AL170

Mini-ITX Industrial Motherboard
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.

Table of Contents

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 consequencial 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 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 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.

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.

- 1 AL170 motherboard
- 1 I/O shield
- 1 heatsink for -40 to 85°C (Height: 32mm)
- 1 heatsink for 0 to 60°C (Height: 17.5mm)

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.

Optional Items

- COM port cable (Length: 250mm, 1 x COM port)
- Serial ATA data with power cable (Length: 300mm)
- USB 2.0 port cable (Length: 200mm)
- LPC EXT-RS232 module (4 x RS232 ports)
- LPC EXT-RS485 module (4 x RS485 ports)

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.

Before Using the System Board

Before using the system board, prepare basic system components.

If you are installing the system board in a new system, you will need at least the following internal components.

- Memory module
- Storage devices such as hard disk drive, etc.

You will also need external system peripherals you intend to use which will normally include at least a keyboard, a mouse and a video display monitor.

Chapter 1 - Introduction

Specifications

SYSTEM	Processor	Intel Atom® Processor E3900 Family, BGA 1296 Intel Atom® x7-E3950 Processor, Quad Core, 2M Cache, 1.6GHz (2.0GHz), 12W Intel Atom® x5-E3940 Processor, Quad Core, 2M Cache, 1.6GHz (1.8GHz), 9.5W Intel Atom® x5-E3930 Processor, Dual Core, 2M Cache, 1.3GHz (1.8GHz), 6.5W Intel® Pentium® Processor N4200, Quad Core, 2M Cache, 1.1GHz (2.5GHz), 6W
	Memory	Two 204-pin SODIMM up to 8GB Dual Channel DDR3L 1867MHz
	BIOS	Insyde SPI 64Mbit (supports UEFI boot only)
GRAPHICS	Controller	Intel® HD Graphics GT Series
	Feature	OpenGL 5.0, DirectX 12, OpenCL 2.1 HW Decode: AVC/H.264, MPEG2, VC1/WMV9, JPEG/MJPEG, HEVC/H.265, VP8, VP9, MVC HW Encode: AVC/H.264, JPEG/MJPEG, HEVC/H.265, VP8, VP9, MVC
	Display	1 x VGA/DP++ (opt.) 1 x DP++ 1 x LVDS/eDP (opt.) VGA: resolution up to 2560x1600 @ 60Hz LVDS: dual channel 48-bit, resolution up to 1920x1200 @ 60Hz DP++: resolution up to 4096x2160 @ 60Hz eDP: resolution up to 4096x2160 @ 60Hz
	Triple Displays	VGA + DP++ + LVDS VGA + DP++ + eDP DP++ + DP++ + LVDS DP++ + DP++ + eDP
EXPANSION	Interface	1 x PCIe x1 (Gen 2) 1 x M.2 M Key (support 2242/2280) 1 x Full-size Mini PCIe (PCIe2.0/USB2.0)(USB3.1 Gen 1)(opt.)
AUDIO	Audio Codec	Realtek ALC888
ETHERNET	Controller	2 x Intel® I211AT PCIe (10/100/1000Mbps) or 2 x Intel® I210IT PCIe (10/100/1000Mbps)
REAR I/O	Ethernet	2 x GbE (RJ-45)
	USB	4 x USB 3.0
	Display	1 x VGA/DP++ (opt.) 1 x DP++
	Audio	1 x Line-in (opt.) 1 x Line-out 1 x Mic-in
	Serial	2 x RS-232/422/485 (RS-232 with power) (DB-9)

INTERNAL I/O	Serial	4 x RS-232 (2.0mm pitch)
	USB	6 x USB 2.0 (2.0mm pitch)
	Display	1 x LVDS LCD Panel Connector or 1 x eDP LCD Panel Connector (opt.) 1 x LCD/Inverter Power
	Audio	1 x S/PDIF 1 x Front Audio (Line-out/Mic-in)
	SATA	2 x SATA 3.0 (up to 6Gb/s) colay with M.2 M key
	DIO	1 x 8-bit DIO
	LPC	1 x LPC (supports LPC EXT-RS232/RS485 module)
	SMBus	1 x SMBus
WATCHDOG TIMER	Output & Interval	System Reset, Programmable via Software from 1 to 255 Seconds
SECURITY	TPM	TPM 2.0 (opt.)
POWER	Type	ATX
	Connector	24-pin ATX power
	Consumption	TDP 5.5~12W
	RTC Battery	CR2032 Coin Cell
OS SUPPORT (UEFI ONLY)	Microsoft /Linux	Windows 10 64-bits (LTSB) Ubuntu 16.04.2
ENVIRONMENT	Temperature	Operating: 0 to 60°C, -40 to 85°C Storage: -40 to 85°C
	Humidity	Operating: 5 to 90% RH Storage: 5 to 90% RH
	MTBF	357,197 hrs @ 25°C; 206,214 hrs @ 45°C; 130,208 hrs @ 60°C Calculation model: Telcordia Issue 2, Method I Case 3 Environment: GB, GC – Ground Benign, Controlled
MECHANICAL	Dimensions	Mini-ITX Form Factor 170mm (6.7") x 170mm (6.7")

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Features

- ### Watchdog Timer

The Watchdog Timer function allows your application to regularly "clear" the system at the set time interval. If the system hangs or fails to function, it will reset at the set time interval so that your system will continue to operate.

- ### DDR3L

DDR3L requires less voltage (1.35V) than DDR3 (1.5V). DDR3L SDRAM modules support 1867MHz for DDR modules.

- ### Graphics

The integrated Intel® HD graphics engine delivers an excellent blend of graphics performance and features to meet business needs. It provides excellent video and 3D graphics with out-standing graphics responsiveness. These enhancements deliver the performance and compat-ibility needed for today's and tomorrow's business applications. Supports 1 x VGA/DP++ (DP++ optional), 1 x DP++ and 1 x LVDS/eDP (eDP optional) interfaces for triple display outputs.

- ### PCI Express

PCI Express is a high bandwidth I/O infrastructure that possesses the ability to scale speeds by forming multiple lanes. The PCI Express architecture also supports high performance graph-ics infrastructure by enhancing the capability of a PCIe x1.

- ### Serial ATA

Serial ATA is a storage interface that is compliant with SATA 1.0a specification. With speed of up to 6Gb/s (SATA 3.0), it improves hard drive performance faster than the standard parallel ATA whose data transfer rate is 100MB/s.

- ### Gigabit LAN

Two Intel® I211AT PCI Express Gigabit Ethernet controllers or two Intel® I210IT PCI Express Gigabit Ethernet controllers support up to 1Gbps data transmission.

- ### Audio

The Realtek ALC888 audio codec provides 4-channel High Definition audio output.

- ### USB

The system board supports the new USB 3.0. It is capable of running at a maximum transmis-sion speed of up to 5 Gbit/s (625 MB/s) and is faster than USB 2.0 (480 Mbit/s, or 60 MB/s) and USB 1.1 (12Mb/s). USB 3.0 reduces the time required for data transmission, reduces power consumption, and is backward compatible with USB 2.0. It is a marked improvement in device transfer speeds between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

- ### Wake-On-LAN

This feature allows the network to remotely wake up a Soft Power Down (Soft-Off) PC. It is supported via the onboard LAN port or via a PCI LAN card that uses the PCI PME (Power Man-agement Event) signal. However, if your system is in the Suspend mode, you can power-on the system only through an IRQ or DMA interrupt.

> **Important:**
> The 5V_standby power source of your power supply must support ≥720mA.

- ### Wake-On-USB

This function allows you to use a USB keyboard or USB mouse to wake up a system from the S3 (STR - Suspend To RAM) state.

> **Important:**
> If you are using the Wake-On-USB Keyboard/Mouse function for 2 USB ports, the 5V_standby power source of your power supply must support ≥1.5A. For 3 or more USB ports, the 5V_standby power source of your power supply must support ≥2A.

- ### ACPI STR

The system board is designed to meet the ACPI (Advanced Configuration and Power Interface) specification. ACPI has energy saving features that enables PCs to implement Power Manage-ment and Plug-and-Play with operating systems that support OS Direct Power Management. ACPI when enabled in the Power Management Setup will allow you to use the Suspend to RAM function.

With the Suspend to RAM function enabled, you can power-off the system at once by pressing the power button or selecting "Standby" when you shut down Windows® without having to go through the sometimes tiresome process of closing files, applications and operating system. This is because the system is capable of storing all programs and data files during the entire operating session into RAM (Random Access Memory) when it powers-off. The operating ses-sion will resume exactly where you left off the next time you power-on the system.

> **Important:**
> The 5V_standby power source of your power supply must support ≥720mA.

- ### Power Failure Recovery

When power returns after an AC power failure, you may choose to either power-on the system manually or let the system power-on automatically.

Chapter 2 - Hardware Installation

Board Layout
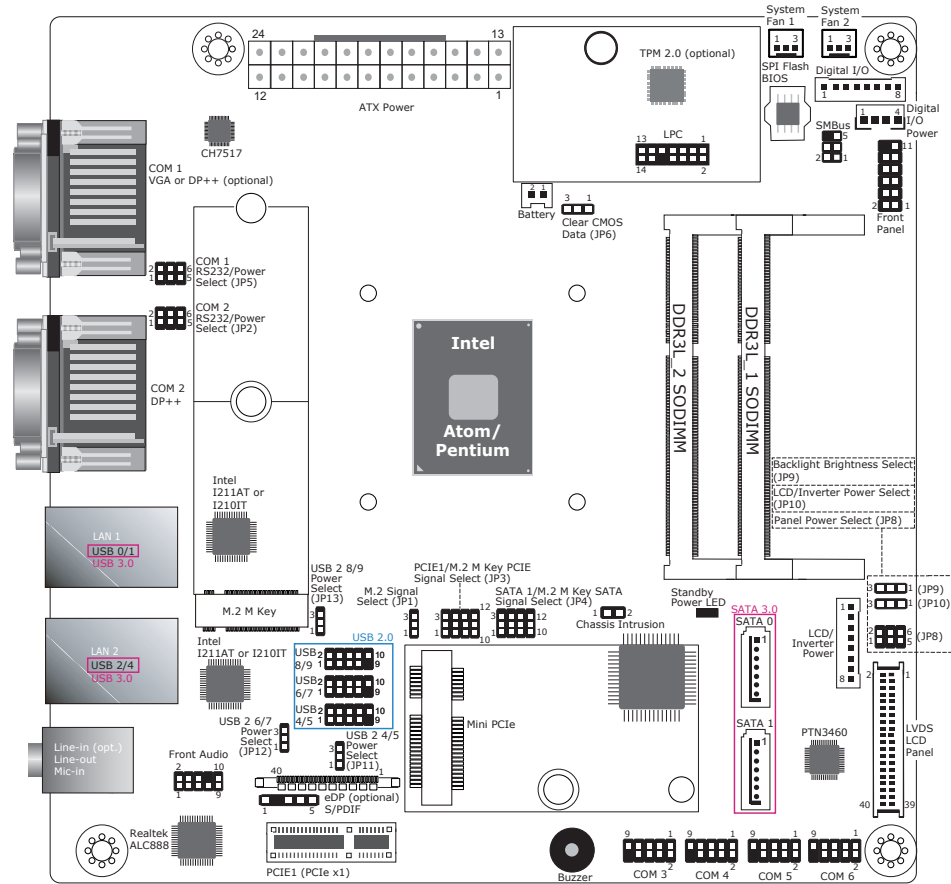
Top View

Bottom View

Retention Module Base
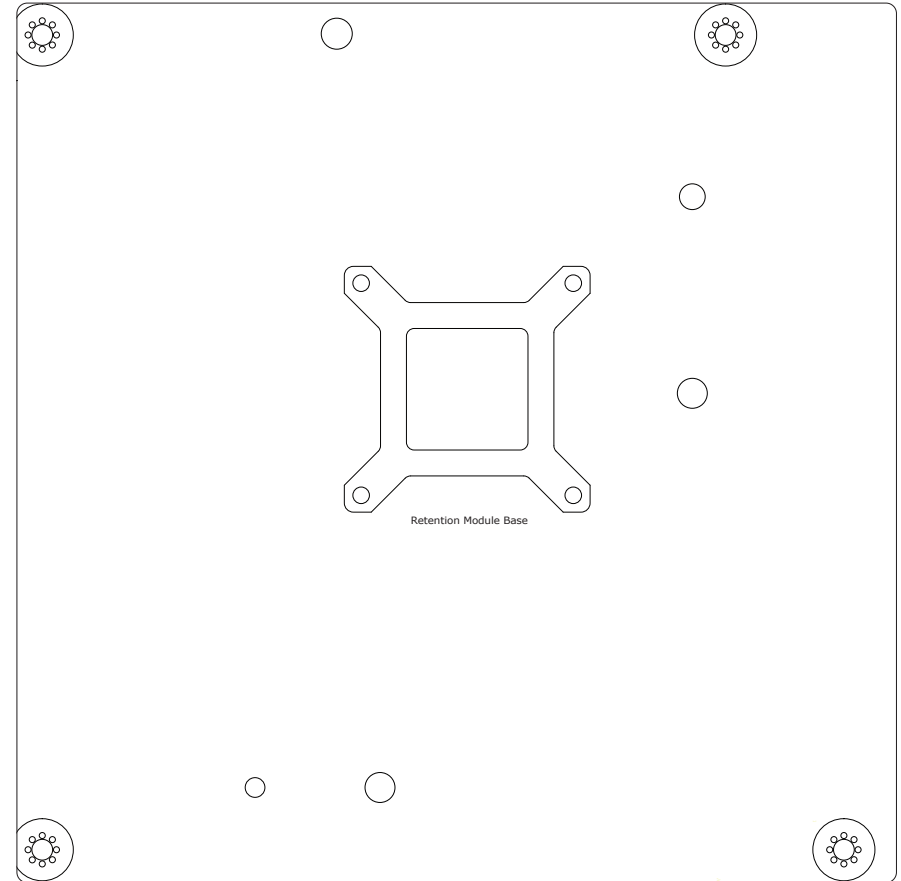
Block Diagram
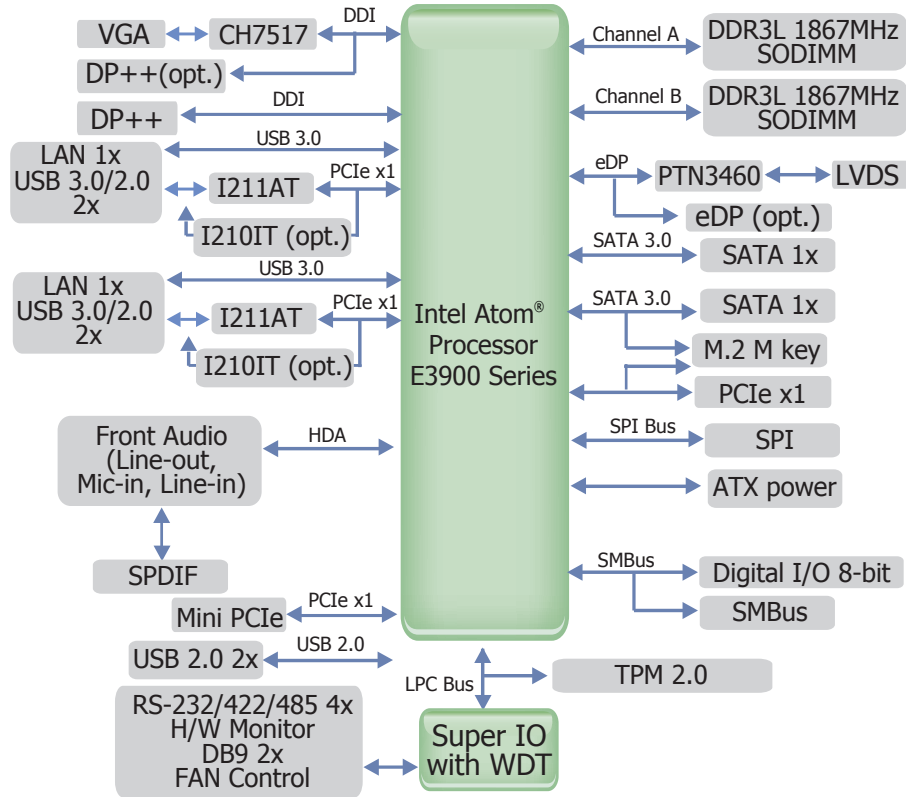
Mechanical Drawing
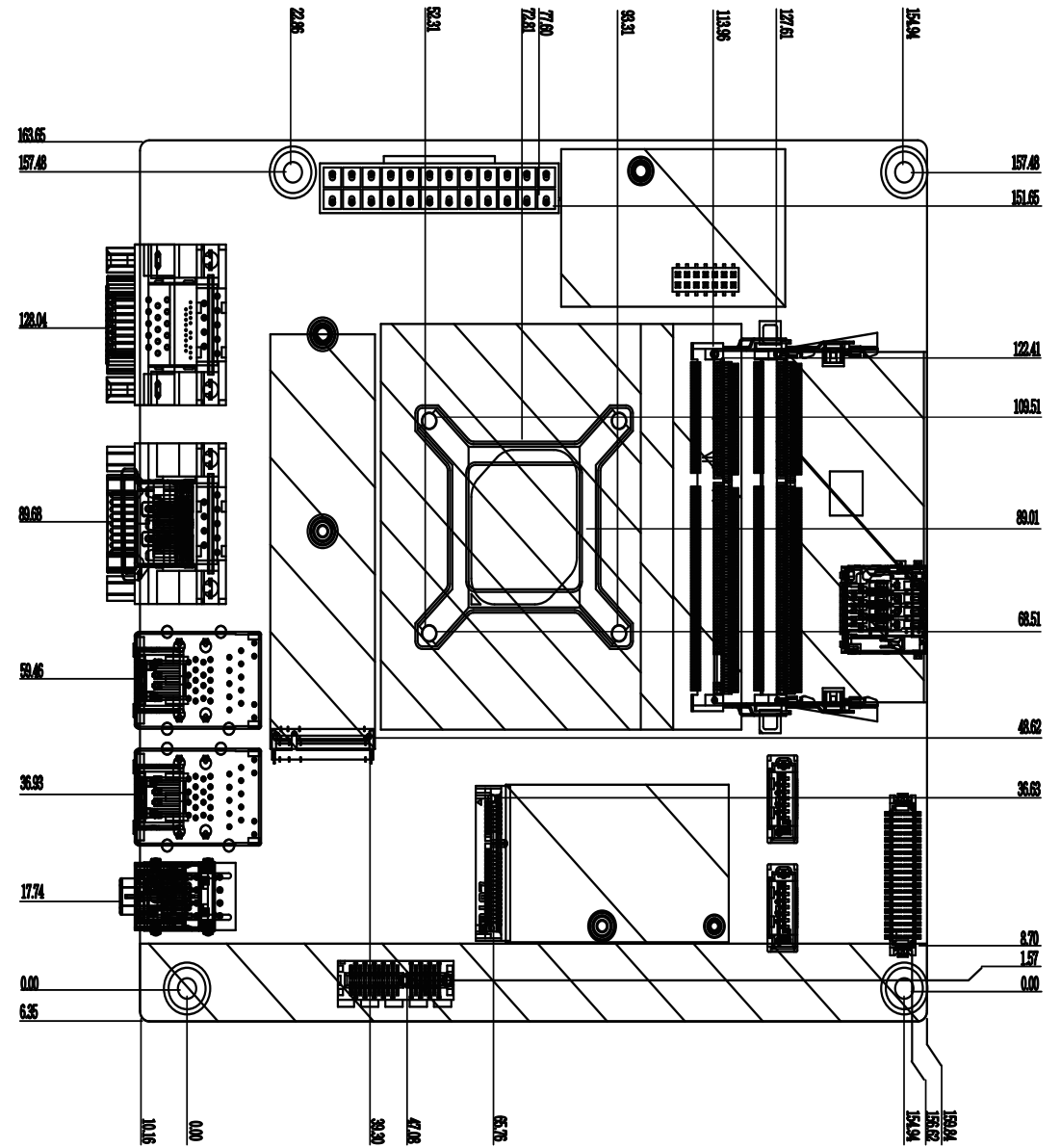
> **Important:**
> Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap 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.

