C246-WU4

User's Manual

Rev. 1003

12ME-C246WU4-1003R

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.

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Disclaimer

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:

Table of Contents

C246-WU4 Motherboard Layout

Box Contents

- ☑ C246-WU4 motherboard
- ☑ Motherboard driver disk
- ☑ User's Manual
- ☑ Two thermistors cables
- ☑ Six SATA cables
- ☑ I/O Shield
- ☑ One G Connector

*   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)   For debug code information, please refer to Chapter 3.

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	◆ LGA1151 package:
	  - Intel® Xeon® E series processors
	  - 9th and 8th Generation Intel® Core™ processors/Intel® Pentium® processors/Intel® Celeron® processors
	  (Go to GIGABYTE's website for the latest CPU support list.)
	◆ L3 cache varies with CPU

Chipset	◆ Intel® C246 Express Chipset
Memory	◆ 4 x DDR4 DIMM sockets supporting up to 128 GB of system memory ◆ Dual channel memory architecture ◆ Support for DDR4 2666/2400/2133 MHz memory modules ◆ Support for ECC Un-buffered DIMM 1Rx8/2Rx8 memory modules ◆ Support for non-ECC Un-buffered DIMM 1Rx8/2Rx8/1Rx16 memory modules ◆ Support for Extreme Memory Profile (XMP) memory modules (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)

Onboard Graphics	◆ Integrated Graphics Processor-Intel® UHD Graphics support:
	  - 2 x DisplayPorts, supporting a maximum resolution of 4096x2304@60 Hz
	    * Support for DisplayPort 1.2 version, HDCP 2.2, and HDR.
	◆ Maximum shared memory of 1 GB

Audio	◆ Realtek® ALC1220-VB codec * The back panel line out jack supports DSD audio. ◆ High Definition Audio ◆ 2/4/5.1/7.1-channel ◆ Support for S/PDIF Out
LAN	◆ 2 x Intel® GbE LAN chips (10/100/1000 Mbit)

Expansion Slots	◆ 1 x PCI Express x16 slot, running at x16 (PCIEX16)
	    * For optimum performance, if only one PCI Express graphics card is to be installed, be sure to install it in the PCIEX16 slot.
	◆ 1 x PCI Express x16 slot, running at x8 (PCIEX8)
	    * The PCIEX8 slot shares bandwidth with the PCIEX16 slot. When the PCIEX8 slot is populated, the PCIEX16 slot operates at up to x8 mode.
	◆ 2 x PCI Express x16 slots, running at x4 (PCIEX4_1/PCIEX4_2)
	    * The PCIEX4_2 slot shares bandwidth with the M2M connector. The PCIEX4_2 slot becomes unavailable when a PCIe SSD is installed in the M2M connector.
	  (All of the PCI Express slots conform to PCI Express 3.0 standard.)
	◆ 1 x PCI slot

Multi-Graphics Technology	◆ Support for AMD Quad-GPU CrossFire™ and 4-Way/3-Way/2-Way AMD CrossFire™ technologies

Storage Interface	◆ Chipset:
	    - 1 x M.2 connector (Socket 3, M key, type 2242/2260/2280 SATA and PCIe x2 SSD support) (M2A)
	    - 1 x M.2 connector (Socket 3, M key, type 2242/2260/2280/22110 PCIe x4/ x2 SSD support) (M2M)
	    - 8 x SATA 6Gb/s connectors (SATA3 0~7)
	    - Support for RAID 0, RAID 1, RAID 5, and RAID 10
	        * Refer to "1-8 Internal Connectors," for the installation notices for the PCIEX4_2, M.2 and SATA connectors.
	◆ ASMedia® ASM1061 chip:
	    - 2 x SATA 6Gb/s connectors (GSATA3 0~1), supporting AHCI mode only
	◆ Intel® Optane™ Memory Ready

USB	◆ Chipset:
	    - 1 x USB Type-C™ port on the back panel, with USB 3.1 Gen 2 support
	    - 1 x USB 3.1 Gen 2 Type-A port (red) on the back panel
	    - 7 x USB 3.1 Gen 1 ports (4 ports on the back panel, 1 port onboard, 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)

Internal Connectors	◆ 1 x 24-pin ATX main power connector ◆ 1 x 8-pin ATX 12V power connector ◆ 1 x 4-pin ATX 12V power connector ◆ 1 x power information detection header ◆ 2 x M.2 Socket 3 connectors ◆ 10 x SATA 6Gb/s connectors ◆ 2 x SATA power headers ◆ 2 x SATA detection headers ◆ 1 x CPU fan header ◆ 1 x water cooling CPU fan header ◆ 2 x system fan headers ◆ 2 x system fan/water cooling pump headers ◆ 1 x front panel header ◆ 1 x front panel audio header ◆ 1 x USB 3.1 Gen 1 port (USB30_OB) ◆ 1 x USB 3.1 Gen 1 header ◆ 1 x USB 2.0/1.1 header ◆ 1 x S/PDIF Out header ◆ 1 x Thunderbolt™ add-in card connector ◆ 1 x Trusted Platform Module (TPM) header (2x6 pin, for the GC-TPM2.0_S module only) ◆ 1 x parallel port header ◆ 2 x serial port headers ◆ 2 x temperature sensor headers ◆ 1 x power button ◆ 1 x reset button ◆ 1 x Clear CMOS button ◆ 1 x Clear CMOS jumper

Back Panel Connectors	◆ 1 x PS/2 keyboard/mouse port ◆ 2 x DisplayPorts ◆ 1 x USB Type-C™ port, with USB 3.1 Gen 2 support ◆ 1 x USB 3.1 Gen 2 Type-A port (red) ◆ 4 x USB 3.1 Gen 1 ports ◆ 2 x USB 2.0/1.1 ports ◆ 2 x RJ-45 ports ◆ 5 x audio jacks
I/O Controller	◆ iTE® I/O Controller Chip
Hardware Monitor	◆ Voltage detection ◆ Temperature detection ◆ Fan speed detection ◆ Water cooling flow rate detection ◆ Overheating warning ◆ Fan fail warning ◆ Fan speed control * Whether the fan (pump) speed control function is supported will depend on the fan (pump) you install.
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
Operating Properties	◆ Operating temperature: -10°C to 50°C ◆ Operating humidity: 8 - 90% ◆ Non-operating temperature: -40°C to 70°C ◆ Non-operating humidity: 5% - 95%

Unique Features	◆ Support for APP Center
	    * Available applications in APP Center may vary by motherboard model. Supported functions of each application may also vary depending on motherboard specifications.
	    - @BIOS
	    - System Information Viewer
	◆ Support for Q-Flash

Bundled Software	◆ Norton® Internet Security (OEM version) ◆ cFosSpeed
Operating System	◆ Support for Windows 10 64-bit
Form Factor	◆ ATX Form Factor; 30.5cm x 24.4cm

* 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.

LGA1151 CPU Socket

LGA1151 CPU

Alignment Key   Alignment Key   Notch   Notch

INTEL CONFIDENTIAL
NA
QNLV 3.20GHZ
C722A762

Pin One Corner of the CPU Socket

Triangle Pin One Marking on the CPU
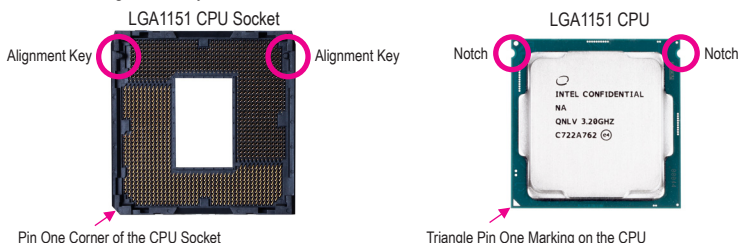
Do not remove the CPU socket cover before inserting the CPU. It may pop off from the load plate automatically during the process of re-engaging the lever after you insert the CPU.

