User Guide

EVGA Z790 CLASSIFIED
Specs and Initial Installation

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Before You Begin…

The EVGA Z790 CLASSIFIED remains the best choice for the motherboard that does everything with a 19-phase VRM and 12-layer PCB to provide exceptional power, performance, and stability. The CLASSIFIED supports PCIe Gen5 devices and PCIe Gen4 M.2 NVMe SSDs on the latest 13th Gen Intel® Core™ Series processors, up to 128GB DDR5 and up to 7800MHz+(OC) DDR5*. The CLASSIFIED now features a rotated socket to reduce memory latency and improve cable management options. Meanwhile, the board also contains 10GbE and 2.5GbE network ports, Wi-Fi 6E / BT 5.2, and two USB4 Type-C ports (supports DP 1.4 + HDR).

For its other features, the Z790 CLASSIFIED contains Realtek 7.1 Channel HD Audio, onboard power/reset/CMOS buttons, triple BIOS support, 8 smart fan headers (including 2x pump headers exclusively built for CPU AIO), and many more premium features. The Z790 CLASSIFIED is the perfect motherboard to help you set records in whatever you do.

Lastly, a motherboard is only as good as its BIOS, and the EVGA Z790 CLASSIFIED features EVGA's latest BIOS GUI with a focus on overclocking and functionality in a lean, straightforward package. You won't need to be an expert to configure your motherboard, but if you are, you'll find features unavailable anywhere else.

*Achievable speeds may vary depending on memory configuration and CPU memory controller.

Parts NOT in the Kit

Your EVGA Z790 CLASSIFIED package contains all the accessories necessary to install and connect your new motherboard to the rest of your hardware. However, the following items must be purchased separately in order to make the system fully functional and ready to install an Operating System:

- ❑ **Intel® Socket 1700 Processor**
- ❑ **DDR5 System Memory**
- ❑ **CPU Cooling Device**
- ❑ **PCI-Express Graphics Card**
- ❑ **Power Supply**
- ❑ **Hard Drive or SSD**
- ❑ **Keyboard and Mouse**
- ❑ **Display**
- ❑ **(Optional) Optical Drive**

EVGA assumes you have purchased all the necessary parts needed to allow for proper system functionality. For a full list of compatible CPUs for this motherboard, please visit https://www.evga.com/support/motherboard

Intentions of the Kit

This motherboard is designed to be the hub for most – if not all – of your PC hardware components, and is therefore a critical component for your OS. If you are upgrading or replacing another motherboard, it is recommended to start with a fresh install of your OS.

Motherboard Specifications

- ❑ **Form-Factor:** E-ATX - 11.99 inches x 10.89 inches (304.5mm x 276.6mm)
- ❑ **Microprocessor support:**
  Intel® Socket 1700 Processors (Raptor Lake-S and Alder Lake-S)
- ❑ **Operating Systems:**
  Supports Windows 11, Windows 10 64bit
- ❑ **System Memory support:**
  Supports up to 128GB Dual-Channel DDR5

  Supports up to 7800MHz+ (OC) Dual-Channel DDR5

    - Achievable speeds depend upon configuration and CPU memory controller
- ❑ **USB 2.0 Ports:**
  2x from Intel® Z790 PCH – 2x internal via 1 FP headers

  1x from Update Port for flashing the BIOS without CPU
- ❑ **USB 3.2 Gen1 Ports:**
  2x from Intel® Z790 PCH – 2x internal via 1 FP header

  Supports transfer speeds up to 5Gb/s
- ❑ **USB 3.2 Gen2 Ports:**
  7x from Intel® Z790 PCH – 6x external (Type-A), 1x internal via 1 FP header

  Supports transfer speeds up to 10Gb/s
- ❑ **USB4 Ports:**
  2x from Intel® Z790 PCH – 2x external (Type-C)

  Supports transfer speeds up to 40Gb/s
- ❑ **SATA Ports:**
  8x SATA 6Gb/s data transfer rate / Intel® Z790 PCH Controller
    - Support for RAID0, RAID1, RAID5, AND RAID10
    - Supports hot plug
- ❑ **Onboard LAN:**
  1x Marvell® 10GbE (10/100/1000/2500/5000/10000) Ethernet Controller

  1x Intel® i226V 2.5 GbE (10/100/1000/2500) Ethernet Controller

  Intel® Dual-Band Wi-Fi 6E / BT5.2
- ❑ **Onboard Audio:**
  Realtek ALC1220 High Definition Audio
  -    Supports 7.1 Channel audio + Optical S/PDIF Out

❑ **Power Functions:**

Supports ACPI (Advanced Configuration and Power Interface)

Supports S0 (normal), S3 (suspend to RAM), S4 (Suspend to disk - depends on OS), and S5 (soft - off).

❑ **PCI-Express Expansion Slots:**

1x PCIe Gen5 x16 slot – x16/x8

1x PCIe Gen5 x16 slot – x8

1x PCIe Gen4 x4 slot (via PCH)

❑ **PCIe 5.0 Support:**

Low power consumption and power management features

❑ **Onboard Graphics**

2x mini-DisplayPort 1.4 + HDR via USB4 Type-C ports

*Requires a compatible CPU that supports Intel® UHD graphics

❑ **mGPU Support:**

AMD mGPU is supported.

❑ **Additional Expansion Slots:**

1x M.2 Key-M 80mm Gen4 slot from CPU

2x M.2 Key-M 80mm Gen4 slot from PCH

1x M.2 Key-E slot

❑ **Pump Header**

2x Pump Header (3A)

❑ **Fan Headers:**

2x 4-pin PWM controlled headers / 4x 4-pin PWM/DC headers

ALL FAN HEADERS HAVE A MAXIMUM POWER LIMIT OF 2 AMP @ 12 VOLTS (24 WATTS). PUMP HEADERS HAVE A MAXIMUM POWER LIMIT OF 3 AMP @ 12 VOLTS (36 WATTS). EXCEDING THIS LIMIT WILL CAUSE IRREPARABLE DAMAGE TO THE BOARD.

Unpacking and Parts Descriptions

The following accessories are included with the EVGA Z790 CLASSIFIED Motherboard:

The EVGA Z790 CLASSIFIED Motherboard
This motherboard contains the Intel® Z790 chipset.

2x SATA 3G/6G Data Cables
Used to support the SATA protocol and each one connects a single drive to the motherboard.

Probelt Connector
Attach your DMM to the Probelt header on the Z790 Classified for real-time voltage measurements.

Case Badge
EVGA enthusiast case badge*.

USB Flash Drive
Contains motherboard drivers and user manual.

WiFi/BT Antenna
Connects to the pre-inatalled Wi-Fi/BT module on the EVGA Z790 Classified.

Visual Installation Guide
Contains helpful steps to get your system up and running!

*Included decals, labels and case badges may vary over time, and the images used are merely reflective of the decal/label/badge designs typically included. EVGA reserves the right to change, modify, or remove decals, labels, and case badges at its discretion, at any time.

EVGA Z790 CLASSIFIED Motherboard LED

The EVGA Z790 CLASSIFIED Motherboard has several LEDs indicating power, connectivity, and activity. Below is the location of the LEDs and their function.
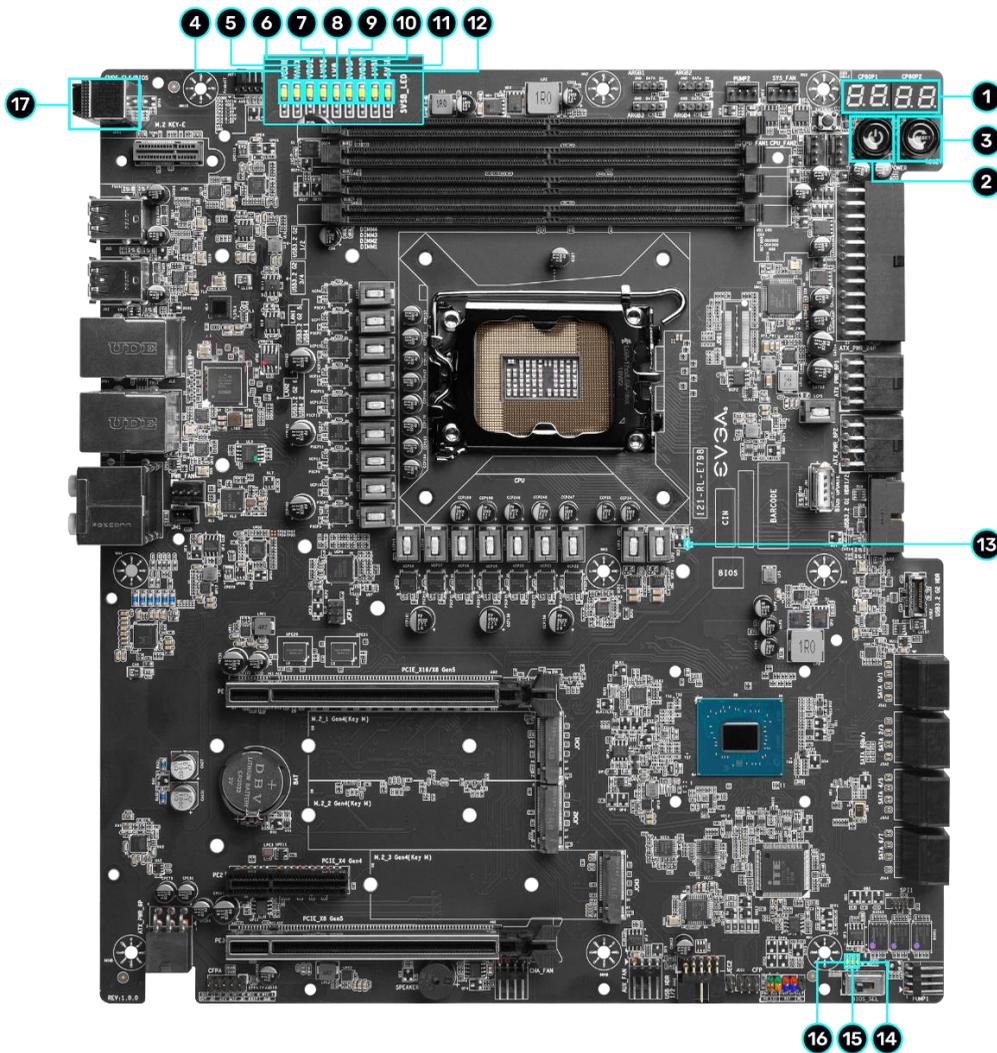
LED Legend		
1. Multi-function Display	7. CPU 1.05V Status	13. CATERR
2. Power Button	8. CPU 1.8V Status	14. BIOS 1 Active
3. Reset Button	9. PCH 1.05V Status	15. BIOS 2 Active
4. VCORE Status	10. PCH 0.82V Status	16. BIOS 3 Active
5. CPU VCCIN AUX Status	11. PCH 1.8V Status	17. CMOS CLS/BIOS Button
6. CPU VDD2 Status	12. +5VSB Status	

1. Multi-function Display
    a. During boot it will cycle many different hexadecimal post codes with a range of 00-FF and this indicates what aspect of the Power On Self Test (POST) is currently running.
        i. For a list of POST Codes, please see Page 113.
    b. This display can be configured in BIOS to display HW monitoring information, such as voltage or temperature. After boot, the display will show temperatures or voltage, depending on the BIOS configuration.
2. Power Button
    a. RED: Motherboard is turned on and running.
3. Reset Button
    a. WHITE: Reset button will typically flash in conjunction with HDD/SSD LED. Depending on load, the button may flash or appear solid at times.
4. VCORE Status
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)
5. CPU VCCIN AUX Status
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)
6. CPU VDD2 Status
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)
7. CPU 1.05V Status
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)
8. CPU 1.8V Status
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)
9. PCH 1.05V Status
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)

10. PCH 0.82V Status
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)
11. PCH 1.8V Status
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)
12. +5V Standby Power
    a. WHITE: Voltage present (Does not mean PSU is outputting in-spec, only that this specific voltage is detected)
13. CATERR - Catastrophic Error on the processor
    a. RED: Processor error has occurred.
    b. OFF: No error state detected in the CPU.
14. BIOS 1 Active LED
    a. WHITE: Active BIOS Chip (only 1 will be lit at a time)
15. BIOS 2 Active LED
    a. WHITE: Active BIOS Chip (only 1 will be lit at a time)
16. BIOS 3 Active LED
    a. WHITE: Active BIOS Chip (only 1 will be lit at a time)
17. CMOS CLS/BIOS Buttons
    a. RED: Always on for visibility.

EVGA Z790 CLASSIFIED Component Legend

The EVGA Z790 CLASSIFIED Motherboard with the Intel® Z790 and PCH Chipset.

Figure 1 shows the motherboard and Figure 2 shows the back panel connectors

FIGURE 1. Z790 CLASSIFIED Motherboard Layout
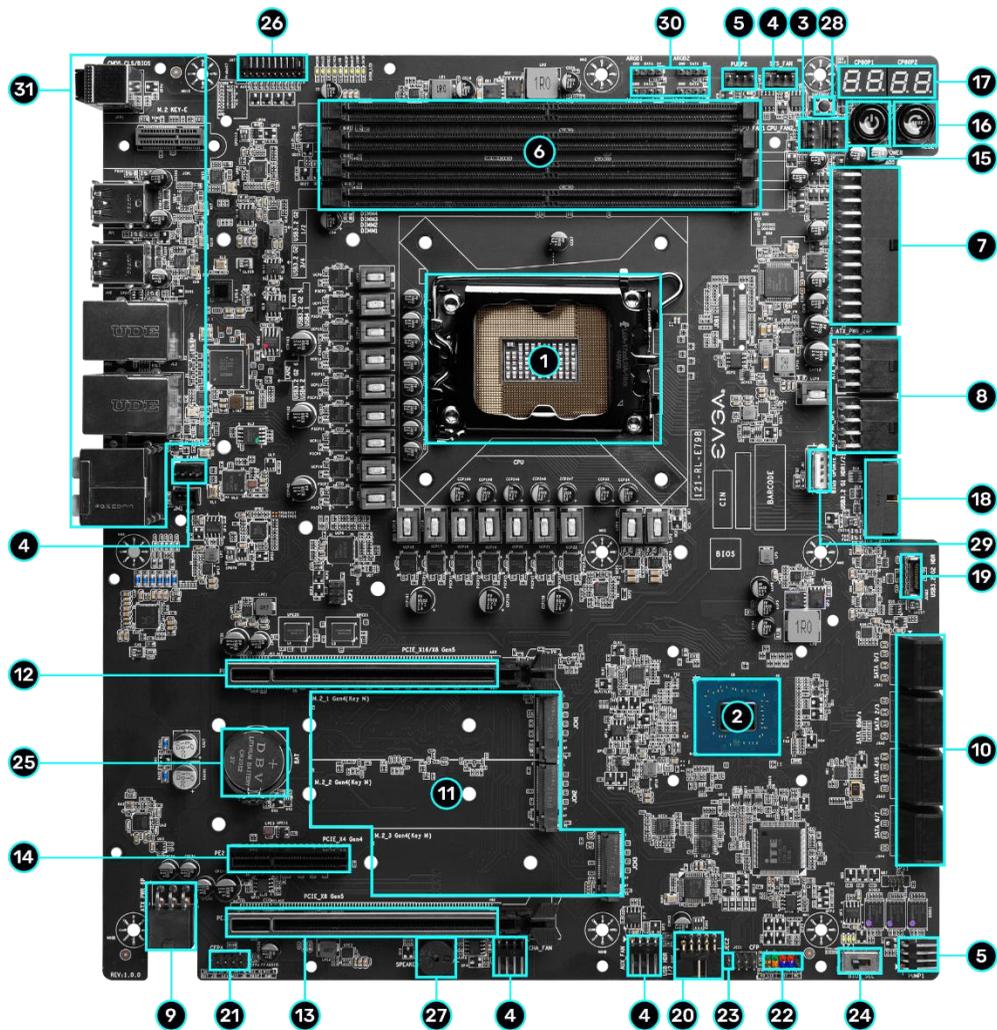
Component Legend		
1. CPU Socket LGA1700	12. PCIe Slot x16/x8	23. Temperature Sensor Header
2. Intel Z790 PCH	13. PCIe Slot x8	24. BIOS Selector Switch
3. CPU PWM Fan Headers (2 amp)	14. PCIe Slot x4	25. CMOS Battery
4. PWM/DC Fan Headers (2 amp)	15. Power Button	26. ProbeIt Header JAT1
5. Pump Headers (3 amp)	16. Reset Button	27. PC Speaker
6. DDR5 DIMM Slots	17. Multi-function Display	28. BIOS Safeboot Button
7. 24-pin ATX Power Connector	18. USB 3.2 Gen1 Header	29. USB to SPI for BIOS Flash
8. 8-pin EPS Power Connectors	19. USB 3.2 Gen2 Type-C Header	30. ARGB LED Controller Headers
9. Supplemental PCIe 6-pin power	20. USB 2.0 Header	31. Rear Panel I/O (Figure 2)
10. Intel SATA 6Gb/s SATA Ports	21. Front Panel Audio Header	
11. 3x M.2 Socket 3 Key-M 80mm	22. Front Panel Header	

**For a FULL description of the above legend, please see Page 15.

Figure 2. Chassis Rear Panel Connectors
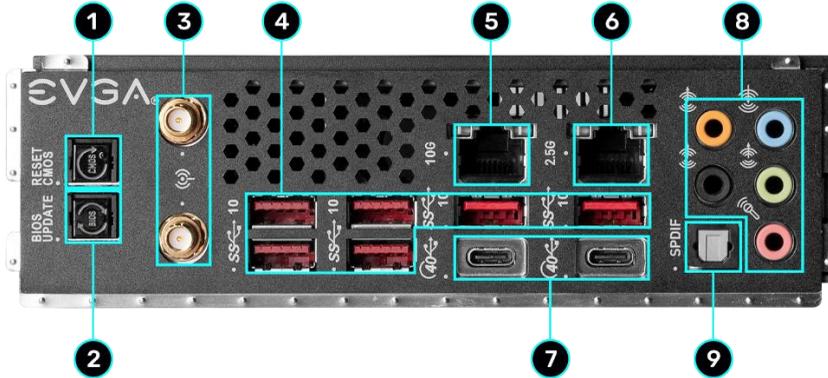
I/O Hub		
1. BIOS/CMOS Reset Button	4. USB 3.2 Gen2 Type-A	7. USB4 Type-C (DP 1.4 + HDR)
2. BIOS Update Button	5. Marvell 10GbE NIC	8. Analog Audio Jacks
3. WiFi Antenna	6. Intel i226V 2.5GbE NIC	9. Optical Out

Marvell 10GbE
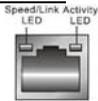
Activity LED Status	Description	Speed/Link LED Status	Description
Off	No Data Transmission	Orange	10Gbps data rate
Blinking	Data Transmission	Green	5Gbps/2.5Gbps/100Mbps/10Mbps data rate
		Off	No Link

Intel i226V
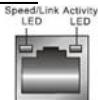
Activity LED Status	Description	Speed/Link LED Status	Description
Off	No Data Transmission	Orange	2.5Gbps data rate
Blinking (Green)	Data Transmission	Green	1 Gbps data rate
		Off	10/100 Mbps data rate or No Link

3.5mm Audio Jack Legend				
Analog Audio Port Breakdown	2/2.1 Channels	4.0/4.1 Channels	5.1 Channels	7.1 Channels
Blue	Line In	*Rear Speakers Out	Line In	* Rear Speakers Out
Green	Front Speakers Out / Front Speakers + Sub	Front Speakers Out / Front Speakers + Sub	Front Speakers Out	Front Speakers Out
Pink	Mic In	Mic In	Mic In	Mic In
Black			Side Speakers Out	Side Speakers Out
Orange			Center / Sub Out	Center / Sub Out
* Only used in 7.1 and is changed via Realtek Software from within Windows.				

Component Legend Descriptions

1. CPU Socket 1700

    This is the interface for the Central Processing Unit (CPU), and supports 13th and 12th Gen. Intel® Core i3, i5, i7 and i9 models compatible with the Intel® LGA1700 Socket, based on Raptor Lake-S and Alder Lake-S architecture.

2. Intel® Z790 PCH

    The Platform Controller Hub (PCH) works as a hub for peripherals that are less bandwidth-intensive. The PCH has 8x DMI lanes (Gen4), up to 20x PCIe Gen4, and up to 8x PCIe Gen3 lanes to allocate bandwidth to smaller PCIe slots, M.2, USB, audio, etc.

3. PWM Fan Headers (CPU1 and CPU2)

    4-pin fan headers control the fan speed via a configurable Smart curve or static percentage. PWM control works by pulsing power to the fan at a constant rate and sending the RPM signal to the fan's controller. PWM control is preferred because it eliminates voltage-based fan stall points. See Page 83 for an in-depth breakdown of PWM controls within the BIOS.

    These headers also support 12VDC fans. DC fans are controlled by decreasing voltage to the fan, causing the fan to spin slower as less voltage is provided. However, DC-powered fans may stall if the voltage provided is below the fan's minimum threshold for operation.

4. PWM/DC Fan Headers

    These headers may be used with both DC and PWM fans, and may be controlled via Smart Fan or manually within the BIOS.

5. Pump Headers (3A)

    These headers are designed for use with AIO coolers and pumps designed for PC watercooling. This header provides up to a solid 3A of power to the connected device, helping to avoid a common issue where devices may not be recognized due to insufficient power. These headers may be controlled via Smart Fan or manually from within the motherboard BIOS.

6. DDR5 Memory Slots

    The memory slots support up to four 288-pin DDR5 DIMMs in Dual-Channel mode. Dual-Channel mode requires installing two or four sticks of supported memory. Using only one stick of memory will lower the board to Single-Channel mode, which may significantly lower performance. 128GB of RAM is supported in a 4x32GB configuration. At the time of this manual's release, this

motherboard officially supports up to 7800MHz+ speeds. These speeds are not guaranteed, however, because Intel® only certifies the speed of the Raptor Lake-S memory controller up to 5600MHz, and Alder Lake-S memory controller up to 4800MHz (depending upon memory configuration).

7. 24-pin ATX power connector

The main power for the motherboard is located on the right side of the board (See Page 37 for more information about the connector). The 24-pin connector on the motherboard is directional and the tab on the connector must line up with the release clip from the male 24pin connector from the power supply. This connector provides the bulk of the power for all components.

8. 8-pin EPS Connector (Two available)

The +12V EPS provides the main power directly for the CPU (See Page 38 for more information about the connector). Carefully choose the correct power cable by consulting with the installation manual for your power supply. Although PCIe and EPS cables appear similar, they are wired differently and attaching the wrong connector may cause damage to the motherboard or prevent the board from turning on.

Only one of the two connectors needs to be installed for basic usage (either connector is fine). A second EPS connector should be installed for extreme overclocking, but there is nothing wrong with installing both connectors. Alternatively, if no power cable is connected or detected, the system will not POST and will hang at POST code "C."

9. Supplemental PCIe 6-pin Power Connector

The 6-pin PCIe connector at the bottom of the motherboard provides dedicated power to the PCIe x16 slots, augmenting the +12V power provided by the 24-pin and power directly to the GPU (See Page 37 for more information about the connector).

This connector is optional for single VGA solutions, but is recommended for mGPU configurations, and dual-processor video cards.

10. Intel® SATA 6Gb/s Ports

The Intel® Z790 PCH has an 8-port SATA 6Gb/s controller (See Page 47 for more information). This controller supports SSDs, HDDs and various types of optical devices (CDROM, DVDROM, BD-ROM, etc). The controller also supports NCQ, TRIM, hot plug capability, and RAID levels 0/1/5/10.

11. M.2 Socket 3 Key-M 80mm (M.2_1, M.2_2, and M.2_3)

> M.2 is an SSD form factor standard, which uses up to four PCIe lanes and utilizes up to Gen4 speeds. Most popularly paired with NVMe SSDs, this standard offers substantially faster transfer speeds and seek time than SATA interface standards. All M.2 devices are designed to connect via a card-bus style connector – rather than a dedicated data cable and power cable.

> This slot supports device lengths of 80mm and 42mm.

