Neousys Technology Inc.

Nuvo-2860VTC Series

User Manual

Revision 1.1

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Legal Information

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Neousys Technology Inc. may modify, update or upgrade the software, firmware or any accompanying user documentation without any prior notice. Neousys Technology Inc. will provide access to these new software, firmware or documentation releases from download sections of our website or through our service partners.

Before installing any software, applications or components provided by a third party, customer should ensure that they are compatible and interoperable with Neousys Technology Inc. product by checking in advance with Neousys Technology Inc.. Customer is solely responsible for ensuring the compatibility and interoperability of the third party's products. Customer is further solely responsible for ensuring its systems, software, and data are adequately backed up as a precaution against possible failures, alternation, or loss.

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

To the extent permitted by applicable laws, Neousys 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.

Contact Information

For contact information, please visit our official website

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.

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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 tyrofoam 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 Neousys Nuvo-2860VTC series system, an Intel® Alder Lake processor fanless in-vehicle computer.

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

Revision History

Version	Date	Description
1.0	Sep. 2026	Initial release
1.1	Oct. 2026	Updated ignition power control

1 Introduction

Nuvo-2860VTC is Neousys' next-generation ultra-compact in-vehicle computer with E-Mark certification for in-vehicle applications such as a mobile gateway, mobile surveillance, and passenger information system. Nuvo-2860VTC utilizes Intel's Alder Lake Atom® x7425E, featuring four CPU cores and supports up to 16GB of DDR5-4800 memory, capable of delivering up to 1.5x the CPU performance when compared to previous Nuvo-2860VTC. And with Intel's UHD Graphics supporting Open Visual Inference and Neural network Optimization (OpenVINO™), users can execute deep learning and inference models for light AI applications.



The system offers four 802.3at PoE+ ports to supply 25W power to compatible connected devices such as IP cameras. Internal expansion wise, the system features one M.2 B key and two mini-PCIe slots for wireless communication module installation which is essential for future intelligent vehicle applications. There are also two isolated CAN 2.0 ports that support SocketCAN in Linux for in-vehicle communications, and isolated digital I/Os for sensor and actuator control. Power input wise, it accepts wide range 8V to 35V DC input with built-in ignition power control to suit a variety of vehicle deployments. With the combination of ignition power control, wide-range DC input, rich I/Os, and edge AI capabilities, Nuvo-2860VTC is the perfect ultra-compact solution for modern intelligent in-vehicle applications.

1.1 Product Specifications

1.1.1 Nuvo-2860VTC

System Core	
Processor	Intel® Alder Lake Atom® x7425E processor (4C/ 4T, 1.5/ 3.4GHz, 12W TDP)
Graphics	Integrated Intel® UHD Graphics with 24EUs
Memory	Up to 16GB DDR5-4800 SDRAM (one SODIMM socket)
TPM	Supports fTPM 2.0
I/O Interface	
Ethernet Port	4x Gb Ethernet ports via M12 X-coded connectors by Broadcom BCM5719
Power over Ethernet	4x IEEE 802.3at (25.5W) Gigabit PoE+ PSE ports Total PoE+ power budget: 50W
USB	2x USB 3.2 Gen2x1 (10 Gbps) ports, type-A connectors with screw-lock
Video Port	1x HDMI1.4b, Supporting 3840 x 2160 30Hz
Serial Port	1x Software-programmable RS-232/422/485 port (COM1)
Isolated DIO	2-CH isolated DI and 5-CH isolated DO
CAN bus	2x CAN 2.0 port, supporting SocketCAN in Linux
Audio	1x 3.5 mm jack for mic-in and speaker-out
Storage Interface	
M.2 SATA	1x M.2 2280 M key socket (PCIe Gen3 x2) for NVMe SSD
SATA HDD	1x internal 2.5" HDD/ SSD installation
Expansion Bus	
Mini PCI Express	2x full-size mini-PCI Express socket (PCIe + USB2) with internal micro SIM socket
M.2 B Key	1x M.2 3042/3052 B key (USB 3 + USB 2) for 4G/ 5G module with dual internal micro SIM sockets
Power Supply	
DC Input	1x 3-pin pluggable terminal block for 8V to 35V DC input with built-in ignition power control (IGN/ GND/ V+)
Mechanical	
Dimension	206 mm (W) x 144 mm (D) x 65 mm (H)
Weight	1.4 kg
Mounting	Wall-mount (standard with enclosure)
Environmental	
Operating Temperature	-40°C to 70°C*

Storage Temperature	-40°C to 85°C
Humidity	10%~90%, non-condensing
Vibration	EN 50155:2021/ IEC 61373, Category I, Class B - Body mounted
Shock	EN 50155:2021/ IEC 61373, Category I, Class B - Body mounted
EMC	E-Mark, EN 50121 (EN 50155 EMC) CE/ FCC Class A, according to EN 55032 & EN 55035

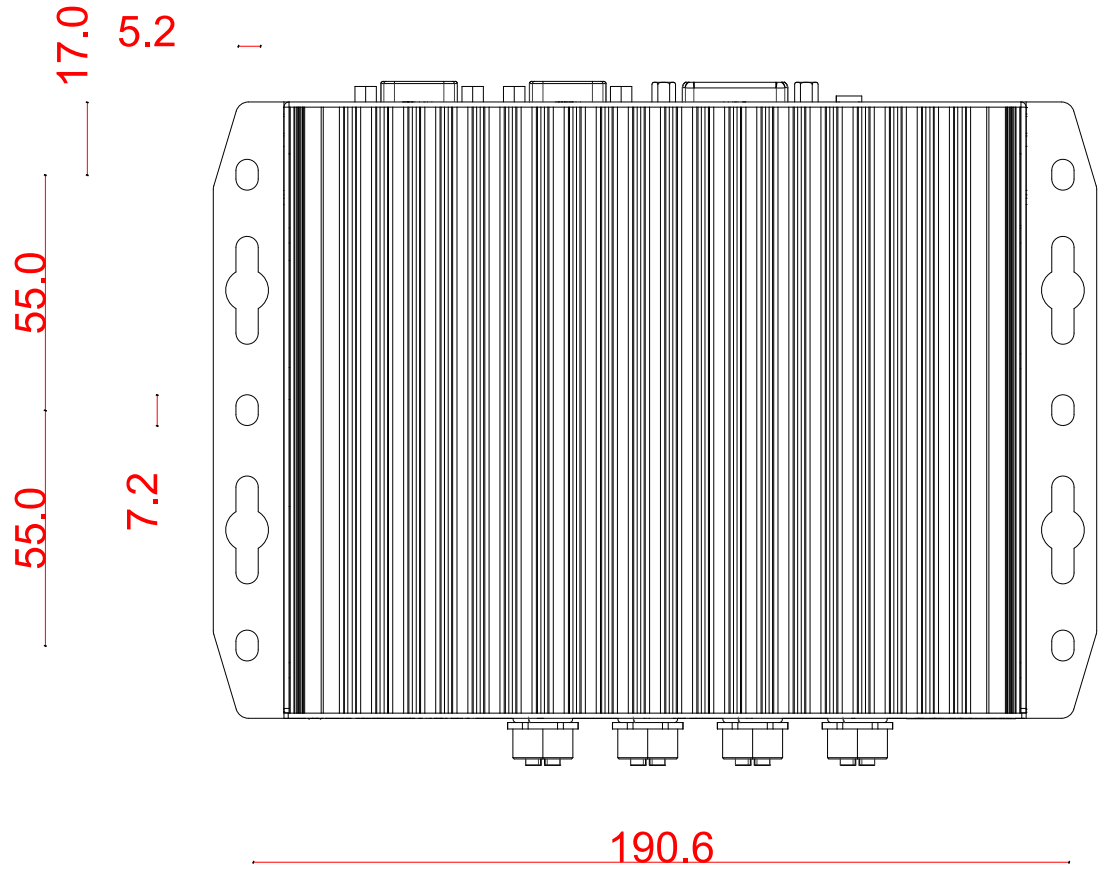
** For sub-zero and over 60°C operating temperature, a wide temperature HHD or Solid State Disk (SSD) is required.*

1.2 Nuvo-2860VTC Dimensions

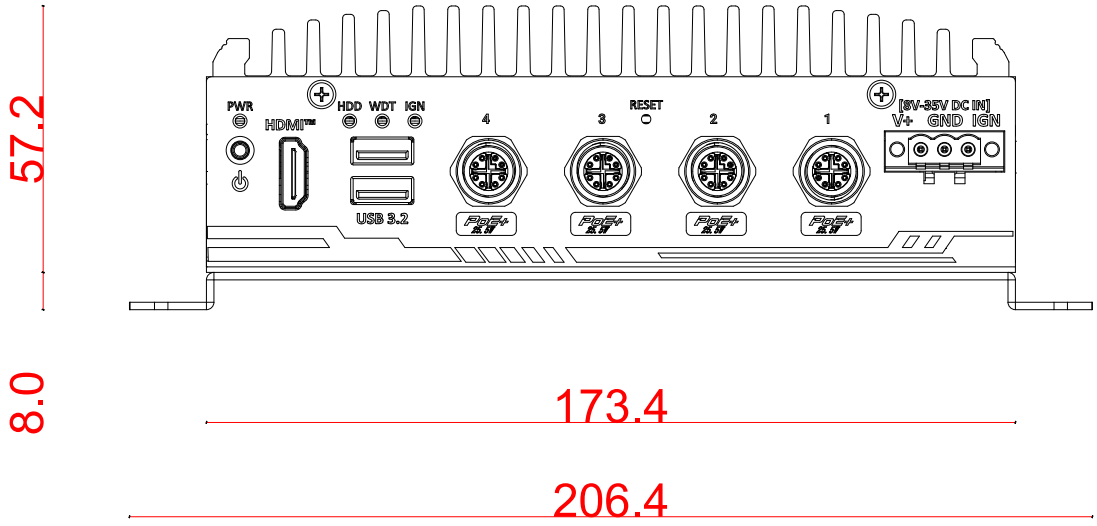
NOTE

All measurements are in millimeters (mm).

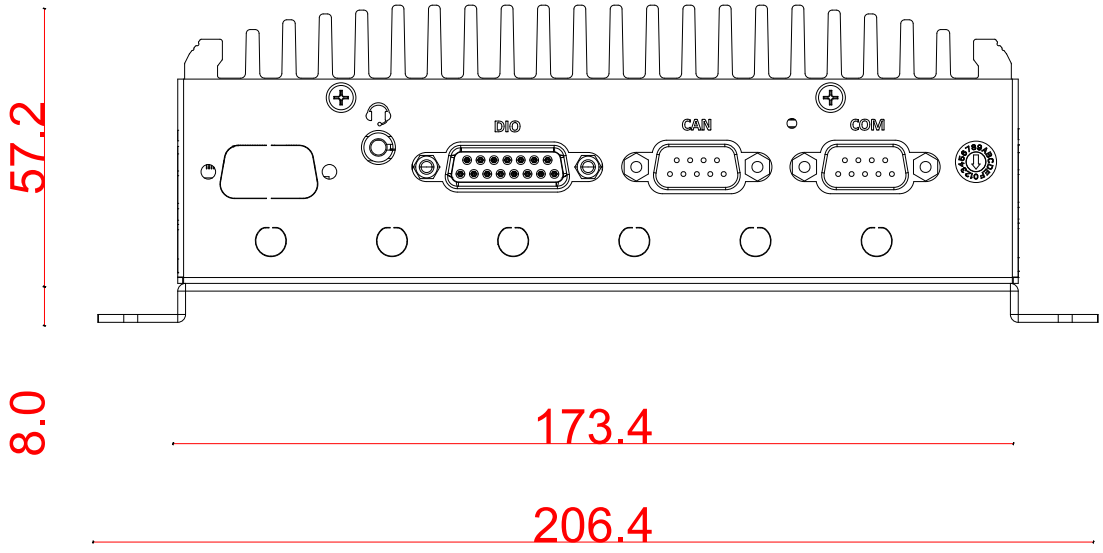
1.2.1 Nuvo-2860VTC Top View



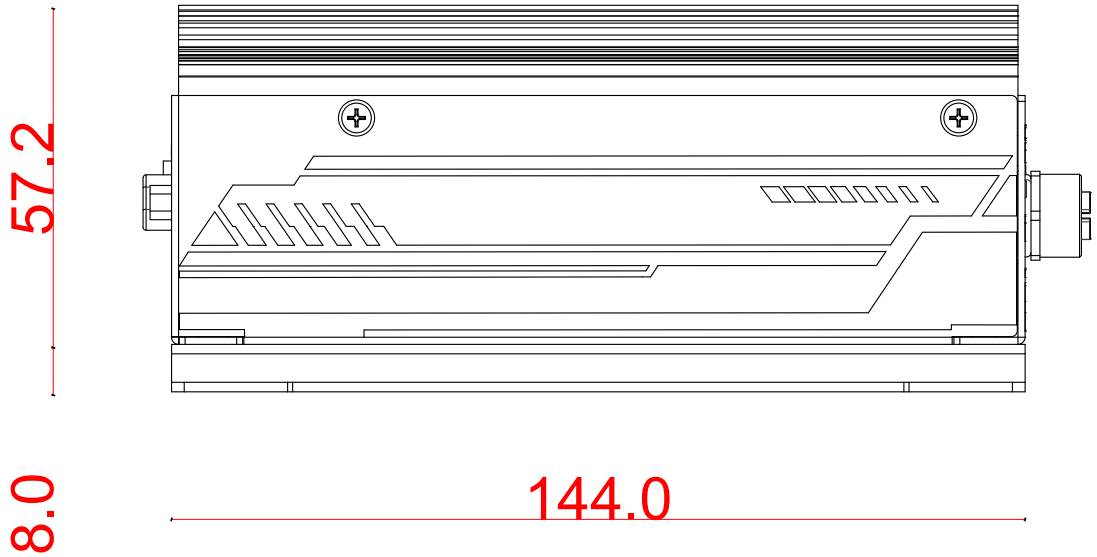
1.2.2 Nuvo-2860VTC Front View



1.2.3 Nuvo-2860VTC Rear View



1.2.4 Nuvo-2860VTC Side View



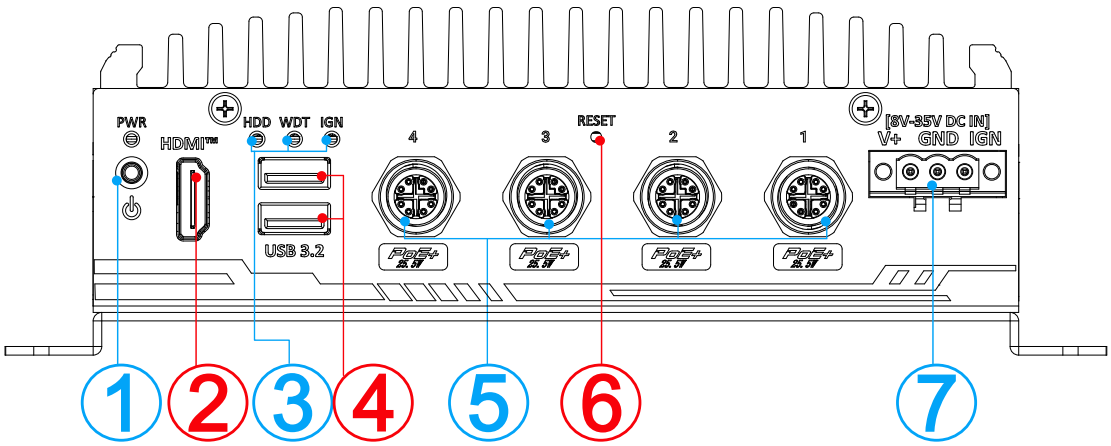
2 System Overview

Upon receiving and unpacking your Nuvo-2860VTC series, 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-2860VTC Packing List

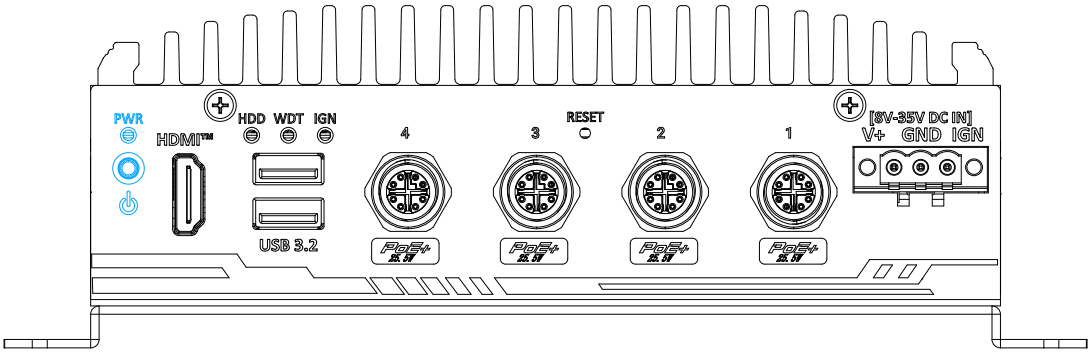
System / Pack	Nuvo-2860VTC	Qty
1	Nuvo-2860VTC series system (If you ordered RAM/SSD or HDD, please verify these items)	1
2	Accessory box, which contains ● 3-pin power terminal block ● High temperature warning label ● Screw pack	 1 1 1

2.2 Front Panel I/O



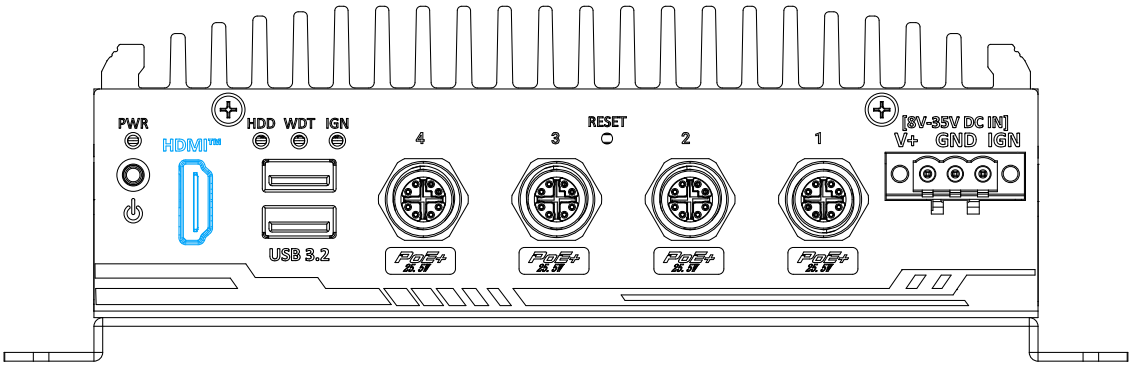
No.	Item	Description
1	Power button	Use this button to turn on or shutdown the system.
2	HDMI™ port	The HDMI™ port is a high-resolution graphics/ data port supporting up to 3840 x 2160 @ 30Hz.
3	System status LEDs	System LEDs indicates disk drive (HDD), watchdog timer (WDT), and ignition power control (IGN).
4	USB3.2 Gen2x1 port	USB3.2 Gen 2 port (SuperSpeed+) offers up to 10Gbps, twice the bandwidth over existing SuperSpeed USB3.2 Gen. 1 connection. It is also backwards compatible with USB3.0 and USB2.0
5	Gigabit Ethernet and PoE+ ports	The M12 X-coded Power over Ethernet ports (IEEE 802.3at PoE+ PSE) provide both data connection and electric power to devices (eg. IP camera), and offers a total power budget of 50W.
6	Reset button	Use this button to manually reset the system.
7	3-pin DC terminal block with ignition power control	Compatible with DC power input from 8V - 35V. The terminal block can also be used for ignition power control signal input.

2.2.1 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).

2.2.2 HDMI™ Port



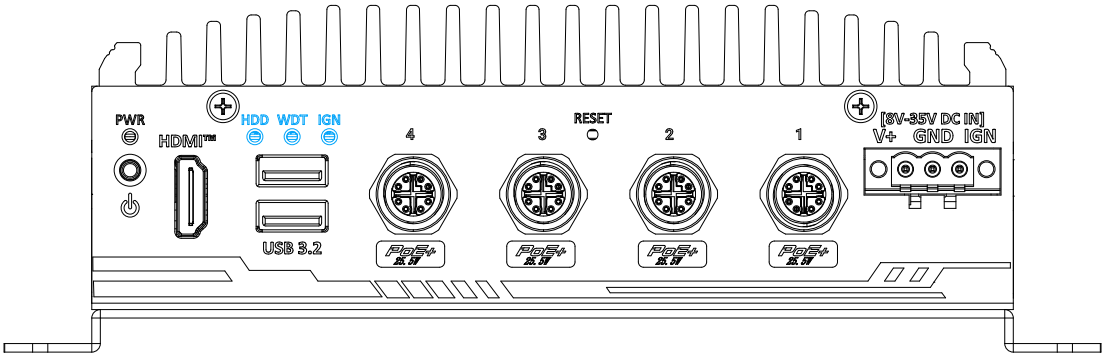
The High-Definition Multimedia Interface (HDMI) port provides uncompressed high-quality digital video and audio transmission between the system and a multimedia display device on a single cable. You can connect to other digital inputs by using a HDMI-to-DVI or HDMI-to-DP cable.



HDMI-to-DP

To achieve the best output resolution in Windows, you need to install corresponding graphics drivers. Please refer to section OS Support and Driver Installation for details.

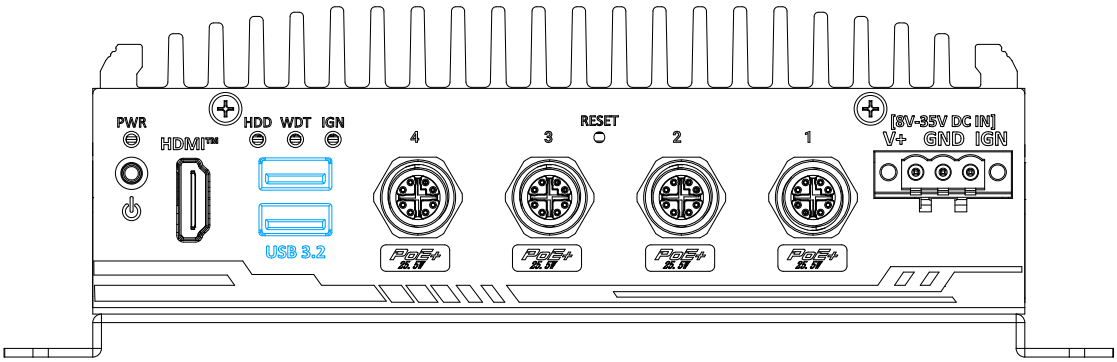
2.2.3 System Status LED



There are three LED indicators on the front panel: HDD, WDT and IGN. The descriptions of these LEDs are listed in the following table.

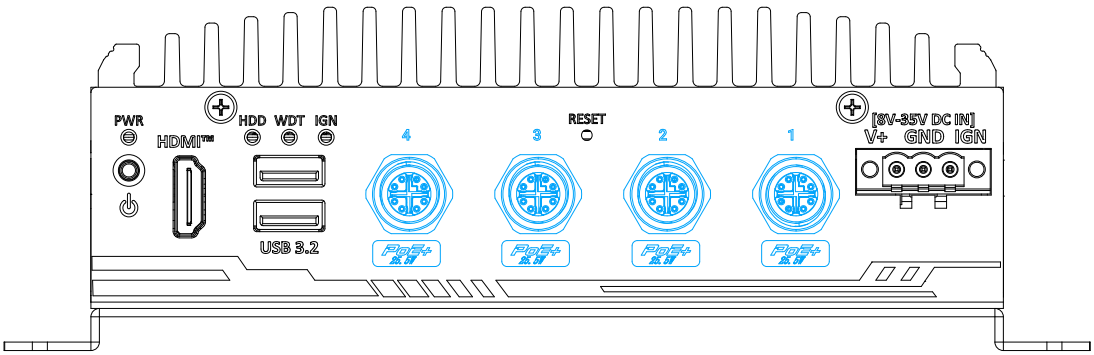
Indicator	Color	Description
HDD	Red	Hard drive indicator, flashing when SATA HDD is active
WDT	Yellow	Watchdog timer indicator, flashing when watchdog timer has started
IGN	Yellow	Ignition power control, lit when IGN signal is applied.

2.2.4 USB3.2 Gen2x1 Port



The system offers one USB3.2 Gen2x1 (SuperSpeed+ USB) port on its front panel with screw-lock mechanism (indicated in **red**). It is 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 3.2 Gen2x1 driver is supported natively in Windows 10.

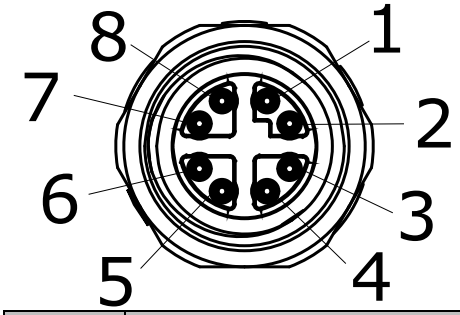
2.2.5 Gigabit Ethernet and Power over Ethernet (PoE+)



The system offers Gigabit Ethernet ports, implemented via M12 X-coded connector on the I/O panel.

The system offers four PoE+ GbE ports via M12 X-coded connectors on the front panel. The ports are implemented using Broadcom BCM5719 controller. Power over Ethernet (PoE) supplies electrical power and data on a 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 25.5W 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.

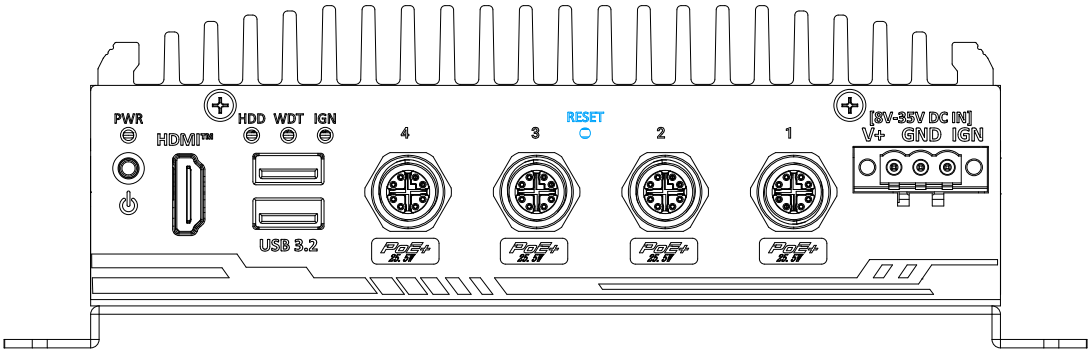
Connector Pin Definition





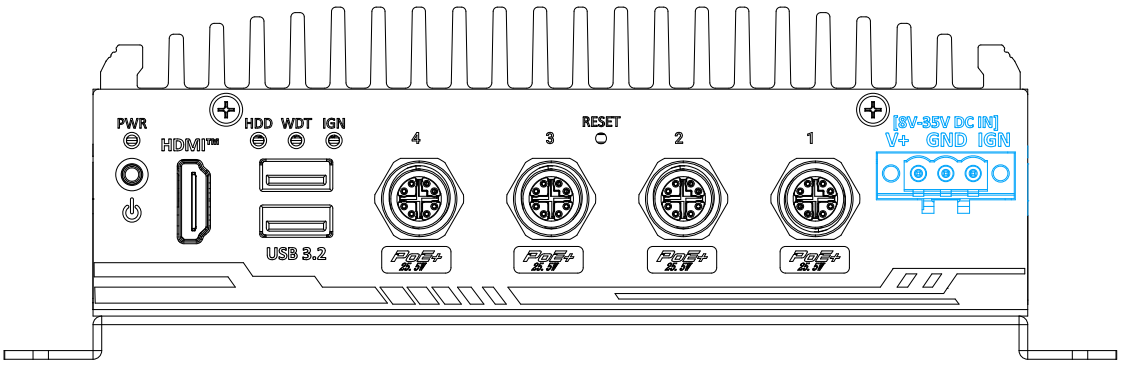
Signal	Panel side	Cable connector end
DA+	1	1
DA-	2	2
DB+	3	3
DB-	4	4
DD+	5	5
DD-	6	6
DC-	7	7
DC+	8	8

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 3-Pin Terminal Block for DC Input with Ignition Input

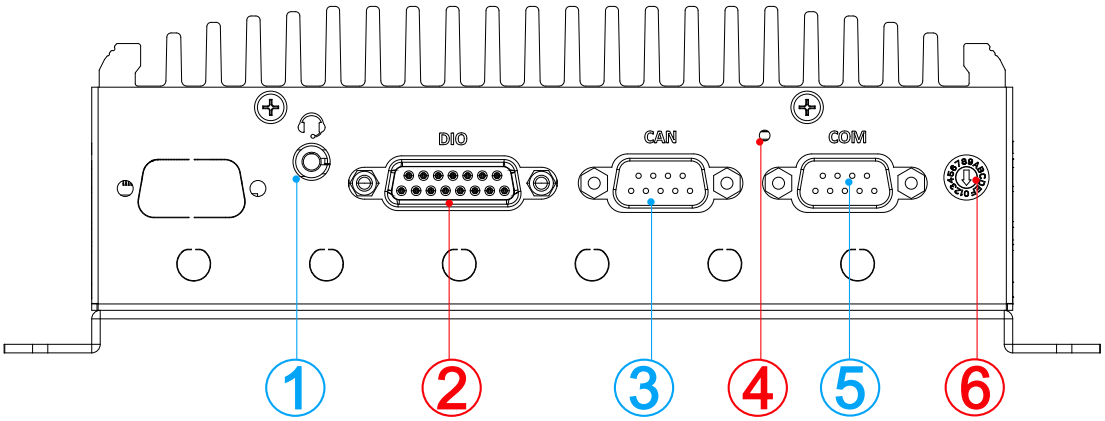


The system accepts a wide range of DC power input from 8V to 35V via a 3-pin pluggable terminal block, which is fit for field usage where DC power is usually provided. The screw clamping mechanism on the terminal block offers connection reliability when wiring DC power. In addition to DC power input, this terminal block can also accept an ignition power control signal input (IGN).

