DFI

KSM-KH Series

Modular-Designed Industrial Panel PC
User's Manual

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Changes after the publication's first release will be based on the product's revision. The website will always provide the most updated information.

Trademarks

Product names or trademarks appearing in this manual are for identification purpose only and are the properties of the respective owners.

FCC and DOC Statement on Class A

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 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.

Table of Contents

About this Manual

An electronic file of this manual can be obtained from the DFI website at www.dfi.com.To download the user's manual from our website, please go to "Support" > "Download Center." On the Download Center page, select your product or type the model name and click "Search" to find all technical documents including the user's manual for a specific product.

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 damages to the product that has been modified or altered.

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 con nectors 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 Measures

To avoid damage to the system:
- Use the correct AC input voltage range.

To reduce the risk of electric shock:
- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.

Battery:
- Danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent type recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.

Safety Precautions

- Use the correct DC 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 the power cord.
- Danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent type recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.
- Keep this system away from humidity.
- Place the system on a stable surface. Dropping it or letting it fall may cause damage.
- The openings on the system are for air ventilation to protect the system from overheating. DO NOT COVER THE OPENINGS.
- Place the power cord in such a way that it will not be stepped on. Do not place anything on top of the power cord. Use a power cord that has been approved for use with the system and that it matches the voltage and current marked on the system's electrical range label.
- If the system will not be used 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 dropped or is damaged.

  - The system has obvious signs of breakage.

- 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 DC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.

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.

- KSM-KH system unit (box module + panel module)
- Screw pack for SATA installation
- Screw pack for Mini PCIe installation
- Power cable with 3-pole terminal block connector
- Extended power switch cable

Optional Items

- Panel mount kit
- Power cord
- Power adapter (160W)

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance to 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.

Chapter 1 - Introduction

Overview

Top View

Bottom View

Key Features

Model Name	KSM-KH
Processor	7th Generation Intel® Core™ Processors, BGA 1440
Chipset	Intel® CM238/QM175 Chipset
LAN	2 LAN ports
COM	4 COM ports
Display	VGA DVI-D (DVI-I connector) or HDMI HDMI or DP++
USB	4 USB 3.0 & 2 USB 2.0 Type A ports
Power	9~36V DC-in

Specifications

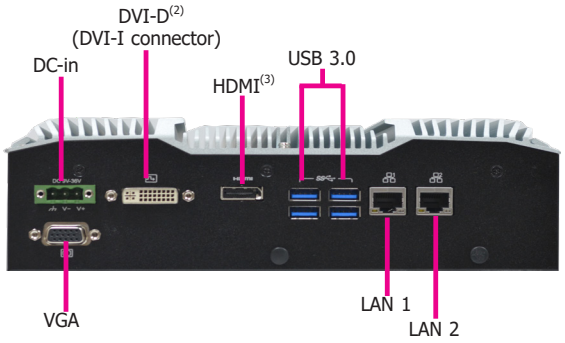
Processor System	7th Generation Intel® Core™ Processors, BGA 1440* Intel® Xeon® Processor E3-1535M v6, Quad Core, 8M Cache, 3.1GHz (4.2GHz), 45W (supports ECC memory) Intel® Core™ i7-7820EQ Processor, Quad Core, 8M Cache, 3.0GHz (3.7GHz), 45W Intel® Core™ i5-7440EQ Processor, Quad Core, 6M Cache, 2.9GHz (3.6GHz), 45W Intel® Core™ i5-7442EQ Processor, Quad Core, 6M Cache, 2.1GHz (2.9GHz), 25W Intel® Core™ i3-7100E Processor, Dual Core, 3M Cache, 2.9GHz, 35W (supports ECC memory) Intel® Core™ i3-7102E Processor, Dual Core, 3M Cache, 2.1GHz, 25W (supports ECC memory)
Chipset	• Intel® CM238 Chipset (supports ECC memory)(1) • Intel® QM175 Chipset
Memory	Two 260-pin SODIMM • Supports dual-channel DDR4 2400MHz • Supports up to 32GB system memory
Graphics	Intel® HD Gen 9 Graphics OpenGL 5.0, DirectX 11, OpenCL 2.1 • Supports these codecs: HW Decode: HEVC/H.265, H.264, M/JPEG, MPEG2, VC1/WMV9, VP8 (8-bit), VP9 (10-bit) HW Encode: HEVC/H.265, M/JPEG, MPEG2, VP8 • Output displays: VGA: resolution up to 1920x1200 @ 60Hz DVI: resolution up to 2560x1600 @ 60Hz HDMI: resolution up to 4096x2160 @ 24Hz DP++: resolution up to 4096x2304 @ 60Hz
Triple/Dual Display	VGA (+) DVI-D (DVI-I connector)/HDMI (+) HDMI/DP
Storage	One 2.5" SATA drive bay • SATA 3.0 port with data transfer rate up to 6Gb/s
Ethernet	One Intel® I210IT PCIe (10/100/1000Mbps) One Intel® I219LM with iAMT11.0 PCIe (only Intel® Xeon® & Core™ i7/i5 support iAMT)
Expansion	One full-size/half-size Mini PCIe with Mini SIM socket (PCIe/USB) One full-size/half-size Mini PCIe with Mini SIM socket (USB) One M.2 Type 2280 (M key, PCIe x4, with Intel® QM175 only to support the Intel® Optane™ technology)
Front Panel I/O Ports	• Top Panel - Two RJ45 LAN ports - One VGA port / one DVI-D (DVI-I connector) or HDMI / one HDMI or DP - Four USB 3.0 Type A ports - One 9~36V DC-in 3-pole terminal block • Bottom Panel - One power button with LED - One reset button - One status and one HDD LED - One remote power-on/power-off connector - Two USB 2.0 ports - Two RS-232/422/485 (DB-9) (RS-232 with power) - Two RS-232/422/485 (DB-9)
Watchdog Timer	System Reset, Programmable via Software from 1 to 255 Seconds
Security	TPM 2.0
Power	• Power input voltage: 9~36V DC-in (terminal block type connector)
Cooling System	• Fanless with heatsink
Environment	• Operating Temperature: -20 to 50°C • Storage Temperature: -30 to 70°C • Relative Humidity: 5 to 90% RH (non-condensing) • Shock: Half sine wave 3G, 11ms, 3 shock per axis
Construction	• Metal + Aluminum
Mounting	• Panel/VESA Mount - Mounting brackets and screws(2) (optional)
Dimensions	• 235mm x 72.92mm x 221.2mm (W x H x D), Box module only
OS Support	• Windows 10 IoT Enterprise LTSB 64 Bit • Linux (available upon request)
Other Features	System Reset, Programmable via Software from 1 to 255 Seconds
Standards and Certifications	• Shock Half sine wave 3G, 11ms, 3 shock per axis • Vibration IEC68-2-64 • Certificates CE, FCC Class A

Notes:

1. The system supports ECC memory only on SKUs with ECC-supported CPUs and ECC-supported chipsets.
2. The mounting kit is optional; please check the optional items of the ordering information or contact your sales representative for more information.

Getting to Know the KSM-KH

Top View



DC-in

DC 9~36V power input via a terminal block connector.

DVI-D (DV-I connector)(2)

Connects the DVI-D connector of an LCD monitor.

HDMI (or DP++, optional)(3)

Connects the HDMI connector of an LCD monitor.

USB 3.0 Ports

Connect all devices with USB Type A ports and support date rate according to USB 3.0 specification.

Gigabit LAN Ports

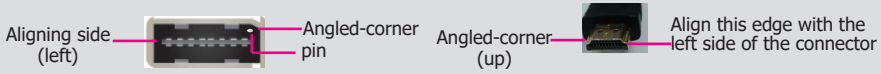
Connect the system to a local area network.

VGA Connector

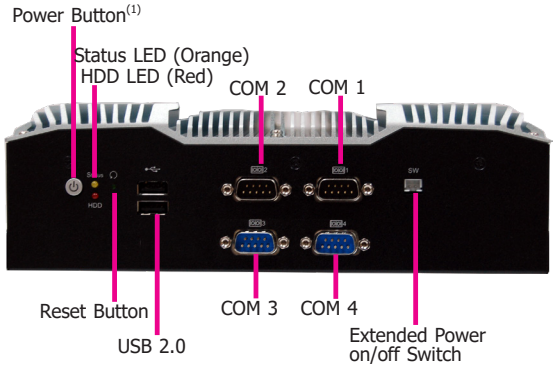
Connects the VGA connector of a monitor.

Notes:

1. Please gently press the power button to avoid possible damage.
2. This port can be in DVI or HDMI.
3. The HDMI is a DP/HDMI combo port but can only provide either HDMI or DP connectivity. Please plug in a DP or an HDMI cable with the right orientation and alignment to avoid damage to the connector. When inserting an HDMI cable, you should feel resistance (due to a pin on the right) if the cable is not inserted correctly. For detailed instructions, please see a video at https://youtu.be/SUj07rfN5l8.



Bottom View



Power button with LED (Green)(1)

Press to power on or power off the system.

USB 2.0 Ports

Connect all devices with USB Type A ports and supports date rate according to USB 2.0 specification.

Reset button

Press to reset the system.

HDD LED (Red)

Indicates the status of storage devices (i.e. SATA and M.2) as below.

HDD LED		
HDD State	**Disk access activity**	**Disk drives present or not present**
LED Behavior	Blink	Off

Status LED (Orange)

Indicates system status as below.

Status LED			
ACPI States	**Powered-On**	**Standby/Sleep**	**Hibernate/ Soft off**
LED Behavior	Always ON	Blinks	Off

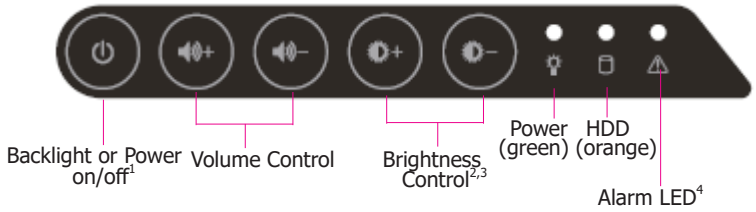
Extended power-on/power-off switch connector

Connects a distant power on/off switch.

COM Ports

All COM ports can be selected among RS232, RS422 and RS485 via jumper settings.
In addition, COM1 and COM2 can be selected between standard RS232 and RS232 with power via jumper settings.

Panel View*

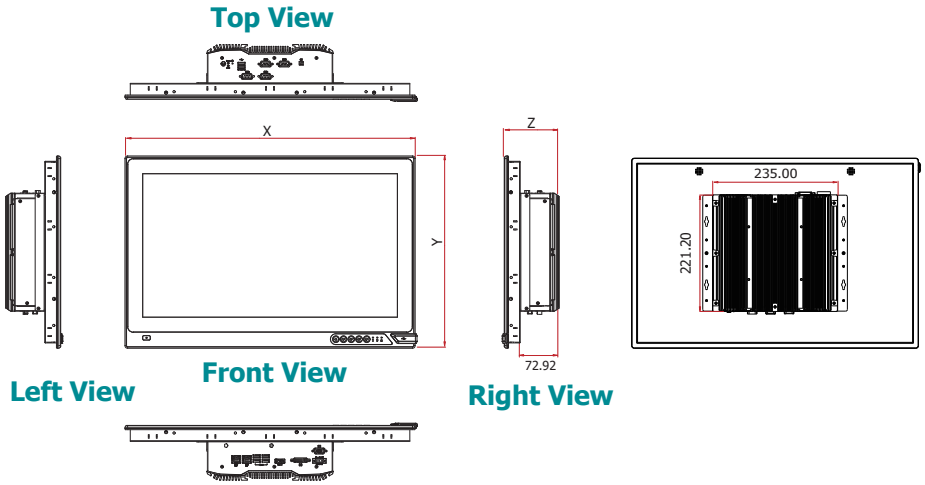


The front OSD is capable of controlling the system in the following ways in addition to its explicit functions.

1. System Power On/Off: Press the Backlight on/off button for 3 seconds.
2. Light Sensor On/Off: Press the Brightness up arrow for 3 seconds.
3. OSD Lock/Unlock: Press the Brightness down arrow for 3 seconds.
4. The Alarm LED will be red when the CPU temperature reaches 95℃ (203℉).

Note:
The front panel OSD is an optional feature for SKUs with panel modules.

Mechanical Dimensions



	System Dimensions		
Display Type	X1	Y1	Z1
15" XGA LCD	387	320	102.32
19" SXGA LCD	467	400	102.32
21.5" FHD LCD	544.2	360.63	102.72

Chapter 2 - Getting Started

Preparing the System

Before you start using the system, you need the following items:

- SATA HDD or mSATA card
- AC power adapter

Installing Devices

The following devices can be installed in the system.

- SODIMM
- mini-mSATA cards
- Mini PCIe cards

Configuring the BIOS

To get you started, you may need to change configurations such as the date, time and the type of hard disk drive.

1. Power on the system.
2. After the memory test, the message "Press DEL to run setup" will appear on the screen. Press the Delete key to enter the BIOS setup utility.

Installing an Operating System

Depending on the method you choose to install your system, you may use a USB flash drive or install a CD-ROM drive to run the Operating System CD.

Make sure that a CFast or an M.2 card is already installed.

1. Refer to the following chapters for information on installing a CFast or an M.2 card.
2. Refer to your operating system manual for instructions on installing an operating system.

Installing the Drivers

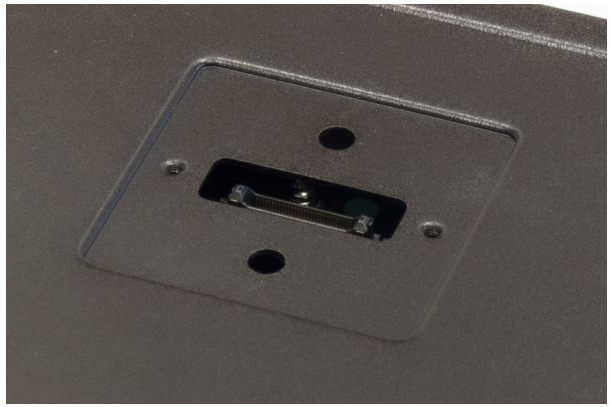
The system package includes a CD disk. The CD includes drivers that must be installed to provide the best system performance. Refer to the Supported Software chapter for instructions on installing the drivers.

Chapter 3 - Installing the Devices

Assemble the Modular Panel PC

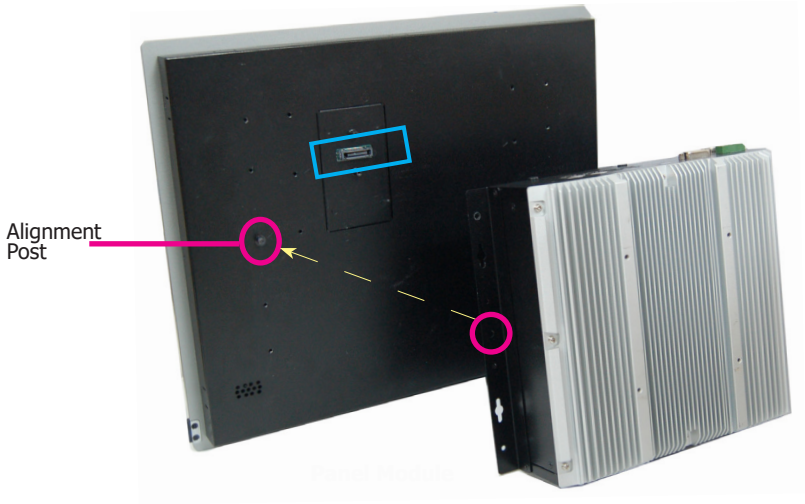
The modular panel PC comprises two parts: a box module and a panel module. The assembly of these two parts is easy thanks to DFI's ADP (Adaptive Display Platform) innovation, which makes the box modules and the panel modules interchangeable. Please use the following procedure to assemble these two parts.

1. At the bottom of the box, there's a male ADP connector.



Box Module

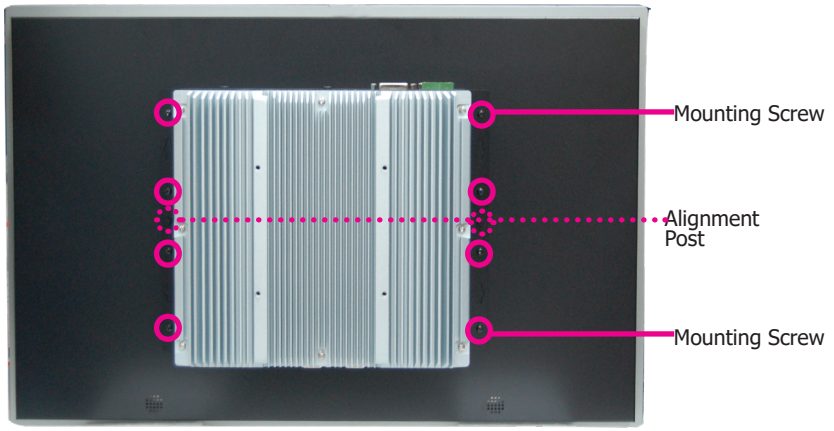
2. Hold the box module with its ADP connector (female) in line with the ADP connector (male) of the panel module. Align the box module with the panel module using the alignment posts.



Note:

If the orientation of the assembly is not correct, the box module will not seat evenly on top of the panel module, which results in some space in between them and indicates that the ADP connectors are not engaged. When this is the case, please turn the box module the other way around.

3. Place the box module on top of the panel module with the alignment posts effortlessly sliping into the designated holes on the box module. Press to install these two modules and secure the installation with 8 mounting screws.



Box + Panel Module

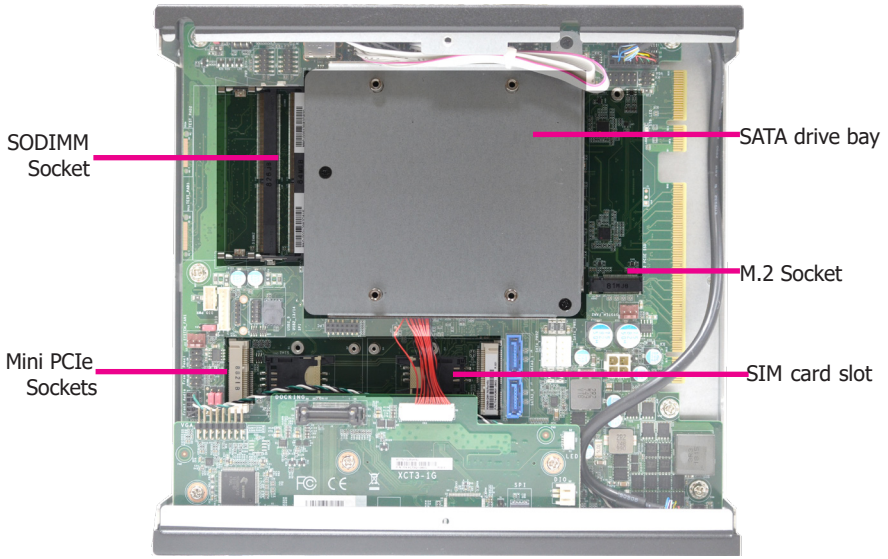
Removing the Chassis Cover

Please follow these guidelines before performing any installation procedures:

1. Make sure the system and all other peripherals connected to it have been powered off.
2. Disconnect all power cords and cables.
3. The 6 mounting screws on the left and right sides and bottom of the system are used to secure the cover to the chassis. Remove these screws and put them in a safe place for later use.

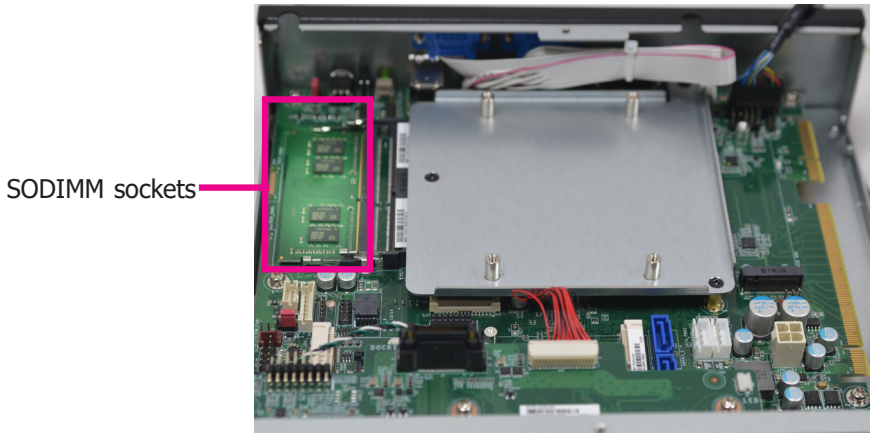
4. Lift the cover upward to open the system.

5. The SODIMM sockets, Mini PCIe slots, M.2 slot and SATA drive bay are accessible after removing the chassis cover.



Installing a SODIMM

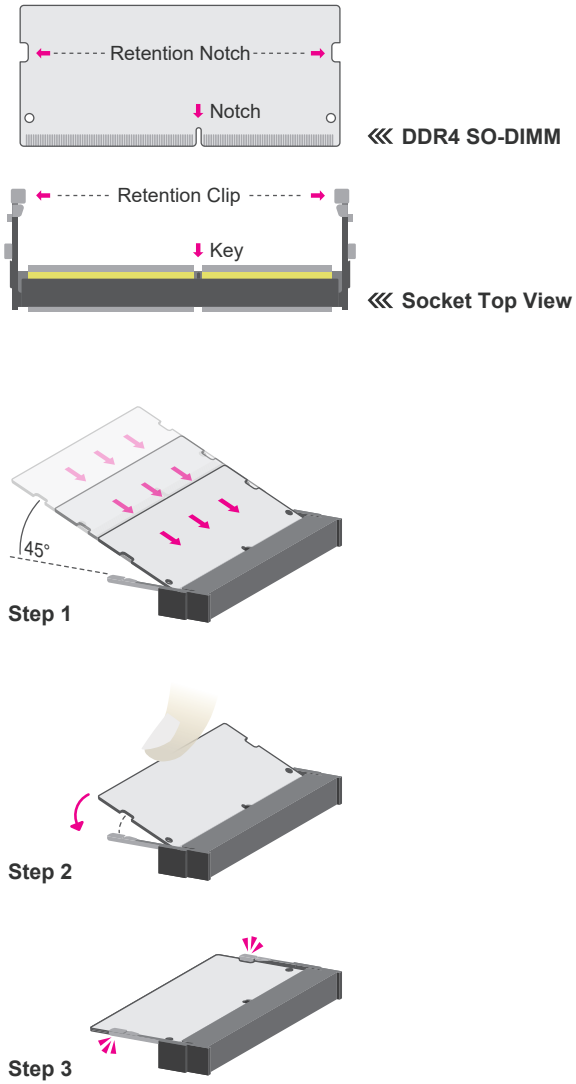
The system supports two DDR4 SODIMM socket. The SODIMM sockets are located on the system board.



