Neousys Technology Inc.

POC-351VTC

User Manual

Revision 1.0

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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.

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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

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 Neousys Technology Inc. Neousys 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
- If the system is not going to be used for a long time, disconnect it from mains (power socket) to avoid transient over-voltage

Service and Maintenance

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

ESD Precautions

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

About This Manual

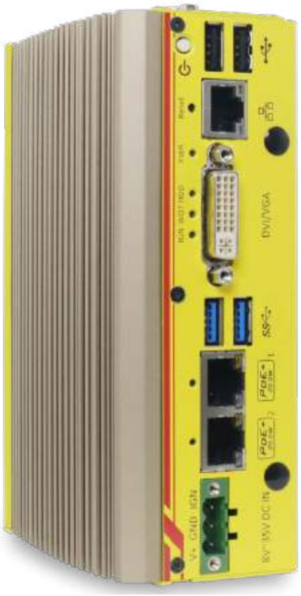
This manual introduces and demonstrates installation procedures of Neousys POC-351VTC.

Revision History

Version	Date	Description
1.0	May. 2018	Initial release

1 Introduction

Neousys Technology POC-351VTC, an ultra-compact in-vehicle fanless embedded computer, featuring Intel® Apollo-Lake Atom™ x7-E3950 quad-core processor. As the latest addition to Neousys' in-vehicle series, it features one of the most compact and rugged chassis with dimensions measuring just 56 (W) x 153 (H) x 108 (D) mm. Designed for front panel I/O port access, POC-351VTC is easy to setup and is ideal for space limited in-vehicle installation such as railway, truck or bus applications.



With plenty of internal expansion options, POC-351VTC features four M.2/ mini-PCIe slots and six antenna openings to accommodate a variety of 4G, 3G, WiFi and GPS modules. An aluminum heat-spreader is thoughtfully designed to dissipate heat generated by modules to maintain superior operating stability.

External connection wise, POC-351VTC has three Gigabit Ethernet ports (two are 802.3at Gigabit PoE+ ports), two USB3.0 ports, two USB2.0 ports, one DVI-I connector for VGA + DVI dual video output, four COM ports, CAN bus, four isolated DI and four isolated DO. The rich assortment of I/O ports allow easy data communication with other devices.

As an in-vehicle embedded computer, POC-351VTC can function under 100% CPU load in wide temperature settings ranging from -25℃ to 70℃. There is an ignition power control for on/ off time delay configuration and the system accepts a wider range of power inputs from 8 to 35V DC and is fully tested for 24/7 operation in harsh environments. In addition, POC-351VTC can be wall-mounted horizontally or vertically.

1.1 Specification of POC-351VTC

System Core	
Processor	Intel® Atom™ E3950 1.6/ 2.0GHz quad-core processor
Graphics	Integrated Intel® HD Graphics 505
Memory	Up to 8GB DDR3L-1866 (single SODIMM slot)
Panel I/O Interface	
Ethernet	3x Gigabit Ethernet ports by Intel® I210 GbE controller
PoE	IEEE 802.3at PoE+ on port #2 and #3
Video Port	1x DVI-I connector for both analog RGB and DVI outputs, supporting up to 1920 x 1200 resolution
Serial Port	1x software-programmable RS-232/ 422/ 485 port (COM1) 3x 3-wire RS-232 ports (COM2/ 3/ 4) or 1x RS-422/ 485 port (COM2)
USB	2x USB 3.0 ports 2x USB 2.0 ports
Audio	1x speaker-out 1x microphone-in
CAN bus	1x isolated CAN 2.0 port
Isolated DIO	4x isolated DI 4x isolated DO
Internal I/O Interface	
M.2	1x M.2 (2042/ 3042) socket for 3G/ 4G option with USIM support (USB signal only)
Mini-PCIe	3x full-size mini PCI Express slot with USIM socket
Storage Interface	
mSATA	1x half-size mSATA port 1x full-size mSATA port
Power Supply	
DC Input	8~35V DC
Input Connector	3-pin pluggable terminal block for DC input (IGN/ GND/ V+)
Power consumption	19.2W (0.8A @ 24V)
Mechanical	
Dimension	56.4 mm (W) x 153.3 mm (H) x 108.1 mm (D)
Weight	1.0 kg
Mounting	Horizontal wall-mount (standard) or vertical wall-mount (optional)

Environmental	
Operating Temperature	-25°C ~ 70°C */** -40°C ~ 70°C (optional) */***
Storage Temperature	-40°C ~85°C**
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ mSATA SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms duration (w/ mSATA SSD, according to IEC60068-2-27)
EMC	E-Mark for in-vehicle applications CE/ FCC Class A, according to EN 55032 & EN 55024

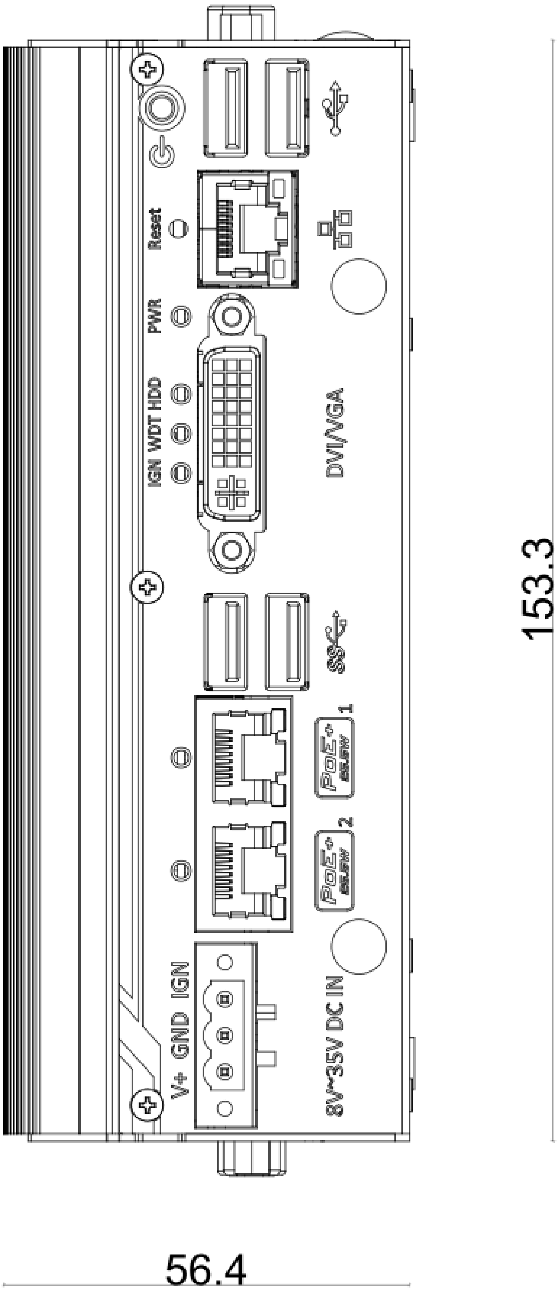
**For wide temperature use condition, a wide temperature/industrial mSATA SSD module is required.*

*** For full function use condition (mini-PCIe, M.2, and mSATA are all adopted), the recommended operating temperature is -25ºC ~ 60ºC*

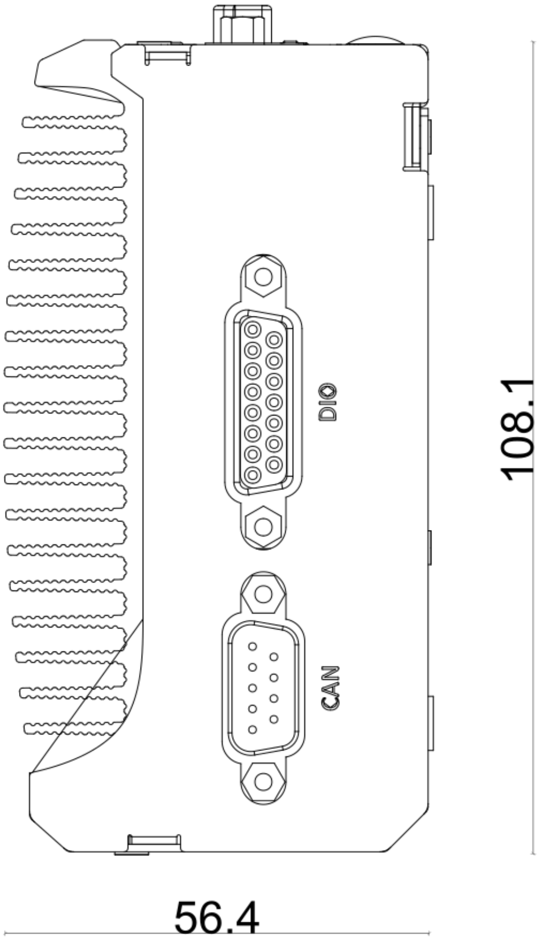
**** For extreme wide temperature -40ºC ~ 70ºC, it is optional with 100% screening, please contact Neousys Technology*

1.2 Dimension

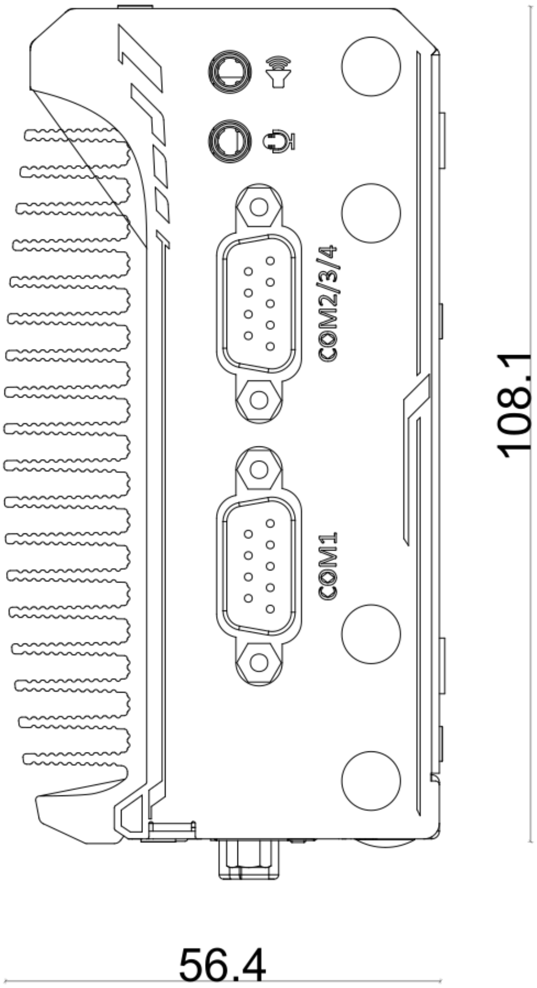
1.2.1 Front View



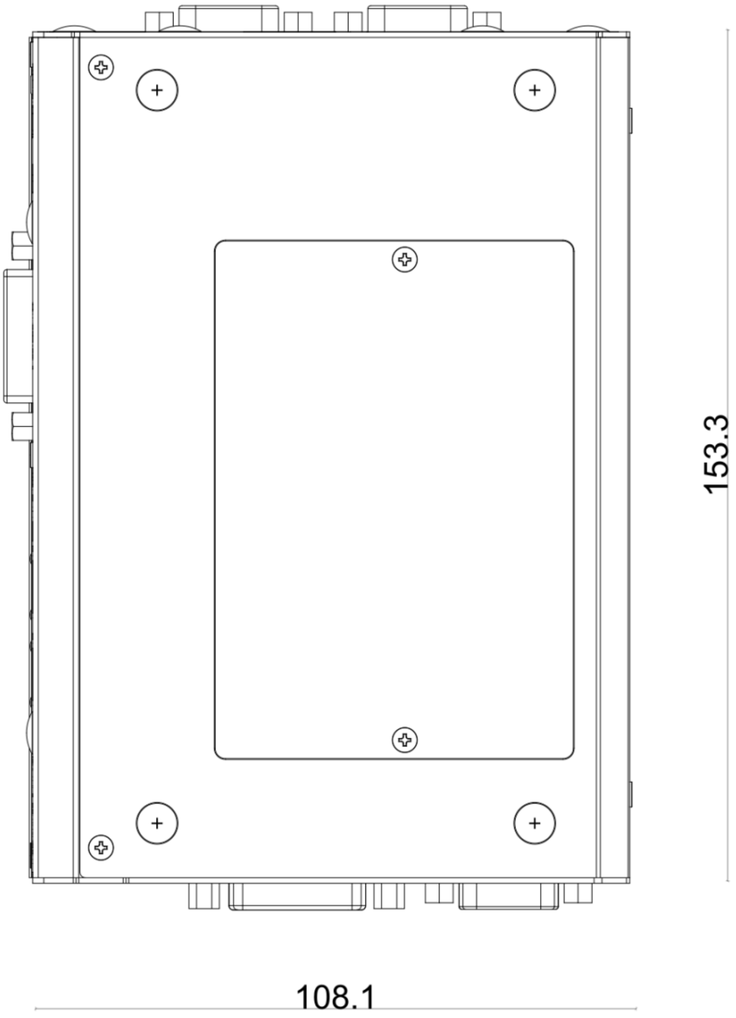
1.2.2 CAN and DIO Panel View



1.2.3 COM and Audio Port Panel View



1.2.4 Bottom View



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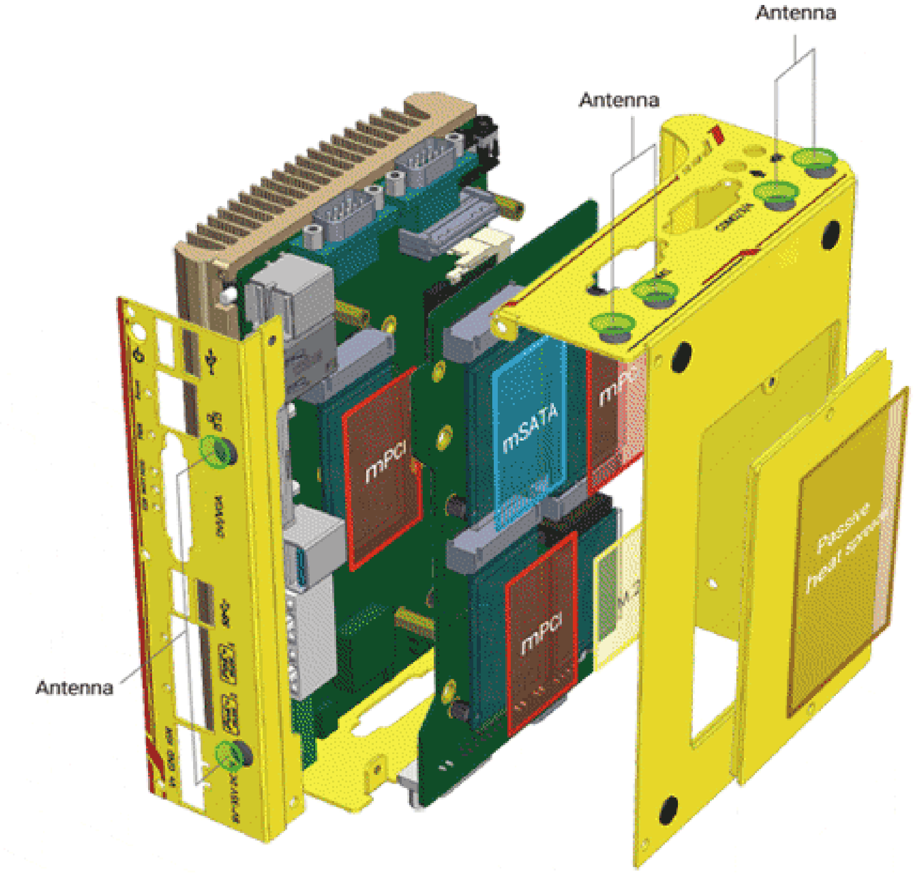
1.3 Exploded View



- 🟥 mPCIe x3
- 🟦 mSATA x2
- 🟨 M.2 x1
- 🟩 Antenna x6
- 🟫 Passive heat spreader for M.2 and mPCIe modules

2 System Overview

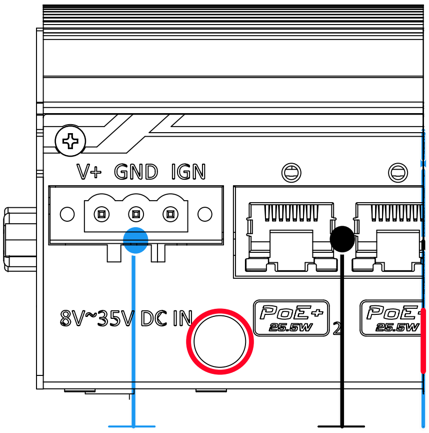
Upon receiving and unpacking your POC-351VTC, please check immediately if the package contains all the items listed in the following table. If any item(s) are missing or damaged, please contact your local dealer or Neousys Technology.

2.1 Unpacking the System

Item	Description	Qty
1	POC-351VTC ultra-compact in-vehicle fanless controller (Please verify additionally purchased accessories such as DDR3L module or mSATA SSD, etc.)	1
2	DVI-to-VGA adapter	1
3	3-pin pluggable terminal block	1
4	Neousys Drivers & Utilities DVD	1
5	Horizontal Wall Mount	1
6	Screw package	1

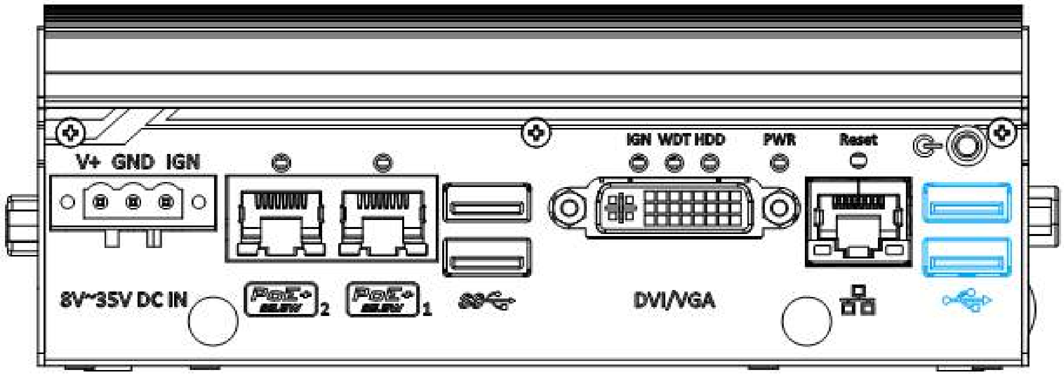
2.2 POC-351VTC Front Panel

The front panel of POC-351VTC feature rich I/O ports, it has three Gigabit Ethernet ports (ports 2 and 3 are 802.3at Gigabit PoE+ ports), two USB3.0 ports, two USB2.0 ports, one DVI-I connector for VGA + DVI dual video output and 3-pin terminal block for DC input.



No.	Item	Description
1	USB 2.0 port	The USB 2.0 ports are backward compatible with USB 1.1 / 1.0.
2	Power button	Use this button to turn on or force shutdown the system.
3	Reset button	Use this button to manual restart the system.
4	Gigabit Ethernet #3	Gigabit Ethernet ports offer fast network access.
5	System status LED	Four system LEDs, Ignition control (IGN), Watchdog Timer (WDT), Hard Disk Drive (HDD) and Power (PWR).
6	DVI-I port	DVI-I offers both DVI and VGA signals. You can use the DVI-to-VGA adapter to connect a VGA display, or use Y-cable to have DVI/VGA dual display output. They support resolutions up to 1920 x 1200.
7	USB 3.0 port	USB 3.0 port, up to 5 Gbit/s data transfer bandwidth.
8	Gigabit PoE+ port #1 & #2	Gigabit Power over Ethernet (PoE) port can provide both data and electric power to devices.
9	3-pin terminal block (DC/ ignition input)	Compatible with DC power input from 8~35V, the terminal block can also be used for ignition signal input.
10	○	Opening reserved for SMA antenna installation.

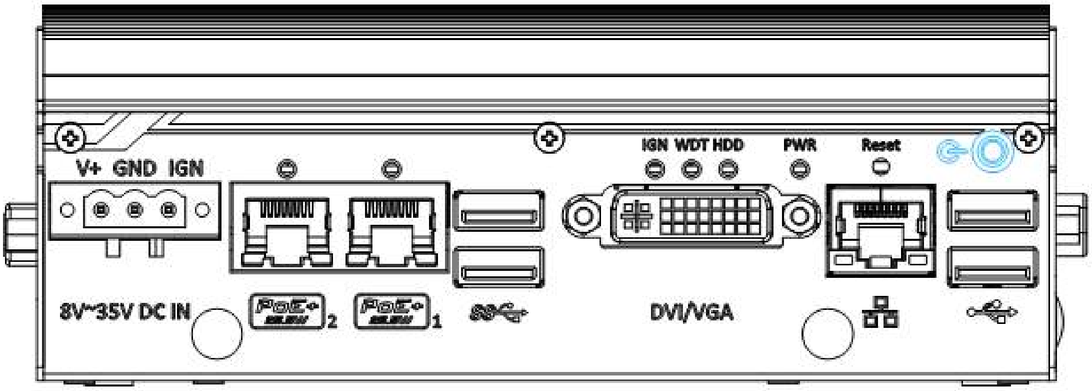
2.2.1 USB 2.0 Port



The USB2.0 ports are implemented via native xHCI (eXtensible Host Controller Interface) controller in Atom E3950 is backward compatible with USB 1.1 and USB 1.0 devices. Legacy USB support is also provided so you can use USB keyboard/ mouse in DOS environment.

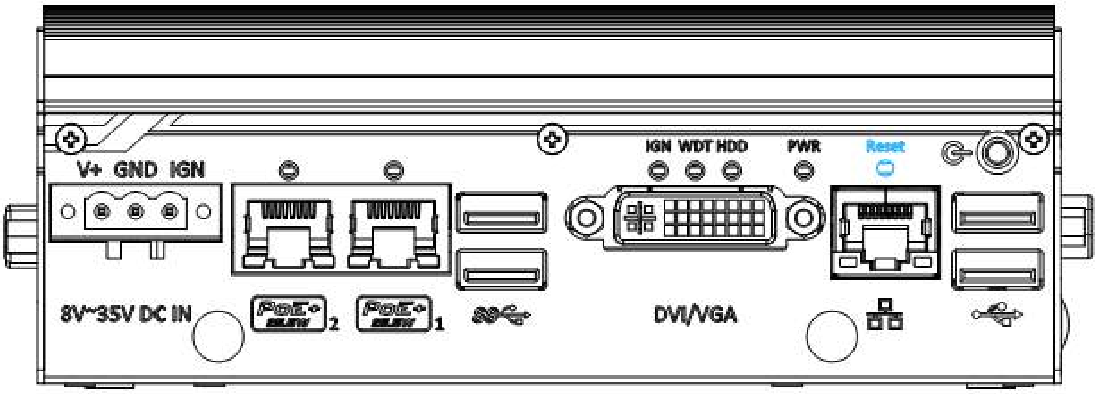
xHCI driver is supported natively in Windows 10, therefore you do not need to install xHCI driver to utilize USB functions on POC-351VTC.

2.2.2 Power Button



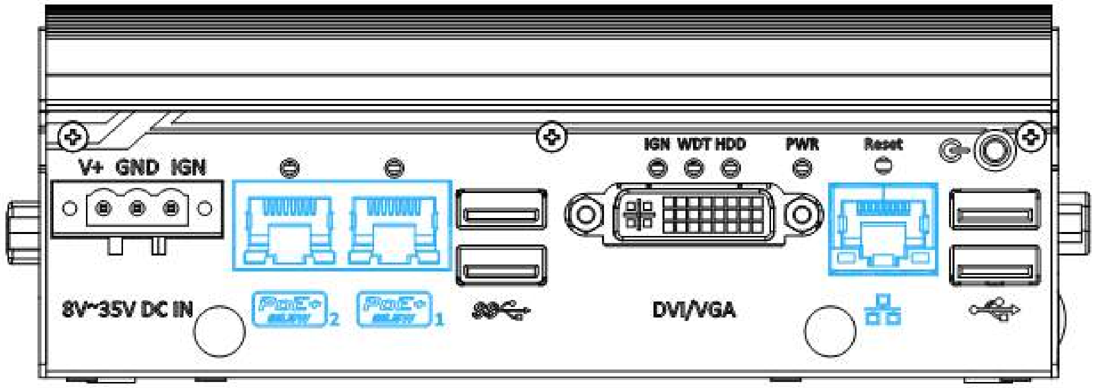
The power button is a non-latched switch for ATX mode on/off operation. To turn on the system, press the power button and the PWR LED should light-up green. To turn off the system, issuing a shutdown command in OS is preferred, or you can simply press the power button. To force shutdown when the system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

2.2.3 Reset Button



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

2.2.4 Gigabit Ethernet



The system offers three Gigabit Ethernet ports using Intel® I210 GbE controller. From top to bottom, they are port #3, #1 and #2. When plugged in and connected via the Ethernet cable, the LEDs on the RJ45 connector indicate connection status and speed.

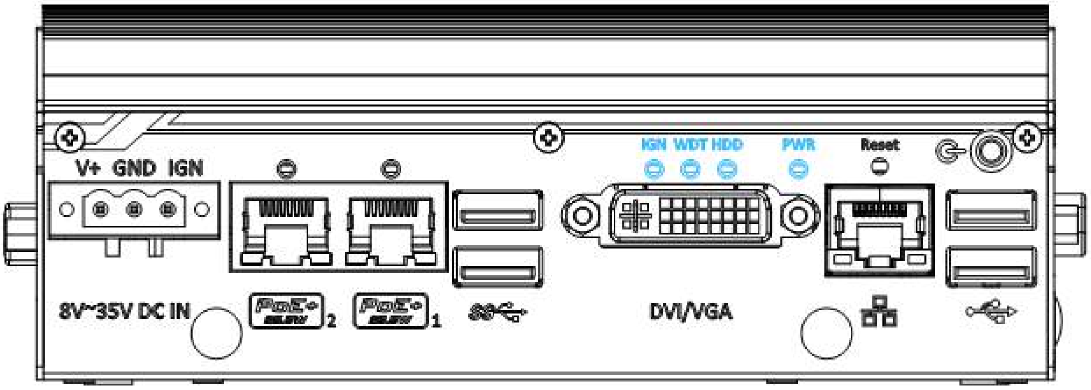
Active/Link LED (Right)

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

Speed LED (Left)

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

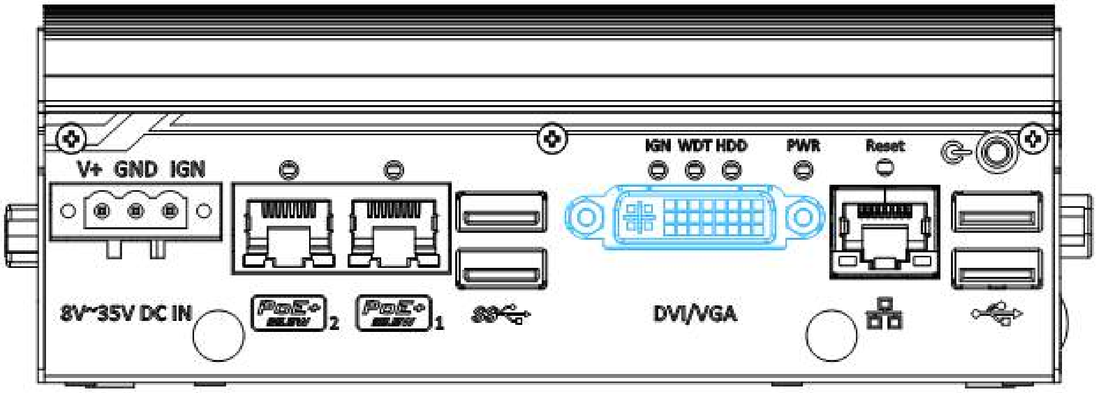
2.2.5 System Status LED



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

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

2.2.6 DVI-I Port



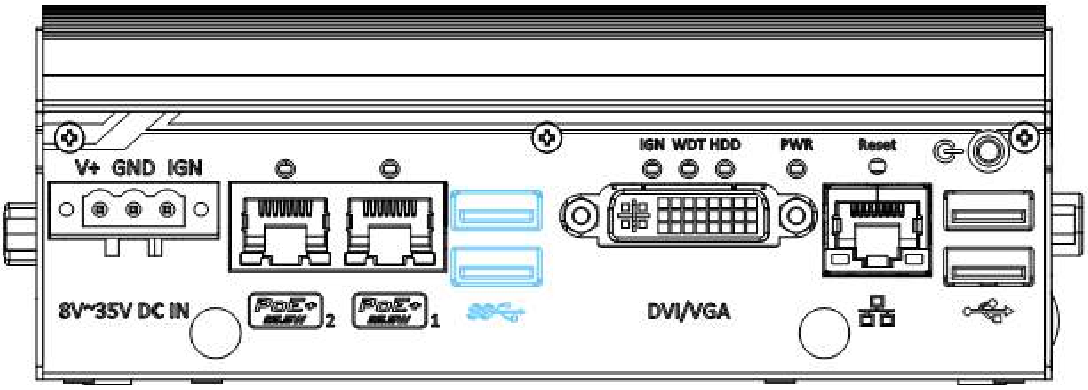
The system features a DVI-I connector on its front panel that is also compatible with VGA signals. The DVI and VGA outputs are directly driven by integrated Intel HD graphics engine and support up to 1920 x 1200 resolution.

