed and then screw the nut first.
Step 2:
Slide the M.2 SSD into the connector at an angle.
Step 3:
Press the M.2 SSD down and then secure it with the screw.

Select the proper hole for the M.2 SSD to be installed and refasten the screw and standoff.

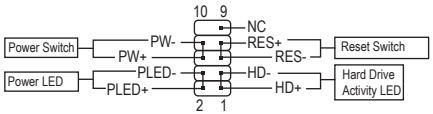
8) USIM (USIM Connector)(Note)

This connector supports a mini PCIe 3G LAN card.

(Note) The connector is on the back of the motherboard.

9) F_PANEL (Front Panel Header)

Connect the power switch, reset switch, and system status indicator on the chassis to this header according to the pin assignments below. Note the positive and negative pins before connecting the cables.



- **PLED** (Power LED, Yellow):

System Status	LED
S0	On
S3/S4/S5	Off

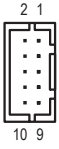
Connects to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED is off when the system is in S3/S4 sleep state or powered off (S5).

- **PW** (Power Switch, Red):
  Connects to the power switch on the chassis front panel. You may configure the way to turn off your system using the power switch (refer to Chapter 2, "BIOS Setup," "Power Management," for more information).
- **HD** (Hard Drive Activity LED, Blue):
  Connects to the hard drive activity LED on the chassis front panel. The LED is on when the hard drive is reading or writing data.
- **RES** (Reset Switch, Green):
  Connects to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart.
- **NC** (Purple):
  No connection.

The front panel design may differ by chassis. A front panel module mainly consists of power switch, reset switch, power LED, hard drive activity LED and etc. When connecting your chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly.

10) VGA (D-Sub Port Header)

This header can be used to connect a D-Sub monitor by an adapter.



Pin No.	Definition	Pin No.	Definition
1	VGA_R	6	GND
2	GND	7	HSYNC
3	VGA_G	8	VSYNC
4	GND	9	VGA_SCL
5	VGA_B	10	VGA_SDA

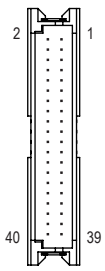
11) GPIO (GPIO Header)

Use this jumper to set the GPIO status of the LPT_GPIO header to HIGH or LOW.

Pin No.	Definition	Pin No.	Definition
1	IO_GP70	6	IO_GP75
2	IO_GP71	7	IO_GP76
3	IO_GP72	8	IO_GP77
4	IO_GP73	9	GP_IN_OUT
5	IO_GP74	10	GND

12) LVDS (LVDS Header)

LLVDS stands for Low-voltage differential signaling, which uses high-speed analog circuit techniques to provide multigigabit data transfers on copper interconnects and is a generic interface standard for high-speed data transmission.



Pin No.	Definition	Pin No.	Definition
1	LCD_VCC	21	-RXE0_C
2	LCD_VCC	22	+RXE0_C
3	VCC3	23	GND
4	NC	24	-RXE1_C
5	NC	25	+RXE1_C
6	-RXO0_C	26	GND
7	+RXO0_C	27	-RXE2_C
8	GND	28	+RXE2_C
9	-RXO1_C	29	CABLE_DET (Note)
10	+RXO1_C	30	-RXE3_C
11	GND	31	+RXE3_C
12	-RXO2_C	32	GND
13	+RXO2_C	33	-RXECLKE_C
14	GND	34	+RXECLKE_C
15	-RXO3_C	35	GND
16	+RXO3_C	36	SC_BKLT_EN
17	GND	37	SC_BKLT_CTL
18	-RXECLKO_C	38	FPD_PWR
19	+RXECLKO_C	39	FPD_PWR
20	GND	40	FPD_PWR

(Note) Connects to Pin 29 and the ground pin of the LVDS..

13) BL_SW (Back Light Switch)

The Back Light switch provides the function for screen back light adjustment.

Pin No.	Definition
1	BL_DOWN
2	BL_UP

14) LCD_VCC (LVDS Drive Voltage Jumper)

This jumper can be used to provide different screen voltage settings.

1-2 Close: Set to 3V. (Default)

2-3 Close: Set to 5V.

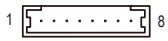
15) MON_SW (Flat Panel Display Switch Header)

This header allows you to connect an on/off switch for the display.

Pin No.	Definition
1	Mon_SW
2	GND

16) FPD (Flat Panel Display Header)

FPD is a high-speed interface connecting the output of a video controller in a laptop computer, computer monitor or LCD television set to the display panel. Most laptops, LCD computer monitors and LCD TVs use this interface internally. T The header conforms to FPD specification.



Pin No.	Definition
1	BKLT_EN
2	BKLT_PWM
3	BKLT_PWR
4	BKLT_PWR
5	BKLT_GND/Brightness_GND
6	BKLT_GND/Brightness_GND
7	Brightness_Up
8	Brightness_Down

17) FPD_PWR (Flat Panel Display Power Select Jumper)

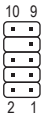
The power select jumper can be used to select the working voltage of the flat panel display. Make use your flat panel display supports DC In power. If not, use a DC In power adapter that meets the voltage requirements of your flat panel display.

1-2 Close: Set to 12V. (Default)

2-3 Close: Set to DC In.

18) F_AUDIO (Front Panel Audio Header)

The front panel audio header supports High Definition audio (HD). You may connect your chassis front panel audio module to this header. Make sure the wire assignments of the module connector match the pin assignments of the motherboard header. Incorrect connection between the module connector and the motherboard header will make the device unable to work or even damage it.



For HD Front Panel Audio:

Pin No.	Definition
1	MIC2_L
2	GND
3	MIC2_R
4	-ACZ_DET
5	LINE2_R
6	Sense
7	FAUDIO_JD
8	No Pin
9	LINE2_L
10	Sense

- The front panel audio header supports HD audio by default.
- Audio signals will be present on both of the front and back panel audio connections simultaneously.
- Some chassis provide a front panel audio module that has separated connectors on each wire instead of a single plug. For information about connecting the front panel audio module that has different wire assignments, please contact the chassis manufacturer.

19) SPKR (Speaker Header)

This header connects to the L/R Audio output of the motherboard and supports 3W stereo speaker (4 Ohm) in an AIO chassis.

Pin No.	Definition
1	Speaker OUT R-
2	Speaker OUT R+
3	Speaker OUT L-
4	Speaker OUT L+

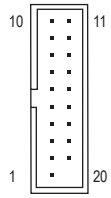
20) SPEAKER (Buzzer Header)

Connects to the buzzer on the chassis front panel. The system reports system startup status by issuing a beep code. One single short beep will be heard if no problem is detected at system startup.

Pin No.	Definition
1	VCC
2	NC
3	NC
4	SPK-

21) F_USB30 (USB 3.1 Gen 1 Header)

The header conforms to USB 3.1 Gen 1 and USB 2.0 specification and can provide two USB ports. For purchasing the optional 3.5" front panel that provides two USB 3.1 Gen 1 ports, please contact the local dealer.



Pin No.	Definition	Pin No.	Definition	Pin No.	Definition
1	VBUS	8	D1-	15	SSTX2-
2	SSRX1-	9	D1+	16	GND
3	SSRX1+	10	NC	17	SSRX2+
4	GND	11	D2+	18	SSRX2-
5	SSTX1-	12	D2-	19	VBUS
6	SSTX1+	13	GND	20	No Pin
7	GND	14	SSTX2+		

Prior to installing the USB bracket, be sure to turn off your computer and unplug the power cord from the power outlet to prevent damage to the USB bracket.

