



VC230-AL

In-Vehicle Box PC
User's Manual



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FCC and DOC Statement on Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.

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About this Manual

This manual can be downloaded from the website, or acquired as an electronic file included in the optional CD/DVD. The manual is subject to change and update without notice, and may be based on editions that do not resemble your actual products. Please visit our website or contact our sales representatives for the latest editions.

Warranty

1. Warranty does not cover damages or failures that arised from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.
2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.
3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.
4. We will not be liable for any indirect, special, incidental or consequential damages to the product that has been modified or altered.

About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- One VC230-AL System
- One Quick Installation Guide

The system and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Optional Items

- Wall Mount Kit
- Power Cord
- Internal Power Board for 9~36V power adaption
- CAN BUS Mini PCIe module (MPE-CAN2)

The system and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.
2. Wear an antistatic wrist strap.
3. Do all preparation work on a static-free surface.
4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.
5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.



Important:

Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Safety Precautions

- Use the correct DC / AC input voltage range.
- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging in the power cord.
- There is danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent specifications of batteries recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.
- Keep this system away from humid environments.
- Make sure the system is placed or mounted correctly and stably to prevent the chance of dropping or falling may cause damage.
- The openings on the system shall not be blocked and shall be kept in distance from

other objects to make sure of proper air ventilation to protect the system from overheating.

- Dress the cables, especially the power cord, so they will not be stepped on, in contact with high temperature surfaces, or cause any tripping hazards.
- Do not place anything on top of the power cord. Use a power cord that has been approved for use with the system and is compliant with the voltage and current ranges required by the system's electrical specifications.
- If the system is to be unused or stored for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
- If one of the following occurs, consult a service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated the system.
 - The system has been exposed to moisture.
 - The system is not working properly.
 - The system is physically damaged.
- The unit uses a three-wire ground cable which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace the outlet.
- Disconnect the system from the electricity outlet before cleaning. Use a damp cloth for cleaning the surface. Do not use liquid or spray detergents for cleaning.

Chapter 1 - Introduction

► Specifications

SYSTEM	Processor	Intel Atom® Processor E3900 Series, BGA 1296 x7-E3950 Processor, Quad Core, 2M Cache, 1.6GHz (2.0GHz), 12W x5-E3940 Processor, Quad Core, 2M Cache, 1.6GHz (1.8GHz), 9W x5-E3930 Processor, Dual Core, 2M Cache, 1.3GHz (1.6GHz), 6.5W
	Memory	1 SODIMM Memory Support up to 8GB Single Channel DDR3L 1600/1866MHz
	BIOS	Insyde SPI 64Mbit
GRAPHICS	Controller	Intel® HD Graphics
	Display	1 x HDMI 1 x DVI-I HDMI: resolution up to 3840x2160 @ 60Hz DVI-I: resolution up to 2560x1600 @ 60Hz
	Dual Displays	HDMI + DVI-I
STORAGE	External/Internal	4GB/8GB/16GB/32GB eMMC Onboard (available upon request)
EXPANSION	Interface	1 x Full-size Mini PCIe (PCIe/USB/Daul micro SIM) 1 x Full-size Mini PCIe (PCIe/USB/micro SIM) 1 x Half-size mSATA
ETHERNET	Controller	2 x Intel® I210AT PCIe (10/100/1000Mbps)
GPS	GPS	u-blox NEO-M8N onboard NEO-M8U/L as option to support Dead Reckoning
LED	Indicators	1 x Power LED 1 x Storage LED
FRONT I/O	Display	1 x HDMI 1 x DVI-I
	DIO	8-bit Isolated DIO up to 30V Input 4 x DI 4 x DO
	CAN-Bus	Supports dual canbus via x1 DB9 port
	Buttons	1 x Reset Button
	Audio	1 x Speaker Out with Dual 5w Amp

REAR I/O	Ethernet	2 x GbE (RJ-45)
	Serial	1 x RS-232/422/485 (DB-9)
	USB	2 x USB 2.0 (type A) 2 x USB 3.0
	Antennas	1 x SMA Antenna Hole 1 x FME Antenna Hole
WATCHDOG TIMER	Output & Interval	System Reset, Programmable via Software from 1 to 255 Seconds
POWER	Type	Wide Range 9~36V with Vehicle Control
	Connector	3-pin Terminal Block (VCC/IGN/GND)
OS SUPPORT		Windows 10 64-bit Linux CentOS 7
MECHANISM	Construction	Aluminum + SPGC Metal
	Mounting	Wall/VESA Mount
	Dimensions	180mm x 50mm x 121.2mm (W x H x D)
ENVIRONMENT		Operating Temperature: -40 to 70°C Storage Temperature: -40 to 85°C
COMPLIANCE	Shock	MIL-STD-810G 516.6
	Vibration	MIL-STD 810G 514.6C-3
	Certifications	CE/FCC Class B/E-mark (E13)



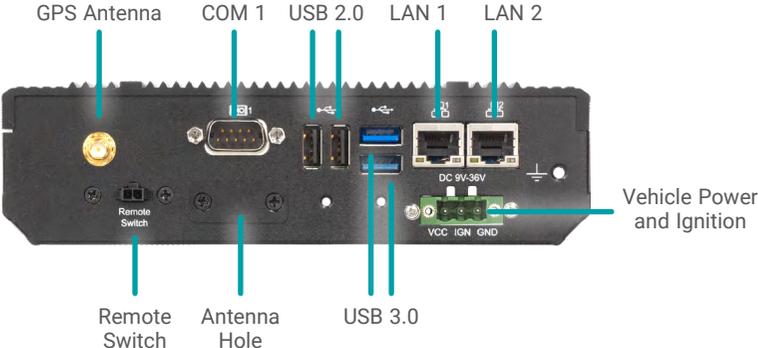
The specifications listed here may be based on editions that do not resemble your actual products. Please visit the download page at go.dfi.com/VC230-AL, or via the QR code to the right for the latest datasheet.



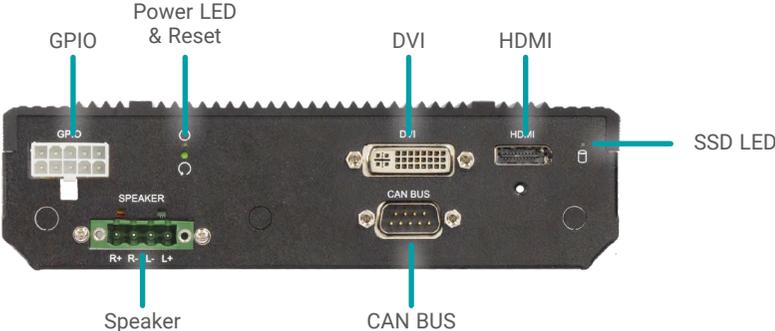
Chapter 2 - Hardware Installation

► Overview

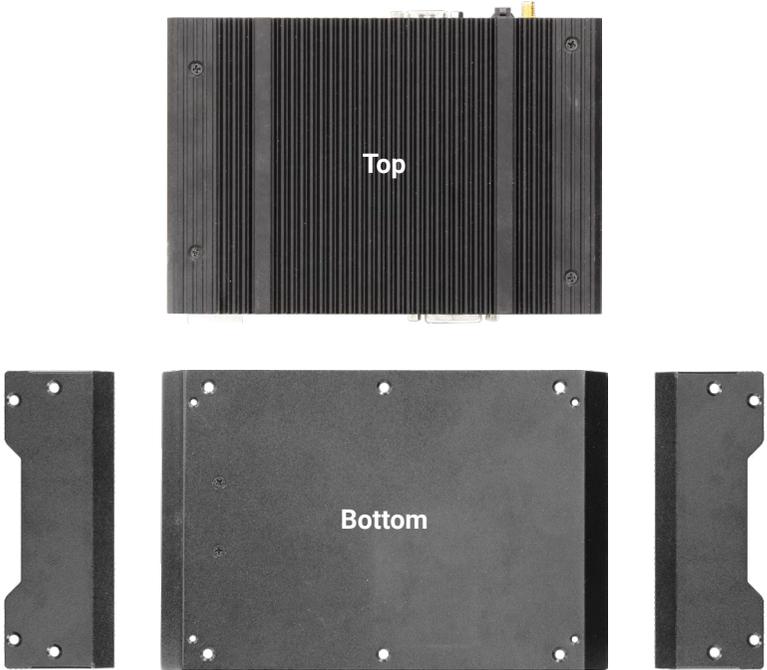
Front Panel



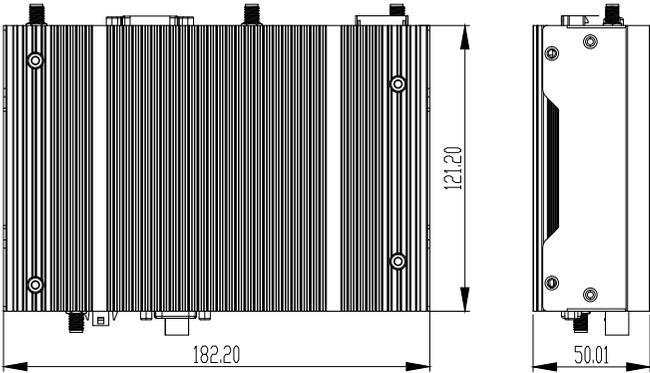
Rear Panel



Top, Bottom, and Sides



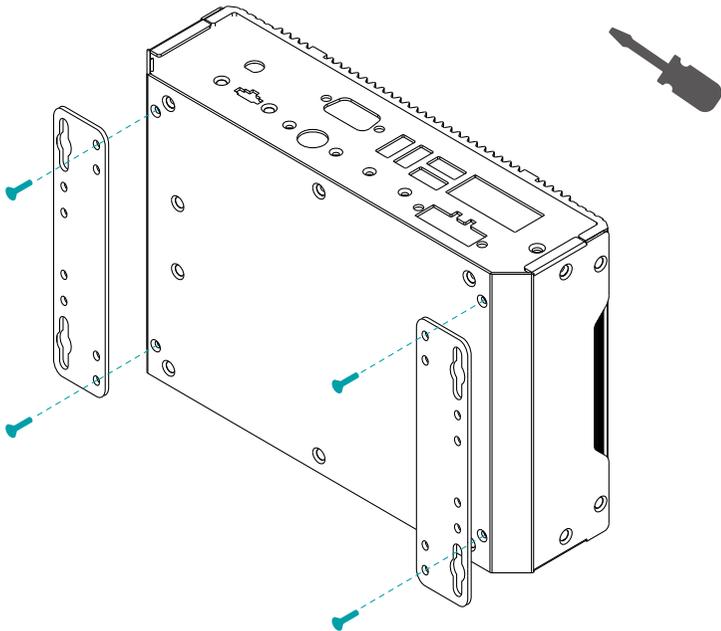
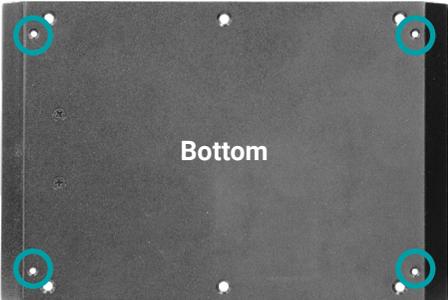
Dimensions



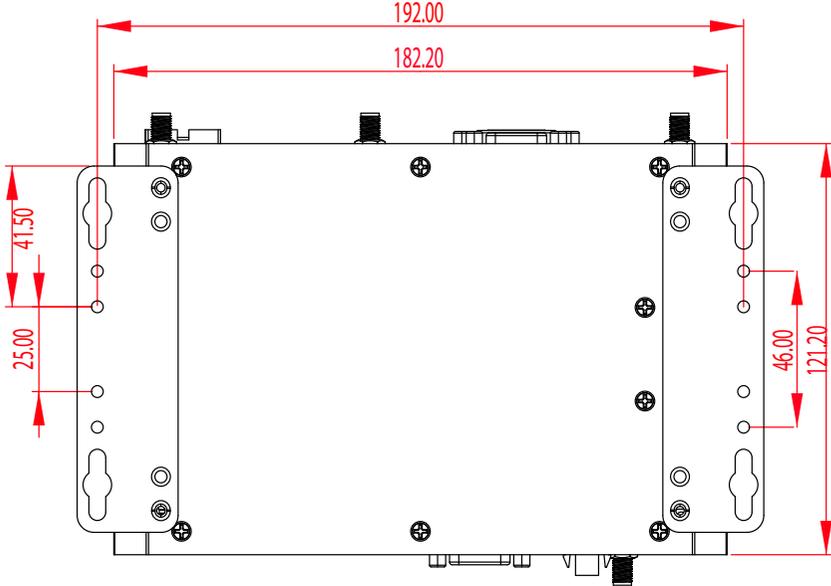
► **Wall Mount**

Wall Mount Bracket Installation

The wall mount kit containing two mounting brackets – purchased as optional items – can be attached to the bottom of the system for mounting onto desired locations, such as walls, stands, or shelves. Locate the mounting holes on the bottom of the system as shown in the photo. Screw on the two brackets onto the system with four screws as illustrated below.



The pre-drilled mounting holes on the brackets allow for different wall mount distances.



► Assembly

Overview

The system is assembled in the following procedure. To disassemble, please carry out the procedure in the reversed order.

- 1. Attach the front and rear panels to the system board.
- 2. Attach the top cover to the assembly.
- 3. Attach power board brackets and power board.
- 4. Attach the bottom cover.

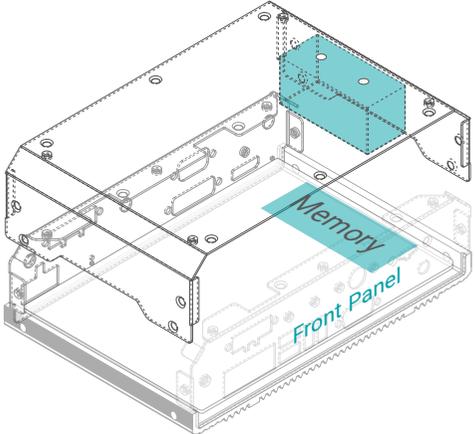
The power board sits parallel to the system board, and may hinder the installation of particular internal I/O interfaces. Please remove the power board first to access the internal I/O.

Bottom Cover

The internal I/O of the system is mainly accessed via the bottom side. The bottom metal cover is secured onto the chassis with 14 F3*5 zinc-coated screws located at both sides and on the bottom. Use a Phillips screwdriver to unscrew them.

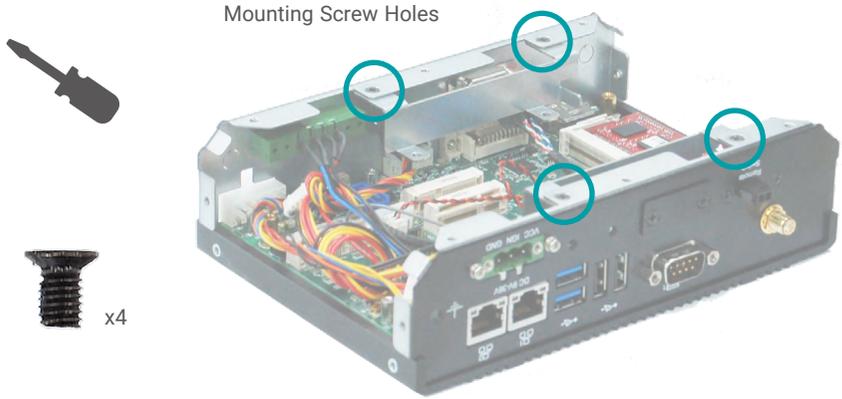


For particular models, there is a memory heatsink attached to the inside of the bottom cover. When installing, orient the bottom cover so that the heatsink sits right on top of the memory.