For VGA monitor, Neousys offers a specialized DVI-to-VGA adapter as an accessory shipped with the system. This adapter supports VGA DDC signals and thus eliminates compatibility issues with VGA monitors. Or you can use a DVI-I to VGA+DVI-D Y-cable to support two independent display outputs

DVI to VGA adapter

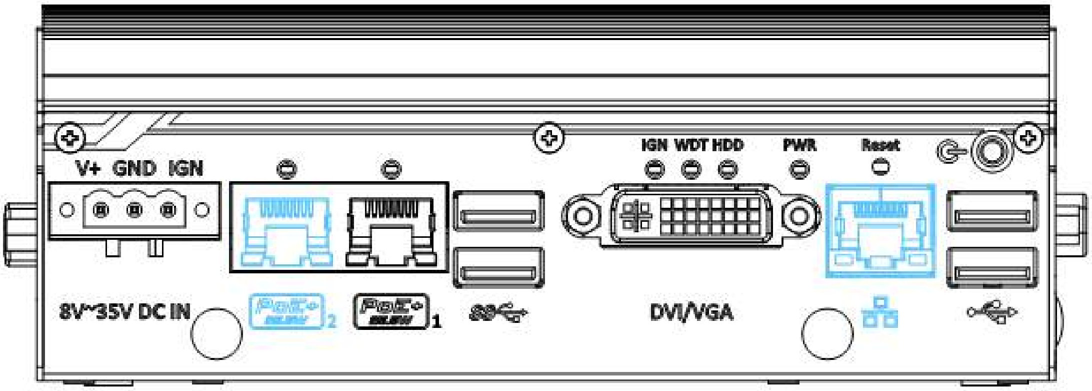
Optional DVI to VGA+DVI Y-cable

2.2.7 USB 3.0 Port



The system offers two USB 3.0 (SuperSpeed USB) ports on its front panel. They are implemented by native xHCI (eXtensible Host Controller Interface) controller in Atom E3950 SoC and 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 xHCI driver is supported natively in Windows 10.

2.2.8 IEEE 802.3at Power over Ethernet Port #1 & #2



The Power over Ethernet (PoE) port supply power and data on a standard CAT-5/CAT-6 Ethernet cable. Acting as a PSE (Power Sourcing Equipment), compliant with IEEE 802.3at, each port delivers up to 25W to a Powered Device (PD). PoE automatically detects and determine if the connected device is PoE PD or not before supplying power, making it compatible with standard Ethernet devices as well.

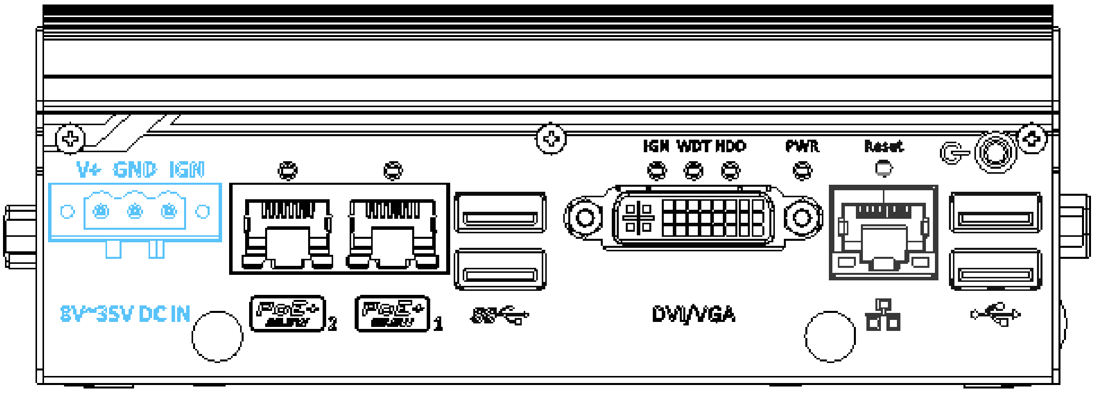
Active/Link LED (Right)

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

Speed LED (Left)

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

2.2.9 3-Pin Terminal Block for DC Input/ Ignition Input



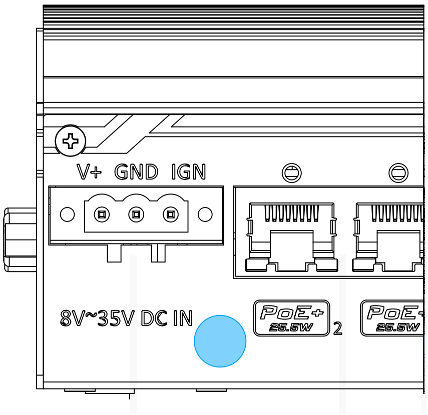
The system accepts a wide range of DC power input from 8 to 35V via a 3-pin pluggable terminal block, which is fit for field usage where DC power is usually provided. The screw clamping mechanism on the terminal block offers connection reliability when wiring DC power.

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

WARNING

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

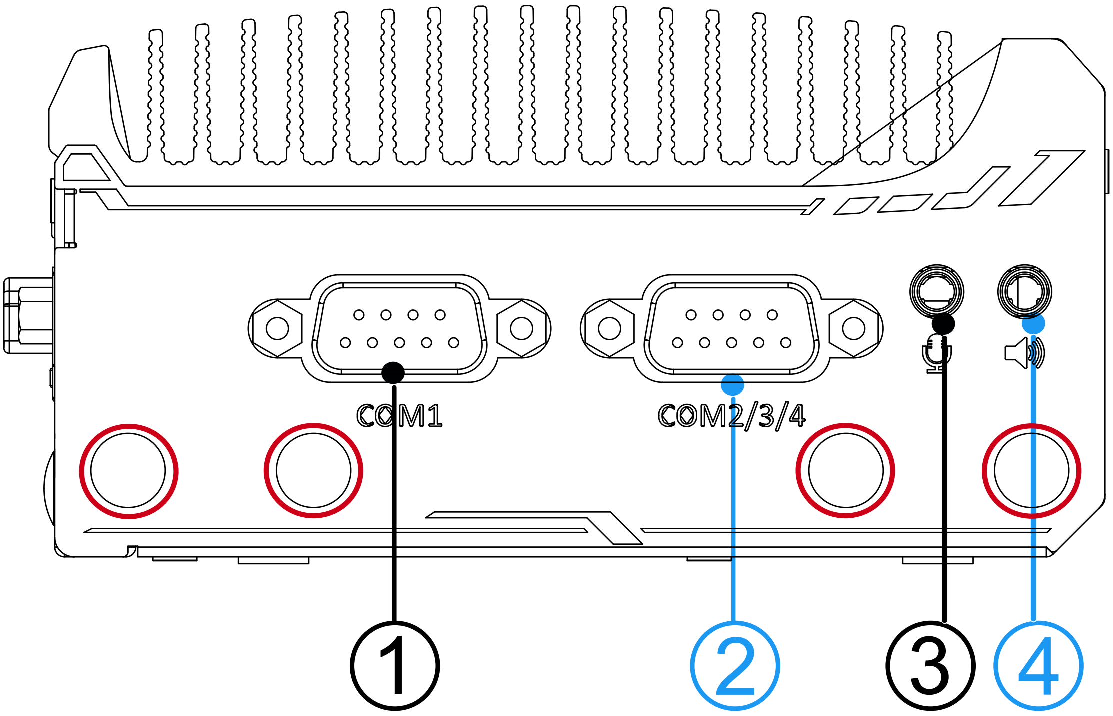
2.2.10 SMA Antenna Opening



The system offers two SMA antenna openings on the front panel reserved for SMA antenna installations. Users can take advantage of these two openings when installing mini-PCIe module for wireless communication reception such as 3G, 4G, GPS or WiFi.

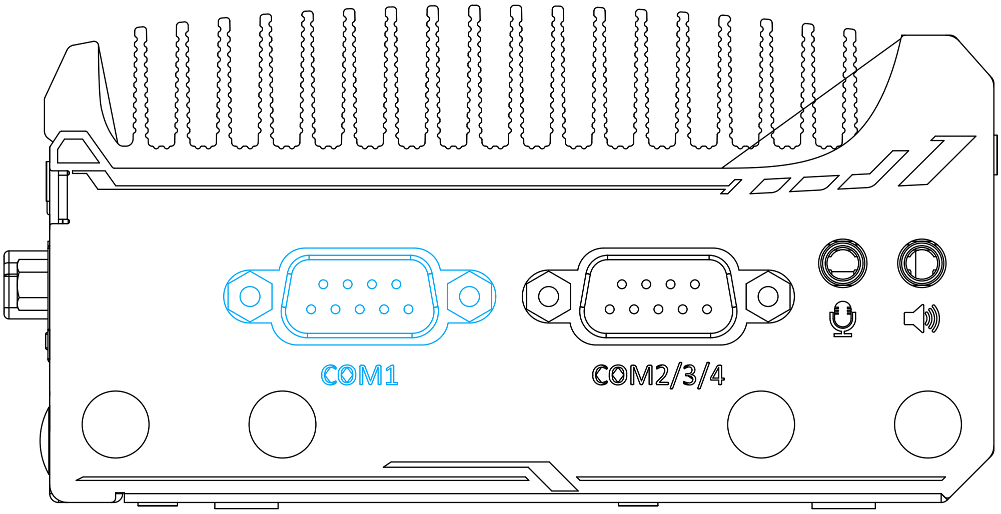
2.3 COM Port Panel

The top panel of POC-351VTC features additional I/O functions, such as 3.5mm speaker-out/ microphone-in jacks, COM ports implemented using ITE8786 SIO chip, and antenna holes for antenna installation.

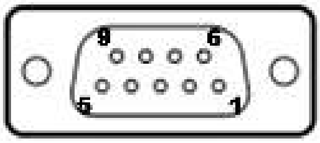


No.	Item	Description
1	COM port 1	Software programmable RS-232/ 422/ 485 port
2	COM port 2/ 3/ 4	**Can be configured as:** **COM2**: single RS-422/ 485 port **COM2/ COM3/ COM4**: three 3-wire RS-232 ports
3	Microphone-in	3.5mm microphone-in jack for voice input.
4	Speaker-out	3.5mm speaker-out/ microphone-out jack for sound output
5	○	Opening reserved for SMA antenna installation

2.3.1 COM Port (COM1)

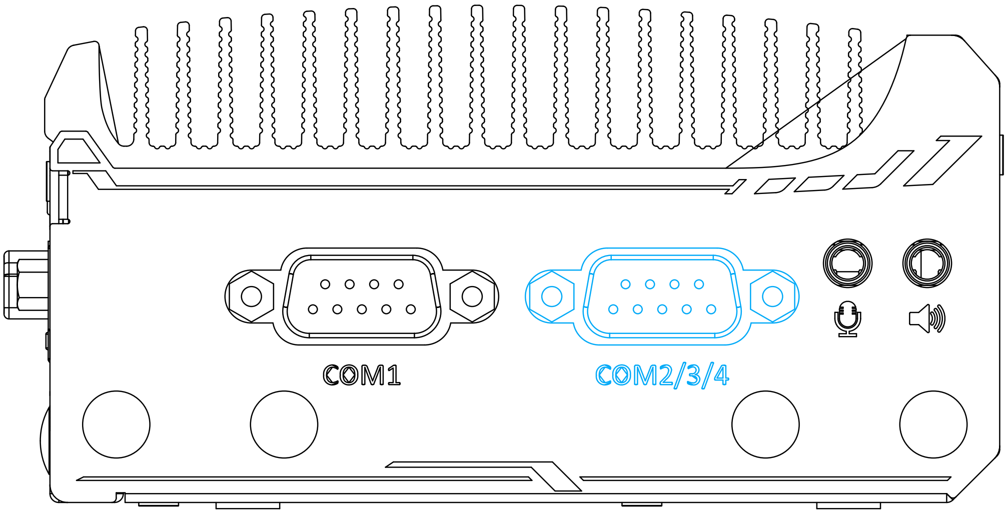


Implemented using industrial-grade ITE8786 Super IO chip (-40 to 85°C) and provide up to 921600 bps baud rate, COM1 is a software-configurable RS-232/422/485 port via 9-pin D-Sub male connector. The operation mode, slew rate and termination of COM1 can be set in BIOS setup utility. The following table describes the pin definition of COM ports.

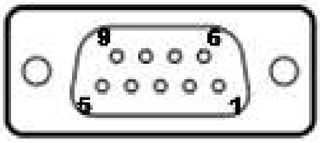


	COM1		
Pin#	**RS-232 Mode**	**RS-422 Mode**	**RS-485 Mode (Two-wire 485)**
1	DCD		
2	RX	422 TXD+	485 TXD+/RXD+
3	TX	422 RXD+	
4	DTR	422 RXD-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS	422 TXD-	485 TXD-/RXD-
9	RI		

2.3.2 COM Ports (COM2/ COM3/ COM4)



Implemented using industrial-grade ITE8786 Super IO chip (-40 to 85°C) and provide up to 921600 bps baud rate, the second D-Sub male connector (COM2/ 3/ 4) can be configured in BIOS as single RS-422/ 485 port (COM2) or three 3-wire RS-232 ports (COM2/COM3/COM4). Please refer to COM2/ 3/ 4 Port Configuration for configuring operation mode. An optional 1-to-3 Y-cable is available to connect three RS-232 devices.



COM2/ 3/ 4 Pin

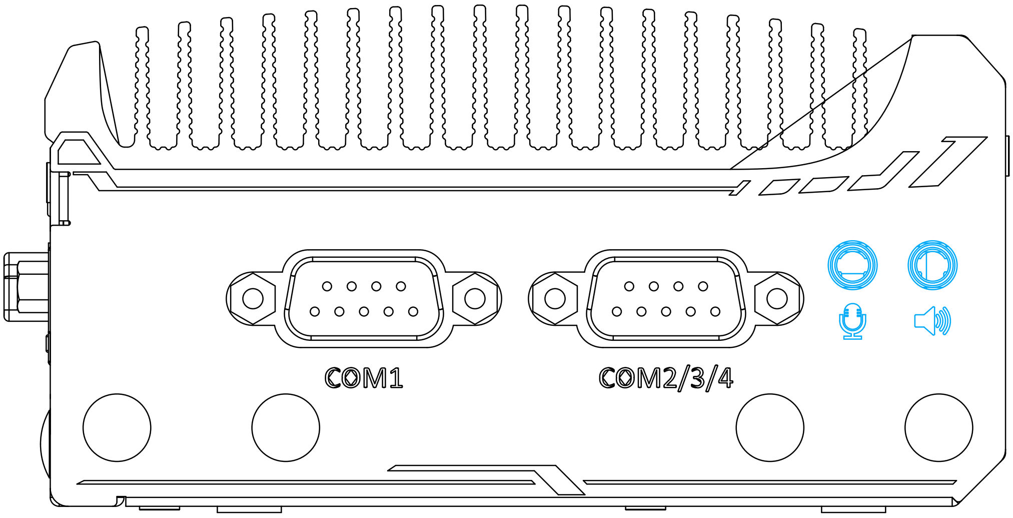
1-to-3 Y-cable

The following table describes the pin definition of the COM port

	3-port RS-232 COM2/ 3/ 4		
Pin#	**COM2**	**COM3**	**COM4**
1			
2	RX		
3	TX		
4		TX	
5	GND	GND	GND
6		RX	
7			TX
8			RX
9			

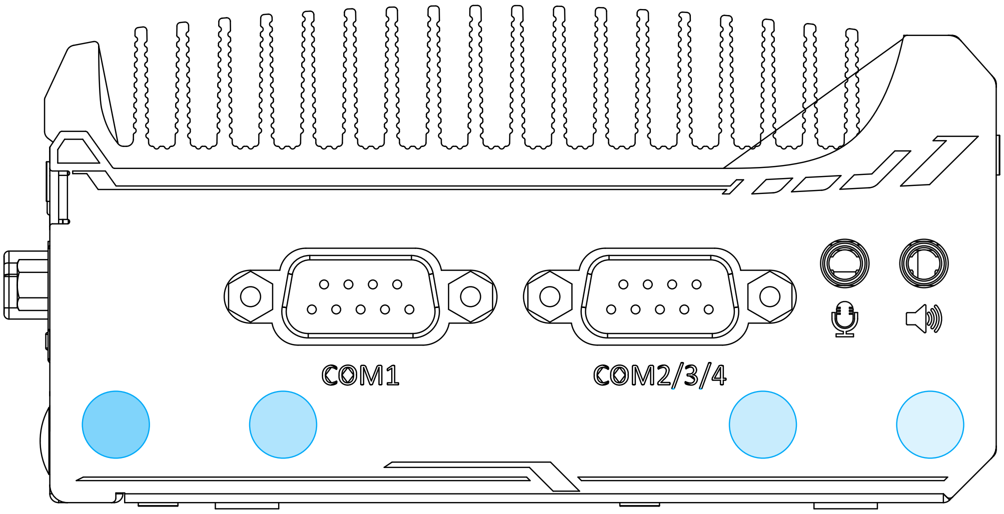
	Single port RS-422/ 485	
Pin#	RS-422	RS-485
1		
2	TxD+	TxD+/ RxD+
3	RxD+	
4	RxD-	
5	GND	GND
6		
7		
8	TxD-	TxD-/ RxD-
9		

2.3.3 3.5mm Microphone-in/ Speaker-out Jack



The system provides audio function using Intel® High Definition Audio in Atom E3950 SoC and Realtek ALC262 codec. There are two audio jacks on the top panel. The 🎙 port is used for microphone input, and 🔊 port is used for speaker output. To utilize the audio function in Windows, you need to install corresponding drivers for both Intel® HD audio and Realtek ALC262 codec. Please refer to the section, Driver Installation.

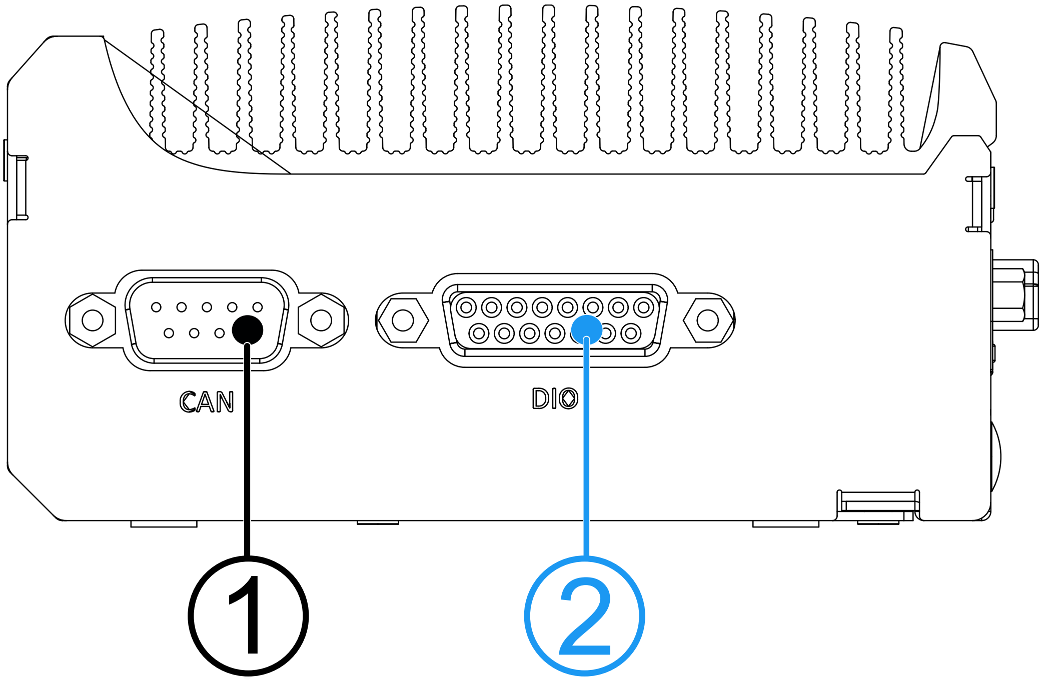
2.3.4 SMA Antenna Opening



The system offers four SMA antenna openings reserved for SMA antenna installations. Users can take advantage of these two openings when installing mini-PCIe module for wireless communication reception such as 3G, 4G, GPS or WiFi.

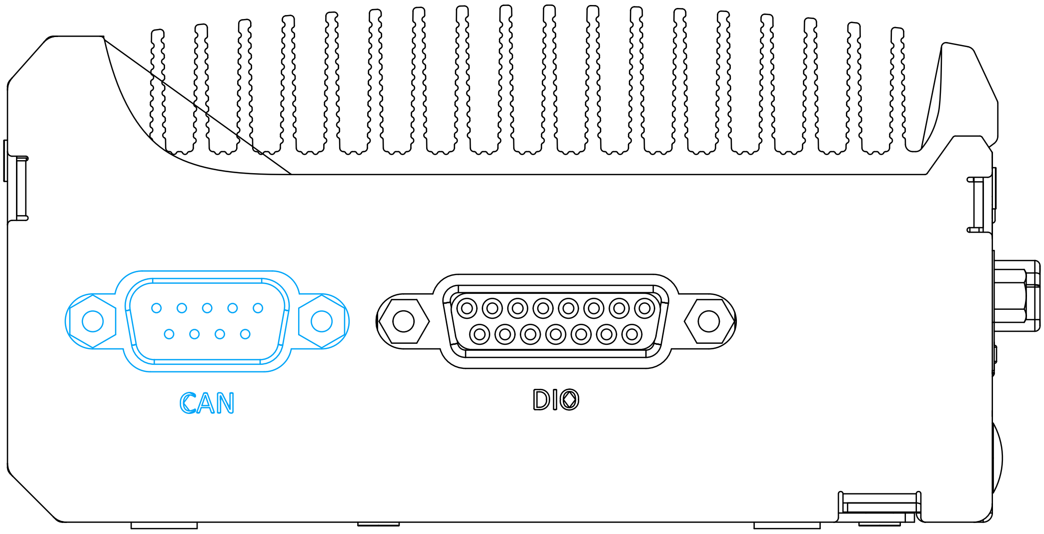
2.4 CAN bus/ DIO Panel

The CAN bus/ DIO panel features a CAN bus port that supports CAN2.0A/ CAN2.0B up to 1Mbps and 4x isolated digital input channels/ 4x isolated digital output channels

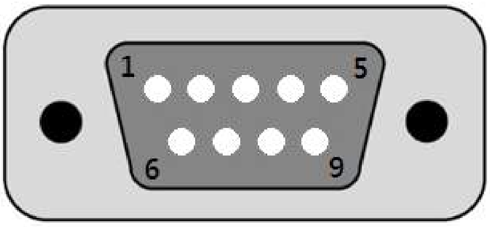


No.	Item	Description
1	CAN bus port	Allows POC-351VTC to communicate with other in-vehicle CAN device(s).
2	DIO port	The DIO port provides 4x isolated digital input and 4x isolate output channels

2.4.1 CAN bus Port

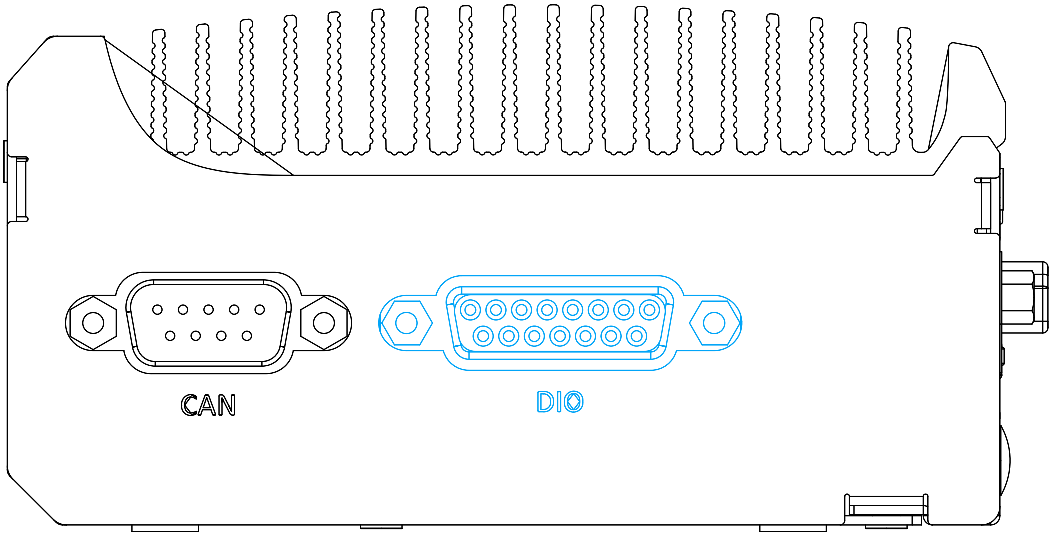


CAN bus is a robust industrial bus with a pair of differential signals and is commonly used in various industrial and in-vehicles applications. The system is equipped with a CAN bus DB9 port that is compatible with both industrial and in-vehicle applications. The CAN bus port supports CAN2.0A and CAN2.0B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

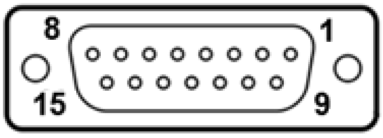


Pin No.	Definition	I/O	Description
1	GND	-	GND
2	Reserved	-	Reserved pin. Keep unconnected
3	CAN_H	I/O	CAN Bus High-level voltage
4	Reserved	-	Reserved pin. Keep unconnected
5	CAN_L	I/O	CAN Bus Low-level voltage
6	Reserved	-	Reserved pin. Keep unconnected
7	Reserved	-	Reserved pin. Keep unconnected
8	Reserved	-	Reserved pin. Keep unconnected
9	Reserved	-	Reserved pin. Keep unconnected

2.4.2 Digital Input/ Output



The system provides 4x isolated digital input channels and 4x isolated digital output channels. The DIO functions support polling mode I/O access and DI change-of-state interrupt. Please refer to Watchdog Timer & Isolated DIO for information on wiring and programming the isolated DIO channels.

