

# **Neusys Technology Inc.**

## **Nuvo-7000 Series**

### **User Manual**

Revision 1.2

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# Declaration of Conformity

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**CE**      The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

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# Safety Precautions

- Read these instructions carefully before you install, operate, or transport the system.
- Install the system or DIN rail associated with, at a sturdy location
- Install the power socket outlet near the system where it is easily accessible
- Secure each system module(s) using its retaining screws
- Place power cords and other connection cables away from foot traffic. Do not place items over power cords and make sure they do not rest against data cables
- Shutdown, disconnect all cables from the system and ground yourself before touching internal modules
- Ensure that the correct power range is being used before powering the device
- Should a module fail, arrange for a replacement as soon as possible to minimize down-time
- If the system is not going to be used for a long time, disconnect it from mains (power socket) to avoid transient over-voltage

# Service and Maintenance

- ONLY qualified personnel should service the system
- Shutdown the system, disconnect the power cord and all other connections before servicing the system
- When replacing/ installing additional components (expansion card, memory module, etc.), insert them as gently as possible while assuring proper connector engagement

# ESD Precautions

- Handle add-on module, motherboard by their retention screws or the module's frame/ heat sink. Avoid touching the PCB circuit board or add-on module connector pins
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or maintaining the system
- Avoid dust, debris, carpets, plastic, vinyl and styrofoam in your work area.
- Do not remove any module or component from its anti-static bag before installation

# About This Manual

This manual introduces Neosys Nuvo-7000 series featuring Intel® 8th/ 9th Gen Core™ i hexa/ octa core 35W/ 65W TDP LGA1151 processors.

The guide also demonstrates the system's installation procedures.

## Applicable systems:

| System          | Description   |
|-----------------|---|
| Nuvo-7002E      | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 2x GbE, 1-slot PCIe Cassette and MeziO™ interface                                  |
| Nuvo-7002P      | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 2x GbE, 1-slot PCI Cassette and MeziO™ interface                                   |
| Nuvo-7002DE     | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 2x GbE, 2-slot PCIe Cassette and MeziO™ interface                                  |
| Nuvo-7006E      | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 6x GbE, 1-slot PCIe Cassette and MeziO™ interface                                  |
| Nuvo-7006P      | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 6x GbE, 1-slot PCI Cassette and MeziO™ interface                                   |
| Nuvo-7006DE     | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 6x GbE, 2-slot PCIe Cassette and MeziO™ interface                                  |
| Nuvo-7006E-PoE  | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 6x GbE, 1-slot PCIe Cassette and MeziO™ interface, with optional IEEE 802.3at PoE+ |
| Nuvo-7006P-PoE  | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 6x GbE, 1-slot PCI Cassette and MeziO™ interface, with optional IEEE 802.3at PoE+  |
| Nuvo-7006DE-PoE | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 6x GbE, 2-slot PCIe Cassette and MeziO™ interface, with optional IEEE 802.3at PoE+ |
| Nuvo-7002LP     | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 2x GbE, MeziO™ interface and low-profile chassis                                   |
| Nuvo-7006LP     | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 6x GbE, MeziO™ interface and low-profile chassis                                   |
| Nuvo-7006LP-PoE | Intel® Coffee Lake 8th/ 9th Gen Core™ i fanless embedded controller with 6x GbE, MeziO™ interface and low-profile chassis, with optional IEEE 802.3at PoE+  |

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## Revision History

| Version | Date      | Description  |
|---------|-----------|--|
| 1.0     | Mar. 2019 | Initial release  |
| 1.1     | Apr. 2019 | Updated maximum 15mm 2.5" SSD/ HDD thickness supported |
| 1.2     | Jul. 2019 | Updated 9 <sup>th</sup> Gen Intel processor support    |

# 1 Introduction

The Neosys Nuvo-7000 series is one of the world's first industrial-grade embedded computers to utilize Intel's 8<sup>th</sup>/ 9<sup>th</sup> Gen. Coffee Lake Core i processors.

The latest Intel Coffee Lake processors are available in quad (Core-i3), hexa (Core-i5 and i7) and octa (i7 9<sup>th</sup> Gen.) core configurations offering significant performance boosts over previous 6<sup>th</sup> and 7<sup>th</sup> Gen Core i processors. The system is based on Intel's Q370 platform and supports up to 64GB of DDR4-2666 memory.



**Nuvo-7000E/ P series**



**Nuvo-7000LP series**



**Nuvo-7000DE series**

Nuvo-7000 series features multiple Neosys patented add-on technology options such as Cassette module, MezIO™ interface and supercapacitor-base power-backup solution for extra functionalities. Users can install off-the-shelf PCIe and PCI add-on card(s) into the expansion Cassette; select MezIO™ module for extra functions such as DIO, RS-232/ 422/ 485, GbE, USB3 or ignition power control; it is also compatible with PB-2500J, Neosys' patented supercapacitor-based power-backup solution. The addition of PB-2500J further allows Nuvo-7000 systems to handle power fluctuation and unforeseen power outages. The combination of PB-2500J and Nuvo-7000 redefines embedded ruggedness and offers users an extra piece of mind.

Flexible and versatile for a variety of applications, Nuvo-7000 variants are available with different Cassette expansion options. With Neosys Nuvo-7000 series, you get a true rugged platform that can accommodate a single PCIe card (Nuvo-7000E series), dual PCIe cards (Nuvo-7000DE series) or a single PCI card (Nuvo-7000P series) according your application needs.



## 1.1 Product Specifications

### 1.1.1 Nuvo-7000E Specifications

Applicable systems: Nuvo-7002E/ 7006E/ 7006E-PoE

| <b>System Core</b>       |  |
|--------------------------|--|
| Processor                | Supporting Intel® 8 <sup>th</sup> / 9 <sup>th</sup> Gen Coffee Lake 6/ 8 core CPU (LGA1151 socket, 65W/ 35W TDP)<br>- Intel® Core™ i7-9700E/ i7-9700TE<br>- Intel® Core™ i7-8700/ i7-8700T<br>- Intel® Core™ i5-9500E/ i5-9500TE<br>- Intel® Core™ i5-8500/ i5-8500T<br>- Intel® Core™ i3-9100E/ i3-9100TE<br>- Intel® Core™ i3-8100/ i3-8100T |
| Chipset                  | Intel® Q370 Platform Controller Hub  |
| Graphics                 | Integrated Intel® UHD Graphics 630   |
| Memory                   | Up to 64GB DDR4 2666/ 2400 SDRAM (two SODIMM slots)  |
| AMT                      | Supports AMT 12.0  |
| TPM                      | Supports TPM 2.0   |
| <b>I/O Interface</b>     |  |
| Ethernet port            | 2x Gigabit Ethernet ports by I219 and I210 ( <b>Nuvo-7002E</b> )<br>6x Gigabit Ethernet ports by I219 and 5x I210 ( <b>Nuvo-7006E</b> )  |
| PoE+                     | IEEE 802.3at PoE+ PSE for Port 3 ~ Port 6 ( <b>Nuvo-7006E-PoE</b> )<br>100 W total power budget  |
| USB                      | via Intel native xHCI controller<br>4x USB 3.1 Gen2 (10Gbps) ports<br>4x USB 3.1 Gen1 (5Gbps) ports  |
| Video Port               | 1x VGA connector, supporting 1920 x 1200 resolution<br>1x DVI-D connector, supporting 1920 x 1200 resolution<br>1x DisplayPort connector, supporting 4096 x 2304 resolution  |
| Serial Port              | 2x software-programmable RS-232/ 422/ 485 ports (COM1/ COM2)<br>2x RS-232 ports (COM3/ COM4)   |
| Audio                    | 1x 3.5 mm jack for mic-in and speaker-out  |
| <b>Storage Interface</b> |  |
| SATA HDD                 | 2x internal SATA ports for 2.5" HDD/ SSD (up to 15mm thickness), supporting RAID 0/1   |
| M.2 NVMe                 | 1x M.2 2280 M key NVMe socket (PCIe Gen3 x4) for NVMe SSD or   |

|                               |   |
|-------------------------------|---|
|                               | Intel® Optane™ memory installation  |
| mSATA                         | 1x full-size mSATA port (mux with mini-PCIe)  |
| <b>Internal Expansion Bus</b> |   |
| PCI Express Slot              | 1x PCIe x16 slot@Gen3, 8-lanes PCIe signals in Cassette module  |
| Mini PCI-E                    | 1x full-size mini PCI Express socket with internal SIM socket (mux with mSATA)  |
| M.2                           | 1x M.2 2242 B key socket with dual front-accessible SIM sockets supporting dual SIM mode with selected M.2 LTE module                                     |
| Expandable I/O                | 1x MeziO™ expansion port for Neousys MeziO™ modules   |
| <b>Power Supply</b>           |   |
| DC Input                      | 1x 3-pin pluggable terminal block for 8~35VDC DC input  |
| Remote Ctrl. & LED Output     | 1x 3-pin pluggable terminal block for remote control and PWR LED output   |
| Maximum Power Consumption     | With i7-8700T (35W mode): 72W (Max.) @ 24V<br>With i5-8500T (35W mode): 68.4W (Max.) @ 24V<br>With i3-8100T (35W mode): 62.64W (Max.) @ 24V               |
| <b>Mechanical</b>             |   |
| Dimension                     | 240 mm (W) x 225 mm (D) x 90 mm (H)   |
| Weight                        | 3.58Kg (approx.)  |
| Mounting                      | Wall-mounting (standard) or DIN-rail mounting (optional)  |
| <b>Environmental</b>          |   |
| Operating Temperature         | <b>With 35W CPU</b><br>-25°C ~ 70°C **<br><b>With 65W CPU</b><br>-25°C ~ 70°C */ ** (configured as 35W TDP)<br>-25°C ~ 50°C */ ** (configured as 65W TDP) |
| Storage Temperature           | -40°C ~85°C   |
| Humidity                      | 10%~90% , non-condensing  |
| Vibration                     | Operating, MIL-STD-810G, Method 514.6, Category 4   |
| * Shock                       | Operating, MIL-STD-810G, Method 516.6, Procedure I, Table 516.6-II  |
| F EMC                         | CE/ FCC Class A, according to EN 55032 & EN 55024   |

*or i7-8700 running at 65W mode, the highest operating temperature shall be limited to 50°C and thermal throttling may occur when sustained full-loading applied. Users can configure CPU power in BIOS to allow higher operating temperature.*

*\*\* For sub-zero operating temperature, a wide temperature HDD or Solid State Disk*

(SSD) is required.

### 1.1.2 Nuvo-7000P Specifications

Applicable systems: Nuvo-7002P/ 7006P/ 7006P-PoE

| <b>System Core</b>       |  |
|--------------------------|--|
| Processor                | Supporting Intel® 8th/ 9th Generation Coffee Lake CPU (LGA1151 socket, 65W/ 35W TDP)<br>- Intel® Core™ i7-8700/ i7-8700T<br>- Intel® Core™ i5-8500/ i5-8500T<br>- Intel® Core™ i3-8100/ i3-8100T<br>- Intel® Pentium® G5400/ G5400T<br>- Intel® Celeron® G4900/ G4900T |
| Chipset                  | Intel® Q370 Platform Controller Hub  |
| Graphics                 | Integrated Intel® UHD Graphics 630   |
| Memory                   | Up to 64GB DDR4 2666/ 2400 SDRAM (two SODIMM slots)  |
| AMT                      | Supports AMT 12.0  |
| TPM                      | Supports TPM 2.0   |
| <b>I/O Interface</b>     |  |
| Ethernet port            | 2x Gigabit Ethernet ports by I219 and I210 ( <b>Nuvo-7002P</b> )<br>6x Gigabit Ethernet ports by I219 and 5x I210 ( <b>Nuvo-7006P</b> )  |
| PoE+                     | IEEE 802.3at PoE+ PSE for Port 3 ~ Port 6 ( <b>Nuvo-7006P-PoE</b> )<br>100 W total power budget  |
| USB                      | via Intel native xHCI controller<br>4x USB 3.1 Gen2 (10Gbps) ports<br>4x USB 3.1 Gen1 (5Gbps) ports  |
| Video Port               | 1x VGA connector, supporting 1920 x 1200 resolution<br>1x DVI-D connector, supporting 1920 x 1200 resolution<br>1x DisplayPort connector, supporting 4096 x 2304 resolution  |
| Serial Port              | 2x software-programmable RS-232/ 422/ 485 ports (COM1/ COM2)<br>2x RS-232 ports (COM3/ COM4)   |
| Audio                    | 1x 3.5 mm jack for mic-in and speaker-out  |
| <b>Storage Interface</b> |  |
| SATA HDD                 | 2x internal SATA ports for 2.5" HDD/ SSD (up to 15mm thickness), supporting RAID 0/1   |
| M.2 NVMe                 | 1x M.2 2280 M key NVMe socket (PCIe Gen3 x4) for NVMe SSD or Intel® Optane™ memory installation  |

|                               |   |
|-------------------------------|---|
| mSATA                         | 1x full-size mSATA port (mux with mini-PCIe)  |
| <b>Internal Expansion Bus</b> |   |
| PCI Slot                      | 1x PCI slot in Cassette   |
| Mini PCI-E                    | 1x full-size mini PCI Express socket with internal SIM socket (mux with mSATA )   |
| M.2                           | 1x M.2 2242 B key socket with dual front-accessible SIM sockets supporting dual SIM mode with selected M.2 LTE module                                   |
| Expandable I/O                | 1x MeziO™ expansion port for Neousys MeziO™ modules   |
| <b>Power Supply</b>           |   |
| DC Input                      | 1x 3-pin pluggable terminal block for 8~35VDC DC input  |
| Remote Ctrl. & LED Output     | 1x 3-pin pluggable terminal block for remote control and PWR LED output   |
| Maximum Power Consumption     | With i7-8700T (35W mode): 72W (Max.) @ 24V<br>With i5-8500T (35W mode): 68.4W (Max.) @ 24V<br>With i3-8100T (35W mode): 62.64W (Max.) @ 24V             |
| <b>Mechanical</b>             |   |
| Dimension                     | 240 mm (W) x 225 mm (D) x 90 mm (H)   |
| Weight                        | 3.58 Kg (approx.)   |
| Mounting                      | Wall-mounting (standard) or DIN-rail mounting (optional)  |
| <b>Environmental</b>          |   |
| Operating Temperature         | <b>With 35W CPU</b><br>-25°C ~ 70°C **<br><b>With 65W CPU</b><br>-25°C ~ 70°C */** (configured as 35W TDP)<br>-25°C ~ 50°C */** (configured as 65W TDP) |
| Storage Temperature           | -40°C ~85°C   |
| Humidity                      | 10%~90% , non-condensing  |
| Vibration                     | Operating, MIL-STD-810G, Method 514.6, Category 4   |
| Shock                         | Operating, MIL-STD-810G, Method 516.6, Procedure I, Table 516.6-II  |
| * EMC                         | CE/ FCC Class A, according to EN 55032 & EN 55024   |

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or i7-8700 running at 65W mode, the highest operating temperature shall be limited to 50°C and thermal throttling may occur when sustained full-loading applied. Users can configure CPU power in BIOS to obtain higher operating temperature.

\*\* For sub-zero operating temperature, a wide temperature HDD or Solid State Disk

(SSD) is required.

### 1.1.3 Nuvo-7000DE Specifications

Applicable systems: Nuvo-7002DE/ 7006DE/ 7006DE-PoE

| <b>System Core</b>       |  |
|--------------------------|--|
| Processor                | Supporting Intel® 8th/ 9th Generation Coffee Lake CPU (LGA1151 socket, 65W/ 35W TDP)<br>- Intel® Core™ i7-8700/ i7-8700T<br>- Intel® Core™ i5-8500/ i5-8500T<br>- Intel® Core™ i3-8100/ i3-8100T<br>- Intel® Pentium® G5400/ G5400T<br>- Intel® Celeron® G4900/ G4900T |
| Chipset                  | Intel® Q370 Platform Controller Hub  |
| Graphics                 | Integrated Intel® UHD Graphics 630   |
| Memory                   | Up to 64GB DDR4 2666/ 2400 SDRAM (two SODIMM slots)  |
| AMT                      | Supports AMT 12.0  |
| TPM                      | Supports TPM 2.0   |
| <b>I/O Interface</b>     |  |
| Ethernet port            | 2x Gigabit Ethernet ports by I219 and I210 ( <b>Nuvo-7002DE</b> )<br>6x Gigabit Ethernet ports by I219 and 5x I210 ( <b>Nuvo-7006DE</b> )  |
| PoE+                     | IEEE 802.3at PoE+ PSE for Port 3 ~ Port 6 ( <b>Nuvo-7006DE-PoE</b> )<br>100 W total power budget   |
| USB                      | via Intel native xHCI controller<br>4x USB 3.1 Gen2 (10Gbps) ports<br>4x USB 3.1 Gen1 (5Gbps) ports  |
| Video Port               | 1x VGA connector, supporting 1920 x 1200 resolution<br>1x DVI-D connector, supporting 1920 x 1200 resolution<br>1x DisplayPort connector, supporting 4096 x 2304 resolution  |
| Serial Port              | 2x software-programmable RS-232/ 422/ 485 ports (COM1/ COM2)<br>2x RS-232 ports (COM3/ COM4)   |
| Audio                    | 1x 3.5 mm jack for mic-in and speaker-out  |
| <b>Storage Interface</b> |  |
| SATA HDD                 | 2x internal SATA ports for 2.5" HDD/ SSD (up to 15mm thickness), supporting RAID 0/1   |
| M.2 NVMe                 | 1x M.2 2280 M key NVMe socket (PCIe Gen3 x4) for NVMe SSD or   |

|                               |   |
|-------------------------------|---|
|                               | Intel® Optane™ memory installation  |
| mSATA                         | 1x full-size mSATA port (mux with mini-PCIe)  |
| <b>Internal Expansion Bus</b> |   |
| PCI Express                   | 2x PCIe x8 slot@Gen3, 4-lanes PCIe signals in Cassette  |
| Mini PCI-E                    | 1x full-size mini PCI Express socket with internal SIM socket (mux with mSATA)  |
| M.2                           | 1x M.2 2242 B key socket with dual front-accessible SIM sockets supporting dual SIM mode with selected M.2 LTE module                                     |
| Expandable I/O                | 1x MezIO™ expansion port for Neousys MezIO™ modules   |
| <b>Power Supply</b>           |   |
| DC Input                      | 1x 3-pin pluggable terminal block for 8~35VDC DC input  |
| Remote Ctrl. & Status Output  | 1x 3-pin pluggable terminal block for remote control and PWR LED output   |
| Maximum Power Consumption     | With i7-8700T (35W mode): 72W (Max.) @ 24V<br>With i5-8500T (35W mode): 68.4W (Max.) @ 24V<br>With i3-8100T (35W mode): 62.64W (Max.) @ 24V               |
| <b>Mechanical</b>             |   |
| Dimension                     | 240 mm (W) x 225 mm (D) x 110.5 mm (H)  |
| Weight                        | 3.7 Kg (approx.)  |
| Mounting                      | Wall-mounting (standard) or DIN-rail mounting (optional)  |
| <b>Environmental</b>          |   |
| Operating Temperature         | <b>With 35W CPU</b><br>-25°C ~ 70°C **<br><b>With 65W CPU</b><br>-25°C ~ 70°C */ ** (configured as 35W TDP)<br>-25°C ~ 50°C */ ** (configured as 65W TDP) |
| Storage Temperature           | -40°C ~85°C   |
| Humidity                      | 10%~90% , non-condensing  |
| * Vibration                   | Operating, MIL-STD-810G, Method 514.6, Category 4   |
| Shock                         | Operating, MIL-STD-810G, Method 516.6, Procedure I, Table 516.6-II  |
| F EMC                         | CE/ FCC Class A, according to EN 55032 & EN 55024   |

or i7-8700 running at 65W mode, the highest operating temperature shall be limited to 50°C and thermal throttling may occur when sustained full-loading applied. Users can configure CPU power in BIOS to obtain higher operating temperature.

\*\* For sub-zero operating temperature, a wide temperature HDD or Solid State Disk (SSD) is required.

### 1.1.4 Nuvo-7000LP Specifications

Applicable systems: Nuvo-7002LP/ 7006LP/ 7006LP-PoE

| <b>System Core</b>       |  |
|--------------------------|--|
| Processor                | Supporting Intel® 8th/ 9th Generation Coffee Lake CPU (LGA1151 socket, 65W/ 35W TDP)<br>- Intel® Core™ i7-8700/ i7-8700T<br>- Intel® Core™ i5-8500/ i5-8500T<br>- Intel® Core™ i3-8100/ i3-8100T<br>- Intel® Pentium® G5400/ G5400T<br>- Intel® Celeron® G4900/ G4900T |
| Chipset                  | Intel® Q370 Platform Controller Hub  |
| Graphics                 | Integrated Intel® UHD Graphics 630   |
| Memory                   | Up to 64GB DDR4 2666/ 2400 SDRAM (two SODIMM slots)  |
| AMT                      | Supports AMT 12.0  |
| TPM                      | Supports TPM 2.0   |
| <b>I/O Interface</b>     |  |
| Ethernet port            | 2x Gigabit Ethernet ports by I219 and I210 ( <b>Nuvo-7002LP</b> )<br>6x Gigabit Ethernet ports by I219 and 5x I210 ( <b>Nuvo-7006LP</b> )  |
| PoE+                     | IEEE 802.3at PoE+ PSE for Port 3 ~ Port 6 ( <b>Nuvo-7006LP-PoE</b> )<br>100 W total power budget   |
| USB                      | via Intel native xHCI controller<br>4x USB 3.1 Gen2 (10Gbps) ports<br>4x USB 3.1 Gen1 (5Gbps) ports  |
| Video Port               | 1x VGA connector, supporting 1920 x 1200 resolution<br>1x DVI-D connector, supporting 1920 x 1200 resolution<br>1x DisplayPort connector, supporting 4096 x 2304 resolution  |
| Serial Port              | 2x software-programmable RS-232/ 422/ 485 ports (COM1/ COM2)<br>2x RS-232 ports (COM3/ COM4)   |
| Audio                    | 1x 3.5 mm jack for mic-in and speaker-out  |
| <b>Storage Interface</b> |  |
| SATA HDD                 | Supports RAID 0/ 1<br>1x front-accessible, hot-swappable 2.5" HDD/SSD (up to 9.5mm thickness) tray<br>1x internal SATA port for 2.5" HDD/SSD (up to 15mm thickness)  |

|                               |   |
|-------------------------------|---|
| M.2 NVMe                      | 1x M.2 2280 M key NVMe socket (PCIe Gen3 x4) for NVMe SSD or Intel® Optane™ Memory installation   |
| mSATA                         | 1x full-size mSATA port (mux with mini-PCIe)  |
| <b>Internal Expansion Bus</b> |   |
| Mini PCI-E                    | 1x full-size mini PCI Express socket with internal SIM socket (mux with mSATA)  |
| M.2                           | 1x M.2 2242 B key socket with dual front-accessible SIM sockets supporting dual SIM mode with selected M.2 LTE module                                   |
| Expandable I/O                | 1x MeziO™ expansion port for Neousys MeziO™ modules   |
| <b>Power Supply</b>           |   |
| DC Input                      | 1x 3-pin pluggable terminal block for 8~35VDC DC input  |
| Remote Ctrl. & LED Output     | 1x 3-pin pluggable terminal block for remote control and PWR LED output   |
| Maximum Power Consumption     | With i7-8700T (35W mode): 72W (Max.) @ 24V<br>With i5-8500T (35W mode): 68.4W (Max.) @ 24V<br>With i3-8100T (35W mode): 62.64W (Max.) @ 24V             |
| <b>Mechanical</b>             |   |
| Dimension                     | 240 mm (W) x 225 mm (D) x 79 mm (H)   |
| Weight                        | 3.1kg   |
| Mounting                      | Wall-mounting (standard) or DIN-rail mounting (optional)  |
| <b>Environmental</b>          |   |
| Operating Temperature         | <b>With 35W CPU</b><br>-25°C ~ 70°C **<br><b>With 65W CPU</b><br>-25°C ~ 70°C */** (configured as 35W TDP)<br>-25°C ~ 50°C */** (configured as 65W TDP) |
| Storage Temperature           | -40°C ~85°C   |
| Humidity                      | 10%~90% , non-condensing  |
| Vibration                     | Operating, MIL-STD-810G, Method 514.6, Category 4   |
| * Shock                       | Operating, MIL-STD-810G, Method 516.6, Procedure I, Table 516.6-II  |
| EMC                           | CE/FCC Class A, according to EN 55032 & EN 55024  |


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*or i7-8700 running at 65W mode, the highest operating temperature shall be limited to 50°C and thermal throttling may occur when sustained full-loading applied. Users can configure CPU power in BIOS to obtain higher operating temperature.*



\*\* For sub-zero operating temperature, a wide temperature HDD or Solid State Disk (SSD) is required.

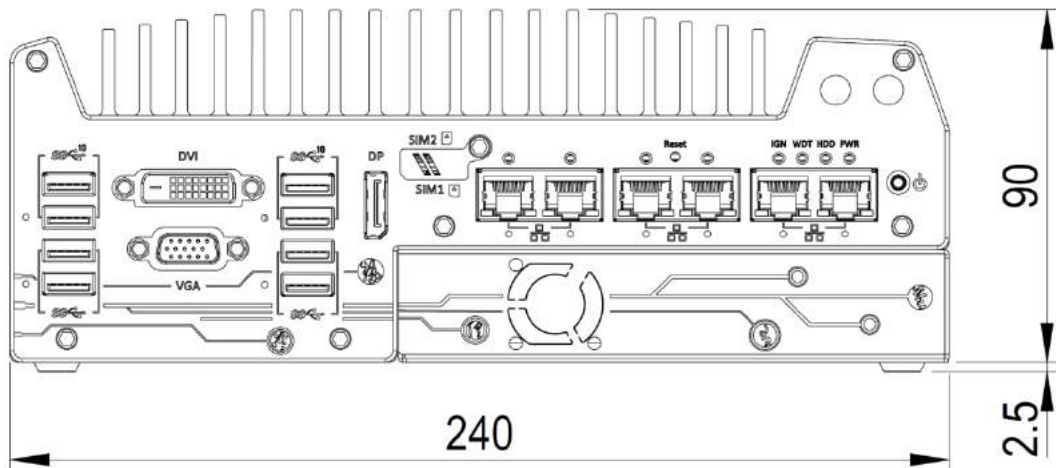
## 1.2 Nuvo-7000E/ P Dimension

 **NOTE**

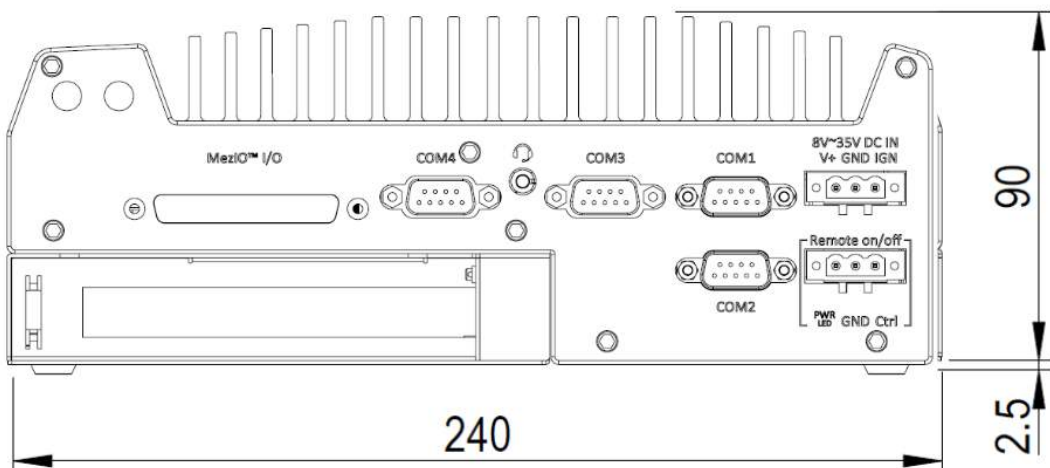
All measurements are in millimeters (mm).

Applicable to Nuvo-7002E/ 7006E/ 7006E-PoE, Nuvo-7002P/ 7006P/ 7006P-PoE

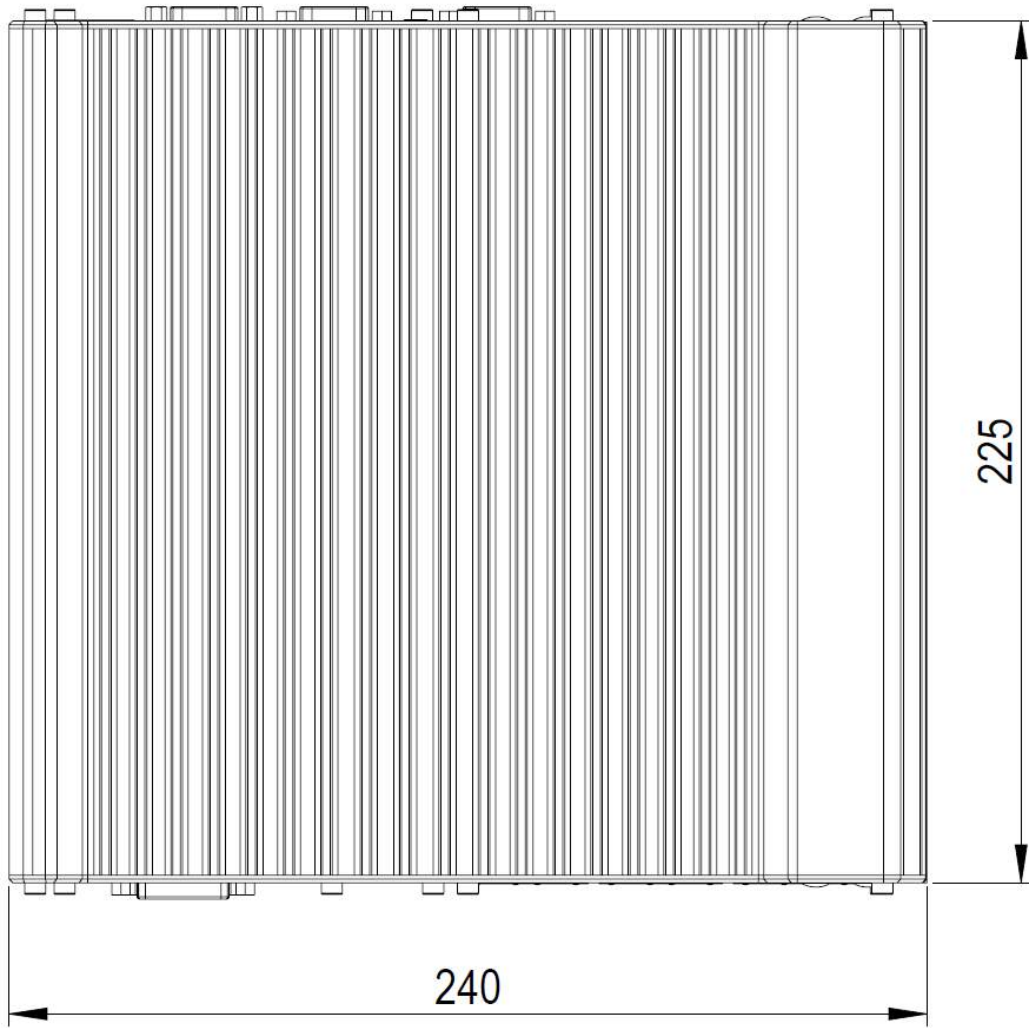
### 1.2.1 Nuvo-7000E/ P Front Panel View



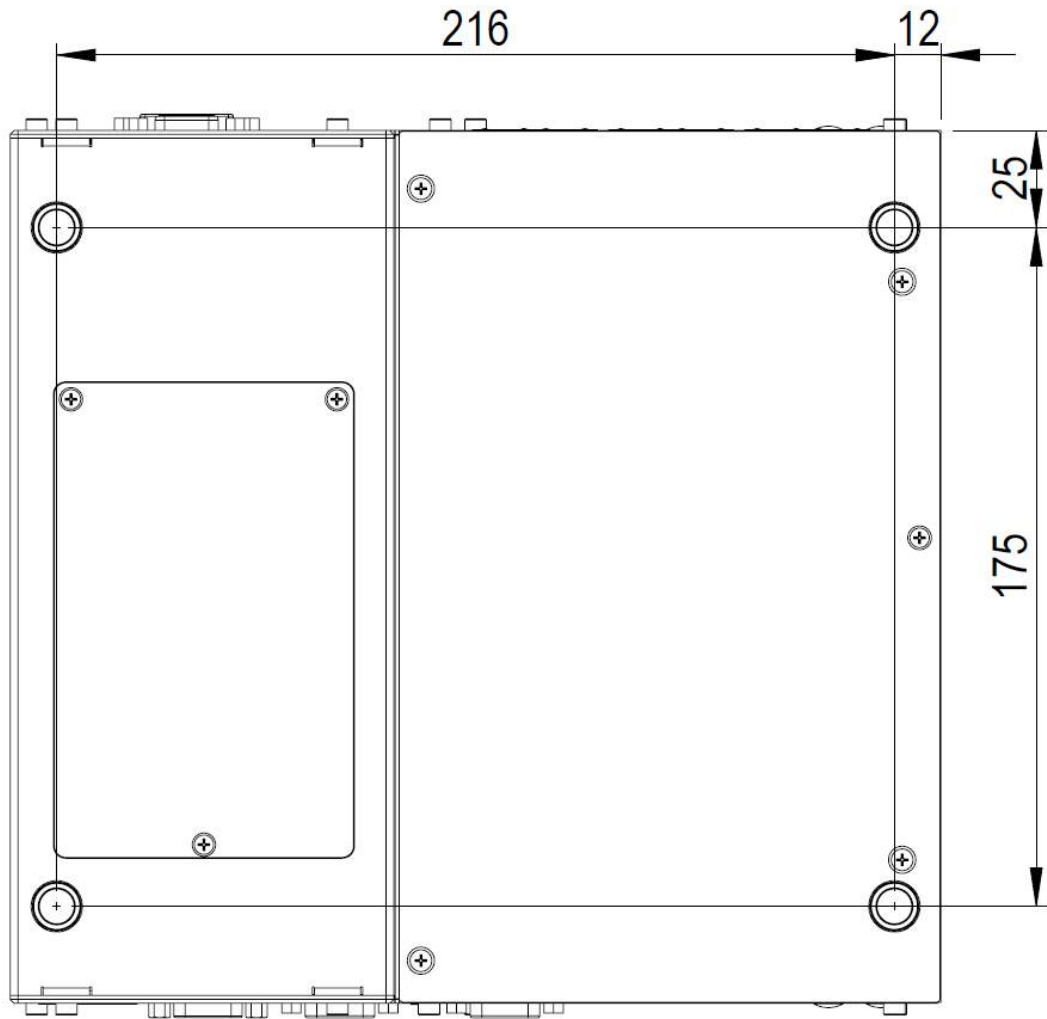
### 1.2.2 Nuvo-7000E/ P Rear Panel View




### 1.2.3 Nuvo-7000E/ P Top View



### 1.2.4 Nuvo-7000E/ P Bottom View



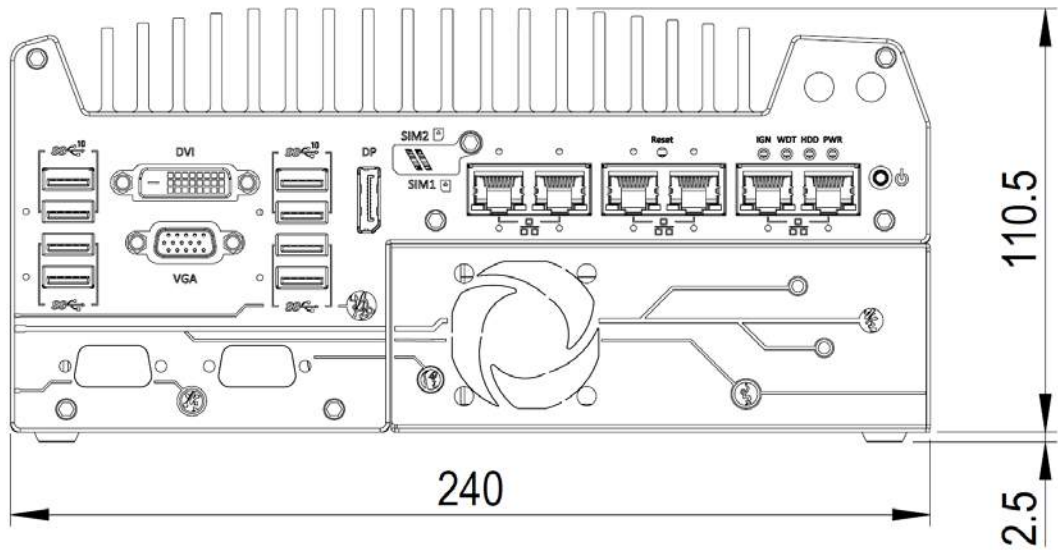
### 1.3 Nuvo-7000DE Dimension

 **NOTE**

*All measurements are in millimeters (mm).*

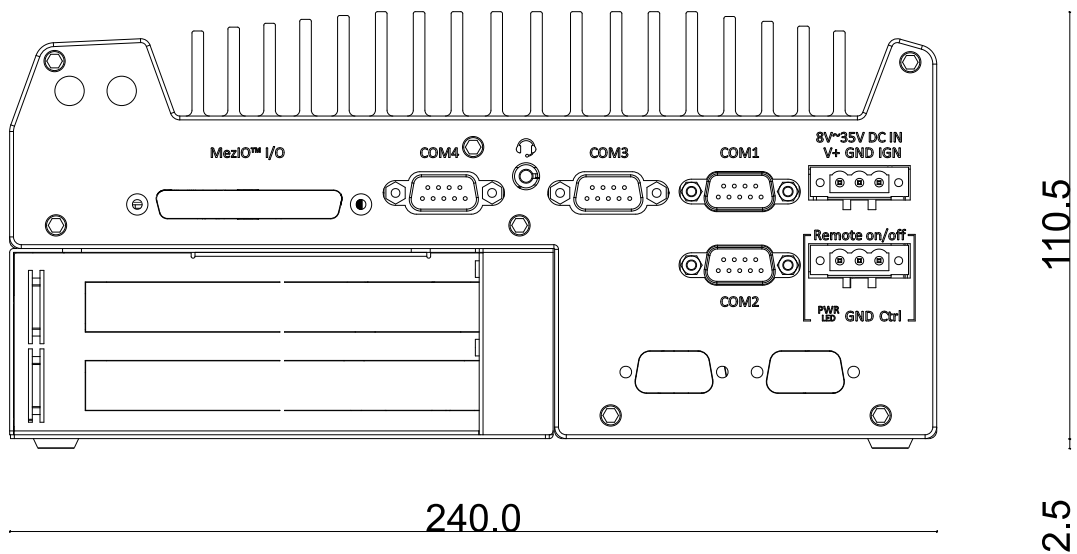
*Applicable to Nuvo-7002DE/ 7006DE/ 7006DE-PoE*

#### 1.3.1 Nuvo-7000DE Front Panel View

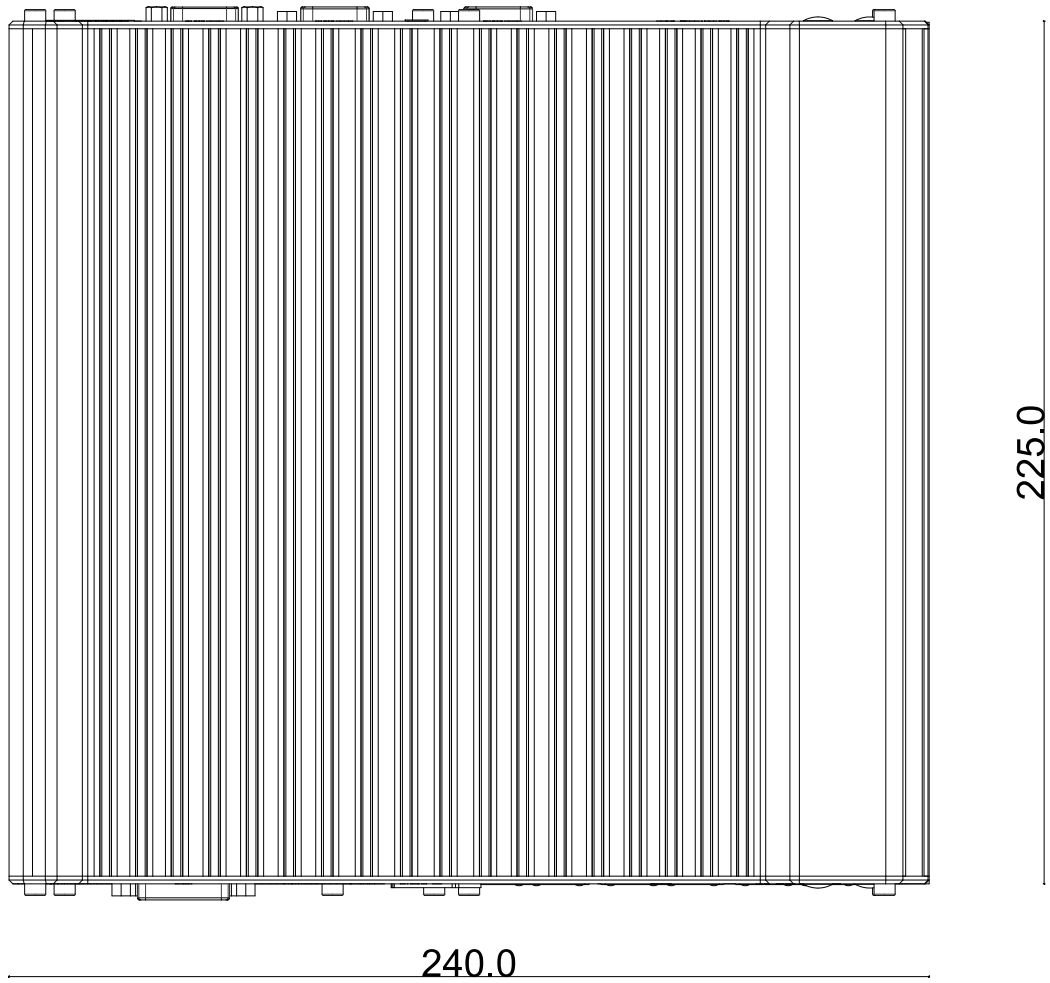


#### 1.3.2 Nuvo-7000DE Rear Panel view

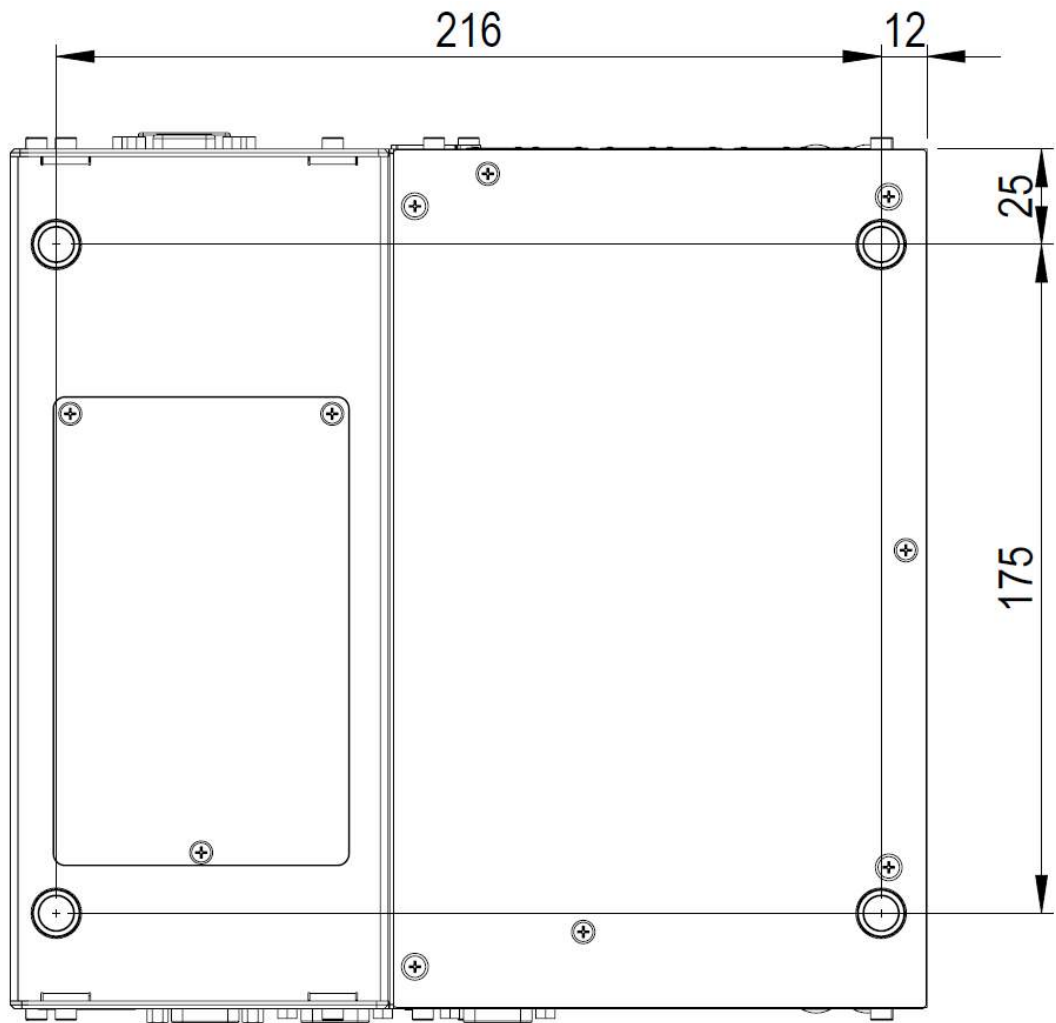
The numbers "2.5" represents the height of the rubber stands at 2.5mm.