22) F_USB (USB 2.0/1.1 Header)

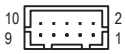
The header conforms to USB 2.0/1.1 specification. Each USB header can provide two USB ports via an optional USB bracket. For purchasing the optional USB bracket, please contact the local dealer.

Pin No.	Definition	Pin No.	Definition
1	Power (5V)	6	USB DY+
2	Power (5V)	7	GND
3	USB DX-	8	GND
4	USB DY-	9	No Pin
5	USB DX+	10	NC

- Do not plug the IEEE 1394 bracket (2x5-pin) cable into the USB 2.0/1.1 header.
- Prior to installing the USB bracket, be sure to turn off your computer and unplug the power cord from the power outlet to prevent damage to the USB bracket.

23) COMA/COMB (Serial Port Headers)

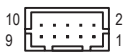
The COM headers can provide one serial port via an optional COM port cable. For purchasing the optional COM port cable, please contact the local dealer.



Pin No.	Definition
1	NDCD-
2	NDSR-
3	NSIN
4	NRTS-
5	NSOUT
6	NCTS-
7	NDTR-
8	12V_5V
9	GND
10	NC

24) COMC/COMD (Serial Port Headers)

The COM headers can provide one serial port via an optional COM port cable. For purchasing the optional COM port cable, please contact the local dealer.



RS232 device:

Pin No.	Definition
1	NDCD-
2	NDSR-
3	NSIN
4	NRTS-
5	NSOUT
6	NCTS-
7	NDTR-
8	+5V/+12V
9	GND
10	NC

RS422 device:

Pin No.	Definition
1	TX(B)
2	NC
3	TX(A)
4	NC
5	RX(A)
6	NC
7	RX(B)
8	+5V/+12V
9	GND
10	NC

RS485 device:

Pin No.	Definition
1	D-
2	NC
3	D+
4	NC
5	NC
6	NC
7	NC
8	+5V/+12V
9	GND
10	NC

25) COMA_PW/COMB_PW/COMC_PW/COMD_PW (Serial Port Header Power Select Jumpers)

The power select jumpers are used to select serial port power.

1-2 Close: Set to 12V.

2-3 Close: Set to 5V. (Default)

26) CI (Chassis Intrusion Header)

This motherboard provides a chassis detection feature that detects if the chassis cover has been removed. This function requires a chassis with chassis intrusion detection design.

Pin No.	Definition
1	Signal
2	GND

27) CLR_CMOS (Clear CMOS Jumper)

Use this jumper to clear the BIOS configuration and reset the CMOS values to factory defaults. To clear the CMOS values, use a metal object like a screwdriver to touch the two pins for a few seconds.

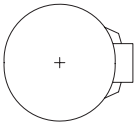
Open: Normal

Short: Clear CMOS Values

- Always turn off your computer and unplug the power cord from the power outlet before clearing the CMOS values.
- After system restart, go to BIOS Setup to load factory defaults (select Load Optimized Defaults) or manually configure the BIOS settings (refer to Chapter 2, "BIOS Setup," for BIOS configurations).

28) BAT (Battery/Battery Power Cable Connector)

The battery provides power to keep the values (such as BIOS configurations, date, and time information) in the CMOS when the computer is turned off. Replace the battery when the battery voltage drops to a low level, or the CMOS values may not be accurate or may be lost.



You may clear the CMOS values by removing the battery cable:

1. Turn off your computer and unplug the power cord.
2. Unplug the the battery cable from the battery cable header and wait for one minute.
3. Plug in the battery cable.
4. Plug in the power cord and restart your computer.

Pin No.	Definition
1	RTC Power
2	GND

- Always turn off your computer and unplug the power cord before replacing the battery.
- Replace the battery with an equivalent one. Damage to your devices may occur if the battery is replaced with an incorrect model.
- Contact the place of purchase or local dealer if you are not able to replace the battery by yourself or uncertain about the battery model.
- When installing the battery, note the orientation of the positive side (+) and the negative side (-) of the battery (the positive side should face up).
- Used batteries must be handled in accordance with local environmental regulations.

29) SMBUS (System Management Bus)

Pin No.	Definition
1	SMB_CLK
2	SMB_DATA
3	GND

30) I2C (Inter-Integrated Circuit)

Pin No.	Definition
1	I2C_SCL
2	I2C_SDA
3	GND

31) STB/BOOT (Status LEDs)

If the STB LED is on, that means the system is in standby mode; if the BOOT LED is on, that means the system is powered on.

Chapter 2 BIOS Setup

BIOS (Basic Input and Output System) records hardware parameters of the system in the CMOS on the motherboard. Its major functions include conducting the Power-On Self-Test (POST) during system startup, saving system parameters and loading operating system, etc. BIOS includes a BIOS Setup program that allows the user to modify basic system configuration settings or to activate certain system features.
When the power is turned off, the battery on the motherboard supplies the necessary power to the CMOS to keep the configuration values in the CMOS.
To access the BIOS Setup program, press the <Delete> key during the POST when the power is turned on.
To upgrade the BIOS, use either the GIGABYTE Q-Flash or @BIOS utility.

- Q-Flash allows the user to quickly and easily upgrade or back up BIOS without entering the operating system.
- @BIOS is a Windows-based utility that searches and downloads the latest version of BIOS from the Internet and updates the BIOS.

- Because BIOS flashing is potentially risky, if you do not encounter problems using the current version of BIOS, it is recommended that you not flash the BIOS. To flash the BIOS, do it with caution. Inadequate BIOS flashing may result in system malfunction.
- It is recommended that you not alter the default settings (unless you need to) to prevent system instability or other unexpected results. Inadequately altering the settings may result in system's failure to boot. If this occurs, try to clear the CMOS values and reset the board to default values. (Refer to the "Load Optimized Defaults" section in this chapter or introductions of the battery/clear CMOS jumper in Chapter 1 for how to clear the CMOS values.)

2-1 Main

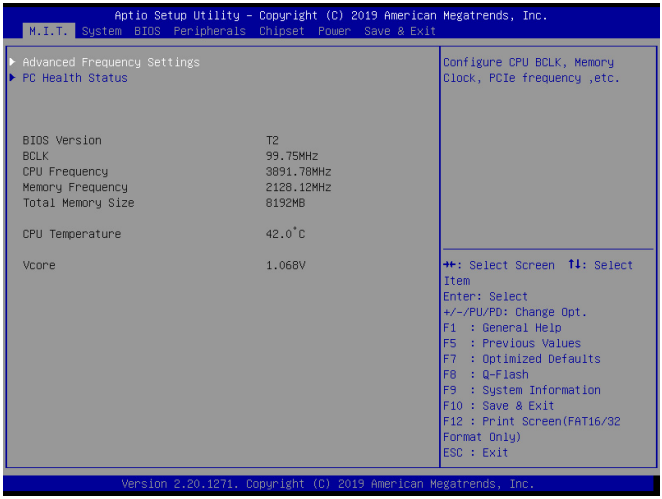
Once you enter the BIOS Setup program, the Main Menu (as shown below) appears on the screen. Use arrow keys to move among the items and press <Enter> to accept or enter a sub-menu.