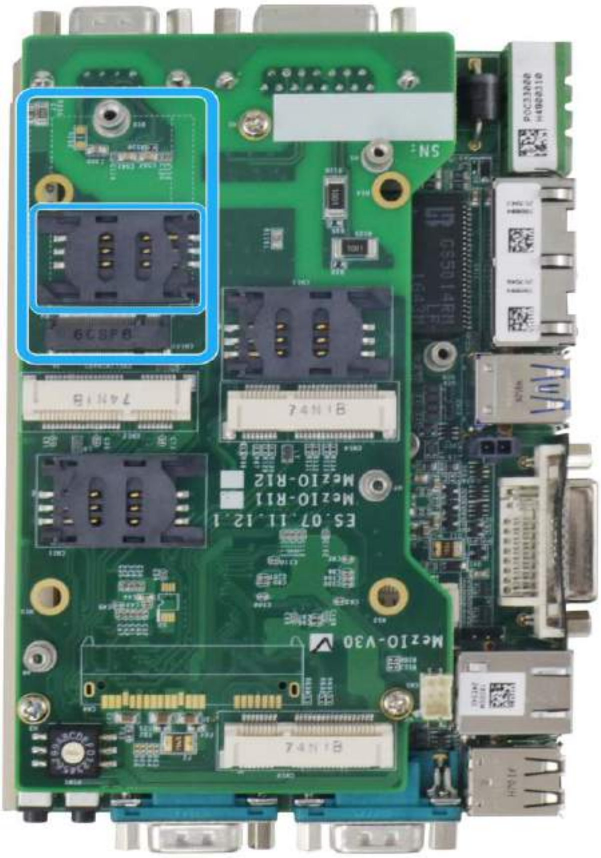


Pin#	Pin Definition	Pin#	Pin Definition
1	DI_0	9	DI_GND
2	DI_1	10	DI_2
3	DI_GND	11	DI_3
4	DO_GND	12	DO_GND
5	DO_0	13	DO_2
6	DO_1	14	DO_3
7	DO_GND	15	-
8	VDD		

2.5 Internal I/O

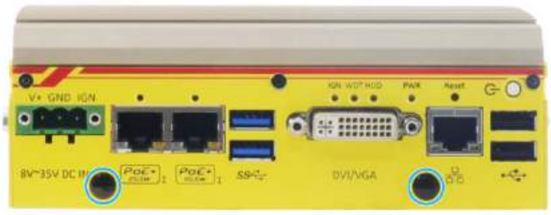
The system's internal I/O connectors consist of M.2 socket with SIM slot, SO-DIMM socket, mini-PCIe slot with SIM slot, a half-size mSATA port and a MezIO^{TM} port for application-oriented expansion purposes.

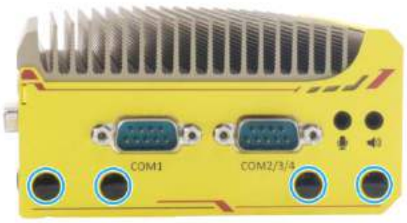
2.5.1 M.2 Socket



The M.2 socket (2242/ 3042) accepts USB signal only and is coupled with SIM card support. By installing a 3G or 4G M.2 module with a SIM card, you can access the internet via your service provider's 3G/ 4G network.

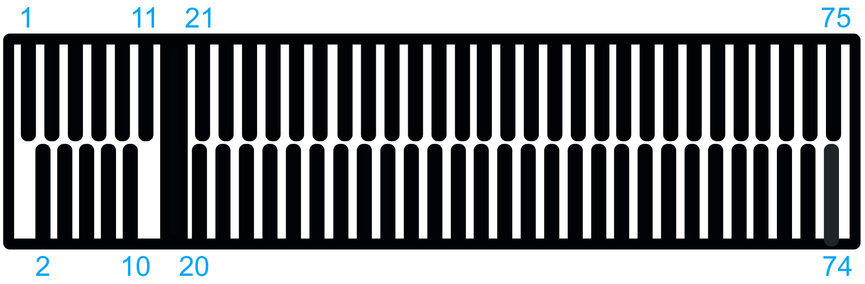
For wireless (WIFI/ 3G/ 4G) communication, there are SMA antenna openings on system side panels.





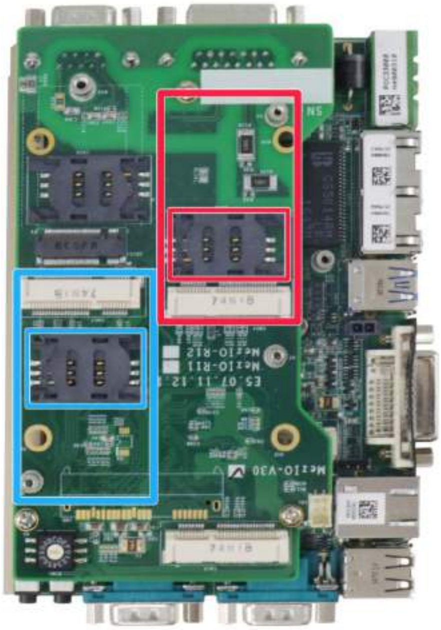
Front panel antenna openings **COM port panel antenna openings**

M.2 Slot Pin Definition

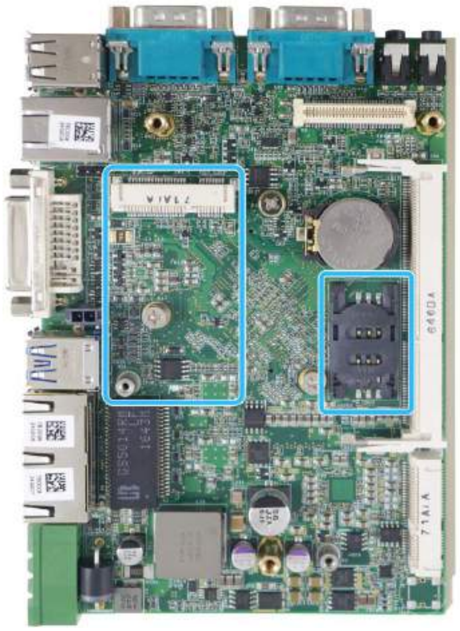


Pin #	Signal	Pin #	Signal
1	-	2	P3V3
3	GND	4	P3V3
5	GND	6	-
7	USB_D+	8	-
9	USB_D-	10	-
11	GND	12	KEY
13	KEY	14	
15		16	
17		18	
19		20	-
21	-	22	-
23	-	24	-
25	-	26	-
27	GND	28	-
29	-	30	UIM_RST
31	-	32	UIM_CLK
33	GND	34	UIM_DATA
35	-	36	UIM_PWR
37	-	38	-
39	GND	40	-
41	-	42	-
43	-	44	-
45	GND	46	-
47	-	48	-
49	-	50	PLTRST
51	GND	52	-
53	-	54	-
55	-	56	-
57	GND	58	-
59	-	60	-
61	-	62	-
63	-	64	-
65	-	66	-
67	PLTRST	68	-
69	-	70	P3V3
71	GND	72	P3V3
73	GND	74	P3V3
75	-		

2.5.2 Full-size mini-PCIe Socket



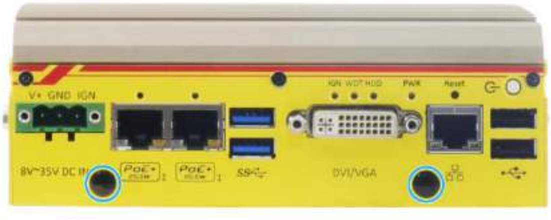
mini-PCIe/ SIM slot on MezIO^{TM} module



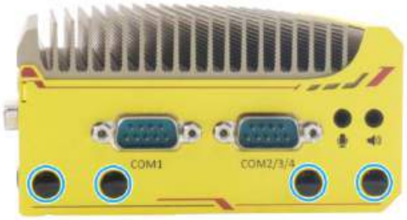
mini-PCIe/ SIM slot on the mainboard

The system provides a full-size mini-PCIe socket that is in compliance with mini-PCIe specification rev. 1.2. The mini-PCIe socket is designed with SIM card support. With a SIM card installed, your system can access the internet via your network provider's 3G/ 4G network.

For wireless (WIFI/ 3G/ 4G) communication, there are SMA antenna openings on system side panels.

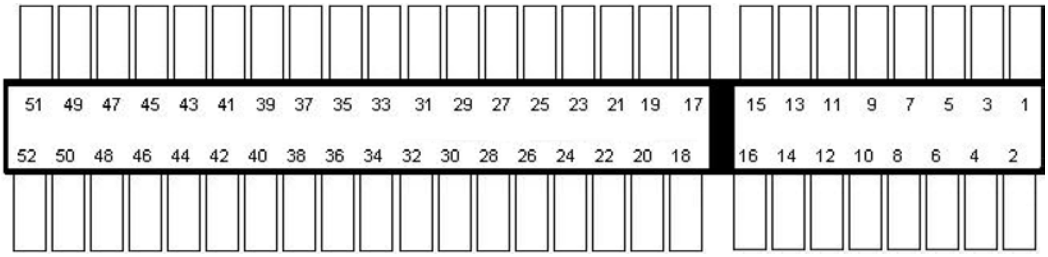


Front panel antenna openings



COM port panel antenna openings

mini-PCIe Pin Definition

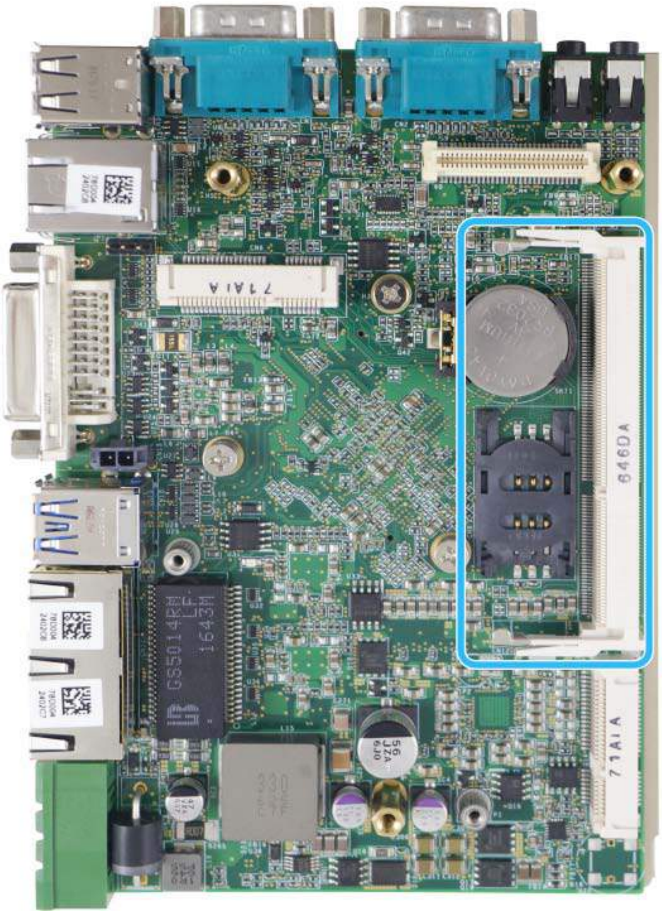


Pin #	Signal	Pin #	Signal
1	WAKE#	2	+3.3Vaux
3	COEX1	4	GND
5	COEX2	6	+1.5V
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RESET
15	GND	16	UIM_VPP
Mechanical Key			
17	Reserved* (UIM_C8)	18	GND
19	Reserved* (UIM_C4)	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3Vaux
25	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	LED_WWAN#
43	GND	44	LED_WLAN#
45	Reserved	46	LED_WPAN#
47	Reserved	48	+1.5V
49	Reserved	50	GND
51	Reserved	52	+3.3Vaux

⚠ **WARNING**

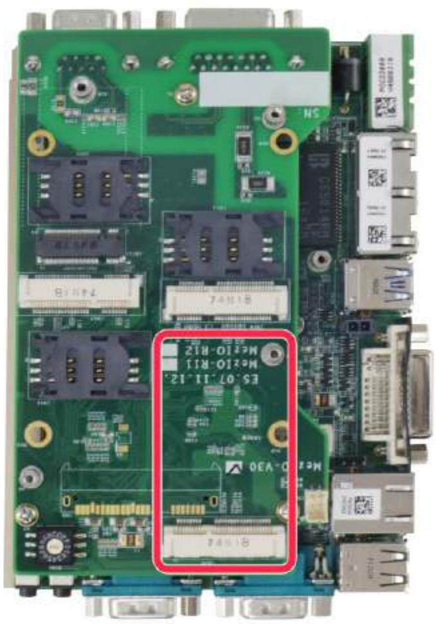
Some off-the-shelf mini-PCIe 4G modules use 1.8V I/O signals instead of 3.3V I/O and may cause signal interference. Installing an incompatible 4G module may damage the system or the module itself may be damaged. Please consult with Neousys when in doubt!

2.5.3 DDR3L SO-DIMM Socket

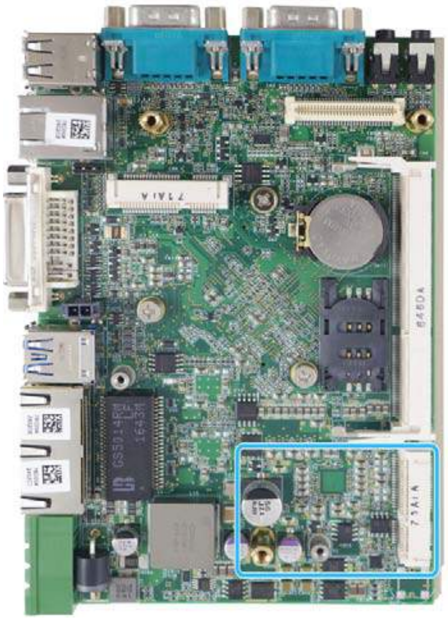


The system has an internal SO-DIMM slot supporting DDR3L-1866 memory module up to 8GB in capacity. The L in DDR3”L”-1866 denotes Low Voltage (1.35V) type SO-DIMM memory modules.

2.5.4 Full and Half-size mSATA Socket



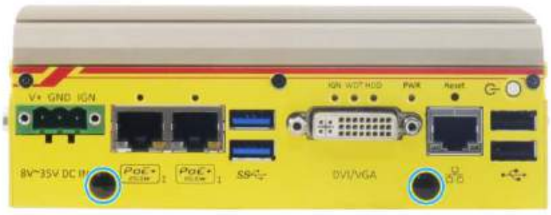
Full size mSATA on MezIO^{TM} board



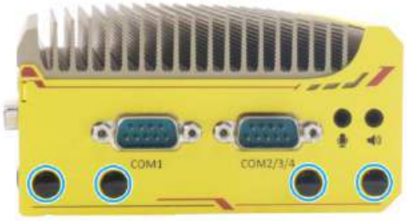
Half size mSATA on mainboard

The system features one half-size and one full-size mSATA socket. You can install a mSATA SSD for operating system installation. The mSATA SSD has all the advantages of solid state disk technology such as lower power consumption and is higher shock/ vibration resistant over traditional hard disk drives.

For wireless (WIFI/ 3G/ 4G) communication, there are SMA antenna openings on system side panels.

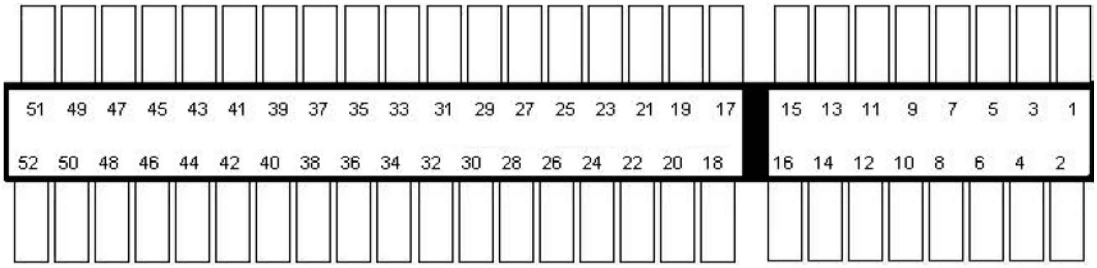


Front panel antenna openings



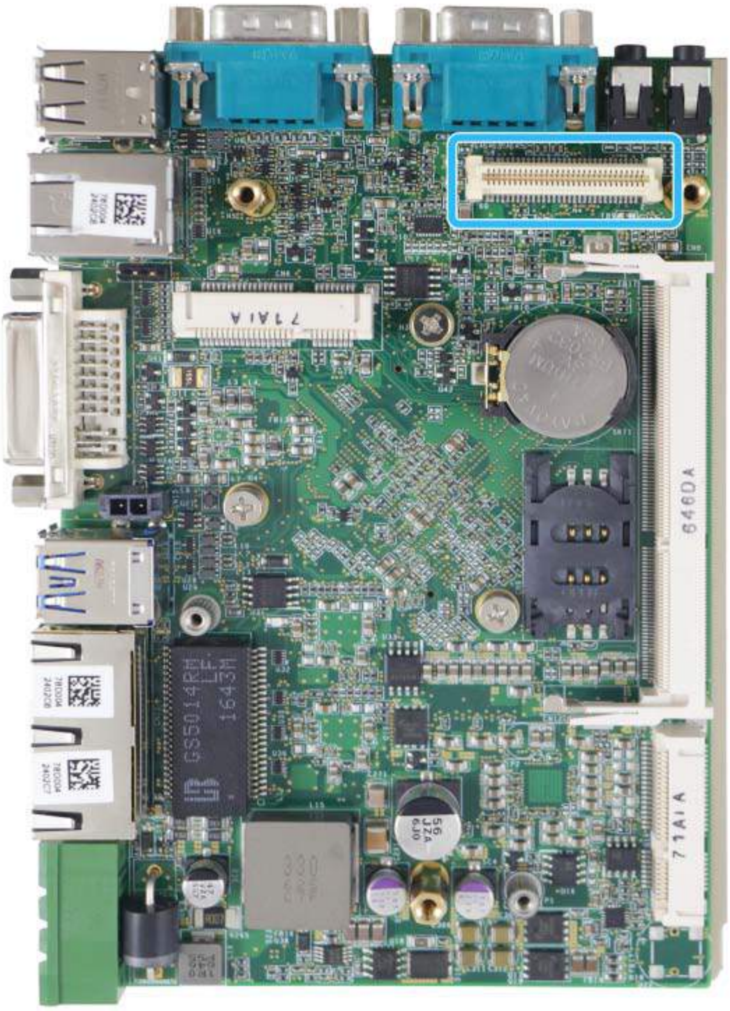
COM port panel antenna openings

Half-Size mSATA Socket Pin Definition



Pin #	Signal	Pin #	Signal
1	-	2	+3.3Vaux
3	-	4	GND
5	-	6	+1.5V
7	-	8	-
9	GND	10	-
11	-	12	-
13	-	14	-
15	GND	16	-
Mechanical Key			
17	-	18	GND
19	-	20	-
21	GND	22	-
23	SATA Rxp	24	+3.3Vaux
25	SATA Rxn	26	GND
27	GND	28	+1.5V
29	GND	30	SMB CLK
31	SATA Txn	32	SMB DATA
33	SATA Txp	34	GND
35	GND	36	-
37	GND	38	-
39	+3.3Vaux	40	GND
41	+3.3Vaux	42	-
43	-	44	-
45	-	46	-
47	-	48	+1.5V
49	-	50	GND
51	-	52	+3.3Vaux

2.6 MezIO^{TM} Interface

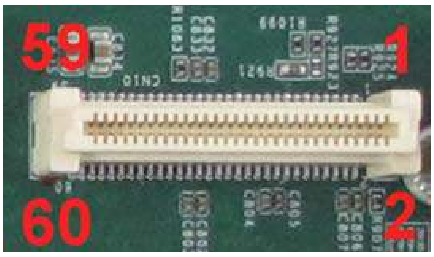


MezIO^{TM} is an innovative interface designed for integrating application-oriented I/O functions into an embedded system. It offers computer signals, power rails and control signals via a high-speed connector. MezIO^{TM} is also mechanically reliable benefited from its 3-point mounted mezzanine structure.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

POC-351VTC incorporates MezIO^{TM} interface and universal mechanical design to accommodate Neousys' standard MezIO^{TM} modules. For customers who want to develop their own MezIO^{TM} module, Neousys provides MezIO^{TM} design documents on a NDA basis. Please contact Neousys for further information.

2.6.1 MezIO^{TM} Interface Pin Definition

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



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

3 System Installation

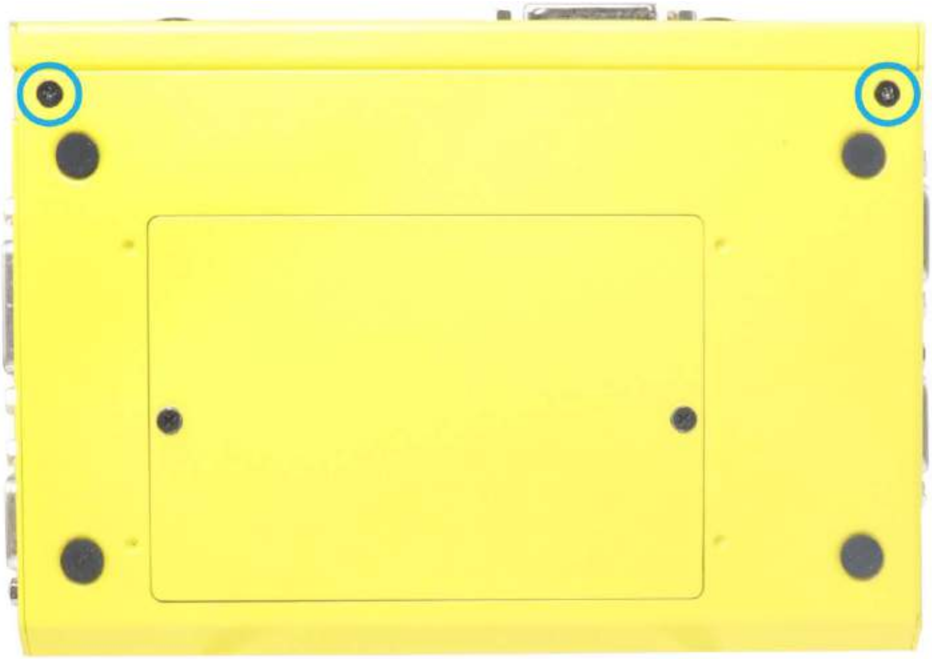
Before disassembling the system enclosure and installing components and modules, please make sure you have done the following:

- It is recommended that only qualified service personnel should install and service this product to avoid injury or damage to the system.
- Please observe all ESD procedures at all times to avoid damaging the equipment.
- Before disassembling your system, please make sure you have the module/ component you wish to install at hand and have all the necessary tools.
- 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.

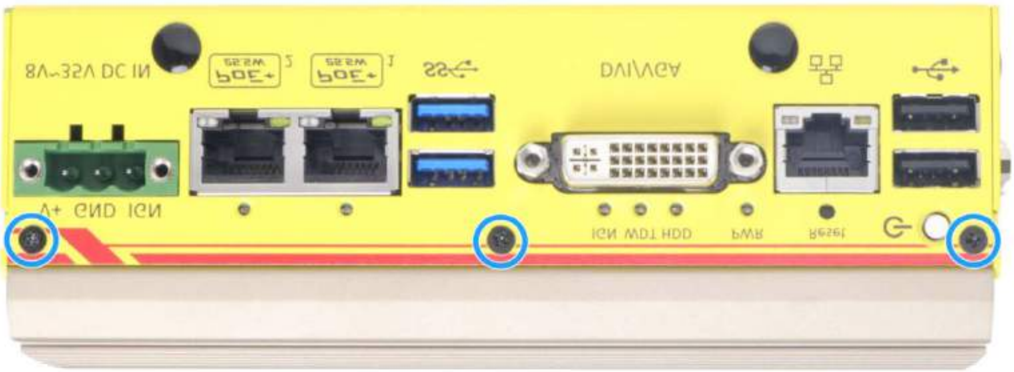
3.1 Disassembling the System Enclosure

To install internal components such as M.2 module, DDR3L memory, mSATA and/ or MezIO^{TM} module, you need to disassemble the system enclosure. Please refer to the following procedures:

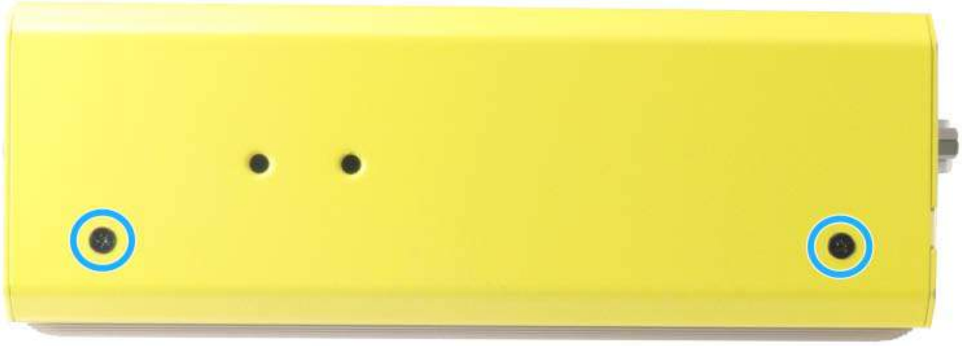
1. To disassemble the system, turn the system upside-down, unfasten the two (2) screws indicated.



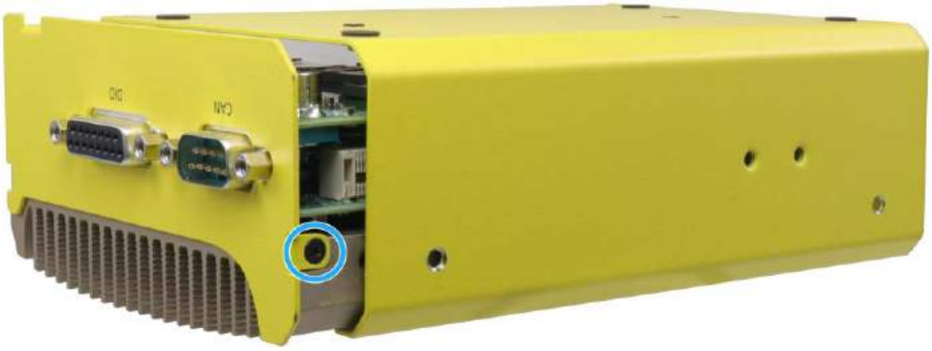
2. Remove the three (3) screws indicated and remove the front panel.



3. Remove the two (2) screws at the rear.



4. G ently slide out the L-shaped panel and remove the screw that holds the DIO/ CAN port panel. Remove the DIO/ CAN port panel.

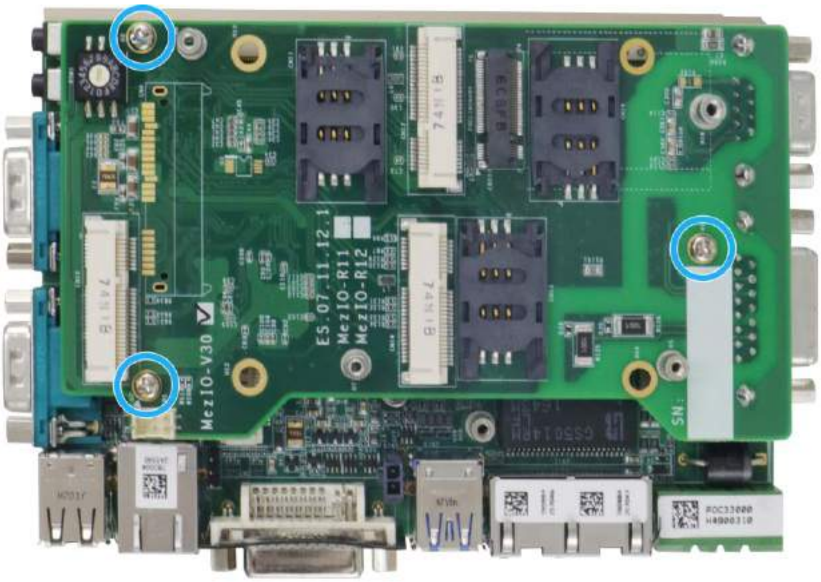


3.2 Installing Internal Components

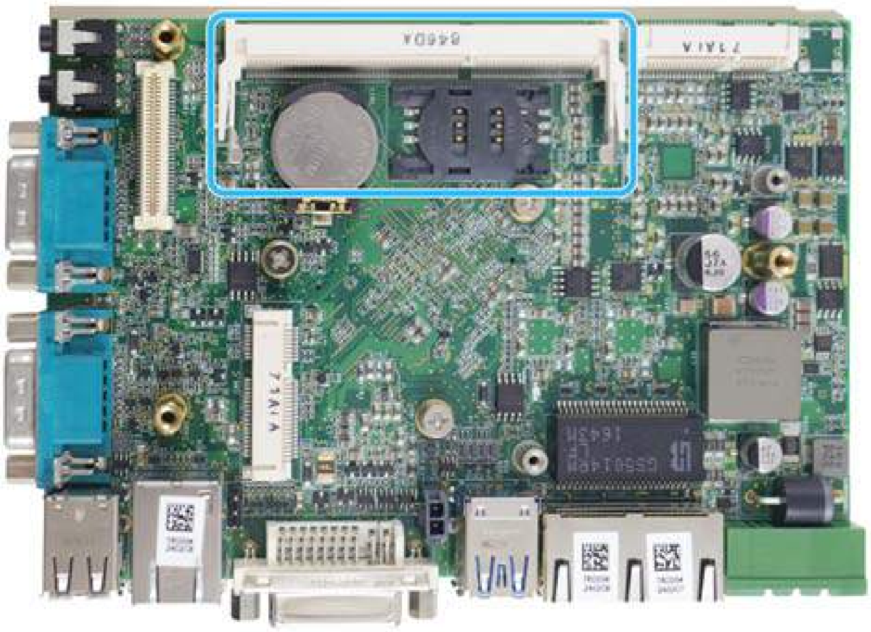
3.2.1 DDR3L SO-DIMM Installation

There is one SO-DIMM memory slot on POC-351VTC motherboard. Please follow the procedures below to install the memory module.