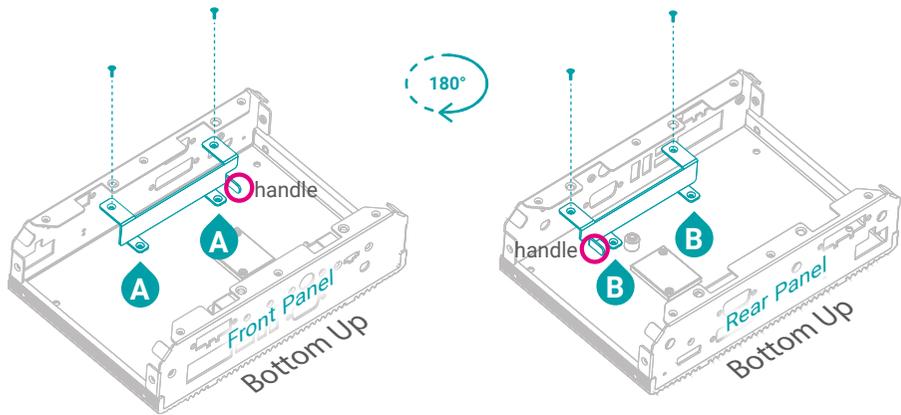


Power Board

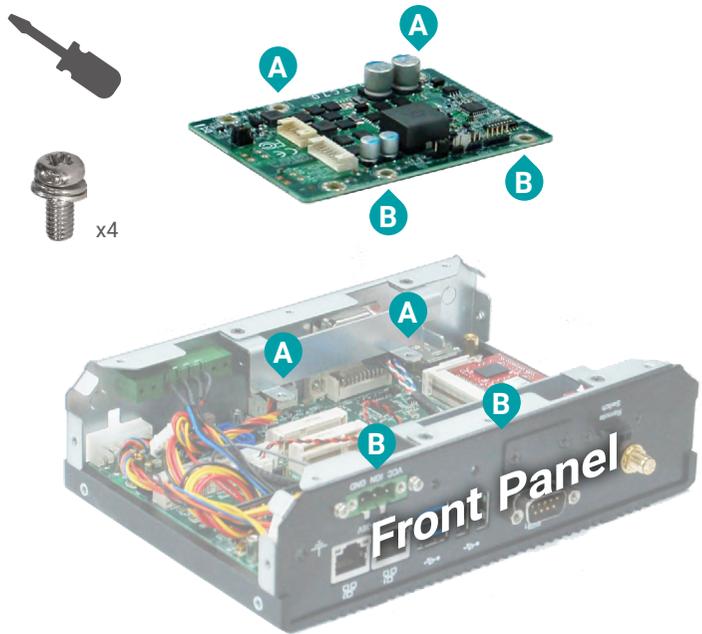
The power board is secured in the chassis via two brackets installed onto the front and the rear panel. The mounting screw holes are as shown in the photo. Locate and align the mounting holes, and screw the brackets to the chassis tight. Please make sure the brackets are oriented correctly as illustrated. The two brackets shall perfectly mirror each other. The handles shall be closer to the SO-DIMM socket on the mother board.



► Assembly



Align the four mounting holes of the power board with those on the bracket as indexed. The I/O interfaces of the power board shall be facing up and away from the motherboard. Place the board onto the brackets and then screw in the four M3*6 spring screws tight as shown below.

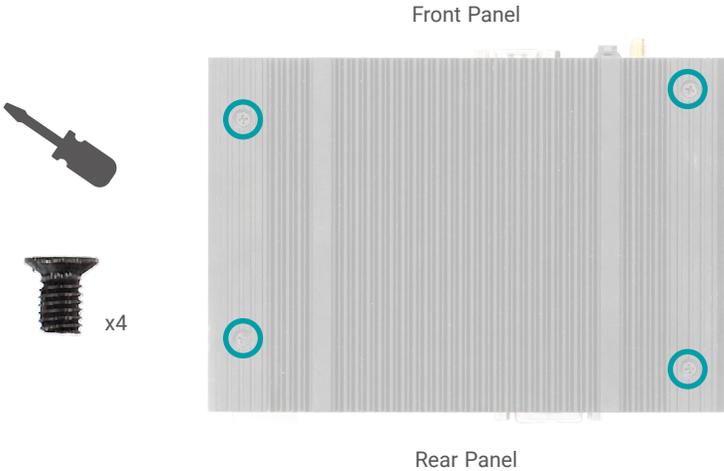


The result shall resemble the photo below. Connect the cables to the power board as necessary.



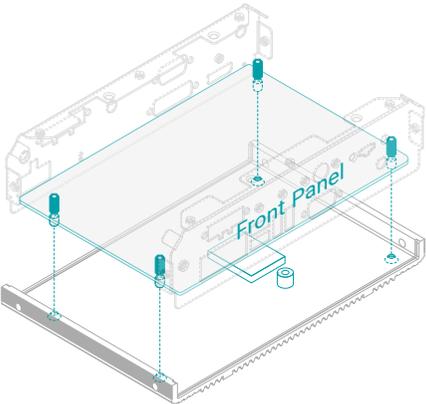
Top Cover

The top cover is secured onto the system board's brass stand-offs at four corners.

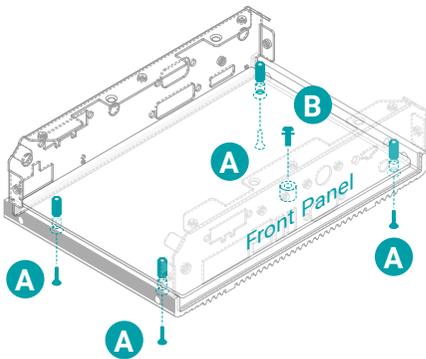
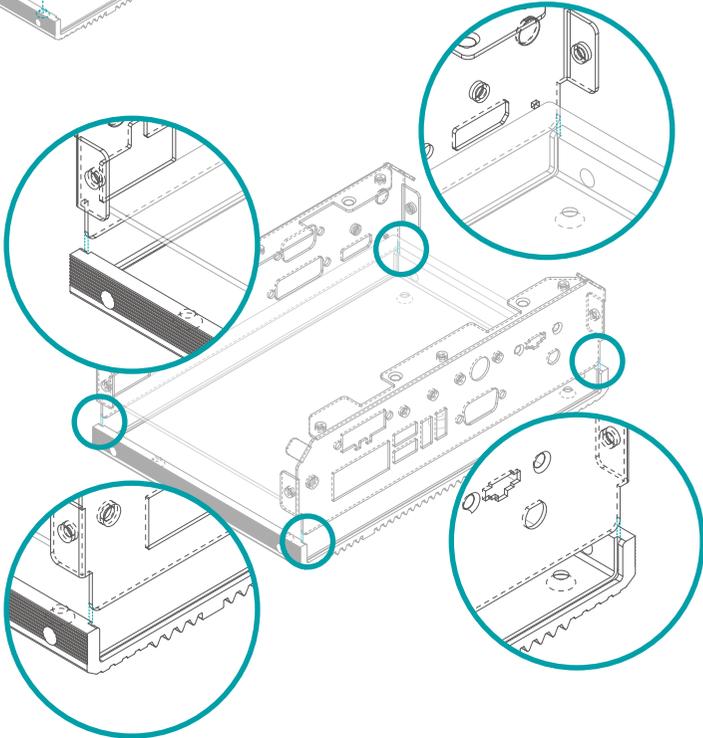


► Assembly

To install the top cover, we suggest that the top cover be placed on a work surface with the inside facing upward. The location of the stand-offs and the top cover screw holes are as illustrated below. Orient the assembly of system board and panels so that ...



1. the CPU on the system board sits right on top of the interface metal on the inside of the top cover;
2. the brass stand-offs on the system board align with the screw holes on the top cover;
3. the front and rear panels sink into the indentations along the long edges of the top cover.



After the top cover is correctly attached to the system board and panels, screw on the four F3*5 zinc-coated screws (A) at four corners, and a M3*6 spring screw (B) for making sure the CPU contacts the interface metal.

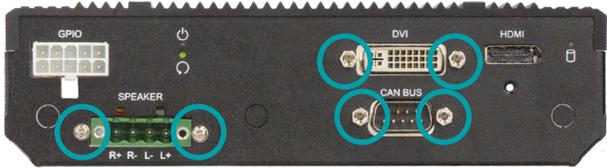


Front and Rear Panels

The front and rear panels are secured onto the system board via the I/O stand-offs and screws as shown below.



Front Panel



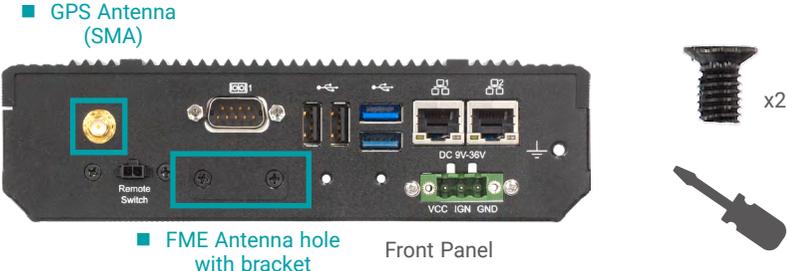
Rear Panel



► Assembly

Antenna

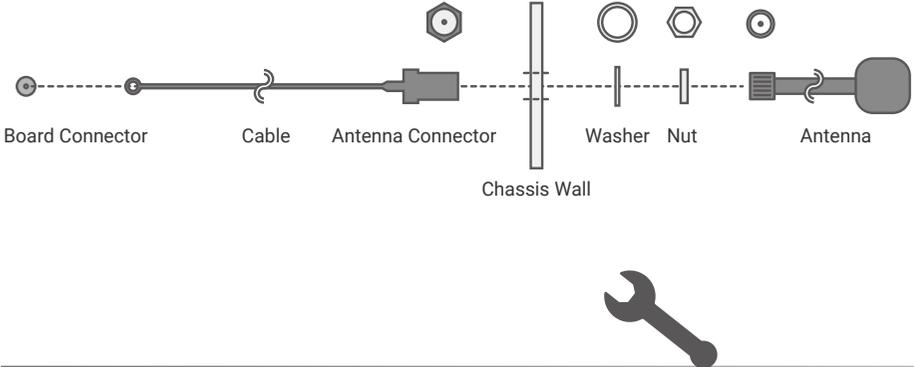
Besides the GPS antenna, there is an additional antenna hole reserved on the front panel and by default covered by a metal bracket. Please remove the metal bracket by unscrewing the two zinc-coated screw prior to installing an antenna.



Before installing the antenna, please make sure that the following safety cautions are well-attended.

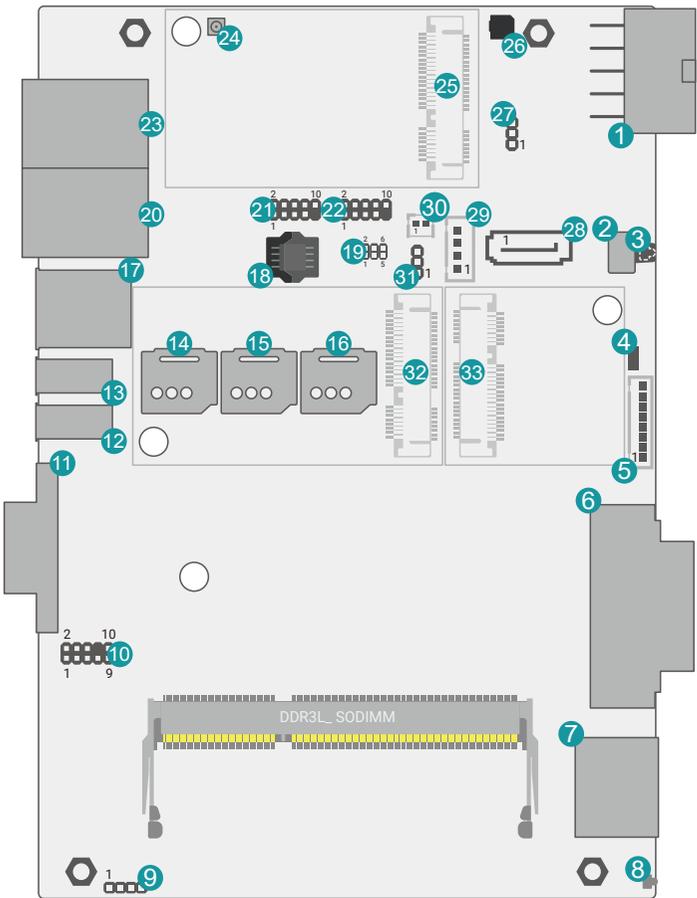
1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.

Connect the internal cable to the board's antenna connector, screw the antenna connector through the antenna hole on the front panel with washers and nuts, and screw on the antenna as illustrated below.



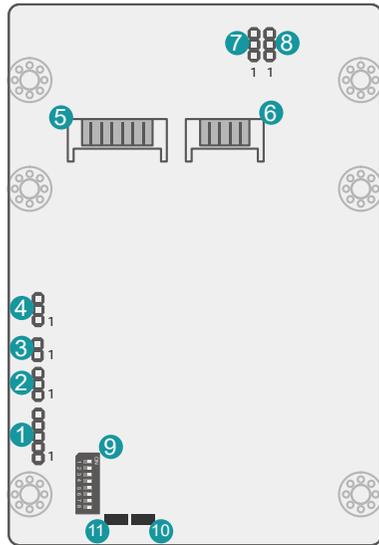
► **Board Layout**

System Board



- 1 DIO (GPIO)
- 2 Reset Button
- 3 LED1
- 4 LED3
- 5 12V DC In
- 6 VGA/DVI-I
- 7 HDMI
- 8 LED2
- 9 Speaker
- 10 Front Audio
- 11 COM1
- 12 USB 7 (USB 2.0)
- 13 USB 6 (USB 2.0)
- 14 Micro SIM (via Mini PCIe 1)
- 15 Micro SIM (via Mini PCIe 1)
- 16 Micro SIM (via Mini PCIe 2)
- 17 USB 1/2 (USB 3.0)
- 18 SPI Flash BIOS
- 19 SMBus
- 20 LAN1
- 21 USB 1/2 (USB 2.0)
- 22 USB 3/4 (USB 2.0)
- 23 LAN2
- 24 Antenna
- 25 Mini PCIe 2
- 26 Buzzer
- 27 JP3
- 28 SATA
- 29 SATA Power
- 30 Battery
- 31 JP2
- 32 Mini PCIe 1
- 33 mSATA

Power Board

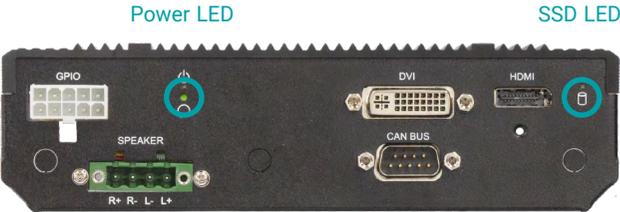
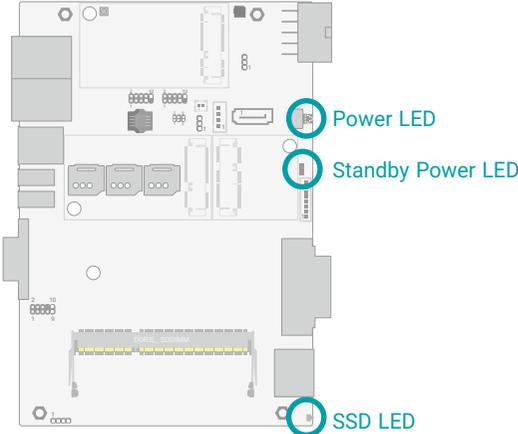


- 1 ST-Link / SWD
- 2 MCU Debug
- 3 Remote Switch
- 4 JP2
- 5 12V DC Out
- 6 9V~36V In
- 7 JP4
- 8 JP3
- 9 SW1
- 10 LED1
- 11 LED2

Important:
 Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

► LEDs

System Board

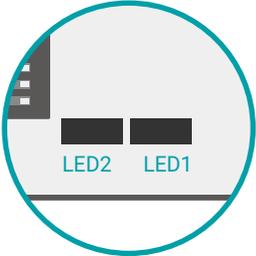
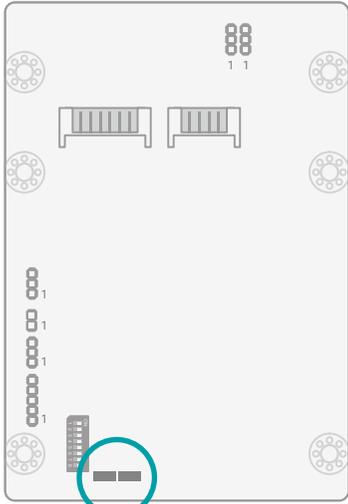


Rear Panel



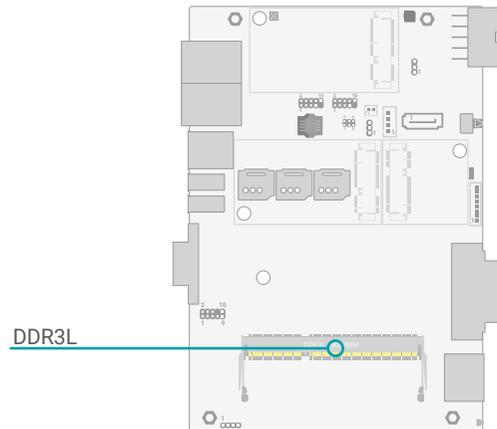
Important: When the Standby Power LED lights up, it indicates that there is power on the system board. Power-off the PC then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the motherboard and components.