Main Menu Help
The on-screen description of a highlighted setup option is displayed on the bottom line of the Main Menu.
Submenu Help
While in a submenu, press <F1> to display a help screen (General Help) of function keys available for the menu. Press <Esc> to exit the help screen. Help for each item is in the Item Help block on the right side of the submenu.

(Sample BIOS Version: T2)

- When the system is not stable as usual, select the **Restore Defaults** item to set your system to its defaults.
- The BIOS Setup menus described in this chapter are for reference only and may differ by BIOS version.

2-2 M.I.T.



Whether the system will work stably with the overclock/overvoltage settings you made is dependent on your overall system configurations. Incorrectly doing overclock/overvoltage may result in damage to CPU, chipset, or memory and reduce the useful life of these components. This page is for advanced users only and we recommend you not to alter the default settings to prevent system instability or other unexpected results. (Inadequately altering the settings may result in system's failure to boot. If this occurs, clear the CMOS values and reset the board to default values.)

▶ Advanced Frequency Settings

☞ Host Clock Value

This value changes with the **CPU Base Clock** setting.

☞ Graphics Slice Ratio (Note)

Allows you to set the Graphics Slice Ratio.

☞ Graphics UnSlice Ratio (Note)

Allows you to set the Graphics UnSlice Ratio.

☞ CPU Clock Ratio

Allows you to alter the clock ratio for the installed CPU. The adjustable range is dependent on the CPU being installed.

☞ CPU Frequency

Displays the current operating CPU frequency.

☞ FCLK Frequency for Early Power On

Allows you to set the FCLK frequency. Options are: Normal(800Mhz), 1GHz, 400MHz. (Default: 1GHz)

▶ Advanced CPU Core Settings

☞ CPU Clock Ratio, CPU Frequency, FCLK Frequency for Early Power On

The settings above are synchronous to those under the same items on the **Advanced Frequency Settings** menu.

☞ AVX Offset (Note)

AVX offset is the negative offset of AVX ratio.

(Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

☞ **Uncore Ratio**
Allows you to set the CPU Uncore ratio. The adjustable range is dependent on the CPU being used.

☞ **Uncore Frequency**
Displays the current CPU Uncore frequency.

☞ **CPU Flex Ratio Override**
Enables or disables the CPU Flex Ratio. The maximum CPU clock ratio will be based on the **CPU Flex Ratio Settings** value if **CPU Clock Ratio** is set to **Auto**. (Default: Disabled)

☞ **CPU Flex Ratio Settings**
Allows you to set the CPU Flex Ratio. The adjustable range may vary by CPU.

☞ **Turbo Per Core Limit Control** (Note)
Allows you to control each CPU core limit separately. (Default: Auto)

☞ **No. of CPU Cores Enabled** (Note)
Allows you to select the number of CPU cores to enable in an Intel® multi-core CPU (the number of CPU cores may vary by CPU). **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **Hyper-Threading Technology** (Note)
Allows you to determine whether to enable multi-threading technology when using an Intel® CPU that supports this function. This feature only works for operating systems that support multi-processor mode. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **Intel(R) Speed Shift Technology (Intel® Speed Shift Technology)** (Note)
Enables or disables Intel® Speed Shift Technology. Enabling this feature allows the processor to ramp up its operating frequency more quickly and then improves the system responsiveness. (Default: Auto)

☞ **CPU Enhanced Halt (C1E)** (Note)
Enables or disables Intel® CPU Enhanced Halt (C1E) function, a CPU power-saving function in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **C3 State Support** (Note)
Allows you to determine whether to let the CPU enter C3 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C3 state is a more enhanced power-saving state than C1. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **C6/C7 State Support** (Note)
Allows you to determine whether to let the CPU enter C6/C7 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C6/C7 state is a more enhanced power-saving state than C3. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **C8 State Support** (Note)
Allows you to determine whether to let the CPU enter C8 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C8 state is a more enhanced power-saving state than C6/C7. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **C10 State Support** (Note)
Allows you to determine whether to let the CPU enter C10 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C10 state is a more enhanced power-saving state than C8. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

(Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

☞ **Package C State Limit** (Note)
Allows you to specify the C-state limit for the processor. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **CPU Thermal Monitor** (Note)
Enables or disables Intel® Thermal Monitor function, a CPU overheating protection function. When enabled, the CPU core frequency and voltage will be reduced when the CPU is overheated. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **Ring to Core offset (Down Bin)**
Allows you to determine whether to disable the CPU Ring ratio auto-down function. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **CPU EIST Function** (Note)
Enables or disables Enhanced Intel® Speed Step Technology (EIST). Depending on CPU loading, Intel® EIST technology can dynamically and effectively lower the CPU voltage and core frequency to decrease average power consumption and heat production. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **Race To Halt (RTH)** (Note 1)**/Energy Efficient Turbo** (Note 1)
Enables or disables the CPU power saving related settings. (Default: Auto)

☞ **Voltage Optimization**
Allows you to determine whether to enable voltage optimization to reduce power consumption. (Default: Auto)

☞ **Hardware Prefetcher**
Allows you to determine whether to enable hardware prefetcher to prefetch data and instructions from the memory into the cache. (Default: Auto)

☞ **Adjacent Cache Line Prefetch**
Allows you to determine whether to enable the adjacent cache line prefetch mechanism that lets the processor retrieve the requested cache line as well as the subsequent cache line. (Default: Auto)

☞ **System Memory Multiplier**
Allows you to set the system memory multiplier. **Auto** sets memory multiplier according to memory SPD data. (Default: Auto)

☞ **Memory Ref Clock**
Allows you to manually adjust the memory reference clock. (Default: Auto)

☞ **Memory Odd Ratio (100/133 or 200/266)**
Allows you to manually adjust the memory reference clock. (Default: Auto)

☞ **Memory Frequency (MHz)**
The first memory frequency value is the normal operating frequency of the memory being used; the second is the memory frequency that is automatically adjusted according to the **System Memory Multiplier** settings.

(Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

PC Health Status

Reset Case Open Status

- Disabled — Keeps or clears the record of previous chassis intrusion status. (Default)
- Enabled — Clears the record of previous chassis intrusion status and the **Case Open** field will show "No" at next boot.

Case Open

Displays the detection status of the chassis intrusion detection device attached to the motherboard CI header. If the system chassis cover is removed, this field will show "Yes", otherwise it will show "No". To clear the chassis intrusion status record, set **Reset Case Open Status** to **Enabled**, save the settings to the CMOS, and then restart your system.

CPU Vcore/CPU VCCSA/DRAM Channel A/B Voltage/+3.3V/+5V/+12V/CPU VAXG

Displays the current system voltages.

CPU/System/PCH/VRM MOS

Displays current CPU/system temperature.

CPU/System 1 Fan Speed

Displays current CPU/system fan speeds.

CPU/System/PCH/VRM MOS Temperature

Sets the warning threshold for CPU/System/PCH/VRM MOS temperature. When temperature exceeds the threshold, BIOS will emit warning sound. Options are: Disabled (default), 60°C/140°F, 70°C/158°F, 80°C/176°F, 90°C/194°F.

CPU/System 1 Fan Fail Warning

Allows the system to emit warning sound if the fan is not connected or fails. Check the fan condition or fan connection when this occurs. (Default: Disabled)

Fan Control Mode

- Auto — Lets the BIOS automatically detect the type of fan installed and sets the optimal control mode. (Default)
- Voltage — Voltage mode is recommended for a 3-pin fan.
- PWM — PWM mode is recommended for a 4-pin fan.