Notes:

1. The system supports dual-channel configuration. To enable dual-channel, populate both SODIMM sockets.
2. The SKUs with ECC-supported CPUs and Intel® CM238 Chipset support ECC memory.
3. If installing only one memory module, please install it on the memory socket labeled DIMM 1 (the one closer to the center of the board).
4. The SODIMM sockets can only accept DDR4 memory modules. Please do not install other types of memory modules.

Grasp the module by its edges and align the memory's notch with the socket's notch. Then insert the memory into the socket at an angle and push it down until you feel a click.

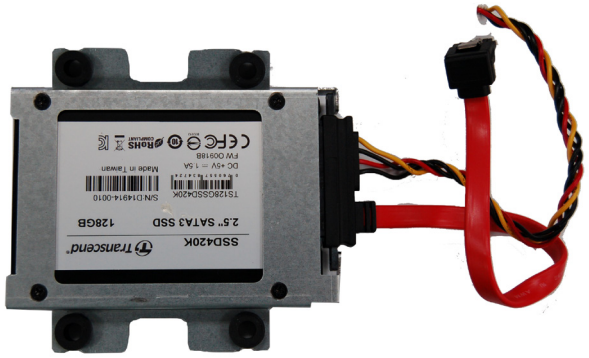


Installing a 2.5" SATA Drive

The system can accommodate one SATA drive. Please use the following procedure to install a SATA drive in the system.

1. Before installing the SATA drive, connect the SATA data/power cable to the SATA data connector of the SATA drive. Then install the SATA drive onto the HDD bracket with the provided mounting screws.

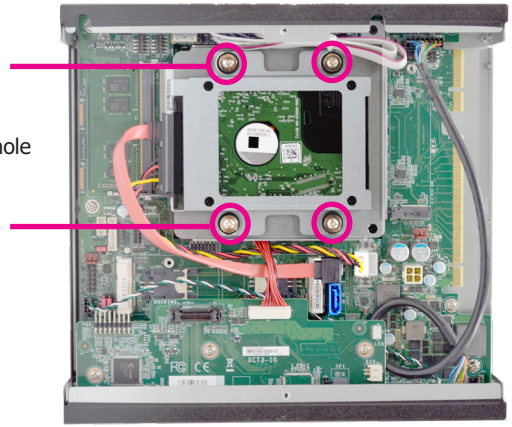
Mounting Screws



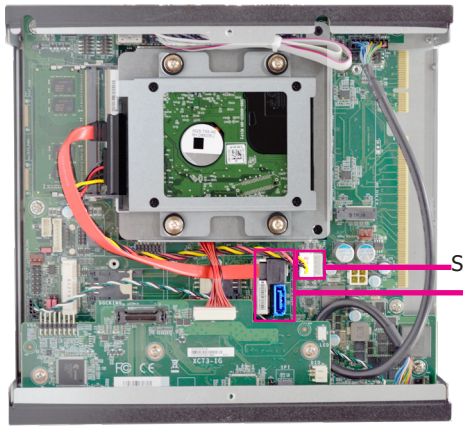
2. Place the SATA drive installed with the HDD bracket in the system. Align the mounting holes on the HDD bracket with the mounting holes on the drive bay and use the provided mounting screws to secure the drive in place.

Mounting Screws

Mounting hole



3. Connect the other end of the SATA data and power cable to the SATA data and power connectors on the system board respectively.

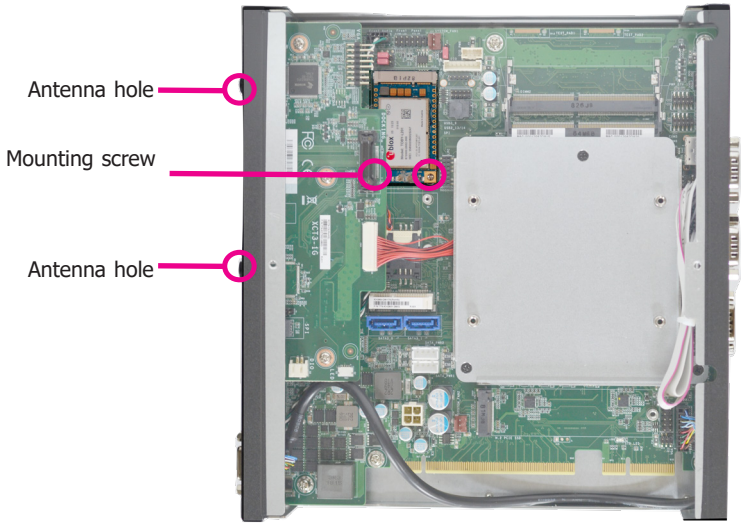


Installing a Mini PCIe and SIM Card

The system board is equipped with 2 Mini PCIe slots with Mini SIM card sockets to support a variety of wireless LAN and mobile broadband communication modules. Mini PCIe slot 1 provides both USB and PCIe interfaces whereas Mini PCIe slot 2 provides only USB interface.

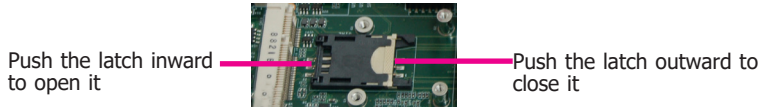
1. Grasp the Mini PCIe card by its edges and align the notch in the connector of the Mini PCIe card with the notch in the connector on the system board.

2. Push the Mini PCIe card down and use the provided mounting screw to secure the card on the system board. If antenna cables are used, route them to the antenna holes on the top panel of the system.

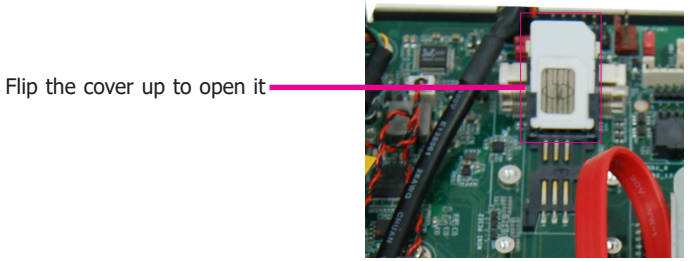


Installing a SIM Card

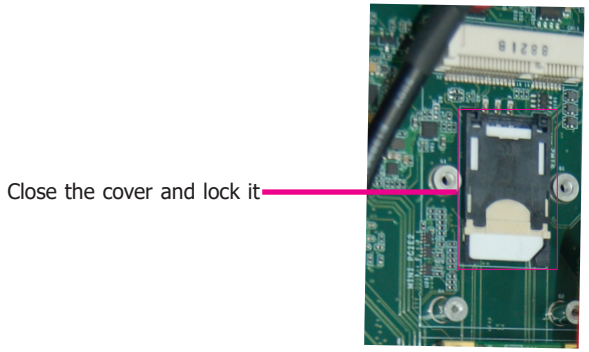
Open the Mini SIM card socket by pushing the white latch inward.



Insert the SIM card into the slot. Please place the card with the IC facing down and the angled corner aligning with the socket's angled corner so it will be correctly in contact with the system board.



Close the slot's cover and lock the slot by pushing the white latch outward.



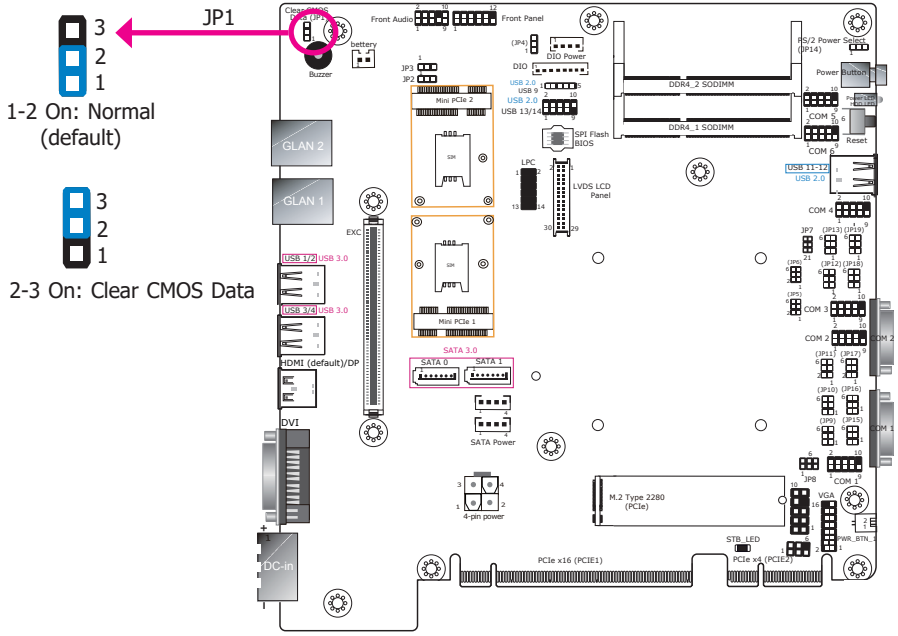
Installing an M.2 Card

The onboard M.2 Type 2280 connector (M Key) supports PCIe NVMe modules up to PCIe Gen 3.0 x4 bandwidth. Note that only SKUs with Intel® QM175 Chipset support M.2 socket.

To install an M.2 card, insert the bottom edge of the M.2 card into the connector, and then secure the card to the standoff with the provided mounting screw.

Chapter 4 - Jumper Settings

Clear CMOS Data



If you encounter the following conditions, you can reconfigure the system with the default values stored in the ROM BIOS.

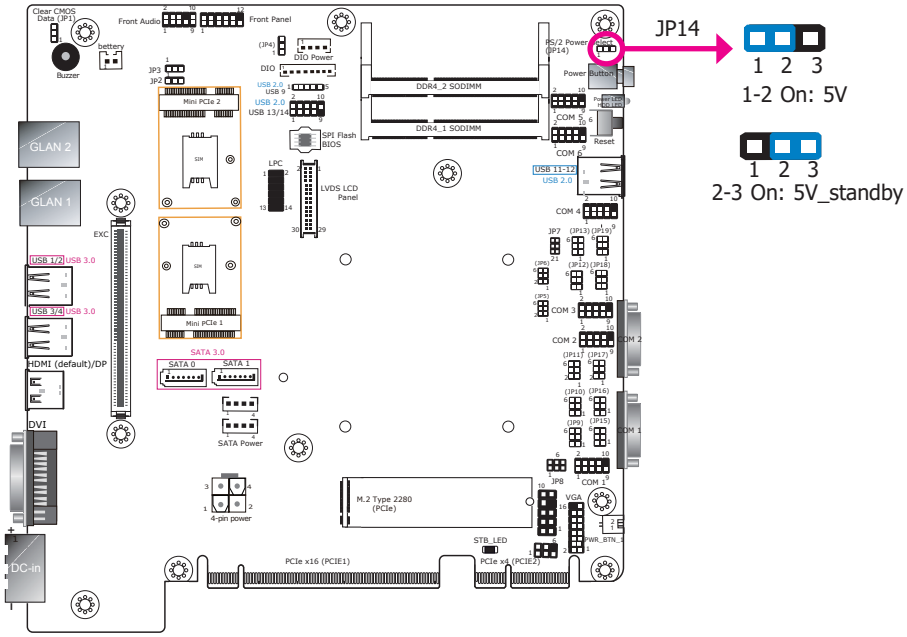
a) CMOS data becomes corrupted.

b) You forgot the supervisor or user password.

To load the default values stored in the ROM BIOS, please follow these steps below:

1. Power off the system and unplug the power cord.
2. Set the jumper pins 2 and 3 to On. Wait for a few seconds and set the jumper pins back to its default setting, pins 1 and 2 On.
3. Now plug the power cord and power on the system.

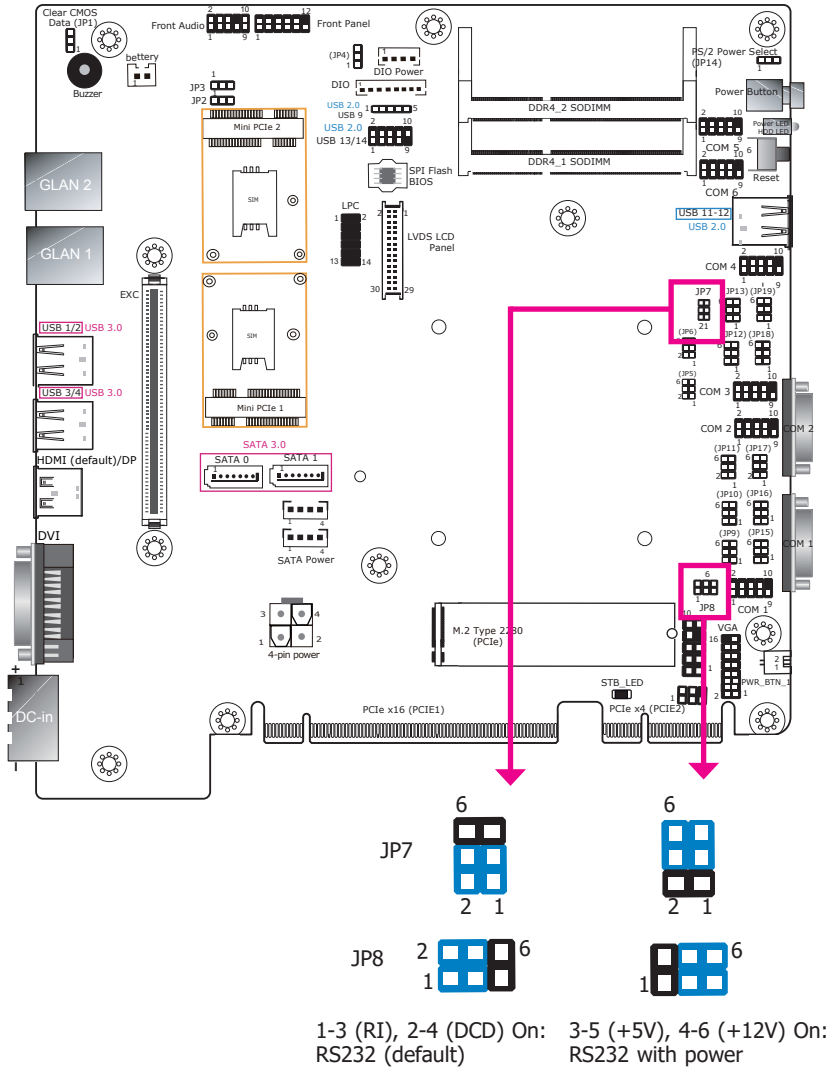
PS/2 KB/MS Power Select



JP14 is used to select power for the PS/2 KB/MS connector (J20). Please refer to Chapter 5 for detailed information on connectors.

Setting +5V_standby allows you to use PS/2 devices to wake up the system.

COM1/COM2 RS232 Power Select

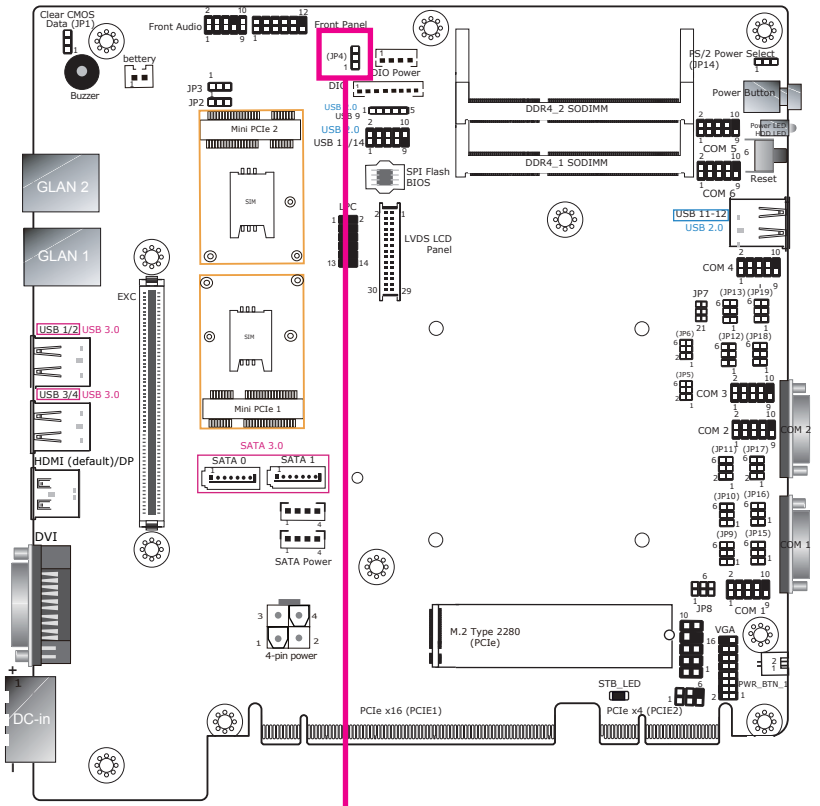


1-3 (RI), 2-4 (DCD) On:
RS232 (default)

3-5 (+5V), 4-6 (+12V) On:
RS232 with power

JP8 (for COM1) and JP7 (for COM2) are used to configure Serial COM ports to pure RS232 or RS232 with power. The pin functions (Pin 1 and Pin 9) of COM1 and COM2 will vary according to JP8's and JP7's setting respectively. Refer to the next page for pin assignments of these COM ports.

DIO Power Source Select (Pins 0~7)

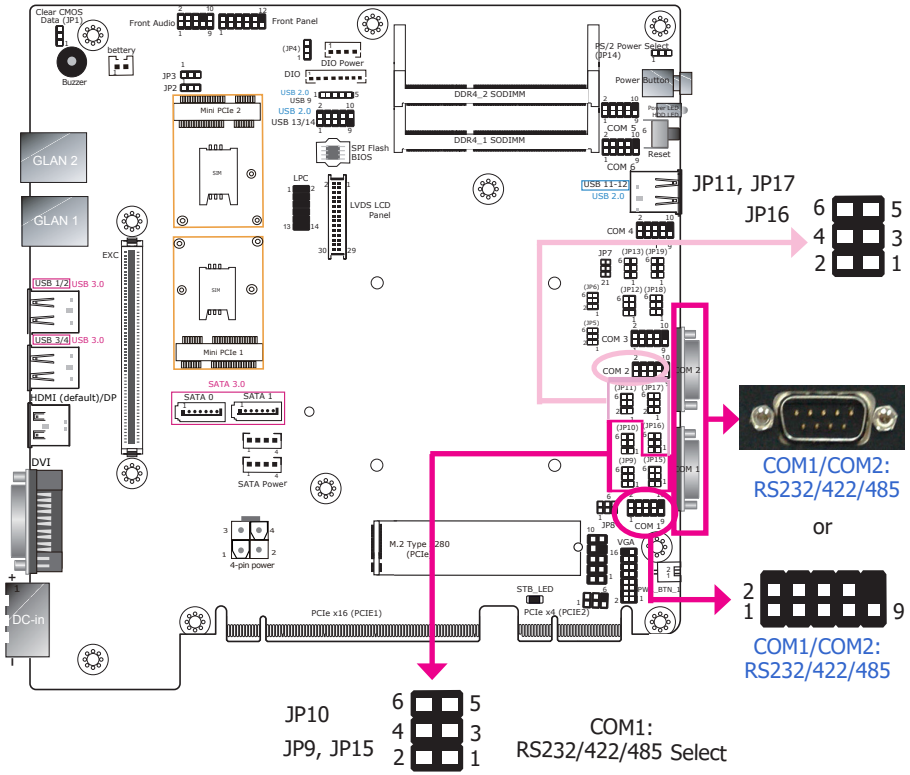


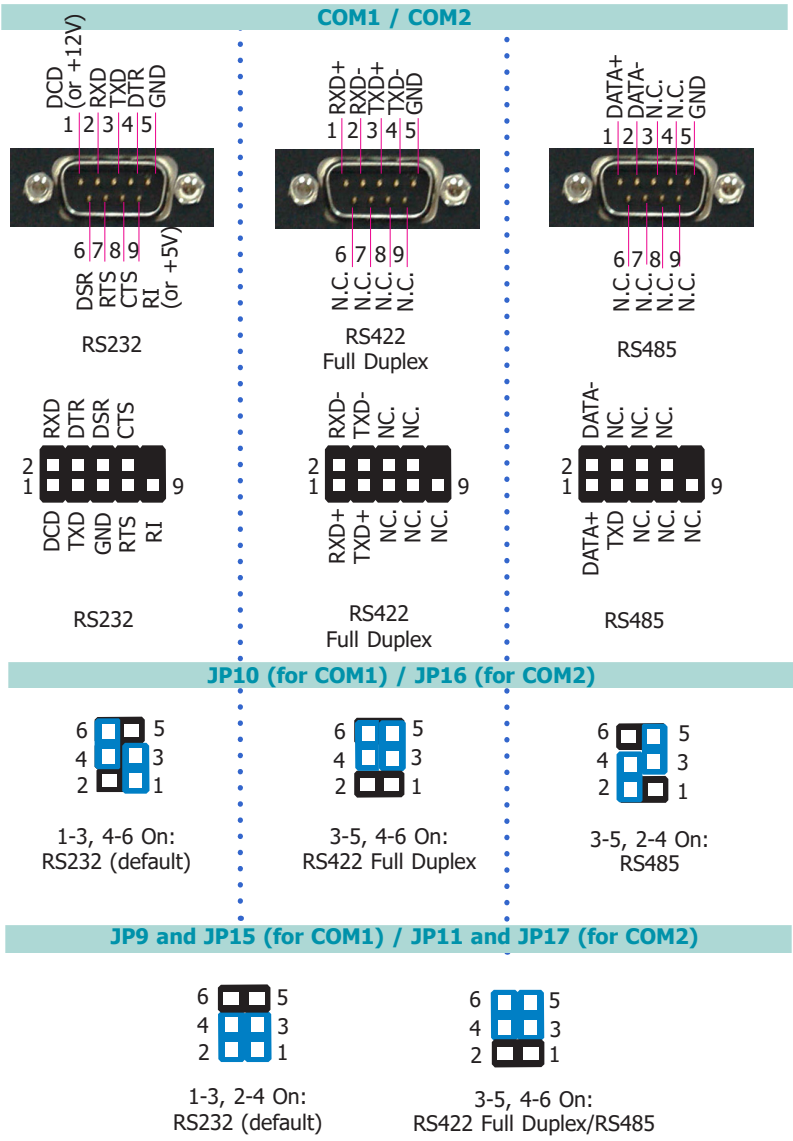
1-2 On:
5V_Standby

2-3 On:
5V

JP4 is used to configure the power of the DIO pins 0~7.