Power Board



- LED2 (Green): R/W LED
- LED1 (Red): Debug LED for the MCU

► **System Memory**



The system board supports the following memory interface.

Single Channel (SC)

Data will be accessed in chunks of 64 bits from the memory channels.

Features

- One SO-DIMM Memory up to 8GB
- Single Channel DDR3L 1600/1866MHz

Installing the SO-DIMM Module

Before installing the memory module, please make sure that the following safety cautions are well-attended.

1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the SO-DIMM socket on the system board
4. Make sure the notch on memory card is aligned to the key on the socket.



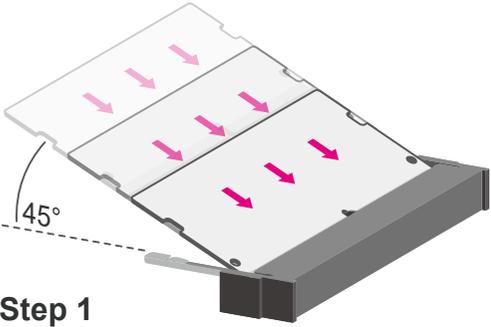
◀◀◀ **DDR3 SO-DIMM**



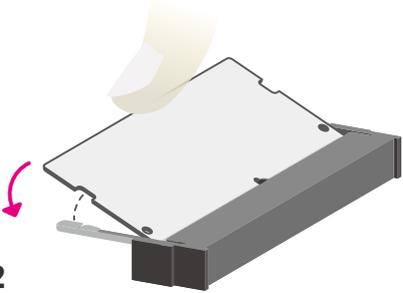
◀◀◀ **Socket Top View**

▶ System Memory

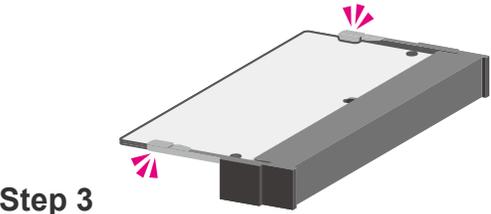
Please follow the steps below to install the memory card into the socket.



Step 1:
Insert the memory card into the slot while making sure 1) the notch and the key are aligned, and 2) the non-connector end rises approximately 45 degrees horizontally. Press the card firmly into the socket while applying and maintaining even pressure on both ends.



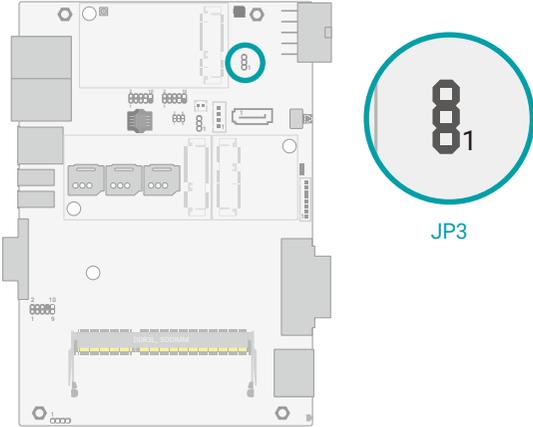
Step 2:
Press the end of the card far from the socket down while making sure the retention notch and the clip align as indicated by the dotted line in the illustration. If the retention notch and the clip do not align, please remove the card and re-insert it. Press the card all the way down.



Step 3:
The clips snap automatically and abruptly to the retention notches of the card sounding a distinctive click, and lock the card in place. Inspect that the clip sits in the notch. If not, please pull the clips outward, release and remove the card, and mount it again.

▶ Jumper Settings (System Board)

Clear CMOS (JP3)



If any anomaly of the followings is encountered –

- a) CMOS data is corrupted;
- b) you forgot the supervisor or user password;
- c) failure to start the system due to BIOS mis-configuration

– it is suggested that the system be reconfigured with default values stored in the ROM BIOS. To load the default values stored in the ROM BIOS, please follow the steps below.

1. Power-off the system and unplug the power cord.
2. Put a jumper cap on JP3's pin 2 and pin 3. Wait for a few seconds and set JP3 back to its default setting, i.e. jumper cap on pin 1 and pin 2.
3. Plug the power cord and power-on the system.



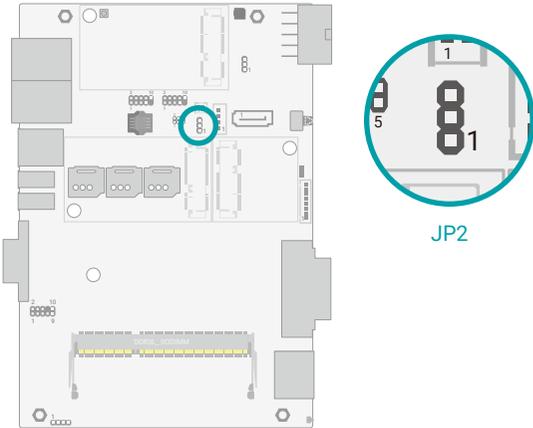
■ 1-2 On: Normal (default)



■ 2-3 On: Clear CMOS

► Jumper Settings (System Board)

Front Panel (JP2)



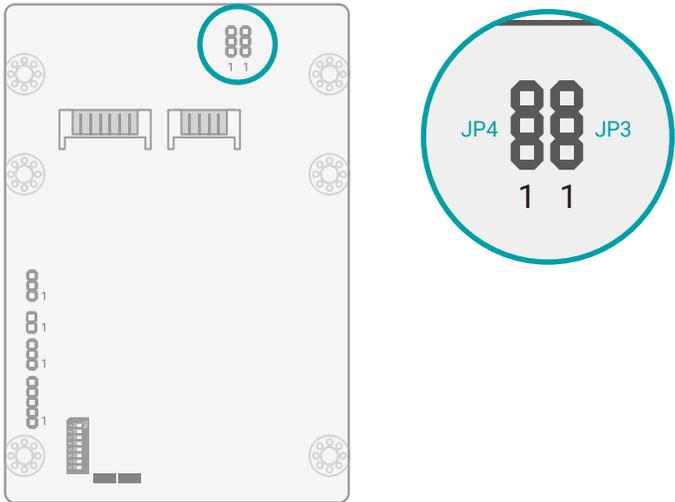
Power Switch
This jumper is used to power on or off the system.

■ Front Panel Pin Assignment

Pin	Assignment
1	Power Button
2	GND
3	N.C.

► Jumper Settings (Power Board)

Host Bus Communication



The two jumpers are for selecting the signals for the bus used for the system to monitor the power board. Both JP4 and JP3 shall be set to the same settings, either 1-2 On or 2-3 On as illustrated below.



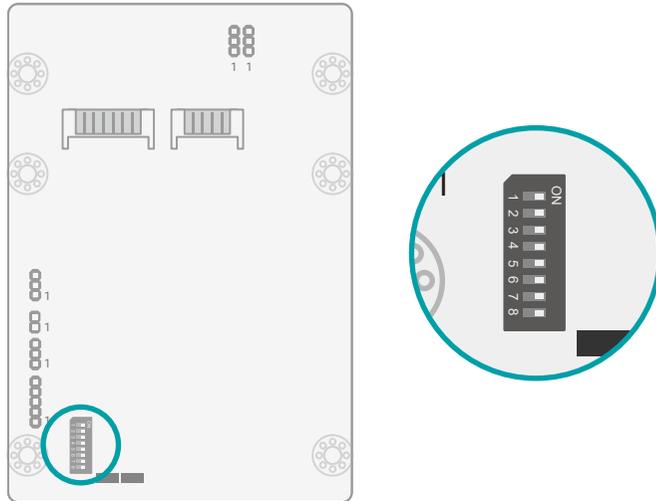
■ 1-2 On: Reserved



■ 2-3 On: TX/RX UART (default)

► Jumper Settings (Power Board)

SW1



The eight switches are for configuring power related setups detailed in the following sections.



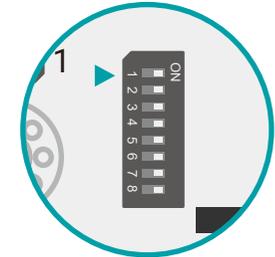
Important:
 Power-off the system and then unplug the power cord prior to setting the switches. Failure to do so will cause severe damage to the system and components.

24V / 12V Select

1 Output Voltage

On 12V (default)

Off 24V

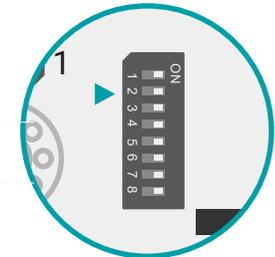


POWER ON Delay Switch

2 Delay On/Off

On On, delay duration defined by 4 and 5

Off Off, delay = 3 seconds by default

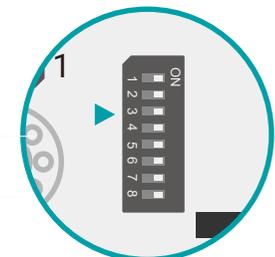


POWER OFF Delay Switch

3 Delay On/Off

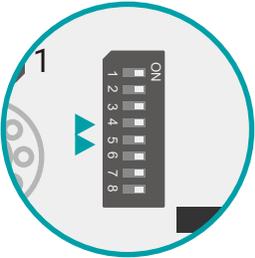
On On, delay duration defined by 6, 7, and 8

Off Off, delay = 0 second by default



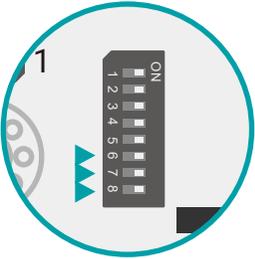
POWER ON Delay Time Select

5	4	Delay Duration
On	On	10 seconds
On	Off	30 seconds
Off	On	1 minute
Off	Off	5 minutes

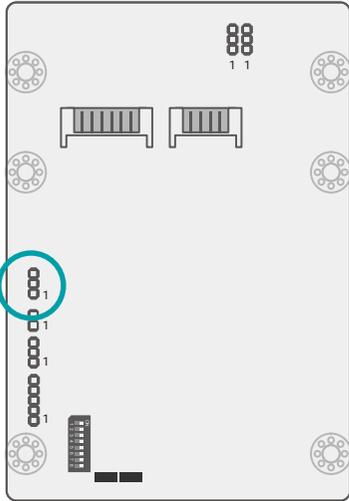


POWER OFF Delay Time Select

8	7	6	Delay Duration
On	On	On	30 seconds
On	On	Off	1 minute
On	Off	On	3 minutes
On	Off	Off	5 minutes
Off	On	On	10 minutes
Off	On	Off	15 minutes
Off	Off	On	30 minutes
Off	Off	Off	1 hour



Remote Switch High/Low Active (JP2)



JP2 is for selecting the remote switch signal using high or low level voltage.



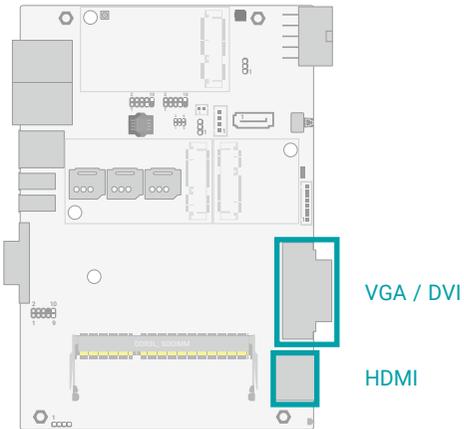
■ 1-2 On: High Active (default)



■ 2-3 On: Low Active

I/O Ports (System Board)

Graphics Display



Rear Panel

HDMI

The HDMI port which carries both digital audio and video signals is used to connect a LCD monitor or digital TV that has the HDMI port.

DVI-I Port

The DVI-I port is used to connect a LCD monitor. This port supports DVI-D signal only. Connect the display device's cable connector to the DVI-I port. After plugging the cable connector into the port, gently tighten the cable screws to hold the connector in place.

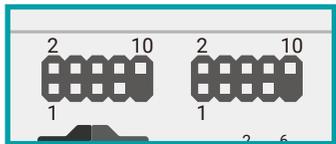
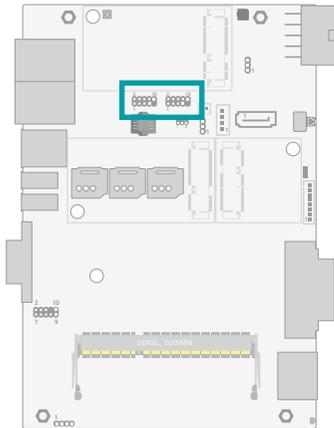
VGA (Optional)

The VGA port is used for connecting a VGA monitor. Connect the monitor's 15-pin D-shell cable connector to the VGA port. After you plug the monitor's cable connector into the VGA port, gently tighten the cable screws to hold the connector in place.

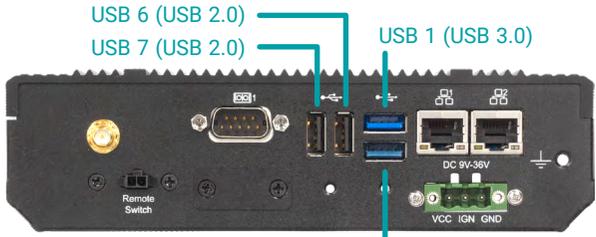
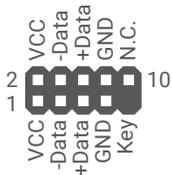
Driver Installation

Install the graphics driver. Please refer to Chapter 4 for more information.

USB Ports



USB 1/2 USB 3/4 (USB 2.0)



Front Panel

USB allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals. The system board is equipped with multiple USB Type A ports at the front panel – two USB 3.0 and two USB 2.0 ports – along with four internal USB 2.0 pin-header ports.