Fan Speed Control

Allows you to determine whether to enable the fan speed control function and adjust the fan speed.

- Normal — Allows the CPU fan to run at different speeds according to the temperature. (Default)
- Silent — Allows the fan to run at slow speeds.
- Manual — Allows you to control the fan speed under the **Fan Speed Percentage** item.
- Full Speed — Allows the fan to run at full speeds.

Fan Speed Percentage

Allows you to control the fan speed. This item is configurable only when **Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /°C ~ 2.50 PWM value /°C.

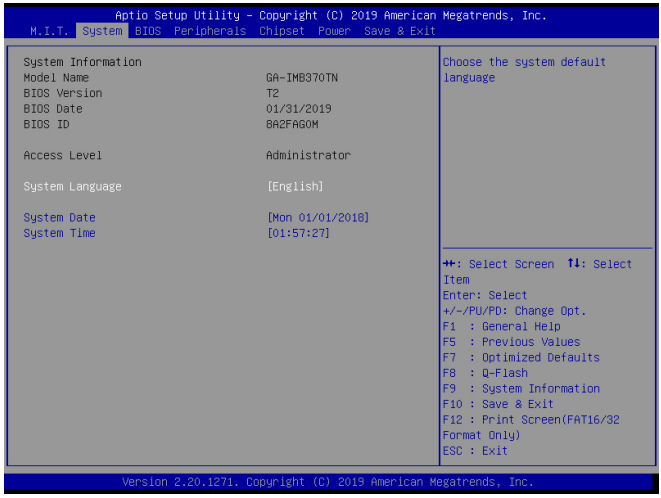
Fan Control Use Temperature Input

Allows you to select the reference temperature for fan speed control.

Temperature Interval

Allows you to select the temperature interval for fan speed change.

2-3 System



This section provides information on your motherboard model and BIOS version. You can also select the default language used by the BIOS and manually set the system time.

☞ **Access Level**

Displays the current access level depending on the type of password protection used. (If no password is set, the default will display as **Administrator**.) The Administrator level allows you to make changes to all BIOS settings; the User level only allows you to make changes to certain BIOS settings but not all.

☞ **System Language**

Selects the default language used by the BIOS.

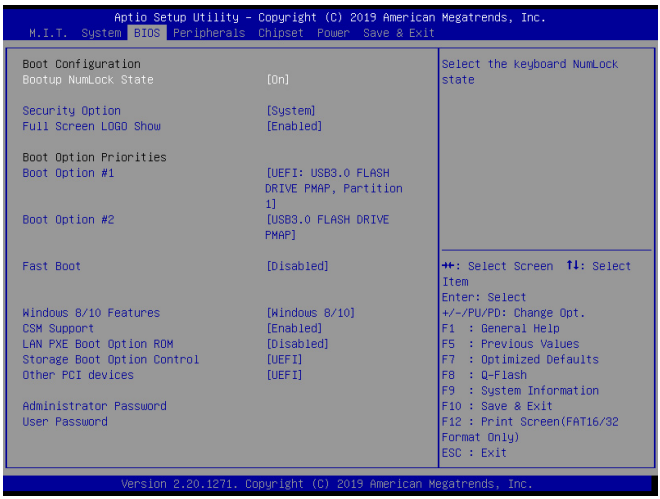
☞ **System Date**

Sets the system date. The date format is week (read-only), month, date, and year. Use <Enter> to switch between the Month, Date, and Year fields and use the <Page Up> or <Page Down> key to set the desired value.

☞ **System Time**

Sets the system time. The time format is hour, minute, and second. For example, 1 p.m. is 13:00:00. Use <Enter> to switch between the Hour, Minute, and Second fields and use the <Page Up> or <Page Down> key to set the desired value.

2-4 BIOS



Bootup NumLock State
Enables or disables Numlock feature on the numeric keypad of the keyboard after the POST. (Default: On)

Security Option
Specifies whether a password is required every time the system boots, or only when you enter BIOS Setup. After configuring this item, set the password(s) under the **Administrator Password/User Password** item.

- Setup — A password is only required for entering the BIOS Setup program.
- System — A password is required for booting the system and for entering the BIOS Setup program. (Default)

Full Screen LOGO Show
Allows you to determine whether to display the GIGABYTE Logo at system startup. **Disabled** skips the GIGABYTE Logo when the system starts up. (Default: Enabled)

Boot Option Priorities
Specifies the overall boot order from the available devices. Removable storage devices that support GPT format will be prefixed with "UEFI:" string on the boot device list. To boot from an operating system that supports GPT partitioning, select the device prefixed with "UEFI:" string.

Or if you want to install an operating system that supports GPT partitioning such as Windows 10 64-bit, select the optical drive that contains the Windows 10 64-bit installation disk and is prefixed with "UEFI:" string.

Hard Drive/CD/DVD ROM Drive/Floppy Drive/Network Device BBS Priorities
Specifies the boot order for a specific device type, such as hard drives, optical drives, floppy disk drives, and devices that support Boot from LAN function, etc. Press <Enter> on this item to enter the submenu that presents the devices of the same type that are connected. This item is present only if at least one device for this type is installed.

Fast Boot
Enables or disables Fast Boot to shorten the OS boot process. **Ultra Fast** provides the fastest bootup speed. (Default: Disabled)

SATA Support

- Last Boot HDD Only — Except for the previous boot drive, all SATA devices are disabled before the OS boot process completes. (Default)
- All Sata Devices — All SATA devices are functional in the operating system and during the POST.

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

VGA Support

Allows you to select which type of operating system to boot.

- Auto — Enables legacy option ROM only.
- EFI Driver — Enables EFI option ROM. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

USB Support

- Disabled — All USB devices are disabled before the OS boot process completes.
- Full Initial — All USB devices are functional in the operating system and during the POST. (Default)
- Partial Initial — Part of the USB devices are disabled before the OS boot process completes.

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is disabled when **Fast Boot** is set to **Ultra Fast**.

NetWork Stack Driver Support

- Disabled — Disables booting from the network. (Default)
- Enabled — Enables booting from the network.

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

Next Boot After AC Power Loss

- Normal Boot — Enables normal bootup upon the return of the AC power. (Default)
- Fast Boot — Keeps the Fast Boot settings upon the return of the AC power.

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

Windows 8/10 Features

Allows you to select the operating system to be installed. (Default: Windows 8/10)

CSM Support

Enables or disables UEFI CSM (Compatibility Support Module) to support a legacy PC boot process.

- Disabled — Disables UEFI CSM and supports UEFI BIOS boot process only.
- Enabled — Enables UEFI CSM. (Default)

LAN PXE Boot Option ROM

Allows you to select whether to enable the legacy option ROM for the LAN controller. (Default: Disabled)
This item is configurable only when **CSM Support** is set to **Enabled**.

Storage Boot Option Control

Allows you to select whether to enable the UEFI or legacy option ROM for the storage device controller.

- Do not launch — Disables option ROM.
- Legacy — Enables legacy option ROM only.
- UEFI — Enables UEFI option ROM only. (Default)

This item is configurable only when **CSM Support** is set to **Enabled**.

Other PCI Device

Allows you to select whether to enable the UEFI or Legacy option ROM for the PCI device controller other than the LAN, storage device, and graphics controllers.