12. PCIe Slot x16/x8*

> Raptor Lake-S and Alder Lake-S processors have 20 PCIe lanes available for routing. When a single PCIe device is installed in PE1, the CPU will allocate up to x16 PCIe Gen5 lanes. If PCIe devices are installed in both x16 slots, both lanes will operate at x8/x8 speeds.

> * Please see the description for Physical (length) vs Electrical (lanes) on Page 21.

13. PCIe Slot x8*

> Raptor Lake-S and Alder Lake-S processors allocate up to 8 PCIe lanes on PE3 for routing. When a PCIe device is installed in PE3, the CPU will allocate up to x8 PCIe Gen5 lanes. If PCIe devices are installed in both x16 slots, both lanes will operate at x8/x8 speeds.

> * Please see the description for Physical (length) vs Electrical (lanes) on Page 21.

14. PCIe Slot x4*

> PCIe x4 is a smaller form-factor PCIe card slot. These can be used for low-bandwidth products, such as a PCIe SSD card, capture card, audio card, etc.

> This slot is limited to a maximum of x4 Gen4 PCH lanes.

> * Please see the description for Physical (length) vs Electrical (lanes) on Page 21.

15. Power Button

> This is an onboard power button, and may be used in place of, or in conjunction with, a front panel power button wired to the board.

> Open-air or test bench chassis are best served by using the onboard power because it removes the need to wire a Power/Reset button.

16. Reset Button

> This is an onboard system reset button, and may be used in place of, or in conjunction with, a front panel system reset button wired to the board.

> Open-air or test bench chassis are best served by using the onboard power because it removes the need to wire a Power/Reset button.

17. Multi-function Display

This is a four-digit Power On Self-Test ("POST") code reader, which displays in sets of 7-segment LEDs. The display can show the characters 0-9, and A-F.

POST is the motherboard's self-test to verify operational status. During POST, the left set of LEDs will display the various codes as each motherboard segment is analyzed, and will stop or repeatedly cycle if an error is detected. The POST codes are listed in the troubleshooting section on Page 113.

After the system boots, these same set of LEDs can be set to display additional temperatures or voltages. Detailed configuration instructions for the Multi-function Display Indicator are provided on Page 110.

18. USB 3.2 Gen1 Header

The USB 3.2 Gen1 header is used to connect an additional USB interface plug to the motherboard. These will function similarly to the USB 3.2 Gen1 ports found on the motherboard's rear I/O hub, but can also be used for a front panel USB device or auxiliary ports that mount in the card slots.

USB 3.2 Gen1 standard is 900ma @ 5V for unpowered devices. If your USB device requires more power, it is recommended to attach a powered USB Hub.

Note: USB 3.2 Gen1 is more commonly referred to as USB 3.0.

19. USB 3.2 Gen2 Type-C Header

The USB 3.2 Gen2 header is used to connect an additional USB interface plug to the motherboard. These will function similarly to the USB 3.2 Gen2 Type-C port sometimes found on a motherboard's rear I/O hub, but can also be used for the chassis' front panel USB, auxiliary ports that mount in the card slots, and certain devices that directly connect to the header. The USB 3.2 Gen2 Header on the Z790 CLASSIFIED is a shielded USB 3.2 Gen2 Header that supports up to 10Gb/s with USB 3.2 Gen2.

This USB 3.2 Gen2 Header has a power limit of 3000ma (3A) @ 5V.

20. USB 2.0 Headers

The USB 2.0 headers are used to connect additional USB interface plugs to the motherboard. These will function similarly to the USB 2.0 ports found on the motherboard's hardwired I/O hub, but these can also be used for the chassis' front panel USB, auxiliary ports that mount in the card slots, and certain devices that directly connect to the header.

USB 2.0 standard is 500ma @ 5V per port (header total is 1000ma) for unpowered devices. If your USB device requires more power, it is recommended to attach a powered USB Hub.

21. Front Panel Audio Connector

    This connector is required for recording and/or playback via the audio connectors on the front of your chassis. This header uses the standard "HD Audio" jack. Some chassis may provide two headers: one labeled HD Audio, and one labeled AC'97. AC'97 cables are **<u>not</u>** compatible with this header on the Z790 CLASSIFIED.

22. Front Panel Header Connectors

    The Front Panel Connectors include the Power Switch, Power LED, Reset Switch, and HDD LED. The Power and Reset switches only need to be bridged for a moment to turn on/reset the device, such as with a flat-head screwdriver by simultaneously touching the + and - posts.

    The Power LED will power on with the system, indicating the system is on and can blink in conjunction with CPU activity.

    HDD LED blinks during access to SATA devices, but not M.2 SSDs.

23. Temperature Sensor Header

    This 2-pin header, labeled JEC2, allows a thermistor cable to provide temperature data to the motherboard, which can be viewed in the BIOS. These cables are commonly used with custom watercooling loops to monitor water/coolant temperature, or with sensors mounted in a chassis to monitor ambient temperature. For the pinout of this sensor, go to Page 40.

24. BIOS Selector Switch

    This switch toggles the active BIOS chip. This board has 3 BIOS chips as a permanent fixture. Each chip holds only the settings and profiles that have been saved to the BIOS chip while active. This allows you to swap between three different BIOS versions, configurations, and settings, if you wish.

25. CMOS Battery

    The CMOS battery backup provides uninterruptable power to the BIOS to store its settings. These batteries typically last several years and rarely need to be replaced.

26. ProbeIt Header JAT1

    The ProbeIt header is a means of live monitoring several different system voltages in real-time with a multimeter. One terminal needs to connect to a ground wire and the other to the specific voltage you want to monitor.

From top to bottom, the function for the JAT1 connector: CPU Vcore, CPU VCCIN AUX, CPU VDD2, CPU 1.05V, CPU 1.8V, PCH 1.05V, PCH 0.82V, PCH 1.8V, VGT, GND.

27. PC Speaker

A small mono low-fidelity speaker, permanently attached to the motherboard. Its primary use is for debugging purposes. A POST beep may indicate a successful POST or various tones for USB initialization, while other beeps may indicate an issue during the POST process. Please see Page 112 for more details.

28. BIOS SafeBoot Button

Pressing this button while the system is running will reboot the motherboard directly into the BIOS without clearing CMOS. This feature is very useful for situations where the motherboard is unable to complete boot due to a failed overclock and the user does not want to erase the previous settings used.

29. USB to SPI for BIOS Flash

This USB port is designed to connect directly to the motherboard to allow the motherboard BIOS to be flashed, even if no CPU is installed. For more information on how to flash your BIOS using this method, please see Page 102.

30. ARGB LED Controller Header

The ARGB header is a 3pin 5V. header with a current limit of 2A; anything above 2A will trigger overcurrent protection and lock at 2A. This header provides RGB lighting configuration via EVGA ELEET X1 within Windows, and supports up to 125 LEDs. Please see Page 42 for header specifics, and Page 94 for control options in ELEET X1.

31. Rear Panel I/O (Figure 2)

This is the section referred to as the I/O Hub. This panel contains the hardwired USB, Audio, and Ethernet connections. Please see Page 14 for a component level breakdown.

* PCIE slots are referred to by an "x" followed by a number, such as "16", which can refer to one of two things:

- The slot's mechanical design (the physical length on the motherboard)
- The slot's electrical design (the number of PCIe lanes available to the slot from the CPU, PCH, or both).

Motherboard specs will often reference both the length of a PCIe slot and the number of available lanes. While it is easy to visually determine the slot length, you cannot determine the bandwidth available by sight alone. Generally, the PCIe slot length also determines the maximum number of lanes available to the installed device.

PCI-Express was designed to be universal. For example, you can install x1 form-factor devices, such as sound cards or USB controllers, into an x16 length slot. The x1 device will be capped at x1 bandwidth, regardless of the slot's electrical characteristics.

On the other hand, shorter PCIe slots may limit the types of devices you can install. For example, a motherboard may have an x4 length slot. If the end of the slot is closed, then you will only be able to install x4 length devices, or shorter. If the x4 length slot is open, you can install a longer PCIe device, such as a full-length graphics card. However, the maximum bandwidth of the slot will still be limited to x4, in this example.

Lastly, a PCIe x16 slot with Gen5 x16 lanes means that the slot is theoretically capable of providing full Gen5 bandwidth. It is unlikely, that you will achieve this, however. PCIe devices work as an on-demand type of component, and only utilizes bandwidth necessary to accomplish its task. Even gaming and compute applications rarely push graphics cards to the upper limits of PCIe Gen4 bandwidth at the time of print.

To simplify the mechanical compatibility of the Z790 CLASSIFIED, this motherboard supports:

- PE1 – supports x16 PCIe devices or shorter.
- PE2 – (with M.2 heatsink installed) supports x4 PCIe devices or shorter.
- PE2 – (without M.2 heatsink installed) supports x16 PCIe devices or shorter*.
- PE3 – supports x16 PCIe devices or shorter.

For the electrical compatibility of the Z790 CLASSIFIED, please see Page 23.

*The PE2 slot can support PCIe devices up to x16-length if the M.2 heatsink is removed. However, use of an M.2 device with a tall pre-installed heatsink in the M.2_3 slot may block installation of devices longer than x4 length.

Card Slots

The Z790 CLASSIFIED features two x16 PCIe slots, one x4 PCIe slot, three Socket 3 Key-M M.2 80mm slots (M.2_1/M.2_2/M.2_3), and a vertical Socket 1 Key-E M.2 (Contains the WiFi/BT module).
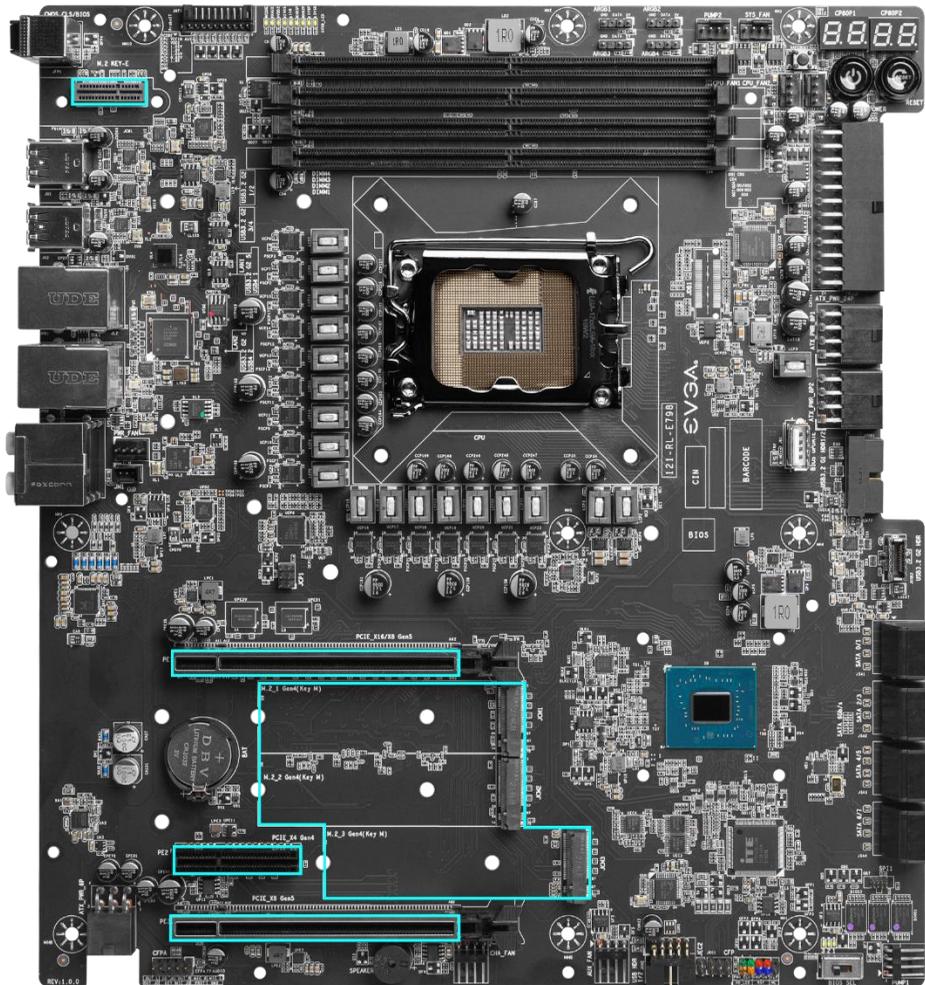
*Note: The M.2 Key-M 80mm slots are accessible only after removing the heatsink between PCIe slots PE1 and PE3. The M.2 Key-E 32mm slot is accessible only after removing the cover over the rear panel connectors.

PCIe Slot Breakdown

PCIe Lane Distribution

- ❑ PE1 – x16/x8 (Gen5, x16 lanes from CPU, x8 shared with PE3)
- ❑ PE2 – x4 (Gen4, x4 lanes from PCH)
- ❑ PE3 – x8 (Gen5, x8 lanes from CPU)

M.2 Slot Breakdown

M.2 Lane Distribution

- ❑ M.2 Key-M (80mm, Top, M.2_1) – Gen4 x4 from CPU
  - o This slot supports PCIe M.2 SSDs / Intel® Optane.
- ❑ M.2 Key-M (80mm, Middle, M.2_2) – Gen4 x4 from Z790 PCH
  - o This slot supports PCIe M.2 SSDs / Intel® Optane
- ❑ M.2 Key-M (80mm, Bottom, M.2_3) – Gen4 x4 from Z790 PCH
  - o This slot supports PCIe M.2 SSDs / Intel® Optane
- ❑ M.2 Key-E (32mm) – Gen1 x1 from Z790 PCH
  - o This slot is pre-installed with the EVGA Wi-Fi/BT Module

Preparing the Motherboard

Installing the CPU

> Note: EVGA strongly recommends that you turn off your power supply and discharge power by pressing the power button on your motherboard before CPU installation. This ensures the motherboard will use the correct startup procedure for all onboard devices. If this step isn't followed, your system may require additional reboots to boot successfully.

Be very careful when handling the CPU. Hold the processor only by the edges and do not touch the bottom of the processor.

> Note: Use extreme caution when working with the CPU to avoid damaging the pins in the motherboard's CPU socket!
>
> Do not remove the socket cover until you have installed the CPU.

Use the following procedure to install the CPU onto the motherboard.

1. Unhook the socket lever by pushing the lever towards the socket and down.

2. Pull the socket lever back and gently lift the load plate to open the socket. Do not touch or drop anything into the socket. Otherwise, you may damage the board socket and/or CPU pins, which may void your warranty.
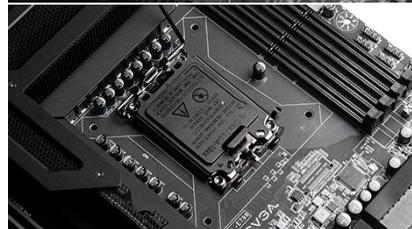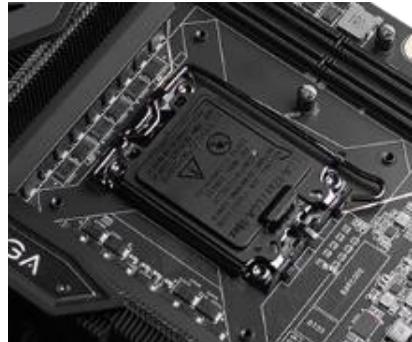
3. Align the notches on the CPU to the notches in the socket, and lower the processor straight down into the socket.

> Note: The gold triangle key on the CPU should match the triangle key on the load plate.
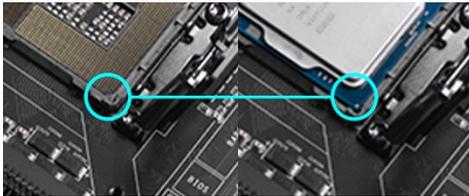
> Note: Make sure the CPU is fully seated and level in the socket.

4. Lower the load plate so that it is resting on the CPU, and make sure to slide it under the lever's loop.

5. Remove the plastic protective socket cover by pulling it straight up and away from the socket.

6. Carefully lock the lever back into place by lowering it down to the hook, then push the lever towards the socket and down under the hook.

> Note: After removing the CPU socket cover, it is recommended to store it in case you ever need to transport your motherboard. If you ever remove the CPU, it is highly recommended to reinstall the socket cover.

Installing the CPU Cooling Device

There are many different cooling devices that can be used with this motherboard. Please follow the instructions included with your cooling assembly.

Installing System Memory (DIMMs)

Your Z790 CLASSIFIED has four (4) 288-pin DDR5 memory slots, and supports:

- Dual-channel non-ECC DDR5 memory.
- Up to 32GB per DIMMs.
- Up to 7800MHz+(OC) speeds.

At least one memory slot must be populated for the board to boot and operate.

Use the following procedure to install your memory:

1. Press both module clips outward to unlock a DIMM slot.

Z790 CLASSIFIED RAM Slot Fill Order				
	Slot 1	Slot 2	Slot 3	Slot 4
1 DIMM	N/A	X	N/A	N/A
2 DIMM	N/A	X	N/A	X
3 DIMM	X	X	N/A	X
4 DIMM	X	X	X	X

2. Align the memory module to the DIMM slot and gap spacing, then insert the DIMM into the slot by pressing straight down.

3. The plastic clips on each end of the DIMM slot should automatically lock the DIMM into the connector. If not, carefully snap the clips into place on each side of the DIMM.

Note: On a DDR5 motherboard with two-DIMMs installed, the memory controller on most Raptor Lake-S / Alder Lake-S CPUs is officially supported up to a frequency of 5600MHz and 4800MHz, respectively, depending on the memory configuration. Achieving memory speeds above the CPU's default speed may require manual setting of the memory timings, frequency and voltages and/or overclocking of the CPU.

Refer to the memory manufacturer specifications for the recommended memory timings. Overclocking support may be found on our community forums: https://forums.evga.com/

Installing the I/O Shield

Your motherboard is pre-installed with an I/O shield, which is used to prevent dust and foreign objects from coming into contact with internal components. Ensure that the I/O shield remains on the inside of the chassis while you are fastening the motherboard to the case.

Installing the Motherboard

Proper motherboard installation involves many factors. Before installing the motherboard into your chassis, review how much space you have to install different components or cables to the motherboard, and whether it may be easier to do so prior to lowering the motherboard into the chassis for the final time. Once the motherboard is fastened to the chassis, the following steps may become more difficult:

- CPU installation -
    o Consider installing your CPU prior to installing your motherboard. As a necessary step, this will not get easier once you install your motherboard into a chassis.
- CPU cooler installation -
    o Depending on the cooling assembly, a backplate or other hardware may need to be installed prior to fastening the board.
    o Some cooling assemblies are significantly harder to install after installing the motherboard (for example, push-pin type assemblies).
    o Bulky coolers can make it much more challenging to both fasten the motherboard and install other cables/components after installation.
- DIMM module installation -
    o If you have a bulky CPU cooler, you may have more limited access to the DIMM slots.
- Front panel connectors, such as USB, Power SW, Reset SW, etc. -
    o Due to chassis space constraints, it is sometimes easier to connect these to the motherboard before installation.
- M.2 SSD installation -
    o M.2 installation requires removing a heatsink and fastening your SSD to the board.

Although many modern cases attempt to make these installation steps simpler for the owner, we recommend to review your chassis installation guide first. After, we suggest taking a moment to review the quick installation guide included with your motherboard, and then proceed to install the motherboard and everything else.

Securing the Motherboard into a System Case

Please review the installation manual included with your chassis. These instructions should direct you to install standoff screws to mount the motherboard to prevent grounding, and align the board with the rear I/O opening in the chassis. Ensure that all standoffs are fully tightened prior to mounting the motherboard.

1. Carefully lower the motherboard onto the standoffs located inside the chassis.

2. Align the motherboard mounting holes with the standoffs.

3. Make sure the pre-installed I/O plate seats within the rear opening of the chassis, and remains on the inside of the chassis.

4. (Optional) If using a CPU air cooler, ensure that the fan assembly aligns with the chassis vents per the manufacturer's instructions.

5. Secure the motherboard with nine (9) screws (See next page for mounting hole locations). Ensure that each screw is lined up with and fastened to its corresponding standoff under the board. Double-check alignment while fastening to avoid stripping the screws.

   Tip: If you have difficulty fastening some of the screws, especially near the I/O opening, unfasten all screws so that they are loose, but still in-place. This will hold the board in place as you properly align each screw. Once all screws are properly threaded, remember to go back and fasten the rest of the screws.

6. See the picture on the next page for the locations of the mounting holes for the Z790 CLASSIFIED.
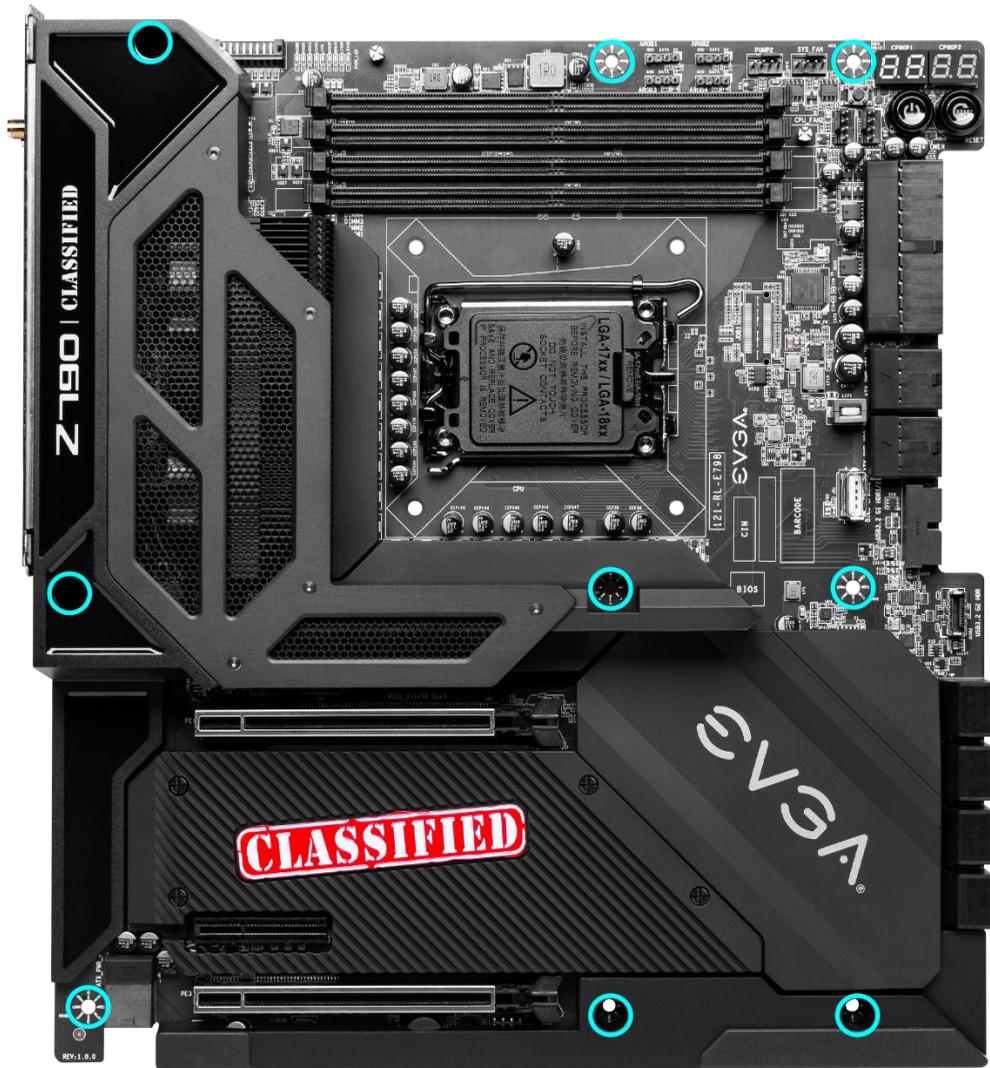
1. All safe locations to secure the board to a standoff are circled in blue.
2. The motherboard should still have 1-2mm of movement before you fully-fasten the screws. Use this this tolerance to help mount graphics cards or tight-fits with other components.
3. Once the board is properly aligned, be sure to fully-fasten the board to the chassis before proceeding.