System Memory

> **Important:**
> When the Standby Power LED lights red, 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.

DDR3L_1
DDR3L_2
Standby Power LED

Features

- Two 204-pin SODIMM up to 8GB
- Dual Channel DDR3L 1867MHz
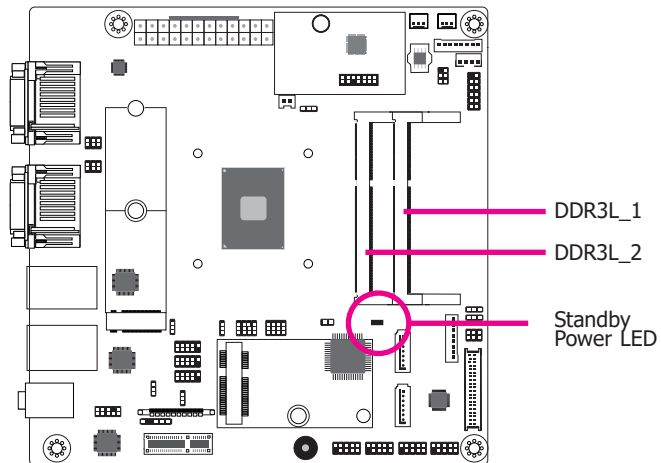
The system board supports the following memory interface.

Single Channel (SC)

Data will be accessed in chunks of 64 bits (8B) from the memory channels.

Dual Channel (DC)

Data will be accessed in chunks of 128 bits from the memory channels. Dual channel provides better system performance because it doubles the data transfer rate.

Installing the SODIMM Module

> **Note:**
> The system board used in the following illustrations may not resemble the actual board. These illustrations are for reference only.

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 SODIMM socket on the system board.

4. Note the key on the socket. The key ensures the module can be plugged into the socket in only one direction.
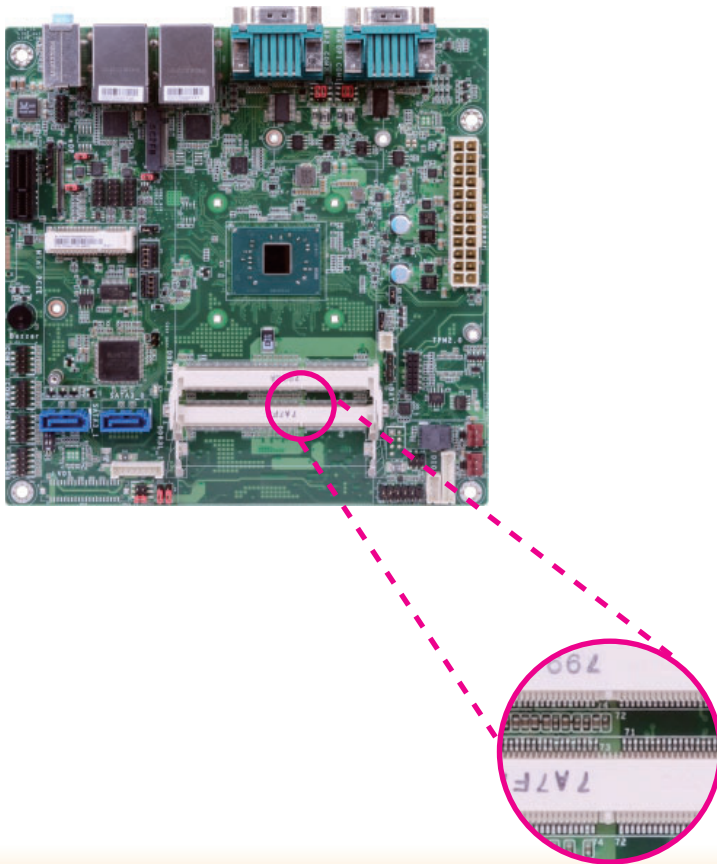
5. Grasping the module by its edges, align the module into the socket at an approximately 30 degrees angle. Apply firm even pressure to each end of the module until it slips down into the socket. The contact fingers on the edge of the module will almost completely disappear inside the socket.

6. Push down the module until the clips at each end of the socket lock into position. You will hear a distinctive "click", indicating the module is correctly locked into position.

Clip   Clip

Installing the Heat Sink

The CPU is recommended to be kept cool by using a heat sink. Without sufficient air circulation across the CPU and heat sink, the CPU will overheat damaging both the CPU and system board.

1. Apply a thin layer of thermal paste on top of the CPU. Do not spread the paste all over the surface. When you later place the heat sink on top, the compound will disperse evenly.

2. Place the heat sink assembly on top of the CPU. The 4 screws around the heat sink must match the screw holes. We strongly recommend using this type of heat sink assembly because it provides adequate cooling to the components of the system board.

    Turn each screw half way down first to initially stabilize the heat sink onto the board, then finally tighten each screw.

Important:
1. Do not turn the first screw all the way down followed by the next and so on. This is to avoid imbalance which might cause cracks or fractures to the CPU and/or heat sink assembly.

2. Please note the opening of the heat sink which is reserved for the connection of the battery connector and adjusting the jumper, JP6.

Battery Connector & JP6

Mounting holes

Mounting screws

Jumper Settings

M.2 Signal Select

JP1

3
2
1

1-2 On:
SATA (default)

3
2
1

2-3 On:
PCIe
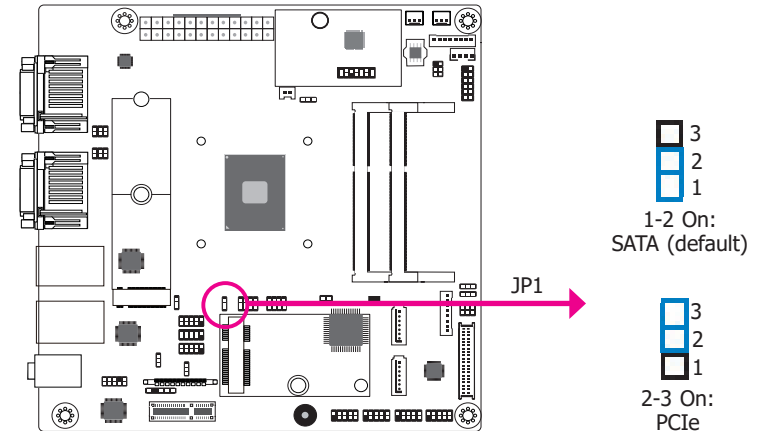
JP1 is used to select the M.2 signal: SATA (default) or PCIe.
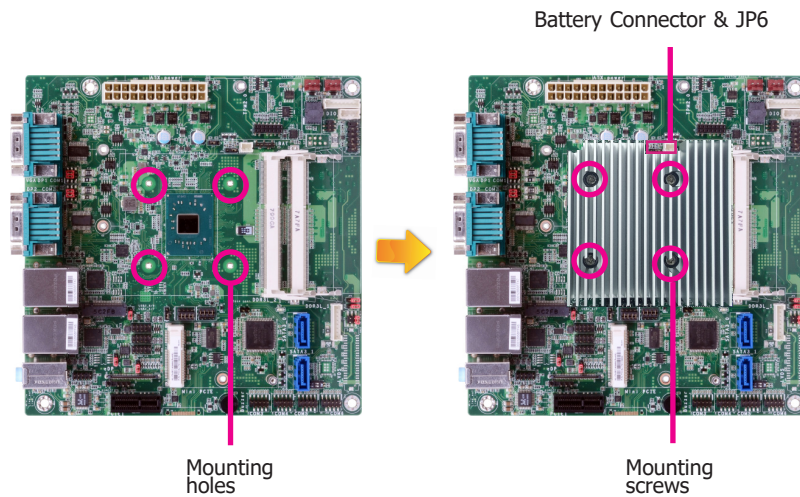
SATA 1/M.2 M Key SATA Signal Select

3 12

1 10

1-2, 4-5, 7-8, 10-11 On:
SATA 1 (default)

JP4

3 12

1 10

2-3, 5-6, 8-9, 11-12 On:
M.2 M key SATA
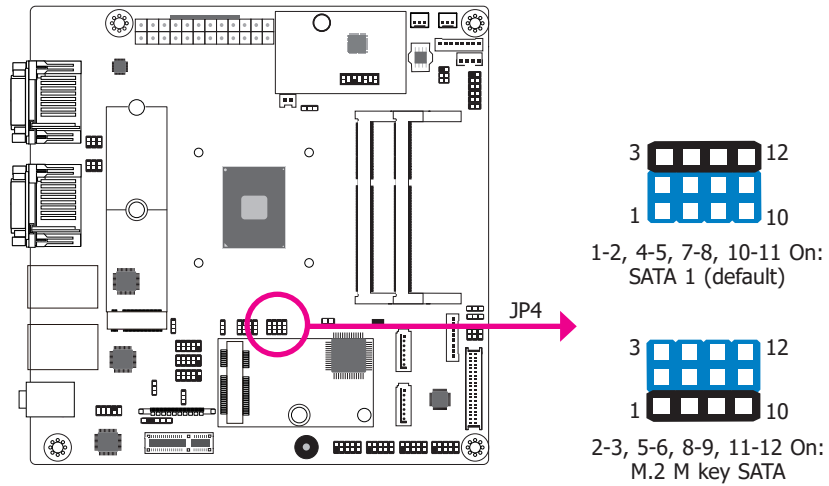
JP4 is used to select the SATA 1 (default) or M.2 M key SATA signal.

PCIE1/M.2 M Key PCIE Signal Select

3 12

1 10

1-2, 4-5, 7-8, 10-11 On:
PCIE1 (default)

JP3

3 12

1 10

2-3, 5-6, 8-9, 11-12 On:
M.2 M key PCIe
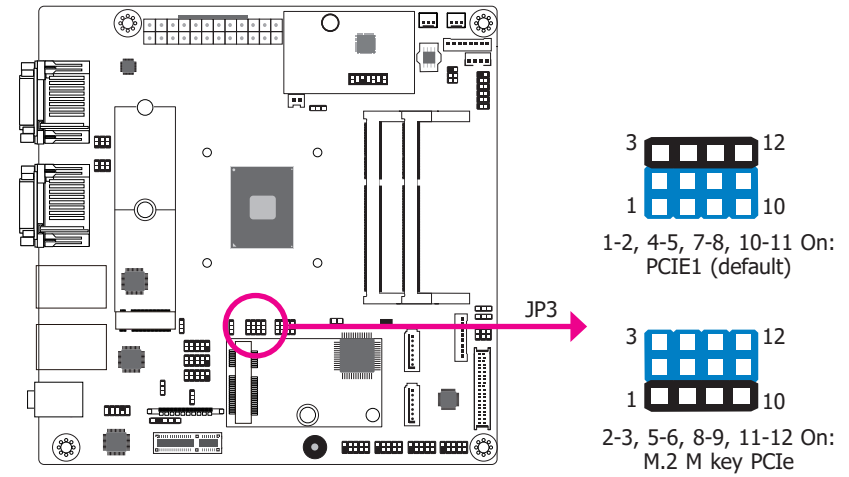
JP3 is used to select the PCIE1 (default) or M.2 M key PCIe signal.

COM1/COM2 RS232/Power Select
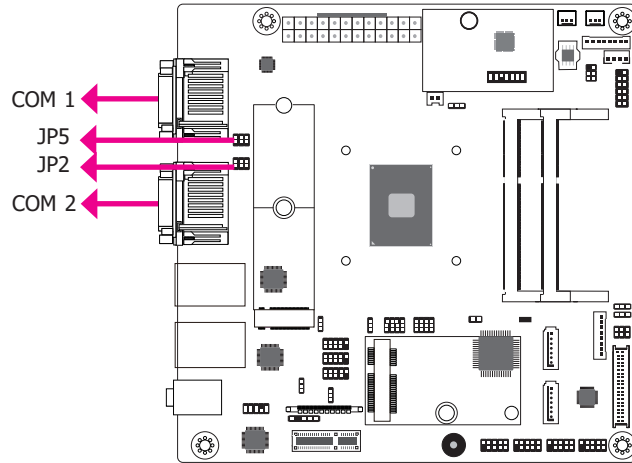
JP5 (for COM 1) and JP2 (for COM 2) are used to configure Serial COM ports to pure RS232 or RS232 with power. The pin functions of COM 1 and COM 2 will vary according to JP5's and JP2's setting respectively.

