

# **Neosys Technology Inc.**

**Nuvo-2700DS**

**User Manual**

Revision 1.1

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# Legal Information

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For questions in regards to hardware/ software compatibility, customers should contact Neosys Technology Inc. sales representative or technical support.

To the extent permitted by applicable laws, Neosys Technology Inc. shall NOT be responsible for any interoperability or compatibility issues that may arise when (1) products, software, or options not certified and supported; (2) configurations not certified and supported are used; (3) parts intended for one system is installed in another system of different make or model.

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# Declaration of Conformity

**FCC**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

---

**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.

# Copyright Notice

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## **Disclaimer**

This manual is intended to be used as an informative guide only and is subject to change without prior notice. It does not represent commitment from Neosys Technology Inc. Neosys Technology Inc. shall not be liable for any direct, indirect, special, incidental, or consequential damages arising from the use of the product or documentation, nor for any infringement on third party rights.

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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
- By means of a power cord connected to a socket-outlet with earthing connection
- This product is intended to be supplied by a Listed Power Adapter or DC power source, rated 24Vdc, 16A, Tma 60 degree C and 5000m altitude during operation. If further assistance is required, please contact Neousys Technology
- If the system is not going to be used for a long time, disconnect it from mains (power socket) to avoid transient over-voltage

## Hot Surface Warning



*HOT SURFACE. DO NOT TOUCH.* "ATTENTION: Surface chaude. Ne pas toucher."

### WARNING!

Components/ parts inside the equipment may be hot to touch!  
Please wait one-half hour after switching off before handling parts.

## Battery Warning

**Caution!**



- Batteries are at risk of exploding if incorrectly installed
- Do not attempt to recharge, force open, or heat the battery
- Replace the battery only with the same or equivalent type recommended by the manufacturer

# 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

# Restricted Access Location

The controller is intended for installation only in certain environments where both of the following conditions apply:

- Access can only be gained by **QUALIFIED SERVICE PERSONNEL** who have been instructed on the reasons for restrictions applied to the location and any precautions that shall be taken
- Access is through the use of a **TOOL**, lock and key, or other means of security, and is controlled by the authority responsible for the location

# About This Manual

This guide introduces Neosys Nuvo-2700DS system featuring the AMD Ryzen Embedded V1605B CPU and Vega GPU. It is a compact fanless 4K interactive digital signage system supporting two Google Edge TPUs.

The guide also demonstrates the system's basic installation procedures.

## Revision History

Version	Date	Description
1.0	May, 2021	Initial release
1.1	Feb, 2023	Updated DIO information

# 1 Introduction

Nuvo-2700DS series is a rugged digital signage system with AI inference capability for the personalized user experience and audience measurement. Powered by AMD Ryzen™ Embedded V1605B, it offers four 4K display and 4K 60fps H.265 video playback. By supporting two Google Edge TPU, it delivers a total of 8 TOPS AI inference performance in a fanless, compact form factor.



The wide operating temperature and fanless design make it ideal for 24/7 applications in harsh indoor and outdoor environments, such as flight information display system (FIDS) or train schedule board on the platform. Furthermore, Nuvo-2700DS is perfect for stationary or mobile applications due to ignition power control and full bandwidth support of WIFI 6, 4G LTE, and 5G network modules.

The support of two Google Edge TPUs empower Nuvo-2700DS as a smart digital signage player. By leveraging real-time camera input and AI computer vision models, e.g., YOLO-lite or PoseNet, Nuvo-2700DS can offer audiences an interactive and personalized experience. Besides, it generates a solid audience understanding by collecting anonymous data from people counting, body gesture recognition, facial recognition, attention measurement, and emotion analysis.

The Nuvo-2700DS series signifies an AI enabled digital signage player for harsh environments and mobile applications. While using Nuvo-2700DS as a video wall player, the crisp HDR image creates an ultra high definition and impressive visual impact. Also, Nuvo-2700DS is a low power fanless Edge AI platform for emerging AI applications. With the AI inference capability from Edge TPU, Nuvo-2700DS creates an interactive, personalized experience, moreover, makes offline campaign performance measurable.

# 1.1 Product Specifications

## 1.1.1 Nuvo-2700DS

<b>System Core</b>	
<b>Processor</b>	AMD Ryzen™ Embedded V1605B CPU (4C/ 8T, 2M Cache, 2.0/ 3.6 GHz, 12W - 25W TDP)
<b>Graphics</b>	Vega GPU with 8 compute units
<b>Memory</b>	Up to 64 GB DDR4 2400 SDRAM (two SODIMM slots)
<b>I/O Interface</b>	
<b>Ethernet</b>	2x Gigabit Ethernet ports by 2x Intel I210® controller
<b>USB</b>	2x USB 3.1 Gen1 (5 Gbps) ports 2x USB 2.0
<b>Video Port</b>	4x DisplayPort, supporting 4K UHD resolution
<b>Serial Port</b>	2x RS-232 (COM1 in RJ50, COM2 in DB9)
<b>Audio</b>	1x 3.5 mm jack for mic-in and speaker-out
<b>Storage Interface</b>	
<b>M.2</b>	1x M.2 3042/3052 B key (USB 3.1 Gen 1 + USB 2.0) for 4G/5G Module 1x M.2 2230 E key (PCIe Gen3 x1 + USB 2.0) for WIFI Module
<b>Internal Expansion Bus</b>	
<b>Mini PCI Express</b>	2x half-size mini PCI Express socket for Google Edge TPU
<b>SIM</b>	1x Micro SIM card slot
<b>Power Supply</b>	
<b>DC Input</b>	1x mini-DIN for 12V DC input or 1x 3-pin pluggable terminal block for 8V to 35V DC input (IGN/ GND/ V+)
<b>Max. Power</b>	CPU set to 15W mode: Max. consumption is 21.7W @ 35V
<b>Mechanical</b>	
<b>Dimension</b>	173 mm (W) x 174 mm (D) x 50 mm (H)
<b>Weight</b>	1.6 kg
<b>Mounting</b>	Wall-mount (optional)
<b>Environmental</b>	
<b>Operating Temperature</b>	-25°C ~ 70°C*
<b>Storage Temperature</b>	-40°C ~ 85°C*
<b>Humidity</b>	10%~90% , non-condensing
<b>Vibration</b>	Operating, MIL-STD-810G, Method 514.7, Category 4
<b>Shock</b>	Operating, MIL-STD-810G, Method 516.7, Procedure I
<b>EMC</b>	CE/ FCC Class A, according to EN 55032 & EN 55035

\* For sub-zero and over 60°C operating temperature, a Solid State Disk (SSD) is required.

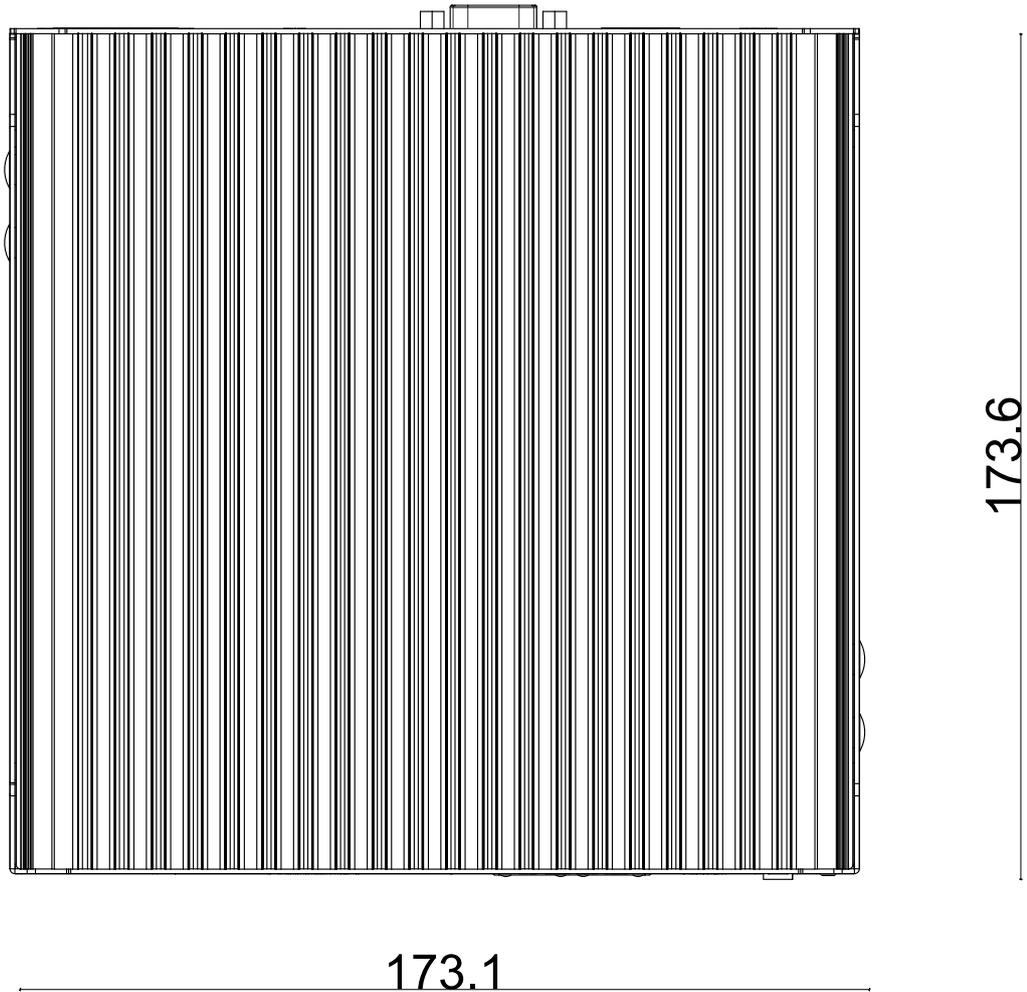
## 1.2 Dimension



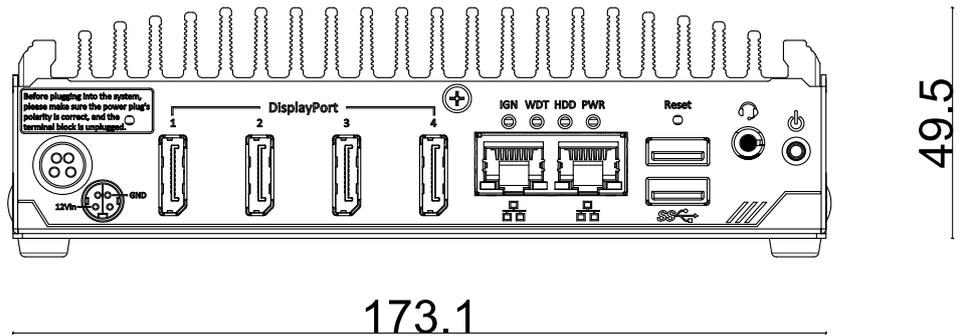
### NOTE

*All measurements are in millimeters (mm).*

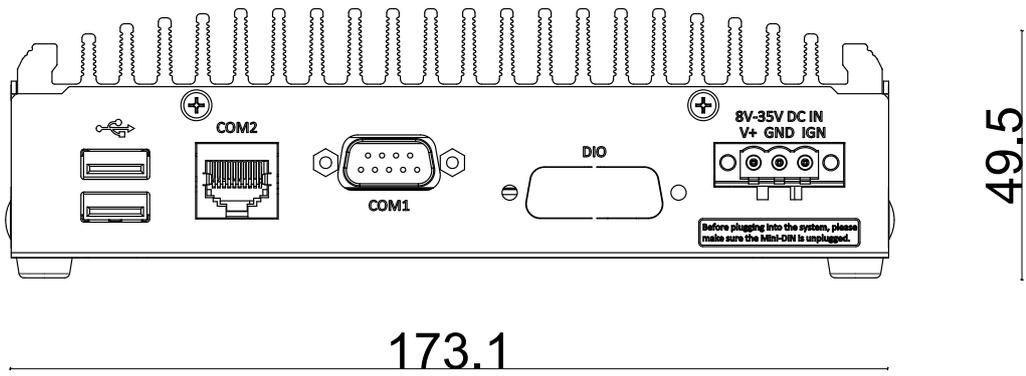
### 1.2.1 Top View of Nuvo-2700DS



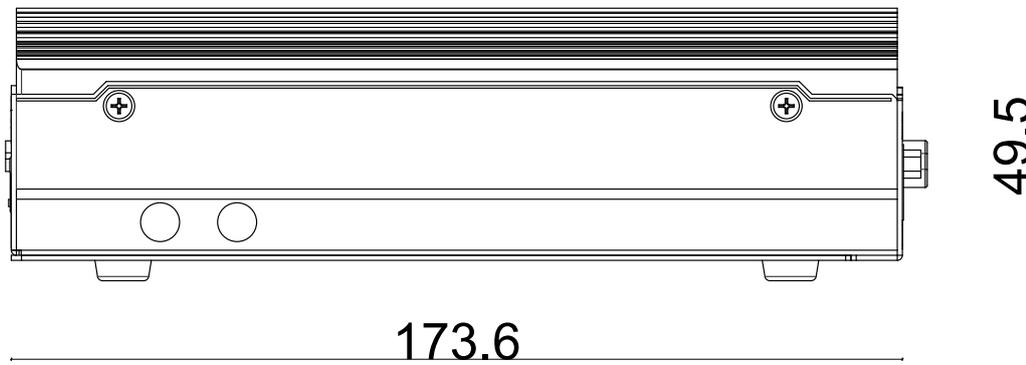
### 1.2.2 Front View of Nuvo-2700DS



### 1.2.3 Rear View of Nuvo-2700DS

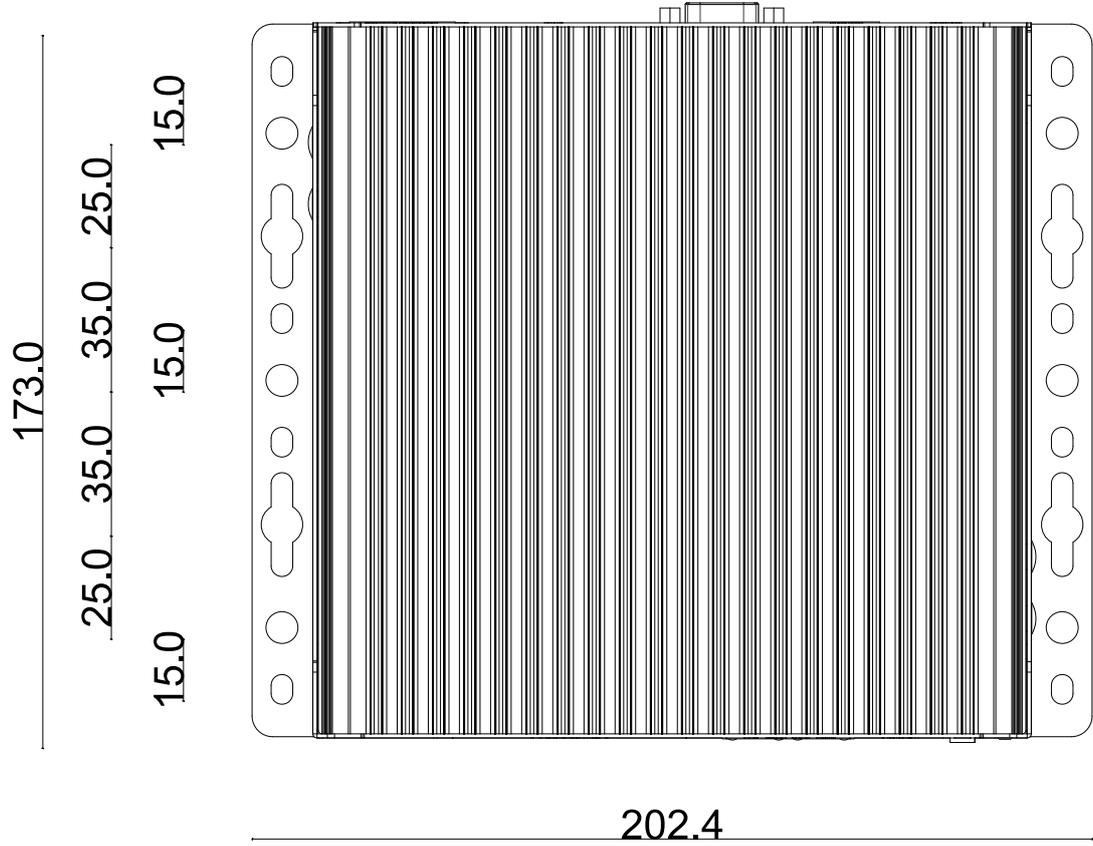


### 1.2.4 Side View of Nuvo-2700DS

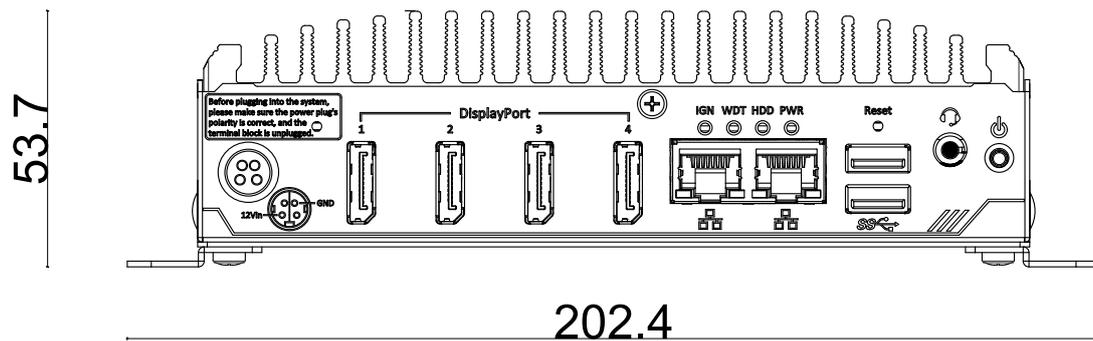


### 1.3 Wall-mount Installed Dimensions

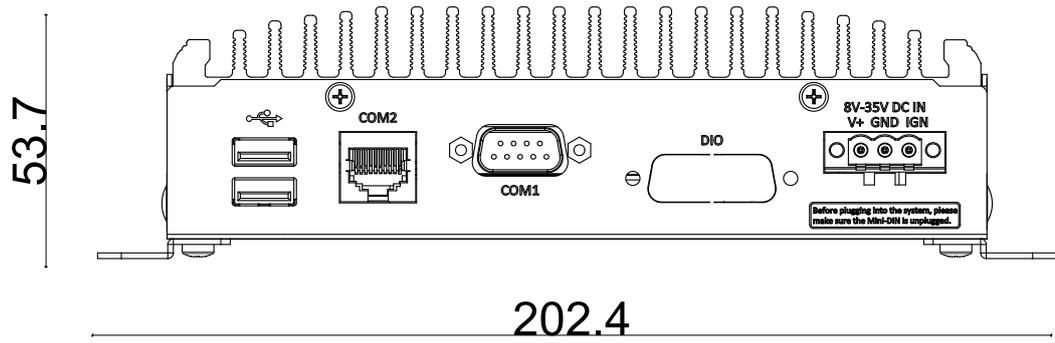
#### 1.3.1 Top View with Wall-mount Installed



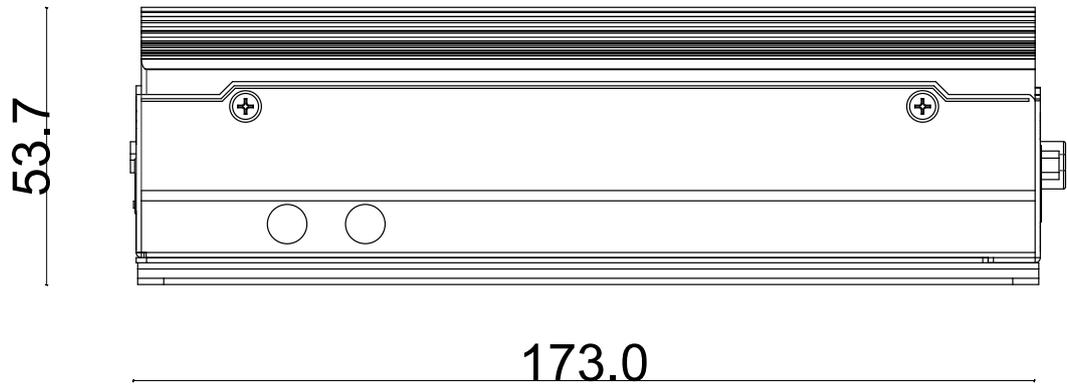
#### 1.3.2 Front View with Wall-mount Installed



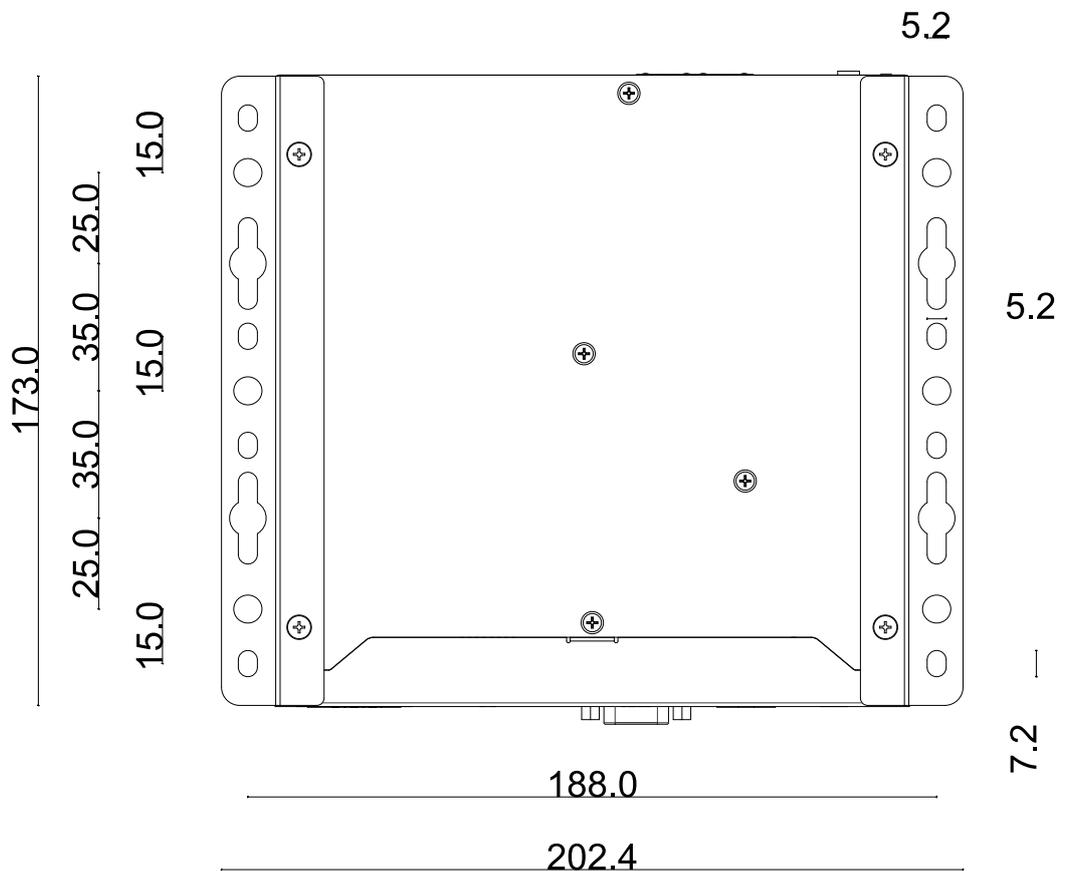
### 1.3.3 Rear View with Wall-mount Installed