Installing M.2 Devices

Installing M.2 Key-M Socket 3 Devices

Installing an M.2 device to the motherboard requires a few extra steps compared to other drives or PCIe slot-based devices. M.2 devices used on this motherboard - Socket 3 (for SSDs) and Socket 1 (for WiFi/Bluetooth) – are installed differently.

Below are images from an installation of an SSD on a Socket 3 Key-M 80mm slot of the Z790 CLASSIFIED. This motherboard has three (3) 80mm M.2 slots, all covered by a heatsink to provide additional cooling.

1. **Remove the M.2 Cover**

- Remove the heatsink. The heatsink is secured by four (4) screws.
- Now visible are three pre-installed thermal pads on the M.2 slots. Three screw/standoffs are included with the MB accessories.
- The screw/standoffs can be used to install 80mm or 42mm M.2 devices.
- Each screw/standoff set includes a small screw to fasten the M.2 device and a hollow standoff that can be installed/uninstalled with a screwdriver to move the standoff to a different interval length.

2. **Steps For Installing M.2 Devices**

When installing the M.2 device, install the gold fingers at a slight angle into the slot, and lower it so that it rests on the thermal pad.

For 80mm M.2 devices:

- The screw/standoffs are included with your MB accessories.
- Remove the inner screw with a screwdriver and fasten the standoff portion to the 80mm interval on the motherboard.
- Remove the plastic cover on the thermal pad from your intended M.2 slot.
- Install the M.2 device and use the inner screw to secure the device against the standoff.

For 42mm devices:

- If you have a 42mm M.2 device, peel back the thermal pad cover and remove sufficient length of the thermal pad to uncover the 42mm mounting hole.
- Remove the inner screw with a screwdriver and fasten the standoff portion to the motherboard to the 42mm interval.
- Install the M.2 device and use the screw to secure the device.

Please carefully check your M.2 devices for proper installation before moving on to the next step. If the M.2 device is not installed properly, the heatsink covers cannot be fully fastened.

3. **Final Step – Reinstall the Z790 CLASSIFIED Cover for M.2 Devices**

Once all SSDs have been installed, reinstall
the M.2 heatsink and fasten all screws. If
the larger heatsink is not fully fastened, you
may have difficulty installing your PCIe
device in the PCIe slots.

For further M.2 setup instructions, please see Page 50.

Tested CPU

CPU	Core/Thread Count	Frequency	PCI-E Lanes
Raptor Lake-S			
Core ™ i9-13900K	8+16 Cores (32 Threads)	3.0 GHz P-Core	20
Core ™ i9-13900KF	8+16 Cores (32 Threads)	3.0 GHz P-Core	20
Core ™ i7-13700K	8+8 Cores (24 Threads)	3.4 GHz P-Core	20
Core ™ i7-13700KF	8+8 Cores (24 Threads)	3.4 GHz P-Core	20
Core ™ i5-13600K	6+8 Cores (20 Threads)	3.5 GHz P-Core	20
Core ™ i5-13600KF	6+8 Cores (20 Threads)	3.5 GHz P-Core	20
Alder Lake-S			
Core ™ i9-12900KS	8+8 Cores (24 Threads)	3.4 GHz P-Core	20
Core ™ i9-12900K	8+8 Cores (24 Threads)	3.2 GHz P-Core	20
Core ™ i9-12900T	8+8 Cores (24 Threads)	3.2 GHz P-Core	20
Core ™ i9-12900	8+8 Cores (24 Threads)	3.2 GHz P-Core	20
Core ™ i9-12900KF	8+8 Cores (24 Threads)	3.2 GHz P-Core	20
Core ™ i7-12700K	8+4 Cores (20 Threads)	3.6 GHz P-Core	20
Core ™ i7-12700F	8+4 Cores (20 Threads)	3.6 GHz P-Core	20
Core ™ i7-12700T	8+4 Cores (20 Threads)	3.6 GHz P-Core	20
Core ™ i7-12700KF	8+4 Cores (20 Threads)	3.6 GHz P-Core	20
Core ™ i5-12600K	6+4 Cores (20 Threads)	3.7 GHz P-Core	20
Core ™ i5-12600KF	6+4 Cores (20 Threads)	3.7 GHz P-Core	20
Core ™ i5-12400	6 Cores (12 Threads)	3.4 GHz P-Core	20
Core ™ i5-12400F	6 Cores (12 Threads)	3.4 GHz P-Core	20
Core ™ i3-12300	4 Cores (8 Threads)	3.5 GHz P-Core	20
Core ™ i3-12100F	4 Cores (8 Threads)	3.3 GHz P-Core	20
Pentium® G7400	2 Cores (4 Threads)	3.7 GHz P-Core	20
Pentium® G6900	2 Cores (2 Threads)	3.4 GHz P-Core	20

For a list of tested CPUs, please visit https://www.evga.com/support/motherboard/ and select the EVGA Z790 CLASSIFIED from the list.

Tested M.2 Key-M

PCIE 4.0 INTERFACE	
WD	Black SN850 WDS200T1X0E-00AFY0 2TB PCIE4.0 NVME M2
Samsung	980 Pro MZ-V8P500 500G PCIE4.0 NVME M2
PCIE 3.0 INTERFACE	
ADATA	ASX8000NP-256GM-C 256G M.2 PCIE
Crucial	CT500P1SSD8 P1 NVME NVME M.2 500G
CORSAIR	MP500 CSSD-F240GBMP500 240G PCIE3.0 NVME M2
INTEL®	600P SERIES SSDPEKKW512G7 M.2 512G PCIE
INTEL®	760P SERIES SSDPEKKW010T8 M.2 1TB PCIE
INTEL®	Intel® Optane Memory H20 with SSD HBRPEKNL0202A 32G Optane / 512G NAND
INTEL®	Intel® Optane Memory H20 with SSD HBRPEKNL0203A 32G Optane / 1T NAND
INTEL®	Intel® SSD 665P SSDPEKNW020T9 2TB PCIE3.0 NVME M2
INTEL®	Intel® SSD 670P SSDPEKNU010TZ 1GB PCIE3.0 NVME M2
Kingston	SKC1000240G
Kingston	SHPM2280P2H/240G
PLEXTOR	PX-128M8PeG M.2 128G PCIE
Samsung	MZ-V7P512 970 PRO
Samsung	MZ-V7E250 970 EVO
Samsung	MZ-V6P512 960 PRO
Samsung	MZ-V6E250 250G 960EVO
Samsung	MZ-VKV512 950 PRO
Samsung	MZ-HPU128T/004 128G XP941
Samsung	MZ-VPW2560 256G SM961
Samsung	MZ-VPV2560 256G SM951 NVME
Samsung	MZ-HPV1280 128G SM951
Samsung	MZ-VLB2560 256G PM981
Samsung	MZ-VLW2560 256G PM961
Synology	SNV3500-400G PCIE3.0 NVME M2 22110
TOSHIBA	THNSN5256GPU7 M.2 256G PCIE
WD	PC SN750 WDS100T3X0C-00SJG0 1T NVME M2
WD	PC SN700 WDS100T2X0C-00L350 1T NVME M2
WD	PC SN520 SDAPNUW-512G-1006 512G NVME M2
WD	Blue SN550 WDS100T2B0C-00PXH0 1TB PCIE3.0 NVME M2
WD	Blue SN500 WDS500G1B0C-00S6U0 500G PCIE3.0 NVME M2
WD	Black SN750 WDS400T3X0C-00SJG0 4T NVME M2

Tested M.2 Key-E

M.2 Key-E WIFI	
INTEL	8260NGW
INTEL	9260NGW
INTEL	9560NGW
Killer	1550
INTEL	AX200
INTEL	AX201
INTEL	AX210
INTEL	AX211

Connecting Cables

Note: The following images do not necessarily visually represent their respective headers on the EVGA Z790 CLASSIFIED. Rather, this section is designed to provide basic information about important connectors and headers pinouts.

The locations of these components can be found in the Component Legend on Pages 12-14.

This section takes you through all the necessary connections on the motherboard. This will include:

❑ Power Connections

  24pin ATX power

  EPS 8-pin 12V power

  6-pin PCIe power

❑ Internal Headers

  Front Panel connectors (Power/Reset/LEDs)

  Thermal Header

  PWM Fan Headers

  ARGB LED Header

  USB 2.0 Header

  USB 3.2 Gen1 Header

  USB 3.2 Gen2 Type-C Header

  USB to SPI Header (for flashing BIOS)

  Audio Header

  SATA Ports

❑ Rear I/O Panel

24pin ATX Power (ATX_PWR_24P)

24-pin Main Power
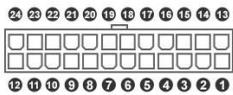
1	+3.3V	7	GND	13	3.3V	19	GND
2	+3.3V	8	PWROK	14	-12V	20	RSVD
3	GND	9	+5V_AUX	15	GND	21	+5V
4	+5V	10	+12V	16	PS_ON	22	+5V
5	GND	11	+12V	17	GND	23	+5V
6	+5V	12	+3.3V	18	GND	24	GND

ATX_PWR_24p is the main power supply connector located along the upper-right edge of the board. Make sure that the power supply cable and pins are properly aligned with the connector on the motherboard. Firmly plug the power supply cable into the connector and make sure it is secure.

The Z790 CLASSIFIED motherboard uses a right-angle 24pin ATX connector.

6-pin PCIe

ATX_PWR_6P
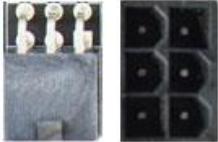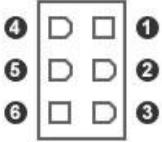
1	+12V
2	+12V
3	+12V
4	GND
5	GND
6	GND

The 6-pin PCIe connector present on the motherboard provides additional power to the PCIe slots, rather than pulling it all from the 24-pin main power. It is advised to plug in this connector when using multiple VGA devices or heavy overclocking, especially with higher-end graphic cards.

EPS 8-pin 12V Power (PWR 8P)
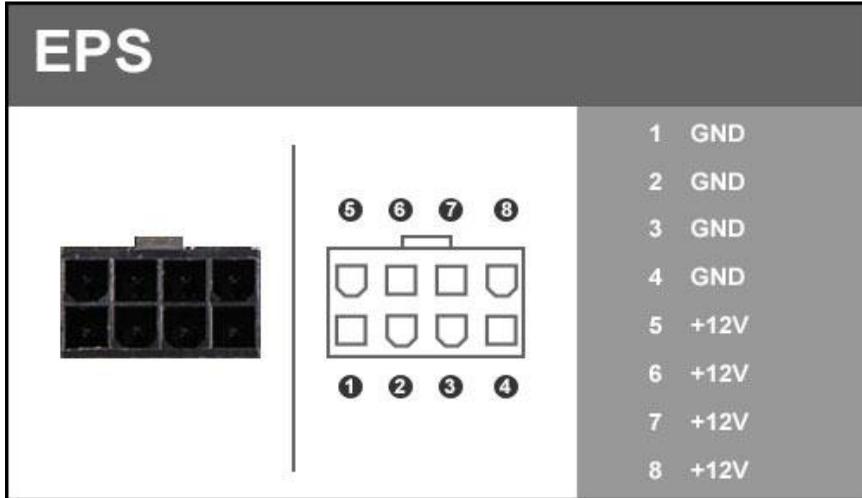
EPS PWR 8P, the 8-pin ATX 12V power connector provides power for the CPU. Align the pins to the connector and press firmly until seated. The secondary EPS is optional for improved overclocking, but is not necessary for normal PC use, including gaming. Please remember to make sure that the tab on the EPS socket is aligned with the release clip on the cable.

NOTE: If you can install the cable even though the tab and release clip are on opposite sides, then you are using a PCIe 8-pin cable and will likely damage your motherboard if powered on. Please review your power supply's installation manual to verify which cables/connectors are designed for the CPU power.

Front Panel Header
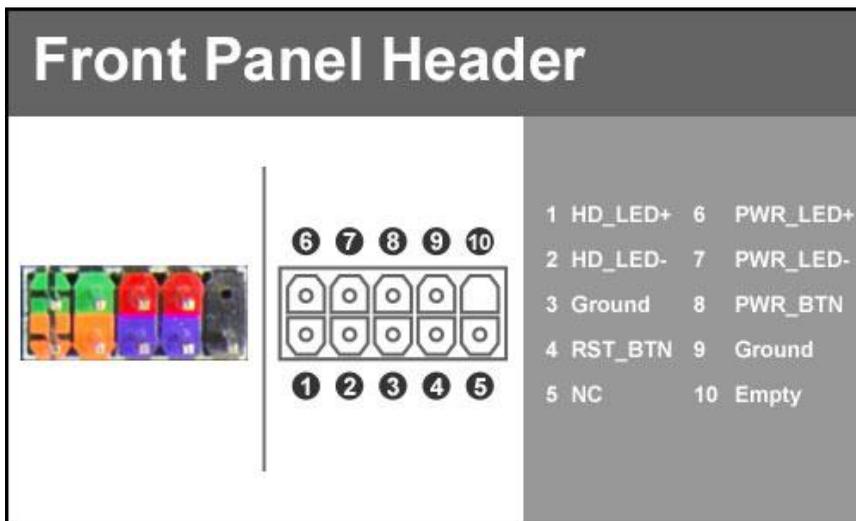
The front panel header on this motherboard is used to connect the following four cables:

❑ **PWRLED**
Attach the front panel power LED cable to these two pins of the connector. The Power LED indicates the system's status. When the system is powered on, the LED will be on.

❑ **PWRSW**
Attach the power button cable from the chassis to these two pins. Pressing the power button on your chassis turns the system on and off, in place of the onboard button.

❑ **HD_LED**
Attach the hard disk drive indicator LED cable to these two pins. The HDD indicator LED indicates the activity status of the hard disks.

❑ **RESET**
Attach the Reset switch cable from the front panel of the case to these two pins.

Note: Some system cases may not have all four cables. Be sure to match the name on the connectors to the corresponding pins.

Thermal Sensor Header
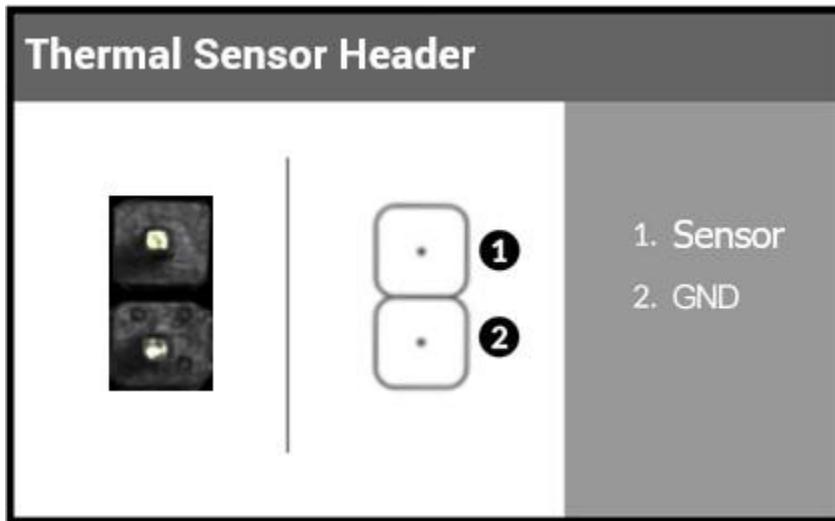
The external thermal sensor header is a 2-pin header that allows you to connect a thermistor cable to monitor temperatures that are not natively monitored by the motherboard. This header consists of a "Sensor" and a ground pin. Once connected, the information derived from the sensor will be viewable in BIOS and Windows.

Fan Header
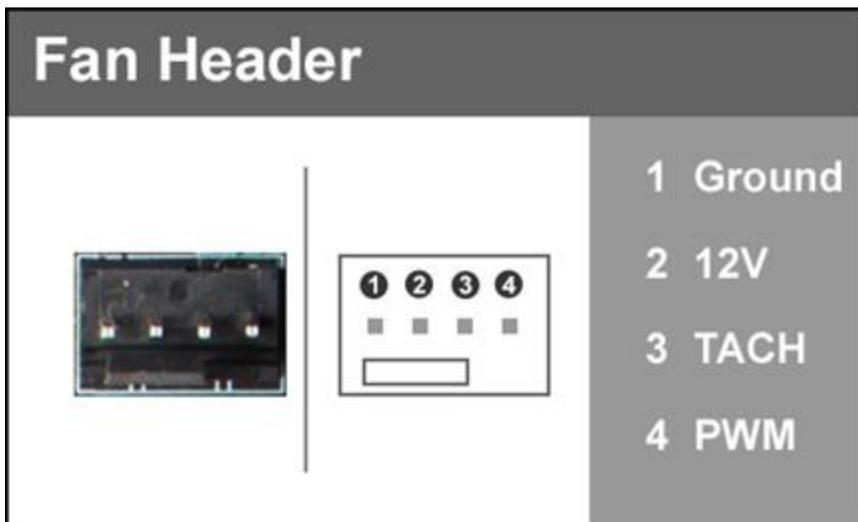
The Z790 CLASSIFIED uses 4-pin fan headers, which are backwards compatible with 3-pin fan connectors. Fans may be controlled by PWM or DC controls. The headers have an absolute safe power limit of 2 Amp @ 12 Volts (24 Watts). These headers are for your CPU heatsink and chassis cooling fans.

The Pump header on the motherboard supports up to 3 Amp @ 12 Volts (36 Watts), and is primarily designed for watercooling pumps or AIO pumps.

All pump headers may be controlled in the motherboard BIOS, and each header may be controlled as a Smart Fan or a manual speed.

ARGB Header
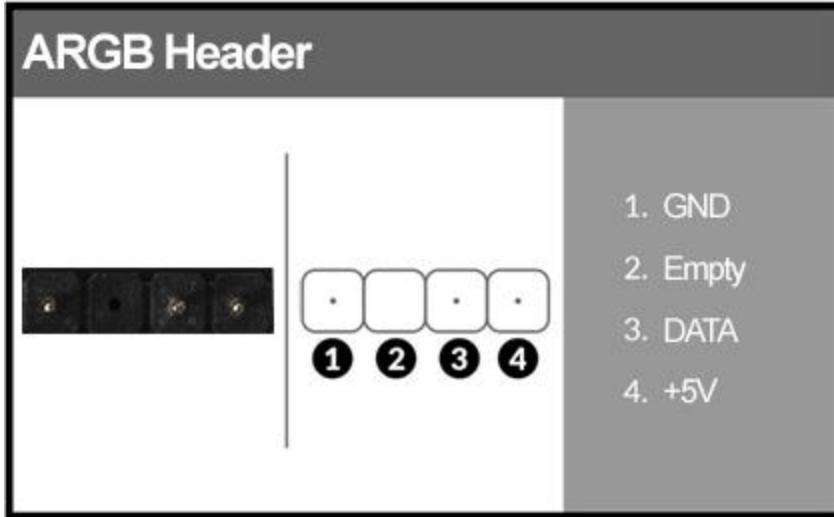
This header and pinout is used for increased control and options over addressable RGB LED strips or devices connected to this header, compared to a standard 12V. RGB Header. This header supports up to a maximum of 2 Amps @ 5 Volts (10 Watts) or up to 125 LEDs. This will add control options through EVGA ELEET X1 for controlling RGB LEDs.

The EVGA Z790 CLASSIFIED lists these headers as "ARGB1" through "ARGB4" on the motherboard.

USB Headers

This motherboard contains USB 3.2 Gen2 and USB 3.2 Gen1 ports that are accessible on the rear panel of the chassis.

The Z790 CLASSIFIED contains 1x 20pin internal header, which can support one USB3.2 Gen2 Type-C front-panel connector or device.

USB3.2 Gen2 Header

P1. VBUS	P11. VBUS
P2. TX1+	P12. TX2+
P3. TX1-	P13. TX2-
P4. GND	P14. GND
P5. RX1+	P15. RX2+
P6. RX1-	P16. RX2-
P7. VBUS	P17. GND
P8. CC1	P18. D-
P9. SBU1	P19. D+
P10. SBU2	P20. CC2
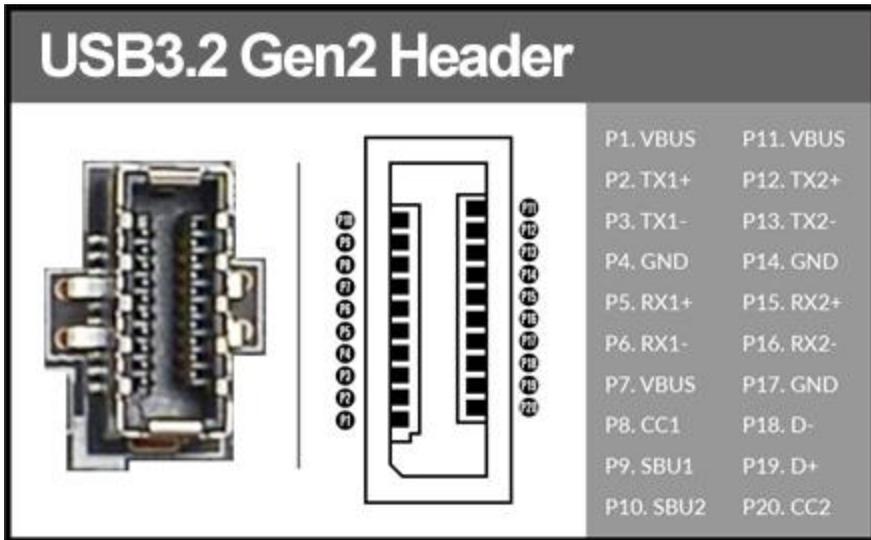
The motherboard also contains 1x 19-pin internal header connectors onboard that can be used to connect an optional external bracket or device containing up to two (2) USB 3.2 Gen1 ports.

USB3.2 Gen1 Header

Pin	Signal	Pin	Signal
1	VBUS	11	P2_DP
2	SSRX_P1_DN	12	P2_DN
3	SSRX_P1_DP	13	GND
4	GND	14	SSTX_P2_DP
5	SSTX_P1_DN	15	SSTX_P2_DN
6	SSTX_P1_DP	16	GND
7	GND	17	SSRX_P2_DP
8	P1_DN	18	SSRX_P2_DN
9	P1_DP	19	VBUS
10	NC		
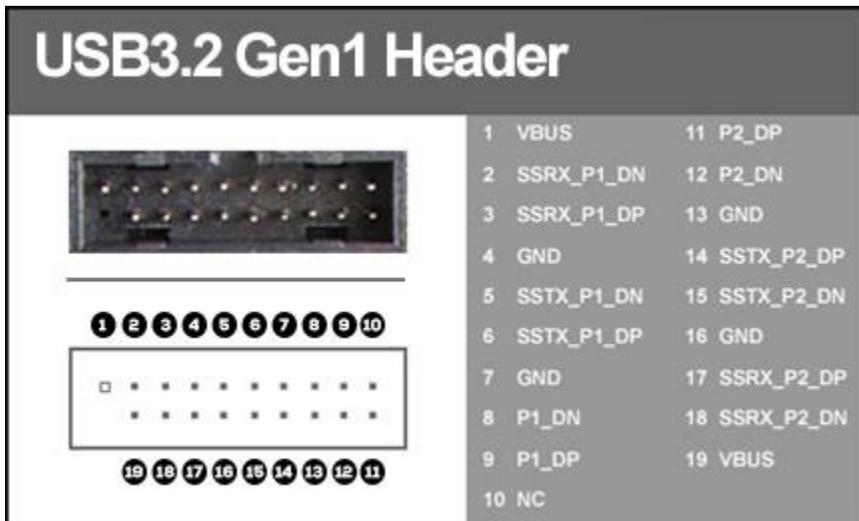
❑ Please note that these headers are often referred to as USB 3.0 internal headers, but the correct designation is USB 3.2 Gen1.

The motherboard contains 1x 9-pin internal header connector that can be used to connect an optional external bracket or devices containing up to two (2) USB 2.0 ports.