JP5 (for COM 1)

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

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

JP2 (for COM 2)

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

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

COM 1/COM 2
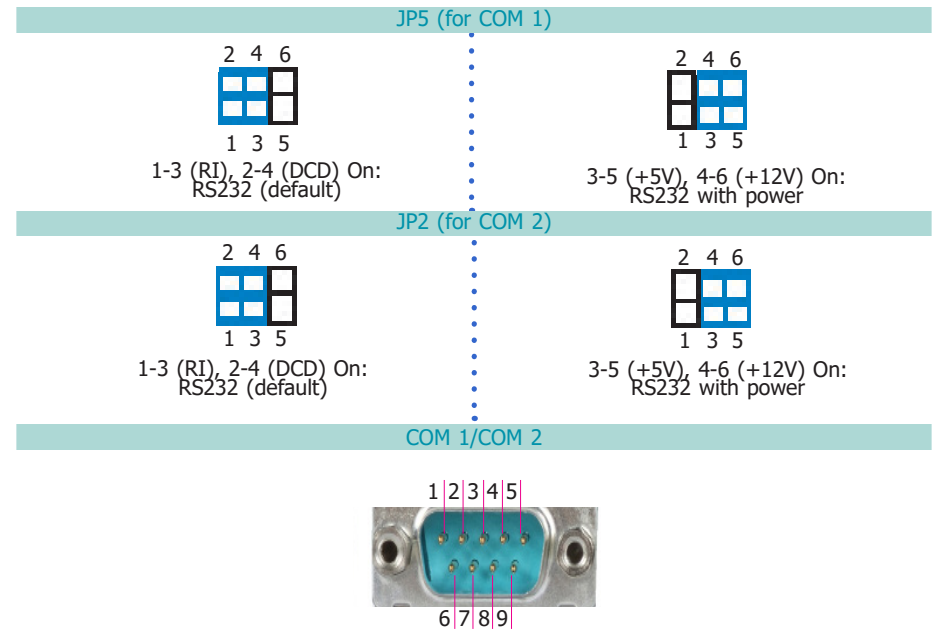
Pin	RS232	RS232 with power
1	DCD	+12V
2	RD	RD
3	TD	TD
4	DTR	DTR
5	GND	GND
6	DSR	DSR
7	RTS	RTS
8	CTS	CTS
9	RI	+5V

LCD/Inverter Power Select

3 2 1

1-2 On:
+12V (default)

JP10

3 2 1

2-3 On:
+5V
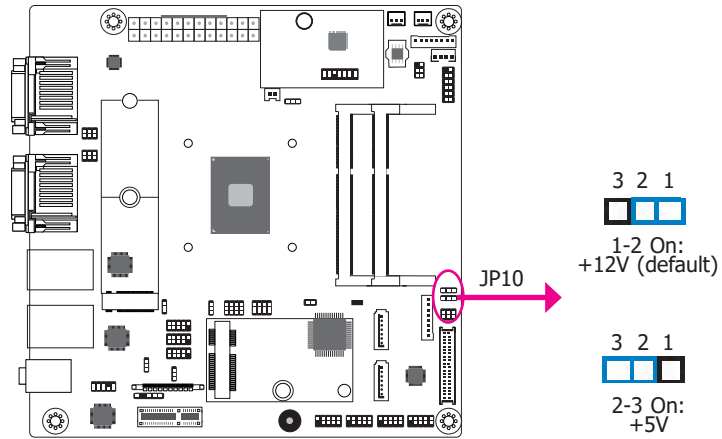
JP10 is used to select the power level of LVDS/eDP (optional) LCD inverter connector.

Backlight Brightness Select

3 2 1

1-2 On:
+3.3V (default)

JP9

3 2 1

2-3 On:
+5V
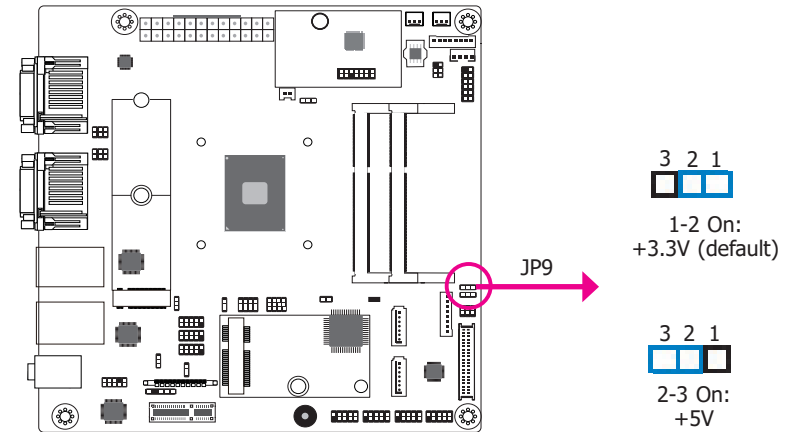
JP9 is used to select the power level of backlight brightness control: +3.3V (default) or +5V.

Important:
Before powering-on the system, make sure that the power settings of JP9 match the power specification of backlight control. Selecting the incorrect voltage will seriously damage the backlight.

Panel Power Select

2 4 6
1 3 5
1-2 On:
+12V

2 4 6
1 3 5
3-4 On:
+5V

JP8

2 4 6
1 3 5
5-6 On:
+3.3V (default)
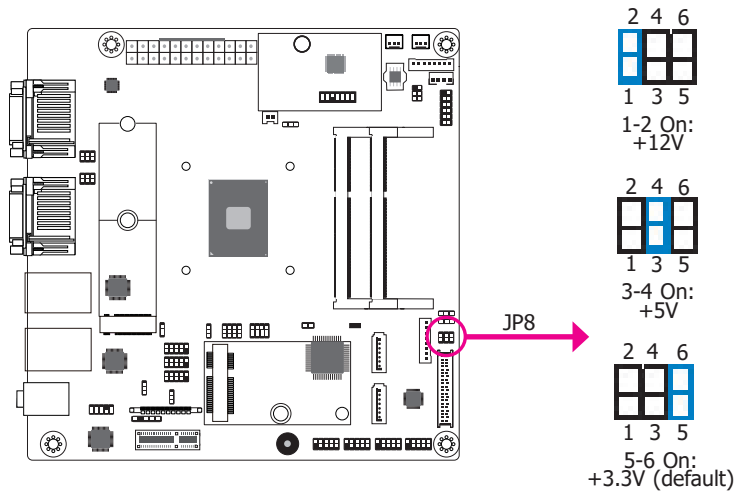
JP8 is used to select the power supplied with the LCD panel.

> **Important:**
> Before powering-on the system, make sure that the power settings of JP8 match the LCD panel's specification. Selecting the incorrect voltage will seriously damage the LCD panel.

Clear CMOS Data

JP6

3 2 1
1-2 On:
Normal (default)

3 2 1
2-3 On:
Clear CMOS Data
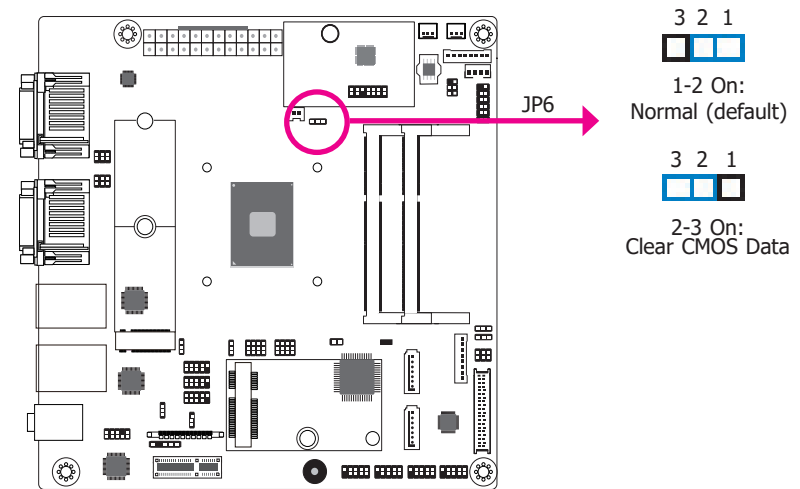
If you encounter that CMOS data becomes corrupted, you can reconfigure the system with the default values stored in the ROM BIOS.

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. Set JP6 pins 2 and 3 to On. Wait for a few seconds and set JP6 back to its default setting, pins 1 and 2 On.

3. Now plug the power cord and power-on the system.

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USB 2.0 Power Select

3
2
1
1-2 On:
+5VDU (default)

USB 8-9
(JP13)
USB 6-7
(JP12)
USB 4-5
(JP11)

3
2
1
2-3 On:
+5V
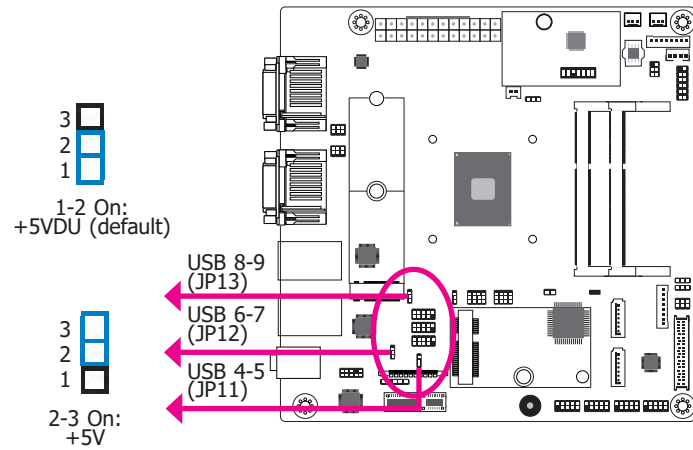
JP11, JP12 and JP13 are used to select the power of the USB ports. Selecting +5VDU will allow you to use a USB device to wake up the system.

> **Important:**
> If you are using the Wake-On-USB Keyboard/Mouse function for 2 USB ports, the +5V_standby power source of your power supply must support ≥1.5A. For 3 or more USB ports, the +5V_standby power source of your power supply must support ≥2A.

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Rear Panel I/O Ports

COM 1 COM 2 LAN 1 LAN 2 Line-in (opt.)

Line-out

Mic-in

VGA or DP++ (opt.) DP++ USB 3.0
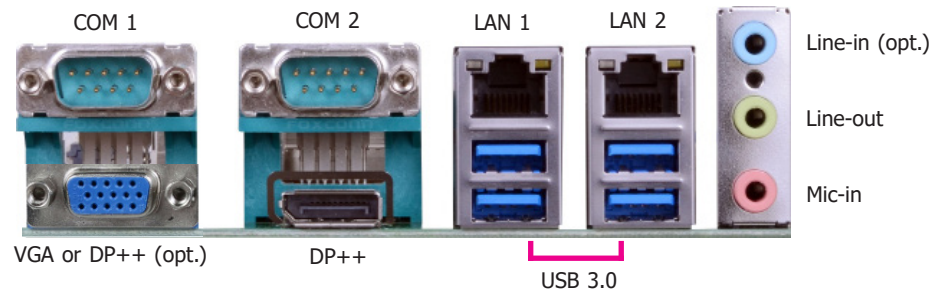
The rear panel I/O ports consist of the following:

- 2 Serial COM ports
- 1 VGA (default) or DP++ (optional) port
- 1 DP++ port
- 2 RJ-45 LAN ports
- 4 USB 3.0 ports
- 1 Line-in jack (optional)
- 1 Line-out jack
- 1 Mic-in jack

RJ45 LAN Ports

LAN 1 LAN 2

LAN 1

LAN 2
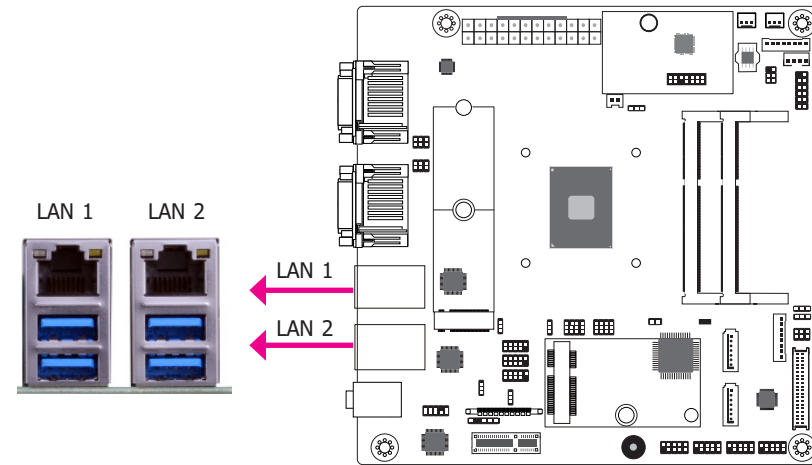
Features

- Two Intel® I210IT PCI Express Gigabit Ethernet controllers or two Intel® I211AT PCI Express Gigabit Ethernet controllers

The two LAN ports allow 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.

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USB Ports

USB 3.0
USB 1
USB 0

USB 4
USB 2

USB 3.0

USB 8-9   USB 6-7
USB 4-5

NC
GND
+Data1
-Data1
VCC

2   10   USB 2.0
1   9

VCC
-Data0
+Data0
GND

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 onboard USB 3.0 ports (USB 0-1/2-4) at the rear panel I/O ports. The 10-pin connectors allow you to connect 6 additional USB 2.0 ports (USB 4-5/6-7/8-9). The additional USB ports may be mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis and then insert the USB port cables to a connector.

BIOS Setting

Configure these onboard USB devices in the Boot menu ("USB Boot" field) of the BIOS. Refer to the chapter 3 for more information.

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.

> **Important:**
> If you are using the Wake-On-USB Keyboard/Mouse function for 2 USB ports, the +5V_standby power source of your power supply must support ≥1.5A. For 3 or more USB ports, the +5V_standby power source of your power supply must support ≥2A.

Graphics Interfaces

The display ports consist of the following:

- 1 VGA (default) or DP++ (optional) port
- 1 DP++ port

VGA

DP++
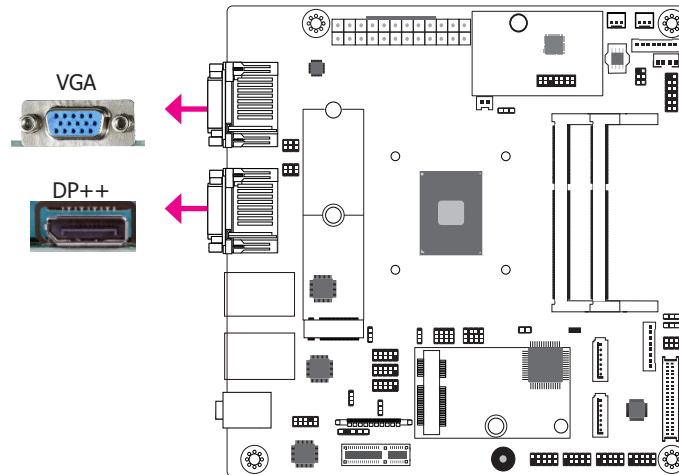
VGA Port

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.

DP++ Port

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

BIOS Setting

Configure the display devices in the advanced menu ("Video Configuration" submenu) of the BIOS. Refer to the chapter 3 for more information.

Driver Installation

Install the graphics driver. Refer to the chapter 4 for more information.