### 1.3.4 Side View with Wall-mount Installed



### 1.3.5 Bottom View with Wall-mount Installed



## 2 System Overview

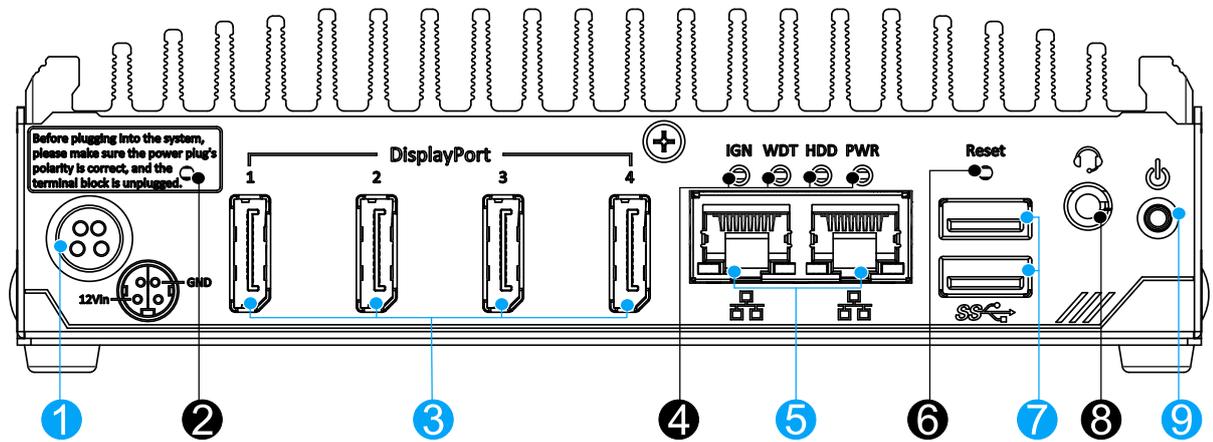
Upon receiving and unpacking your Nuvo-2700DS, please check immediately if the package contains all the items listed in the following table. If any item(s) are missing or damaged, please contact your local dealer or Neousys Technology.

### 2.1 Nuvo-2700DS Packing List

System Pack	Nuvo-2700DS	Qty
1	Nuvo-2700DS (If you ordered RAM/ SSD or HDD, please verify these items)	1
2	Accessory box, which contains <ul style="list-style-type: none"> <li>● 3-pin power terminal block</li> <li>● Neousys drivers &amp; utilities DVD</li> <li>● Wall mount assembly (optional)</li> </ul>	1 1 2

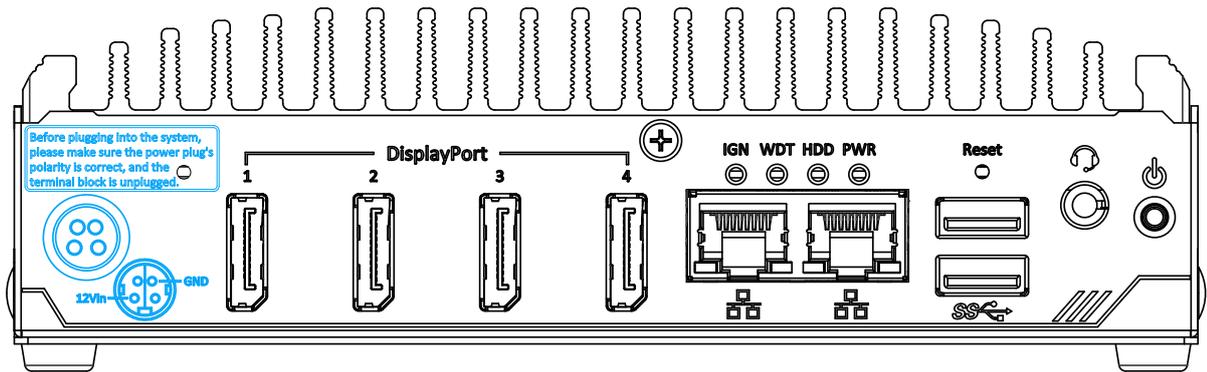
## 2.2 Front Panel I/O

The Nuvo-2700DS I/O panel features two gigabit Ethernet, two USB3.1 Gen1, four DisplayPort ports.



No.	Item	Description
1	<a href="#">DC input</a>	Mini DIN for 12V DC input
2	<a href="#">CMOS reset</a>	Use this button to manually reset the CMOS
3	<a href="#">DisplayPort</a>	The four DisplayPort ports support 4K UHD resolution per port.
4	<a href="#">System status LEDs</a>	Four system LEDs, ignition (IGN), watchdog timer (WDT), hard disk drive (HDD) and power (PWR).
5	<a href="#">Ethernet port</a>	The two Ethernet ports support 10/ 100/ 1000Mbps network connections.
6	<a href="#">Reset button</a>	Use this button to manually reset the system.
7	<a href="#">USB 3.1 Gen1 port</a>	USB 3.0 port supports up to 5 Gbit/s data transfer bandwidth.
8	<a href="#">3.5mm 4-pole audio jack</a>	The 4-pole 3.5mm jack accepts microphone voice input and headphone speaker sound output.
9	<a href="#">Power button</a>	Use this button to turn on or shutdown the system.

## 2.2.1 DC Input

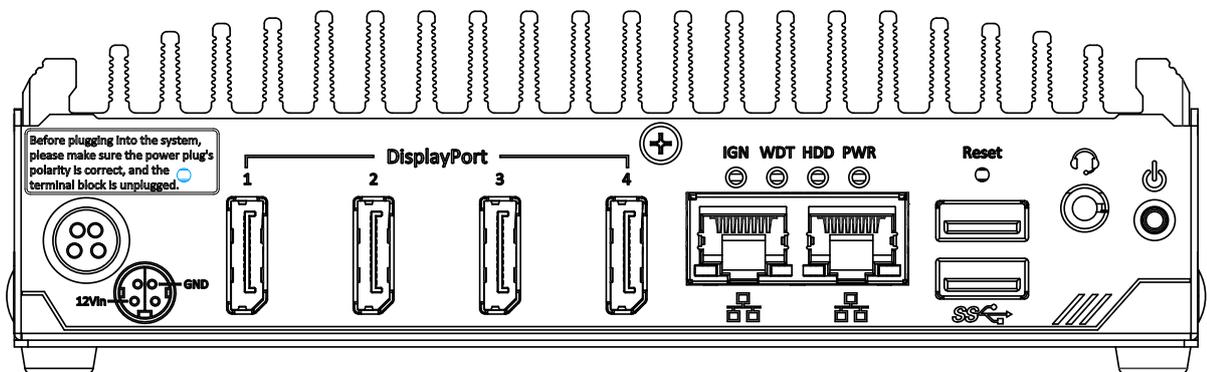


The system accepts a DC power input of 12V. DO NOT plug in the 12V DC connector and the 3-pin terminal connector. The system only requires one or the other for operation.

 **WARNING**

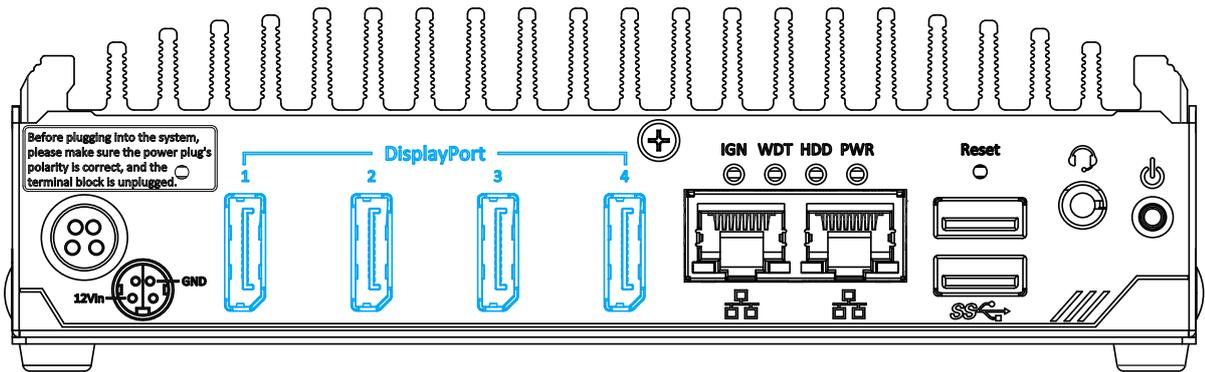
*Please make sure the voltage of DC power is correct before you connect it to the system. Supplying a voltage over 12V will damage the system.*

## 2.2.2 CMOS Reset Button



The CMOS Reset button is used to manually reset the motherboard BIOS in case of system halt or malfunction. To avoid unexpected operation, it is purposely placed behind the panel. To reset, please use the tip of a pen, press and hold for at least 5 seconds to reset the BIOS.

### 2.2.3 DisplayPort



The system has four DisplayPort (DP) outputs which are digital display interfaces 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.



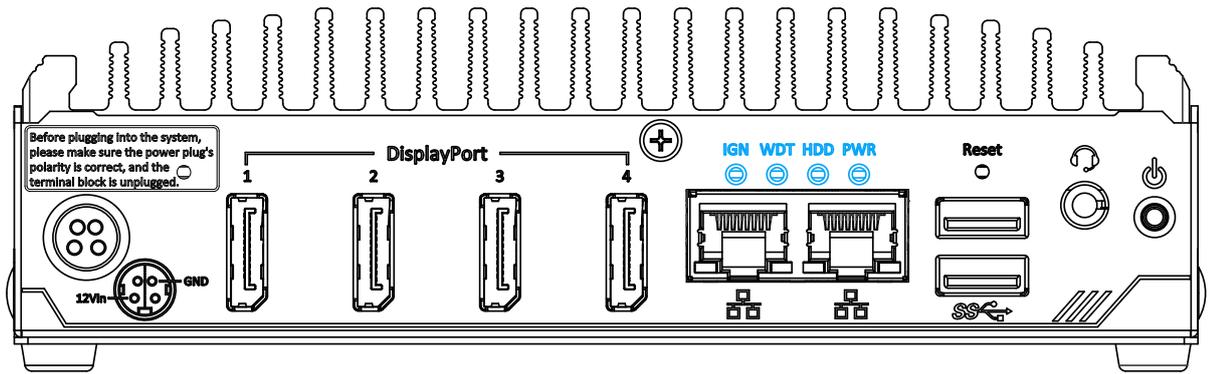
**DP-to-HDMI**



**DP-to-DVI**

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

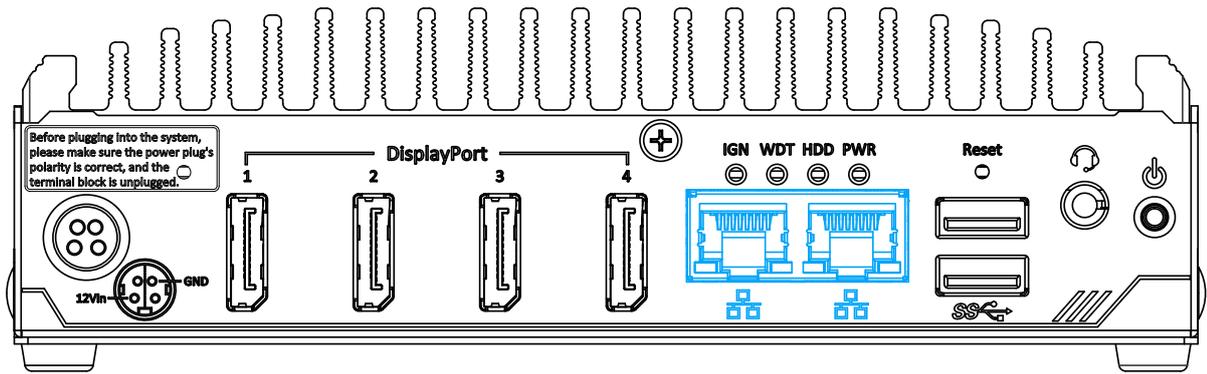
## 2.2.4 System Status LED



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

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

## 2.2.5 Ethernet Port



The system offers two GbE ports implemented with Intel® I210-IT controllers. Each port has one dedicated PCI Express link for maximum performance. When an Ethernet connection is established, the LED indicators on the RJ45 connector represents the following connection statuses:

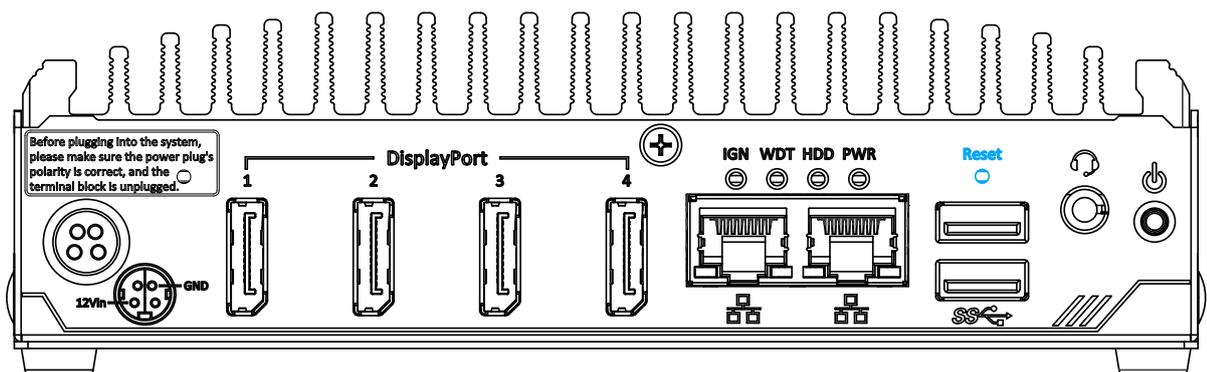
### Active/Link LED

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

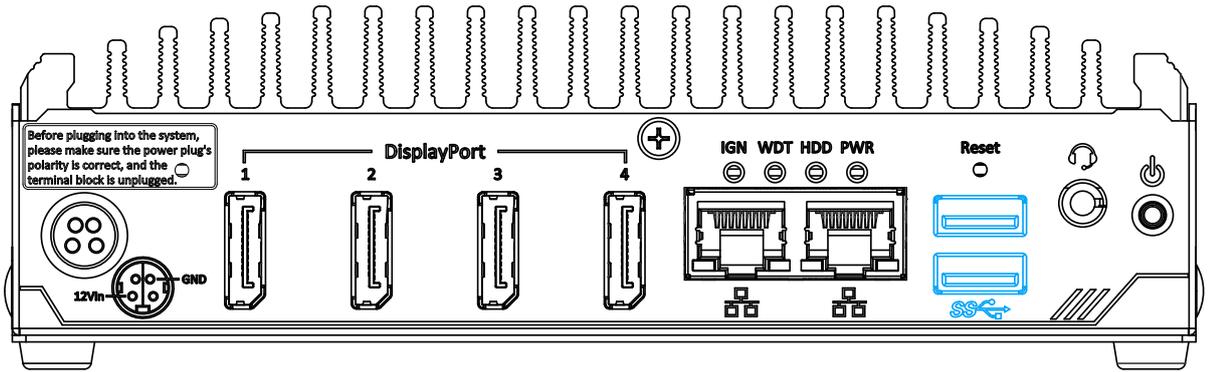
LED Color	Status	Description
Green or Orange	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

## 2.2.6 Reset Button



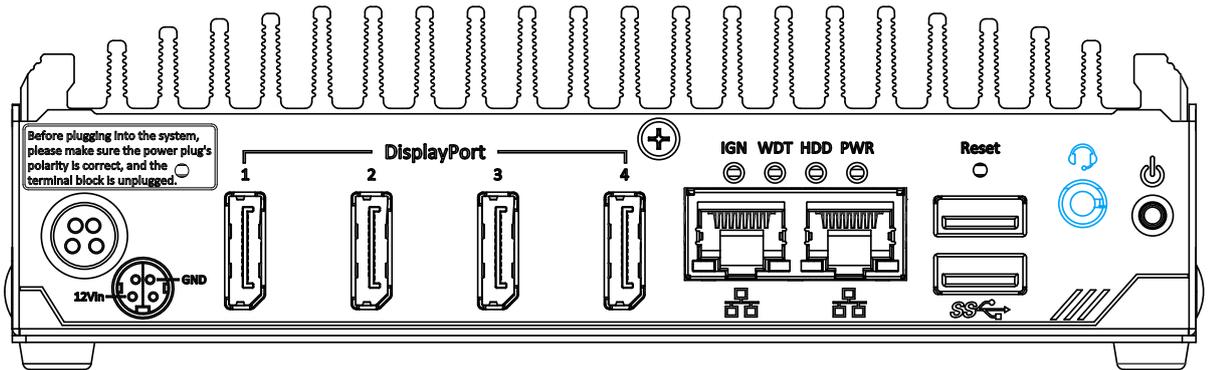
The reset button can be used to manually reset the system in case of abnormal condition. To avoid unexpected operation, the reset button is hidden behind the front panel. You need to use a pin-like object to push the reset button.

### 2.2.7 USB3.1 Gen1 Ports



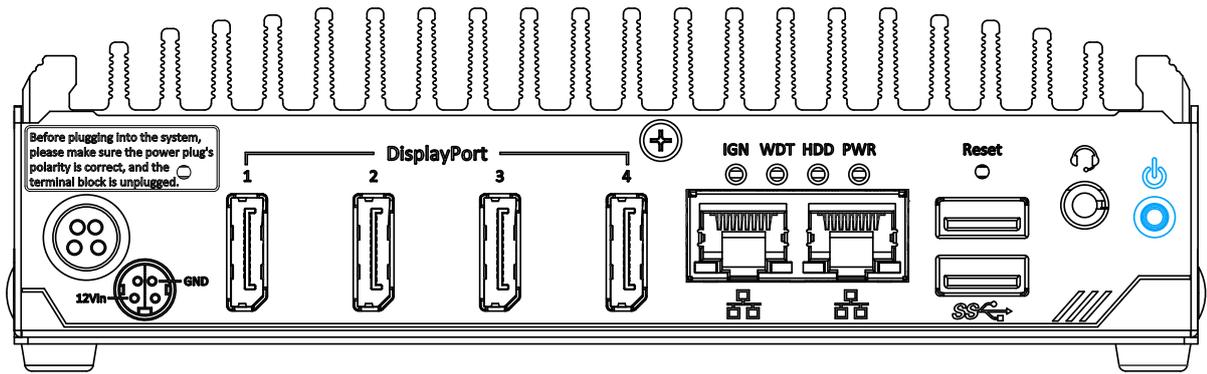
The system offers two USB 3.1 Gen1 (SuperSpeed USB) ports on its front panel with screw-lock mechanism. They are backward-compatible with USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB support is also provided so you can use USB keyboard/mouse in DOS environment while USB 3.1 Gen1 driver is supported natively in Windows 10.

### 2.2.8 3.5mm 4-pole Audio Jack



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. Please refer to the section, [Driver Installation](#).

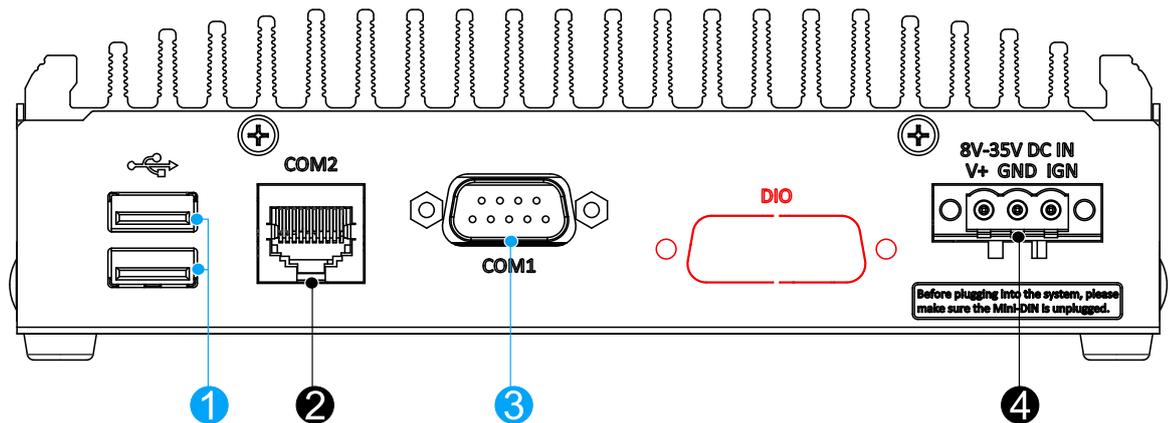
## 2.2.9 Power Button



The power button is a non-latched switch for ATX mode on/off operation. Press to turn on the system, PWR LED should light up and to turn off, you can either issue a shutdown command in the OS, or just press the power button. In case of system halts, you can press and hold the power button for 5 seconds to force-shutdown the system. Please note that there is a 5 seconds interval between two on/off operations (i.e. once turning off the system, you will need to wait for 5 seconds to initiate another power-on operation).