USB 2.0 Header
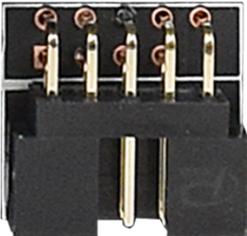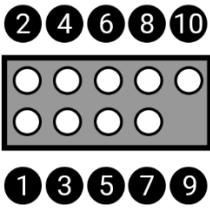
Pin	Signal
1	5V_Dual
3	D-
5	D+
7	GND
9	Empty
2	5V_Dual
4	D-
6	D+
8	GND
10	No Connect

The Z790 CLASSIFIED also features an onboard USB 2.0 port header, near the BIOS Select Switch. This header has a specific purpose – to allow you to flash the BIOS with a USB flash drive without an installed CPU. For more information on flashing the BIOS without a CPU, please see Page 102.

USB to SPI BIOS Flash
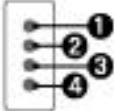
1. VCC
2. DATA -
3. DATA +
4. GND

Front Panel Audio Header

Front Audio Connector

Pin	Signal
1	PORT1_L
2	AUD_GND
3	PORT1_R
4	PRECENCE_J
5	PORT2_R
6	SENSE1_RETURN
7	SENSE_SEND
8	Empty
9	PORT2_L
10	SENSE2_RETURN
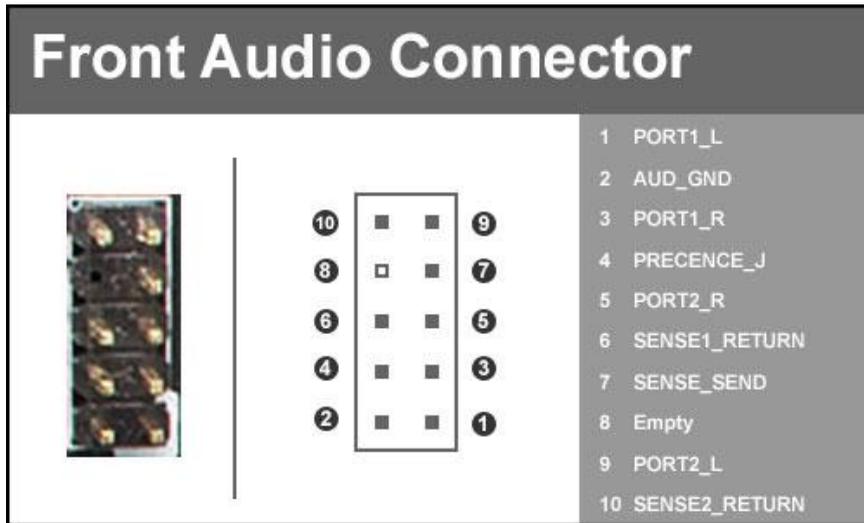
Front panel audio supports HD Audio for stereo/gaming headphones or 2.1 speakers, and a Mic.

Drive Headers (SATA)

SATA 6Gb/s is the current standard for an HDD/SSD interface. These ports provide the data interconnect for the motherboard and HDD/SSD via cable. Your drive still requires a separate power connection from your power supply.

Intel® SATA ports on this platform natively support full AHCI and RAID functions. RAID mode supports RAID levels 0, 1, 5, and 10 through the Intel® controller, and all ports retain full AHCI functionality in RAID mode.

See Page 58 for RAID levels supported and explanations for how they work.

Onboard and External Buttons

These onboard buttons include Reset CMOS, BIOS Update, RESET and
POWER buttons.

External Reset CMOS Button

Reset CMOS Button

The motherboard uses CMOS RAM
to store your BIOS configuration.
Press the Reset CMOS button shown
on the right to reset the BIOS back to defaults.

Use the Reset CMOS button to clear the BIOS before and after updating the
BIOS, and as a troubleshooting option when the motherboard fails to POST
(e.g. after installing new hardware, testing an unstable overclock, etc.).

BIOS Update Button

The BIOS Update button is an alternative option to update your motherboard
BIOS, in case you cannot update from within the BIOS or within Windows.
This option is convenient when you must update your BIOS for compatibility
prior to installing a new CPU. See Page 102 for more details.

RESET and POWER Button

These buttons allow you to easily turn on/off the system. These buttons allow
for easy debugging and testing of the system during troubleshooting situations.

The POWER button has an integrated LED,
indicating the system's status. When the system
is powered on, the LED remains a solid red.

The RESET button has an integrated LED,
indicating the activity status of the hard disk
drives and will flicker accordingly.
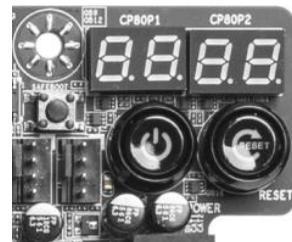
Power
Button

Reset
Button

First Boot

BIOS Update

When you power on the system for the first time (or after a BIOS update/reset) it may take a little longer than expected, and follow with a warning message on the screen reading "BIOS checksum error". This is completely normal.
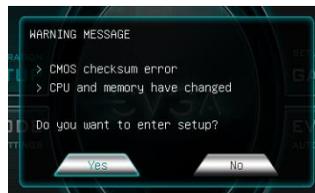
It's recommended to first check whether your motherboard has a BIOS update available. Go to https://www.evga.com/drivers, select the Motherboard tab, and select BIOS to see if there's an available BIOS for your board.

Download and unzip the file onto a thumb drive formatted for FAT32. Boot into your motherboard BIOS, go to the EXTRAS section, select "BIOS Update," and navigate to where the ".bin" file is stored. Press Enter to update.

DO NOT POWER OFF OR REBOOT THE SYSTEM DURING A BIOS UPDATE. THIS WILL LIKELY RENDER THE ACTIVE BIOS UNBOOTABLE

Once the BIOS is updated, you will be greeted with the same screen as before denoting a checksum error. Click "Yes" to go into the BIOS.

The Z790 chipset is natively designed for UEFI and Windows 11/10. However, Legacy Boot can be enabled in the Boot Menu if your older hardware is not compatible with UEFI.

Memory Setup

Use the arrow keys or your mouse to select the Memory Menu. You can view XMP Profile information at the top of this menu, although most memory kits only feature one profile. Select the "Memory Profiles" pulldown and select a XMP Profile. This will automatically set some basic memory information, such as speed, latency and voltage. You may set the memory speed manually, but the XMP Profile generally gets the memory running at the memory manufacturer's specification with little to no effort.

HDD/SSD/M.2 Setup

Select "Boot" from the menu list at the top. "Boot Option #1" should show the device where you intend to install your operating system, or where you already have an installed OS. During OS installation, you may prefer to set your installation media as Boot Option #1 and your HDD/SSD/M.2 as Option #2.

- SATA Drives

  If you are using multiple SATA drives with multiple OS installs (or installation media) and the system boots to the wrong device you have several options:

  1. One-time boot to a different device – Go to the Save & Exit menu. Devices that have an OS or installation media will be listed under Boot Override. Select a device and the motherboard will boot directly to it.
  2. Configure Boot each time you power on – Go to the Boot Menu. Set the "Always Show Boot Option" to On. After reboot, the motherboard will ask you to select your boot device at every startup.
  3. Designate your primary hard drive – This option can be configured in either UEFI or Legacy Boot mode. You must Save and Exit after making a change to the boot mode for the correct menu to appear.
      a. UEFI Boot Mode – Enter the UEFI Hard Disk Drive BBS Priorities. Select your preferred boot drive. Save and Exit.
      b. Legacy Boot Mode – Enter the Hard Disk Drive BBS Priorities. Select your preferred boot drive. Save and Exit.

- M.2 NVMe Devices

  After installing your M.2 device(s) into at least one of the three M.2 slots on the motherboard, enter the BIOS and enter the Advanced Menu. From there, select Onboard Device Configuration and make sure to enable any of the M.2 Key-M slots in-use.

Once your drives are configured in the BIOS, plug in your operating system installation medium (likely a USB disk), press F10 to save and exit, and Windows 11/10 should be able to boot to M.2 without issue.

Note Windows 11/10 should detect nearly all M.2 NVMe SSDs during installation. However, newly released and older devices may require specific drivers to be installed before Windows can detect the drive for installation. Please make sure to consult the manufacturer's instructions for your device before attempting to install Windows for the proper installation procedure.

M.2 SSD, PCIe SSD, and NVMe SSD Installation steps

M.2 devices can be connected via an M.2 card slot or through PCIe by using an M.2 to PCIe adapter. Some SSDs are designed to be installed in a PCIe slot to provide higher bandwidth than a SATA interface, such as the Intel® 750. NVMe devices are the current high-performance standard for M.2/PCIe SSDs.

Each M.2 and PCIe device requires a certain amount of bandwidth – in the form of lanes – to transfer data. These lanes can be provided by the CPU or the motherboard PCH. As a result, these devices sometimes share resources with other components on the motherboard, which may limit some hardware combinations. **PLEASE SEE CHART ON PAGE 23 FOR A BREAKDOWN OF SHARED RESOURCES**.

M.2 Physical Installation

1. Please see Page 30 for instructions how to physically install an M.2 device.

PCIe SSD Physical Installation

1. Install the SSD into any available PCIe slot with at least x4 Lanes available (Gen5 and Gen4 are preferred for better speed).
    a. The Z790 CLASSIFIED will support PCIe SSDs in all PCIe slots.
2. Attach the SSD's mounting bracket to the back of the case.
3. Review the installation manual for your SSD to see whether the SSD requires an external power connector. If no, then the SSD will be powered by the board.

BIOS Setup / Windows Installation for M.2/PCIe NVMe SSDs

- **Installation steps for a fresh install of Windows.**
    1. Power on the PC and enter the BIOS by tapping the Delete key repeatedly.
    2. Once in BIOS, navigate to the "BOOT" section.
    3. For Windows 11/10 installations, it's recommended to leave the Boot mode select on UEFI.
        a. IF you have legacy hardware that cannot work in an UEFI environment, you have two options – Change the Boot mode to Legacy, or enable CSM and configure CSM settings for your device.
            i. For performance and security reasons, it's strongly recommended to consider updating your legacy hardware, rather than use the Legacy boot mode.
            ii. Before setting the Boot mode to Legacy, we recommend trying to enable CSM and confirm whether your legacy device works with CSM enabled.

4. After making your Boot mode choice, press F10 to save and exit the BIOS.
5. Press Delete on reboot to reenter the BIOS.
6. Verify that your M.2 or PCIe SSD is recognized by the motherboard:
    a. M.2 SSDs can be seen in the Advanced>NVMe configuration menu.
        i. Please note that some M.2 SSDs may not be recognized in the BIOS. If your M.2 SSD is not recognized, confirm that it is properly installed and the slot is enabled in the Advanced > Onboard Devices menu.
        ii. If the device is properly installed and the slot is enabled, continue with your installation of Windows, as the installation will show whether the drive is ultimately detected.
    b. PCIe SSDs will be detected in the Advanced > PCIe Configuration menu next to its PCIe slot, along with the number of lanes used.
        i. PCIe NVMe SSDs may also show device information in the Advanced > NVMe configuration menu.
7. Insert/Connect your Operating System installation media and reboot. At this point, the Windows installation process should begin.

- **Installation steps using an existing Windows installation.**
    1. Power on the PC and enter the BIOS by tapping the Delete key repeatedly.
    2. Follow the steps above to verify that your M.2/PCIe SSD is seen in the BIOS.
    3. Once you've confirmed that your device is seen, go into the Boot menu.
        a. If your SSD has an existing installation of Windows, you can confirm that the BIOS sees it by going to the Save & Exit Menu.
        b. In the Save & Exit menu, the Boot Override option will list any recognized installations of Windows. If you see your drive here, then the BIOS can boot to Windows.
    4. Set the primary Boot Option to the drive with your Windows installation.
    5. Press F10 to save and exit the BIOS/UEFI.
        a. If successful, then you do not need to configure anything else.
        b. If unsuccessful, it will be for one of three reasons:
            i. Your Windows bootloader may be on a different drive.
            ii. Your previous OS may not be easily compatible if this is a new motherboard; likely due to incompatible drivers.
            iii. Your previous installation may have been in Legacy mode. If this is the case, go into the Boot menu and change the Boot mode to Legacy, press F10 to save and reboot. If Windows boots at this point, the configuration is complete.
    6. If Windows cannot boot at this point, we suggest contacting EVGA Customer Service, as further troubleshooting would be outside the scope of this manual.

Configuring RAID With M.2 SSDs

The EVGA Z790 CLASSIFIED supports RAID0 and RAID1 spanned across the three M.2 slots and SATA ports. For a more complete discussion about RAID and the different types and positives/negatives of each type of RAID, skip to the next section of the manual, which covers everything you need to know about RAID.

Install/Verify That Your SSDs Are Ready:

1. To configure a RAID in the EVGA Z790 CLASSIFIED, you will first need to install your M.2 SSDs, as shown above on Page 30.
2. Next, enter the BIOS by tapping the Delete key after the POST beep.
3. Enter the Advanced menu, and then the Onboard Device Configuration menu. Make sure that your populated M.2 Key-M slots are enabled here.
4. Hit ESC or click the back arrow to return to the Advanced menu. Click on the NVMe Configuration page to verify that your SSDs are detected and available.
5. If you made any changes to the motherboard BIOS, exit back to the main menu, go to the "Save & Exit" menu, and click "Save Changes and Reset".

Enable the VMD Controller:

1. Enter the BIOS and go into the Advanced menu. Enter the "SATA Configuration" menu.

2. Next, change the setting to enable the VMD controller. Save and Exit.

Configure RAID:

1. After enabling the VMD controller, you will see a new Advanced menu called "Intel® Rapid Storage Technology". Enter the menu.

2. Here, you will see all available drives, RAID volumes, and have the option to Create RAID Volume. For this guide, we will create a RAID5.

3. The RAID Level is set by default to RAID0 (Stripe), so you will need to change it to RAID5 (Parity). Available drives for the RAID will be listed here, along with a blank box to allow you to select whether you want each drive to be part of the RAID. In this case, we will select all SSDs for the RAID, so we will select each drop-down and choose the "X" option. After configuring your RAID Level, disks, Strip Size, and RAID capacity, select "Create Volume".

4. Once the volume is created, you will see a list of your created RAID volumes. Click each volume for more information.

5. Inside the RAID Volume Info menu, you can review the basic details about the RAID, including the physical drives, as well as the option to delete or repair the RAID volume if necessary.

	OC	MEMORY	ADVANCED
EXTRAS ▼			

RAID VOLUME INFO

Volume Actions

Delete

Rebuild

Name:	Volume1
RAID Level:	RAID5 (Parity)
Strip Size:	32KB
Size:	335.4GB
Status:	Degraded
Bootable:	Yes

RAID Member Disks:

SATA 0.0, SanDisk SDSSDXP120G 132742406094, 111.7GB

SATA 0.1, SanDisk SDSSDXP120G 132742405916, 111.7GB

SATA 0.2, Samsung SSD 850 EVO 250GB S3R1NF0J857226Z, 232.8GB

Note: RAID0, RAID1, RAID5, and RAID10 are supported on the Z790 CLASSIFIED when spanned between the M.2 slots and SATA ports, but this is strongly not recommended due to the significant difference in performance and the lack of device uniformity (i.e. different SSDs within the same RAID), which may cause a RAID to become unrecognized or fail unexpectedly.

Internal SATA RAID Controller

This section covers the basics of what RAID does, how RAID works, and why you may or may not want to use RAID. There are other means of creating a RAID drive on this motherboard, such as through the Intel® VMD or through the IOMSM in Windows, which will be covered in more detail further below.

This motherboard supports several RAID modes over its eight (8) Intel® SATA ports. These RAID modes include RAID0, RAID1, RAID5, and RAID10, which tends to be the standard for most motherboard-based RAID options.

Some basic understandings for this section:

- All drives equal 1 Terabyte in size. Let's just make the math easy. In reality, all drives are slightly less than what their labels show.
- A physical drive is, essentially, the drive you installed in your system.
- A logical drive is the drive "created" through RAID. In other words, this virtual drive is what Windows sees.
- Performance considerations are based on arrays using the same drive model. Arrays comprised of drives with different performance characteristics may see reduced performance and stability. There are many factors outside the scope of this manual that can also affect performance.

ESSENTIAL RAID CONSIDERATIONS
- Please save yourself some time and effort by using drives with the same make, model and capacity. Although it's tempting to use what you might have lying around, mixing drives can lead to performance issues, desyncing issues, data corruption, and ultimately array failure.
- Confirm that your drives support RAID. This may surprise people, but drive manufacturers sometimes limit RAID support to specific models. If a drive is not supported for RAID, the array may desynchronize unexpectedly due to features missing that are necessary for communication between drives in RAID.

RAID LEVELS

There are three main considerations when creating a RAID array: performance, capacity, and redundancy. Fortunately, each RAID mode offered has unique characteristics that make choosing one fairly simple, based on your needs.

- Performance – Quite simply, which array type is the fastest?
    - RAID0 is considered the best performance option here. The whole purpose of the array is to combine storage capacity and speed.
    - RAID10 utilizes both mirrors (like RAID1) and a stripe (like RAID0). This configuration allows it to be faster than RAID1 and RAID5.
    - RAID5 is flexible enough to be a faster all-around type of RAID. Read speeds are much faster, but write speeds can be slightly slower.
    - RAID1 is designed for redundancy and not speed, so it will usually operate slightly slower than a single hard drive.
- Capacity – How does creating an array affect the size of the logical drive?
    - All RAID levels utilize a very small amount of disk space, in part, to maintain connections to data across drives and store configuration data. Additional disk space will be subtracted as a result of formatting.
    - RAID0 = Sum of the drive capacity of all physical drives.
        - Math – 3x 1TB drives = 3TB RAID0 array.
    - RAID1 = Drive capacity of the data drive
        - Math – 2x 1TB drives = 1TB RAID1 array.
    - RAID5 = (Number of drives multiplied by drive capacity), subtracted by the capacity of one drive.
        - Math – 3x 1TB drives – 1TB = 2TB RAID5 array.
    - RAID10 = Sum of the capacity of the data drives in each mirrored volume.
        - Math – 4x 1TB drives = 2TB RAID10
- Redundancy – If a drive fails, what happens?
    - RAID1 – Actual redundancy. If one drive fails, all data is backed up on the second. Install a new drive and the RAID will be repaired again.
    - RAID10 – Actual redundancy. If one drive in a mirrored pair fails, data can be restored from the other drive. The array can survive losing two disks, so long as each drive is from a different mirror. The array will completely fail if both drives from the same mirror fail.
    - RAID5 – Quasi redundancy via parity. If one drive fails, you can still use the array in a degraded state, until you can replace the drive. The array cannot survive a second drive failure.
    - RAID0 – No redundancy. If one drive fails, it's game over.

RAID0: RAID0 is considered "Striping" or a "Striped Array." RAID0 takes a data set and spreads it equally across two or more drives. Reading a file, for example, will be much faster if the file is spread across multiple drives and read from each drive simultaneously. This can reduce the time each drive spends reading data by at least 50% compared to reading from one source. However, there is no fault tolerance, meaning if one drive fails, the array fails and data will likely be permanently lost.

RAID0 can scale up to the limits of your controller, but performance will see diminishing returns above 4 drives.

The Good-

- Read/write speed of drives are greatly increased
- Storage capacity loss is minimal, compared to other array types.

The Bad

- RAID0 has no redundancy, which makes it very volatile. If even one drive fails, the array and data is toast.
- Although popular once, newer SSDs and storage options significantly outperform or make RAID0 less relevant.

RAID1: RAID1 is also called "Mirroring" or a "Mirrored Array." RAID1 uses two physical drives and writes ALL data to both drives simultaneously, providing a real-time 100% redundancy. If a drive fails, you can continue using your system even if only one drive is healthy.

RAID1 is limited to 2 drives. Because this is a mirror, you will use 50% of your capacity for redundancy.

The Good-

- RAID1 can suffer one failed drive without any affecting stored data.

The Bad-

- Storage size is limited to the capacity of one drive.
- Write speed will be a bit lower than a single drive.

A final note regarding capacity – Using drives of different sizes will affect the maximum capacity of a RAID1. When creating the array, the controller will look at the drive with the smallest capacity and use this amount as the size of the array. For example, let's say you have two drives – one 1TB drive, one 500GB drive. The array size will be reduced to a 500GB RAID1.

RAID5: RAID5 is a stripe with fault tolerance, which attempts to bridge the gap between speed and redundancy. It is the most all-around type of array. This array-type will reserve, essentially, a capacity size equivalent to one drive for fault-tolerance. This means that if you use four 1TB drives to create your RAID5, you will only have the capacity of three 1TB drives. RAID5 requires a minimum of three drives, and the maximum is set by the RAID controller; this level works well when using between four to six drives, but sees diminishing returns beyond six.

A RAID5 array is still usable even while a drive is missing or failed drive, resulting in a degraded state. Performance will suffer until the missing drive is replaced and the software rebuild process is completed. The rebuild process can take several hours, causing reduced performance during this time.

The Good-
- Most capacity-efficient array-type that also has fault tolerance.
- Read/write speed is very good; faster than RAID1 but slower than RAID0. However, speed may vary depending on the number of drives in the array.

The Bad-
- Rebuilding an array can take a long time on a motherboard controller, especially when using a very large capacity array with multiple drives.
- If more than one drive fails before repairing the array, the array will fail and data will be lost.
- RAID5 is a good all-around RAID, but it does not excel at performance or redundancy. Consider a RAID10 for speed and redundancy, instead.

RAID5 protects data by rotating parity across physical drives. Each physical drive receives small portions of data from other drives and maintains this data in a parity block of data. When a failed drive is replaced, its data is restored from the parity block on each of the remaining drives in the array. The repair process copies a very large volume of small data segments back to the replacement drive while also maintaining the array's index of data.

A final note regarding capacity – Using drives of different sizes will affect the maximum capacity of a RAID5. When creating the array, the controller will look at the drive with the smallest capacity and use this as the size for each drive in the array. For example, let's say you have three drives – two 1TB drives, one 500GB drive. The array size will be reduced to 500GB per drive, resulting in a 1TB RAID5 (3x 500GB – 500GB).

RAID10: RAID10 is a nested RAID, which is a type of RAID utilizing multiple arrays within a single configuration. This type of virtualization allows you to have an array where each node has its own level of redundancy. RAID10 is highly scalable, but this motherboard supports arrays of only four drives – up to two RAID10 arrays, total.

RAID10 is comprised of two or more Mirrored arrays (RAID1s) that are striped together (RAID0). Looking at it a different way, this is RAID0 using a stripe of mirrored logical drives.

The Good-
- Excellent Fault Tolerance
- Good rebuild times, compared to other modes with redundancy.
- Overall performance is good; comparable or slightly faster than RAID5.

The Bad-
- Low capacity for the number of drives required.

RAID10 fault tolerance works different than RAID1 and RAID5 because the array has nodes with internal redundancy. Although a four-drive array can lose two drives and remain operational, it greatly depends on which two drives fail. If both physical drives from the same logical drive fail, then half of the data is gone and the array has failed. However, every logical drive, regardless of the number of total logical drive, can suffer one internal failure with no adverse effects.

A final note regarding capacity – Using drives of different sizes will affect the maximum capacity of each mirror in a RAID10. When creating the array, the controller will look at the drive with the smallest capacity in the mirror and use this as the size for each drive in the array. This follows the rule of RAID1. The striping portion of the array will follow RAID0 and combine the sum of each mirrored array.

Which types of RAID can I use with my setup?
1 Drive - No RAID arrays are supported
2 Drives - RAID0 and RAID1.
3 Drives - RAID0, RAID1 and RAID5.
4 Drives and above - RAID0, RAID1, RAID5, and RAID10.

Also, you can run more than one array on the Intel® controller, so long as the total is no more than eight (8) drives. For example, this means you can allocate four (4) drives to a RAID10, two (2) drives to a RAID1 and two (2) drives to a RAID0.

Configuring the Array

1. Attach all SATA devices you intend to use, and make sure power is attached. Power the system on. Press the "Delete" key repeatedly to enter BIOS. Once into BIOS you will need to enable the RAID function of the board.

2. Once into the BIOS, click on (or navigate with your arrow keys) the "Advanced" tab at the top, and then on "SATA Configuration." You will see all attached SATA devices at this point.