Audio

Line-in (optional)

Line-out

Mic-in

Rear Audio

Front Audio

GND
NC
Mic2-JD
Line2-JD

Mic2-L
Mic2-R
Line2-R
GND
Line2-L

2   10
1   9
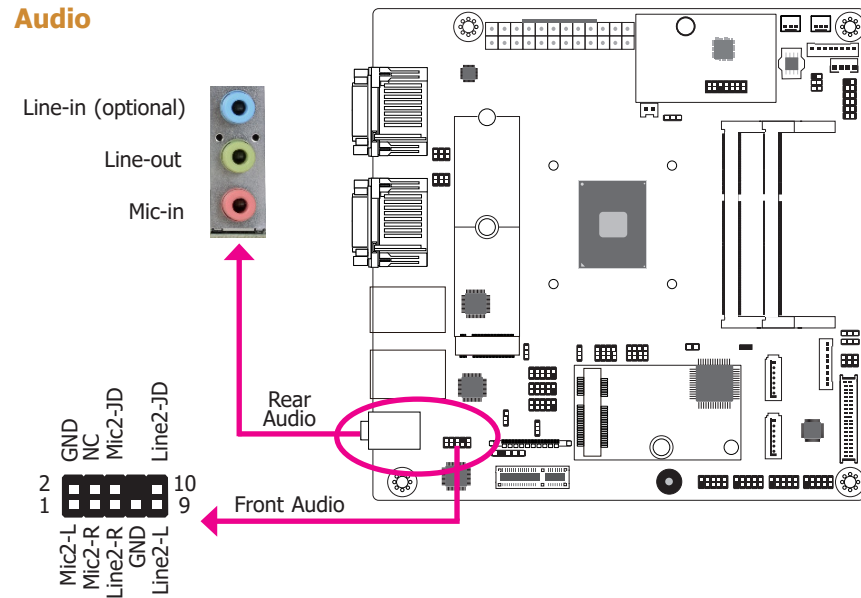
Rear Audio

The system board is equipped with 2 audio jacks (Line-out and Mic-in). Line-in jack is available upon request. A jack is a one-hole connecting interface for inserting a plug.

- Line-in Jack (Light Blue) (optional)
  This jack is used to connect any audio devices such as Hi-fi set, CD player, tape player, AM/FM radio tuner, synthesizer, etc.

- Line-out Jack (Lime)
  This jack is used to connect a headphone or external speakers.

- Mic-in Jack (Pink)
  This jack is used to connect an external microphone.

Front Audio

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

BIOS Setting

Configure these onboard Audio devices in the Advanced menu ("Audio Configuration" submenu) of the BIOS. Refer to the chapter 3 for more information.

Driver Installation

Install the audio driver. Refer to the chapter 4 for more information.

20

COM (Serial) Ports

COM 1/2:
RS232/422/485

COM 3/4/5/6: RS232

COM 1/2

Pin	RS232	RS422 Full Duplex	RS485
1	DCD	RX+	DATA+
2	RD	RX-	DATA-
3	TD	TX+	N.C.
4	DTR	TX-	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.
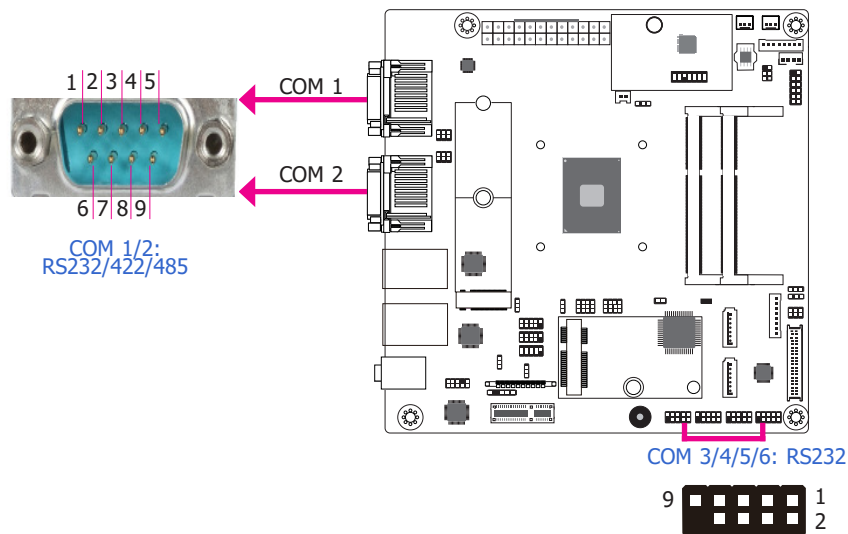
COM 1 and COM 2 can be configured as RS232, RS422 and RS485 by BIOS setting. The pin functions are listed at right. The pin functions of COM ports 1/2 will also vary according to JP5's and JP2's settings. JP5 and JP2 are used to configure the Serial COM ports 1/2 to pure RS232 or RS232 with power. Refer to "COM1/COM2 RS232/Power Select" in this chapter for more information.

COM 3 to COM 6 are fixed at RS232. The pin functions are listed at right.

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.

Connecting External Serial Ports

Your COM port may come mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis then insert the serial port cable to the COM connector. Make sure the colored stripe on the ribbon cable is aligned with pin 1 of the COM connector.
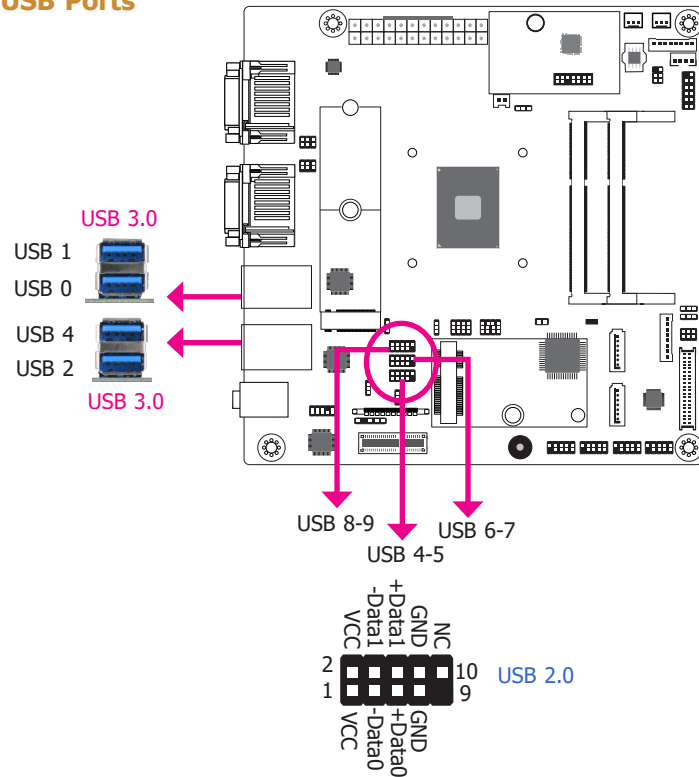
BIOS Setting

Configure the serial COM ports in the Advanced menu ("SIO NUVOTON6116D" submenu) of the BIOS. Refer to the chapter 3 for more information.

COM 3 to COM 6

Pin	Pin Assignment
1	DCD
2	RD
3	TD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

21

I/O Connectors

SATA (Serial ATA) Connectors

SATA 3.0 6Gb/s

SATA 0

SATA 1

GND
TXP
TXN
GND
RXN
RXP
GND

1

7
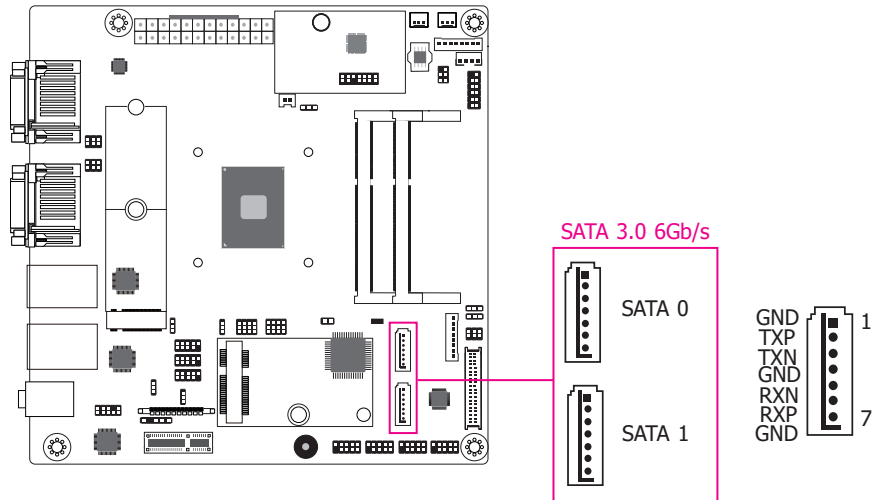
Features

- 2 Serial ATA 3.0 ports with data transfer rate up to 6Gb/s (SATA 0 and SATA 1)

- Integrated Advanced Host Controller Interface (AHCI) controller

The Serial ATA connectors are used to connect Serial ATA devices. Connect one end of the Serial ATA data 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 the chapter 3 for more information.

Power Connector

ATX Power

GND	+5V	+5V	+5V	NC	GND	GND	GND	PS_ON#	GND	-12V	+3.3V

24 → 13

12 → 1

+3.3V	+12V	+12V	+5VSB	PWR_OK	GND	+5V	GND	+5V	GND	+3.3V	+3.3V
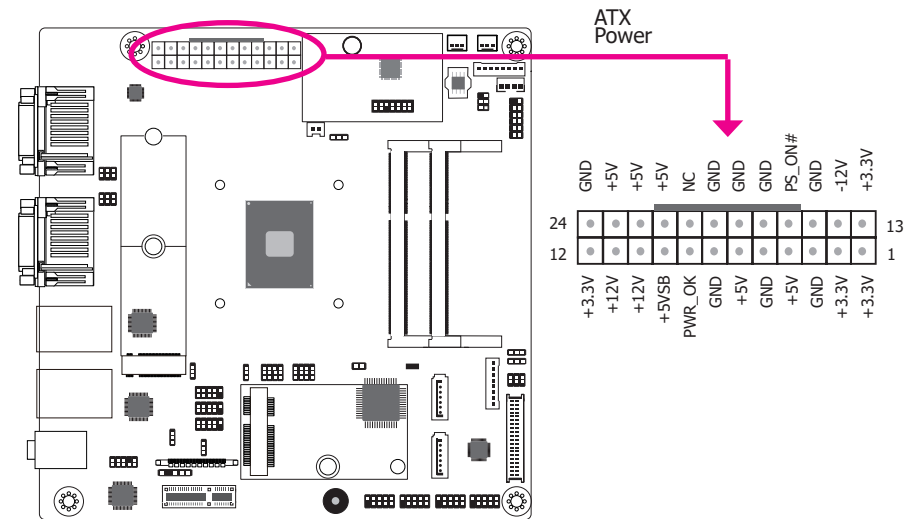
Use a power supply that complies with the ATX12V Power Supply Design Guide Version 1.1. An ATX12V power supply unit has a standard 24-pin ATX main power connector that must be inserted into the 24-pin connector.

The power connector from the power supply unit is designed to fit the 24-pin connector in only one orientation. Make sure to find the proper orientation before plugging the connector.

Because the Atom CPU is a low-power platform, please pay attention to the choice of ATX power supply. The total power consumption of the system application must exceed the minimum loading of the ATX power supply.

S/PDIF Connector

1 5
SPIN
Ground
SPOUT
+5V
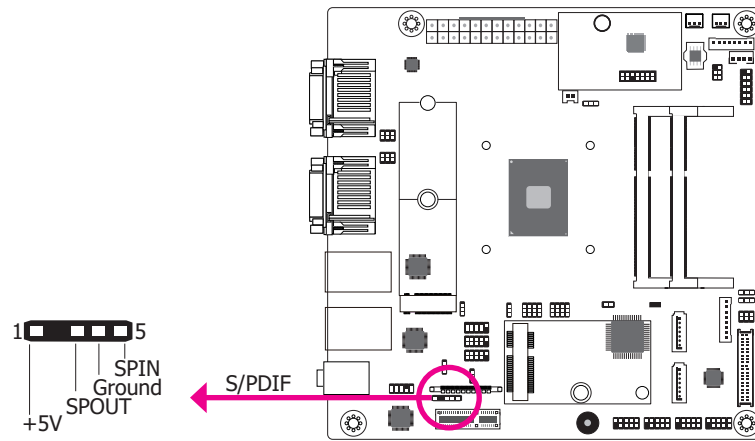
S/PDIF

The S/PDIF connector is used to connect an external S/PDIF port. Your S/PDIF port may be mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis then connect the audio cable to the S/PDIF connector. Make sure pin 1 of the audio cable is aligned with pin 1 of the S/PDIF connector.

Digital I/O and Power Connectors

Digital I/O

1 8

Digital I/O
Power

+12V
Ground
5VDU
+5V

1 4
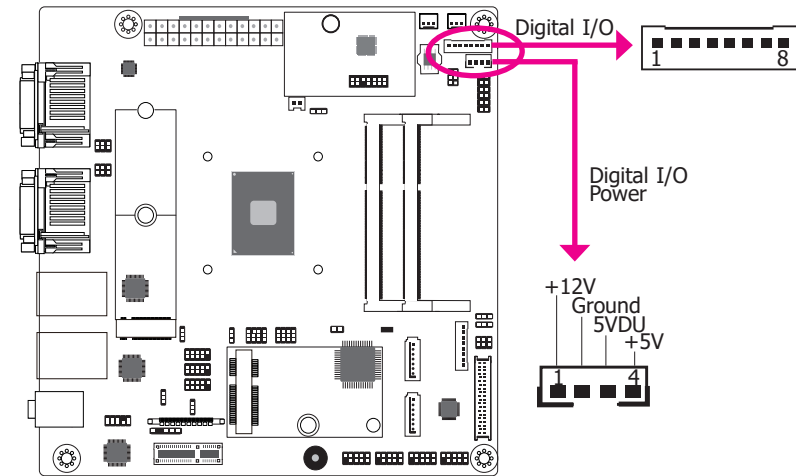
The 8-bit Digital I/O connector provides powering-on function to external devices that are connected to these connectors. The pin functions of the 8-bit digital I/O connector are listed below.

Digital I/O Connector

Pin	Function
1	DIO0
2	DIO1
3	DIO2
4	DIO3
5	DIO4
6	DIO5
7	DIO6
8	DIO7

23

Cooling Fan Connectors
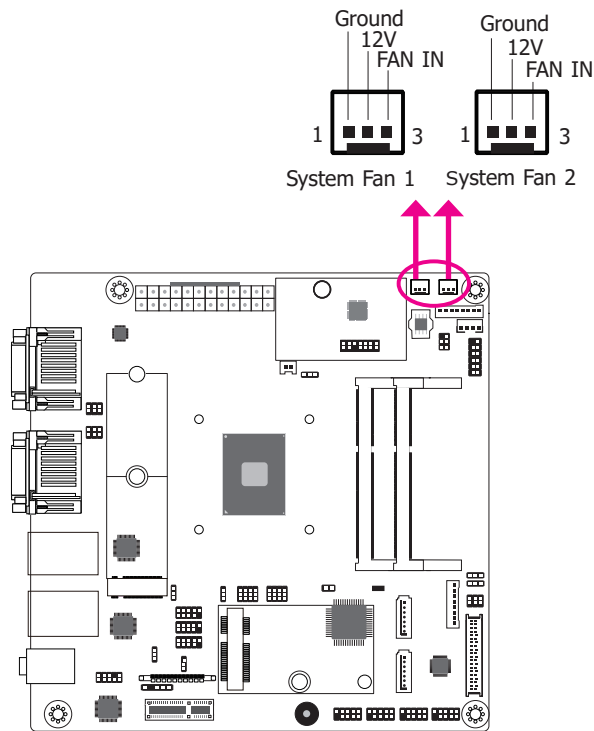
The fan connectors are used to connect cooling fans. The cooling fans will provide adequate airflow throughout the chassis to prevent overheating the CPU and system board components.