### 1.3.3 Nuvo-7000DE Top View



### 1.3.4 Nuvo-7000DE Bottom View



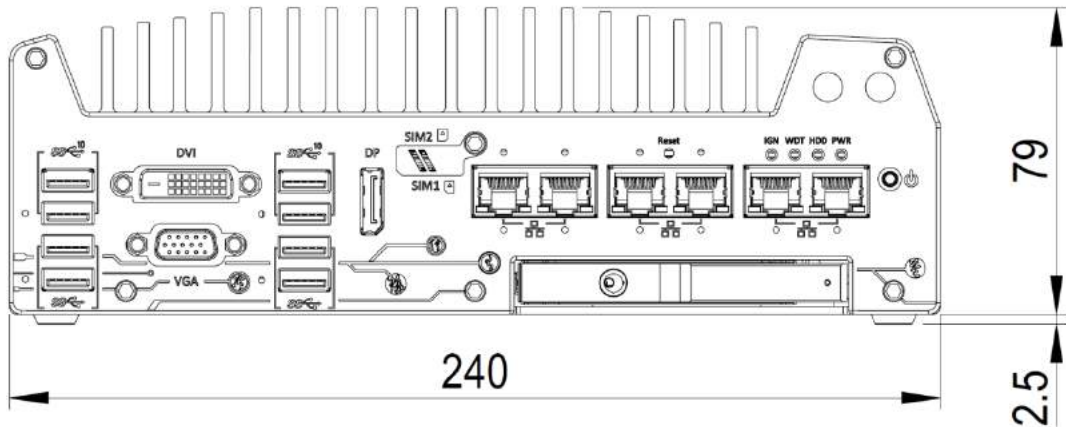
## 1.4 Nuvo-7000LP Dimension

 **NOTE**

*All measurements are in millimeters (mm).*

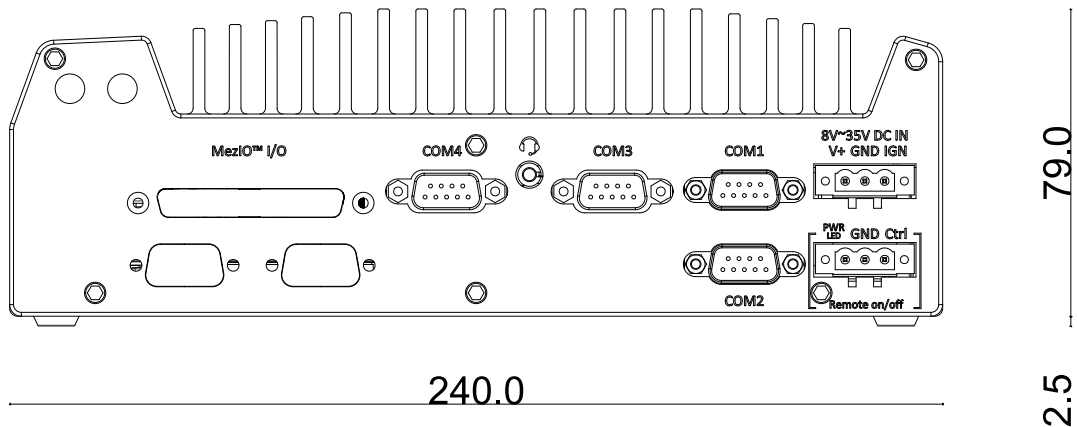
*Applicable to Nuvo-7002LP/ 7006LP/ 7006LP-PoE*

### 1.4.1 Nuvo-7000LP Front Panel View

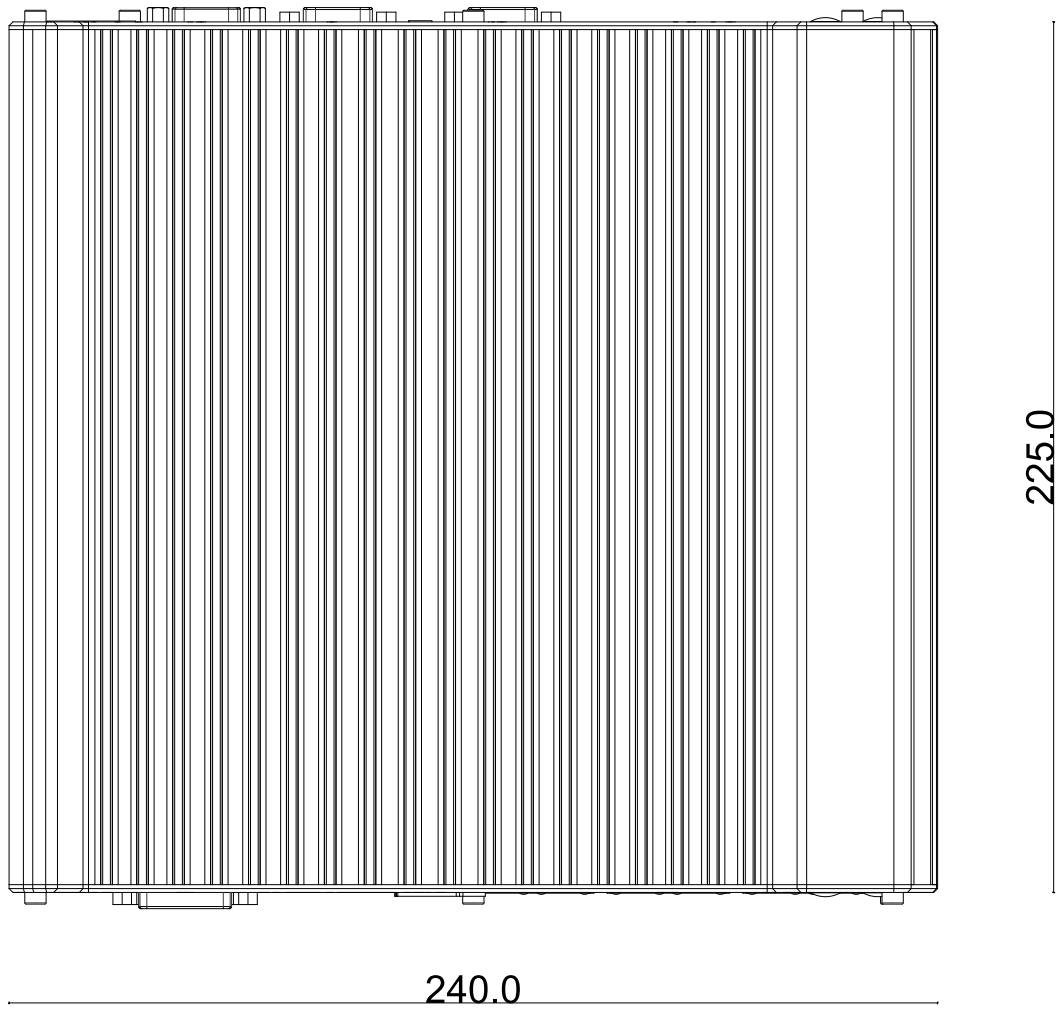


### 1.4.2 Nuvo-7000LP Rear Panel View

The numbers "2.5" represents the height of the rubber stands at 2.5mm.

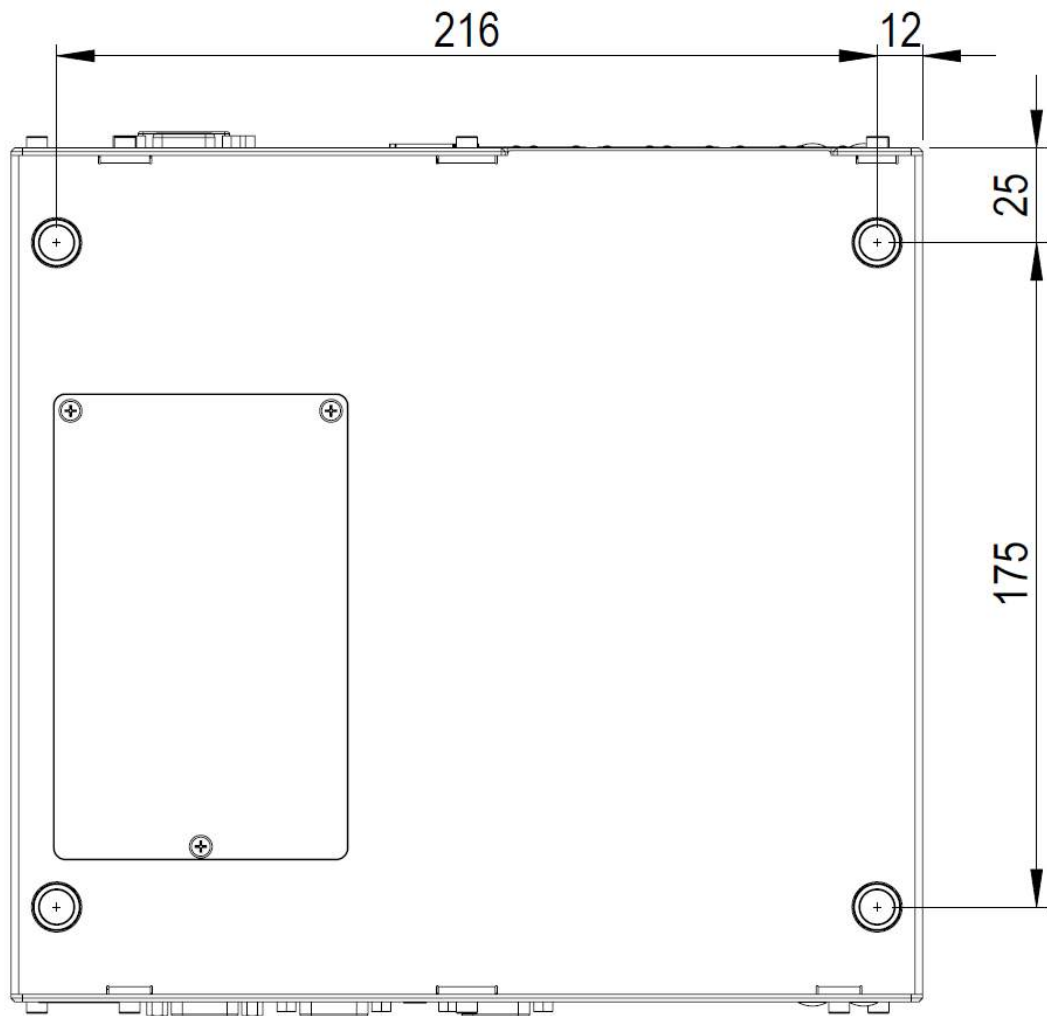


### 1.4.3 Nuvo-7000LP Top View





### 1.4.4 Nuvo-7000LP Bottom View



## 2 System Overview

Upon receiving and unpacking your Nuvo-7000 series system, please check immediately if the package contains all the items listed in the following table. If any item(s) are missing or damaged, please contact your local dealer or Neosys Technology.

### 2.1 Packing List

#### 2.1.1 Nuvo-7000E/ P Series Packing List

| System<br>Pack | Nuvo-7000E/P   | Qty                                  |
|----------------|--|--------------------------------------|
| 1              | Nuvo-7000E/P series system<br>(If you ordered CPU/ RAM/ HDD, please verify these items)  | 1                                    |
| 2              | Accessory box, which contains <ul style="list-style-type: none"> <li>● CPU bracket</li> <li>● Neosys drivers &amp; utilities DVD</li> <li>● Wall-mount bracket</li> <li>● Foot pad</li> <li>● 3-pin power terminal block</li> <li>● HDD thermal pad for 2.5" HDD/SSD (if HDD is not installed)</li> <li>● Screw pack</li> <li>● Rubber spacer</li> </ul> | 1<br>1<br>2<br>4<br>2<br>1<br>1<br>4 |

#### 2.1.2 Nuvo-7000DE Series Packing List

| System<br>Pack | Nuvo-7000DE  | Qty                                       |
|----------------|--|---|
| 1              | Nuvo-7000DE series system<br>(If you ordered CPU/ RAM/ HDD, please verify these items)   | 1   |
| 2              | Accessory box, which contains <ul style="list-style-type: none"> <li>● CPU bracket</li> <li>● Neosys drivers &amp; utilities DVD</li> <li>● Wall-mount bracket</li> <li>● Foot pad</li> <li>● 3-pin power terminal block</li> <li>● HDD thermal pad for 2.5" HDD/SSD (if HDD is not installed)</li> <li>● Screw pack</li> <li>● Rubber spacer</li> <li>● Fan (40X40X10mm)</li> </ul> | 1<br>1<br>2<br>4<br>2<br>1<br>1<br>4<br>1 |

### 2.1.3 Nuvo-7000LP Series Packing List

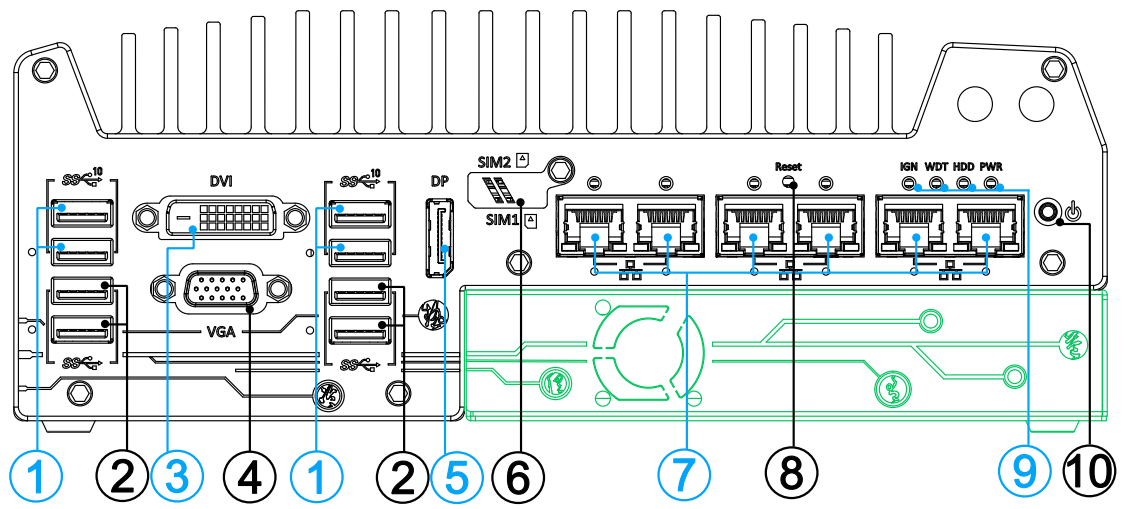
| System<br>Pack | Nuvo-7000LP   | Qty                                  |
|----------------|---|--------------------------------------|
| 1              | Nuvo-7000LP Series<br>(If you ordered CPU/ RAM/ HDD, please verify these items)   | 1                                    |
| 2              | Accessory box, which contains <ul style="list-style-type: none"> <li>● CPU bracket</li> <li>● Neosys drivers &amp; utilities DVD</li> <li>● Wall-mount bracket</li> <li>● Foot pad</li> <li>● 3-pin power terminal block</li> <li>● HDD thermal pad for 2.5" HDD/SSD (if HDD is not installed)</li> <li>● Screw pack</li> <li>● Key to 2.5" external HDD/ SSD slot</li> </ul> | 1<br>1<br>2<br>4<br>2<br>1<br>1<br>1 |

## 2.2 Front Panel I/O

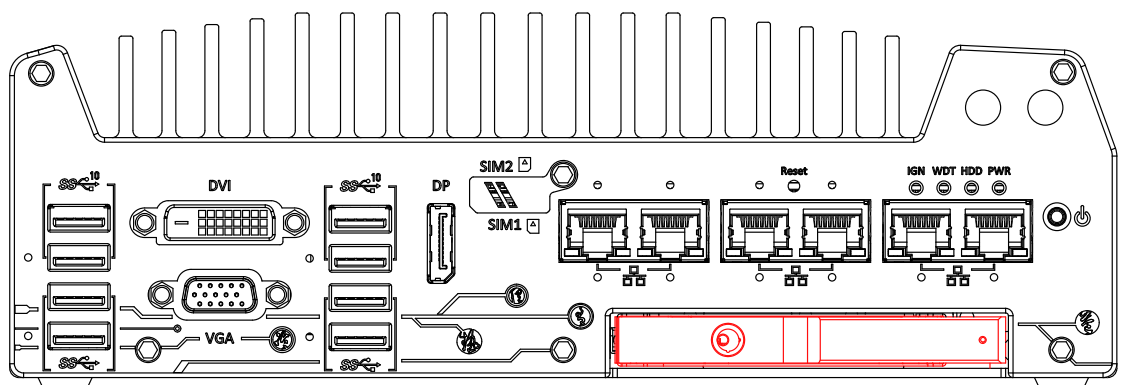
The Nuvo-7000 systems' front panel features the following external I/O connections.



*For demonstration purposes, Nuvo-7000E/ P will be used in most illustrations. A dedicated illustration will be shown if the component is significantly different.*



**Nuvo-7000E/P/ DE**

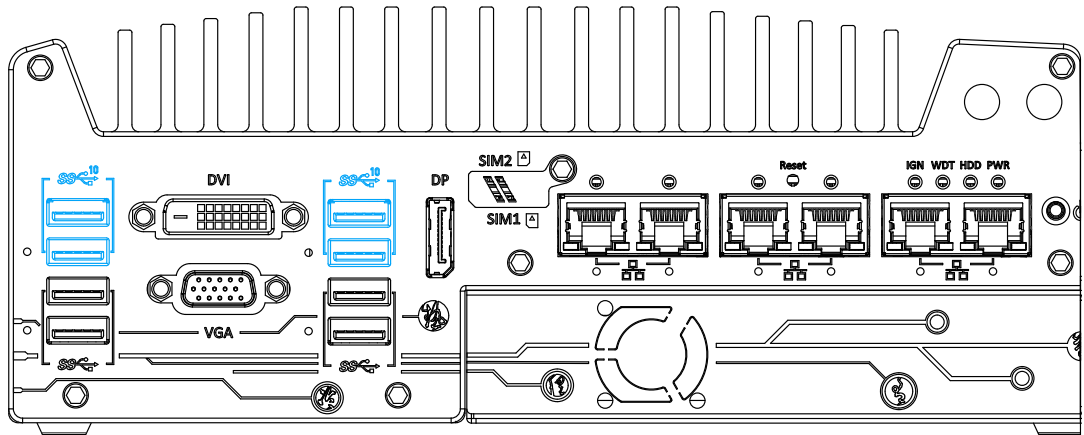


**Nuvo-7000LP**

| No. | Item                              | Description  |
|-----|-----------------------------------|--|
| 1   | <a href="#">USB3.1 Gen 2 port</a> | USB3.1 Gen 2 port (SuperSpeed+) offers up to 10Gbps, twice the bandwidth over existing SuperSpeed USB3.1 Gen. 1 connection. It is also backwards compatible with USB3.0 and USB2.0 |
| 2   | <a href="#">USB3.1 Gen 1 port</a> | USB3.1 Gen 1 offers up to 5Gbps of data-throughput performance   |
| 3   | <a href="#">DVI port</a>          | DVI-D output supports resolution up to 1920x1200@60Hz and is compatible with other digital connections via an adapter.   |

|               |                                    |   |
|---------------|------------------------------------|---|
| 4             | <a href="#">VGA port</a>           | VGA output supports resolution up to 1920x1200@60Hz   |
| 5             | <a href="#">DisplayPort</a>        | Support display resolutions up to 4096 x 2304. Compatible with HDMI/ DVI via respective adapter/ cable (resolution may vary).           |
| 6             | <a href="#">SIM 1 &amp; 2</a>      | Install a 3G/ 4G module and insert a SIM card to access the operator's network.   |
| 7             | <a href="#">PoE+ GbE port</a>      | 2x Gigabit Ethernet ports by I219 and I210 (Nuvo-7002E/ P/ DE)<br>6x Gigabit Ethernet ports by I219 and 5x I210 (Nuvo-7006E/ P/ DE)     |
| 8             | <a href="#">Reset button</a>       | Use this button to manually reset the system.   |
| 9             | <a href="#">LED indicators</a>     | From left to right, the LEDs are IGN (ignition control), WDT (watchdog timer), HDD (hard disk drive) and PWR (system power).            |
| 10            | <a href="#">Power button</a>       | Use this button to turn on or shutdown the system.  |
| Area in Green | <a href="#">Cassette module</a>    | The cassette module offers a separate compartment to manage thermal conditions and reduce installation complications of an add-on card. |
| Area in red   | <a href="#">2.5" HDD/ SSD slot</a> | The HDD expansion tray offer hot-swap ability (Nuvo-7000LP systems only).   |

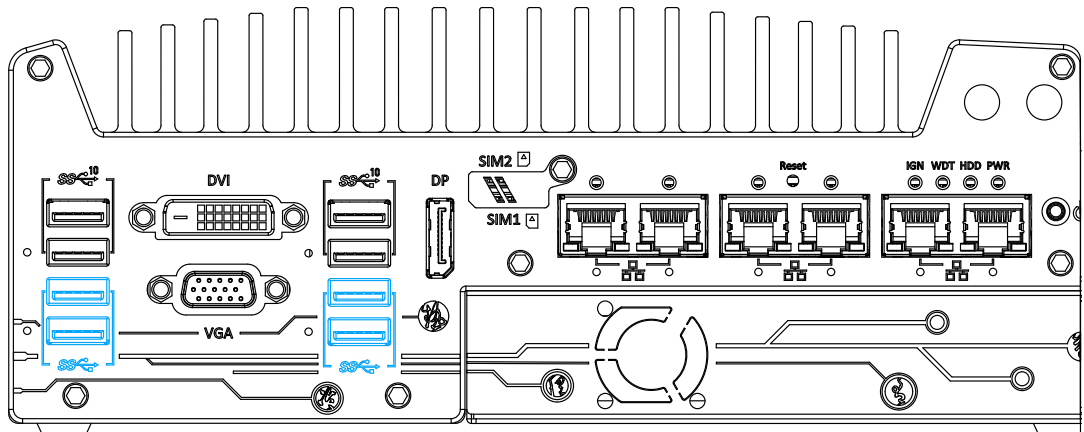
### 2.2.1 USB3.1 Gen 2 Port



The system's USB 3.1 Gen 2 ports (10Gbps) are implemented via native xHCI (eXtensible Host Controller Interface) controller and are backward compatible with USB3.1 Gen.1 USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB is also supported so you can use USB keyboard/ mouse in DOS environment

xHCI driver is supported natively in Windows 10, therefore you do not need to install the xHCI driver prior to utilizing USB functions.

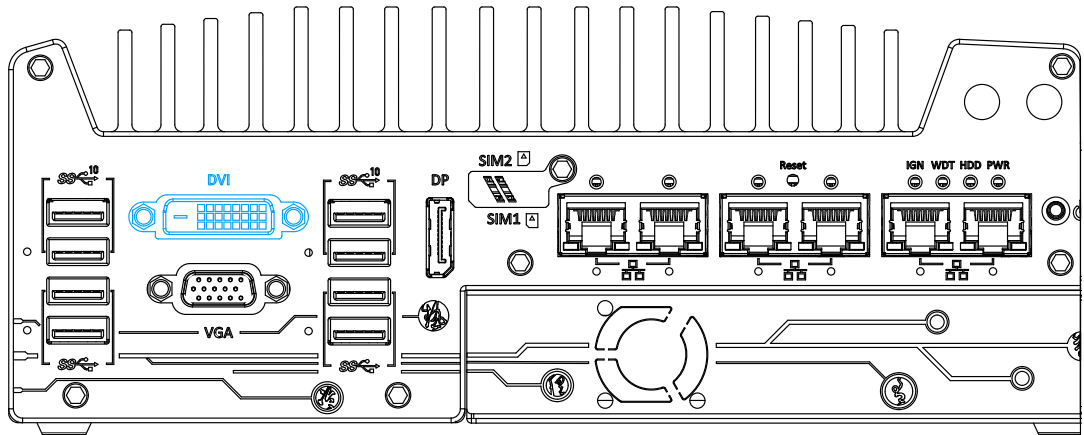
### 2.2.2 USB3.1 Gen 1 Port



The system's USB 3.0 Gen 1 ports (5Gbps) are implemented via native xHCI (eXtensible Host Controller Interface) controller and are backward compatible with USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB is also supported so you can use USB keyboard/mouse in DOS environment

xHCI driver is supported natively in Windows 10, therefore you do not need to install the xHCI driver prior to utilizing USB functions.

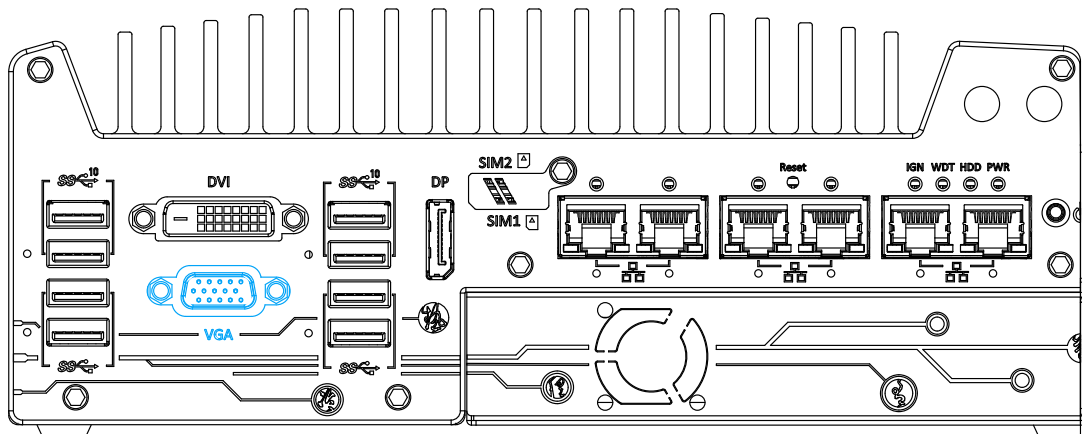
### 2.2.3 DVI Port



DVI-D transmits graphics data in digital format and therefore can deliver better image quality at high resolution. The DVI connector on the front panel can either output DVI signals or other digital signals (via an adapter/ cable) depending on the display device connected. It supports resolutions up to 1920x1200@60Hz.

The system supports triple independent display outputs by connecting display devices to VGA, DVI and DisplayPort connection. To support multiple display outputs and achieve best DVI output resolution in Windows, you need to install corresponding graphics driver. Please refer to section [OS Support and Driver Installation](#) for details.

## 2.2.4 VGA Port



VGA connector is the most common video display connection. The VGA output supports up to 1920x1200@60Hz resolution.

The system supports triple independent display outputs by connecting display devices to VGA, DVI and DisplayPort connection. To support multiple display outputs and achieve best VGA output resolution in Windows, you need to install corresponding graphics drivers. Please refer to section [OS Support and Driver Installation](#) for details.

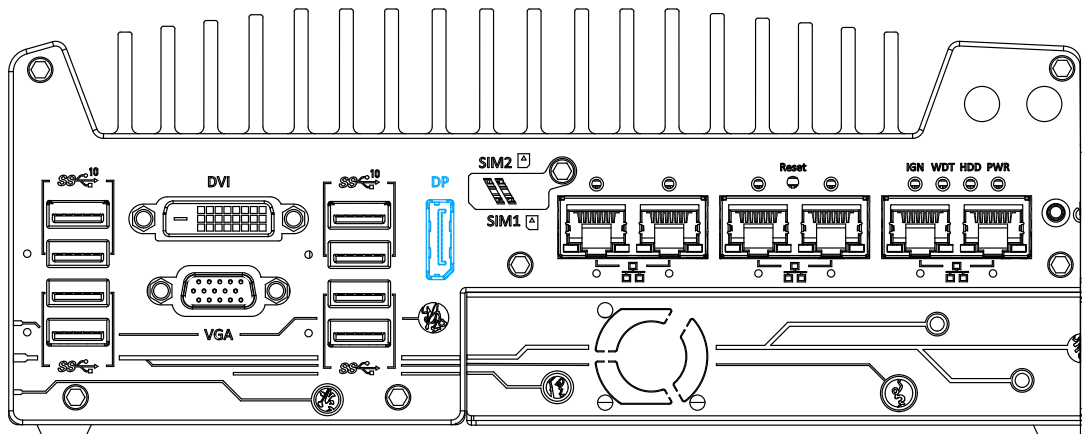


### NOTE

*Please make sure your VGA cable includes SDA and SCL (DDC clock and data) signals for correct communication with monitor to get resolution/timing information. A cable without SDA/ SCL can cause blank screen on your VGA monitor due to incorrect resolution/timing output.*



## 2.2.5 DisplayPort



The system has a DisplayPort (DP) output which is a digital display interface that mainly connect video source and carry audio to a display device. When connecting a DP, it can deliver up to 4K UHD (4096 x 2304) in resolution. The system is designed to support passive DP adapter/ cable. You can connect to other display devices using DP-to-HDMI cable or DP-to-DVI cable.



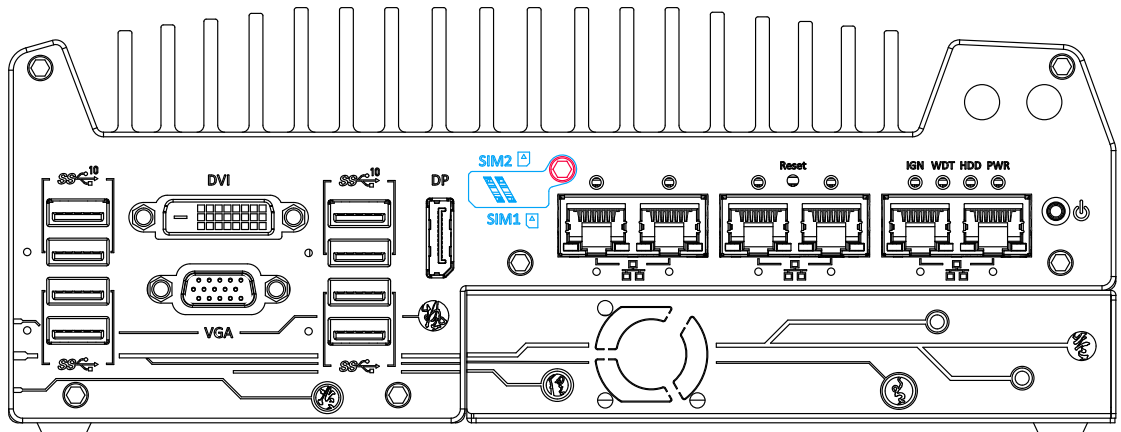
**DP-to-HDMI**



**DP-to-DVI**

The system supports triple independent display outputs by connecting display devices to VGA, DVI and DisplayPort connection. To support multiple display outputs and achieve best DisplayPort output resolution in Windows, you need to install corresponding graphics drivers. Please refer to section [OS Support and Driver Installation](#) for details.

## 2.2.6 Micro-SIM (3FF) 1 & 2 Slots



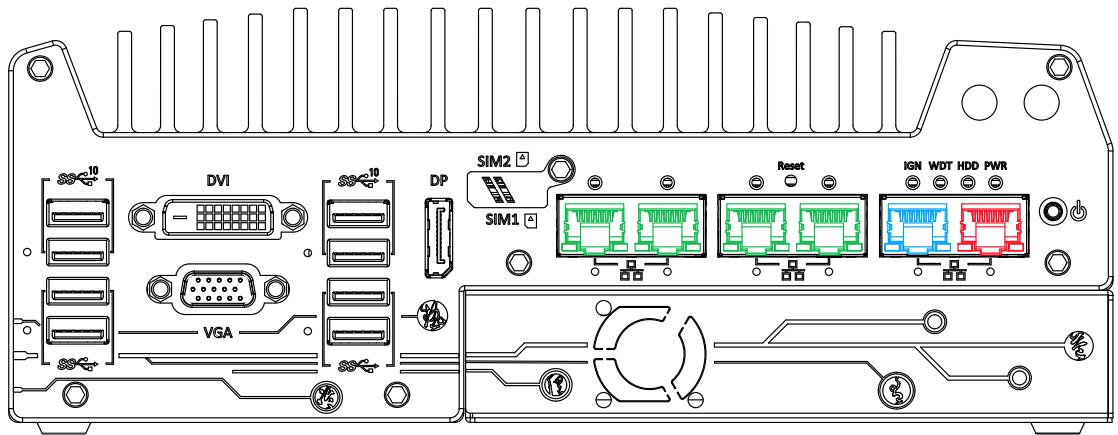
On the front panel, there are two panel-accessible Micro-SIM sockets. By installing 3G/4G modules onto the internal M.2 slot, you can access the internet via telecom operator's network. The Micro-SIM slots can be accessed by loosening the screw (indicated in red) that holds the Micro-SIM slot cover and Micro-SIM cards are secured into the sockets via push-push type mechanisms. The push-push mechanism means the SIM card is push-to-install and push-to-retrieve. Please note that the SIM1 micro-SIM card must be inserted upside-down (gold fingers facing upward) while SIM2 micro-SIM must be inserted right-side up (gold fingers facing downward).



### NOTE

*The dual SIM card functionality is only available when Sierra Wireless EM7455/ 7430 solution is installed. For other M.2 4G add-on solutions, SIM card 1 slot is the default functioning slot.*

## 2.2.7 Ethernet Port/ PoE+



All Nuvo-7000 series systems offer two GbE ports (in **red** and **blue**) while Nuvo-7006E/P/ DE systems have four additional PoE (Power over Ethernet) ports marked in **green** on the front panel. All Ethernet ports feature panel screw fix holes for a firm connection. The port marked in **blue** is implemented using Intel® I219-LM controller that supports Wake-on-LAN and is also compatible with [Intel® AMT \(Active Management Technology\)](#) to support advanced features such as remote SOL desktop and remote on/ off control. Power over Ethernet (PoE) supplies electrical power and data on a standard CAT-5/CAT-6 Ethernet cable. Acting as a PoE PSE (Power Sourcing Equipment), compliant with IEEE 802.3at, each PoE port delivers up to 25W to a Powered Device (PD). PoE can automatically detect and determine if the connected device requires power or not, so it is compatible with standard Ethernet devices as well. Each port has one dedicated PCI Express link for maximum network performance. Please refer to the table below for LED connection statuses.

### Active/Link LED (Right)

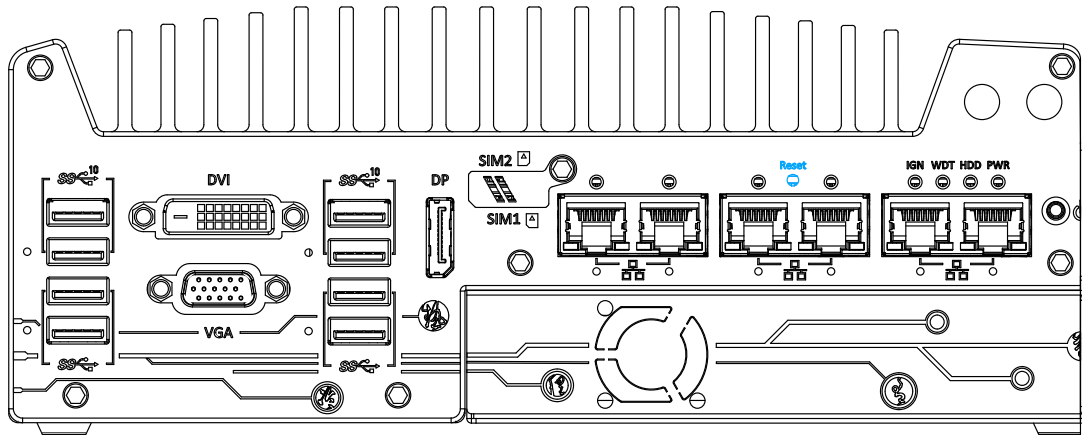
| LED Color | Status   | Description   |
|-----------|----------|---|
| Yellow    | Off      | Ethernet port is disconnected                                 |
|           | On       | Ethernet port is connected and no data transmission           |
|           | Flashing | Ethernet port is connected and data is transmitting/receiving |

### Speed LED (Left)

| LED Color       | Status | Description |
|-----------------|--------|-------------|
| Green or Orange | Off    | 10 Mbps     |
|                 | Green  | 100 Mbps    |
|                 | Orange | 1000 Mbps   |

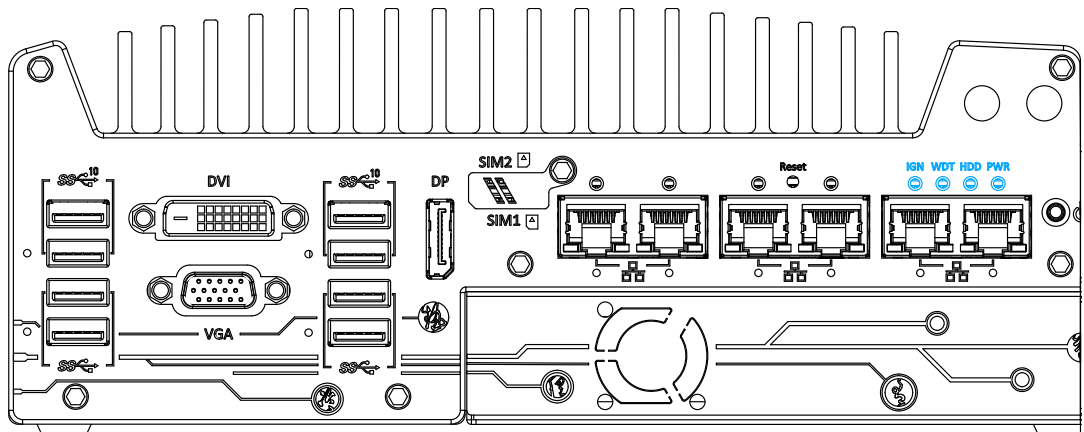
To utilize the GbE port in Windows, you need to install corresponding driver for Intel® I210-IT/ I219-LM GbE controller.

### 2.2.8 Reset Button



The reset button is used to manually reset the system in case of system halt or malfunction. To avoid unexpected reset, the button is purposely placed behind the panel. To reset, please use a pin-like object (eg. tip of a pen) to access the reset button

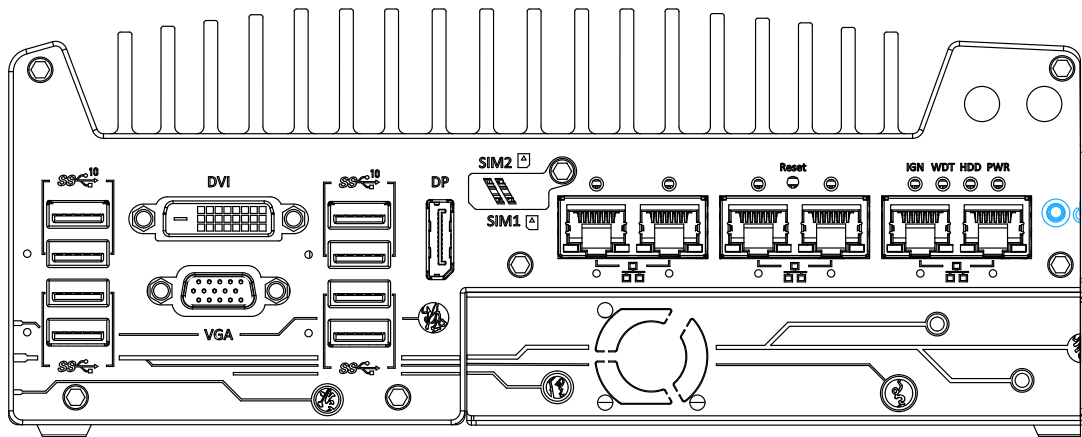
### 2.2.9 LED Indicators



There are four LED indicators on the I/O panel: IGN, WDT, HDD and PWR. The descriptions of these four LED are listed in the following table.

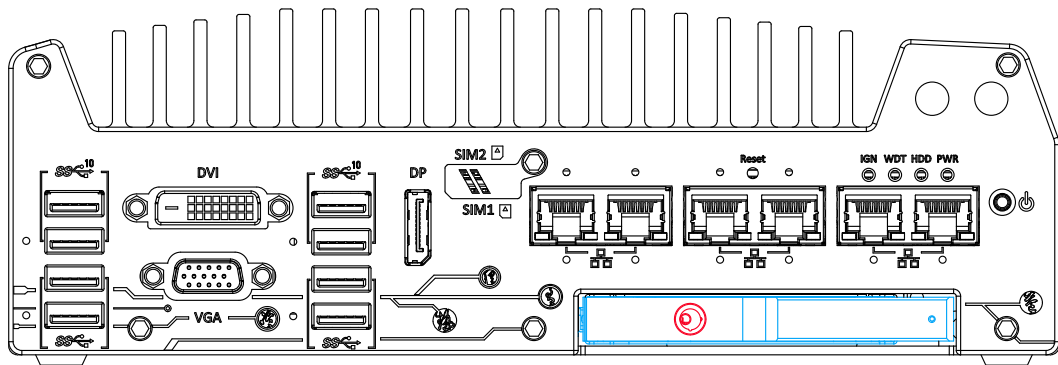
| Indicator | Color  | Description  |
|-----------|--------|--|
| IGN       | Yellow | Ignition signal indicator, lid when IGN is high (12V/ 24V).    |
| WDT       | Yellow | Watchdog timer LED, flashing when WDT is active.               |
| HDD       | Red    | Hard drive indicator, flashing when hard disk drive is active. |
| PWR       | Green  | Power indicator, lid when system is on.                        |

### 2.2.10 Power Button



The power button is a non-latched switch for ATX mode on/off operation. To turn on the system, press the power button and the PWR LED should light-up green. To turn off the system, issuing a shutdown command in OS is preferred, or you can simply press the power button. To force shutdown when the system freezes, press and hold the power button for 5 seconds. Please note that there is a 5-second interval between on/off operations (i.e. once the system is turned off, there is a 5-second wait before you can power-on the system).

### 2.2.11 Hot-swappable 2.5" HDD/ SSD Slot (Nuvo-7000LP Series Only)



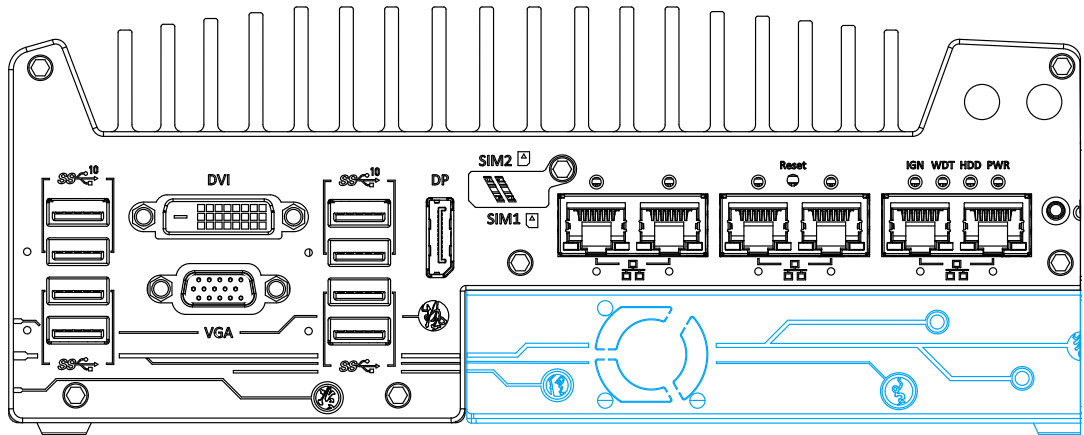
The Nuvo-7000LP series supports an external 2.5" HDD/ SSD via a hot-swappable slot. Designed for easy access, the HDD/ SSD slot is secured by a lock (indicated in red) and it supports RAID modes 0/ 1 configuration by combining with the internal HDD/ SSD drive for OS installation (coupled with the internal HDD). To set up RAID, please refer to RAID Volume Configuration section for details.



#### NOTE

*Tray supports up to 9.5mm thickness HDD/ SSD.*

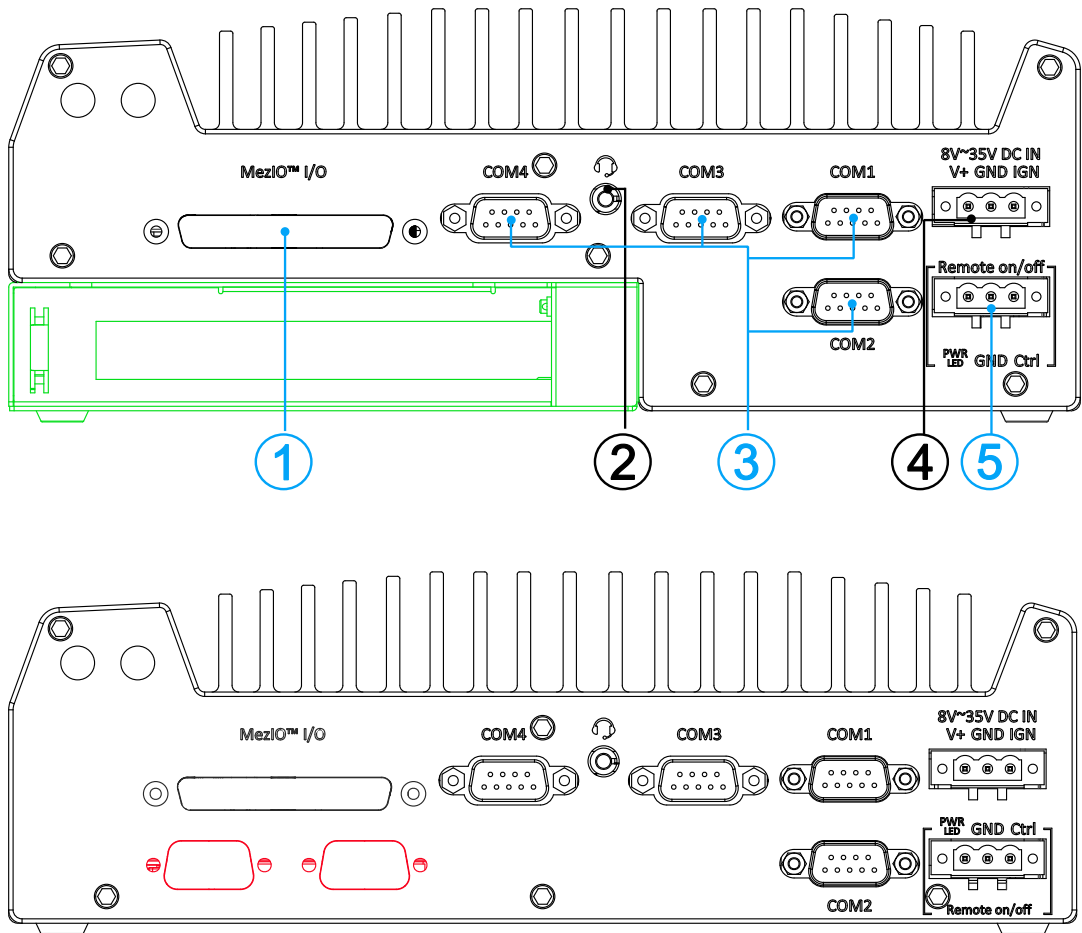
### 2.2.12 Cassette Module



Neosys' patented expansion Cassette (R.O.C. Patent No. M456527) provides a separated compartment to accommodate an add-on card. It effectively manages thermal conditions of both the system and the add-on card. The modular concept brought by Cassette module also reduces the complexity of installing and replacing an add-on card in the fanless controller.

| Expansion configuration<br>System | Expansion slot(s)       |
|-----------------------------------|-------------------------|
| Nuvo-7000E series                 | Single PCI Express slot |
| Nuvo-7000P series                 | Single PCI slot         |
| Nuvo-7000DE series                | Dual PCI Express slots  |

## 2.3 Rear Panel I/O



### Nuvo-7000LP

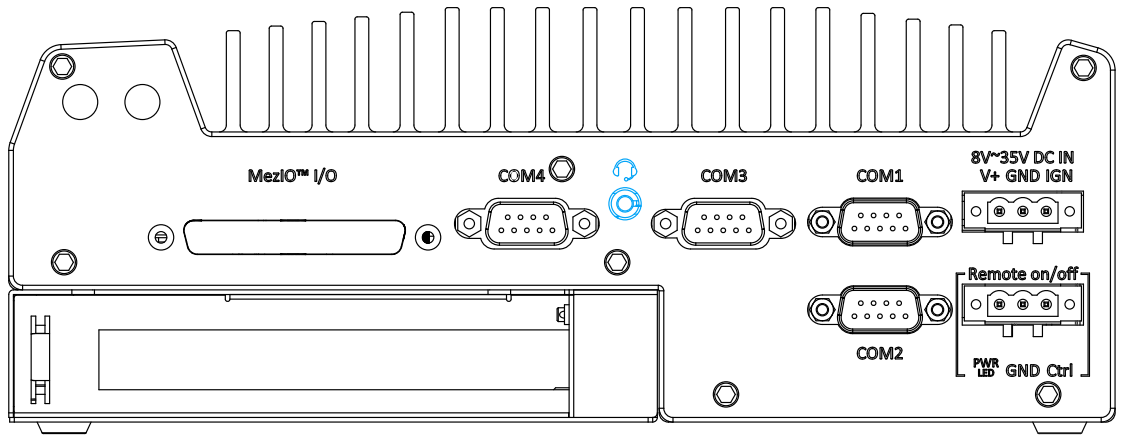
The Nuvo-7000 rear panel features MeziO™ port, four (4) COM ports, 3-pin terminal and 3-pin on/ off control. The Cassette module can be located at the bottom of the enclosure. The connectors of the installed PCI or PCIe card within the Cassette module can be accessed from this side of the panel.


| No. | Item   | Description   |
|-----|--|---|
| 1   | MeziO™ I/O   | Reserved for MeziO™ I/O connector. Connector may vary depending on your choice of MeziO™. |
| 2   | <a href="#">4-Pole 3.5mm headphone/microphone jack</a> | The 4-pole 3.5mm jack accepts microphone voice input and headphone speaker sound output.  |
| 3   | <a href="#">COM ports 1-4</a>                          | The four COM ports offer communication with external devices.                             |
| 4   | <a href="#">3-pin terminal</a>                         | Compatible with DC power input from 8~35V, the terminal                                   |

|                      |   |   |
|----------------------|---|---|
|                      | <a href="#">block (DC/ignition input)</a>   | block is also used for ignition signal input.   |
| <b>5</b>             | <a href="#">3-pin remote on/off control</a> | Allows for external switch extension when the system is placed inside a cabinet.  |
| <b>Area in green</b> | <a href="#">Cassette module</a>             | The cassette module offers a separate compartment to manage thermal conditions and reduce installation complications of an add-on card.   |
| <b>Area in red</b>   | Reserved port opening/ cover                | The area indicated in red on the rear panel of Nuvo-7000LP series feature reserved port opening/ cover for additional D-sub 9 connectors. |

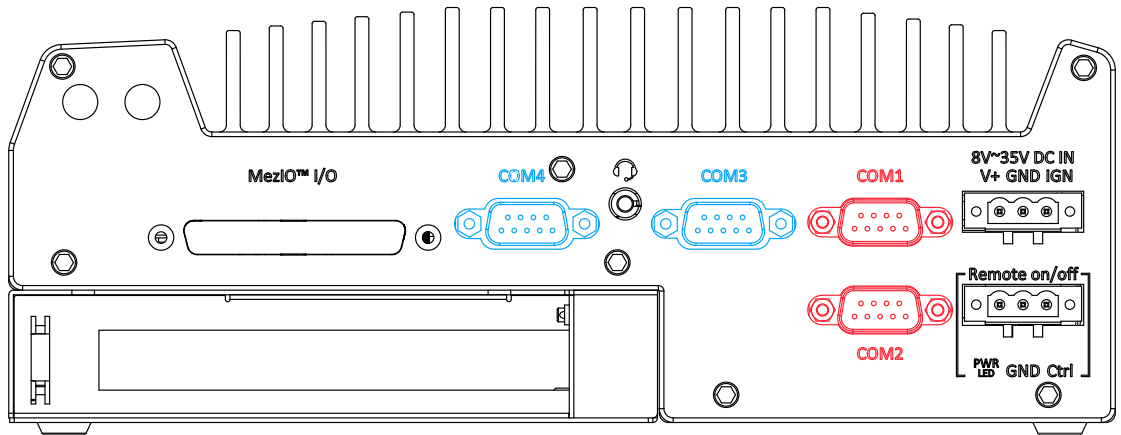


### 2.3.1 4-Pole 3.5mm Headphone/ Microphone Jack



The system audio function uses high definition audio Realtek ALC262 codec. There is a female 4-pole  audio jack for headphone (speaker) output and microphone input. To utilize the audio function in Windows, you need to install corresponding drivers for both Intel® Q370 chipset and Realtek ALC262 codec.