WARNING

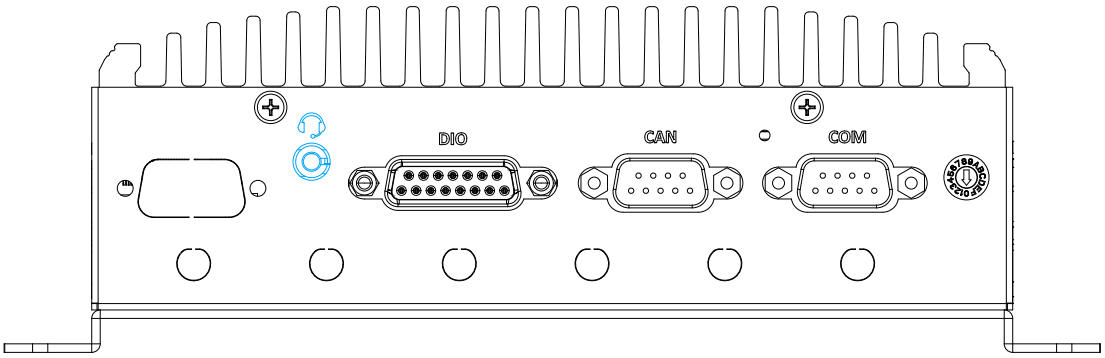
Please make sure the voltage of DC power is correct before you connect it to the system. Supplying a voltage over 35V will damage the system.

2.3 Rear Panel I/O



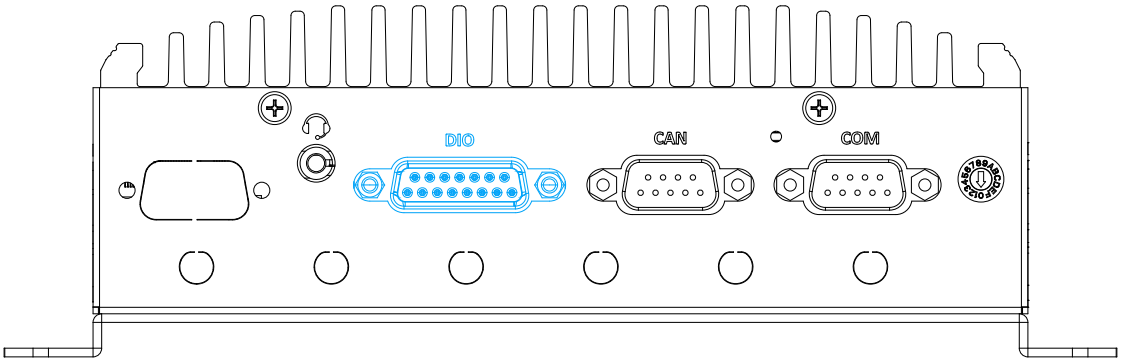
No.	Item	Description
1	3.5mm Speaker-out/ microphone-input jack	3.5mm jack for speaker-out or microphone-input.
2	Isolated DIO port	The DIO port provides 2x isolated digital input and 5x isolate output channels
3	CAN bus port	2x CAN 2.0 port, supporting SocketCAN in Linux.
4	CMOS reset button	Use this button to manually to reset the CMOS to load default BIOS.
5	COM port	Software programmable RS-232/ 422/ 485 port.
6	Rotary ignition switch	The rotary ignition switch features multiple modes for pre and post ignition settings.

2.3.1 3.5mm Speaker-Out/ Microphone-Input Jack

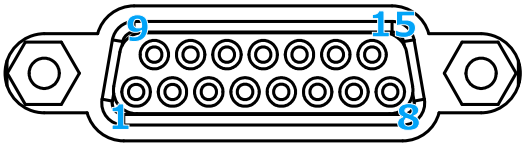


There is a female 4-pole audio jack for headphone (speaker) output and microphone input. To utilize the audio function in Windows, you need to install corresponding drivers for both Intel® chipset and audio device drivers.

2.3.2 Isolated Digital Input/ Output



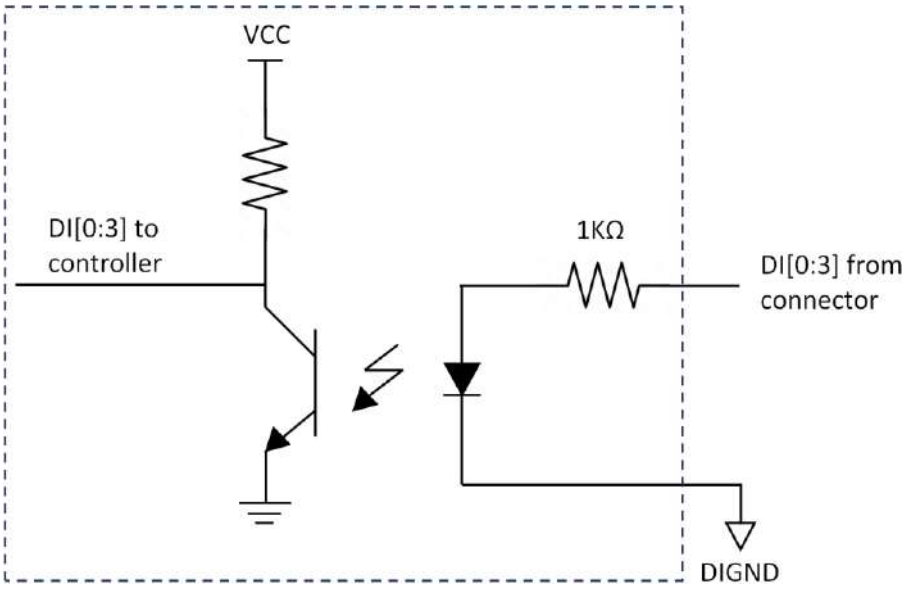
The system provides 2-CH isolated digital input and 5-CH isolated digital output channels. Please refer to **the following table** for information on wiring and programming the isolated DIO channels.



Pin#	Pin Definition	Pin#	Pin Definition
1	VDD	9	ISO_DO0_CN
2	ISO_DO1_CN	10	DO0_COM
3	DO1_COM	11	ISO_DO2_CN
4	ISO_DO3_CN	12	DO2_COM
5	DO3_COM	13	ISO_DO4_CN
6	ISO_DI1_CN	14	DO4_COM
7	DI1_COM	15	DI0_COM
8	ISO_DI0_CN		

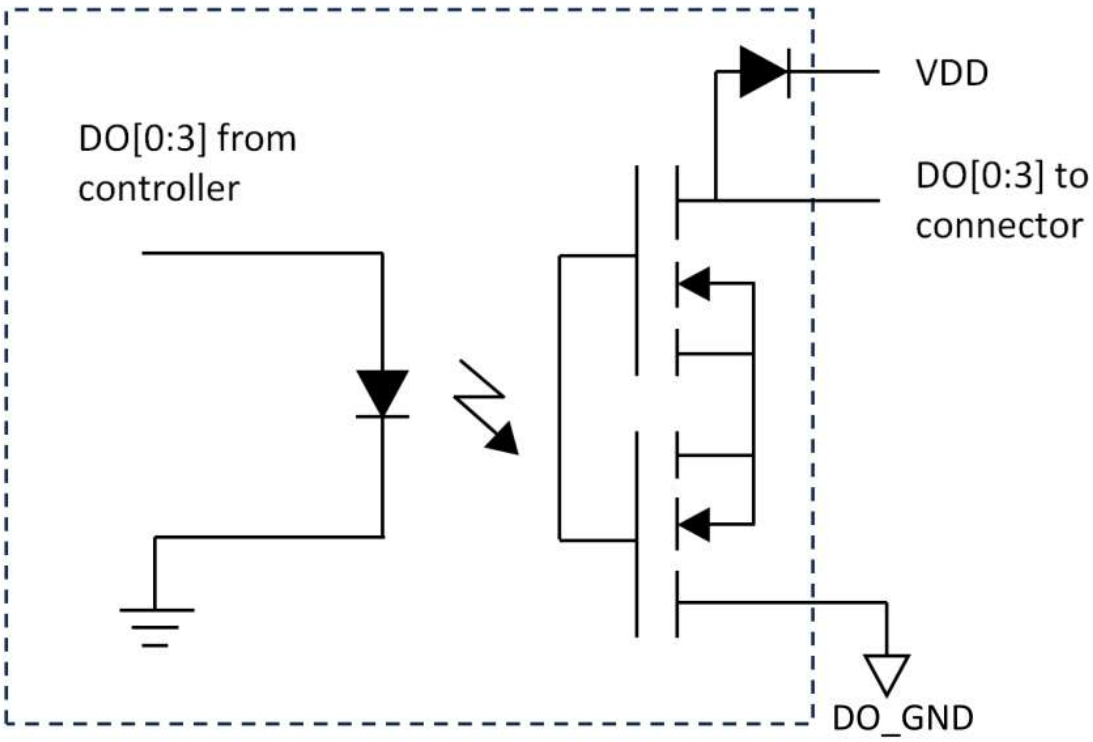
Digital Input Wiring

Channel	2
Type	Sink mode
Interface	Unipolar Photocoupler
Isolation Voltage	2500Vrms
Rated Input Voltage	0V-24V
Logic High Voltage	5V-24V
Logic Low Voltage	0V-1.5V
Operation Mode	Polling
Response Time (Rise)	3us
Response Time (Fall)	3us

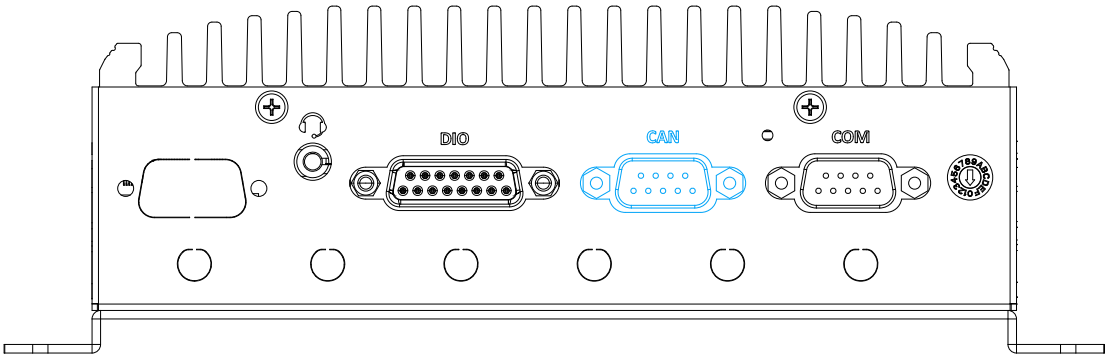


Digital Output Wiring

Channel	5
Type	Sink mode
Interface	Bidirectional PhotoMOS
Isolation Voltage	1500V AC
Operation Voltage	0V-24V
Driving Current	250mA
Operation Mode	Polling
Response Time (Turn on)	660us ~ 2ms
Response Time (Turn off)	90us ~ 210us

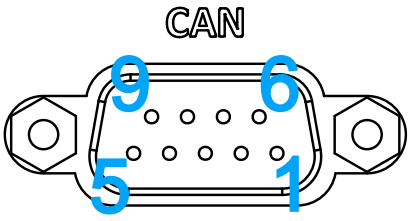


2.3.3 CAN bus



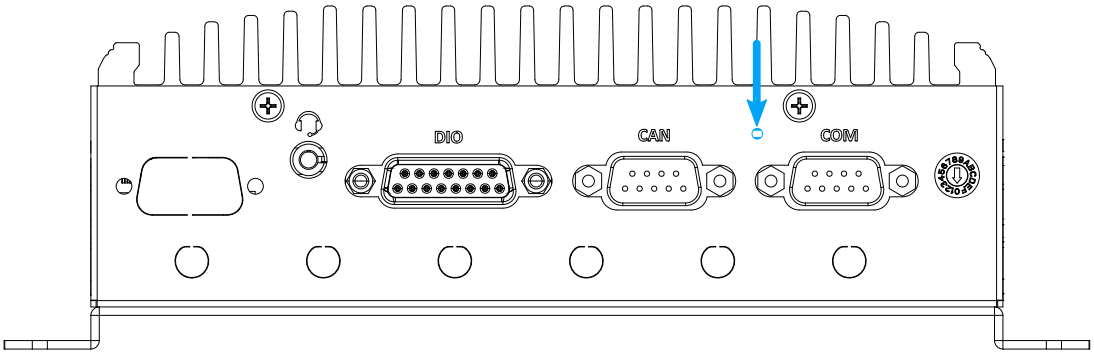
CAN bus is a robust industrial bus with a pair of differential signals and is commonly used in various industrial and in-vehicles applications. The CAN bus port supports CAN2.0A and CAN2.0B up to 1Mbps.

CAN bus is a robust industrial bus with a pair of differential signals and is commonly used in various industrial and in-vehicles applications. The system is equipped with a CAN bus DB9 port that is compatible with both industrial and in-vehicle applications. The CAN bus port supports CAN2.0A and CAN2.0B up to 1Mbps.



Pin No.	Definition	I/O	Description
1	-	-	Reserved pin. Keep unconnected
2	CAN1_L	I/O	CAN Bus1 Low-level voltage
3	-	-	Reserved pin. Keep unconnected
4	CAN2_L	I/O	CAN Bus2 Low-level voltage
5	-	-	Reserved pin. Keep unconnected
6	CAN1_GND	-	CAN bus1 ground
7	CAN1_H	I/O	CAN Bus1 high-level voltage
8	CAN2_H	I/O	CAN Bus2 high-level voltage
9	CAN2_GND	-	CAN bus2 ground

2.3.4 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, disconnect the DC power input, and use the tip of a pen to press and hold for at least 5 seconds to reset the BIOS.

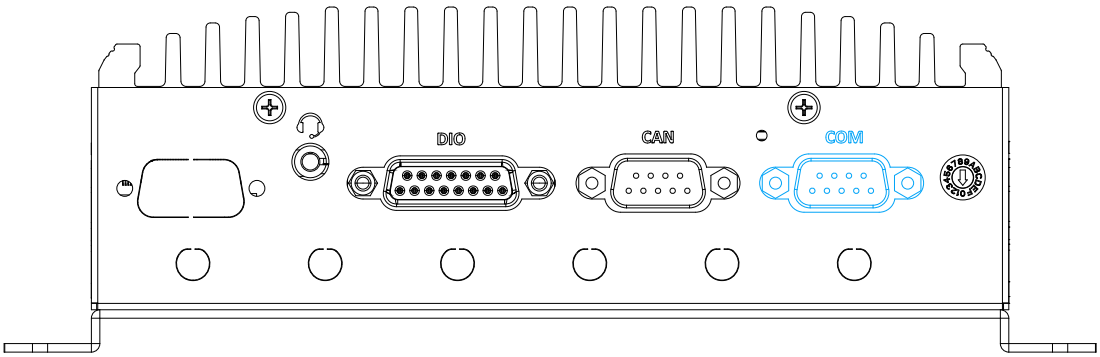
NOTE

*You **MUST** disconnect the DC input from the system before resetting the CMOS.*

WARNING

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

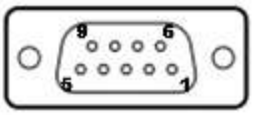
2.3.5 COM Port



The system provides a software-configurable RS-232/ 422/ 485 COM port for communicating with external devices. The COM port is implemented using industrial-grade ITE8786 Super IO chip (-40 to 85°C) and provide up to 115200 bps baud rate.

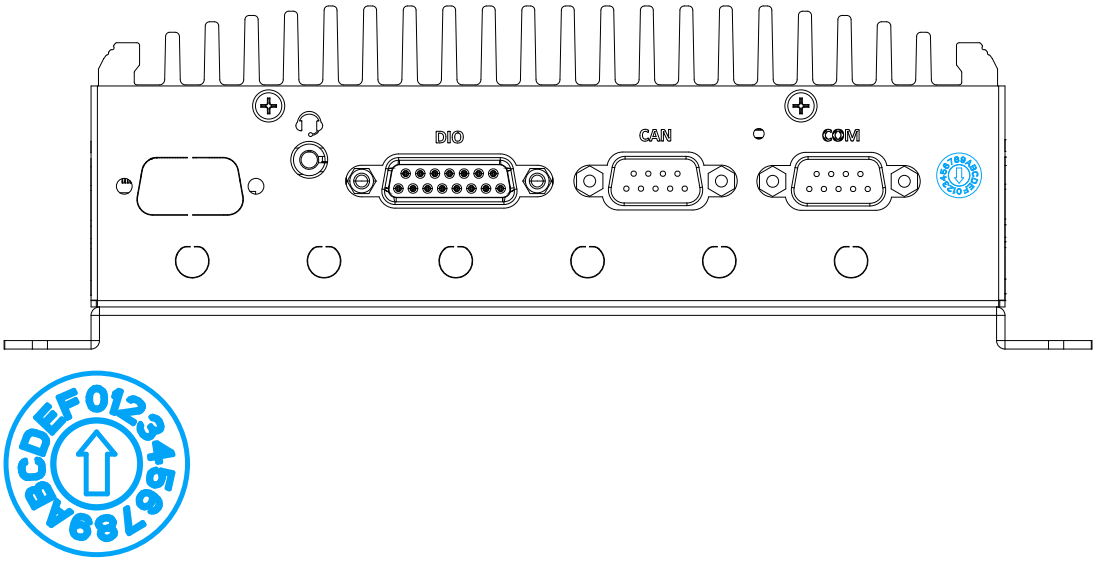
The operation mode of COM port can be set in BIOS setup utility. The following table describes the pin definition of the COM port.

COM Port Pin Definition



	COM Port		
Pin#	**RS-232 Mode**	**RS-422 Mode**	**RS-485 Mode (Two-wire 485)**
1	DCD		
2	RX	422 TXD+	485 TXD+/RXD+
3	TX	422 RXD+	
4	DTR	422 RXD-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS	422 TXD-	485 TXD-/RXD-
9	RI		

2.3.6 Rotary Ignition Switch



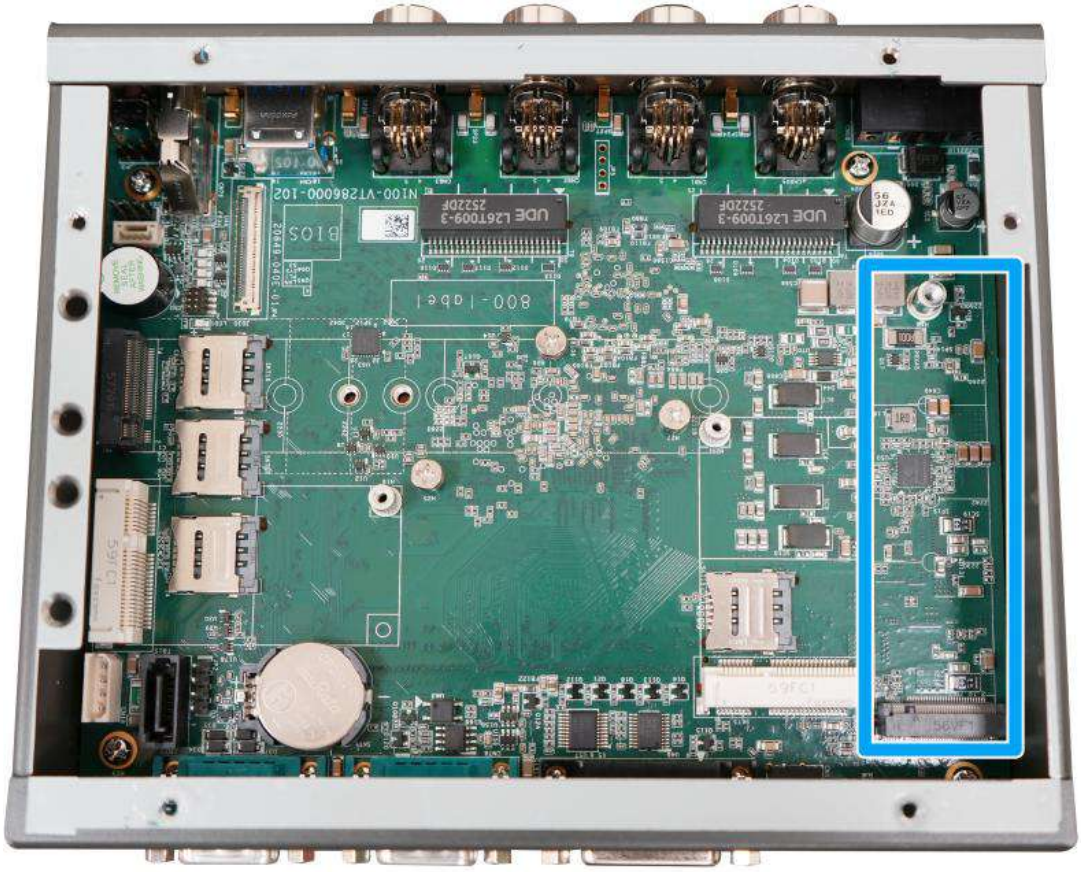
The ignition power control switch features multiple modes for pre and post ignition settings. Please refer to the section Ignition Power Control for details. Please use a flathead screwdriver to adjust the position of the ignition power control switch.

For details, please refer to the section Ignition Power Control for details.

2.4 Internal I/O Functions

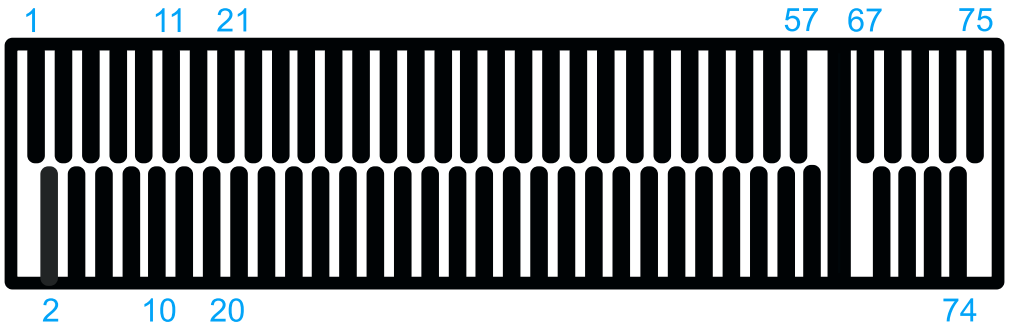
In addition to I/O connectors on the front panel, the system also provides internal on-board expansion slots. In this section, we'll illustrate these internal I/O functions.

2.4.1 M Key M.2 2280 Slot for NVMe SSD



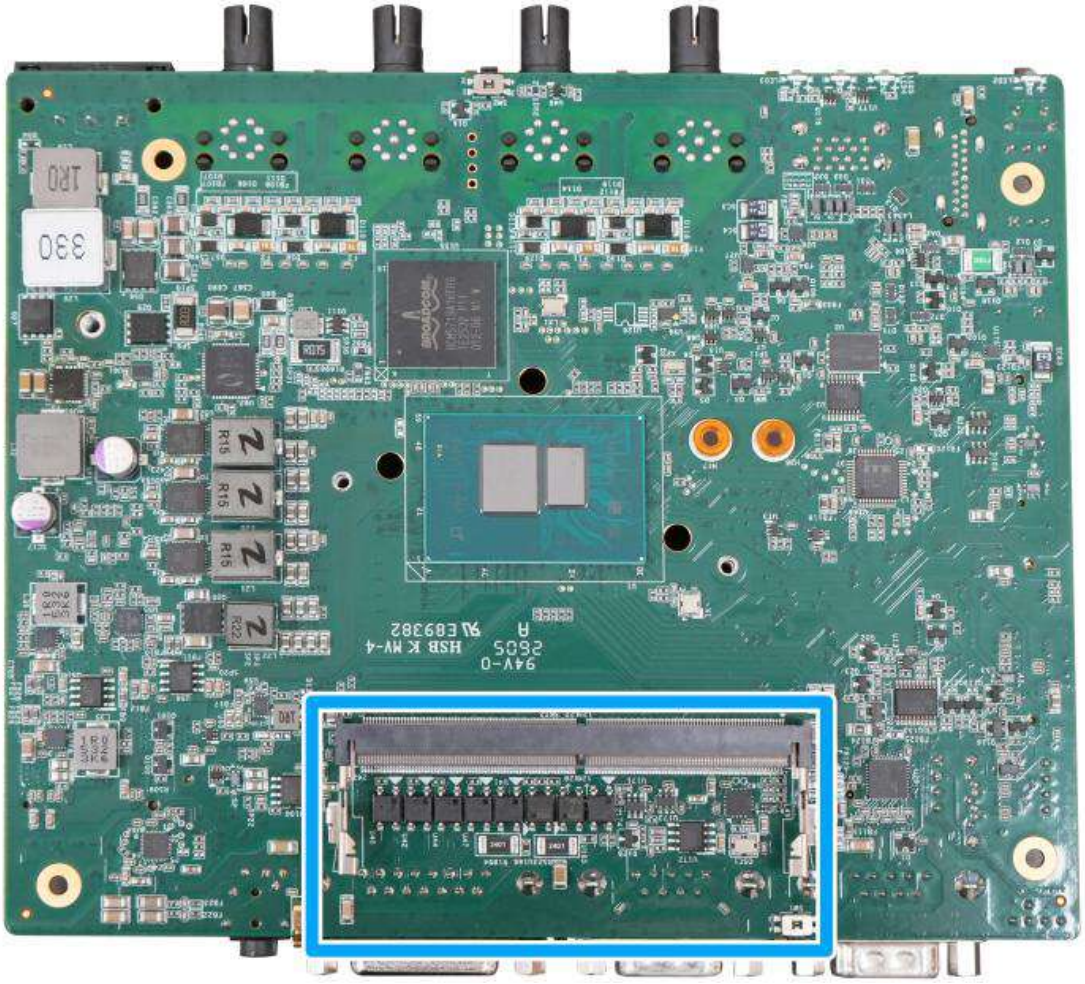
The system has a Gen3 x2 PCIe M.2 2280 slot for you to install an NVMe SSD for the ultimate performance. The NVMe SSD offers noticeable performance advantages over 2.5" SSDs for smoother operating system operation and responses.