BIOS Setting

The Advanced menu ("SIO NUVOTON6116D" submenu) of the BIOS will display the current speed of the cooling fans. Refer to the chapter 3 for more information.

Front Panel Connector
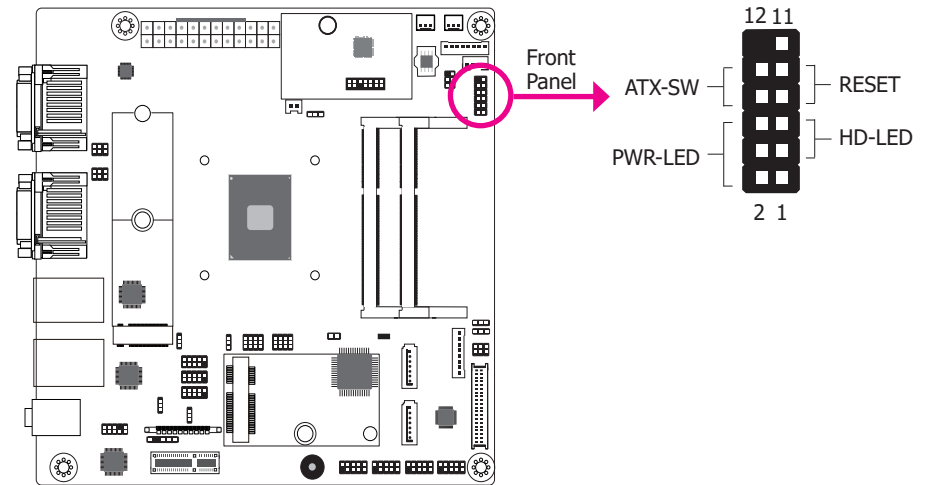
HD-LED - Hard Drive LED

This LED will light when the hard drive is being accessed.

RESET - Reset Switch

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

ATX-SW - 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	Function		Pin	Function
	1, 11	NC		2	3V3SB
HD-LED	3	3V3	PWR-LED	4	3V3SB
	5	HDD_LED		6	Power_LED
RESET	7	GND	ATX-SW	8	GND
	9	Reset		10	Power_Button

LVDS LCD Panel Connector

LCD/Inverter Power Connector

LCD/Inverter Power
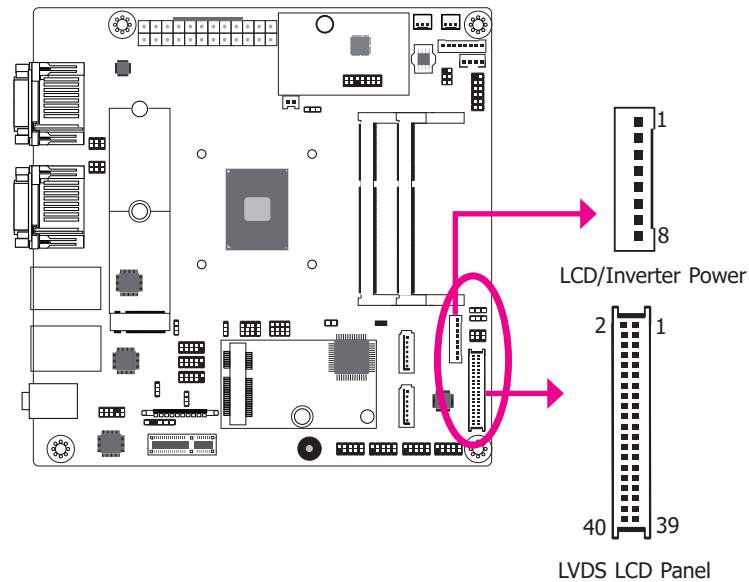
LVDS LCD Panel

The system board allows you to connect a LCD Display Panel by means of the LVDS LCD panel connectors and the LCD/Inverter power connectors. These connectors transmit video signals and power from the system board to the LCD Display Panel.

Refer to the right side for the pin functions of these connectors.

Jumper Settings

Refer to the "Jumper Settings" section in this chapter for settings relevant to the LCD panel.

BIOS Setting

Configure the LCD panel in the Advanced menu ("Video Configuration" sub-menu) of the BIOS. Refer to chapter 3 for more information.

LVDS LCD Panel Connector

Pin	Function	Pin	Function
1	GND	2	GND
3	LVDS_Out3+	4	LVDS_Out7+
5	LVDS_Out3-	6	LVDS_Out7-
7	GND	8	GND
9	LVDS_Out2+	10	LVDS_Out6+
11	LVDS_Out2-	12	LVDS_Out6-
13	GND	14	GND
15	LVDS_Out1+	16	LVDS_Out5+
17	LVDS_Out1-	18	LVDS_Out5-
19	GND	20	GND
21	LVDS_Out0+	22	LVDS_Out4+
23	LVDS_Out0-	24	LVDS_Out4-
25	GND	26	GND
27	LVDS_CLK1+	28	LVDS_CLK2+
29	LVDS_CLK1-	30	LVDS_CLK2-
31	GND	32	GND
33	DDC_CLK	34	NC
35	DDC_DATA	36	3.3V
37	Panel Power	38	Panel Power
39	Panel Power	40	Panel Power

LCD/Inverter Power Connector

Pin	Function
1	GND
2	GND
3	Panel Inverter Brightness Voltage Control
4	Panel Power
5	+3.3V
6	Panel Backlight On/Off Control
7	+12V (default)/+5V
8	+12V (default)/+5V

Note:
DFI board's LVDS connector: WTB HEADER 40P, 1.25mm, 712-76-40GWE0 (PRINEX)

SMBus Connector

5
SMBus_Alert
SMBus_Data   SMBus_Clock
GND   3V3DU
2 1
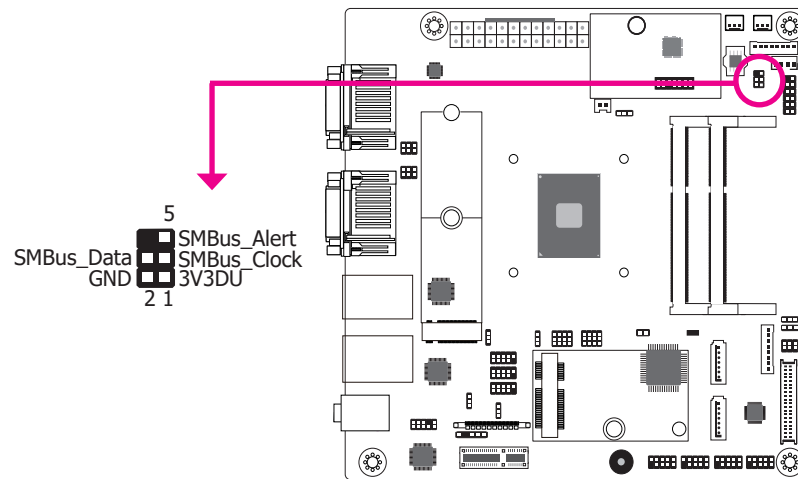
The SMBus (System Management Bus) connector is used to connect SMBus devices. It is a multiple device bus that allows multiple chips to connect to the same bus and enable each one to act as a master by initiating data transfer.

Standby Power LED

Standby Power LED
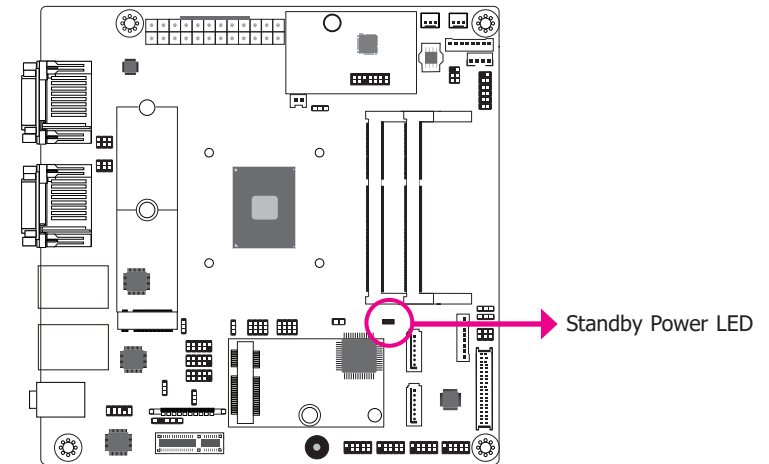
This LED will lit red when the system is in the standby mode. It indicates that there is power on the system board. Power-off the PC and then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the motherboard and components.

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Chassis Intrusion Connector

Chassis Intrusion

Signal
Ground

1 2
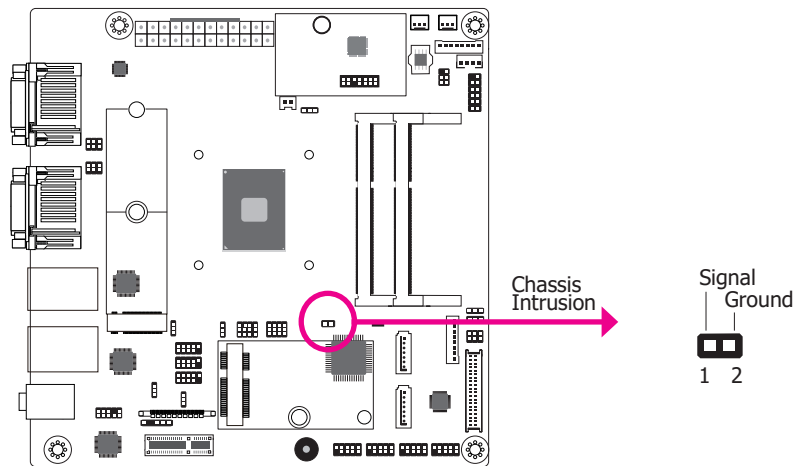
The board supports the chassis intrusion detection function. Connect the chassis intrusion sensor cable from the chassis to this connector. When the system's power is on and a chassis intrusion occurred, an alarm will sound. When the system's power is off and a chassis intrusion occurred, the alarm will sound only when the system restarts.

BIOS Setting

Configure the chassis intrusion detection function in the Advanced menu ("SIO NUVO-TON6116D" submenu) of the BIOS. Refer to the chapter 3 for more information.

Expansion Slots

M.2   Mini PCI Express   SIM
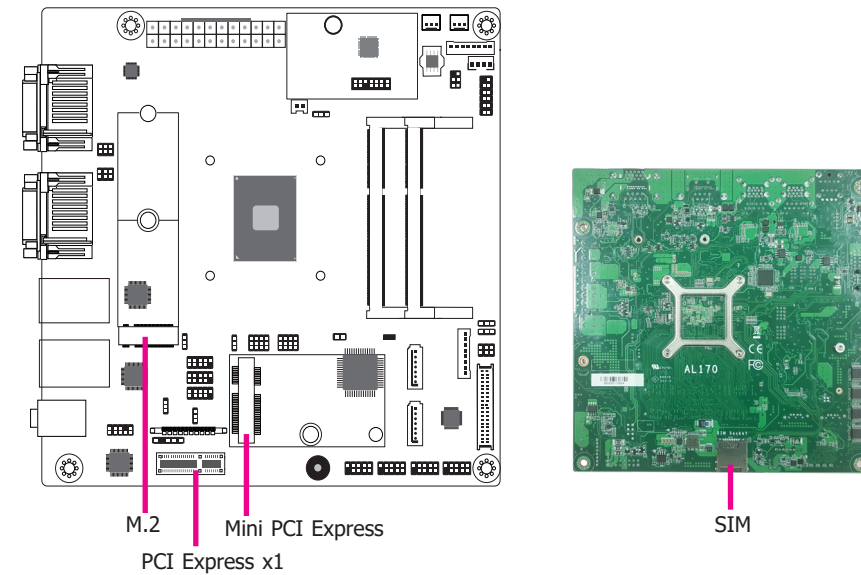
PCI Express x1

M.2 (M key) Socket

The M.2 socket is the Next Generation Form Factor (NGFF) which is designed to support multiple modules and make the M.2 more suitable in application for solid-state storage.

PCI Express x1 Slot

Install PCI Express cards such as network cards or other cards that comply to the PCI Express specifications into the PCI Express x1 slot.

Mini PCI Express Slot

The Mini PCIe socket is used to install a Mini PCIe card. Mini PCIe card is a small form factor PCIe card with the same signal protocol, electrical definitions, and configuration definitions as the conventional PCIe.

SIM Card Socket

The SIM card socket on the system board is used to insert a SIM card.

LPC Connector

LPC

13   1
14   2
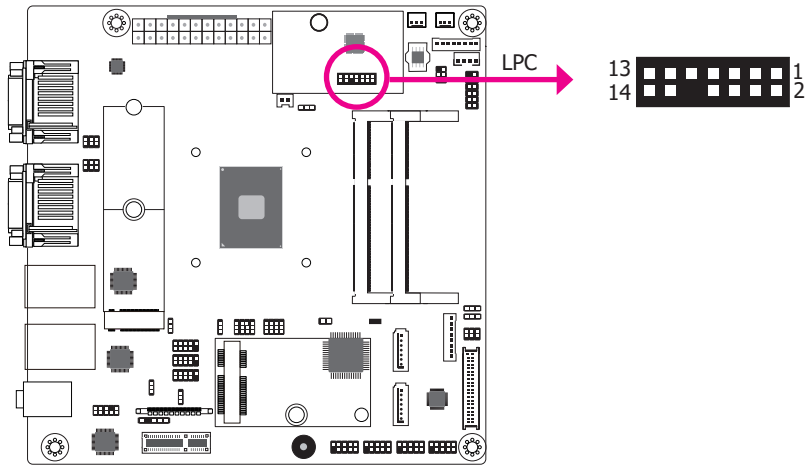
The Low Pin Count Interface was defined by Intel® Corporation to facilitate the industry's transition towards legacy free systems. It allows the integration of low-bandwidth legacy I/O components within the system, which are typically provided by a Super I/O controller. Furthermore, it can be used to 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 33MHz 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	Function	Pin	Function
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	---
11	INT_SERIRQ	12	GND
13	5VSB	14	5V

Connecting the EXT-RS232/RS485 Card to the Motherboard

With DFI's proprietary technology, AL170 supports two extension modules for additional four COM ports. The EXT-RS232/RS485 card is connected to AL170 via the LPC connector. The illustrations below guide you how to connect the extension module to the motherboard.

Note:
The system board used in the following illustrations may not resemble the actual one. These illustrations are for reference only.