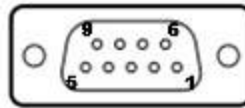
### 2.3.2 COM Ports



The system provides four COM ports for communicating with external devices. These COM ports are implemented using industrial-grade ITE8786 Super IO chip (-40 to 85°C) and provide up to 115200 bps baud rate.

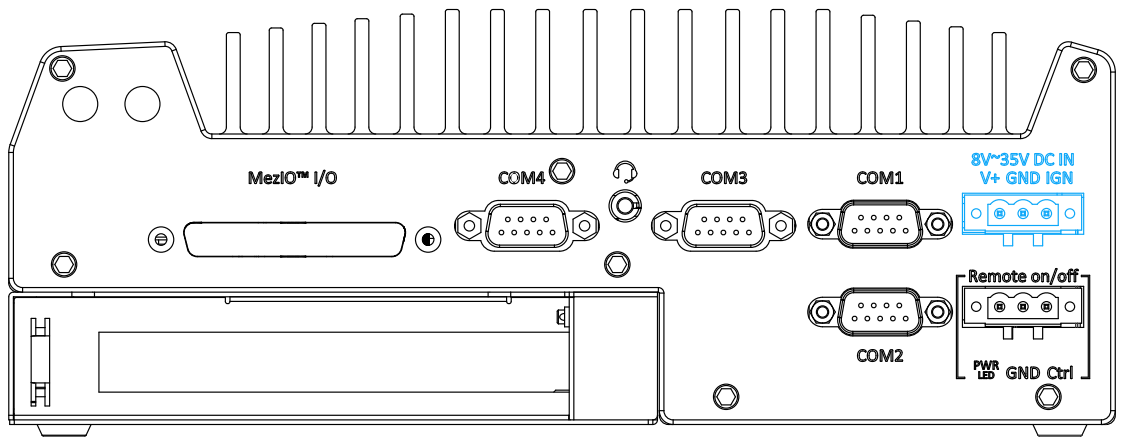
COM1 and COM2 (in red) are software-configurable RS-232/ 422/ 485 ports. COM3 and COM4 (in blue) are standard 9-wire RS-232 ports. The operation mode of COM1 and COM2 can be set in BIOS setup utility. The following table describes the pin definition of COM ports.

#### COM Port Pin Definition




| Pin# | COM1 & COM2 |             |                            | COM3 & COM4 |
|------|-------------|-------------|----------------------------|-------------|
|      | RS-232 Mode | RS-422 Mode | RS-485 Mode (Two-wire 485) | RS-232 Mode |
| 1    | DCD         |             |                            | DCD         |
| 2    | RX          | 422 TXD+    | 485 TXD+/RXD+              | RX          |
| 3    | TX          | 422 RXD+    |                            | TX          |
| 4    | DTR         | 422 RXD-    |                            | DTR         |
| 5    | GND         | GND         | GND                        | GND         |
| 6    | DSR         |             |                            | DSR         |
| 7    | RTS         |             |                            | RTS         |
| 8    | CTS         | 422 TXD-    | 485 TXD-/RXD-              | CTS         |
| 9    | RI          |             |                            | RI          |

### 2.3.3 3-Pin Terminal Block for DC and Ignition Input



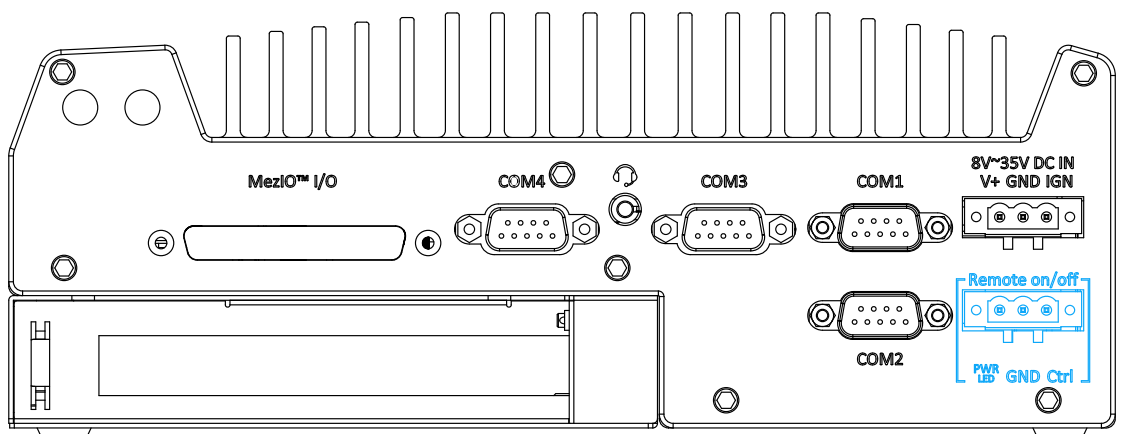
The system accepts a wide range of DC power input from 8 to 35V via a 3-pin pluggable terminal block, which is fit for field usage where DC power is usually provided. The screw clamping mechanism on the terminal block offers connection reliability when wiring DC power.

In addition to DC power input, this terminal block can also accept ignition signal input (IGN) when ignition control module (eg. MeziO-V20) is installed for in-vehicle applications.

 **WARNING**

*Please make sure the voltage of DC power is correct before you connect it to the system. Supplying a voltage over 35V will damage the system.*

### 2.3.4 3-Pin Remote On/ Off



The “Remote On/ Off” 3-pin connection allows for external switch extension. It is useful when the system is placed in a cabinet or a not easily accessed location. You may connect an external status LED (20mA) indicator by connecting to PWR LED and GND.

## 2.4 Internal I/O Functions

In addition to I/O connectors on the front panel, the system also provides internal on-board connectors, such as remote on/off control, LED status output, internal USB 2.0 ports, etc. In this section, we'll illustrate these internal I/O functions.

### 2.4.1 Clear CMOS Button

The Clear CMOS button is used to manually reset the motherboard BIOS in case of system halt or malfunction. To avoid unexpected operation, the button is purposely placed behind the panel. To clear the CMOS, please refer to the following procedure.

1. Please power off and unplug the system, and refer to the section [Disassembling the System](#) on how to remove the front panel.
2. Once the front panel has been removed, the Clear CMOS button can be located at the top of the USB port (indicated in [blue circle](#)).



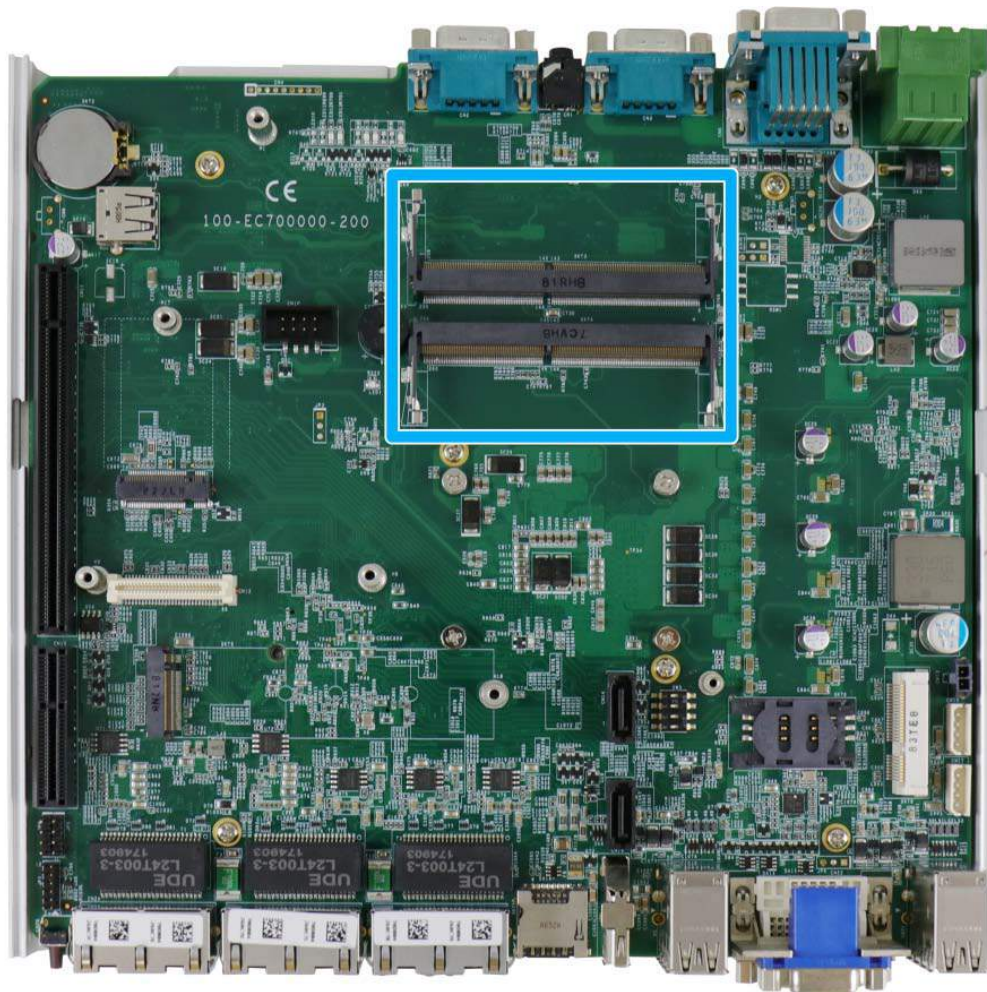
3. To clear the CMOS, press and hold the button for at least 5 seconds.
4. [Reinstall the system front panel](#) when done.

#### WARNING

*Clearing the CMOS will reset all BIOS settings to default and may result in down time!*

*If you have RAID volume configured, please backup all data as clearing the CMOS may result in data loss!*

## 2.4.2 Dual SODIMM DRAM Slot



The system motherboard supports two 260-pin SODIMM socket for installing DDR4 memory module up to 64GB. Each slot supports single module DDR4 2666MHz SODIMM up to 32GB capacity.

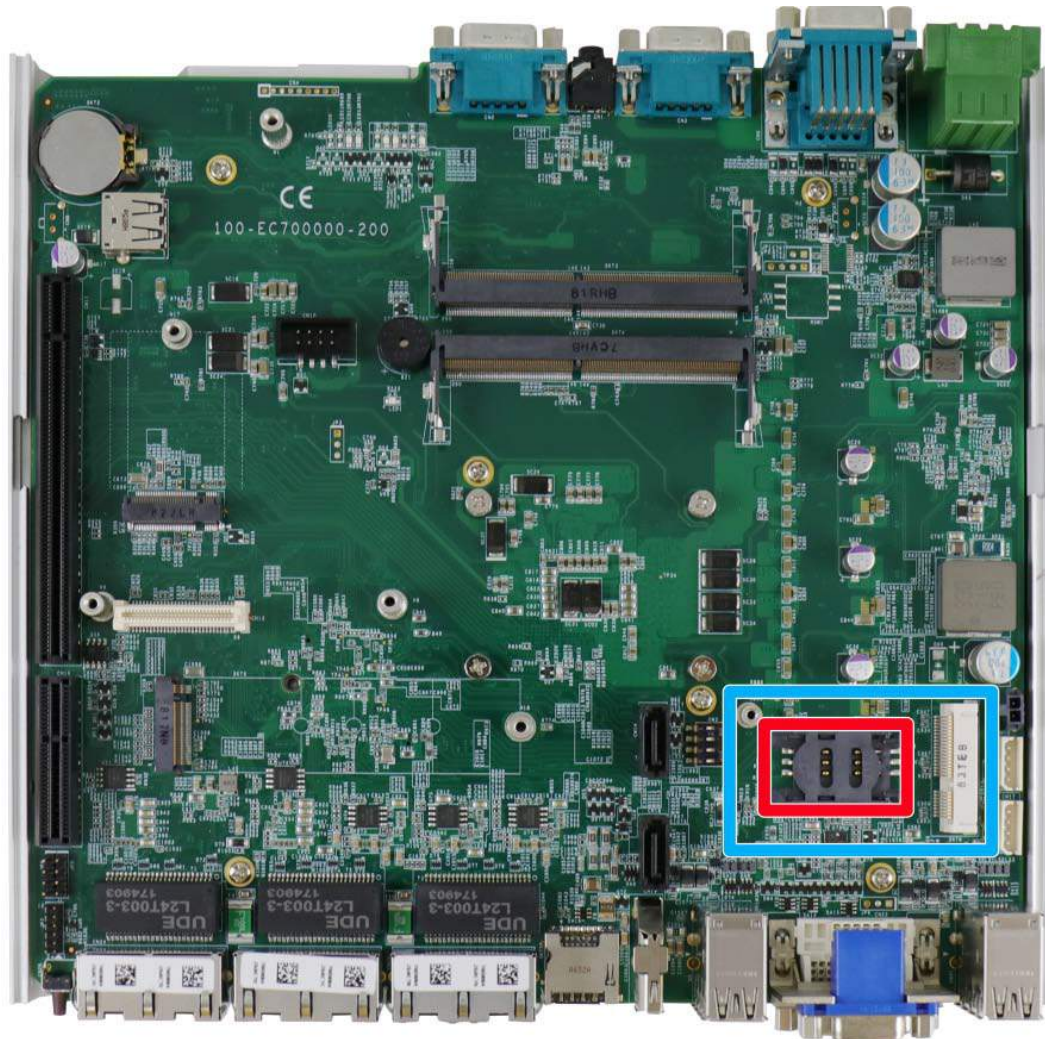


### NOTE

*When changes are made to DRAM module(s), such as additionally install or remove and reinstall (into the same/ different slot), it will result in approximately a 30 to 60 seconds delay when booting up for the first time after such change(s).*

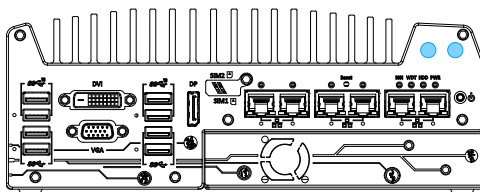


### 2.4.3 Dual Mode mSATA/ mini-PCle Socket & Pin Definition

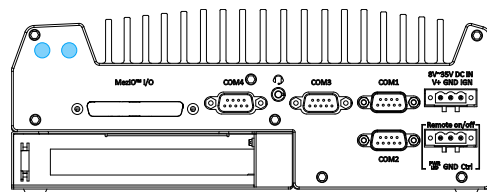


The system provides a dual mode mSATA/ mini-PCle socket (indicated in **blue**) that is in compliance with mini-PCle specification rev. 1.2. You can install either an mSATA SSD or mini-PCle module into this socket and the system will automatically detect and configure it to run PCIe or SATA signals. This mini-PCle socket is designed with SIM card (slot indicated in **red**) support. With a SIM card installed, your system can access the internet via your network provider's 3G/ 4G network.

For wireless (WIFI/ 3G/ 4G) communication, multiple SMA antenna apertures can be located on the front and rear panel.

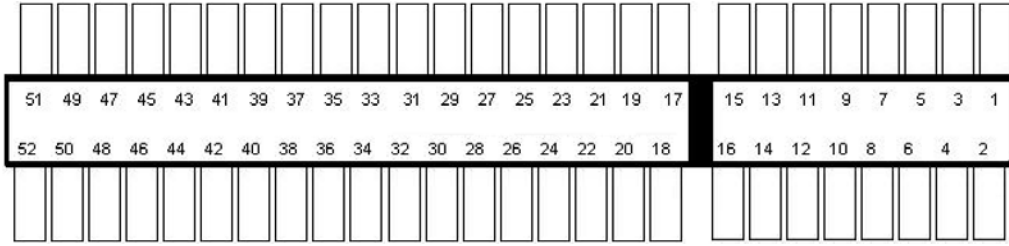


Front panel antennae opening




Rear panel antennae opening

**Dual mode mSATA/ mini-PCle socket definition**



| Pin                   | Signal (mPCle) | Signal (mSATA) | Pin # | Signal (mPCle) | Signal (mSATA) |
|-----------------------|----------------|----------------|-------|----------------|----------------|
| 1                     | WAKE#          | -              | 2     | +3.3Vaux       | 3.3V           |
| 3                     | -              | -              | 4     | GND            | GND            |
| 5                     | -              | -              | 6     | +1.5V          | +1.5V          |
| 7                     | CLKREQ#        | -              | 8     | UIM_PWR        | -              |
| 9                     | GND            | GND            | 10    | UIM_DATA       | -              |
| 11                    | REFCLK-        | -              | 12    | UIM_CLK        | -              |
| 13                    | REFCLK+        | -              | 14    | UIM_RESET      | -              |
| 15                    | GND            | GND            | 16    | UIM_VPP        | -              |
| <b>Mechanical Key</b> |                |                |       |                |                |
| 17                    | Reserved*      | -              | 18    | GND            | GND            |
| 19                    | Reserved*      | -              | 20    | W_DISABLE#     | -              |
| 21                    | GND            | GND            | 22    | PERST#         | -              |
| 23                    | PERn0          | SATA_Rxp       | 24    | 3.3V           | 3.3V           |
| 25                    | PERp0          | SATA_Rxn       | 26    | GND            | GND            |
| 27                    | GND            | GND            | 28    | +1.5V          | +1.5V          |
| 29                    | GND            | GND            | 30    | SMB_CLK        | SMB_CLK        |
| 31                    | PETn0          | SATA_Txn       | 32    | SMB_DATA       | SMB_DATA       |
| 33                    | PETp0          | SATA_Txp       | 34    | GND            | GND            |
| 35                    | GND            | GND            | 36    | USB_D-         | -              |
| 37                    | GND            | GND            | 38    | USB_D+         | -              |
| 39                    | 3.3V           | 3.3V           | 40    | GND            | GND            |
| 41                    | 3.3V           | 3.3V           | 42    | -              | -              |
| 43                    | GND            | -              | 44    | -              | -              |
| 45                    | Reserved       | -              | 46    | -              | -              |
| 47                    | Reserved       | -              | 48    | +1.5V          | +1.5V          |
| 49                    | Reserved       | -              | 50    | GND            | GND            |
| 51                    | Reserved       | -              | 52    | 3.3V           | 3.3V           |



**WARNING**

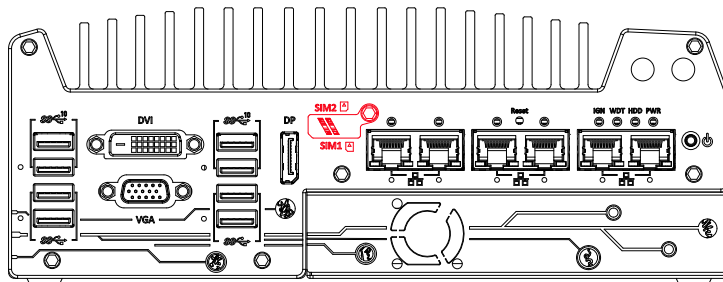
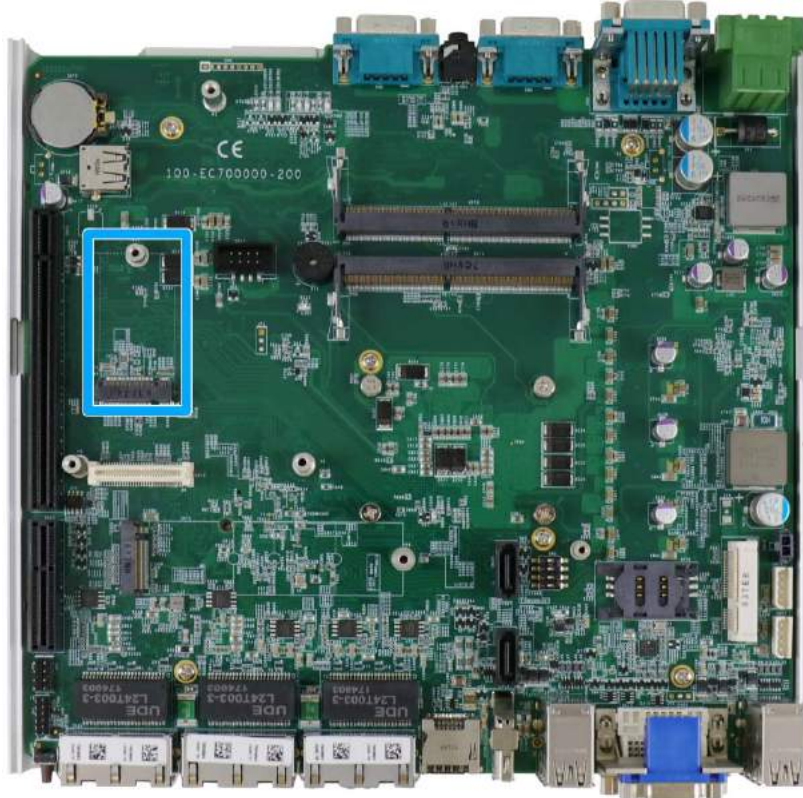
*Some off-the-shelf mini-PCle 4G modules are not compliant to standard mini-PCle interface. They use 1.8V I/O signals instead of standard 3.3V I/O and may have signal conflict. Please consult with Neousys for compatibility when in doubt! Installing an incompatible 4G module may damage the system or the module itself may be damaged.*

### 2.4.4 M.2 2242 (B Key), Mini-SIM Card Slot & Pin Definition



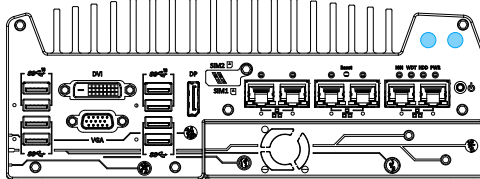
**NOTE**

The dual SIM card functionality is only available when Sierra Wireless EM7455/ 7430 solution is installed. For other 4G add-on solutions, SIM card slot 1 is the default functioning slot.

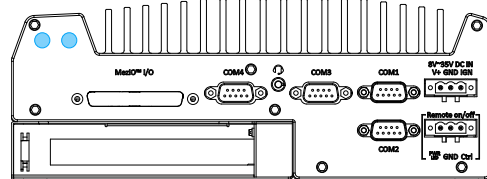


The system has an M.2 2242 slot (indicated in **blue**) that works with dual SIM slots (4G + 3G) on the front panel (indicated in **red**). By installing a 3G or 4G M.2 module and SIM card, you can access the internet via the provider's network.

For wireless 3G/ 4G, SMA antenna apertures are located on front/ rear panels.



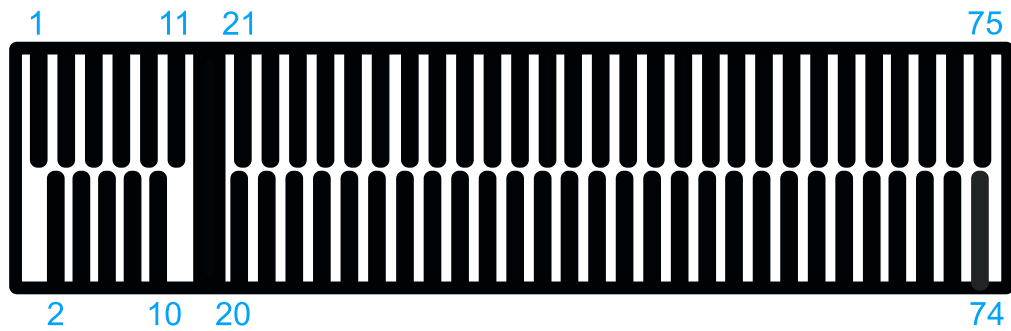
**Front panel antennae opening**



**Rear panel antennae opening**

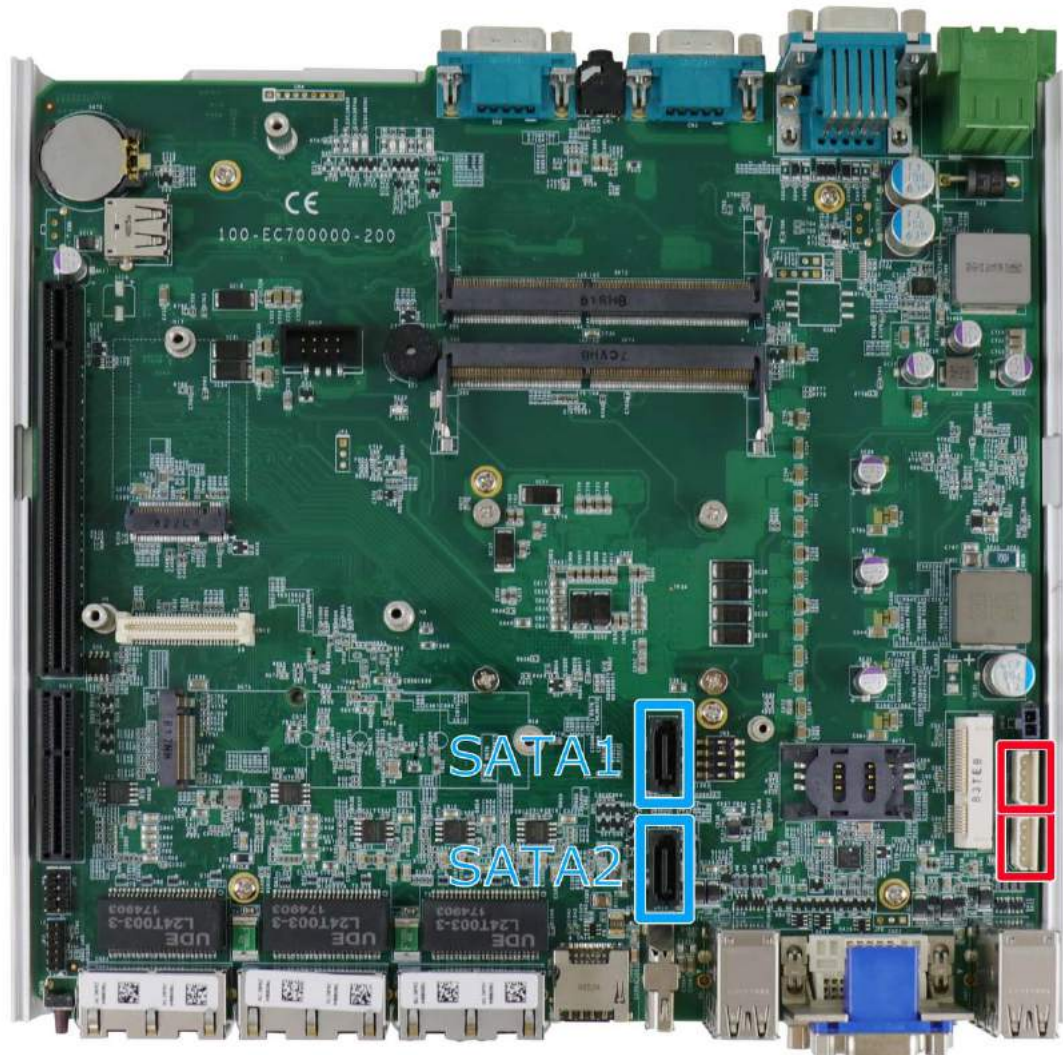


M.2 (B Key) Slot Pin Definition



| Pin #                 | Signal          | Pin # | Signal                |
|-----------------------|-----------------|-------|-----------------------|
| 1                     | -               | 2     | +3V3                  |
| 3                     | GND             | 4     | +3V3                  |
| 5                     | GND             | 6     | FULL_CARD_POWER_OFF_N |
| 7                     | USB_D+          | 8     | W_DISABLE_N           |
| 9                     | USB_D-          | 10    | -                     |
| 11                    | GND             |       |                       |
| <b>Mechanical Key</b> |                 |       |                       |
| 21                    | -               | 20    | -                     |
| 23                    | -               | 22    | -                     |
| 25                    | -               | 24    | -                     |
| 27                    | GND             | 26    | -                     |
| 29                    | USB3.0-RX-      | 28    | -                     |
| 31                    | USB3.0-RX+      | 30    | UIM1-RESET            |
| 33                    | GND             | 32    | UIM1-CLK              |
| 35                    | USB3.0-TX-      | 34    | UIM1-DATA             |
| 37                    | USB3.0-TX+      | 36    | UIM1-PWR              |
| 39                    | GND             | 38    | -                     |
| 41                    | PERn0 / SATA-B+ | 40    | UIM2-DET              |
| 43                    | PERp0 / SATA-B- | 42    | UIM2-DATA             |
| 45                    | GND             | 44    | UIM2-CLK              |
| 47                    | PETn0 / SATA-A- | 46    | UIM2-RST              |
| 49                    | PETp0 / SATA-A+ | 48    | UIM2-PWR              |
| 51                    | GND             | 50    | PERST_N               |
| 53                    | REFCLKN         | 52    | -                     |
| 55                    | REFCLKP         | 54    | -                     |
| 57                    | GND             | 56    | -                     |
| 59                    | -               | 58    | -                     |
| 61                    | -               | 60    | -                     |
| 63                    | -               | 62    | -                     |
| 65                    | -               | 64    | -                     |
| 67                    | RESET_N         | 66    | UIM1_DETECT           |
| 69                    | CONFIG_1        | 68    | -                     |
| 71                    | GND             | 70    | +3V3                  |
| 73                    | GND             | 72    | +3V3                  |
| 75                    | -               | 74    | +3V3                  |

## 2.4.5 SATA Ports



The system provides two SATA ports which support Gen3, 6 Gb/s SATA signals. Each SATA port (indicated in **blue**) features a 7-pin SATA connector and a 4-pin power connector.

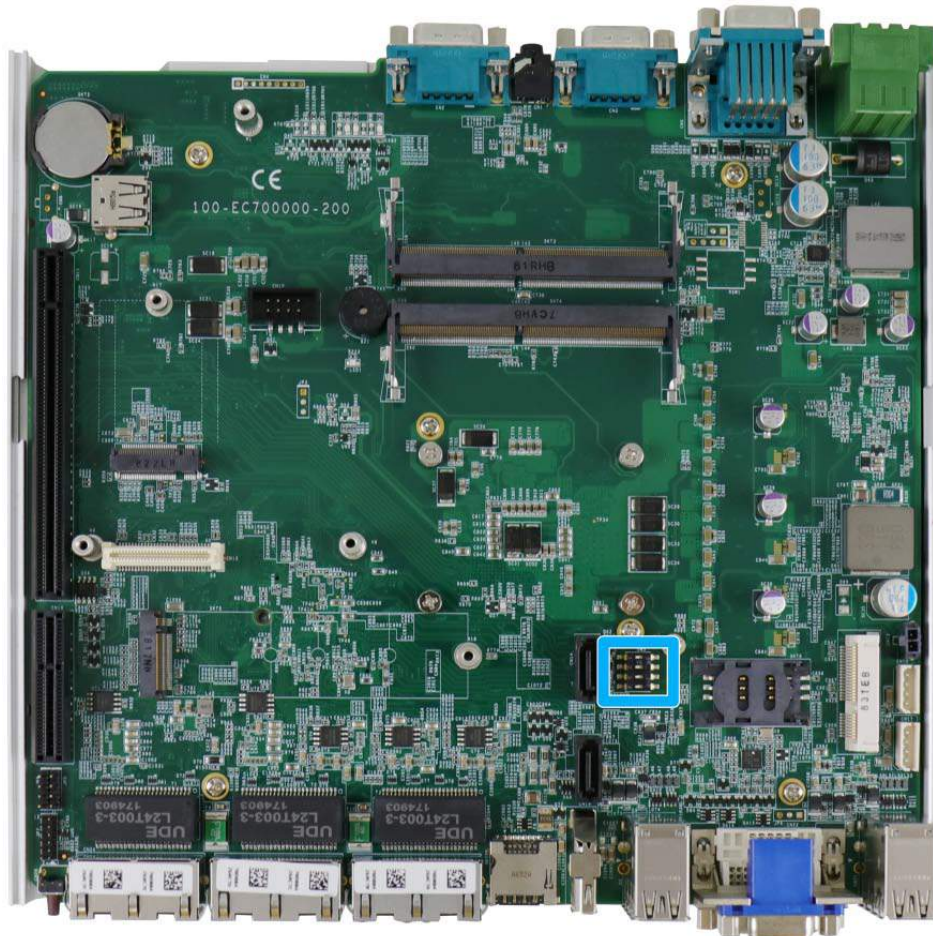
The power connector (indicated in **red**) accommodates a 2.5" HDD/ SSD in internal HDD bracket. Standard 22-pin SATA connectors are provided with the system. You may refer to the SATA Configuration section for SATA settings.



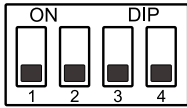
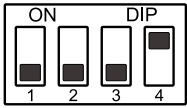
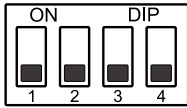
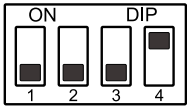
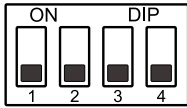
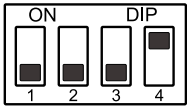
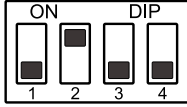
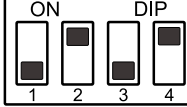
### NOTE

*Supports up to 15mm thickness HDD/ SSD.*

## 2.4.6 DIP Switch



The DIP switch (indicated in **blue**) should be already configured out of the factory. Users need only set the 4th DIP switch to ON for BIOS update and switch it back to the OFF position when BIOS upgrade has completed. The table below shows the system default DIP switch settings for reference purposes.

| System      | Default DIP switch setting  | Enable BIOS upgrade  |
|-------------|---|--|
| Nuvo-7000E  |  |  |
| Nuvo-7000P  |  |  |
| Nuvo-7000LP |  |  |
| Nuvo-7000DE |  |  |

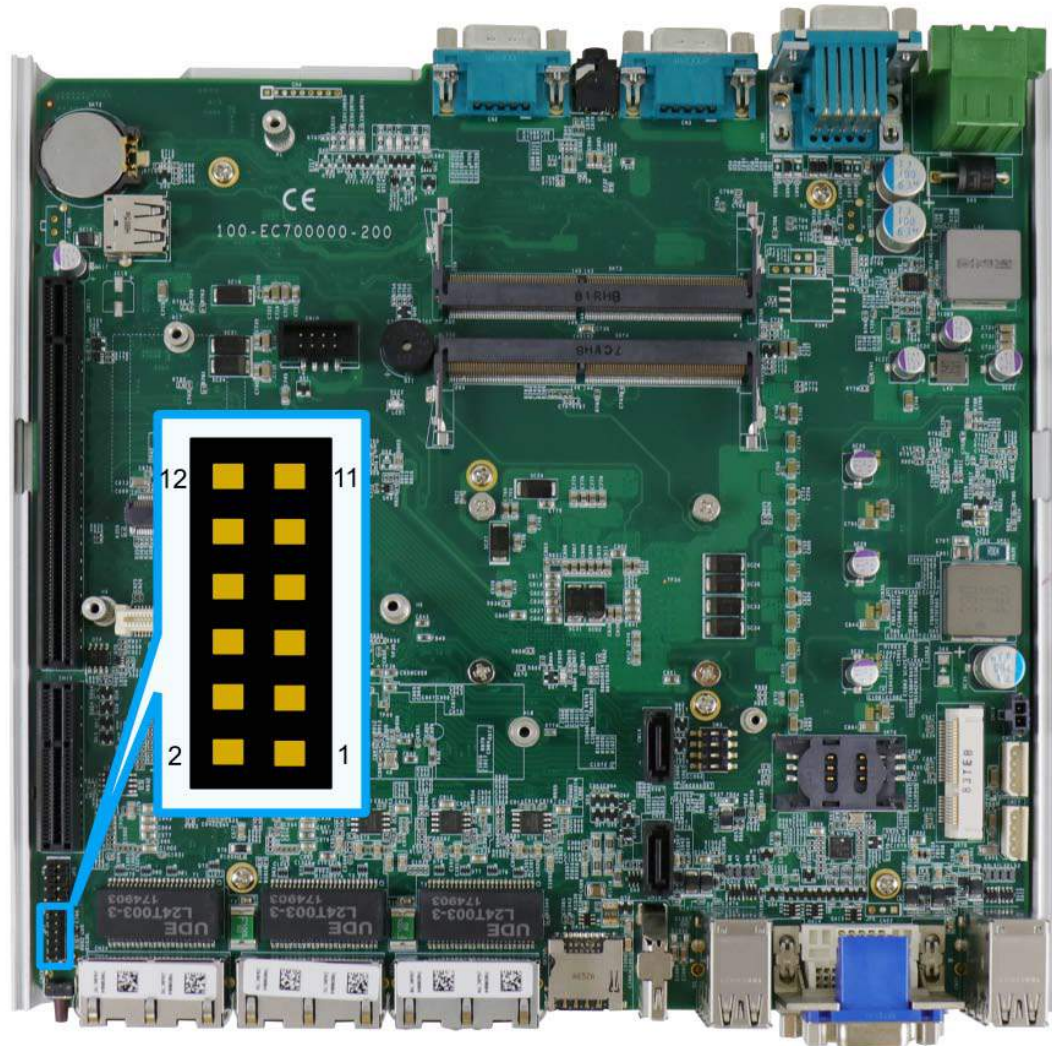


### NOTE

Changing any DIP switches to the ON or OFF position will result in extra detection time during the start up process.

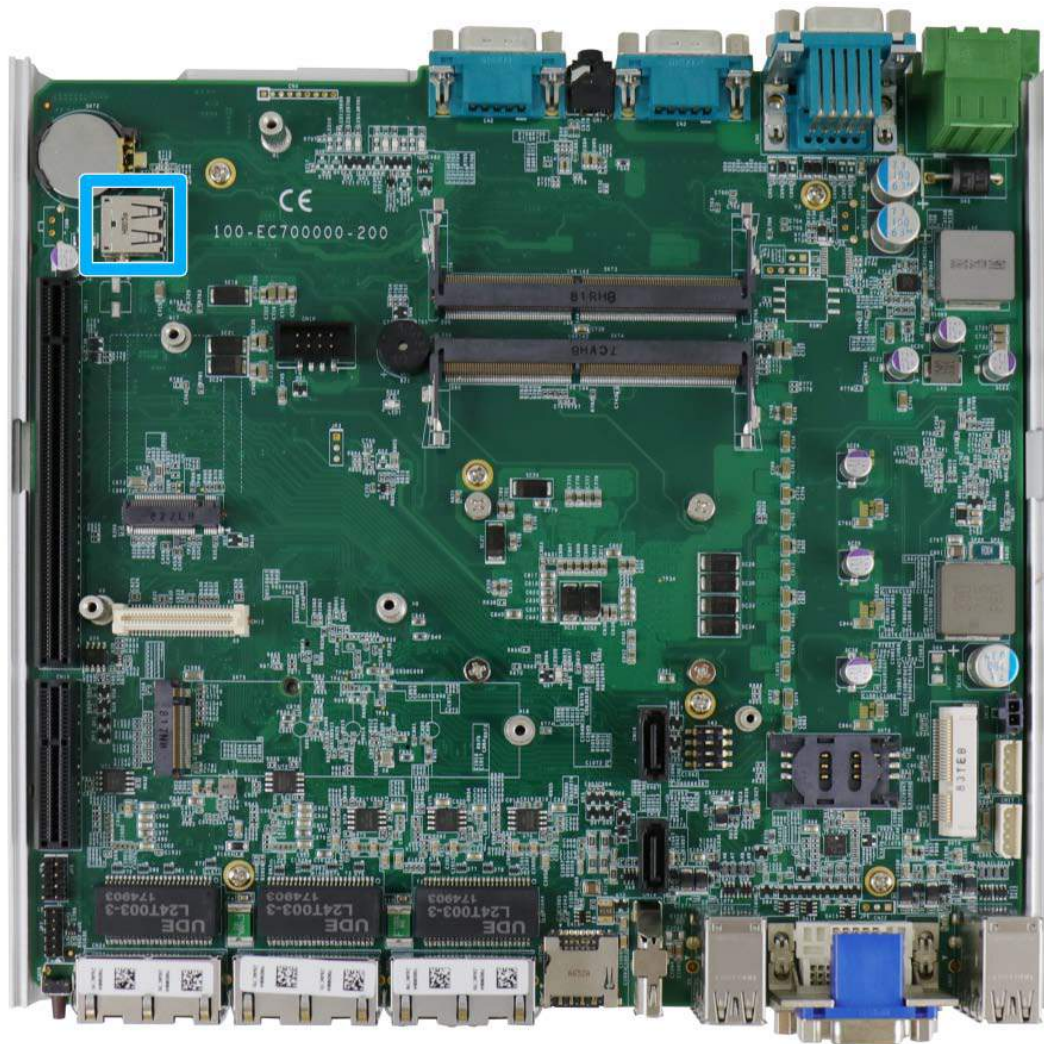


### 2.4.7 On/ Off Ctrl & Status Output



| Pin# | Definition     | Description   |
|------|----------------|---|
| 1    | WDT_LED-       | [Output] Watchdog timer indicator, flashing when Watchdog timer is active   |
| 2    | WDT_LED+       |   |
| 3    | Standby Power- | [Output] Standby power indicator, on if DC power is applied and system is in S5 (standby) mode.                   |
| 4    | Standby Power+ |   |
| 5    | HDD-           | [Output] Hard drive indicator, flashing when SATA hard drive is active.   |
| 6    | HDD+           |   |
| 7    | Power-         | [Output] System power indicator, on if system is turned on, off if system is turned off.                          |
| 8    | Power+         |   |
| 9    | Ctrl-          | [Input] Remote on/off control, connects to an external switch to turn on/off the system (polarity is negligible). |
| 10   | Ctrl+          |   |
| 11   | IGN_LED-       | [Output] Ignition control indicator, on if ignition control is on, off if ignition control is off.                |
| 12   | IGN_LED+       |   |

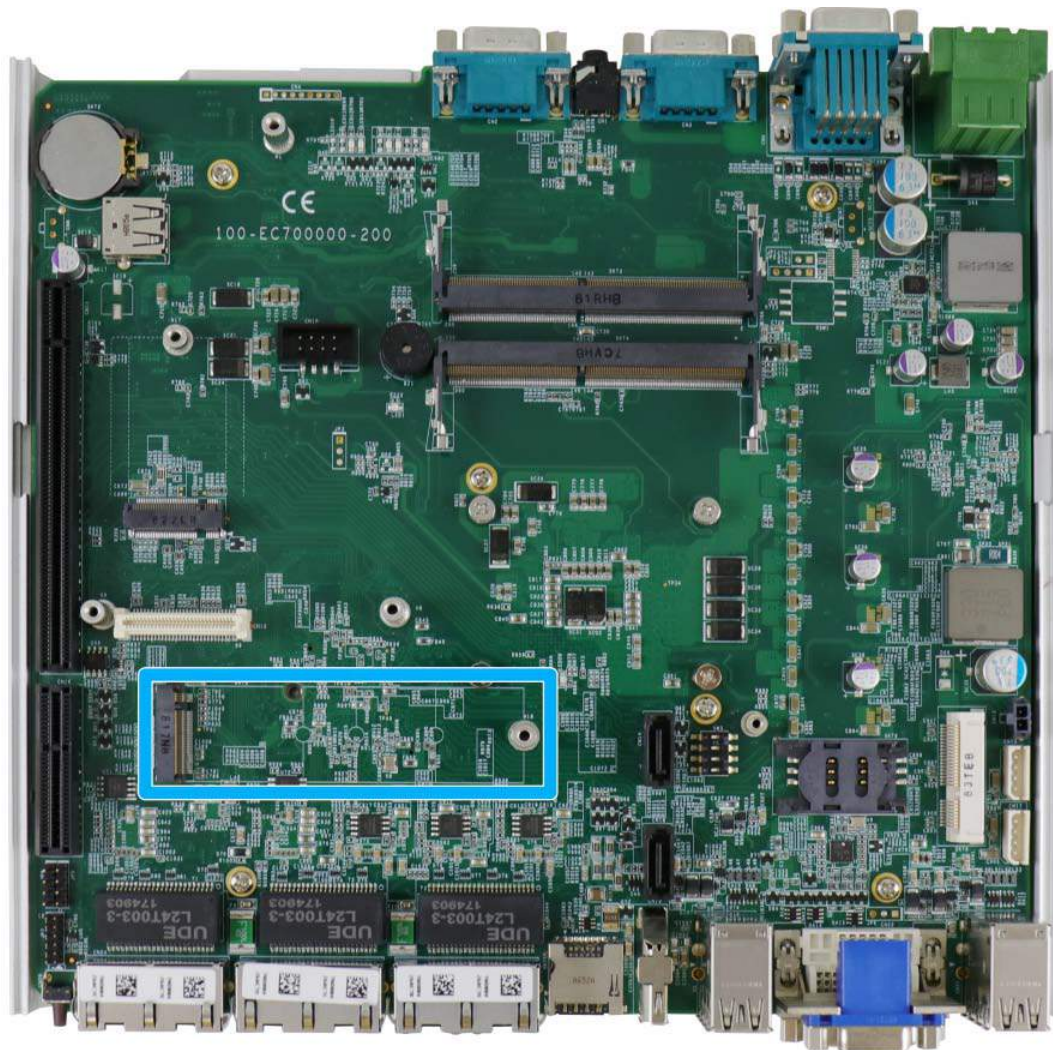
## 2.4.8 Internal USB 2.0 Port



The system's motherboard has an internal USB2.0 port on the PCBA. You can utilize this USB port to connect a USB protection dongle inside the chassis of the system.