Wake-On-USB Keyboard/Mouse

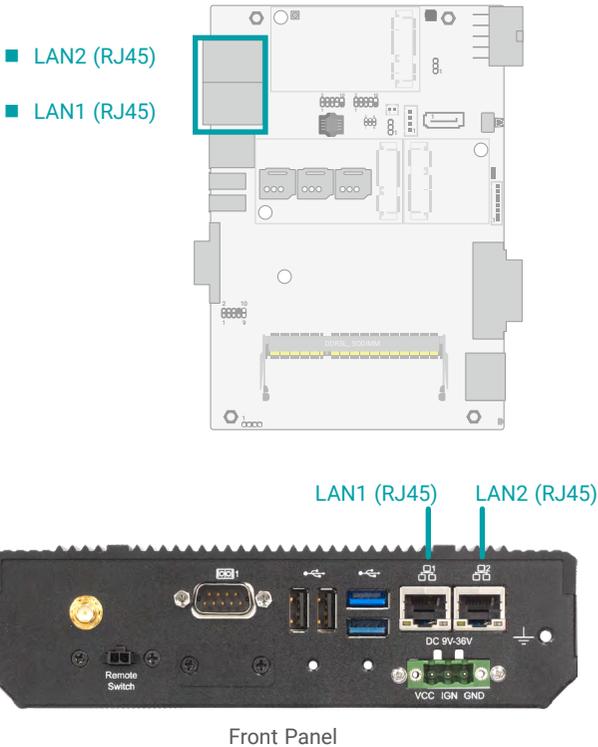
The Wake-On-USB Keyboard/Mouse function allows you to use a USB keyboard or USB mouse to wake up a system from the S3 (STR - Suspend To RAM) state.

BIOS Setting

Configure USB devices in the Advanced menu ("USB Configuration" submenu) of the BIOS. Refer to Chapter 7 for more information.

I/O Ports (System Board)

RJ45 LAN Ports



The LAN port allows the system board to connect to a local area network by means of a network hub.

BIOS Setting

Configure the onboard LAN ports in the Advanced menu ("ACPI Configuration" submenu) of the BIOS. Refer to the chapter 3 for more information.

Driver Installation

Install the LAN drivers. Refer to the chapter 4 for more information.

Features

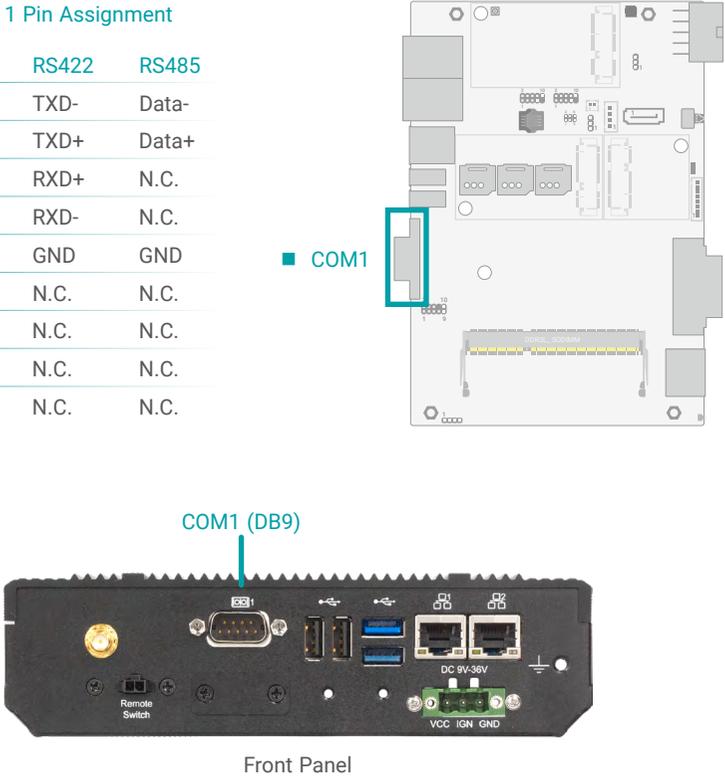
- 2 x Intel® I210AT PCIe (10/100/1000Mbps) LAN controllers

I/O Ports (System Board)

COM (Serial) Port

- COM 1 Pin Assignment

Pin	RS232	RS422	RS485
1	DCD-	TXD-	Data-
2	RD	TXD+	Data+
3	TD	RXD+	N.C.
4	DTR-	RXD-	N.C.
5	GND	GND	GND
6	DSR-	N.C.	N.C.
7	RTS-	N.C.	N.C.
8	CTS-	N.C.	N.C.
9	RI-	N.C.	N.C.



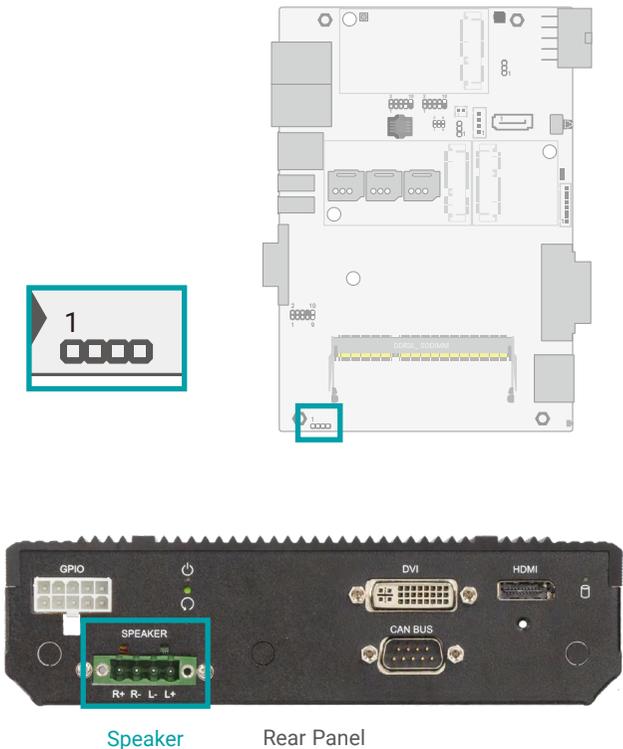
The serial ports are asynchronous communication ports with 16C550A-compatible UARTs that can be used with modems, serial printers, remote display terminals, and other serial devices.

BIOS Setting

Configure the COM ports including its communication mode in the Advanced menu ("Super IO Configuration" submenu) of the BIOS. Refer to Chapter 3 for more information.

I/O Ports (System Board)

Speaker



Speaker Rear Panel

The speaker connector is for audio output and sound amplification via external amplifiers and speakers. The speaker connector (terminal block) at the rear panel is connected to the speaker pin headers via a converter cable. Please make sure the left/right channel wires are correctly installed as printed on the panel and listed here.

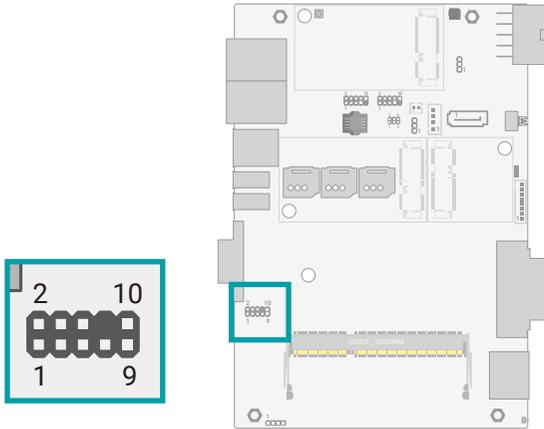
The terminal block is also secured onto the rear panel via two spring screws.

Speaker Pin Assignment

Pin	Assignment
1	SPK_Out_L+
2	SPK_Out_L-
3	SPK_Out_R-
4	SPK_Out_R+

I/O Ports (System Board)

Front Audio



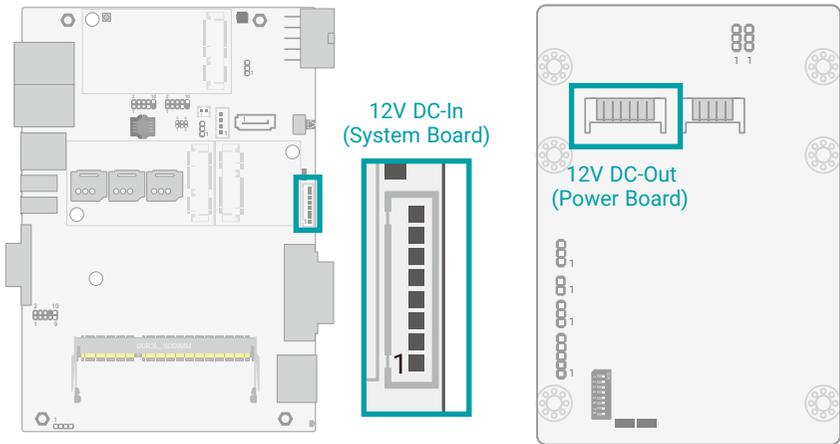
The Front Audio internal connector allows you to connect to the second line-out and mic-in jacks that are at the front panel of your system.

Front Audio Pin Assignment

Pin	Assignment	Pin	Assignment
1	Mic2-L	2	GND
3	Mic2-R	4	N.C.
5	Line2-R	6	Mic2-JD (sense)
7	GND	8	---
9	Line2-L	10	Line2-JD (sense)

I/O Ports (System Board)

12V DC-In



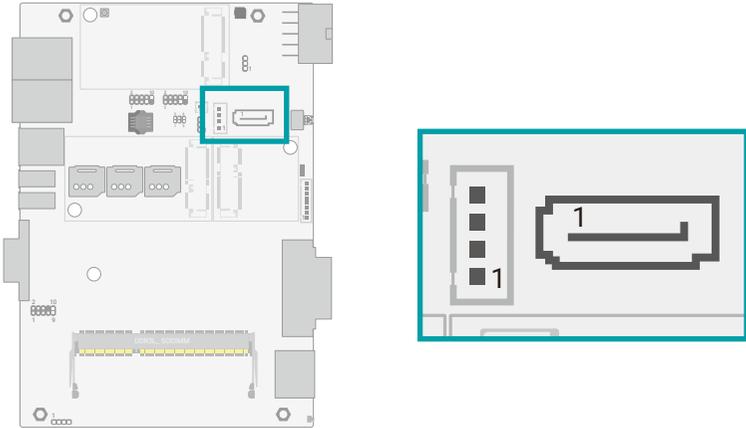
The 12V DC-In box headers are designed to connect to the power board which acts as a power converter (9~36V to 12V) and ignition signal relay. Please refer to the 12V DC-Out connector on the power board for more information.

12V DC-In Pin Assignment

Pin	Assignment
1	GND
2	GND
3	Power Off
4	SOUT
5	SIN
6	12VSB
7	12VSB
8	12VSB

I/O Ports (System Board)

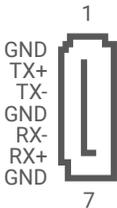
SATA (Serial ATA) Connectors



The Serial ATA (SATA) connectors are used to connect the Serial ATA device. SATA 3.0 is supported by the five SATA ports and provides data rate up to 6Gb/s. Connect one end of the Serial ATA cable to a SATA connector and the other end to your Serial ATA device.

BIOS Setting

Configure the Serial ATA drives in the Advanced menu ("SATA Configuration" submenu) of the BIOS. Refer to chapter 3 for more information.



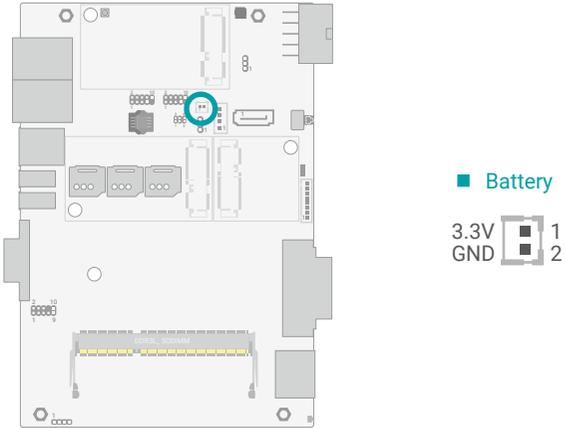
SATA 3.0 Pin Assignment



SATA Power Pin Assignment

I/O Ports (System Board)

Battery



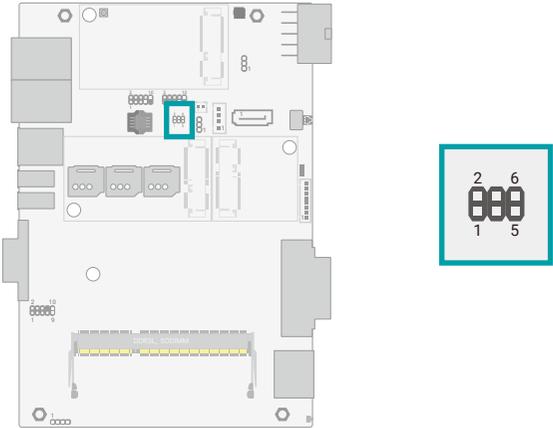
The external lithium ion battery supplies power to the real-time clock and CMOS memory as an auxiliary source of power when the main power is shut off.

Safety Measures

- There exists explosion hazard if the battery is incorrectly installed.
- Replace only with the same or equivalent type recommended by the manufacturer.
- Dispose of used batteries according to local ordinances.

I/O Ports (System Board)

SMBus



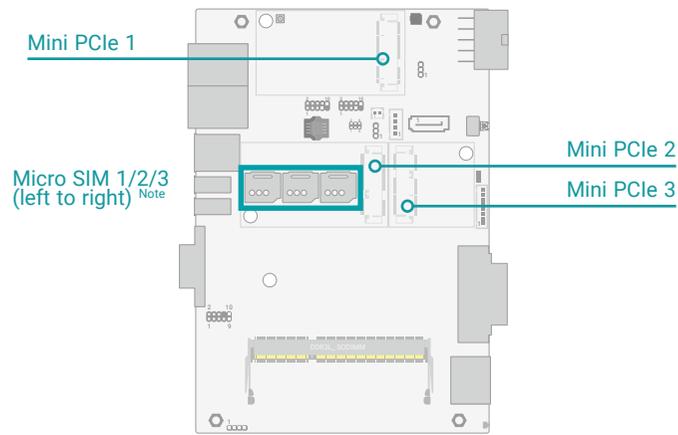
The SMBus (System Management Bus) connector is used to connect the SMBus device. It is a multiple device bus that allows multiple chips to connect to the same bus and enable each one to act as a master by initiating data transfer.

■ SMBus Pin Assignment

Pin	Assignment	Pin	Assignment
1	3V3SB	2	GND
3	SMB_CLK_RESUME	4	SMB_DATA_RESUME
5	SMBALERT-	6	N.C.

► I/O Ports (System Board)

Expansion Slots



Mini PCIe

The Mini PCIe sockets allow for Mini PCIe modules that support multiple expansion modules. Mini PCIe 1/2 support full-size Mini PCIe modules for PCIe and USB signals. Mini PCIe 3 supports a half-size Mini PCIe module for mSATA storage.

Micro SIM

The three Micro SIM sockets allow for Micro SIM cards for the system to access the subscribed telecom services.