1. Disassemble the system enclosure
2. To access the memory module slot on the mainboard, please remove the three screws shown below. Carefully disengage the MezIO^{TM} connector by lifting the MezIO^{TM} mainboard.



3. The SO-DIMM slot can be located once the enclosure has been removed.



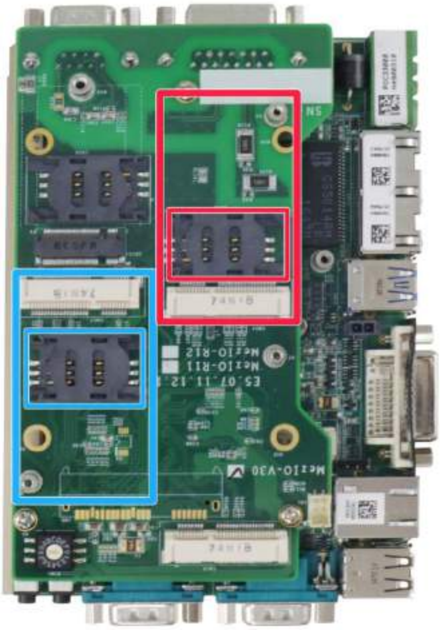
4. **To install**, insert the gold finger end of the SO-DIMM on a 45 degree angle into the slot and gently push the SO-DIMM down until it clips-in.

3.2.2 mini-PCIe Module, SIM Card and Antenna Installation

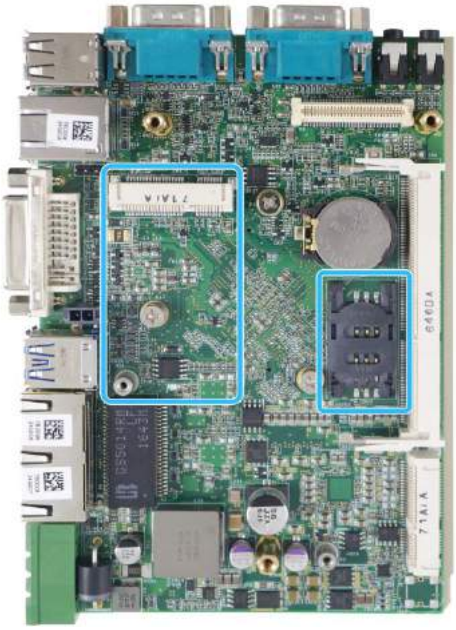
There are mini-PCIe with SIM slots on MezIO^{TM} module and the mainboard. Please follow the procedures below to install the mini-PCIe module and SIM card, as well as the antenna for wireless communication.

1. Disassemble the system enclosure.

2. The mini-PCIe and USIM slots are shown in the illustration below.

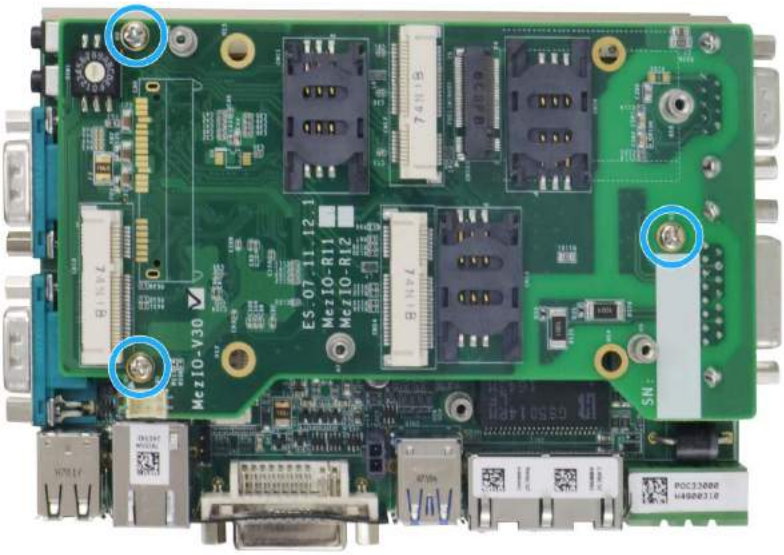


mini-PCIe/ SIM slot on MezIO^{TM} module

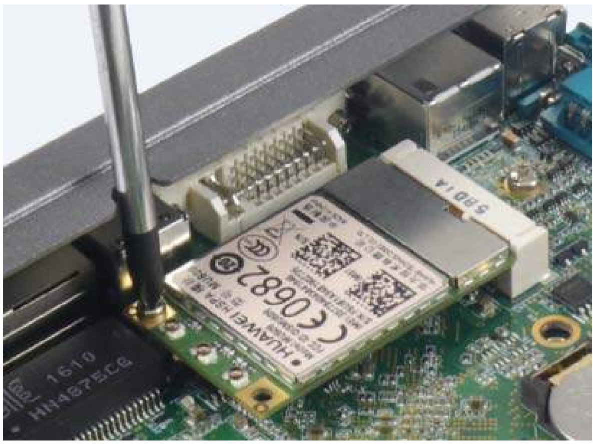


mini-PCIe/ SIM slot on the mainboard

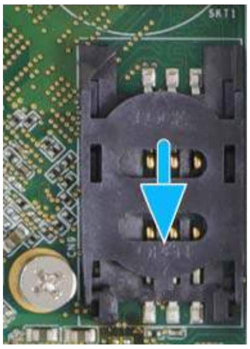
3. To access the mini-PCIe slot on the mainboard, remove the three screws shown below. Carefully disengage the MezIO^{TM} connector by lifting the module..



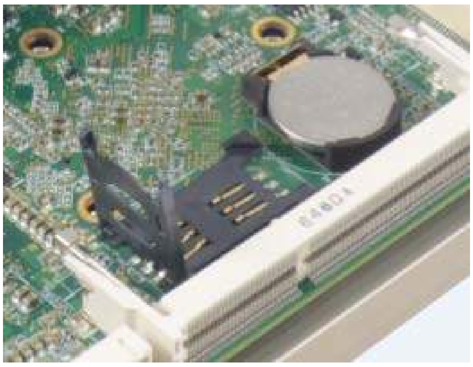
4. **To install**, insert mini-PCIe module's gold finger on a 45 degree angle into the socket, gently press the module down and secure it with a screw.



5. The SIM card slot utilizes a slide-and-clamp mechanism. To open the slot, slide the top section away from the battery and flip open the slot.

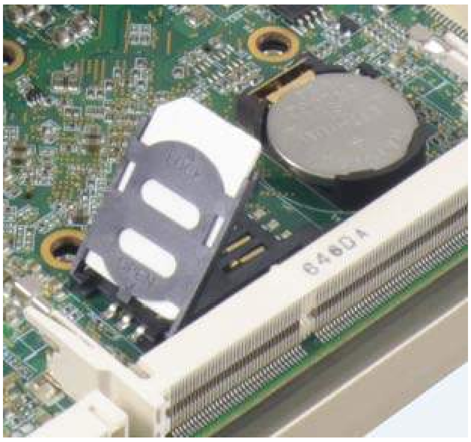


Push away from the battery

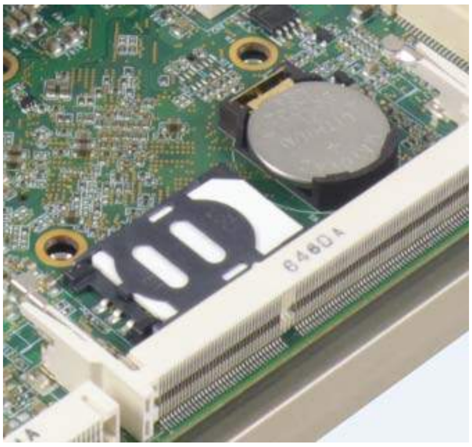


Flip open the slot

6. Insert the SIM card into the flipped open section, close, gently press and slide the top section towards the battery to secure the SIM card in place.

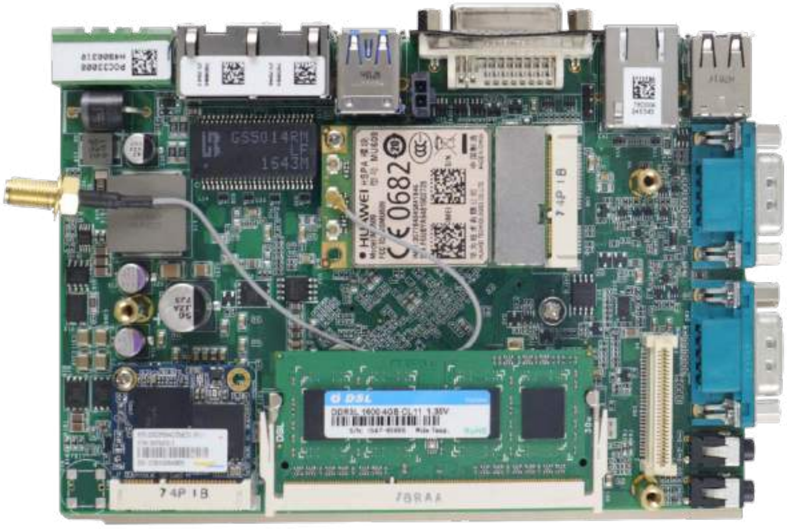


Insert the SIM card

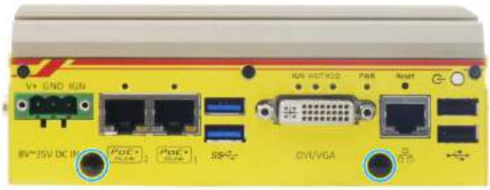


Secure the SIM card

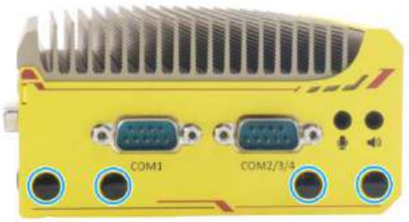
7. Clip-on mini-PCIe module’s antenna (please refer to the module’s user manual on antenna cable connection).



8. Remove one of the antenna covers from the enclosure.

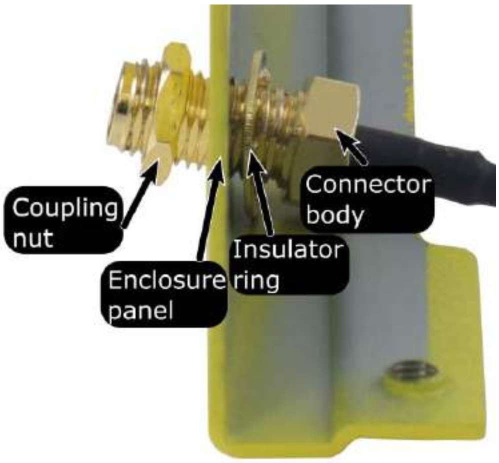


Front panel antenna openings



COM port panel antenna openings

9. Secure the SMA antenna connector, reinstall the enclosure and attach the external SMA antenna.



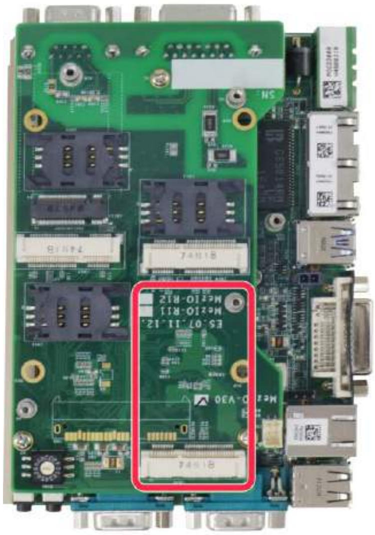
Securing antenna connection

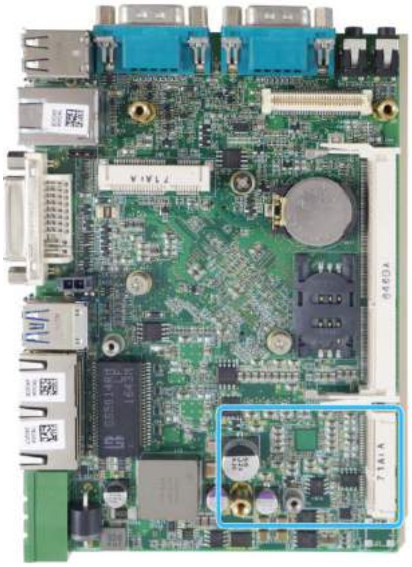
Attach external antenna

3.2.3 mSATA Module Installation

There is a full-size mSATA slot and a half-size mSATA slot on POC-351VTC motherboard. Please follow the procedures below to install mSATA modules.

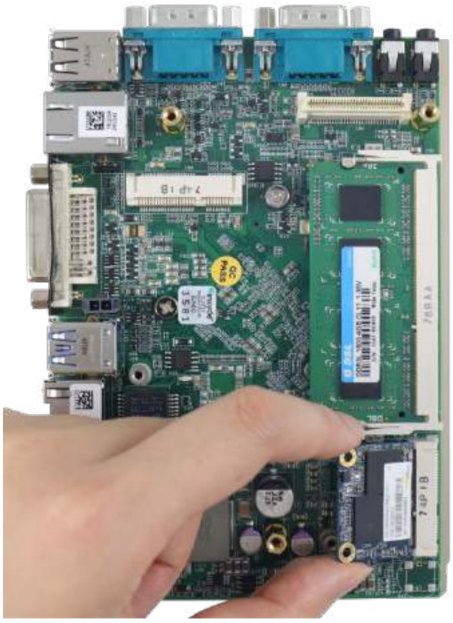
1. Disassemble the system enclosure.
2. There is a half-size mSATA (indicated in blue) and a full-size mSATA slot (indicated in red), shown in the illustration below.



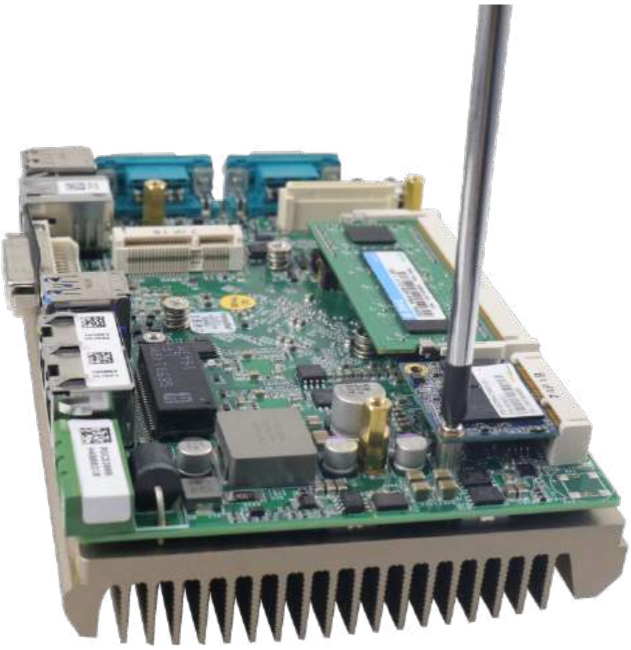


Full size mSATA on MezIO^{TM} board **Half size mSATA on mainboard**

3. Apart from their size difference, the installation method for the half-size and full-size mSATA modules are the same. To install, insert the mSATA card on a 45 degree angle.



4. Gently press the card down and secure with a screw.

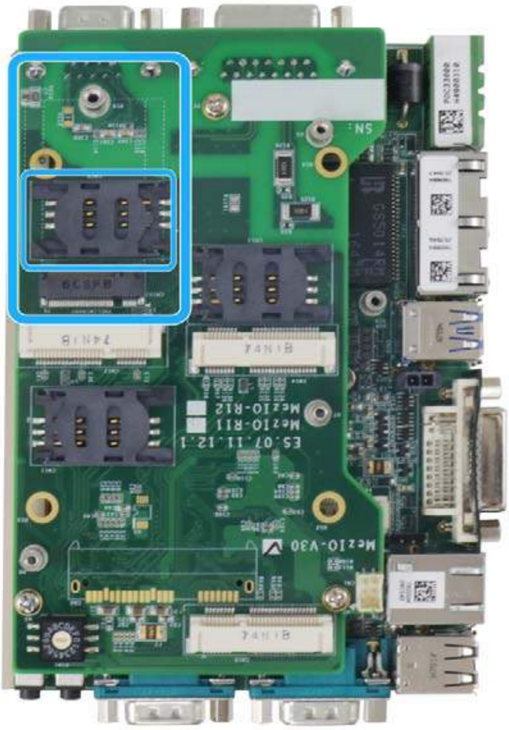


5. Reinstall the system enclosure.

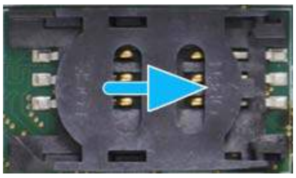
3.2.4 M.2 (2242/ 3042) Module Installation

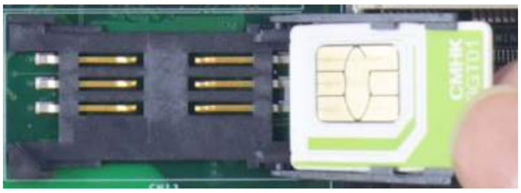
There is one M.2 (2242/ 3042) slot and corresponding SIM slot on MezIO^{TM} module. Please follow the procedures below to install the SIM card and M.2 module

1. Disassemble the system enclosure.
2. An M.2 slot and SIM slot can be located on the MezIO^{TM} module once the system enclosure has been removed.



3. To insert a SIM card, push and flip the slide-and-clamp slot towards the center of the MezIO^{TM} module.

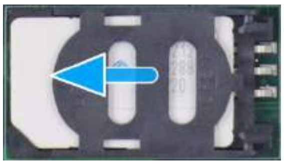




Push towards the middle of the MezIO^{TM} module to release the slot

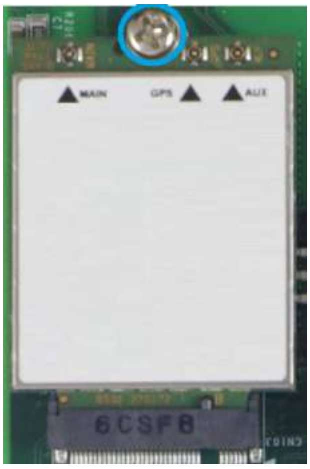
Flip towards the middle of the MezIO^{TM} module to open the slot and insert the SIM card

4. Close and secure the slide-and-clamp SIM card slot.

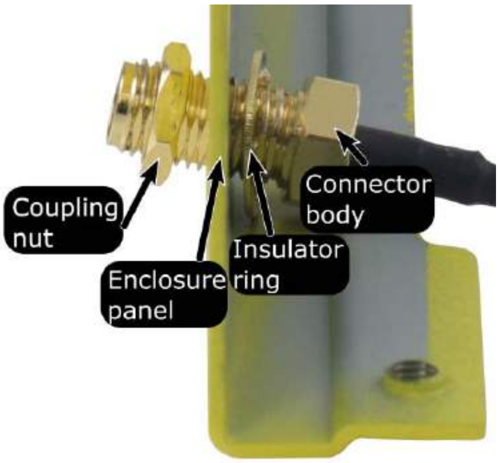


Close and push towards the outside of the MezIO™ module to secure the SIM card

5. Insert the M.2 card on a 45 degree angle and secure it with a screw to complete the M.2 and SIM card installation



6. Secure the SMA antenna connector, reinstall the enclosure and attach the external SMA antenna.



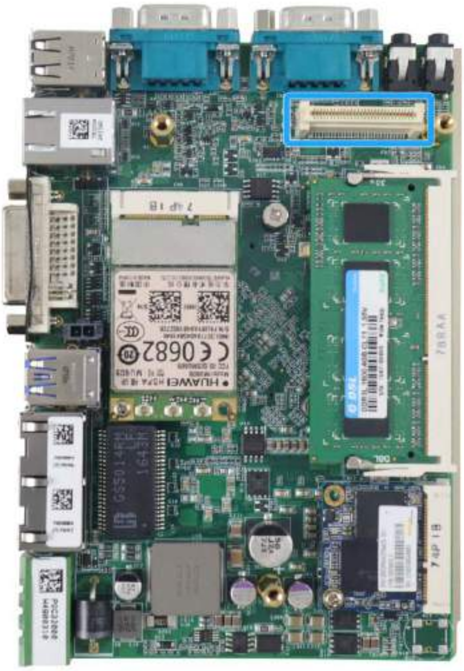
Securing antenna connection

Attach external antenna

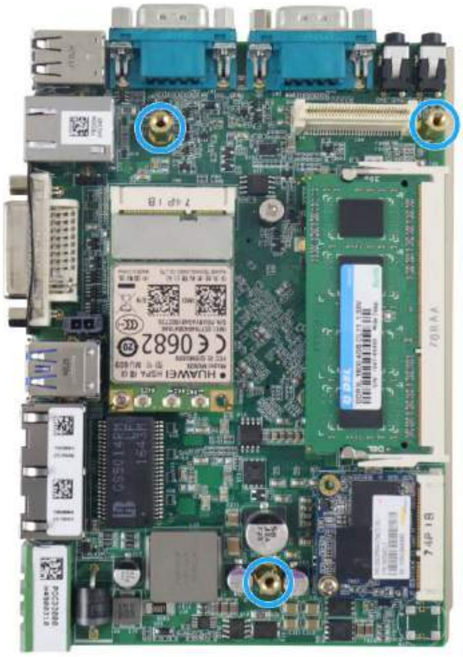
3.2.5 MezIO^{TM} Module Installation

Once you have installed the memory module, half-size mSATA module, mini-PCIe and SIM cards, you may reinstall the MezIO^{TM} module. Please refer to the following procedure.

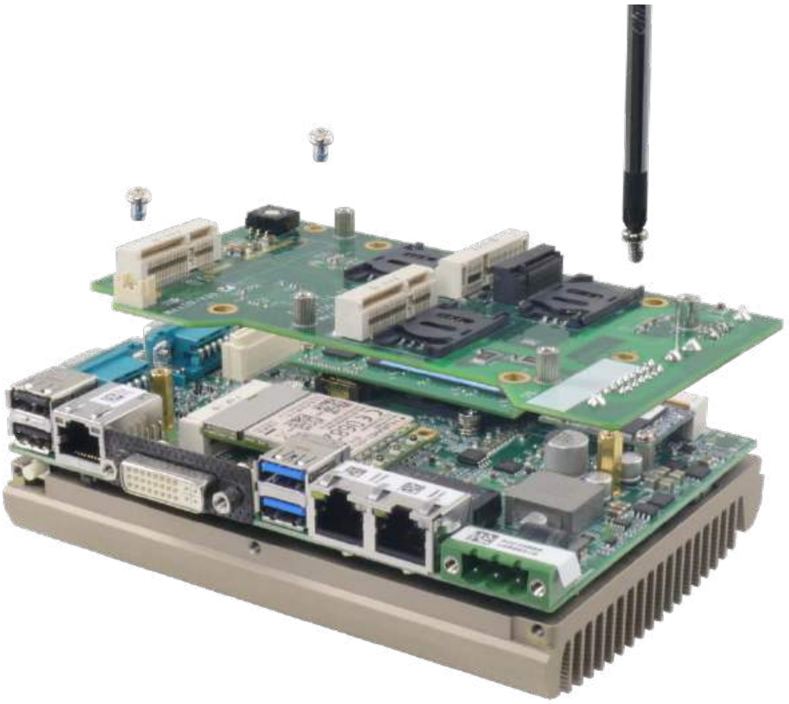
1. The MezIO^{TM} module connector can be located on the mainboard.



2. The stand-off hex bolts can be located on the mainboard. Place the MezIO^{TM} module on top of the mainboard, match the three hex bolts and the MezIO^{TM} connector should meet.



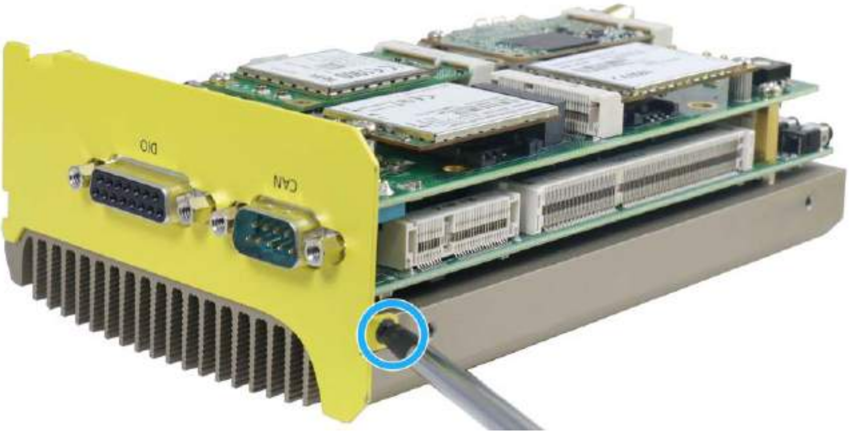
3. Gently lower the module onto the mainboard. The MezIO^{TM} port should engage if the three (3) standoffs and screw holes meet. Then secure the MezIO^{TM} module to the hex bolts with three (3) P-head screws.



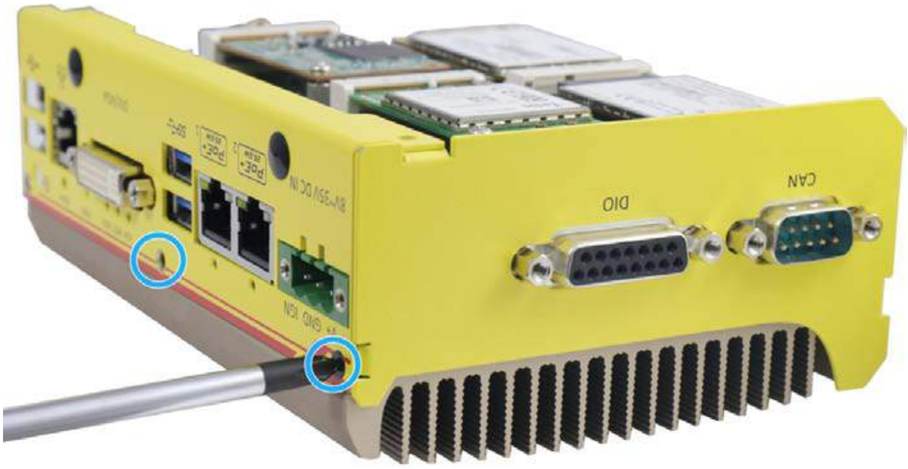
4. Reinstall the system enclosure when done.

3.3 Installing the System Enclosure

1. To reinstall the system enclosure, install the DIO/ CAN bus port panel and secure with a screw on the CAN bus port side.