## 2.4.9 M.2 2280 (M Key) Slot for NVMe SSD or Optane™ Memory



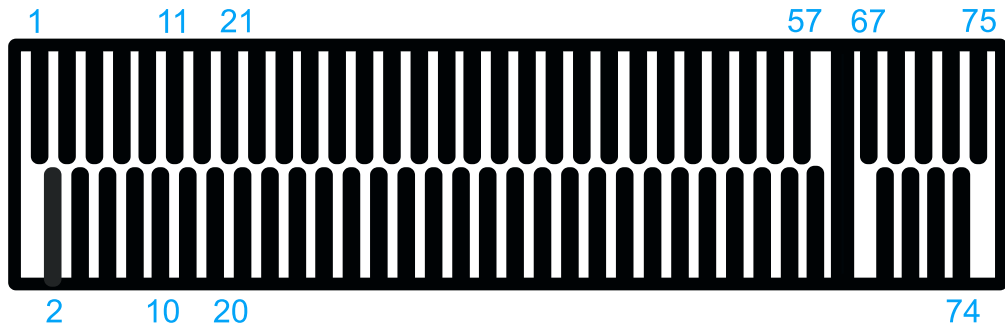
The system has an x4 PCIe M.2 2280 slot (also in compliance with SATA signal) for you to install an NVMe SSD for the ultimate performance or an Intel® Optane™ memory to accelerate the read/ write performances of traditional hard disk drive. An NVMe SSD offers exceptional performance over 2.5" SSDs while Intel® Optane™ memory can dramatically boost your traditional hard disk drives' read/ write performances.



### NOTE

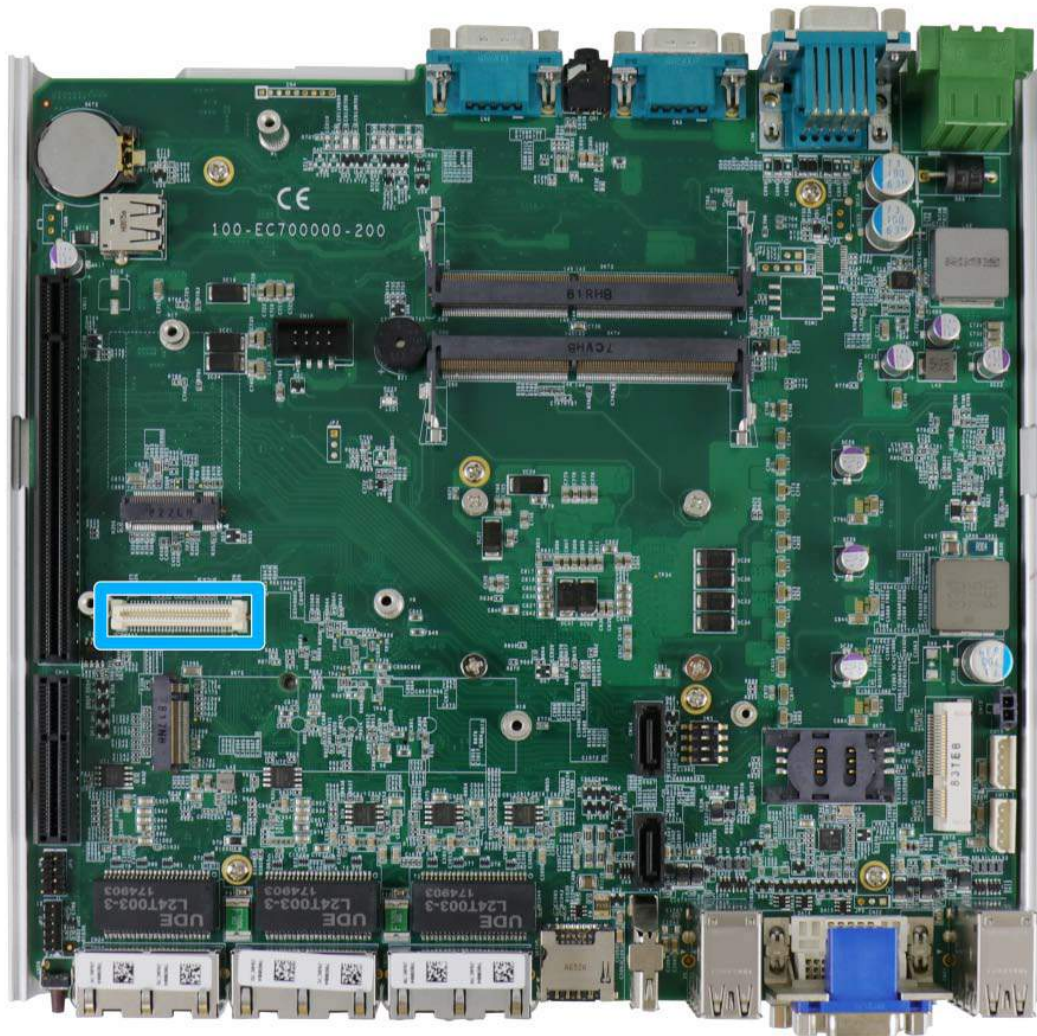
*The M.2 slot will automatically detect and configure the slot to run PCIe or SATA signal depending on the installed device.*

M.2 (M Key) Slot Pin Definition



| Pin #                 | Signal          | Pin # | Signal    |
|-----------------------|-----------------|-------|-----------|
| 1                     | GND             | 2     | +3V3      |
| 3                     | GND             | 4     | +3V3      |
| 5                     | PERN3           | 6     | -         |
| 7                     | PERP3           | 8     | -         |
| 9                     | GND             | 10    | DAS/DSS_N |
| 11                    | PETN3           | 12    | +3V3      |
| 13                    | PETP3           | 14    | +3V3      |
| 15                    | GND             | 16    | +3V3      |
| 17                    | PERN2           | 18    | +3V3      |
| 19                    | PERP2           | 20    | -         |
| 21                    | GND             | 22    | -         |
| 23                    | PETN2           | 24    | -         |
| 25                    | PETP2           | 26    | -         |
| 27                    | GND             | 28    | -         |
| 29                    | PERN1           | 30    | -         |
| 31                    | PERP1           | 32    | -         |
| 33                    | GND             | 34    | -         |
| 35                    | PETN1           | 36    | -         |
| 37                    | PETP1           | 38    | -         |
| 39                    | GND             | 40    | -         |
| 41                    | PERn0 / SATA-B+ | 42    | -         |
| 43                    | PERp0 / SATA-B- | 44    | -         |
| 45                    | GND             | 46    | -         |
| 47                    | PETn0 / SATA-A- | 48    | -         |
| 49                    | PETp0 / SATA-A+ | 50    | PERST_N   |
| 51                    | GND             | 52    | -         |
| 53                    | REFCLKN         | 54    | -         |
| 55                    | REFCLKP         | 56    | -         |
| 57                    | GND             | 58    | -         |
| <b>Mechanical Key</b> |                 |       |           |
| 67                    | -               | 68    | SUSCLK    |
| 69                    | PEDET           | 70    | +3V3      |
| 71                    | GND             | 72    | +3V3      |
| 73                    | GND             | 74    | +3V3      |
| 75                    | GND             |       |           |

## 2.4.10 MezIO™ Interface & Pin Definition



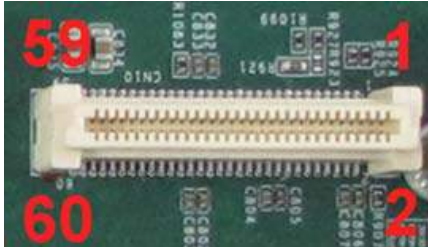
MezIO™ is an innovative interface designed for integrating application-oriented I/O functions into an embedded system. It offers computer signals, power rails and control signals via a high-speed connector. MezIO™ is also mechanically reliable benefited from its 3-point mounted mezzanine structure. A MezIO™ module can leverage these signals to implement comprehensive I/O functions.

The system incorporates MezIO™ interface and universal mechanical design to accommodate Neosys' standard MezIO™ modules. For customers who want to develop their own MezIO™ module, Neosys provides MezIO™ design documents on a NDA basis. Please contact Neosys for further information.



### MezIO™ Interface Pin Definition

MezIO™ interface leverages FCI BergStak® board-to-board connector to provide interconnectivity of high-speed signals. The receptacle part on the PCBA is FCI 61082-063402LF while the plug part on the MezIO™ module is FCI 61083-064402LF. Please refer to the following table for signal definition of its 60-pin connector.



| Function Description | Signal      | Pin# | Pin# | Signal     | Function Description |
|----------------------|-------------|------|------|------------|----------------------|
| Reserved             | Reserved    | 1    | 2    | PCIE_TXP_0 | PCIe data pair       |
| Reserved             | Reserved    | 3    | 4    | PCIE_TXN_0 | PCIe data pair       |
| Reserved             | Reserved    | 5    | 6    | GND        | Ground               |
| Reserved             | Reserved    | 7    | 8    | PCIE_RXP_0 | PCIe data pair       |
| System S4 signal     | SLP_S4#     | 9    | 10   | PCIE_RXN_0 | PCIe data pair       |
| Ground               | GND         | 11   | 12   | CLK100_P_0 | PCIe clock pair      |
| Reserved             | Reserved    | 13   | 14   | CLK100_N_0 | PCIe clock pair      |
| Ground               | GND         | 15   | 16   | GND        | Ground               |
| Reserved             | UID_LED     | 17   | 18   | PCIE_TXP_1 | PCIe data pair       |
| Platform reset       | PLT_RST#    | 19   | 20   | PCIE_TXN_1 | PCIe data pair       |
| USB data pair        | USBP5_N     | 21   | 22   | PCIE_RXP_1 | PCIe data pair       |
| USB data pair        | USBP5_P     | 23   | 24   | PCIE_RXN_1 | PCIe data pair       |
| Ground               | GND         | 25   | 26   | GND        | Ground               |
| SMB bus              | SMB_DATA    | 27   | 28   | CLK100_P_1 | PCIe clock pair      |
| SMB bus              | SMB_CLK     | 29   | 30   | CLK100_N_1 | PCIe clock pair      |
| PCIe data pair       | PCIE_TXP_3  | 31   | 32   | GND        | Ground               |
| PCIe data pair       | PCIE_TXN_3  | 33   | 34   | PCIE_TXP_2 | PCIe data pair       |
| Ground               | GND         | 35   | 36   | PCIE_TXN_2 | PCIe data pair       |
| PCIe data pair       | PCIE_RXP_3  | 37   | 38   | GND        | Ground               |
| PCIe data pair       | PCIE_RXN_3  | 39   | 40   | PCIE_RXP_2 | PCIe data pair       |
| Power button         | PWRBTN#     | 41   | 42   | PCIE_RXN_2 | PCIe data pair       |
| Reserved             | Reserved    | 43   | 44   | RXD4       | SIO COM4             |
| PCH GPIO             | GPIO_RISER3 | 45   | 46   | TXD4       | SIO COM4             |
| PCH GPIO             | GPIO_RISER2 | 47   | 48   | RXD5       | SIO COM5             |
| PCH GPIO             | GPIO_RISER1 | 49   | 50   | TXD5       | SIO COM5             |
| Ground               | GND         | 51   | 52   | GND        | Ground               |
| 3.3V power           | P3V3        | 53   | 54   | P1V8       | 1.8V power           |
| 3.3V power           | P3V3        | 55   | 56   | GND        | Ground               |
| 5V power             | P5V         | 57   | 58   | P12V       | 12V power            |
| 5V power             | P5V         | 59   | 60   | P12V       | 12V power            |

## 3 System Installation

Before disassembling the system enclosure and installing components and modules, please make sure you have done the following:

- It is recommended that only qualified service personnel should install and service this product to avoid injury or damage to the system.
- Please observe all ESD procedures at all times to avoid damaging the equipment.
- Before disassembling your system, please make sure the system has powered off, all cables and antennae (power, video, data, etc.) are disconnected.
- Place the system on a flat and sturdy surface (remove from mounts or out of server cabinets) before proceeding with the installation/ replacement procedure.

### 3.1 Disassembling the System

To access system internal components, the system needs to be disassembled. To disassemble the system enclosure, you need to remove the Cassette module and screws on both I/O panels.

1. Turn the system upside-down and remove the four screws at the bottom of the Cassette module.



**NOTE**

*Not applicable to Nuvo-7000LP systems.*



2. Gently wiggle and separate the Cassette module from the system.



**NOTE**

*Not applicable to Nuvo-7000LP systems.*



3. On the front I/O panel, remove the hexa-screws indicated below.

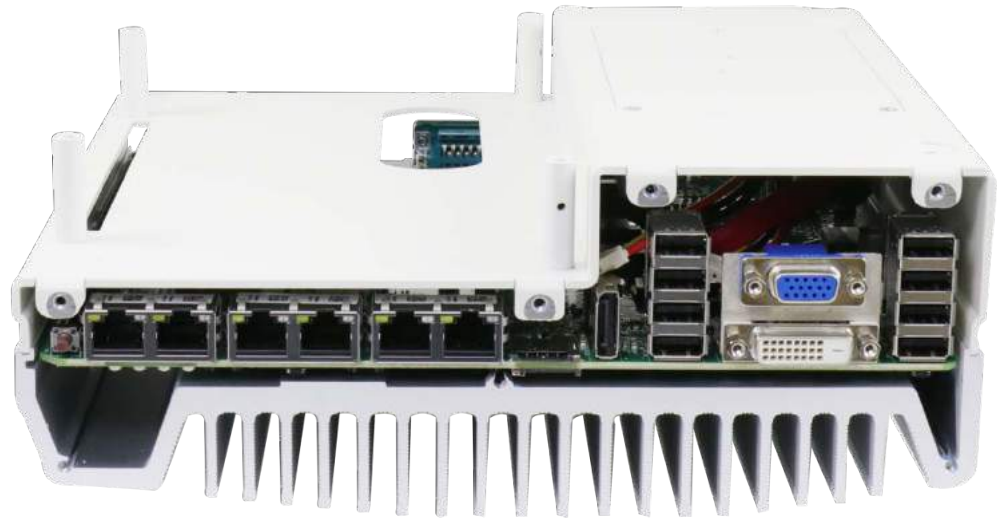


**Nuvo-7000E/ P/ DE systems**

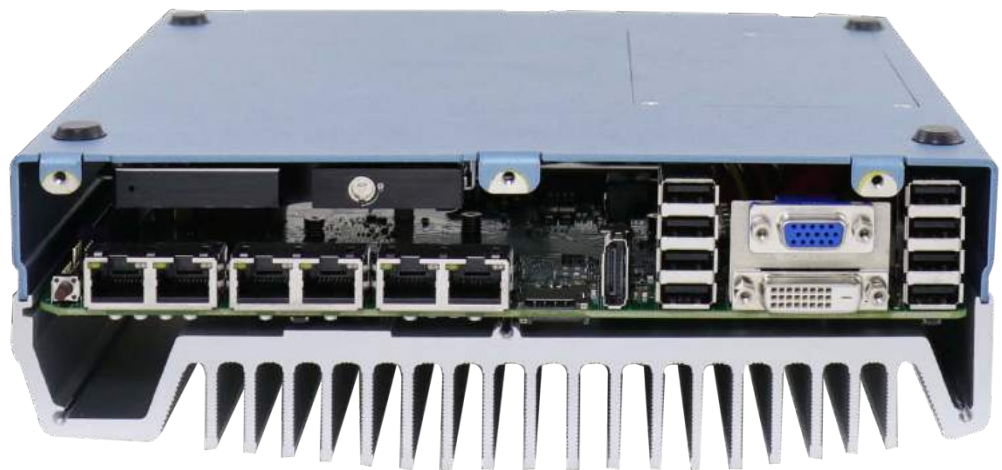


**Nuvo-7000LP systems**

4. Remove the front I/O panel.



**Nuvo-7000E/ P/ DE systems**



**Nuvo-7000LP systems**

5. On the rear I/O panel, remove the hexa-screws indicated below.



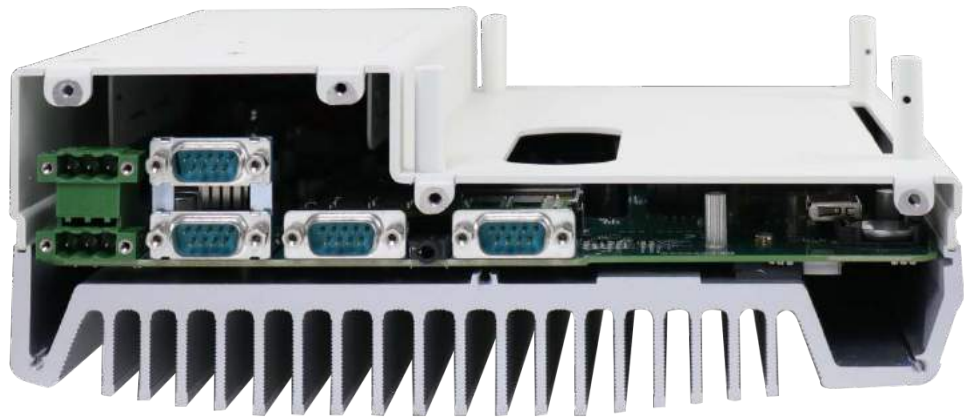
**Nuvo-7000E/ P/ DE systems**



**Nuvo-7000LP systems**



6. Remove the rear I/O panel.

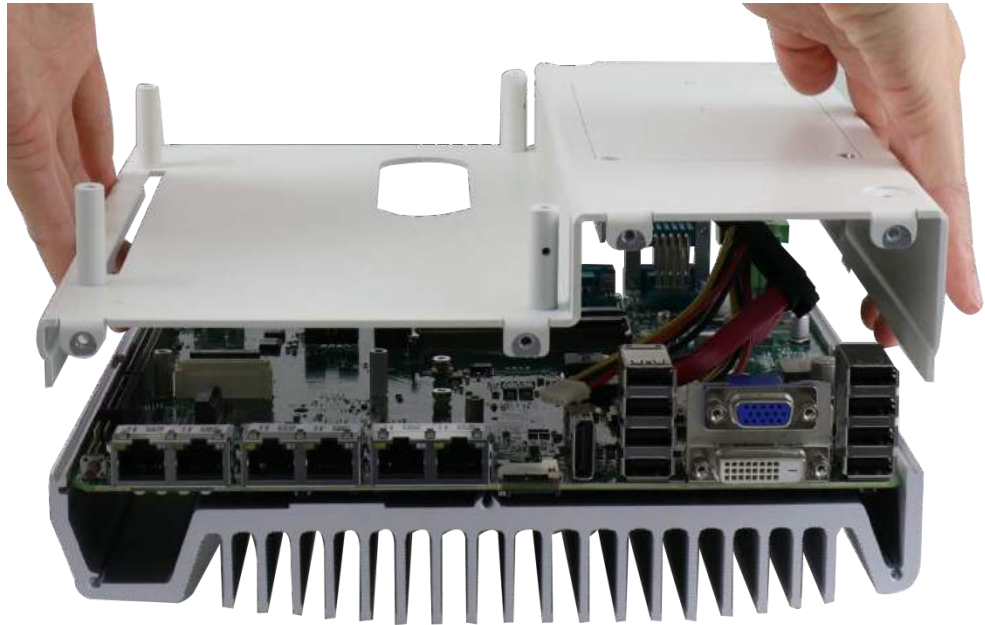


**Nuvo-7000E/ P/ DE systems**



**Nuvo-7000LP systems**

7. Gently lift the system's bottom panel.



**Nuvo-7000E/ P/ DE systems**



**Nuvo-7000LP systems**



**NOTE**

*For Nuvo-7000LP systems, please disengage the 22-pin SATA cable connected to the 2.5" hot swappable tray before removing the bottom panel.*



8. Once the bottom panel has been removed, you should have access to the system's internal I/O interfaces.



## 3.2 Installing Internal Components

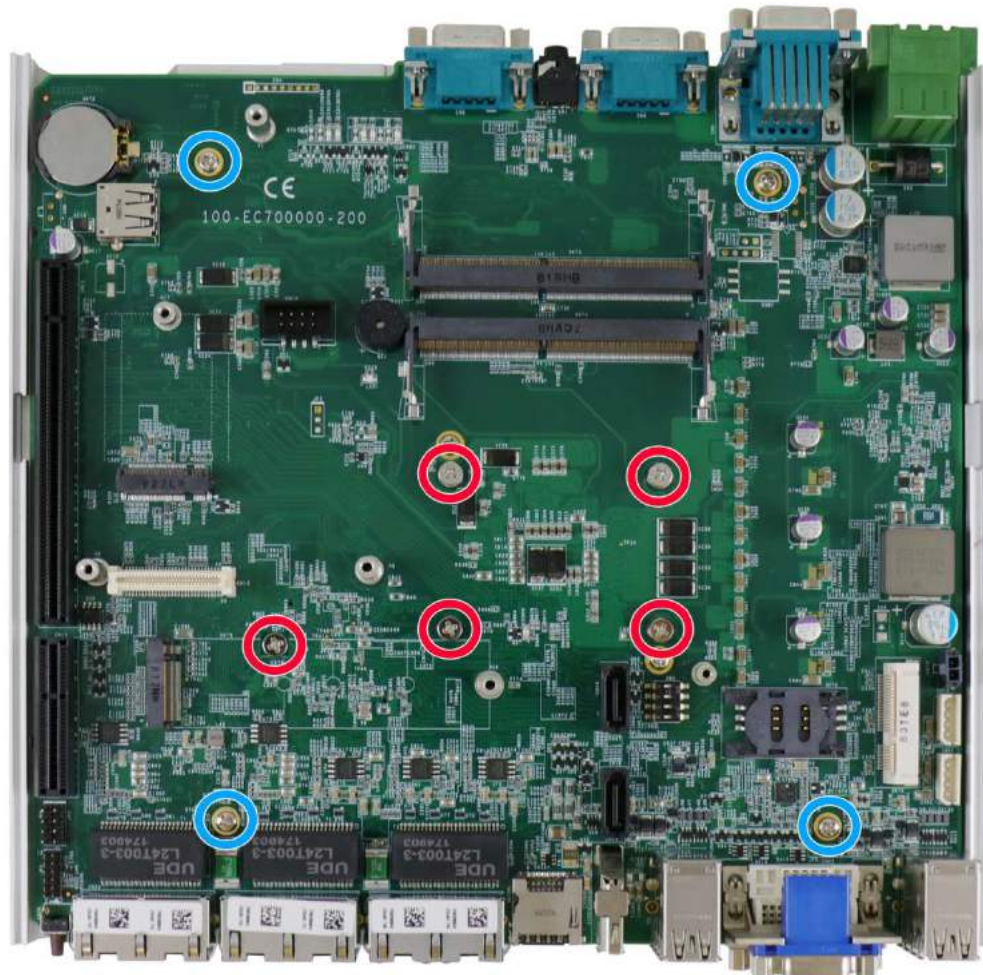


### NOTE

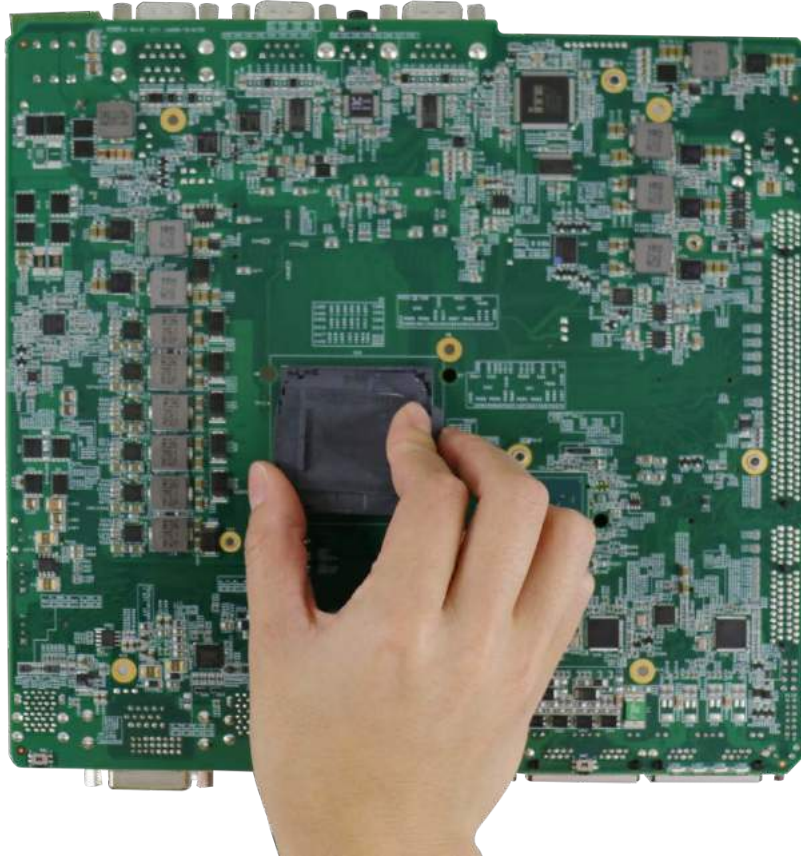
*For demonstration purposes, Nuvo-7000E/ P will be used in most illustrations. A dedicated illustration will be shown if the component is significantly different.*

### 3.2.1 CPU Installation Procedure

1. To install the CPU, you will need to separate the heatsink and the motherboard.
2. To do so, remove the nine screws indicated below (if you are installing the CPU for the first time, you need not remove the screws indicated in **red** as they are not yet installed and the screws can be found in the accessory box).



3. Gently separate the motherboard from the heatsink, you'll see the CPU socket protective cover, place finger tips underneath the sign "REMOVE" for leverage and gently lift the cover.



 **WARNING**

*With the protective cover removed, please be careful when handling the motherboard. DO NOT touch the pins in the LGA socket!*



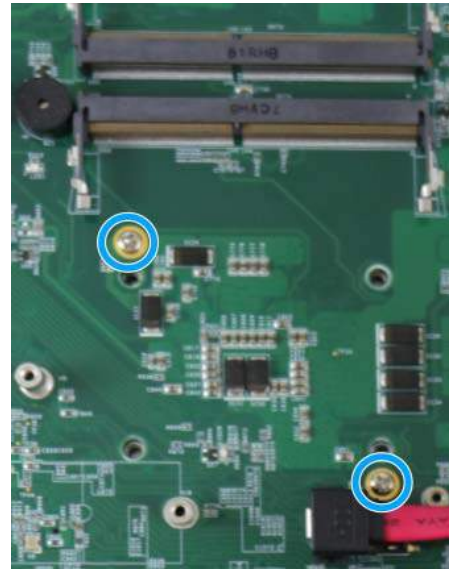
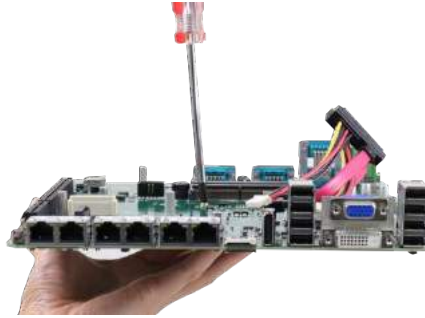
4. Remove the CPU from its container/ tray. Match the two notches on the side to the protrusions in the socket, gently lower the CPU into the socket.



5. Locate the CPU retention bracket from the accessory box. Place the retention bracket on the CPU and hold it in place.



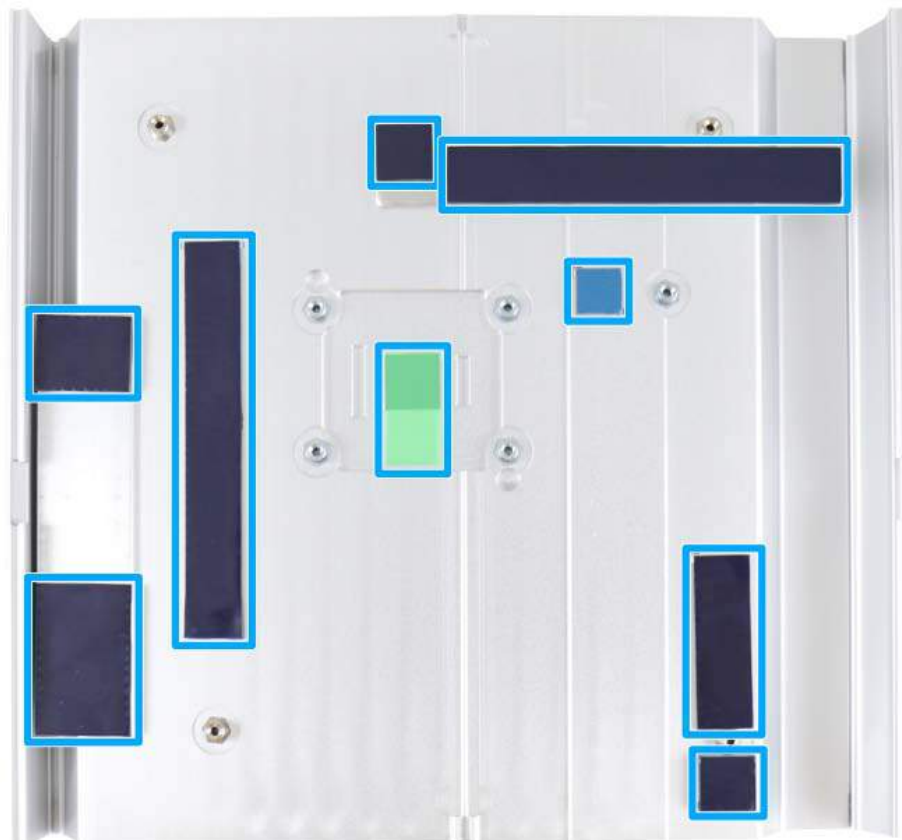
6. Turn the motherboard around and secure the bracket by tightening two M3 P-head screws.



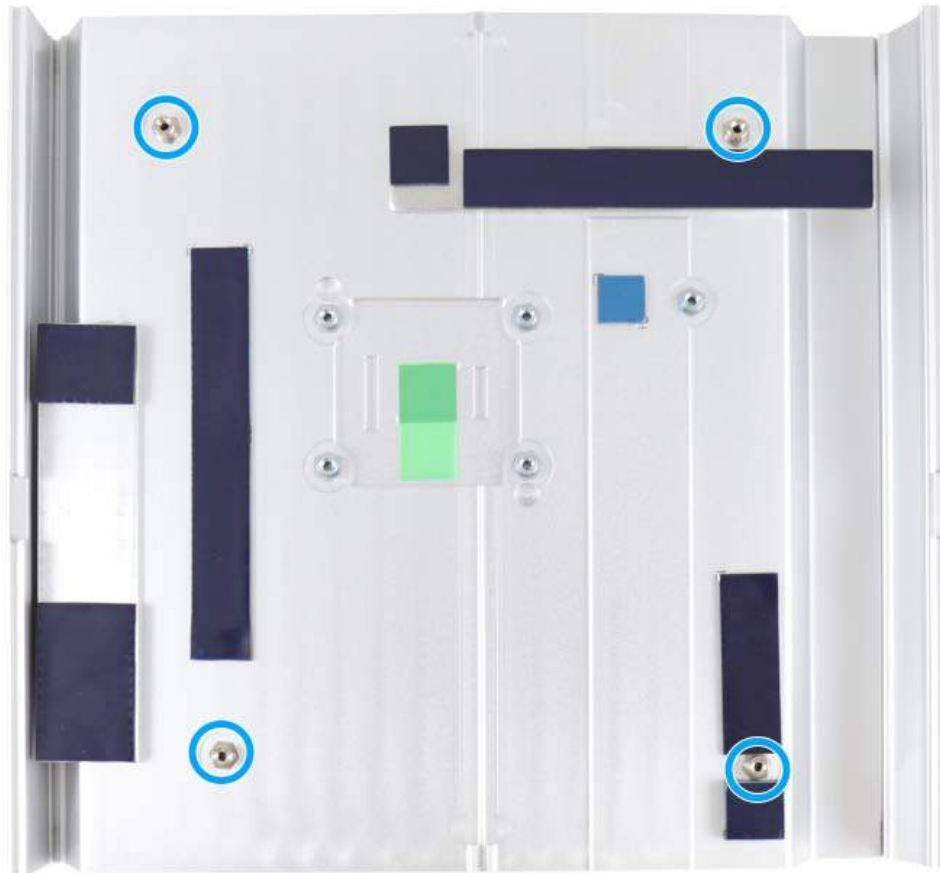
**Hold CPU bracket firmly and turn the motherboard around**

**Secure two M3 P-head screws**

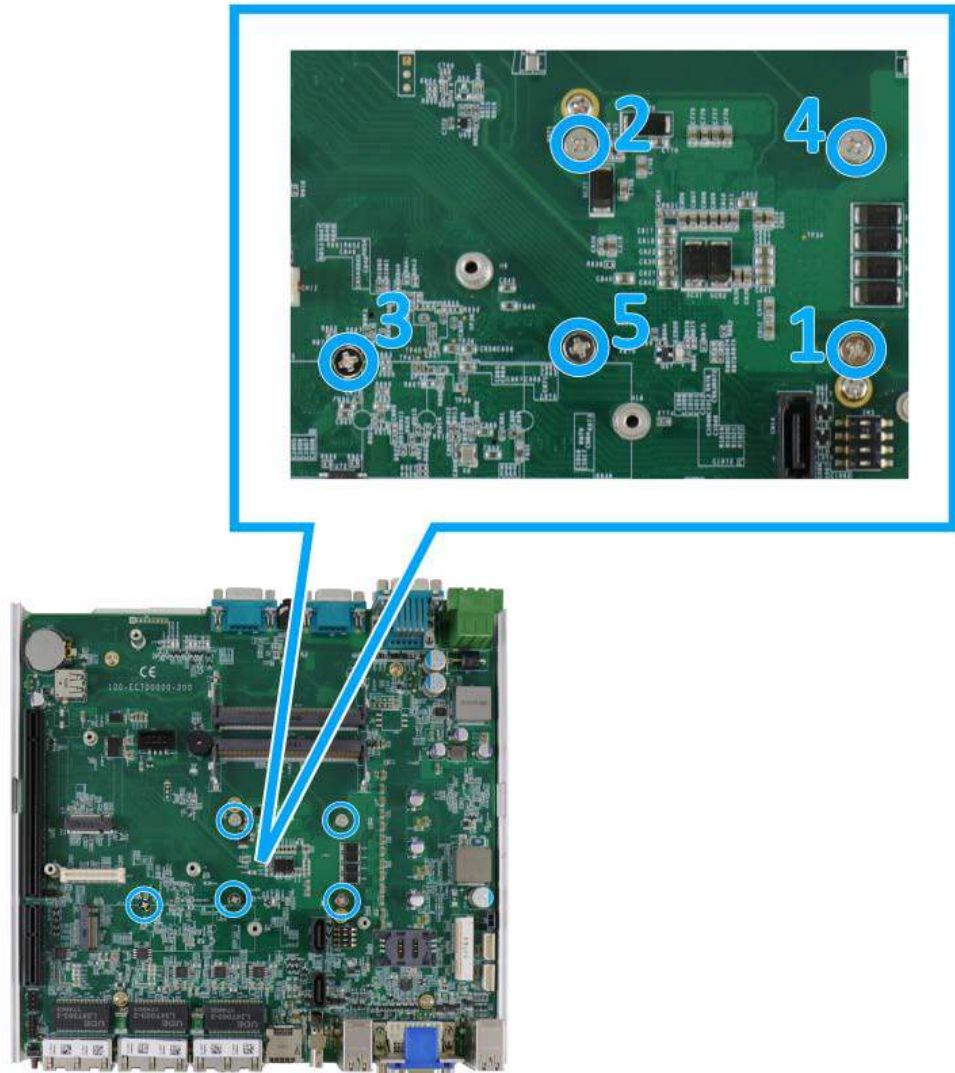
7. Remove all thermal pads' protective films on the heatsink.



8. With the four motherboard standoffs aligned, gently lower the motherboard onto the heatsink and secure the four screws.



- Once the motherboard has been installed, you're ready to secure the five screws that help the heatsink apply pressure to the CPU/ chipset die. You'll want to apply even pressure to the corners by gradually tightening each screw. Please refer to the recommended order when tightening the screws.



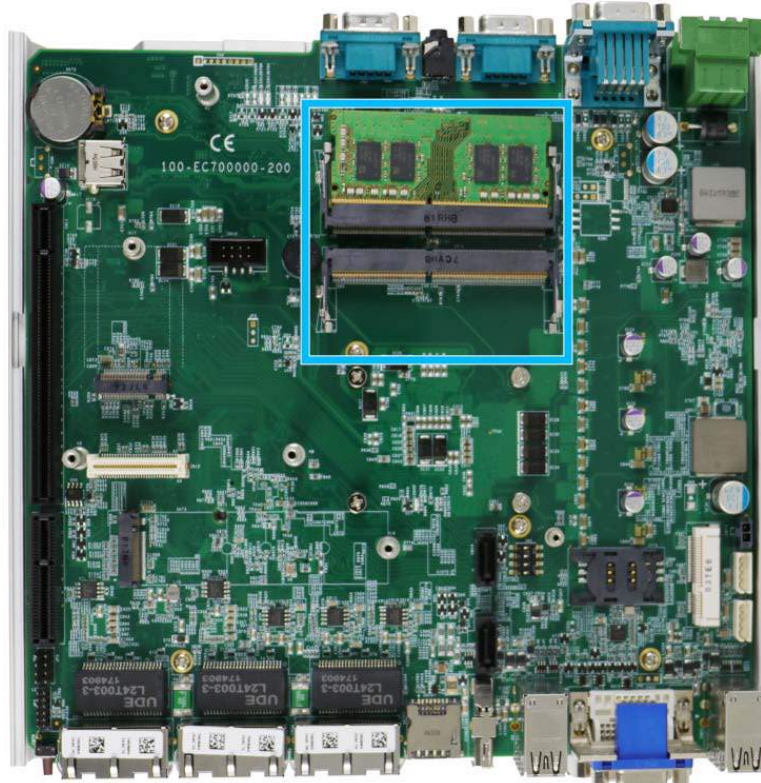
- Reinstall the system panels and Cassette module when done.
- If you need to install other components, please refer to respective sections.



### 3.2.2 DDR4 SO-DIMM Installation

There are two SO-DIMM memory slots (indicated in **blue**) on the motherboard that supports a total maximum of 64GB DDR4-2666. Please follow the procedures below to replace or install the memory modules.

1. Please refer to the section “[Disassembling the System](#)”.
2. Locate the SODIMM memory module slots on the motherboard.



3. To install the memory module, insert gold fingers into the slot at 45-degree angle, push down on the memory module to clip the module into position.





4. Push the memory module down until it is clipped-in.

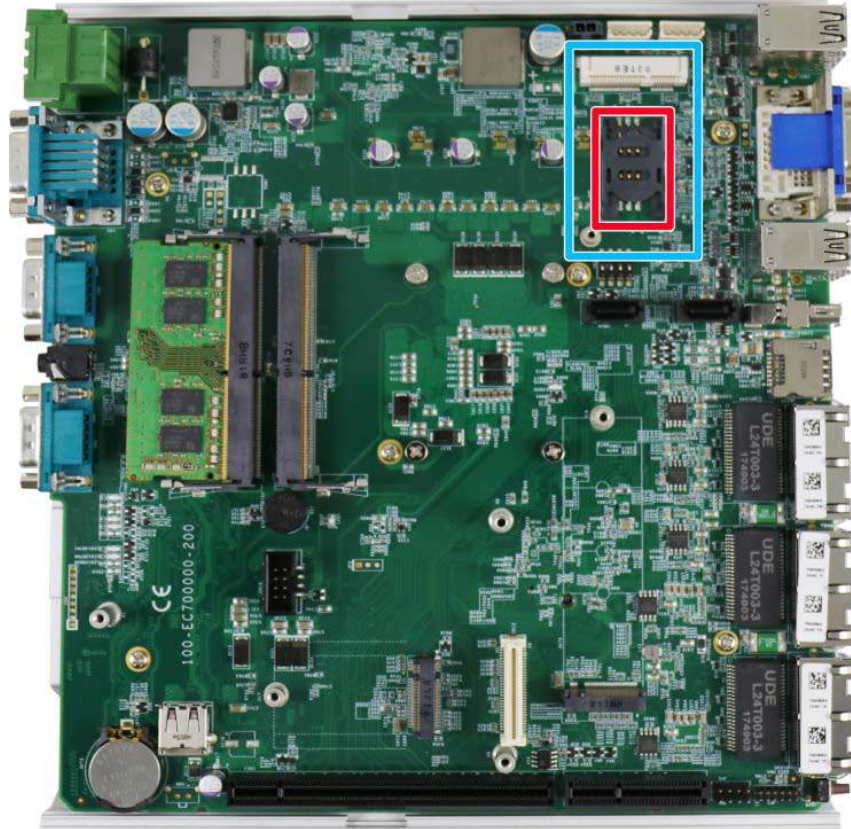


5. Repeat steps 3 and 4 to install the other module.
6. [Reinstall the system enclosure](#) and panel when done.
7. If you need to install other components, please refer to respective sections.

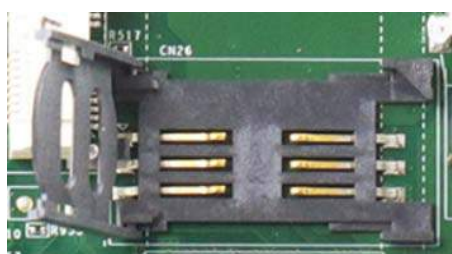
### 3.2.3 mPCIe Module, Mini-SIM (2FF) Card and Antennae Installation

The system has an mPCIe slot (indicated in blue) coupled with Mini-SIM socket (indicated in red) for installing 3G/ 4G module. For installation, please refer to the following instructions.

1. Please refer to the section “[Disassembling the System](#)”.
2. Locate the mPCIe and SIM card slots on the motherboard.



3. Before installing the mPCIe module, you need to insert the Mini-SIM card. Slide the SIM slot holder and lift the SIM card holder. Insert the Mini-SIM card (pins facing up), shut the SIM holder and slide it to lock the SIM card in-place.



Slide and lift SIM card holder



Insert Mini-SIM card with pins facing up

- Secure the Mini-SIM card by sliding the holder.



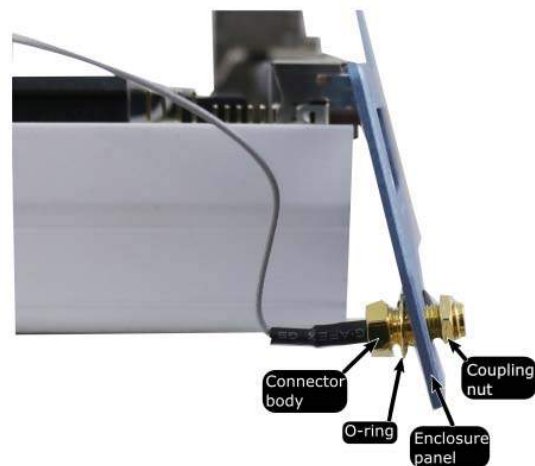
- Insert the mPCIe module on a 45 degree angle into the mPCIe slot and secure the module.



**Insert on 45 degree angle**

**Secure the module**

- Clip on the IPEZ-to-SMA cable to the module and secure the antenna to the front or rear panel. Please refer to the module's manual for clip-on connection.



**Clip on IPEZ-to-SMA cable**

**Secure antenna to rear panel**

- [Reinstall the system enclosure](#) and panel when done.
- If you need to install other components, please refer to respective sections.



### 3.2.4 M.2 2242 (B Key) Module and Micro-SIM (3FF) Card Installation

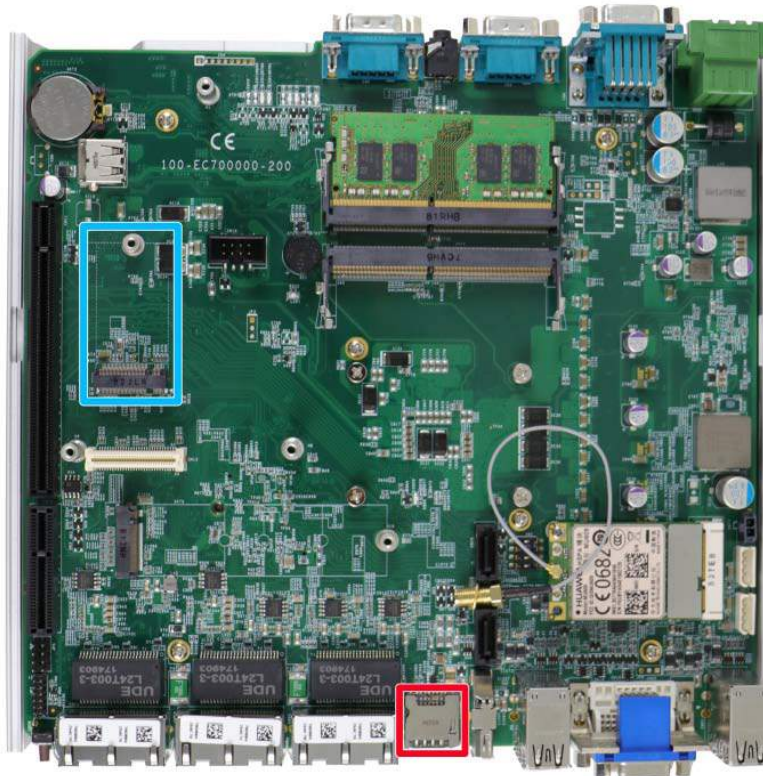


**NOTE**

*The dual SIM card functionality is only available when Sierra Wireless EM7455/ 7430 solution is installed. For other 4G add-on solutions, SIM card 1 slot is the default functioning slot.*

The system has an M.2 slot (indicated in **blue**) for installing 3G/ 4G or a WiFi module that can be coupled with dual Micro-SIM card slots (indicated in **red**). For installation, please refer to the following instructions.

1. Please refer to the section "[Disassembling the System](#)".
2. Locate the M.2 2242 (B Key) and SIM card slots on the motherboard.