- Do not launch — Disables option ROM.
- Legacy — Enables legacy option ROM only.
- UEFI — Enables UEFI option ROM only. (Default)

This item is configurable only when **CSM Support** is set to **Enabled**.

☞ **Administrator Password**

Allows you to configure an administrator password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. Differing from the user password, the administrator password allows you to make changes to all BIOS settings.

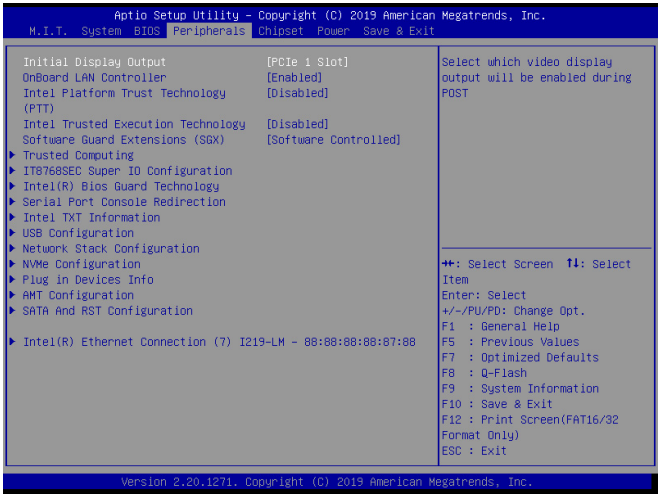
☞ **User Password**

Allows you to configure a user password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. However, the user password only allows you to make changes to certain BIOS settings but not all.

To cancel the password, press <Enter> on the password item and when requested for the password, enter the correct one first. When prompted for a new password, press <Enter> without entering any password. Press <Enter> again when prompted to confirm.

Note: Before setting the User Password, be sure to set the Administrator Password first.

2-5 Peripherals



Initial Display Output

Specifies the first initiation of the monitor display from the installed PCI Express graphics card or the onboard graphics.

- IGFX Sets the onboard graphics as the first display.
- PCIe 1 Slot Sets the graphics card on the PCIEX4 slot as the first display. (Default)

OnBoard LAN Controller

Enables or disables the onboard LAN function. (Default: Enabled)

If you wish to install a 3rd party add-in network card instead of using the onboard LAN, set this item to **Disabled**.

Intel Platform Trust Technology (PTT)

Enables or disables Intel® PTT Technology. (Default: Disabled)

Intel Trusted Execution Technology (Note)

Enables or disables **Intel® Trusted Execution Technology** (Intel® TXT). Intel® Trusted Execution Technology provides a hardware-based security foundation. (Default: Disabled)

Software Guard Extensions (SGX)

Enables or disables the Intel® Software Guard Extensions technology. This feature allows legal software to operate in a safe environment and protects the software against attacks from malicious software. The **Software Controlled** option allows you to enable or disable this feature with an Intel-provided application. (Default: Software Controlled)

Trusted Computing

Enables or disables Trusted Platform Module (TPM).

Super IO Configuration

Serial Port 1/2/3/4

Enables or disables the onboard serial port.

▶ **Intel(R) Bios Guard Technology**
Enables or disables the Intel® BIOS Guard feature, which protects the BIOS from malicious attacks.

▶ **Serial Port Console Redirection**
This section allows you to enable/disable serial port console redirection for remote server management through a serial port.

▶ **USB Configuration**

☞ **Legacy USB Support**
Allows USB keyboard/mouse to be used in MS-DOS. (Default: Enabled)

☞ **XHCI Hand-off**
Determines whether to enable XHCI Hand-off feature for an operating system without XHCI Hand-off support. (Default: Disabled)

☞ **USB Mass Storage Driver Support**
Enables or disables support for USB storage devices. (Default: Enabled)

☞ **Port 60/64 Emulation**
Enables or disables emulation of I/O ports 64h and 60h. This should be enabled for full legacy support for USB keyboards/mice in MS-DOS or in operating system that does not natively support USB devices. (Default: Disabled)

☞ **Mass Storage Devices**
Displays a list of connected USB mass storage devices. This item appears only when a USB storage device is installed.

▶ **Network Stack Configuration**

☞ **Network Stack**
Disables or enables booting from the network to install a GPT format OS, such as installing the OS from the Windows Deployment Services server. (Default: Disabled)

☞ **Ipv4 PXE Support**
Enables or disables IPv4 PXE Support. This item is configurable only when **Network Stack** is enabled.

☞ **Ipv4 HTTP Support**
Enables or disables HTTP boot support for IPv4. This item is configurable only when **Network Stack** is enabled.

☞ **Ipv6 PXE Support**
Enables or disables IPv6 PXE Support. This item is configurable only when **Network Stack** is enabled.

☞ **Ipv6 HTTP Support**
Enables or disables HTTP boot support for IPv6. This item is configurable only when **Network Stack** is enabled.

☞ **IPSEC Certificate**
Enables or disables HTTP boot support for IPv6. This item is configurable only when Network Stack is enabled.

☞ **PXE boot wait time**
Allows you to configure how long to wait before you can press <Esc> to abort the PXE boot. This item is configurable only when **Network Stack** is enabled. (Default: 0)

☞ **Media detect count**
Allows you to set the number of times to check the presence of media. This item is configurable only when **Network Stack** is enabled. (Default: 1)

▶ **NVMe Configuration**
Displays information on your M.2 NVME PCIe SSD if installed.

Plug in Devices Info
Displays information on device(s) installed in the PCIe/M.2 slots/connectors.

AMT Configuration
This section allows you to enable/disable **Intel® Active Management Technology** (Intel® AMT) for remote computer management on hardware level and provides you with further configuration options.

SATA And RST Configuration

SATA Controller(s)
Enables or disables the integrated SATA controllers. (Default: Enabled)

SATA Mode Selection
Enables or disables RAID for the SATA controllers integrated in the Chipset or configures the SATA controllers to AHCI mode.

- Intel RST Premium With Intel Optane System Acceleration — Enables RAID for the SATA controller. (Default)
- AHCI — Configures the SATA controllers to AHCI mode. Advanced Host Controller Interface (AHCI) is an interface specification that allows the storage driver to enable advanced Serial ATA features such as Native Command Queuing and hot plug.

Aggressive LPM Support
Enables or disables the power saving feature, ALPM (Aggressive Link Power Management), for the Chipset SATA controllers. (Default: Enabled)

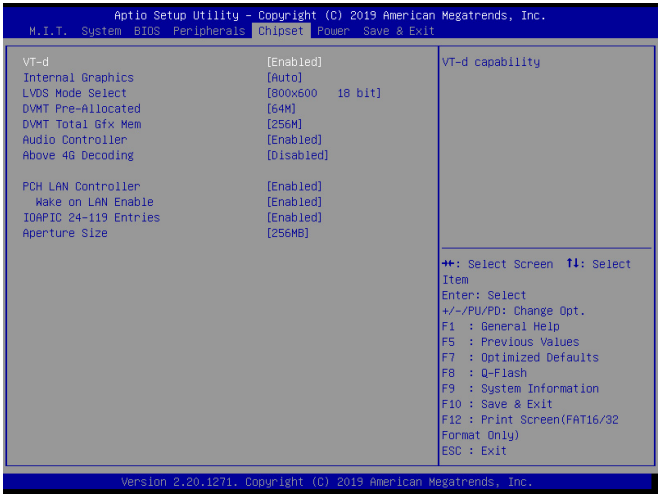
Port 0/1
Enables or disables each SATA port. (Default: Enabled)

Hot plug
Enables or disable the hot plug capability for each SATA port. (Default: Disabled)

Configured as eSATA
Enables or disables support for external SATA devices.