COM1/COM2 RS232/422/485 Select

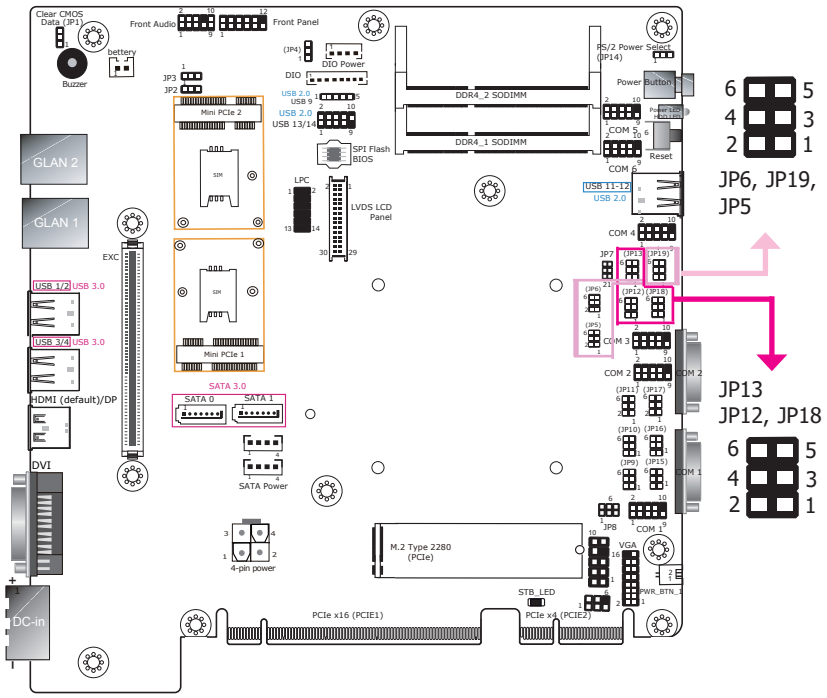




These jumpers allow you to configure the Serial COM ports to RS232, RS422 (full duplex) or RS485. JP9, JP10 and JP15 are used to configure Serial COM port 1; JP11, JP16 and JP17 are used to configure Serial COM port 2. The pin assignments of COM port 1 and COM port 2 will vary according to these jumpers' settings. You can also configure the RS485 auto flow mechanism through the BIOS setup utility. For more information, please refer to Chapter 7.

Note:
When COM1 RS232/422/485 is selected, JP9 and JP15 must be set in accordance to JP10. And when COM2 RS232/422/485 is selected, JP11 and JP17 must be set in accordance to JP16.

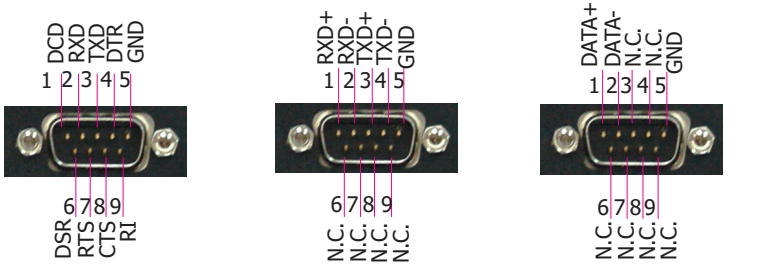
COM3/COM4 RS232/422/485 Select



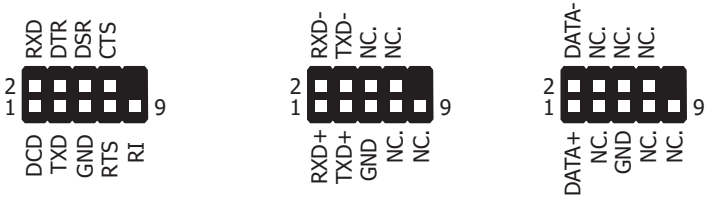
These jumpers allow you to configure the Serial COM ports to RS232, RS422 (full duplex) or RS485. JP12, JP13 and JP18 are used to configure Serial COM port 3; JP5, JP6 and JP19 are used to configure Serial COM port 4. The pin assignments of COM port 3 and COM port 4 will vary according to these jumpers' settings. You can also configure the RS485 auto flow mechanism through the BIOS setup utility. For more information, please refer to Chapter 7.

Note:
When COM3 RS232/422/485 is selected, JP12 and JP18 must be set in accordance to JP13. And when COM4 RS232/422/485 is selected, JP6 and JP19 must be set in accordance to JP5.

COM3 / COM4



COM3 / COM4

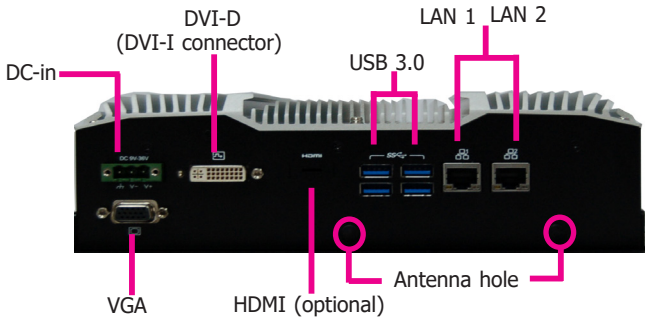


JP13 (for COM3) / JP5 (for COM4)

JP12 and JP18 (for COM3) / JP6 and JP19 (for COM4)

Chapter 5 - Ports and Connectors

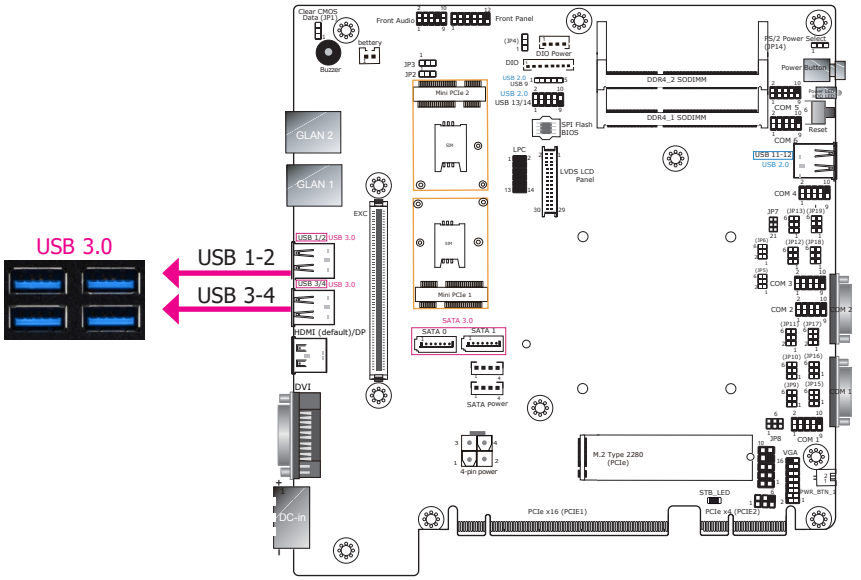
Top Panel I/O Ports



The top panel I/O consists of the following ports:

- 9~36V DC-in
- DVI-D (DVI-I connector)/HDMI/VGA connectors
- Four USB 3.0 ports
- Two RJ45 LAN ports

USB Ports

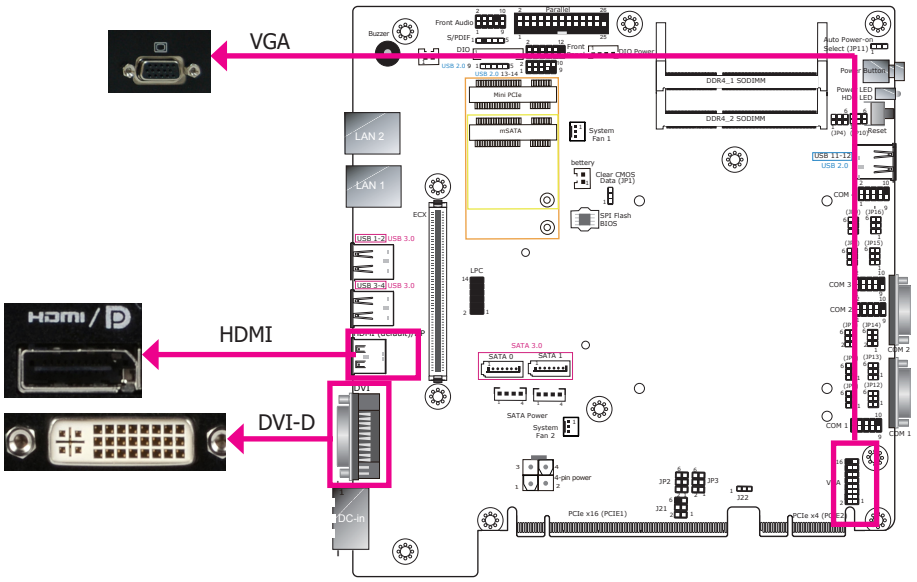


The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals. The system board is equipped with 4 USB 3.0 ports at the rear panel and 2 USB 2.0 ports at the front panel of the system unit.

- **BIOS Setting**

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

Display Interfaces



VGA Port

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.

DVI-D (DVI-I Connector) Port or HDMI

The DVI-D port is used to connect a digital LCD monitor to transmit uncompressed digital video. This connector has a DVI-I receptacle but implements DVI-D signals (digital only).

Connect the display device's cable connector to the DVI-D port. After you plug the cable connector into the DVI-D port, gently tighten the cable screws to hold the connector in place. You can choose this port to be either DVI-D or HDMI.

HDMI Port or DisplayPort

The HDMI port which carries both digital audio and video signals is used to connect an LCD monitor or digital TV that has the HDMI port. You can choose this port to be either HDMI or DP.

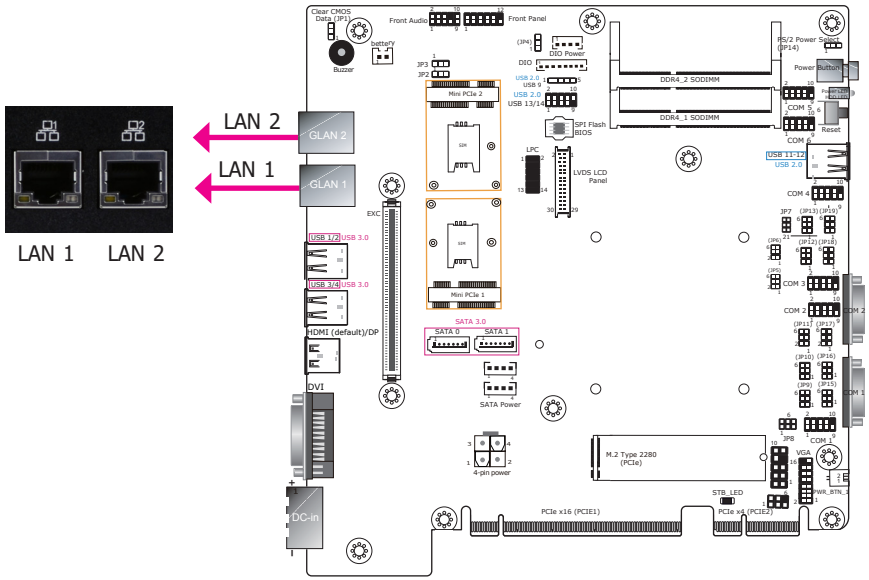
BIOS Setting

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

Driver Installation

Install the graphics driver. Refer to Chapter 8 for more information.

RJ45 LAN Ports



Features

- LAN 1: Intel® I219LM Ethernet controller with iAMT11.0 (Intel® Core™ i3 processors do not support iAMT)
- LAN 2: Intel® I210IT PCIe Gigabit Ethernet Controller
-

The LAN ports allow the system board to connect to a local area network with a network hub.

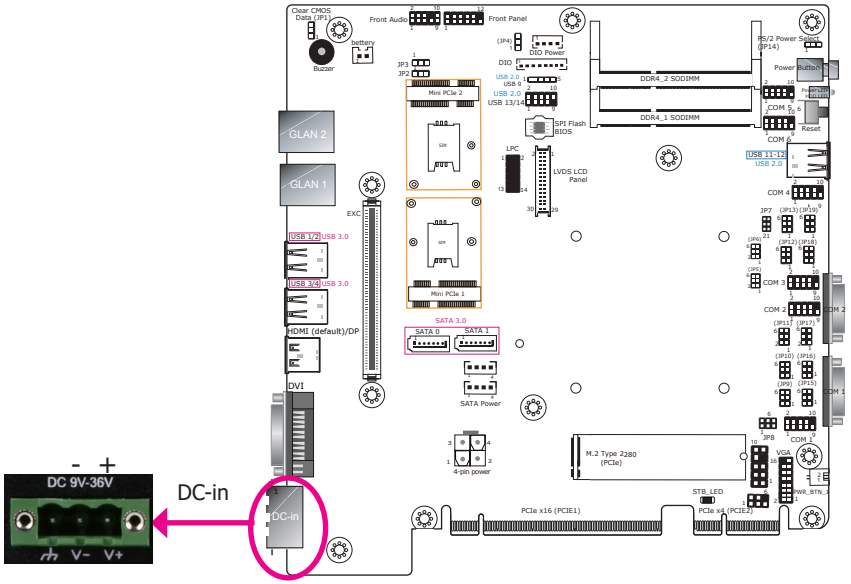
BIOS Setting

Configure the onboard LAN in the Advanced menu ("ACPI Configuration") of the BIOS. Refer to Chapter 7 for more information.

Driver Installation

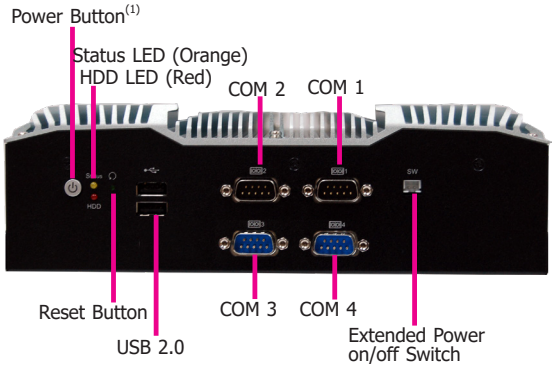
Install the LAN drivers. Refer to Chapter 8 for more information.

9~36V DC-in



This jack provides a maximum of 160W power input solution. Connect a DC power cord to this jack. Using a voltage higher than the recommended one may fail to boot the system or cause damage to the system board.

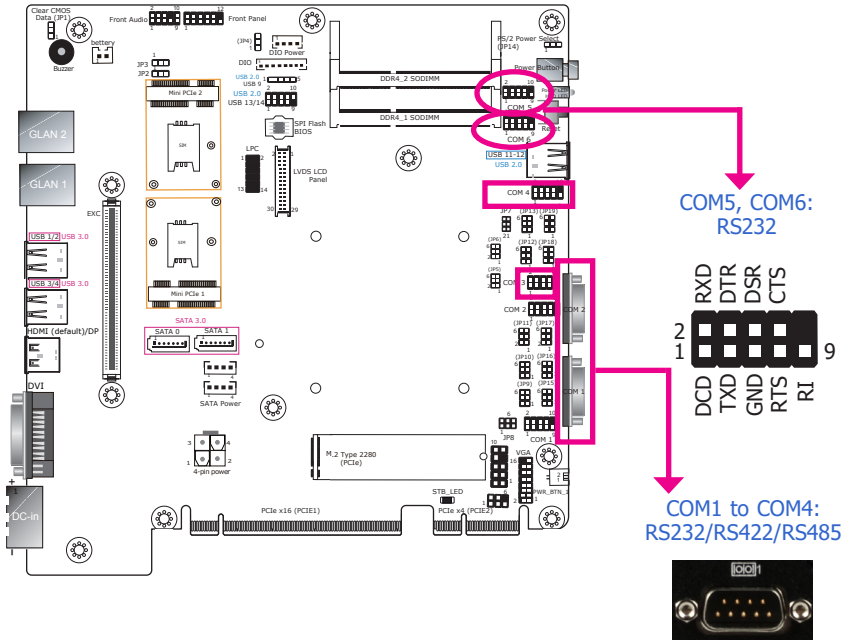
Bottom Panel I/O Ports



The bottom panel I/O consists of the following ports:

- Power button with LED
- Remote power-on/off switch
- Reset switch
- Status and HDD LEDs
- Two USB 2.0 ports
- Four RS232/422/485 serial COM ports

COM (Serial) Ports



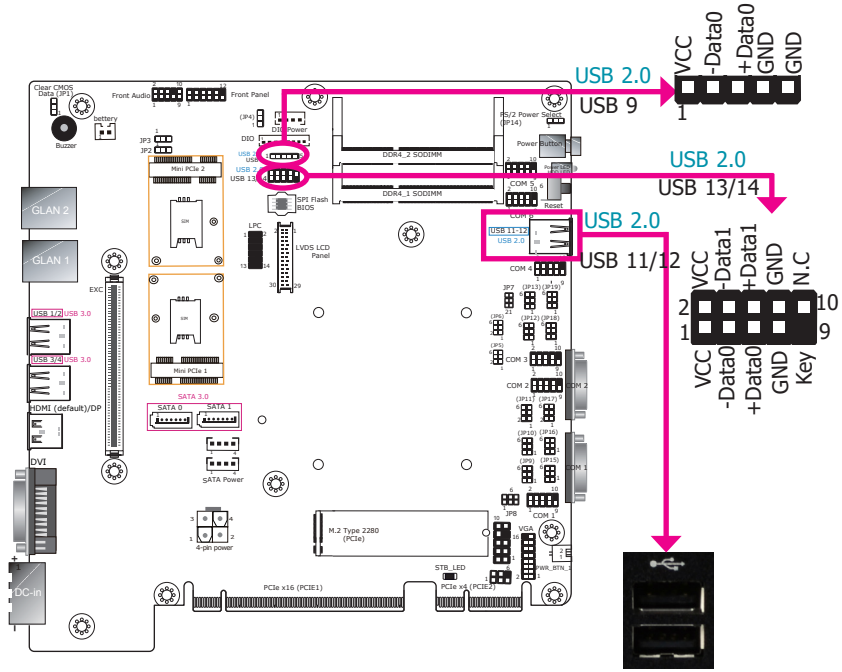
COM1 to COM4 can be selected among RS232/RS422/RS485 whereas COM5 and COM6 are fixed at RS232. For pin definitions and jumper selection of different communication modes, please refer to Chapter 4.

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 serial ports in the Advanced menu ("Super IO Configuration" submenu) of the BIOS. Refer to Chapter 7 for more information.

USB Ports

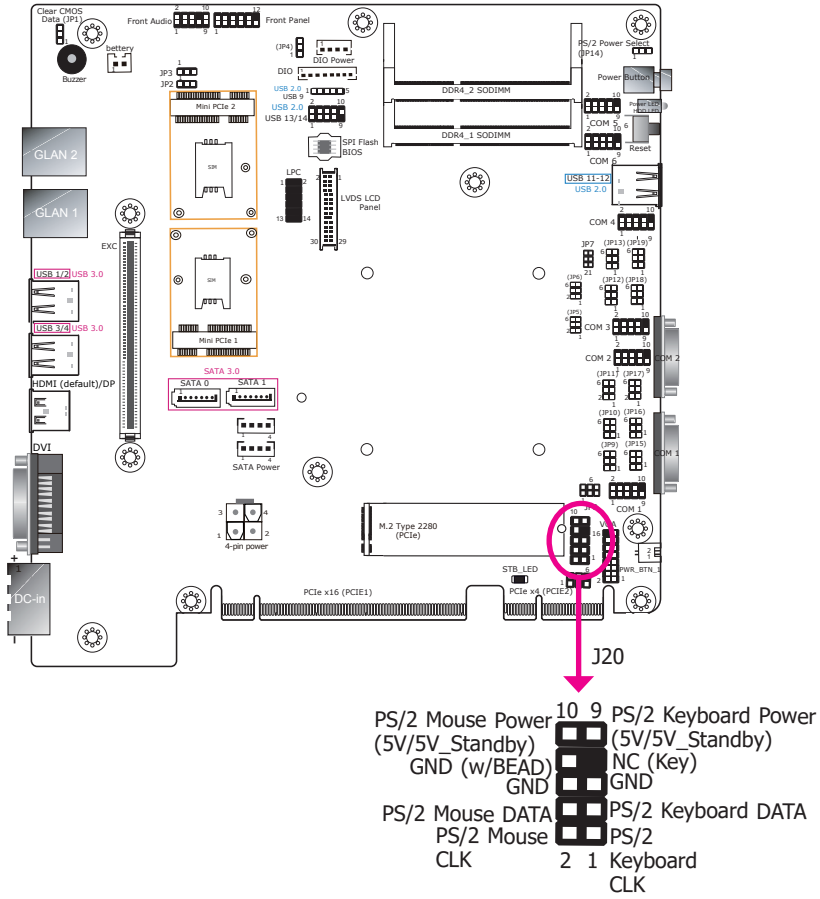


The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals. The system board is equipped with 2 USB 2.0 ports at the front panel I/O ports of the system unit. In addition, the system board provides 3 USB 2.0 ports via the internal pin headers.