M.2 (M Key) Slot Pin Definition



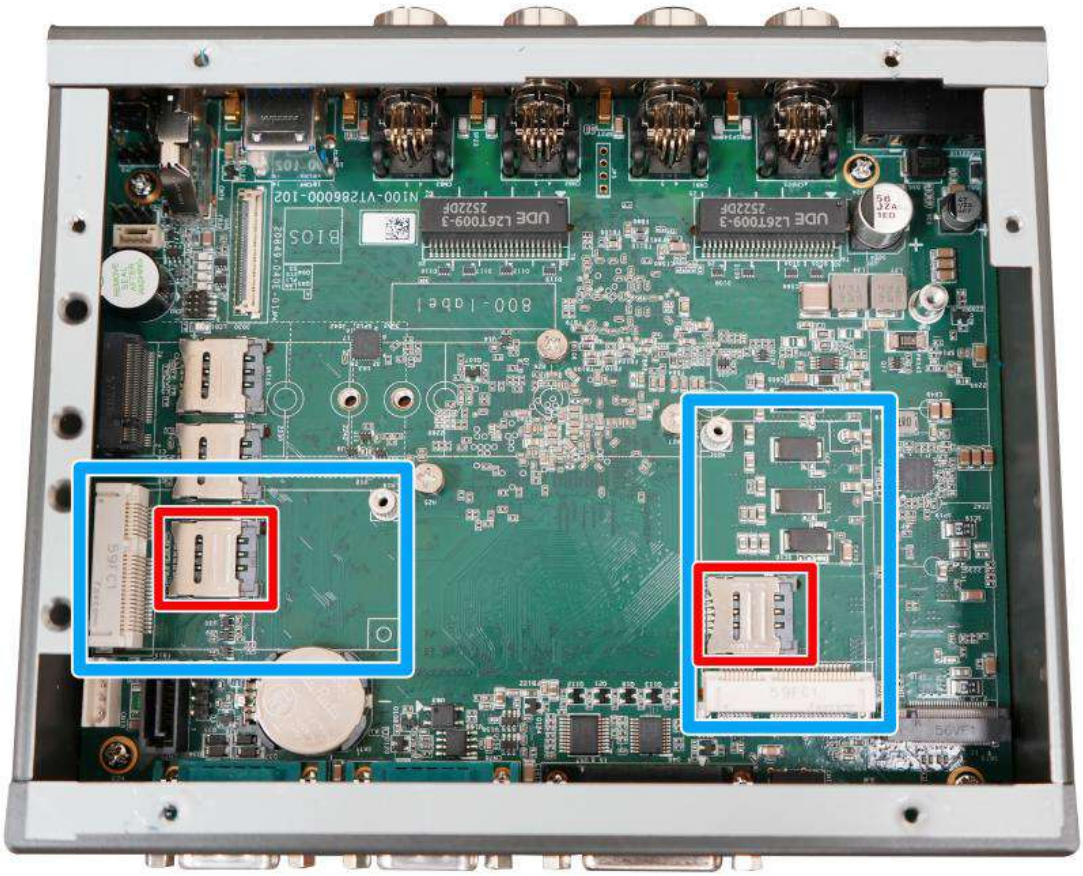
Pin #	Signal	Pin #	Signal
1	GND	**2**	+3V3
3	GND	**4**	+3V3
5	PERN3	**6**	-
7	PERP3	**8**	-
9	GND	**10**	DAS/DSS_N
11	PETN3	**12**	+3V3
13	PETP3	**14**	+3V3
15	GND	**16**	+3V3
17	PERN2	**18**	+3V3
19	PERP2	**20**	-
21	GND	**22**	-
23	PETN2	**24**	-
25	PETP2	**26**	-
27	GND	**28**	-
29	PERN1	**30**	-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

2.4.2 DRAM SO-DIMM Slot



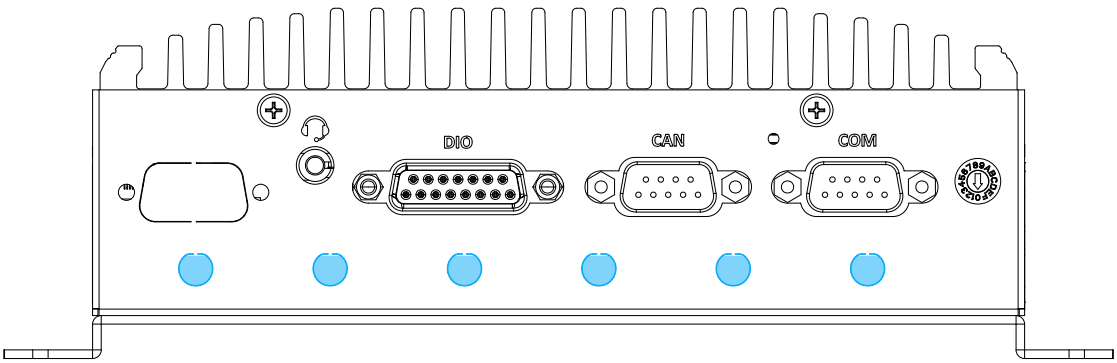
The system motherboard supports a SODIMM socket for installing a DDR5-4800 memory module up to 16GB capacity.

2.4.3 Mini-PCIe Slot (PCIe and USB2.0 Signal)

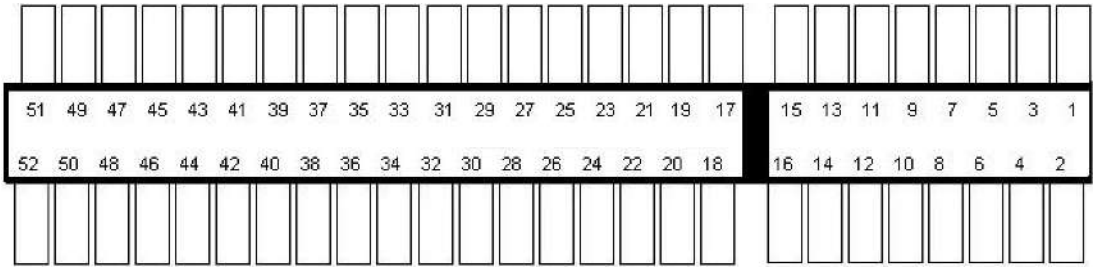


The mini-PCIe socket (in **blue**) accepts off-the-shelf mini-PCIe modules. You can add additional features to your system such as 5G/ 4G, WiFi, GPS, CAN bus, analog frame grabber, etc.

The multiple antenna apertures can be located on the rear panel.



mini-PCIe Pin Definition

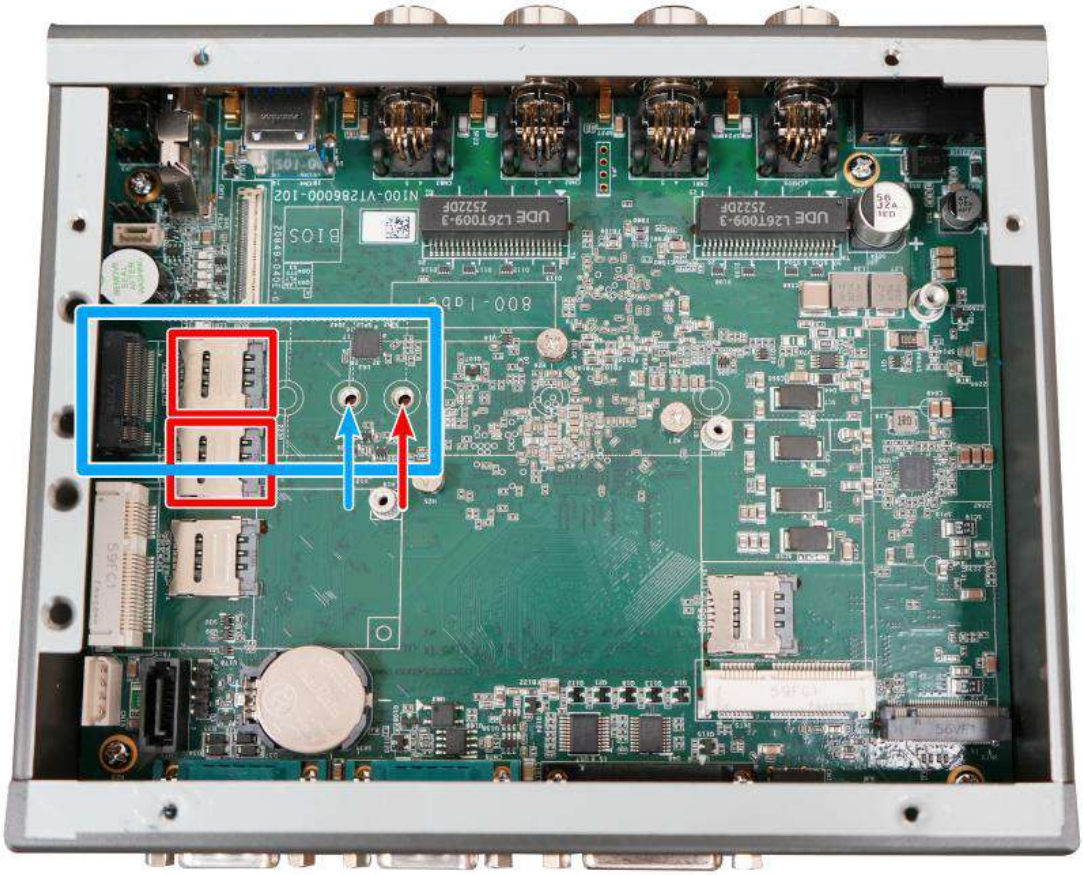


Pin #	Signal	Pin #	Signal
1	WAKE#	2	+3.3Vaux
3	-	4	GND
5	-	6	+1.5V
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RESET
15	GND	16	UIM_VPP
Mechanical Key			
17	-	18	GND
19	-	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3Vaux
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK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

WARNING

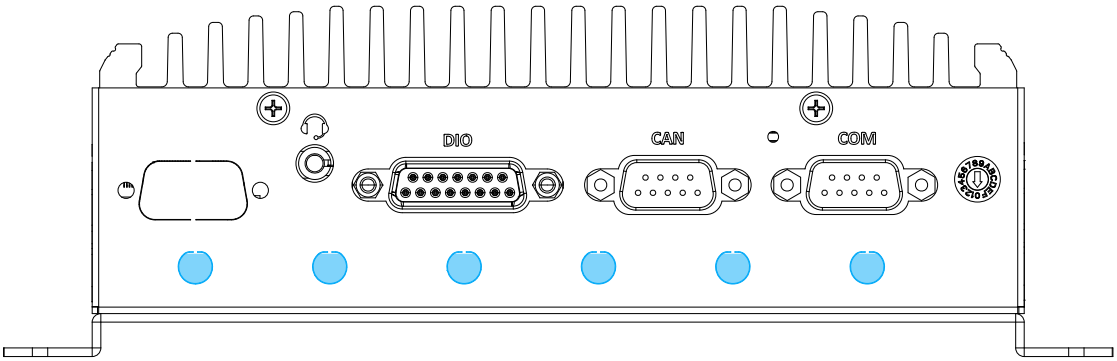
Some off-the-shelf mini-PCIe 4G modules are not compliant to standard mini-PCIe interface. They use 1.8V I/O signals instead of standard 3.3V I/O and may have signal conflict. Please consult with Neousys for compatibility when in doubt!

2.4.4 M.2 3042/ 3052 B Key Socket

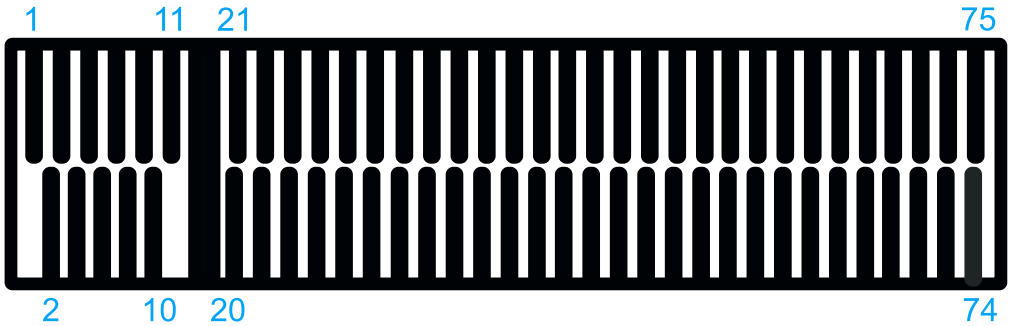


The system has one M.2 3042/ 3052 B key socket (in **blue**) for 5G/ 4G module installation and dual SIM slots (in **red**). The M.2 slot features USB3 and USB2 signal. By adjusting the copper stand, the slot can accommodate an M.2 3042 (**blue arrow**) or an M.2 3052 (**red arrow**) module.

For SMA antenna installation, there are antenna openings located on the rear panel.

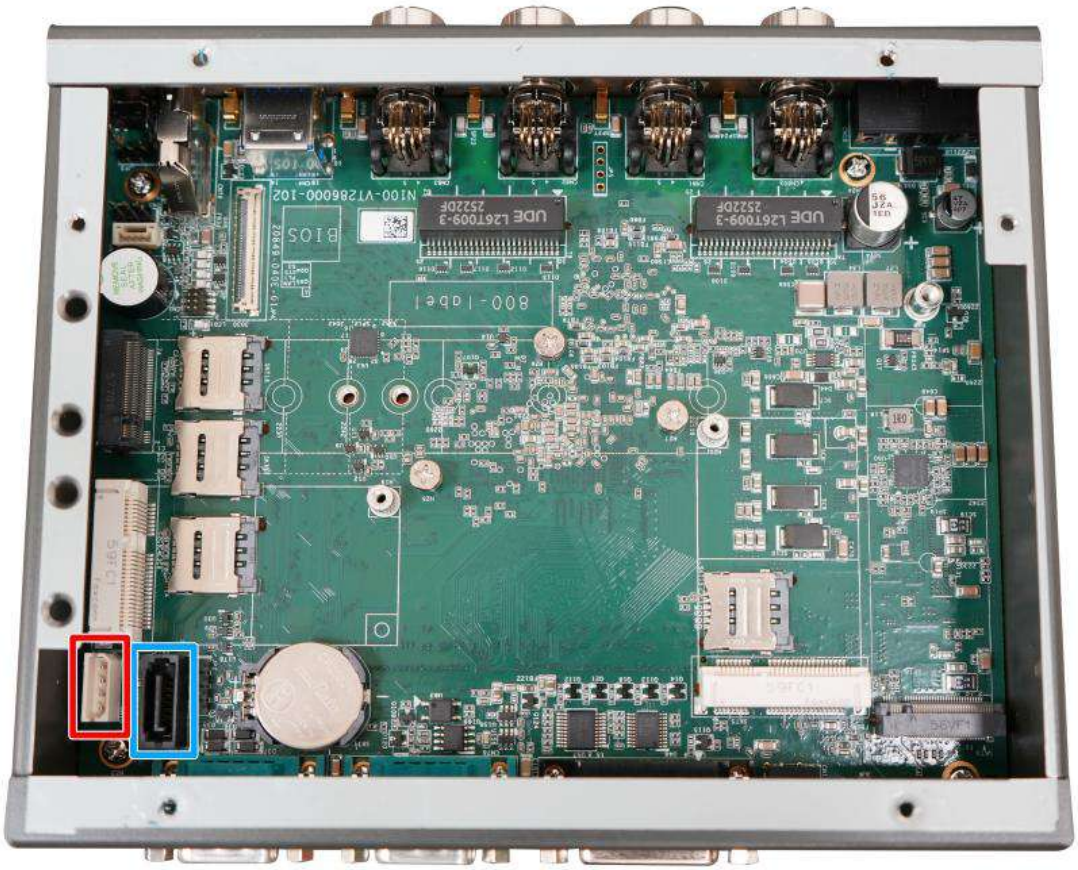


M.2 3042/ 3052 B Key Pin Definition



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		
Mechanical Key			
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	UIM2-DATA
45	GND	44	UIM2-CLK
47	-	46	UIM2-RESET
49	-	48	UIM2-PWR
51	GND	50	PERST_N
53	-	52	-
55	-	54	-
57	GND	56	-
59	-	58	-
61	-	60	-
63	-	62	-
65	-	64	-
67	Reserved	66	-
69	Reserved	68	Reserved
71	GND	70	+3V3
73	GND	72	+3V3
75	-	74	+3V3

2.4.5 SATA Port



The system provides a SATA port (indicated in **blue**) features a 7-pin SATA connector and a 4-pin power connector (indicated in **red**).

The SATA and power connector can accommodate a 2.5” HDD/ SSD on the internal HDD bracket.

3 System Installation

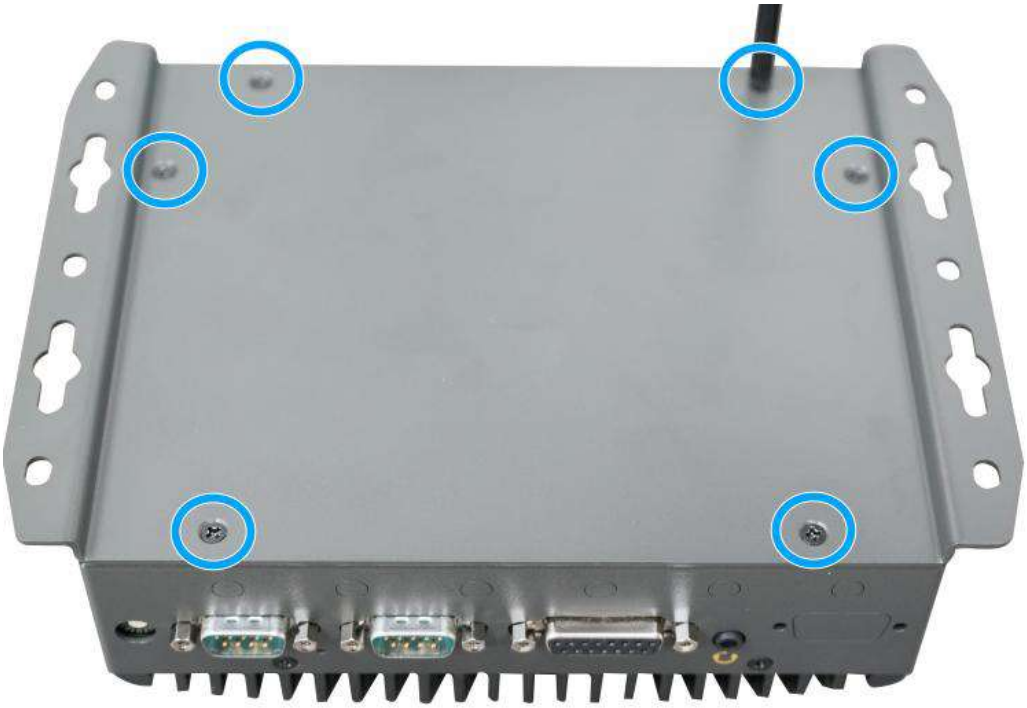
Before disassembling the system enclosure and installing components and modules, please make sure you have done the following:

- 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 antenna (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.

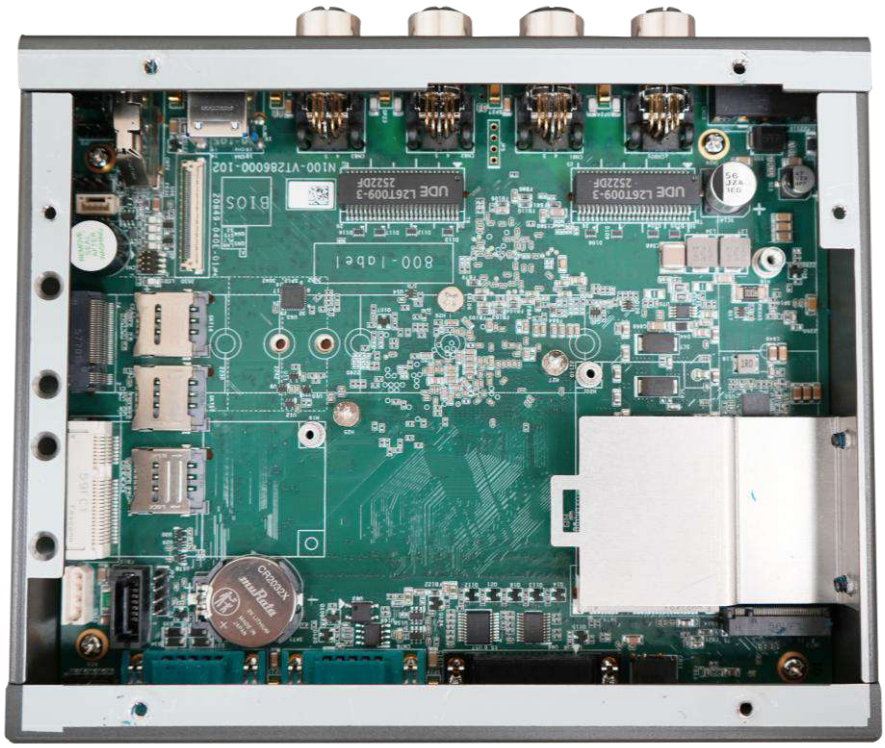
3.1 Disassembling the System

To access system internal components, the system needs to be disassembled. To disassemble the system enclosure, please refer to the procedures below:

1. Please place the system on a flat sturdy surface, turn the system upside-down, and remove the screws indicated.

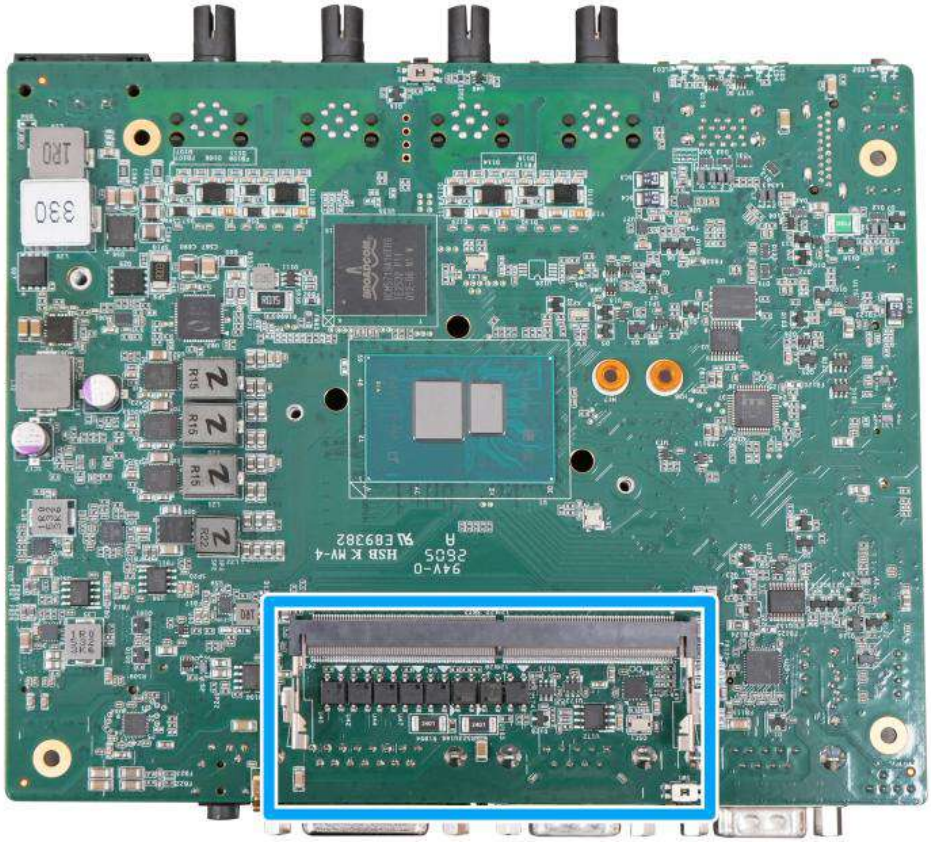


2. Remove the bottom panel to gain access to internal expansion slots.



3.2 Installing Internal Components

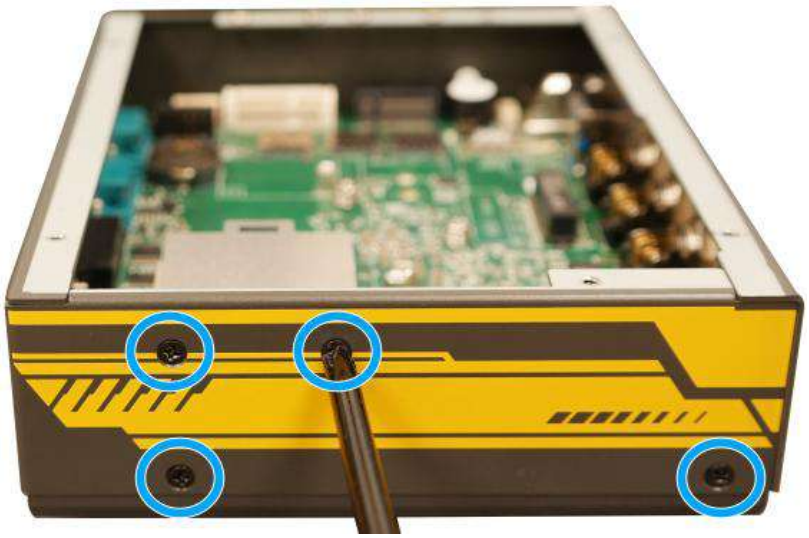
3.2.1 SO-DIMM Installation



There is a SO-DIMM memory slot on the motherboard that supports up to 16GB DDR5-4800.

Please follow the procedures below to replace or install the memory modules.

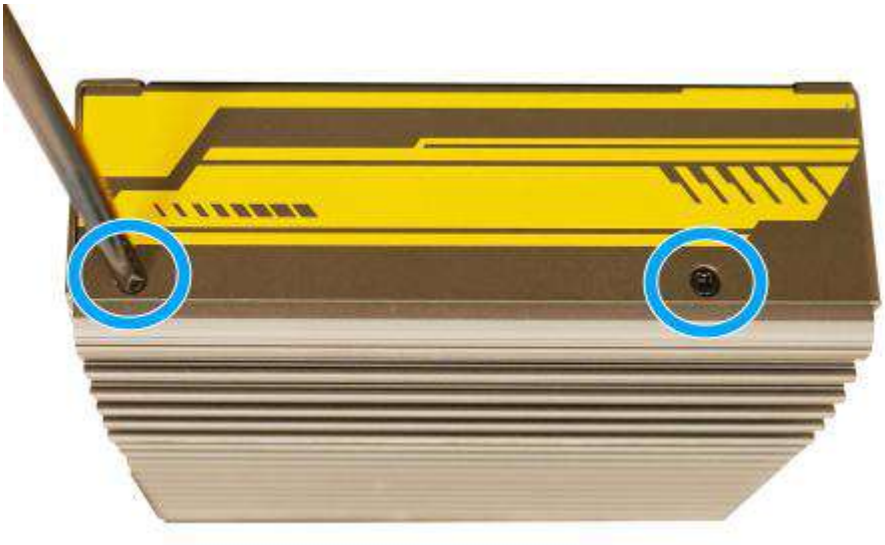
1. Please refer to the section “Disassembling the System”.
2. Remove the screws indicated.



3. Remove the heatsink.



4. Remove the screws indicated on the other side.



5. Remove the screws indicated on the front and rear panels.



Front panel



Rear panel

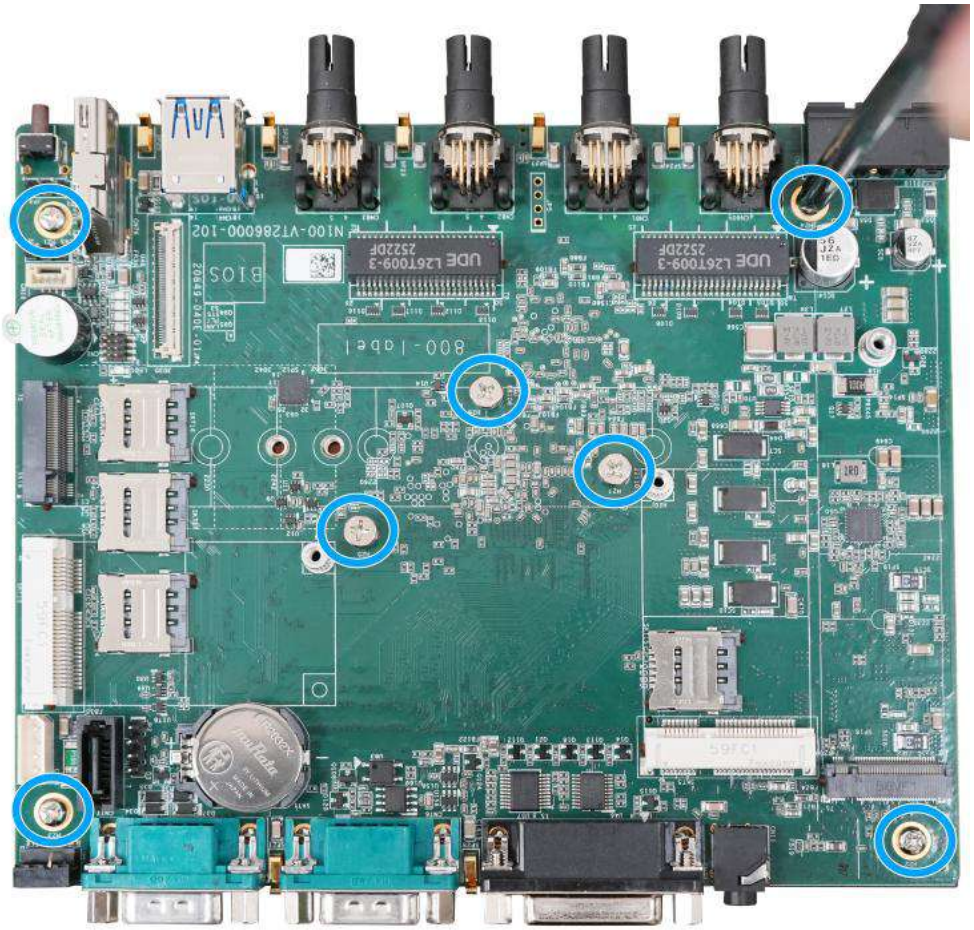
6. Separate the front and rear panels.