LPC

Top View

COM

Bottom View

LPC

EXT-RS485

EXT-RS485

DFI Motherboard
EXT-RS232/RS485
Additional 4 COM
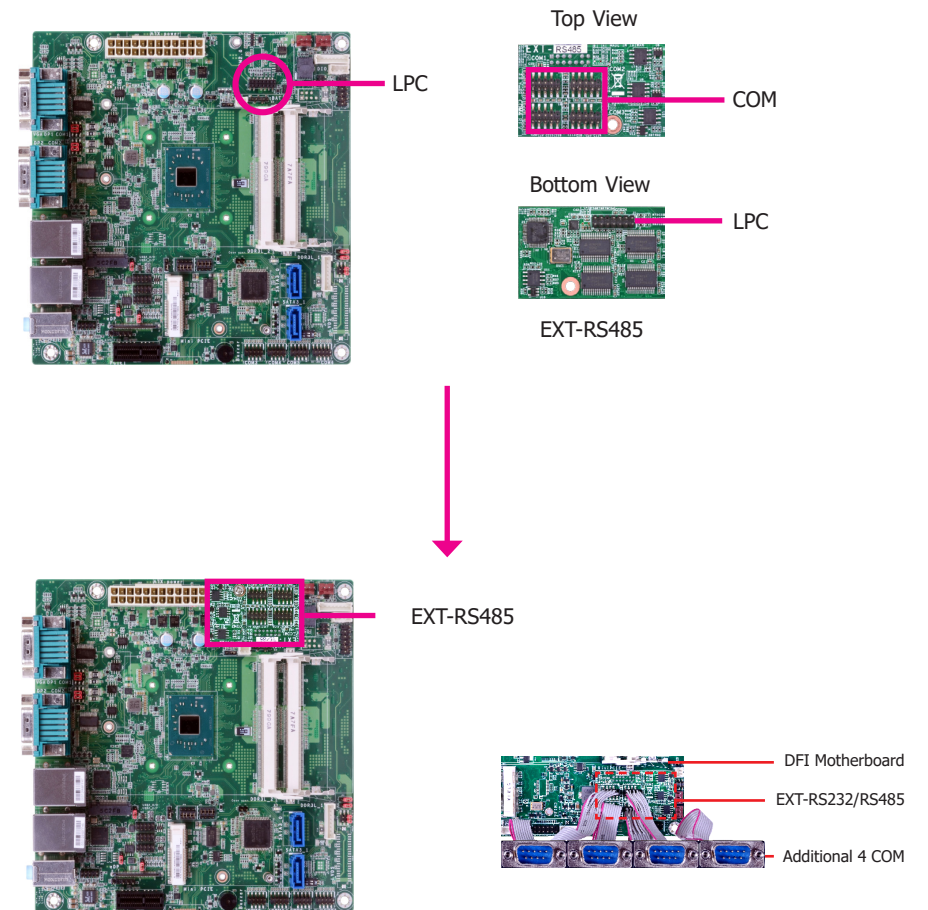
eDP Connector (optional)
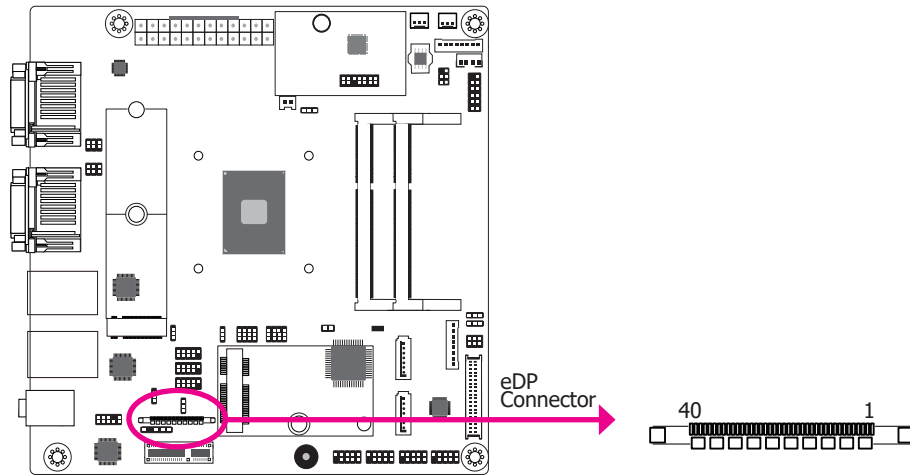
The eDP connector is an embedded displayport which has advanced power-saving features to connect a display device to transmit digital communication of audio and video signals. The table on the right indicates the pin fuctions of the eDP connector.

eDP Connector

Pin	Function	Pin	Function
1	NC	21	eDP_Panel PWR
2	GND	22	NC
3	eDP_Lane 3-	23	GND
4	eDP_Lane 3+	24	GND
5	GND	25	GND
6	eDP_Lane 2-	26	GND
7	eDP_Lane 2+	27	Hot Plug
8	GND	28	eDP_GND
9	eDP_Lane 1-	29	eDP_GND
10	eDP_Lane 1+	30	eDP_GND
11	GND	31	eDP_GND
12	eDP_Lane 0-	32	Panel Backlight On/Off Control
13	eDP_Lane 0+	33	Panel Inverter Brightness Voltage Control
14	GND	34	NC
15	AUX+	35	NC
16	AUX-	36	Inverter PWR
17	GND	37	Inverter PWR
18	eDP Panel PWR	38	Inverter PWR
19	eDP Panel PWR	39	Inverter PWR
20	eDP Panel PWR	40	NC

Battery

Battery
Connector

2 ▪▪ 1

+3.3V

GND

Battery

Connect to the
battery connector
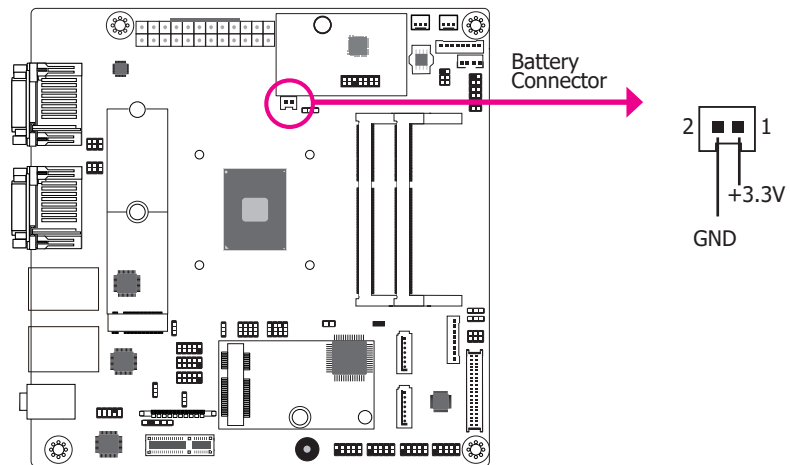
The lithium ion battery powers the real-time clock and CMOS memory. It is an auxiliary source of power when the main power is shut off.

Safety Measures

• Danger of explosion if battery incorrectly replaced.

• Replace only with the same or equivalent type recommended by the manufacturer.

• Dispose of used batteries according to local ordinance.

Chapter 3 - 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

Key	Function
Right and Left arrows	Moves the highlight left or right to select a menu.
Up and Down arrows	Moves the hightlight up or down between submenu or fields.
<Esc>	Exit to 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>.

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Insyde BIOS Setup Utility

Main

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

```
                           InsydeH2O Setup Utility                    Rev. 5.0
   Main    Advanced    Security    Boot    Exit

   Project Name              AL170                    This  is  the  help  for  the
   BIOS Version              B18C. 25A                hour,  minute,  second
                                                      field.  Valid range is from
   Intel(R) Atom(TM) Processor E3950 @ 1.60GHz        0 to 23, 0 to 59, 0 to 59.
   CPU Speed                 1600 MHz                  INCREASE/REDUCE:
   CPUID                     0x506C9                   +/-.
   L1 Data Cache             24 KB
   L1 Instruction Cache      32 KB
   L2 Cache                  1024 KB
   L3 Cache                  0 KB
   Number Of Processors      4 Core(s) / 4 Thread(s)
   BXT SOC                   B1 Stepping
   Microcode Rev             00000032

   Total Memory              4096 MB
   System Memory Speed       1600 MHz
   SODIMM 0                  [Not Installed]
   SODIMM 1                  4096 MB

   TXE FW Version            3. 1. 55. 2269

   System Time               [15:35:35]
   System Date               [01/17/2019]


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

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 01 to 12. Date displays the date, from 01 to 31. Year displays the year, from 2000 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.

```
                           InsydeH2O Setup Utility                    Rev. 5.0
   Main    Advanced    Security    Boot    Exit

   ▶ACPI Configuration                              ACPI Configuration Setting
   ▶CPU Configuration
   ▶Video Configuration
   ▶Audio Configuration
   ▶SATA Configuration
   ▶PCI Express Configuration
   ▶Console Redirection
   ▶SIO NUVOTON6116D


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

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ACPI Configuration

This section configures the system ACPI parameters.

```
                    InsydeH2O Setup Utility                      Rev. 5.0
    Advanced

Wake On LAN              <Disabled>              Enable/Disable Wake On
After G3                 <Always Off>            LAN capability




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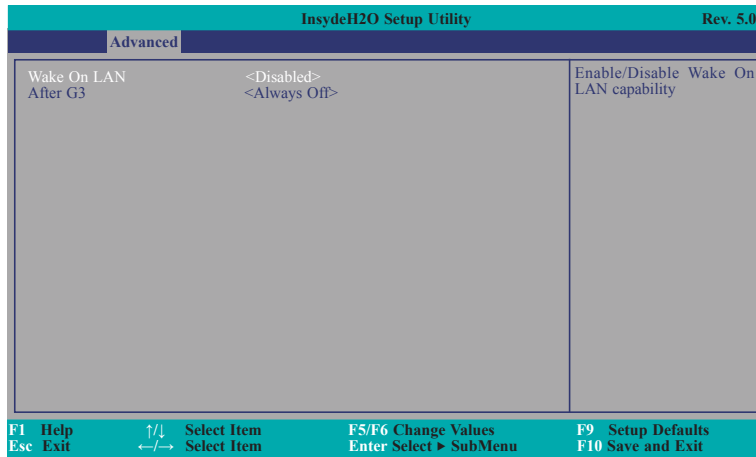
Wake On LAN

Enable or Disable this field to use the LAN signal to wake up the system.

After G3

This field is to specify what 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 in working state.

Always Off   The system is in soft-off state, except for trickle current to devices such as the power button.

Note:
If "Quiet Boot" of Boot menu is set to enabled, "BGRT Logo" will appear for configuration. Refer to the Boot menu in this chapter for more information.

```
                    InsydeH2O Setup Utility                      Rev. 5.0
    Advanced

Wake On LAN              <Disabled>              Support display logo with
After G3                 <Always Off>            ACPI BGRT table.
BGRT Logo                <Enabled>




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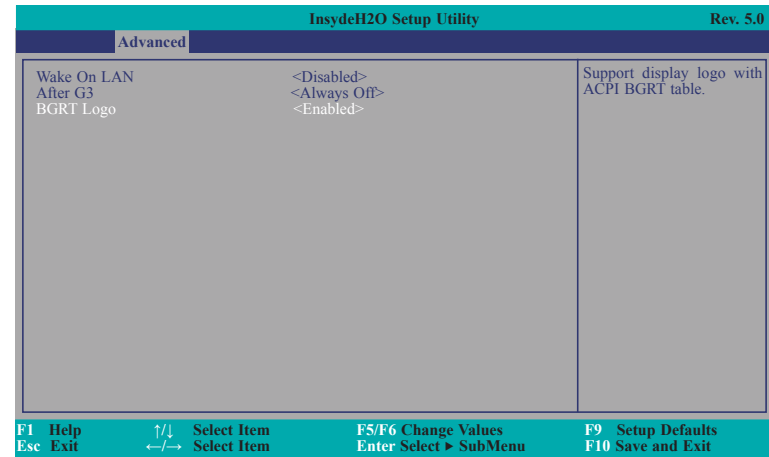
BGRT Logo

This field is used to enable or disable to support display logo with ACPI BGRT table.

33

Chapter 3

CPU Configuration

This section configures the CPU.

```
                    InsydeH2O Setup Utility                    Rev. 5.0
    Advanced

    EIST                    <Enabled>              Enable/Disable  Intel
    Turbo Mode              <Enabled>              SpeedStep
    C-States                <Enabled>




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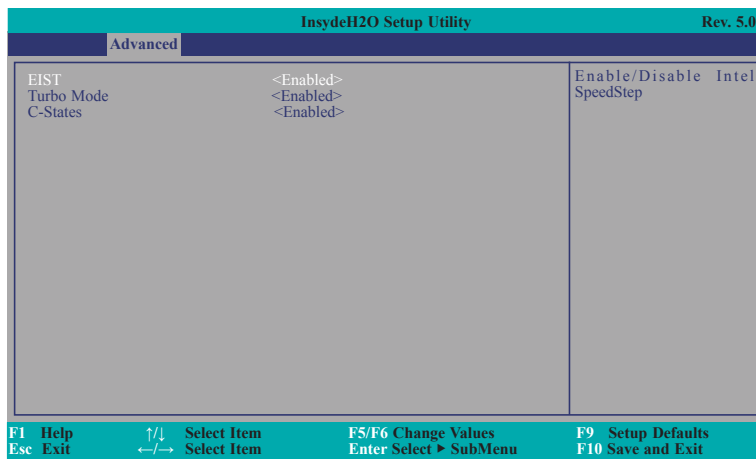
EIST

This field is used to 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 enable the EIST feature using the operating system's power management.

Turbo Mode

This field is used to enable or disable processor turbo mode.

C-States

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

Video Configuration

This section configures the video settings.

```
                    InsydeH2O Setup Utility                    Rev. 5.0
    Advanced

    Primary Display             <IGD>              Select which of IGD/PCIe
    Integrated Graphics Device  <Enabled>          Graphics device should be
    PTN3460 Function            <Enabled>          Primary Display
    LCD Panel Type              <1024X768>         Initial priority :
    LCD Panel Color Depth       <24 Bit>           AUTO: PEG->PCIe->PCI-
    Backlight Type              <Normal+PWM Mode>  >IGFX
                                                   IGFX:  IGFX->PEG-
                                                   >PCIe->PCI
                                                   PEG: PEG->PCIe->PCI-
                                                   >IGFX
                            Primary Display        PCI: PCI->PCIe->PEG-
                                                   >IGFX
                         IGD
                         PCIe



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

Primary Display

Select either IGD or PCIe Graphics device to be the primary display.

Integrated Graphics Device

Keep IGD enabled or disabled based on the setup options.

PTN3460 Function

Enable or disable PTN3460 LCD features.

LCD Panel Type

Please check the specifications of your LCD monitor. Select the type of LCD panel connected to the system's LCD connector: 800X480, 800X600, 1024X768, 1366X768, 1280X1024, 1920X1080 or 1920X1200.

LCD Panel Color Depth

Select the LCD panel color depth: 18 Bit, 24 Bit, 36 Bit or 48 Bit.

Backlight Type

Set the backlight type: Normal+PWM Mode, Normal+DC Mode, Invert+PWM Mode or Invert+DC Mode.

Audio Configuration

This section configures the audio settings.

```
                        InsydeH2O Setup Utility                              Rev. 5.0
        Advanced

    Audio Controller                <Enabled>                   Enable/Disable  HD-Audio
                                                                Support




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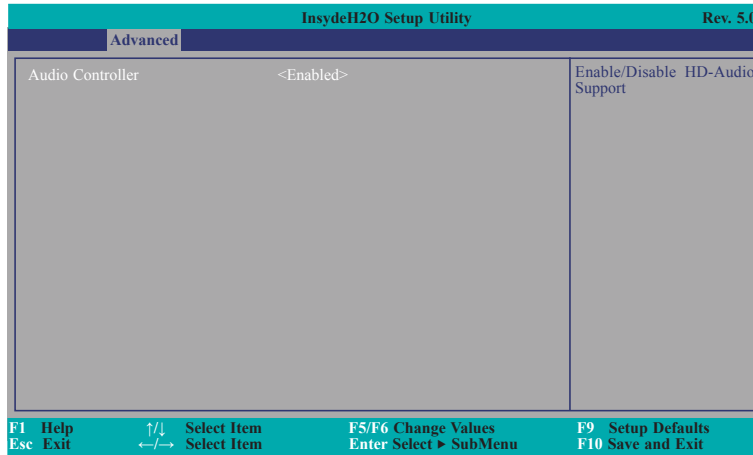
Audio Controller

Enable or disable HD audio support.

Disabled
HD Audio will be disabled.
Enabled
HD Audio will be enabled.

SATA Configuration

This section configures the SATA controller.