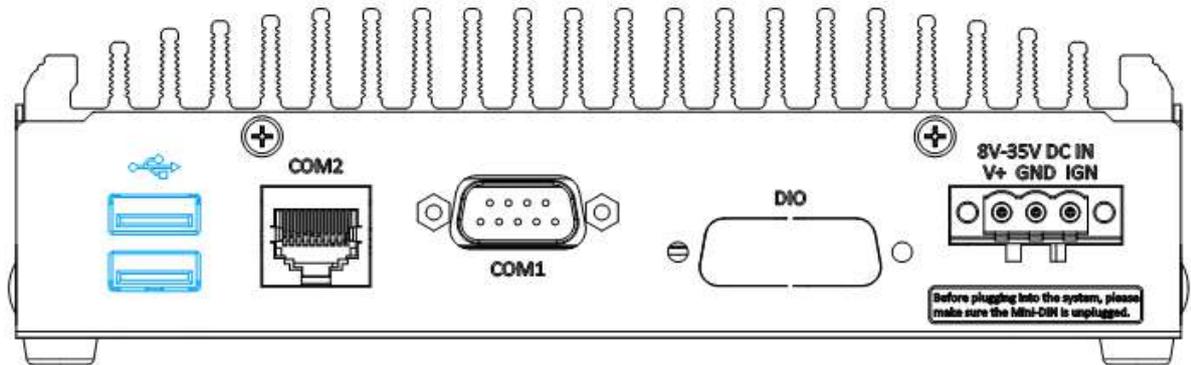
## 2.3 Rear Panel I/O

On the rear panel of the system, you will find a 3-pin terminal block for DC input, two configurable COM ports, on/ off control status output header, USB2.0 ports for legacy USB devices, a DisplayPort, a 4-pole female 3.5mm headphone (speaker)/ microphone jack and an optional isolated digital input/ output DB15 connector.



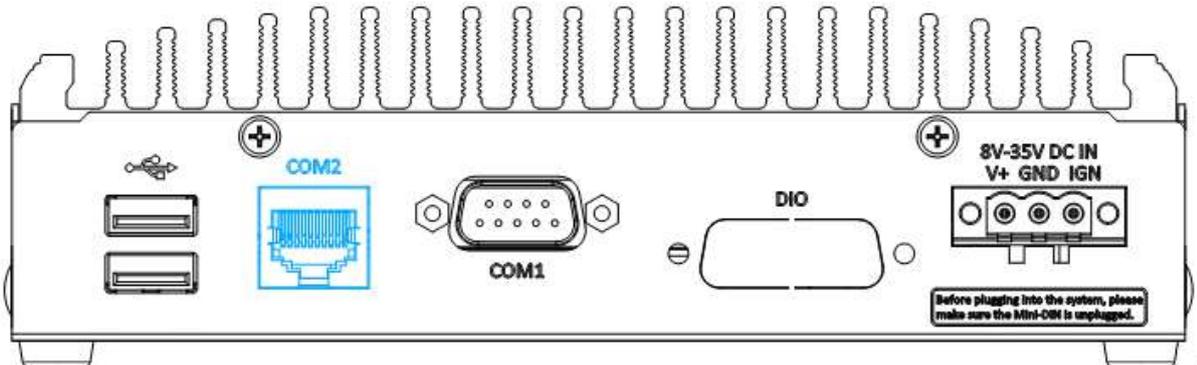
No.	Item	Description
1	<a href="#">USB 2.0 ports</a>	The USB 2.0 ports are backward with USB 1.1 / 1.0.
2	<a href="#">COM2 port</a>	RJ50 COM2 port
3	<a href="#">COM1 port</a>	DB9 COM1 port
4	<a href="#">3-pin terminal block (DC/ ignition input)</a>	Compatible with DC power input from 8-35V, the terminal block is also used for ignition signal input.
		The isolated digital input/ output DB15 opening is reserved. An optional "Cbl-IDC216F-DB15M-4.5CM" cable must be purchased, connected, and installed to enable DIO functions.

### 2.3.1 USB2.0 Ports



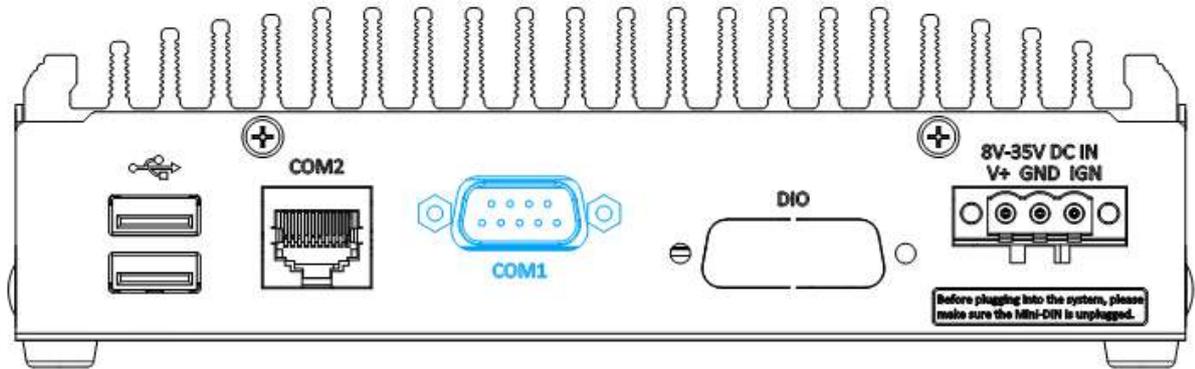
The system has two USB 2.0 ports. They are implemented by native xHCI (eXtensible Host Controller Interface) controller in H310 chipset and are compatible with USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB support is also provided so you can use USB keyboard/mouse in DOS environment.

### 2.3.2 COM2 Port



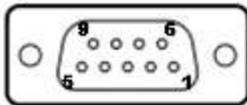
COM 2 port is a RS-232 port that uses an RJ 50 connection. The RJ 50 connection is designed to be compatible with existing digital signage players.

### 2.3.3 COM1 Port



The system provides two COM ports for communicating with external devices. COM1 port is an RS-232 port and you may refer to the following table for its pin definition.

#### COM Port Pin Definition

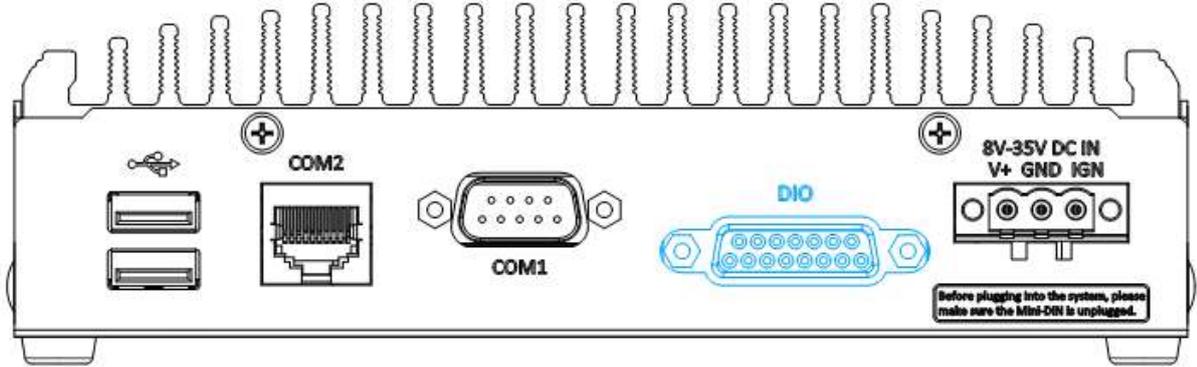


Pin#	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

### 2.3.4 Isolated Digital Input/Output (Optional)

 **NOTE**

An optional “Cbl-IDC216F-DB15M-4.5CM” cable must be purchased, connected and installed to enable DIO functions.



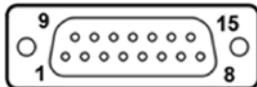
With the cable Cbl-IDC216F-DB15M-4.5CM” connected onto the motherboard, and female DB15 connector installed onto the panel, the digital input (DI) and digital output (DO) function provides four digital input and four digital output on the rear panel of the system.

#### Isolated Digital Input

No. of Channel	4-CH Isolated Digital Input Channels
Logic Level	Logic High: 5 to 24V Logic Low: 0 to 1.5V
Isolated Voltage	2500 Vrms
Input Resistance	1kΩ
Operation Mode	Polling

#### Isolated Digital Output

No. of Channel	4-CH Isolated Digital Output Channels
Sink Current (per channel)	500 mA
Isolated Voltage	1500 Vrms
Operation Mode	Polling

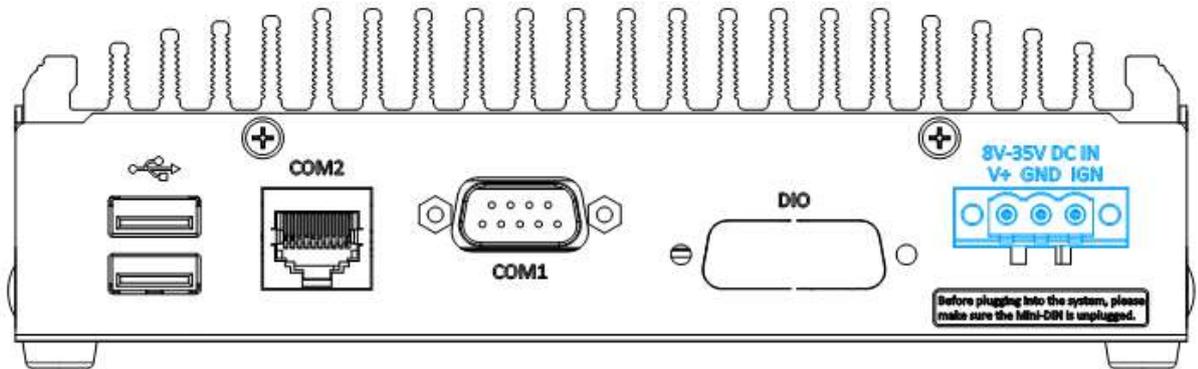


#### Pin Definition

Pin#	Pin Definition	Pin#	Pin Definition	Pin#	Pin Definition
1	DI_0	6	DO_1	11	DI_3
2	DI_1	7	DO_GND	12	DO_GND
3	DI_GND	8	VDD	13	DO_2
4	DO_GND	9	DI_GND	14	DO_3
5	DO_0	10	DI_2	15	-

\* When using DO0 ~ DO3, DOGND is the ground should be used.

### 2.3.5 3-pin Terminal Block DC Input



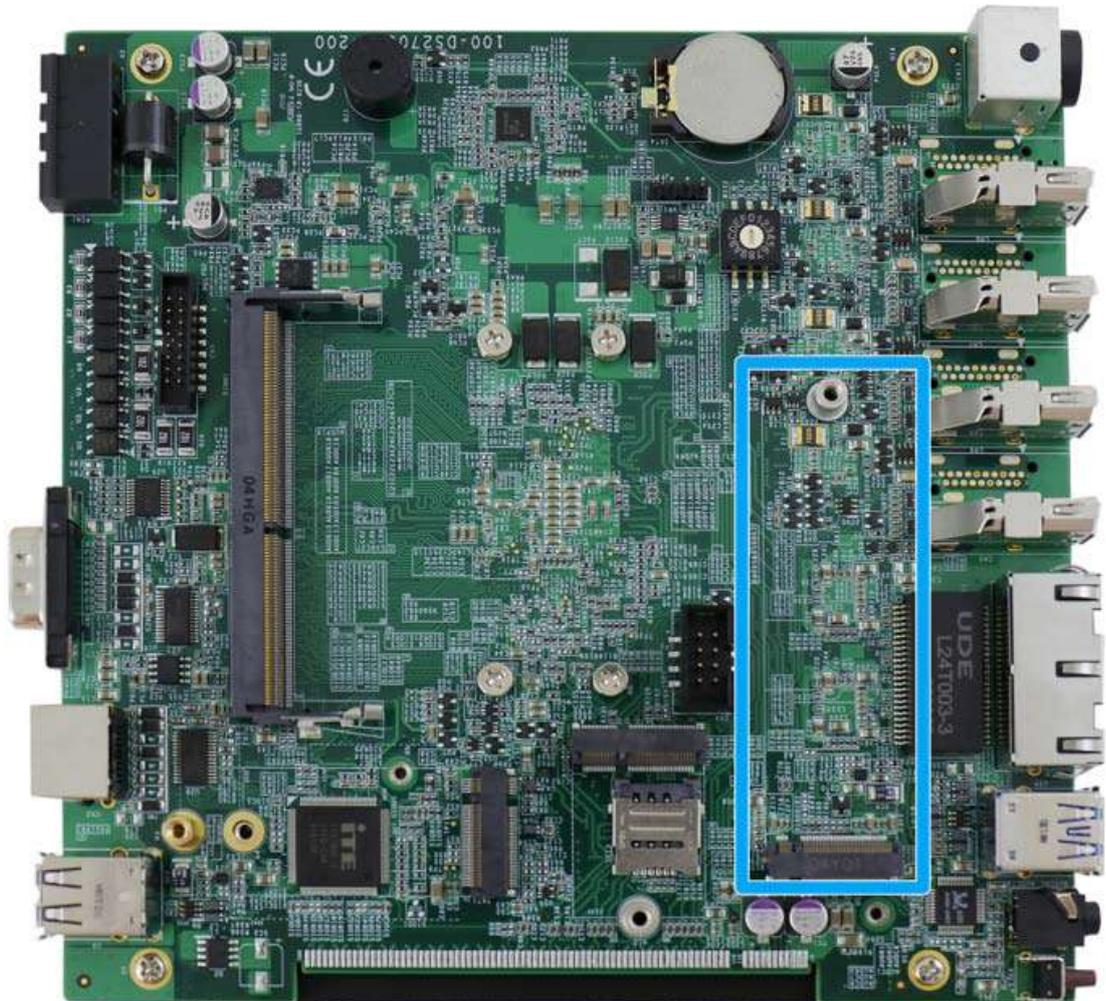
The system accepts a wide range of DC power input from 8 to 35V via a 3-pin pluggable terminal block, which is fit for field usage where DC power is usually provided. The screw clamping mechanism on the terminal block offers connection reliability when wiring DC power.

In addition to DC power input, this terminal block can also accept ignition signal input (IGN).

## 2.4 Internal I/O Functions

In addition to I/O connectors on the front panel, the system also provides internal on-board expansion slots. In this section, we'll illustrate these internal I/O functions.

### 2.4.1 M.2 2280 (SATA Signal Only) Slot for SSD



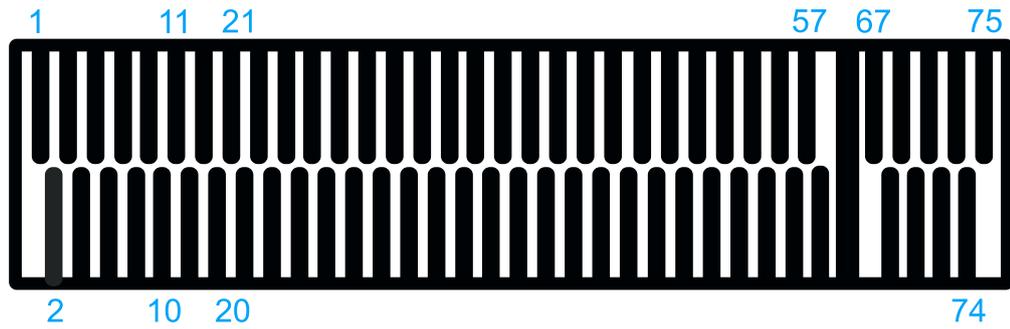
The system has an M.2 2280 slot (SATA signal only) for you to install an M.2 SATA SSD for faster access over traditional hard disk drives.



#### NOTE

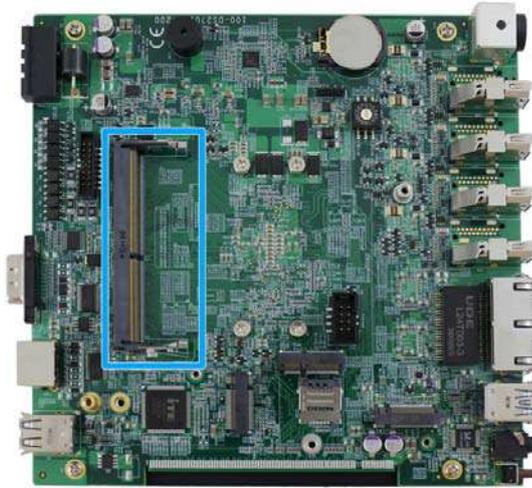
*The M.2 slot is only compatible with SATA signal M.2 SSD only.*

**M.2 2280 M Key Pin Definition**



Pin #	Signal	Pin #	Signal
1	GND	2	+3V3
3	GND	4	+3V3
5		6	-
7		8	-
9	GND	10	DAS/DSS N
11		12	+3V3
13		14	+3V3
15	GND	16	+3V3
17		18	+3V3
19		20	-
21	GND	22	-
23		24	-
25		26	-
27	GND	28	-
29		30	-
31		32	-
33	GND	34	-
35		36	DEVSLP
37		38	-
39	GND	40	-
41	SATA-B+	42	-
43	SATA-B-	44	-
45	GND	46	-
47	SATA-A-	48	-
49	SATA-A+	50	PERST N
51	GND	52	-
53		54	-
55		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		

## 2.4.2 Dual DRAM SO-DIMM Slot



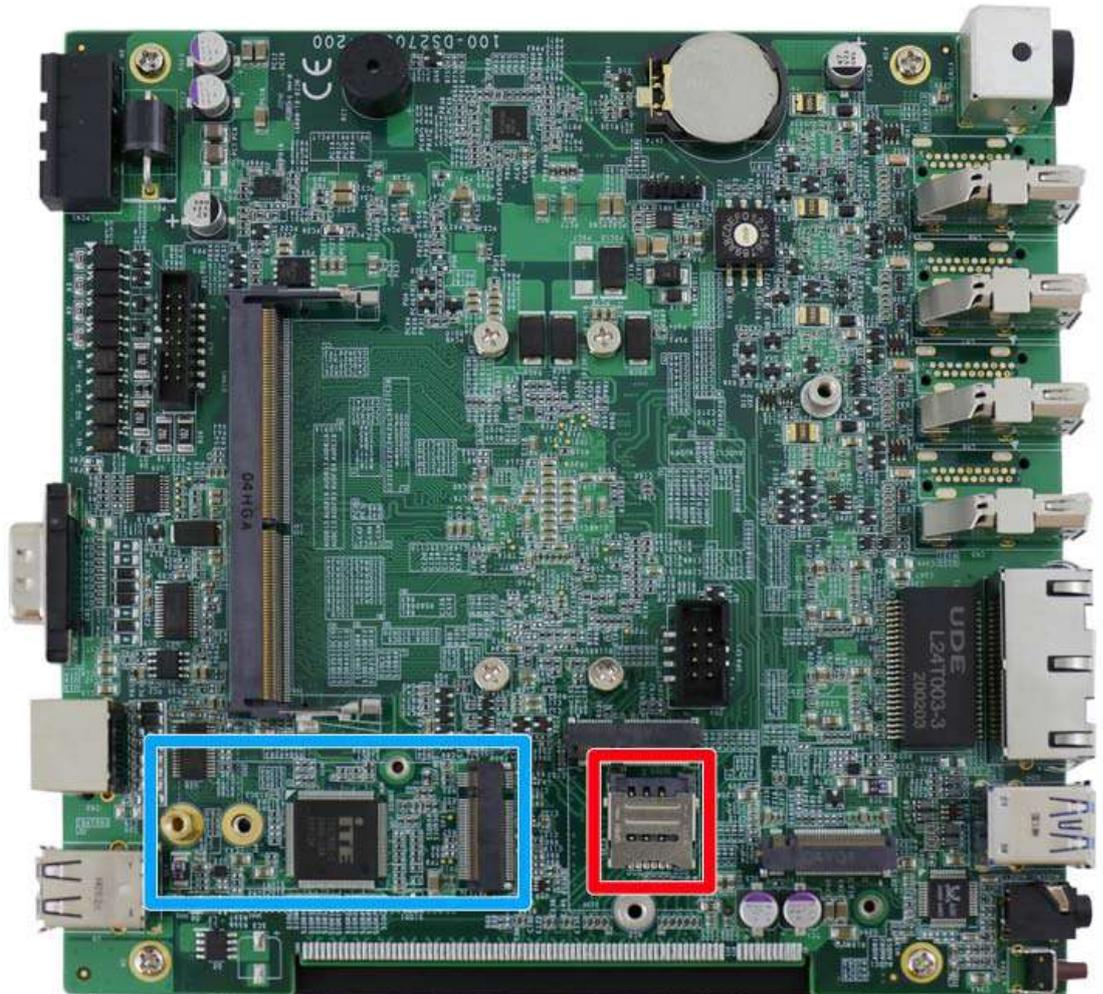
**DRAM slot, bottom panel side**



**DRAM slot, heatsink side**

The system motherboard supports two 260-pin SODIMM socket for installing two DDR4-2400 memory modules up to 64GB capacity.

### 2.4.3 M.2 3042/ 3052 B Key Socket



The system has one M.2 3042/ 3052 B key socket (in **blue**) with USB3.1 Gen 1 and USB 2.0 signal for 4G/ 5G module installation. There is also a corresponding micro-SIM SIM card slot (in **red**).

For SMA antenna installation, there are two dedicated openings located on both side of the chassis.