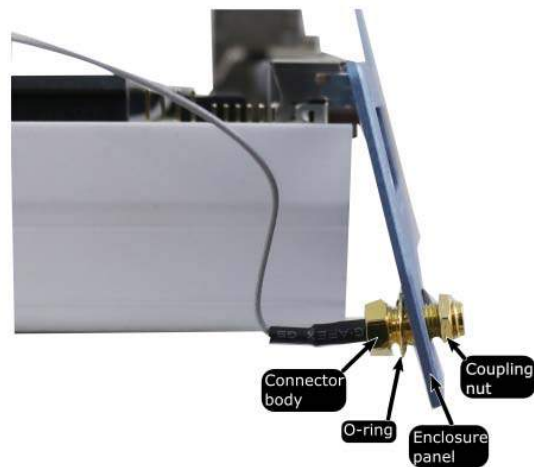
3. Insert the module on a 45 degree angle.



- Gently press down and secure the module with an M2.5 P-head screw.



- Clip on the IPEZ-to-SMA cable to the module and secure the antenna to the front or rear panel. Please refer to the module's manual for clip-on connection.



**Clip on IPEZ-to-SMA cable**

**Secure antenna to rear panel**

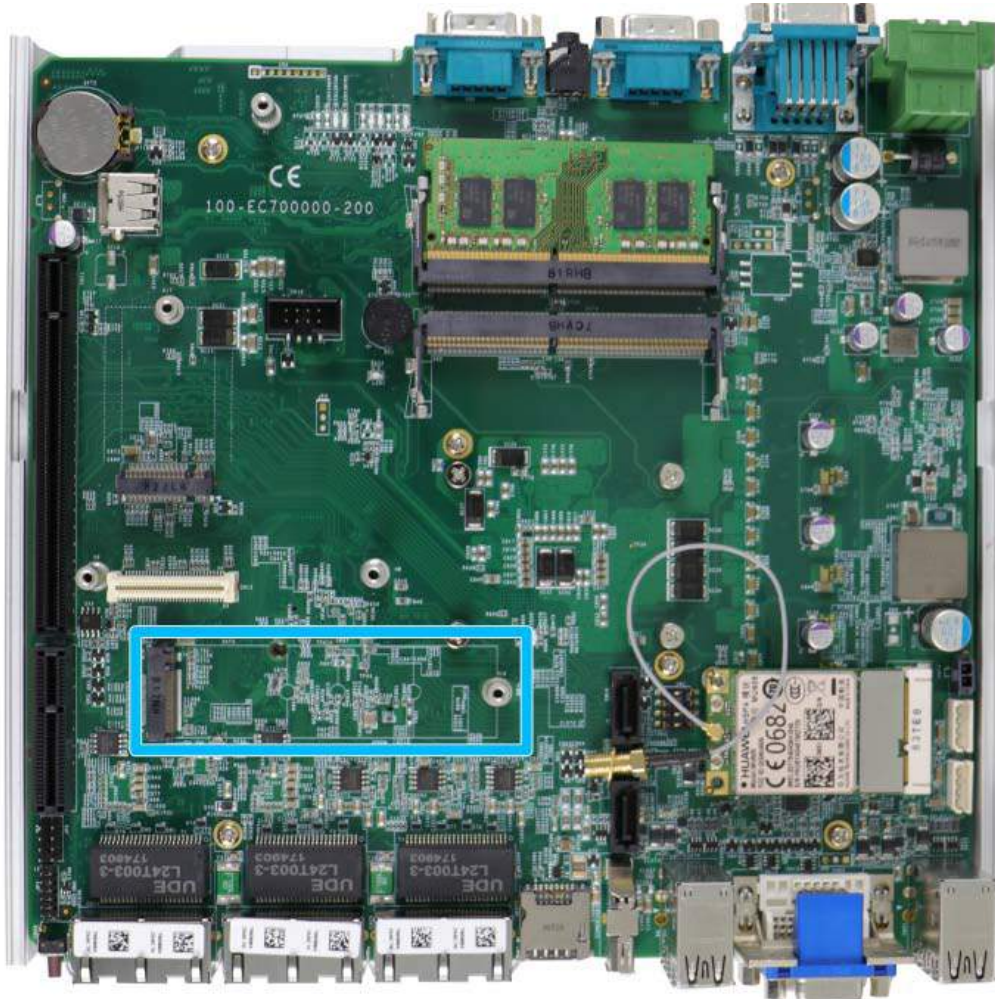
- With the motherboard exposed, the SIM card is inserted with the gold fingers facing downward. If you are inserting the SIM card with the system upright (heatsink fins upwards), the gold fingers should be facing upward. The SIM socket utilizes push-push mechanism (push-to-install and push-to-retrieve).
- If you wish to swap or add SIM card via the front panel, you will need to loosen the screw indicated in the illustration below to gain access to the SIM card slots.



- [Reinstall the system enclosure](#) and panel when done.
- If you need to install other components, please refer to respective sections.



### 3.2.5 M.2 2280 NVMe SSD or Intel® Optane™ Memory Installation



The system has a x4 PCIe M.2 2280 slot for you to install an NVMe SSD for the ultimate performance or an Intel® Optane™ memory to accelerate the read/ write performances of traditional hard disk drive. An NVMe SSD offers exceptional performance over 2.5" SSDs while Intel® Optane™ memory can dramatically boost your traditional hard disk drives' read/ write performances. For installation, please refer to the following instructions.

1. Please refer to the section "[Disassembling the System](#)", you may not need to completely dismantle the system to gain access to the M.2 slot.
2. Insert the module on a 45 degree angle.



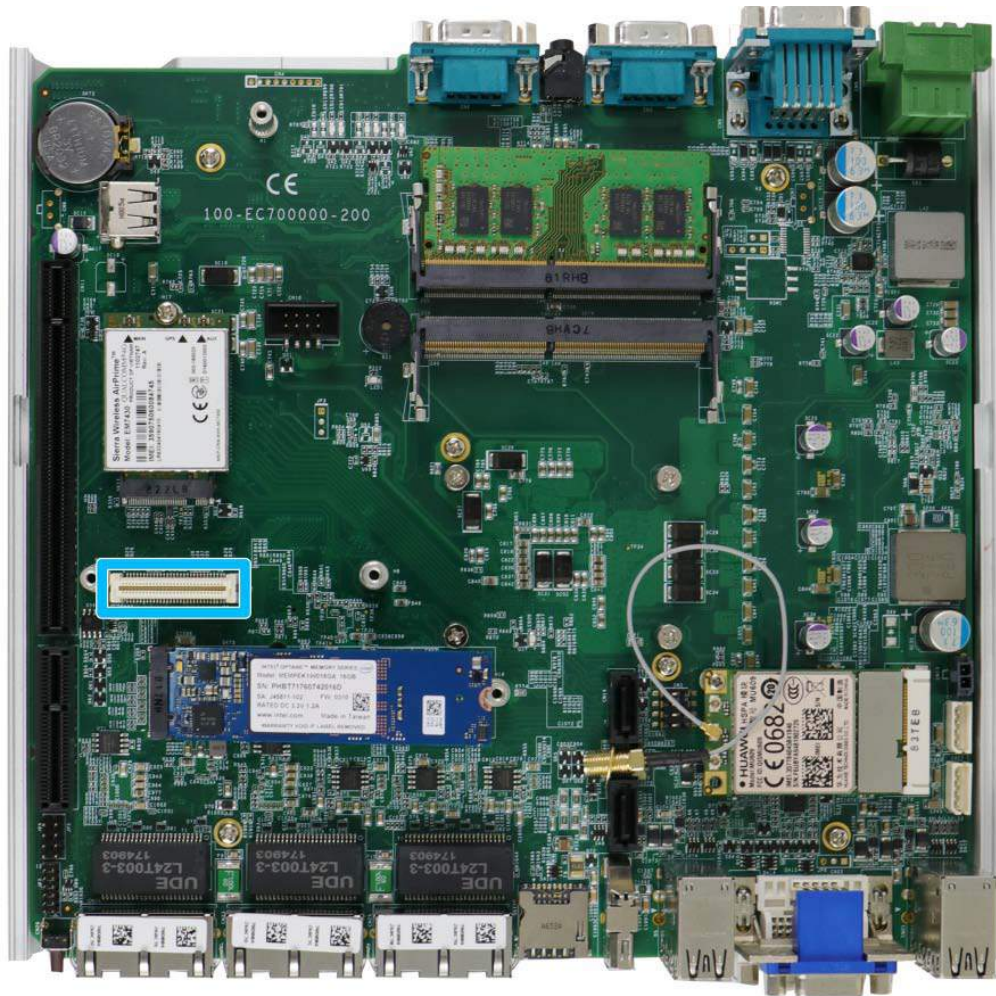
3. Gently press down and secure the module with an M2.5 P-head screw.



4. [Reinstall the system enclosure](#) and panel when done.
5. If you need to install other components, please refer to respective sections.
6. Please refer to the section [Intel® Optane™ Memory BIOS Setup and Driver Installation](#) for traditional hard drive acceleration.



### 3.2.6 MezIO™ Module Installation

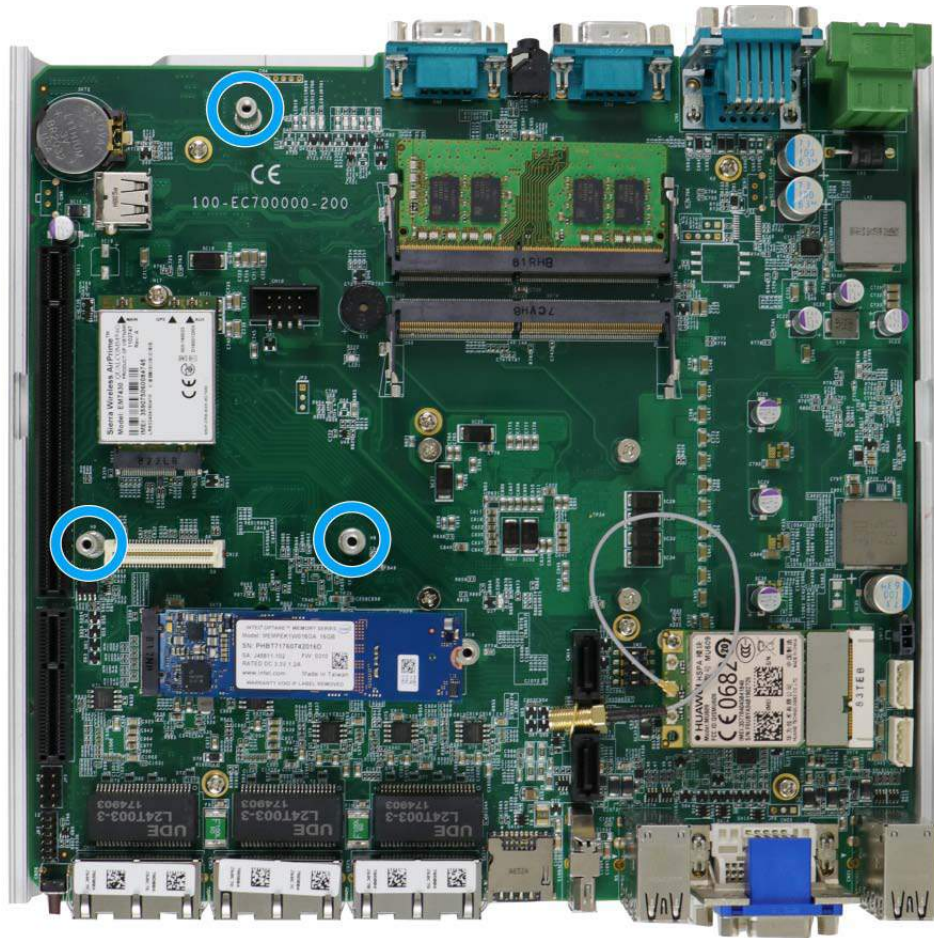


MezIO™ is an innovative interface designed for integrating application-oriented I/O functions into an embedded system. It offers computer signals, power rails and control signals via a high-speed connector. MezIO™ is also mechanically reliable benefited from its 3-point mounted mezzanine structure. A MezIO™ module can leverage these signals to implement comprehensive I/O functions.

The system incorporates MezIO™ interface and universal mechanical design to accommodate Neosys' standard MezIO™ modules. For customers who want to develop their own MezIO™ module, Neosys provides MezIO™ design documents on a NDA basis. Please contact Neosys for further information.

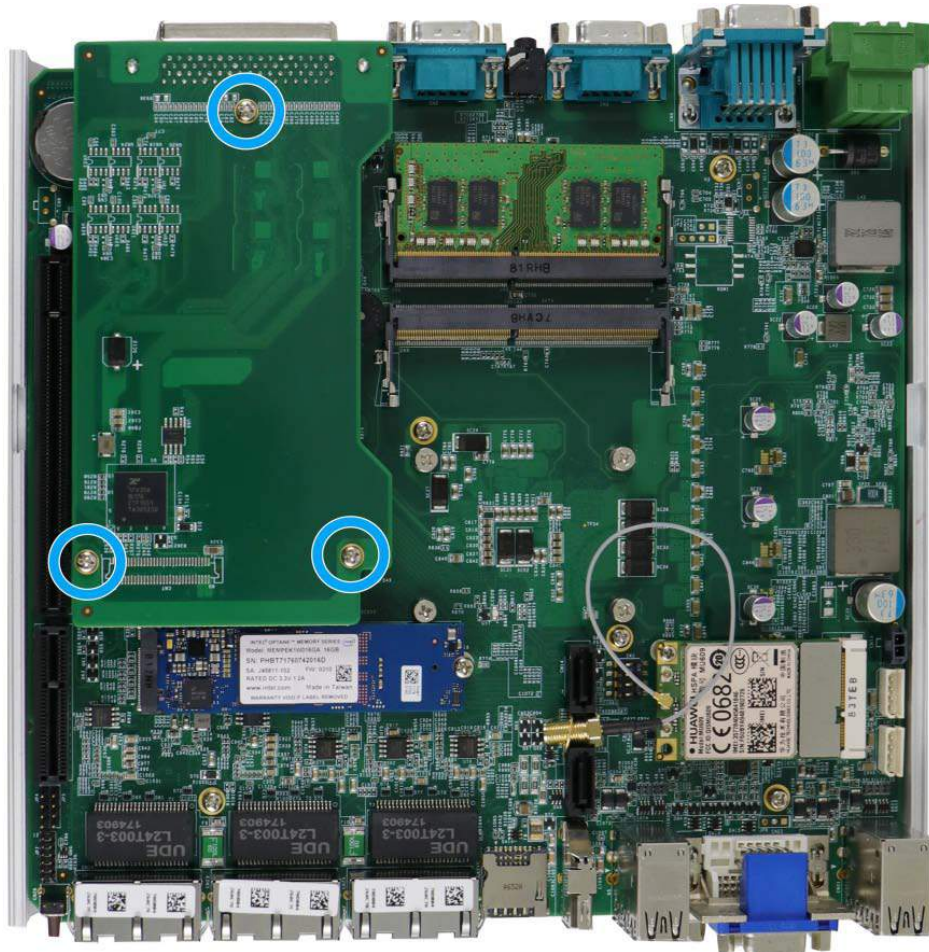
1. Please refer to the section "[Disassembling the System](#)", you may not need to completely dismantle the system to gain access to the MezIO™ interface.

2. The MezIO™ module is secured by the three stand-mounts indicated in the illustration below.





3. Gently lower the MezIO™ module onto the three stand-mounts while matching the MezIO™ interface. Secure the module using three screws supplied.



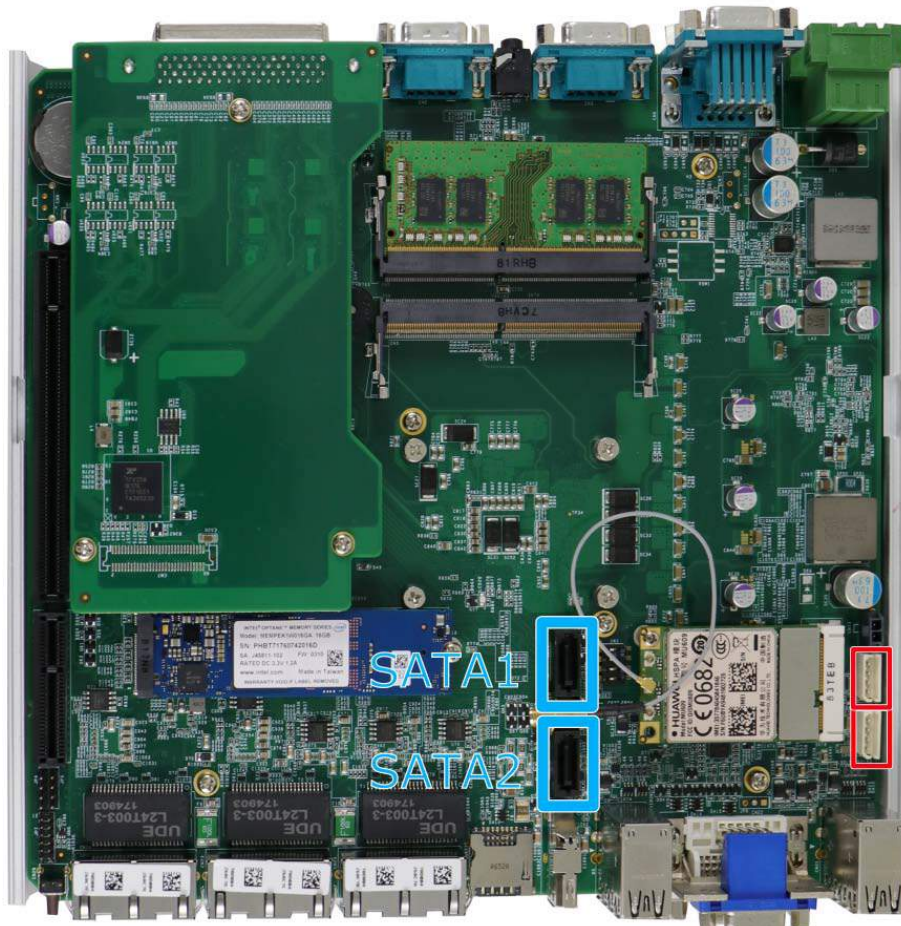
4. [Reinstall the system enclosure](#) and panel when done.
5. If you need to install other components, please refer to respective sections.

### 3.2.7 HDD/ SSD Installation (Nuvo-7000E/ P/ DE Systems)



**NOTE**

*Supports up to 15mm thickness HDD/ SSD.*



The system has two SATA ports (indicated in **blue**) and two four pin power connectors (indicated in **red**). The SATA and power cables should already be connected on the motherboard so users only need to install the HDD/ SSD. Please refer to the following instructions on how to install 2.5" SATA HDD/SSD.

1. Turn the system upside-down and remove the three screws indicated in the illustration below and lift the tray out of the system.



2. Take the HDD/ SSD thermal pad out of the accessory box and place it in the middle of the tray. Remove the protective film covering the HDD/ SSD thermal pad.



3. Place the HDD/ SSD (with labels facing up) and match the SATA connector end to the side with two screw holes (indicated in blue), secure the HDD/ SSD with the supplied flathead screws (4 per drive).



4. At the tray opening, you should be able to locate the 22-pin SATA cable, connect it to the installed HDD/ SSD.



5. Gently put the tray back into the system with the connector side being inserted into the system first and secure the tray with three screws.



**Reinsert the tray**



**Securing the tray**

6. If you need to install other components, please refer to respective sections.

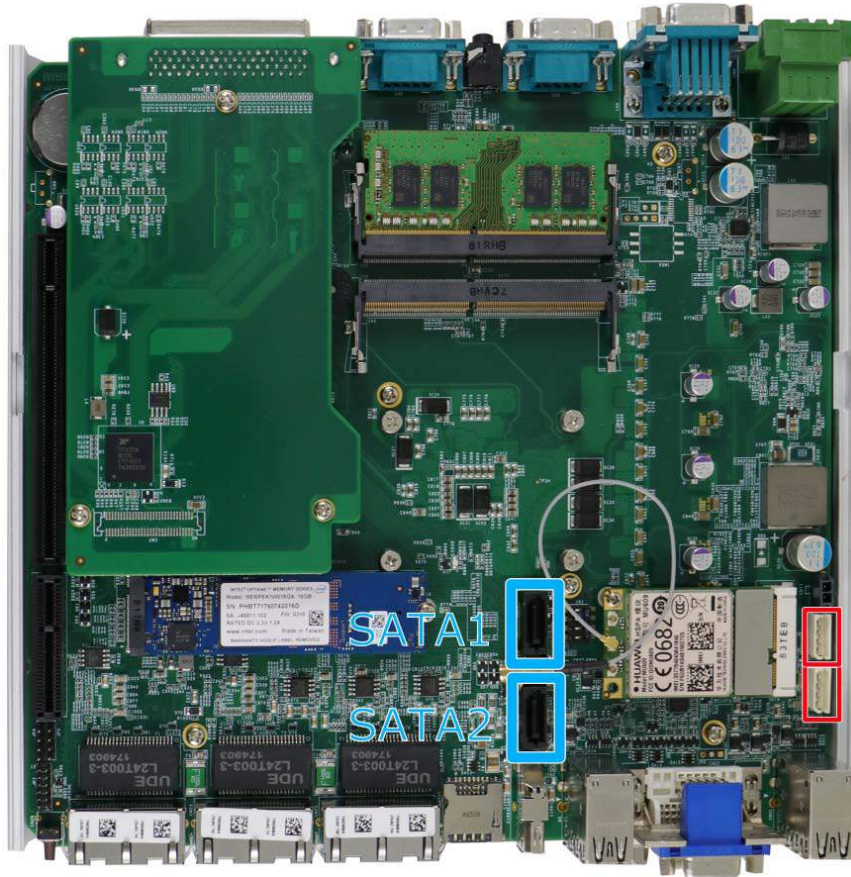


### 3.2.8 HDD/ SSD Installation (Nuvo-7000LP Systems Only)



**NOTE**

*Supports up to 15mm thickness HDD/ SSD.*



The system has two SATA ports (indicated in **blue**) and two four pin power connectors (indicated in **red**). The SATA and power cables should already be connected on the motherboard so users only need to install the HDD/ SSD. A 2.5" SATA HDD/SSD can be installed to the internal tray or the front hot-swappable tray.

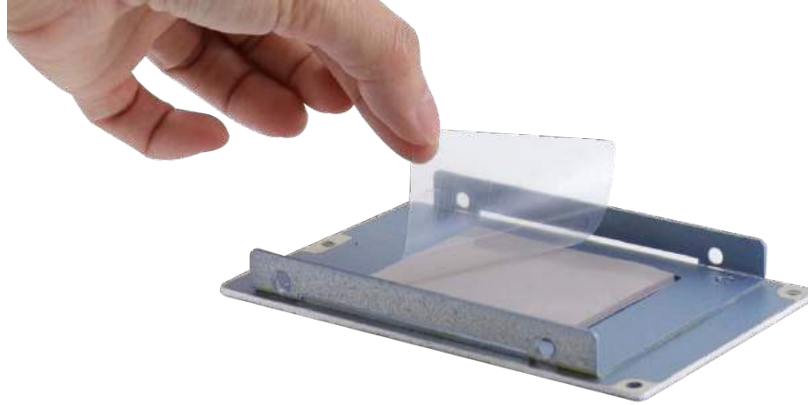
To install a HDD/ SSD to the internal tray please perform the following procedure:

1. Please turn the system upside-down and remove the screws indicated.





2. Take the HDD/ SSD thermal pad out of the accessory box.
3. Take the tray out of the system, place the thermal pad in the middle and remove the protective film covering the thermal pad.



4. Place the HDD/ SSD onto the tray with the label side facing upward and the SATA connector facing the side with two screw holes (indicated in **red**). Secure the SSD/ HDD with flathead screws (indicated in **blue**).



5. Insert the connector end first, of the installed HDD/ SSD and tray into the system.



6. Secure using the three screws that were removed earlier.



### 3.2.9 HDD/ SSD Installation to Hot Swappable Tray (Nuvo-700LP Systems Only)

 **NOTE**

*Supports up to 9.5mm thickness HDD/ SSD.*

The system features a 2.5" external hot-swappable HDD/ SSD slot. It coincides with the internal drive and can be configured into RAID 0 or 1 storage. To install HDD/ SSD into the 2.5" external hot-swappable slot, please refer to the following procedure:

1. Pull the handle on the 2.5" external hot-swappable slot to open it.



**Pull handle**



**Open slot door**

2. With the label side facing upward, insert the SATA connector side of the 2.5" HDD/ SSD into the slot first. You may feel resistance when the SATA connectors meet, push it firmly until the 2.5" HDD/ SSD is fully inserted into the slot.



3. Push the handle into the 2.5" slot until it snaps into position. A key is provided (in accessory box) to lock the external slot.



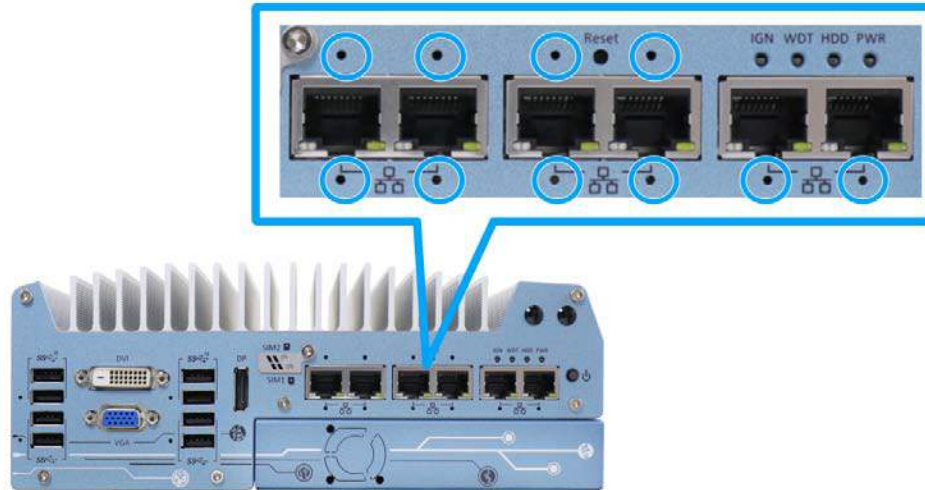
**Key in accessory box**



**2.5" HDD/ SSD slot lock**

### 3.2.10 Ethernet/ PoE+ Port Panel Screw Fix

The system's RJ45 Ethernet ports have panel screw fix holes (indicated in blue circles) to secure the cable connection.



1. To install and make use to the panel screw fix connection, you must acquire panel screw fix cables such as the cable shown below.



2. Simply insert the RJ45 connector into the RJ45 port and secure the top and bottom screws using your fingers or a screw driver.



#### NOTE

Ports 5 and 6 have only the bottom panel screw fix hole.

### 3.2.11 PCIe/ PCI Card Installation into Cassette Module (Nuvo-7000E/ P/ DE Only)



**NOTE**

*Nuvo-7000E/ P and Nuvo-7000DE systems' Cassette module share the exact same screw locations and removal procedure, therefore a Nuvo-7000E/ P will be used for demonstration.*



The Cassette module provides a separated compartment to accommodate add-on card(s). It compartmentalizes the heat generated and effectively manages thermal conditions of both the system and add-on card(s). The modular design reduces the complexity of installing and replacing add-on card(s) in the fanless controller. In addition, the mechanical design creates a sealed wind tunnel to bring in cold air and expels hot air via a system fan to offer the system extreme stability and reliability.

To install a PCIe/ PCI card into the Cassette module, please refer to the following procedure:

1. Turn the system upside-down and remove the four screws.





2. Gently wiggle the Cassette module and separate it from the system enclosure.



3. Remove the screw to open the Cassette cover.



- Remove the bezel cover (indicated in **blue circle**) and insert the card into the PCIe/PCI slot while making sure the bezel is properly inserted into the notch and the card is secured in place with screw.



**Remove bezel cover**



**Make sure the card is inserted into the notch and secured with a screw**



**Nuvo-7000DE systems have two PCIe slots in the Cassette module**



**Make sure both cards are inserted into their notches and secured with screws.**



- Secure the screw indicated in the **blue circle**.

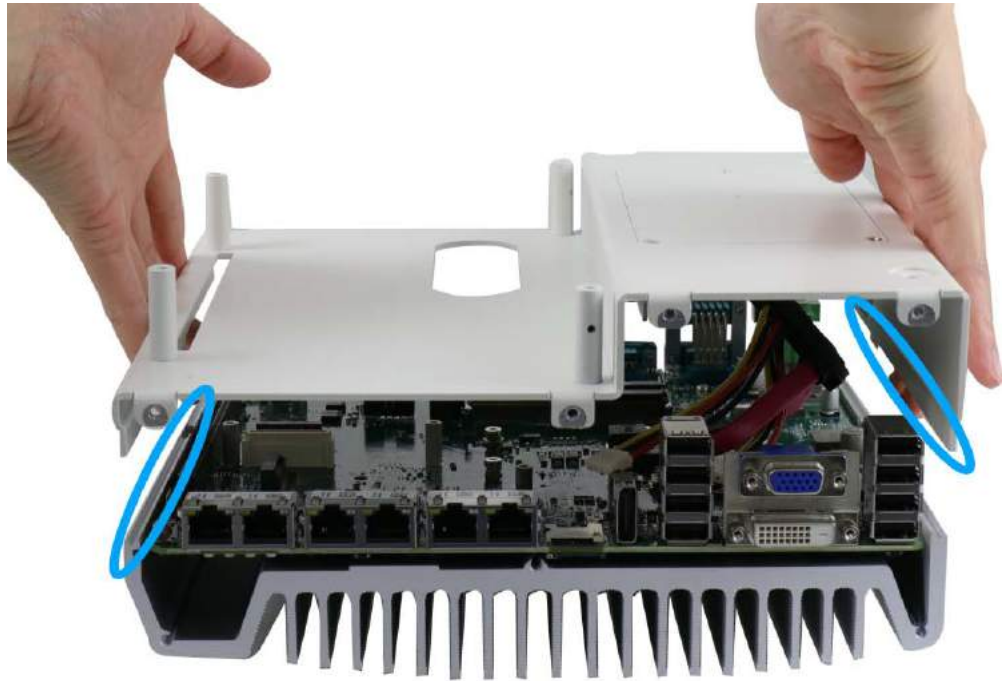


- Gently lower the Cassette module back onto the system enclosure and secure the module onto the system enclosure by securing the following screws.

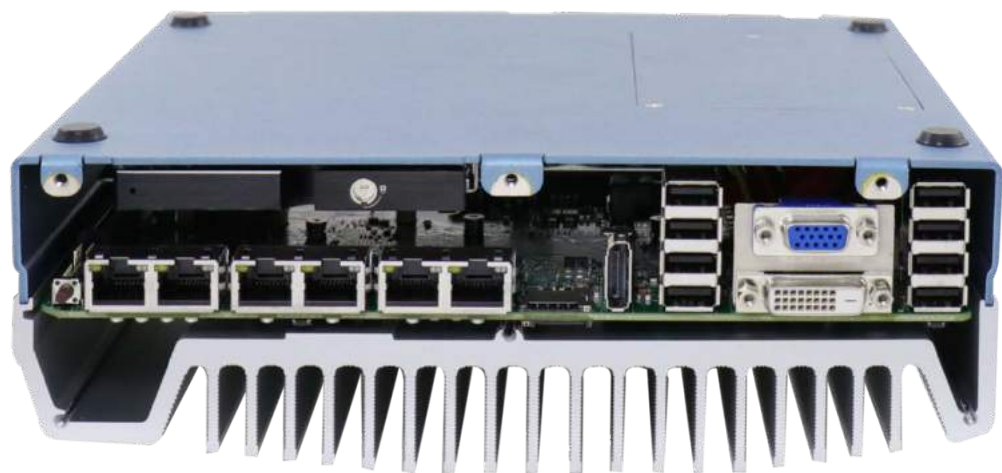
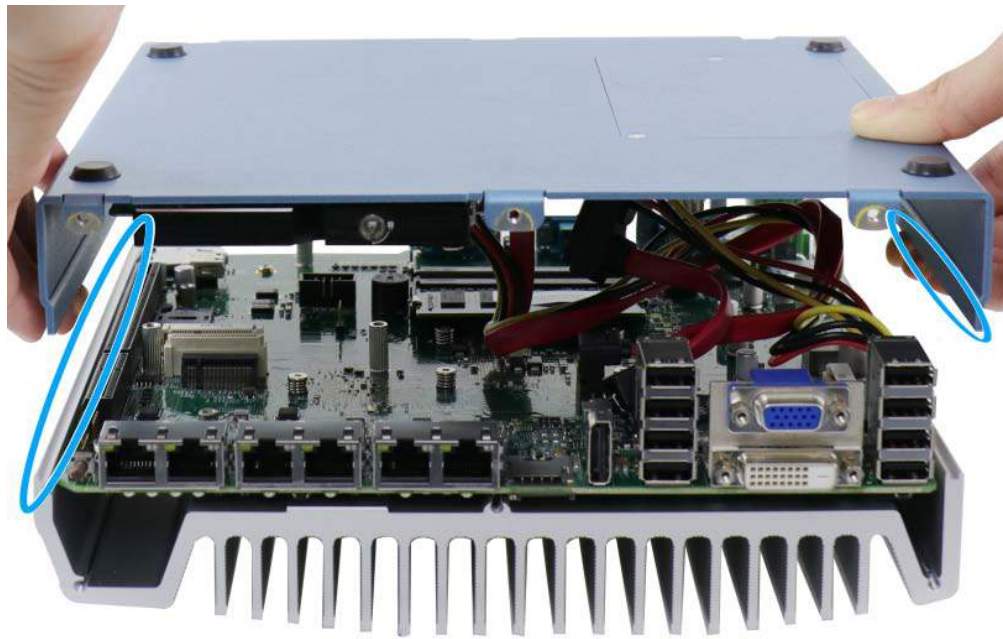


### 3.3 Installing the System Enclosure

1. To reinstall the system enclosure, place the bottom panel on top of the motherboard while making sure both sides are inserted into the heatsink (indicated in **blue**).



**Nuvo-7000E/ P/ DE systems**



### Nuvo-7000LP systems



#### NOTE

*For Nuvo-7000LP systems, please connect the 22-pin SATA cable connected to the 2.5" hot swappable tray before installing the bottom panel.*

2. Install the front panel and secure screws indicated in **blue**.



**Nuvo-7000E/ P/ DE systems**



**Nuvo-7000LP systems**



3. Install the rear panel and secure screws indicated in **blue**.



**Nuvo-7000E/ P/ DE systems**



**Nuvo-7000LP systems**

4. Install the Cassette module and secure screws indicated in **blue**.



**NOTE**

*Not applicable to Nuvo-7000LP systems.*





### 3.4 Wall Mount Bracket/ DIN-rail Installation

Nuvo-7000 series ships with dedicated wall mount and DIN-rail (optional).



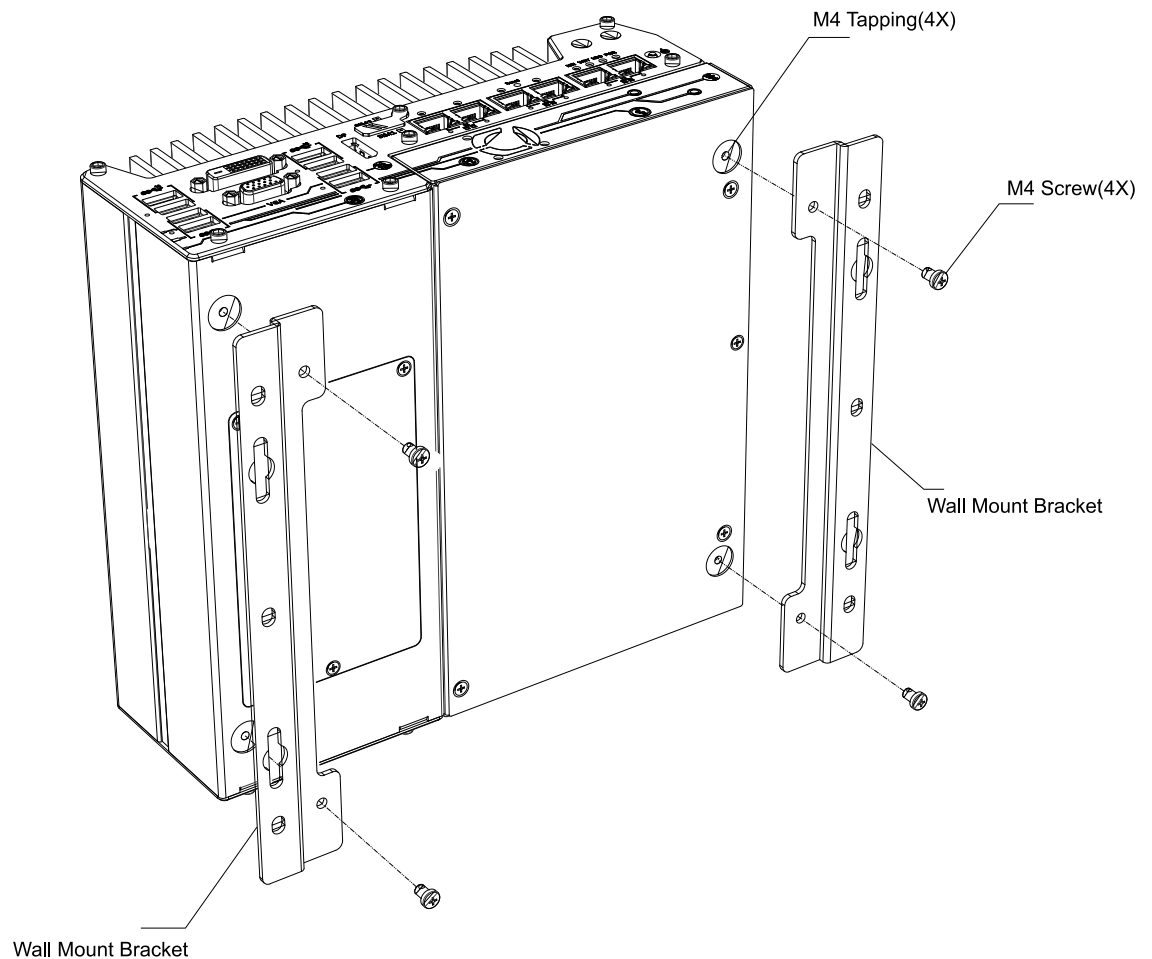
**NOTE**

*You will need to remove the four (4) rubber stands at the bottom of the enclosure if they have been attached.*

#### 3.4.1 Wall Mount Bracket Installation

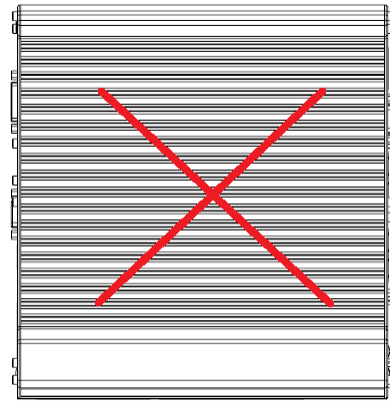
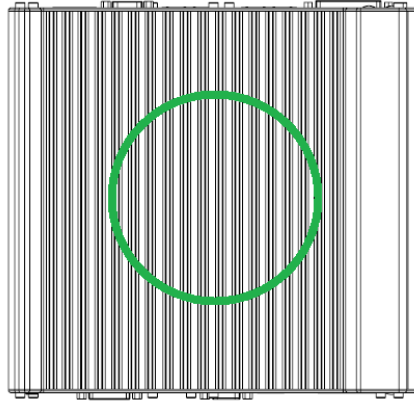
To install the system as a wall mount device, please refer to the following instructions.

1. Take out the two wall mount brackets and four (4) M4 screws out of the accessory box. Fix the wall mount brackets to the system enclosure using M4 screws.



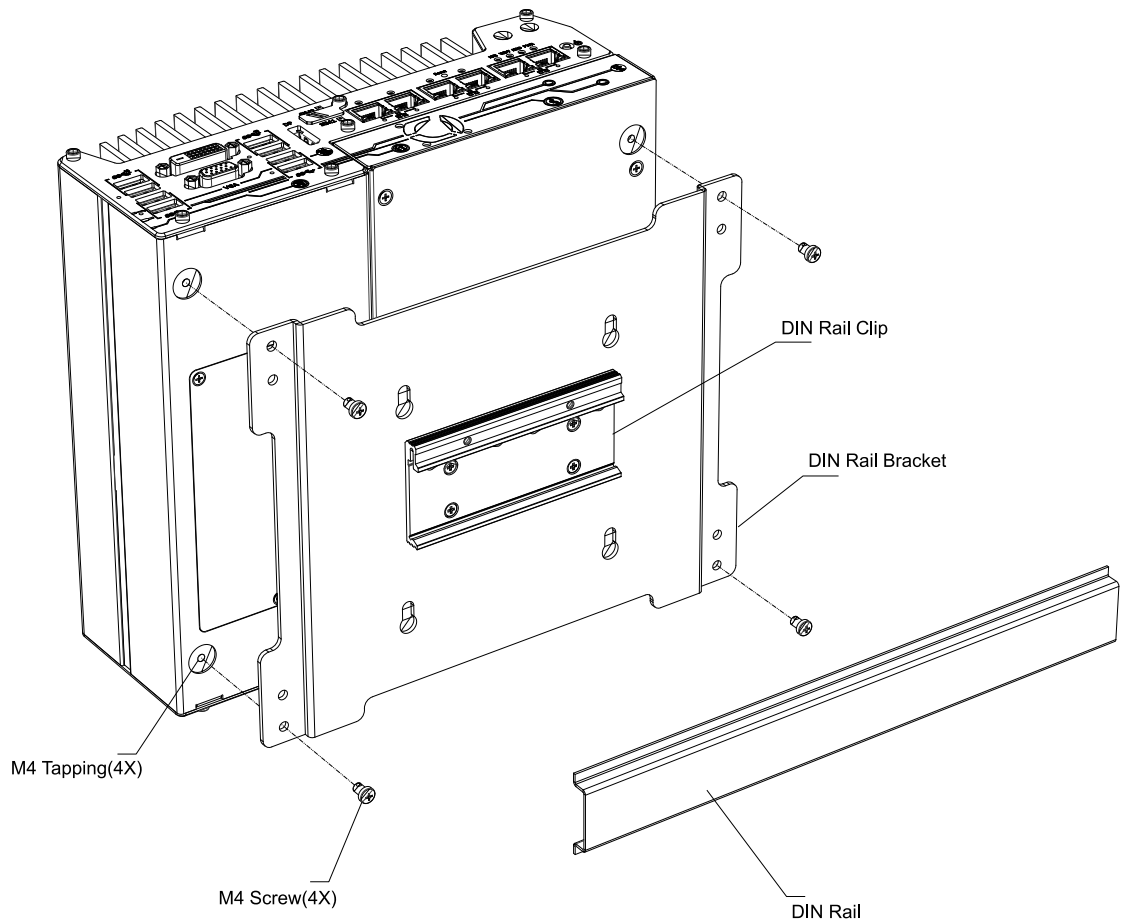
2. Place the system on a flat surface portion of the wall and secure it with four (4) M4 pan screws.

3. when wall mounting, place the heatsink fins perpendicular to the ground for better heat dissipation efficiency.



### 3.4.2 DIN-rail Installation (Optional)

The system also comes with an optional DIN-rail mounting kit. The kit includes a bracket and a DIN-rail mounting clip. By fixing the clip to the bracket using four M4 flat-head screws and fixing the bracket assembly to the system four M4 screws, complete the installation by clipping the system onto the DIN rail. This option may be useful if you want to deploy it inside an equipment cabinet where DIN rail is available.



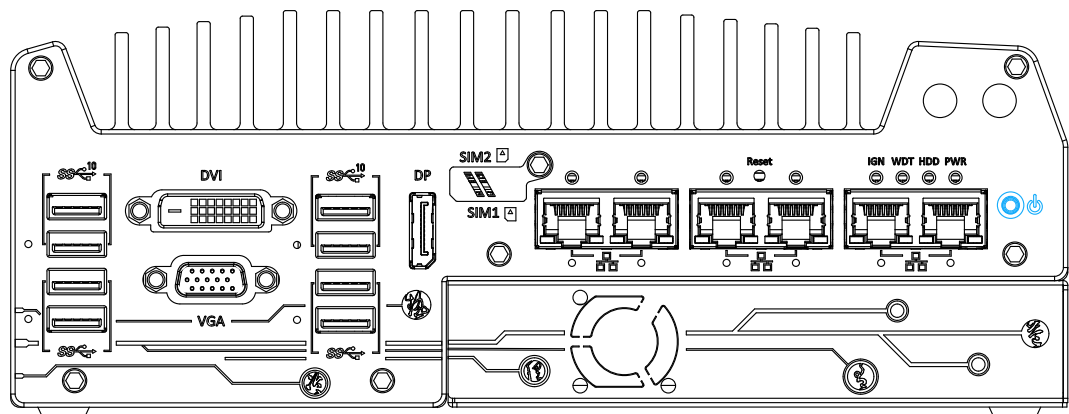
## 3.5 Powering On the System

There are three methods to power on the system

- Pressing the power button
- Using an external non-latched switch by connecting to the remote on/ off plug
- Sending a LAN packet via Ethernet (Wake-on-LAN)

### 3.5.1 Powering On Using the Power Button

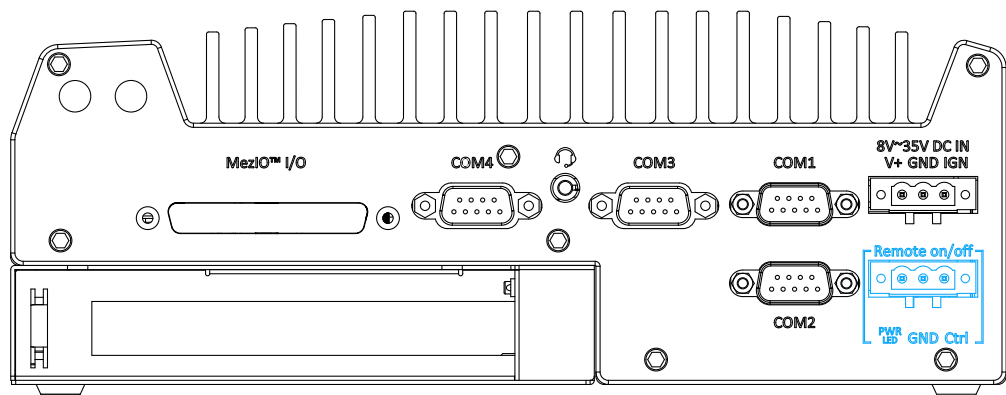
This is the simplest way to turn on your system. The power button on the front panel is a non-latched switch and behaves as the ATX-mode on/off control. With DC power connected, pushing the power button will turn on the system and the PWR LED indicator will light up. Pushing the button when system is on will turn off the system. If your operating system supports ATX power mode (i.e. Microsoft Windows or Linux), pushing the power button while the system is in operation will result in a pre-defined system behavior, such as shutdown or hibernation.



### 3.5.2 Powering On Using External Non-latched Switch

If your application demands the system to be placed inside a cabinet, you may use an external non-latched switch to power on/ off the system. The system provides a 3-pin “Remote On/ Off” plug for connecting a non-latched switch and acts as the ATX-mode power on/off control switch. The external non-latched switch acts exactly the same as the power button on the front panel. To setup and power on/ off the system using an external non-latched switch (ATX-mode), please follow the steps described below.