- **BIOS Setting**

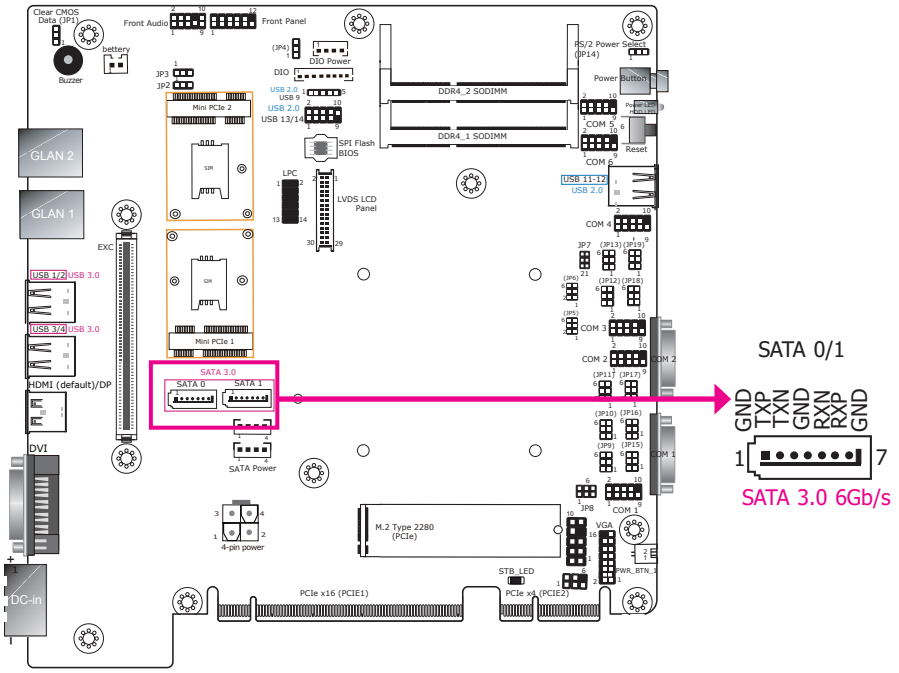
Configure the onboard USB in the Advanced menu ("USB Configuration" submenu) of the BIOS. Refer to Chapter 7 for more information.

I/O Connectors
PS/2 KB/MS Connector



The 10-pin connector is used to connect PS/2 keyboard and mouse.

SATA (Serial ATA) Connectors



Features

- 2 Serial ATA 3.0 ports
  - SATA port 0 and 1 with data transfer rate up to 6Gb/s
- Integrated Advanced Host Controller Interface (AHCI) controller with RAID

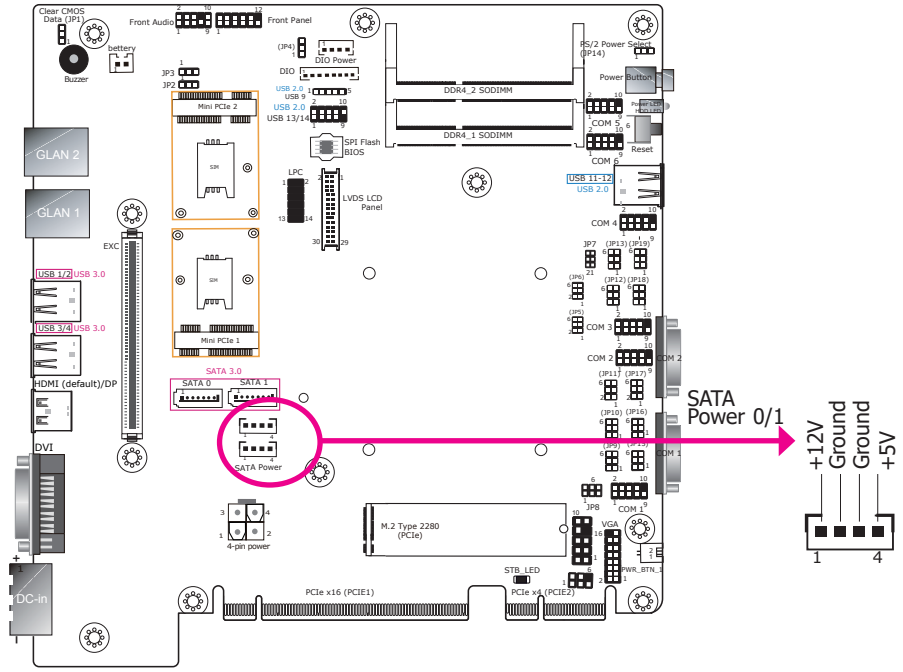
The Intel® Rapid Storage Technology supports RAID configuration of 0 and 1 as well as Intel® Optane™ Technology. Please refer to "Expansion Slots" in this chapter for more information.

The power cable must be connected from the system board's Serial ATA power connector to the SATA drive's power connector in order to provide power to the drive.

BIOS Setting

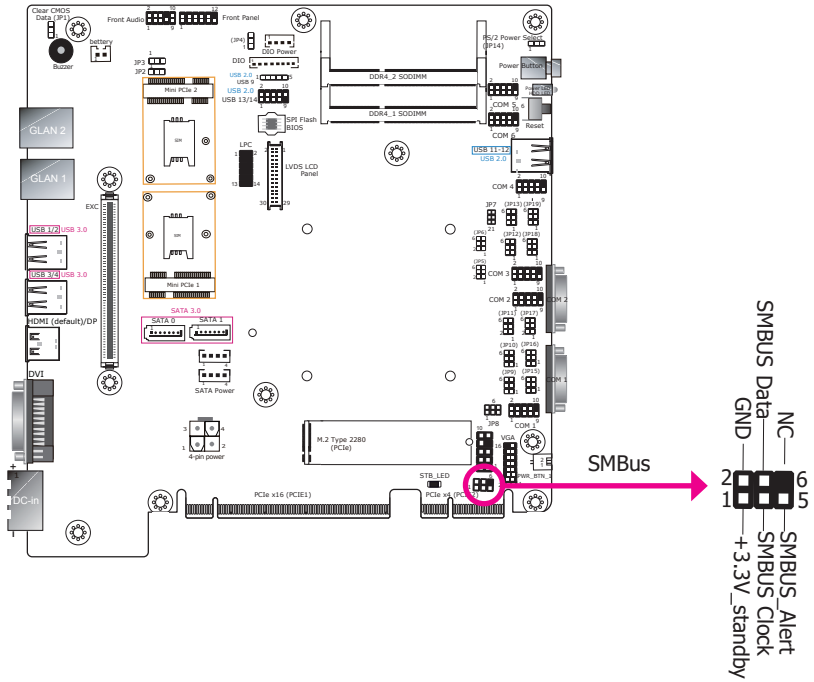
Configure the Serial ATA drives in the Advanced submenu ("SATA Configuration" section) of the BIOS. Refer to Chapter 7 for more information.

SATA (Serial ATA) Power Connectors



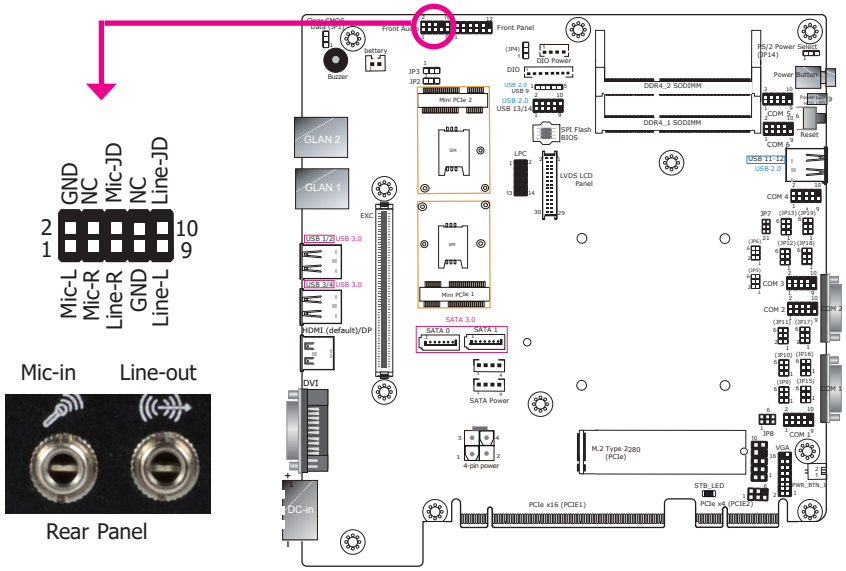
These SATA power connectors supply power to the SATA drives. Connect one end of the provided power cable to the SATA power connector and the other end to your storage device.

SMBus Connector



The SMBus (System Management Bus) connector is used to connect SMBus devices. 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.

Rear Audio Connector



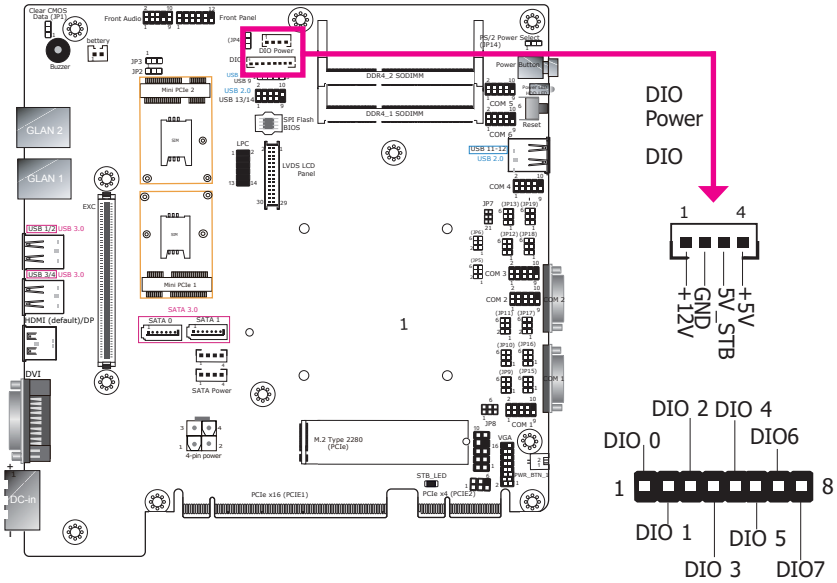
Rear Audio

The system board has one audio connector for microphone and line-out connections.

Driver Installation

Install the audio driver. Refer to the Chapter 8 for more information.

Digital I/O Connector & DIO Power



The 8-bit Digital I/O connector provides 8-bit digital input/output signals to provide the ability to monitor and control the states of the connected external devices.

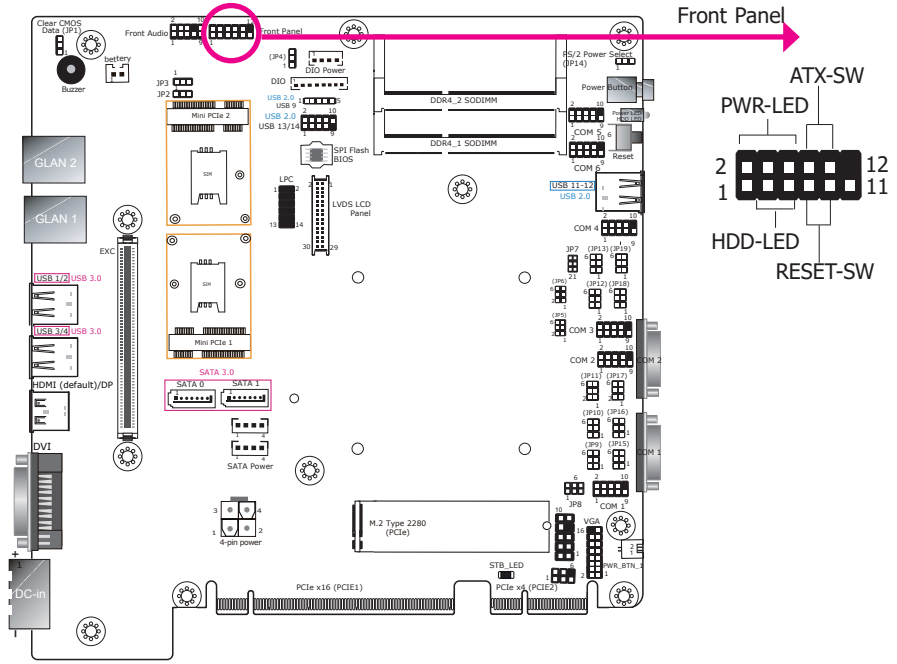
Digital I/O Connector

Pins	Function
1	DIO 0
2	DIO 1
3	DIO 2
4	DIO 3
5	DIO 4
6	DIO 5
7	DIO 6
8	DIO 7

Digital I/O Power

Pins	Function
1	+12V
2	GND
3	5V_Standby
4	5V

Front Panel Connector



HDD-LED - HDD LED

This LED will be lit when the hard drive is being accessed.

RESET SW - Reset Switch

This switch allows you to reboot without having to power off the system.

ATX-SW - ATX Power Switch

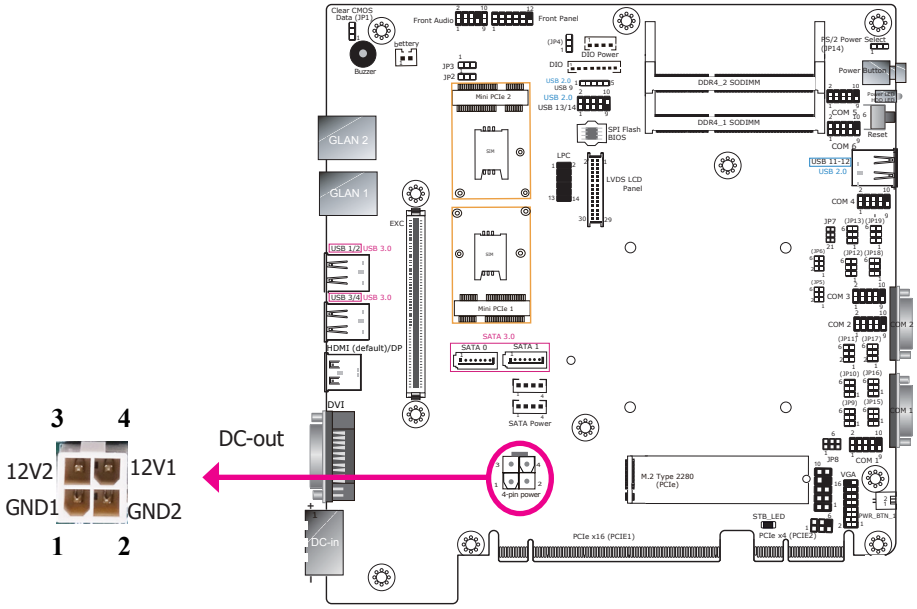
This switch is used to power on or off the system.

PWR-LED - Power/Standby LED

When the system's power is on, this LED will light. When the system is in the S1 (POS - Power On Suspend) state, it will blink every second. When the system is in the S3 (STR - Suspend To RAM) state, it will blink every 4 seconds.

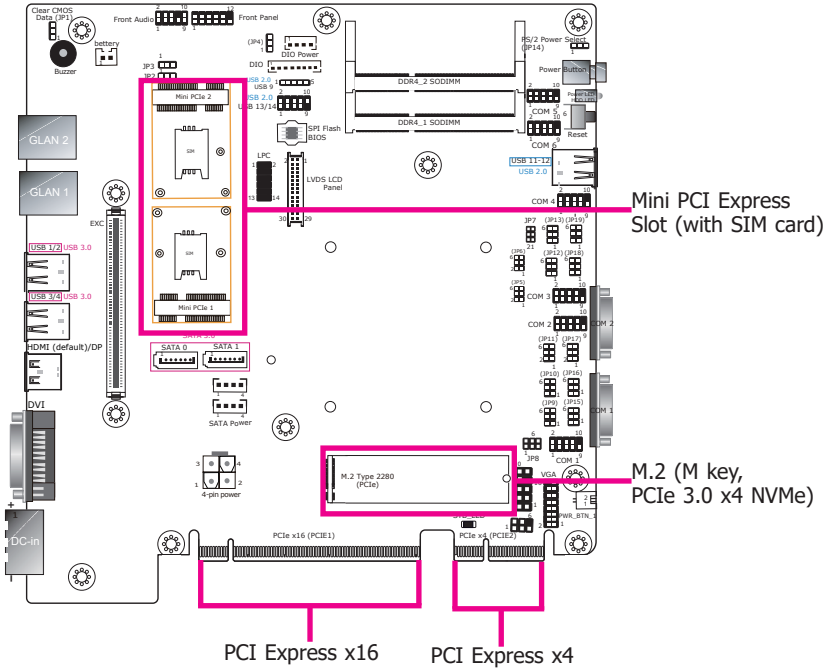
	Pin	Pin Assignment		Pin	Pin Assignment
HDD-LED	3	HDD Power	PWR-LED	2	LED Power
	5	Signal		4	LED Power
RESET SW	7	Ground		6	Signal
	9	RST Signal	ATX-SW	8	Ground
	11	N.C.		10	Signal

12V DC-out



The 4-pin vertical type connector (optional) provides low power output.

Expansion Slots



Dual Mini PCIe Slots (with Mini SIM Card Slots)

The Mini PCIe socket is used to install a Mini PCIe card. The system is equipped with two full-size Mini PCIe slot slots (Mini PCIe 1: PCIe & USB signals; Mini PCIe 2: USB signals only).

PCI Express x16 Slot

Install PCI Express x16 graphics card, that comply to the PCI Express specifications, into the PCI Express x16 slot such as a graphics card.

PCI Express x4 Slot

Install PCI Express cards such as network cards or other cards that comply to the PCI Express specifications into this slot.

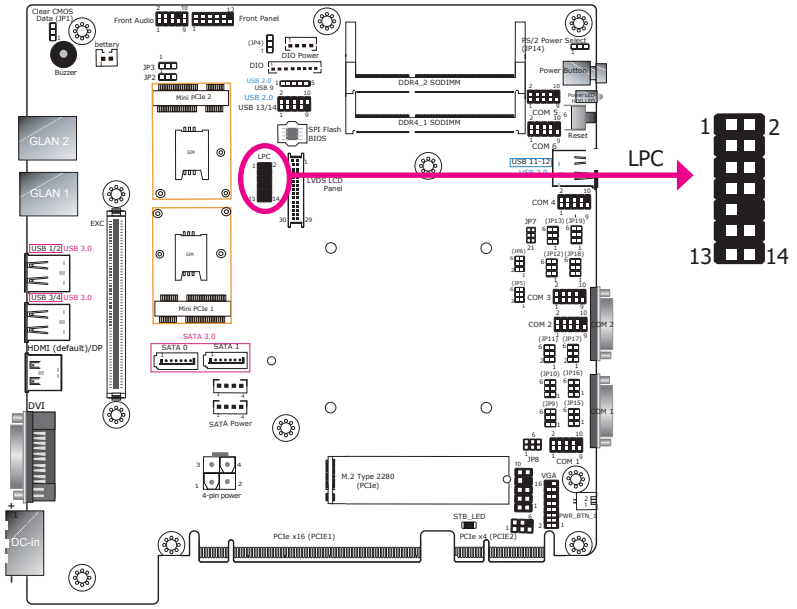
M.2 Slot with Intel® Optane™ Memory Support

To set up Intel® Optane™ technology, please configure the SATA controller mode to "Intel RST Premium" and install the Intel® Rapid Storage Technology driver (15.5 or later depending on your Intel® Optane™ memory model). Refer to Chapter 7 and 8 for more information.

BIOS Setting

Configure these PCIe slots including their speed in the Advanced menu ("PCI Express Configuration" submenu) of the BIOS. Refer to Chapter 7 for more information.

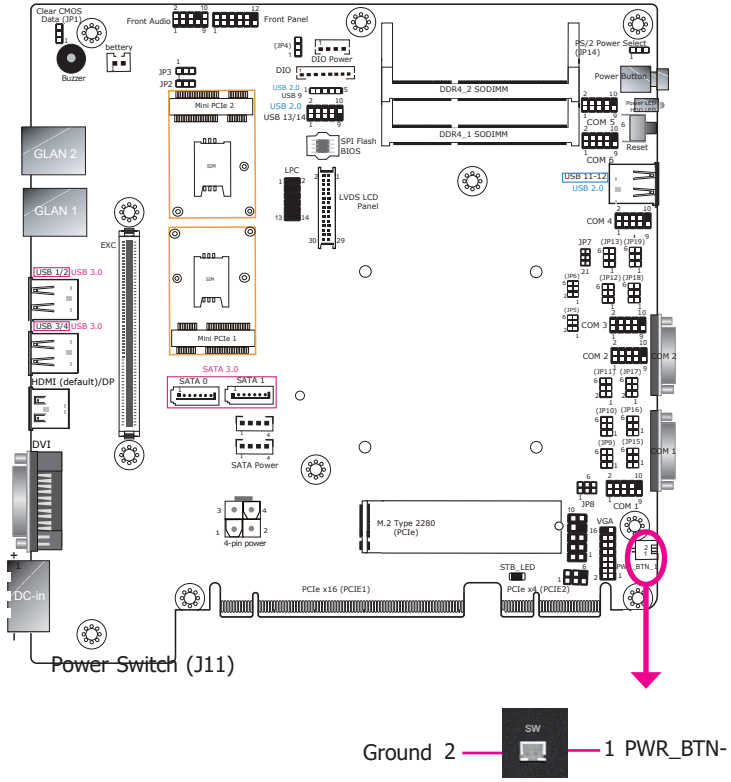
LPC Connector



The Low Pin Count Interface was defined by Intel® Corporation to facilitate the industry's transition towards legacy free systems. It allows the integration of low-bandwidth legacy I/O components within the system, which are typically provided by a Super I/O controller. Furthermore, it can be used to interface firmware hubs, Trusted Platform Module (TPM) devices and embedded controller solutions. Data transfer on the LPC bus is implemented over a 4 bit serialized data interface, which uses a 24MHz LPC bus clock. For more information about LPC bus refer to the Intel® Low Pin Count Interface Specification Revision 1.1'. The table below indicates the pin fuctions of the LPC connector.

Pin	Pin Assignment	Pin	Pin Assignment
1	L_CLK	2	L_AD1
3	L_RST#	4	L_AD0
5	L_FRAME#	6	3V3
7	L_AD3	8	GND
9	L_AD2	10	Key
11	INT_SERIRQ	12	GND
13	5VSB	14	5V

Remote Power Switch



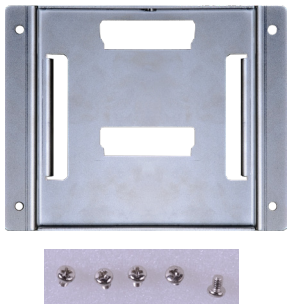
This connector can be used for power-on/power-off control.