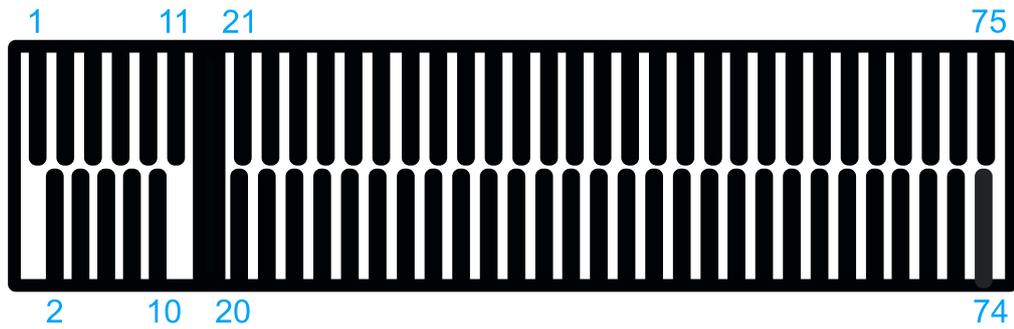


Left side of chassis



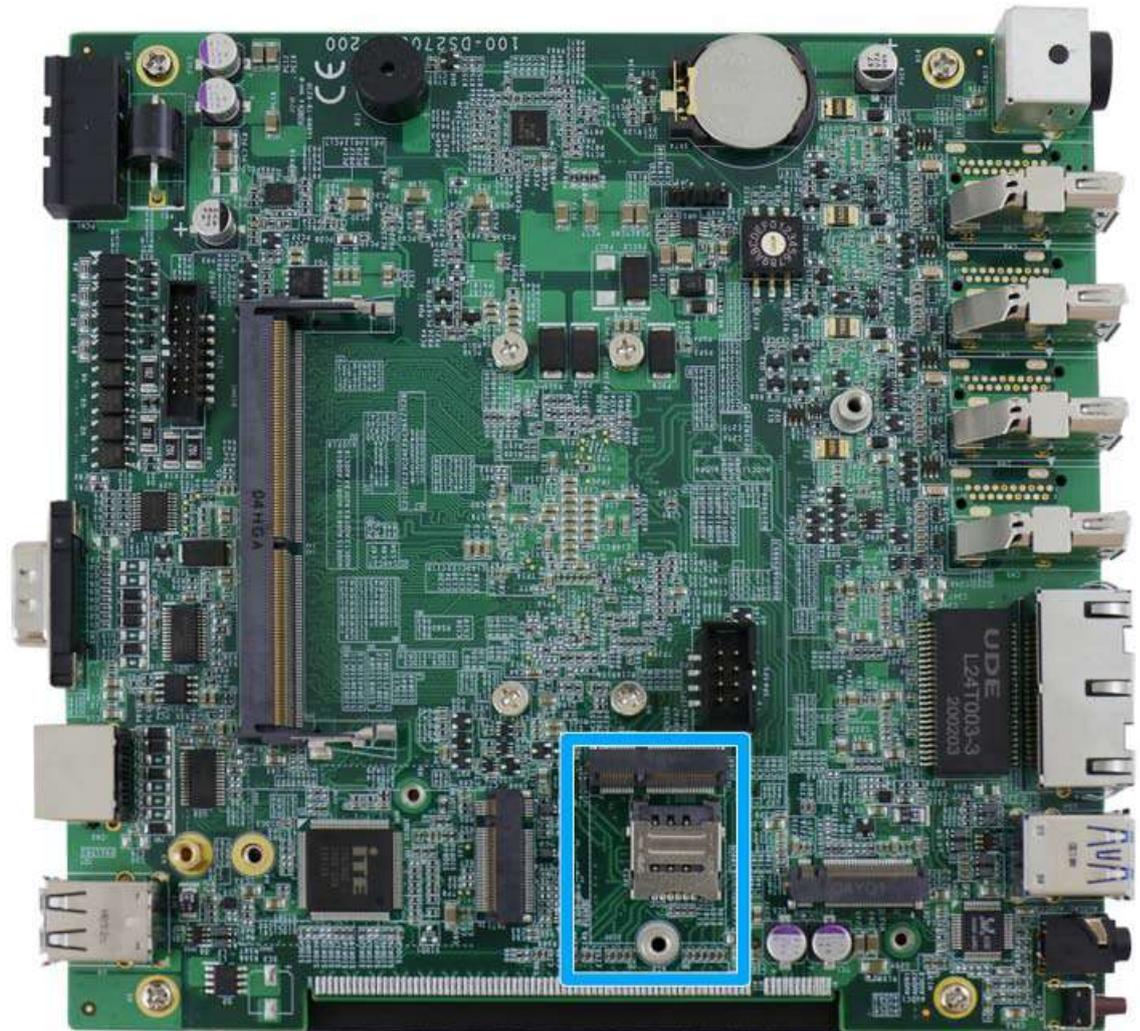
Right side of chassis

M.2 3042/ 3052 B Key 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		40	
43		42	
45	GND	44	
47		46	
49		48	
51	GND	50	PERST_N
53		52	-
55		54	-
57	GND	56	-
59	-	58	-
61	-	60	-
63	-	62	-
65	-	64	-
67	RESET_N	66	
69	CONFIG_1	68	-
71	GND	70	+3V3
73	GND	72	+3V3
75	-	74	+3V3

### 2.4.4 M.2 2230 E Key Socket



The system has an M.2 2230 E key socket that offers PCIe Gen3 x1 and USB2.0 signal for WiFi module installation.

For SMA antenna installation, there are two dedicated openings located on both side of the chassis.

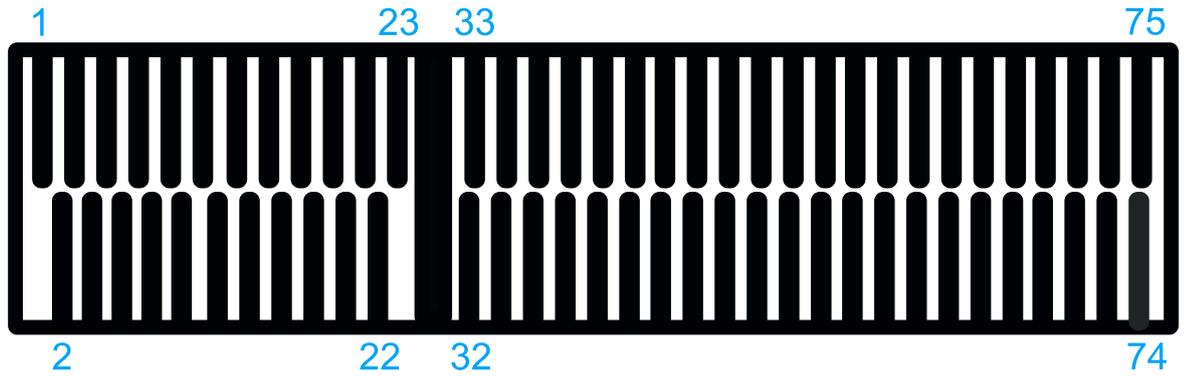


Left side of chassis



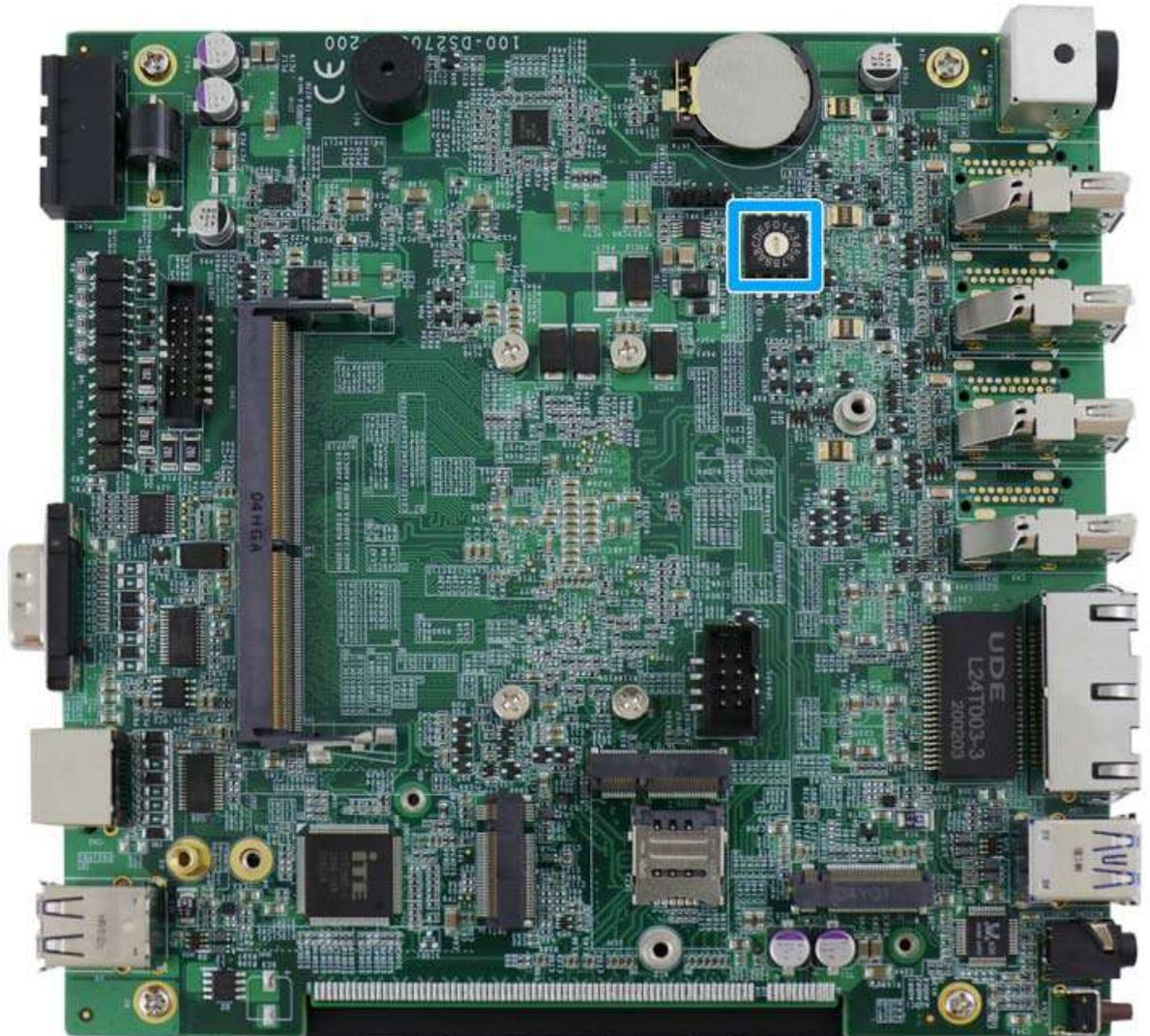
Right side of chassis

M.2 2230 E Key Pin Definition



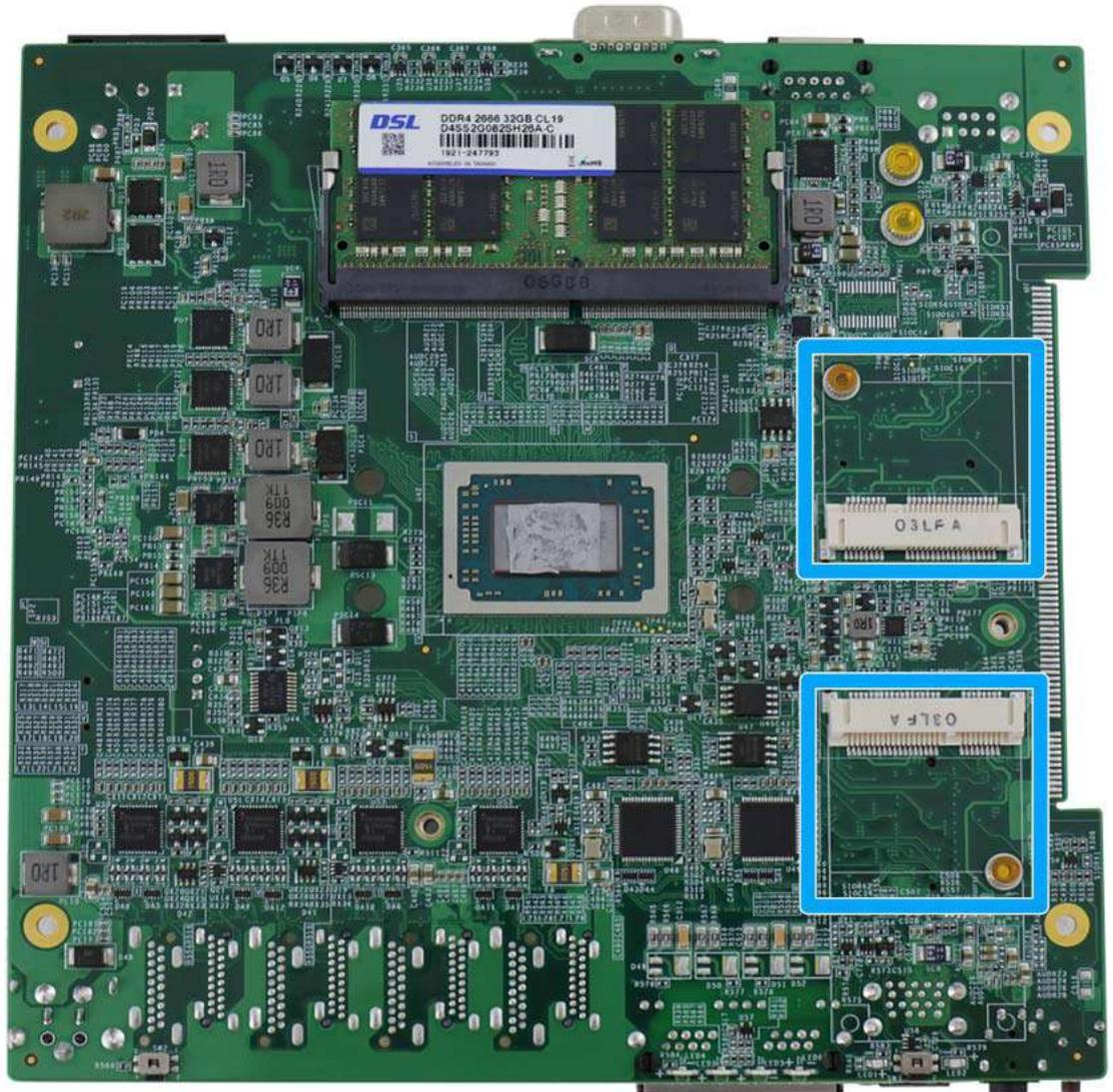
Pin #	Signal	Pin #	Signal
1	GND	2	+3V3
3	USB_D+	4	+3V3
5	USB_D-	6	
7	GND	8	
9		10	-
11		12	
13		14	
15		16	
17		18	GND
19		20	
21	-	22	-
23	-		
Mechanical Key			
33	GND	32	
35	PETP0	34	
37	PETN0	36	
39	GND	38	
41	PER P0	40	
43	PER N0	42	
45	GND	44	
47	REFCLK_P0	46	
49	REFCLK_N0	48	
51	GND	50	
53	CLKREQ#	52	PERST#
55		54	
57	GND	56	W_DISABLE#
59		58	
61		60	
63	GND	62	
65		64	
67		66	
69	GND	68	
71		70	
73		72	+3V3
75	GND	74	+3V3

## 2.4.5 Ignition Rotary Switch



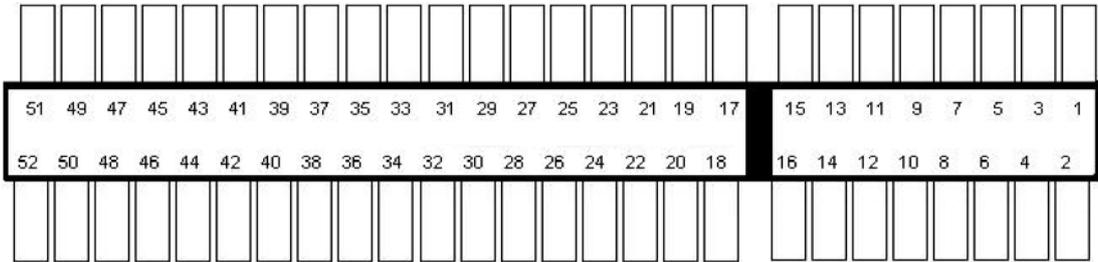
The system features an ignition control switch that has multiple modes for pre and post ignition settings. Please refer to the section [Ignition Power Control](#) for details.

## 2.4.6 Dual Half-mini PCIe Socket



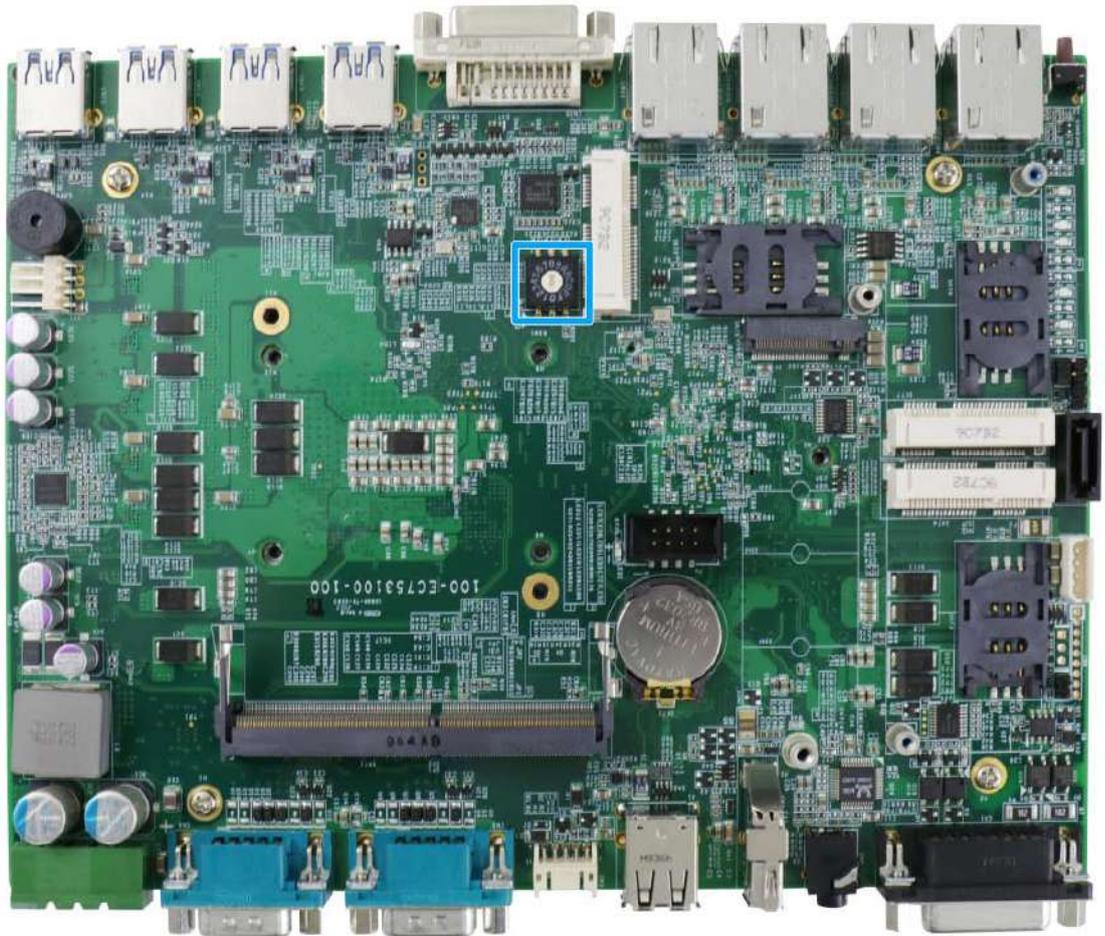
The dual half-size mini-PCIe sockets are for installing Google Edge Tensor Processing Unit (TPU). They are ideal for machine learning applications or large complex neural network models that can take up to weeks to compute but requiring only a few hours on Google TPUs.

mini-PCle slot definition



Pin #	Signal	Pin #	Signal
1	WAKE#	2	+3.3Vaux
3		4	GND
5		6	+1.5V
7	CLKREQ#	8	
9	GND	10	
11	REFCLK-	12	
13	REFCLK+	14	
15	GND	16	
<b>Mechanical Key</b>			
17	Reserved* (UIM_C8)	18	GND
19	Reserved* (UIM_C4)	20	W_DISABLE#
21	GND	22	PERST#
23	PCIe_Rxn	24	+3.3Vaux
25	PCIe_Rxp	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PCIe_Txn	32	SMB_DATA
33	PCIe_Txp	34	GND
35	GND	36	
37	GND	38	
39	+3.3V	40	GND
41	+3.3V	42	
43	GND	44	
45	Reserved	46	
47	Reserved	48	+1.5V
49	Reserved	50	GND
51		52	+3.3V

## 2.4.7 Ignition Rotary Switch



The ignition power control switch features multiple modes for pre and post ignition settings. Please refer to the section [Ignition Power Control](#) for details.