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 four 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 four memory sockets are divided into two channels and each channel has two memory sockets as following:
▶ Channel A: DDR4_A1, DDR4_A2
▶ Channel B: DDR4_B1, DDR4_B2

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

▶▶ Dual Channel Memory Configurations Table

	DDR4_A1	DDR4_A2	DDR4_B1	DDR4_B2
2 Modules	- -	DS/SS	- -	DS/SS
	DS/SS	- -	DS/SS	- -
4 Modules	DS/SS	DS/SS	DS/SS	DS/SS

(SS=Single-Sided, DS=Double-Sided, "- -"=No Memory)

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 or four memory modules, it is recommended that memory of the same capacity, brand, speed, and chips be used.

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 Setting up AMD CrossFire™ Configuration

A. System Requirements
- Windows 10 64-bit operating system
- A CrossFire-supported motherboard with two or more PCI Express x16 slots and correct driver
- CrossFire-ready graphics cards of identical brand and chip and correct driver
  (For the latest GPUs that support the 3-way CrossFire technology, please refer to the AMD website.) (Note 1)
- CrossFire (Note 2) bridge connectors
- A power supply with sufficient power is recommended (Refer to the manual of your graphics cards for the power requirement)

B. Connecting the Graphics Cards
Step 1:
Install CrossFire graphics cards on the PCI Express x16 slots. (To set up a 2-Way configuration, we recommend installing the graphics cards on the PCIEX16 and PCIEX8 slots.)
Step 2:
Insert the CrossFire (Note 2) bridge connectors in the CrossFire gold edge connectors on top of the cards.
Step 3:
Plug the display cable into the graphics card on the PCIEX16 slot.

C. Configuring the Graphics Card Driver
To Enable CrossFire Function
After installing the graphics card driver in the operating system, go to the **AMD RADEON SETTINGS** screen. Browse to **Gaming\Global Settings** and ensure **AMD CrossFire** is set to **On**.

(Note 1)   When using dual core graphics cards, only 2-way is supported.
(Note 2)   The bridge connector(s) may be needed or not depending on your graphics cards.

Procedure and driver screen for enabling CrossFire technology may differ by graphics cards and driver version. Refer to the manual that came with your graphics cards for more information about enabling CrossFire technology.

1-7   Back Panel Connectors
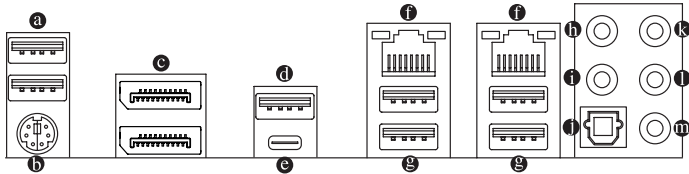
ⓐ USB 2.0/1.1 Port

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

ⓑ PS/2 Keyboard/Mouse Port

Use this port to connect a PS/2 mouse or keyboard.

ⓒ 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.

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

ⓓ USB 3.1 Gen 2 Type-A Port (Red)

The USB 3.1 Gen 2 Type-A port supports the USB 3.1 Gen 2 specification and is compatible to the USB 3.1 Gen 1 and USB 2.0 specification. Use this port for USB devices.

ⓔ USB Type-C™ Port

The reversible USB port supports the USB 3.1 Gen 2 specification and is compatible to the USB 3.1 Gen 1 and USB 2.0 specification. Use this port for USB devices.

ⓕ 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

ⓖ USB 3.1 Gen 1 Port

The USB 3.1 Gen 1 port supports the USB 3.1 Gen 1 specification and is compatible to the USB 2.0 specification. Use this port for USB devices.

ⓗ Center/Subwoofer Speaker Out (Orange)

Use this audio jack to connect center/subwoofer speakers.

ⓘ Rear Speaker Out (Black)

Use this audio jack to connect rear speakers.

ⓙ Optical S/PDIF Out Connector

This connector provides digital audio out to an external audio system that supports digital optical audio. Before using this feature, ensure that your audio system provides an optical digital audio in connector.

ⓚ Line In/Side Speaker Out (Blue)
The line in jack. Use this audio jack for line in devices such as an optical drive, walkman, etc.

ⓛ Line Out/Front Speaker Out (Green)
The line out jack. This jack supports audio amplifying function. For better sound quality, it is recommended that you connect your headphone/speaker to this jack (actual effects may vary by the device being used).

ⓜ Mic In/Side Speaker Out (Pink)
The Mic in jack.

Audio Jack Configurations:

Jack	Headphone/2-channel	4-channel	5.1-channel	7.1-channel
ⓙ Center/Subwoofer Speaker Out			✔	✔
ⓘ Rear Speaker Out		✔	✔	✔
ⓚ Line In/Side Speaker Out				✔
ⓛ Line Out/Front Speaker Out	✔	✔	✔	✔
ⓜ Mic In/Side Speaker Out				✔

• If you want to install a Side Speaker, you need to retask either the Line in or Mic in jack to be Side Speaker out through the audio driver.
• To enable or configure the audio amplifying function for the Line out jack, please access the HD Audio Manager application.

• 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.

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

1-8 Internal Connectors
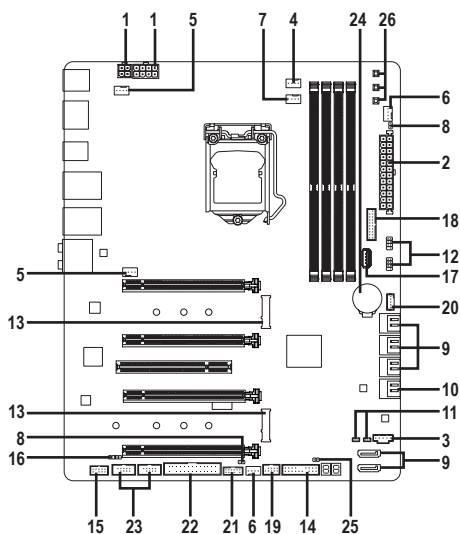
1)	**ATX_12V_2X2/ATX_12V_2X4**	**14)**	**F_PANEL**
2)	**ATX**	**15)**	**F_AUDIO**
3)	**PMBUS**	**16)**	**SPDIF_O**
4)	**CPU_FAN**	**17)**	**USB30_OB**
5)	**SYS_FAN1/2**	**18)**	**F_USB30**
6)	**SYS_FAN3_PUMP/SYS_FAN4_PUMP**	**19)**	**F_USB1**
7)	**CPU_OPT**	**20)**	**THB_C**
8)	**EC_TEMP1/EC_TEMP2**	**21)**	**TPM**
9)	**SATA3 0/1/2/3/4/5/6/7**	**22)**	**LPT**
10)	**GSATA3 0/1**	**23)**	**COMA/COMB**
11)	**SATA_DOM0/1**	**24)**	**BAT**
12)	**SATA_SGP1/2**	**25)**	**CLR_CMOS**
13)	**M2A/M2M**	**26)**	**PW_SW/CMOS_SW/RST_SW**

⚠️ 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.