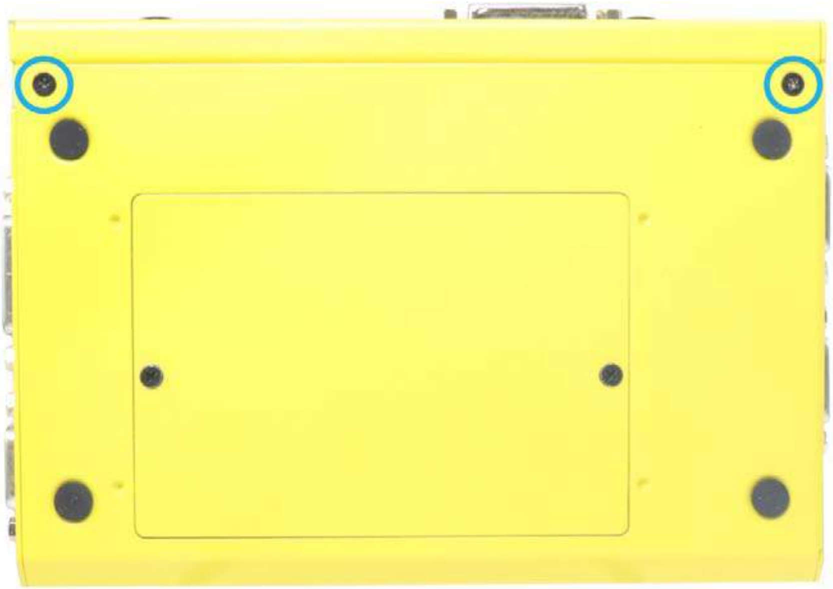


2. Install the front panel and secure it with two (2) screws indicated in the illustration below.

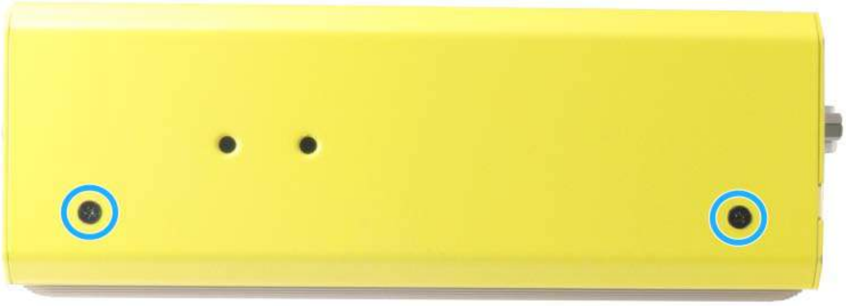


3. Gently slide the L-shaped enclosure panel back into place.

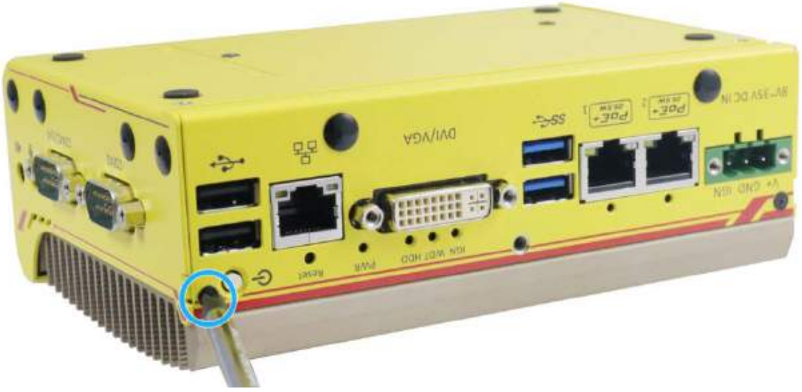
4. Secure the L-shaped enclosure with five (5) screws indicated in the illustration below.



Bottom enclosure panel



Rear enclosure panel



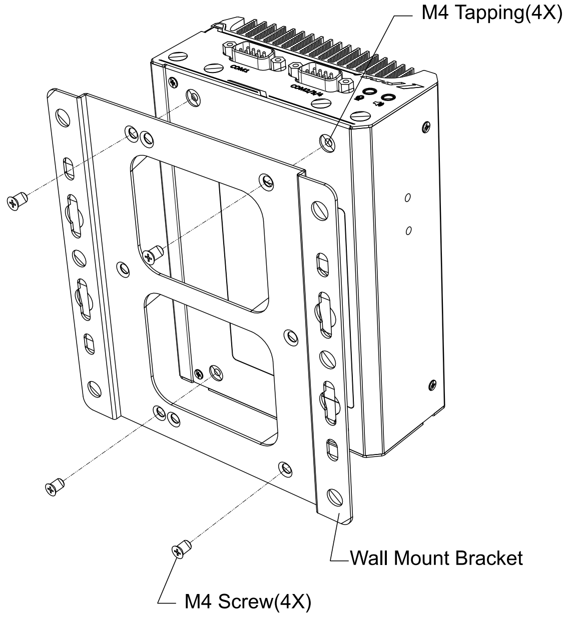
Screw next to the power button on the front panel

3.4 Wall Mount/ DIN Rail Installation

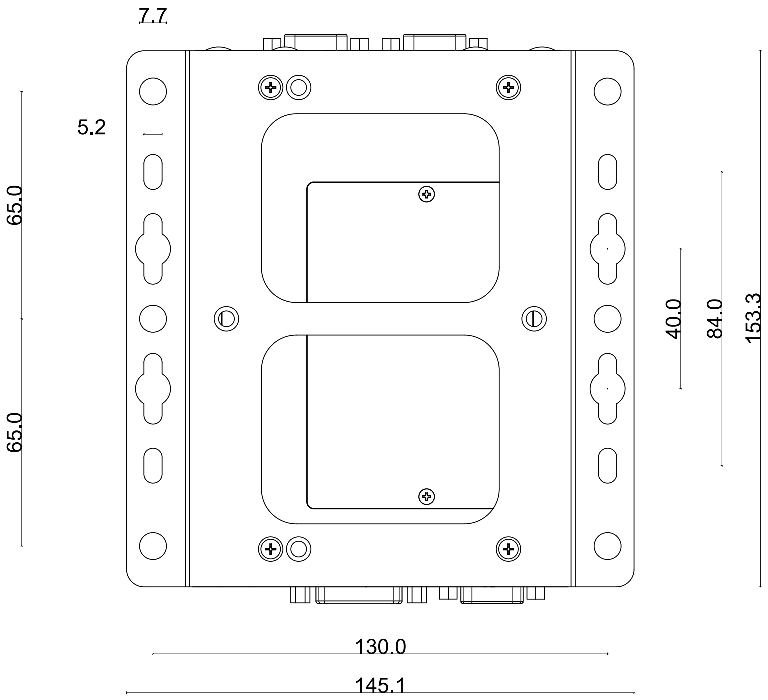
The system comes with a wall mount bracket (in the accessory box) that allows the system to be mounted horizontally. As an option, DIN rail mount bracket that allows the system to be mounted vertically can be purchased.

3.4.1 Horizontal Wall Mount

1. To install, secure the wall mount bracket to the bottom of the system enclosure using the M4 screws provided.

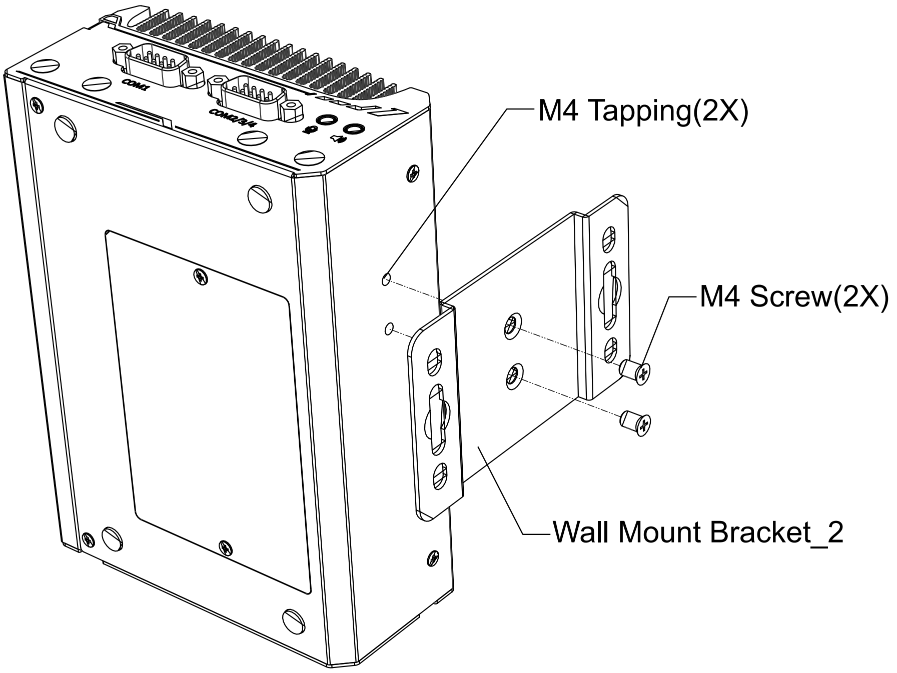


2. Dimension illustration of the install wall horizontal mount bracket for you reference.

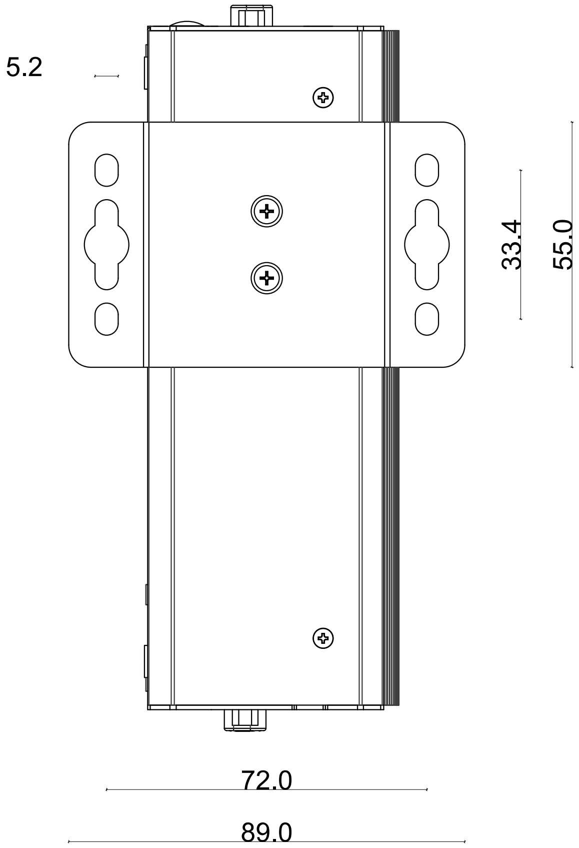


3.4.2 Vertical Wall Mount Bracket (Optional)

1. To install, secure the wall mount bracket to the rear side panel of the system enclosure using the M4 screws provided.

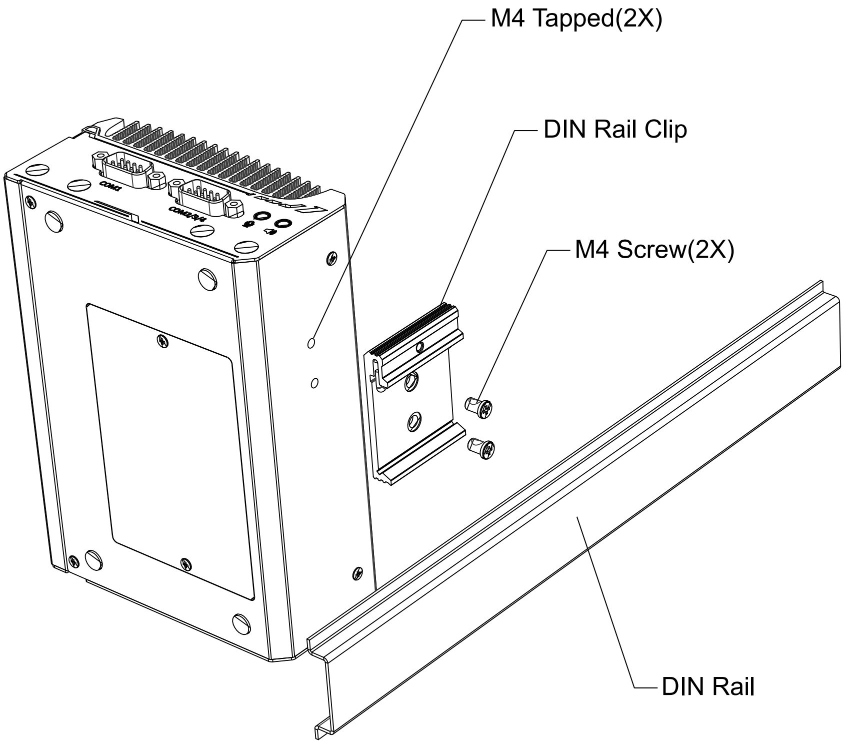


2. Dimension illustration of the install vertical wall mount bracket for you reference.

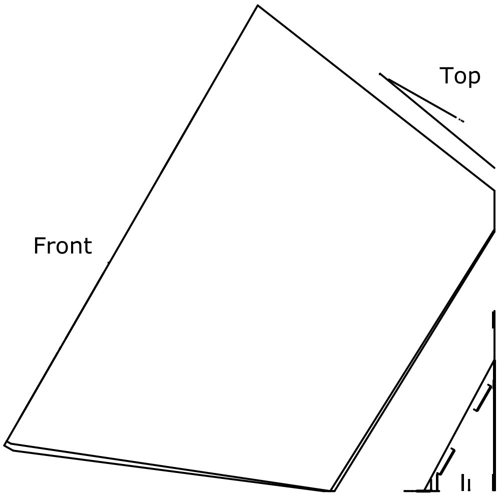


3.4.3 DIN Rail Installation (Optional)

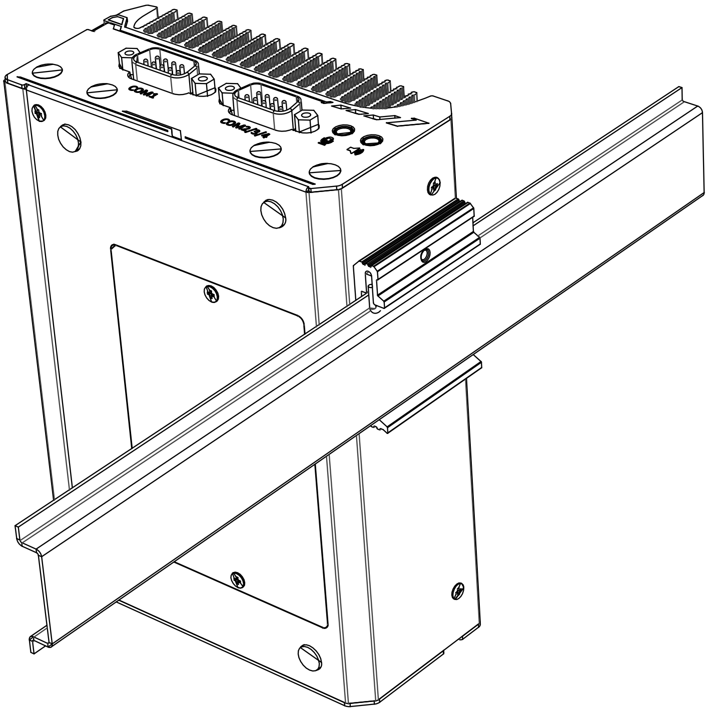
1. To install, secure the DIN rail clip to the rear side panel of the system enclosure using the M4 screws provided.



2. To install the DIN rail clip onto the DIN rail, you must come over the top of the DIN rail, tilting, overlap the top clip edge of the DIN rail clip onto the DIN rail first, and then firmly press the bottom-front of the enclosure to clip the bottom edge of the mount plate.



3. Confirm the mount plate has indeed clipped onto the DIN rail for proper fit to complete the installation.



3.5 Powering On the System

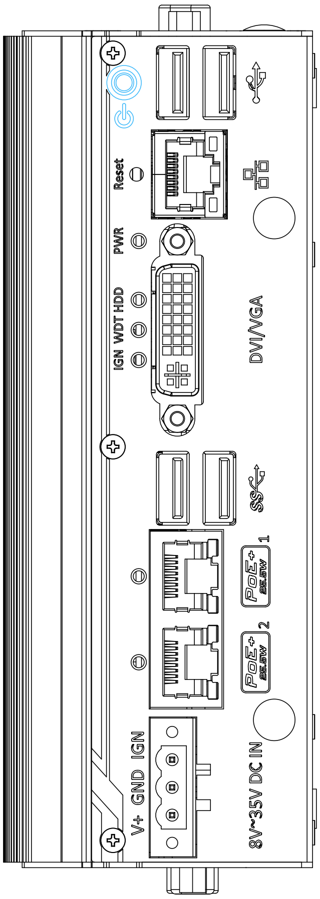
There are five methods to power on the system

- Pressing the power button
- Via an external non-latched switch
- Via an external latched switch
- Sending a LAN packet via Ethernet (Wake-on-LAN)
- Using the ignition signal input

We will describe the processes and actions involved for the first four methods in this section and the ignition signal input method, please refer to Ignition Power Control.

3.5.1 Powering On Using the Power Button

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

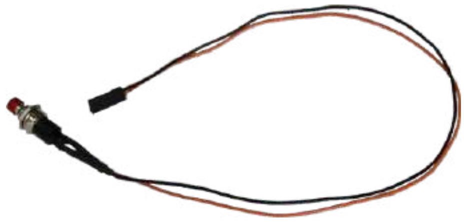


3.5.2 Powering On Using An External Non-Latched Switch

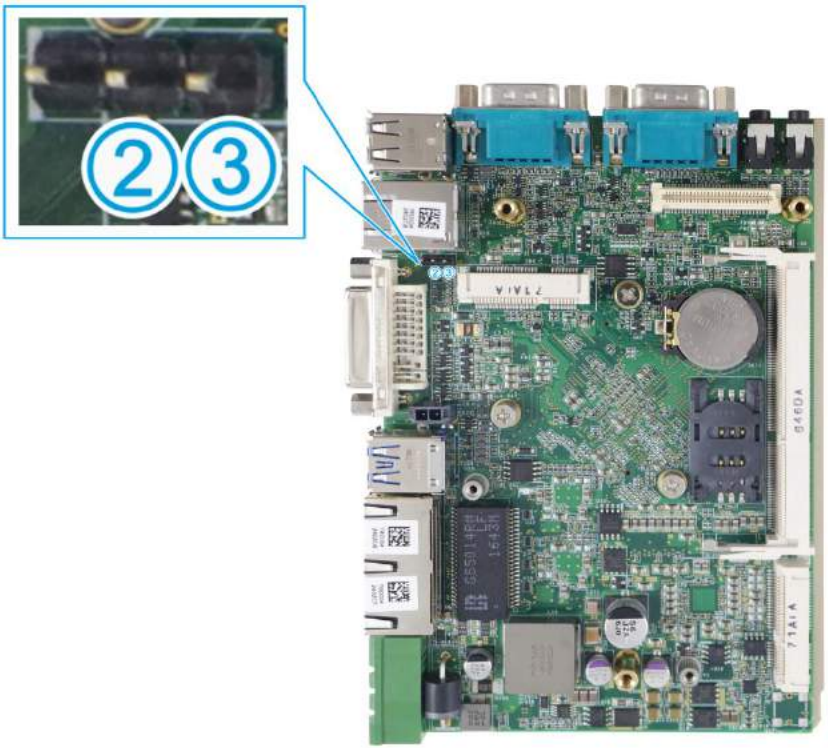
For an application which places the system inside a cabinet, it's useful to control powering on/off the system using an external switch. The system provides an on-board connector for connecting a latched/ non-latched switch and behaving either AT-mode or ATX-mode power on/off control.

When using the ATX-mode on/ off control, you need a non-latch switch. The external non-latched switch acts exactly the same as the power button on the front panel Please follow the steps below to install an external non-latch switch.

1. Prepare a non-latched switch with a 2-pin, 2.0mm pitch connector



2. Connect the non-latched switch to the **pin#2** and **pin#3** of the on-board 1x3 pins, 2.0mm pitch pin header (polarity is negligible). Press the button on the switch to turn on the system.

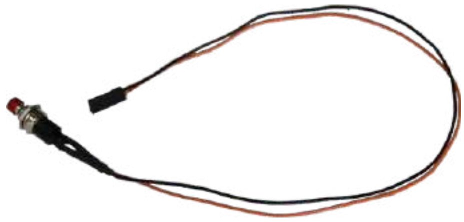


3.5.3 Powering On Using An External Latched Switch

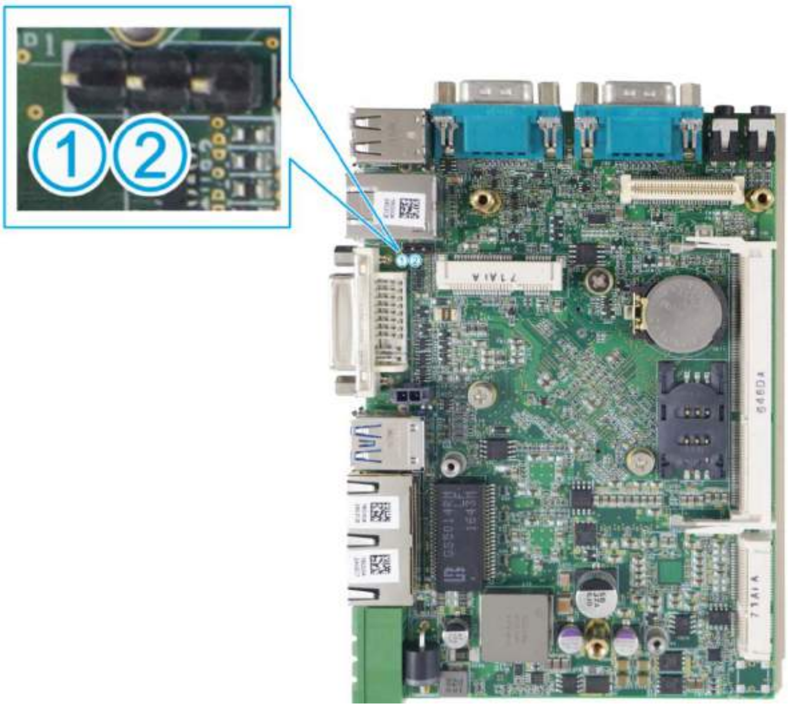
For an application which places the system inside a cabinet, it's useful to control powering on/off the system using an external switch. The system provides an on-board connector for connecting a latched/ non-latched switch and behaving either AT-mode or ATX-mode power on/off control.

When using the AT-mode on/off control, you need a latched switch. The external latched switch controls the of DC power feed status. When the switch is closed, the DC power supply is in break-off status. When it's opened, the DC power supply is in feed-in status. Please follow the steps below to install an external latch switch.

1. Prepare a latched switch with a 2-pin, 2.0mm pitch connector.



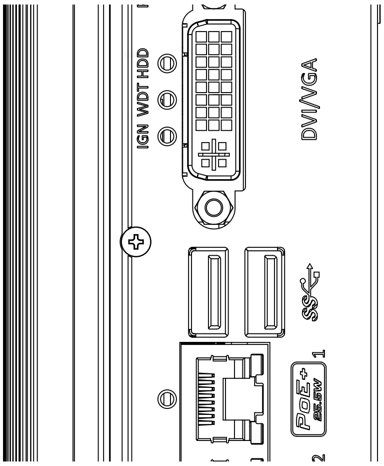
2. Connect the latched switch to the **pin#1** and **pin#2** of the on-board 1x3 pins, 2.0mm pitch pin header (polarity is negligible).



3. When the latched switch is closed, the DC power is in break-off status and system is turned off. When the latched switch is opened, the DC power is in feed-in status and with the correct setting of "Power On after Power Failure" BIOS option, the system is turned on.

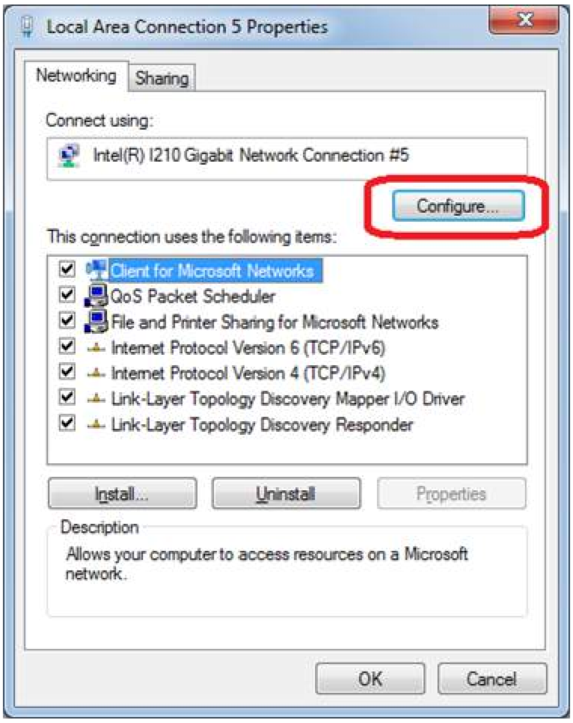
3.5.4 Powering On Using Wake-on-LAN

Wake-on-LAN (WOL) is a mechanism to wake up a computer system from a S3 (standby), S4 (Hibernate) or S5 (system off with standby power) state via issuing Subnet Directed Broadcasts (SDB) or a magic packet. The system implements the Wake-on-LAN function for the GbE port #3 shown below.



To enable WOL function and power on your system, please follow the steps below.

1. Press F2 when the system boots up to enter BIOS.
2. Enter the **[Power]** menu. And configure the **[Wake On LAN]** option as **[Enabled]**. Please refer to the Wake-on-LAN section.
3. In Windows systems, identify the Local Area Connection of the corresponding Gigabit Controller and click the **Configure** button.



Local Area Connection 5 Properties

Connect using:

Intel(R) I210 Gigabit Network Connection #5

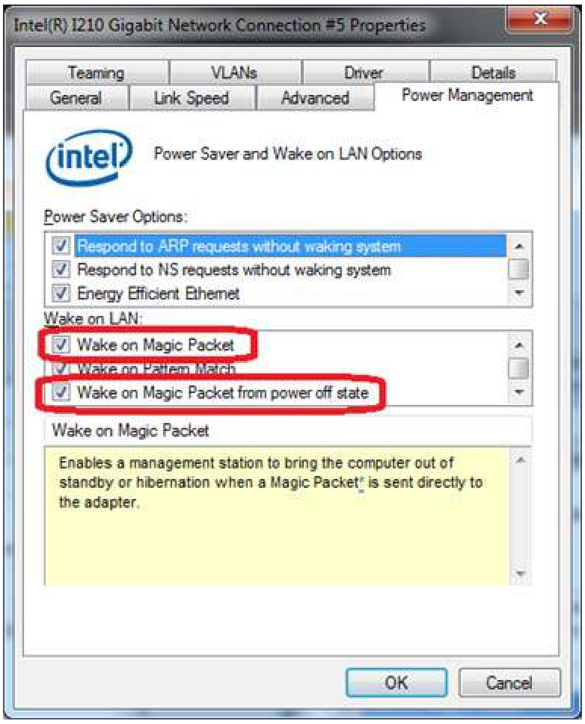
This connection uses the following items:

- ☑ Client for Microsoft Networks
- ☑ QoS Packet Scheduler
- ☑ File and Printer Sharing for Microsoft Networks
- ☑ Internet Protocol Version 6 (TCP/IPv6)
- ☑ Internet Protocol Version 4 (TCP/IPv4)
- ☑ Link-Layer Topology Discovery Mapper I/O Driver
- ☑ Link-Layer Topology Discovery Responder

Description

Allows your computer to access resources on a Microsoft network.

4. Click the **Power Management** tag, and check the following two options accordingly



Intel(R) I210 Gigabit Network Connection #5 Properties

Power Saver and Wake on LAN Options

Power Saver Options:

- ☑ Respond to ARP requests without waking system
- ☑ Respond to NS requests without waking system
- ☑ Energy Efficient Ethernet

Wake on LAN:

- ☑ Wake on Magic Packet
- ☑ Wake on Pattern Match
- ☑ Wake on Magic Packet from power off state

Wake on Magic Packet

Enables a management station to bring the computer out of standby or hibernation when a Magic Packet* is sent directly to the adapter.