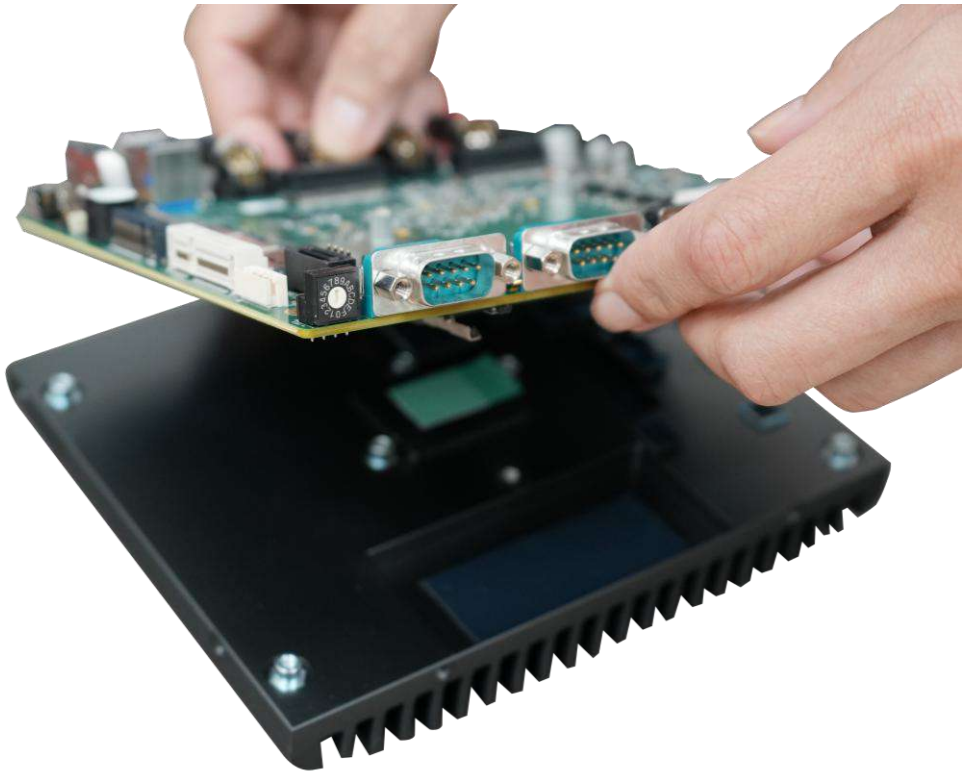
7. Please note when separating the M12 connector panel, O-rings from the M12 connector will fall out. Please safe keep them for later installation.



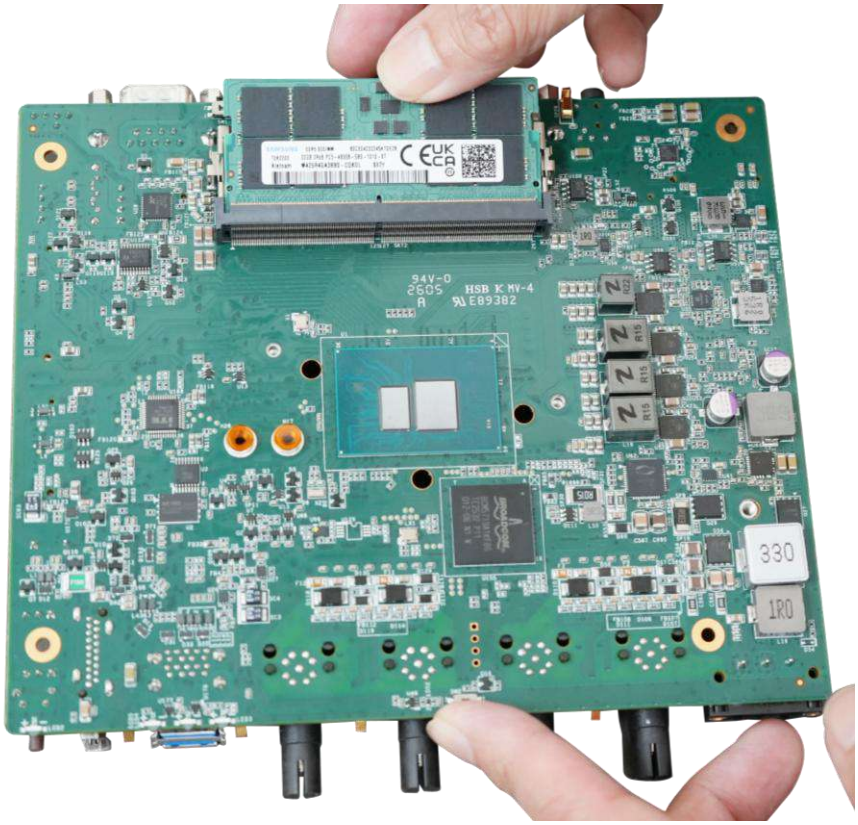
8. Remove the screws indicated on the motherboard.



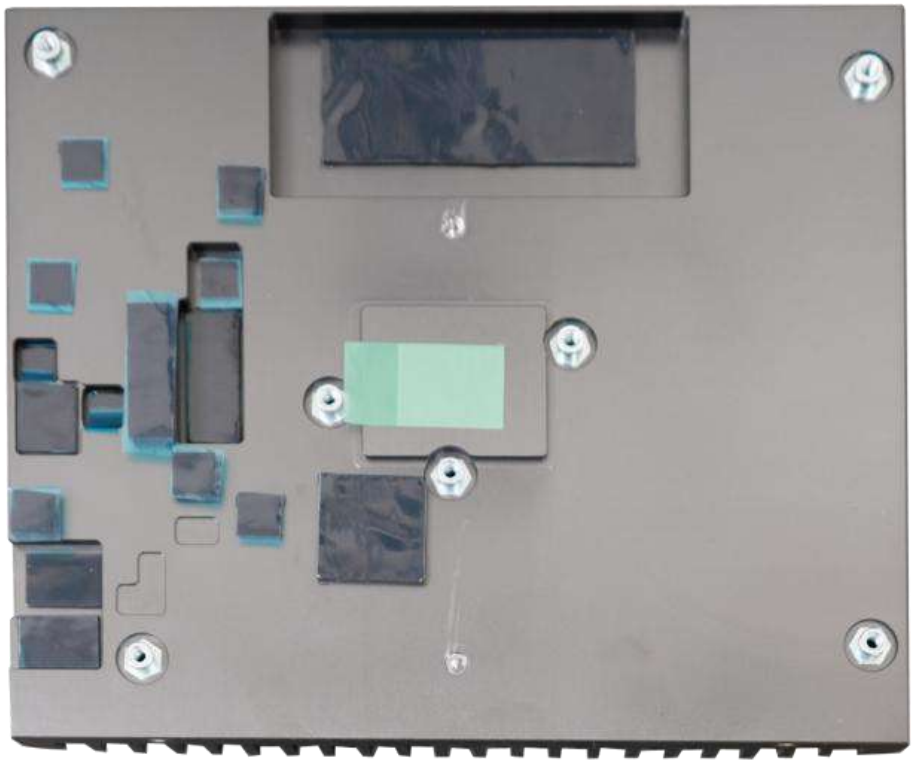
9. Separate the motherboard from the heatsink.



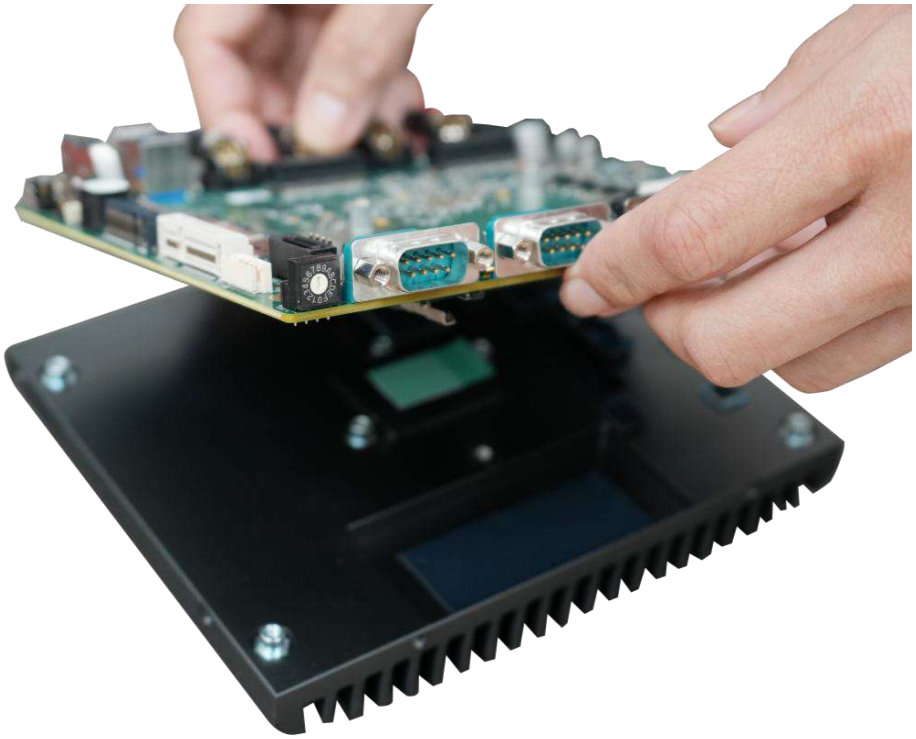
10. Turn the motherboard upside-down to access the DRAM slot. Insert the module into the slot at a 45-degree angle, push down on the edge of the module to clip the module into position.



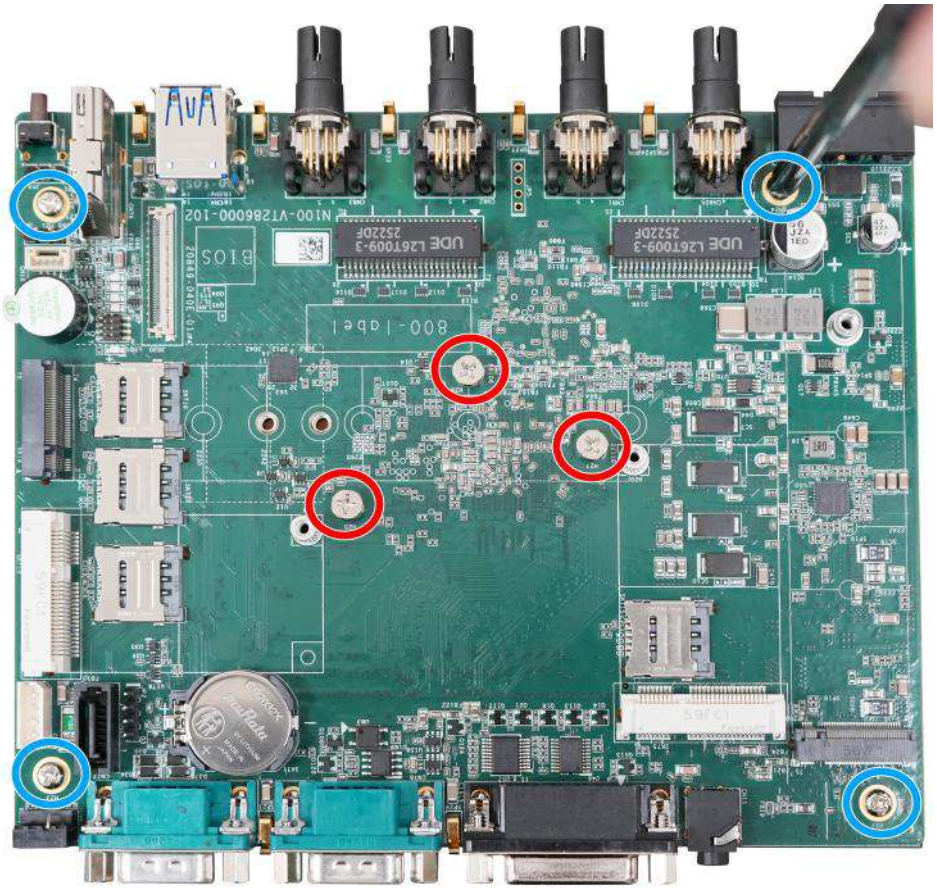
11. Make sure all protection films on thermal pads are removed.



12. Re-seat the motherboard onto the heatsink.



13. Secure the motherboard onto the heatsink with the screws indicated. Note the screws indicated in **red** are spring-loaded.



14. Reinstall front and rear panels.



15. Secure front and rear panels.



Front panel



Rear panel

16. Tuck the O-rings back into each M12 connector.

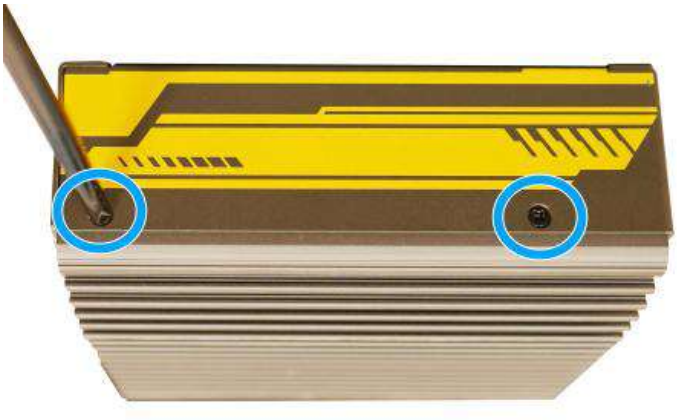


Place O-ring into each connector



Tuck the O-ring into connector

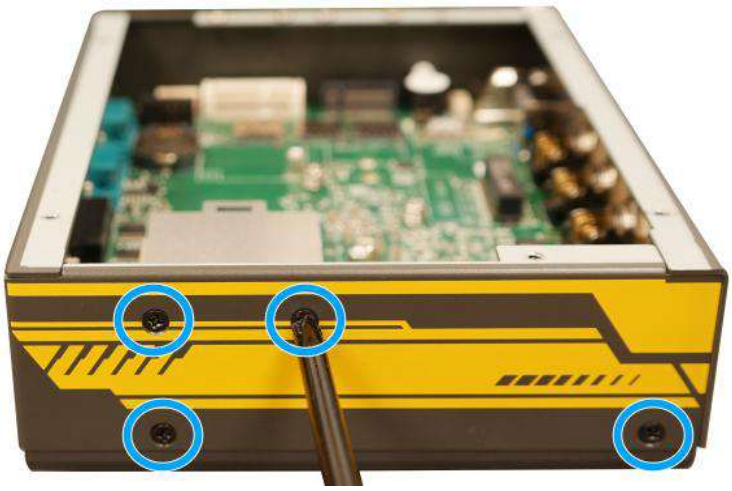
17. Secure screws on side panel.



18. Place the heatsink back into the enclosure.



19. Secure heatsink and side panel with the screws indicated.



20. Reinstall the system enclosure or the panel when done.

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

3.2.2 M.2 2280 NVMe SSD Installation

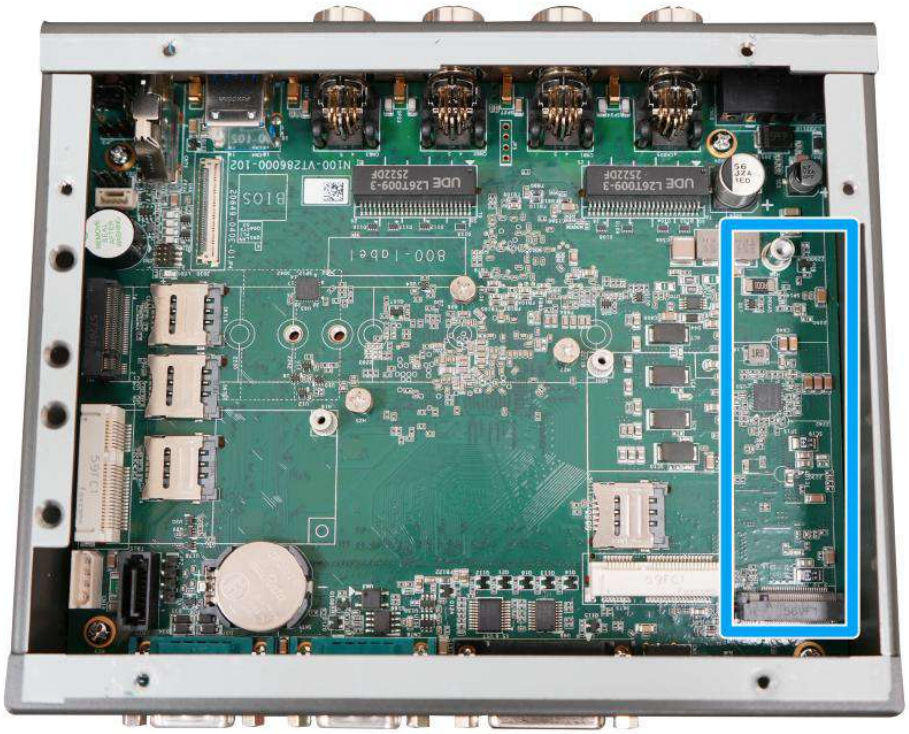
The system has a M.2 2280 slot for you to install an M.2 2280 NVMe SSD. For installation, please refer to the following instructions.

1. Please refer to the section “Disassembling the System”.

2. Remove the screws indicated.



3. Remove the heatsink to access the M.2 slot



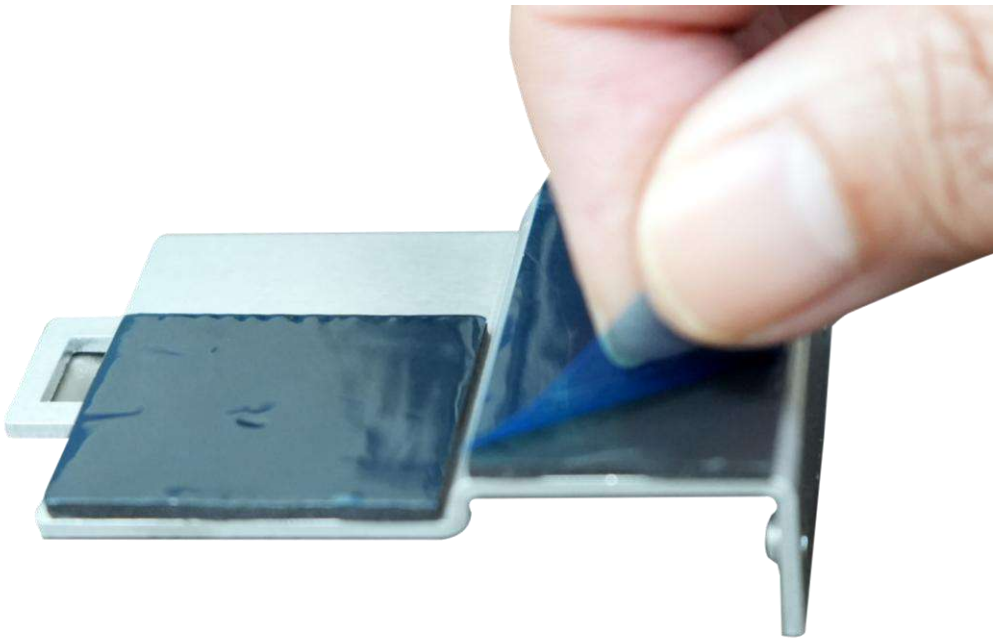
4. Insert the module on a 45-degree angle.



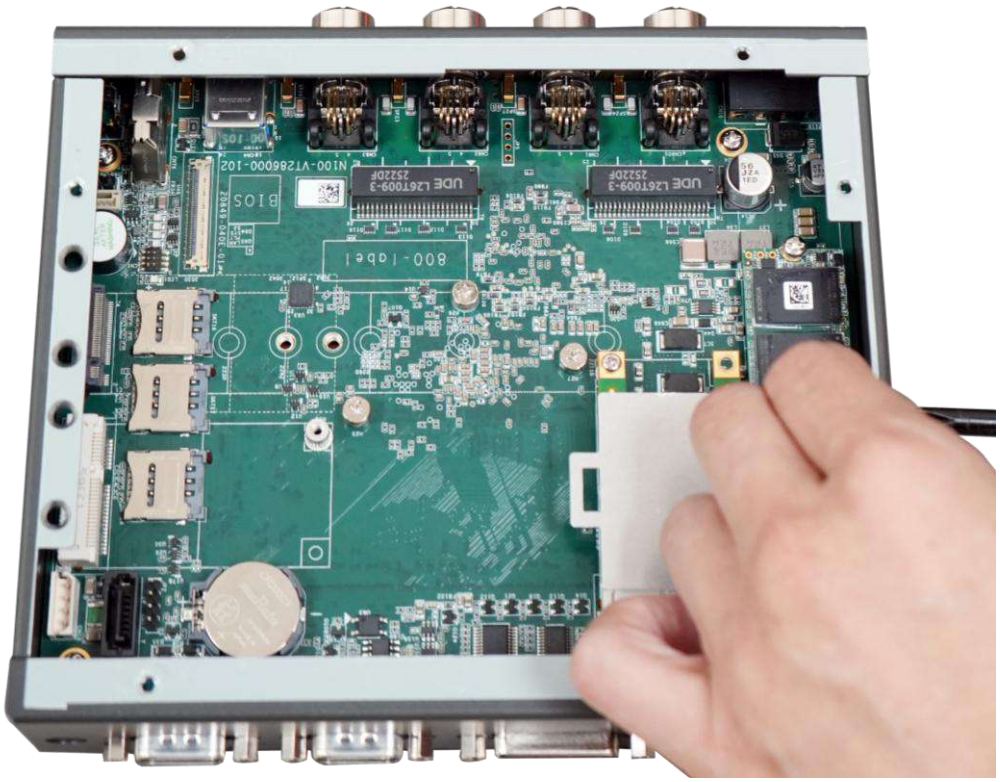
5. Gently press down and secure the module with an M3 P-head screw.



6. Remove the protection film on the thermal pad.



7. Place the heatsink back into the enclosure, make sure the thermal pad is in contact with the NVMe SSD.



8. Secure the heatsink with screws on the side panel.

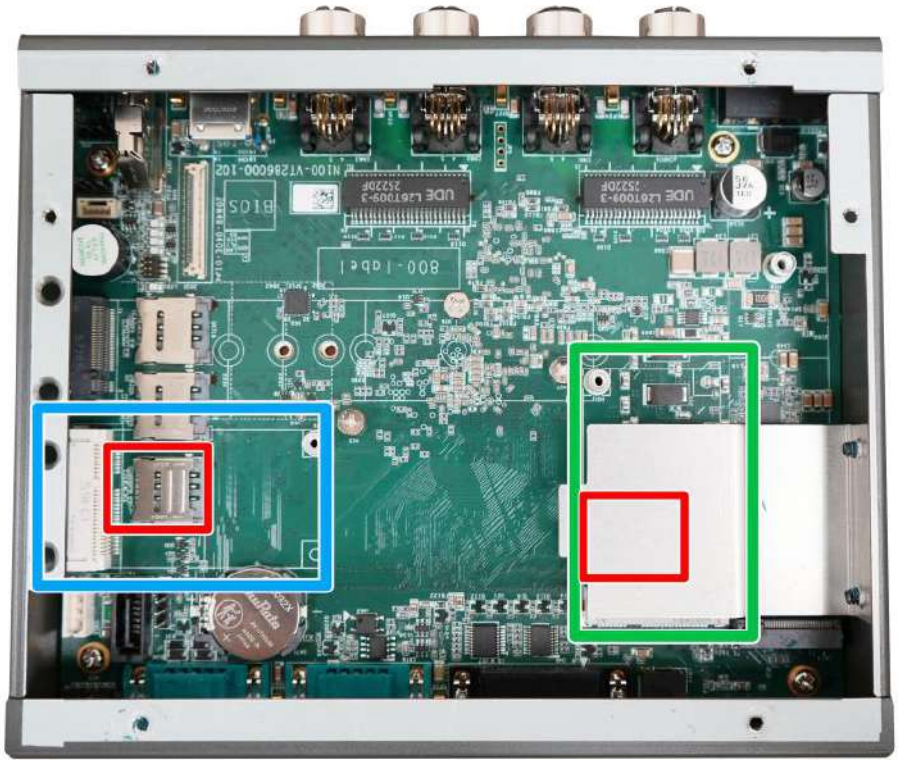


9. Reinstall the system enclosure when done.

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

3.2.3 mini-PCIe Installation (Near NVMe)

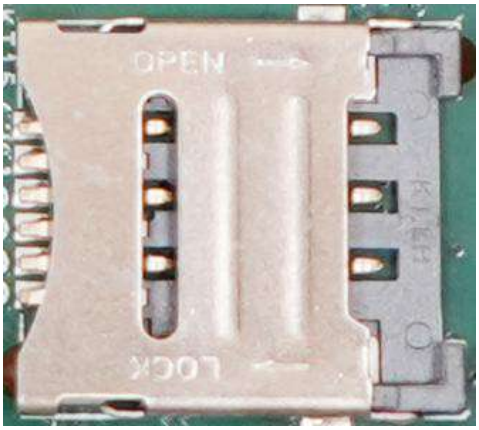
The system has two mini-PCIe sockets, both offering both PCIe and USB2.0 signals. This procedure demonstrates the installation for the slot indicated in **green**, situated underneath the heatsink.



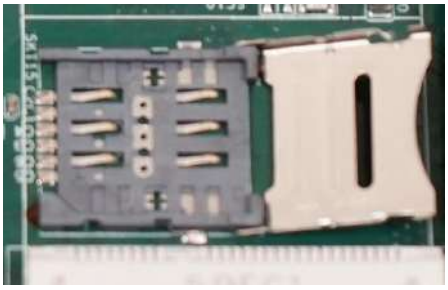
1. To access the internal expansion slots, please refer to the section "Disassembling the System".
2. If you wish to install a module underneath the heatsink, please remove the heatsink by removing the two screws indicated.



3. If you are installing a 5G/ 4G module, please install the SIM card first. To install the SIM card, slide and push the SIM slot in the direction indicated to “OPEN”.