1/2) ATX_12V_2X2/ATX_12V_2X4/ATX (2x2, 2x4, 12V Power Connectors and 2x12 Main Power Connector)

With the use of the power connector, the power supply can supply enough stable power to all the components on the motherboard. Before connecting the power connector, first make sure the power supply is turned off and all devices are properly installed. The power connector possesses a foolproof design. Connect the power supply cable to the power connector in the correct orientation.

The 12V power connector mainly supplies power to the CPU. If the 12V power connector is not connected, the computer will not start.

> To meet expansion requirements, it is recommended that a power supply that can withstand high power consumption be used (500W or greater). If a power supply is used that does not provide the required power, the result can lead to an unstable or unbootable system.
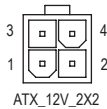
ATX_12V_2X2:

Pin No.	Definition
1	GND
2	GND
3	+12V
4	+12V
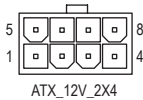
ATX_12V_2X4:

Pin No.	Definition	Pin No.	Definition
1	GND (Only for 2x4-pin 12V)	5	+12V (Only for 2x4-pin 12V)
2	GND (Only for 2x4-pin 12V)	6	+12V (Only for 2x4-pin 12V)
3	GND	7	+12V
4	GND	8	+12V
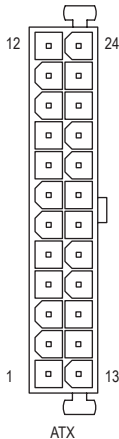
ATX:

Pin No.	Definition	Pin No.	Definition
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON (soft On/Off)
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	Power Good	20	NC
9	5VSB (stand by +5V)	21	+5V
10	+12V	22	+5V
11	+12V (Only for 2x12-pin ATX)	23	+5V (Only for 2x12-pin ATX)
12	3.3V (Only for 2x12-pin ATX)	24	GND (Only for 2x12-pin ATX)

3) PMBUS (Power Information Detection Header)

The header allows for detection of the power information which can be displayed via the system software.

Pin No.	Definition
1	PMBUS_CLOCK
2	PMBUS_DATA
3	PMBUS_ALERT
4	GND
5	3.3V

4/5) CPU_FAN/SYS_FAN1/2 (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.

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

6) SYS_FAN3_PUMP/SYS_FAN4_PUMP (System Fan/Water Cooling Pump Headers)

The fan/pump headers are 4-pin and possess a foolproof insertion design. 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. The header also provides speed control for a water cooling pump, refer to Chapter 2, "BIOS Setup," "M.I.T.," for more information.
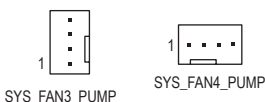
Pin No.	Definition
1	GND
2	Voltage Speed Control
3	Sense
4	PWM Speed Control

⚠ • 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.

7) CPU_OPT (Water Cooling CPU Fan Header)

The fan header is 4-pin and possesses a foolproof insertion design. 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.

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

8) EC_TEMP1/EC_TEMP2 (Temperature Sensor Headers)

Connect the thermistor cables to the headers for temperature detection.

EC_TEMP1

EC_TEMP2

Pin No.	Definition
1	SENSOR IN
2	GND

9) SATA3 0/1/2/3/4/5/6/7 (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, RAID 1, RAID 5, and RAID 10. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.
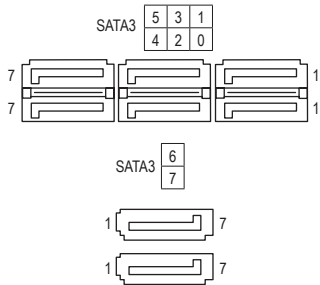
Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

To enable hot-plugging for the SATA ports, refer to Chapter 2, "BIOS Setup," "Peripherals\SATA And RST Configuration," for more information.

10) GSATA3 0/1 (SATA 6Gb/s Connectors, Controlled by ASMedia® ASM1061 Chip)

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.

GSATA3
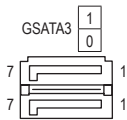
Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

11) SATA_DOM0/1 (SATA Power Headers)

The headers can provide power to SATA devices.

Pin No.	Definition
1	+5V
2	GND
3	NC

12) SATA_SGP1/2 (SATA Detection Headers)

The headers can connect to SATA detection devices.
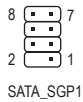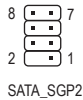
SATA_SGP2

SATA_SGP1

SATA_SGP1:

Pin No.	Definition
1	NC
2	No Pin
3	DATA0
4	NC
5	NC
6	LOAD
7	NC
8	CLOCK

SATA_SGP2:

Pin No.	Definition
1	NC
2	No Pin
3	DATA1
4	NC
5	NC
6	LOAD
7	NC
8	CLOCK

13) M2A/M2M (M.2 Socket 3 Connectors)

The M.2 connector supports M.2 SATA SSDs or M.2 PCIe SSDs and support RAID configuration. 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.

M2A

○   ○   ○
80 60 42

M2M

○   ○   ○   ○
110   80 60 42
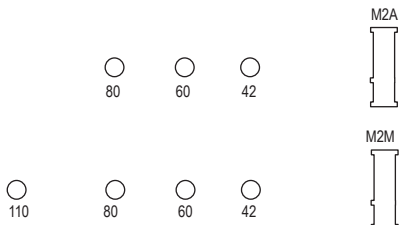
Follow the steps below to correctly install an M.2 SSD in the M.2 connector.
Step 1:
Use a screw driver to unfasten the screw and standoff from the motherboard. Locate the proper mounting hole for the M.2 SSD to be installed and then screw the standoff first.
Step 2:
Slide the M.2 SSD into the connector 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.

Installation Notices for the M.2 and SATA Connectors:
Due to the limited number of lanes provided by the Chipset, the availability of the SATA connectors may be affected by the type of device installed in the M.2 connector. The M2A connector shares bandwidth with the SATA3 1 connector; the M2M connector shares bandwidth with the PCIEX4_2 connector. Refer to the following table for details.

• M2A:

Connector / Type of M.2 SSD	SATA3 0	SATA3 1	SATA3 2	SATA3 3	SATA3 4	SATA3 5	SATA3 6	SATA3 7
M.2 SATA SSD	✔	✖	✔	✔	✔	✔	✔	✔
M.2 PCIe SSD	✔	✔	✔	✔	✔	✔	✔	✔
No M.2 SSD Installed	✔	✔	✔	✔	✔	✔	✔	✔

✔ : Available, ✖ : Not available

• M2M:

Connector / Type of M.2 SSD	SATA3 0	SATA3 1	SATA3 2	SATA3 3	SATA3 4	SATA3 5	SATA3 6	SATA3 7	PCIEX4_2
M.2 PCIe SSD	✔	✔	✔	✔	✔	✔	✔	✔	✖
No M.2 SSD Installed	✔	✔	✔	✔	✔	✔	✔	✔	✔

✔ : Available, ✖ : Not available

* The M2M connector supports only PCIe SSDs.

14) F_PANEL (Front Panel Header)

Connect the power switch, reset switch, speaker, chassis intrusion switch/sensor 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.
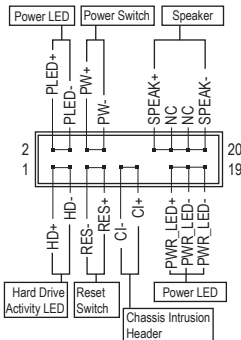
- **PLED/PWR_LED** (Power LED, Yellow/Purple):

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," for more information).

- **SPEAK** (Speaker, Orange):
  Connects to the speaker 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.

- **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.