Intel(R) Ethernet Connection
This sub-menu provides information on LAN configuration and related configuration options.

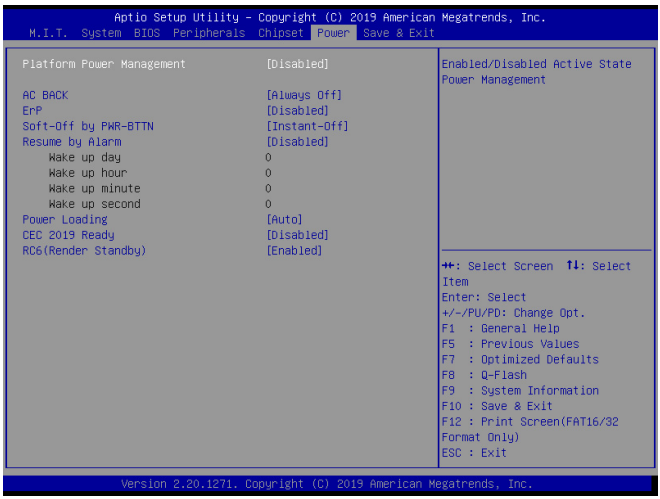
2-6 Chipset



- **VT-d** (Note)
  Enables or disables Intel® Virtualization Technology for Directed I/O. (Default: Enabled)
- **Internal Graphics**
  Enables or disables the onboard graphics function. (Default: Auto)
- **LVDS Mode Select**
  Allows to you set LVDS resolution and bit rate. (Default: 800x600 18 bit)
- **DVMT Pre-Allocated**
  Allows you to set the onboard graphics memory size. Options are: 32M~1024M. (Default: 64M)
- **DVMT Total Gfx Mem**
  Allows you to allocate the DVMT memory size of the onboard graphics. Options are: 128M, 256M, MAX. (Default: 256M)
- **Audio Controller**
  Enables or disables the onboard audio function. (Default: Enabled)
  If you wish to install a 3rd party add-in audio card instead of using the onboard audio, set this item to Disabled.
- **PCH LAN Controller**
  Enables or disables the onboard LAN function. (Default: Enabled)
  If you wish to install a 3rd party add-in network card instead of using the onboard LAN, set this item to **Disabled**.
- **Wake on LAN**
  Enables or disables the wake on LAN function. (Default: Enabled)
- **IOAPIC 24-119 Entries**
  Enables or disables this function. (Default: Enabled)
- **Aperture Size**
  Allows you to set Apeture Size. (Default: 256MB)

(Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

2-7 Power



Platform Power Management

Enables or disables the Active State Power Management function (ASPM). (Default: Disabled)

PEG ASPM

Allows you to configure the ASPM mode for the device connected to the CPU PEG bus. This item is configurable only when **Platform Power Management** is set to **Enabled**. (Default: Disabled)

PCH ASPM

Allows you to configure the ASPM mode for the device connected to Chipset's PCI Express bus. This item is configurable only when **Platform Power Management** is set to **Enabled**. (Default: Disabled)

DMI ASPM

Allows you to configure the ASPM mode for both CPU side and Chipset side of the DMI link. This item is configurable only when **Platform Power Management** is set to **Enabled**. (Default: Disabled)

AC BACK

Determines the state of the system after the return of power from an AC power loss.

- Memory — The system returns to its last known awake state upon the return of the AC power.
- Always On — The system is turned on upon the return of the AC power.
- Always Off — The system stays off upon the return of the AC power. (Default)

ErP

Determines whether to let the system consume least power in S5 (shutdown) state. (Default: Disabled)
Note: When this item is set to **Enabled**, the following functions will become unavailable: Resume by Alarm, power on by mouse, and power on by keyboard.

Soft-Off by PWR-BTTN

Configures the way to turn off the computer in MS-DOS mode using the power button.

- Instant-Off — Press the power button and then the system will be turned off instantly. (Default)
- Delay 4 Sec. — Press and hold the power button for 4 seconds to turn off the system. If the power button is pressed for less than 4 seconds, the system will enter suspend mode.

Resume by Alarm

Determines whether to power on the system at a desired time. (Default: Disabled)

If enabled, set the date and time as following:

- Wake up day: Turn on the system at a specific time on each day or on a specific day in a month.
- Wake up hour/minute/second: Set the time at which the system will be powered on automatically.

Note: When using this function, avoid inadequate shutdown from the operating system or removal of the AC power, or the settings may not be effective.

Power Loading

Enables or disables dummy load. When the power supply is at low load, a self-protection will activate causing it to shutdown or fail. If this occurs, please set to **Enabled**. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

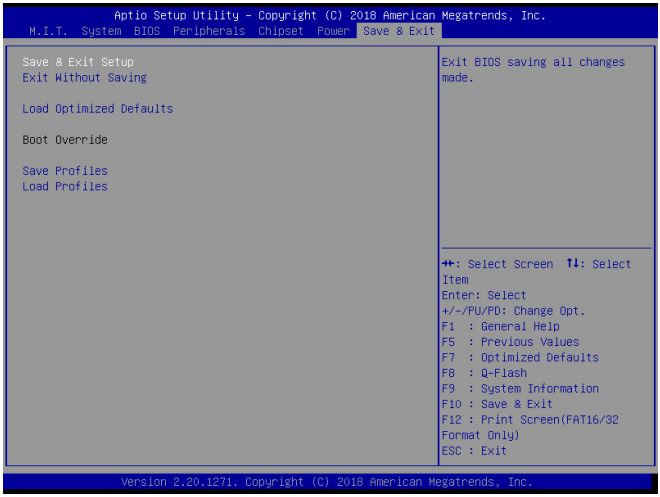
CEC 2019 Ready

Allows you to select whether to allow the system to adjust power consumption when it is in shutdown, idle, or standby state in order to comply with the CEC (California Energy Commission) 2019 Standards. (Default: Disabled)

RC6(Render Standby)

Allows you to determine whether to let the onboard graphics enter standby mode to decrease power consumption. (Default: Enabled)

2-8 Save & Exit



☞ **Save & Exit Setup**

Press <Enter> on this item and select **Yes**. This saves the changes to the CMOS and exits the BIOS Setup program. Select **No** or press <Esc> to return to the BIOS Setup Main Menu.

☞ **Exit Without Saving**

Press <Enter> on this item and select **Yes**. This exits the BIOS Setup without saving the changes made in BIOS Setup to the CMOS. Select **No** or press <Esc> to return to the BIOS Setup Main Menu.

☞ **Load Optimized Defaults**

Press <Enter> on this item and select **Yes** to load the optimal BIOS default settings. The BIOS defaults settings help the system to operate in optimum state. Always load the Optimized defaults after updating the BIOS or after clearing the CMOS values.

☞ **Boot Override**

Allows you to select a device to boot immediately. Press <Enter> on the device you select and select **Yes** to confirm. Your system will restart automatically and boot from that device.