Chapter 6 - Mounting Options

VESA Mount

The VESA-mount specifications for this device is 100 x 100 (mm). Please use a compatible VESA mount kit that can sustain the weight and size of this device. The VESA mount kit includes the following:

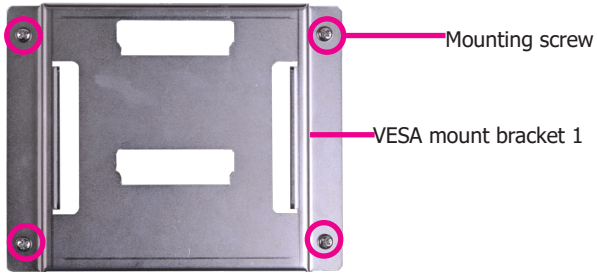
- 2 VESA mount brackets
- Bracket screws



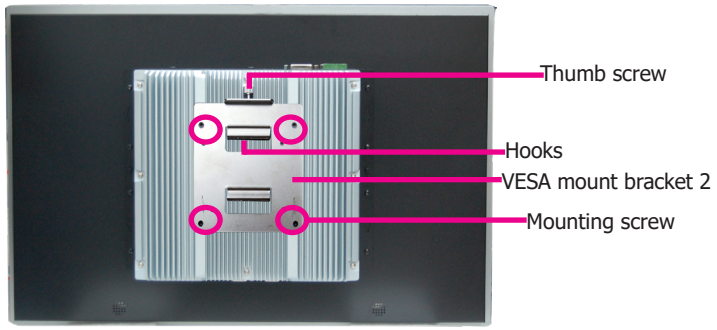
VESA mount bracket 1

VESA mount bracket 2

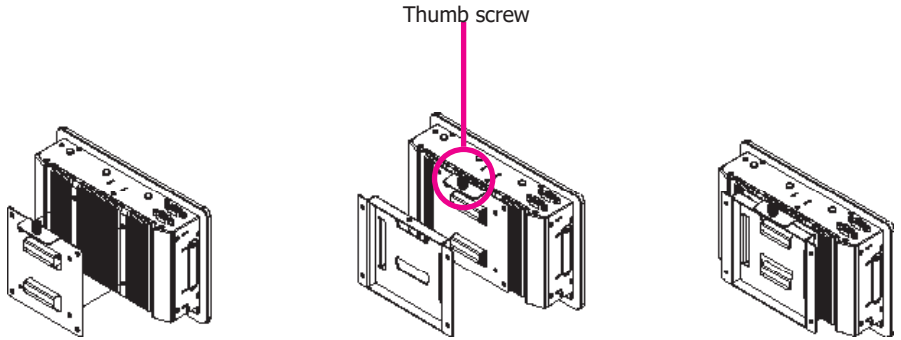
1. Select a place on the wall where you will mount the Panel PC.
2. Use the provided mounting screws to attach "VESA mount bracket 1" to the wall.



3. Attach the other bracket (VESA mount bracket 2) to the rear of the Panel PC.



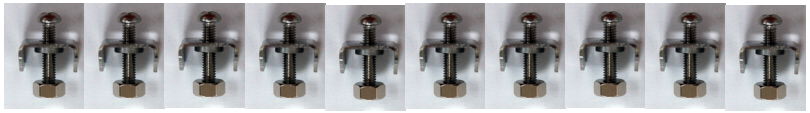
4. Slide the Panel PC to "wall mount bracket 1" to attach the two brackets with the hooks. Then tighten the thumb screw to secure the assembly in place. Note that the following diagram is for illustration only and may not resemble the actual product.



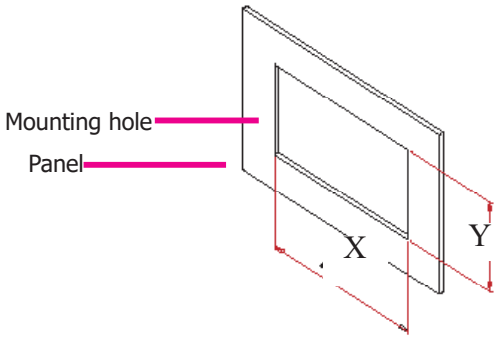
Panel Mount

The panel mounting kit includes the following:

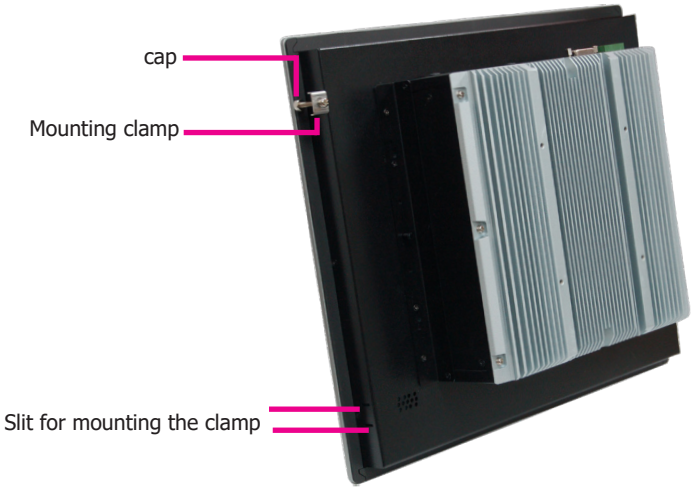
- 10 mounting clamps



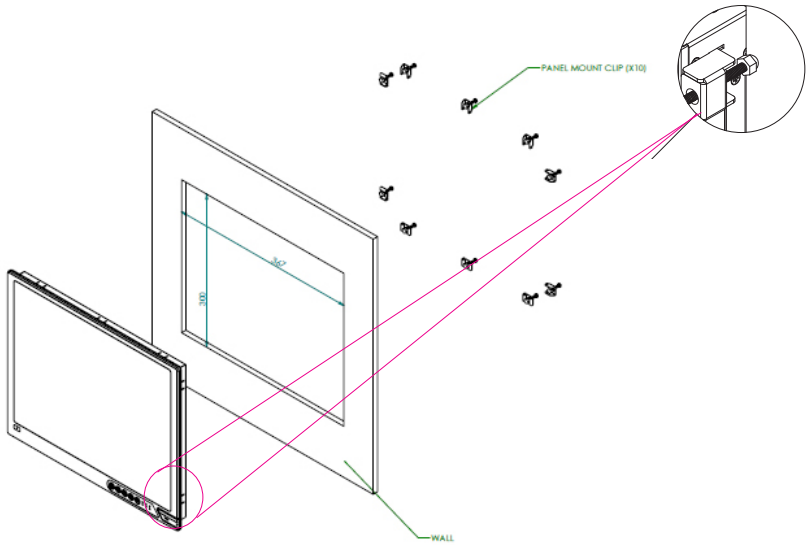
1. Select a place on the panel (or wall) where you will mount the Panel PC.
2. Cut out a shape on the panel that corresponds to the Panel PC's rear dimensions (15": 367mm x 300mm; 18.5": 454mm x 296mm; 19": 447mm x 380mm; 21.5": 526.2mm x 342.6mm) and ensure that the Panel PC can be fitted into the panel properly.



3. Insert the Panel PC from the outside surface of the panel into the mounting hole until it is properly fitted against the panel.
4. Position the mounting clamps along the rear edges of the Panel PC and insert them into the slits around the Panel PC. Note that the following diagram is for illustration only and may not resemble the actual product.



5. The first and second clamps must be positioned and secured diagonally prior to mounting the rest of the clamps. Tighten the clamp's screw using an electric screwdriver by pressing the flat cap onto the back of the panel.



Note:
The maximum thickness of your panel's mounting wall should be 10 mm for secure panel mount.

Chapter 7 - BIOS Setup

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 <Del> keys simultaneously.

Legends

Keys	Function
Right and Left arrows	Move the highlight left or right to select a menu
Up and Down arrows	Move the highlight up or down between submenu or fields
<Esc>	Exit the current menu or the BIOS Setup Utility
<F1>	Help
<F5>	Change values
<F6>	Change values
<F9>	Setup Defaults
<F10>	Save and Exit
<Enter>	Press <Enter> to enter the highlighted submenu.

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.

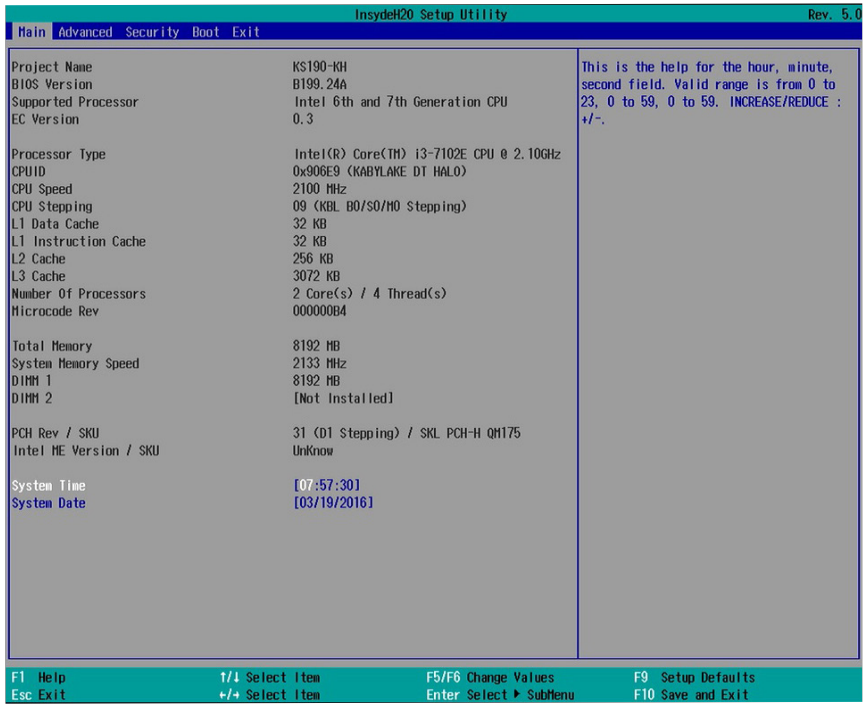
Submenu

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>.

Insyde BIOS Setup Utility

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.

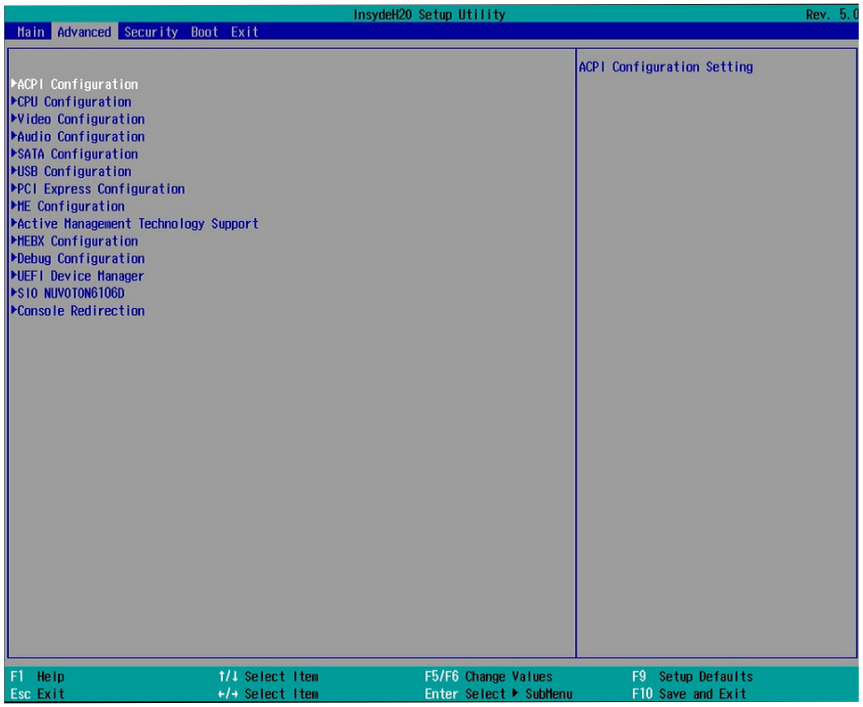
System Date

The date format is <month>, <date>, <year>. Month displays the month, from January to December. Date displays the date, from 1 to 31. Year displays the year, from 1980 to 2099.

Advanced

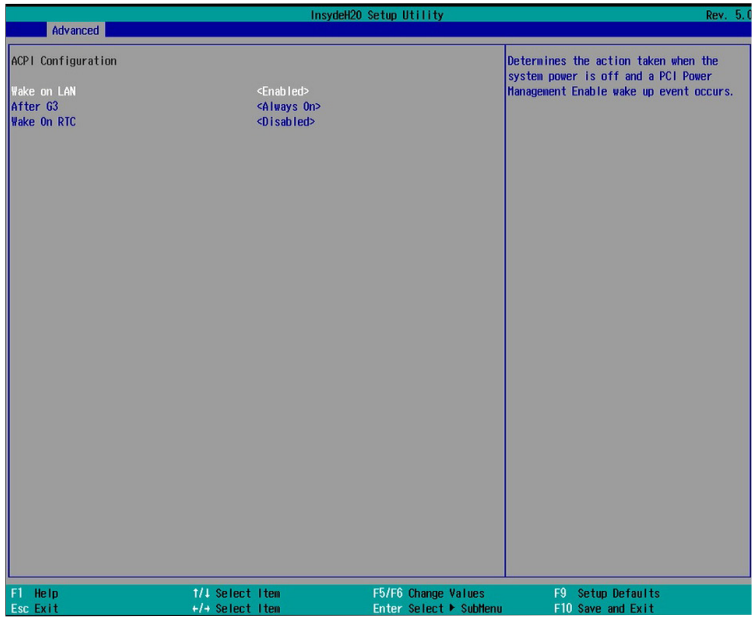
The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.

Important:
Setting incorrect field values may cause the system to malfunction.



ACPI Settings

This section configures system's ACPI parameters.



Wake on LAN

Enable or disable WOL (wake-on-LAN) to wake the system through an Ethernet adapter.

Wake on PS/2

Enable or disable the use of PS/2 devices to wake the system.

After G3

Specify which state the system should be in when power is re-applied after a power failure (G3, the mechanical-off, state).

Always On The system is powered on.

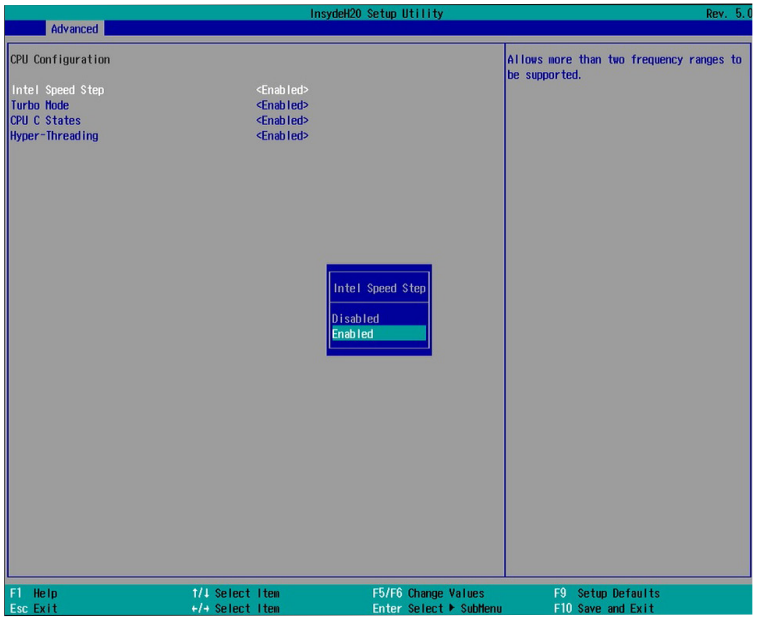
Always Off The system is powered off.

Wake on RTC

Enable this function to power the system up automatically at a particular time every day from the real-time clock battery. Specify the wake up time of the day below: <hour>, <minute>, <second>. The default is disabled.

CPU Configuration

This section configures the CPU.



Intel® SpeedStep™

Enable or disable the Enhanced Intel SpeedStep® Technology, which helps optimize the balance between system's power consumption and performance. After it is enabled in the BIOS, you can take advantage of its offering by setting power schemes from the operating system's power options.

Turbo Mode

Enable or disable processor turbo mode, which allows the processor core to run faster automatically than the base frequency by taking advantage of thermal and power headroom.

CPU C States

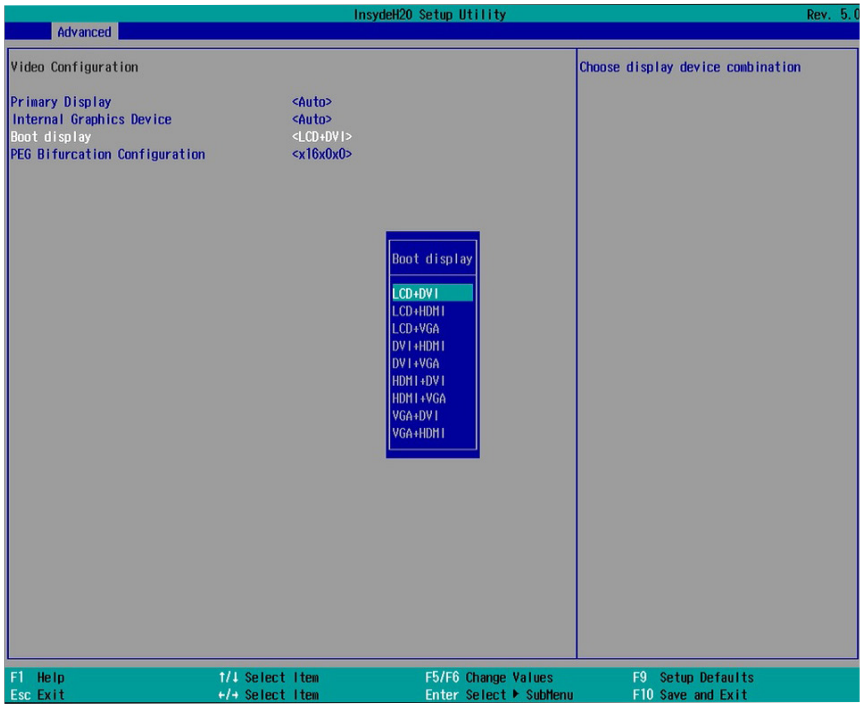
Enable or disable CPU Power Management. It allows the CPU to go to C states when it's not 100% utilized.

Hyper-Threading

Enable Intel® Hyper-Threading Technology (HT) on the processor to improve performance of operating systems and software that are optimized for hyper-threading technology. Please check the software specifications to determine if enabling HT can be advantageous to the overall system performance.

Video Configuration

This section configures the video settings. Note that the configuration options vary depending on the "Boot type" selected in the "Boot" menu.



Primary Display

Select the primary display for the system. Note that this option will be shown only if the "Boot type" is set to "Dual" or "UEFI". Depending on your selection, the order of video device initialization will be as follows:

Auto mode: PEG (PCIe Graphics devices connected to PEG lanes directly routed from the CPU)->PCIe graphics devices->PCI graphics devices->IGFX (internal graphics)

IGFX: IGFX (internal graphics)->PEG (PCIe Graphics devices connected to PEG lanes directly routed from the CPU)->PCIe graphics devices->PCI graphics devices

PEG: PEG (PCIe Graphics devices connected to PEG lanes directly routed from the CPU) ->PCIe graphics devices->PCI graphics devices->IGFX (internal graphics)

PCI: PCI graphics devices -> PCIe graphics devices->PEG (PCIe Graphics devices connected to PEG lanes directly routed from the CPU)->IGFX (internal graphics)

Internal Graphics Device

Enable, disable or automatically detect the internal graphics.

Boot display

Prioritize device combination for display during system boot. Note that this option will be shown only if the "Boot type" is set to "Dual" or "Legacy".

The options are as follows:

LCD+DVI

LCD+HDMI

LCD+VGA

DVI+HDMI

DVI+VGA

HDMI+DVI

HDMI+VGA

VGA+DVI

VGA+HDMI

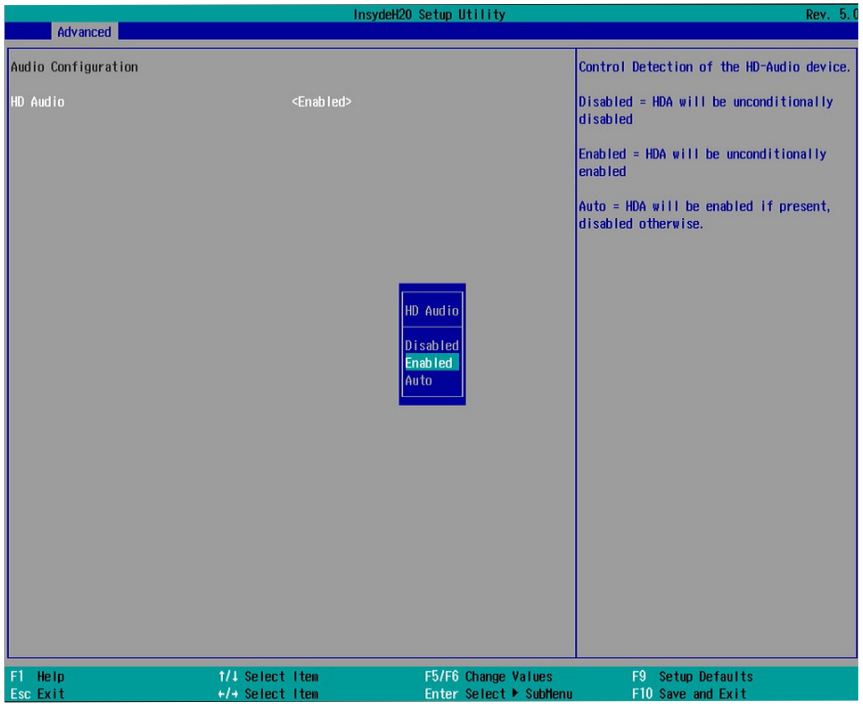
PEG Bifurcation Configuration

The bifurcation method allows you to split a PEG lane into multiple lanes by dividing its bandwidth based on one of the following settings:

x16, x0, x0 (the default setting)
x8, x4, x4
x8, x8, x0

Audio Configuration

This section configures the audio settings.