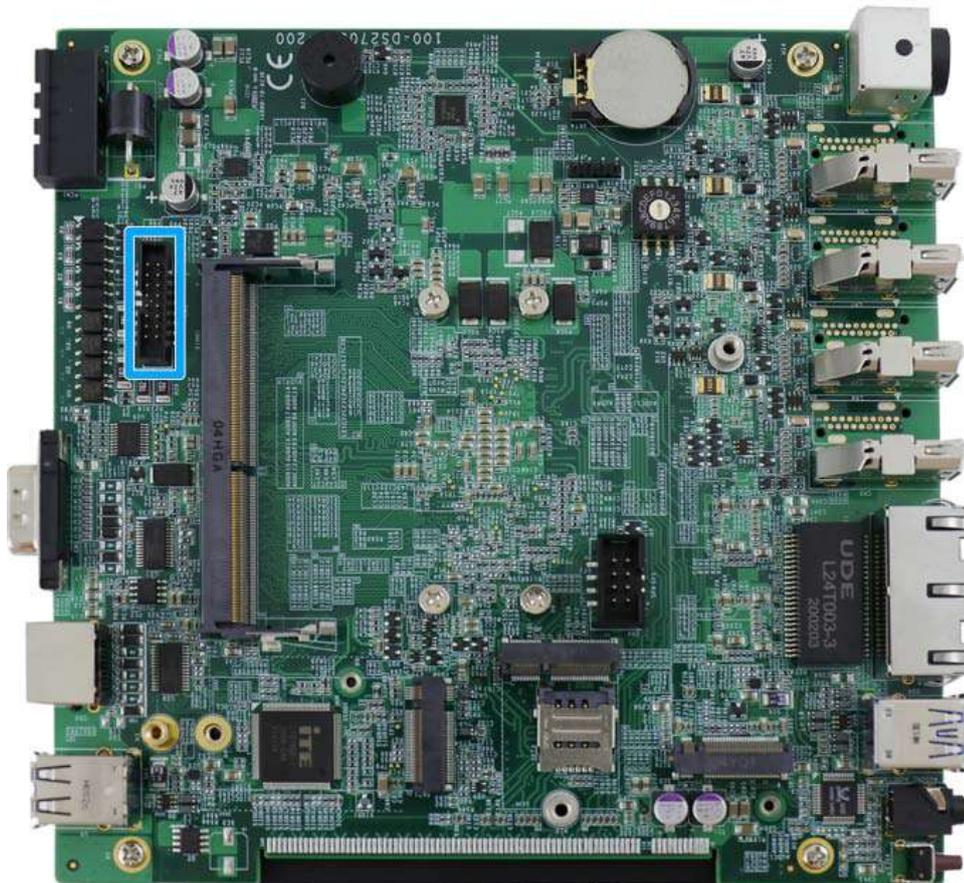
## 2.4.8 Isolated Digital Input/ Output (Optional)



### NOTE

An optional “Cbl-IDC216F-DB15M-4.5CM” cable must be purchased, connected and installed to enable DIO functions.

With the cable Cbl-IDC216F-DB15M-4.5CM” cable connected onto the pins indicated below, and DB15 female connector installed onto the panel, the digital input (DI) and digital output (DO) connector provides four digital input and four digital output.



### 3 System Installation

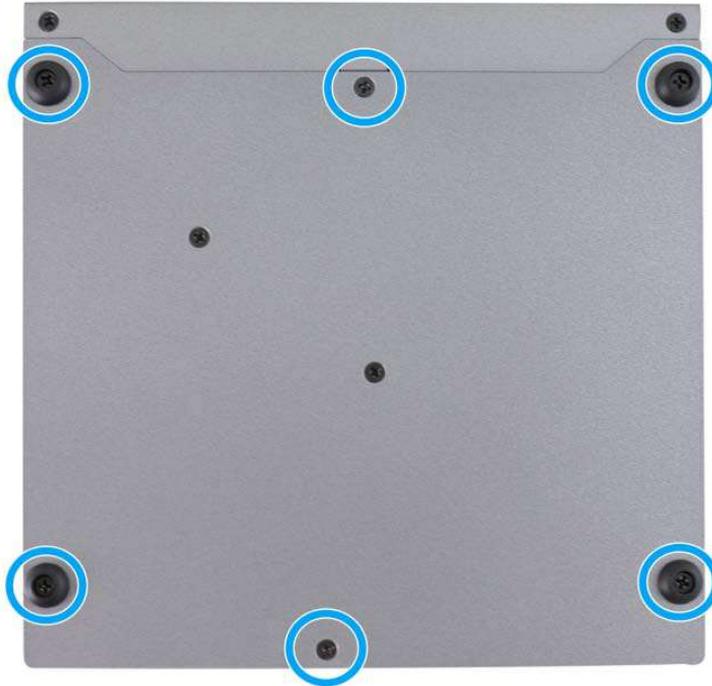
Before disassembling the system enclosure and installing components and modules, please make sure you have done the following:

- 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, please refer to the procedures below:

1. Turn the system upside-down on a steady surface. Remove the screws indicated and separate the bottom panel from the system's enclosure.



2. Gently lift the bottom panel of the enclosure and remove the screws indicated.



- Remove the screw indicated on the rear I/O panel.



- Remove the screw indicated on the front I/O panel.



- Remove the screws from both sides of the chassis.

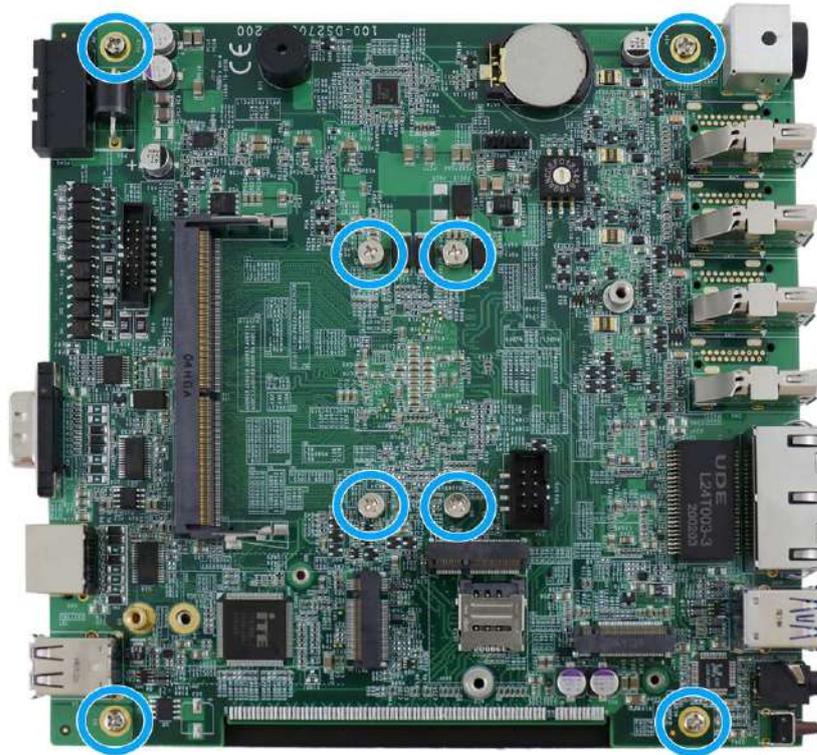


**Left side chassis screws**

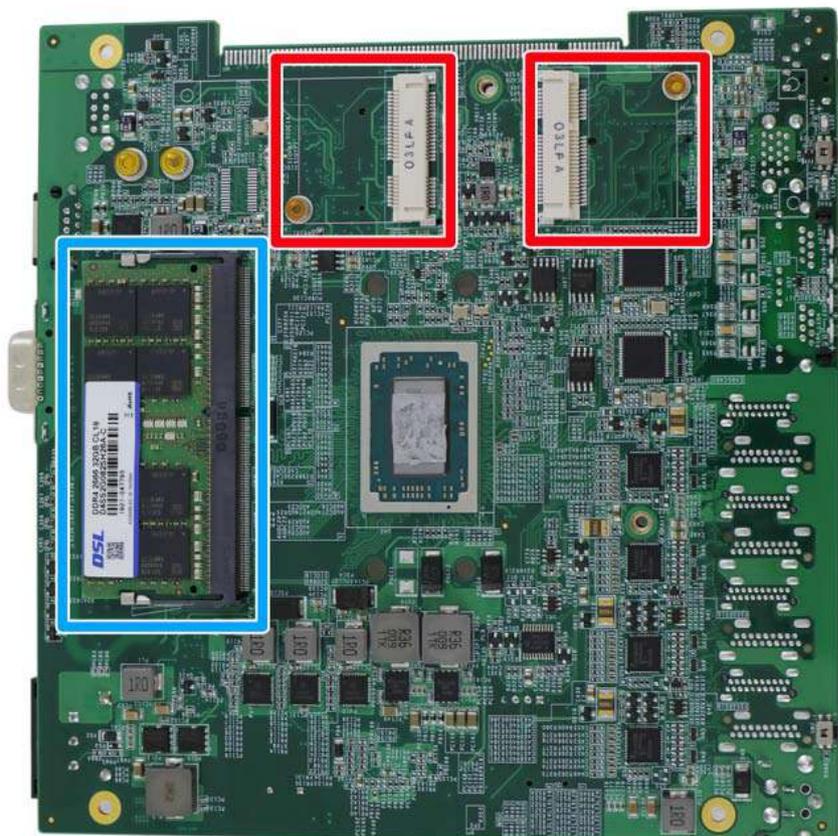
**Right side chassis screws**

- The four side of the enclosure can now be separated into a faceplate and a rear section. Note the motherboard is still attached to the heatsink.

7. To separate the motherboard from the heatsink, please remove the screws indicated. Gently lift the motherboard to separate it from the heatsink.



8. Turn the motherboard around to gain access to the second DRAM module slot (in blue) and dual half-size mini-PCIe expansion slots (in red) for TPU module installation.



## 3.2 Installing Internal Components

### 3.2.1 DDR4 SO-DIMM Installation

There are two memory SO-DIMM slots on the motherboard that supports up to 64GB DDR4-2400. Please follow the procedures below to replace or install the memory modules.

1. Please refer to the section "[Disassembling the System](#)". If you are installing one DRAM module, you only need to remove the bottom panel. If you are installing a second or two DRAM modules, you will need to disassemble the whole system to gain access to the second DRAM module slot on the heatsink side.
2. Locate the SODIMM memory module slot on the motherboard.



**Bottom panel side DRAM slot**



**Heatsink side DRAM slot**

3. To install the memory module, insert gold fingers of the module into the slot at 45 degree angle, push down on the edge of the module and the clips on the side should clip the module into position.



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



5. [Reinstall the system enclosure](#) and panel when done.

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

### 3.2.2 M.2 2280 SSD Installation

The system has an SATA signal M.2 2280 slot for you to install an M.2 2280 SATA SSD. For installation, please refer to the following instructions.

1. The M.2 slot can be accessed by removing the bottom panel. Please refer to the section "[Disassembling the System](#)".



2. Insert the module on a 45 degree angle.



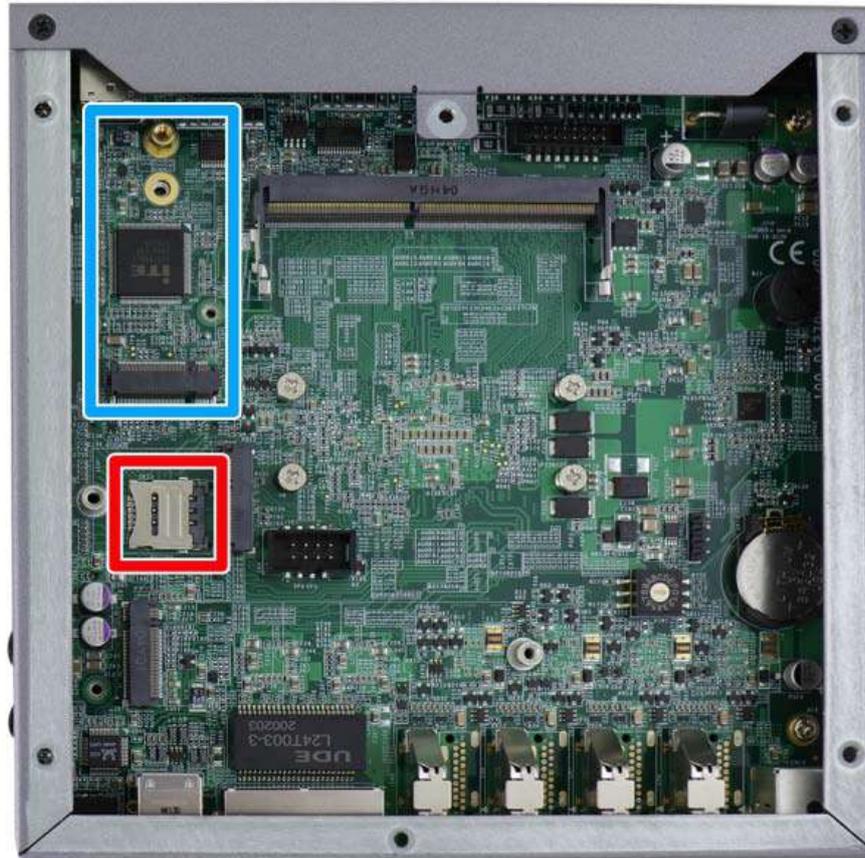
3. Gently press down and secure the module with an M3 P-head screw.



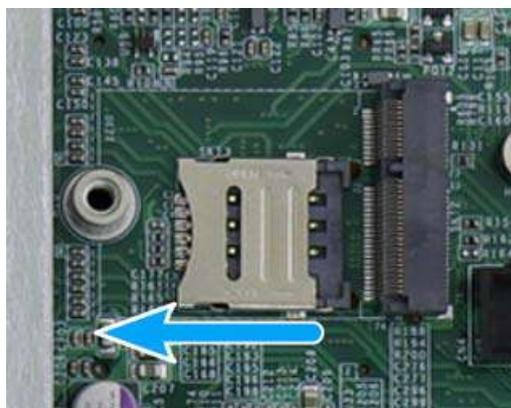
4. [Reinstall the system enclosure](#) or the bottom panel when done.
5. If you need to install other components, please refer to respective sections.

### 3.2.3 M.2 3042/ 3052 B Key Installation

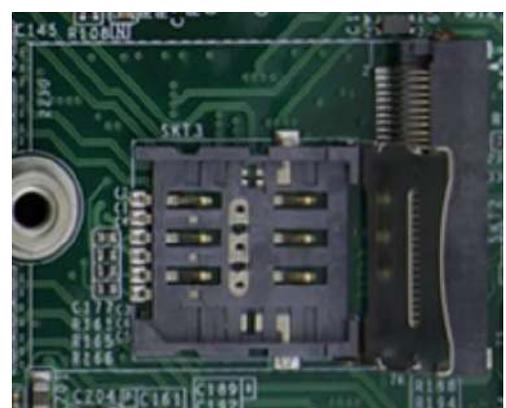
The M.2 3042/ 3052 B key slot (indicated in **blue**) has a corresponding micro-SIM SIM card slot (indicated in **red**). The M.2 slot can be accessed by removing the bottom panel. Please refer to the section "[Disassembling the System](#)".



1. To install the micro-SIM SIM card, slide the metallic cover in the direction shown and lift it to expose the socket and gold fingers.

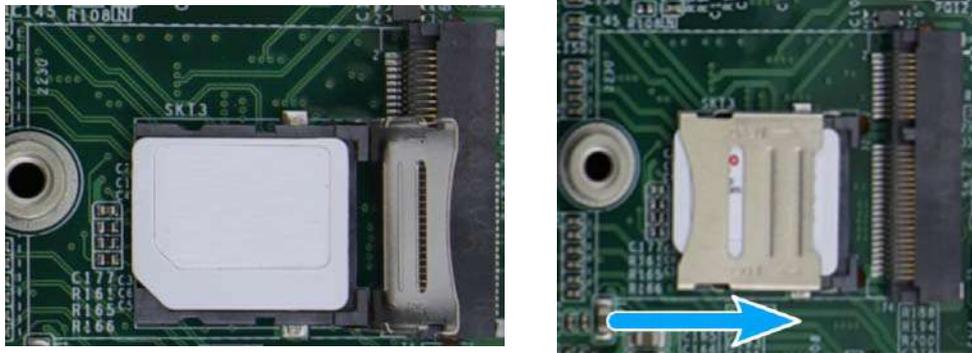


Slide cover in direction shown



Lift the cover with fingertip

2. Gently place the micro-SIM SIM card in the orientation shown, lower the cover and slide the cover in the direction shown to secure the SIM card in place.



**Place into socket with orientation shown    Slide cover to secure the micro-SIM**

3. To install the M.2 3042/ 3052 module into place, insert the module on a 45° angle into the slot and secure it using the screw provided.

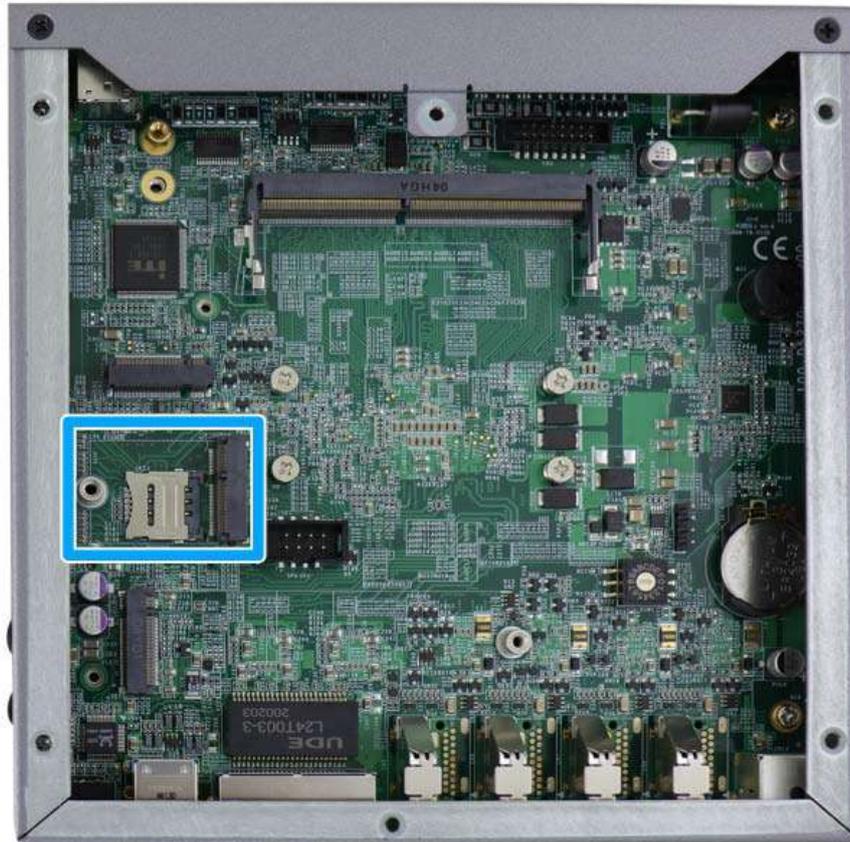


4. [Reinstall the system enclosure](#) or the bottom panel when done.
5. If you need to install other components, please refer to respective sections.

### 3.2.4 M.2 2230 E Key Installation

The system has an M.2 2230 E key socket that offers PCIe Gen3 x1 and USB2.0 signal for WiFi module installation. The M.2 slot can be accessed by removing the bottom panel.

Please refer to the section "[Disassembling the System](#)".



1. To install the M.2 2230 E key module, insert the module on a 45° angle and secure the module using the screw provided.

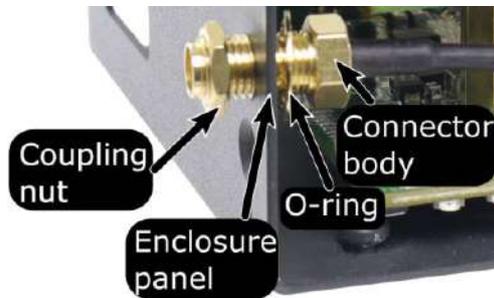


Insert on 45° angle



Secure using the screw provided

- To install the antenna onto the system enclosure, clip on the IPEZ-to-SMA cable to the module and secure the antenna to the side panel. Please refer to the module's manual for clip-on connection.



**Secure on side panel**



**Antenna installation**

- [Reinstall the system enclosure](#), panel and external antenna.

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

### 3.2.5 Isolated Digital Input/ Output Connector Installation (Optional)



#### NOTE

An optional “Cbl-IDC216F-DB15M-4.5CM” cable must be purchased, connected and installed to enable DIO functions.

To install the isolated digital input/ output connector, please refer to the following procedure:

1. Turn the system upside-down on a steady surface. Remove the screws indicated and separate the bottom panel from the system’s enclosure.



2. Gently lift the bottom panel of the enclosure and remove the screws indicated.



- Remove the screw indicated on the rear I/O panel, and remove the DIO shield plate.



**Remove screws on I/O panel**



**Remove DIO shield plate**

- Secure the DB15 connector end to the enclosure



**Cbl-IDC216F-DB15M-4.5  
CM cable**



**Use hex column screws  
to secure the DB15  
connector to the panel**



**Secure DB15 with two  
hex column screws**

- Locate the DIO port on the motherboard.



- Match and plug the cable onto the motherboard DIO port.



**Match the connector to the DIO port    Make sure the connector is properly inserted**

- Place the panel back on and secure with screws where indicated.



- Secure screws at the indicated locations.



9. Place the bottom panel onto the enclosure and secure the following screws to complete the DIO connector installation.



### 3.3 Installing the System Enclosure

To reinstall the system enclosure, please follow the steps below:

1. Slide the motherboard and heatsink back into the U-shaped enclosure and secure it with four screws on top of the heatsink.



Screws locations on the heatsink

Lower the motherboard matching the screw holes

2. The enclosure panels consist of front and rear sections. Match the connection opening (eg. DisplayPort and DB9 COM port) and secure the screws indicated to install the enclosure side panels.