☞ **Save Profiles**

This function allows you to save the current BIOS settings to a profile. You can create up to 8 profiles and save as Setup Profile 1~ Setup Profile 8. Press <Enter> to complete. Or you can select **Select File in HDD/FDD/USB** to save the profile to your storage device.

☞ **Load Profiles**

If your system becomes unstable and you have loaded the BIOS default settings, you can use this function to load the BIOS settings from a profile created before, without the hassles of reconfiguring the BIOS settings. First select the profile you wish to load and then press <Enter> to complete. You can select **Select File in HDD/FDD/USB** to input the profile previously created from your storage device or load the profile automatically created by the BIOS, such as reverting the BIOS settings to the last settings that worked properly (last known good record).

Chapter 3 Appendix

3-1 Configuring a RAID Set

RAID Levels

	RAID 0	RAID 1
Minimum Number of Hard Drives	≥2	2
Array Capacity	Number of hard drives * Size of the smallest drive	Size of the smallest drive
Fault Tolerance	No	Yes

Before you begin, please prepare the following items:

- At least two SATA hard drives or SSDs. (Note) (To ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity).
- Windows setup disk.
- Motherboard driver disk.
- A USB thumb drive.

Configuring the Onboard SATA Controller

A. Installing SATA hard drive(s) in your computer

Install the hard drives/SSDs in the Intel® Chipset controlled connectors on the motherboard. Then connect the power connectors from your power supply to the hard drives.

B. Configuring SATA controller mode in BIOS Setup

Make sure to configure the SATA controller mode correctly in system BIOS Setup.

Steps:

1. Go to **Peripherals\SATA And RST Configuration**, make sure **SATA Controller(s**) is enabled. To create RAID, set **SATA Mode Selection** to **Intel RST Premium With Intel Optane System Acceleration**. Then save the settings and restart your computer.
2. To configure UEFI RAID, follow the steps in "C-1." To enter the legacy RAID ROM, refer to "C-2" for more information. Finally, save the settings and exit BIOS Setup.

C-1. UEFI RAID Configuration

Steps:

1. In BIOS Setup, go to **BIOS** and set **Windows 8/10 Features** to **Windows 8/10** and **CSM Support** to **Disabled**. Save the changes and exit BIOS Setup.
2. After the system reboot, enter BIOS Setup again. Then enter the **Peripherals\Intel(R) Rapid Storage Technology** sub-menu.
3. On the **Intel(R) Rapid Storage Technology** menu, press <Enter> on **Create RAID Volume** to enter the **Create RAID Volume** screen. Enter a volume name with 1~16 letters (letters cannot be special characters) under the **Name** item and press <Enter>. Then, select a RAID level. RAID levels supported include RAID 0 and RAID 1 (the selections available depend on the number of the hard drives being installed). Next, use the down arrow key to move to **Select Disks**.
4. Under **Select Disks** item, select the hard drives to be included in the RAID array. Press the <Space> key on the hard drives to be selected (selected hard drives are marked with "X"). Then set the stripe block size. The stripe block size can be set from 4 KB to 128 KB. Once you have selected the stripe block size, set the volume capacity.

The BIOS Setup menus described in this section may differ from the exact settings for your motherboard. The actual BIOS Setup menu options you will see shall depend on the motherboard you have and the BIOS version.

(Note) An M.2 PCIe SSD cannot be used to set up a RAID set either with an M.2 SATA SSD or a SATA hard drive.

5. After setting the capacity, move to **Create Volume**
6. After completing, you'll be brought back to the **Intel(R) Rapid Storage Technology** screen. Under **RAID Volumes** you can see the new RAID volume. To see more detailed information, press <Enter> on the volume to check for information on RAID level, stripe block size, array name, and array capacity, etc.

C-2. Configuring Legacy RAID ROM

Enter the Intel® legacy RAID BIOS setup utility to configure a RAID array. Skip this step and proceed with the installation of Windows operating system for a non-RAID configuration.

Steps:

1. In BIOS Setup, go to **BIOS** and set **CSM Support** to **Enabled** and **Storage Boot Option Control** to **Legacy**. Next, go to **Peripherals\SATA And RST Configuration** and make sure **Use RST Legacy OROM** is set to **Enabled**. Save the changes and exit BIOS Setup. After the POST memory test begins and before the operating system boot begins, look for a message which says "Press <Ctrl-I> to enter Configuration Utility". Press <Ctrl> + <I> to enter the RAID Configuration Utility.
2. After you press <Ctrl> + <I>, the **MAIN MENU** screen will appear. If you want to create a RAID array, select **Create RAID Volume** in **MAIN MENU** and press <Enter>.
3. After entering the **CREATE VOLUME MENU** screen, enter a volume name with 1~16 letters (letters cannot be special characters) under the **Name** item and press <Enter>. Then, select a RAID level. RAID levels supported include RAID 0, RAID 1, Recovery, RAID 10, and RAID 5 (the selections available depend on the number of the hard drives being installed). Press <Enter> to proceed.
4. Under **Disks** item, select the hard drives to be included in the RAID array. If only two hard drives are installed, they will be automatically assigned to the array. Set the stripe block size if necessary. The stripe block size can be set from 4 KB to 128 KB. Once you have selected the stripe block size, press <Enter>.
5. Enter the array capacity and press <Enter>. Finally press <Enter> on the **Create Volume** item to begin creating the RAID array. When prompted to confirm whether to create this volume, press <Y> to confirm or <N> to cancel.
6. When completed, you can see detailed information about the RAID array in the **DISK/VOLUME INFORMATION** section, including the RAID level, stripe block size, array name, and array capacity, etc. To exit the RAID BIOS utility, press <Esc> or select **6. Exit** in **MAIN MENU**.

Installing the SATA RAID/AHCI Driver and Operating System

With the correct BIOS settings, you are ready to install the operating system.

Installing the Operating System

As some operating systems already include SATA RAID/AHCI driver, you do not need to install separate RAID/AHCI driver during the Windows installation process. After the operating system is installed, we recommend that you install all required drivers from the motherboard driver disk using "Xpress Install" to ensure system performance and compatibility. If the operating system to be installed requires that you provide additional SATA RAID/AHCI driver during the OS installation process, please refer to the steps below:

1. Copy the **IRST** folder under **\Boot** in the driver disk to your USB thumb drive.
2. Boot from the Windows setup disk and perform standard OS installation steps. When the screen requesting you to load the driver appears, select **Browse**.
3. Insert the USB thumb drive and then browse to the location of the driver. The location of the driver is as follows:
   \iRST\f6flpy-x64
4. When a screen as shown, select **Intel Chipset SATA RAID Controller** and click **Next** to load the driver and continue the OS installation.

Please visit GIGABYTE's website for details on configuring a RAID array.