- **CI** (Chassis Intrusion Header, Gray):
  Connects to the chassis intrusion switch/sensor on the chassis that can detect if the chassis cover has been removed. This function requires a chassis with a chassis intrusion switch/sensor.

- **NC** (Orange): 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, speaker and etc. When connecting your chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly.

15) 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.

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

> 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.

16) SPDIF_O (S/PDIF Out Header)

This header supports digital S/PDIF Out and connects a S/PDIF digital audio cable (provided by expansion cards) for digital audio output from your motherboard to certain expansion cards like graphics cards and sound cards. For example, some graphics cards may require you to use a S/PDIF digital audio cable for digital audio output from your motherboard to your graphics card if you wish to connect an HDMI display to the graphics card and have digital audio output from the HDMI display at the same time. For information about connecting the S/PDIF digital audio cable, carefully read the manual for your expansion card.

Pin No.	Definition
1	5VDUAL
2	No Pin
3	SPDIFO
4	GND

17) USB30_OB (USB 3.0/2.0 Port)

The USB port makes it easier to save data, flash the BIOS or install software in open bench testing platforms whether for extreme overclocking or simply pretesting the PC before final component installation inside a case scenarios where accessing the rear panel IO can be an inconvenience.

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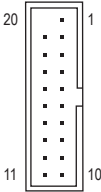
Pin No.	Definition	Pin No.	Definition	Pin No.	Definition
1	VBUS	8	D1-	15	SSTX2-
2	SSRX1-	9	D1+	16	GND
3	SSRX1+	10	NC	17	SSRX2+
4	GND	11	D2+	18	SSRX2-
5	SSTX1-	12	D2-	19	VBUS
6	SSTX1+	13	GND	20	No Pin
7	GND	14	SSTX2+		

19) F_USB1 (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.

20) THB_C (Thunderbolt™ Add-in Card Connector)

This connector is for a GIGABYTE Thunderbolt™ add-in card.

THUNDERBOLT™
ready

Supports a Thunderbolt™ add-in card.

21) TPM (Trusted Platform Module Header)

You may connect a TPM (Trusted Platform Module) to this header.
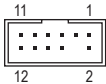
Pin No.	Definition	Pin No.	Definition
1	LAD0	7	LAD3
2	VCC3	8	GND
3	LAD1	9	LFRAME
4	No Pin	10	NC
5	LAD2	11	SERIRQ
6	LCLK	12	LRESET

22) LPT (Parallel Port Header)

The LPT header can provide one parallel port via an optional LPT port cable. For purchasing the optional LPT port cable, please contact the local dealer.

```
25              1
   . . . . . . . . . . . . .
   . . . . . . . . . . . . .
26              2
```
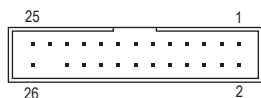
Pin No.	Definition	Pin No.	Definition	Pin No.	Definition
1	STB-	10	GND	19	ACK-
2	AFD-	11	PD4	20	GND
3	PD0	12	GND	21	BUSY
4	ERR-	13	PD5	22	GND
5	PD1	14	GND	23	PE
6	INIT-	15	PD6	24	No Pin
7	PD2	16	GND	25	SLCT
8	SLIN-	17	PD7	26	GND
9	PD3	18	GND		

23) COMA/COMB (Serial Port Headers)

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

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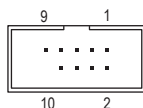
Pin No.	Definition	Pin No.	Definition
1	NDCD-	6	NDSR-
2	NSIN	7	NRTS-
3	NSOUT	8	NCTS-
4	NDTR-	9	NRI-
5	GND	10	No Pin

24) BAT (Battery)

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.
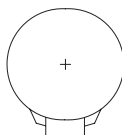
You may clear the CMOS values by removing the battery:
1. Turn off your computer and unplug the power cord.
2. Gently remove the battery from the battery holder and wait for one minute. (Or use a metal object like a screwdriver to touch the positive and negative terminals of the battery holder, making them short for 5 seconds.)
3. Replace the battery.
4. Plug in the power cord and restart your computer.

- 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.

25) 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).

26) PW_SW/CMOS_SW/RST_SW (Quick Buttons)

This motherboard has 3 quick buttons: power button, reset button and clear CMOS button. The power button and reset button allow users to quickly turn on/off or reset the computer in an open-case environment when they want to change hardware components or conduct hardware testing. Use this button to clear the BIOS configuration and reset the CMOS values to factory defaults when needed.

PW_SW: Power Button
CMOS_SW: Clear CMOS Button
RST_SW: Reset Button

- Always turn off your computer and unplug the power cord from the power outlet before using the clear CMOS button.
- Do not use the clear CMOS button when the system is on, or the system may shutdown and data loss or damage may occur.
- 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).

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   Startup Screen
The following startup Logo screen will appear when the computer boots.
(Sample BIOS Version: T26)

DEL : BIOS SETUP \ Q-FLASH   F9 : SYSTEM INFORMATION   F12 : BOOT MENU   END : Q-FLASH — Function Keys

> •   When the system is not stable as usual, select the **Load Optimized 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   The Main Menu

Setup Menus
Help
Function Keys
Configuration Items   Current Settings
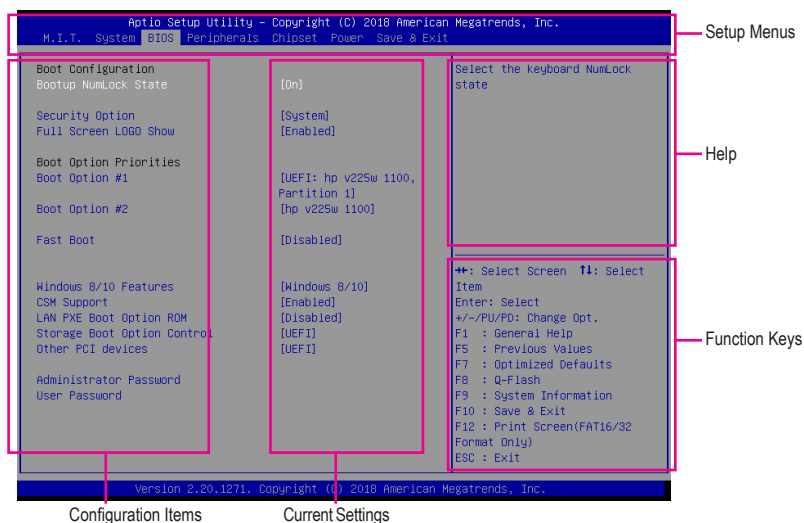
Classic Setup Function Keys

<←><→>	Move the selection bar to select a setup menu
<↑><↓>	Move the selection bar to select an configuration item on a menu
<Enter>	Execute command or enter a menu
<+>/<Page Up>	Increase the numeric value or make changes
<->/<Page Down>	Decrease the numeric value or make changes
<F1>	Show descriptions of the function keys
<F2>	Switch to Easy Mode
<F5>	Restore the previous BIOS settings for the current submenus
<F7>	Load the Optimized BIOS default settings for the current submenus
<F8>	Access the Q-Flash utility
<F9>	Display system information
<F10>	Save all the changes and exit the BIOS Setup program
<F12>	Capture the current screen as an image and save it to your USB drive
<Esc>	Main Menu: Exit the BIOS Setup program Submenus: Exit current submenu