- **Wake on Magic Packet**

The system can wake from S3 or S4 state when receiving a 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

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.

http://en.wikipedia.org/wiki/Wake-on-LAN

- **Wake on Magic Packet from power off state**

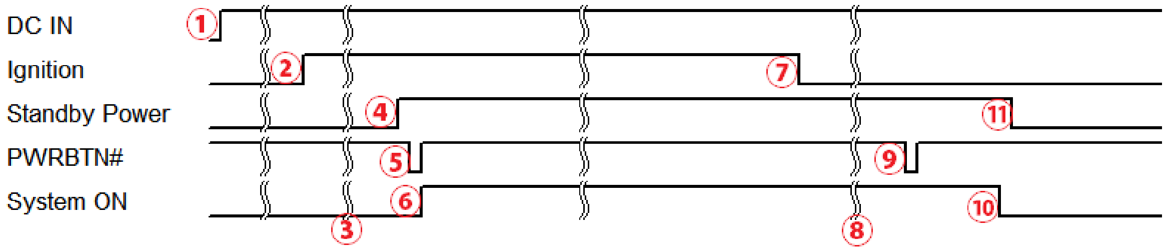
When checking this option, the system can wake from S5 (system off with standby power) state when receiving a magic packet.

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.

- **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.

- **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.

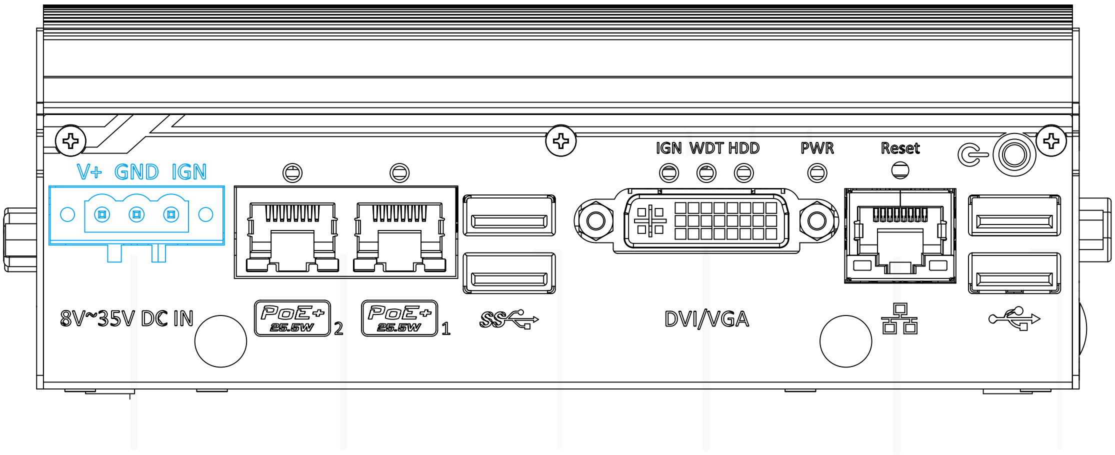
- **System hard-off**

  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.

- **Smart off-delay**

  The ignition power control module offers two modes (mode 6 & mode 7) 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). For in-vehicle ignition control wiring, please do the following:

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.

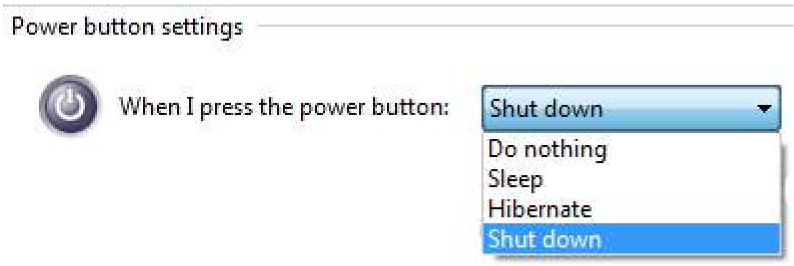
WARNING

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.

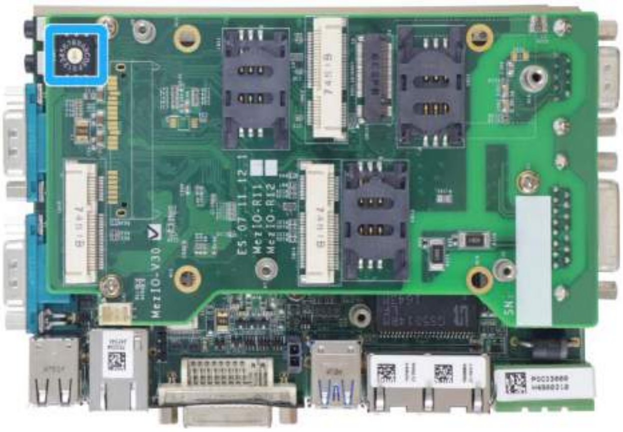


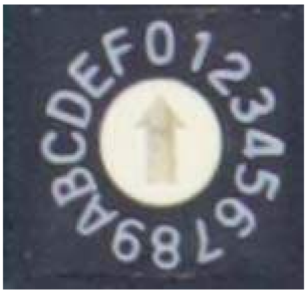
Power button settings

When I press the power button: Shut down

3.6.5 Operation Modes of Ignition Power Control

Y 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 rotary switch can be located on the MezIO^{TM} board and to access it, please refer to the section "Disassembling the System Enclosure".





Ignition rotary switch location on MezIO^{TM} board **Ignition rotary switch**

The ignition control module is also BIOS-configurable. When rotary switch is set to mode 15 (0xF), the ignition power control is set to executed according to parameters configured in BIOS setup menu, which allows richer combination of power-on/ power-off delay and more detailed control parameters.

- **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.

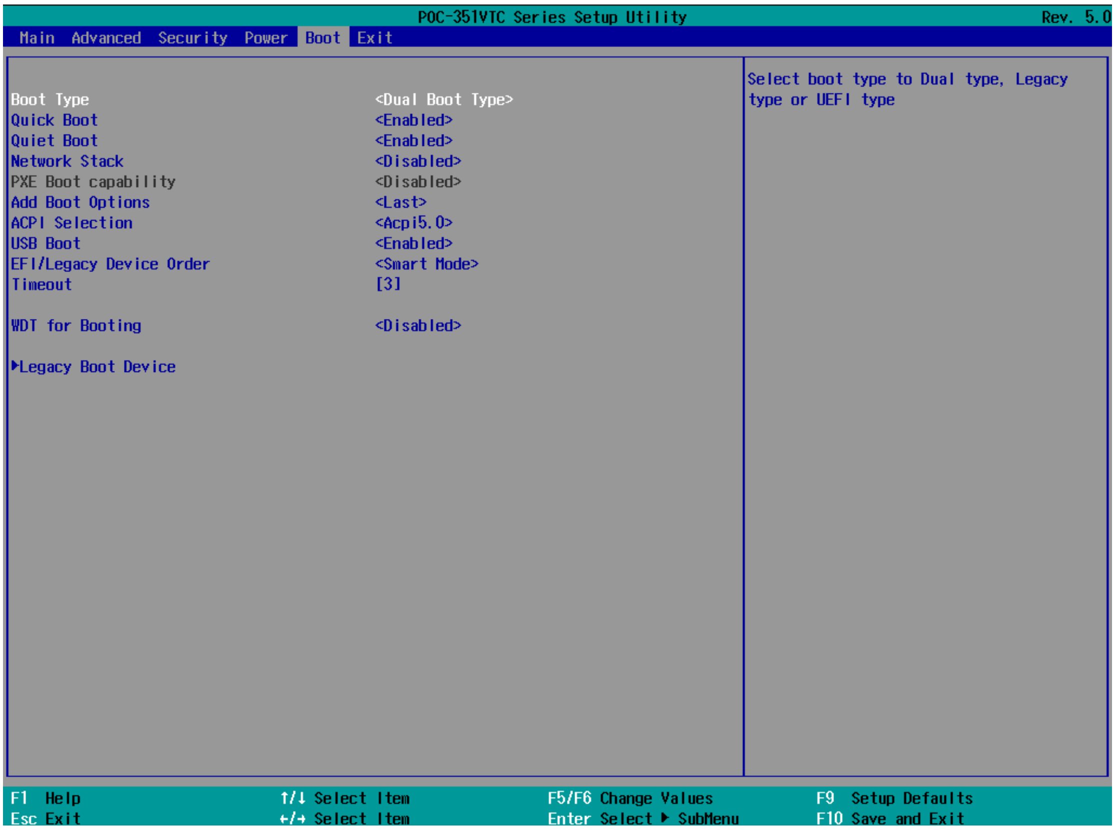
Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
13 (D)	30 seconds	2 hours	10 minutes
14 (E)	3 minutes	2 hours	10 minutes

- **Mode 15 (F)**

Mode 15 is reserved for manufacturer purposes.

4 BIOS Settings

The system is shipped with factory-default BIOS settings optimized for best performance and compatibility. In this section, we'll illustrate some BIOS settings you may need to set or change prior to operating system installation. Please always make sure you understand the effect of change before you proceed with any changes. 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).



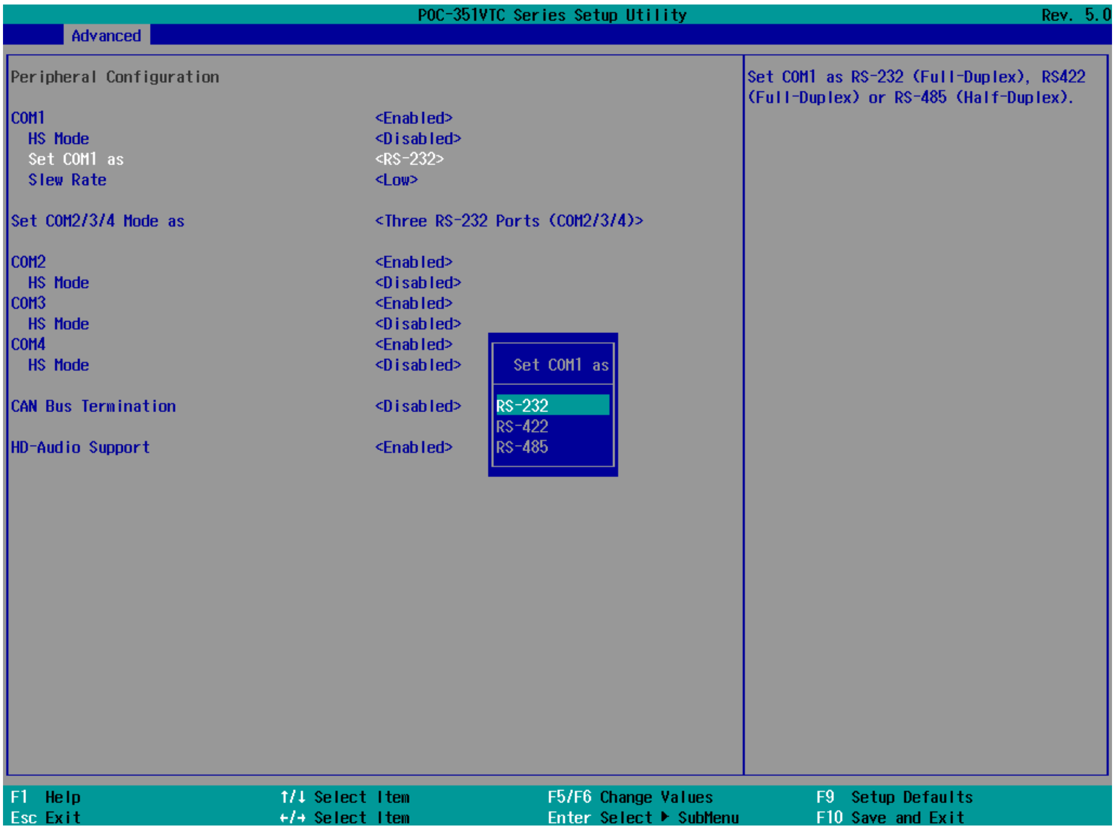
```
                         POC-351VTC Series Setup Utility                          Rev. 5.0
  Main  Advanced  Security  Power  Boot  Exit

                                                                Select boot type to Dual type, Legacy
                                                                type or UEFI type
Boot Type                                <Dual Boot Type>
Quick Boot                               <Enabled>
Quiet Boot                               <Enabled>
Network Stack                            <Disabled>
PXE Boot capability                      <Disabled>
Add Boot Options                         <Last>
ACPI Selection                           <Acpi5.0>
USB Boot                                 <Enabled>
EFI/Legacy Device Order                  <Smart Mode>
Timeout                                  [3]

WDT for Booting                          <Disabled>

▶Legacy Boot Device

F1  Help                ↑/↓ Select Item          F5/F6 Change Values        F9  Setup Defaults
Esc Exit                ←/→ Select Item          Enter Select ▶ SubMenu     F10 Save and Exit
```

4.1 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 COM1 operating mode:

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



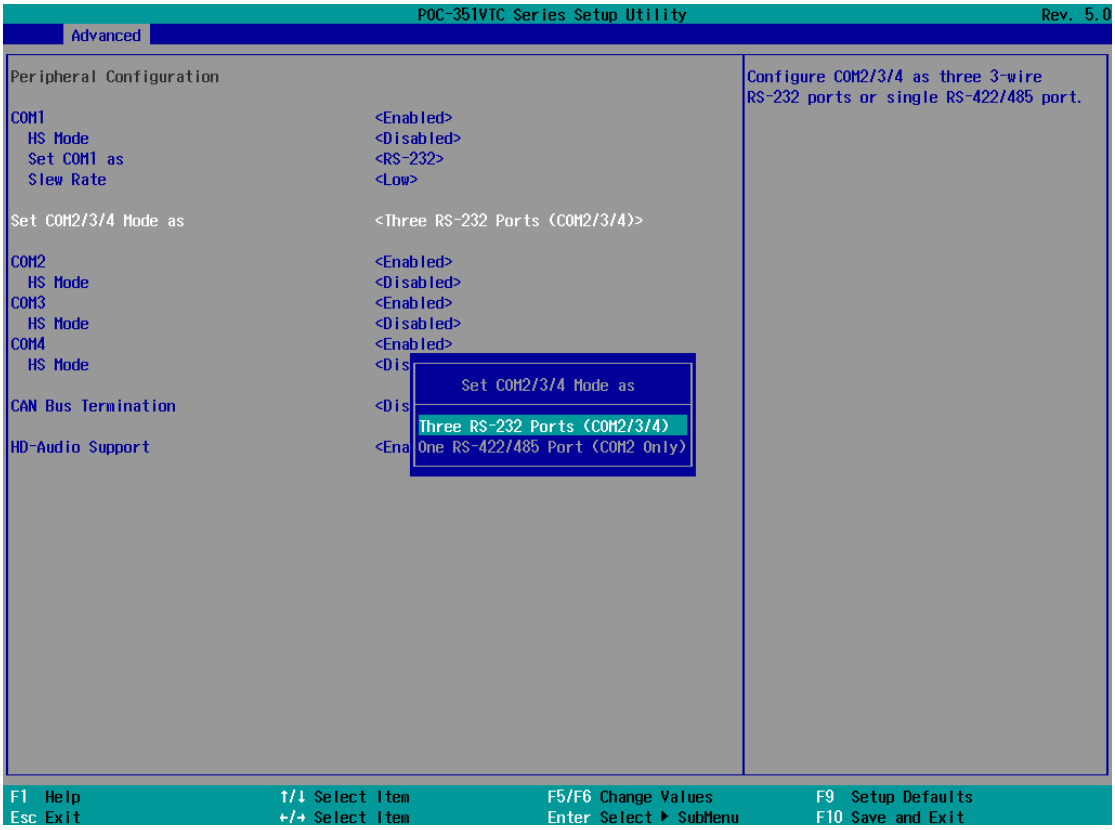
```
                         POC-351VTC Series Setup Utility                        Rev. 5.0
       Advanced

Peripheral Configuration                                       Set COM1 as RS-232 (Full-Duplex), RS422
                                                               (Full-Duplex) or RS-485 (Half-Duplex).
COM1                                    <Enabled>
  HS Mode                               <Disabled>
  Set COM1 as                           <RS-232>
  Slew Rate                             <Low>

Set COM2/3/4 Mode as                    <Three RS-232 Ports (COM2/3/4)>

COM2                                    <Enabled>
  HS Mode                               <Disabled>
COM3                                    <Enabled>
  HS Mode                               <Disabled>
COM4                                    <Enabled>
  HS Mode                               <Disabled>   Set COM1 as

CAN Bus Termination                     <Disabled>   RS-232
                                                     RS-422
HD-Audio Support                        <Enabled>    RS-485

F1  Help                ↑/↓ Select Item      F5/F6 Change Values        F9  Setup Defaults
Esc Exit                ←/→ Select Item      Enter Select ▶ SubMenu     F10 Save and Exit
```

4.2 COM2/ 3/ 4 Port Configuration

The system’s COM2/ 3/ 4 ports support RS-232 (full-duplex) while COM2 also supports RS-422 (full-duplex) and RS-485 (half-duplex) mode. The operating mode can be configured via the BIOS. Another option in BIOS called “*Slew Rate*” defines how sharp the rising/falling edge is for the output signal. 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 COM2/ 3/ 4 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 COM2/ 3/ 4 Mode as]** option to the desired mode.
4. Once set, press **F10** to save setting and exit.



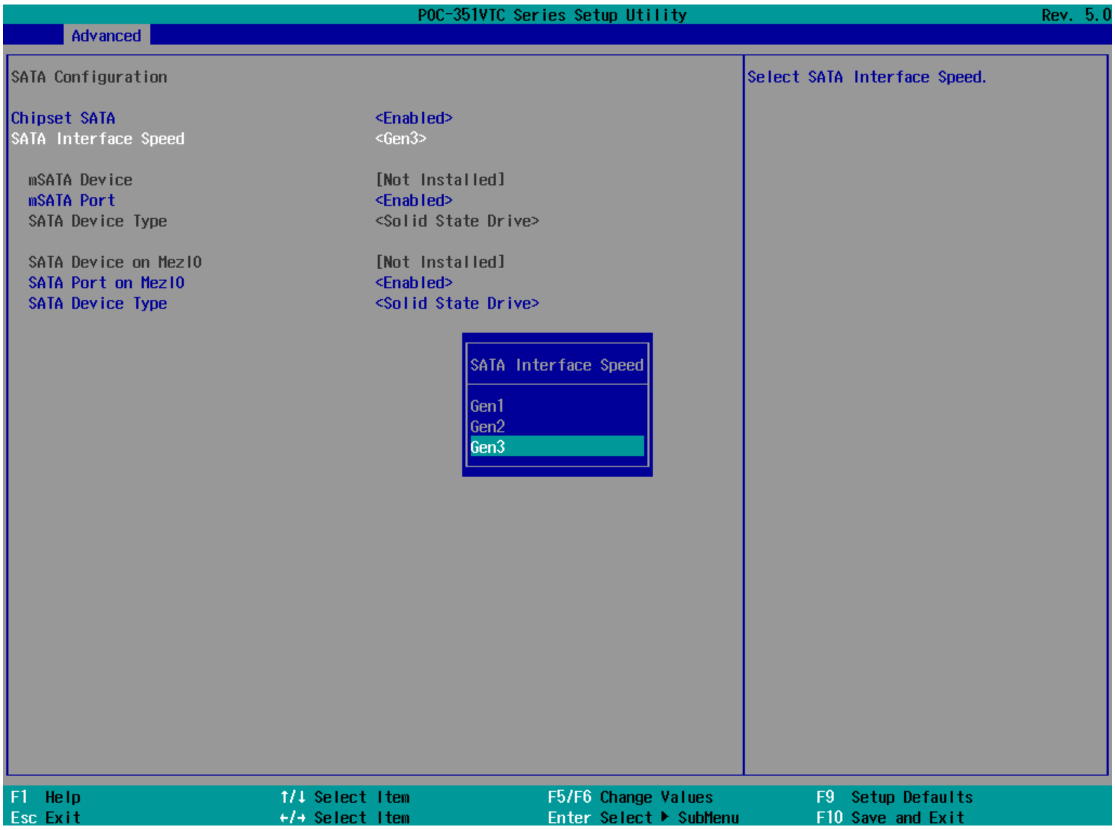
```
                         POC-351VTC Series Setup Utility                        Rev. 5.0
   Advanced

Peripheral Configuration                                   Configure COM2/3/4 as three 3-wire
                                                           RS-232 ports or single RS-422/485 port.
COM1                              <Enabled>
  HS Mode                         <Disabled>
  Set COM1 as                     <RS-232>
  Slew Rate                       <Low>

Set COM2/3/4 Mode as              <Three RS-232 Ports (COM2/3/4)>

COM2                              <Enabled>
  HS Mode                         <Disabled>
COM3                              <Enabled>
  HS Mode                         <Disabled>
COM4                              <Enabled>
  HS Mode                         <Dis
                                       Set COM2/3/4 Mode as
CAN Bus Termination               <Dis
                                       Three RS-232 Ports (COM2/3/4)
HD-Audio Support                  <Ena One RS-422/485 Port (COM2 Only)

F1   Help          ↑/↓ Select Item     F5/F6 Change Values       F9   Setup Defaults
Esc  Exit          ←/→ Select Item     Enter Select ▶ SubMenu    F10  Save and Exit
```

4.3 SATA Interface Speed

The system's SATA controller supports three modes of operations, <Gen1>, <Gen2> and <Gen3>. Gen 1 SATA mode offers bandwidth throughput of up to 150MB/s; Gen 2 SATA mode offers bandwidth throughput of up to 300MB/s; Gen 3 SATA mode offers bandwidth throughput of up to 600MB/s. For systems with only mSATA module installed, Gen 2 is recommended. For systems with MezIO-R11/ R12 and 2.5" SSD, you can set this option to Gen2/ Gen3 according to SSD's specifications.

To set Chipset SATA mode:

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



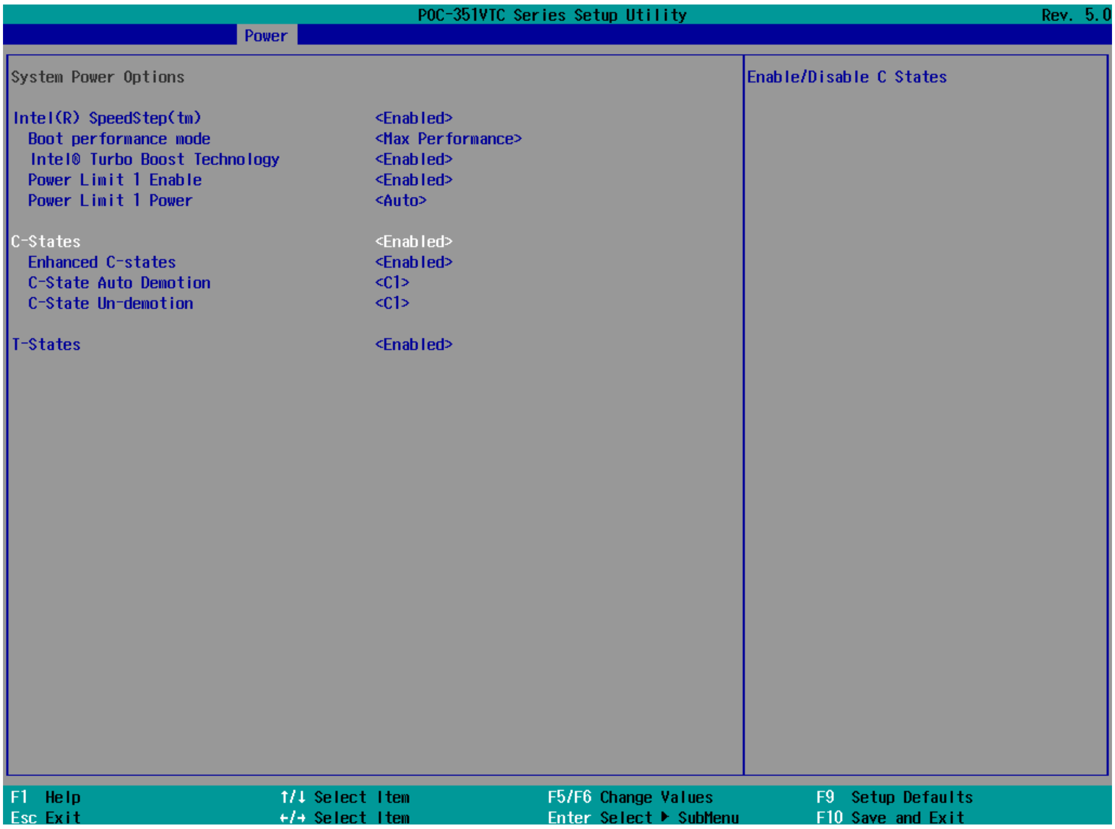
```
POC-351VTC Series Setup Utility                                        Rev. 5.0
      Advanced

SATA Configuration                                                Select SATA Interface Speed.

Chipset SATA                          <Enabled>
SATA Interface Speed                  <Gen3>

  mSATA Device                        [Not Installed]
  mSATA Port                          <Enabled>
  SATA Device Type                    <Solid State Drive>

  SATA Device on MezIO                [Not Installed]
  SATA Port on MezIO                  <Enabled>
  SATA Device Type                    <Solid State Drive>

                                        SATA Interface Speed

                                        Gen1
                                        Gen2
                                        Gen3

F1  Help             ↑/↓ Select Item       F5/F6 Change Values        F9  Setup Defaults
Esc Exit             ←/→ Select Item       Enter Select ▶ SubMenu     F10 Save and Exit
```

4.4 C-States

C-States is a power-saving technique implemented in modern Intel processors. It shuts down the clock signals and power for idle logic units inside the CPU to save the energy consumed. The trade-off, however, is a longer latency for CPU to wake up and be 100% operational. Depending on your application, you can configure these options to have higher performance (disable "C-States") or lower power-consumption (enable "C-States").

To set C-States and Enhanced C-States:

1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Power]** → **[CPU Configuration]** →**[CPU Power Management]**
3. Enable/disable the **[C-States]** option according to your application.
4. Once set, press **F10** to save setting and exit.



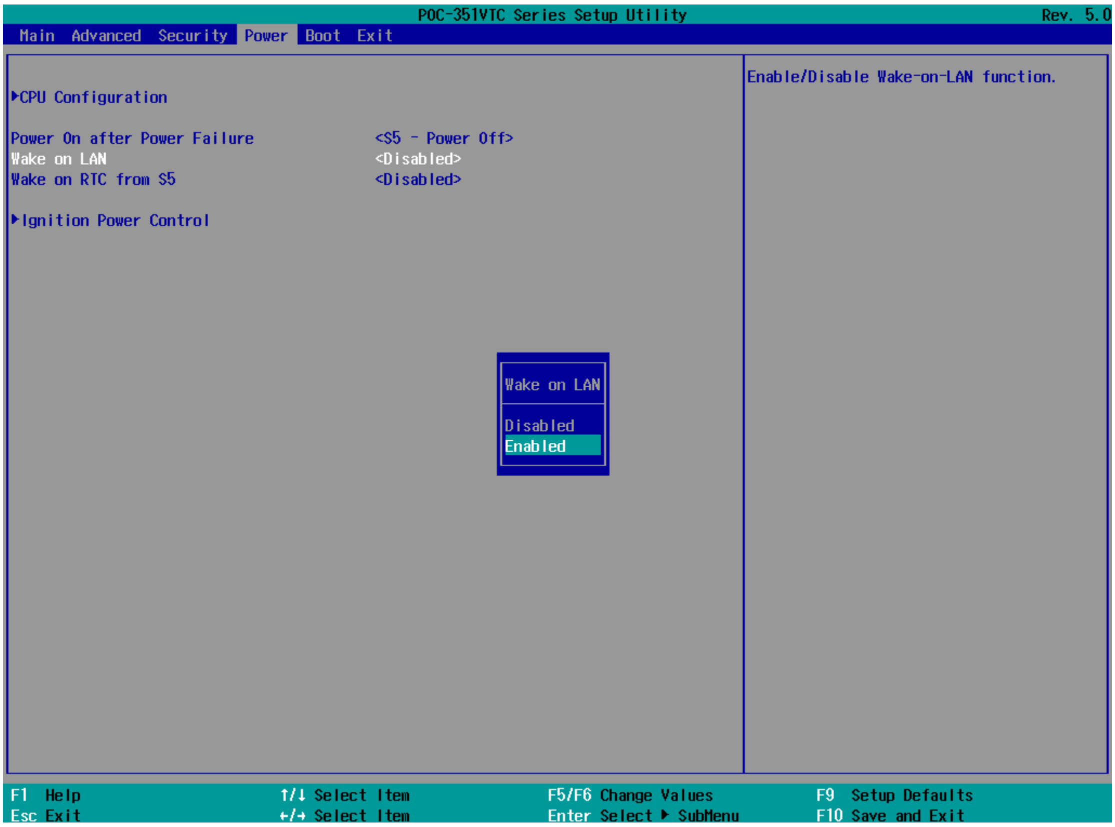
```
                         POC-351VTC Series Setup Utility                      Rev. 5.0
                      Power
 System Power Options                                        Enable/Disable C States

 Intel(R) SpeedStep(tm)                <Enabled>
   Boot performance mode               <Max Performance>
   Intel® Turbo Boost Technology       <Enabled>
   Power Limit 1 Enable                <Enabled>
   Power Limit 1 Power                 <Auto>

 C-States                              <Enabled>
   Enhanced C-states                   <Enabled>
   C-State Auto Demotion               <C1>
   C-State Un-demotion                 <C1>

 T-States                              <Enabled>

 F1  Help          ↑/↓ Select Item     F5/F6 Change Values      F9  Setup Defaults
 Esc Exit          ←/→ Select Item     Enter Select ▶ SubMenu   F10 Save and Exit
```

4.5 Wake-on-LAN

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 via Wake-on-LAN function.