```
                        InsydeH2O Setup Utility                              Rev. 5.0
        Advanced

    SATA Controller                 <Enabled>                   Enables or Disables the
    SATA Mode Selection             <AHCI>                      Chipset SATA Controller.
    SATA Speed Selection            <Gen3>
       SATA Port 0                  [Not Installed]
       SATA Port 0                  <Enabled>
       Hot Plug                     <Disabled>
       SATA Port 1                  [Not Installed]
       SATA Port 1                  <Enabled>
       Hot Plug                     <Disabled>




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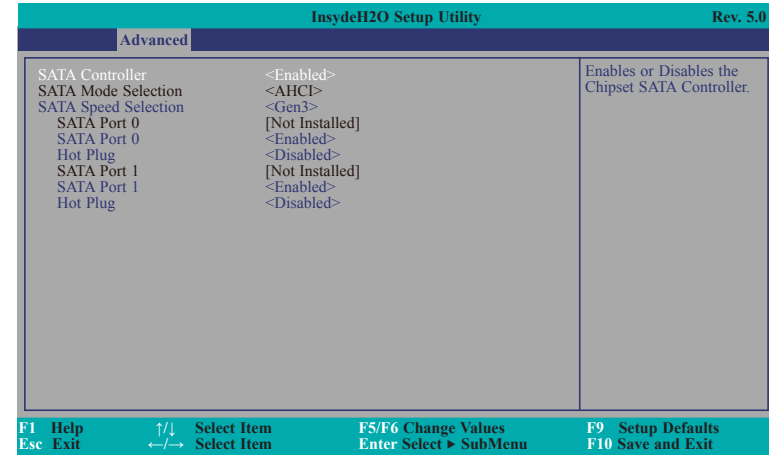
SATA Controller

This field is used to enable or disable the Serial ATA controller.

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).

SATA Speed Selection

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

SATA Port 0 and 1/Hot Plug

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

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PCI Express Configuration

This section configures settings relevant to PCI Express root ports.

```
                    InsydeH2O Setup Utility                          Rev. 5.0
      Advanced
  ▶PCI Express Root Port 1 (Mini PCIE)              Control the PCI Express
  ▶PCI Express Root Port 3 (PCIE 1)                 Root Port.
  ▶PCI Express Root Port 4 (LAN 1)                  Enable: Enable PCIe root
  ▶PCI Express Root Port 5 (LAN 2)                  port
                                                    Disable: Disable PCIe root
                                                    port




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

```
                    InsydeH2O Setup Utility                          Rev. 5.0
      Advanced
  PCI Express Root Port 1 (Mini PCIE)     <Enabled>   Control the PCI Express
  Hot Plug                                <Disabled>  Root Port.
  PCIe Speed                              <Auto>      Enable: Enable PCIe root
                                                      port
                                                      Disable: Disable PCIe root
                                                      port




  F1  Help          ↑/↓   Select Item      F5/F6 Change Values     F9   Setup Defaults
  Esc Exit          ←/→   Select Item      Enter Select ▶ SubMenu  F10 Save and Exit
```
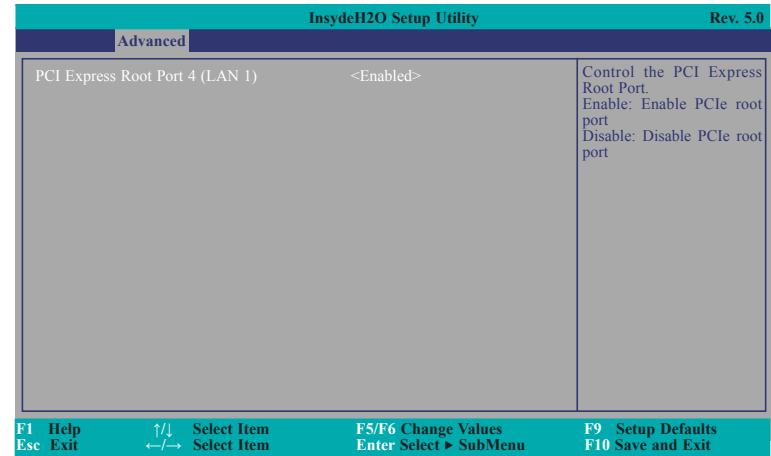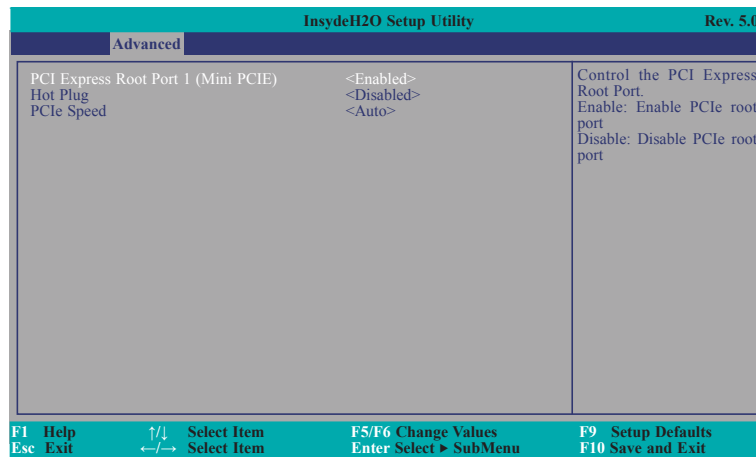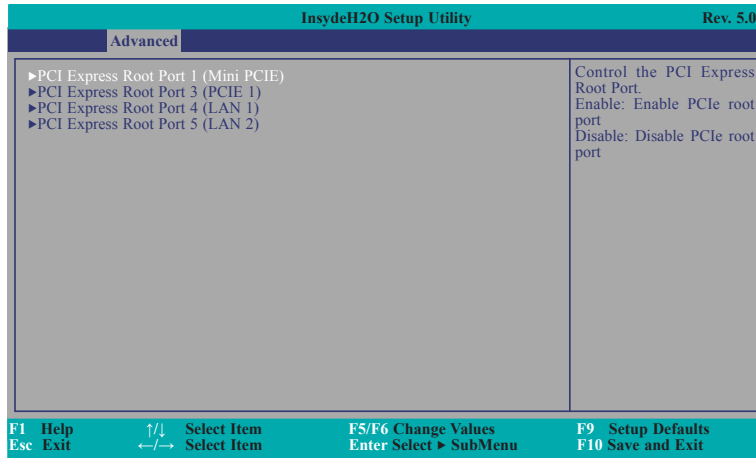
```
                    InsydeH2O Setup Utility                          Rev. 5.0
      Advanced
  PCI Express Root Port 4 (LAN 1)         <Enabled>   Control the PCI Express
                                                      Root Port.
                                                      Enable: Enable PCIe root
                                                      port
                                                      Disable: Disable PCIe root
                                                      port




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

PCI Express Root Port 1/3/4/5

This field is used to enable or disable the PCI express root port.
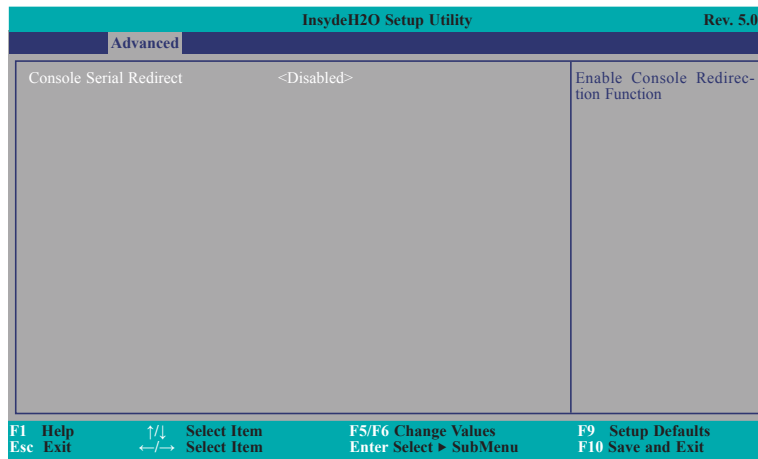
Hot Plug

Enable or disable the hot plug function of the PCI Express root port.

PCIe Speed

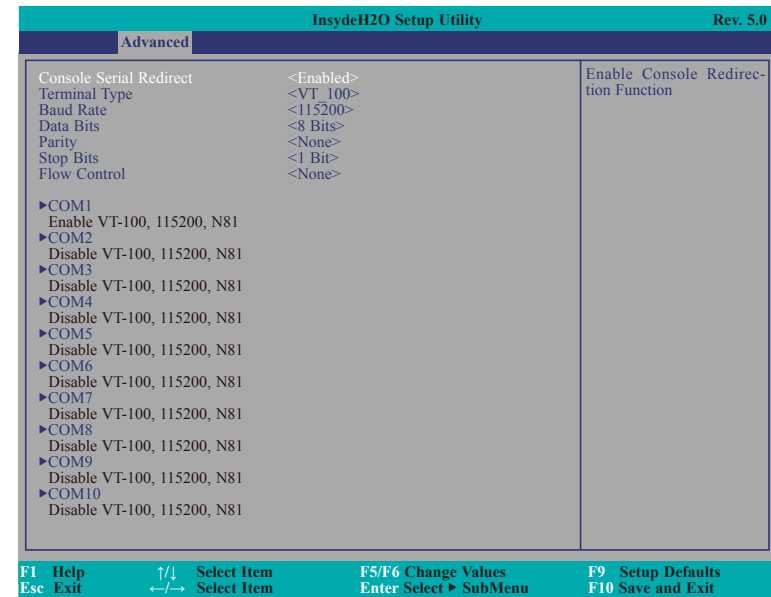Select the speed of the PCI Express root port: Auto, Gen1 or Gen2.

Console Redirection

This section configures settings relevant to console redirection.

```
                    InsydeH2O Setup Utility                 Rev. 5.0
        Advanced

   Console Serial Redirect          <Disabled>          Enable Console Redirec-
                                                        tion Function

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

Console Serial Redirect

This field is used to enable or disable the console serial redirection function.

When Console Serial Redirect is set to enabled, several options will be available for configuration:

```
                    InsydeH2O Setup Utility                 Rev. 5.0
        Advanced

   Console Serial Redirect          <Enabled>           Enable Console Redirec-
   Terminal Type                    <VT_100>            tion Function
   Baud Rate                        <115200>
   Data Bits                        <8 Bits>
   Parity                           <None>
   Stop Bits                        <1 Bit>
   Flow Control                     <None>

   ▶COM1
     Enable VT-100, 115200, N81
   ▶COM2
     Disable VT-100, 115200, N81
   ▶COM3
     Disable VT-100, 115200, N81
   ▶COM4
     Disable VT-100, 115200, N81
   ▶COM5
     Disable VT-100, 115200, N81
   ▶COM6
     Disable VT-100, 115200, N81
   ▶COM7
     Disable VT-100, 115200, N81
   ▶COM8
     Disable VT-100, 115200, N81
   ▶COM9
     Disable VT-100, 115200, N81
   ▶COM10
     Disable VT-100, 115200, N81

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

Terminal Type

Select terminal type: VT_100, VT_100+, VT_UTF8 or PC_ANSI.

Baud Rate

Select baud rate: 115200, 57600, 38400, 19200 or 9600.

Data Bits

Select data bits: 7 bits or 8 bits.
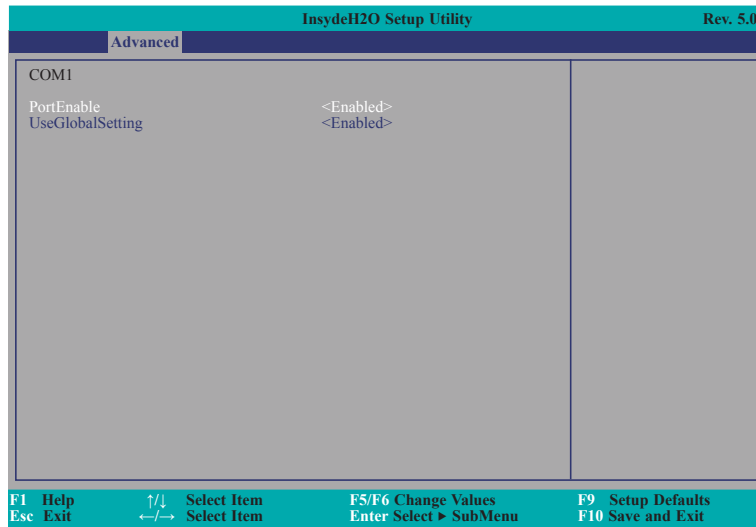
Parity

Select parity bits: none, even or odd.

Stop Bits

Select stop bits: 1 bit or 2 bits.

Flow Control

Select flow control type: none, RTS/CTS or XON/XOFF.

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COM1~COM10 (Additional COM ports COM7~COM10 are available when EXT-RS232/RS485 card is connected to AL170 via the LPC connector.)
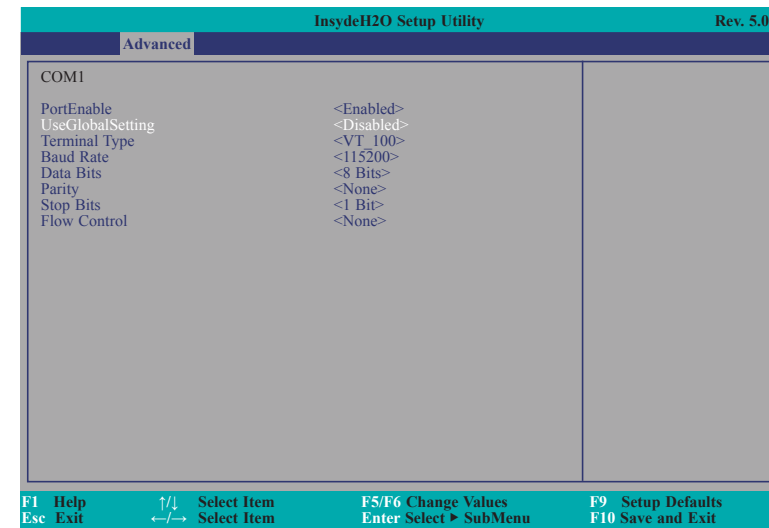
InsydeH2O Setup Utility	Rev. 5.0
Advanced	

COM1

PortEnable   <Enabled>
UseGlobalSetting   <Enabled>

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

PortEnable

This field is used to enable or disable the COM port to redirect the console.
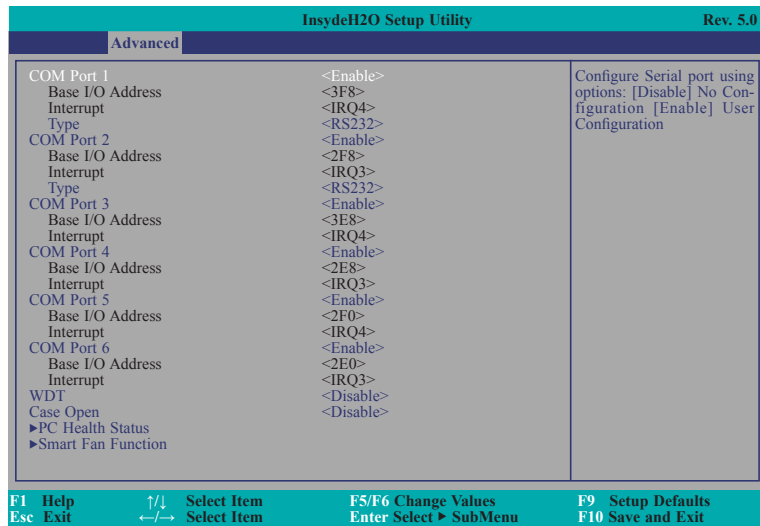
UseGlobalSetting

This field is to enable or disable to use global setting. When enabled the global setting, setting of the COM port will be the same as those in Console Redirection section. When disabled the global setting, setting of the COM port can be configured independently in this section.