4. Flip-open the SIM slot holder, and place the SIM card into the slot.

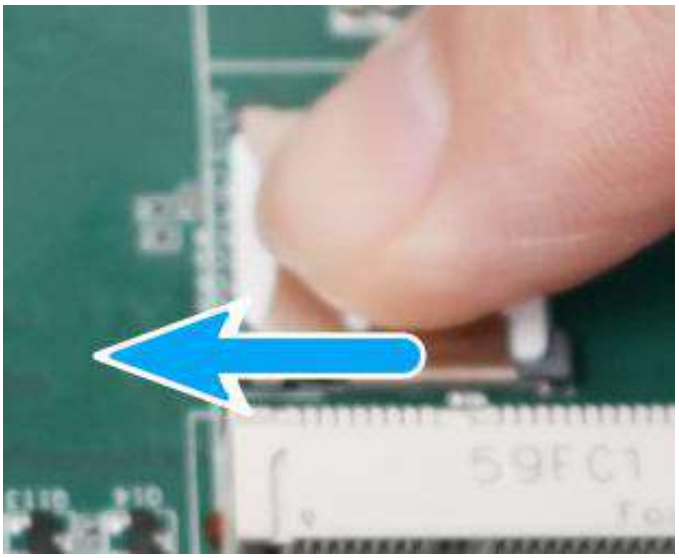


Flip-open the SIM holder



Place SIM in slot

5. Close the holder, press, slide and push in the direction indicated to secure the SIM card in place.



6. To install the mini PCIe module, insert the module on a 45° angle and secure the module using the screw provided.



Insert on a 45° angle

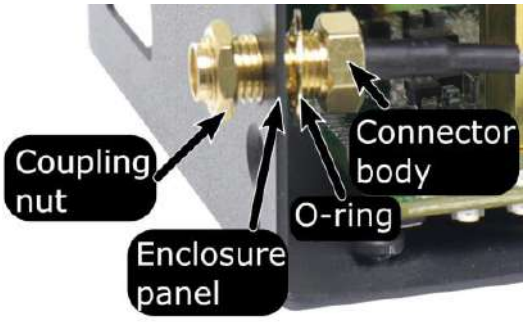


Secure using a screw

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

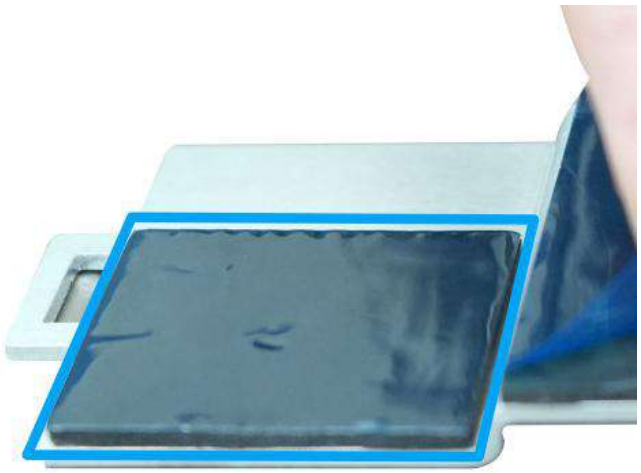


Clip on the IPEX-to-SMA cable



Secure the connector body, coupling nut onto an antenna opening on the panel

8. Remove the thermal pad protection film.



9. Place the heatsink back into the enclosure, and secure the heatsink by securing the screws on the side panel.



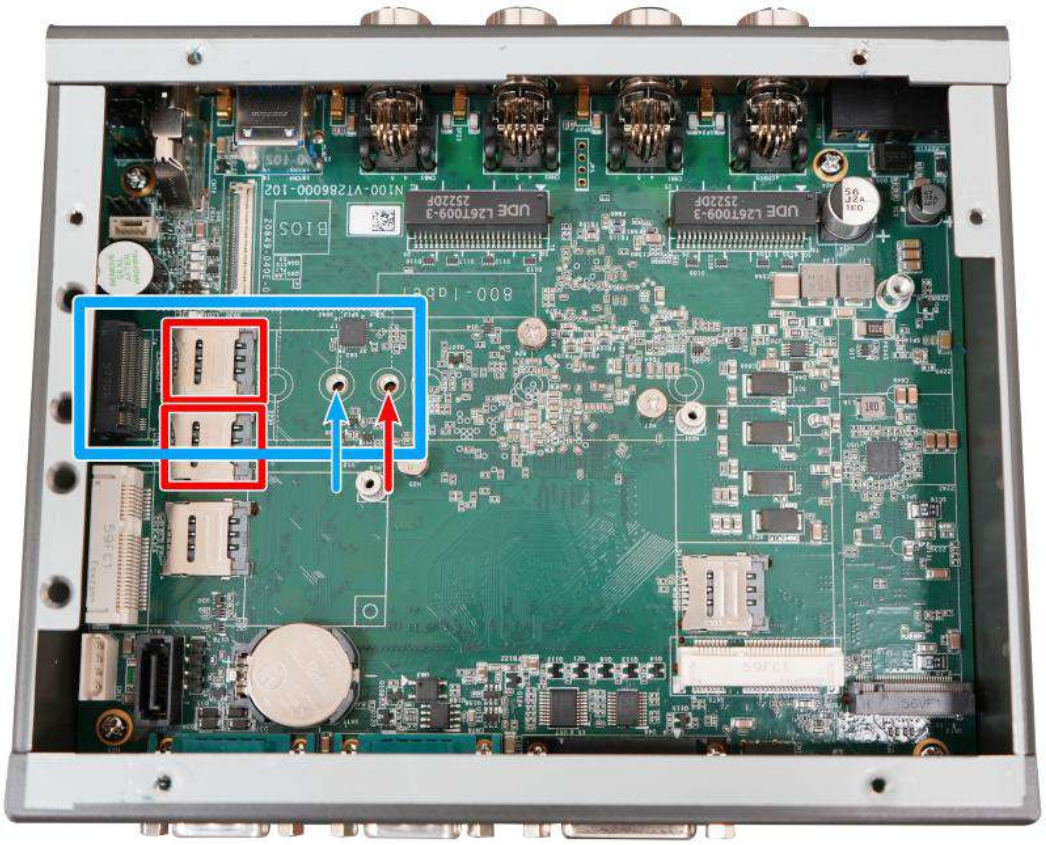
10. If you wish to install the mini PCIe module near the B key M.2 slot, please refer to this section.

11. Reinstall the system enclosure, panel and external antenna.

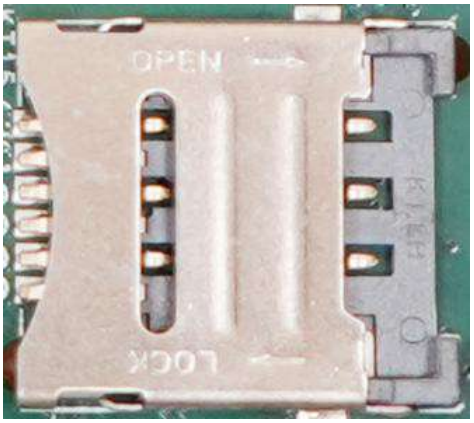
If you need to install other components, please refer to respective sections.

3.2.4 M.2 3042/ 3052 B Key Installation

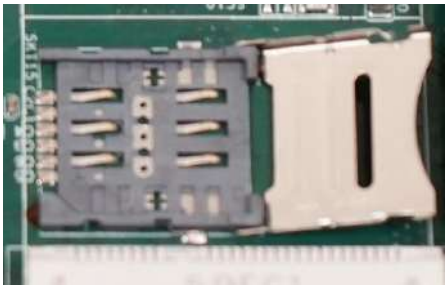
The system has an M.2 3042/ 3052 B key slot (indicated in **blue**) with two corresponding micro-SIM card slots (indicated in **red**). By adjusting the copper stand, the slot can accommodate an M.2 3042 (**blue arrow**) or an M.2 3052 (**red arrow**) module. The M.2 slot can be accessed by removing the bottom panel.



1. Please refer to the section "Disassembling the System".
2. If you are installing a 5G/4G module, please install the SIM card first. To install the SIM card, slide and push the SIM slot in the direction indicated to "OPEN".



3. Flip-open the SIM slot holder, and place the SIM card into the slot.

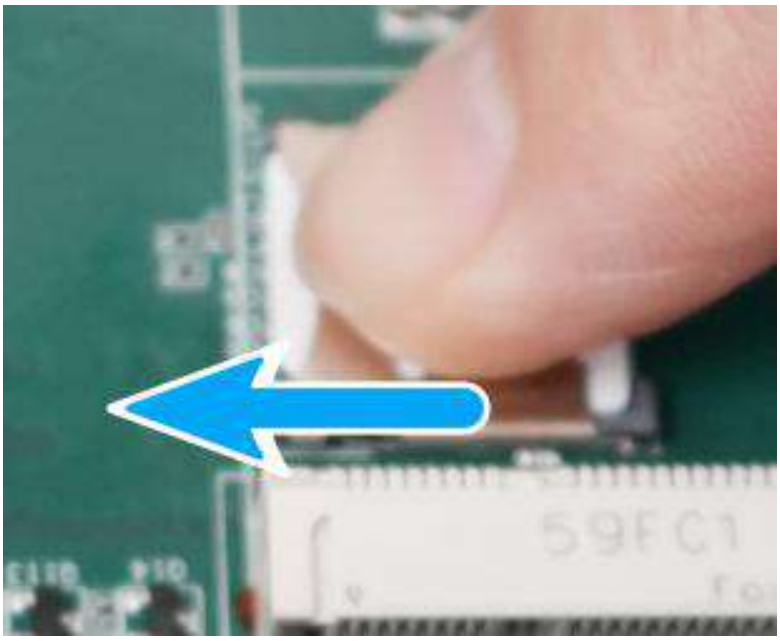


Flip-open the SIM holder

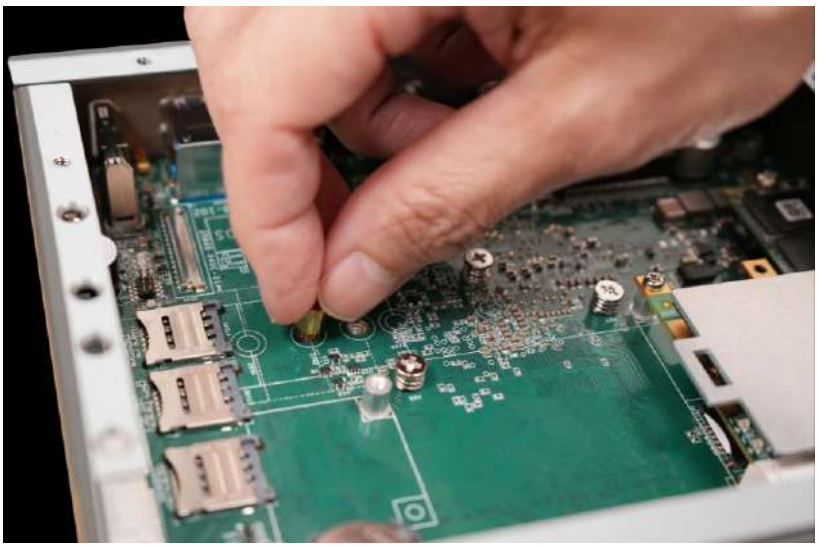


Place SIM in slot

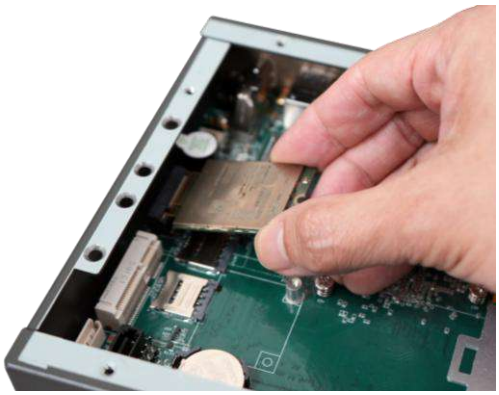
4. Close the holder, press, slide and push in the direction indicated to secure the SIM card in place.



5. Position the copper stand to suit the module's specifications.



6. To install the M.2 module, insert the module on a 45° angle, and secure the module with a screw.



Insert on a 45° angle

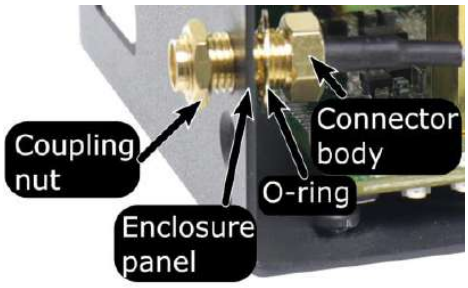


Secure with a screw

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



Clip on the IPEX-to-SMA cable



Secure the connector body, coupling nut onto an antenna opening on a panel

8. Remove the film protector on thermal pad.



9. Install the heatsink onto enclosure and onto the M.2 module by securing the screws indicated.

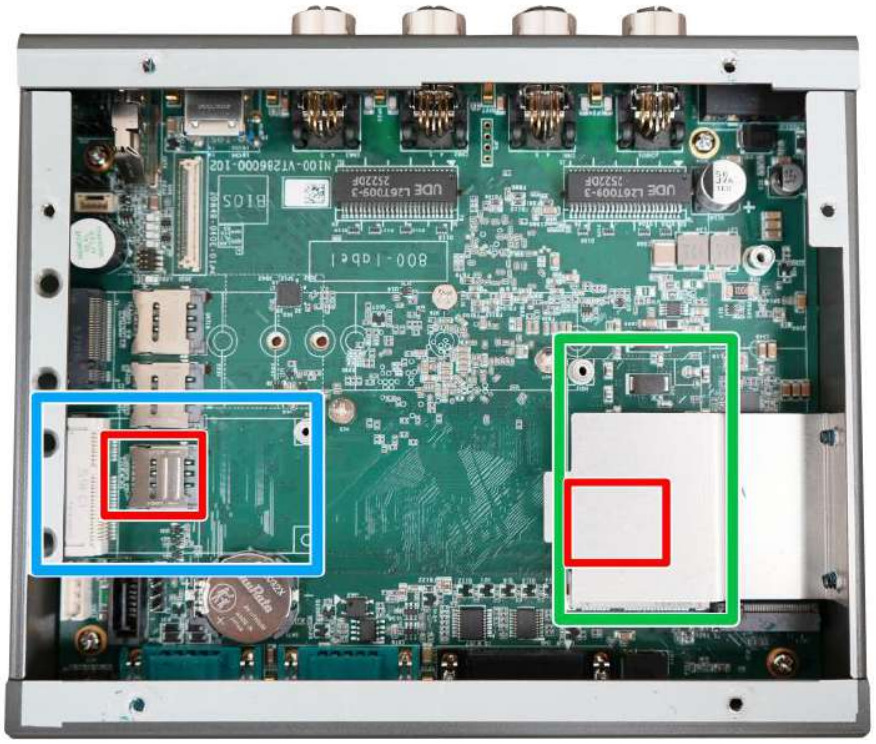


10. Reinstall the system enclosure or the bottom panel when done.

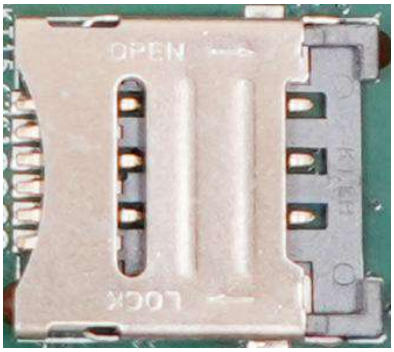
11. If you need to install other components, please refer to respective sections.

3.2.5 Mini-PCIe Installation (Near B Key M.2 Module)

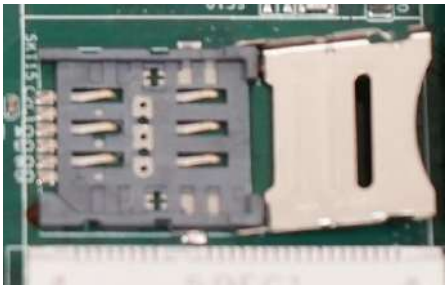
The system has two mini-PCIe sockets, both offering both PCIe and USB2.0 signals. This procedure demonstrates the installation for the slot indicated in **blue**.



1. To access the internal expansion slots, please refer to the section “Disassembling the System”.
2. If you are installing a 5G/ 4G module, please install the SIM card first. To install the SIM card, slide and push the SIM slot in the direction indicated to “OPEN”.



3. Flip-open the SIM slot holder, and place the SIM card into the slot.

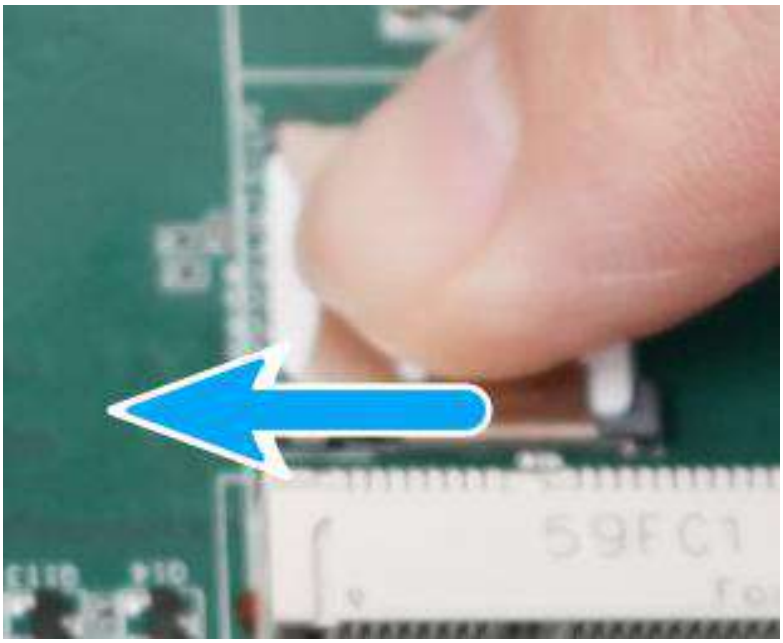


Flip-open the SIM holder



Place SIM in slot

4. Close the holder, press, slide and push in the direction indicated to secure the SIM card in place.



5. To install the mini PCIe module, insert the module on a 45° angle and secure the module using the screw provided.



Insert on a 45° angle

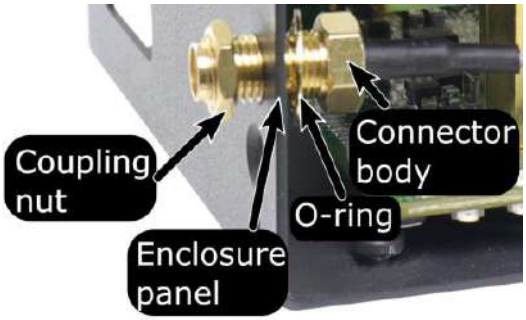


Secure using a screw

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



Clip on the IPEX-to-SMA cable



Secure the connector body, coupling nut onto an antenna opening on the panel

7. Remove the thermal pad protection film. Note this heatsink has an opening on the side.



8. Install the heatsink onto enclosure and onto the mini PCIe module by securing the screws indicated.



9. Reinstall the system enclosure, panel and external antenna.

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

3.2.6 2.5” HDD/ SSD Installation

The system features a bracket for a single 2.5” HDD or SSD installation onto the internal surface of the bottom panel. Please refer to the procedures below for installation.

1. Install the 2.5 HDD/ SSD on the bracket by securing the screws on the side.



Install onto bracket



Secure drive to bracket

2. Secure the drive and bracket onto the internal surface of the bottom panel.

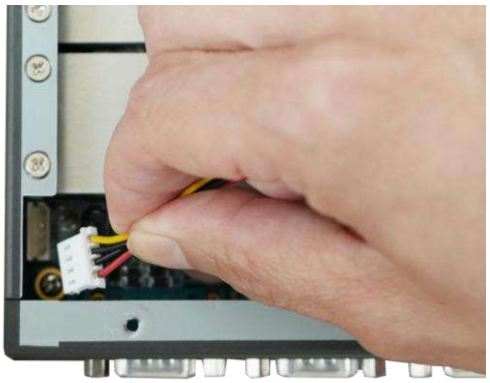


Install drive and bracket onto panel

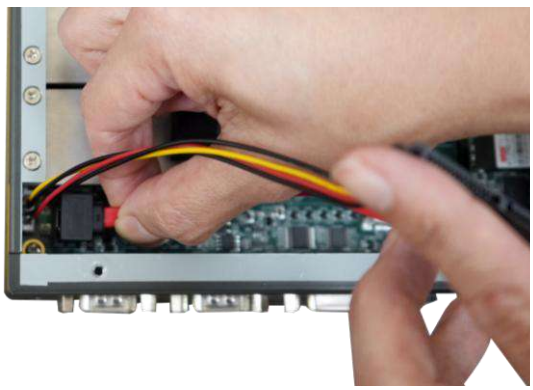


Secure drive and bracket

3. Connect the SATA power and data cable onto the motherboard if they are not already connected.

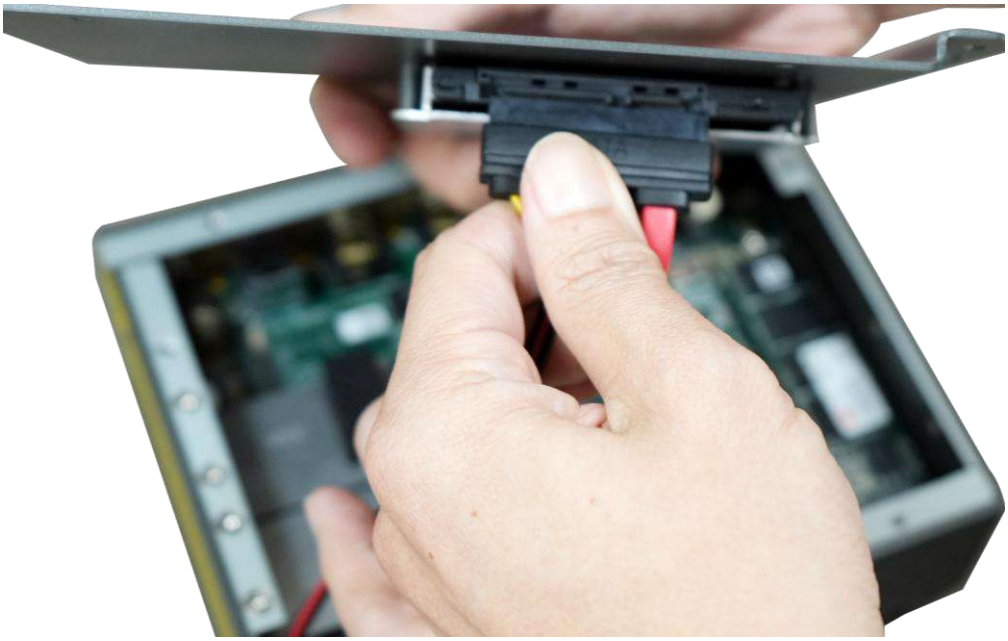


Power cable



Data cable

4. Connect the cable to the disk drive.

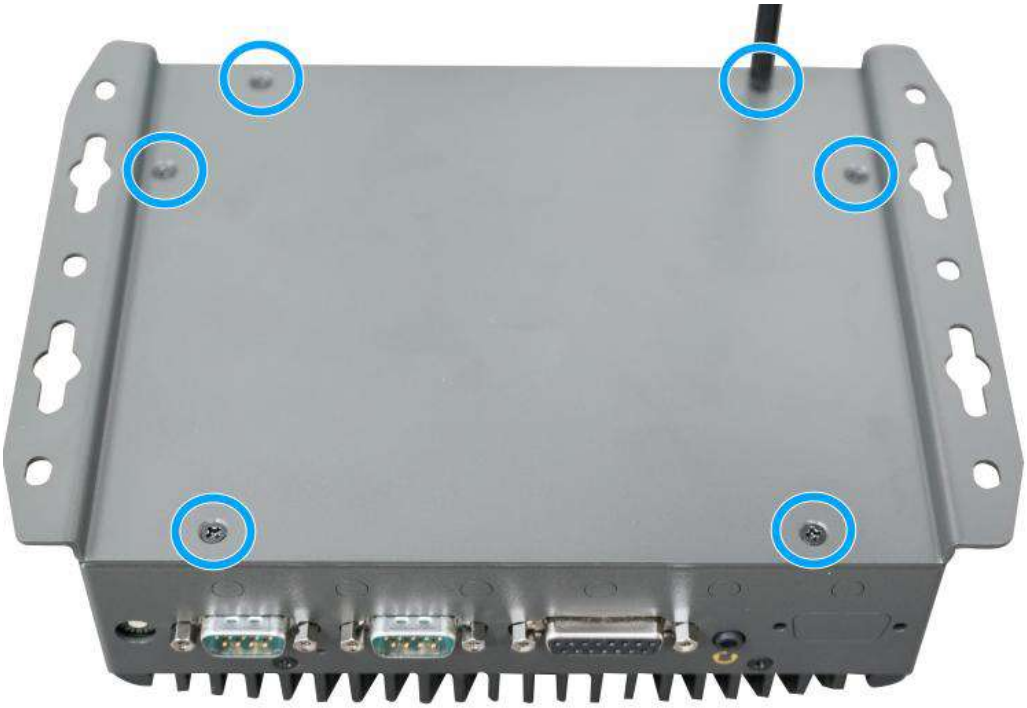


5. Reinstall the system enclosure to complete the installation.

3.3 Installing the System Enclosure

To install the enclosure, please follow the instructions below.

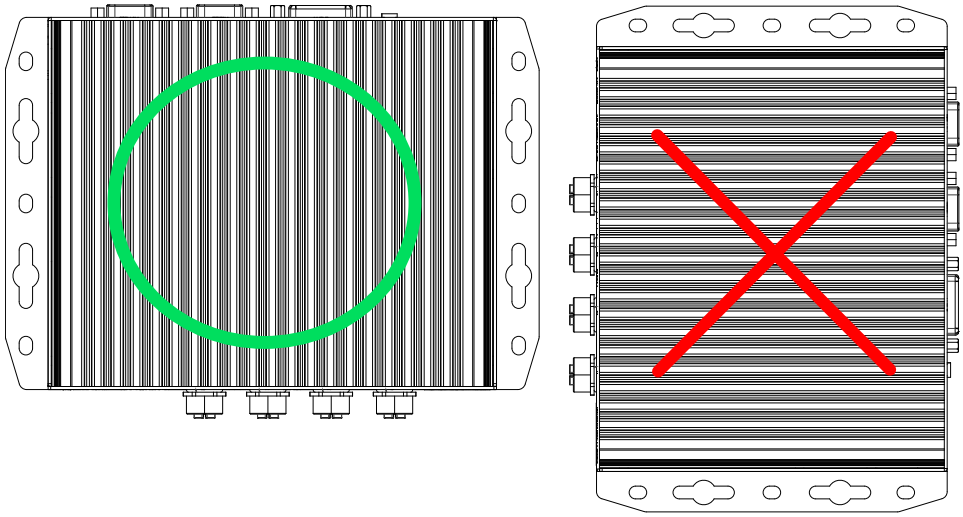
1. Please the system on a flat sturdy surface, turn the system upside-down, and secure the panel with the screws indicated.



3.4 Wall Mounting the Nuvo-2860VTC

The Nuvo-2860VTC system comes standard with wall-mount brackets on the enclosure to mount the system onto the wall. To wall-mount the system, please refer to the instructions listed below.

1. Place the system on a flat surface portion of the wall and secure it with six (6) M4 pan screws.
2. When wall mounting, place the heatsink fins perpendicular to the ground for better heat dissipation efficiency.



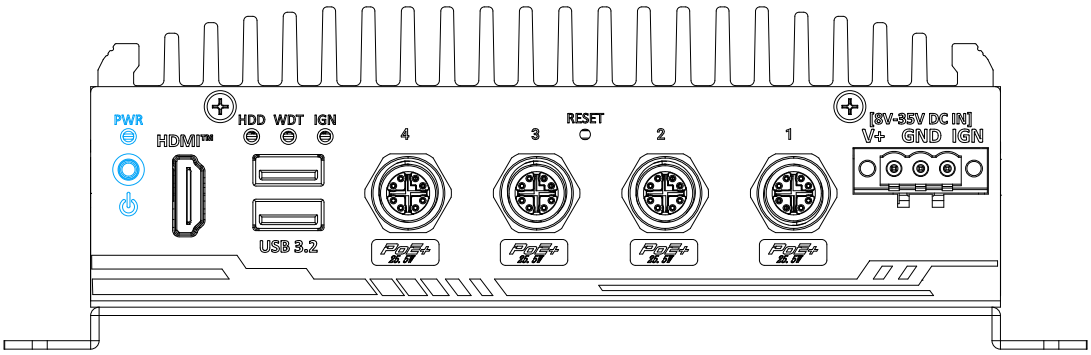
3.5 Powering On the System

There are three methods to power on the system

- Pressing the power button
- Powering on via ignition control (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.

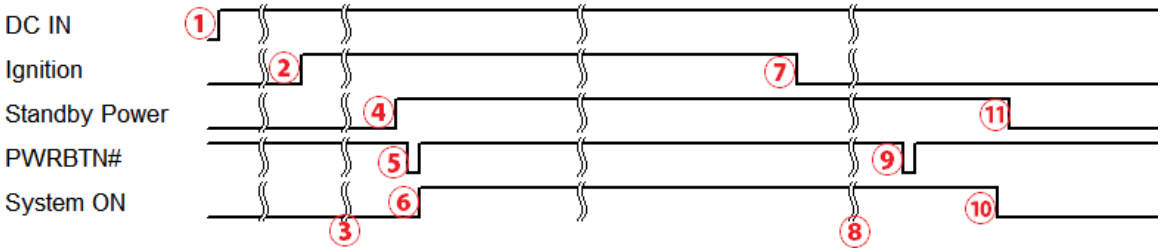


3.6 Ignition Power Control

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 300mW.
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 (< 300mW 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 11V (for 12VDC input) or less than 22V (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.