To enable/ disable “Wake on LAN” 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 **[Wake on LAN]** option.
4. Once set, press **F10** to save setting and exit.



```
▸CPU Configuration

Power On after Power Failure          <S5 - Power Off>
Wake on LAN                           <Disabled>
Wake on RTC from S5                   <Disabled>

▸Ignition Power Control
```

Enable/Disable Wake-on-LAN function.

```
Wake on LAN

Disabled
Enabled
```

4.6 Power On after Power Failure

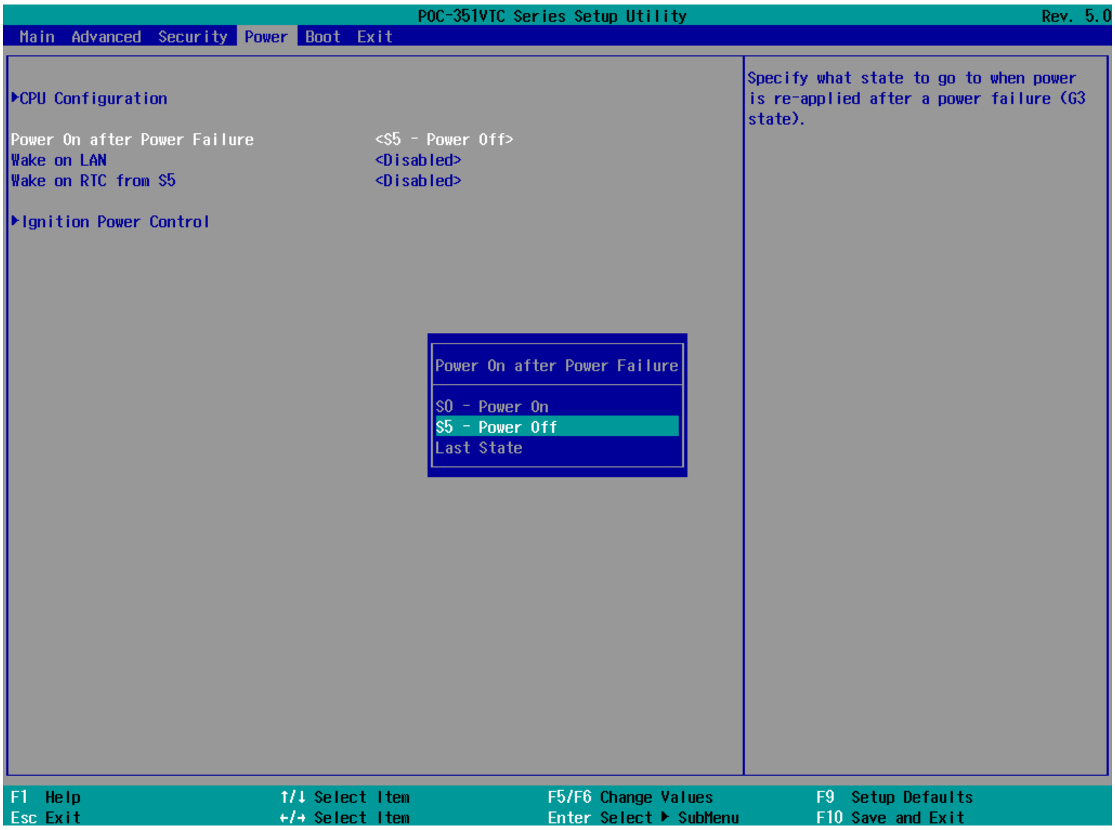
This option defines the system's behavior when DC power is supplied.

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.
Last State	Last system operating state when DC power loss occurred.

When you want to use the AT-mode remote on/off control function, you have to set this option to "S0 – Power On". Please refer to the section "Powering on the System" for instructions of using AT-mode remote on/off control function.

To set "Power On after Power Failure" option:

1. Press **F2** when the system boots up to enter the BIOS setup utility.
2. Go to **[Power]**.
3. Set the **[Power On after Power Failure]** option to the desired setting.
4. Once set, press **F10** to save setting and exit.



POC-351VTC Series Setup Utility Rev. 5.0

Main Advanced Security Power Boot Exit

▸CPU Configuration

Power On after Power Failure <S5 - Power Off>
Wake on LAN <Disabled>
Wake on RTC from S5 <Disabled>

▸Ignition Power Control

Specify what state to go to when power is re-applied after a power failure (G3 state).

Power On after Power Failure

S0 - Power On
S5 - Power Off
Last State

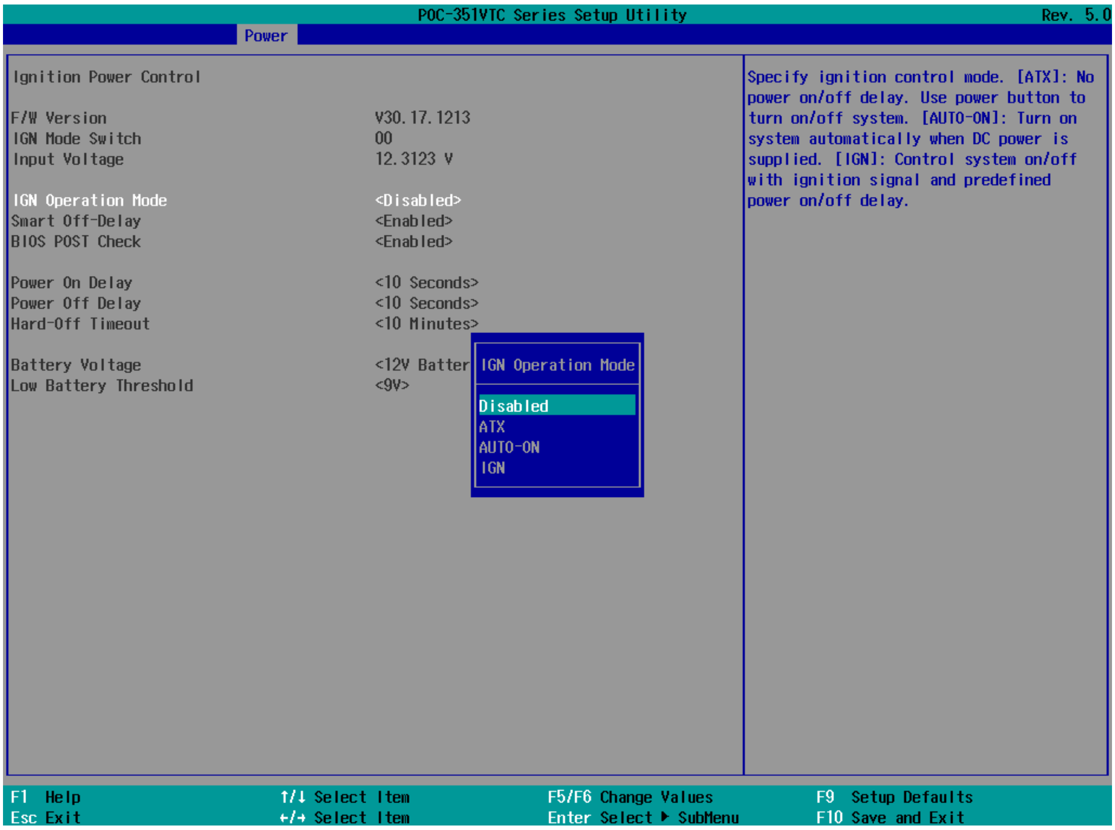
F1 Help ↑/↓ Select Item F5/F6 Change Values F9 Setup Defaults
Esc Exit ←/→ Select Item Enter Select ▸ SubMenu F10 Save and Exit

4.7 Ignition Power Control

The ignition control module is also BIOS-configurable. When rotary switch is set to mode 15 (0xF), the ignition power control is set to executed according to parameters configured in BIOS setup menu, which allows richer combination of power-on/ power-off delay and more detailed control parameters.

To set 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]**
3. Set **IGN Operation Mode** to the desired setting to enable Power On/ Off, Hard-Off Timeout and other settings.



```
                    POC-351VTC Series Setup Utility                    Rev. 5.0
                              Power

Ignition Power Control                                    Specify ignition control mode. [ATX]: No
                                                          power on/off delay. Use power button to
F/W Version                   V30.17.1213                 turn on/off system. [AUTO-ON]: Turn on
IGN Mode Switch               00                          system automatically when DC power is
Input Voltage                 12.3123 V                   supplied. [IGN]: Control system on/off
                                                          with ignition signal and predefined
IGN Operation Mode            <Disabled>                  power on/off delay.
Smart Off-Delay               <Enabled>
BIOS POST Check               <Enabled>

Power On Delay                <10 Seconds>
Power Off Delay               <10 Seconds>
Hard-Off Timeout              <10 Minutes>

Battery Voltage               <12V Batter
Low Battery Threshold         <9V>

F1  Help          ↑/↓ Select Item    F5/F6 Change Values       F9  Setup Defaults
Esc Exit          ←/→ Select Item    Enter Select ▶ SubMenu    F10 Save and Exit
```

4.8 Position New Boot Device

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

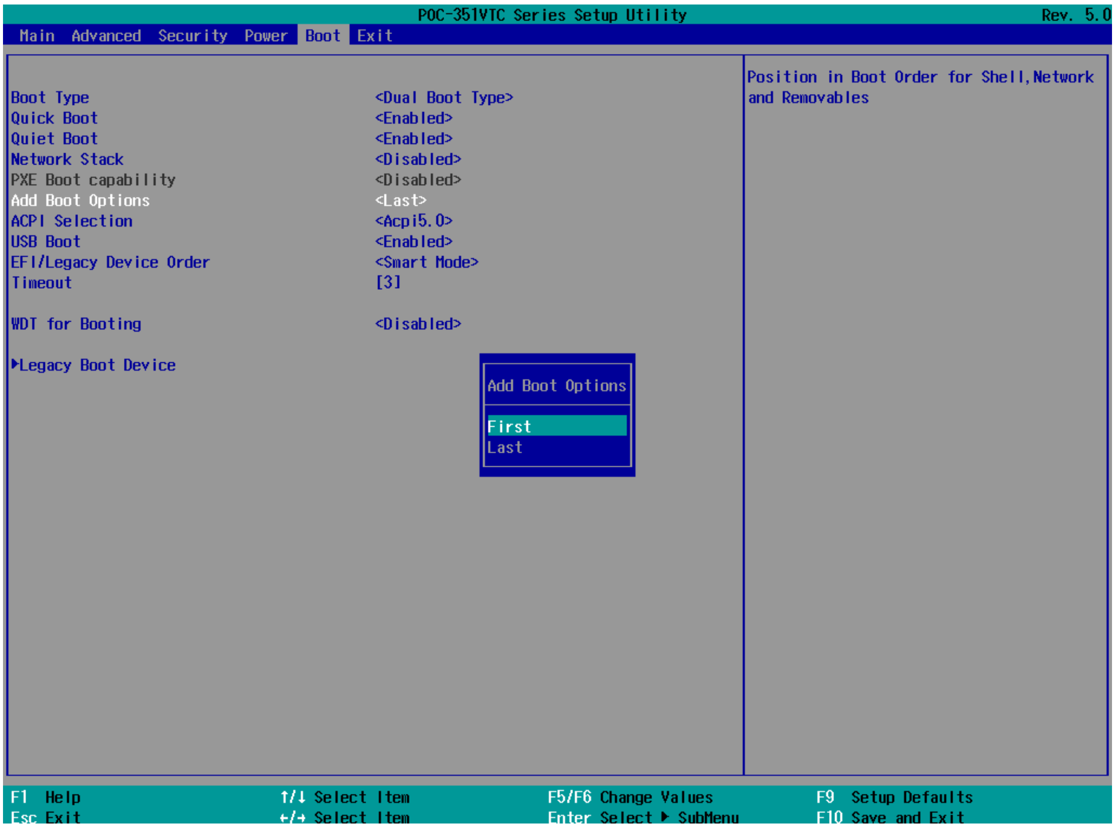
To set the newly-installed boot device as the first or last boot device:

1. Press **F2** when the system boots up to enter the BIOS setup utility.

2. Go to **[Boot] > [Add Boot Options]** menu.

3. Select **[First]** or **[Last]** for your newly-added boot device and press Enter.

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



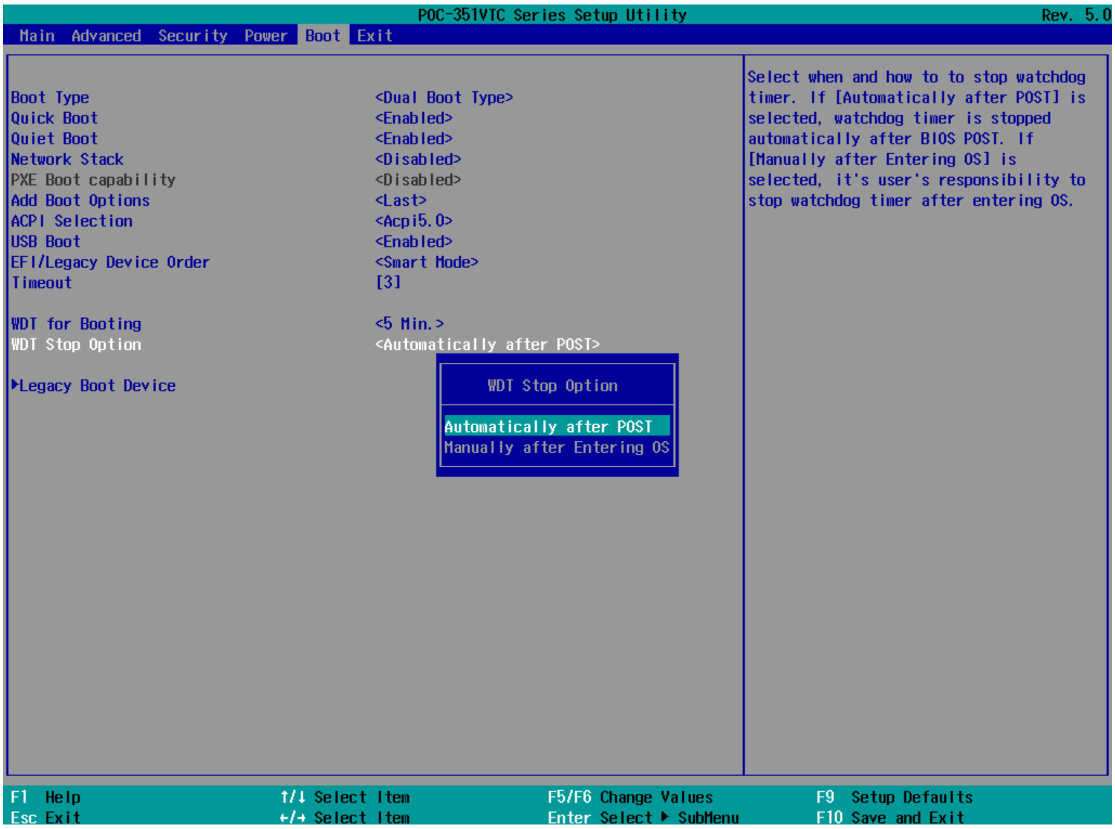
```
                         POC-351VTC Series Setup Utility                        Rev. 5.0
 Main  Advanced  Security  Power  Boot  Exit

Boot Type                                 <Dual Boot Type>        Position in Boot Order for Shell,Network
Quick Boot                                <Enabled>               and Removables
Quiet Boot                                <Enabled>
Network Stack                             <Disabled>
PXE Boot capability                       <Disabled>
Add Boot Options                          <Last>
ACPI Selection                            <Acpi5.0>
USB Boot                                  <Enabled>
EFI/Legacy Device Order                   <Smart Mode>
Timeout                                   [3]

WDT for Booting                           <Disabled>

▶Legacy Boot Device                                  Add Boot Options

                                                     First
                                                     Last

F1  Help                 ↑/↓ Select Item          F5/F6 Change Values          F9  Setup Defaults
Esc Exit                 ←/→ Select Item          Enter Select ▶ SubMenu       F10 Save and Exit
```

4.9 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.



```
POC-351VTC Series Setup Utility                                   Rev. 5.0
Main  Advanced  Security  Power  Boot  Exit

Boot Type                        <Dual Boot Type>     Select when and how to stop watchdog
Quick Boot                       <Enabled>            timer. If [Automatically after POST] is
Quiet Boot                       <Enabled>            selected, watchdog timer is stopped
Network Stack                    <Disabled>           automatically after BIOS POST. If
PXE Boot capability              <Disabled>           [Manually after Entering OS] is
Add Boot Options                 <Last>               selected, it's user's responsibility to
ACPI Selection                   <Acpi5.0>            stop watchdog timer after entering OS.
USB Boot                         <Enabled>
EFI/Legacy Device Order          <Smart Mode>
Timeout                          [3]

WDT for Booting                  <5 Min.>
WDT Stop Option                  <Automatically after POST>

▸Legacy Boot Device                  WDT Stop Option

                                 Automatically after POST
                                 Manually after Entering OS

F1  Help          ↑/↓ Select Item      F5/F6 Change Values       F9  Setup Defaults
Esc Exit          ←/→ Select Item      Enter Select ▸ SubMenu    F10 Save and Exit
```

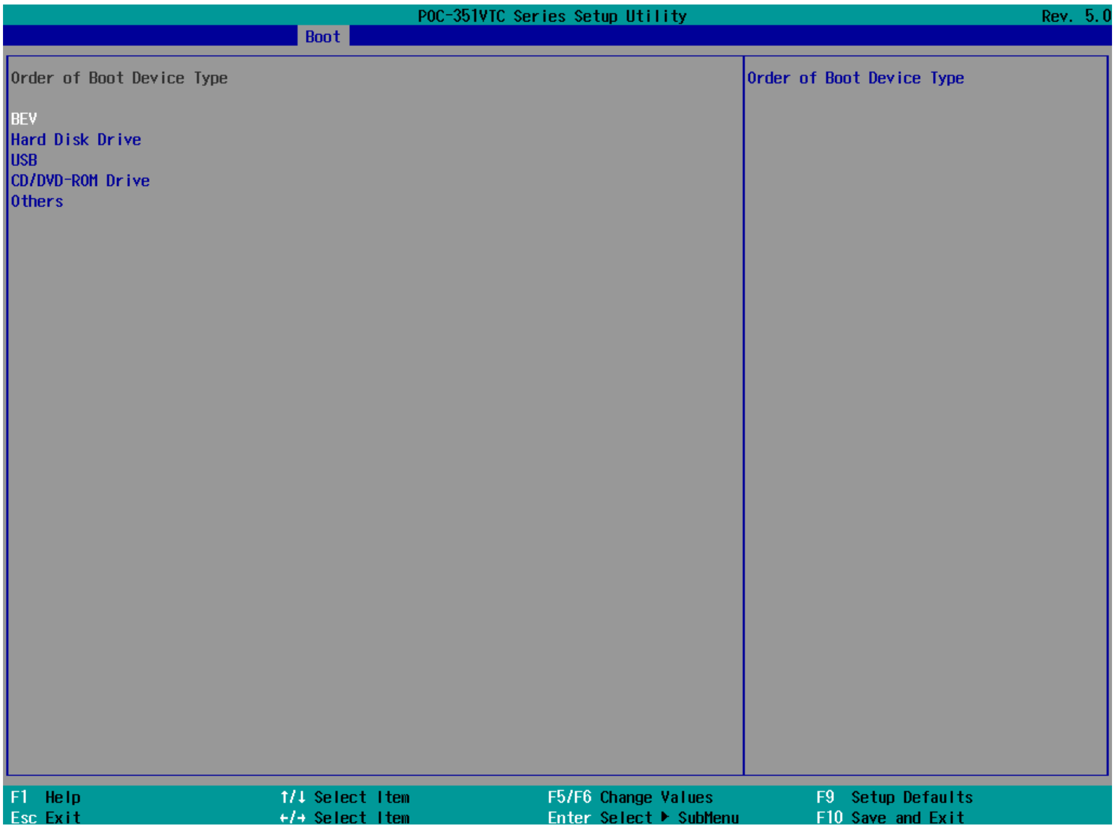
4.10 Select a Boot Device

When you have multiple bootable devices connected to your system and you may set which device as the first boot device. There are two ways to select the device. One, press F12 upon system boot up to go to Boot Manager and then select one of the devices, or two, set a default boot device in the BIOS.

To select a boot device in BIOS:

1. When system boots up, press F2 to enter BIOS setup utility.
2. Go to **[Boot] → [Boot Menu]**.
3. The **[Boot Menu]** option determines whether to list all bootable devices connected to your system according to device or device type. The default order of boot device type is
   - Hard Disk Drive
   - USB
   - CD/DVD-ROM Driver
   - Others

   You can use F5/F6 or +/- to change the boot order of devices or device types.
4. Once set, press **F10** to save setting and exit.



```
                         POC-351VTC Series Setup Utility                          Rev. 5.0
                                    Boot
Order of Boot Device Type                                      Order of Boot Device Type

BEV
Hard Disk Drive
USB
CD/DVD-ROM Drive
Others

F1  Help              ↑/↓ Select Item       F5/F6 Change Values       F9  Setup Defaults
Esc Exit              ←/→ Select Item       Enter Select ▶ SubMenu    F10 Save and Exit
```

5 OS Support and Driver Installation

5.1 Operating System Compatibility

Due to Intel’s policy, POC-351VTC 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 Neousys Technology.

- Microsoft Windows 10 Professional 64-bit
- Microsoft Windows 10 IoT Enterprise 64-bit
- Ubuntu 16.04.3 LTS** (4.10 kernel)

NOTE

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

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.

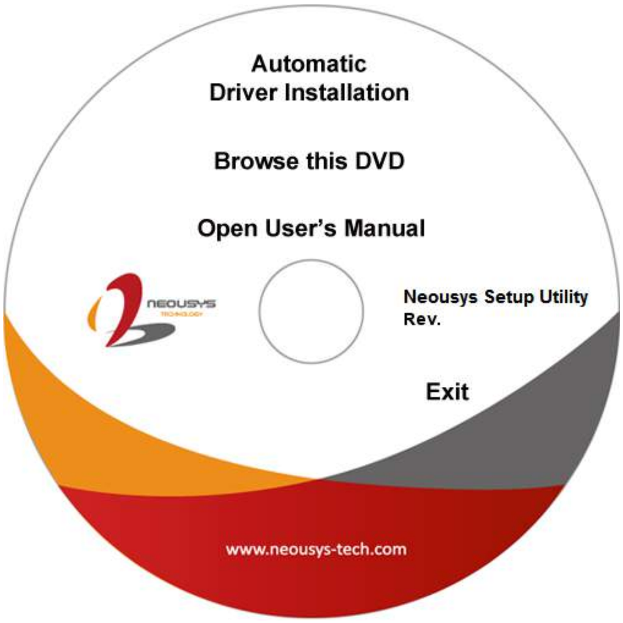
5.2 Driver Installation

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

5.2.1 Install Drivers Automatically

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

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



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

5.2.2 Install Drivers Manually

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

Windows 10 (x64)

The recommended driver installation sequence is

1. **Chipset driver** (x:\Driver_Pool\Chipset_10_APL\Win_ALL\SetupChipset.exe)
2. **Graphics driver** (x:\Driver_Pool\Graphics_SKL_APL\Win_7_8_10_APL_64\Setup.exe)
3. **Audio driver** (x:\Driver_Pool\Audio_ALC262\Win_ALL_64\Setup.exe)
4. **LAN driver** (x:\Driver_Pool\GbE_I210_I350\Win_ALL_64\APPS\PROSETDX\Winx64\DxSetup.exe)
5. **TXE driver** (x:\Driver_Pool\TXE_APL\Win_10_64\SetupTXE.exe)

5.3 Driver for Watchdog Timer and DIO

Neousys provides a driver package which contains function APIs for WDT function and isolated DIO control function. You should install the driver package (WDT_DIO_Setup.exe) in prior to use these functions. Please note that you must install WDT_DIO_Setup_v2.2.8.1 or later versions.

NOTE

Please install WDT_DIO_Setup_v2.2.8.1 or later versions.

Windows 7/ 8/ 10 (x64)

Please execute the driver setup program in the following directory.

x:\ Driver_Pool\WDT_DIO\Win7_8_10_64\WDT_DIO_Setup_v2.2.8.1(x64).exe

Windows 7/ 8/ 10 (WOW64)

Please execute the driver setup program in the following directory.

x:\
Driver_Pool\WDT_DIO\Win7_8_10_WOW64\WDT_DIO_Setup_v2.2.8.1(wow64).exe

Appendix A Using WDT & DIO

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

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

Installing WDT_DIO Library

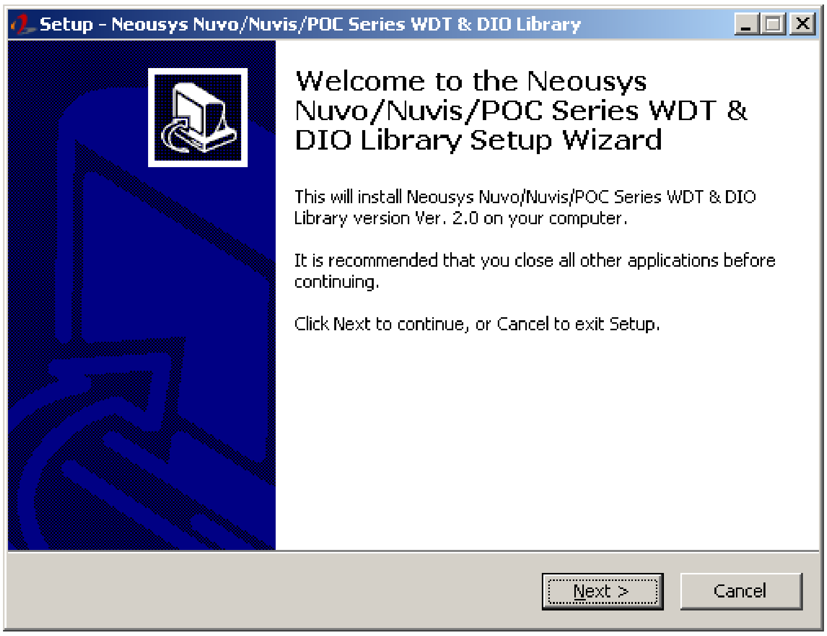
The WDT_DIO function library is delivered in the form of a setup package named **WDT_DIO_Setup.exe**. In prior to program WDT, you should execute the setup program and install the WDT library. Please use the following WDT_DIO_Setup packages according to your operating systems and application.