HD Audio

Control the detection of the high-definition audio devices.

Disabled

High-definition audio devices will be unconditionally disabled.

Enabled

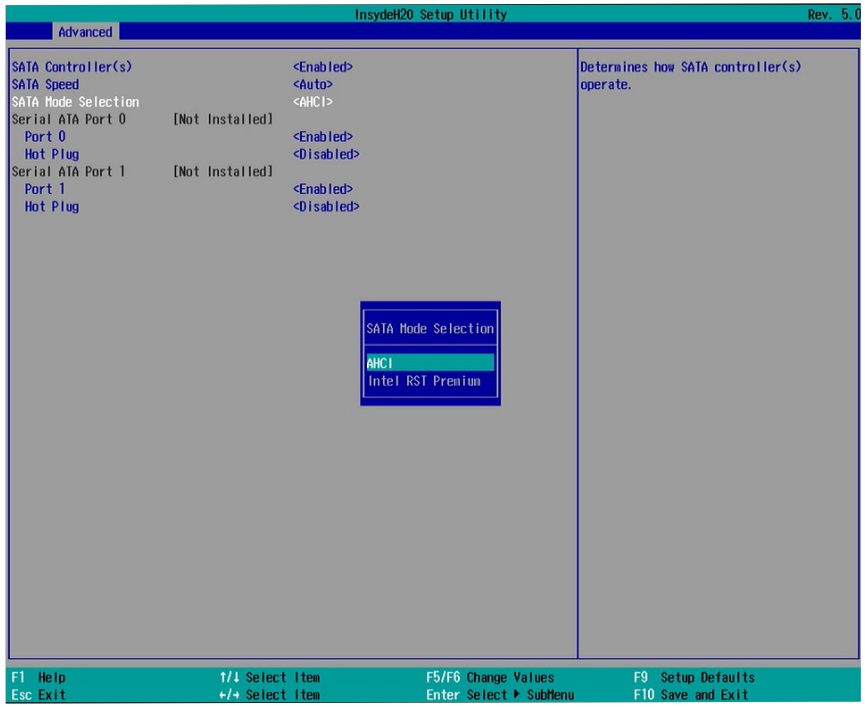
High-definition audio devices will be unconditionally enabled.

Auto

High-definition audio devices will be enabled if present and disabled otherwise.

SATA Configuration

This section configures SATA controllers.



SATA Controller(s)

Enable or disable Serial ATA controllers.

SATA Speed

Select Serial ATA device speed from Gen1 (1.5 Gbit/s), Gen2 (3 Gbit/s), Gen 3 (6 Gbit/s) or auto.

SATA Mode Selection

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

AHCI Mode

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

Intel RST Premium

This option allows you to create RAID using Intel® Rapid Storage Technology. It also allows for the SATA controller to use the "Intel® Optane™ technology" to accelerate system performance and responsiveness. To enable Intel® Optane™ technology, the system

requires that a PCIe NVMe module and a Windows* 10 x64 bit (Version 1703/Build 15063) or later versions installed with a more recent version of the Intel® Rapid Storage Technology (Intel® RST) driver and application. For more information on Intel® Optane™ memory, please refer to Installation Guide for Intel® Optane™ Memory.

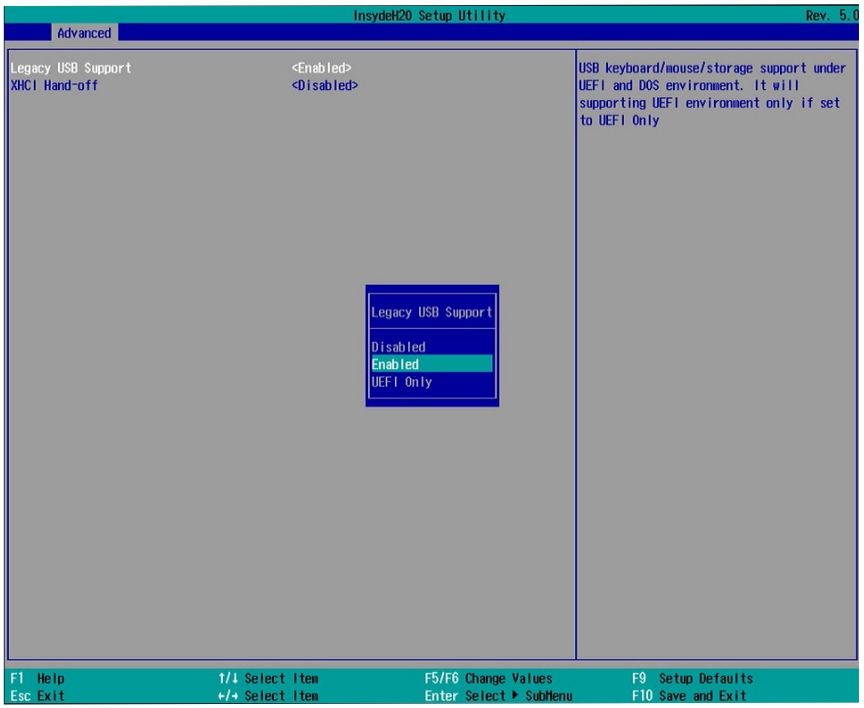
For more information on RAID Creation, please refer to Chapter 8 and 9.

Serial ATA Port 0 to 1 and Hot Plug

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

USB Configuration

This section configures the parameters of the USB devices.



Legacy USB Support

Disabled

Disable USB keyboard/mouse/storage support.

Enabled

Enable USB keyboard/mouse/storage support.

UEFI Only

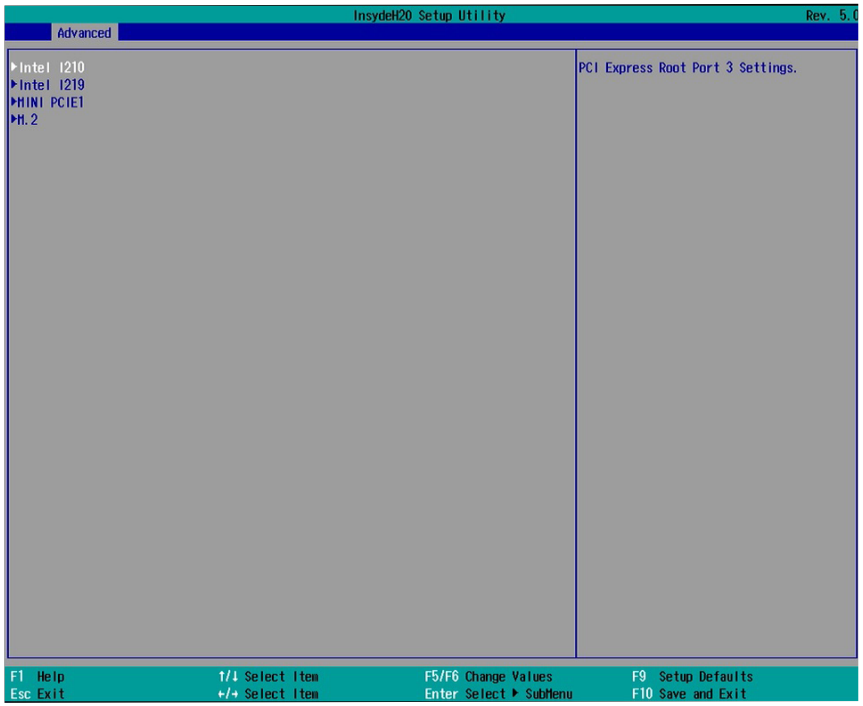
Enable USB keyboard/mouse/storage support only under the UEFI environment.

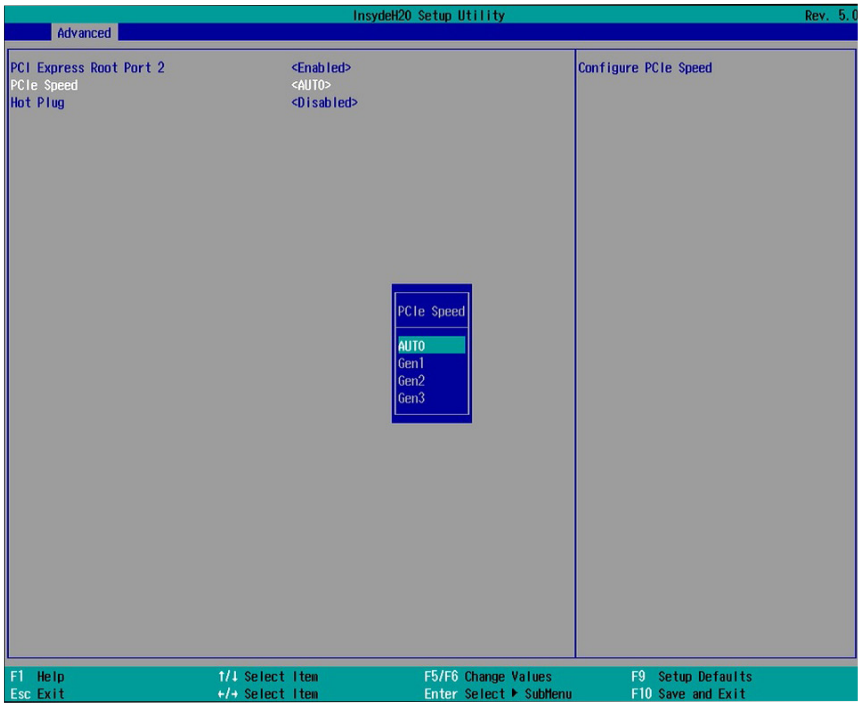
XHCI Hand-off

Enable this function for operating systems that do not support xHCI Hand-off. The XHCI ownership change will be claimed by the XHCI driver.

PCI Express Configuration

This section configures the settings of PCI Express root ports.





PCI Express Configuration

Select a device associated with a PCI Express root port and press "Enter" to configure:

Intel I210
Intel I219
Mini PCIE1
M.2

For each PCIe root port above, press "Enter" to configure its speed and hog plug function.

Enable/Disable

Enable or disable this PCI Express root port.

PCIe Speed

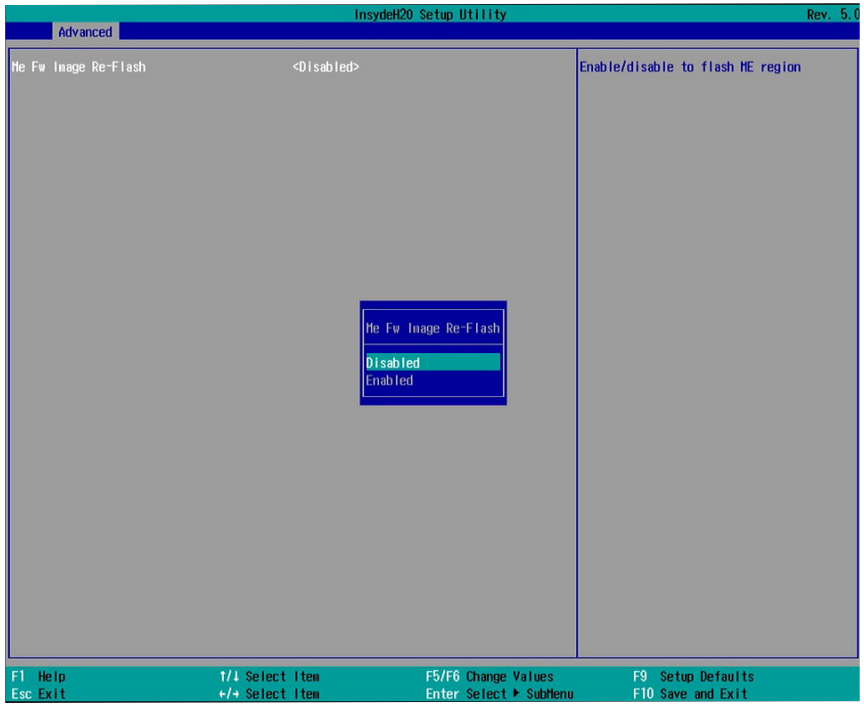
Select the speed of the PCI Express root port: Auto, Gen1 (2.5 GT/s), Gen2 (5 GT/s) or Gen3 (8 GT/s). This option is only available for Mini PCIE1 and M.2.

Hot Plug

Enable or disable the hot plug function of the PCIe root port. This option is only available for Mini PCIE1 and M.2.

ME Configuration

This section configures flashing of the Intel® Management Engine.

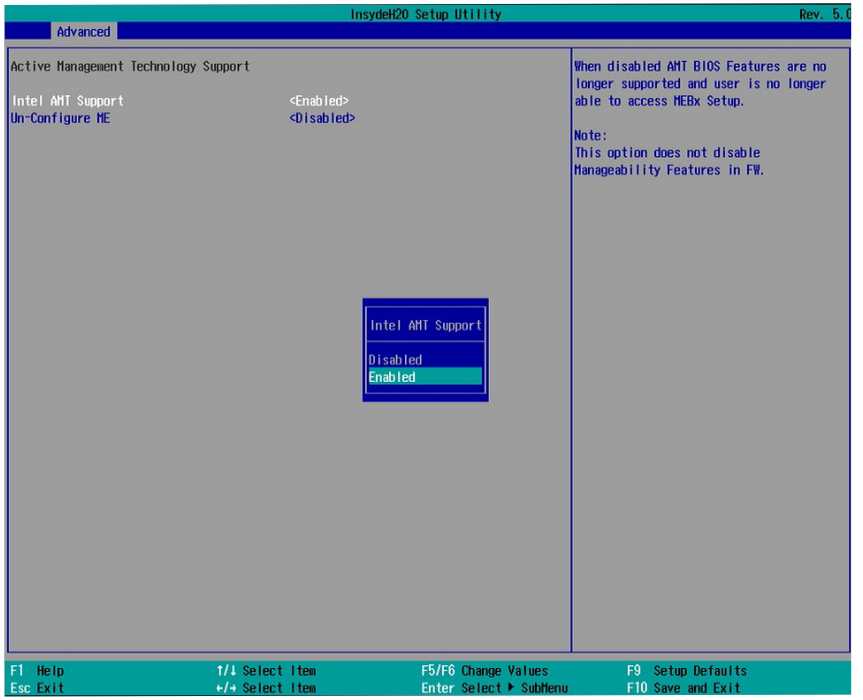


Me Fw Image Re-Flash

Enable or disable Intel® Management Engine firmware flashing when updating the BIOS.

Active Management Technology Support

The section allows you to enable or disable the Intel® Active Management Technology (Intel® AMT) BIOS extension. Refer to Chapter 10 - Intel AMT Settings for more information. Note that this function is not available for the Intel® Core™ i3 processors.



Intel AMT Support

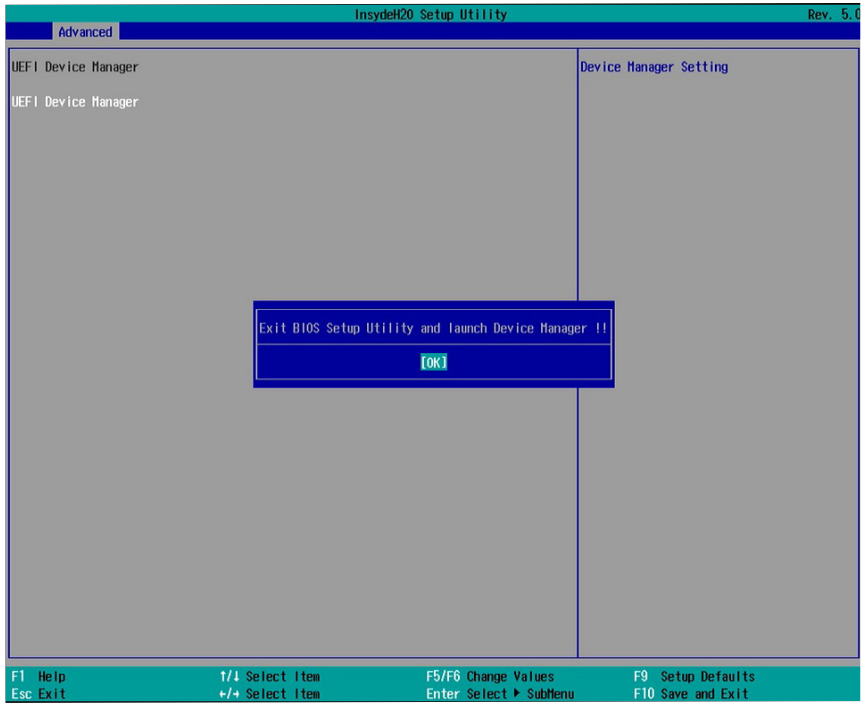
Enable or disable Intel® Active Management Technology BIOS extension.

Un-Configure ME

Clears all ME related configurations without requiring a password on the next boot.

UEFI Device Manager

This Device Manager menu is used to configure UEFI network settings when the "Network Stack" is enabled in the "Dual" or "UEFI" boot mode or when the PXE Boot to LAN is enabled in the "Legacy" boot mode. Refer to the "Boot" section in this chapter. After this function is selected, the screen will warn you that you are going to exit the BIOS setup utility.



Network Device List

The "Device Manager" screen is displayed. And if the "Network Stack" or the "PXE Boot to LAN" option is enabled from the "Boot" menu, the "Network Device List" should be shown in the "Device list". Select "Network Device List" to view all of the detected network devices. For each network device, you can select to view and configure its settings. In addition, you can select either the IPv4 or IPv6 network settings for UEFI network configuration.

NIC Configuration Menu

This screen shows hardware information for the Ethernet controllers and configures their operation.

Blink LEDs

Enter the duration (seconds) for the Ethernet's LED to blink to indicate its presence.

NIC Configuration

This screen configures the Ethernet controller. Select the link speed from the following options: Auto Negotiated, 10Mbps Half, 10Mbps Full, 100Mbps Half, and 100Mbps Full.

IPv4 Network Configuration

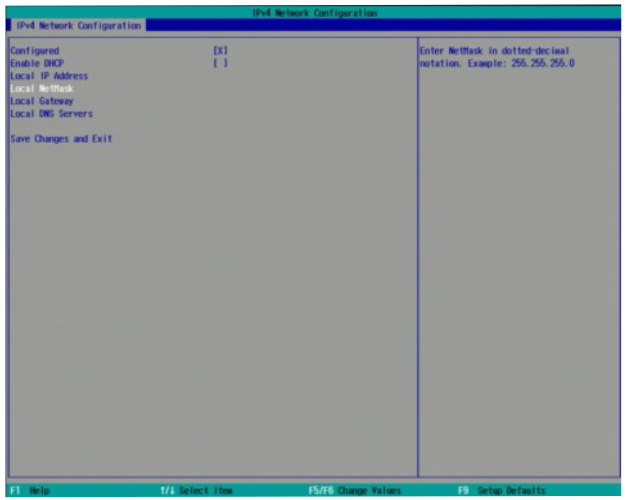
This screen configures the IP addressing method (DHCP or static IP). For static IP addressing, configure the following:

Local IP address and subnet mask: Enter the IP address for the network device in the IPv4 format:

x . x . x . x (x must be a decimal value between 0 and 255).

Local Gateway: Enter the gateway address in the IPv4 format.

Local DNS (Domain Name System) Servers: Enter DNS (Domain Name System) server IP addresses in the IPv4 format.



IPv6 Network Configuration

If you select to use IPv6 network settings, enter the Interface ID (64 bit).
Policy: Select either automatic or manual. And select "Advanced Configuration" to configure IPv6 network address manually if the manual option is selected.

New IPv6 address: Enter the IP address for the network device in the IPv6 format:

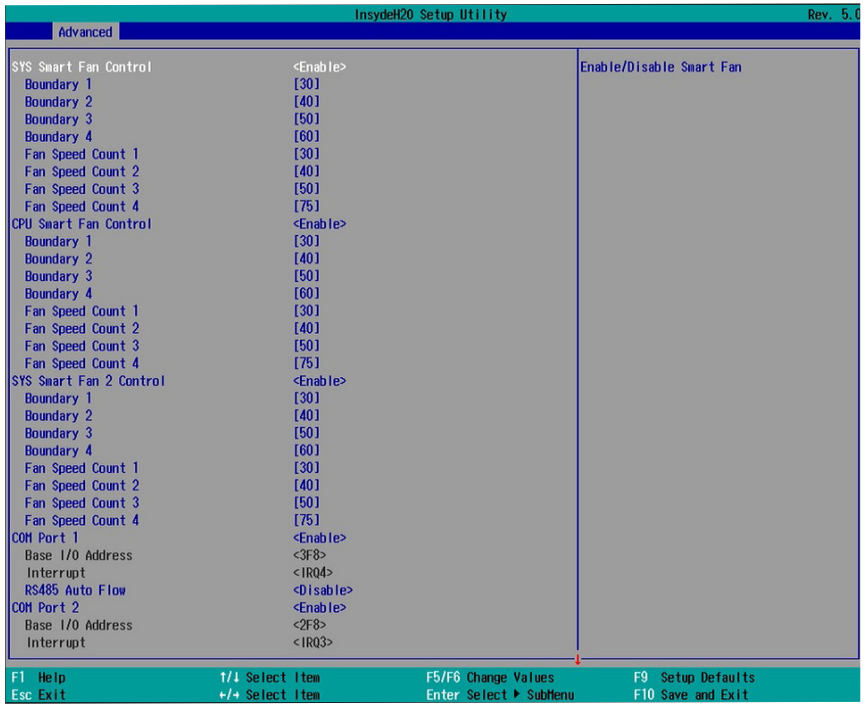
x : x : x : x : x : x : x : x (x can be any hexadecimal value between 0 and FFFF). Place a space to separate each IP address to enter more than one address.

New Gateway addresses: Enter gateway addresses in the IPv6 format.

New DNS addresses: Enter DNS (Domain Name System) server IP addresses in the IPv6 format.

Super IO Configuration

This section configures the system super I/O chip parameters.



SYS Smart Fan/CPU Smart Fan/SYS Smart Fan 2 Control

Enable or disable the smart fan control.