Note: The SATA Configuration menu shows a list of all drives currently detected by the controller. Make sure the list in your BIOS matches what you have plugged in. If it does not, reseat cables on the device(s) in question. If the issue persists, please check the troubleshooting section on Page 104.

3. Similar to the M.2 RAID instructions, set Enable VMD Controller to "Enabled", then Save and Reboot. Upon entering the menu again, you will notice that your SATA port information will be empty. This mode includes both the RAID controls and the same options/functions/commands as AHCI. As a result, you may continue to use your AHCI devices normally while configuring a RAID.

4. Return to the SATA Configuration menu and enter the Intel® Rapid Storage Technology menu.

5. Once in the RAID controller, you will see a list of all detected drives and a "Create RAID Volume" button. To begin, click on "Create RAID Volume."
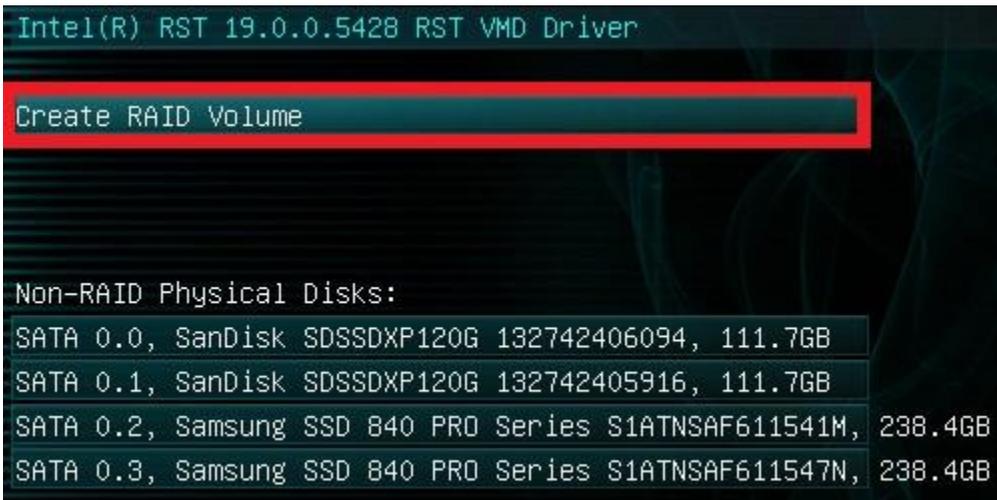
6. Choose a name for the volume. The controller allows up to 15 characters; you can use numbers and letters, but not special characters.

7. Next, select your intended array type. Please see the bottom of Page 61 for a quick reference on different RAID levels and RAID types based on your total number of drives. For the purpose of this guide, we will make a RAID5.

8. Next, select the drives you want to use for the array. Select the down arrow and the "X" for each drive you want to include in the array.
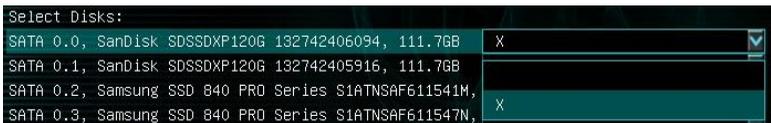
9. Strip size (also called "block size" in other controllers) can be selected manually at 16k, 32k, 64k, or 128k. The controller will determine the default strip size after looking at your drives and array type. Although there are some limited instances where this must be set manually, it is highly recommended to leave this at default.

Strip Size:	32KB
Capacity (MB):	16KB
	32KB
Create Volume	64KB
	128KB
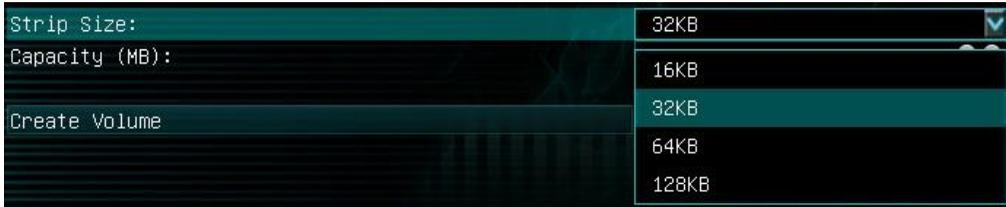
10. The controller defaults the capacity to the maximum available space for the RAID. Leaving the capacity at default is recommended because reducing the size is not beneficial, except in limited cases.

11. To complete the setup process, please select "Create Volume" at the bottom of the page. Depending on the array type, drive type, and volume this can take a few seconds to a few minutes.

Create RAID Volume

Name:	Volume1	⊕ ⊖
RAID Level:	RAID5 (Parity)	∨

Select Disks:

SATA 0.0, SanDisk SDSSDXP120G 132742406094, 111.7GB	X	∨
SATA 0.1, SanDisk SDSSDXP120G 132742405916, 111.7GB	X	∨
SATA 0.2, Samsung SSD 840 PRO Series S1ATNSAF611541M,	X	∨
SATA 0.3, Samsung SSD 840 PRO Series S1ATNSAF611547N,	X	∨

Strip Size:	32KB	∨
Capacity (MB):	343413	⊕ ⊖

Create Volume

12. Once the array is completed you will see this text, or something similar based on the array type and drives used. At this point, the array is ready to use.

Intel(R) RST 19.0.0.5428 RST VMD Driver

RAID Volumes:
Volume1, RAID5 (Parity), 335.4GB, Normal

13. For OS installation, provided that the array is configured properly, the operating system will detect the array and see it as a single drive or a bootable RAID array – as opposed to several drives – and allow you to install the OS to the array without any further steps. However, depending on the OS version, you may need to install RAID drivers for the RAID array to be detected.

Note: If this is meant to be a secondary array, your next step is to partition and format the array within Windows. Please see Page 78 for setup in Windows 10.

Repairing an array within the BIOS

This guide will show you how to repair a degraded array from within the BIOS. For testing purposes, a drive was intentionally removed from a RAID5 array and wiped to guarantee that the array rebuild behaved the same as if a new replacement drive was added to a degraded array.

If a drive fails and the array becomes degraded, you will typically see an alert in Windows or while checking the array status within the BIOS. If a drive fails in an array with redundancy (a RAID5 array, in this case), the controller will report the array as "Degraded.". This means that the array has a node down, that the data is still intact, but your fault tolerance is reduced.

The Non-RAID Physical Disks list will display any remaining drives on the controller. For this example, you will see a degraded array and a "Non-RAID Physical Disk," which we've attached to repair the degraded array.

Note: Although any drive that features sufficient capacity will be permitted to rebuild the array, it is recommended to use an exact match or same capacity/performance of the failed drive. The BIOS will remind you, but it cannot be overstated that using a drive with data on it will result in the total loss of all previous data in favor of the data on the array.

1. To begin the repair, select the degraded RAID volume to see your array status and all remaining drives currently configured in the RAID array. When ready, click Rebuild to start the process.

2. Next, you will see a list of all attached HDD/SSDs that can be used to rebuild the array. Select your preferred disk, then click on it to begin the process.

ALL DATA ON THIS DRIVE WILL BE REMOVED AND CANNOT BE RECOVERED WHEN ADDING IT INTO THE ARRAY

3. Once the process has started you will see the status change to "Rebuilding."

```
Intel(R) RST 19.0.0.5428 RST VMD Driver




RAID Volumes:
Volume1, RAID5 (Parity), 335.4GB, Rebuilding
```

Note:	Completing this process in the BIOS queues the rebuilding of the array, but does not start the process until after you restart and boot into your OS. The rebuilding duration will vary – fast drives in uncomplicated arrays can rebuild very quickly, while complicated arrays with redundancy may take several hours to rebuild. The duration of the rebuild process can also be impacted by the usage of the array and system performance during the process.

4. The rebuild process can be monitored from the "Intel® Optane™ Memory and Storage Management" utility in Windows, which is effectively the software front-end for the Intel® RAID controller. The rebuild status can be viewed in the "Manage" tab, located on the top of the IOMSM Window. Please see the image at the top of Page 77 to see where to find the rebuilding information% in the IOMSM.

IOMSM (Intel® Optane™ Memory and Storage Management)

The IOMSM is the software front-end for the Intel® SATA controller. IOMSM may be more convenient for some people due to a more detailed UI than the BIOS. It is recommended to install the RAID drivers after installing the Intel® Chipset Drivers – the main motherboard drivers. This guide walks you through not only building, but also repairing an array from within Windows. All forms of RAID that can be built in the BIOS are available in IOMSM.
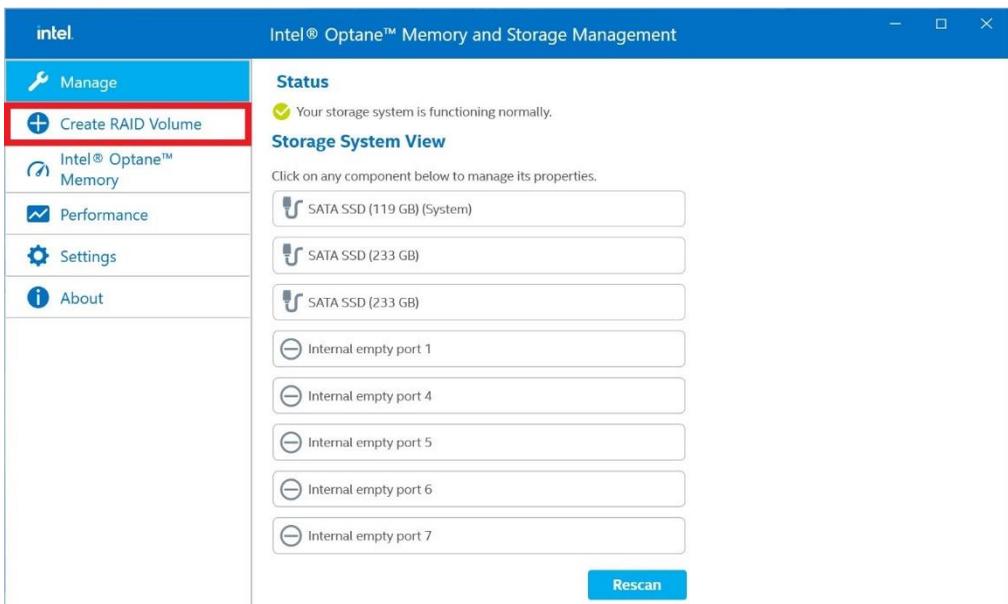
This guide will illustrate how to create a RAID1 array using the IOMSM. Using the screen above, we know that three (3) SSDs are currently attached to the controller and the other Intel® SATA ports are empty. If you plan to create another type of array, please ensure that you have the correct number of drives attached and shown on the status screen in IOMSM for your intended array before you start.

1. Verify that all the drives intended for the array are present on the screen, then click "Create RAID Volume" to begin the process. For the purpose of this guide, we are using a pair of SATA SSDs to create the RAID1 array. If you were using PCIe / M.2 based NVMe drives, the same basic steps apply to both, however. For now, select SATA, and "Real-time protection (RAID1)." Then, click Next at the bottom of the window.
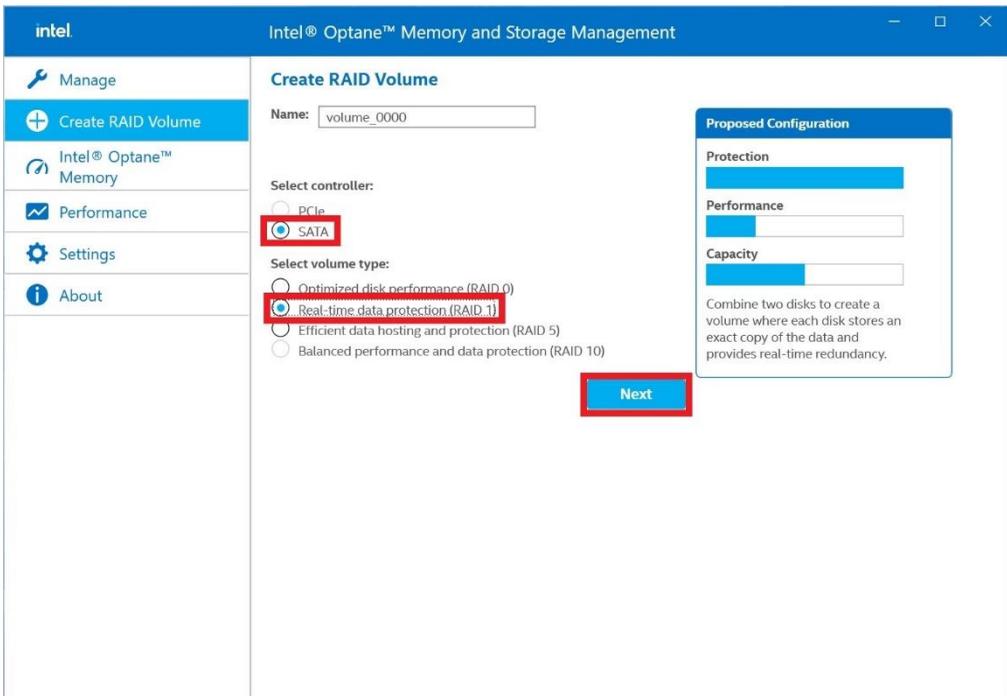
2. On the next window, we will select the drives for our RAID. RAID1 requires exactly two (2) drives. Click the boxes for the two drives you wish to use in the array. There are other choices you can make on this page:

   a. You may either keep data on one of the drives and clone it to the other, or wipe both drives to start fresh. Regardless, you will not be able to keep the data on both drives. Make sure to back-up any sensitive data prior to beginning this process.

   b. You may lower the capacity used to create the array from the entire drive to a reduced size, if you wish. However, it is recommended to leave the array at 100%, which is the default.

   c. You may "Initialize Volume," which will occur after the array is created. The array must be initialized before Windows can partition the drive. If the array is not initialized now, it may be initialized later in "Disk Management." See Page 78 for Disk Management instructions.

   d. Once you've made your choices, click "Next".
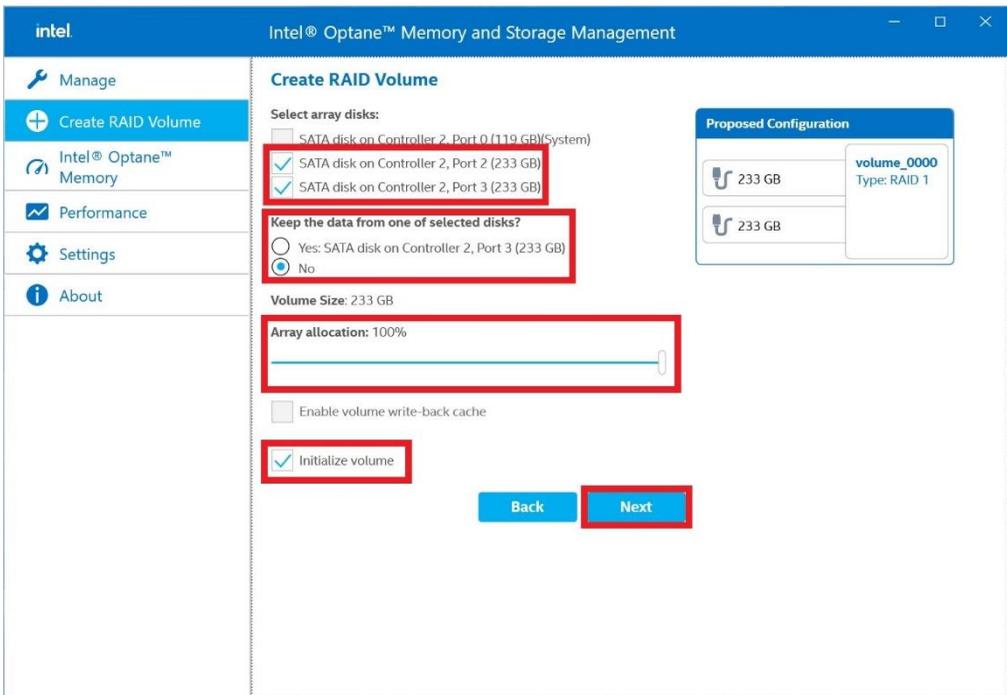
3. At this point, the RAID manager will summarize the choices you've made and request confirmation to delete data. Click Create RAID Volume to begin the process.
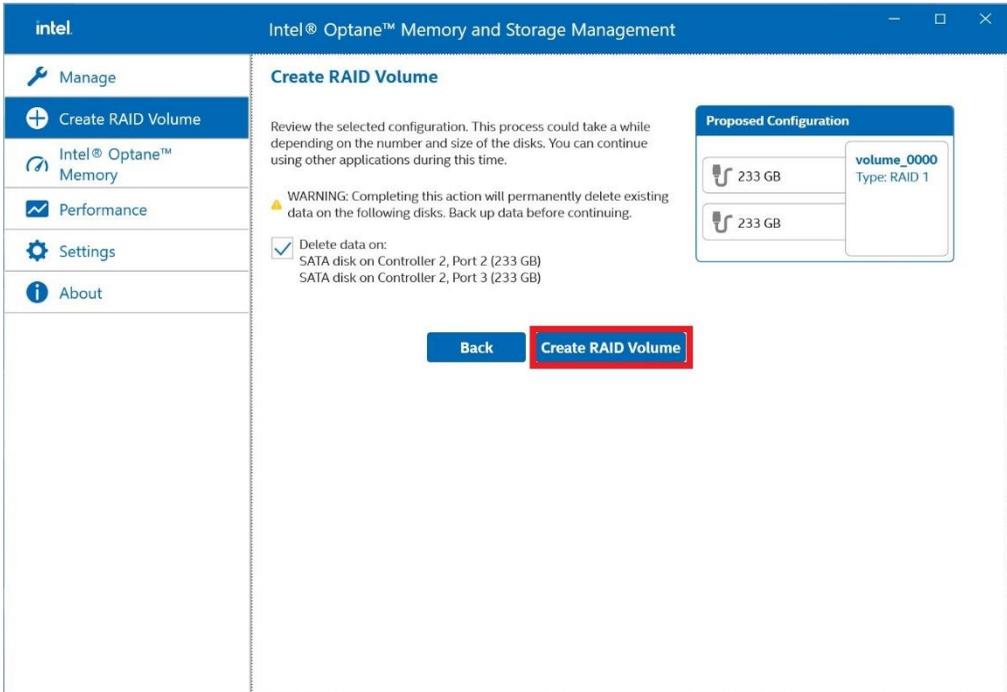
4. The build progress will be displayed on the Manage page. Once the RAID is fully built, the percentage will disappear, and your array will be shown. For further information about the array or your drives, click on the array for more details, including the option to delete or repair the array, if necessary.
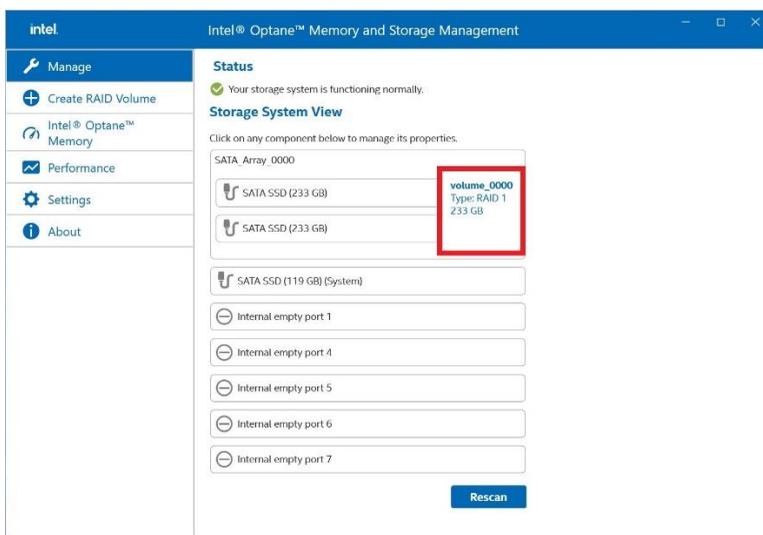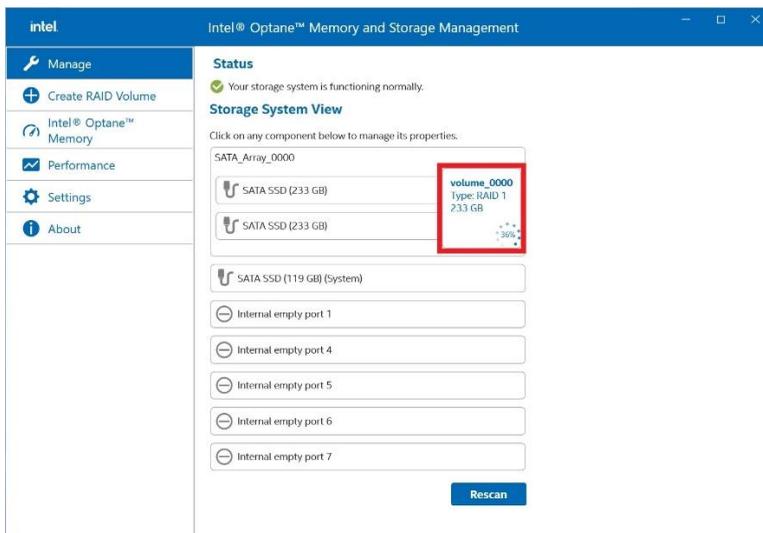
Repairing an array within IOMSM

This section of the guide will illustrate how to repair a degraded array from within the IOMSM. For purposes of this guide, we will repair a degraded RAID1 array using a third drive plugged into the controller, but not currently in use.