DisplayPort panel side



DB9 COM port panel side



**Left side chassis screws securing the heatsink**



**Right side chassis screws securing the heatsink**

3. Secure the screws indicated to complete the enclosure installation.



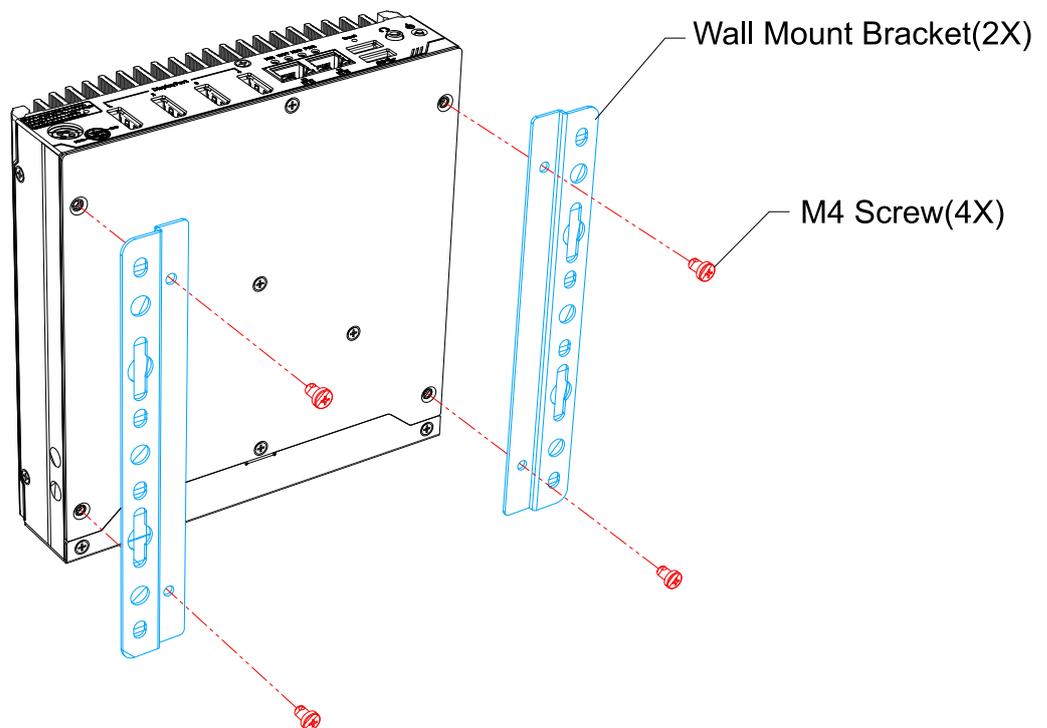
## 3.4 Mounting Nuvo-2700DS

Neosys provides versatile mounting methods for Nuvo-2700DS systems. You can use wall-mounting brackets to mount the system on the wall. To mount your Nuvo-2700DS controller, please refer to the instructions listed below.

### 3.4.1 Wall-mounting Nuvo-2700DS (Optional Accessory)

Nuvo-2700DS systems have built-in wall-mounting brackets as the standard mounting option. Please follow steps below to mount your Nuvo-2700DS controller on a flat surface.

1. Take the two wall mount brackets and four M4 screws out of the accessory box, secure the wall mount brackets according to the illustration shown below.



2. Find a sturdy flat surface and secure the system.

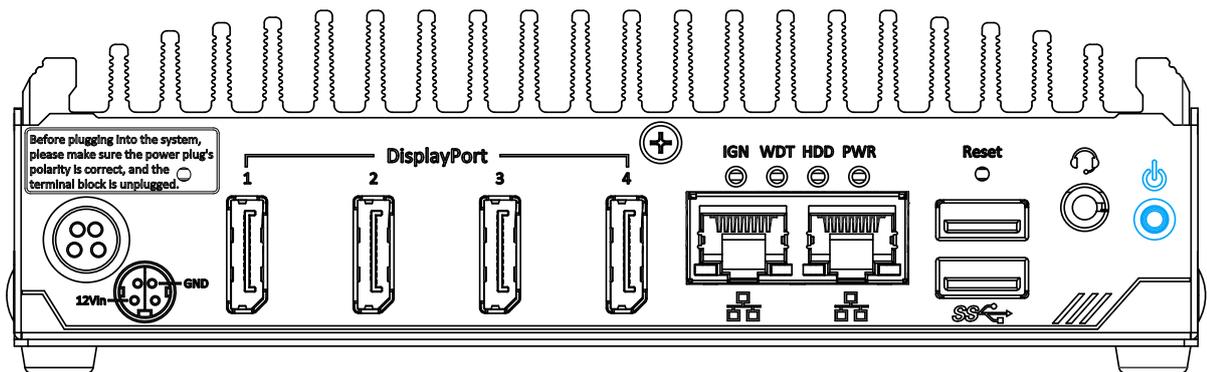
### 3.5 Powering On the System

There are three methods to power on the system

- Pressing the power button
- Sending a LAN packet via Ethernet (Wake-on-LAN)
- Powering on via ignition control (for Nuvo-2700DS-IGN only, please refer to [Ignition Control](#) section)

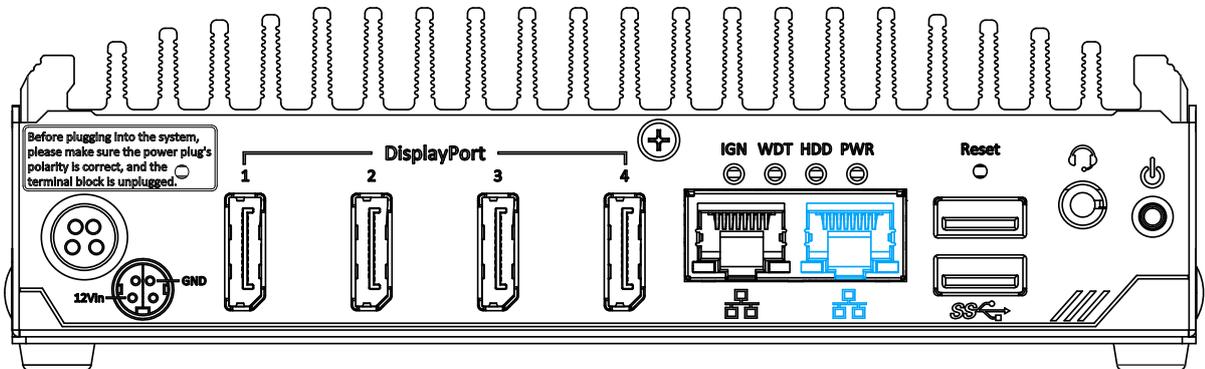
#### 3.5.1 Powering On Using the Power Button

This is the simplest way to turn on your system. The power button 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 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.

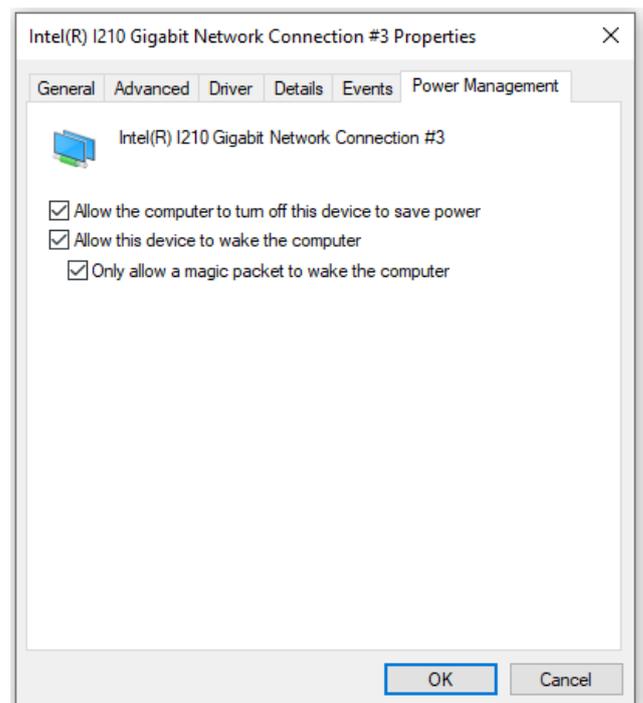


 **NOTE**

*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® I210 Gigabit Network Connection, click on **Configure**.
5. 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 FF FF FF FF FF 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

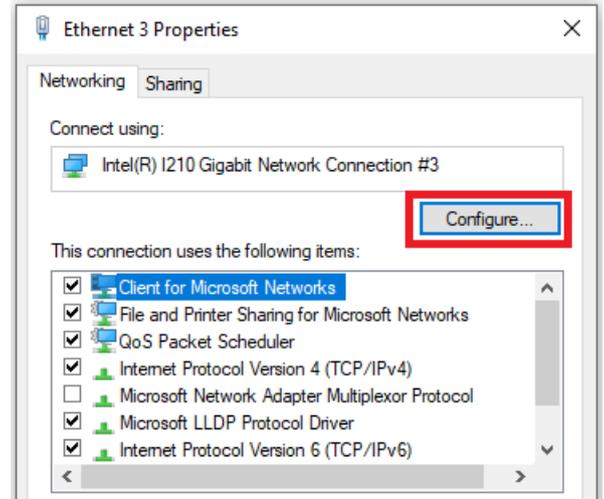
FF FF FF FF FF FF

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
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](#).

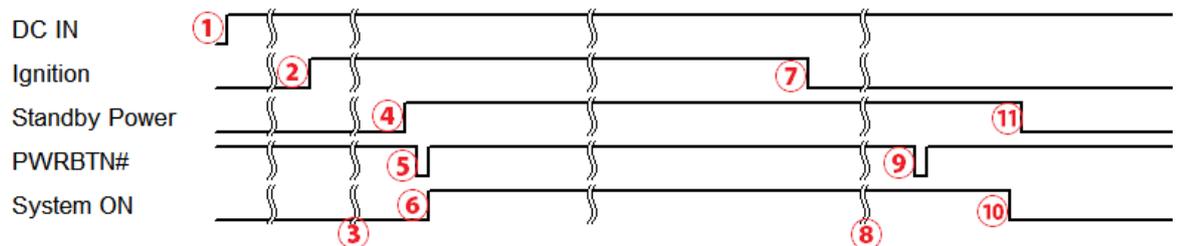


### 3.6 Ignition Power Control

The ignition power control module for in-vehicle applications is a MCU-based implementation that monitors the ignition signal and reacts to turn on/off the system according to predefined on/off delay. Its built-in algorithm supports other features such as ultra-low power standby, battery-low protection, system hard-off, etc. In this section, we'll illustrate the principle of ignition power control and operation modes.

#### 3.6.1 Principles of Ignition Power Control

The basic concept of ignition power control module is to control the timing correlation between ignition signal and system power status. A typical timing correlation is described in following diagram.



1. When DC power is supplied to the system, MCU starts to periodically detect ignition signal. Note that only MCU is working at this moment and the overall power consumption is less than 2 mW.
2. Ignition signal is active (both 12VDC and 24VDC ignition signals are accepted).
3. MCU starts to count a pre-defined power-on delay.
4. Once power-on delay expired, MCU turns on necessary standby power for the system (3.3VSB & 5VSB).
5. A PWRBTN# pulse is then issued to turn on the system (equivalent to one pressing the power button on the front panel).
6. The system is booting and becomes operational.
7. After a period of time, the ignition signal becomes inactive.
8. MCU starts to count a pre-defined power-off delay.
9. Once power-off delay expired, another PWRBTN# pulse is issued to perform a soft-off for the system (ex. a normal shutdown process for Windows system).
10. The system is completely shut down.
11. As MCU detects system is off, it turns off the standby power for the system, and operates in low power mode again (< 2mW power consumption).

### 3.6.2 Additional Features of Ignition Power Control

In addition to the typical timing correlation, the ignition power control module offers additional features to provide additional reliability for in-vehicle applications.

#### 1. Low battery detection

The ignition power control module continuously monitors the voltage of DC input when the system is operational. If input voltage is less than 9V (for 12VDC input) or less than 18V (for 24VDC input) over a 60-second duration, it will shut down the system automatically.

#### 2. Guarded power-on/ power-off delay duration

If ignition signal goes inactive during the power-on delay duration, the ignition power control module will cancel the power-on delay process and go back to idle status. Likewise if ignition signal goes active during the power-off delay duration, the ignition power control module will cancel the power-off delay process and keep the system running.

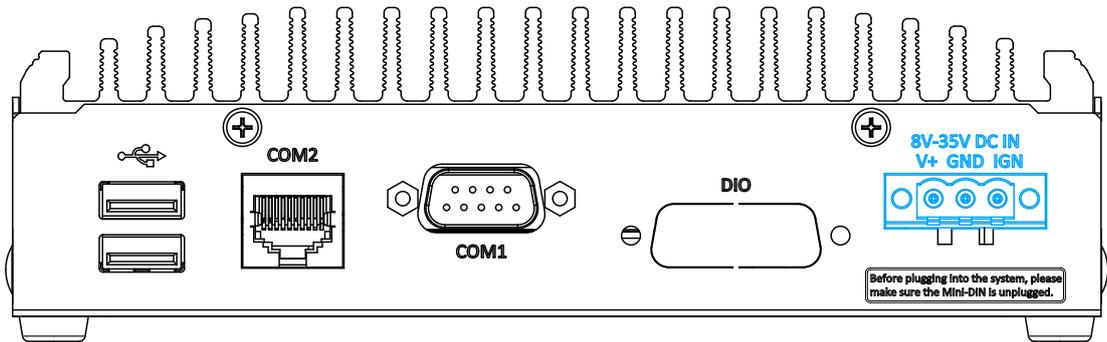
#### 3. System hard-off

In some cases, system may fail to shutdown via a soft-off operation due to system/ application halts. The ignition power control module offers a mechanism called “hard-off” to handle this unexpected condition. By detecting the system status, it can determine whether the system is shutting down normally. If not, the ignition power control module will force cut-off the system power 10 minutes after the power-off delay duration.

#### 4. Smart off-delay

The ignition power control module offers two modes (mode 13 & mode 14) which have very long power-off delay duration for applications require additional off-line time to process after the vehicle has stopped. In these two modes, the ignition power control module will automatically detect the system status during the power-off delay duration. If the system has shutdown (by the application software) prior to power-off delay expiring, it will cut off the system power immediately to prevent further battery consumption.

### 3.6.3 Wiring Ignition Signal



To have ignition power control for in-vehicle usage, you need to supply IGN signal to the system. The IGN input is located on the 3-pin pluggable terminal block (shared with DC power input). Below is the typical wiring configuration for in-vehicle applications.

1. Connect car Battery+ line (12V for sedan, 24V for bus/truck) to V+.
2. Connect car Batter-/ GND line to GND.
3. Connect ACC line to IGN.



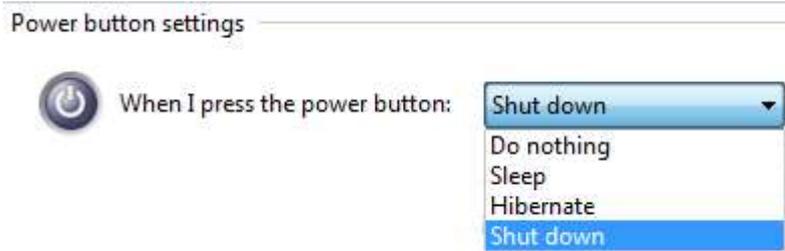
**WARNING**

*Please make sure your DC power source and IGN signal share the same ground.*

*IGN input accepts 8-35VDC. Supply a voltage higher than 35VDC may damage the system.*

### 3.6.4 Configure your Windows system

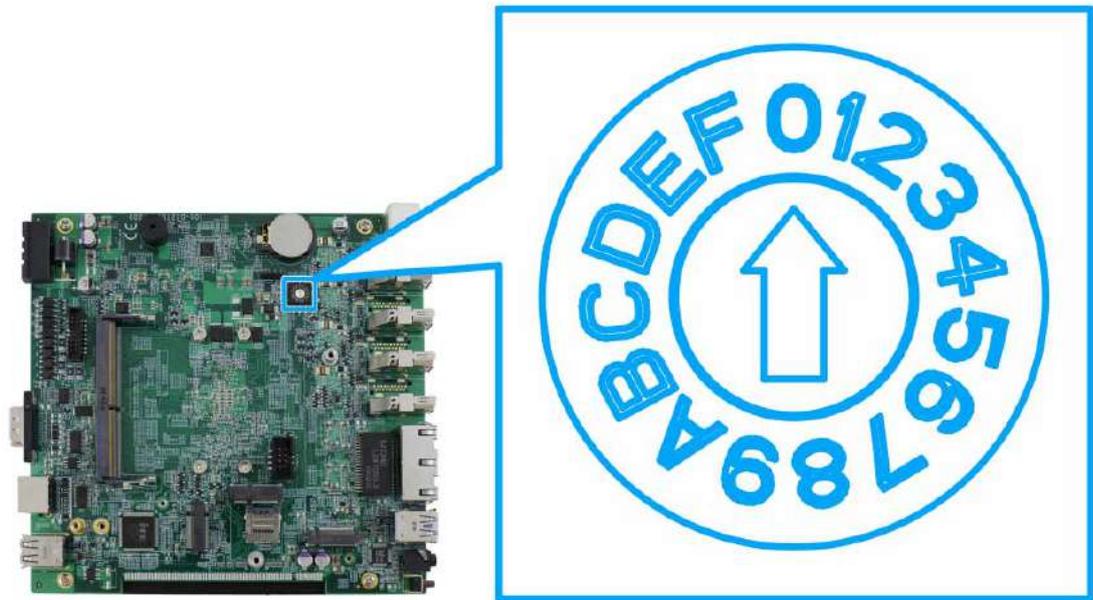
When applying ignition power control to your system, please make sure you've configured your Windows system to initiate a shutdown process when pressing the power button. By default, Windows 7/ 8/ 10 goes to sleep (S3) mode when power button is pressed. As sleep (S3) is not a complete shutdown behavior, the ignition control function does not recognize the finish of a normal shut down process and thus users will encounter a system hard-off (power cut-off after 10 minutes). Please configure "When I press the power button" to "Shut down" in your Windows system settings.



### 3.6.5 Operation Modes of Ignition Power Control

You can use the rotary switch to configure the operation mode. The system offers 16 (0~15) operation modes with different power-on/power-off delay configurations.

The ignition control rotary switch can be located on the motherboard. Please refer to the “Disassembling the enclosure” section on how to remove the bottom panel and gaining access to the rotary switch.



- **Mode 0**

Mode 0 is the ATX mode without power-on and power-off delay. User can only use the power button on the front panel to turn on or turn off the system.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
0	N/A	N/A	N/A

- **Mode 1**

Mode 1 is AT mode without power-on and power-off delay. The system automatically turns on when DC power is applied. A retry mechanism is designed to repeat the power-on cycle if the system fails to boot up.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
1	N/A	N/A	N/A

- **Mode 2**

Mode 2 is designed to have a very minor power on/ off delay of 160ms for applications that requires the system to start up almost at the same as the rest of the equipment it is working in collaboration with.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
2	160ms	160ms	10 minutes

- **Mode 3 ~ Mode 12**

Mode 3 ~ Mode 12 have various power-on delay and power-off delay. Each mode supports a hard-off timeout of 10 minutes.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
3	10 seconds	10 seconds	10 minutes
4	10 seconds	1 minute	10 minutes
5	10 seconds	5 minutes	10 minutes
6	30 seconds	1 minute	10 minutes
7	30 seconds	5 minutes	10 minutes
8	30 seconds	10 minutes	10 minutes
9	3 minutes	1 minute	10 minutes
10 (A)	3 minutes	10 minutes	10 minutes
11 (B)	3 minutes	30 minutes	10 minutes
12 (C)	10 minutes	30 minutes	10 minutes

- **Mode 13 (D) / Mode 14 (E)**

Mode 13 and Mode 14 are ignition power control modes with very long power-off delay. Both modes support the feature of “smart off-delay”, which automatically detect system status during power-off delay duration and cut off system power if system is off in prior to power-off delay expired.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
13 (D)	30 seconds	2 hours	10 minutes
14 (E)	3 minutes	2 hours	10 minutes