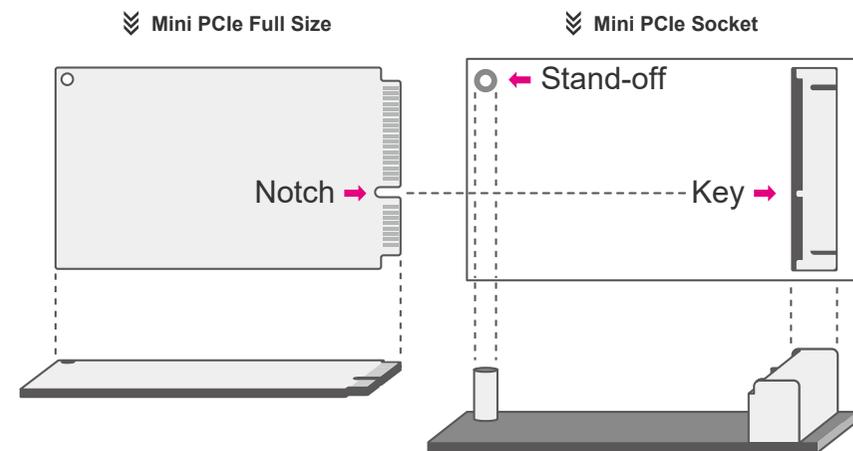
Note:

Micro SIM 1 and 2 share one signal bus of Mini PCIe 1, and only one of them can be enabled at a time via software configuration. Micro SIM 3 uses a signal bus of Mini PCIe 2.

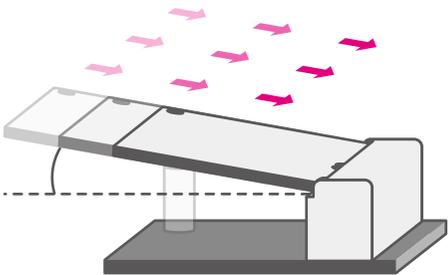
Installing the Mini PCIe Module

Before installing the Mini PCIe module into the Mini PCIe socket, please make sure that the following safety cautions are well-attended.

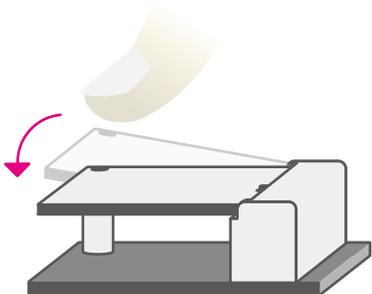
1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the Mini PCIe socket on the system board
4. Make sure the notch on card is aligned to the key on the socket.



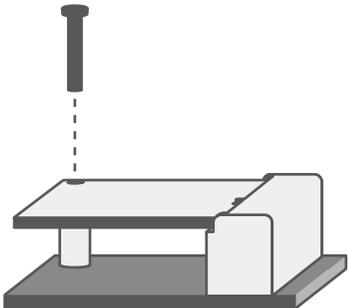
Please follow the steps below to install the card into the socket.



Step 1:
Insert the card into the socket at an angle while making sure the notch and key are perfectly aligned.



Step 2:
Press the end of the card far from the socket down until against the stand-off.



Step 3:
Screw tight the card onto the stand-off with a screw driver and a stand-off screw until the gap between the card and the stand-off closes up. The card should be lying parallel to the board when it's correctly mounted.

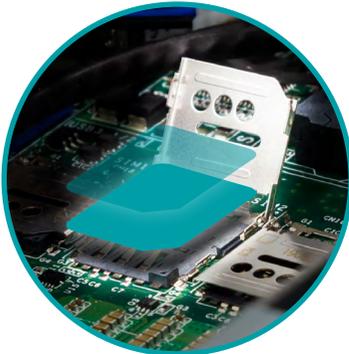
Installing Micro SIM Card



Step 1:
Slide the cover to unlock.



Step 2:
Lift the cover.



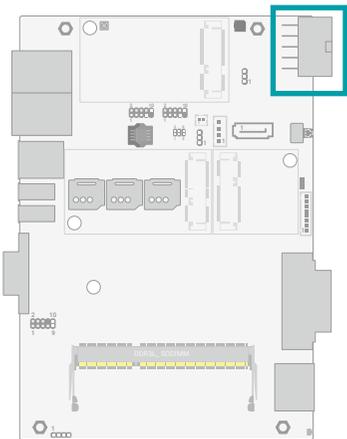
Step 3:
Orient the SIM card and place it into the socket.



Step 4:
Close the cover and slide the cover to lock.

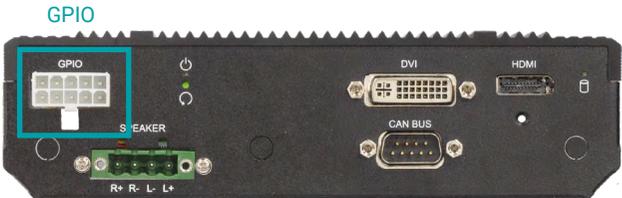
► I/O Ports (System Board)

DIO (GPIO)



■ GPIO Pin Assignment

Pin	Assignment	Pin	Assignment
1	GPI_0	2	GPI_1
3	GPI_2	4	GPI_3
5	Power	6	GPO_0
7	GPO_1	8	GPO_2
9	GPO_3	10	GND



Rear Panel

The 8-bit Digital I/O connector can be configured as 8 inputs or outputs to provide monitoring and control function to connected external devices with the following specifications:

- Input voltage: 0 to 30 VDC
- Output current: 100mA per pin and maximum of 500mA in total
- On-state voltage: open collector with 12VDC nominal

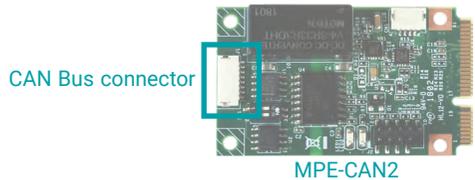
We have built support software called EAPI that enables the functionality of hardware components. Please contact our tech support or sales representatives for the support software package.

BIOS Setting

Configure the COM ports including its communication mode in the Advanced menu ("Super IO Configuration" submenu) of the BIOS. Refer to Chapter 4 for more information.

► I/O Ports (System Board)

CAN Bus (Optional)



MPE-CAN2



Rear Panel

CAN Bus

The CAN Bus connector (DB9) is for the system to integrate the vehicle's electronic controllers for up to two CAN Buses. The internal cable is connected to an Mini PCIe CAN Bus module – MPE-CAN2, which can be ordered as an optional item. Please visit go.dfi.com/MPE-CAN2 for more documentation on the MPE-CAN2 module.



Pin	Assignment	Pin	Assignment
1	CAN1_L	6	J1708_L
2	CAN1_H	7	J1708_H
3	CAN2_L	8	N.C.
4	CAN2_H	9	N.C.
5	GND		

▶ I/O Ports (System Board)

GPS Antenna

■ GPS Antenna



GPS Antenna

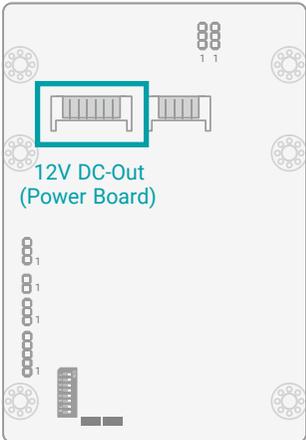
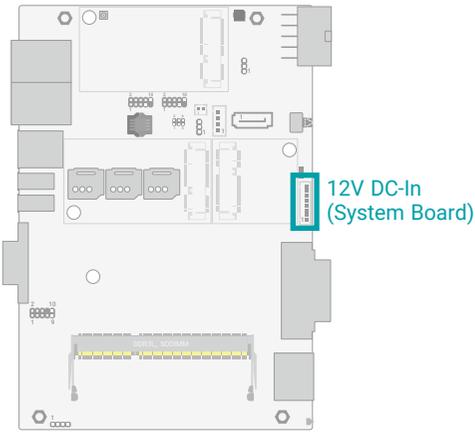


Front Panel

The GPS antenna SMA connector on the front panel is connected to the internal GPS Antenna connector via a coaxial cable. Please refer to assembly for detailed installation of the cable.

► I/O Ports (Power Board)

12V DC-Out

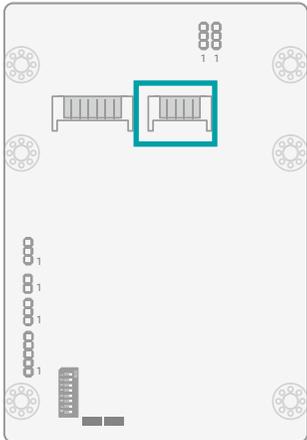


The 12V DC-Out box headers are designed to relay power and ignition signal from the power board to the system board.

■ 12V DC-Out Pin Assignment

Pin	Assignment
1	GND
2	GND
3	Power Button
4	Host TX
5	Host RX
6	12VSB
7	12VSB
8	12VSB

9V~36V In



■ 9V~36V In Pin Assignment

Pin	Assignment
1	V_In
2	V_In
3	Ignition
4	Ignition
5	GND
6	GND



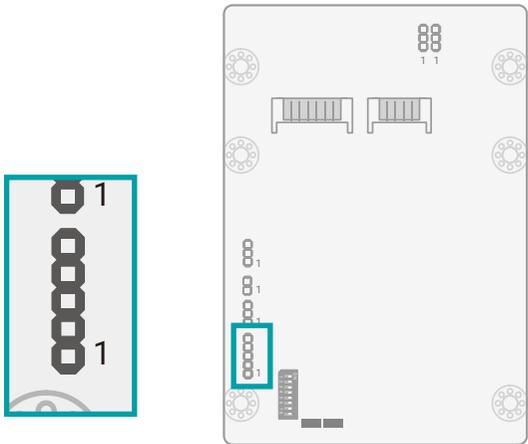
The 9V~36V In box headers are for ignition and power input to the power board, which then converts to 12VDC for output to the system board.

Jumper Settings

Power on/off, delay time, and other power related aspects can be configured via SW1 as previously instructed in this chapter.

► I/O Ports (Power Board)

MCU Connector

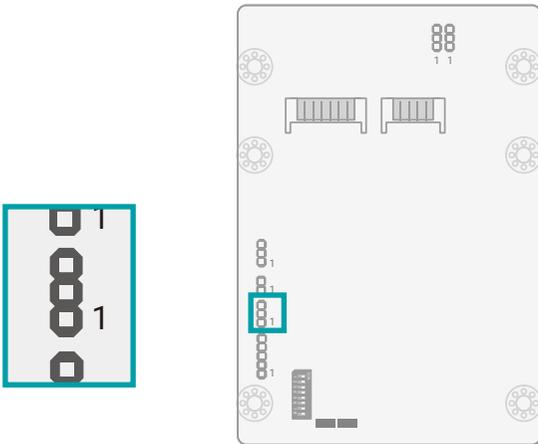


The connector is for monitoring the power board's MCU.

Pin	Assignment
1	3V
2	GND
3	SYS_SWDIO
4	SYS_SWCLK
5	STMCU_RST#

► I/O Ports (Power Board)

MCU Debug

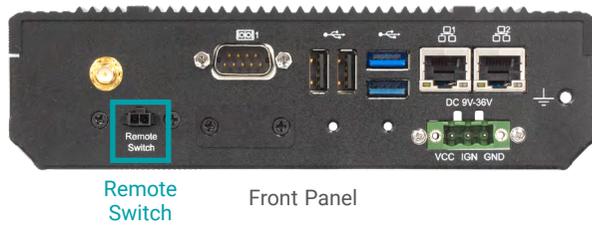
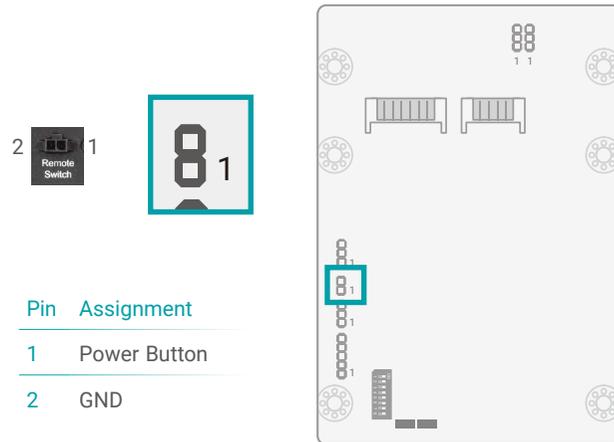


The connector is for using a UART to debug the power board.

Pin	Assignment
1	UART_TX
2	UART_RX
3	GND

► I/O Ports (Power Board)

Remote Switch



The remote switch is connected to the front panel via an internal cable. The purpose of the remote switch is for routing the power-on switch to a remote location.

Jumper Setting

Remote switch mechanism can be configured via a jumper as previously instructed in this chapter.

Chapter 3 - BIOS Settings

► Overview

The BIOS is a program that takes care of the basic level of communication between the CPU and peripherals. It contains codes for various advanced features found in this system board. The BIOS allows you to configure the system and save the configuration in a battery-backed CMOS so that the data retains even when the power is off. In general, the information stored in the CMOS RAM of the EEPROM will stay unchanged unless a configuration change has been made such as a hard drive replaced or a device added. It is possible that the CMOS battery will fail causing CMOS data loss. If this happens, you need to install a new CMOS battery and reconfigure the BIOS settings.



Note:

The BIOS is constantly updated to improve the performance of the system board; therefore the BIOS screens in this chapter may not appear the same as the actual one. These screens are for reference purpose only.

Default Configuration

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

Entering the BIOS Setup Utility

The BIOS Setup Utility can only be operated from the keyboard and all commands are keyboard commands. The commands are available at the right side of each setup screen. The BIOS Setup Utility does not require an operating system to run. After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the message "Press DEL to run setup" will appear on the screen. If the message disappears before you respond, restart the system or press the "Reset" button. You may also restart the system by pressing the <Ctrl> <Alt> and keys simultaneously.

Legends

Keys	Function
Right / Left arrow	Move the highlight left or right to select a menu
Up / Down arrow	Move the highlight up or down between submenus or fields
<Enter>	Enter the highlighted submenu
+ (plus key)/F6	Scroll forward through the values or options of the highlighted field
- (minus key)/F5	Scroll backward through the values or options of the highlighted field
<F1>	Display general help
<F9>	Optimized defaults
<F10>	Save and Exit
<Esc>	Return to previous menu

Scroll Bar

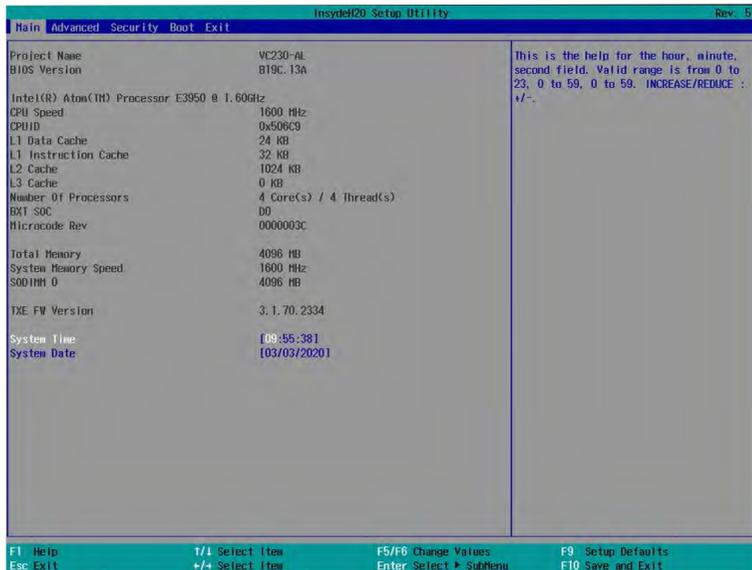
When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

Submenu

When "►" appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>.

► Main

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.



System Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

System Date

The date format is <day>, <month>, <date>, <year>. Day displays a day, from Sunday to Saturday. Month displays the month, from 01 to 12. Date displays the date, from 01 to 31. Year displays the year, from 2005 to 2099.