Below, you can see a degraded array, and one of its drives reported as unknown/failed. The data on the other drive is still intact, but the fault tolerance is offline due to the unknown/failed drive. The IOMSM also shows several warnings, including the "!" for "Status," an outlined box to bring attention to the degraded array, and the listing for the unknown hard disk, which also states 0 bytes – a further indicator of a faulty drive.
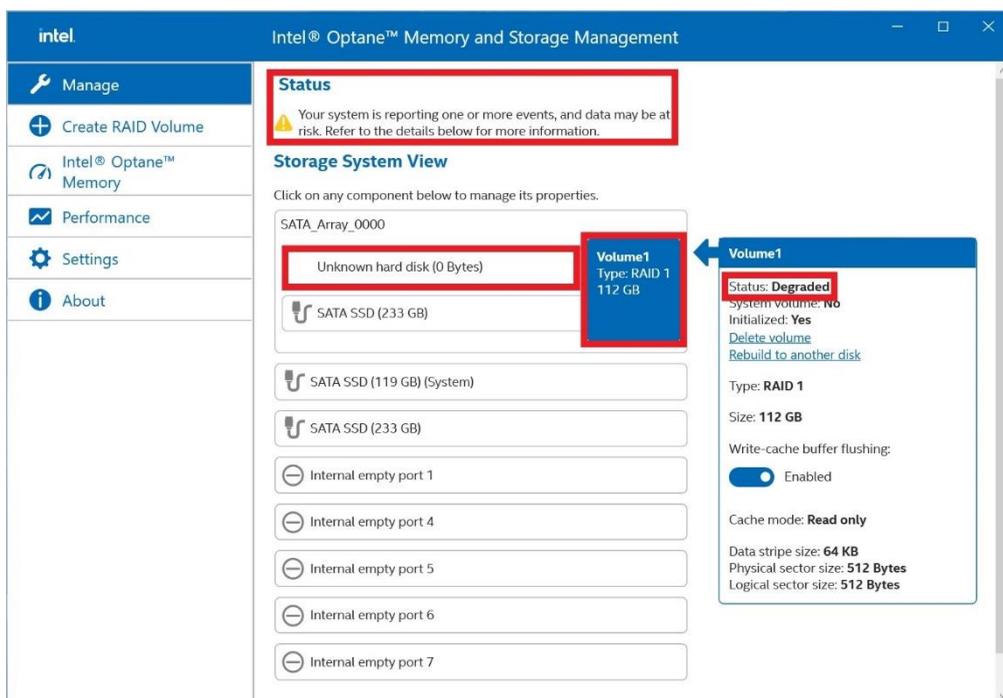
Click "Rebuild to another disk" to begin the repair process. On the next page, the IOMSM will explain why you need to repair your drive, warn you that you will delete any data on the spare drive, and ask you to select the disk where you want to rebuild the array. After selecting the disk, click "Rebuild."
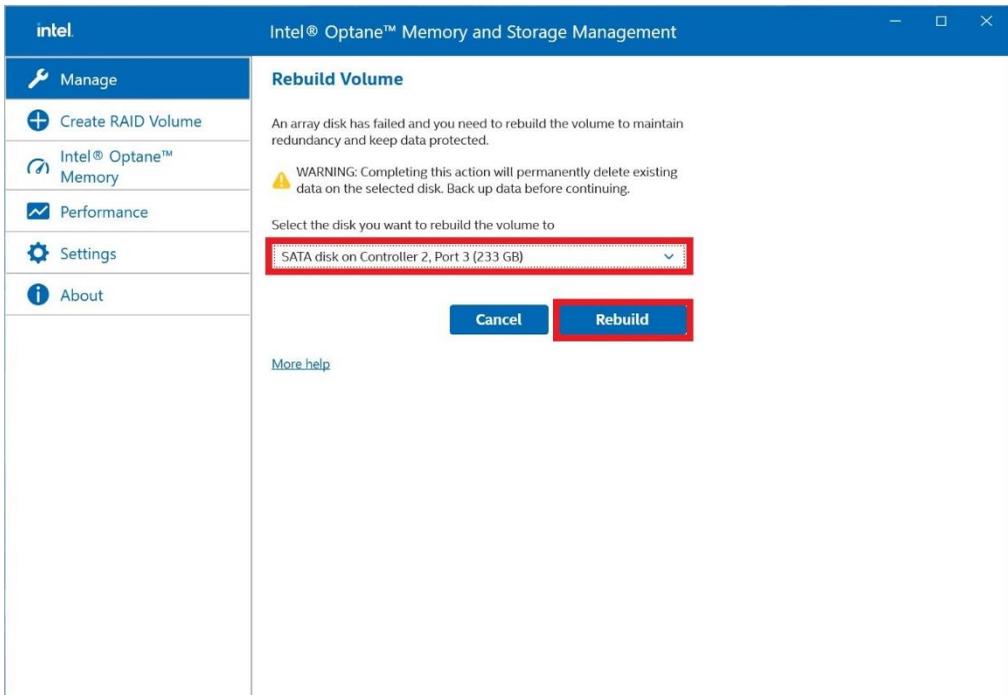
ALL DATA ON THIS DRIVE WILL BE REMOVED AND CANNOT BE RECOVERED WHEN ADDING IT INTO THE ARRAY
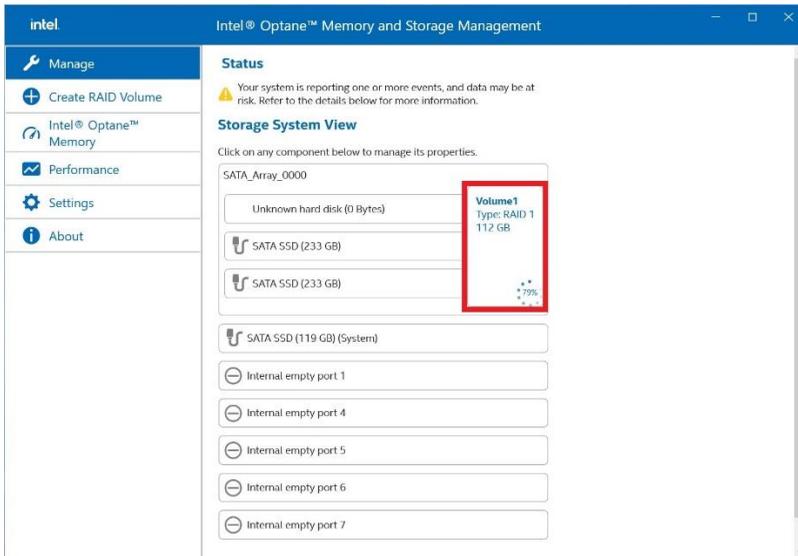
The rebuild process will begin. As with any RAID array with Fault Tolerance, the rebuilding time depends on several factors, such as array size, array type, CPU, etc. You may keep track of the rebuilding progress in the Manage tab. Once repairs are complete, the warning will disappear and the array will update to "Status: Normal."
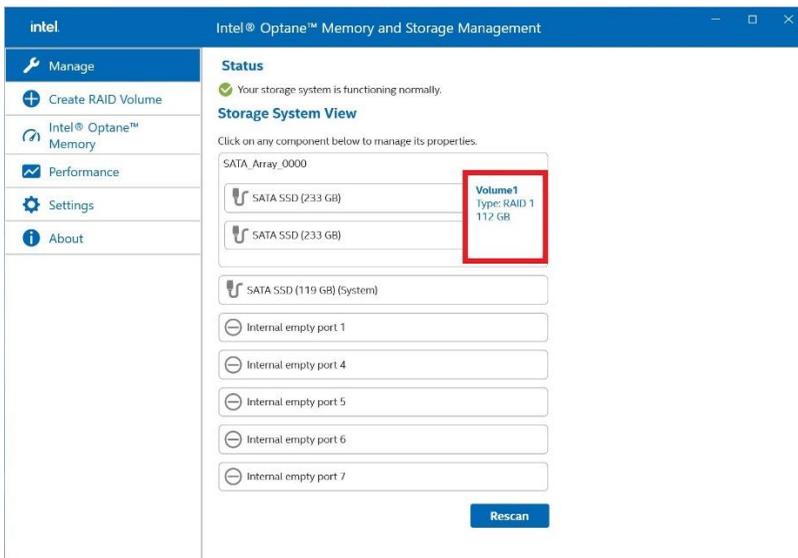
Partitioning and Formatting a drive

Once you have created your array, either from within the BIOS or from the IOMSM, you will not initially see your array in "This PC." This is expected, because even though you have created the array, you have not yet prepared the array to be used.
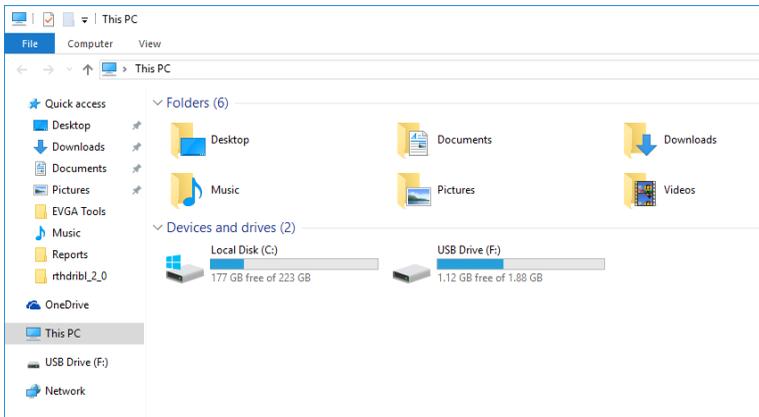
To begin, you'll need to go into Disk Management.

Windows 11/10: Right-click on the Windows Start button and select "Disk Management." Alternatively, press the Windows Key + X on your keyboard and select "Disk Management."

After "Disk Management" loads, you'll see a pop-up to Initialize Disk if you've added a new drive or created a new array.

Generally, it's recommended to select "GPT," unless you need backwards compatibility with an old OS or PC. When you've made your choice, click "OK."

Note: If you previously initialized your array through IOMSM, you will skip this step and move on to the New Simple Volume Wizard in the next step.
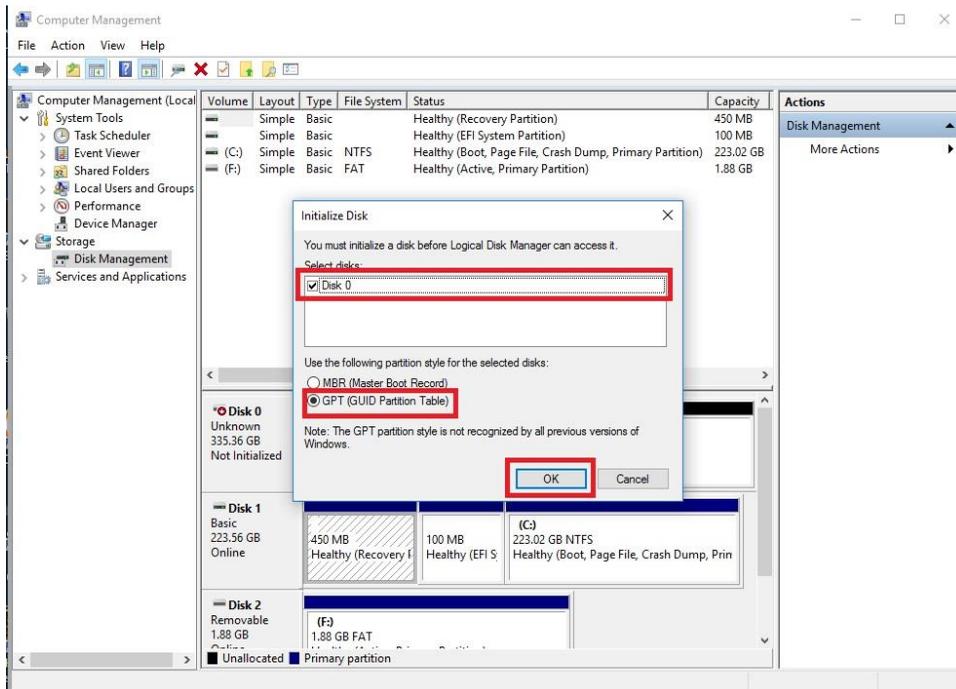
Before you can assign a drive letter to a drive or array, the initialized disk must be partitioned. If you are following this guide and just initialized your drive or array, the New Simple Volume Wizard will automatically pop-up.

If your drive or array is initialized, but not partitioned, the disk will appear in Disk Management as "Unallocated," as shown in the image below. Right-click on the box containing "Unallocated" and select "New Simple Volume" (this text may vary slightly based on operating system). The New Simple Volume Wizard will pop-up.

When the window below opens, click "Next."
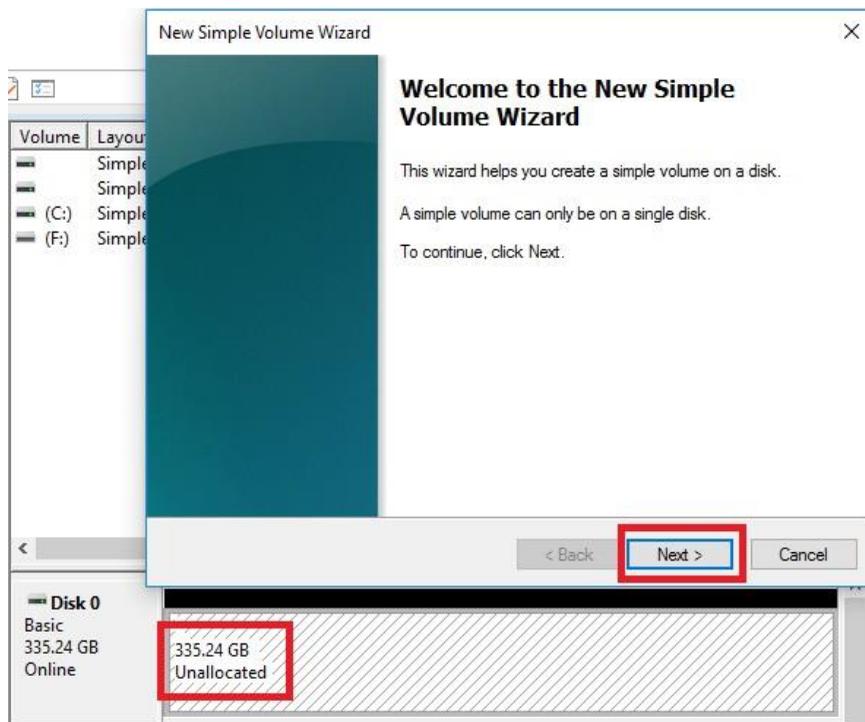
Leave the size at default to create a partition using the entire volume of disk space, then click "Next." Select the drive letter you want to represent this drive, then click "Next." Note: The drive letter does NOT have to be a consecutive letter with previous drive(s). Also, the wizard will not allow you to accidentally select the letter of a drive in use.
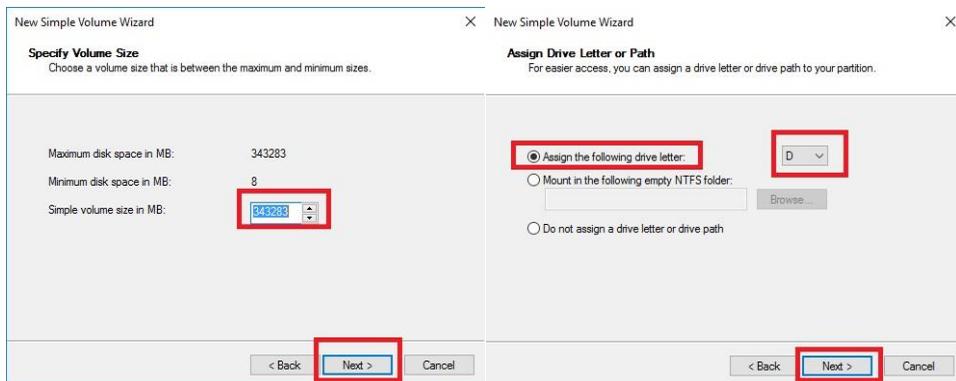
The next step is to format the partition. Select your File System; NTFS is default, and generally recommended for most large drives. Check the box for "Perform a quick Format." You may rename the volume, or leave it at default. Click "Next" when ready.
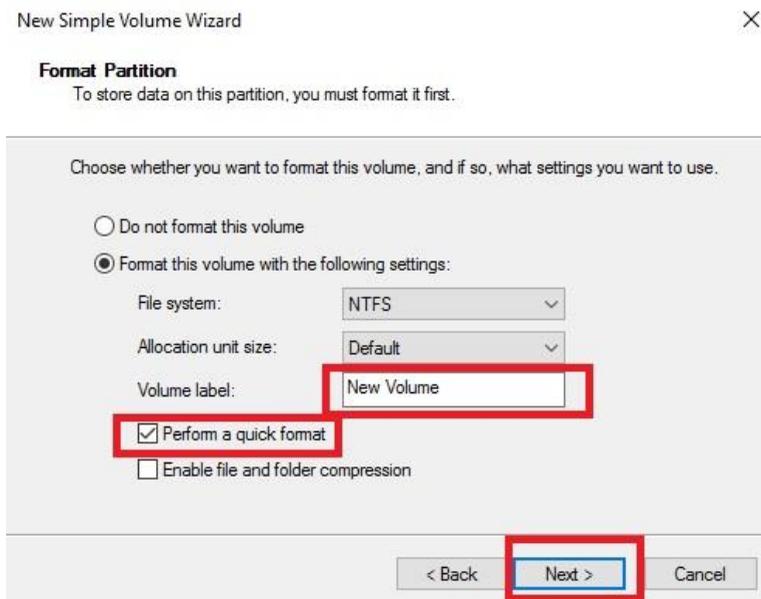
After the quick format is completed, you will see the last Window of the wizard, a summary of the process, then click "Finish." The drive is now usable.
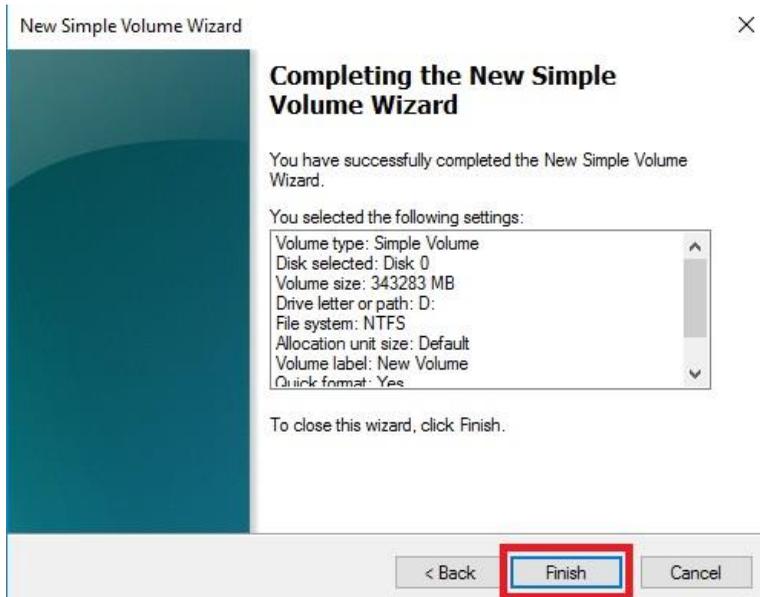
To confirm, go back to File Explorer in Windows. Click on "This PC" and check the drives section. You should have a new empty drive there, with the letter you designated.
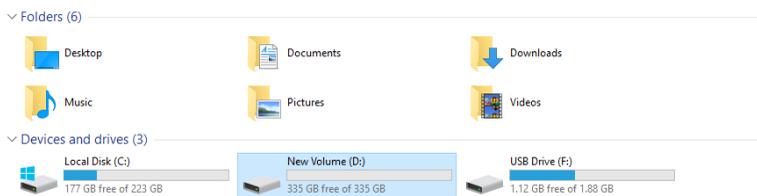
At this point the process of building an array and making it usable is completed.

Fan Header DC and PWM setup

The Z790 CLASSIFIED supports both 4-pin PWM fans and 3-pin DC fans. The motherboard uses eight 4-pin fan headers, including 2x CPU FAN (PWM), a CHA FAN (PWM/DC), a SYS FAN (PWM/DC), a PWR FAN (PWM/DC), an AUX FAN (PWM/DC), and two Pump headers (PWM/DC). You can locate each header on Pages 12 and 13, component numbers 3, 4, and 5.

To configure the fans, go into the motherboard BIOS. During the POST sequence, press Delete repeatedly to get into the BIOS. Once in the BIOS, use the arrow keys or your mouse to navigate, whichever is easier, and make your way to the Advanced > H/W Monitor Configuration menu.

Once into the H/W Monitor section, you can see the temperature monitors across the top. Below the monitors, each fan is already configured in Smart mode, which means the fan controller is using a Smart curve for fan controls. Each fan can be set to a separate fan curve. To set a Smart curve, please see the guide starting at the top of the next page.

The +/- buttons next to Smart allow you to set your fans at a static speed percentage, instead of a curve. If you set the speed too low, however, the fan may stall.

Below the PWM fans, you will see the six (6) PWM/DC fans: CHA_FAN, SYS_FAN, PWR_FAN, AUX_FAN, and PUMP1 and PUMP2. The fan controller will automatically detect and set the fan to either PWM or DC.

Alternatively, the PWM/DC fan headers can be set to either DC Mode or PWM Mode, which can be selected by clicking on the pulldown menu. DC Mode powers the fan directly by +12V voltage, while PWM Mode powers a PWM fan via pulse.
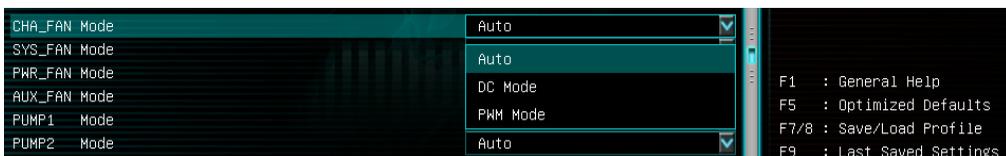
PWM mode is necessary if you are running a PWM fan powered by a different connector, such as a molex, SATA, or 3-pin header not on the motherboard. If you don't select PWM mode in this scenario, the fan may run at 100%, or behave erratically, regardless of the Smart Profile or percentage that you set above.

Standard Smart Fan Mode

To set a Smart curve, select the "Smart Fan Settings" and enter the menu.
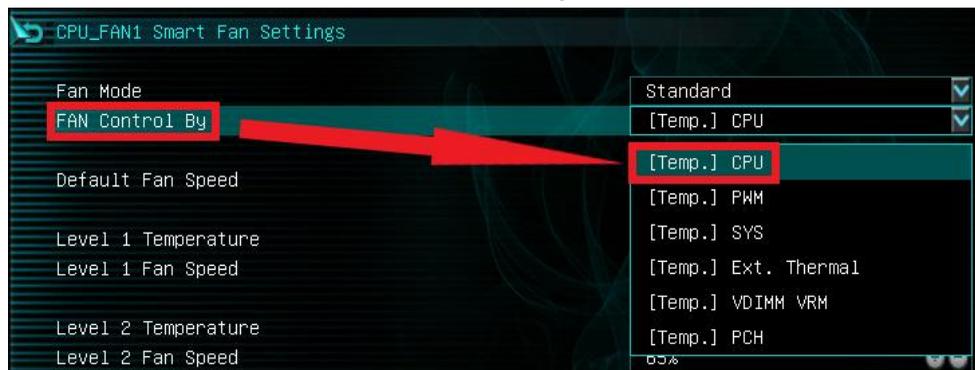
First, choose the temperature monitor the PWM controller will use to monitor for its temp information. It's recommended to link the fan control to the CPU, which is predominantly the most important temperature in the system. The exception is when you have 128GB of heavily overclocked RAM, which may cause PWM temps to be a concern. If this is a concern, set the fan control to the PWM temp.

Once you've set the Fan Control reference point, you can set the Default fan speed. The fan speed will increase once the temperature reference point has heated up enough to hit the Level 1 Temperature. Once it hits the Level 1 Temperature the fan controls will override the Default speed setting based on the temperature at the time.
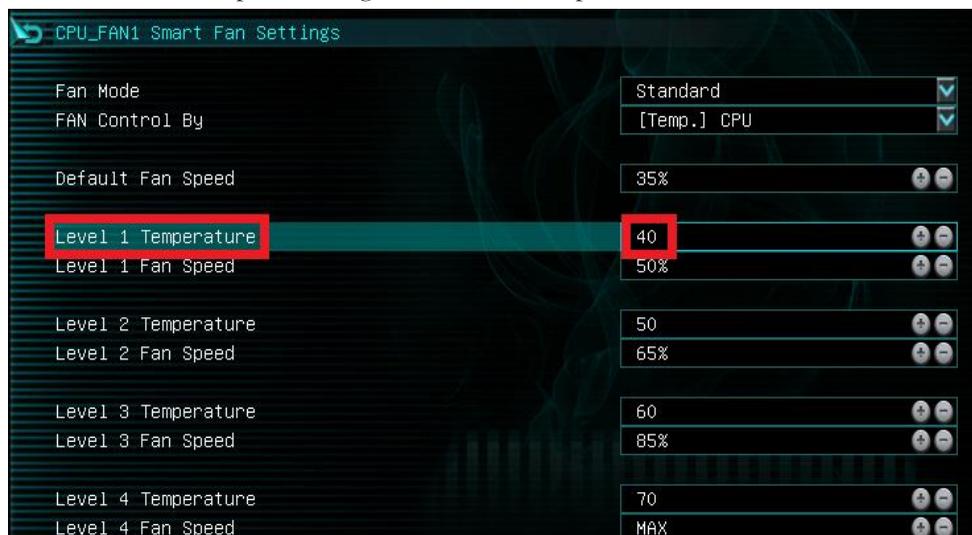
In Standard Mode, there are four tiers of temp control. At Level 4, we recommend to set the fan speeds to Max. Feel free to create your own profile to meet your noise and cooling needs. Make sure, however, to stay 5-10C below the Max safe load temp for your processor, which is listed on Intel's website. All Smart Fan Settings have the same controls and can be setup the same way.

When monitoring your system, you may notice that your fans spin up and down at different intervals. This is due, in part, to a function called hysteresis. Hysteresis builds in a buffer to control fan speed behavior to prevent your system from constantly changing the fan speed around your SMART Level temperature. Without hysteresis, for example, if your Level is set to 30C and your temperature varies between 29C-31C, you may find your fan spins up and down repeatedly, causing unwanted noise. Hysteresis adds a - 3C buffer for all "Fan Control By" options. This means that once your fan speed changes, it will not change again until the temperature goes below 27C.