- For Windows 10 64-bit OS with 64-bit application (x64 mode), please install WDT_DIO_Setup_v2.2.8.1(x64).exe or later version.
- For Windows 10 64-bit OS with 32-bit application (WOW64 mode), please install WDT_DIO_Setup_v2.2.8.1(wow64).exe or later version.

WDT and DIO Library Installation

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

1. Execute **WDT_DIO_Setup.2.2.8.1.exe**.



Setup - Neousys Nuvo/Nuvis/POC Series WDT & DIO Library

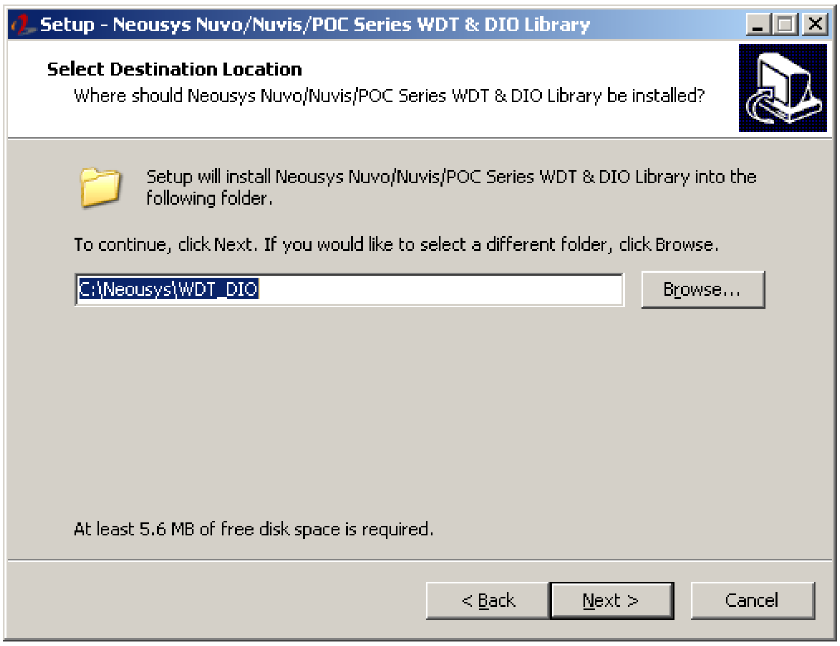
Welcome to the Neousys Nuvo/Nuvis/POC Series WDT & DIO Library Setup Wizard

This will install Neousys Nuvo/Nuvis/POC Series WDT & DIO Library version Ver. 2.0 on your computer.

It is recommended that you close all other applications before continuing.

Click Next to continue, or Cancel to exit Setup.

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



Setup - Neousys Nuvo/Nuvis/POC Series WDT & DIO Library

Select Destination Location

Where should Neousys Nuvo/Nuvis/POC Series WDT & DIO Library be installed?

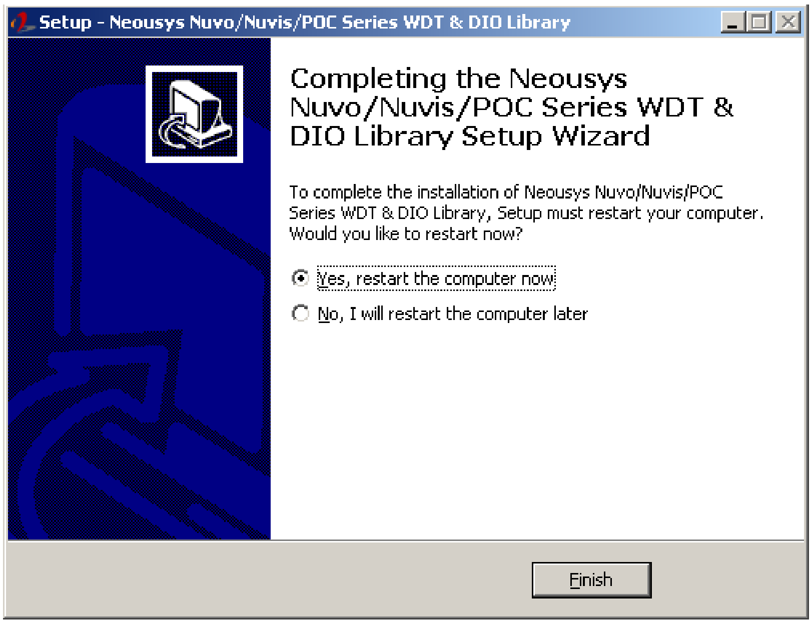
Setup will install Neousys Nuvo/Nuvis/POC Series WDT & DIO Library into the following folder.

To continue, click Next. If you would like to select a different folder, click Browse.

C:\Neousys\WDT_DIO

At least 5.6 MB of free disk space is required.

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.



Setup - Neousys Nuvo/Nuvis/POC Series WDT & DIO Library

Completing the Neousys Nuvo/Nuvis/POC Series WDT & DIO Library Setup Wizard

To complete the installation of Neousys Nuvo/Nuvis/POC Series WDT & DIO Library, Setup must restart your computer. Would you like to restart now?

● Yes, restart the computer now

○ No, I will restart the computer later

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 isolated DIO Control) \Sample\COS_Demo (Demo for change-of-state DI)

□□

WDT Function Reference

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()

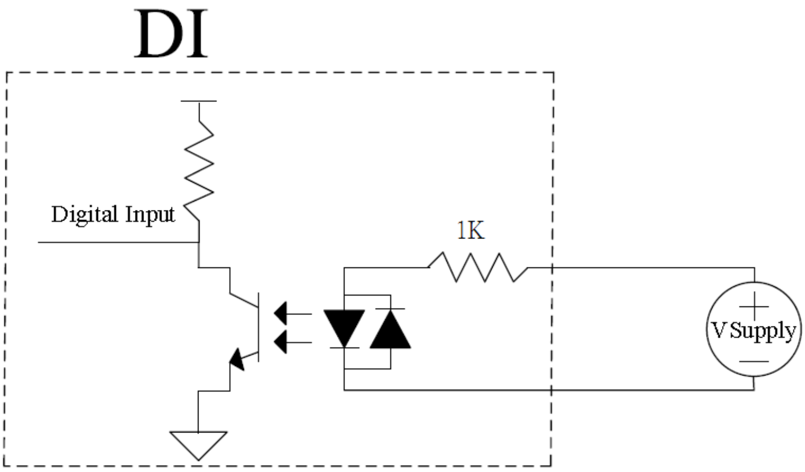
StopWDT

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()

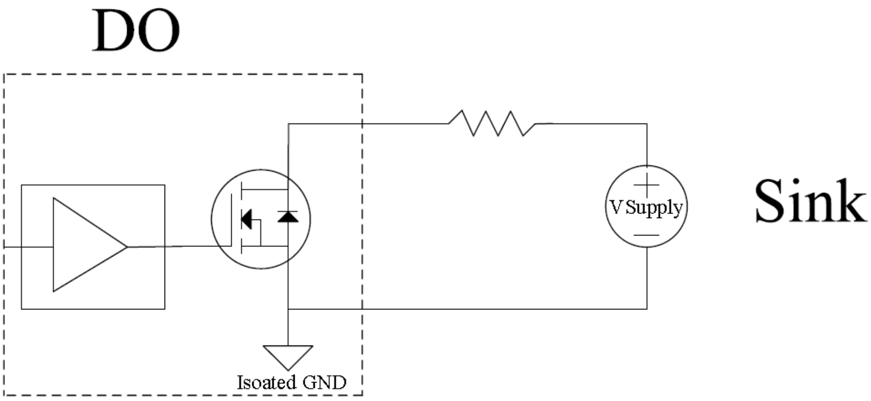
Using DIO Function

Wiring for DIO

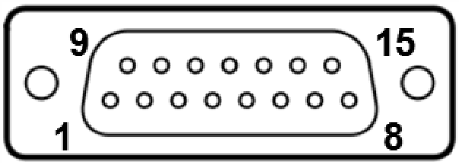
The digital input function of System series is implemented using a photo-coupler with an internally series-connected 1kΩ resistor. You need to provide a voltage to specify the logic high/low state. The input voltage for logic high is 5~24V, and the input voltage for logic low is 0~1.5V.



The digital output function of System series is implemented using Power MOSFET + Analog Device iCoupler® component. The DO channels are configured as NO (normally-open) configuration. When you turn on system, all DO channels have a deterministic state of logic 0 (circuit disconnected from GND return). When logic 1 is specified, MOSFET is activated and GND return path is established. The digital output function on System series supports sinking current connection. The following diagrams are the suggested wiring for DO:



DIO Pin Definition



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

DIO Function Reference

InitDIO

Syntax	BOOL InitDIO(void);
Description:	Initialize the DIO function. You should always invoke InitDIO() before write/read any DIO port/channel.
Parameter	None
Return Value	**TRUE:** Successfully initialized **FALSE:** Failed to initialize
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. *ch* should be a value of 0 ~ 3.
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 (4 channels).
Parameter	None
Return Value	The status (TRUE or FALSE) of the specified DI channel.
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. *ch* should be a value of 0 ~ 3. *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 (4 channels).
Parameter	*value* WORD value specifies the status of the DO port. *value* should be a value of 0~15.
Return Value	None
Usage	WORD DOPortValue=0x0C; //1100b DOWritePort(DOPortValue); //write DO port as 1100b

DOWriteLineChecked

Syntax	void DOWriteLineChecked(BYTE ch, BOOL value);
Description:	Write a single channel of isolated digital output and read-back the value of DO register. Note that this function is not returned until the DO register is checked and identical to the written value.
Parameter	*ch* BYTE value specifies the DO channel to be written. *ch* should be a value of 0 ~ 3. *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;
	DOWriteLineChecked(ch, DOChValue); //write DO channel #3 as TRUE

DOWritePortChecked

Syntax	void DOWritePortChecked(WORD value);
Description:	Write the entire isolated digital output port (8 channels) and check it has been done. Note that this function is not returned until the write value has been checked the same with the device registry.
Parameter	*value* WORD value specifies the status of the DO port. *value* should be a value of 0~15.
Return Value	None
Usage	WORD DOPortValue=0x0C; //1100b DOWritePortChecked(DOPortValue); //write DO port as 1100b

COS Function Reference

SetupDICOS

Syntax	BOOL SetupDICOS(COS_INT_SETUP *lpSetup, DWORD cbSetup);
Description	Setup Digital-Input(DI) Change-of-State(COS) interrupt parameters.
Parameter	***lpSetup* [in]** A pointer to a **COS_INT_SETUP** structure that contains the COS configuration information for the DI device. This data structure contains the following variables: ***portMask*** WORD value specifies the interrupt mask for corresponding channel(s). ***edgeMode*** WORD value specifies that interrupt is generated when level change (set to 0) or on rising/falling edge (set to 1) for the corresponding channel(s). ***edgeType*** WORD value specifies that interrupt is generated on rising edge (set to 0) or falling (set to 1) edge for corresponding channel(s). This value is neglected if *edgeMode* is set to 0 for the corresponding channel(s). ***cbSetup* [in]** The length of the structure, in bytes. The caller must set this member to size of (COS_INT_SETUP).
Return Value	**TRUE** if setup successes **FALSE** if setup failed

Usage	COS_INT_SETUP setup;
	memset(&setup, 0, sizeof(setup));
	setup.portMask = 0x0f; // enable ch.0~3
	setup.edgeMode = 0; // level
	setup.edgeType = 0x00; // Lo/Hi
	BOOL bRet = SetupDICOS(&setup, sizeof(setup));

RegisterCallbackDICOS

Syntax	BOOL RegisterCallbackDICOS(COS_INT_CALLBACK callback);
Description:	Registers a callback function, which is called when the DICOS interrupt occurred.
Parameter	***callback* [in]** Specifies the callback function. The prototype for this function is descripted as follow. void __stdcall callback_func(COS_INT_CALLBACK_ARG* arg);
Return Value	**TRUE** if setup successes, **FALSE** if setup failed.

Usage	void __stdcall callback_func(COS_INT_CALLBACK_ARG* arg)
	{
	printf("data=0x%02x, flag=0x%02x, seq=%02d\n", arg->portData, arg->intrFlag, arg->intrSeq);
	}
	BOOL bRet = RegisterCallbackDICOS(callback_func);

StartDICOS

Syntax	BOOL StartDICOS(void);
Description	Start DI Change-of-State interrupt
Parameter	None
Return Value	**TRUE** if start procedure successes **FALSE** if start procedure failed
Usage	BOOL bRet = StartDICOS();

StopDICOS

Syntax	BOOL StopDICOS(void);
Description	Stop DI Change-of-State interrupt
Parameter	None
Return Value	**TRUE** if stop procedure successes **FALSE** if stop procedure failed
Usage	BOOL bRet = StopDICOS();

DI COS Example

```
#include <stdio.h>
#include <stdlib.h>
#include <windows.h>
#include "WDT_DIO.h"

//Step 0,     define a Change-of-State Interrupt callback function
void __stdcall callback_function(COS_INT_CALLBACK_ARG* arg)
{
    printf("data=0x%02x, flag=0x%02x, seq=%02d\n",
    arg->portData, arg->intrFlag, arg->intrSeq);
}

int main(int argc, char* argv[])
{
 //Step 1, initialize DIO library by invoking InitDIO()
    if ( ! InitDIO() )
    {
        printf("InitDIO --> FAILED\n");
        return -1;
    }
    printf("InitDIO --> PASSED\n");

 //Step 2, setup Change-of-State Interrupt mask and level/edge mode
    COS_INT_SETUP   setup;
```

```
        memset(&setup, 0, sizeof(setup));

        setup.portMask = 0x0f;          // 00001111b, enable ch.0~3
        setup.edgeMode = 0x00;    // generate interrupt on level change
        setup.edgeType = 0x00;        // rising/falling edge, only effective when
edgeMode = 1

        if ( ! SetupDICOS(&setup, sizeof(setup)) )
        {
            printf("SetupDICOS --> FAILED\n");
            return -2;
        }
        printf("SetupDICOS --> PASSED\n");

    //Step 3, register the callback function
        if ( ! RegisterCallbackDICOS(callback_function) )
        {
            printf("RegisterCallbackDICOS --> FAILED\n");
            return -3;
        }
        printf("RegisterCallbackDICOS --> PASSED\n");

    //Step 4, start the DI Change-of-State Interrupt
        if ( ! StartDICOS() )
        {
            printf("StartDICOS --> FAILED\n");
            return -4;
        }
        printf("StartDICOS --> PASSED\n");

        printf("\npress any key to stop...\n");
        system("pause >nul");

    //Step 5, stop the DI Change-of-State Interrupt operation
        if ( ! StopDICOS() )
        {
            printf("StopDICOS --> FAILED\n");
            return -5;
        }
        printf("StopDICOS --> PASSED\n");

        printf("\npress any key to exit...\n");
        system("pause >nul");
        return 0;
    }
```

Appendix B CAN bus Function

Users can configure the CAN Bus, as well as get access to the bus, via APIs included in the WDT_DIO driver package. This section provides API functions, parameters and definitions for users to create their own software applications.

CAN bus Function Reference

CAN_RegisterReceived

Syntax	BOOL CAN_RegisterReceived(DWORD idx, void (__stdcall *pfnHandler)(CAN_MSG *lpMsg, DWORD cbMsg));
Description	Registers a callback function. It is called when the CAN controller has received a message object
Parameter	*idx* [in] Specifies the index of CAN bus controllers. Currently there are only one CAN bus controller. *pfnHandler* [in] Specifies the callback function. The prototype for this function is descripted as follow. void __stdcall CAN0_Received(CAN_MSG *lpMsg, DWORD cbMsg);
Return Value	**TRUE** if registration successes **FALSE** if registration failed

Usage	void __stdcall CAN0_Received(CAN_MSG *lpMsg, DWORD cbMsg)
	{
	printf("%08x, %d, %02x %02x %02x %02x %02x %02x %02x %02x\r\n", lpMsg->id, lpMsg->len, lpMsg->data[0], lpMsg->data[1], lpMsg->data[2], lpMsg->data[3], lpMsg->data[4], lpMsg->data[5], lpMsg->data[6], lpMsg->data[7]);
	}

```
void main(int argc, char *argv[])
{
   if ( ! CAN_RegisterReceived(0, AN0_Received) )
{
   printf("CAN_RegisterReceived is FAILED !\r\n");
   }
}
```

.

CAN_RegisterStatus

Syntax	BOOL CAN_RegisterStatus(DWORD idx, void (__stdcall *pfnHandler)(DWORD status));
Description	Registers a callback function, which is called when the CAN controller has received a status interrupt.
Parameter	idx [in] Specifies the index of CAN bus controllers. Currently there are only one CAN bus controller. pfnHandler [in] Specifies the callback function. The prototype for this function is descripted as follow. void __stdcall CAN0_Status(DWORD status);
Return Value	**TRUE** if registration successes **FALSE** if registration failed

Usage	void __stdcall CAN0_Status(DWORD status)
	{
	printf("%08x\r\n", status);
	}
	void main(int argc, char *argv[])
	{
	if (! CAN_RegisterStatus(0, CAN0_Status))
	{
	printf("CAN_RegisterStatus is FAILED !\r\n");
	}
	}

CAN_Setup

Syntax	BOOL CAN_Setup(DWORD idx, CAN_SETUP *lpSetup, DWORD cbSetup);
Description	Setup timing correlation of trigger source input (DI) and pulse target output (DO) for Deterministic Trigger Fan-Out function.
Parameter	*idx* [in] Specifies the index of CAN bus controllers. Currently there are only one CAN bus controller. *lpSetup* [in] A pointer to a CAN_SETUP structure that contains the CAN-Bus configuration. This data structure contains the following variables: *Bitrate* DWORD value specifies the bit rate of the specified CAN controller. *recvConfig* DWORD value specifies the received message configuration. *recvId* DWORD value specifies the received identity number. *recvMask* DWORD value specifies the mask for received identity number. *cbSetup* [in] The length of the structure, in bytes. The caller must set this member to size of (CAN_SETUP).
Return Value	**TRUE** if setup successes, **FALSE** if setup failed.
Usage	

CAN_Start

Syntax	BOOL CAN_Start(DWORD idx);
Description	Start CAN Bus transmit and receive operation.
Parameter	*idx* [in] Specifies the index of CAN bus controllers. Currently there are only one CAN bus controller.
Return Value	**TRUE** if start procedure successes **FALSE** if start procedure failed
Usage	BOOL bRet = CAN_Start(0);

CAN_Stop

Syntax	BOOL CAN_Stop(DWORD idx);
Description	Stop CAN Bus controller operation.
Parameter	*idx* [in] Specifies the index of CAN bus controllers. Currently there are only one CAN bus controller.
Return Value	**TRUE** if stop procedure successes **FALSE** if stop procedure failed
Usage	BOOL bRet = CAN_Stop(0);

CAN_Send

Syntax	BOOL CAN_Send(DWORD idx , CAN_MSG *lpMsg, DWORD cbMsg);
Description	Put message object into CAN Bus controller.
Parameter	*idx* [in] Specifies the index of CAN bus controllers. Currently there are only one CAN bus controller. *lpMsg* [in] A pointer to a CAN_MSG structure that contains the CAN-Bus message object. This data structure contains the following variables:. *id* DWORD value specifies the identity number of the message object. *flags* WORD value specifies the status or configuration of the message object. *extra* BYTE value specifies nothing but does reserved. *len* BYTE value specifies the length of the message object. *data* BYTE array specifies the data of the message object. *cbMsg* [in] The length of the structure, in bytes. The caller must set this member to size of (CAN_MSG).
Return Value	**TRUE** if stop procedure successes **FALSE** if stop procedure failed
Usage	void main(int argc, char *argv[]) {

```
    CAN_MSG    canMsg;
    memset(&canMsg, 0, sizeof(canMag));
    if ( ! CAN_Send(0, &canMsg, sizeof(canMsg)) )
{
        printf("CAN_Send is FAILED !\r\n");
}
}
```

Appendix C Ignition Control Function

The system supports ignition control. This is a hardware functionality and control by the on-board micro controller. However, the following APIs enable users to check the status and configuration. Therefore, actions in users' software applications are possible according to different ignition status.

Ignition Control Function Reference

IGN_GetState

Syntax	BOOL IGN_GetState(DWORD *lpState);
Description	Get current ignition input status
Parameter	*lpState* [in] pointer to DWORD value which represents the state of ignition input.
Return Value	**TRUE** if stop procedure successes **FALSE** if stop procedure failed

Usage	void main(int argc, char *argv[])
	{
	    DWORD state;
	    state = 0;
	    if (! IGN_GetState(&state))
	    {
	    printf("IGN_GetState is FAILED !\r\n");
	    }
	}

IGN_GetBatteryVoltage

Syntax	BOOL IGN_GetBatteryVoltage(double *lpVoltage);
Description	Get current DC input voltage
Parameter	*lpVoltage* [in] pointer to double value which represents the input voltage.
Return Value	**TRUE** if procedure successful **FALSE** if procedure failed

Usage	void main(int argc, char *argv[])
	{
	    double voltage;
	    voltage = 0;
	    if (! IGN_GetBatteryVoltage(&voltage))
	    {
	        printf("IGN_GetBatteryVoltage is FAILED !\r\n");
	    }
	}

IGN_GetSetting

Syntax	BOOL IGN_GetSetting(IGN_SETTING *lpSetting, DWORD cbSetting);
Description	Get ignition BIOS setting information
Parameter	*lpSetting* [in] A pointer to an **IGN_SETTING** structure that contains the ignition setting from BIOS. This data structure contains the following variables: *mode* BYTE value specifies the operation mode of the ignition controller. (0: atx, 1: at, 2~7: ignition mode) *batteryType* BYTE value specifies the battery type. (0: 12v, 1: 24v) *isSmartOff* BYTE value specifies the smart off function is enabled or not. (0: disabled, 1: enabled) *isPostCheck* BYTE value specifies the post check function is enabled or not. (0: disabled, 1: enabled) *onDelay* DWORD value specifies the delay count in seconds until ignition controller turn on the machine. *offDelay* DWORD value specifies the delay count in seconds until ignition controller turn off the machine. *hardOffTimeout* DWORD value specifies the limit count in seconds while ignition controller could not turn off the machine. *lowVolThreshold* DOUBLE precision floating point number specifies the low

	voltage limit then ignition controller will turn off the machine.
Return Value	**TRUE** if procedure successful **FALSE** if procedure failed

Usage	int main(int argc, char *argv[])
	{
	    IGN_SETTING setting;
	    memset(&setting, 0, sizeof(setting));
	    if (! IGN_GetSetting(&setting, sizeof(setting)))
	    {
	        printf("IGN_GetSetting is FAILED !\r\n");
	        return -1;
	    }
	    return 0;
	}

Appendix D PoE On/ Off Control

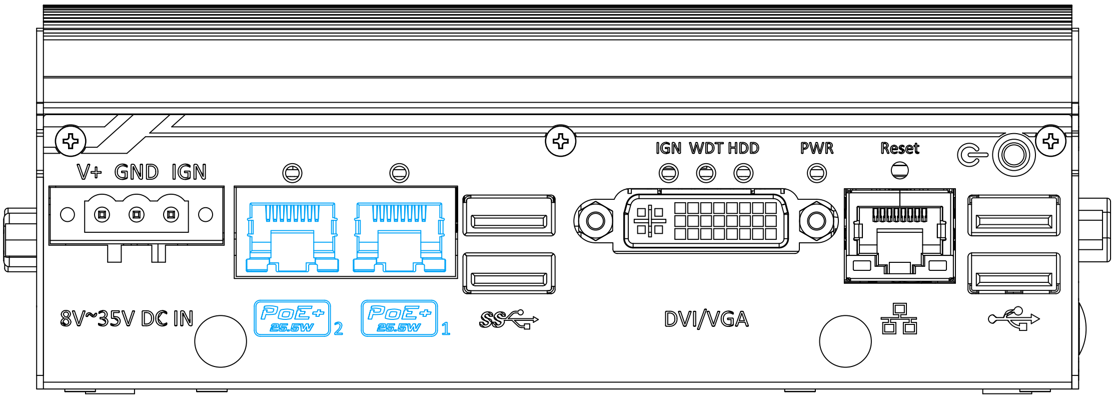
The system offers two 802.3at PoE+ ports with a unique feature to allow users manually turn on or off the power supply of each PoE port. This can be function can be useful in power device (PD) fault-recovery or power reset.

The function APIs are encapsulated in Neousys WDT_DIO driver package. Please follow the instructions in Appendix A Watchdog Timer & Isolated DIO to install the driver package prior to programming PoE on/off control function

PoE On/ Off Control Function Reference

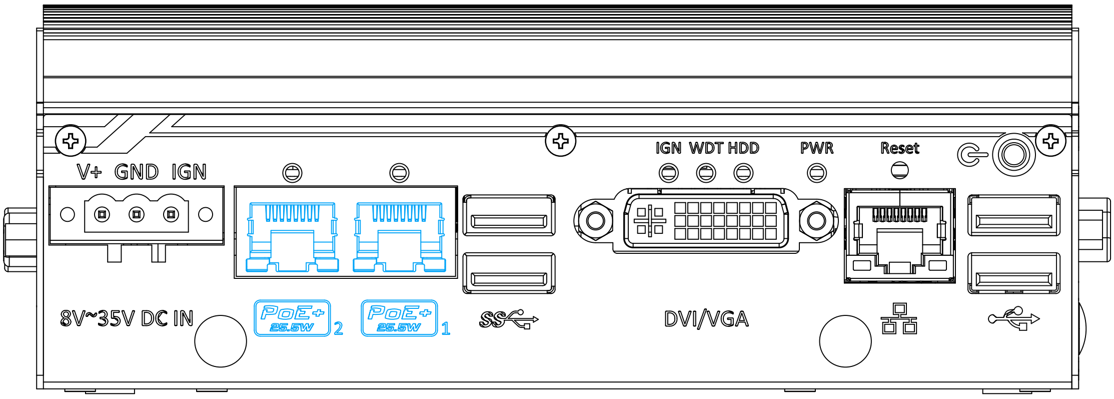
GetStatusPoEPort

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 ~ 2.
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



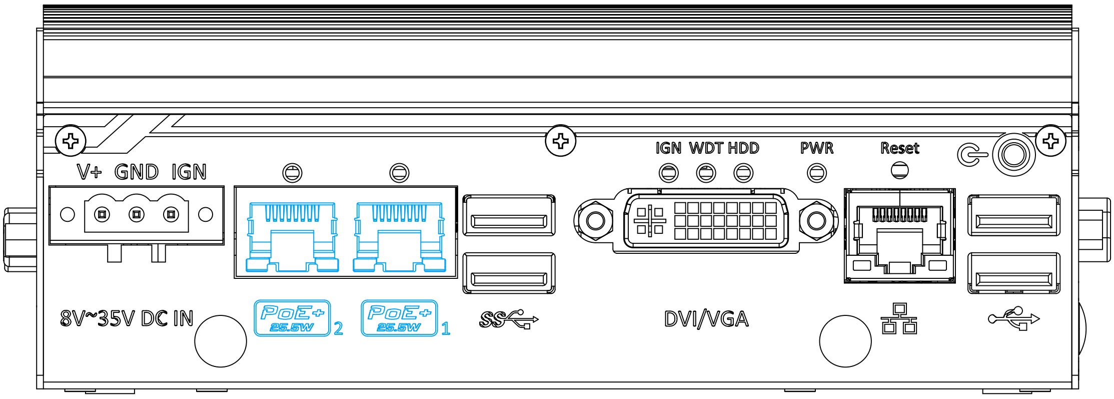
EnablePoEPort

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 ~ 2.
Return Value	**TRUE** if enabled success **FALSE** if fail to enable.
Usage	BOOL bRet = EnablePoEPort (1); //Turn on PoE Port#1



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 ~ 2.
Return Value	**TRUE** if disabled success **FALSE** if fail to disable
Usage	BOOL bRet = DisablePoEPort (1); //Turn off PoE Port#1


V+ GND IGN
8V~35V DC IN
PoE+ 25.5W 2
PoE+ 25.5W 1
SS
IGN WDT HDD
PWR
Reset
DVI/VGA