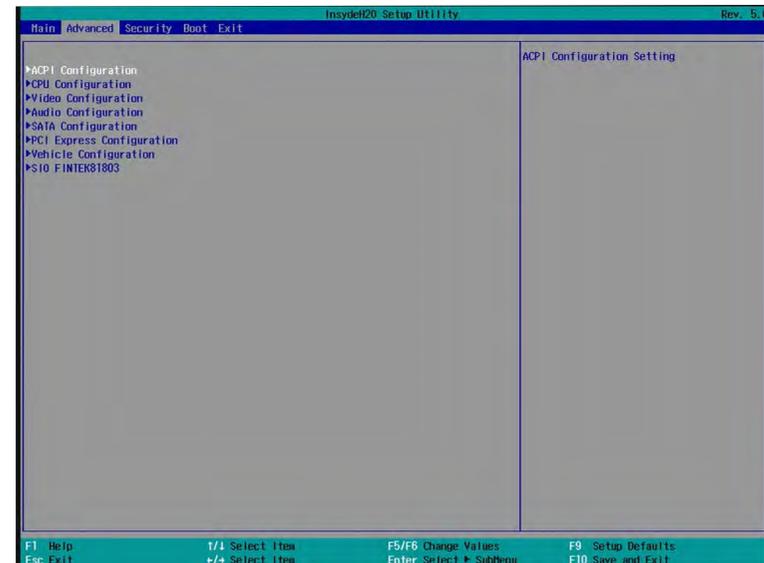
► Advanced

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.



Important:

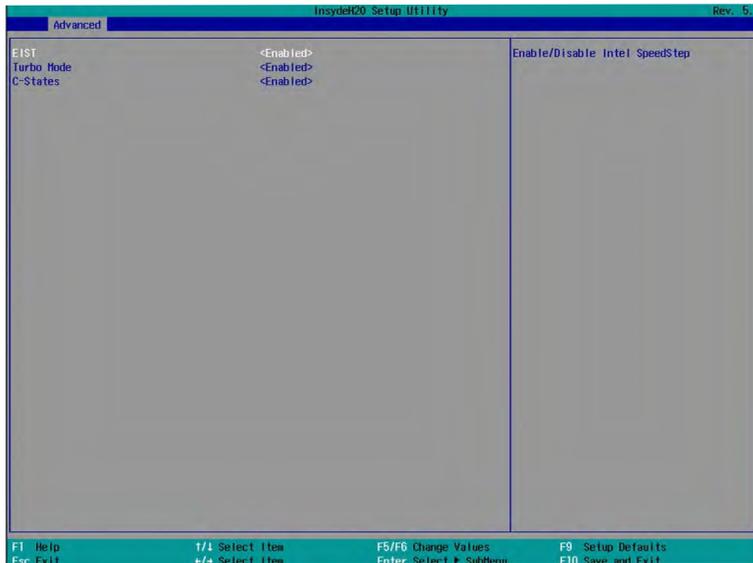
Setting incorrect field values may cause the system to malfunction.



► Advanced

CPU Configuration

Configure CPU processing related settings in this page.



Intel Speed Step

This field is used to enable or disable the Enhanced Intel SpeedStep® Technology (EIST), which helps optimize the balance between system’s power consumption and performance. After it is enabled in the BIOS, EIST features can then be enabled via the operating system’s power management.

Turbo Mode

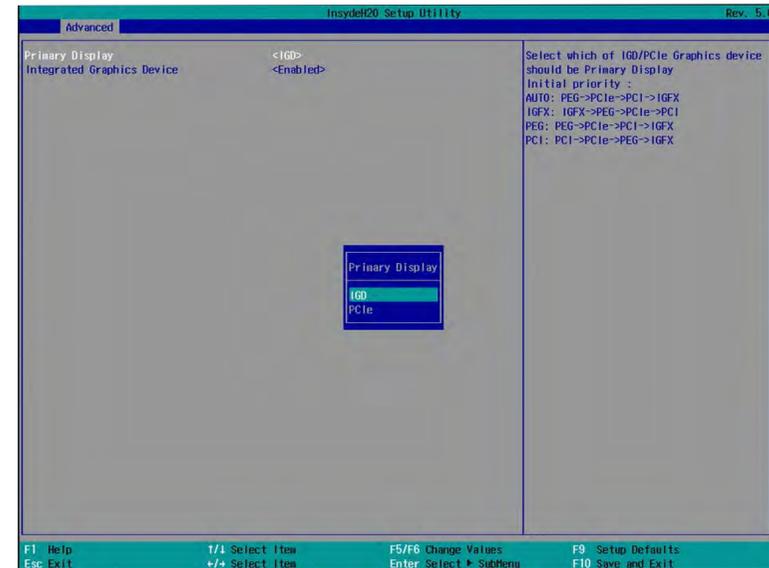
Enable or disable turbo mode of the processor. This field will only be displayed when “Intel Speed Step” is enabled. This field is not available when the equipped CPU does not support Turbo Mode.

CPU C States

Enable or disable CPU Power Management. It allows CPU to go to C States when it’s not 100% utilized.

► Advanced

Video Configuration



Primary Display

Select the primary display for the system from the following options:

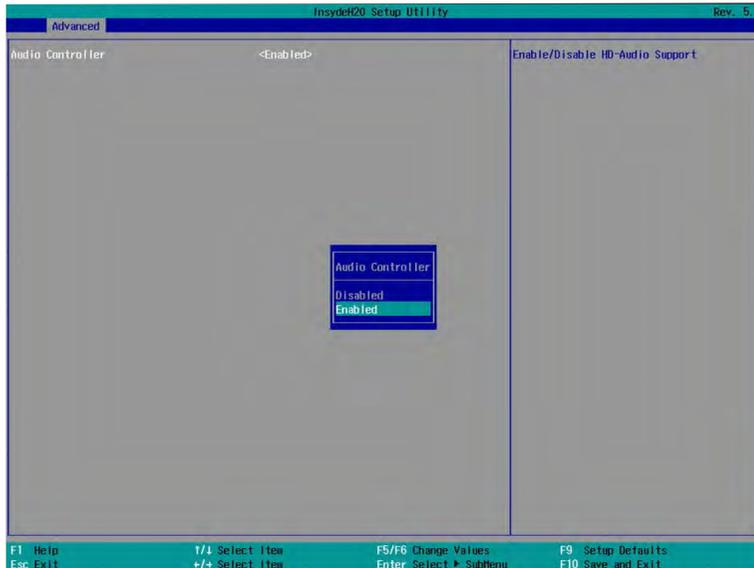
- IGD: Internal graphics device
- PCIe: PCIe graphics devices

Integrated Graphics Device

Keep IGFX enabled or disabled based on the setup options.

► Advanced

Audio Configuration



Audio Controller

Control the detection of the high-definition audio devices.

- Disabled High-definition audio devices will be unconditionally disabled.
- Enabled High-definition audio devices will be unconditionally enabled.

► Advanced

SATA Configuration



SATA Controller(s)

Enable or disable the Serial ATA controller. This following fields will only be displayed when this field is enabled.

SATA Speed

Select Serial ATA controller(s) speed – Auto, Gen1 (1.5 Gbit/s), Gen2 (3 Gbit/s) or Gen 3 (6 Gbit/s).

SATA Mode Selection

The mode selection determines how the SATA controller(s) operates.

AHCI This option allows the Serial ATA controller(s) to use AHCI (Advanced Host Controller Interface).

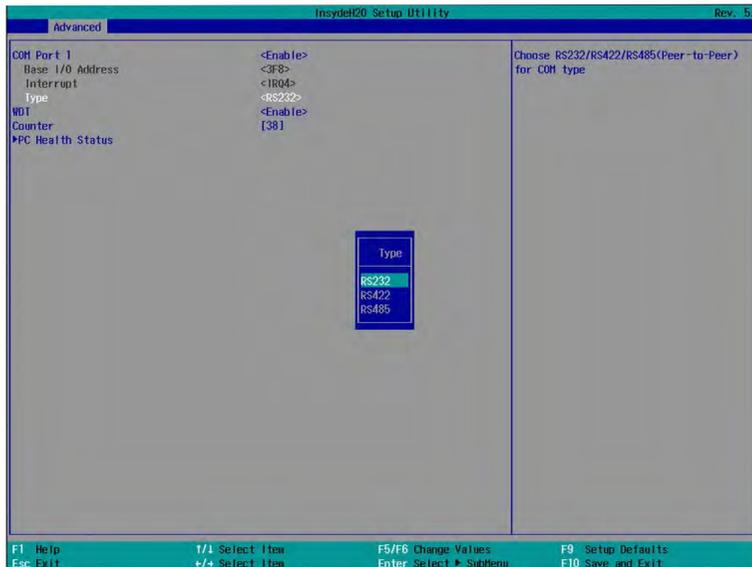
Intel RST Premium With Intel Optane System Acceleration This option allows you to create RAID or Intel Rapid Storage configuration along with Intel® Optane™ system acceleration on Serial ATA devices.

SATA Port 0, 1, 2/Hot Plug

Enable or disable each Serial ATA port and its hot plug function.

► Advanced

Super IO Configuration



COM Port 1

Enable or disable each serial port.

Disable Disable this serial port.

Enable Enable this serial port.

It also shows the Base I/O address and the assigned interrupt number.

Type

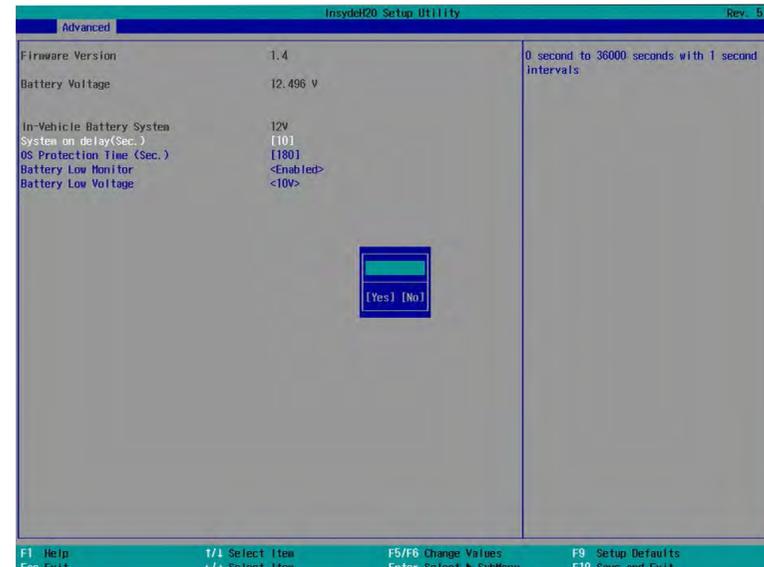
Choose RS232, RS422 or RS485 (Peer-to-Peer) for the serial communication type for COM port 1 and 2.

WDT

Enable or disable the watchdog function. A counter will appear if you select to enable WDT. Input any value between 1 and 255 (seconds).

► Advanced

Vehicle Configuration



In-vehicle Battery System

It displays the in-vehicle battery used: 12V or 24V.

System on delay

Select the system-on delay time: 0 to 36000 seconds (default: 10 seconds).

OS Protection Time

Select the OS protection time to allow the system to shut down completely before the system powers off: 120 second to 36000 seconds (default: 180 seconds).

Battery Low Monitor

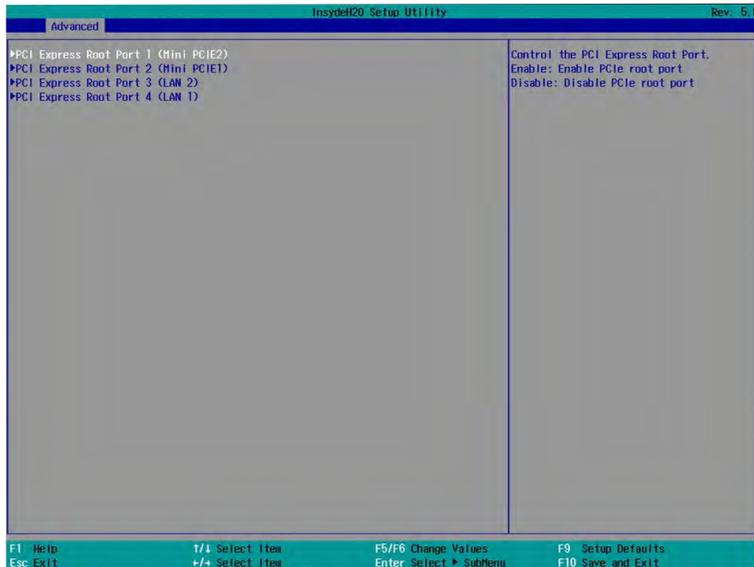
Enables low-voltage protection to protect your car battery (default: Enabled).

Battery Low Voltage

The system remains power-off or will automatically shut down if the car battery is below the specified voltage. (default: 10V for 12V battery & 22V for 24V battery).

► **Advanced**

PCI Express Configuration



PCI Express Root Port 1 (Mini PCIe 2)

Controls the PCIe signal of the full-size Mini PCIe 2 slot.

PCI Express Root Port 2 (Mini PCIe 1)

Controls the PCIe signal of the full-size Mini PCIe 1 slot.

PCI Express Root Port 3 (LAN 2)

Controls the PCIe signal of LAN port 2.

PCI Express Root Port 4 (LAN 1)

Controls the PCIe signal of LAN port 1.

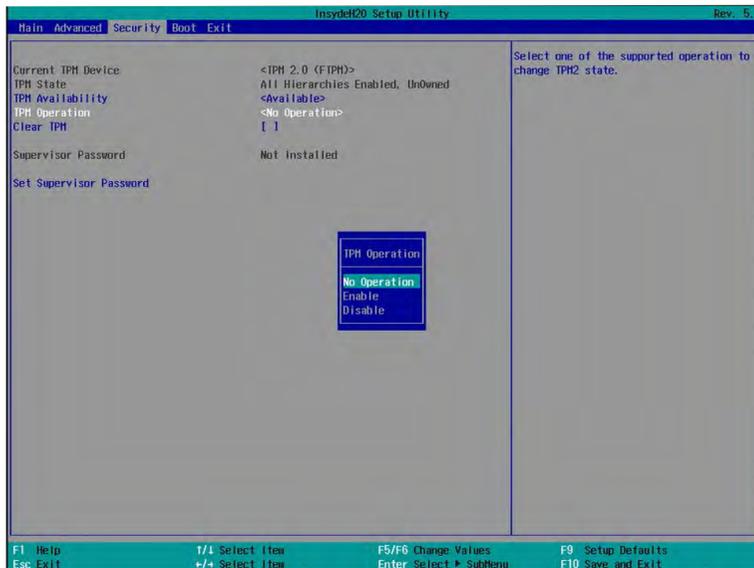
► **Advanced** ► **SIO NUVOTON6116D**

► **PC Health Status**

This section displays the PC health status.



► Security



TPM Availability

Set the TPM availability – Available, or Hidden.

TPM Operation

Select one of the supported operation to change TPM state.

Clear TPM

Remove all TPM context associated with a specific owner.