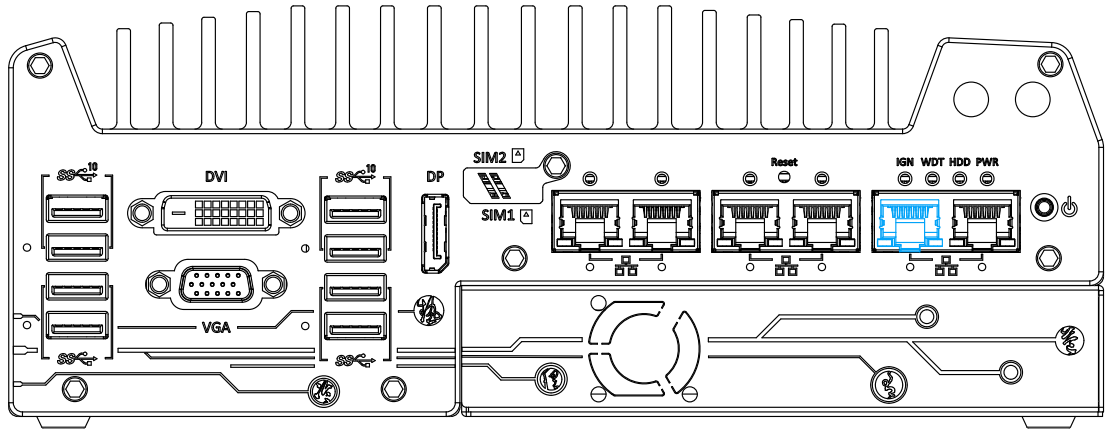
1. Acquire a non-latched switch with 3-pin plug.
2. Connect the non-latched switch to the Remote On/ Off plug.




3. With DC power connected, pushing the power button will turn on the system and the PWR LED indicator will light up. Pushing the button when system is on will turn off the system. If your operating system supports ATX power mode (i.e. Microsoft Windows or Linux), pushing the power button while the system is in operation will result in a pre-defined system behavior, such as shutdown or hibernation.

### 3.5.3 Powering On Using Wake-on-LAN

Wake-on-LAN (WOL) is a mechanism to wake up a computer system from a S5 (system off with standby power) state via issuing a magic packet. The system's Wake-on-LAN compatible GbE port is shown below.



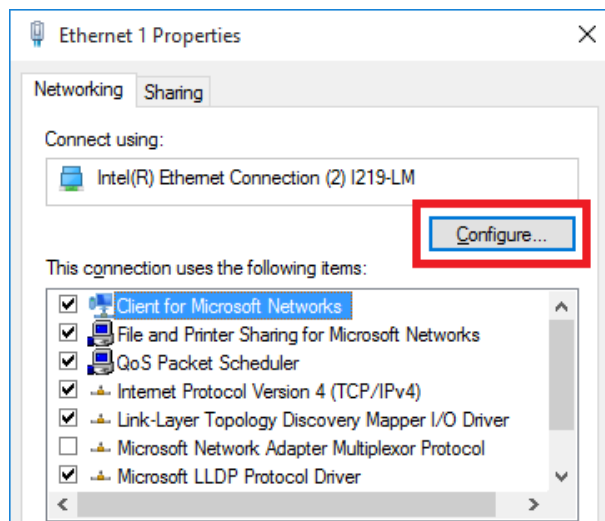
 **NOTE**

*Please make sure the Intel® chipset and Ethernet driver has been properly installed prior to setting up WOL function.*

To enable WOL function, please set up WOL settings in the BIOS and in the operating system by follow the steps described below.

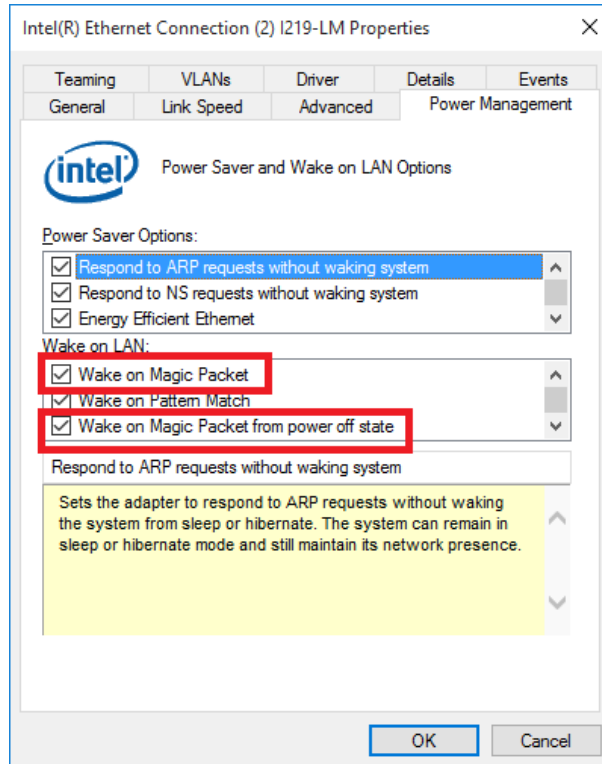
1. When the system boots up, press F2 to enter BIOS setup utility.
2. Go to the **[Power]>[Wake On LAN]** and set it to **[Enabled]**.
3. Press F10 to **“Save changes and exit BIOS”** and allow the system boot into the operating system.

4. Once booted into the Windows system, press **“Windows key + E”**, right-click on **“Network>Properties>Change adapter settings”**. Locate and double-click on the adapter Intel® I219 Gigabit Network Connection, click on **Configure...**





- Click on the **Power Management** tab and check the following options. Click on OK when done.



### Magic Packet

The magic packet is a broadcast frame containing anywhere within its payload 6 bytes of all 255 (FF FFFFFFFF in hexadecimal), followed by sixteen repetitions of the target computer's 48-bit MAC address.

For example, NIC's 48-bit MAC Address is 78h D0h 04h 0Ah 0Bh 0Ch

DESTINATION SOURCE MISC

FF FFFFFFFF

78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C

78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C

78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C

78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C

78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C

78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C

78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C

78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C

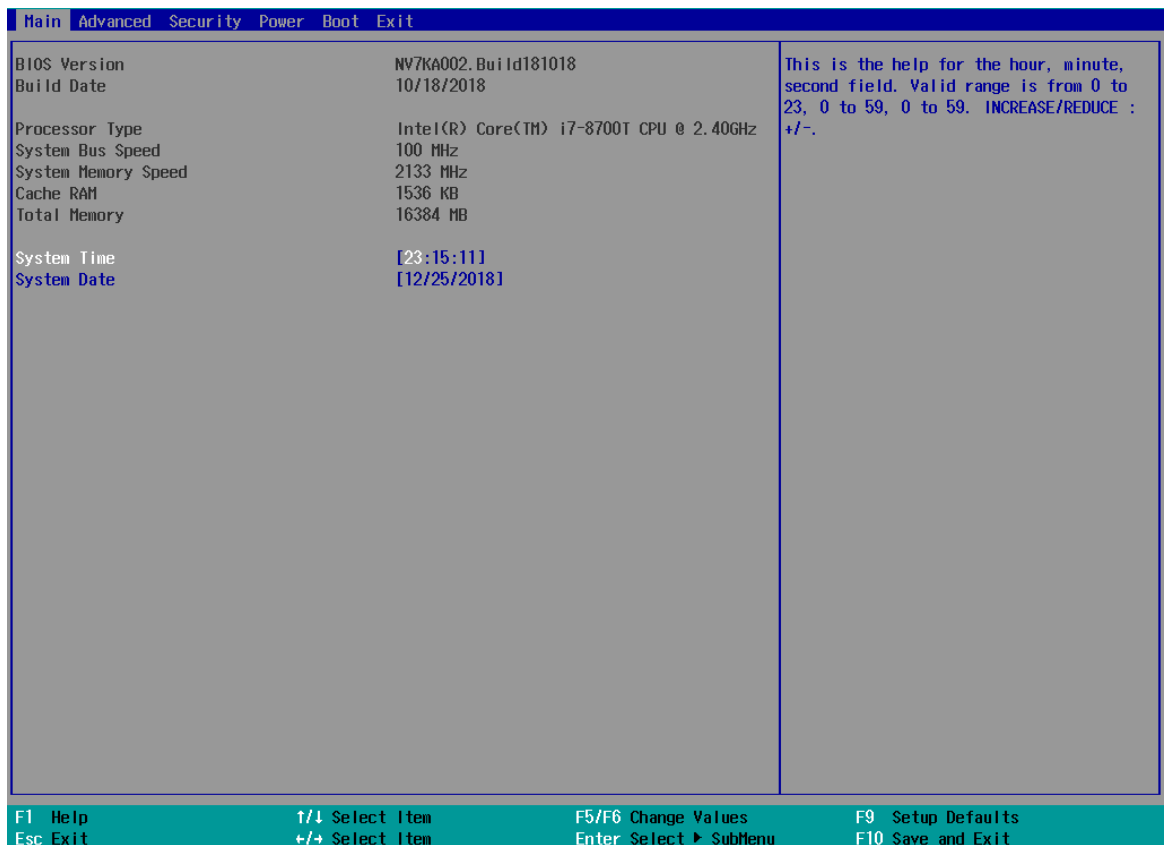
MISC    CRC


There are some free tools available on Internet that can be used to send a magic packet. Please refer to the following link to understand more about [Magic Packet](#).

# 4 System Configuration

## 4.1 BIOS Settings

The system is shipped with factory-default BIOS settings meticulously programmed for optimum performance and compatibility. In this section, we'll illustrate some of BIOS settings you may need to modify. Please always make sure you understand the effect of change before you proceed with any modification. If you are unsure of the function you are changing, it is recommended to change one setting at a time to see its effect(s).

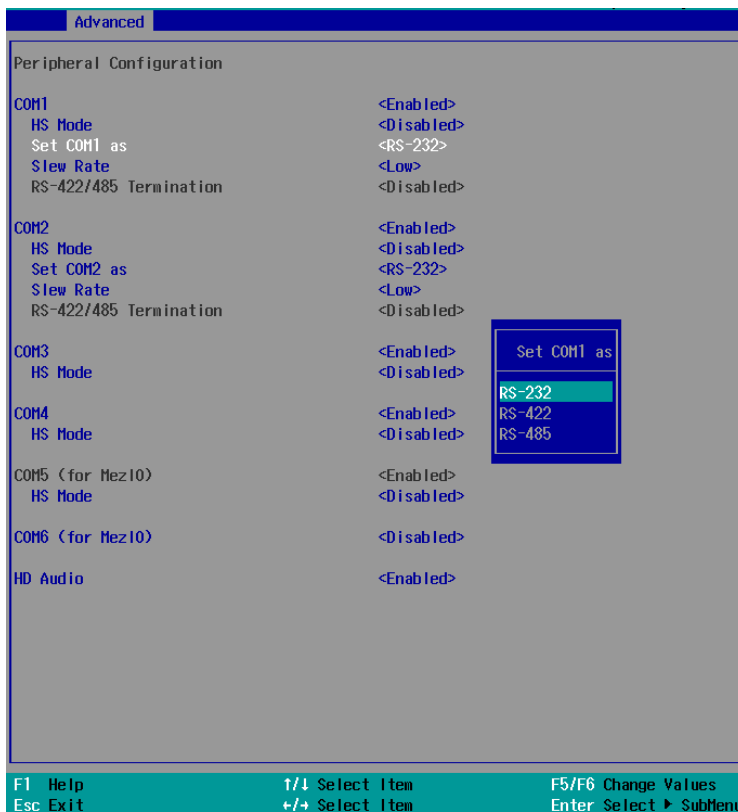


 **NOTE**

*Not all BIOS settings will be discussed in this section. If a particular setting/ function you are after requires specific BIOS settings but is not discussed in this section, please contact Neousys Technical Support staff.*

### 4.1.1 COM Port Configuration

The system's [COM1/COM2](#) ports support RS-232 (full-duplex), RS-422 (full-duplex) and RS-485 (half-duplex) mode. You can set the COM1 operating mode via BIOS settings. Another option in BIOS called "Slew Rate" defines how sharp the rising/falling edge is for the output signal of COM1. For long-distance RS-422/485 transmission, you may set the "Slew Rate" option as "High" to improve signal quality. For RS-422/485 communication, the "RS-422/485 Termination" option determines whether to enable/disable internal termination of RS-422/485 transceiver according to your wiring configuration (e.g. with or without external termination).



#### To set COM port operating mode:

1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Advanced] > [Peripheral Configuration]**.
3. Set the **[Set COM1 Mode as]** option to the desired mode.
4. Once set, press **F10** to save setting and exit.

### 4.1.2 COM Port High Speed Mode

The high speed mode of each COM port effectively allows for the port's baud rate generator to operate at 8x the speed with an effective baud rate of 921,600 bps (115,200 x 8). Please refer to the following instructions on how to enable the high speed mode for your COM port (COM1 used as an example).

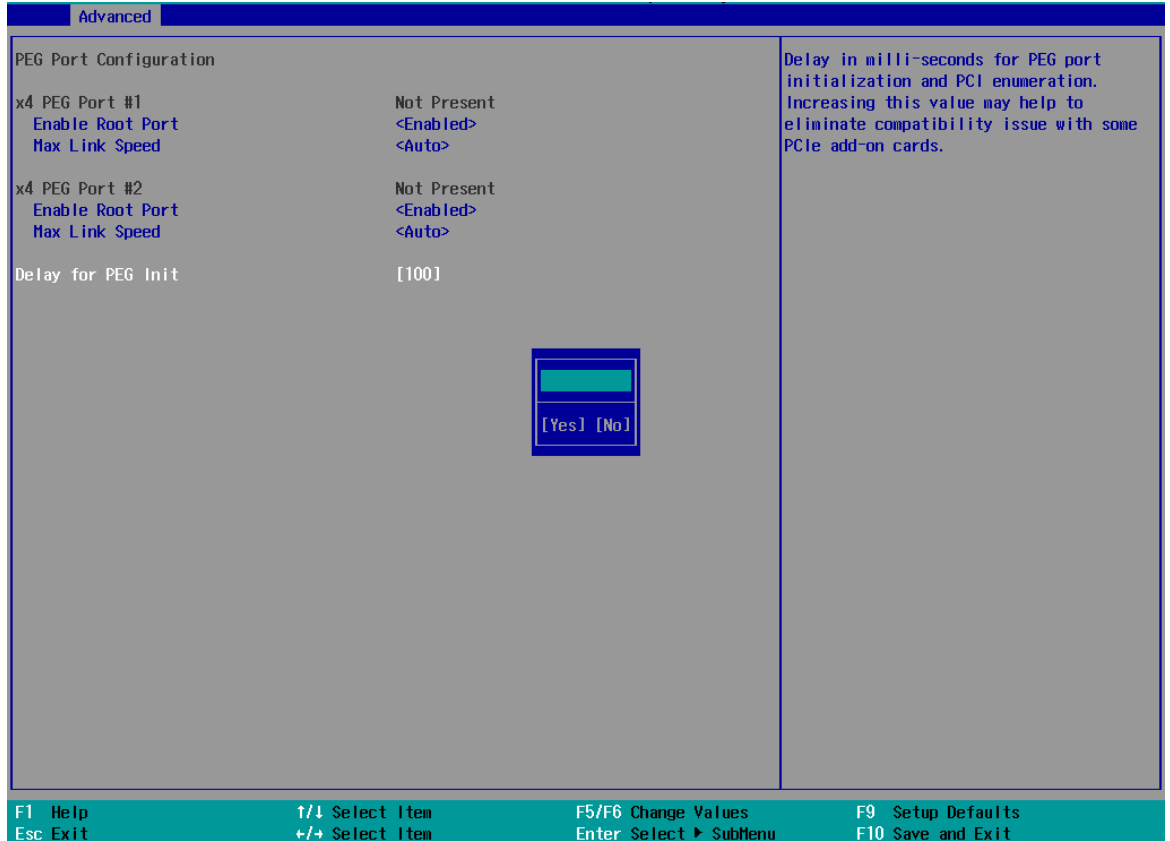


#### To set COM port high speed mode:

1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Advanced] > [Peripheral Configuration]**.
3. Enable or set the **[Set COM1 Mode as]** option to the desired mode.
4. Highlight **[HS Mode]** and press ENTER to bring up options, highlight **[Enable]** and press ENTER.
5. Once set, press **F10** to save setting and exit.

### 4.1.3 Delay for PEG Initialization

This setting offers delay in milliseconds for PEG port initialization and PCI enumeration. By increasing the delay value, it may eliminate compatibility issue(s) with some PCIe add-on cards.

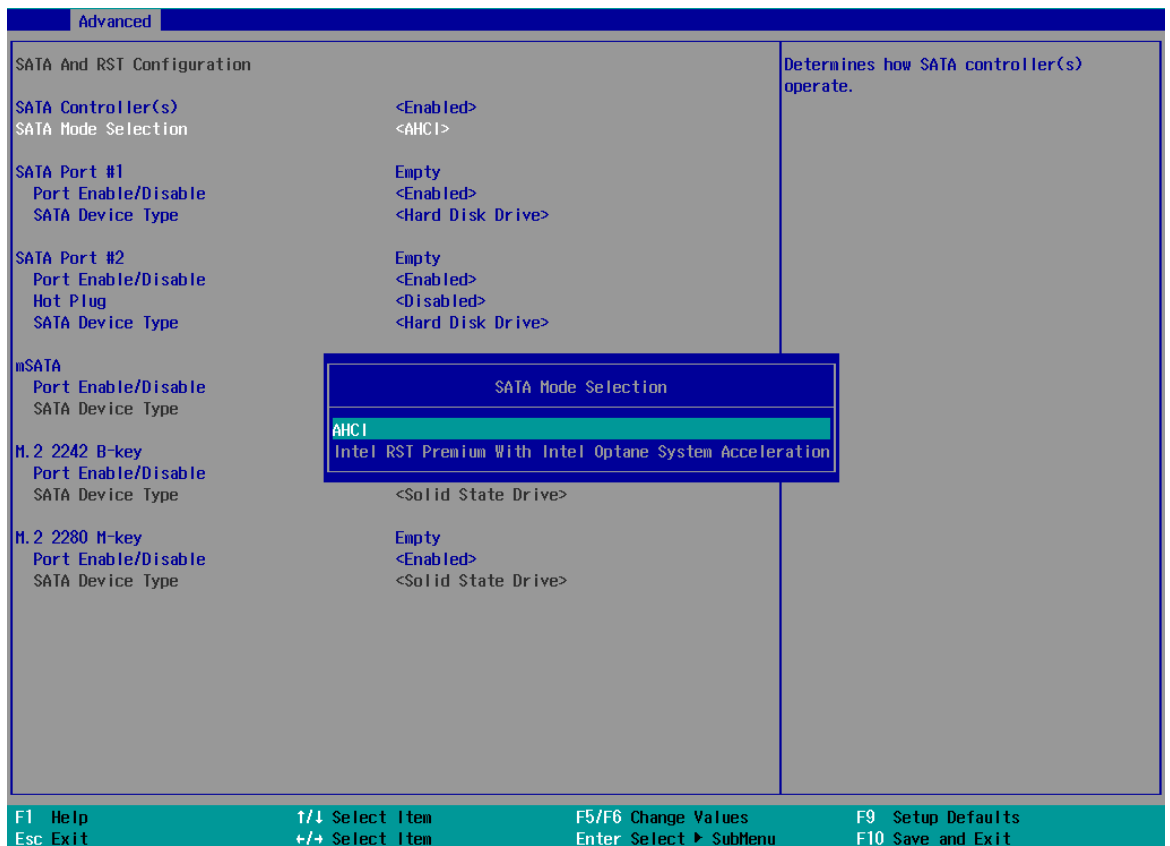


#### To set PEG delay in milliseconds:

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced] > [System Agent (SA) Configuration] > [PEG Port Configuration] > [Delay for PEG Init]** and press ENTER.
3. A small window appears and you may enter a maximum delay value of up to 30,000ms.
4. When done, press F10 to “Exit Saving Changes”

#### 4.1.4 SATA Configuration

The SATA controller of your system supports two (2) operating modes: **AHCI** and **Intel RST Premium With Intel Optane System Acceleration mode**. The **AHCI** mode, which exposes SATA's advanced capabilities such as hot swapping and native command queuing, is supported in several later version of operating systems. The **Intel RST Premium With Intel Optane System Acceleration** mode allows the user to greatly accelerate SATA hard drive read/ write speeds by installing an Optane memory into the M.2 slot. Please refer to the section “**Intel RST Premium With Intel Optane System Acceleration**” for details.



#### Recommended SATA controller mode settings:

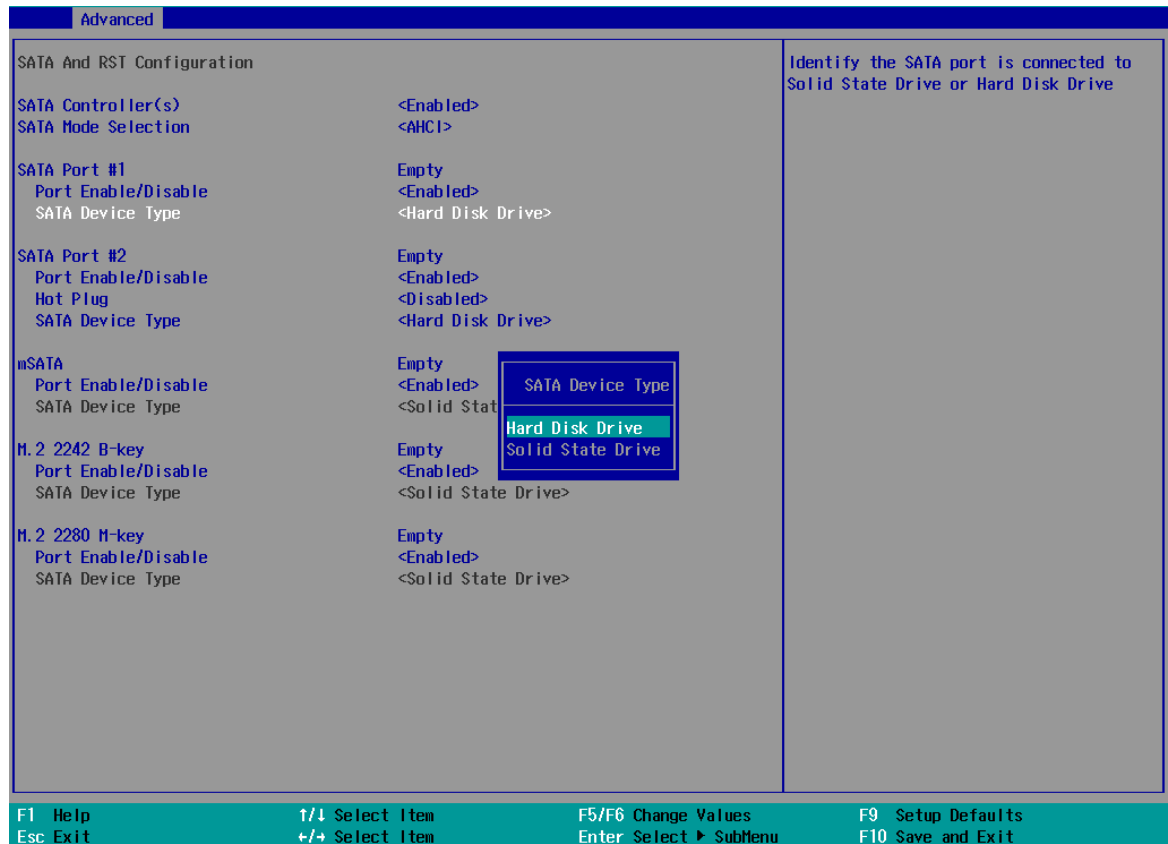
- If you're using Windows 10 or Linux with kernel 4.15.18 or later, you can select **AHCI** mode for better performance.
- If you are looking for faster hard drive read/ write performance, please install an SSD (M.2, mPCIe, SATA) or install an Intel Optane memory for hard drive acceleration.

#### To set SATA controller mode:

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced] > [SATA And RST Configuration]**.



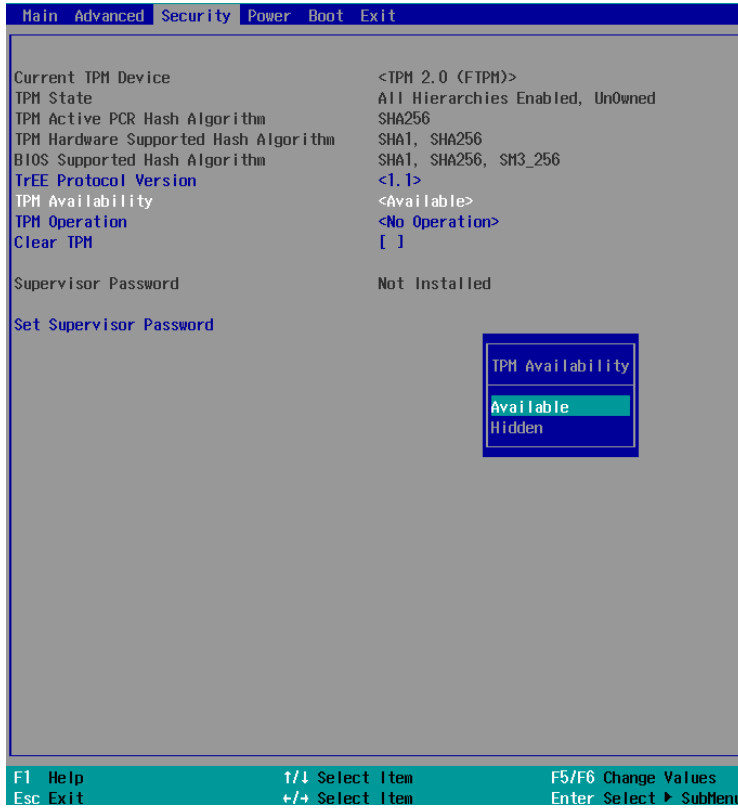
- Highlight the SATA, mSATA or M.2 port you wish to set and press ENTER to bring up setting options. Scroll to and highlight the setting you wish to set and press ENTER.



- Repeat step 3 to set other SATA ports.
- Press F10 to "Exit Saving Changes".

### 4.1.5 TPM Availability

Trusted Platform Module (TPM) is a hardware-based cryptoprocessor to secure hardware by integrating cryptographic keys into devices. The system is designed with on-board TPM 2.0 module. As TPM 2.0 requires 64-bit Windows 10 with UEFI boot mode, it is enabled in BIOS by default.



**To enable TMP availability:**

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Security] > [TPM Availability]**, press ENTER to bring up Options, Available/Hidden.
3. Highlight your selection, press Enter and press F10 to “Exit Saving Changes”.

### 4.1.6 Auto Wake on S5

When the system is set to operate in S5 state, the user can specify a time to turn on the system, daily or monthly.

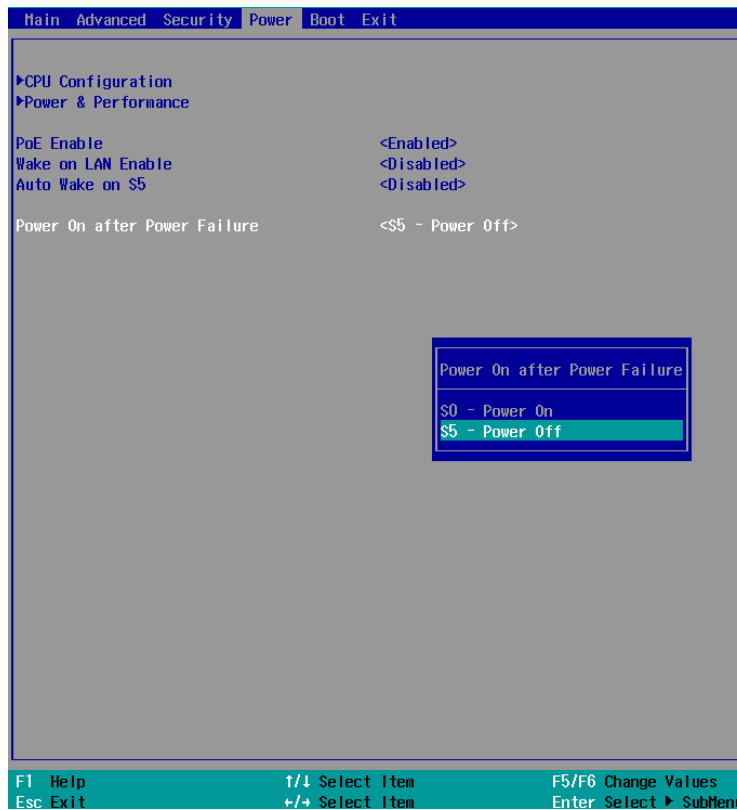


| Value           | Option          | Description  |
|-----------------|-----------------|--|
| Auto Wake on S5 | Disabled        | The system does not turn on when operating in state S5.                              |
|                 | By Every Day    | The system turns on each day when operating in state S5. Specify the time of day.    |
|                 | By Day of Month | The system turns on each month when operating in state S5. Specify the day and time. |

Highlight your selection, press ENTER and press F10 to “Exit Saving Changes”.

### 4.1.7 Power On After Power Failure Option

This option defines the behavior of System series when DC power is supplied.



| Value          | Description  |
|----------------|--|
| S0 – Power On  | System is powered on when DC power is supplied.        |
| S5 – Power Off | System is kept in off state when DC power is supplied. |

To set “Power On after Power Failure” option:

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power] > [Power On after Power Failure]**.
3. Scroll down to highlight **[Power On after Power Failure]**, press ENTER to bring up setting options, S0 – Power On or S5 – Power Off, and press ENTER to select the setting.
4. Press F10 to “Exit Saving Changes”.

#### 4.1.8 Power & Performance (CPU SKU Power Configuration)

The system supports various 8th/ 9th Gen Coffee Lake LGA1151 CPUs. A unique feature, “**SKU Power Config**” is implemented in BIOS to allow users to specific user-defined SKU power limit. Although the system is designed to have best thermal performance with CPUs of 35W TDP, you can install a 65W CPU and limit its SKU power (to 35W) to obtain more computing power. This feature gives you the flexibility of CPU selection and great balance between computing power and operating temperature range.

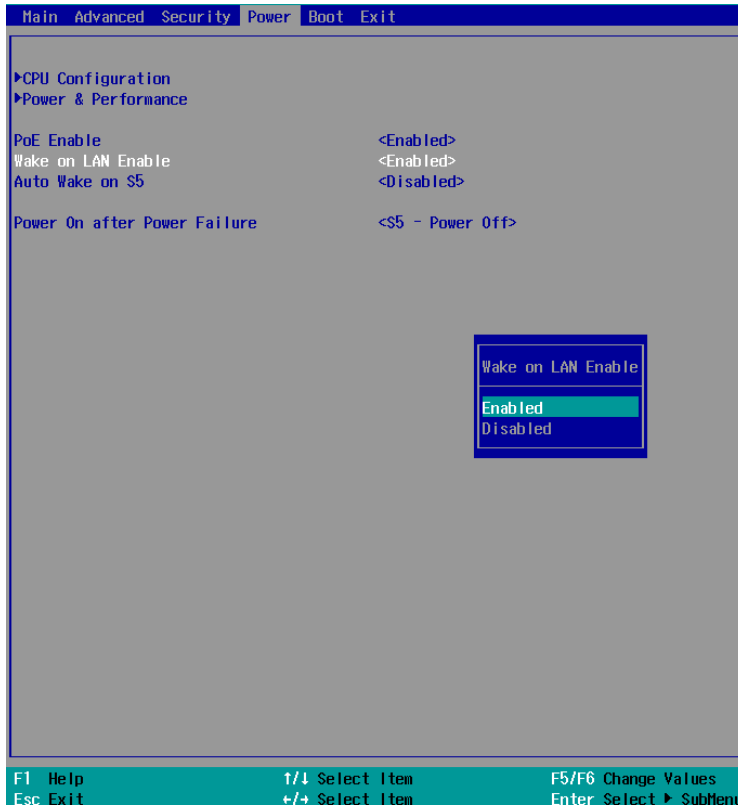


To configure the CPU SKU power limit:

1. When the system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power]** → **[Power & Performance]**.
3. Select a proper value of SKU power limit for **[SKU Power Config]** option.
4. Press F10 to “Exit Saving Changes”.

### 4.1.9 Wake on LAN Option

Wake-on-LAN (WOL) is a mechanism which allows you to turn on your System series via Ethernet connection. To utilize Wake-on-LAN function, you have to enable this option first in BIOS settings. Please refer "[Powering On Using Wake-on-LAN](#)" to set up the system.



To enable/ disable “Wake on LAN” option:

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power] > [Wake on LAN]**.
3. Press ENTER to bring up setting options, scroll to the setting you desire and press Enter to set.
4. Press F10 to “Exit Saving Changes.”



### 4.1.10 Boot Menu

The Boot menu in BIOS allows you to specify the system’s boot characteristics by setting bootable device components (boot media) and method. Or, you may press F12 upon system start up and select a device you wish boot from.

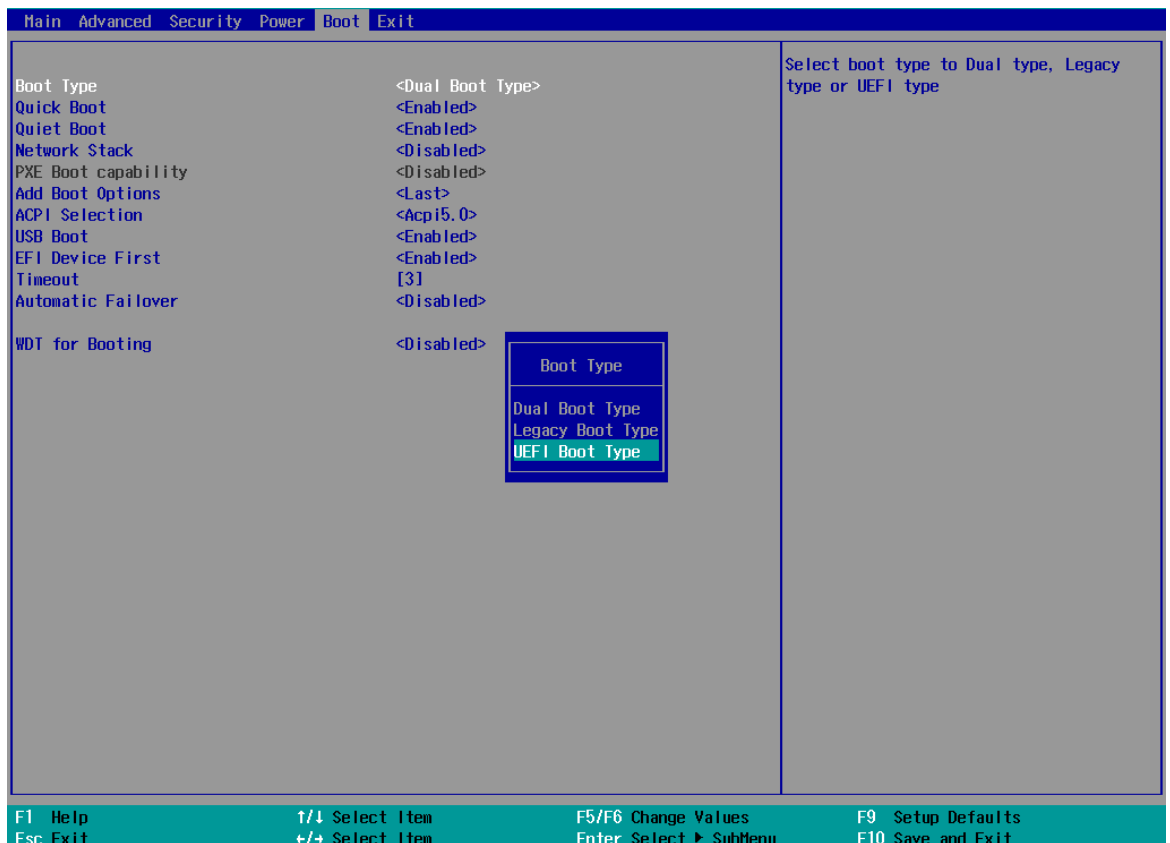



| Value                     | Option           | Description  |
|---------------------------|------------------|--|
| <a href="#">Boot Type</a> | Dual Boot Type   | Both legacy and EFI boot media listed are approved as boot media.                      |
|                           | Legacy Boot Type | Only legacy boot media listed are approved as boot media.                              |
|                           | UEFI Boot Type   | Only UEFI boot media listed are approved as boot media.                                |
| Quick Boot                | Enabled          | The system starts up faster because BIOS skips various hardware function tests         |
|                           | Disabled         | The system starts up slower because BIOS goes through various hardware functions tests |
| Network Stack             | Enabled          | The system is available for network access using UEFI.                                 |
|                           | Disabled         | The system is not available for network access using UEFI.                             |

|                                 |                                 |   |
|---------------------------------|---------------------------------|---|
| PXE Boot capability             | Disabled                        | Only UEFI Network Stack is supported: Preboot eXecution Environment (PXE) is not supported                |
|                                 | Enabled                         | By enabling the PXE boot, one can choose to boot via <b>I219 Only/ I210 Only</b> or <b>All NICs</b> .     |
| Add Boot Options                | First                           | Newly detected boot media are placed at the top of the boot order.  |
|                                 | Last                            | Newly detected boot media are placed at the bottom of the boot order.                                     |
| ACPI Selection                  | 1.0B/ 3.0/ 4.0/ 5.0/ 6.0        | Advanced Configuration and Power Interface allows the operating system to control system power management |
| USB Boot                        | Enabled                         | Allow boot from bootable USB devices.   |
|                                 | Disabled                        | Does not allow boot from bootable USB devices   |
| EFI Device First                | Enabled                         | Set to boot bootable EFI media first.   |
|                                 | Disabled                        | Will not boot bootable EFI media first.   |
| Timeout                         | 1, 2, 3, etc (in seconds)       | Boot delay time in seconds to give the user time to activate the hotkey to access the BIOS                |
| Automatic Failover              | Enabled                         | Automatically checks for the next bootable device when the set default device fails.                      |
|                                 | Disabled                        | Will only boot from the designated device.  |
| <a href="#">WDT for booting</a> | Disabled, 1, 3, 5, 10 (minutes) | WDT ensures a successful system boot by specifying a timeout value  |

### 4.1.11 Boot Type (Legacy/ UEFI)

The system supports both Legacy and Unified Extensible Firmware Interface (UEFI) boot modes. UEFI is a specification proposed by Intel to define a software interface between operating system and platform firmware. Most modern operating systems, such as Windows 10 and Linux support both Legacy and UEFI boot modes. The Legacy boot mode uses MBR partition for disk and VBIOS for video initialization, the UEFI boot mode uses GPT partition which supports greater than 2TB partition size and GOP driver for faster video initialization.



 **NOTE**

*If you choose Legacy mode, you will not be able to create disk partitions greater than 2TB or use TPM 2.0 function.*

To configure Boot Type:

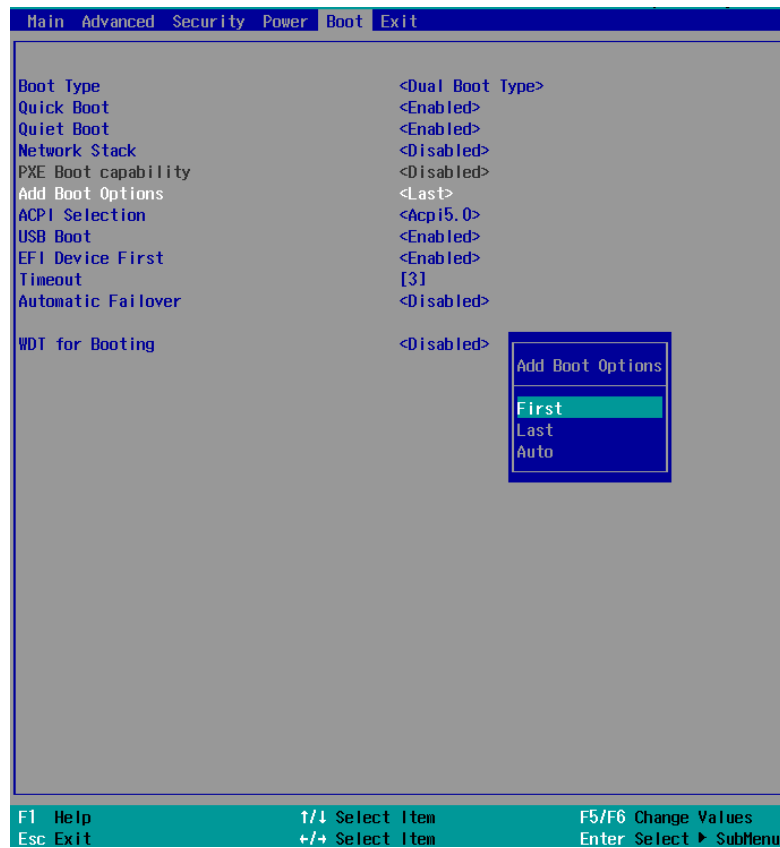
1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Boot]>[Boot Type]**, press ENTER to bring up options, Dual Boot (Legacy+UEFI), Legacy Boot Type, UEFI Boot Type.
3. Highlight your selection and press ENTER.
4. Press F10 to “Exit Saving Changes”.

### 4.1.12 Position New Boot Device

The “Add Boot Options” allow you to determine whether a newly added device (eg. USB flash disk) is to boot as the first device to boot or the last in the boot sequence.

To set the newly-installed boot device as the first or last boot device:

1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Boot] > [Add Boot Options]** menu.
3. Select **[First]** or **[Last]** for your newly-added boot device and press ENTER.



4. Once set, press **F10** to save setting and exit.

### 4.1.13 Watchdog Timer for Booting

The watchdog timer secures the boot process by means of a timer. Once the timer expires, a reset command is issued to initiate another booting process. There are two options in BIOS menu, “*Automatically after POST*” and “*Manually after Entering OS*”. When “*Automatically after POST*” is selected, the BIOS automatically stops the watchdog timer after POST (Power-On Self Test) OK. When “*Manually after Entering OS*” is selected, the user must stop the watchdog timer once booted into the OS. This guarantees the system can always boot into the OS, otherwise another booting process will be initiated. For information about programming watchdog timer, please refer to [Watchdog Timer & Isolated DIO](#).



To set the watchdog timer for boot in BIOS:

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Boot]** menu.
3. Disable or select timeout value for **[WDT for Booting]** option.
4. Once you give a timeout value, the **[WDT Stop Option]** option appears. You can select “*Automatically after POST*” or “*Manually after Entering OS*”.
5. Press F10 to “Exit Saving Changes.

#### 4.1.14 Legacy/ UEFI Boot Device

When you wish to set a designated boot device, you may set it as the first device to boot in Legacy or UEFI Boot Device setting. Or if you wish to manually select a boot device, you may do so by pressing F12 when the system boots up.



To set boot order for devices in UEFI Boot Device:

1. When system boots up, press F2 to enter BIOS setup utility
2. Go to **[Boot] > [UEFI]**
3. Highlight the device you wish to make boot order changes to and press F5/ F6 or +/- to change device boot order.

To select boot order for devices in Legacy Boot Device:

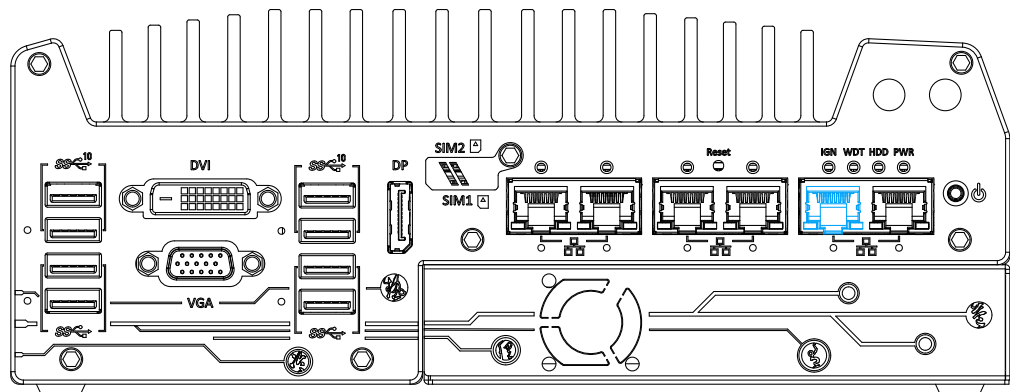
1. When system boots up, press F2 to enter BIOS setup utility
2. Go to **[Boot] > [Legacy]**, you can choose the type of device to list by selecting “By Device or By Device Type”.
3. Highlight the device you wish to make boot order changes to and press F5/ F6 or +/- to change device boot order.



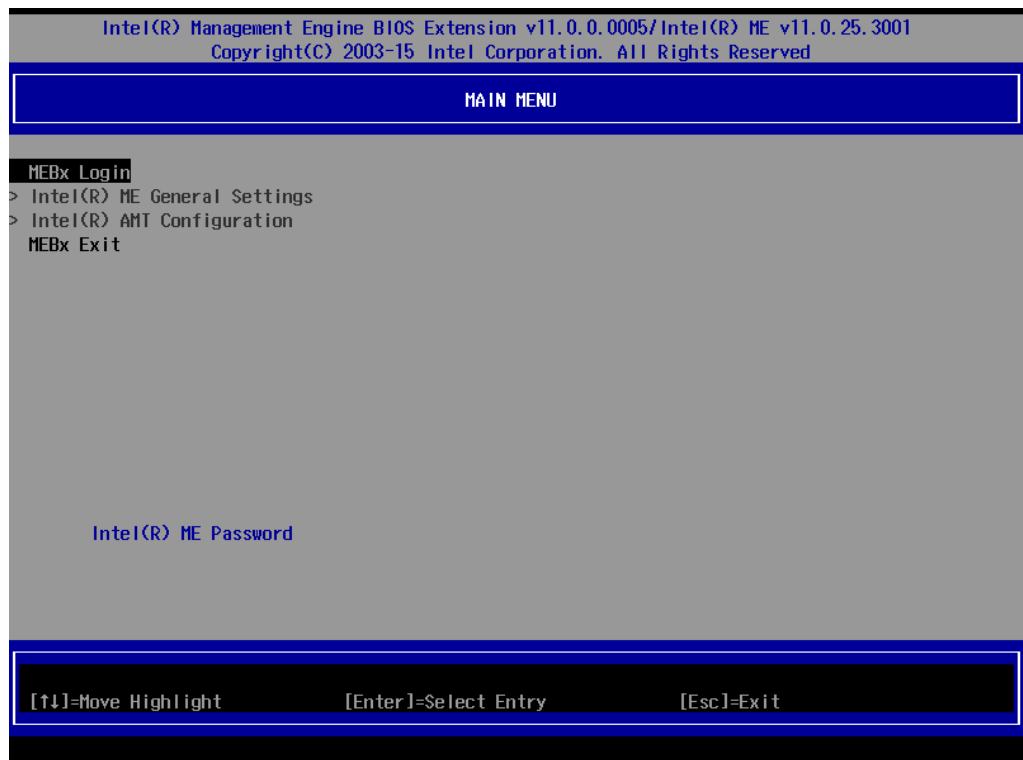
## 4.2 AMT Configuration

Intel® AMT (Active Management Technology) is a hardware-based technology for remotely managing target PCs via Ethernet connection. The system supports AMT function via its Ethernet port implemented with Intel I219-LM. Prior to using the AMT function to remotely control the system, you need to configure AMT password and network settings.

1. Connect Ethernet cable to I219-LM Ethernet port (indicated in blue).



2. When the system boots up, press F10 to enter the MEBx configuration menu.



3. Highlight MEBx Login and press Enter, a prompt will appear asking for password. The default password is "admin". For further MEBx configuration details, please refer to [Intel® MEBX User Guide](#).