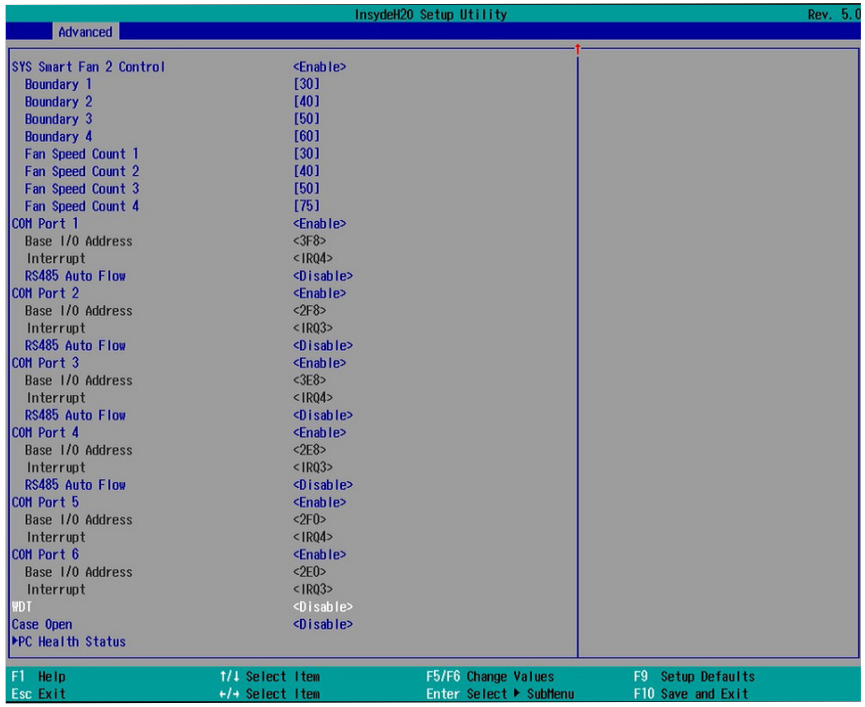
Boundary 1 to Boundary 4

Set the boundary temperatures that determine the operation of the fan with different fan speeds accordingly. For example, when the system or the CPU temperature reaches boundary temperature 1, the system or CPU fan should be turned on and operate at the designated speed.

The range of the temperature is from 0 to 127°C.

Fan Speed Count 1 to Fan Speed Count 4

Set the fan speed. The range is from 1 (lowest speed)-100% (full speed).



COM Port 1 and COM Port 6

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.

For COM Port 1 to COM Port 4, you can enable or disable the RS485 auto flow mechanism.

WDT

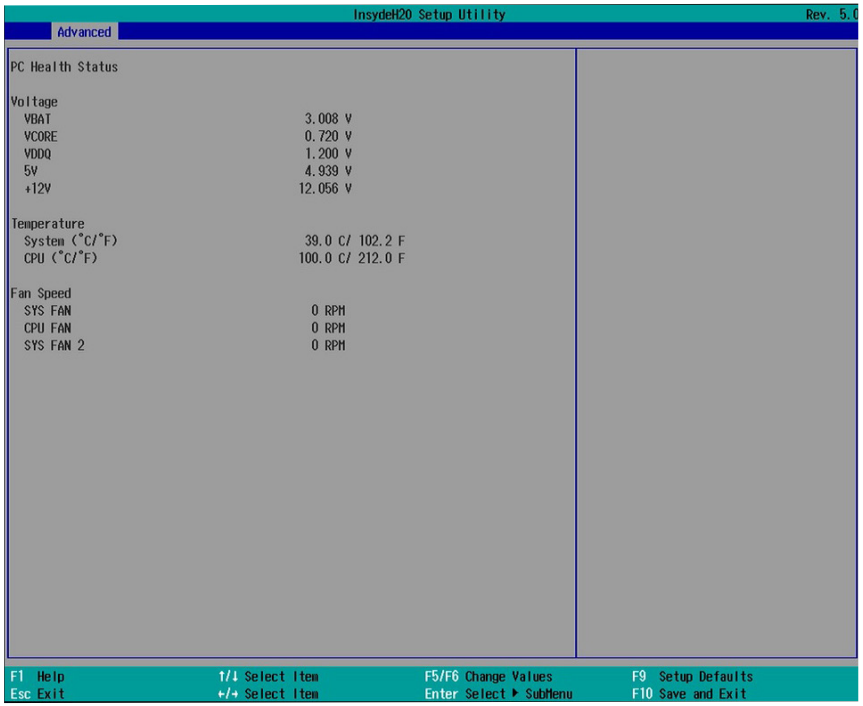
Enable or disable the watchdog function. A counter will appear if you select to enable WDT. Input any value between 1 and 255.

Case Open

Enable or disable the case open function.

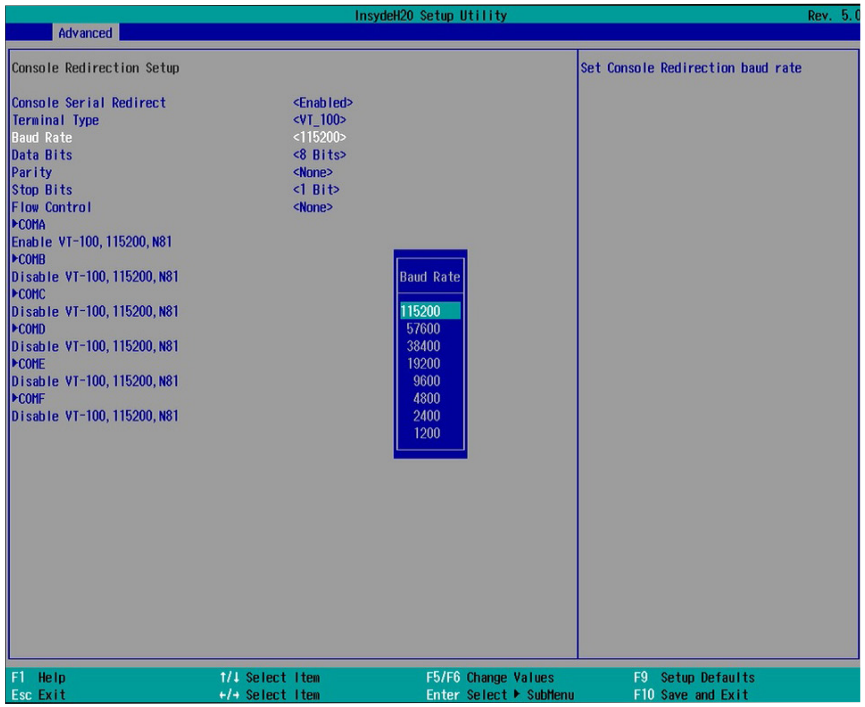
PC Health Status

This section displays PC health information such as the voltages and CPU and system temperatures.



Console Redirection

Console redirection lets you monitor and control the system from a remote station by re-directing the host screen output through a serial port.



Console Serial Redirect

Enable or disable the console redirection function. (The default is disabled.) If you select to enable it, please configure the following parameters for serial communication between the system and a remote station:

Terminal type: VT_100, VT_100+, VT_UTF8, or PC_ANSI.

Baud rate: 115200, 57600, 38400, 19200, 9600, 4800, 2400 or 1200.

Data bits: 8 bits or 7 bits.

Parity: None, Even or Odd.

Stop bits: 1 bit or 2 bits.

Flow control: None, RTS/CTS or XON/XOFF

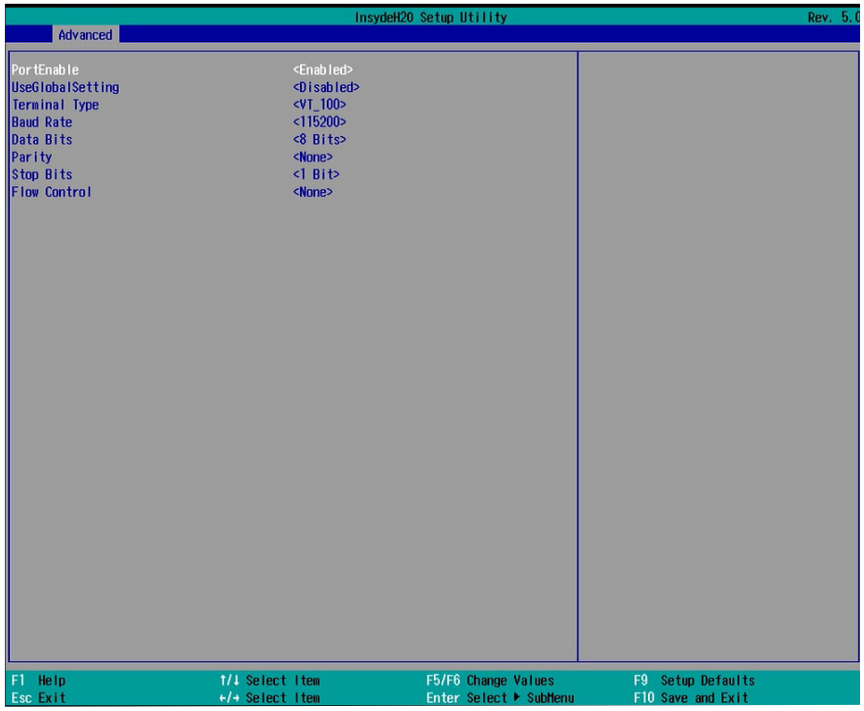
This is the global setting for all of the designated serial ports for the console redirection function.

COMA to COMF

Enable or disable the serial redirection function for each of the serial ports on the system. And configure the serial communication parameters to be used between the system and a remote station.

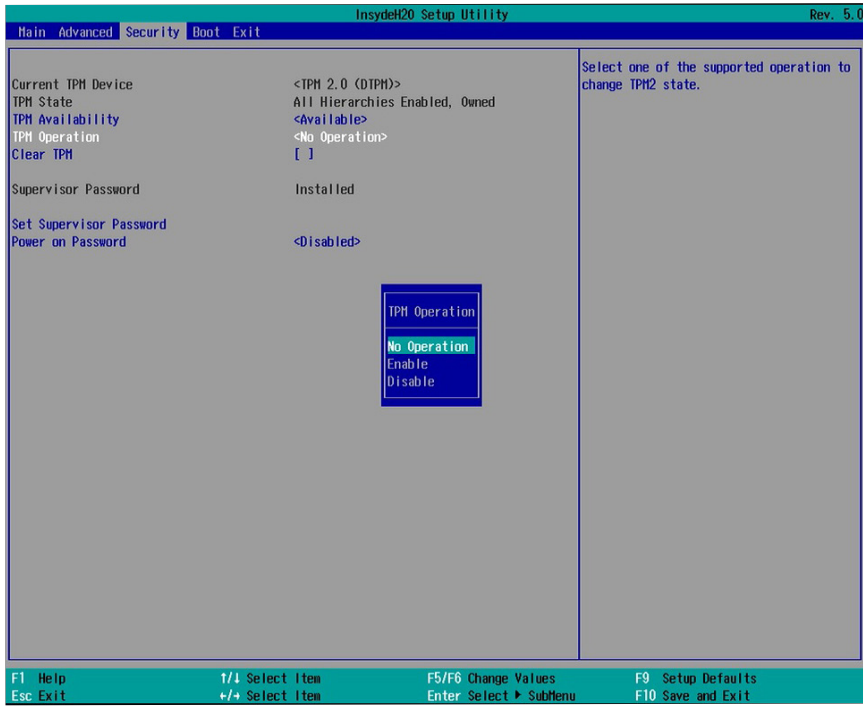
UseGlobalSetting

Choose to use the pre-configured global settings from the previous menu or configure a different setting for each serial port.



Security

This section configures the security for the BIOS Setup utility and the optional Trusted Platform Module (TPM) function.



TPM Availability (optional)

Show or hide TPM availability and its configurations.

TPM Operation

Enable or disable the TPM function. It displays the following options:

- No Operation: No changes to the current state.
- Disable: Disable and deactivate TPM.
- Enable: Enable and activate TPM.

Clear TPM

Remove all TPM ownership contents.

Set Supervisor Password

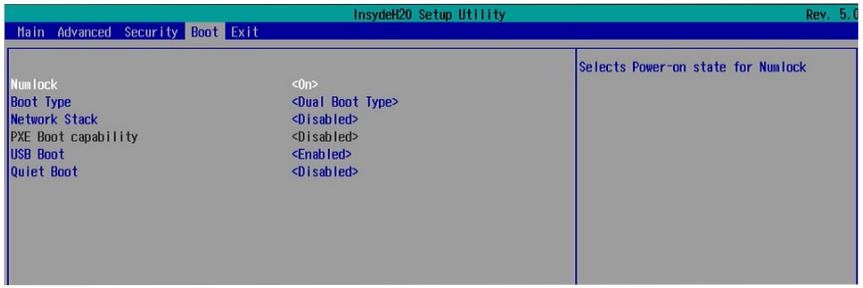
Set the administrative password for entering the BIOS utility or upon entering the power-on self-test (POST) process. The length of the password must be greater than 1 character and less than or equal to 10 characters.

Power-on Password

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

Boot

This section configures boot options.



Numlock

Select the power-on state for the Num Lock key.

Boot Type

Select the boot type. The options are Dual Boot (the default), Legacy Boot and UEFI Boot Type.

Network Stack

This option is shown only when the boot type is set to Dual or UEFI.

Enable or disable UEFI network stack. It supports the operation of these functions or software: Windows 8 BitLocker Network Unlock, UEFI IPv4/IPv6 PXE and legacy PXE option ROM.

If this function is enabled, you can then go to "Advanced">"Device Manager" to configure network settings for network connection under the UEFI environment.

PXE Boot Capability (UEFI mode) /PXE Boot to LAN (Legacy mode)

Enable or disable Preboot eXecution Environment (PXE) boot to LAN. In the UEFI or Dual boot mode, this function can only be enabled if the Network Stack support is enabled.

USB Boot

Enable or disable booting to USB boot devices.

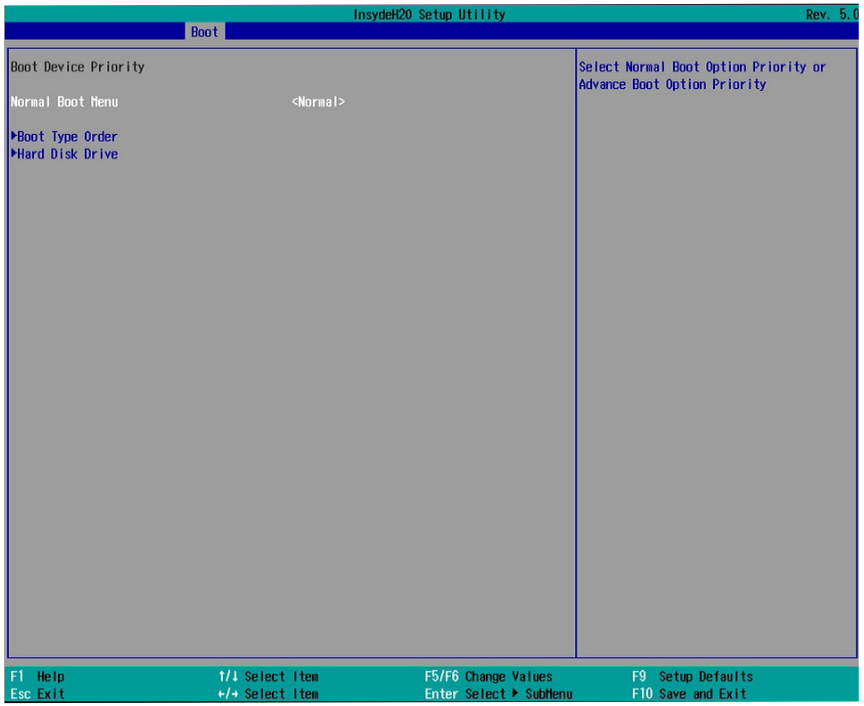
Quiet Boot

Enable or disable the quiet boot function to configure the screen's display between

POST messages or the OEM logo at bootup. Select Disabled to display the POST messages and select Enabled to display the OEM logo.

Boot Device Priority

This section configures legacy or EFI boot order or both depending on the "Boot Type" selected.



EFI Boot Menu

Use + and - keys to arrange the priority of the boot devices in the list.

Legacy Boot Menu

Normal

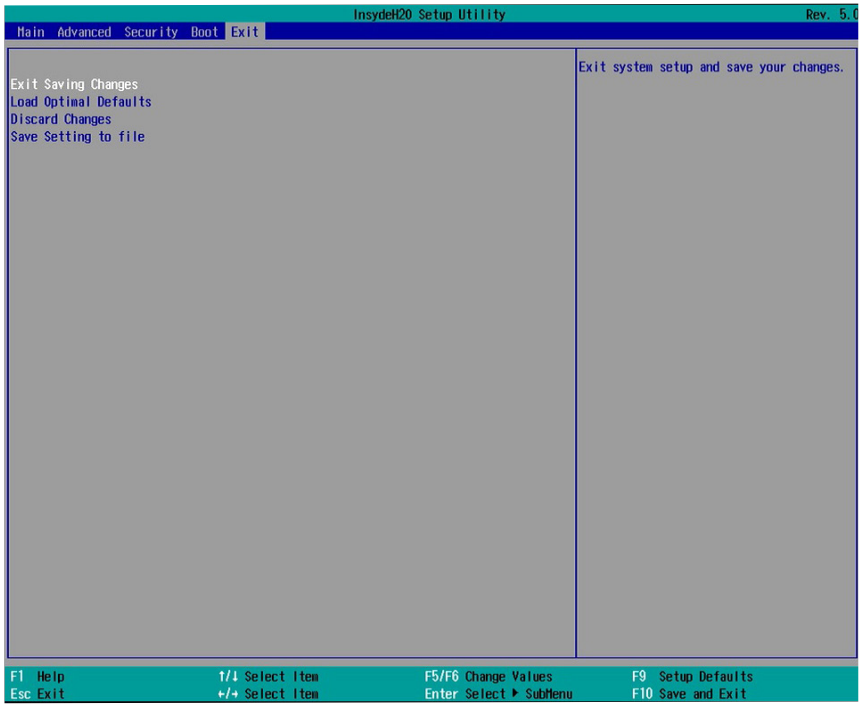
For this option, determine the boot order for the devices within each category. Use the + and - key to arrange the priority of the boot type devices in the list. The first device in the list has the highest boot priority.

Advance

For this option, determine the boot order for all bootable devices. Use + and - keys to arrange the priority of the detected boot devices in the list. The first device in the list has the highest boot priority.

Exit

This section configures the parameters for exiting the BIOS setup utility.



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.

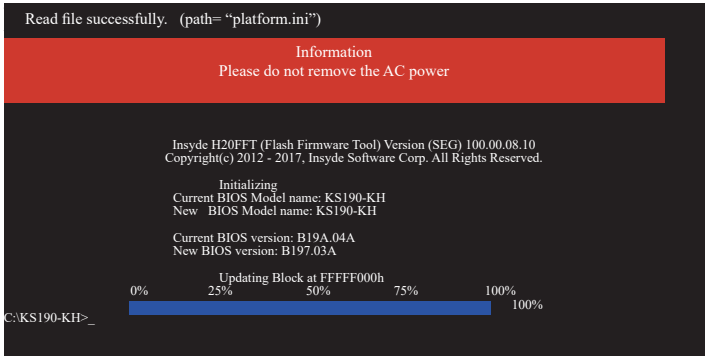
Restore Setting from file

Select this option to restore BIOS configuration settings from a USB drive. Note that this option appears only if a USB device is detected on the system.

Updating the BIOS

To update the BIOS, you will need an updated BIOS file and a flash utility. Please contact technical support or your sales representative for the files and specific instructions on how to update BIOS with the flash utility.

When you download the given BIOS file, you may find a BIOS flash utility attached with the BIOS file. This is the utility for performing the BIOS update procedure. For your convenience, we will also provide you with an auto-execution file in the BIOS file downloaded. This auto-execution file will bring you directly to the flash utility menu soon after system boots up and finishes running the boot files in your boot disk.



Notice: BIOS SPI ROM

1. The Intel® Management Engine has already been integrated into this system board. Due to 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 8 - Supported Software

Some devices of the system require drivers from hardware manufactures to operate properly. The system may come with a CD/DVD that contains drivers, utilities and software applications. Insert the CD into a CD-ROM drive. The auto-run screen (Mainboard Utility CD) will appear. If the "Autorun" does not automatically start, please go to the root directory of the CD and double-click "Setup".

If your product package does not include a CD/DVD, you can download the latest drivers from the DFI Download Center:

http://www.dfi.com/DownloadCenter

Once you are on the Download Center page, select your product or type the model name and click "Search" to find product-related resources such as documentation and drivers.

Drivers are available for the following devices in Windows:

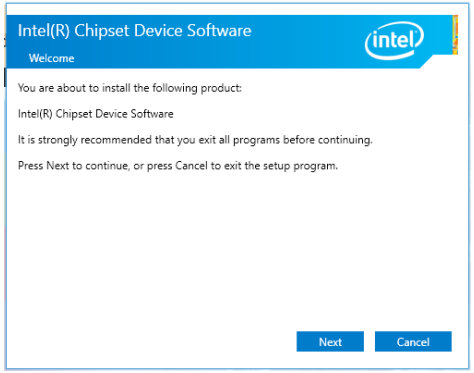
- Intel® Chipset Device Software
- Intel® Graphics Driver
- Intel® LAN Driver
- Intel® ME Driver
- Intel® Rapid Storage Technology Driver
- Audio Driver
- Intel® Serial IO Driver
- PenMount Windows Universal Driver

Intel Chipset Device Software

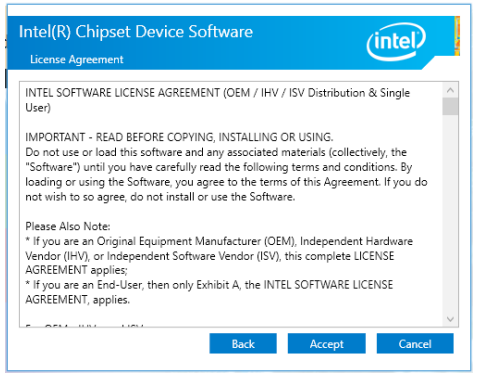
The Intel® Chipset Device Software is used for updating Windows® INF files so that the Intel chipset can be recognized and configured properly in the system.