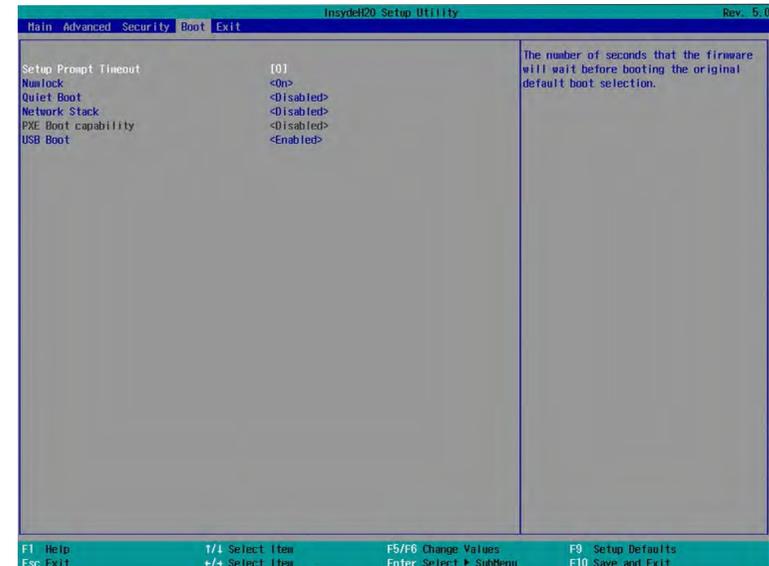
Set Supervisor Password

Set the supervisor’s password and the length of the password must be longer than one character.

Power-on Password

If you select to set the supervisor password, this option will be shown. Enable or disable the system to require password at boot.

► Boot



Setup Prompt Timeout

Select the number of seconds the system will wait before booting the original firmware selection.

Numlock

Select the power-on state for numlock.

Quiet Boot

Enable or disable the quiet boot function to configure the screen’s display between text messages or the OEM logo at bootup. Select Disabled to display the text messages. Select Enabled to display the OEM logo.

Network Stack

This field is used to enable or disable network stacks, i.e. IPv4 or IPv6 network protocols.

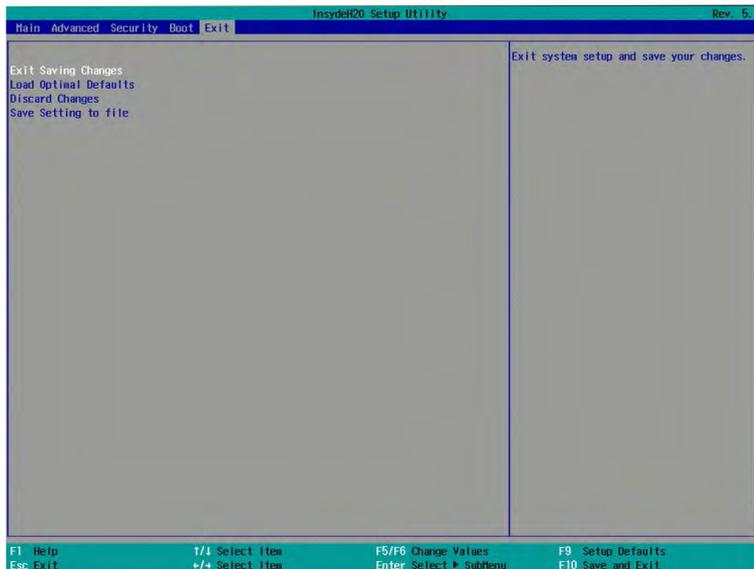
PXE Boot Capability

Enable or disable Preboot eXecution Environment (PXE) boot through an Ethernet port. This function can only be enabled if the Network Stack support is enabled.

USB Boot

Enable or disable USB boot from a flash drive.

► Exit



Exit Saving Changes

Select this field and press <Enter> to exit BIOS setup and save your changes.

Load Optimal Defaults

Select this field and press <Enter> to load the optimal defaults.

Discard Changes

Select this field and press <Enter> to exit the BIOS setup without saving your changes.

Save Setting to file

Select this option to save BIOS configuration settings to a USB drive. The operation will fail if there aren't any USB devices detected on the system. The saved configuration will have the DSF file extension and can be used for restoration.

Restore Setting from file

Select this option to restore BIOS configuration settings from a USB drive. Note that this option will not be available if there aren't any USB devices detected in the system.

► Updating the BIOS

To update the BIOS, you will need the new BIOS file and a flash utility. Please contact technical support or your sales representative for the files and specific instructions about how to update BIOS with the flash utility. For updating Insyde BIOS in UEFI mode, you may refer to the how-to video at <https://www.dfi.com/tw/knowledge/video/31>.

► Notice: BIOS SPI ROM

1. The Intel® Management Engine has already been integrated into this system board. Due to the safety concerns, the BIOS (SPI ROM) chip cannot be removed from this system board and used on another system board of the same model.
2. The BIOS (SPI ROM) on this system board must be the original equipment from the factory and cannot be used to replace one which has been utilized on other system boards.
3. If you do not follow the methods above, the Intel® Management Engine will not be updated and will cease to be effective.



Note:

- a. You can take advantage of flash tools to update the default configuration of the BIOS (SPI ROM) to the latest version anytime.
- b. When the BIOS IC needs to be replaced, you have to populate it properly onto the system board after the EEPROM programmer has been burned and follow the technical person's instructions to confirm that the MAC address should be burned or not.

Chapter 4 - Supported Software

Install drivers, utilities and software applications that are required to facilitate and enhance the performance of the system board. You may acquire the software from your sales representatives, from an optional DVD included in the shipment, or from the website download page at <https://www.dfi.com/DownloadCenter>.

► Auto-run Menu

After inserting your DVD-ROM into your optical drive or executing your DVD image, the System Utility auto-run menu may pop up. Click on the utility or driver that is to be installed on the system. Please refer to the following sections that correspond to your selection for more information.

Click "More >>" on the lower right to go to the next page of the auto-run menu, and click "<< Previous" to return to the previous menu.



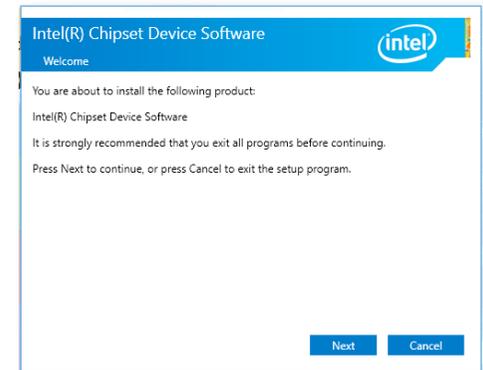
Note:

This step can be ignored if the applications are downloaded standalone files.

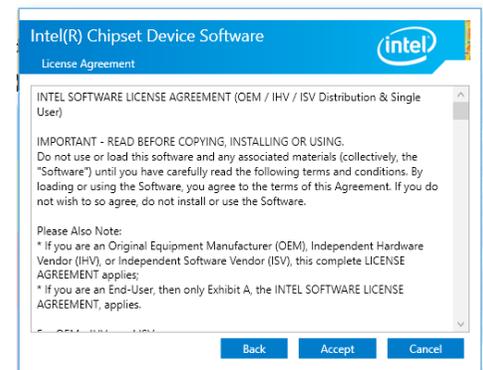
► Intel Chipset Software Installation Utility

The Intel Chipset Software Installation Utility is used for updating Windows® INF files so that the Intel chipset can be recognized and configured properly in the system.

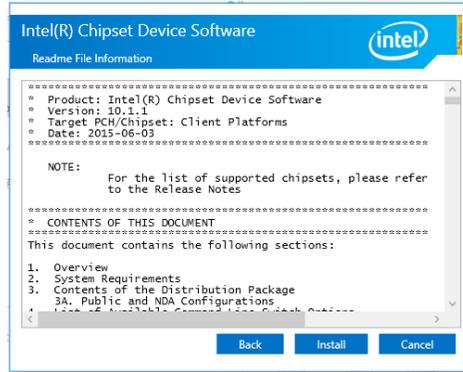
1. Setup is ready to install the utility. Click "Next".



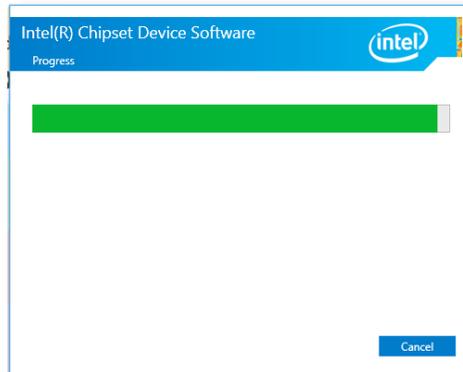
2. Read the license agreement then click "Accept".



- Go through the readme document for more installation tips then click "Install".



- The step displays the installing status in the progress.



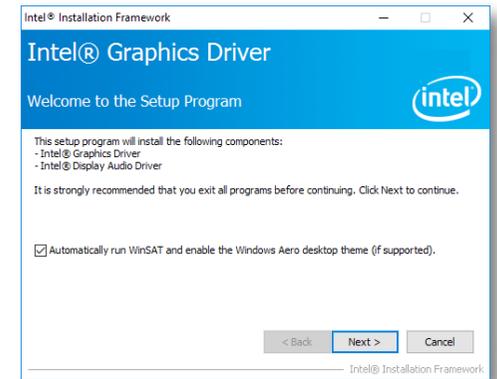
- After completing installation, click "Restart Now" to exit setup.

Restarting the system will allow the new software installation to take effect.



► Intel HD Graphics Drivers

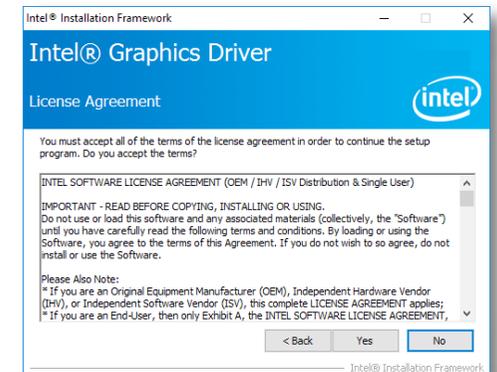
- Setup is now ready to install the graphics driver. Click "Next".



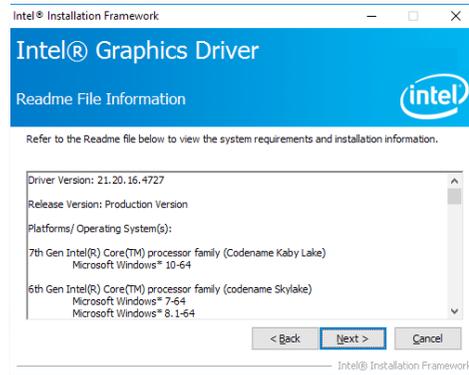
By default, the "Automatically run WinSAT and enable the Windows Aero desktop theme" is enabled. With this enabled, after installing the graphics driver and the system rebooted, the screen will turn blank for 1 to 2 minutes (while WinSAT is running) before the Windows 10 desktop appears. The "blank screen" period is the time Windows is testing the graphics performance.

We recommend that you skip this process by disabling this function then click "Next".

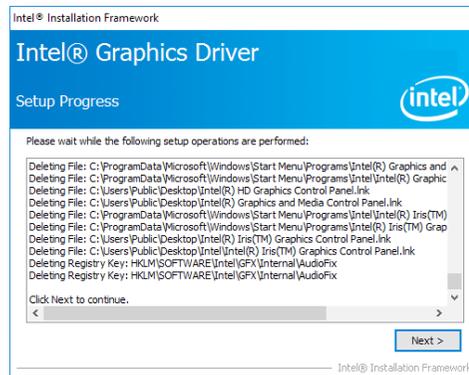
- Read the license agreement then click "Yes".



- Go through the readme document for system requirements and installation tips then click "Next".

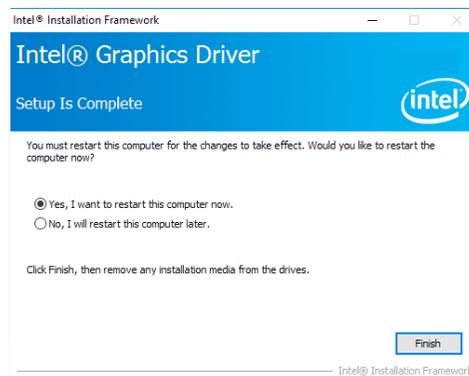


- Setup is now installing the driver. Click "Next" to continue.



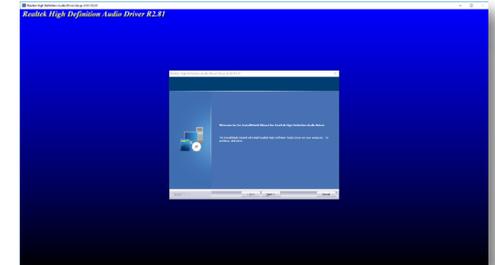
- Click "Yes, I want to restart this computer now" then click "Finish".

Restarting the system will allow the new software installation to take effect.



► Realtek Audio Drivers

- Setup is ready to install the driver. Click "Next".



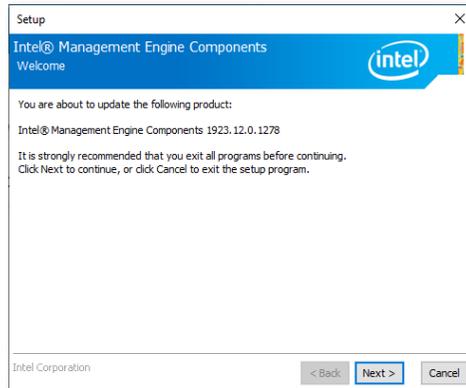
- Click "Yes, I want to restart my computer now" then click "Finish".

Restarting the system will allow the new software installation to take effect.

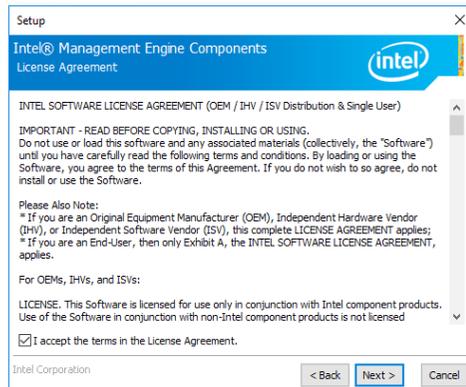


► Intel ME Drivers

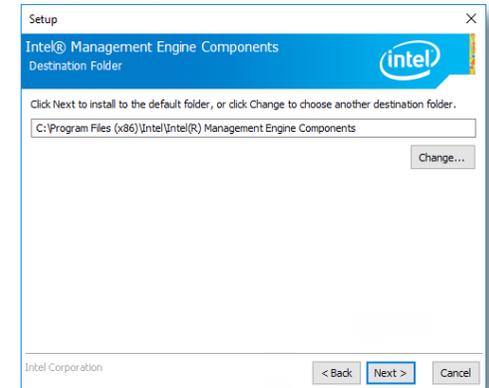
1. Setup is ready to install the driver. Click "Next".



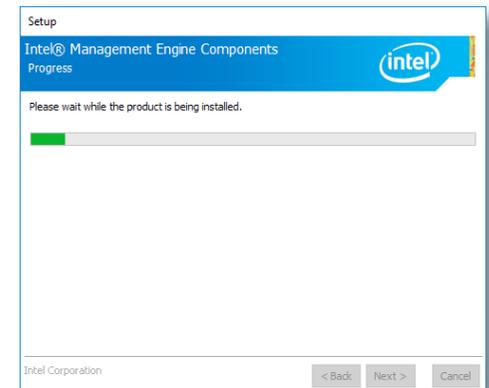
2. Read the license agreement then tick "I accept the terms in the License Agreement". Click "Next".



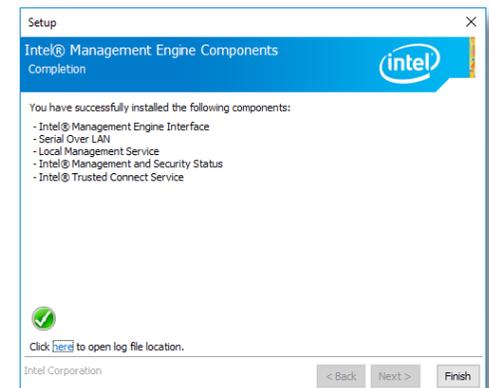
3. Click "Next" to install to the default folder, or click "Change" to choose another destination folder.