Advanced Smart Fan Mode

To address problems with user configurations, such as adding additional Smart Fan steps and hysteresis control, an Advanced Smart Fan Mode is available. Go to the Fan Mode option and select Advanced:

In addition to now having seven Smart Fan profile settings, you can also directly modify the hysteresis settings for your temperature preference:
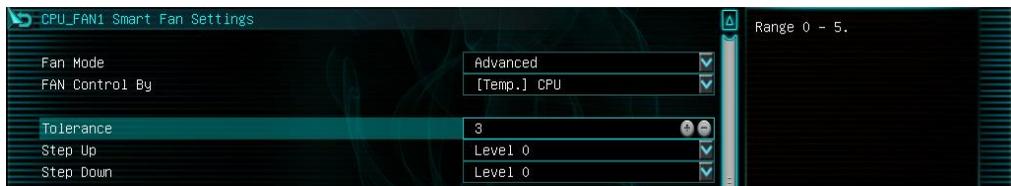
Three settings are available for this purpose: Tolerance, Step Up, and Step Down.

Tolerance sets the value (in Celsius) for how far below the temperature can go before the Smart Fan Level changes. For example, at 0C, Levels will change as soon as the temperature crosses the temperature threshold; at 3C, Levels will change once the temperature goes 3C below the Smart Level.

Step Up and Step Down affect how quickly your fan changes when the temperature goes above or below, respectively, a Smart Level. At Level 0, your fan speed changes immediately. Set a higher Level if you prefer the fan speed to adjust more gradually.

Using the ELEET X1 Software Suite

EVGA ELEET X1 is a monitoring and tuning software designed for EVGA motherboards, which is available on the included USB drive and the EVGA website at https://www.evga.com/eleetx1.

After installation, run ELEET X1. The left-hand side of the display contains system information about your motherboard, including the CPU, per-core CPU clock speed/voltage/temperature, and memory information. This information is displayed in real-time and is available at all times, regardless of which tab is selected.

The first tab is "Overclocking," which covers adjustments to each Core multiplier, Ring ratio and various voltages, which provides a level of voltage control similar to what is available in the BIOS. Overclocking can be done more simply via the Package menu, or you can opt for more fine-tuning adjustments via the Per Core menu.

As seen above, there are options for multiple voltages, and two options for your CPU Vcore: Adaptive and Override voltages. Adaptive allows for a tighter voltage profile to keep voltage and heat to a minimum, while Override is more of a brute-force method of setting your voltage. One primary advantage of using a stable Adaptive voltage is that it allows your CPU to properly take advantage of C-States and energy saving features, which can extend the lifespan of your CPU.

Adaptive requires you to set both a Target Voltage and an Offset Voltage. Start by setting your Target Voltage, which represents the voltage necessary to run stable (or close to it), even under load. One way to determine this is by stress-testing your CPU with your desired overclock. Offset voltage can then be used to fine-tune additional voltage that may be required under load or stress situations.

Override is simply a static voltage. Outside of extreme benching, this setting is typically not needed or ideal for the longevity of the CPU, since voltages are meant to fluctuate based on load. Alternatively, this can be used in the early stages of overclocking to find your Target voltage, before switching back to Adaptive.

Other voltages do not utilize the Adaptive or Override voltage settings. Instead, these use a pulldown menu to select preset voltages, as shown above. The voltages for these components are set by detection during POST, and ELEET X1 will open the pulldown to the currently detected voltage. Please remember that adjusting voltages should be done in small steps, and even then can cause your system to become unstable and crash.

The Per-Core menu allows for both ratio and voltage adjustments on an individual core basis. This can be very useful if you find that one or more cores can be overclocked more or less than other cores, or requires more or less voltage for stability.
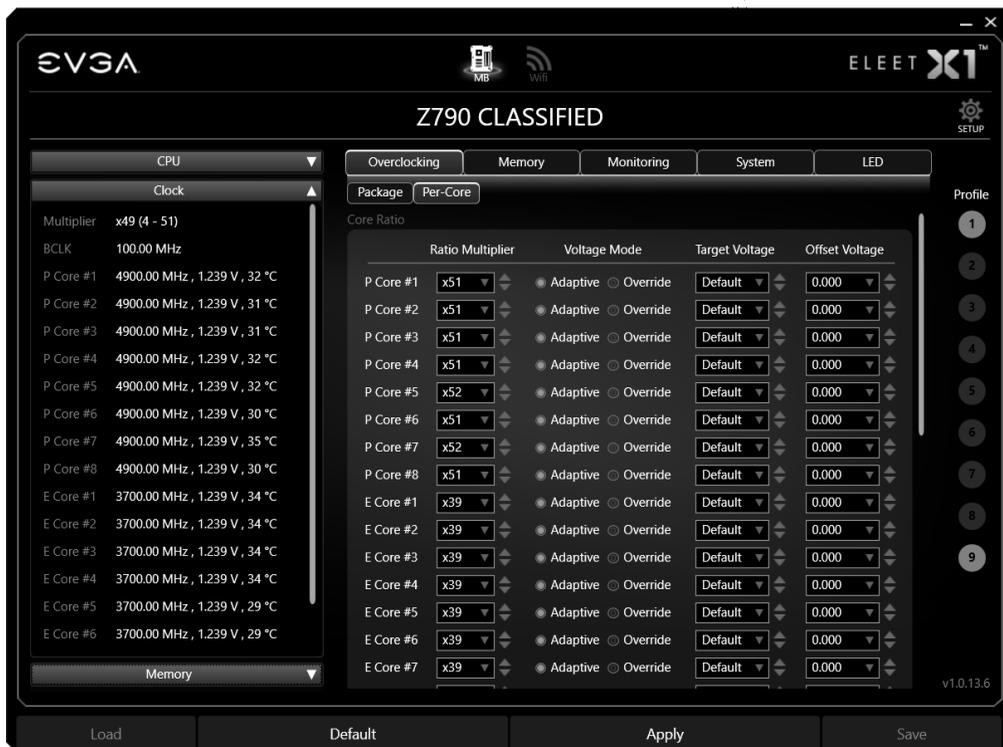
When your changes are complete, click "Apply" to accept and apply the new settings, or click "Default" to restore stock settings.

To Save a profile, first configure and apply any and all settings. Next, click on any of the profiles on the right side of the screen. Saved profiles show a ring around the profile, while empty profiles have no outline. When you click on one of the profiles, it will be filled in. If you have previously saved a profile here, click "Load" to apply your profile. Once loaded, you may close ELEET X1 and continue to use the new settings.

The "Memory" tab allows for Real Time Memory overclocking on the Z790 CLASSIFIED, although this function is limited and determined by the installed processor. In other words, not all processors will be able to adjust memory timings on this page. Alternatively, memory timing adjustments may still be made in the BIOS.

The next tab is "Monitoring," which contains real-time system information of voltages, temperatures, and fan speed information. Please note that all readings on this page are pulled from motherboard sensors, and change dynamically. Temperatures and voltages are measured at fixed intervals, which can often make the readings appear to jump back and forth. Furthermore, voltages on modern motherboards often closely respond to changes in load, meaning that voltage readings will change based on load and usage, which is normal.
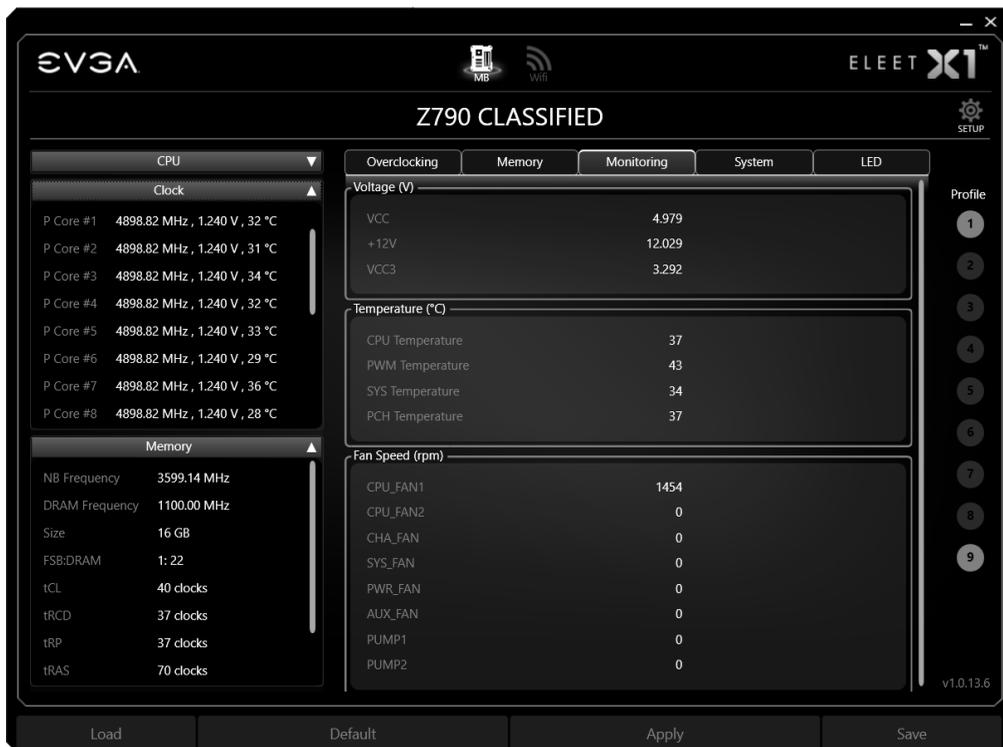
The Monitoring page only supports a static readout of each voltage, temperature, and fan speed. Settings cannot be adjusted or manipulated on this page.

The "System" tab provides more detailed information on the motherboard, CPU, and memory. Here, you can find the motherboard specs and BIOS date and version.
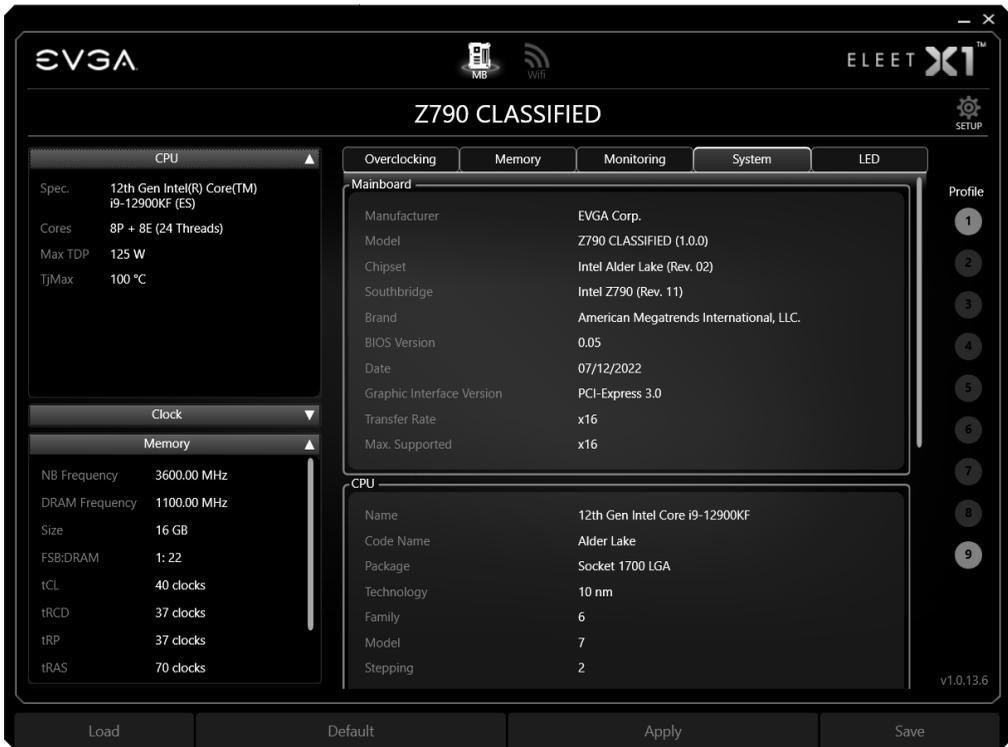
Additional CPU details are provided, including the Stepping, Revision, Instructions, and Cache layout.
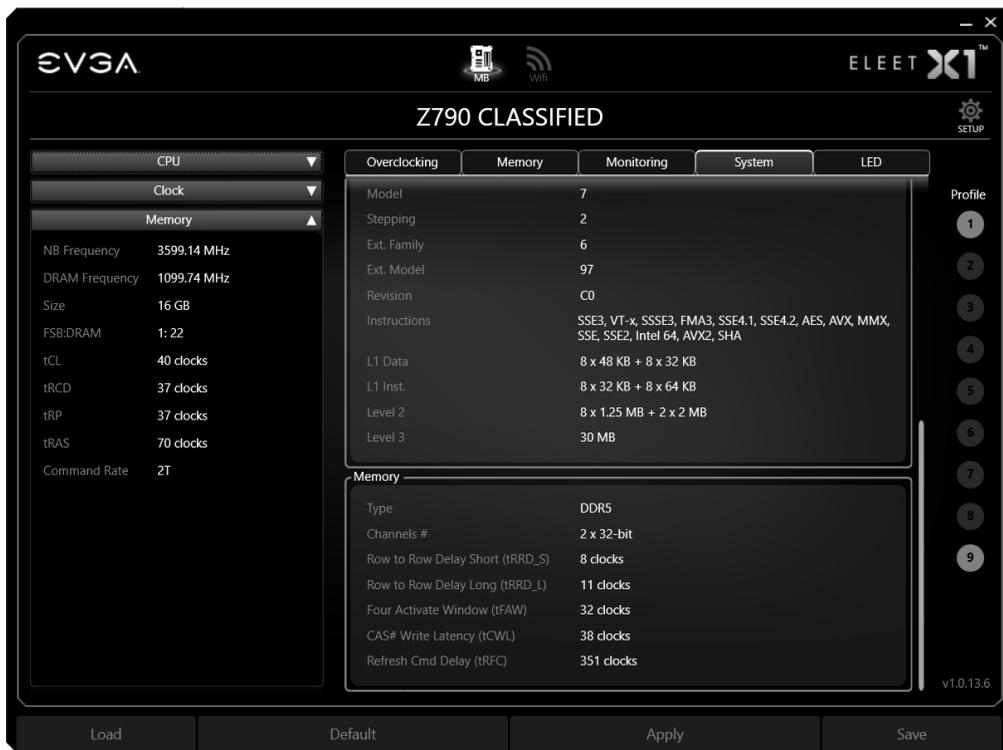
Lastly, additional memory information is available for secondary memory timings, as well as the type and number of channels being used.

Onboard ARGB and lighting connected to the ARGB headers can be controlled through the LED tab. Users can select different modes/patterns of lighting based on the header type and the number of LEDs connected through the ARGB headers. The LED lighting can be synced together by enabling the "link" button located to the right of the ARGB drop-down box. In the lower box, you can adjust the color of the LED light, as well as the brightness and speed of the LED lighting.

The Z790 CLASSIFIED motherboard includes a BT/Wi-Fi module, along with a new antenna design that provides extended features.

The Wi-Fi page will display typical information about your wireless connection and your signal strength, including your Access Point name, wireless band, and wireless version. The signal strength is indicated on a 1-10 scale, with 1 being the weakest and 10 being the strongest.

The Setup menu gives you control over basic program and OS startup behavior, along with the ability to check for new updates.

This has been the ELEET X1 utility overview, which should give you a solid start to understanding and using the ELEET X1 software suite.

*EVGA ELEET X1 is still undergoing final testing and design modifications at the time of this manual's printing. Final GUI design, menus, and functionality may be subject to change.

Installing Drivers and Software

Note: It is important to remember that before installing the drivers included in the kit, you must first load or install your operating system. The motherboard natively supports 64bit versions of Windows 10 and Windows 11.

The USB flash drive that has been shipped with the EVGA Z790 CLASSIFIED Motherboard contains the following software and drivers:

❑ Chipset Drivers
❑ Audio Drivers
❑ Intel® HD Graphics Drivers
❑ Intel® Rapid Storage Drivers
❑ Intel® RAID Drivers (floppy)
❑ LAN Drivers
❑ ME Drivers
❑ USB4 Drivers
❑ Intel® Serial I/O Drivers
❑ WIFI+BT Drivers
❑ EVGA ELEET X1™
❑ User's Manual

Windows 11/10 Driver Installation

1.   Insert the USB flash drive included in your EVGA Z790 CLASSIFIED motherboard kit into a USB port on the motherboard or from your chassis.

2.   Double-click the "Autorun" application file.

autorun.cdd	1/5/2018 9:17 AM	CDD File	492 KB
autorun	1/5/2018 9:17 AM	Application	6,284 KB
autorun	9/25/2017 3:10 PM	ICO File	9 KB
autorun	1/5/2018 9:17 AM	Setup Information	1 KB
autorun	1/5/2018 9:07 AM	Configuration sett...	2 KB

3. The EVGA Driver Utility Screen will appear.

4. EVGA strongly recommends that you install the motherboard Chipset and ME drivers first, followed by rebooting your system. Next, install the Intel Rapid Storage drivers and reboot.

5. The Driver Utility Screen also contains helpful links to give you more information about your new EVGA motherboard and additional resources to get started. The Z790 CLASSIFIED manual is available through this utility and within the USB flash drive directly.

6. EVGA also encourages you to register your motherboard online by either clicking on the Online Registration button in the Driver Utility, or by visiting https://www.evga.com/register.

Warranty and Overclocking

EVGA's PC components are designed for and intended for enthusiasts. To be perfectly clear, overclocking will **NOT VOID** your warranty. This means that you are free to do any type or level of overclocking you like, including traditional means, such as by using the BIOS (for motherboards); software overclocking with EVGA utilities, such as Precision X1 or ELEET X1; or even third-party software utilities. If your EVGA hardware fails due to overclocking, you're covered.

Likewise, EVGA understands that enthusiasts are not always satisfied with the provided stock cooling options. Replacing heatsinks, fans, or thermal grease will **NOT VOID** your warranty. Want to install a waterblock on your new motherboard or graphics card? No problem. Planning on a long benching session with a DICE/LN2 pot? Good luck on the benching, but your warranty will still be intact after you've set new world records.

Of course, there are some limitations to our warranties. If an EVGA motherboard or graphics card sustains physical or liquid damage (i.e. damage to the PCB or components), the warranty is void. Similarly, permanent changes to components or the PCB will void your warranty, including the removal of pre-attached components soldered to the board, or the addition of components that are not removable without heat or solvents. In other words, you may use Precision X1 to raise the voltage on your graphics card while overclocking, but you may not solder on another power connector as an alternative.

If the product fails within the warranty period, you must return the product to its original configuration. This means ALL original heatsinks and fans must be reattached as they were when it was first shipped. Even if the product no longer works, it must be returned to its original state before sending it in. If you no longer have the original heatsinks you may be charged for the missing parts.

The EVGA warranty covers overclocking ONLY to EVGA products; EVGA is NOT responsible for damage caused to components manufactured by other companies. Before overclocking your system, check with the manufacturer of your other components to ensure that you will not void the warranty on those parts due to overclocking. Due to the uniqueness of every system, EVGA Customer Support cannot assist you with overclocking. For overclocking assistance, please visit our Community Forums at https://forums.evga.com

Troubleshooting

Flashing the BIOS

The Z790 CLASSIFIED motherboard BIOS occasionally needs to be updated to correct bugs, improve performance, and add features. The latest motherboard official BIOS can always be found at https://www.evga.com/drivers. Select the Motherboard tab, select the Z790 Chipset, 121-RL-E798 for the motherboard, and select BIOS.

You may update the motherboard BIOS in several ways: via Windows, via USB disk from within BIOS, or update using the BIOS UPDATE button described below in the section, "Flashing the BIOS Without a CPU".

For ease of use, you may use the included USB flash drive provided with your motherboard kit. If you use a different USB flash drive, you must format the flash drive to FAT32 or the USB disk will not be recognized.

A. To flash via Windows:
    a. Download the latest motherboard BIOS from the EVGA Download page.
    b. Unzip the downloaded file to your desktop.
    c. Make sure to close all open software and applications.
    d. Open the folder and double-click the "Update.bat" file.
    e. The flash utility will begin. If prompted, type "Y" to begin the flash.

       DO NOT TURN OFF THE MOTHERBOARD UNTIL THE FLASH IS COMPLETE.

    f. When complete, the motherboard will automatically shut down. Power on the motherboard to go into the motherboard BIOS.
    g. When you see the Z790 CLASSIFIED splash screen, you will likely see a checksum error message. Click Yes to continue. Confirm that the BIOS has been updated to the latest version by checking the BIOS version (located in the bottom-right of the screen) with the BIOS version you downloaded.

Note: If the flash box immediately closes after running Update.bat, you may need to run Update.bat from a command prompt with administrator privileges, or right-click Update.bat and select "Run as administrator".

B. <u>To flash from within the Z790 CLASSIFIED BIOS:</u>
  a. Download the latest motherboard BIOS, and unzip the file to your desktop.
  b. Move the extracted folder onto your USB flash drive.
  c. Reboot the motherboard.
  d. When the splash screen appears, tap the Delete key to enter the BIOS.
  e. Go to the EXTRAS tab in the upper-right corner, and select BIOS Update:
  f. Navigate to the folder containing the BIOS file. Select the correct .bin file from the dropdown list.
  g. After selecting the file, confirm that you wish to update the motherboard BIOS.
  h. After confirming the file, a window will pop up to show that the BIOS is updating.
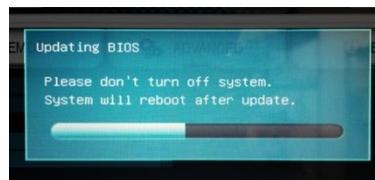
  DO NOT POWER OFF THE MOTHERBOARD WHILE THE BIOS IS UPDATING.

  i. Once the update is finished, the motherboard will power off. Power on the motherboard and enter the BIOS again. It is normal to see an error message after updating your BIOS, as show here:

  j. Confirm that the BIOS has been updated to the latest version by checking the BIOS version (located in the bottom-right of the screen) with the BIOS version you downloaded.

  Note: Your USB flash drive must be formatted as FAT32, or this method of flashing the BIOS will not work. The USB flash drive included with your motherboard is already properly formatted to FAT32. If you plan to use your own USB flash drive, however, please make sure the file system is correct before attempting this method.

Flashing the BIOS Without a CPU

If your motherboard cannot boot, or you are unable to see picture on your display, and other troubleshooting does not resolve your issue, you may need to flash the BIOS. Similarly, if your new motherboard has an older BIOS version that does not have support for your compatible Intel® CPU, you may need to flash the BIOS.

In order to flash the BIOS without picture or a CPU, you must follow these steps:

1. Locate or prepare a USB disk formatted to FAT32. The USB disk included with this motherboard is already formatted to FAT32.
2. Download your intended BIOS from https://www.evga.com/drivers.
3. Unzip the file. Go into the extracted folder, and rename the .bin file to EVGAE798.bin. Move this file into the root of your USB disk.


```
autorun.exe
autorun.ico
autorun.inf
autorun.ini
EVGAE798.bin
lua5.1.dll
lua51.dll
```

4. Turn off your system, then switch your power supply to the "Off" position.
5. Plug the USB disk into the USB 2.0 to SPI header, seen in the component legend on Page 2, component 29, or here:
6. Connect the 24pin power cable from your power supply to the motherboard.

7. Flip your power supply switch to the "On" position and hold down the "BIOS UPDATE" button, which can be found on the Rear I/O Panel:
8. Continue holding down the BIOS Update button for approximately 2 seconds while the LED counts down.

9. When the flash begins, release the BIOS Update button. The POST LED will cycle in a clockwise manner during the flash.

    DO NOT TURN OFF THE MOTHERBOARD. IF THE MOTHERBOARD IS TURNED OFF PRIOR TO COMPLETING THE FLASH PROCESS, THE BIOS MAY BECOME IRREVERSIBLY DAMAGED.

The flash process may take up to 7 minutes, and the motherboard will automatically reboot. If you have not installed a CPU and at least one 8-pin CPU power connector, the POST LED will stop at an error code. If this occurs, turn off the motherboard and install any remaining hardware components before booting again.