2-3 M.I.T.

```
              Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
    M.I.T.  System  BIOS  Peripherals  Chipset  Power  Save & Exit

▶ Advanced Frequency Settings                          Configure CPU BCLK, Memory
▶ PC Health Status                                     Clock, PCIe frequency ,etc.


  BIOS Version                     T26
  BCLK                             100.00MHz
  CPU Frequency                    4301.26MHz
  Memory Frequency                 2133.33MHz
  Total Memory Size                8192MB

  CPU Temperature                  37.0˚C

  Vcore                            1.212V                ↔: Select Screen  ↕: Select
                                                        Item
                                                        Enter: Select
                                                        +/-/PU/PD: Change Opt.
                                                        F1  : General Help
                                                        F5  : Previous Values
                                                        F7  : Optimized Defaults
                                                        F8  : Q-Flash
                                                        F9  : System Information
                                                        F10 : Save & Exit
                                                        F12 : Print Screen(FAT16/32
                                                        Format Only)
                                                        ESC : Exit

              Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.
```

⚠️ 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.)

```
              Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
    M.I.T.  System  BIOS  Peripherals  Chipset  Power  Save & Exit

▶ Advanced Frequency Settings                          Configure CPU BCLK, Memory
▶ PC Health Status                                     Clock, PCIe frequency ,etc.


  BIOS Version                     T26
  BCLK                             100.00MHz
  CPU Frequency                    4301.26MHz
  Memory Frequency                 2133.33MHz
  Total Memory Size                8192MB

  CPU Temperature                  37.0˚C

  Vcore                            1.212V                ↔: Select Screen  ↕: Select
                                                        Item
                                                        Enter: Select
                                                        +/-/PU/PD: Change Opt.
                                                        F1  : General Help
                                                        F5  : Previous Values
                                                        F7  : Optimized Defaults
                                                        F8  : Q-Flash
                                                        F9  : System Information
                                                        F10 : Save & Exit
                                                        F12 : Print Screen(FAT16/32
                                                        Format Only)
                                                        ESC : Exit

              Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.
```

This section provides information on the BIOS version, CPU base clock, CPU frequency, memory frequency, total memory size, CPU temperature and Vcore.

▶ **Advanced Frequency Settings**

☞ **CPU Base Clock**
Allows you to manually set the CPU base clock in 0.01 MHz increments. (Default: Auto)
Important: It is highly recommended that the CPU frequency be set in accordance with the CPU specifications.

☞ **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 Upgrade** (Note)
Allows you to set the CPU frequency. Options may vary depending on the CPU being used. (Default: Auto)

☞ **Enhanced Multi-Core Performance**
Determines whether to allow the CPU to run at Turbo C1 speed. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **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.

☞ **TJ-Max offsett** (Note)
Allows you to fine-tune the TJ Max offset value. (Default: Auto)

☞ **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.

☞ **Intel(R) Turbo Boost Technology** (Note)
Allows you to determine whether to enable the Intel® CPU Turbo Boost technology. **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.

- **Turbo Ratio** (Note)
  Allows you to set the CPU Turbo ratios for different number of active cores. **Auto** sets the CPU Turbo ratios according to the CPU specifications. (Default: Auto)
- **Power Limit TDP (Watts) / Power Limit Time**
  Allows you to set the power limit for CPU Turbo mode and how long it takes to operate at the specified power limit. If the specified value is exceeded, the CPU will automatically reduce the core frequency in order to reduce the power. **Auto** sets the power limit according to the CPU specifications. (Default: Auto)
- **Core Current Limit (Amps)**
  Allows you to set a current limit for CPU Turbo mode. When the CPU current exceeds the specified current limit, the CPU will automatically reduce the core frequency in order to reduce the current. **Auto** sets the power limit according to the CPU specifications. (Default: Auto)
- **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 1)
  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 1)
  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 1)
  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.
- **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)
- **Extreme Memory Profile (X.M.P.)** (Note 2)
  Allows the BIOS to read the SPD data on XMP memory module(s) to enhance memory performance when enabled.
    ▶▶ Disabled   Disables this function. (Default)
    ▶▶ Profile1   Uses Profile 1 settings.
    ▶▶ Profile2 (Note 2)   Uses Profile 2 settings.
- **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)**
  Enabled allows Qclk to run in odd frequency. (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.

▶ **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.

(Note 1) 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.
(Note 2) This item is present only when you install a CPU and a memory module that support this feature.

⊃ **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/CPU VCCIO/DDRVTT Channel A/B Voltage/DRAM Channel A/B Voltage/DDRVPP Channel A/B Voltage/+3.3V/+5V/PCH Core/+12V/CPU VAXG**
Displays the current system voltages.

⊃ **CPU/System 1/System 2/PCH/PCIEX16/VRM MOS/PCIEX8/EC_TEMP1/EC_TEMP2**
Displays current temperature.

⊃ **CPU/CPU OPT/System Fan Speed**
Displays current fan speeds.

⊃ **CPU/System 1/System 2/PCH/PCIEX16/VRM MOS/PCIEX8/EC_TEMP1/EC_TEMP2 Temperature Warning**
Sets the warning threshold for CPU/system/Chipset 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/CPU OPT/System Fan Fail Warning**
Allows the system to emit warning sound if the fan/pump is not connected or fails. Check the fan condition or fan connection when this occurs. (Default: Disabled)

⊃ **CPU Fan Control Mode (CPU_FAN Connector)**
▶ 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.

⊃ **CPU Fan Speed Control (CPU_FAN Connector)**
Allows you to determine whether to enable the fan speed control function and adjust the fan speed.
▶ Normal   Allows the fan to run at different speeds according to the CPU temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (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 **CPU Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /^{o}C ~ 2.50 PWM value /^{o}C.

⊃ **Fan Control Use Temperature Input**
Allows you to select the reference temperature for fan speed control. (Default: CPU)

⊃ **Temperature Interval**
Allows you to select the temperature interval for fan speed change. (Default: 1)

⊃ **CPU OPT Fan Control Mode (CPU_OPT Connector)**
▶ 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.

⊃ **CPU OPT Fan Speed Control (CPU_OPT Connector)**
Allows you to determine whether to enable the fan speed control function and adjust the fan speed.
▶ Normal   Allows the fan to run at different speeds according to the CPU temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (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 **CPU OPT Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /^{o}C ~ 2.50 PWM value /^{o}C.

- **Fan Control Use Temperature Input**
  Allows you to select the reference temperature for fan speed control. (Default: CPU)

- **Temperature Interval**
  Allows you to select the temperature interval for fan speed change. (Default: 1)

- **System FAN 1 Control Mode (SYS_FAN1 Connector)**
  - 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.

- **System FAN 1 Speed Control (SYS_FAN1 Connector)**
  Allows you to determine whether to enable the fan speed control function and adjust the fan speed.
  - Normal   Allows the fan to run at different speeds according to the CPU temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (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 **System FAN 1 Speed Control** is set to **Manual**. Options are: 0.75 PWM value /^{o}C ~ 2.50 PWM value /^{o}C.

- **Fan Control Use Temperature Input**
  Allows you to select the reference temperature for fan speed control. (Default: System 1)

- **Temperature Interval**
  Allows you to select the temperature interval for fan speed change. (Default: 1)

- **System FAN 2 Control Mode (SYS_FAN2 Connector)**
  - 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.

- **System FAN 2 Speed Control (SYS_FAN2 Connector)**
  Allows you to determine whether to enable the fan speed control function and adjust the fan speed.
  - Normal   Allows the fan to run at different speeds according to the CPU temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (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 **System FAN 2 Speed Control** is set to **Manual**. Options are: 0.75 PWM value /^{o}C ~ 2.50 PWM value /^{o}C.