## 4.3 RAID Configuration

To set up a RAID 0 or 1 volume in Legacy or UEFI mode, you need to have at least two hard drives or SSDs installed. The system supports RAID configurations in RAID 0 (striping) or RAID 1 (mirror) mode. Users can select the configuration that best suit their needs with RAID 0 (striping) mode offering better hard drive read/ write performances while RAID 1 (mirror) offers better data security.



### WARNING

*Please back up the hard drive data before you create or modify RAID volume(s) as the process may cause irreversible data deletion. When creating a RAID volume, it is also recommended to use hard drives from the same batch (same brand, model, capacity, rpm rate, etc.) to avoid performance or capacity allocation issues.*

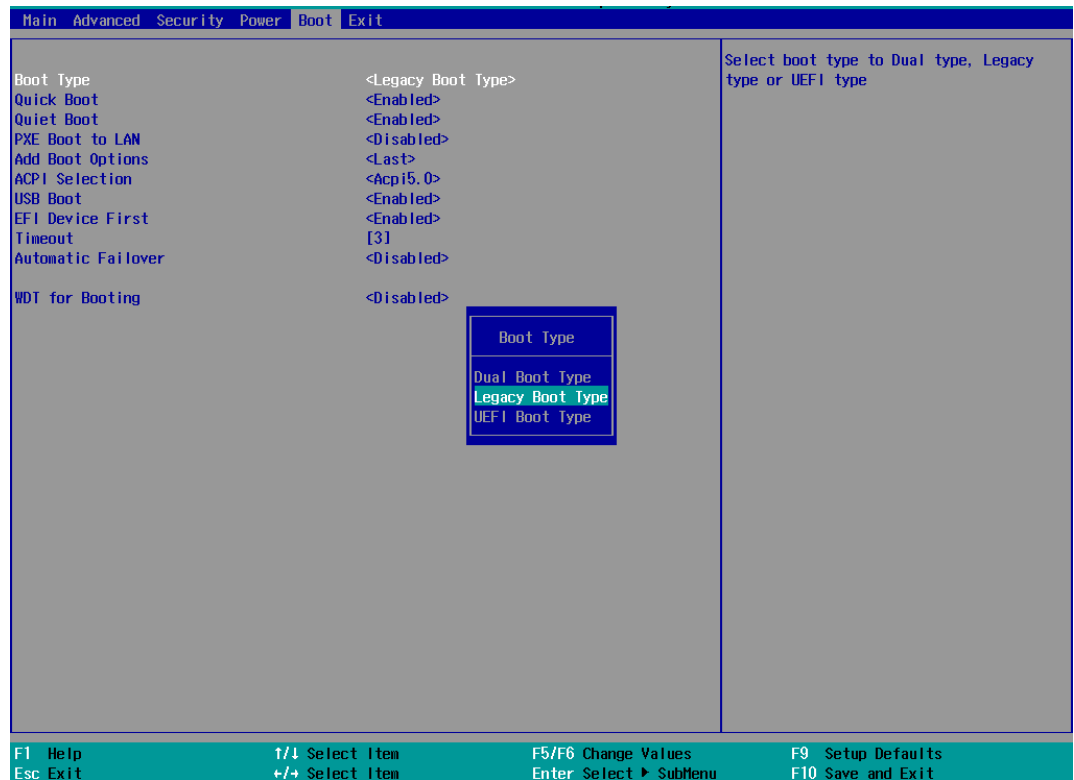
### 4.3.1 Legacy Mode RAID Configuration

To set up RAID configuration, you need to pre-configure the SATA mode setting in the BIOS. Please refer to the following steps:

1. When system boots up, press **F2** to enter BIOS setup utility.
2. Go to **[Advanced] > [SATA And RST Configuration] > [SATA Mode Selection]** > highlight **[Intel RST Premium With Intel Optane System Acceleration]** and press ENTER.



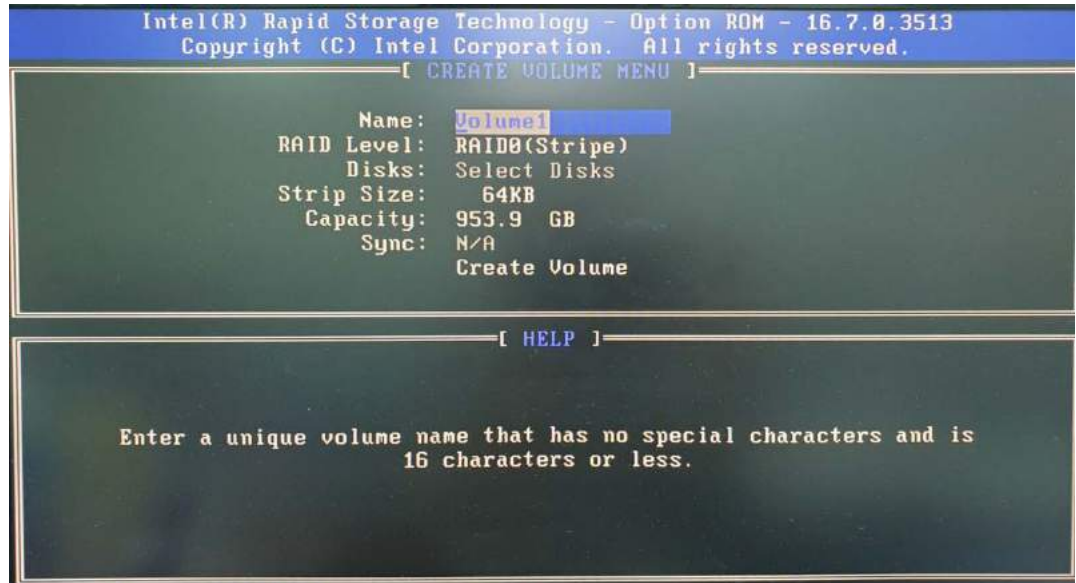
- Go to [Boot] > highlight [**Legacy Boot Type**] and press ENTER to set boot type.



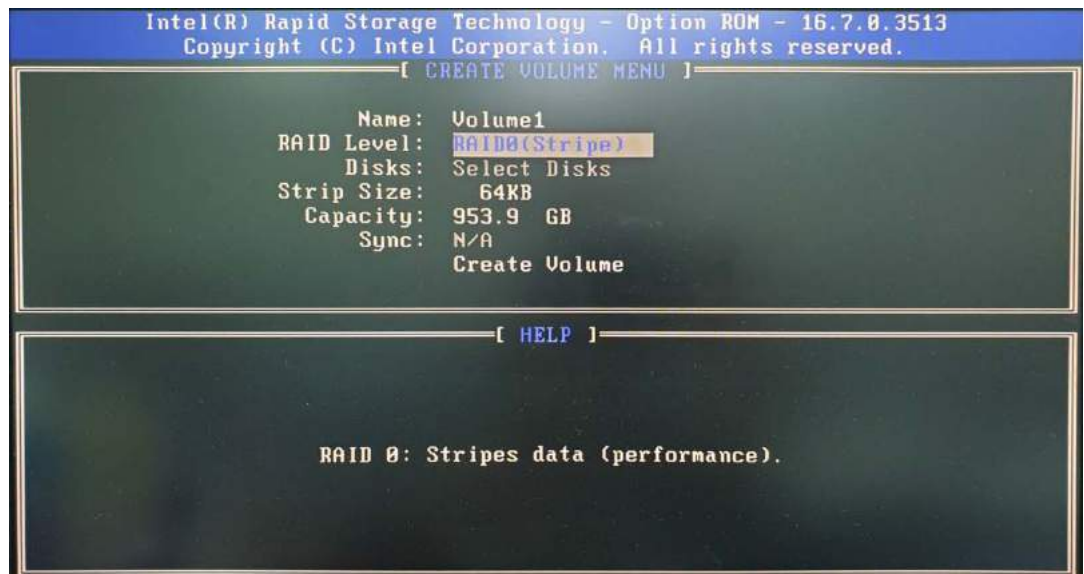
- Press F10 to "Exit Saving Changes" and reboot the system.
- When the system reboots, press [**Ctrl + I**] to enter the RAID configuration utility.
- Once you're in the Configuration Utility, highlight [**Create RAID Volume**] and press ENTER.



7. The following screen allows you to enter the **Name** of the RAID volume you wish to create. Enter a name and press ENTER to access the **RAID Level** setting.

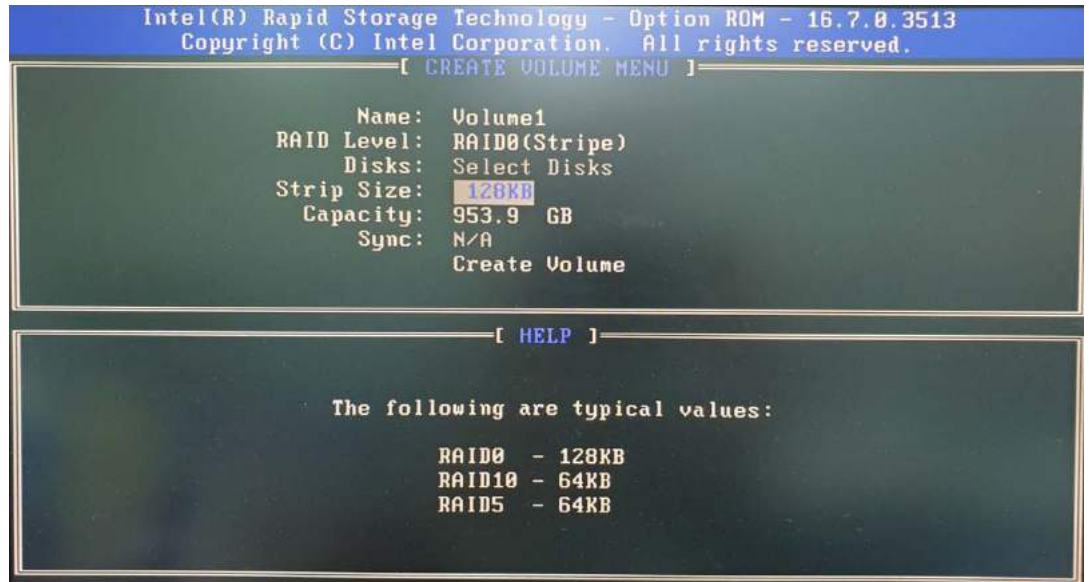


8. For **RAID Level**, use the up and down arrow key to select between **RAID0 (Stripe)** or **RAID1 (Mirror)** settings. Select a RAID mode and press ENTER to access **Stripe Size** setting (not applicable to Mirror mode).

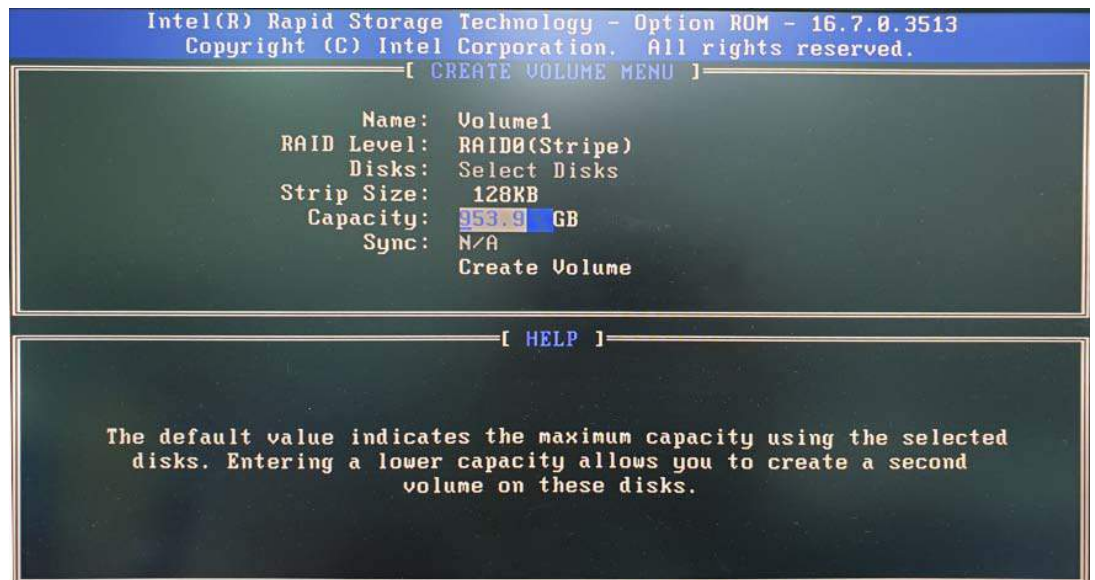


- For **Stripe Size**, use the up and down arrow key to select between 4KB, 8KB, 16KB, 32KB, 64KB, 128KB for your RAID volume stripe size and press ENTER to access the **Capacity** setting.

\*RAID1(Mirror) does not offer Stripe Size options.

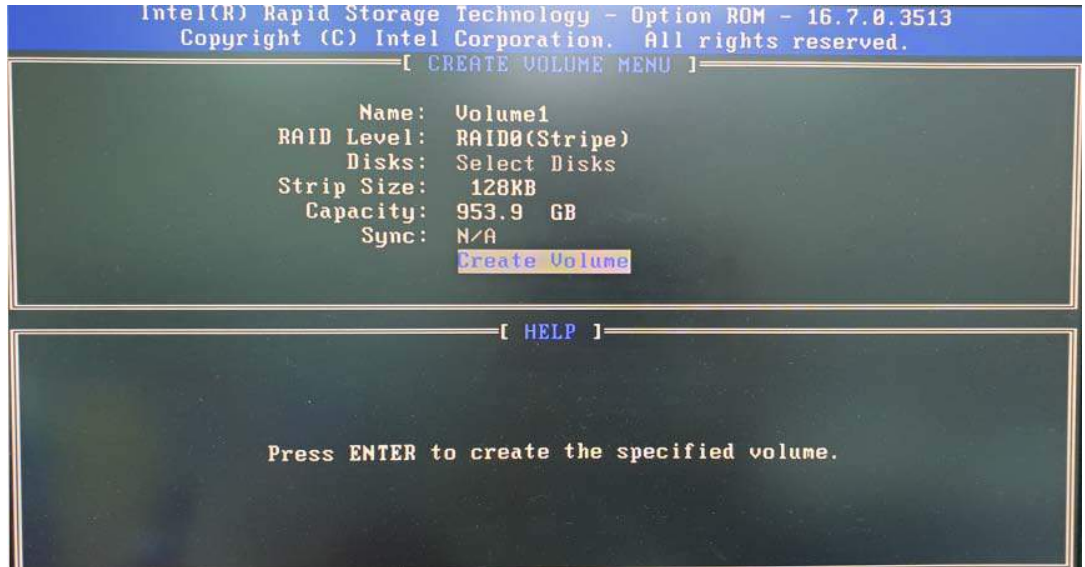


- You may enter the RAID volume capacity you wish to create at this step and press the Enter key to complete your RAID settings. By default, the maximum capacity will be applied. Once you have entered a capacity, press ENTER to confirm.

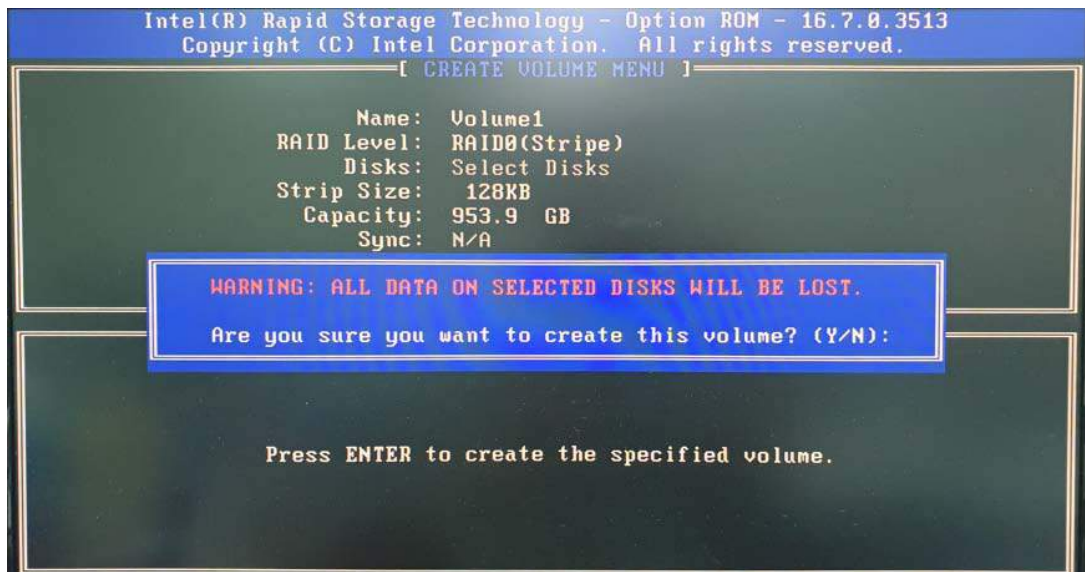




11. Reviewed your settings and if you wish to change any setting(s), you will need to press [ESC] and start again from **Step 5**. If all settings are correct and you wish to continue, with “**Create Volume**” highlighted, press ENTER to begin creating the RAID volume.

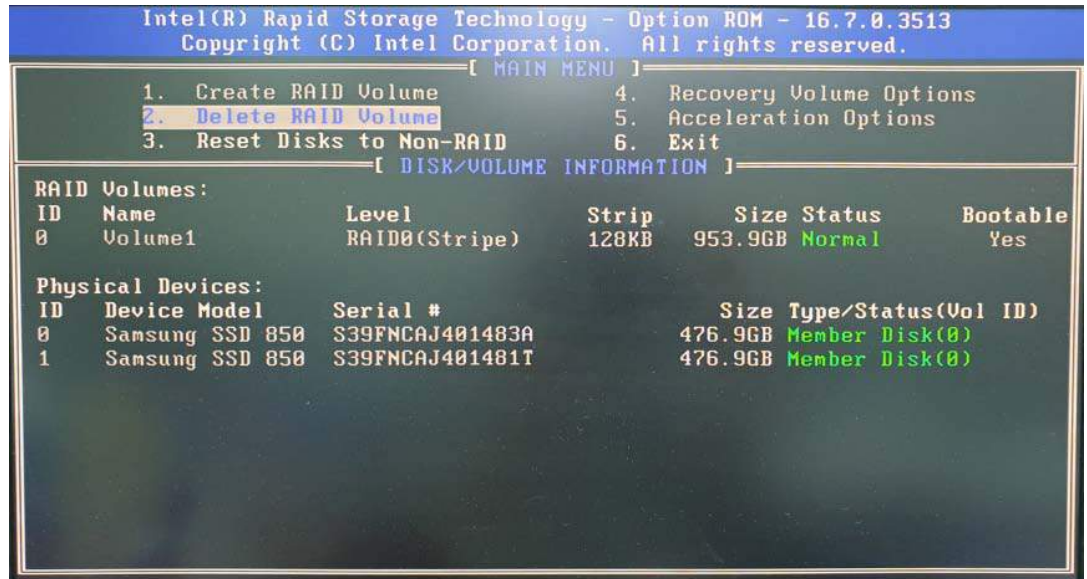


12. A data deletion warning will appear, enter “Y” to continue and “N” to stop the volume creation process.





13. Once the RAID volume has been created, the configuration utility will bring you back to the main screen showing the RAID volume and their member disks.

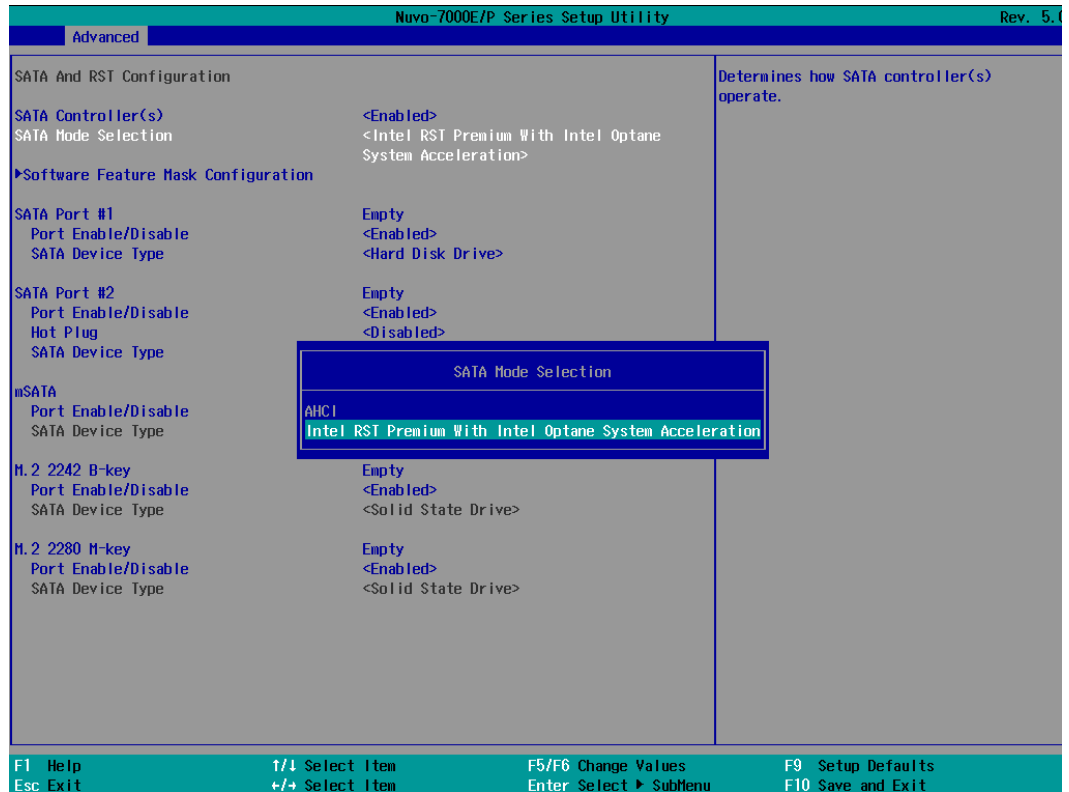


14. The above process was to create a RAID-0 volume. If you wish to create a RAID-1 volume, please perform steps 5 to 13 in this section and select RAID-1 during step 8.

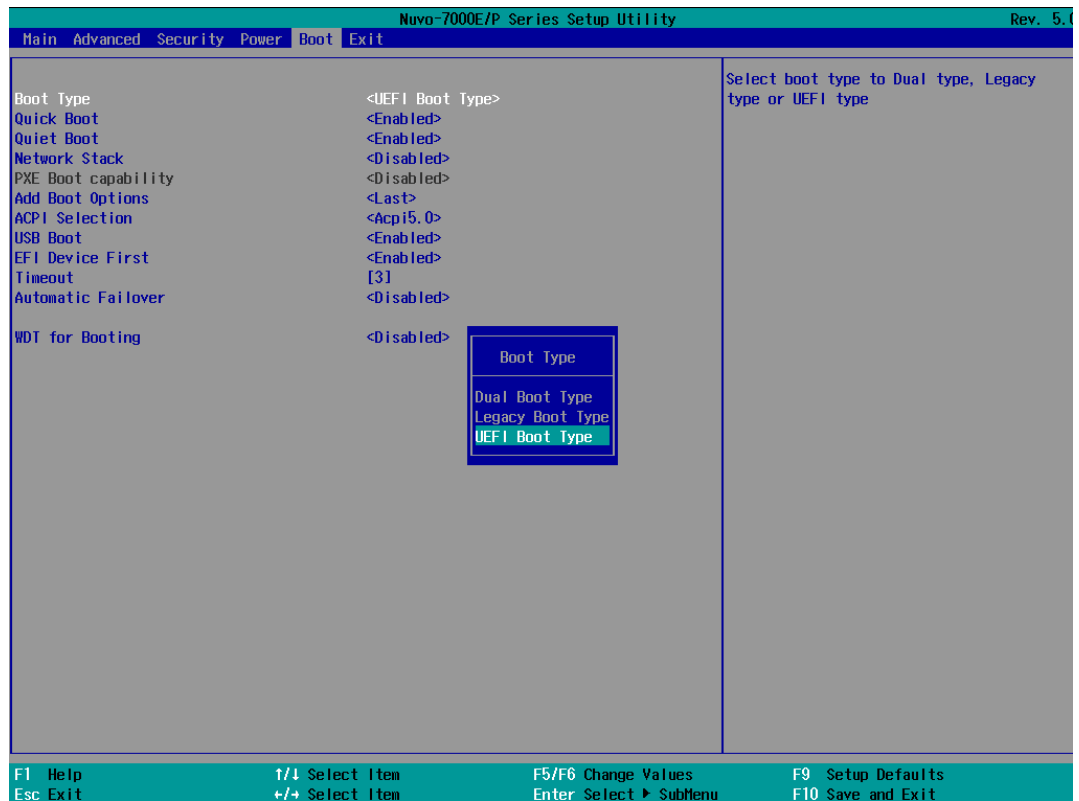
### 4.3.2 UEFI Mode RAID Configuration

To enable RAID functionality in UEFI mode:

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced] > [SATA And RST Configuration] > [SATA Mode Selection] > highlight [Intel RST Premium With Intel Optane System Acceleration]** and press ENTER.



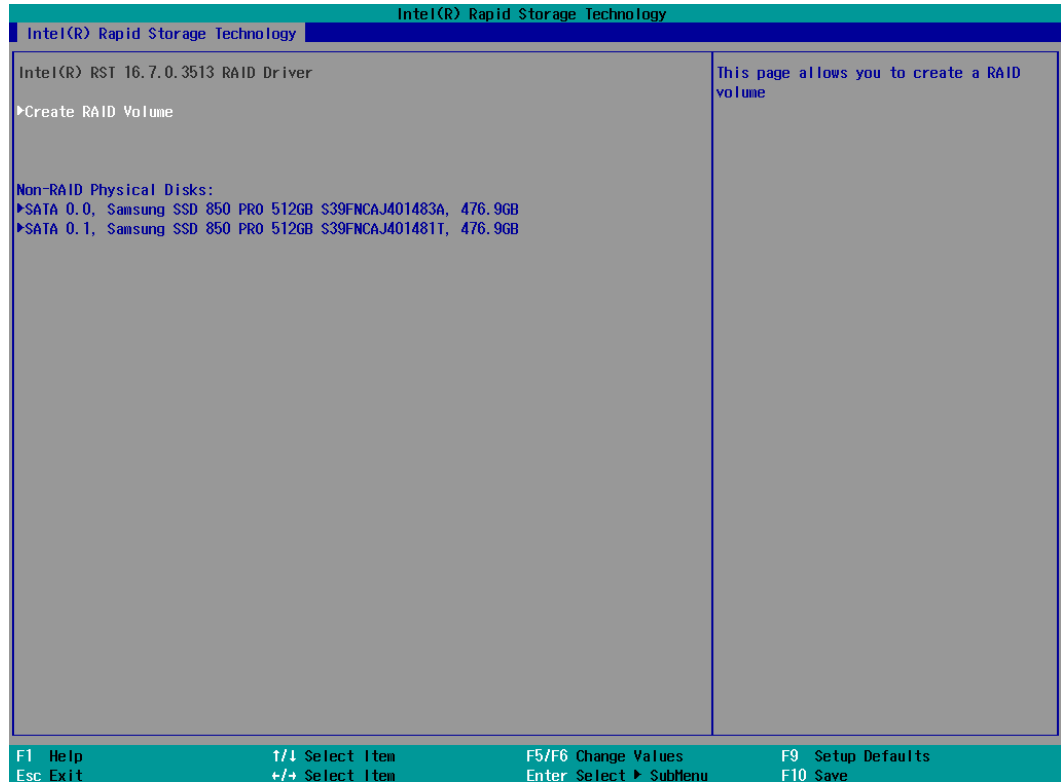
- Go to **[Boot]**, highlight **[UEFI Boot Type]** and press ENTER to set boot type.



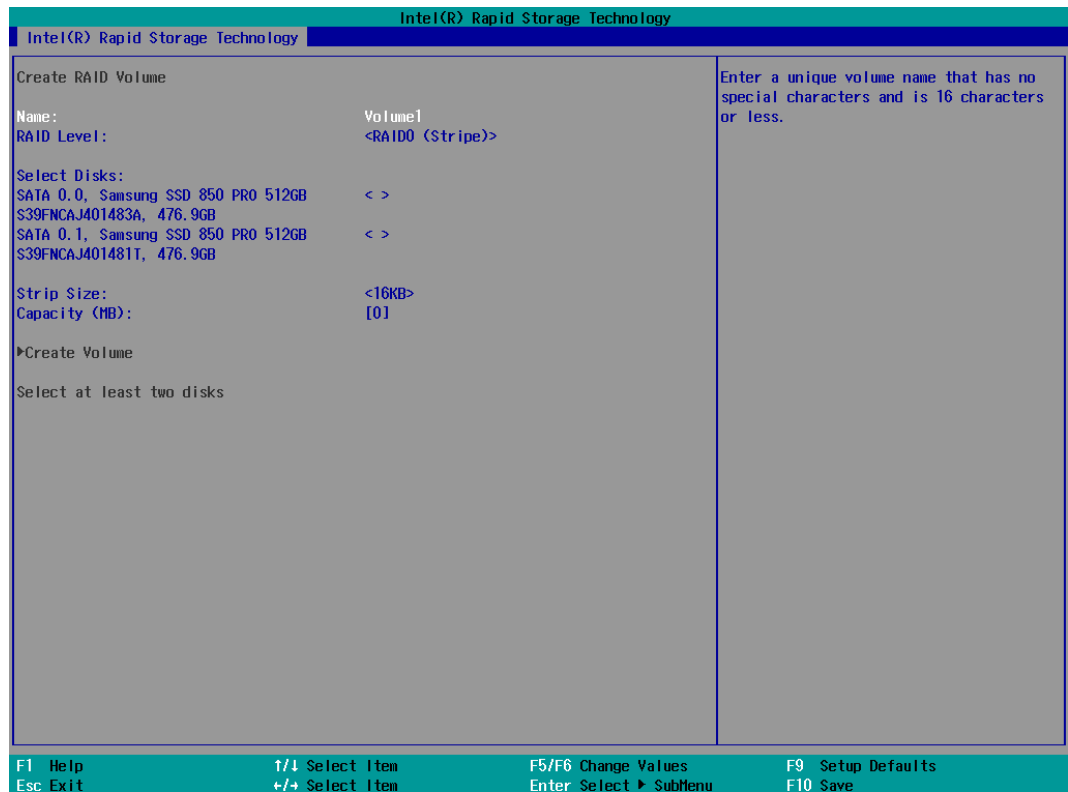
- Press F10 to “Exit Saving Changes” and reboot the system.
- When the system reboots, press **[F3]** to enter the Configuration Utility.
- Once you’re in the Configuration Utility, highlight **[Intel® Rapid Storage Technology]** and press ENTER.



- The following screen shows Non-RAID physical disks and the option “**Create RAID Volume**”. Highlight “**Create RAID Volume**” and press ENTER to begin creating your RAID volume.



8. The Name option allows you to name your RAID volume. Press ENTER when ready to go to the next option.

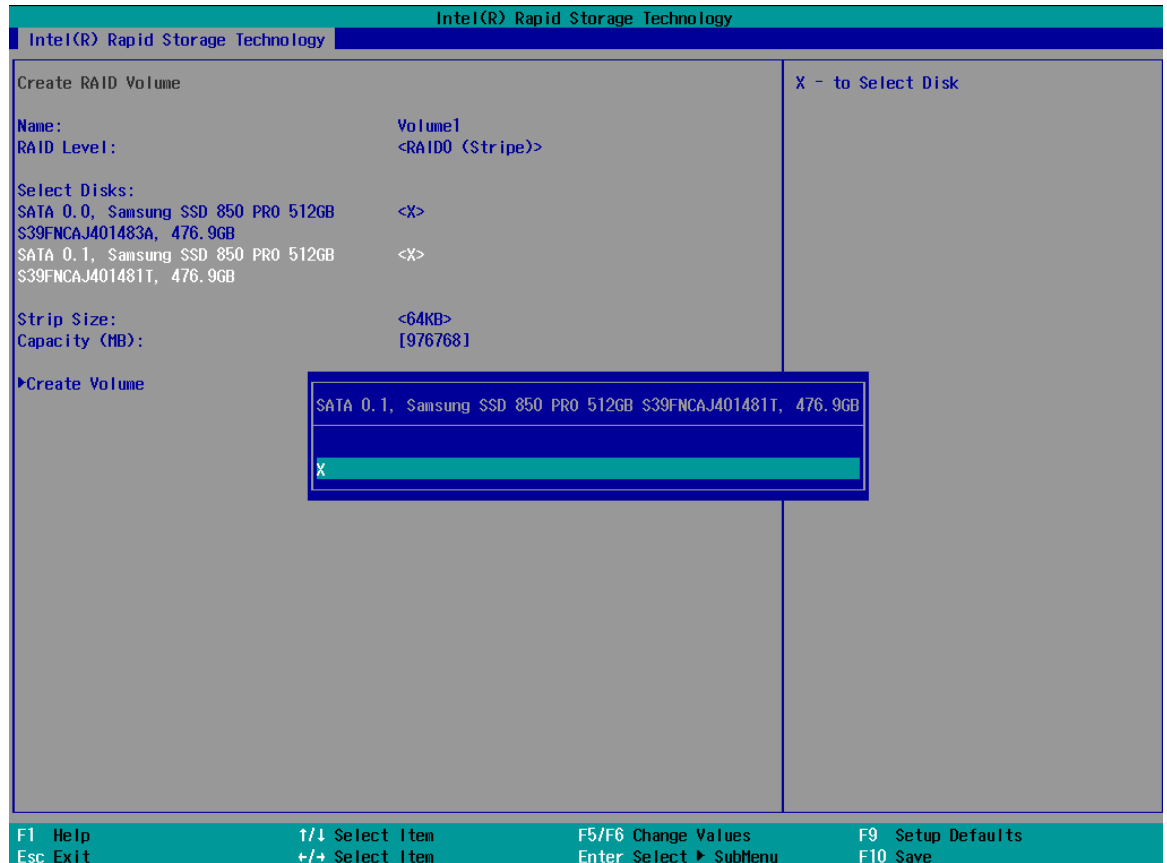


- The RAID Level option allows you to select RAID-0 (striping) or RAID-1 (mirror) for your RAID volume. Press ENTER when ready.



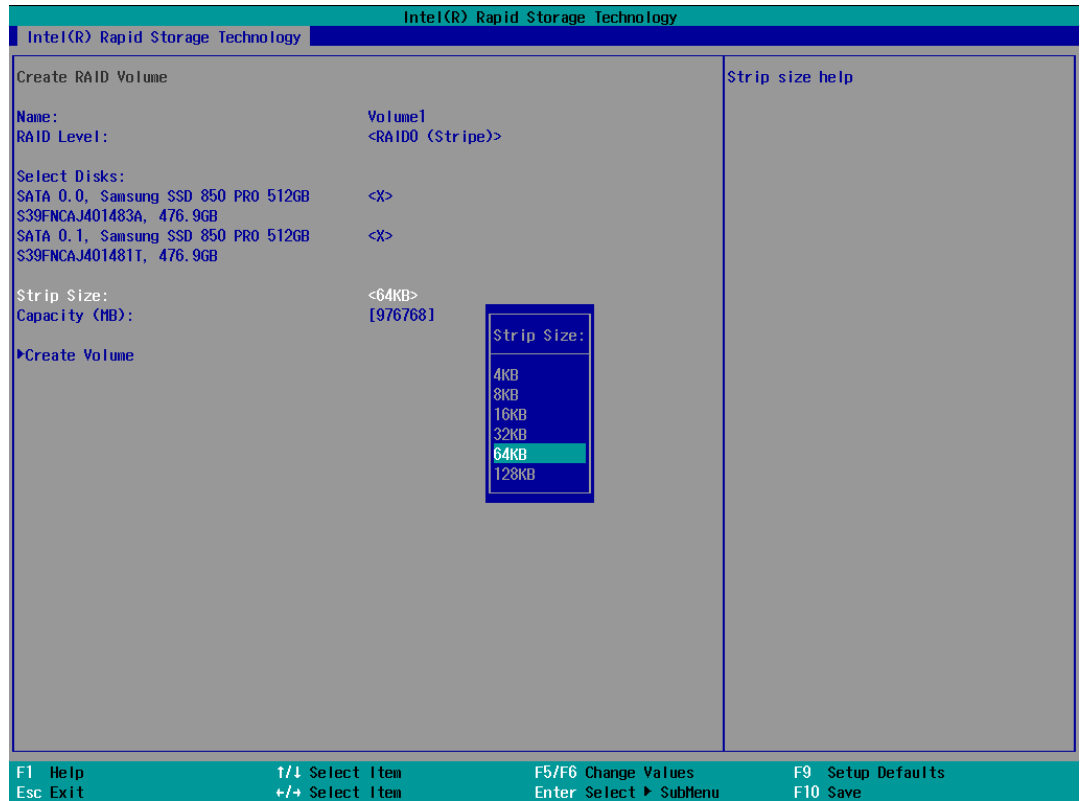


10. The Select Disks option allows you to select disk drives for your RAID volume. Highlight a drive and press ENTER, use up/ down arrow keys to highlight "x" and press ENTER to confirm the selection. A minimum of two disk drives must be selected for RAID-0 or RAID-1 configuration. Press ENTER when ready.



11. The Stripe Size option allows you to configure the stripe size of your RAID volume. Available stripe sizes are 4KB, 8KB, 16KB, 32KB, 64KB, 128KB, use the up and down arrow keys to highlight and press ENTER to confirm the stripe size selection.

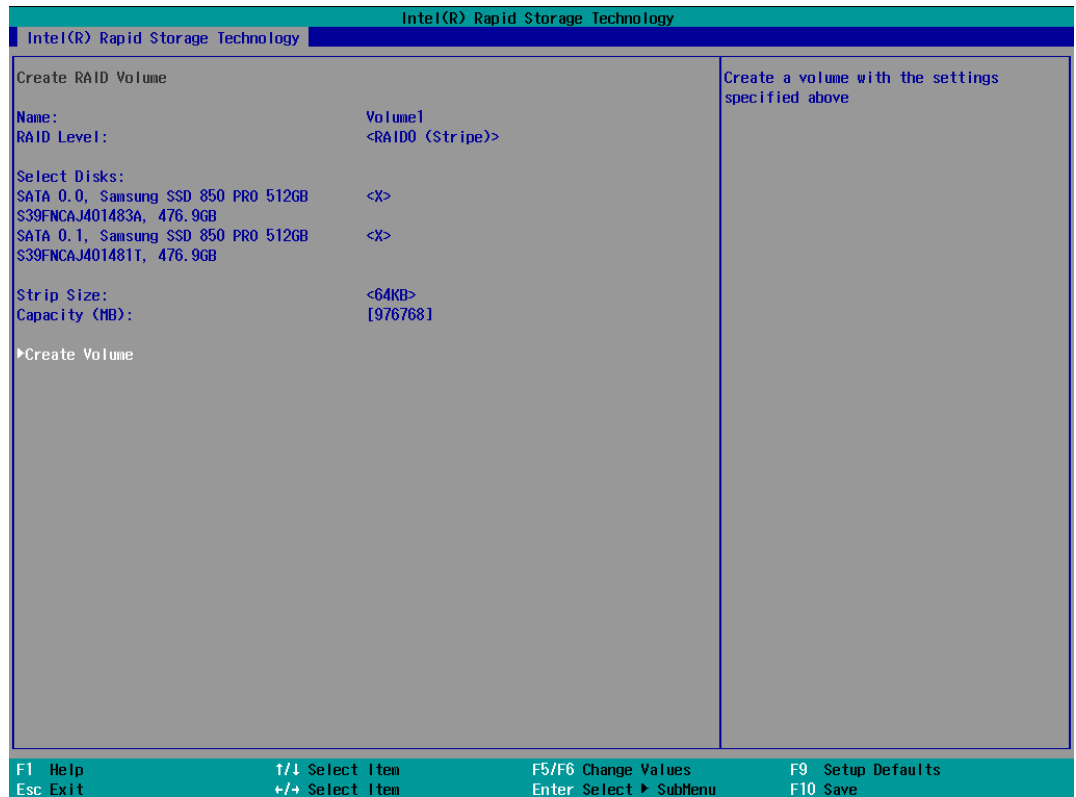
\*RAID1(Mirror) does not offer Stripe Size options.



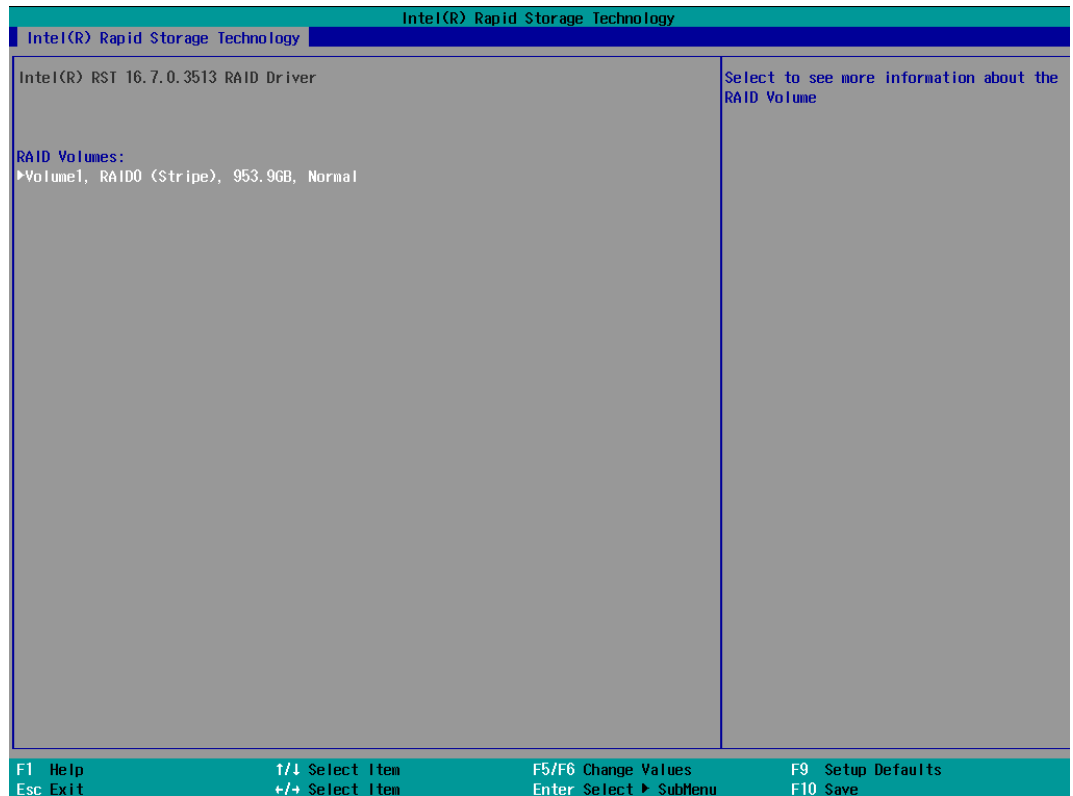
- The Capacity (MB) option allows you to configure the storage capacity of your RAID volume. By default, the full storage capacity will be applied. Once you have entered a capacity, press ENTER to confirm.




- The Create Volume option is the final step in the volume creation process. Highlight **“Create Volume”** and press ENTER to begin creating your RAID volume base on the settings you just configured.



14. A summary and status of the RAID volume will be shown when the RAID volume is successfully created.



15. Press F10 to save and Esc to exit the Intel® Rapid Storage Technology configuration page.



**NOTE**

*The above process was to create a RAID-0 volume. If you wish to create a RAID-1 volume, please perform steps 5 to 13 in this section and select RAID-1 during step 9.*

## 5 OS Support and Driver Installation

### 5.1 Operating System Compatibility

The system supports most operating system developed for Intel® x86 architecture. The following list contains the operating systems which have been tested by Neosys Technology.

- Microsoft Window 10 (x64)
- Fedora 29\*\*
- Ubuntu 16.04.5 LTS & Ubuntu 18.04.0 LTS \*\*



#### NOTE

*For other Linux OS, Linux kernel should upgrade to 4.15.18.*

*\* For Linux system, user may need to manually compile and install the driver for Intel graphics or I210 GbE controller if the driver is not embedded in kernel. You can visit Intel website for further information.*

*\*\* For distributions, graphics driver and RAID function may not be completely implemented in its kernel. You may encounter restrictions when using these features, such as triple independent display and RAID. For optimum operation, it is the users' responsibility to manually check for new drivers and upgrades!*

Neosys may remove or update operating system compatibility without prior notice. Please contact us if your operating system of choice is not on the list.



## 5.2 Driver Installation

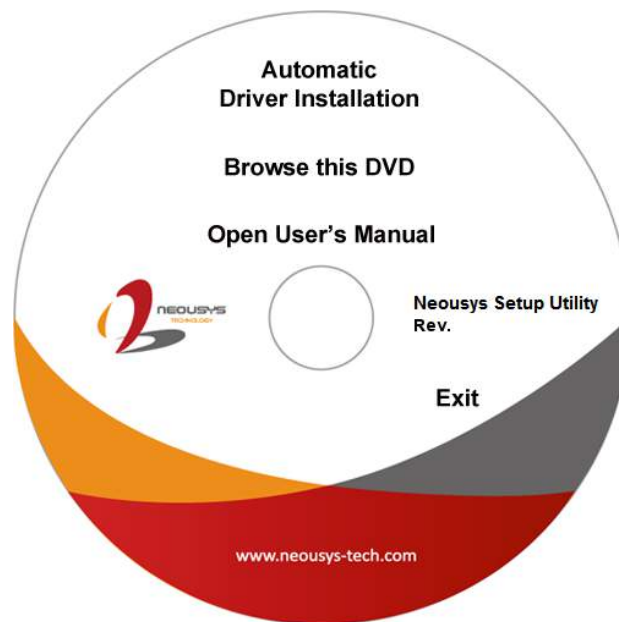
The system comes with a “Drivers & Utilities” DVD that offers “one-click” driver installation process. It automatically detects your Windows operating system and installs all necessary drivers for you system with a single click.

### 5.2.1 Install Drivers Automatically

The system comes with a “Drivers & Utilities” DVD that offers “one-click” driver installation process. It automatically detects your Windows operating system and installs all necessary drivers for you system with a single click.

To install drivers automatically, please refer to the following procedures.

1. Insert the “Drivers & Utilities” DVD into a USB DVD-drive connect to your system. A setup utility launches and the following dialog appears.



2. Click on “**Automatic Driver Installation**” and the setup utility will automatically detect your Windows operating system and install all necessary drivers. The installation process takes about 6~8 minutes depending on your Windows version. Once driver installation is done, the setup utility reboots your Windows and you may begin using your system.

## 5.2.2 Install Drivers Manually

You can also manually install each driver for the system. Please note when installing drivers manually, you need to install the drivers in the following sequence mentioned below.

### Windows 10 (x64)

The recommended driver installation sequence is

1. Chipset driver (x:\Driver\_Pool\Chipset\_CFL\Win\_10\_64\SetupChipset.exe)
2. Graphics driver (x:\Driver\_Pool\Graphics\_CFL\_SKL\_APL\Win\_10\_64\igxpin.exe)
3. Audio driver (x:\Driver\_Pool\Audio\_ALC262\Win\_ALL\_64\Setup.exe)
4. LAN driver  
(x:\Driver\_Pool\GbE\_I210\_I350\Win\_10\_64\_CFL\APPS\PROSETDX\Winx64\DxSetup.exe)
5. ME driver (x:\Driver\_Pool\ME\_CFL\Win\_10\_64\SetupME.exe)

## 5.3 Driver Installation for Watchdog Timer Control

Neosys provides a driver package which contain function APIs for Watchdog Timer control function. You should install the driver package (WDT\_DIO\_Setup.exe) in prior to use these functions. Please note that you must install WDT\_DIO\_Setup\_v2.2.9.x or later versions.