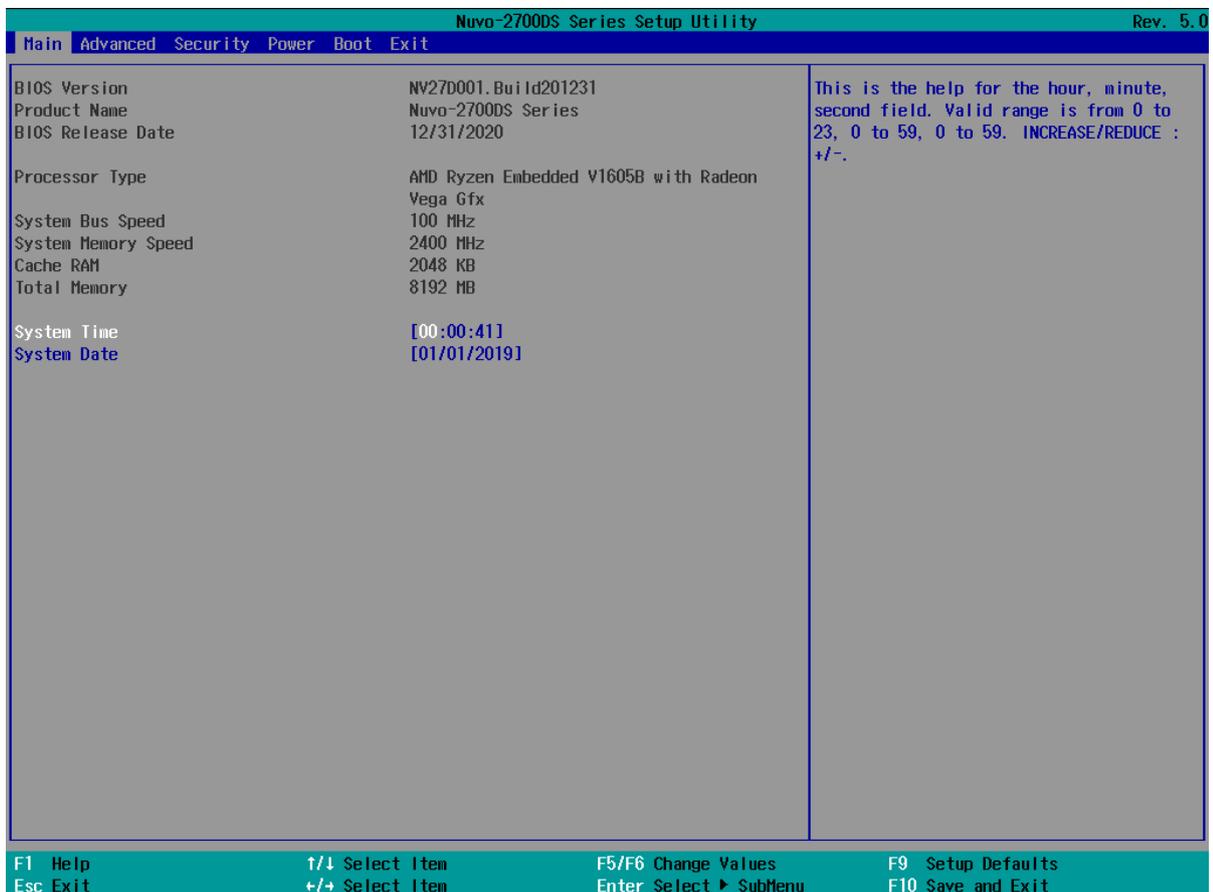
- **Mode 15 (F)**

Reserved

# 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).

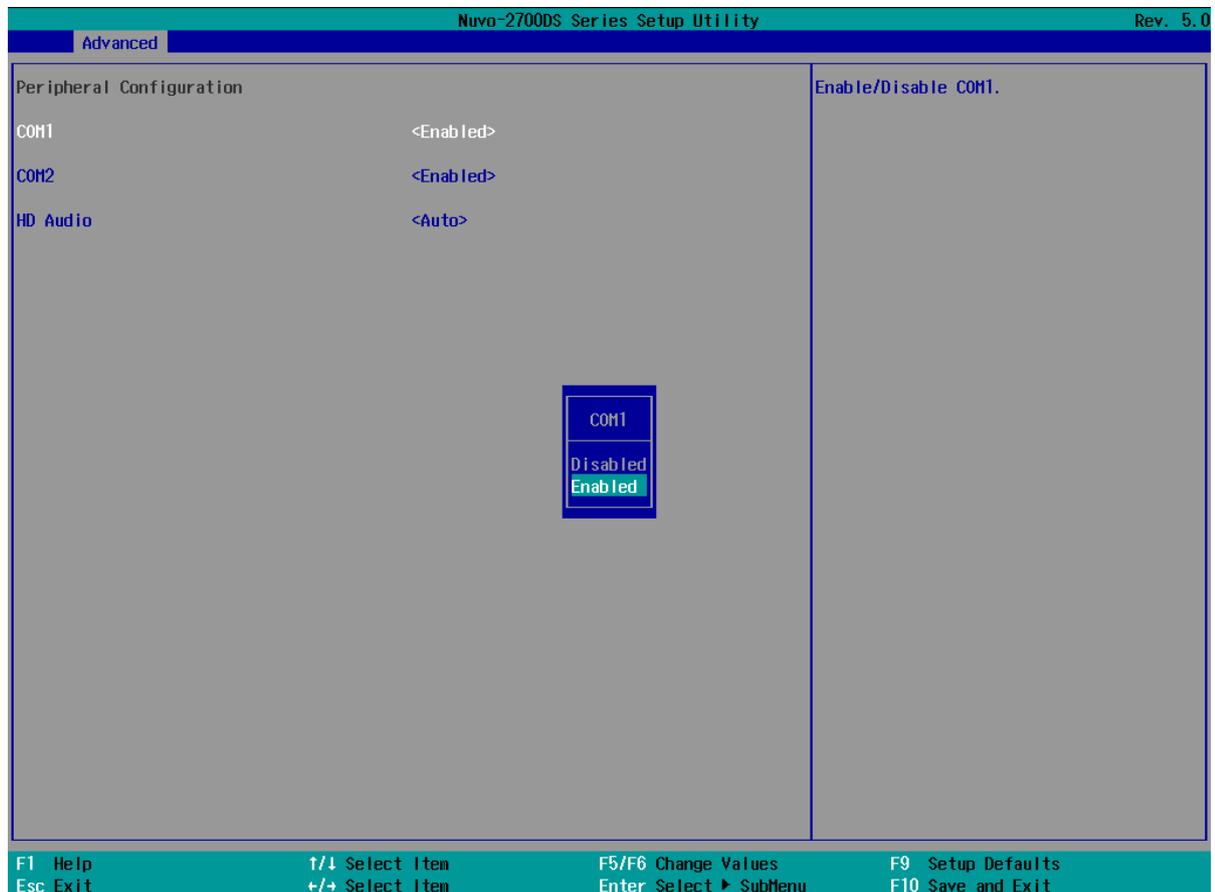


### NOTE

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

### 4.1.1 COM1 & COM2 Configuration

The system's COM1/ COM2 ports support RS-232 (full-duplex) mode. You can enable/disable both COM ports via BIOS settings.

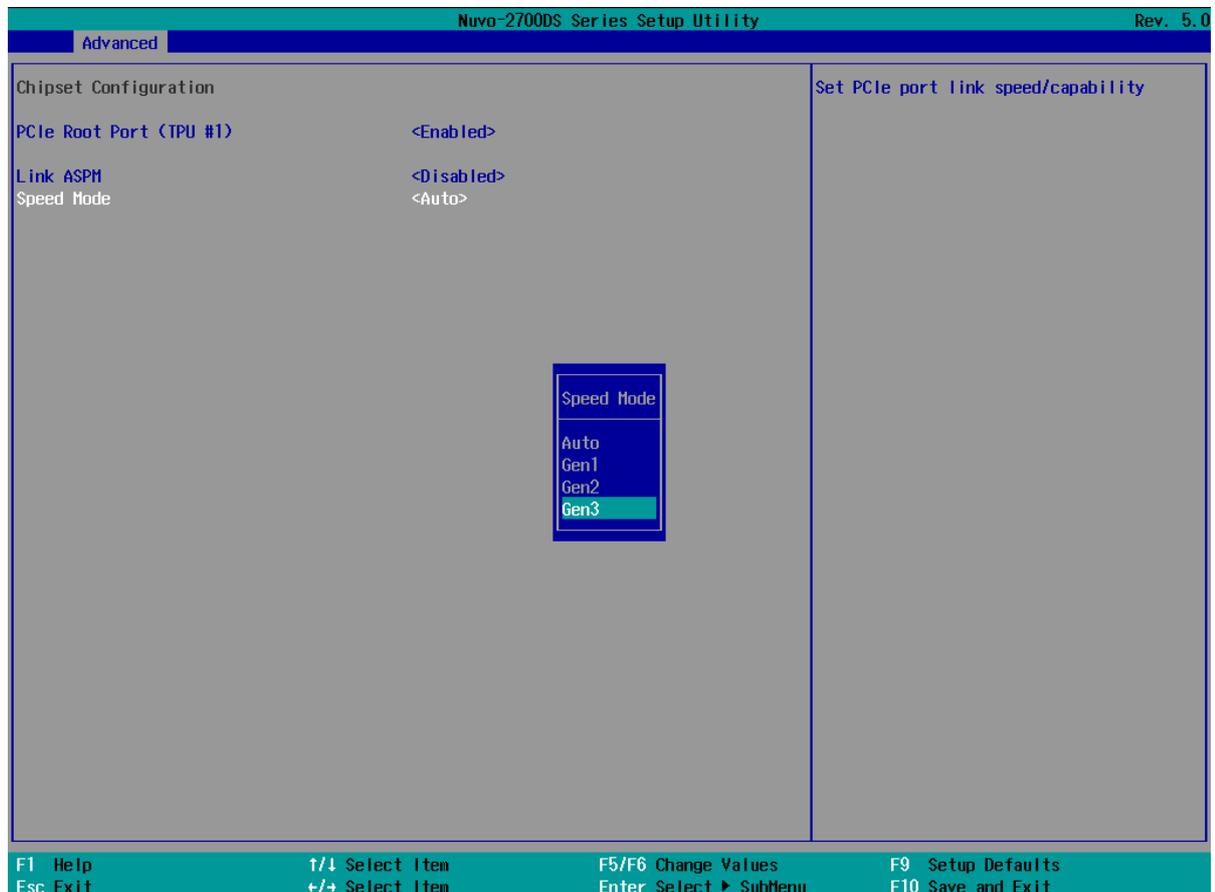


#### To set COM port operating mode:

1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Advanced] → [Peripheral Configuration]**.
3. Highlight the COM port and select the **[Disabled or Enabled]** and press Enter to set the mode.
4. Once set, press **F10** to save setting and exit.

### 4.1.2 Chipset Configuration (PCIe Root Port for TPU)

If you are installing Google Tensor Processing Unit (TPU) into the half-size mini-PCIe slots, you may enable and configure the slot in the BIOS.

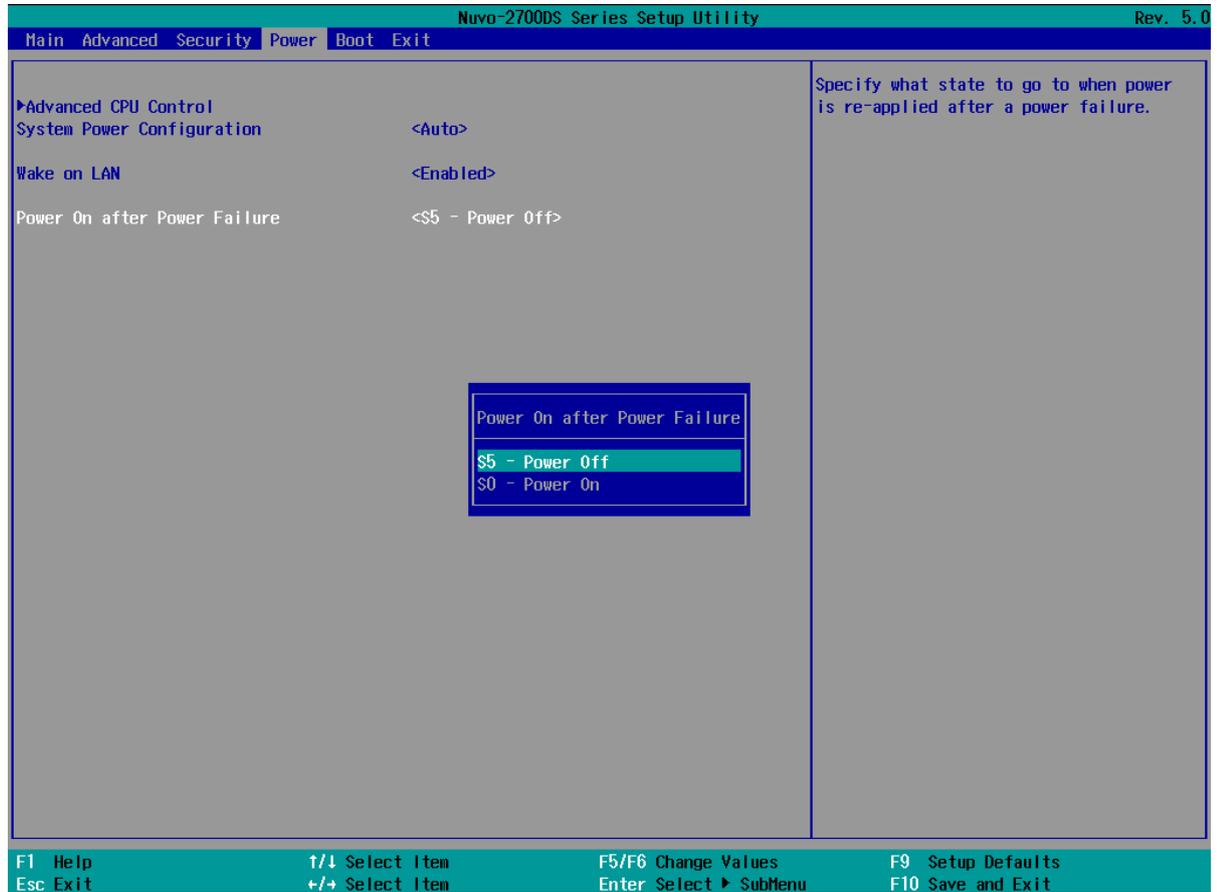


To configure PCIe Root Port (TPU):

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced] > [Chipset Configuration]**.
3. Highlight **[PCIe Root Port (TPU #1)]**, press Enter to bring up setting options, Enabled/ Disabled, and press Enter to select the setting.
4. If you wish to enable Active State Power Management (ASPM), highlight **Link ASPM** and press Enter, select the option you prefer and press Enter again to set the configuration.
5. You may also manually set the mini-PCIe slot mode by highlighting the **Speed Mode** option and press Enter, select the option you prefer and press Enter again to set the configuration.
6. Press F10 to “Exit Saving Changes”.

### 4.1.3 Power On After Power Failure Option

This option defines the behavior of system 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:

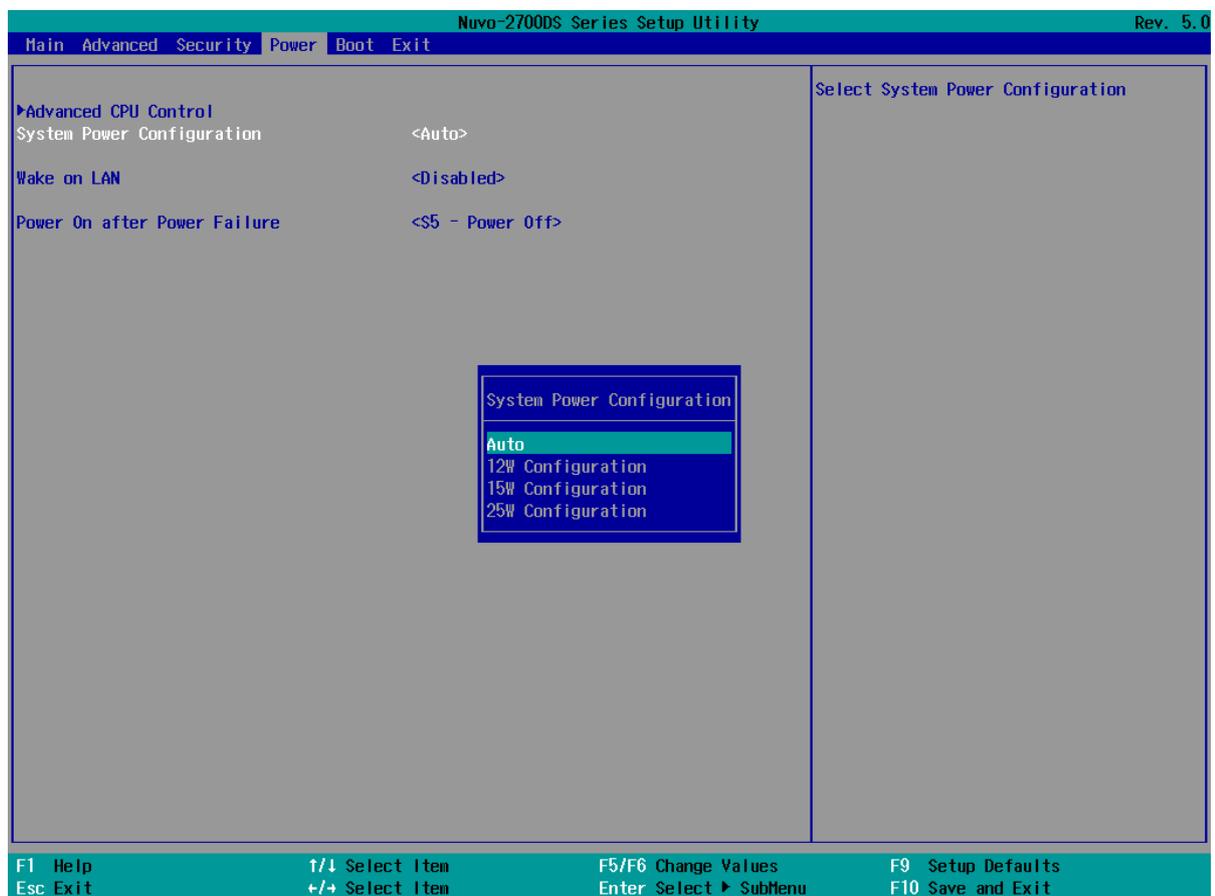
7. When system boots up, press F2 to enter BIOS setup utility.
8. Go to **[Power] > [Power On after Power Failure]**.
9. Highlight **[Power On after Power Failure]**, press Enter to bring up setting options, S0 – Power On or S5 – Power Off, and press Enter to select the setting.
10. Press F10 to “Exit Saving Changes”.

### 4.1.4 System Power Configuration

The system supports various AMD Ryzen Embedded V1605B CPU, the configuration “**System Power Configuration**” is implemented in BIOS to allow users to specify user-defined power limit. This feature gives you the flexibility of selecting different power performance while balance between computing power and operating temperature range.

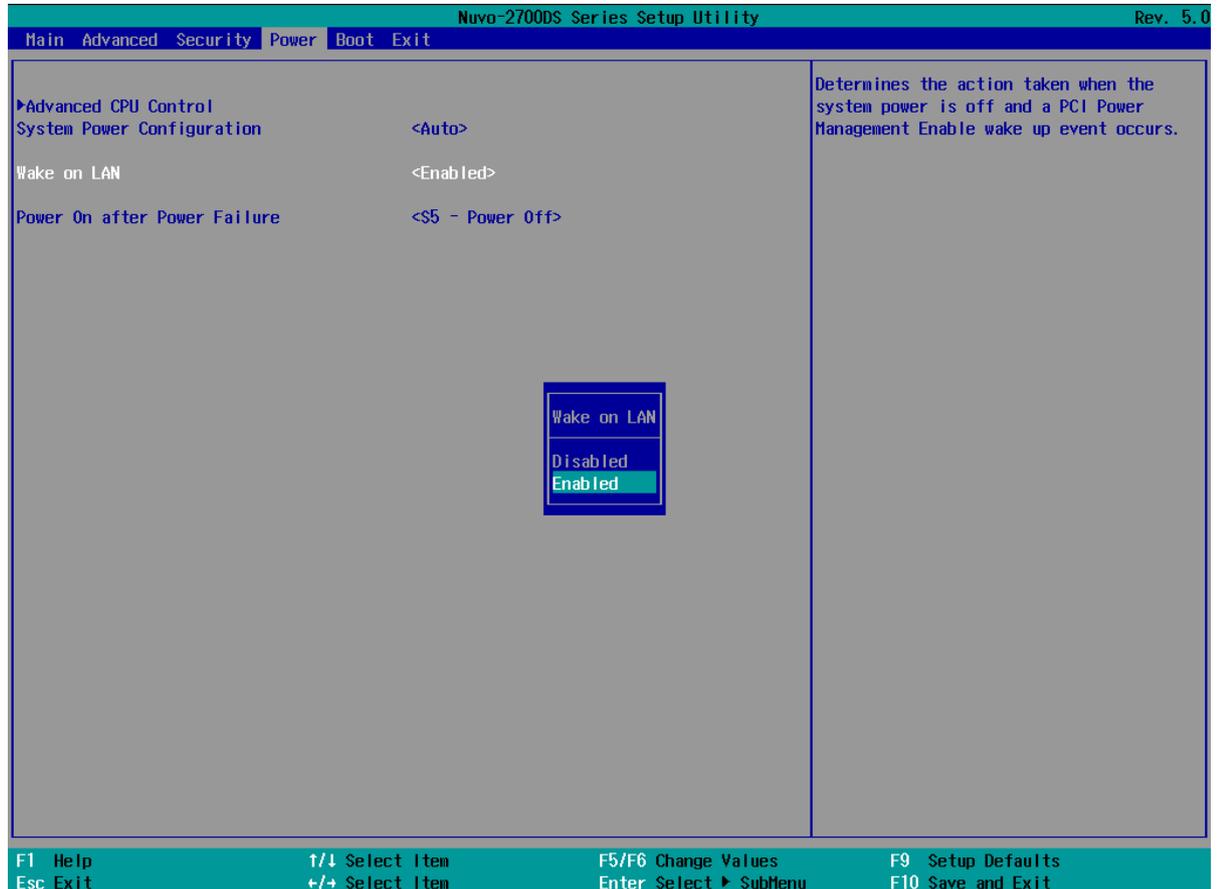
To configure the CPU power limit:

1. When the system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power]** → **[System Power Configuration]**.
3. Highlight the power limit and press Enter to set configuration option.



### 4.1.5 Wake on LAN Option

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

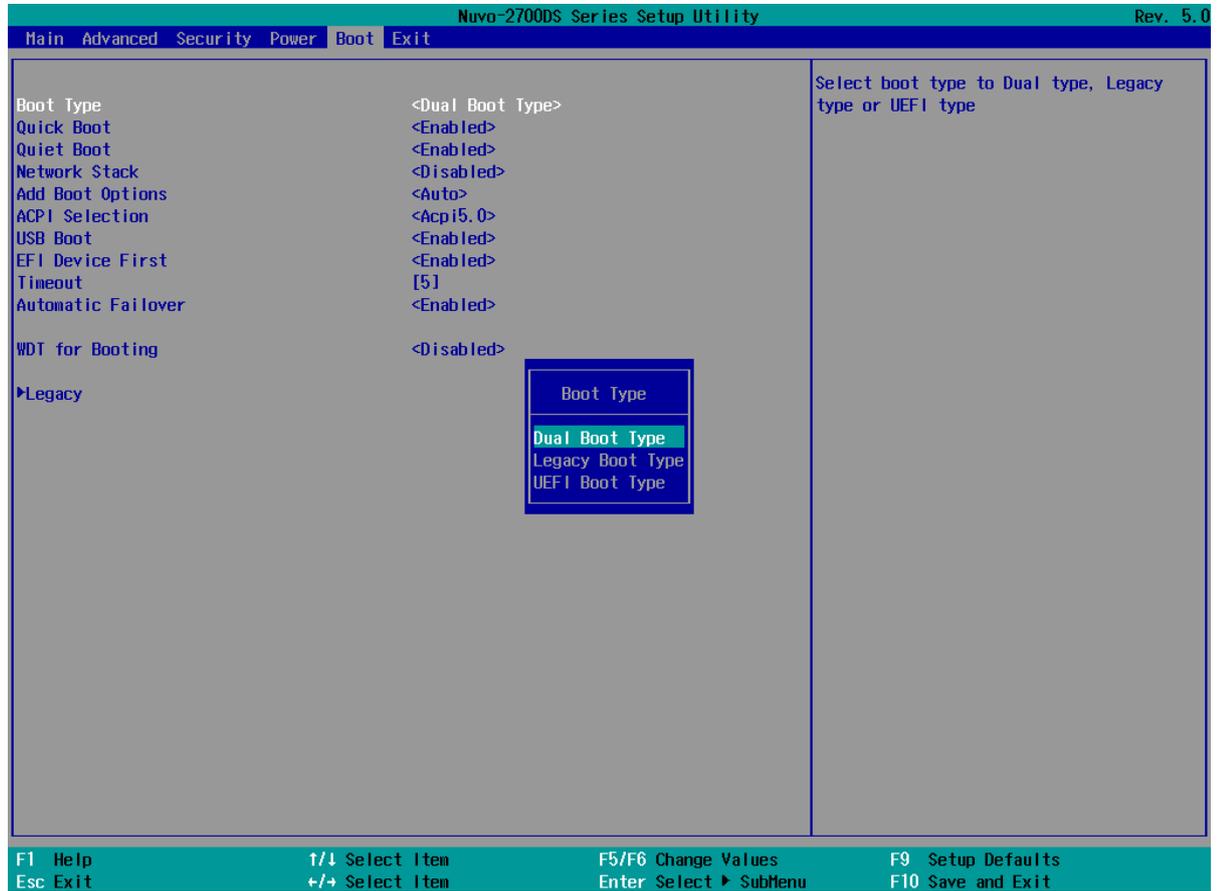


To enable/disable “Wake on LAN” option:

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.”