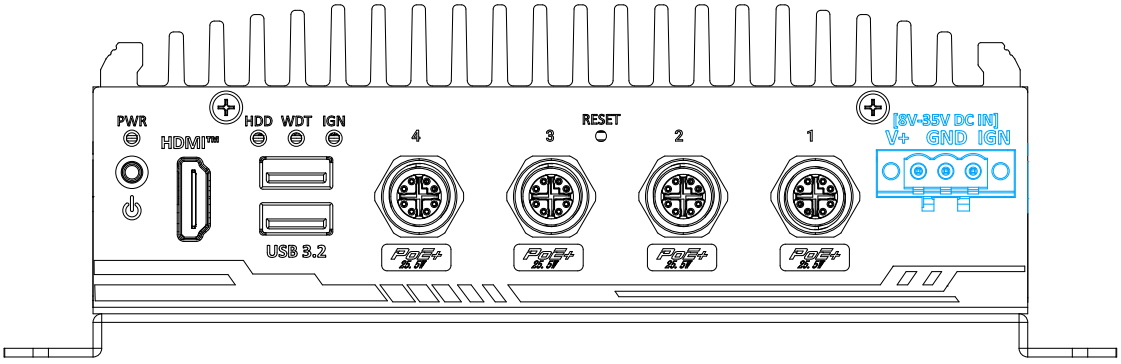
3. **System hard-off**

   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 features a Smart Off-Delay function in IGN Mode F. The power-off delay time can be configured by the user according to application requirements. During the configured delay period, the module automatically monitors the system status. If the system shuts down through application software before the delay expires, the module immediately cuts off system power to prevent unnecessary battery consumption

3.6.3 Wiring Ignition Signal



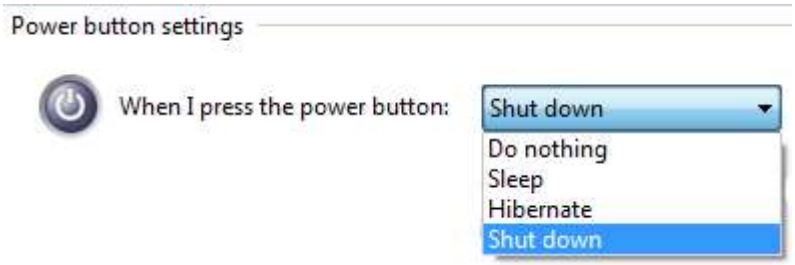
To have ignition power control for in-vehicle usage, you need to supply IGN signal to the system. The IGN input is located on the 3-pin pluggable terminal block (shared with DC power input). Below is the typical wiring configuration for in-vehicle applications.

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

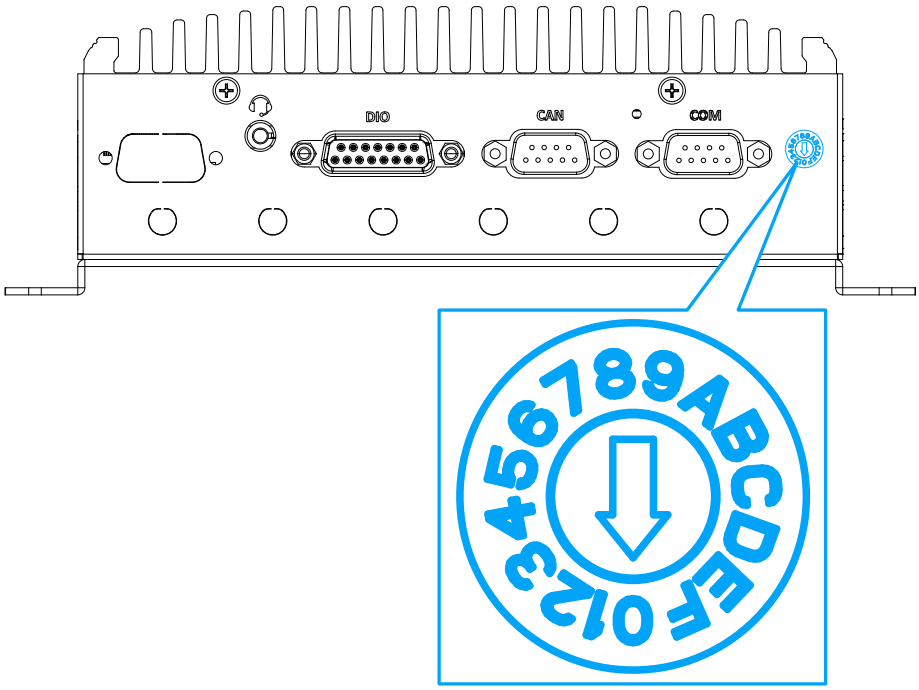
When applying ignition power control to your system, please make sure you've configured your Windows system to initiate a shutdown process when pressing the power button. By default, Windows goes to sleep (S3) mode when power button is pressed. As sleep (S3) is not a complete shutdown behavior, the ignition 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 front panel.



- **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.

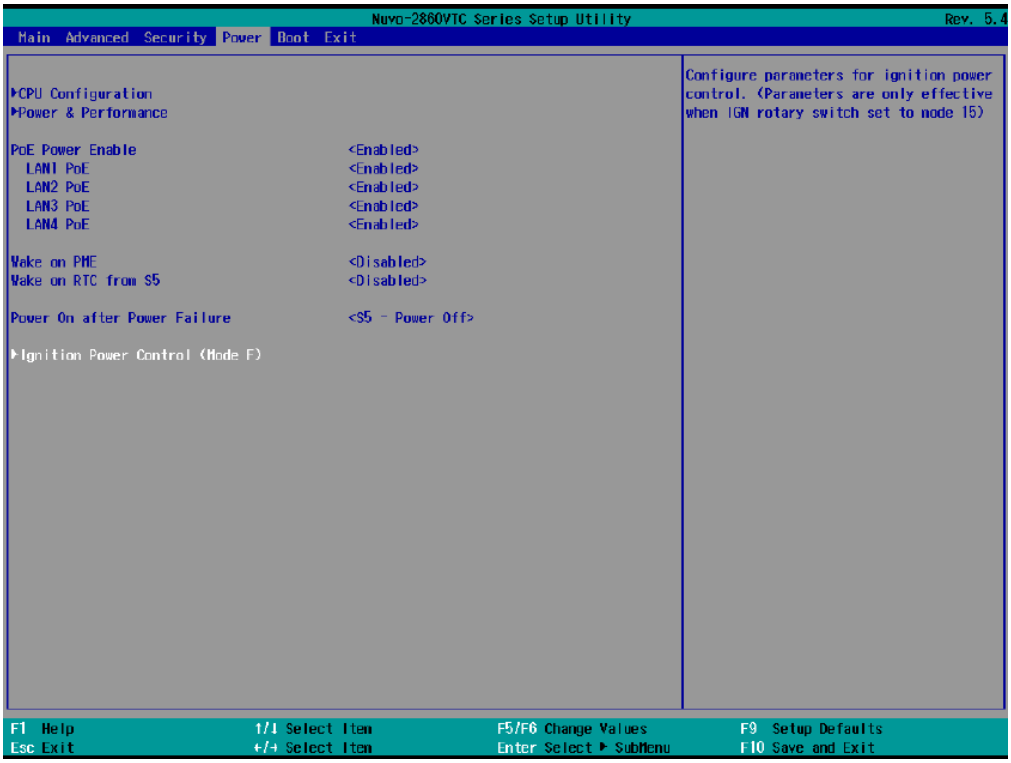
Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
13 (D)	30 seconds	2 hours	10 minutes
14 (E)	3 minutes	2 hours	10 minutes

- **Mode 15 (F)**

  The ignition control module is implemented to support BIOS-configurable ignition parameters. When the rotary switch is set to 15 (0xF), users can configure ignition parameters in BIOS setup menu.

  To configure ignition parameters in BIOS, please follow the steps below.

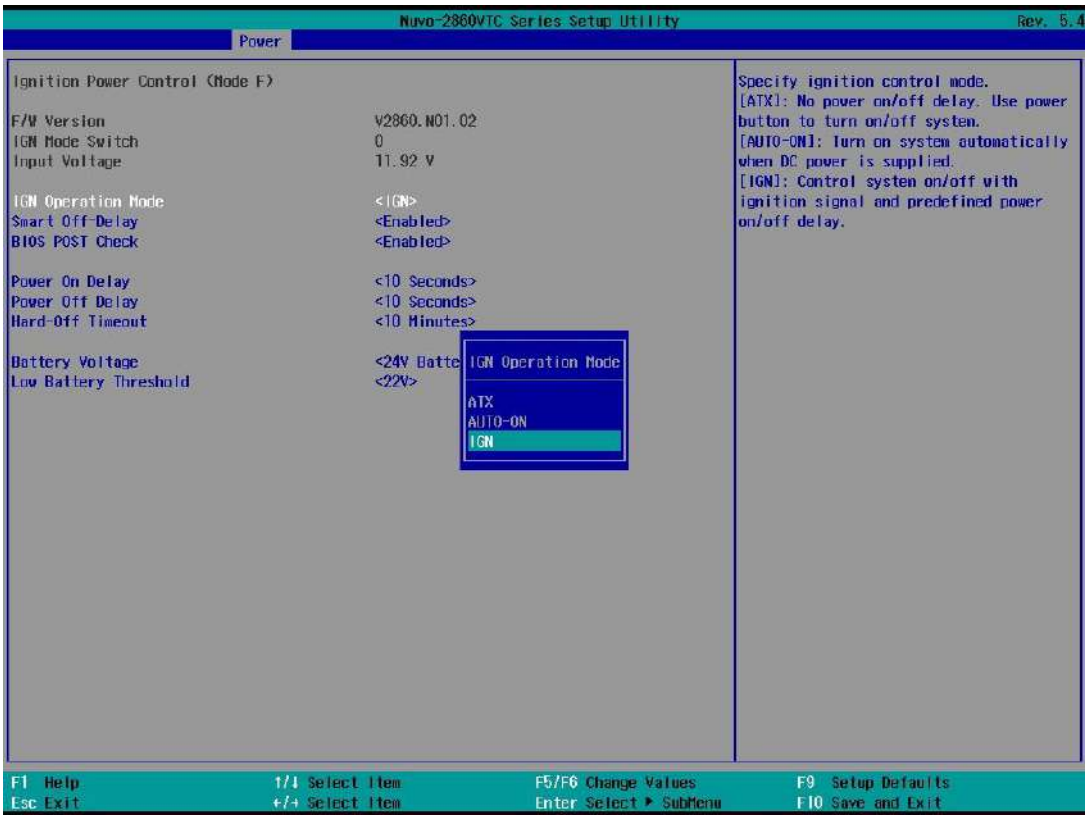
  1. Make sure you have set the rotary switch to position 15 (0xF).
  2. When system boots up, press F2 to enter BIOS setup menu.
  3. Go to **[Power]→[Ignition Power Control]**.



4. You can configure parameters for ignition power control according to your application.

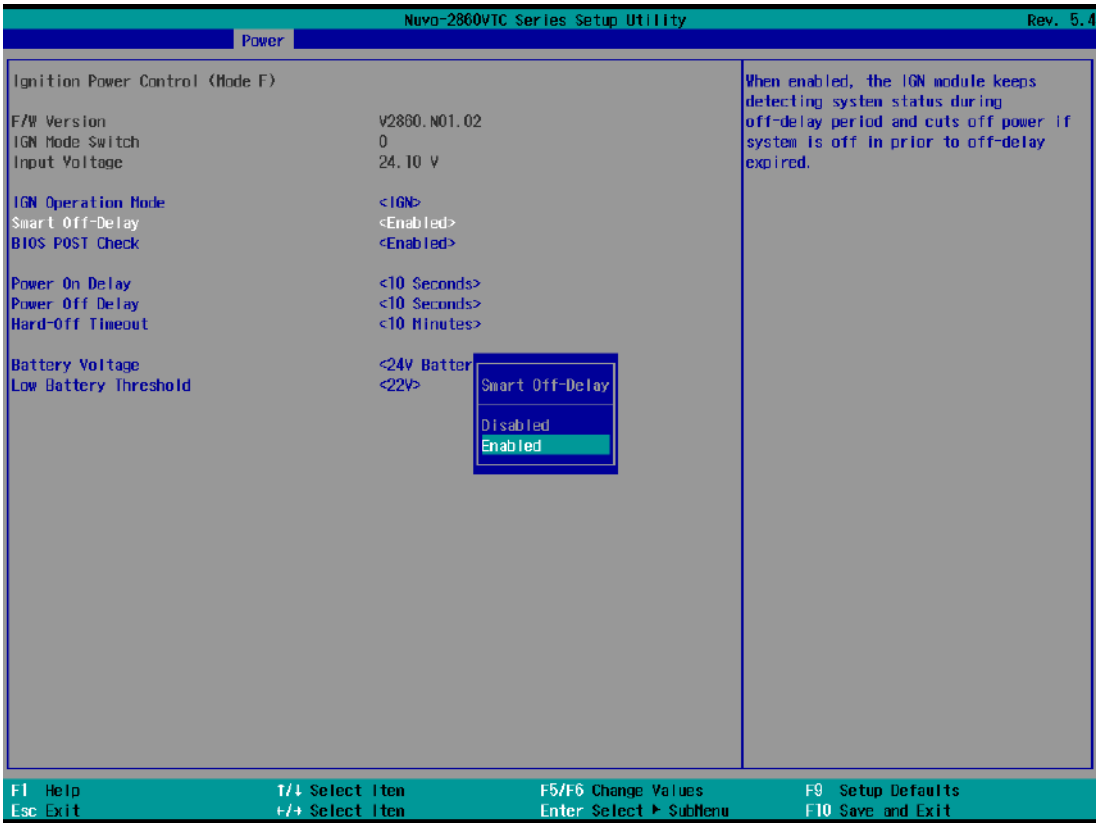
[IGN Operation Mode]

ATX	ATX mode without power-on and power-off delay. Same operation as rotary switch set to 0.
AUTO-ON	Automatically turns on the system when DC power is applied. Same operation as rotary switch set to 1.
IGN	Ignition power control mode. Ignition control is executed according to the specified parameters.



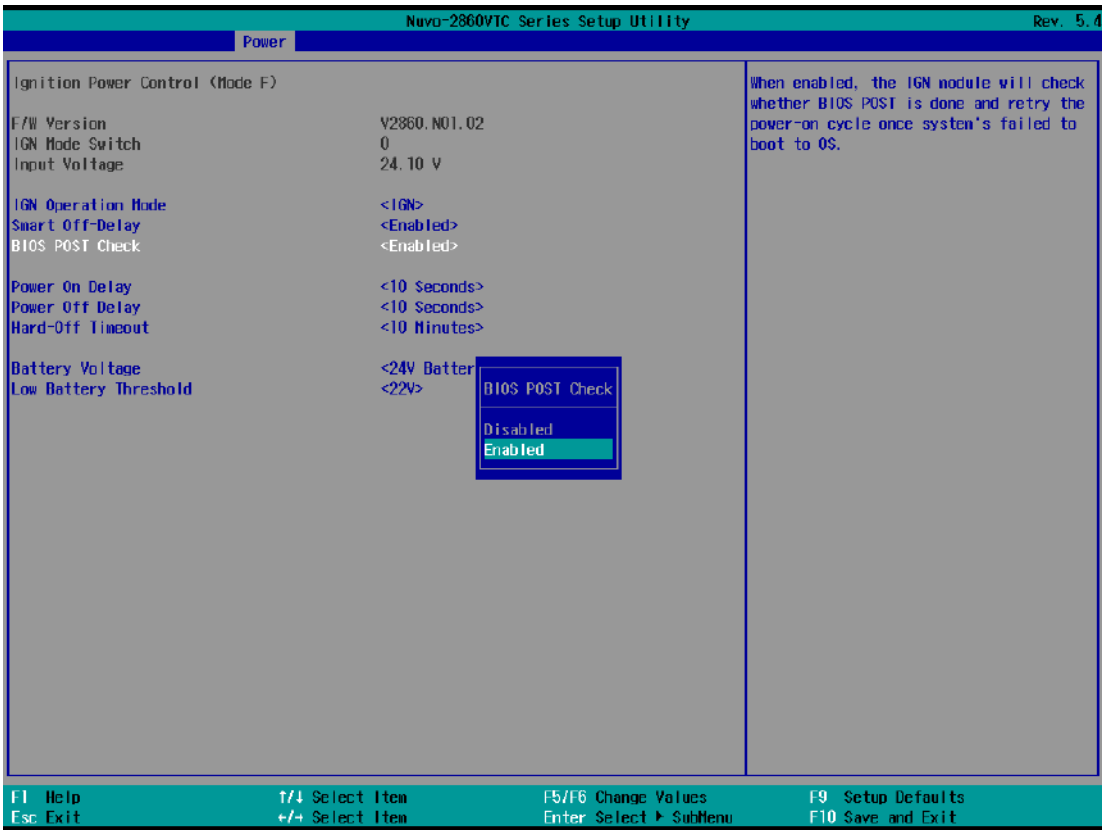
[Smart Off-Delay]

Enabled	If system is manually shutdown during the power-off delay period, ignition control module will cut off system power in prior to expiration of power-off delay to save battery power.
Disabled	Ignition control module cut off system power only after power-off delay expired.



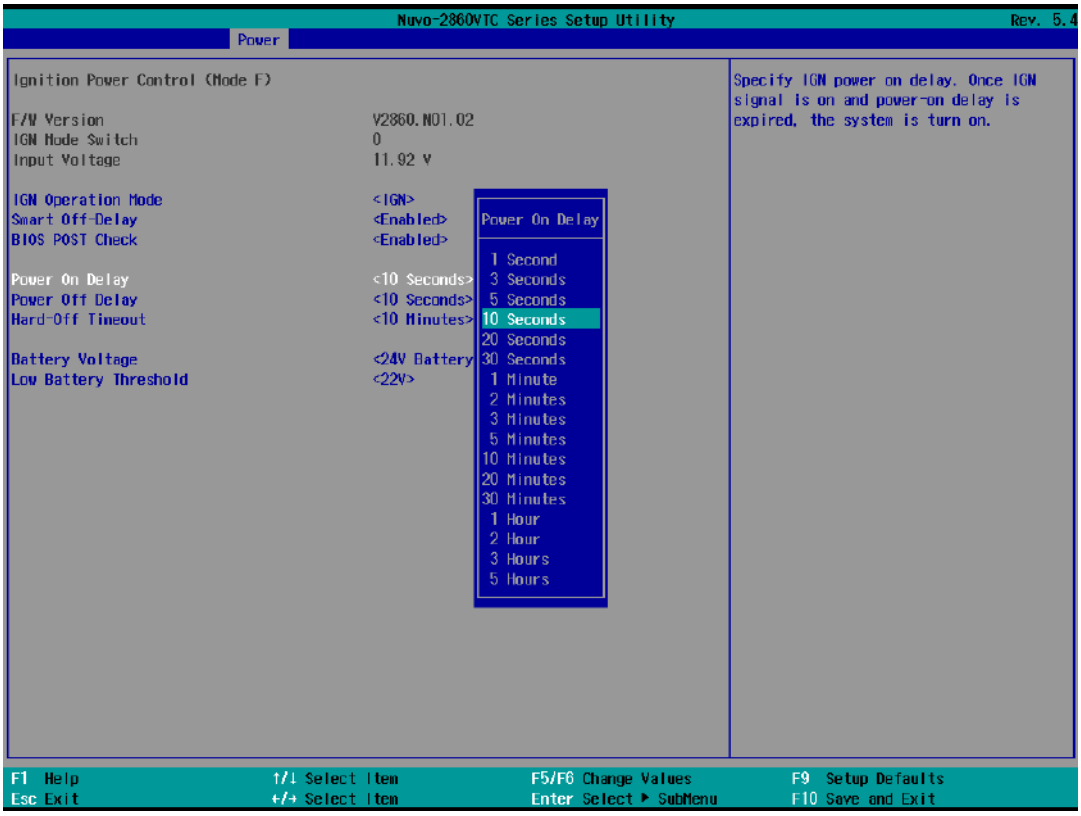
[BIOS POST Check]

Enabled	This option secures a boot-to-OS operation. If the system is failed to boot to OS (e.g. disk failure or no bootable device) within 60 seconds, ignition control module will cut off system power and retry another power on cycle.
Disabled	BIOS POST check is skipped.



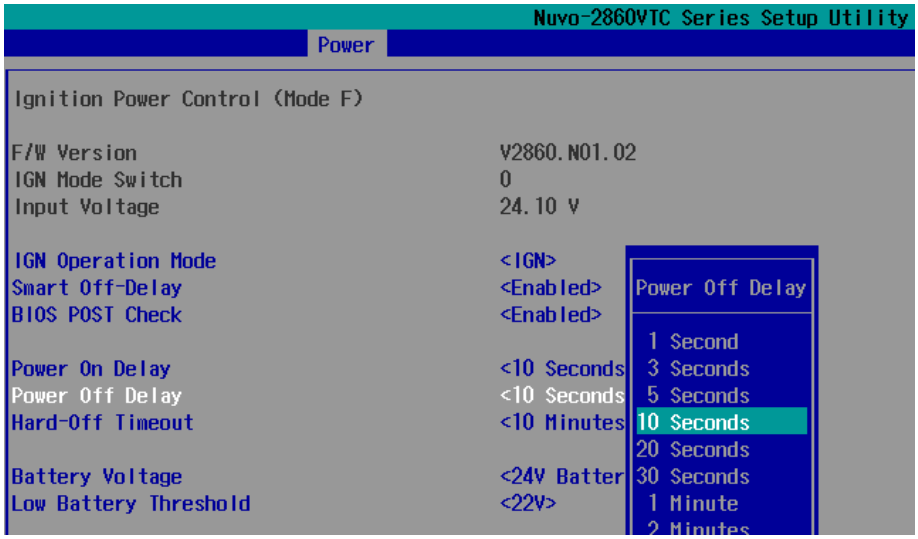
[Power On Delay]

Specifies the power-on delay duration. Once IGN signal goes active and sustains for the duration of power-on delay, ignition control module turns on system power and boot up the system.



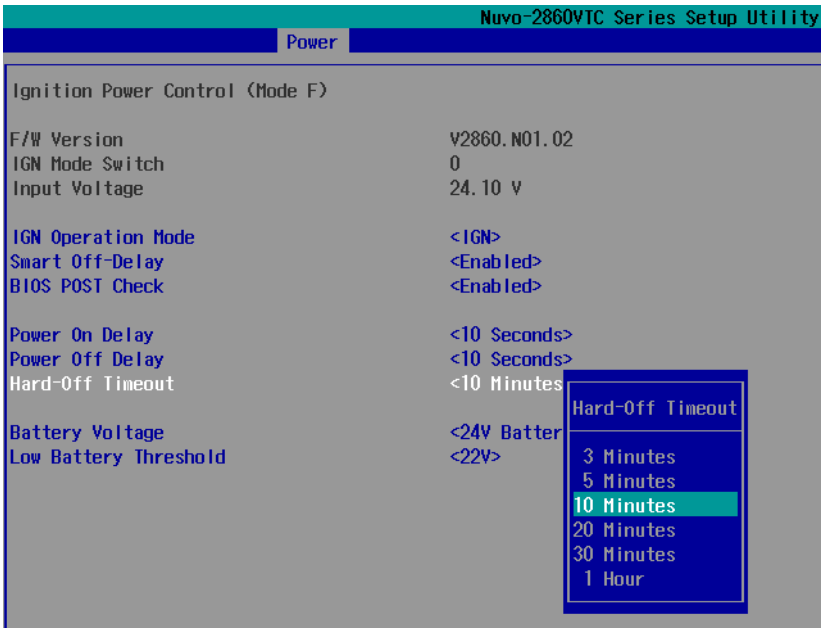
[Power Off Delay]

Specifies the power-off delay duration. Once IGN signal goes inactive and sustains for the duration of power-off delay, ignition control module performs system shutdown (soft-off) and then cut off system power.



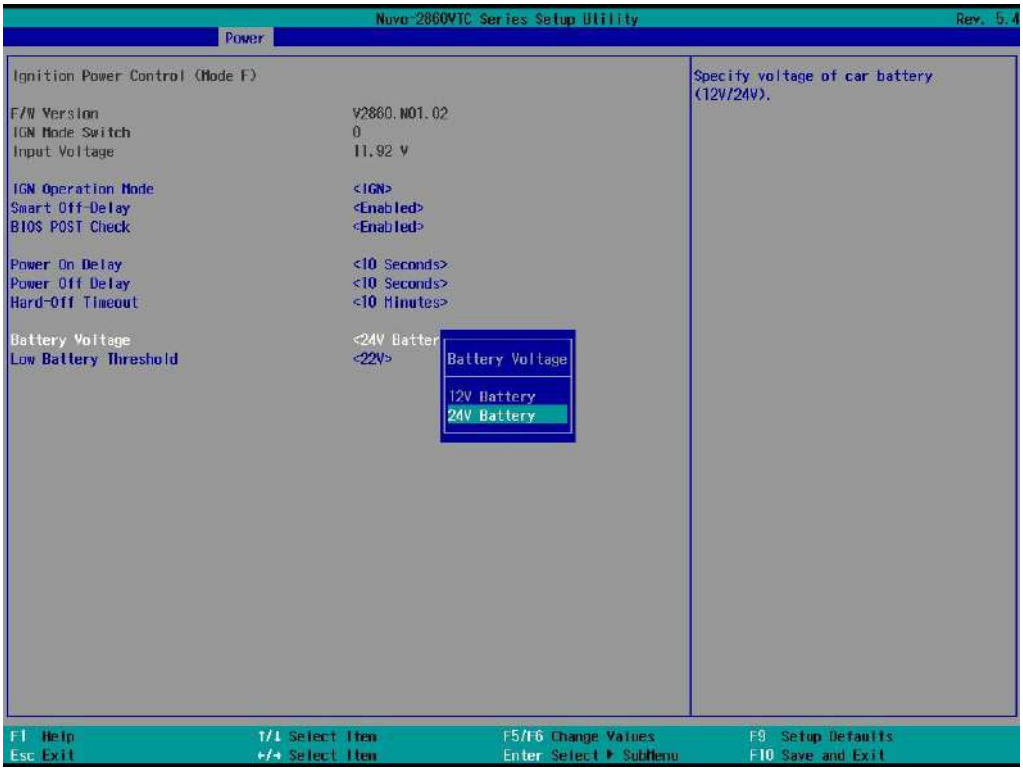
[Hard-off Timeout]

Specifies system hard-off timeout. Once system failed to normally shutdown via a soft-off operation due to system/application halts (e.g. Windows BSOD), ignition control module can compulsively cut off system power after the given hard-off timeout.



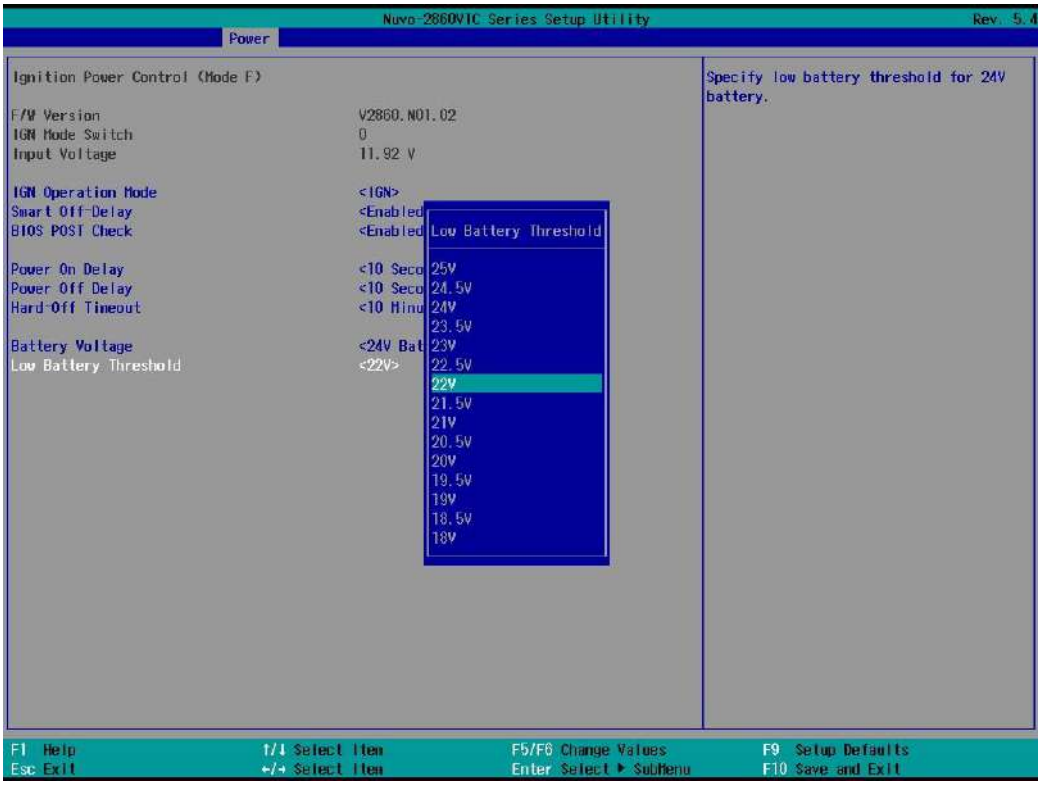
[Battery Voltage]

Specifies the battery voltage of the vehicle where System VTC is deployed. Typically, it's 12 VDC for sedan and 24 VDC for bus/truck.