4. Please wait while the product is being installed.

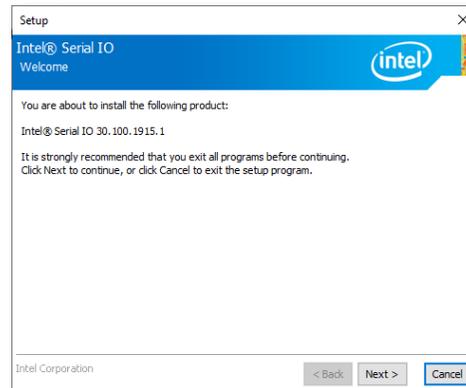


5. After completing installation, click "Finish".

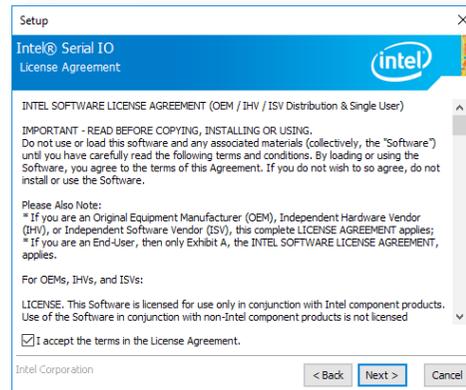


► Intel Serial IO Drivers

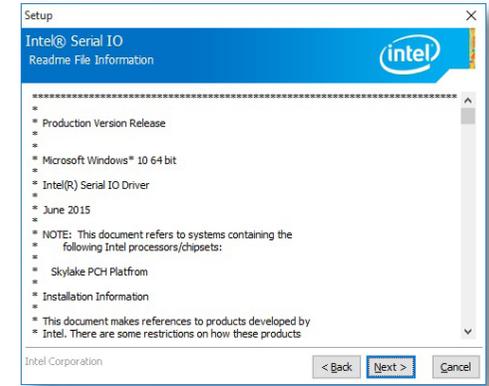
1. Setup is ready to install the driver. Click "Next".



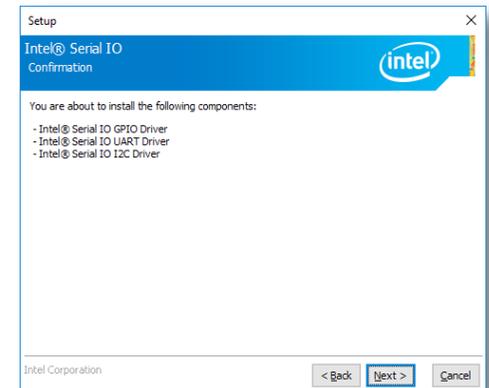
2. Read the license agreement carefully.
Tick "I accept the terms in the License Agreement" then click "Next".



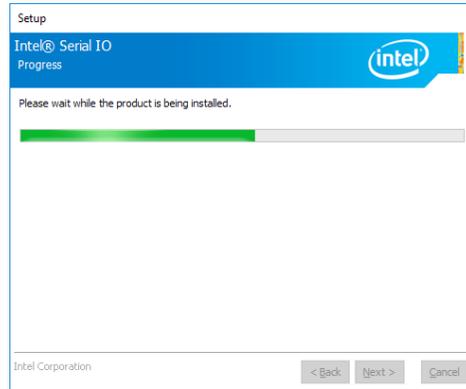
3. Go through the readme document for system requirements and installation tips then click "Next".



4. Setup is ready to install the driver. Click "Next".

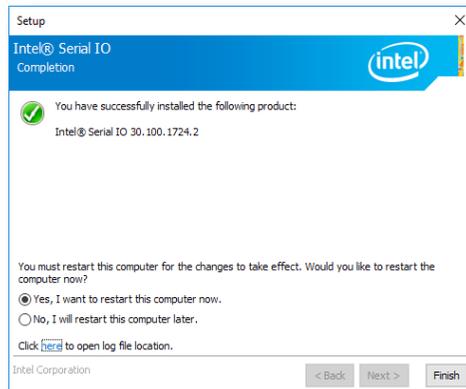


5. Setup is now installing the driver.



6. Click “Yes, I want to restart this computer now” then click “Finish”.

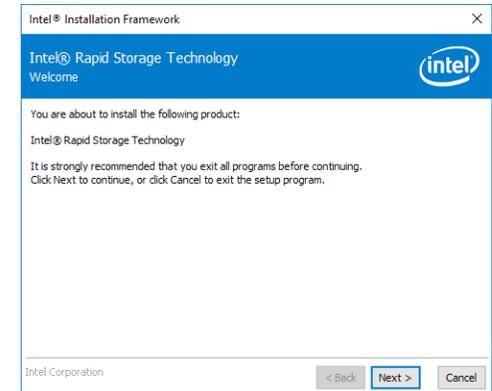
Restarting the system will allow the new software installation to take effect.



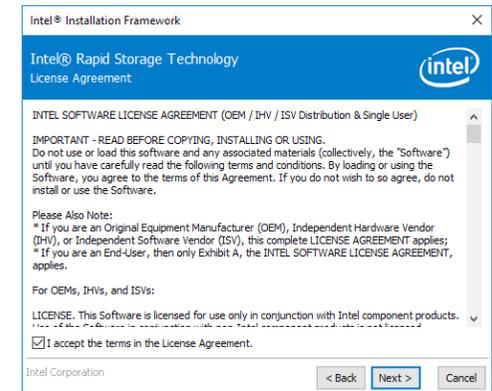
► Intel Rapid Storage Technology

The Intel Rapid Storage Technology is a utility that allows you to monitor the current status of the SATA drives. It enables enhanced performance and power management for the storage subsystem.

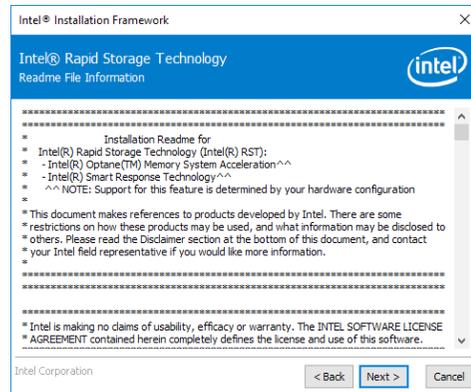
1. Setup is ready to install the utility. Click “Next”.



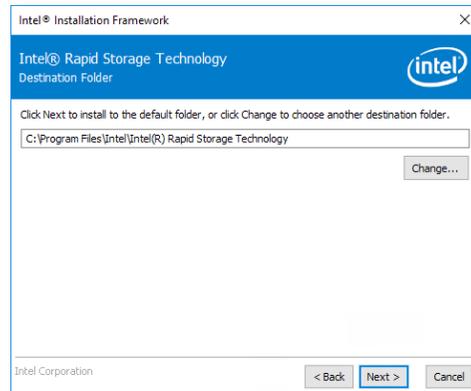
2. Read the license agreement and click “I accept the terms in the License Agreement”. Then, click “Next”.



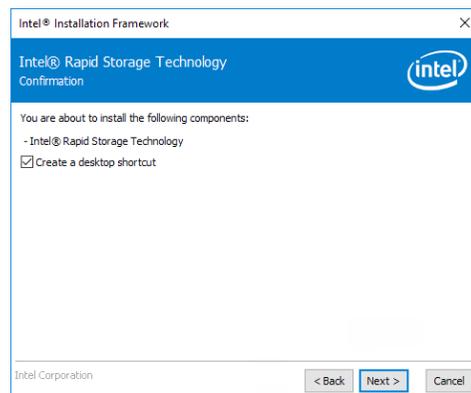
- Go through the readme document to view system requirements and installation information then click "Next".



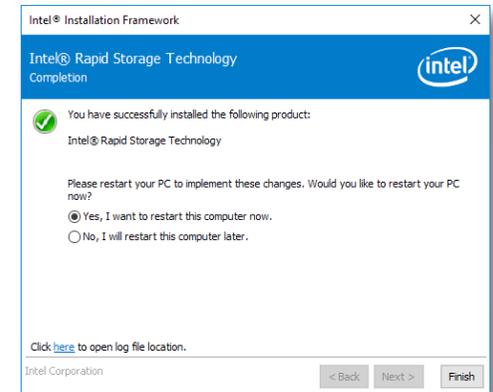
- Click "Next" to install to the default folder or click "Change" to choose another destination folder".



- Confirm the installation and click "Next".



- Click "Yes, I want to restart this computer now" to complete the installation and then click "Finish".

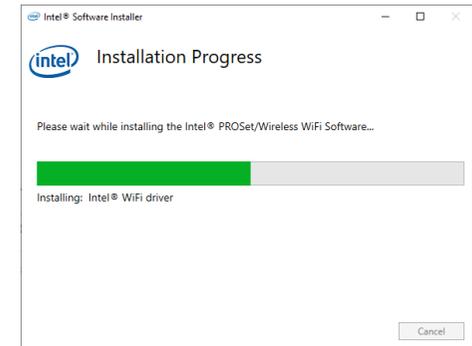


► Intel Wi-Fi Drivers

1. The installer is ready to install the WiFi driver. Click "Next" to start.



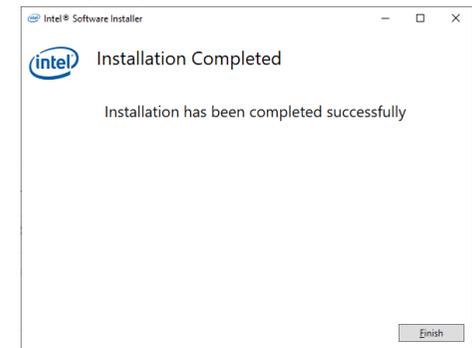
3. Wait for the installer to finish installation.



2. Reader the agreement thoroughly, check the "I agree box", and click "Next" to proceed.

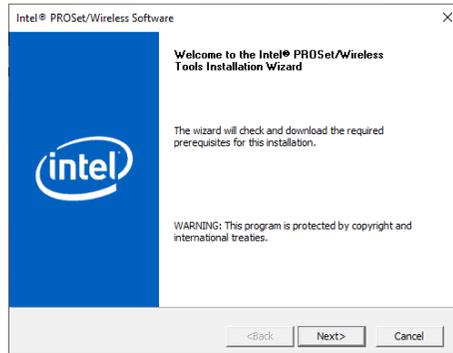


4. Click "Finish" to complete.



► Intel Bluetooth Drivers

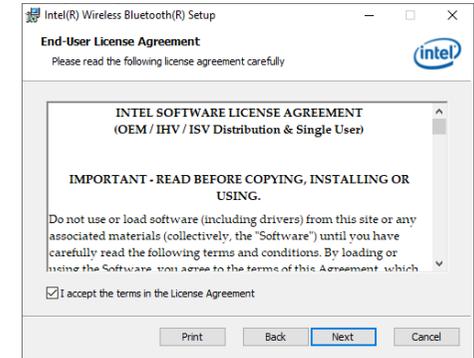
1. The installer is ready to install the driver. Click "Next" to start.



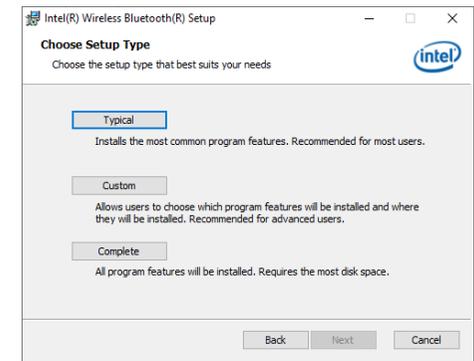
2. Click "Next" to proceed.



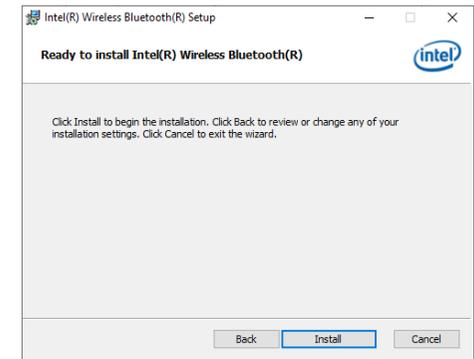
3. Reader the agreement thoroughly, check the "I agree" box, and click "Next" to proceed.



4. Select a setup suit and click "Next" to proceed.

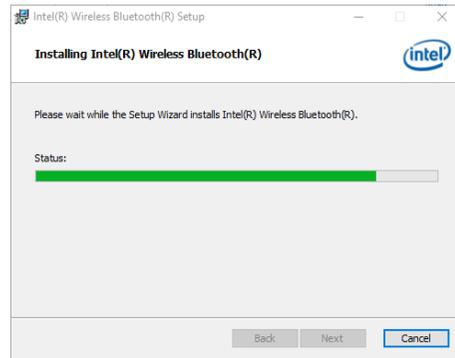


5. Click "Install" to start the installation.



► Realtek LAN Driver

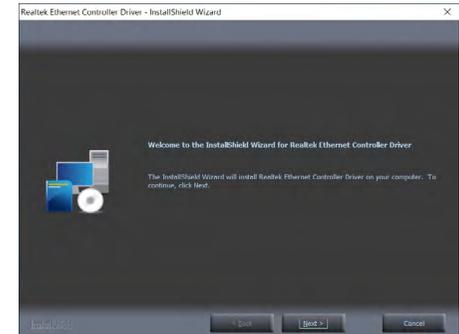
6. Wait for the installer to finish installation.



7. Click "Finish" to complete.



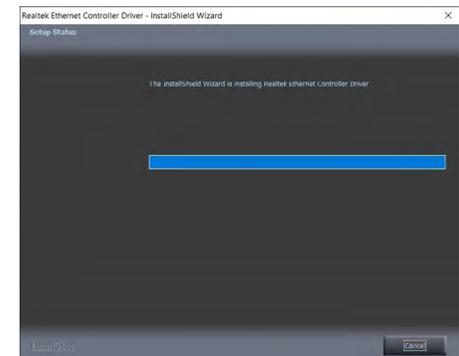
1. Setup is ready to install the driver. Click "Next".



2. Click "Install" to begin the installation.

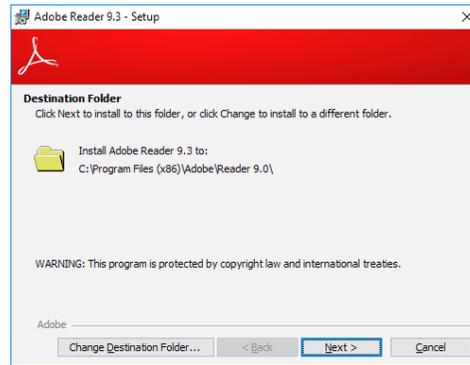


3. The step displays the installing status in the progress.



► Adobe Acrobat Reader 9.3

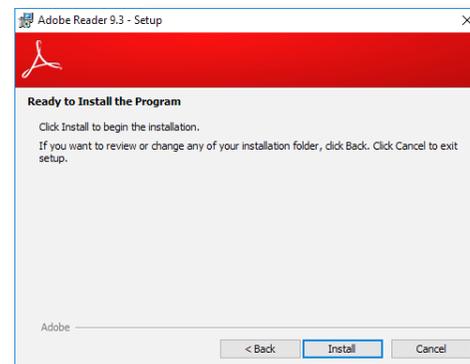
1. Click "Next" to install or click "Change Destination Folder" to select another folder.



3. Setup is now installing the driver.



2. Click "Install" to begin installation.



4. Click "Finish" to exit installation.