- **Fan Control Use Temperature Input**
  Allows you to select the reference temperature for fan speed control. (Default: System 2)

- **Temperature Interval**
  Allows you to select the temperature interval for fan speed change. (Default: 1)

- **System FAN 3 Control Mode (SYS_FAN3_PUMP Connector)**
  - ▶ 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.

- **System FAN 3 Speed Control (SYS_FAN3_PUMP Connector)**
  Allows you to determine whether to enable the fan speed control function and adjust the fan speed.
  - ▶ Normal   Allows the fan to run at different speeds according to the CPU temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (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 **System FAN 3 Speed Control** is set to **Manual**. Options are: 0.75 PWM value /^{o}C ~ 2.50 PWM value /^{o}C.

- **Fan Control Use Temperature Input**
  Allows you to select the reference temperature for fan speed control. (Default: CPU)

- **Temperature Interval**
  Allows you to select the temperature interval for fan speed change. (Default: 1)

- **System FAN 4 Control Mode (SYS_FAN4_PUMP Connector)**
  - ▶ 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.

- **System FAN 4 Speed Control (SYS_FAN4_PUMP Connector)**
  Allows you to determine whether to enable the fan speed control function and adjust the fan speed.
  - ▶ Normal   Allows the fan to run at different speeds according to the CPU temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (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 **System FAN 4 Speed Control** is set to **Manual**. Options are: 0.75 PWM value /^{o}C ~ 2.50 PWM value /^{o}C.

- **Fan Control Use Temperature Input**
  Allows you to select the reference temperature for fan speed control. (Default: CPU)

- **Temperature Interval**
  Allows you to select the temperature interval for fan speed change. (Default: 1)

2-4   System
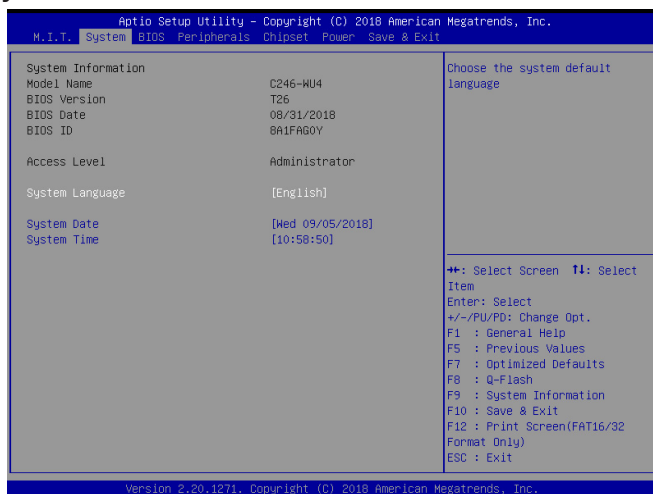
This section provides information on your motherboard model and BIOS version. You can also select the default language used by the BIOS and manually set the system time.

☞ **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.

2-5 BIOS

Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
M.I.T. System **BIOS** Peripherals Chipset Power Save & Exit

Boot Configuration
Bootup NumLock State   [On]

Security Option   [System]
Full Screen LOGO Show   [Enabled]

Boot Option Priorities
Boot Option #1   [UEFI: hp v225w 1100,
                                     Partition 1]
Boot Option #2   [hp v225w 1100]

Fast Boot   [Disabled]

Windows 8/10 Features   [Windows 8/10]
CSM Support   [Enabled]
LAN PXE Boot Option ROM   [Disabled]
Storage Boot Option Control   [UEFI]
Other PCI devices   [UEFI]

Administrator Password
User Password

Select the keyboard NumLock state

→←: Select Screen ↑↓: Select Item
Enter: Select
+/-/PU/PD: Change Opt.
F1 : General Help
F5 : Previous Values
F7 : Optimized Defaults
F8 : Q-Flash
F9 : System Information
F10 : Save & Exit
F12 : Print Screen(FAT16/32 Format Only)
ESC : Exit

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☞ **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**.

& **PS2 Devices Support**
    ▶ Disabled   All PS/2 devices are disabled before the OS boot process completes.
    ▶ Enabled   All PS/2 devices are functional in the operating system and during the POST. (Default)
    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.
    ▶ Enabled   Enables UEFI CSM. (Default)
    ▶ Disabled   Disables UEFI CSM and supports UEFI BIOS boot process only.

& **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.
    ▶ UEFI   Enables UEFI option ROM only. (Default)
    ▶ Legacy   Enables legacy option ROM only.
    This item is configurable only when **CSM Support** is set to **Enabled**.

- **Other PCI devices**
  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.
  - UEFI   Enables UEFI option ROM only. (Default)
  - Legacy   Enables legacy option ROM only.
  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.

- **Secure Boot**
  Allows you to enable or disable Secure Boot and configure related settings. This item is configurable only when **CSM Support** is set to **Disabled**.