[Low Battery Threshold]

When system is running, ignition control module continuously monitors the battery voltage. Once the battery voltage is lower than the specified threshold, it performs system shutdown (soft-off) and cut off system power to prevent battery drain-out. You should specify the low battery threshold according to the given battery voltage.

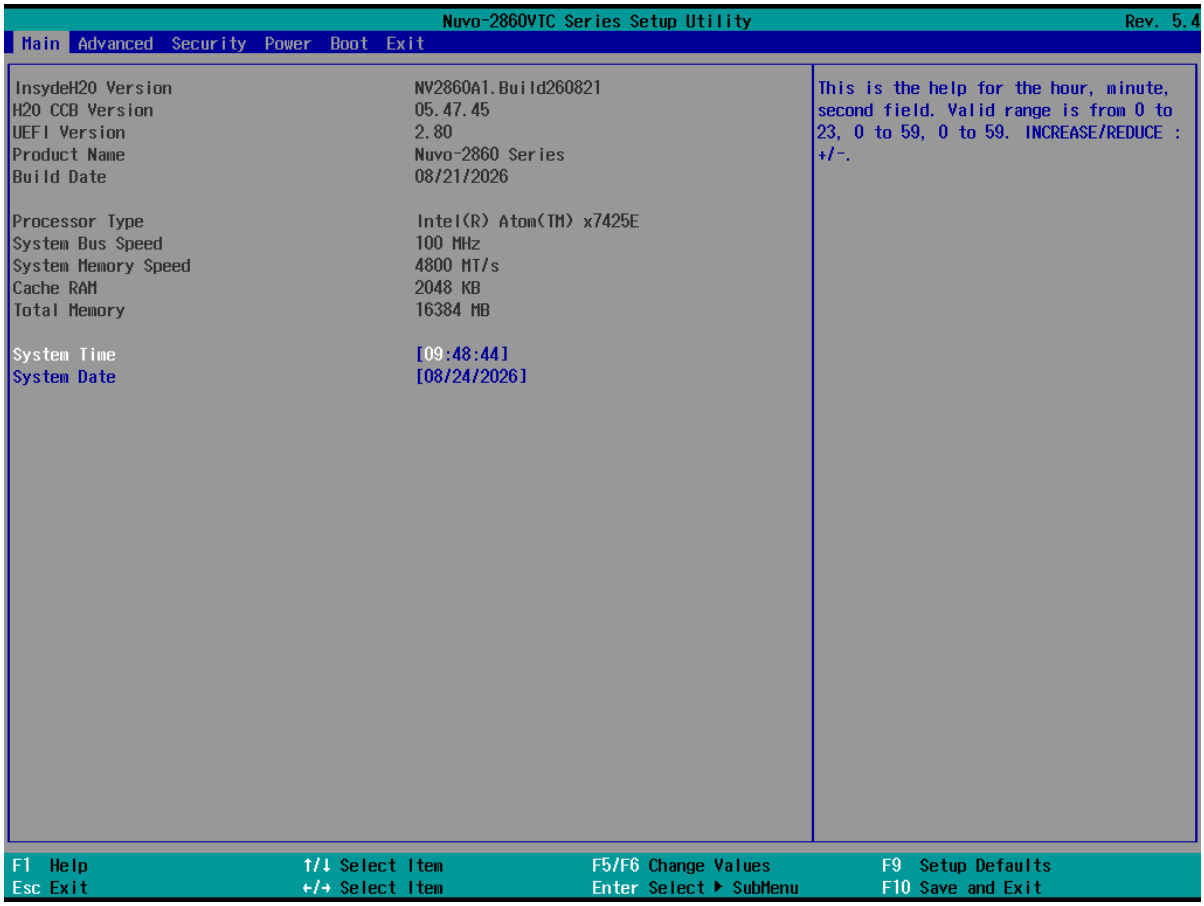


5. Press F10 to “Save Changes and Exit”. The ignition control module will be reset and operate according to parameters configured in BIOS setup menu.

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).

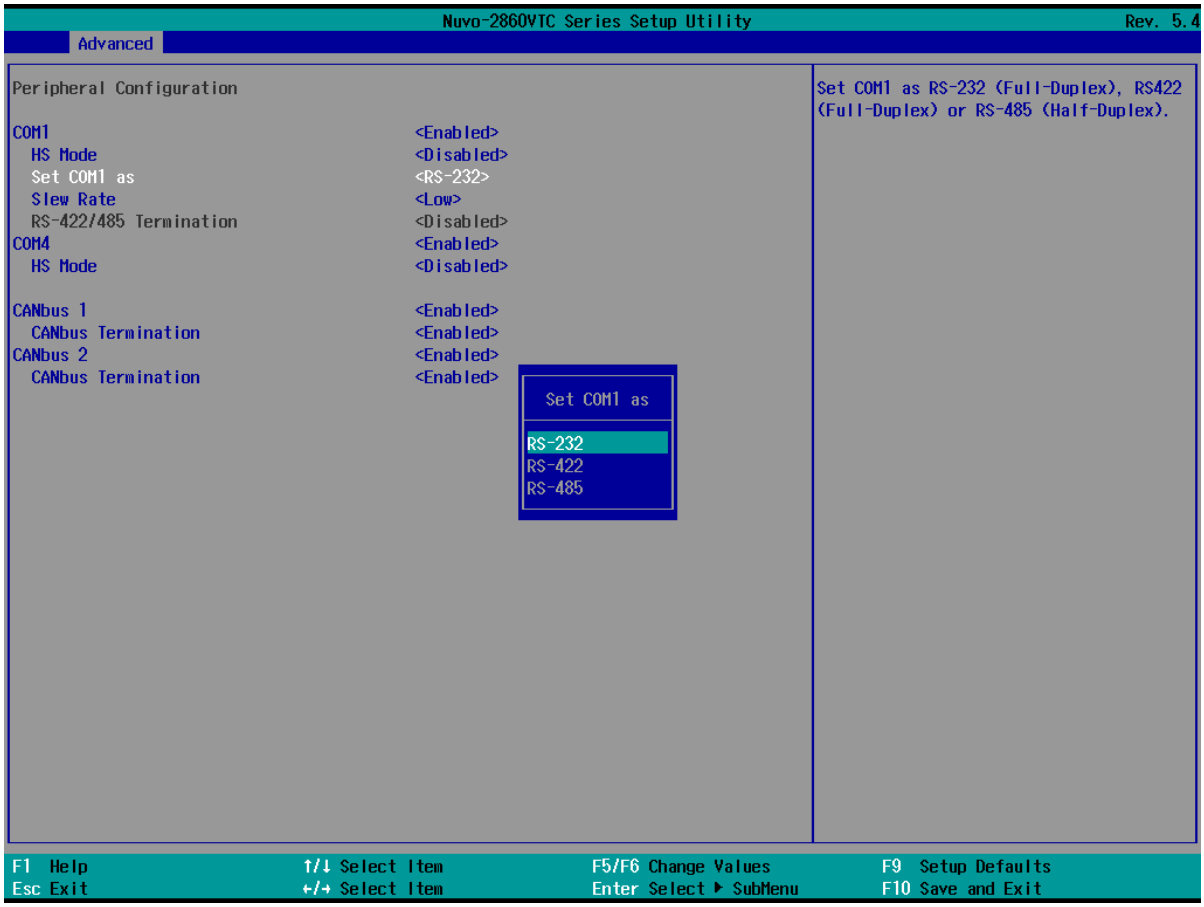


NOTE

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 Port Configuration

The system's COM1 port supports 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).

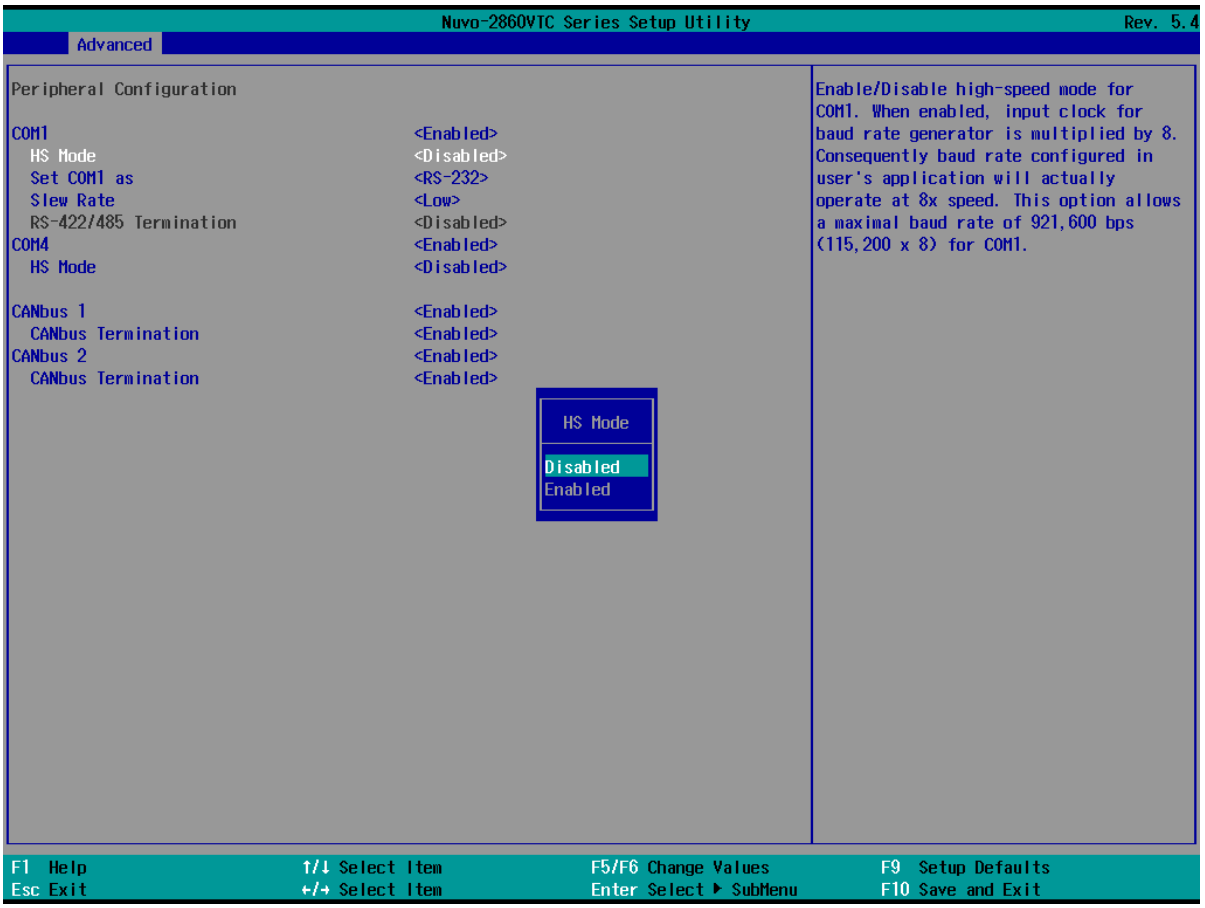


To set COM port operating mode:

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 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).

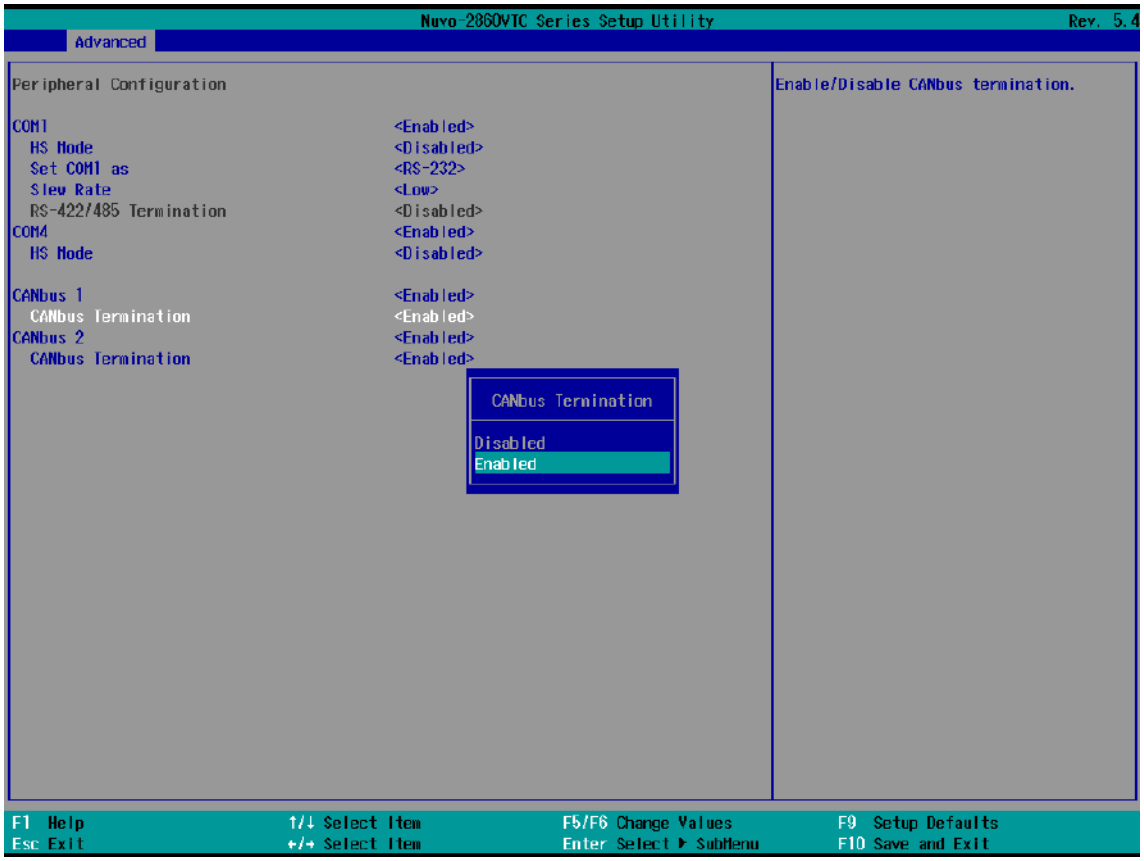


To set COM port high speed mode:

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 CAN bus Termination

The CAN bus is a communication bus running at differential signal pair and it must be terminated. The system features built-in termination to suppress signal reflection. You should enable the built-in CAN Bus Termination if no external resistor is added to the connection.

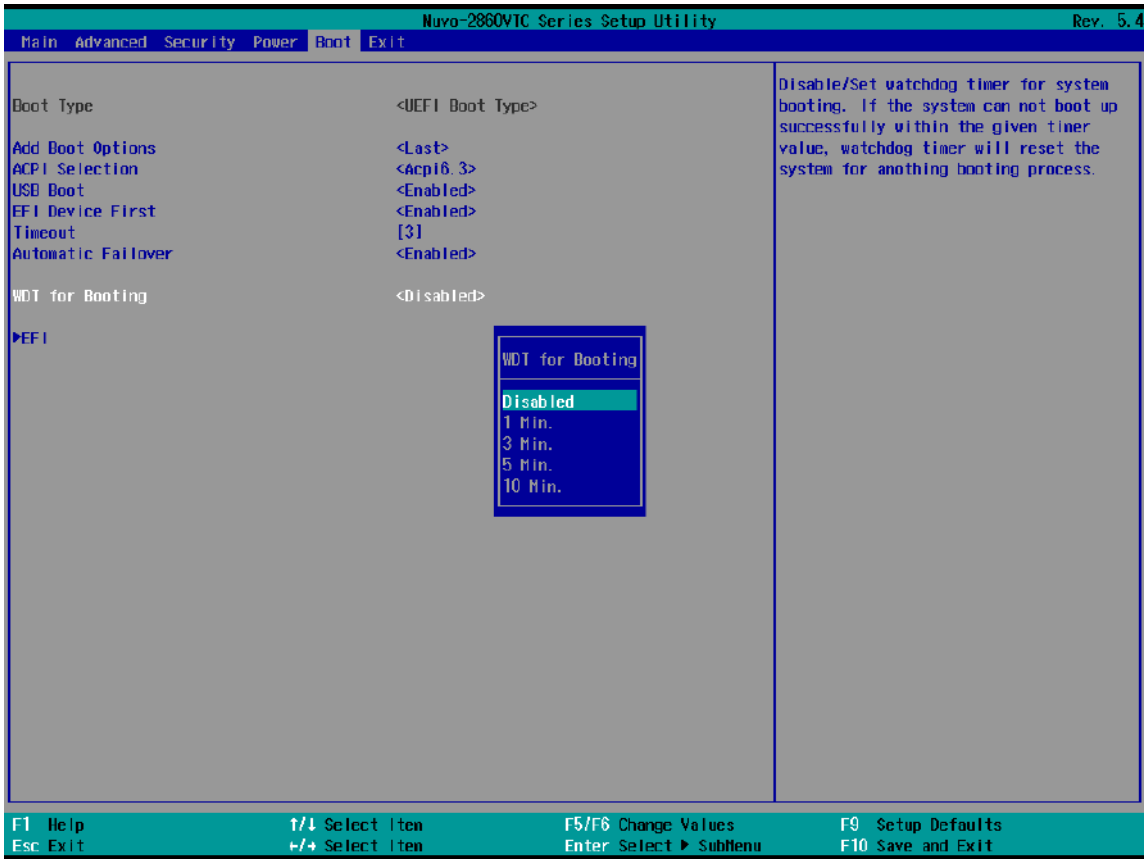


1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced] > [Peripheral Configuration]**.
3. Highlight CAN bus Termination and press Enter to bring up options, Disabled/ Enabled, use up/ down arrow to highlight your selection and press Enter.
4. Press F10 to “Exit Saving Changes”.

4.1.4 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 issue 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.**

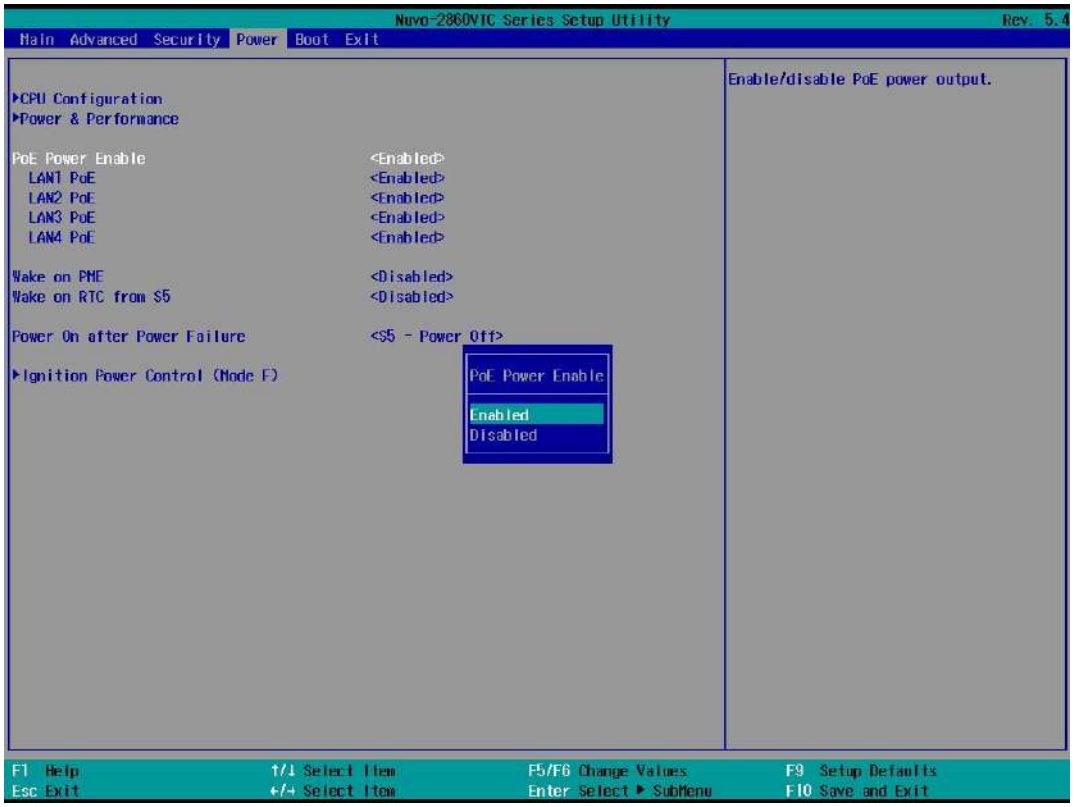


To set the watchdog timer for boot in BIOS:

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.

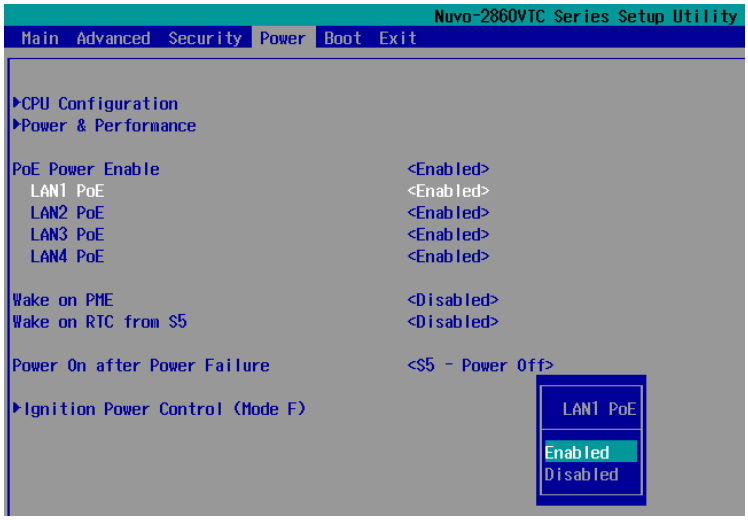
4.1.5 Power over Ethernet

The Power over Ethernet (PoE) functionality is available on following ports, and it allows for the transmission of data and power delivery.

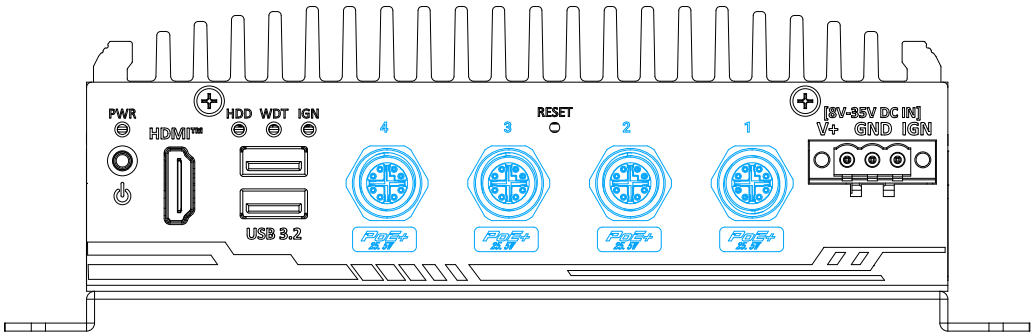


To enable/disable "PoE Power Enable" option:

1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Power]**.
3. You may enable/disable the **[PoE Power Enable]** option.
4. When Enabled, you may set each LAN port's PoE function by selecting Enabled/ Disabled using the arrow key, press Enter to make your selection.



Enable/ Disable LAN PoE function



Corresponding PoE ports

5. Once set, press F10 to save setting and exit.

4.1.6 Ignition Power Control

The ignition power control features three settings:

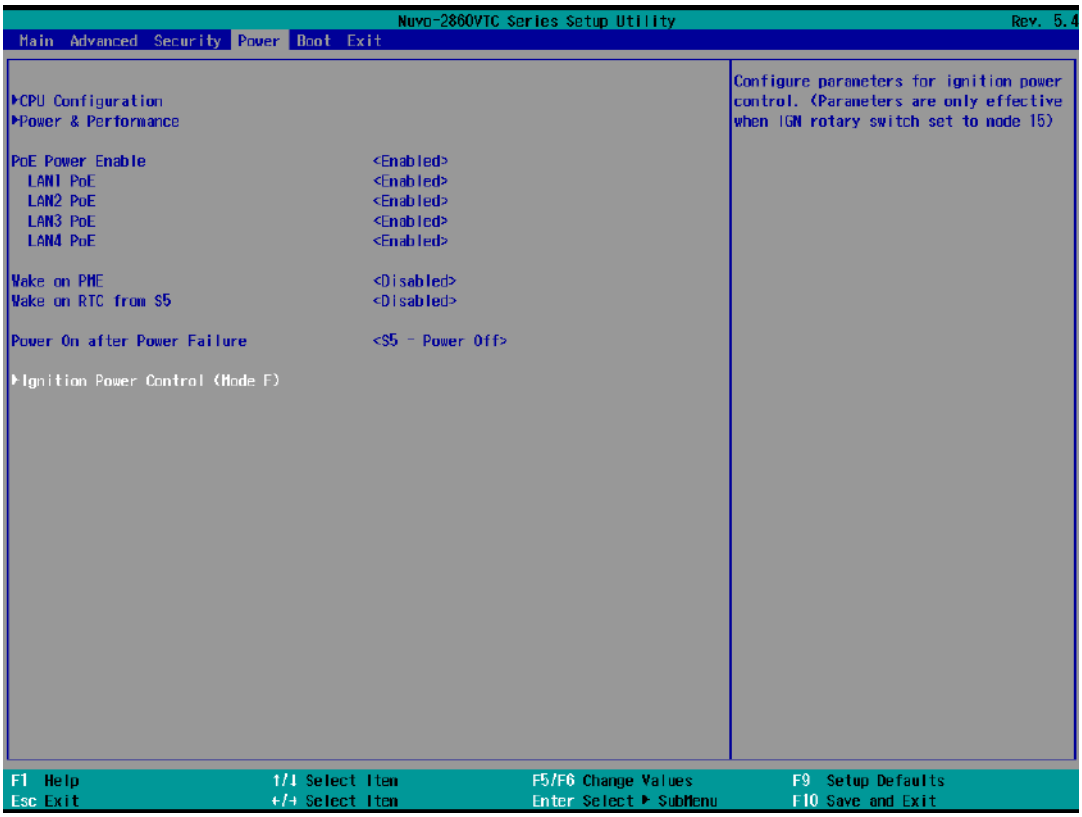
AUTO-ON	The system turns on with the vehicle's ignition
IGN	The system turns on with the vehicle's ignition, according to manual delay settings
ATX	Ignition control is disabled, Wake-On-LAN compatible

NOTE

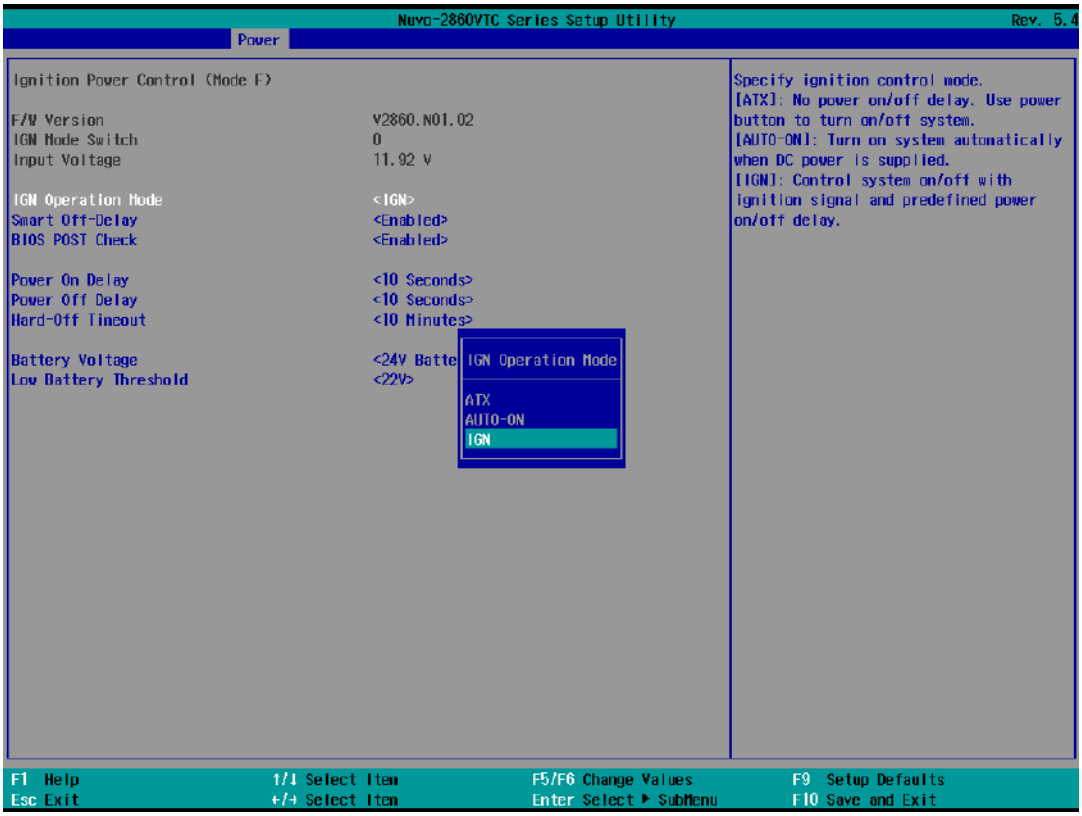
The power mode is tied to the onboard MCU behavior. After adjusting the power settings, please save the settings to the BIOS. After exiting the BIOS menu, unplug the DC input and wait for the onboard capacitors to fully discharge. Then, re-plug the DC input to ensure the MCU behavior is fully applied.