### **Windows 10 (x64)**

Please execute the driver setup program in the following directory.

x:\Driver\_Pool\WDT\_DIO\Win7\_8\_10\_64\WDT\_DIO\_Setup\_v2.2.9.x(x64).exe

### **Windows 10 (WOW64)**

Please execute the driver setup program in the following directory.

x:\Driver\_Pool\WDT\_DIO\Win7\_8\_10\_WOW64\WDT\_DIO\_Setup\_v2.2.9.x(wow64).exe

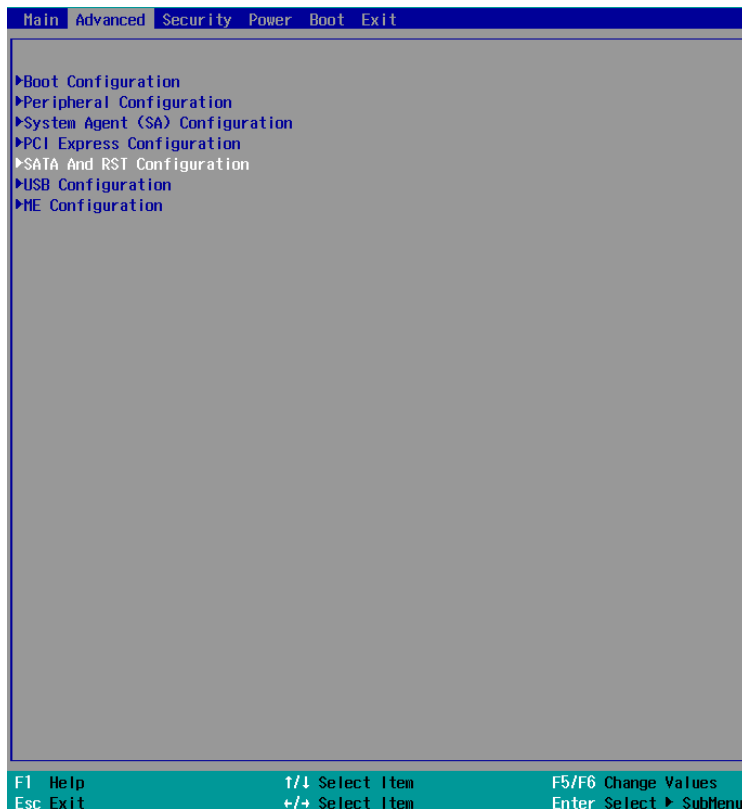
## 5.4 Intel® Optane™ Memory BIOS Setup and Driver

### Installation

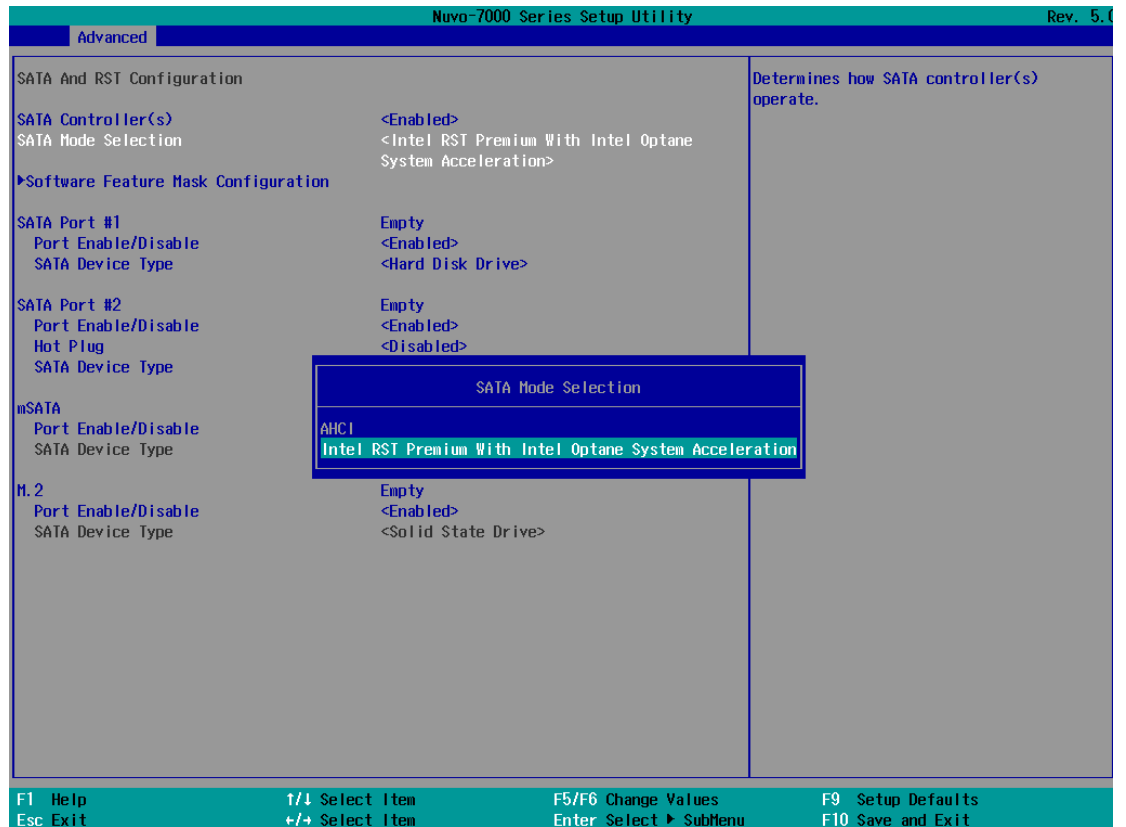
The system is compatible with Intel® Rapid Storage Technology that supports the installation of Intel® Optane™ memory to significantly boost traditional hard disk drive read and write performances. Intel® Optane™ memory is Intel® RST's latest system acceleration solution featuring a dual-media/disk combination (ultrafast media for file and block caching + slow media for storage capacity) that is presented to the host OS as a single SSD. The ultra fast media utilizes PCIe NVMe SSDs that are based on Intel® Optane™ technology with read/ write speed of up to 2000Mb/ sec.

To setup Intel® Optane memory, please perform the following steps:

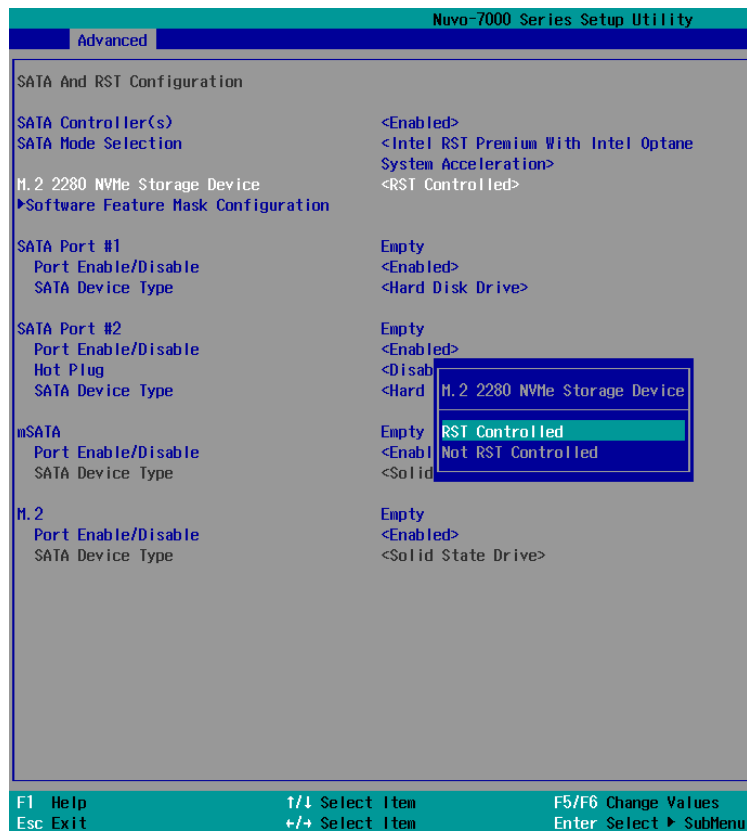
1. Press the power button to startup your system (please restart if your system is already up and running) and press F2 to enter BIOS.
2. Go to "Advanced > SATA And RST Configuration".



- Go to "SATA Mode Selection", press ENTER to bring up options, select "Intel RST Premium With Intel Optane System Acceleration" and press ENTER to select the option.



- Go to “M.2 2280 NVMe Storage Device” and press ENTER to bring up the selection, select “RST Controlled” and press ENTER to select the option.

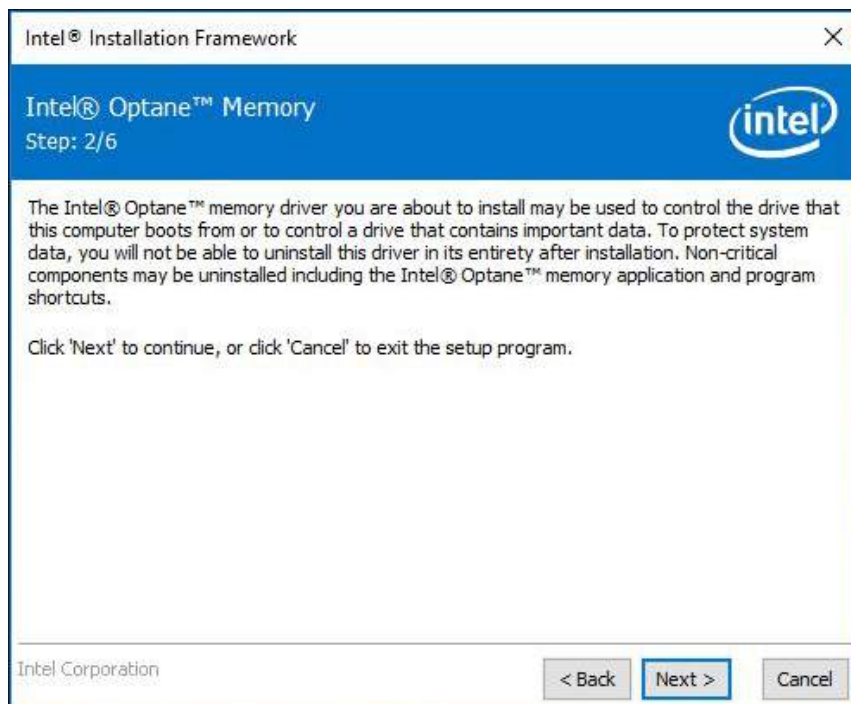
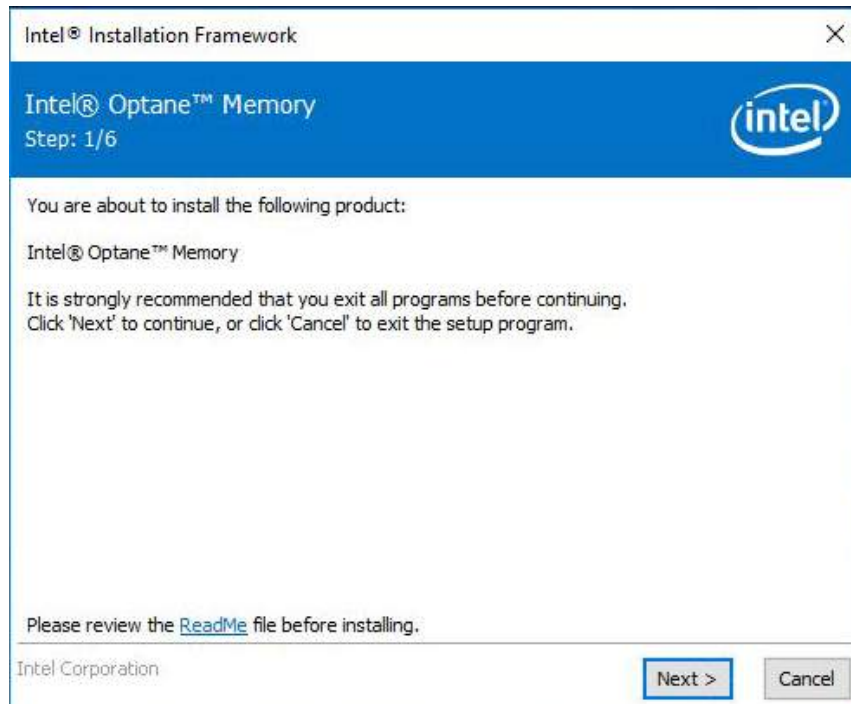


- Press F10 to save and exit, and allow the system to boot into Windows.
- In Windows, download [Intel® RST driver](#) if you don't already have it on hand.



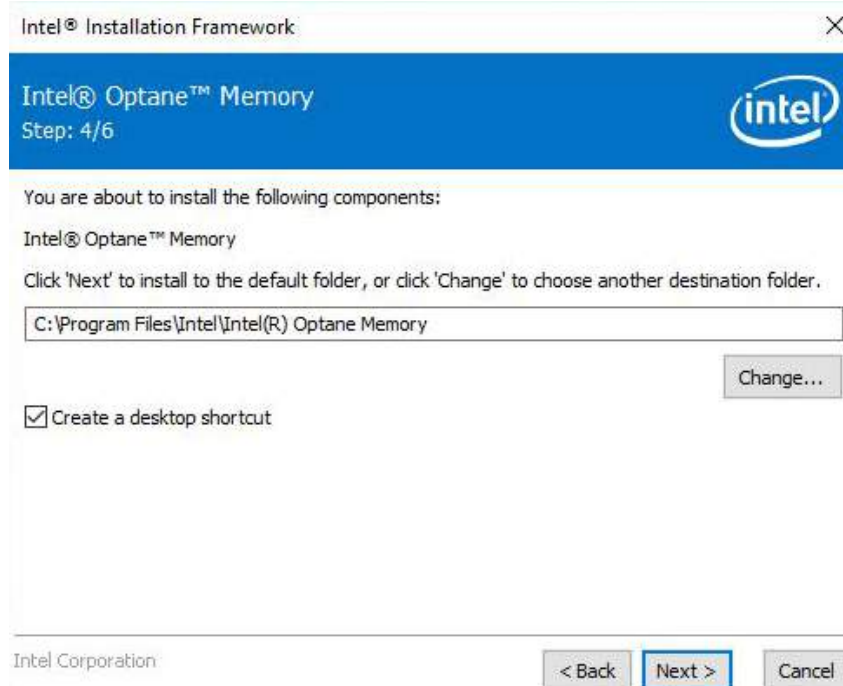
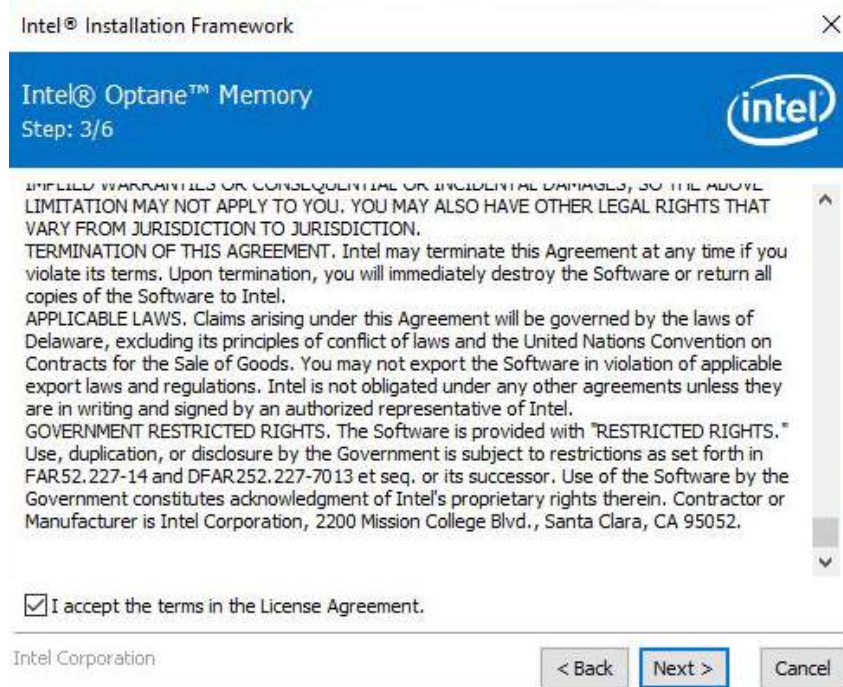
Right-click on the SetupOptaneMemory.exe and left-click on “Run as administrator” to execute the setup file.

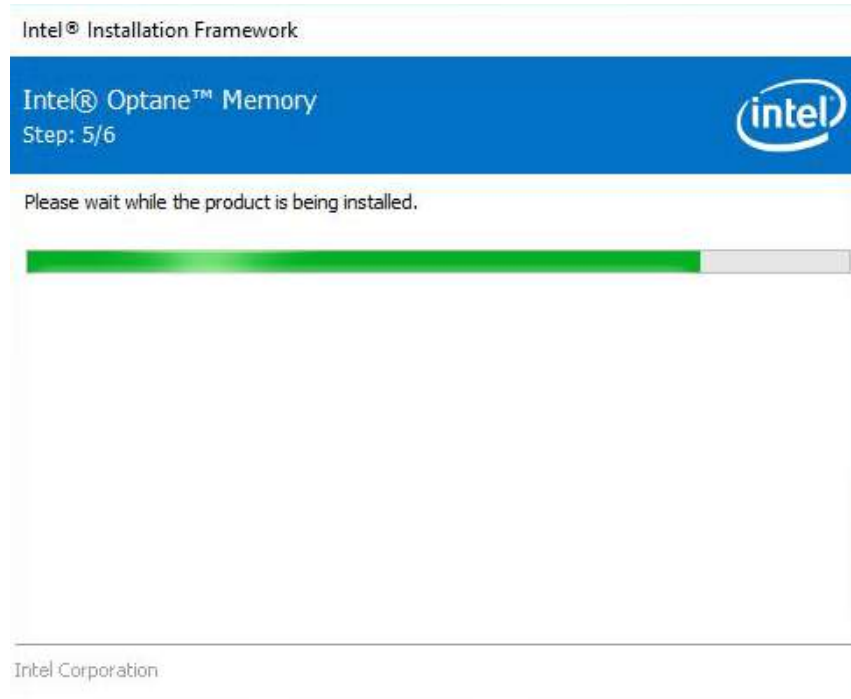
7. Follow the 6-step setup procedure as instructed.



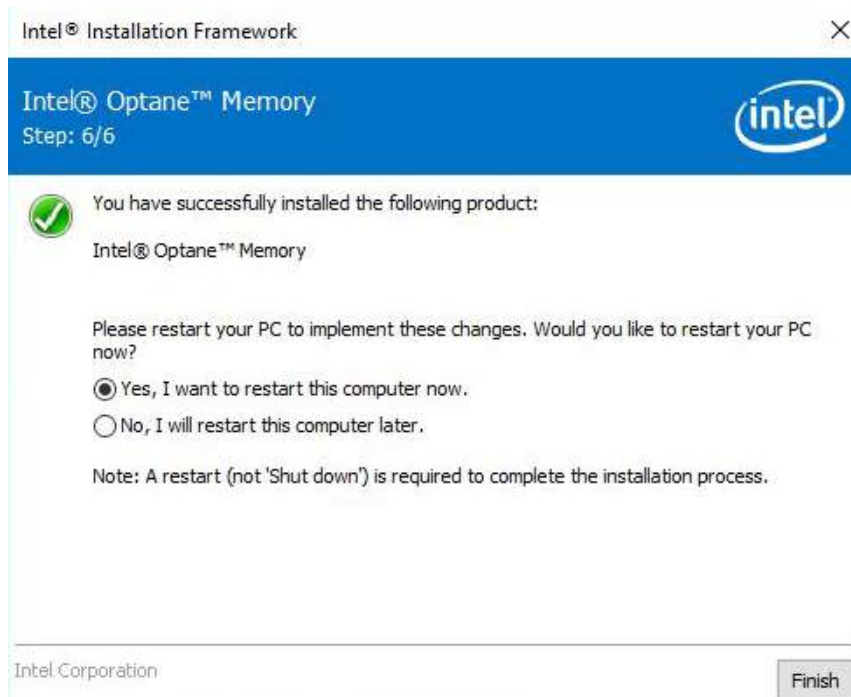


8. Check the “I accept the terms in the License Agreement” box and click on “Next >” to continue the installation process.

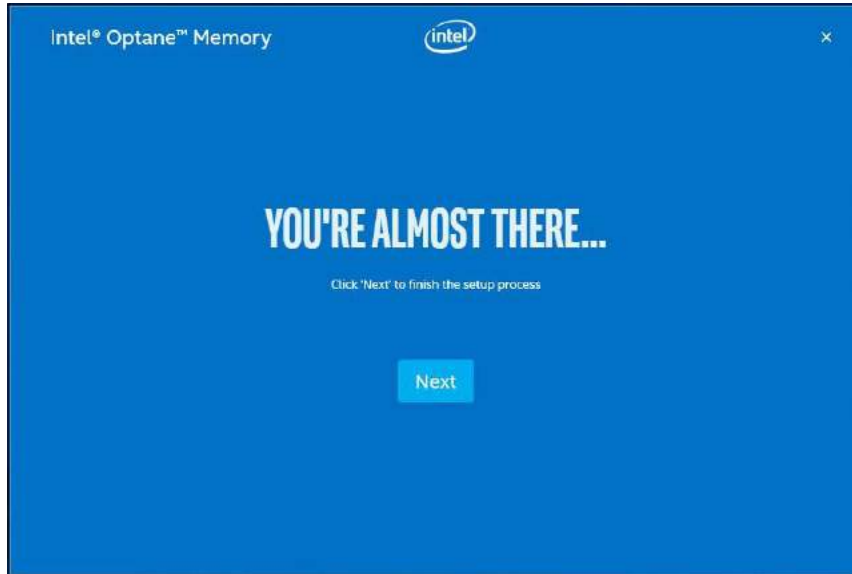




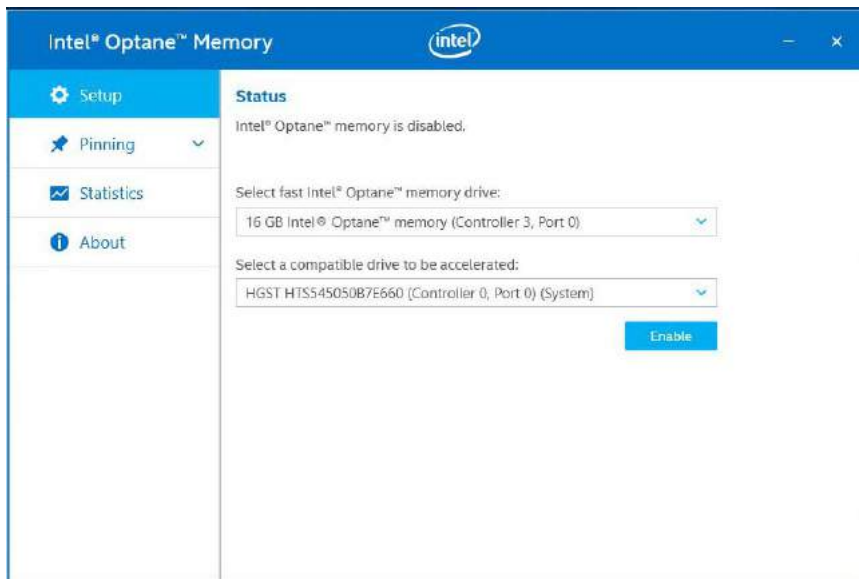
9. When done, click on “Finish” and restart the system.



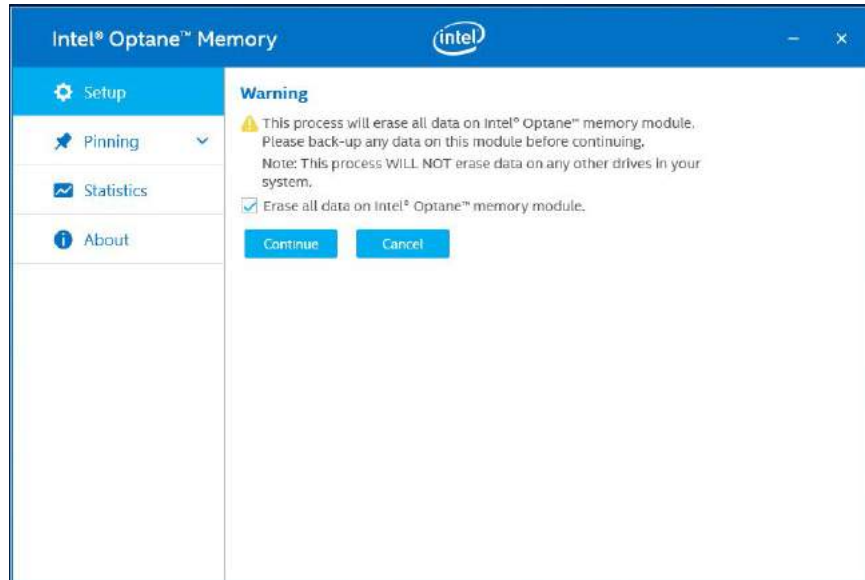
- Upon system restart, the following initialization screen will appear. Click on Next to continue.



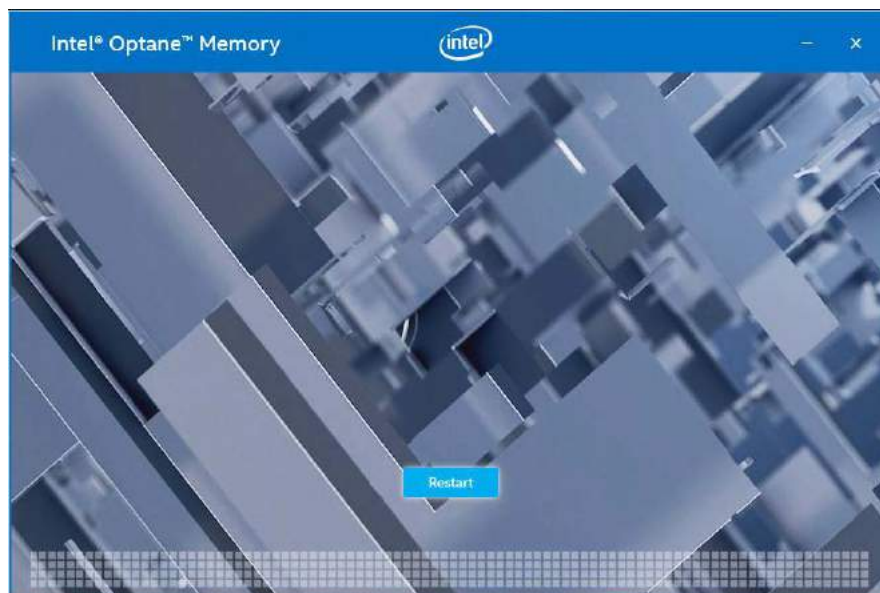
- In the Setup section, you will see your Intel® Optane™ memory drive and compatible drive(s) that can be accelerated. Click on the downward arrow to bring up a selection of drives to be accelerated. Click on “Enable” when ready.



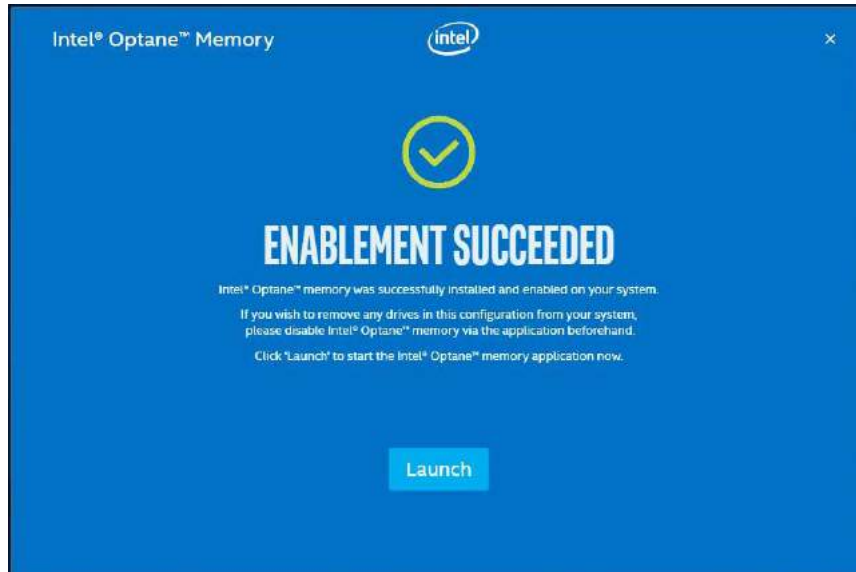
12. The data backup warning will appear, please backup any data you may have stored on your Intel® Optane™ memory module before proceeding. Check the box “Erase all data on Intel® Optane™ memory module” and click on Continue.



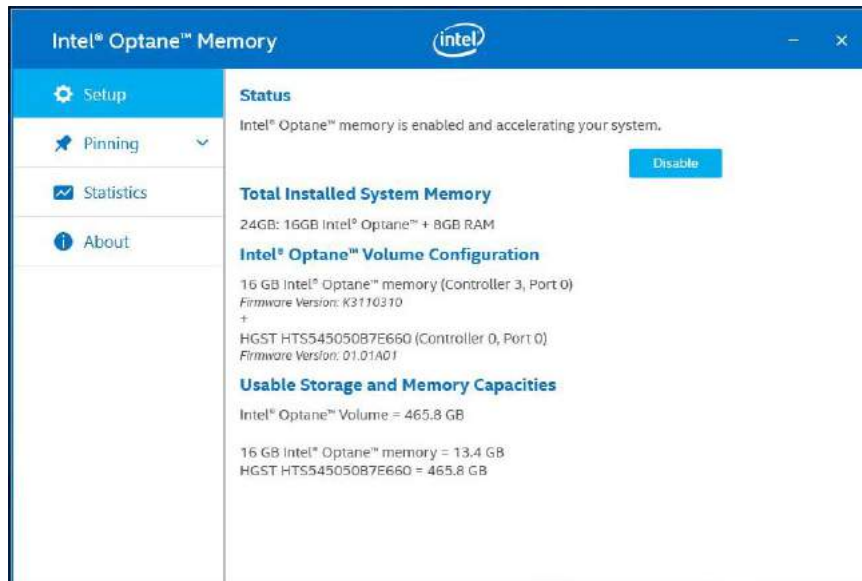
13. When the Intel® Optane™ memory module has been enabled, the installation window and a notification window at the bottom right corner will prompt you to restart the system.



14. Upon system restart, a successful enablement message will appear to indicate the Intel® Optane™ memory module has been enable successfully.



15. Once enabled, the RST software Setup section should show your configuration information.



# Appendix A Using WDT & DIO

The watchdog timer (WDT) function to ensure reliable system operation. The WDT is a hardware mechanism to reset the system if the watchdog timer is expired. Users can start the WDT and keeping resetting the timer to make sure the system or program is running. Otherwise, the system shall be reset.

In this section, we'll illustrate how to use the function library provided by Neosys to program the WDT functions. Currently, WDT driver library supports Windows 10 x64 and WOW64 platform. For other OS support, please contact Neosys Technology for further information.

## Installing WDT\_DIO Library

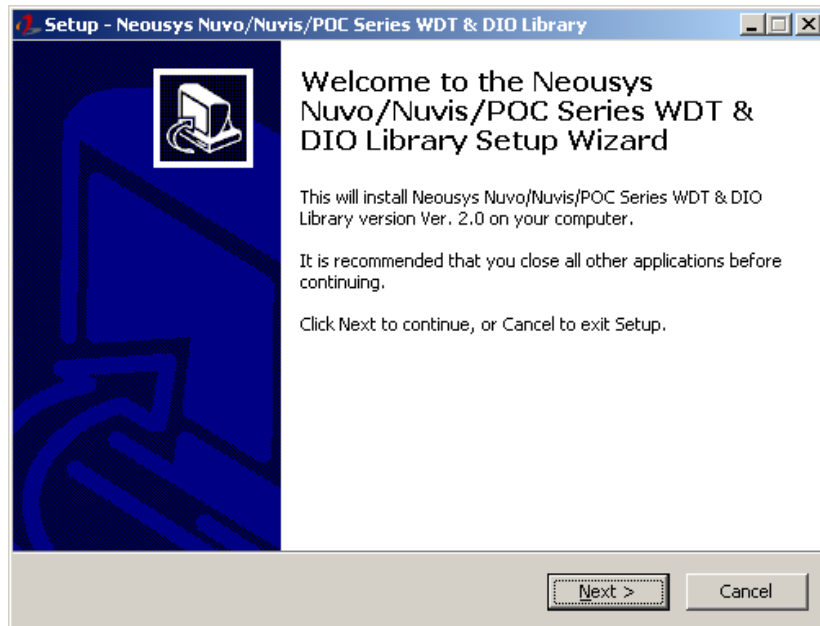
The WDT\_DIO function library is delivered in the form of a setup package named **WDT\_DIO\_Setup.exe**. In prior to program WDT, you should execute the setup program and install the WDT library. Please use the following WDT\_DIO\_Setup packages according to your operating systems and application.

- For Windows 10 64-bit OS with 64-bit application (x64 mode), please install WDT\_DIO\_Setup\_v2.2.9.x(x64).exe or later version.
- For Windows 10 64-bit OS with 32-bit application (WOW64 mode), please install WDT\_DIO\_Setup\_v2.2.9.x(wow64).exe or later version.

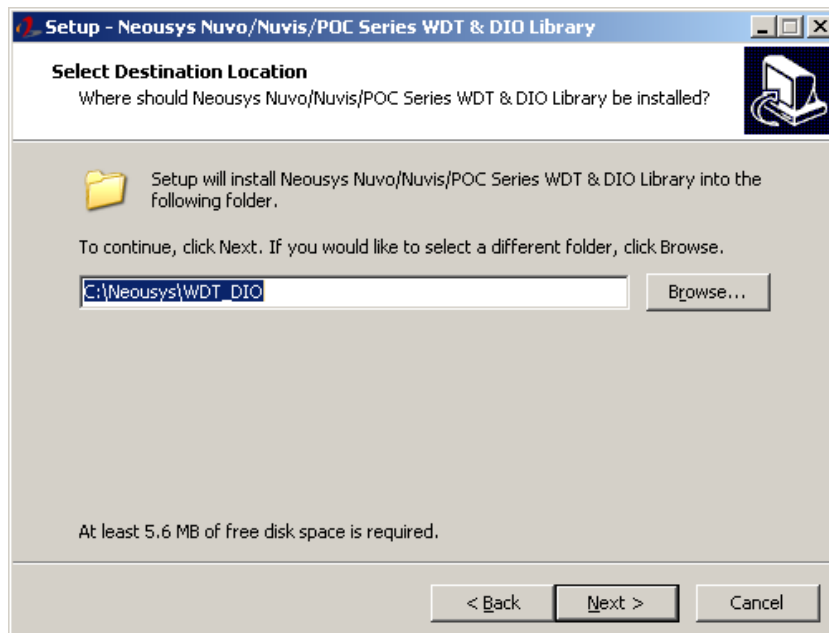
## WDT and DIO Library Installation

To setup WDT & DIO Library, please follow instructions below.

1. Execute **WDT\_DIO\_Setup.2.2.9.x.exe**. and the following dialog appears.

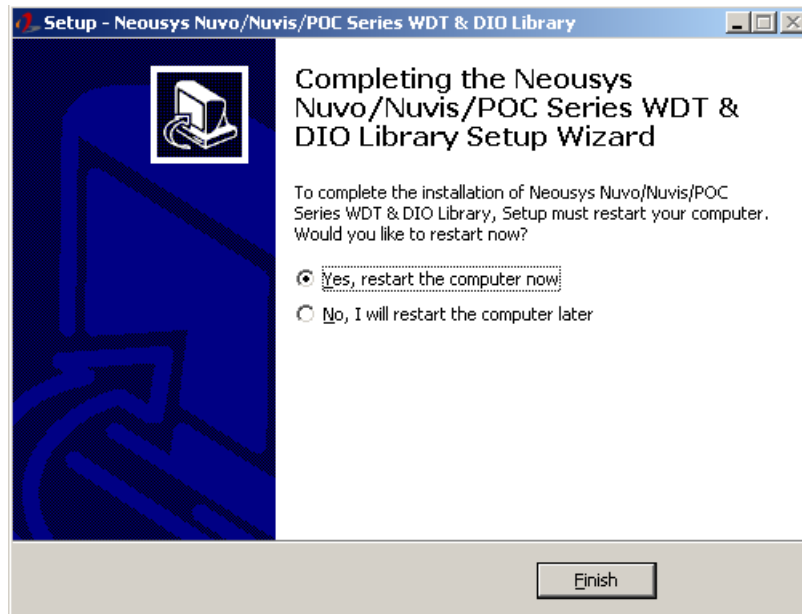


2. Click "Next >" and specify the directory of installing related files. The default directory is **C:\Neosys\WDT\_DIO**.





- Once the installation has finished, a dialog will appear to prompt you to reboot the system. The WDT & DIO library will take effect after the system has rebooted.



- When programming your WDT or DIO program, the related files are located in

|                      |  |
|----------------------|--|
| <b>Header File:</b>  | \Include                                   |
| <b>Library File:</b> | \Lib                                       |
| <b>Function</b>      | \Manual                                    |
| <b>Reference:</b>    |  |
| <b>Sample Code:</b>  | \Sample\WDT_Demo (Demo for Watchdog Timer) |

## WDT Functions

### InitWDT

|                     |   |
|---------------------|---|
| <b>Syntax</b>       | BOOL InitWDT(void);   |
| <b>Description:</b> | Initialize the WDT function. You should always invoke InitWDT() before set or start watchdog timer. |
| <b>Parameter</b>    | None  |
| <b>Return Value</b> | <b>TRUE:</b> Successfully initialized<br><b>FALSE:</b> Failed to initialize                         |
| <b>Usage</b>        | BOOL    bRet = InitWDT()  |

### SetWDT

|                     |   |
|---------------------|---|
| <b>Syntax</b>       | BOOL SetWDT(WORD tick, BYTE unit);  |
| <b>Description</b>  | Set timeout value and unit for watchdog timer. When InitWDT() is invoked, a default timeout value of 255 seconds is assigned.   |
| <b>Parameter</b>    | <i>tick</i><br>WORD value (1 ~ 65535) to indicate timeout ticks.<br><i>unit</i><br>BYTE value (0 or 1) to indicate unit of timeout ticks.<br>0 : unit is minute<br>1 : unit is second |
| <b>Return Value</b> | If value of unit is correct (0 or 1), this function returns TRUE, otherwise FALSE.  |
| <b>Usage</b>        | WORD    tick=255;<br>BYTE    unit=1; //unit is second.<br>BOOL    bRet = SetWDT(tick, unit); //timeout value is 255 seconds   |

### StartWDT

|                     |   |
|---------------------|---|
| <b>Syntax</b>       | BOOL StartWDT(void);  |
| <b>Description</b>  | Starts WDT countdown. Once started, the WDT LED indicator will begin blinking. If ResetWDT() or StopWDT is not invoked before WDT countdowns to 0, the WDT expires and the system resets. |
| <b>Parameter</b>    | None  |
| <b>Return Value</b> | If the timeout value is given in correct format (WDT started), this function returns TRUE, otherwise FALSE  |
| <b>Usage</b>        | BOOL bRet = StartWDT()  |

### ResetWDT

|                     |   |
|---------------------|---|
| <b>Syntax</b>       | BOOL ResetWDT(void);  |
| <b>Description</b>  | Reset the timeout value to the value given by SetWDT().If ResetWDT() or StopWDT is not invoked before WDT countdowns to 0, the WDT expires and the system resets. |
| <b>Parameter</b>    | None  |
| <b>Return Value</b> | Always returns TRUE   |
| <b>Usage</b>        | BOOL bRet = ResetWDT()  |

### StopWDT

|                     |   |
|---------------------|---|
| <b>Syntax</b>       | BOOL StopWDT(void);   |
| <b>Description</b>  | Stops the countdown of WDT. When WDT has stopped, the WDT LED indicator stops blinking. |
| <b>Parameter</b>    | None  |
| <b>Return Value</b> | Always returns TRUE   |
| <b>Usage</b>        | BOOL bRet = StopWDT()   |

# Appendix B PoE On/ Off Control

Nuvo-7000series offer 802.3at PoE+ ports and users are allowed to manually turn on or off the power supply of each PoE port. This can be useful in power device (PD) fault-recovery or power reset. The APIs are part of Neosys WDT\_DIO driver package. Please follow the instructions in [Appendix A Watchdog Timer & Isolated DIO](#) for installation before programming PoE on/off control function.

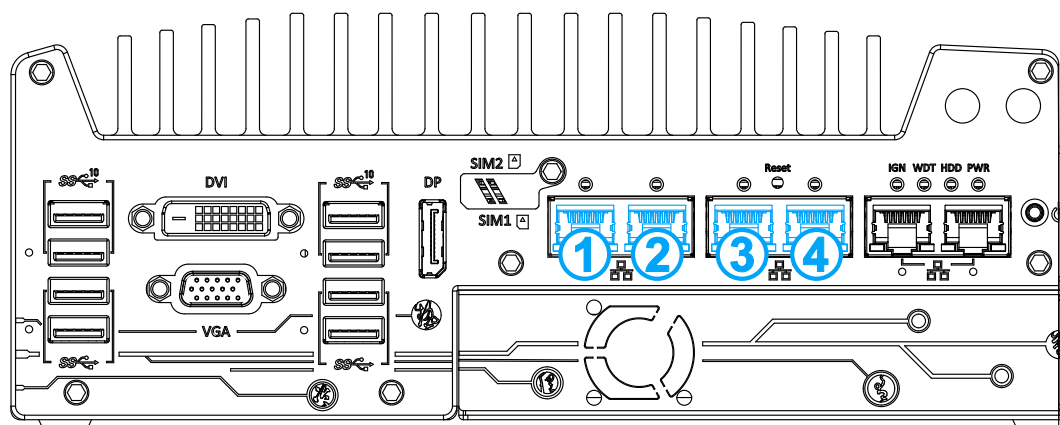


**NOTE**

Nuvo-7000E/P series will be shown in illustrations for demonstration purposes.

## GetStatusPoEPort

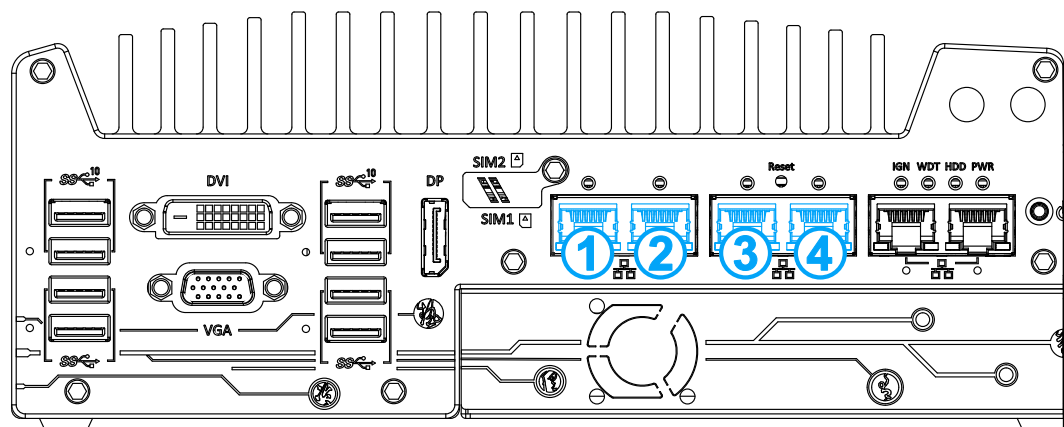
|                     |   |
|---------------------|---|
| <b>Syntax</b>       | BYTE GetStatusPoEPort (Byte port);  |
| <b>Description</b>  | Get current on/off status of designated PoE port.   |
| <b>Parameter</b>    | <i>port</i><br><br>BYTE value specifies the index of PoE port. Please refer to the following illustration, <i>port</i> should be a value of 1 ~ 4 |
| <b>Return Value</b> | BYTE value indicating PoE on/off status<br>0 if port is disabled (off)<br>1 if port is enabled (on)   |
| <b>Usage</b>        | BYTE bEnabled = GetStatusPoEPort (1); //Get on/off status of PoE Port#1   |



**PoE+ ports on the front panel.**

## EnablePoEPort

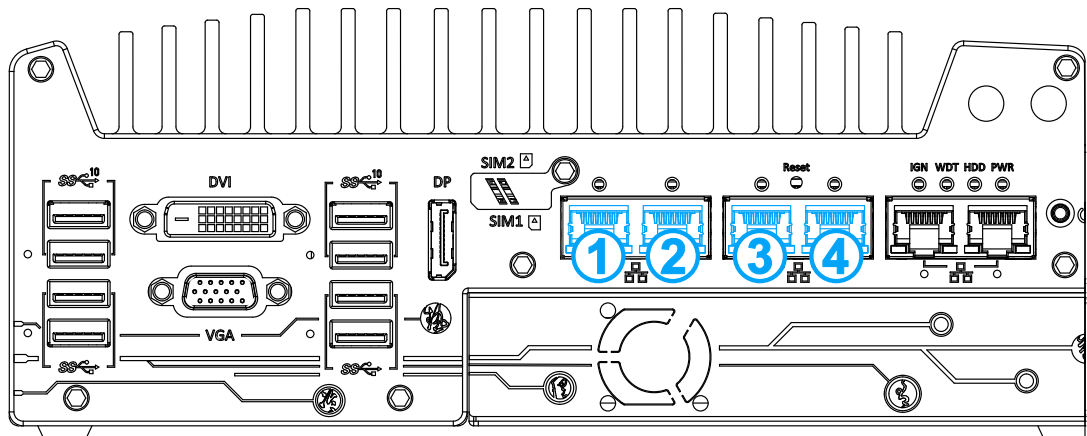
|                     |  |
|---------------------|--|
| <b>Syntax</b>       | BOOL EnablePoEPort (BYTE port);  |
| <b>Description</b>  | Turn on PoE power of designated PoE port.  |
| <b>Parameter</b>    | <p><i>port</i></p> <p>BYTE value specifies the index of PoE port. Please refer to the following illustration, <i>port</i> should be a value of 1 ~ 4</p> |
| <b>Return Value</b> | <p><b>TRUE</b> if enabled success</p> <p><b>FALSE</b> if fail to enable.</p>   |
| <b>Usage</b>        | BOOL bRet = EnablePoEPort (1); //Turn on PoE Port#1  |



PoE+ ports on the front panel.

## DisablePoEPort

|                     |   |
|---------------------|---|
| <b>Syntax</b>       | BOOL DisablePoEPort (BYTE port);  |
| <b>Description</b>  | Turn off PoE power of designated PoE port   |
| <b>Parameter</b>    | <i>port</i><br><br>BYTE value specifies the index of PoE port. Please refer to the following illustration, <i>port</i> should be a value of 1 ~ 4 |
| <b>Return Value</b> | <b>TRUE</b> if disabled success<br><b>FALSE</b> if fail to disable  |
| <b>Usage</b>        | BOOL bRet = DisablePoEPort (1); //Turn off PoE Port#1   |



PoE+ ports on the front panel