3-2 Installing an Intel® Optane™ Memory

System Requirements

1. Intel® Optane™ memory
2. The Optane™ memory must have at least 16 GB capacity, and it must have equal or smaller capacity than the hard drive/SSD to be accelerated.
3. The Optane™ memory cannot be used to accelerate an existing RAID array; the accelerated hard drive/SSD cannot be included in a RAID array.
4. The hard drive/SSD to be accelerated must be a SATA hard drive or M.2 SATA SSD and must have Windows 10 64-bit (or later version) installed on it. (Must be formatted for GPT partition.)
5. The motherboard driver disk

Installation Guidelines

A-1: Installation in AHCI mode

If the SATA controller has been configured in AHCI mode, please follow the steps below:

1. After entering the operating system, insert the motherboard driver disk into your optical drive. On the **Xpress Install** screen, select **Intel(R) Optane(TM) Memory System Acceleration** (Note) to install. Follow the on-screen instructions to continue. The system will auto-restart.
2. After re-entering the operating system, the dialog box as shown above will appear. Click **Yes** to continue the installation and then restart the system.
3. Launch the Intel(R) Optane Memory application from the Start menu. A message which says Intel® Optane™ Memory is disabled will appear on the main screen. Click **Enable** to activate the Intel® Optane™ Memory and restart the system again.
4. Launch the Intel(R) Optane Memory application from the Start menu and make sure the Intel® Optane™ Memory has been enabled. (The SATA controller mode is changed to Intel RST Premium With Intel Optane System Acceleration from AHCI mode. DO NOT change your SATA controller mode back to AHCI. Doing so will prevent Intel® Optane™ memory from functioning properly.)

A-2: Installation in Intel RST Premium With Intel Optane System Acceleration mode

If the SATA controller has been configured in Intel RST Premium With Intel Optane System Acceleration mode, please follow the steps below:

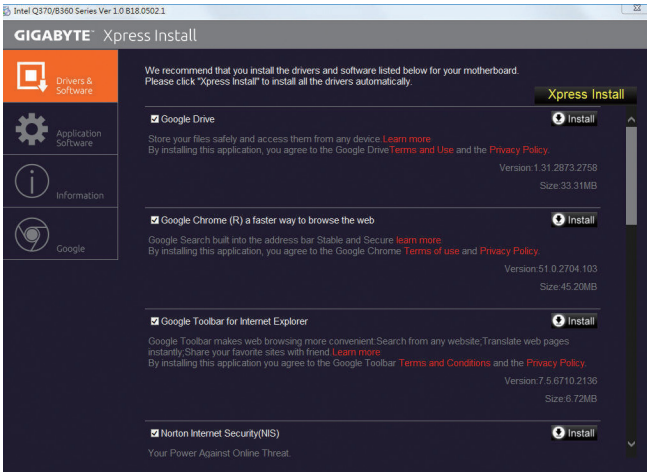
1. After system restarts, go to the BIOS Setup, make sure **CSM Support** under the **BIOS** menu is disabled.
2. Go to **Peripherals\SATA And RST Configuration** and make sure **Use RST Legacy OROM** is disabled. To enable the Optane™ memory, set **PCIe Storage Dev on Port 9** to **RST Controlled**.
3. Enter the operating system, launch the Intel® Rapid Storage Technology utility from the Start menu, and then enable Intel® Optane™ Memory on the **Intel® Optane™ Memory** screen.
4. Follow the on-screen instruction to continue the installation and then restart the system when completed.

- An Optane™ memory cannot be used to accelerate an M.2 PCIe SSD.
- Do not abruptly remove the Optane™ memory. Doing so will cause the operating system to stop functioning correctly.
- If you want to change/remove the Optane™ memory, you must disable it using the Intel® Rapid Storage Technology or Intel(R) Optane™ Memory application first.
- After enabling the Optane™ memory, the related BIOS settings will remain even after a BIOS update.

3-3 Drivers Installation

- Before installing the drivers, first install the operating system.
- After installing the operating system, insert the motherboard driver disk into your optical drive. Click on the message "Tap to choose what happens with this disc" on the top-right corner of the screen and select "Run **Run**.exe." (Or go to My Computer, double-click the optical drive and execute the Run.exe program.)

"Xpress Install" will automatically scan your system and then list all of the drivers that are recommended to install. You can click the **Xpress Install** button and "Xpress Install" will install all of the selected drivers. Or click the arrow Install icon to individually install the drivers you need.



Please visit GIGABYTE's website for more software information.

Please visit GIGABYTE's website for more troubleshooting information.

Regulatory Statements

Regulatory Notices

This document must not be copied without our written permission, and the contents there of must not be imparted to a third party nor be used for any unauthorized purpose.
Contravention will be prosecuted. We believe that the information contained herein was accurate in all respects at the time of printing. GIGABYTE cannot, however, assume any responsibility for errors or omissions in this text. Also note that the information in this document is subject to change without notice and should not be construed as a commitment by GIGABYTE.

Our Commitment to Preserving the Environment

In addition to high-efficiency performance, all GIGABYTE motherboards fulfill European Union regulations for RoHS (Restriction of Certain Hazardous Substances in Electrical and Electronic Equipment) and WEEE (Waste Electrical and Electronic Equipment) environmental directives, as well as most major worldwide safety requirements. To prevent releases of harmful substances into the environment and to maximize the use of our natural resources, GIGABYTE provides the following information on how you can responsibly recycle or reuse most of the materials in your "end of life" product.

Restriction of Hazardous Substances (RoHS) Directive Statement

GIGABYTE products have not intended to add and safe from hazardous substances (Cd, Pb, Hg, Cr+6, PBDE and PBB). The parts and components have been carefully selected to meet RoHS requirement. Moreover, we at GIGABYTE are continuing our efforts to develop products that do not use internationally banned toxic chemicals.

Waste Electrical & Electronic Equipment (WEEE) Directive Statement

GIGABYTE will fulfill the national laws as interpreted from the 2012/19/EU WEEE (Waste Electrical and Electronic Equipment) directive. The WEEE Directive specifies the treatment, collection, recycling and disposal of electric and electronic devices and their components. Under the Directive, used equipment must be marked, collected separately, and disposed of properly.

WEEE Symbol Statement

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, the device should be taken to the waste collection centers for activation of the treatment, collection, recycling and disposal procedure. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local government office, your household waste disposal service or where you purchased the product for details of environmentally safe recycling.

- When your electrical or electronic equipment is no longer useful to you, "take it back" to your local or regional waste collection administration for recycling.
- If you need further assistance in recycling, reusing in your "end of life" product, you may contact us at the Customer Care number listed in your product's user's manual and we will be glad to help you with your effort.

Finally, we suggest that you practice other environmentally friendly actions by understanding and using the energy-saving features of this product (where applicable), recycling the inner and outer packaging (including shipping containers) this product was delivered in, and by disposing of or recycling used batteries properly. With your help, we can reduce the amount of natural resources needed to produce electrical and electronic equipment, minimize the use of landfills for the disposal of "end of life" products, and generally improve our quality of life by ensuring that potentially hazardous substances are not released into the environment and are disposed of properly.

Battery Information

European Union—Disposal and recycling information
GIGABYTE Recycling Program (available in some regions)

This symbol indicates that this product and/or battery should not be disposed of with household waste. You must use the public collection system to return, recycle, or treat them in compliance with the local regulations.

FCC Notice (U.S.A. Only)

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult a dealer or experienced TV/radio technician for help.

Canada, Industry Canada (IC) Notices / Canada, avis d'Industry Canada (IC)

- This Class B digital apparatus complies with Canadian ICES-003 and RSS-210.
- Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
- Cet appareil numérique de classe B est conforme aux normes canadiennes ICES-003 et RSS-210.
- Son fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférence et (2) cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

Contact Us

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WEB address (Chinese): https://www.gigabyte.com/tw

- **GIGABYTE eSupport**

  To submit a technical or non-technical (Sales/Marketing) question, please link to:
  https://esupport.gigabyte.com