To install the utility, follow these steps:

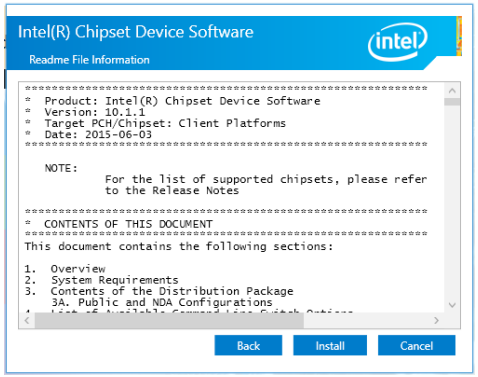
1. Setup is ready to install the utility. Click "Next" to continue.



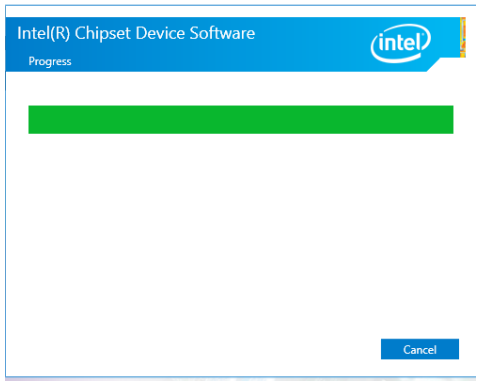
2. Read the license agreement, and then click "Yes".



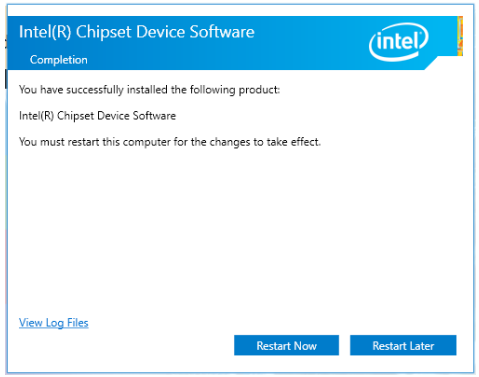
3. Go through the readme document for system requirements and installation tips, and then click "Next". Please wait while the installation is in progress.



4. Please wait while the installation is in progress.



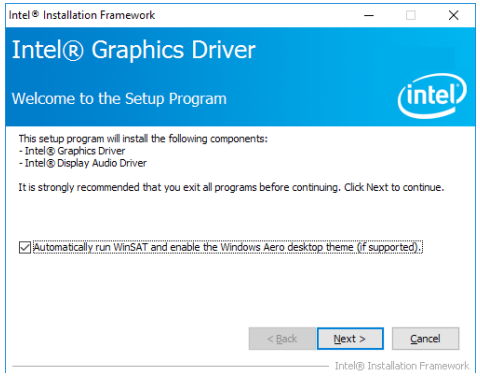
5. Click "Restart Now" to allow the new software installation to take effect.



Intel Graphics Driver

To install Intel® Graphics Driver, follow these steps:

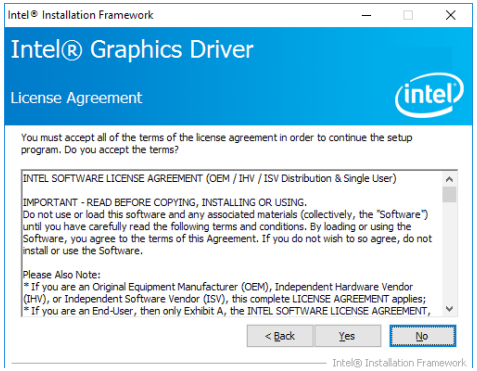
1. Setup is now ready to install the graphics driver. Click "Next" to continue.



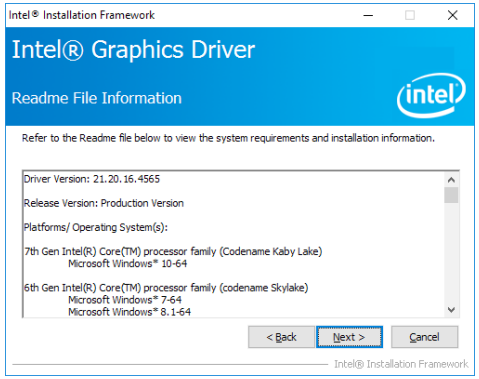
By default, the "Automatically run WinSAT and enable the Windows Aero desktop theme" is enabled. When this is enabled and after the system reboots, the screen will turn blank for 1 to 2 minutes (while WinSAT is running) before the Windows 7/ Windows 8.1/ Windows 10 desktop appears. The "blank screen" period is the time Windows is testing the graphics performance.

We recommend that you skip this process by disabling this function and click "Next" to continue.

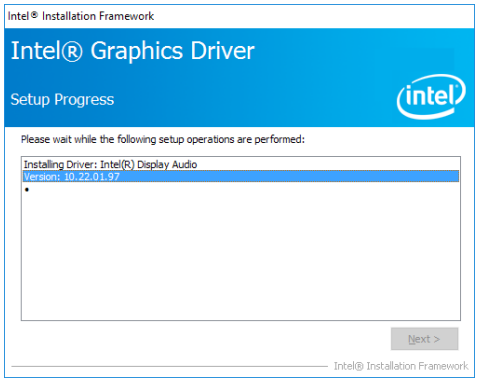
2. Read the license agreement, and then click "Yes".



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

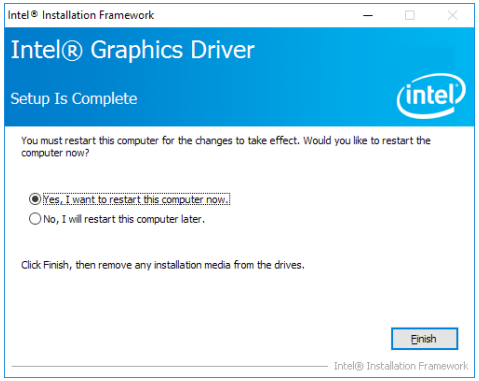


4. Setup is now installing the driver. Click "Next" to continue.



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

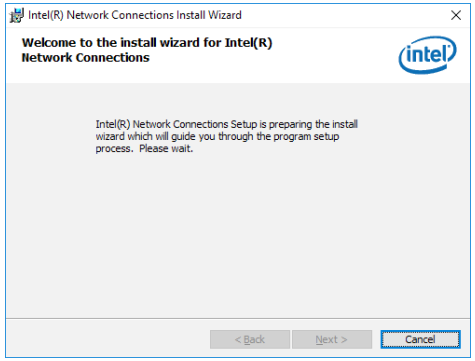
   Restarting the system will allow the new software installation to take effect.



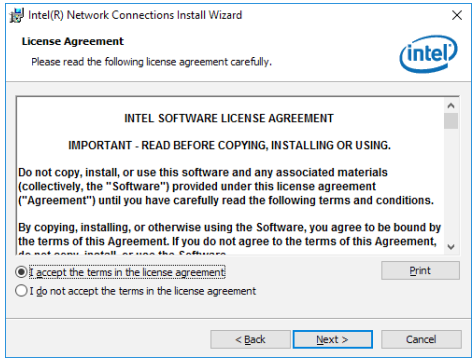
Intel LAN Driver

To install the Intel® LAN Driver, follow these steps:

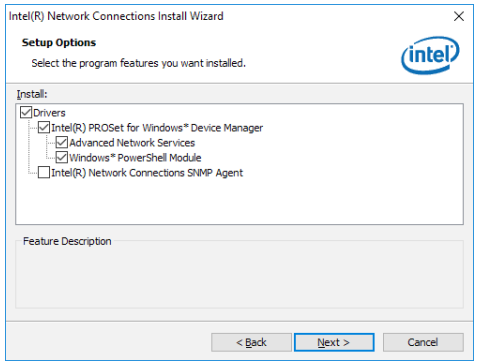
1. Setup is preparing to install the driver. Click "Next" to continue.



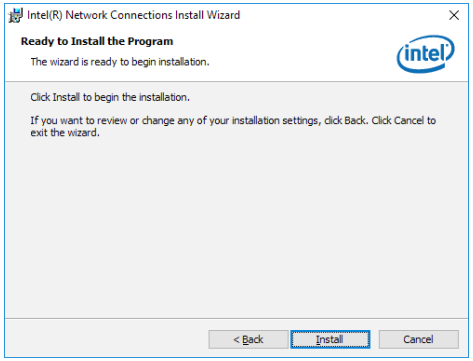
2. Click "I accept the terms in the license agreement" if you accept the agreement, and then click "Next".



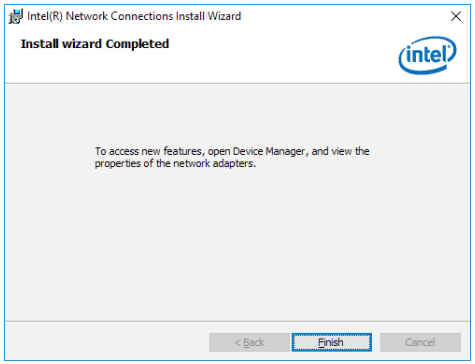
3. Select the program features you want to install, and then click "Next".



4. Click "Install" to begin the installation.



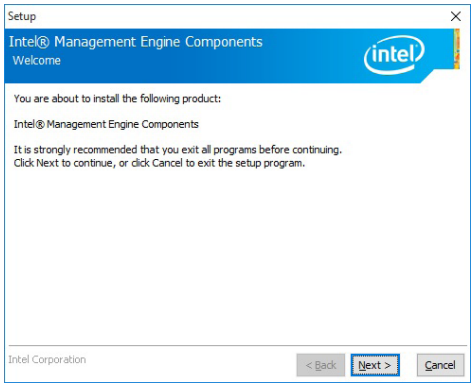
5. After the installation is complete, click "Finish".



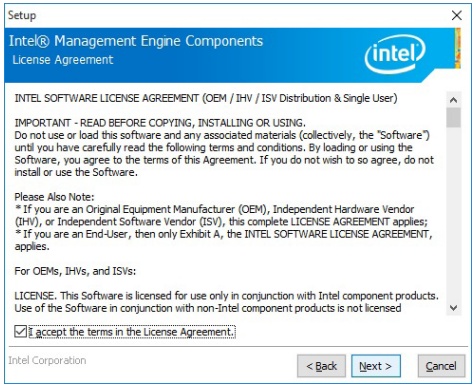
Intel ME Driver

To install the Intel® Management Engine (Intel® ME) Driver, follow these steps:

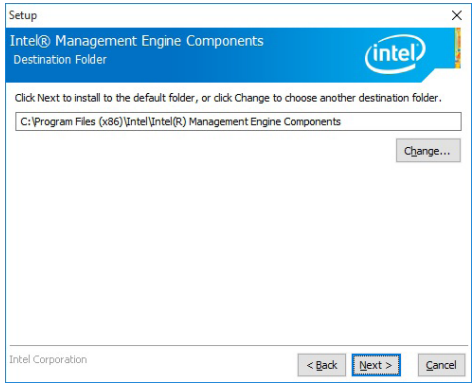
1. You are about to install the driver. Click "Next" to continue.



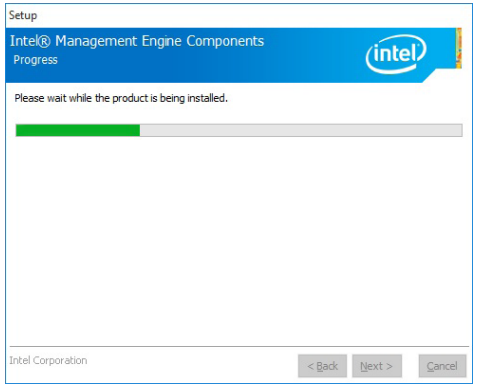
2. Read the license agreement, and then click "Next".



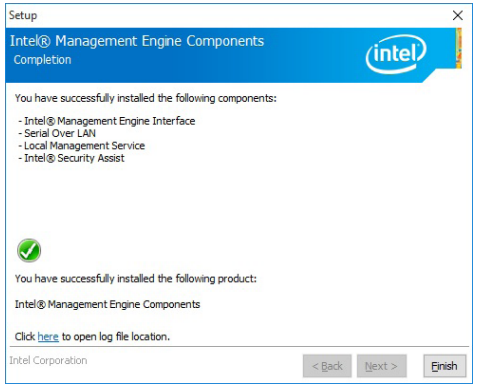
3. Setup is currently installing the driver. After the installation is complete, click "Next."



4. Please wait while the product is being installed.



5. After the installation is complete, click "Finish".

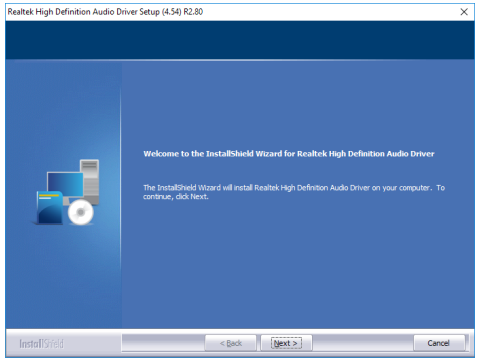


Audio Driver

To install the audio driver, follow these steps:

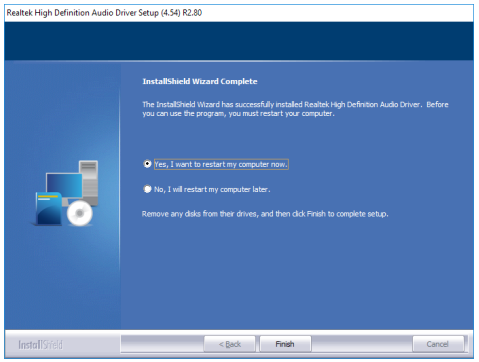
1. Setup is now ready to install the audio driver. Click "Next" to continue.

2. Follow the steps of the on-screen instructions; click "Next" each time you finish a step.



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

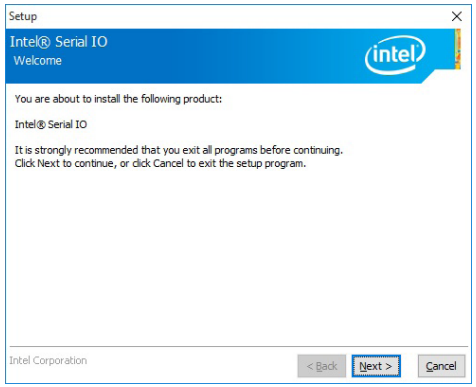
   Restart the system allows the new software installation to take effect.



Intel Serial IO Driver

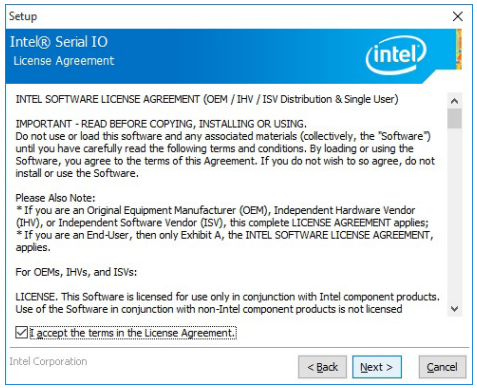
To install Intel® Serial IO Driver, follow these steps:

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

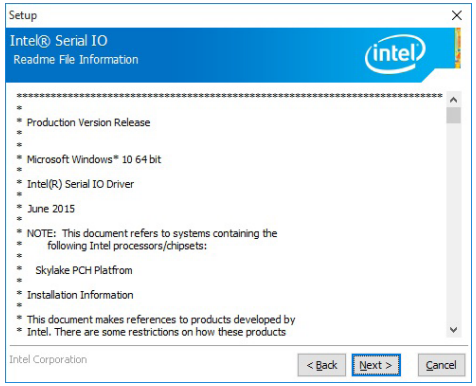


2. Read the license agreement carefully.

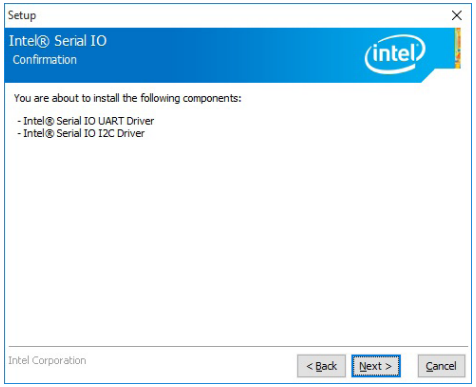
   Click "I accept the terms in the License Agreement" if you agree with the terms in the agreement and then click "Next".



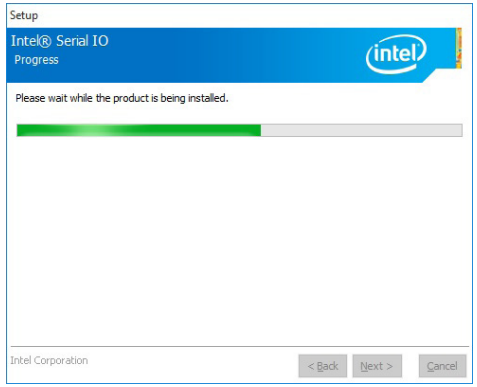
3. Read the file information and then click "Next".



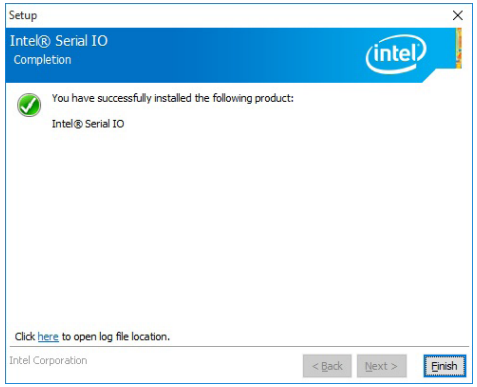
4. Setup is ready to install the driver. Click "Next" to begin the installation.



5. Setup is now installing the driver.



6. Click "Finish" to exit the setup.



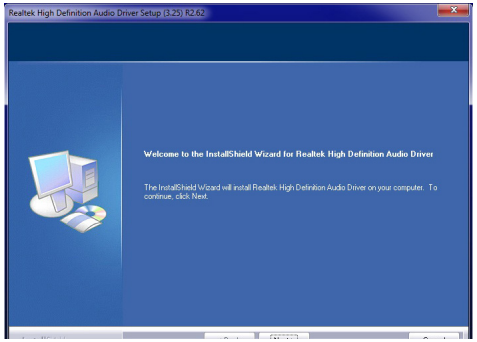
Intel® Rapid Storage Technology Driver

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. You can also install and set up Intel® Optane™ memory with the Intel® Rapid Storage Technology application.

Audio Drivers

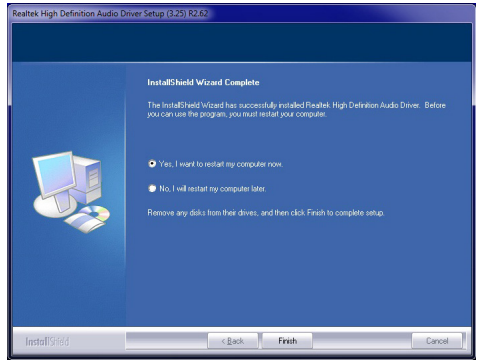
To install the driver, click "Audio Drivers" on the main menu.

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



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

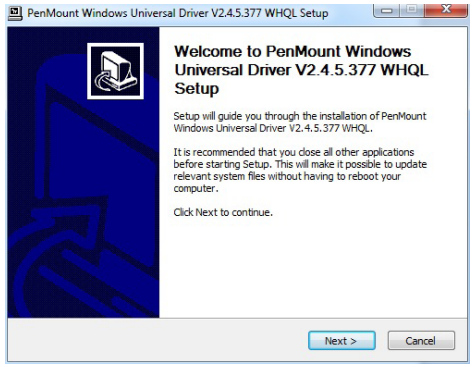
   Restarting the system allows the new software installation to take effect.



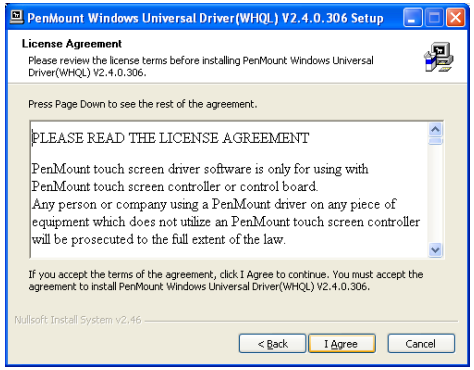
PenMount Windows Universal Driver

To install the PenMount Windows driver, follow these steps:

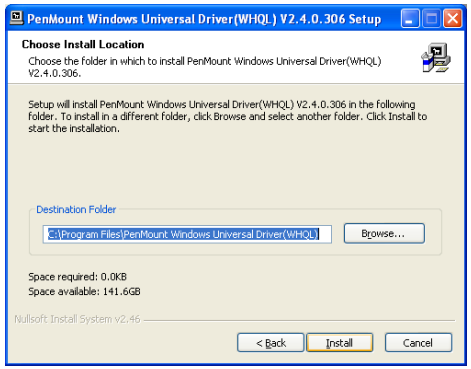
1. Setup is ready to install the driver. Click "Next" to continue.



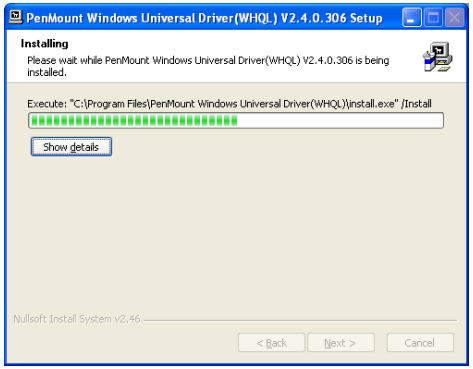
2. Click "I agree".



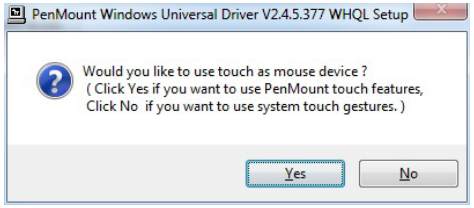
3. Click "Browse" to install the driver in a different folder and select the folder. Click "Install" to begin the installation.



4. Setup is currently installing the utility.



4. Choose whether you would like to use PenMount touch features.



5. After completing installation, click "Finish" to exit the utility.