Flashing the BIOS without CPU POST Code Errors

Flashing the BIOS without a CPU is relatively straightforward, and this includes the kinds of problems you may run into while using the BIOS Update function.

- Unusual POST Codes – If you see unusual POST Codes, such as "2.5" or "1.2", this may indicate a couple of problems:
    - o Make sure that you hold the BIOS Update button down long enough to begin the flash process.
    - o If you have successfully flashed the BIOS at least once without a CPU installed, please try booting the motherboard with a supported CPU and the rest of your hardware installed. Eventually, you must test with all hardware installed to learn more about an error code.
- E1 – USB disk is still being read/unable to be read correctly. If this continues to occur, try reformatting the USB disk and/or trying a different USB disk.
- E2 – USB disk cannot be detected. Make sure the USB disk is connected to the USB2.0 Type-A port on the motherboard.
- E3 – USB Disk is not in FAT32 format.
- E4 – BIOS file is missing or not found. Make sure the BIOS file is named correctly and placed in the root of the USB disk.
- E9 – BIOS file is incorrect. Make sure the BIOS file is named correctly and is for the correct motherboard.

Hot-Flashing a BIOS

Hot-flashing is usually suggested to restore a BIOS after a bad flash and prevents you from booting. Here are the recommended steps using the BIOS Update button:

1. Prepare your FAT32 USB disk, place a BIOS file named EVGAE798.bin into the root of the disk. Plug the USB disk into the USB to SPI port.
2. Boot into Windows or BIOS on a working BIOS chip.
3. Hold the Power Button down to turn off the system, but don't turn off your power supply.
4. Move the BIOS Switch to the BIOS you want to hot-flash.
5. Hold down the BIOS Update for several seconds until the flash process starts.
6. The flash may take up to 7 minutes. The system will restart once finished.

SSD / HDD is not detected

If you've physically installed a drive that is not detected in Windows, by Windows setup, or within BIOS, please try the following steps. Component troubleshooting is primarily accomplished through process of elimination testing to deduce a faulty component or a bad connection.

It is important to note that the first steps are to always physically check if the device is installed and connected via the proper cables (if applicable), and to check if the device is properly configured in the BIOS.

Device is not receiving power:
For devices with external power, such as SATA, make sure power is connected to the drive, and that the other side of the cable is attached to the correct port on your PSU. If you are using a mechanical drive (either a platter HDD or an optical drive) you should hear the motor spin up when you first power on the system. Similarly, if you put your hand on the device you should feel the drive spin up, warmth from the motor, and a light on the front from an optical drive. If you see, hear, and feel this, then the device is receiving power, and you may skip to the next section. If you do not see, hear, or feel this, first try the cable on a device that you know works; if the cable works, then the issue is the device in question.

However, if you replace the device and the issue persists, then it is either the PSU, one of its modular cables or the port the cable is plugged into. If you are using a modular cable, try a different cable in the same PSU port, and also test on a different port to isolate the source of the problem. In many cases, the PSU manufacturer may be able to replace a defective cable.

Device has power, but does not show up in the BIOS:
If the device is getting power, then we should expect to see the drive in BIOS. If the drive does not show in the SATA Configuration screen in BIOS, make sure the SATA cable is firmly seated on both the drive side and the motherboard.

If you've already done this, test a different device using the same cable and SATA port to see if the issue persists. If the issue is not resolved, test a different SATA cable, or a different SATA port. Always be sure to test each step separately, so that you can definitively determine the source of the issue. If other devices work on the ports and with the same cables, then the issue is the device in question. If testing shows that either one or more of the ports are bad with a different device, then the motherboard is likely

the issue. If one or more of the cables test bad with a different device, then replacing the cable(s) should resolve the issue.

M.2 devices are much simpler to troubleshoot. M.2 devices are installed at a slight angle, gently lowered until parallel with the motherboard, and then fastened into place. M.2 devices can only be installed in one direction. However, if the M.2 device is not fully-inserted into the slot before fastening, you can still have a bad connection. Please refer to Page 30 for M.2 hardware installation, and Page 51 for setup.

<u>Device has power, is seen in BIOS, but cannot be found in Windows:</u>
Lastly, if the device was just added, other troubleshooting in this section has been done, the device has power and shows up in the BIOS, but is not seen in Windows, then it may be that the drive needs to be initialized, partitioned, and formatted in Windows. This can be seen in Windows Disk Management. See Page 78 for instructions.

Using the POST code indicator to troubleshoot

When the system powers on, the Multi-function Display should cycle through several different codes before booting. However, if the boot process does not complete, you should look at the POST codes shown on the display, which functions as a debug LED. When the Multi-function Display cycles through codes and stops at a specific code, this is an indication that an error was detected at a specific point during the boot process. Some POST codes are very specific about the type of error it detects; other POST codes indirectly point to certain components or processes that may be occurring. Use the POST Code list on Page 113 to help diagnose common errors during the boot process.

System does not POST and Multi-function Display reads "C"

If you power on the board and the display reads "C", this is an indication of a CPU-related issue. This issue could occur due to a faulty or incompatible CPU, bent pins in the CPU socket, or simply that the CPU is not receiving power. We suggest to first check that the CPU is receiving power. To the right of the CPU socket, there are two 8-pin power connectors (outlined in **blue** in the image to the right) that provide direct power for the CPU. Without power from the PSU, the system cannot fully power on and initialize. The Z790 Classified has two of these connectors; at least one must be plugged in. If your PSU only has one 8-pin CPU power cable (sometimes designed with two 4-pin connectors), you may use either port.
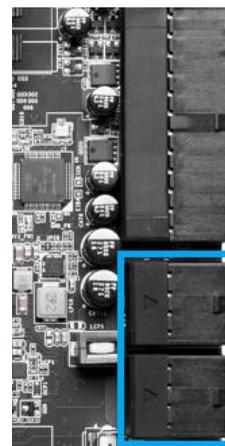
Make sure the CPU power connector is fully-inserted and also make sure that the tab on the socket and the release on the power connector are on the same side (see the **blue** boxes in the second picture). If the tabs do not line up, then you have plugged in a PCIe 8-pin into the EPS connector, which may cause irreparable damage to the motherboard or the CPU. For the Z790 CLASSIFIED, inserting an 8-pin PCIe connector will likely damage the PCB due to the right-angle connectors.
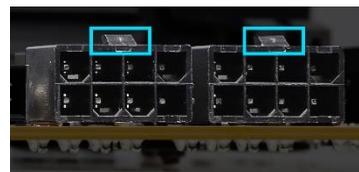
Consult your power supply manual to confirm the correct cables for your motherboard. If the PSU is modular, make sure the cable is also fully-seated on the PSU side. Only use the manufacturer's officially-supported cables for your specific PSU. PSU cables are not standardized in the industry; using a third-party cable may have catastrophic effects.

System does not POST, and Multi-function Display reads "55"

A "55" POST code error indicates a memory issue. Verify that memory is properly installed and fully-seated. Make sure the memory is compatible with the specs of this motherboard and your processor. Most memory kits tested by EVGA are fully compatible with this motherboard. However, this motherboard will not support modules over 32GB or ECC/Registered RAM.

If your memory *should* work on this motherboard, the next step is to try to boot with only one stick of memory in "DIMM slot 2". If this is your first boot with the motherboard and the board will not POST, or you recently installed new memory, press the "Reset CMOS" button. The system will power on when the Reset CMOS button is pressed. This should allow the system to boot up. When you see the EVGA Z790 CLASSIFIED screen, press "Delete" to enter BIOS, set the XMP profile (instructions are covered in first boot section on Page 49), save and exit, and the system will reboot. If the system reboots successfully, you can power down and install the rest of the memory to retest.

System does not POST, and Multi-function Display reads "d7"

A "d7" POST code indicates that the motherboard cannot detect a keyboard or input device. When this happens, some video card / monitor setups will display a message on screen about a Keyboard error, while others will just remain blank. Power down the system and reseat the USB connector. Make sure the keyboard is only plugged in to a USB3.2 Gen1 slot.

Older wireless keyboards can sometimes cause this issue. For legacy wireless keyboards, we recommended that you plug in a regular USB keyboard, reboot, enter BIOS, and go to Advanced – USB Configuration. Make sure "Legacy USB Support" is set to "enabled," then save an exit. Power down and then reconnect your wireless keyboard. At this point, the board should POST past "d7."

Have a question not covered above, or want some online resources?

If you have any issues or questions, you can find a lot of valuable help and information on our website, including contact information for our top-notch Technical Support/Customer Service.

- You may find all of the motherboard drivers at https://www.evga.com/drivers. Select the "Motherboard" tab, then select "Intel® Z790" from the Family tab, then "121-RL-E798" from the part number pulldown. Next, select either "All" or the specific component that requires a driver, then select your operating system and click "Submit"

- You may find the list of officially supported CPUs for your motherboard, including the minimum required BIOS revision for compatibility, at: https://www.evga.com/motherboard/. BIOS updates are cumulative, so they will always support products from the previous version, except when specified otherwise.

- For our Frequently Asked Questions (FAQ) database, go to: https://www.evga.com/faq

- To visit our Community Forums, go to: https://forums.evga.com/

- For our Community Forums section dedicated to Z790 motherboards, go to: https://forums.evga.com/EVGA-Z790-Series-f124.aspx

- Just finished building or upgrading your system and want to show it off? Make a ModsRigs Profile here: http://www.modsrigs.com/ and create a page dedicated entirely to YOUR system!

- Still building your rig? Make a build log here: https://forums.evga.com/EVGA-MODS-RIGS-f33.aspx

Multi-function Display POST Debug LED

The Multi-function Display's functions include providing two-digit diagnostic POST codes. These POST codes show system boot status and its behavior can help to determine why the system may be failing to boot. This LED is extremely useful as a debugging tool during troubleshooting situations.

This debug LED will display a series of hexadecimal (0-F) codes during the POST and will display current CPU socket temperatures (by default) after the system has fully booted into the Operating System. You can modify the post-boot LED behavior in the BIOS, as shown in the Multi-function LED indicator section below. For error codes, see the "POST Codes" section below for more detailed.

Multi-function Display POST Debug LED
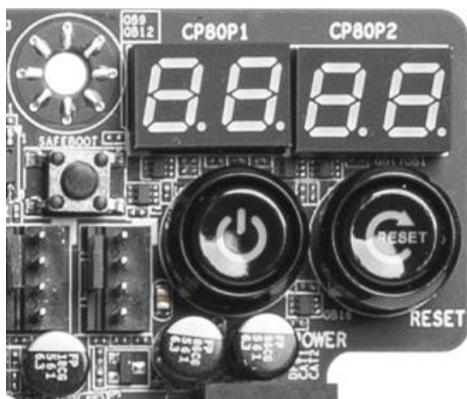
Multi-function LED indicator

EVGA Z790 CLASSIFIED board is equipped with a versatile display to allow real-time monitoring of system status during and after the BIOS POST process. The operating mode can be configured in the BIOS Setup in the Advanced menu, and then H/W Monitor Configuration. The Debug Port Display setting selects the OS display mode. There are multiple modes available:

- ❑ [Temp.] CPU – displays external CPU die temperature sensor readout in real-time. Use this mode to read negative temperatures.
- ❑ [Temp.] PWM – displays VRM temperature sensor readout in real-time after BIOS POST completion.
- ❑ [Temp.] SYS – displays motherboard bay temperature sensors.
- ❑ [Temp.] Ext. Thermal – displays temps reported by the Ext. Thermal Sensor.
- ❑ [Temp.] VDIMM VRM – displays VDIMM VRM temperature sensors.
- ❑ [Temp.] PCH – displays PCH temperature sensors.
- ❑ [Volt.] Vcore – displays CPU VCORE after BIOS POST completion.
- ❑ [Volt.] CPU VCCIN AUX – displays CPU Input Voltage after BIOS POST completion.
- ❑ [Volt.] CPU VDD2 – displays CPU Memory Controller voltage after BIOS POST completion.
- ❑ [Volt.] CPU 1.8V – displays CPU 1.8V voltage after BIOS POST completion.
- ❑ [Volt.] CPU 1.05V – displays CPU 1.05V voltage after BIOS POST completion.
- ❑ [Volt.] PCH 1.05V – displays PCH 1.05V voltage after BIOS POST completion.
- ❑ [Volt.] PCH 0.82V – displays PCH 0.82V voltage after BIOS POST completion.
- ❑ [Volt] VCC – displays the +5V rail voltage after BIOS POST completion.
- ❑ [Volt] VCC3 – displays the +3.3V rail voltage after BIOS POST completion.
- ❑ [Volt] 12V – displays the +12V rail voltage after BIOS POST completion.
- ❑ POST Code – displays only BIOS POST completion.
- ❑ Turn Off - completely deactivates Multi-function LED display

The Debug Port Display menu in the BIOS Setup allows you to pick specific sensors to be displayed on the Multi-function Display.

These temperatures and voltages can also be seen in the BIOS setup window in real-time, for a quick overview.

The recommended settings to display during overclocking are "[Temp.] CPU" and "[Volt.] Vcore".

POST Beep Codes

POST beeps are used in conjunction with the Multi-function Display to help determine the root cause when your system fails to boot. However, modern motherboards also use the speaker to convey helpful information, such as USB device detection. As a result, users may become confused about the number of beeps emitted, making the POST code beep - while still helpful - not as useful as it once was.

Many motherboards will beep 1-2 times per USB device plugged in at boot; some will beep more based on functions of the device.

Beep Codes	
# of Beeps	Description
1	Invalid Password
4	Some of the Architectural Protocols are not Available
5	No Console Output Device detected
5	No Console Input Device detected
6	Flash Update Failed
7	Reset Protocol is not available
8	Platform PCI resource requirements cannot be met

of the device. These detection beeps may occur at the same time as the system's POST beeps, sometimes making it a challenge to separate the POST beeps from the USB initialization. Since the Multi-function Display now fills most of the role previously held by audible beeps, there are far fewer POST beeps to help debug problems, compared to previous motherboard generations.

1 Beep: This relates to BIOS boot passwords. The BIOS will beep, indicating that a password is required to boot. If you incorrectly enter your BIOS password when prompted by the BIOS, you will receive one beep.

4 Beeps: This is an error relating to some small recovery errors, which can occur when coming out of sleep/hibernate.

5 Beeps: This error is stating it cannot detect a keyboard. This can also indicate a video card is not detected.

6 Beeps: This relates to either a failed BIOS update, or a failed Intel® ME Firmware update.

7 Beeps: This relates to a failed CPU INIT request. EFI/UEFI Reset protocol is used when a processor INIT call is used and was not successful. This returns either an "EFI_UNSUPPORTED" error if the INIT type is not supported or an "EFI_Device_Error" if the error occurs while generating the INIT; either will result in seven (7) POST beeps.

8 Beeps: Error given when an incompatible PCI Express device is installed and cannot initialize properly.

POST Codes

Multi-function Display with
Temperature Monitor

This section provides the AMI POST Codes for
the EVGA Z790 CLASSIFIED Motherboard
during system boot up. The POST Codes are
displayed on the Multi-function Display readout
located directly on the motherboard and can be
used to help troubleshoot pre-boot issues. See Pages 12 and 13, component 17
of the Component Legend for physical location.
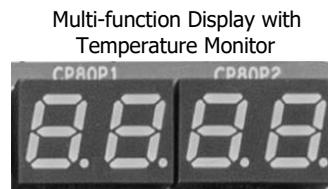
This display will switch to show the user's Multi-function Display settings after
POST (see Page 110). Please note that if you see the display constantly
switching numbers after entering Windows, the display is showing temperature
or voltage information, and is NOT reporting errors.

AMI POST Codes

1	Power on. Reset type detection (soft/hard).
2	AP initialization before microcode loading
3	North Bridge initialization before microcode loading
4	South Bridge initialization before microcode loading
5	OEM initialization before microcode loading
6	Microcode loading
7	AP initialization after microcode loading
8	North Bridge initialization after microcode loading
9	South Bridge initialization after microcode loading
0A	OEM initialization after microcode loading
0B	Cache initialization
0C-0D	Reserved for future AMI SEC error codes
0E	Microcode not found

0F	Microcode not loaded
10	PEI Core is started
11-14	Pre-memory CPU initialization is started
15-18	Pre-memory North Bridge initialization is started
19-1C	Pre-memory South Bridge initialization is started
1D-2A	OEM pre-memory initialization codes
2B	Memory initialization. Serial Presence Detect (SPD) data reading
2C	Memory initialization. Memory presence detection
2D	Memory initialization. Programming memory timing information
2E	Memory initialization. Configuring memory
2F	Memory initialization (other).
30	Reserved for ASL (see ASL Status Codes section below)
31	Memory Installed
32	CPU post-memory initialization is started
33	CPU post-memory initialization. Cache initialization
34	CPU post-memory initialization. Application Processor(s) (AP) initialization
35	CPU post-memory initialization. Boot Strap Processor (BSP) selection
36	CPU post-memory initialization. System Management Mode (SMM) initialization
37-3A	Post-Memory North Bridge initialization is started
3B-3E	Post-Memory South Bridge initialization is started
3F-4E	OEM post memory initialization codes
4F	DXE IPL is started
50	Memory initialization error. Invalid memory type or incompatible memory speed
51	Memory initialization error. SPD reading has failed
52	Memory initialization error. Invalid memory size or memory modules do not match.
53	Memory initialization error. No usable memory detected
54	Unspecified memory initialization error.
55	Memory not installed
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 not available
5C-5F	Reserved for future AMI error codes
E0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
E1	S3 Boot Script execution
E2	Video repost
E3	OS S3 wake vector call
E4-E7	Reserved for future AMI progress codes
E8-EB	S3 Resume Failed
EC-EF	Reserved for future AMI error codes
F0	Recovery condition triggered by firmware (Auto recovery)
F1	Recovery condition triggered by user (Forced recovery)
F2	Recovery process started
F3	Recovery firmware image is found
F4	Recovery firmware image is loaded
F5-F7	Reserved for future AMI progress codes
F8	Recovery PPI is not available
F9	Recovery capsule is not found
FA	Invalid recovery capsule
FB–FF	Reserved for future AMI error codes
60	DXE Core is started
61	NVRAM initialization
62	Installation of the South Bridge Runtime Services
63-67	CPU DXE initialization is started
68	PCI host bridge initialization
69	North Bridge DXE initialization is started
6A	North Bridge DXE SMM initialization is started
6B-6F	North Bridge DXE initialization (North Bridge module specific)
70	South Bridge DXE initialization is started
71	South Bridge DXE SMM initialization is started
72	South Bridge devices initialization
73-77	South Bridge DXE Initialization (South Bridge module specific)
78	ACPI module initialization

79	CSM initialization
7A–7F	Reserved for future AMI DXE codes
80–8F	OEM DXE initialization codes
90	Boot Device Selection (BDS) phase is started
91	Driver connecting is started
92	PCI Bus initialization is started
93	PCI Bus Hot Plug Controller Initialization
94	PCI Bus Enumeration
95	PCI Bus Request Resources
96	PCI Bus Assign Resources
97	Console Output devices connect
98	Console input devices connect
99	Super IO Initialization
9A	USB initialization is started
9B	USB Reset
9C	USB Detect
9D	USB Enable
9E–9F	Reserved for future AMI codes
A0	IDE initialization is started
A1	IDE Reset
A2	IDE Detect
A3	IDE Enable
A4	SCSI initialization is started
A5	SCSI Reset
A6	SCSI Detect
A7	SCSI Enable
A8	Setup Verifying Password
A9	Start of Setup
AA	Reserved for ASL (see ASL Status Codes section below)
AB	Setup Input Wait
AC	Reserved for ASL (see ASL Status Codes section below)
AD	Ready To Boot event

AE	Legacy Boot event
AF	Exit Boot Services event
B0	CPU Memory controller configuration
B1	Runtime Set Virtual Address MAP End
B2	iMC init
B3	Memory training
B4	Memory training
B5	Memory training / timing training
B6	Memory training
B7	Memory training
B8-BF	Memory training / DRAM final configuration
C0–CF	OEM BDS initialization codes
D0	CPU initialization error
D1	North Bridge initialization error
D2	South Bridge 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
D6	No Console Output Devices are found
D7	No Console Input Devices are found
D8	Invalid password
D9	Error loading Boot Option (Load Image returned error)
DA	Boot Option is failed (Start Image returned error)

EVGA Glossary of Terms

AC – Alternating Current

ACPI - Advanced Configuration and Power Interface

AHCI – Advanced Host Controller Interface

APIC - Advanced Programmable Interrupt Controller

ARGB – Addressable Red Green Blue (LED lighting)

BCLK – Base Clock (or operating frequency of base system bus)

BIOS - Basic Input Output System

CMOS - Complementary Metal-Oxide Semiconductor

CPU – Central Processing Unit

DC – Direct Current

DDR - Double Data Rate

DIMM - Dual In-line Memory Module

DMI – Direct Memory Interface

DP – Display Port

DRAM - Dynamic random access memory

DVI – Digital Video Interface

ELEET X1 – EVGA motherboard monitoring and tuning software

GHz – Gigahertz

GPU – Graphics Processing Unit

GUI – Graphical User Interface

HDD – Hard Disk Drive

HDMI - High-Definition Multimedia Interface

HDR – High Dynamic Range (Lighting)

HPET - High Precision Event Timer

HT – Hyper-Threading

HSF - Heat Sink Fan

I/O - Input/Output

IEEE - Institute of Electrical and Electronics Engineers

IGP - Integrated Graphics Processors

IMC – Integrated memory controller

IOH – Input/Output Hub

IRQ - Interrupt Request

JBOD - Just a Bunch of Disks

JEDEC - Joint Electron Device Engineering Council

LAN - Local Area Network

LCD - Liquid Crystal Display

LGA – Land Grid Array

LN/2 – Liquid Nitrogen (Cooling)

MAC - Media Access Control

M.2 – A card bus based standard commonly used for VERY fast SSD's, and WiFi.

MCP - Media and Communications Processor

Intel® ME – Intel® Management Engine

MHz – Megahertz

mGPU – Multi-GPU technology from AMD

MMIO – Memory Mapped I/O

NB - Northbridge

NCQ - Native Command Queuing

NIC - Network Interface Card

NTFS - New Technology File System

NVMe – Non-Volatile Memory Express

OEM - Original Equipment Manufacturer

PCB - Printed Circuit Board

PCH – Platform Controller Hub

PCI - Peripheral Component Interconnect

PCIe - Peripheral Component Interconnect Express

PLL – Phase Locked Loop

POST – Power On Self-Test

PWM – Pulse Width Modulation

QOS – Quality of Service

RAID - Redundant Array of Inexpensive Disks

RAM – Random Access Memory

ROM – Read Only Memory

RGB - Red Green Blue

SATA - Serial Advanced Technology Attachment

SAS – Serial Attached SCSI

SCSI - Small Computer System Interface

SPD - Serial Presence Detect

S/PDIF - Sony/Philips Digital Interconnect Format

SPP - System Platform Processors

SSD – Solid State Drive

TCP/IP - Transmission Control Protocol/Internet Protocol

U.2 – High-Speed storage interface also referred to as SFF-8639

UDP – User Datagram Protocol

UEFI – Unified Extensible Firmware Interface

USB - Universal Serial Bus

VDroop - Voltage Droop

VGA - Video Graphics Array

VREG – Voltage Regulator

Compliance Information

FCC Compliance Information

This device complies with FCC Rules Part 15. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. 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 manufacturer's 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: (1) Increase the separation between the equipment and signal source, or (2) connect the equipment to an outlet on a circuit different from that to which the signal source is connected. Consult the dealer or an experienced computer technician for help. The use of shielded cables for connection of peripheral devices to the PC systems is required to ensure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE Compliance Information

Generic Radiation Interference Standard for Information Technology Equipment. (EN 55022: 2006, Class B), (EN 61000-3-2: 2006), (EN 61000-3-3: 1995 + A1: 2001 + A2: 2005). Warning: This is a Class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measure. Generic Immunity Standard for Information Technology Equipment. (EN 55024: 1998 + A1: 2001 + A2: 2003).

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Ver. 2