### 4.1.6 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.



### 4.1.7 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 7/8/10 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.



It is recommended that:

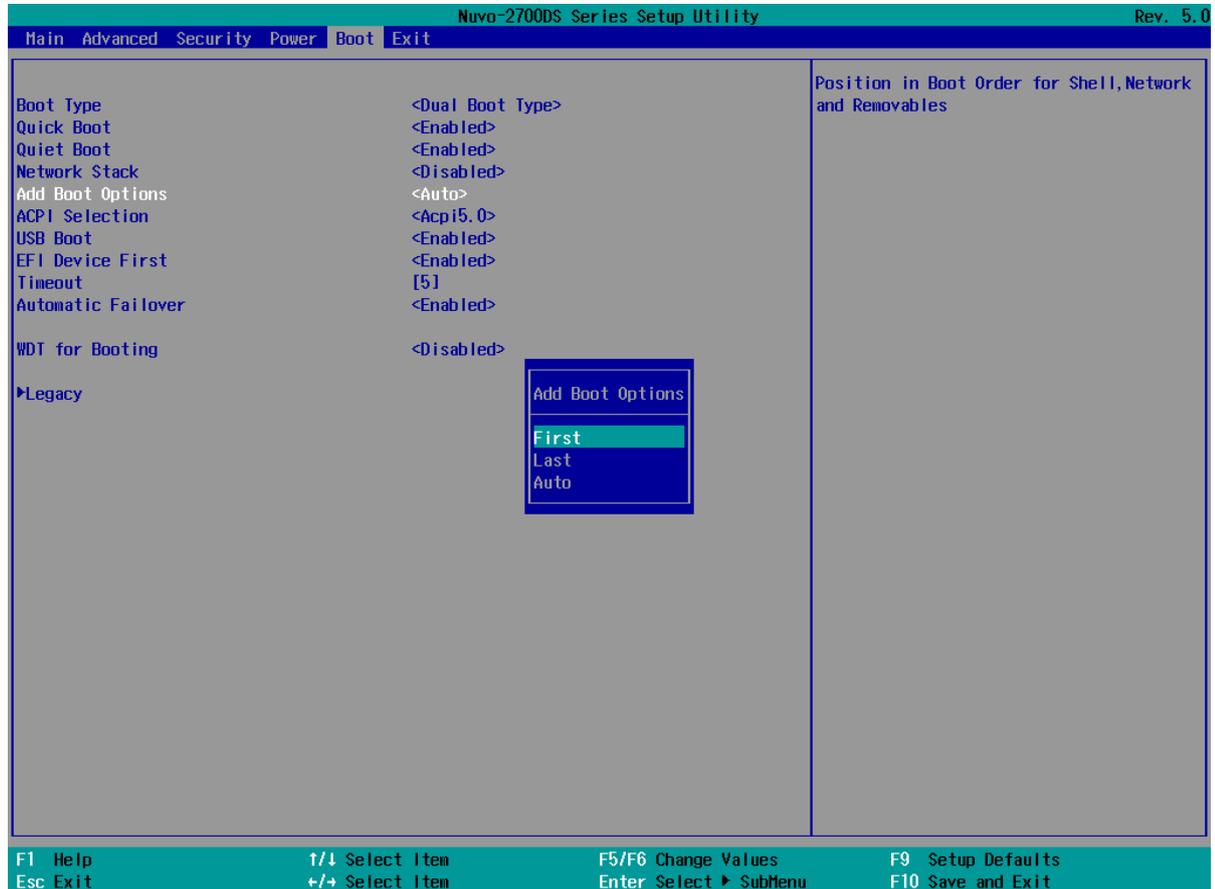
- If you need greater than 2TB disk partition, you shall choose UEFI boot mode and install operating system accordingly.
- Choose Legacy boot mode if the installed HDD/ SSD capacities are under 2TB

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”.

### 4.1.8 Add Boot Options

The Add Boot Options dedicates the boot sequence order of a newly added device (eg. USB flash drive). The setting allows you to set the newly added device to boot first or as the last device on the list.



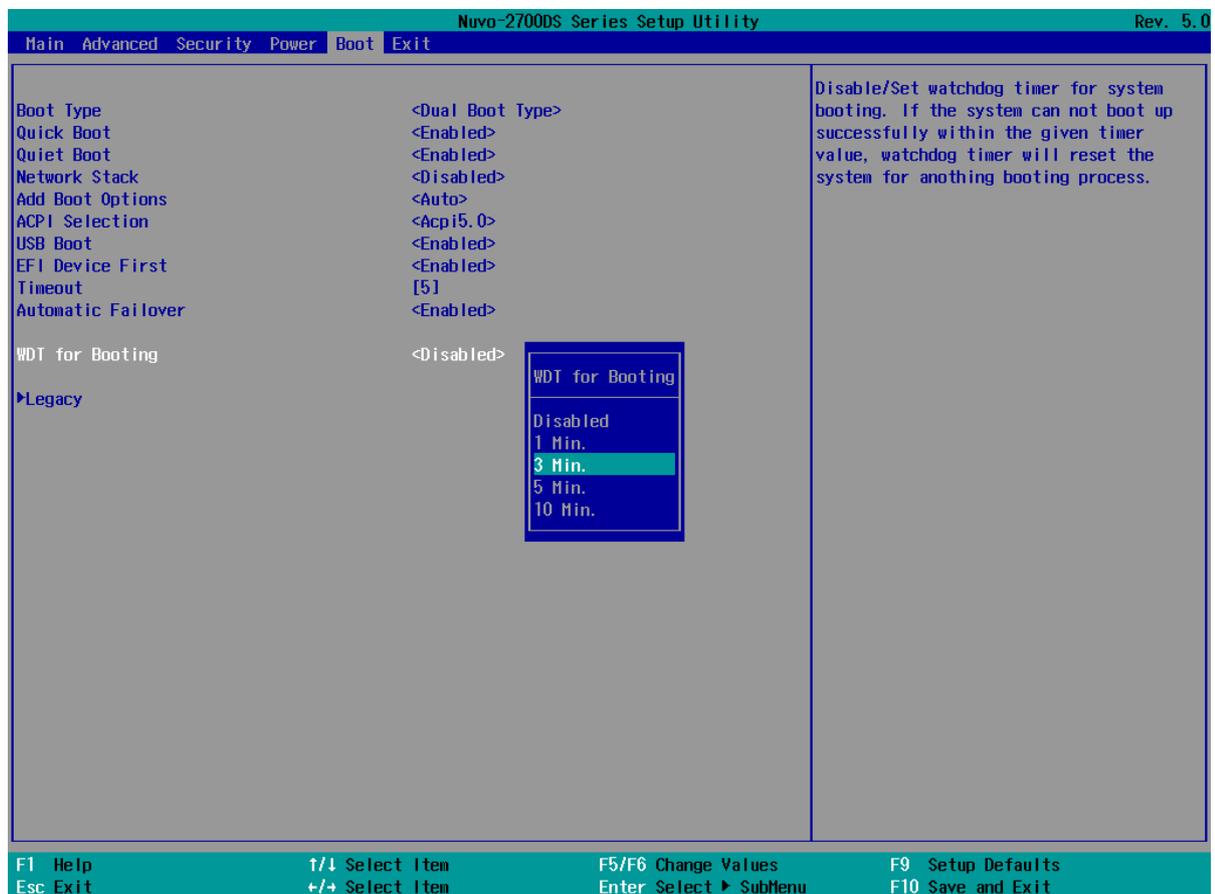
To set Add Boot Options:

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to [Boot] > [Add Boot Option], press Enter to bring up options, First or Last.
3. Highlight your selection and press Enter, press F10 to "Exit Saving Changes".

### 4.1.9 Watchdog Timer for Booting

The Watchdog timer setting in the BIOS ensures a successful system boot by specifying a timeout value. If the Watchdog timer is not stopped and expires, the BIOS will issues a reset command to initiate another boot 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 stop the watchdog timer after POST (Power-On Self Test) OK. When “**Manually after Entering OS**” is selected, it’s user’s liability to stop the watchdog timer when entering OS. This guarantees the system can always boot into OS, otherwise another booting process will be initiated.

For information about programming watchdog timer, please refer to **Appendix A Watchdog Timer & Isolated DIO**.

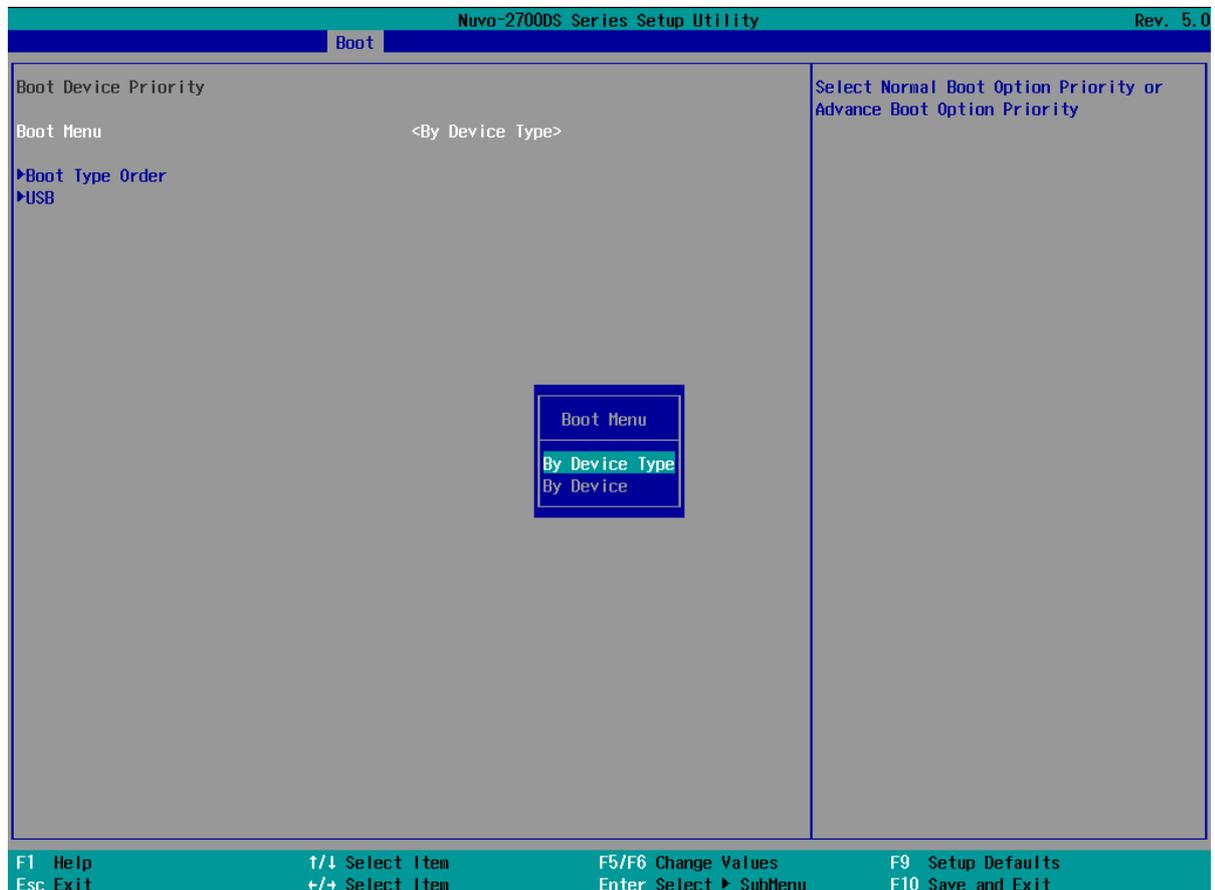


To set the watchdog timer for boot in BIOS:

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.

#### 4.1.10 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 Boot Device]**
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 Boot Device]**, 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.

## 5 OS Support and Driver Installation

### 5.1 Operating System Compatibility

The system only has driver support for Windows 10 64-bit. For Linux support, please use Linux kernel versions no later than 4.10. The following list contains the operating systems which have been tested in Neosys Technology.

1. Microsoft Windows 10 IoT 2019 LTSC Value
2. Microsoft Windows 10 Professional 64-bit RS5
3. Ubuntu 18.04.1 LTS\* (4.10 kernel)

**NOTE**

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

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

To manually install the drivers, please click on this [link](#) to download the drivers.

### 5.2.1 Install Drivers Manually

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)

## 5.3 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\_v2.3.0.0 or later versions.

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

Please execute the driver setup program in the following directory.

x:\Driver\_Pool\WDT\_DIO\Win7\_8\_64\WDT\_DIO\_Setup\_v2.3.0.x (x64).exe

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

Please execute the driver setup program in the following directory.

x:\Driver\_Pool\WDT\_DIO\Win7\_8\_WOW64\WDT\_DIO\_Setup\_v2.3.0.x (wow64).exe

# Appendix A Using WDT & DIO

## Watchdog Timer

The watchdog timer (WDT) function ensures reliable system operation. The WDT is a hardware mechanism to reset the system if the watchdog timer expires. Users can start the WDT and keep 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 7/ 8.1/ 10 32-bit and 64-bit versions. For other OS support, please contact Neosys Technology for further information.

## Installing WDT\_DIO Library

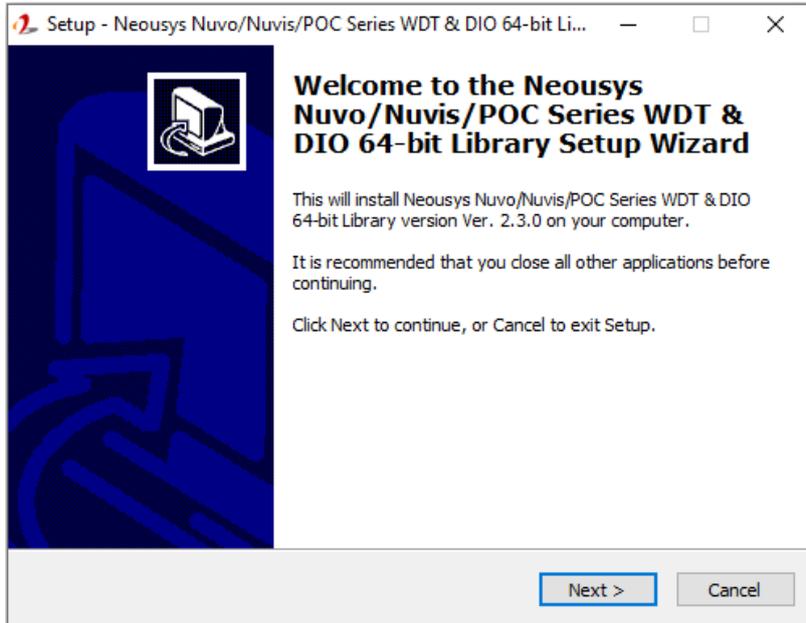
The WDT\_DIO function library is delivered in the form of a setup package named **WDT\_DIO\_Setup.exe**. Prior to programming WDT, you should execute the setup program and install the WDT library. Please use the following WDT\_DIO\_Setup packages according to your operating systems and application.

- For Windows 10 64-bit OS with 64-bit application (x64 mode), please install WDT\_DIO\_Setup\_v2.3.0.0(x64).exe or later version.
- For Windows 10 64-bit OS with 32-bit application (WOW64 mode), please install WDT\_DIO\_Setup\_v2.3.0.0 (wow64).exe or later version.

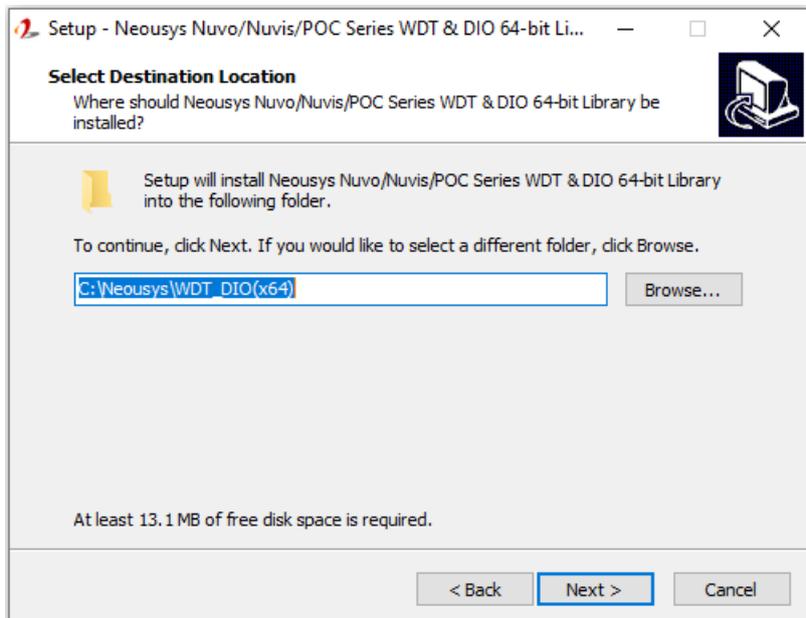
## WDT and DIO Library Installation

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

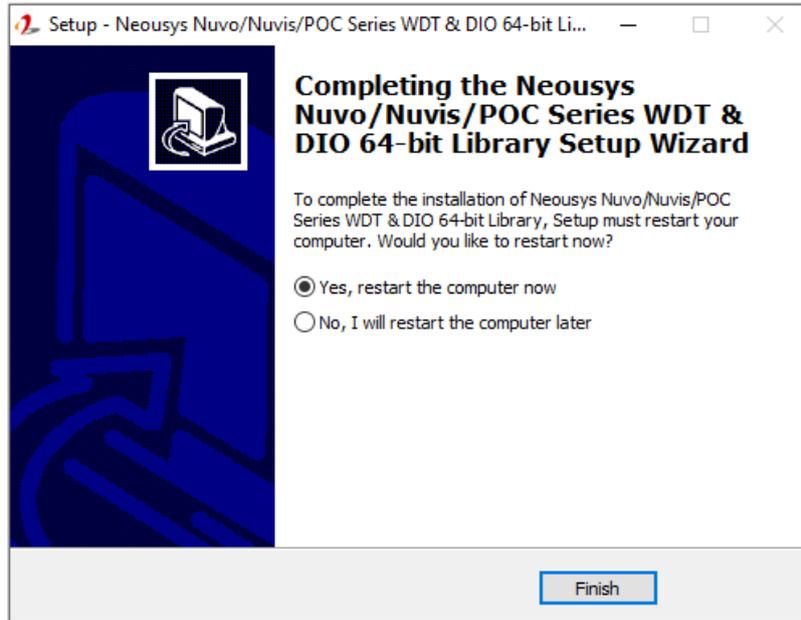
1. Execute **WDT\_DIO\_Setup.2.3.0.xexe**. and the following dialog appears.



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) \Sample\ DIO_Demo (Demo for Polling I/O )

## 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 <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>	<b>tick</b> WORD value (1 ~ 65535) to indicate timeout ticks. <b>unit</b> BYTE value (0 or 1) to indicate unit of timeout ticks. 0 : unit is minute 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; BYTE unit=1; //unit is second. 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()

## DIO Functions

### InitDIO

<b>Syntax</b>	BOOL InitDIO(void);
<b>Description</b>	Initialize the DIO function. You should always invoke InitDIO() before write/read any DIO port/channel.
<b>Parameter</b>	None
<b>Return Value</b>	Returns TRUE if initialization successes, FALSE if initialization failed.
<b>Usage</b>	BOOL bRet = InitWDT();

### DIReadLine

<b>Syntax</b>	BOOL DIReadLine(BYTE ch);
<b>Description</b>	Read a single channel of isolated digital input.
<b>Parameter</b>	<b>ch</b> BYTE value specifies the DI channel to be read. <i>Ch</i> should be a value of 0 ~ 7.
<b>Return Value</b>	The status (TRUE or FALSE) of the specified DI channel.
<b>Usage</b>	BYTE ch=3; //DI channel #3  BOOL DIChValue = DIReadLine(ch); //read DI channel #3

### DIReadPort

<b>Syntax</b>	WORD DIReadPort(void);
<b>Description</b>	Read the entire isolated digital input port (8 channels).
<b>Parameter</b>	None
<b>Return Value</b>	A WORD value (0~255) indicates the status of DI port (8 DI channels).
<b>Usage</b>	WORD DIPortValue = DIReadPort ();

## DOWriteLine

<b>Syntax</b>	void DOWriteLine(BYTE ch, BOOL value);
<b>Description</b>	Write a single channel of isolated digital output.
<b>Parameter</b>	<p><b>ch</b> BYTE value specifies the DO channel to be written. <i>Ch</i> should be a value of 0 ~ 7.</p> <p><b>value</b> BOOL value (TRUE or FALSE) specifies the status of DO channel.</p>
<b>Return Value</b>	None
<b>Usage</b>	<pre>BYTE ch=3; //DI channel #3 BOOL DOChValue=TRUE;  DOWriteLine(ch, DOChValue); //write DO channel #3 as TRUE</pre>

## DOWritePort

<b>Syntax</b>	void DOWritePort(WORD value);
<b>Description</b>	Write the entire isolated digital output port (8 channels).
<b>Parameter</b>	<p><b>value</b> WORD value specifies the status of the DO port. <i>Value</i> should be a value of 0~255.</p>
<b>Return Value</b>	None
<b>Usage</b>	<pre>WORD DOPortValue=0XFF; //11111111b DOWritePort(DOPortValue); //write DO port as 11111111b</pre>