To set the ignition power control in the BIOS:

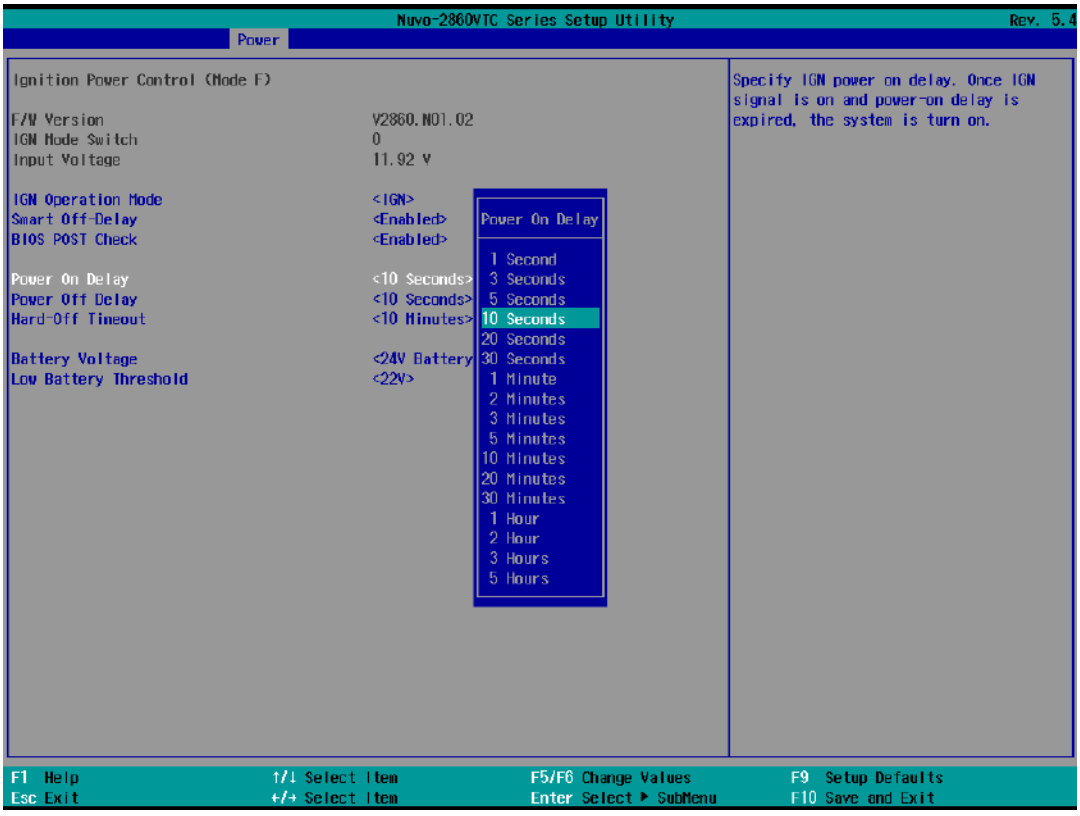
1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Power]** →**[Ignition Power Control]** and press **ENTER.**



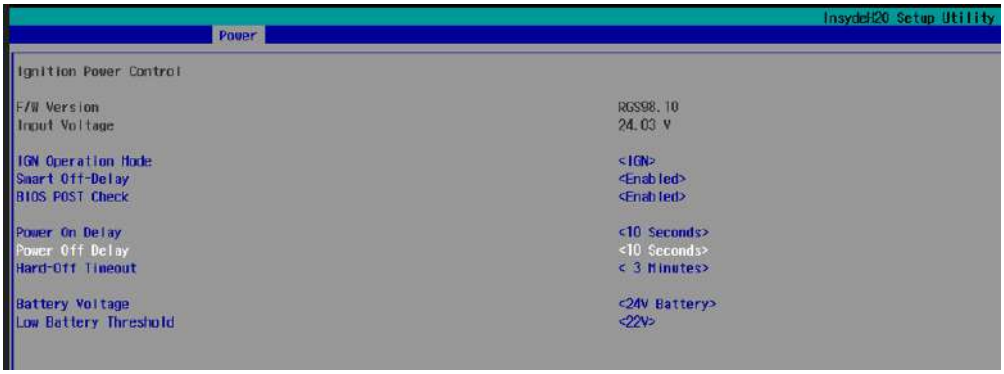
3. Set IGN Operation Mode to “IGN” and press ENTER.



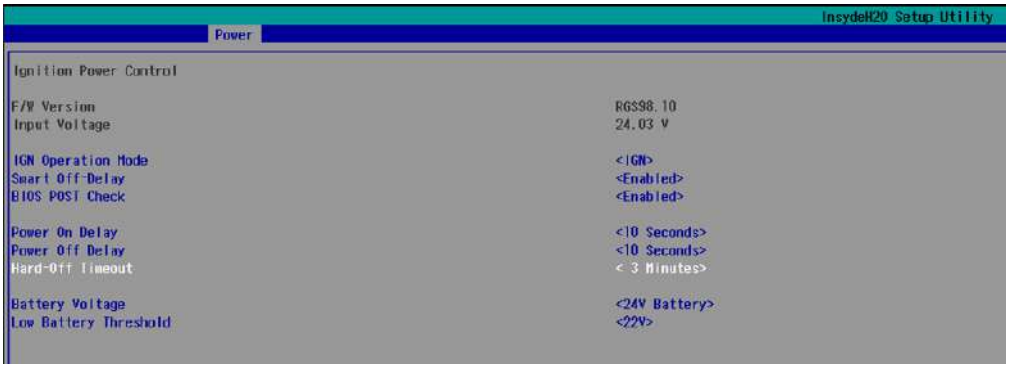
4. If you wish to set the power on delay time from when you start-up the vehicle, highlight and select “Power On Delay”, select the timing according to your needs and press Enter.



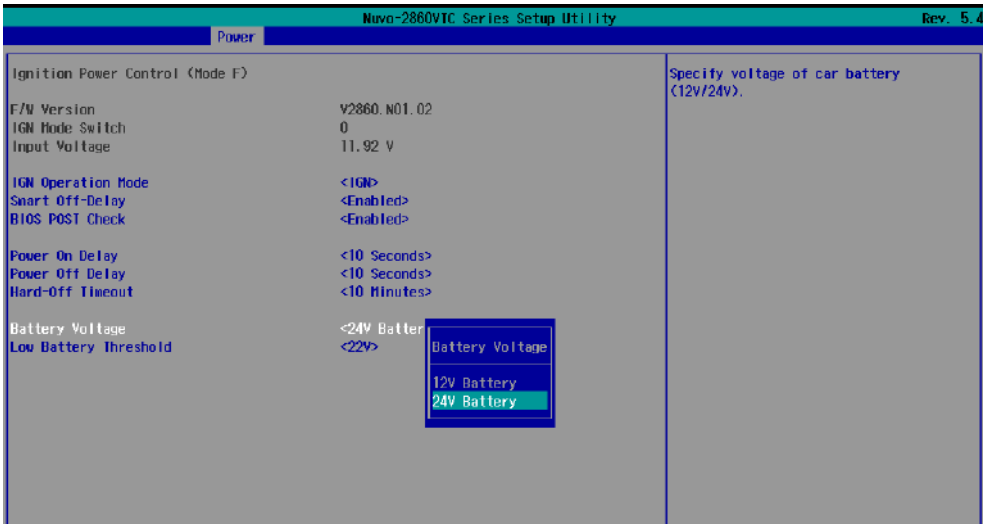
5. If you wish to set the power off delay time from when you turn off the vehicle, highlight and select “Power Off Delay”, select the timing according to your needs and press Enter.



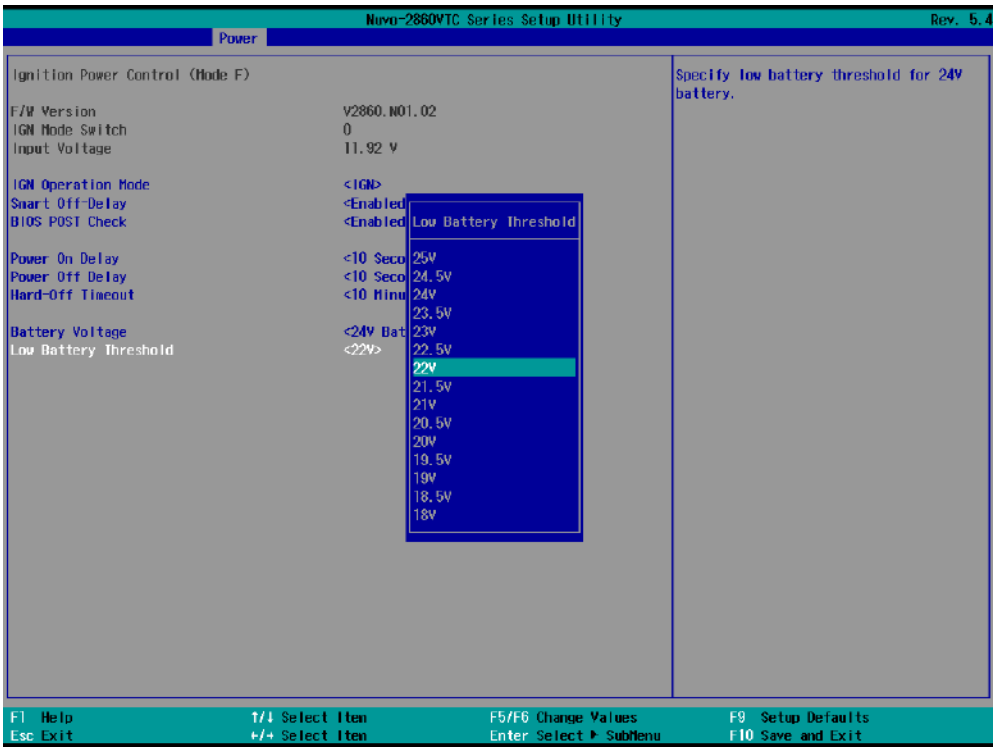
6. If you wish to set a hard power off timing, select “Hard-Off Timeout”, select the timing according to your needs and press Enter.



7. For Battery voltage setting, you may choose between 12V (with a default low battery threshold of 11V, for normal passenger vehicles), or 24V (with a default low battery threshold of 22V, for trucks). Highlight an option and press Enter.



8. To set the low battery threshold, highlight “Low Battery Threshold”, select a setting, and press Enter.



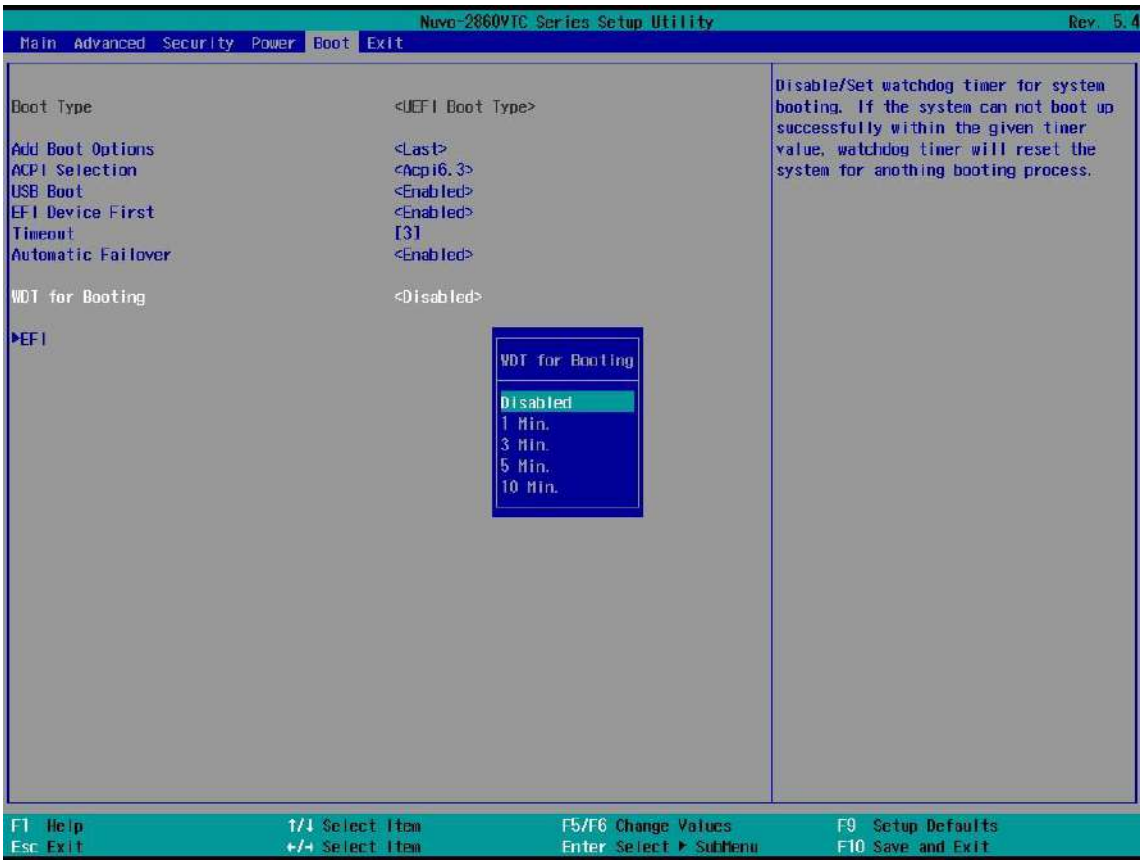
When you are done configuring the BIOS ignition control settings, press F10 to save changes and exit the BIOS.

NOTE

*The ignition power control is managed by an onboard MCU, and clear CMOS will **NOT** reset the ignition control settings.*

4.1.7 Watchdog Timer

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 **Appendix A Using WDT & DIO**.



To set the watchdog timer for boot in BIOS:

1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Boot]** menu.
3. Disable or select timeout value for **[WDT for Booting]** option.
4. Once you set a timeout value, the **[WDT Stop Option]** option appears. You can select either *"Automatically after POST"* or *"Manually after Entering OS"*.
5. Once set, press **F10** to save setting and exit.

5 OS Support and Driver Installation

5.1 Operating System Compatibility

Due to Intel's policy, the system only provides driver support for Windows 11 64-bit. For Linux support, please use Linux kernel versions no later than 5.8. The following list contains the operating systems which have been tested in Neousys Technology Inc.

1. Microsoft Windows 11 LTSC 24H2
2. Ubuntu 22.04.2 LTS or other distribution with kernel version ≥ 5.19

Neousys 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.

5.3 Driver Installation for Watchdog Timer Control

Neousys 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_v2.4.2.0 or later versions.

Please refer to this link to download WDT_DIO.

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 Neousys to program the WDT functions. Currently, WDT driver library supports Windows 10 32-bit and 64-bit versions. For other OS support, please contact Neousys Technology for further information.

Installing WDT_DIO Library

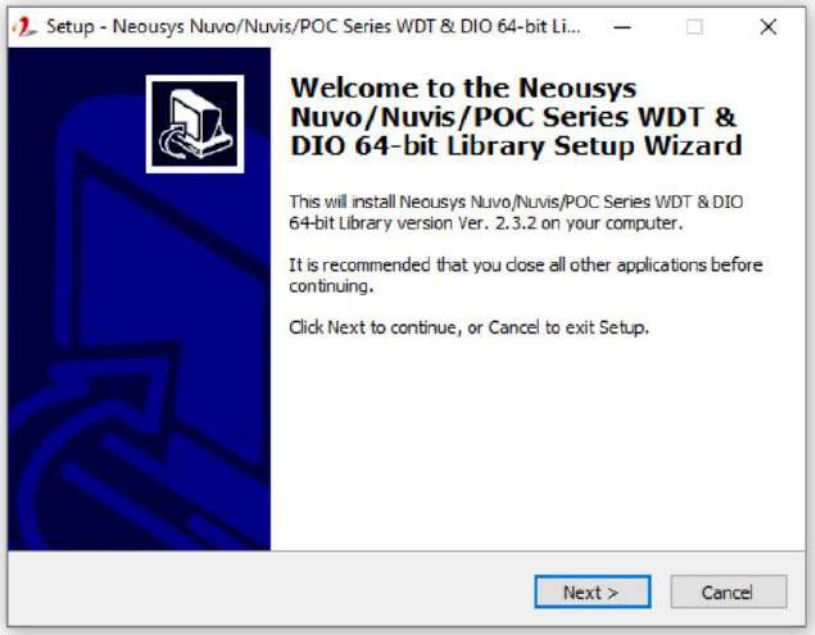
The WDT_DIO function library is delivered in the form of a setup package named **WDT_DIO_Setup.exe**. Prior to programming WDT, you should execute the setup program and install the WDT library. Please use the following WDT_DIO_Setup packages according to your operating systems and application.

- For Windows 10 64-bit OS with 64-bit application (x64 mode), please install WDT_DIO_Setup_v2.3.1.8(x64).exe or later version.

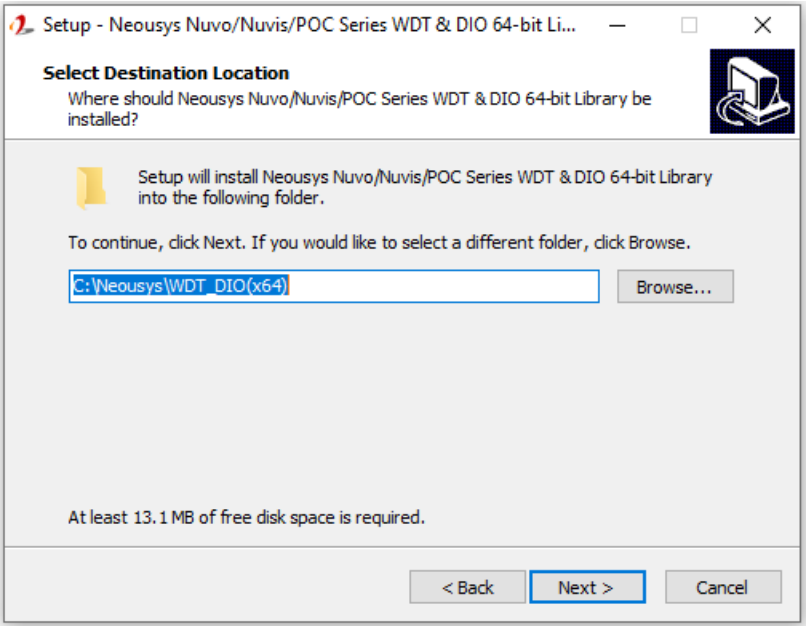
WDT and DIO Library Installation

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

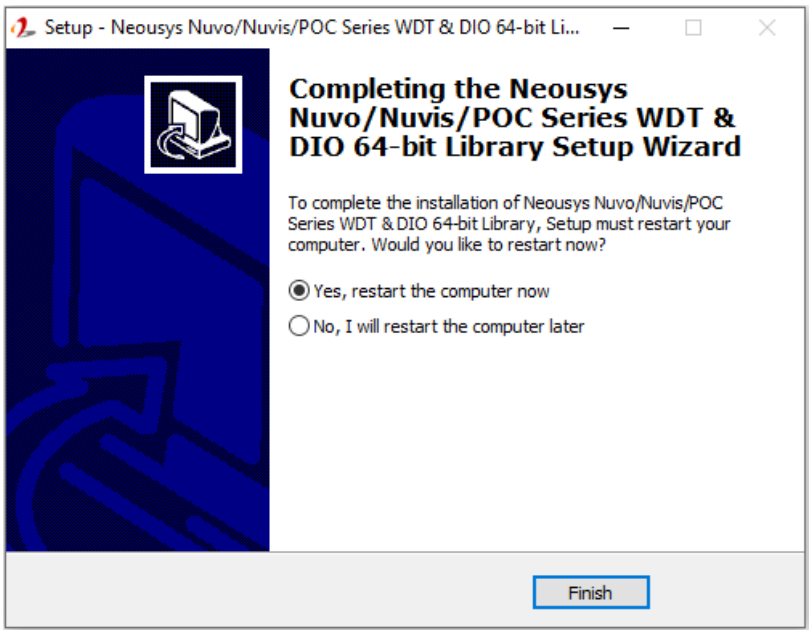
1. Execute **WDT_DIO_Setup.2.3.2.0.exe** (or later) and the following dialog appears.



2. Click “Next >” and specify the directory of installing related files. The default directory is *C:\Neousys\WDT_DIO*.



3. 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.



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

Header File:	\Include
Library File:	\Lib
Function Reference:	\Manual
Sample Code:	\Sample\WDT_Demo(Demo for Watchdog Timer) \Sample\DIO_Demo (Demo for Polling I/O)

WDT Functions

InitWDT

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

SetWDT

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

Usage	WORD tick=255;
	BYTE unit=1; //unit is second.
	BOOL bRet = SetWDT(tick, unit); //timeout value is 255 seconds

StartWDT

Syntax	BOOL StartWDT(void);
Description	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.
Parameter	None
Return Value	If the timeout value is given in correct format (WDT started), this function returns TRUE, otherwise FALSE
Usage	BOOL bRet = StartWDT()

ResetWDT

Syntax	BOOL ResetWDT(void);
Description	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.
Parameter	None
Return Value	Always returns TRUE
Usage	BOOL bRet = ResetWDT()

StopWDT

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

DIO Functions

InitDIO

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

DIReadLine

Syntax	BOOL DIReadLine(BYTE ch);
Description	Read a single channel of isolated digital input.
Parameter	***ch*** BYTE value specifies the DI channel to be read. C*h* should be a value of 0 ~ 7.
Return Value	The status (TRUE or FALSE) of the specified DI channel.

Usage	BYTE ch=3; //DI channel #3
	
	BOOL DIChValue = DIReadLine(ch); //read DI channel #3

DIReadPort

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

DOWriteLine

Syntax	void DOWriteLine(BYTE ch, BOOL value);
Description	Write a single channel of isolated digital output.
Parameter	***ch*** BYTE value specifies the DO channel to be written. C*h* should be a value of 0 ~ 7. ***value*** BOOL value (TRUE or FALSE) specifies the status of DO channel.
Return Value	None

Usage	BYTE ch=3; //DI channel #3
	BOOL DOChValue=TRUE;
	
	DOWriteLine(ch, DOChValue); //write DO channel #3 as TRUE

DOWritePort

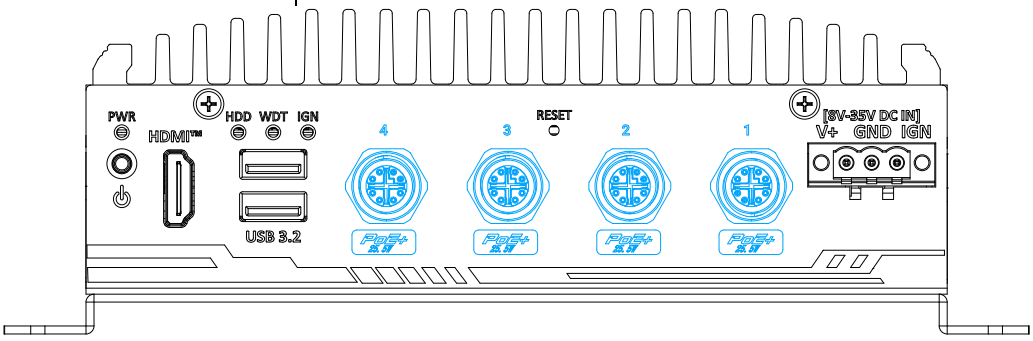
Syntax	void DOWritePort(WORD value);
Description	Write the entire isolated digital output port (8 channels).
Parameter	***value*** WORD value specifies the status of the DO port. V*alue* should be a value of 0~255.
Return Value	None
Usage	WORD DOPortValue=0XFF; //11111111b DOWritePort(DOPortValue); //write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

Appendix B PoE On/ Off Control

The system offers 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 Neousys WDT_DIO driver package. Please follow the instructions in Appendix AWatchdog Timer & Isolated DIO for installation before programming PoE on/off control function.

GetStatusPoEPort

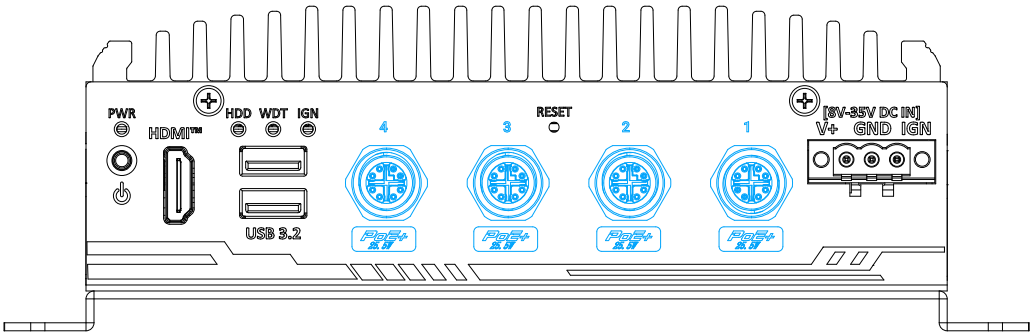
Syntax	BYTE GetStatusPoEPort (Byte port);
Description	Get current on/off status of designated PoE port.
Parameter	*port* BYTE value specifies the index of PoE port. Please refer to the following illustration, *port* should be a value of 1 ~ 4
Return Value	BYTE value indicating PoE on/off status 0 if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



PoE+ ports on the front panel

EnablePoEPort

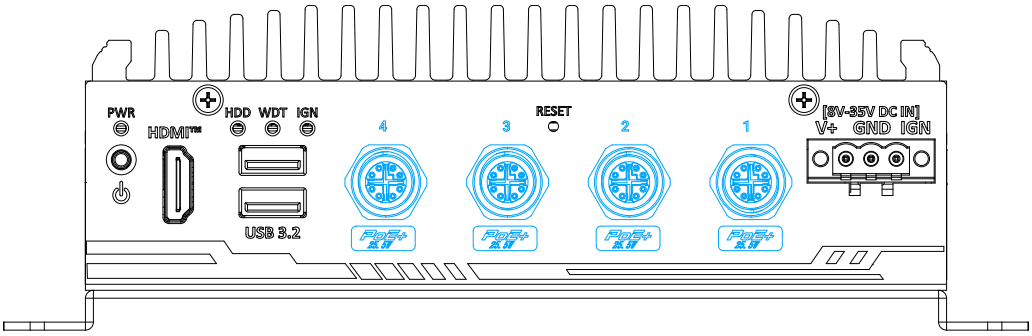
Syntax	BOOL EnablePoEPort (BYTE port);
Description	Turn on PoE power of designated PoE port.
Parameter	*port* BYTE value specifies the index of PoE port. Please refer to the following illustration, *port* should be a value of 1 ~ 4
Return Value	**TRUE** if enabled success **FALSE** if fail to enable.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



PoE+ ports on the front panel

DisablePoEPort

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



PoE+ ports on the front panel