2-6 Peripherals


```
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       M.I.T.  System  BIOS  Peripherals  Chipset  Power  Save & Exit

   Initial Display Output              [PCIe 1 Slot]          Select which video display
   OnBoard LAN Controller             [Enabled]              output will be enabled during
   Intel Platform Trust Technology    [Disabled]             POST
   (PTT)
   Intel Trusted Execution Technology [Disabled]
   Software Guard Extensions (SGX)    [Software Controlled]
 ▶ OffBoard SATA Controller Configuration
 ▶ Trusted Computing
 ▶ Super IO Configuration
 ▶ Intel(R) Bios Guard Technology
 ▶ Serial Port Console Redirection
 ▶ Intel TXT Information
 ▶ USB Configuration
 ▶ Network Stack Configuration                              →←: Select Screen  ↑↓: Select
 ▶ NVMe Configuration                                       Item
 ▶ AMT Configuration                                        Enter: Select
 ▶ SATA And RST Configuration                               +/-/PU/PD: Change Opt.
                                                            F1  : General Help
 ▶ Intel(R) I210 Gigabit  Network Connection -             F5  : Previous Values
   1C:1B:0D:E7:37:71                                        F7  : Optimized Defaults
 ▶ Intel(R) Ethernet Connection (7) I219-LM - 1C:1B:0D:E7:37:70  F8 : Q-Flash
                                                            F9  : System Information
                                                            F10 : Save & Exit
                                                            F12 : Print Screen(FAT16/32
                                                            Format Only)
                                                            ESC : Exit

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```

 ☞ **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 PCIEX16 slot as the first display. (Default)
   ▶▶ PCIe 2 Slot Sets the graphics card on the PCIEX4_1 slot as the first display.
   ▶▶ PCIe 3 Slot Sets the graphics card on the PCIEX8 slot as the first display.
   ▶▶ PCIe 4 Slot Sets the graphics card on the PCIEX4_2 slot as the first display.

 ☞ **OnBoard LAN Controller (Intel® GbE LAN Chip, LAN2)**
  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**
  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)

▶ **OffBoard SATA Controller Configuration**
  Displays information on your M.2 PCIe SSD if installed.

▶ **Trusted Computing**
  Enables or disables Trusted Platform Module (TPM).

▶ **Super IO Configuration**

☞ **Serial Port (COMA)**
Enables or disables the onboard serial port. (Default: Enabled)

☞ **Serial Port (COMB)**
Enables or disables the onboard serial port. (Default: Enabled)

☞ **Parallel Port**
Enables or disables the onboard parallel port. (Default: Enabled)

▶ **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.

▶ **Intel TXT Information**
This section displays information about **Intel® Trusted Execution Technology**.

▶ **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 Internet Protocol Security. 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.

▶ **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.
  ▶▶ 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. (Default)
- **Aggressive LPM Support**
  Enables or disables the power saving feature, ALPM (Aggressive Link Power Management), for the Chipset SATA controllers. (Default: Enabled)
- **Port 0/1/2/3/4/5/6/7**
  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) I210 Gigabit Network Connection (LAN2)**
  This sub-menu provides information on LAN configuration and related configuration options.
▶ **Intel(R) Ethernet Connection (LAN1)**
  This sub-menu provides information on LAN configuration and related configuration options.

2-7   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)

⎘ **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**.

⎘ **Above 4G Decoding**
Enables or disables 64-bit capable devices to be decoded in above 4 GB address space (only if your system supports 64-bit PCI decoding). Set to **Enabled** if more than one advanced graphics card are installed and their drivers are not able to be launched when entering the operating system (because of the limited 4 GB memory address space). (Default: Disabled)

⎘ **PCH LAN Controller (Intel® GbE LAN Chip, LAN1)**
Enables or disables the Intel® GbE 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)

(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.

2-8   Power
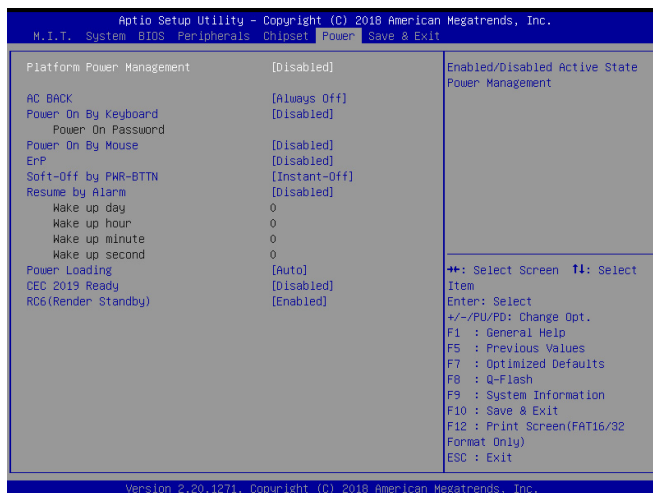
- **Platform Power Management**

  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)

- **Power On By Keyboard**

  Allows the system to be turned on by a PS/2 keyboard wake-up event.
  Note: To use this function, you need an ATX power supply providing at least 1A on the +5VSB lead.

  ▶▶ Disabled   Disables this function. (Default)
  ▶▶ Password   Set a password with 1~5 characters to turn on the system.
  ▶▶ Keyboard 98   Press POWER button on the Windows 98 keyboard to turn on the system.
  ▶▶ Any Key   Press any key to turn on the system.

- **Power On Password**
  Set the password when **Power On By Keyboard** is set to **Password**.
  Press <Enter> on this item and set a password with up to 5 characters and then press <Enter> to accept.
  To turn on the system, enter the password and press <Enter>.
  Note: To cancel the password, press <Enter> on this item. When prompted for the password, press <Enter>
  again without entering the password to clear the password settings.

- **Power On By Mouse**
  Allows the system to be turned on by a PS/2 mouse wake-up event.
  Note: To use this function, you need an ATX power supply providing at least 1A on the +5VSB lead.
  ▶ Disabled   Disables this function. (Default)
  ▶ Move   Move the mouse to turn on the system.
  ▶ Double Click   Double click on left button on the mouse to turn on the system.

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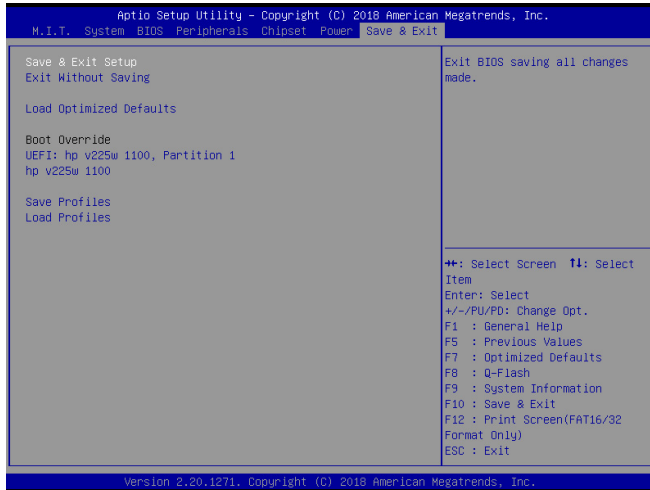 Allows you to select whether to allow the system to adjust power consumption when it is in shutdown, idle,
  or standby state in order to comply with the CEC (California Energy Commission) 2019 Standards. (Default:
  Disabled)

- **RC6(Render Standby)**
  Allows you to determine whether to let the onboard graphics enter standby mode to decrease power
  consumption. (Default: Enabled)

2-9   Save & Exit

```
              Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
      M.I.T.   System  BIOS  Peripherals  Chipset  Power  Save & Exit

   Save & Exit Setup                                    Exit BIOS saving all changes
   Exit Without Saving                                  made.

   Load Optimized Defaults

   Boot Override
   UEFI: hp v225w 1100, Partition 1
   hp v225w 1100

   Save Profiles
   Load Profiles

                                                        ←→: Select Screen  ↑↓: Select
                                                        Item
                                                        Enter: Select
                                                        +/-/PU/PD: Change Opt.
                                                        F1  : General Help
                                                        F5  : Previous Values
                                                        F7  : Optimized Defaults
                                                        F8  : Q-Flash
                                                        F9  : System Information
                                                        F10 : Save & Exit
                                                        F12 : Print Screen(FAT16/32
                                                        Format Only)
                                                        ESC : Exit

              Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.
```

☞ **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	RAID 5	RAID 10
Minimum Number of Hard Drives	≥2	2	≥3	4
Array Capacity	Number of hard drives * Size of the smallest drive	Size of the smallest drive	(Number of hard drives -1) * Size of the smallest drive	(Number of hard drives/2) * Size of the smallest drive
Fault Tolerance	No	Yes	Yes	Yes

Before you begin, please prepare the following items:
• At least two SATA hard drives or SSDs. (Note 1) (To ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). (Note 2)
• 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. Turn on your computer and press <Delete> to enter BIOS Setup during the POST (Power-On Self-Test). 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. Note: When using a PCIe SSD, make sure to set the **Use RST Legacy OROM** item under **Peripherals\SATA And RST Configuration** to **Disabled**. Then depending the M.2 connector you use, set the corresponding **PCIe Storage Dev on Port XX** item to **RST Controlled**. Finally, save the settings and exit BIOS Setup.
2. To configure UEFI RAID, follow the steps in "C-2." To enter the legacy RAID ROM, refer to "C-3" for more information. Finally, save the settings and exit BIOS Setup.

> 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.

C-1. UEFI RAID Configuration
Steps:
1. In BIOS Setup, go to **BIOS** and set **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) RSTe SATA Controller** sub-menu.
3. On the **Intel(R) RSTe SATA Controller** 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, RAID 1, RAID 10, and RAID 5 (the selections available depend on the number of the hard drives being installed). Next, use the down arrow key to move to **Select Disks**.

(Note 1)   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.
(Note 2)   Refer to "1-8 Internal Connectors," for the installation notices for the M.2 and SATA connectors.

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.
5. After setting the capacity, move to **Create Volume** and press <Enter> to begin.
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, 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 **5. Exit** in **MAIN MENU**.

Install 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 Intel® 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**.

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

3. Then browse to the USB flash drive and select the location of the driver. The location of the driver is as follows: \IRST\f6flpy-x64
4. When a screen as shown, select **Intel(R) NVMe Controller** and click **Next** to load the driver and continue the OS installation.

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.
5. The hard drive/SSD to be accelerated can be a system drive or data drive. The system drive must be GPT formatted and have Windows 10 64-bit (or later version) installed on it. The data drive must also be GPT formatted.
6. The motherboard driver disk

Installation Guidelines
Installation in Intel RST Premium With Intel Optane System Acceleration mode
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 **iRSTe Support** and **Use RST Legacy OROM** is disabled. If you want to enable the Optane™ memory installed in the M2A connector, set **PCIe Storage Device on Port 9** to **RST Controlled**; to enable the Optane™ memory installed in the M2M connector, set **PCIe Storage Device on Port 21** 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. If you install more than one Optane™ memory, please select which one you are going to use. Then select which drive to be accelerated. Click **Enable**. Follow the on-screen instructions to proceed. When completed, restart the system.
5. Launch the **Intel® Rapid Storage Technology** utility from the Start menu and make sure the Intel® Optane™ Memory has been enabled. If you want to accelerate the system drive, you can select specific folders, files, or applications to accelerate using the **Intel® Optane™ Memory Pinning** function. (The Optane™ memory used must have at least 32 GB capacity.)

- An Optane™ memory cannot be used to accelerate an M.2 PCIe SSD.
- If more than one Optane™ memory is installed, you can select only one of them to accelerate your SATA-based boot drive. The other(s) can only be used as data drive(s).
- 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.
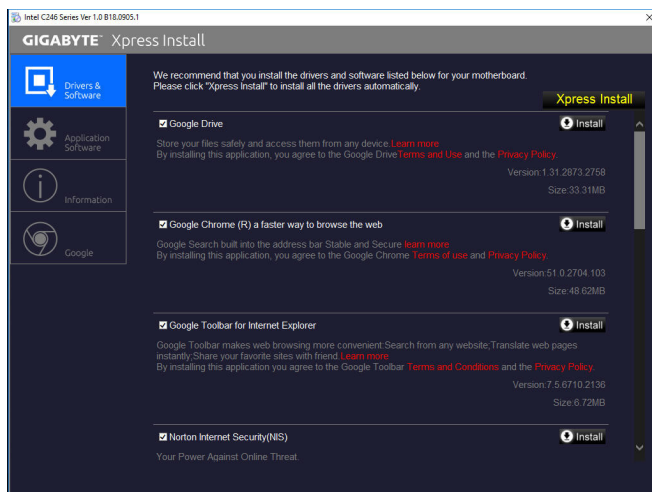
 Please visit GIGABYTE's website for more software information.

 Please visit GIGABYTE's website for more troubleshooting information.

3-4   Debug LED Codes

Regular Boot

Code	Description
10	PEI Core is started.
11	Pre-memory CPU initialization is started.
12~14	Reserved.
15	Pre-memory North-Bridge initialization is started.
16~18	Reserved.
19	Pre-memory South-Bridge initialization is started.
1A~2A	Reserved.
2B~2F	Memory initialization.
31	Memory installed.
32~36	CPU PEI initialization.
37~3A	IOH PEI initialization.
3B~3E	PCH PEI initialization.
3F~4F	Reserved.
60	DXE Core is started.
61	NVRAM initialization.
62	Installation of the PCH runtime services.
63~67	CPU DXE initialization is started.
68	PCI host bridge initialization is started.
69	IOH DXE initialization.
6A	IOH SMM initialization.
6B~6F	Reserved.
70	PCH DXE initialization.
71	PCH SMM initialization.
72	PCH devices initialization.
73~77	PCH DXE initialization (PCH module specific).
78	ACPI Core initialization.
79	CSM initialization is started.
7A~7F	Reserved for AMI use.
80~8F	Reserved for OEM use (OEM DXE initialization codes).
90	Phase transfer to BDS (Boot Device Selection) from DXE.
91	Issue event to connect drivers.

Code	Description
92	PCI Bus initialization is started.
93	PCI Bus hot plug initialization.
94	PCI Bus enumeration for detecting how many resources are requested.
95	Check PCI device requested resources.
96	Assign PCI device resources.
97	Console Output devices connect (ex. Monitor is lighted).
98	Console input devices connect (ex. PS2/USB keyboard/mouse are activated).
99	Super IO initialization.
9A	USB initialization is started.
9B	Issue reset during USB initialization process.
9C	Detect and install all currently connected USB devices.
9D	Activated all currently connected USB devices.
9E~9F	Reserved.
A0	IDE initialization is started.
A1	Issue reset during IDE initialization process.
A2	Detect and install all currently connected IDE devices.
A3	Activated all currently connected IDE devices.
A4	SCSI initialization is started.
A5	Issue reset during SCSI initialization process.
A6	Detect and install all currently connected SCSI devices.
A7	Activated all currently connected SCSI devices.
A8	Verify password if needed.
A9	BIOS Setup is started.
AA	Reserved.
AB	Wait user command in BIOS Setup.
AC	Reserved.
AD	Issue Ready To Boot event for OS Boot.
AE	Boot to Legacy OS.
AF	Exit Boot Services.
B0	Runtime AP installation begins.
B1	Runtime AP installation ends.
B2	Legacy Option ROM initialization.
B3	System reset if needed.

Code	Description
B4	USB device hot plug-in.
B5	PCI device hot plug.
B6	Clean-up of NVRAM.
B7	Reconfigure NVRAM settings.
B8~BF	Reserved.
C0~CF	Reserved.

S3 Resume

Code	Description
E0	S3 Resume is started (called from DXE IPL).
E1	Fill boot script data for S3 resume.
E2	Initializes VGA for S3 resume.
E3	OS S3 wake vector call.

Recovery

Code	Description
F0	Recovery mode will be triggered due to invalid firmware volume detection.
F1	Recovery mode will be triggered by user decision.
F2	Recovery is started.
F3	Recovery firmware image is found.
F4	Recovery firmware image is loaded.
F5~F7	Reserved for future AMI progress codes.

Error

Code	Description
50~55	Memory initialization error occurs.
56	Invalid CPU type or speed.
57	CPU mismatch.
58	CPU self test failed or possible CPU cache error.
59	CPU micro-code is not found or micro-code update is failed.
5A	Internal CPU error.
5B	Reset PPI is failed.
5C~5F	Reserved.
D0	CPU initialization error.
D1	IOH initialization error.

Code	Description
D2	PCH initialization error.
D3	Some of the Architectural Protocols are not available.
D4	PCI resource allocation error. Out of Resources.
D5	No Space for Legacy Option ROM initialization.
D6	No Console Output Devices are found.
D7	No Console Input Devices are found.
D8	It is an invalid password.
D9~DA	Can't load Boot Option.
DB	Flash update is failed.
DC	Reset protocol is failed.
DE~DF	Reserved.
E8	S3 resume is failed.
E9	S3 Resume PPI is not found.
EA	S3 Resume Boot Script is invalid.
EB	S3 OS Wake call is failed.
EC~EF	Reserved.
F8	Recovery PPI is invalid.
F9	Recovery capsule is not found.
FA	Invalid recovery capsule.
FB~FF	Reserved.

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

• **GIGABYTE eSupport**

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