When UseGlobalSetting is set to disabled, it will display the following information:

InsydeH2O Setup Utility	Rev. 5.0
Advanced	

COM1

PortEnable   <Enabled>
UseGlobalSetting   <Disabled>
Terminal Type   <VT_100>
Baud Rate   <115200>
Data Bits   <8 Bits>
Parity   <None>
Stop Bits   <1 Bit>
Flow Control   <None>

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

SIO NUVOTON6116D

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

```
                    InsydeH2O Setup Utility                    Rev. 5.0
       Advanced

   COM Port 1                    <Enable>         Configure Serial port using
      Base I/O Address           <3F8>            options: [Disable] No Con-
      Interrupt                  <IRQ4>           figuration [Enable] User
      Type                       <RS232>          Configuration
   COM Port 2                    <Enable>
      Base I/O Address           <2F8>
      Interrupt                  <IRQ3>
      Type                       <RS232>
   COM Port 3                    <Enable>
      Base I/O Address           <3E8>
      Interrupt                  <IRQ4>
   COM Port 4                    <Enable>
      Base I/O Address           <2E8>
      Interrupt                  <IRQ3>
   COM Port 5                    <Enable>
      Base I/O Address           <2F0>
      Interrupt                  <IRQ4>
   COM Port 6                    <Enable>
      Base I/O Address           <2E0>
      Interrupt                  <IRQ3>
   WDT                           <Disable>
   Case Open                     <Disable>
   ▶PC Health Status
   ▶Smart Fan Function

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

COM Port 1 to COM Port 6

Configure the settings to use the serial port.

Disable No configuration

Enable   User configuration

Type

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

WDT

Enable or disable the watchdog function. If enabled, a time-out counter ranges from 1 to 255 seconds will appear.

Case Open

Enable or disable the case open detection function.

PC Health Status

This section displays the system's health information such as the CPU and system temperatures.

```
                    InsydeH2O Setup Utility                    Rev. 5.0
       Advanced

   Voltage
      VCORE                      0. 880  V
      VBAT                       3. 024  V
      VDDQ                       1. 360  V
      3VSB                       3. 264  V
      5V                         5. 056  V
      +12V                       12. 056  V

   Temperature
      CPU (ºC/ºF)                38 C/ 100 F
      System (ºC/ºF)             34 C/  93 F

   Fan Speed
      SYS FAN1                   0 RPM
      SYS FAN2                   0 RPM

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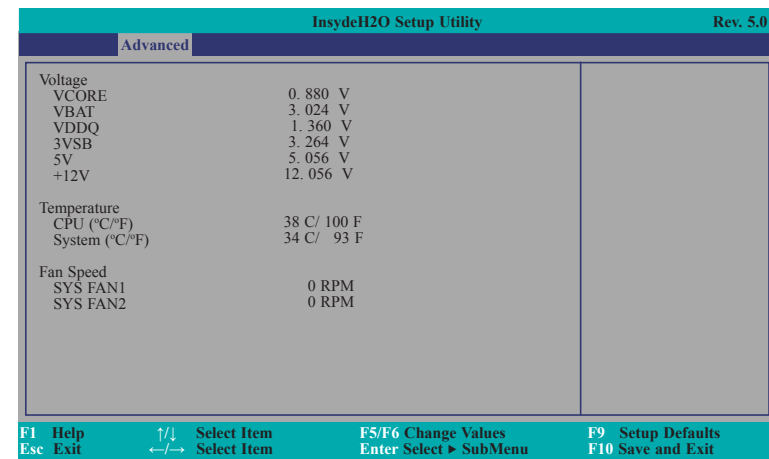
Smart Fan Function

This section configures the Smart Fan Function.

```
                          InsydeH2O Setup Utility                    Rev. 5.0
      Advanced
  SYS Smart Fan1 Control          <Enable>             Enable/Disable Smart Fan
     Boundary 1                    [30]
     Boundary 2                    [40]
     Boundary 3                    [50]
     Boundary 4                    [60]
     Fan Speed Count 1             [35]
     Fan Speed Count 2             [60]
     Fan Speed Count 3             [80]
     Fan Speed Count 4             [100]
  SYS Smart Fan2 Control          <Enable>
     Boundary 1                    [30]
     Boundary 2                    [40]
     Boundary 3                    [50]
     Boundary 4                    [60]
     Fan Speed Count 1             [35]
     Fan Speed Count 2             [60]
     Fan Speed Count 3             [80]
     Fan Speed Count 4             [100]

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

SYS Smart Fan1/Fan2 Control

Enable or disable the system smart fan. If disabled, Fix Fan Speed Count field ranged

from 1 to 100% (full speed) will appear.

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 1 temperature, the system or CPU fan should be turned on and operate at the designated speed. The range is from 0-127ºC.

Fan Speed Count 1 to Fan Speed Count 4

Set the fan speed. The range is from 1 to 100% (full speed). The fans will operate according to the specified boundary temperatures above.

Security

This section configures the security settings for entering the BIOS setup utility.

```
                          InsydeH2O Setup Utility                    Rev. 5.0
  Main    Advanced   Security   Boot    Exit
  Current TPM Device       <TPM 2.0 (FTPM)>        Select one of the supported
  TPM State                All Hierarchies Enabled, UnOwned  operation to change TPM2
  TPM Availability         <Available>             state.
  TPM Operation            <No Operation>
  Clear TPM                [ ]

  Supervisor Password      Not installed

  Set Supervisor Password       TPM Operation
                                No Operation
                                Enable
                                Disable

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

TPM Availability

Show or hide the TPM availability and its configurations.

TPM Operation

Select one of the supported operation to change TPM2 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 greater than one character.

Boot

This section configures boot options.

```
                              InsydeH2O Setup Utility                    Rev. 5.0
      Main      Advanced     Security    Boot     Exit

    Setup Prompt Timeout              [0]               The number of seconds
    Numlock                           <Off>             that the firmware will wait
    Quiet Boot                        <Disabled>        before booting the original
    Network Stack                     <Disabled>        default boot selection.
    PXE Boot capability               <Disabled>
    USB Boot                          <Enabled>




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

Setup Prompt Timeout

Select the number of seconds that the firmware will wait before booting the original default boot selection.

Numlock

Select the power-on state for numlock: On or Off.

Quiet Boot

Enable or disable booting in text mode.

Network Stack

Enable or disable network stack. It supports the operation of these functions or software: UEFI IPv4/IPv6 PXE.

PXE Boot capability

Disabled Suppoort Network Stack
UEFI IPv4/IPv6

USB Boot

Enable or disable the booting to USB boot devices.

Note:
AL170 only supports UEFI boot, no Legacy boot.

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Exit

This section configures the parameters for exiting the BIOS menu.

```
                          InsydeH2O Setup Utility                        Rev. 5.0
    Main     Advanced    Security     Boot     Exit

                                                         Exit system setup and save
                                                         your changes.
    Exit Saving Changes
    Load Optimal Defaults
    Discard Changes
    Save Setting to file









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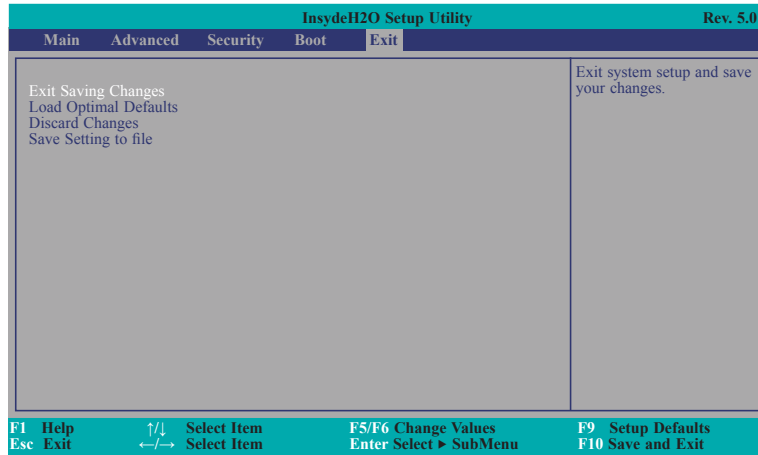
Exit Saving Changes

Select Yes and press <Enter> to exit the system setup and save your changes.

Load Optimal Defaults

Select YES and press <Enter> to load optimal defaults.

Discard Changes

Select YES and press <Enter> to exit the system setup without saving your changes.

Save Setting to file

Select this option to save BIOS configuration settings to a USB flash device.

Restore Setting from file

This field will appear only when a USB flash device is detected. Select this field to restore setting from the USB flash device.

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/Knowledge/Video/31 .

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Notice: BIOS SPI ROM

1. The Intel® Trusted Execution 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® Trusted Execution 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

Please download drivers, utilities and software applications required to enhance the performance of the system board at https://www.dfi.com/DownloadCenter .

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.

To install the utility, download "AL170_Chipset Driver" zip file at our website.

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

2. Read the license agreement then click "Accept".
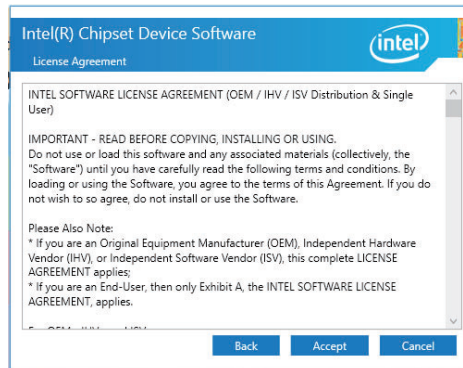
3. Go through the readme document for more installation tips then click "Install".
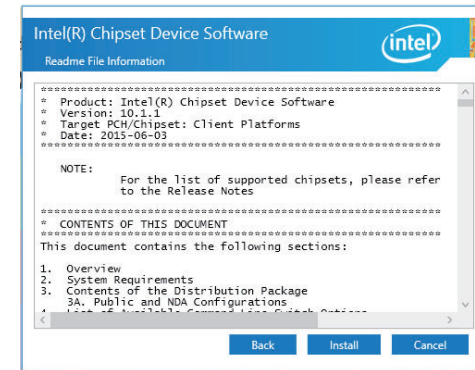
4. The step displays the installing status in the progress.
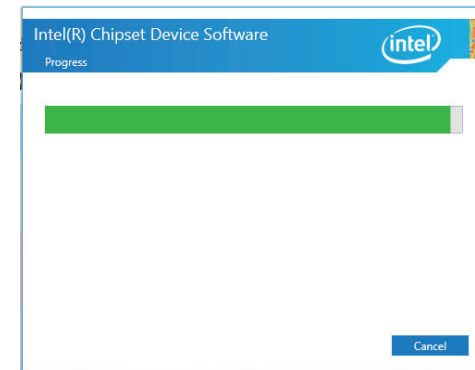
5. After completing installation, click "Restart Now" to exit setup.
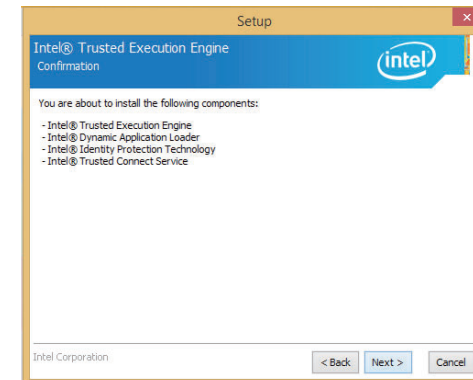
   Restarting the system will allow the new software installation to take effect.

Intel Graphics Drivers

To install the driver, download "AL170_Graphics Driver" zip file at our website.

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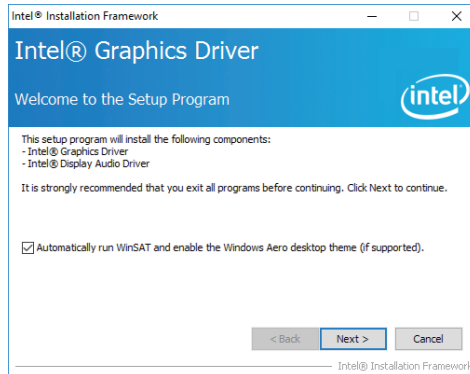
By default, the "Automatically run WinSAT and enable the Windows Aero desktop theme" is enabled. With this enabled, after installing the graphics driver and the system rebooted, the screen will turn blank for 1 to 2 minutes (while WinSAT is running) before the Windows 10 desktop appears. The "blank screen"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

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

2. Read the license agreement then click "Yes".
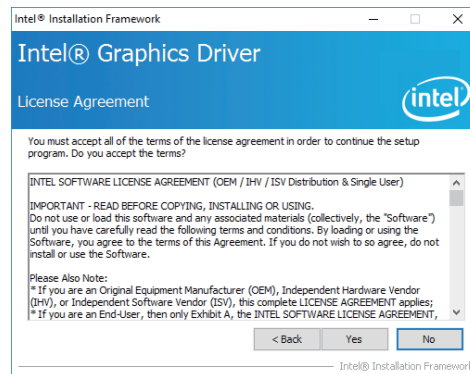
3. Go through the readme document for system requirements and installation tips then click "Next".
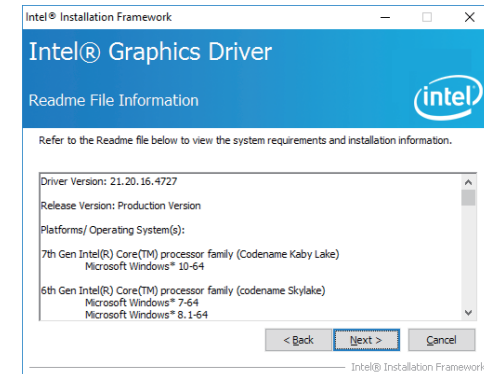
4. Setup is now installing the driver. Click "Next" to continue.
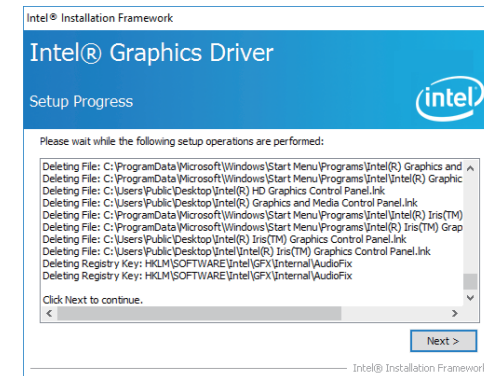
5. Click "Yes, I want to restart this computer now" then click "Finish".

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

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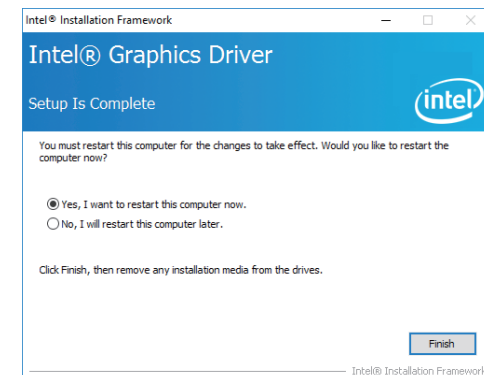
Audio Driver

To install the driver, download "AL170_Audio Driver" zip file at our website.

1. Setup is ready to install the driver. Click "Next".
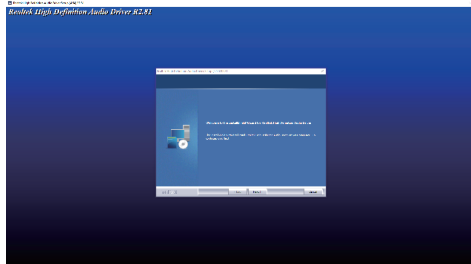
2. Click "Yes, I want to restart my computer now" then click "Finish".

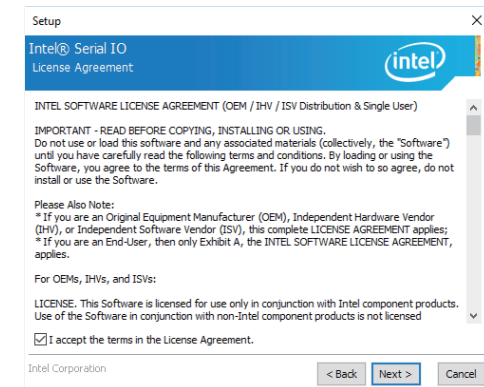   Restarting the system will allow the new software installation to take effect.
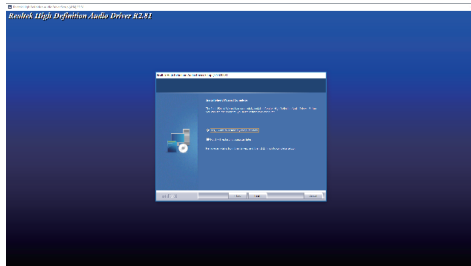
Intel LAN Driver

To install the driver, download "AL170_LAN Driver" zip file at our website.

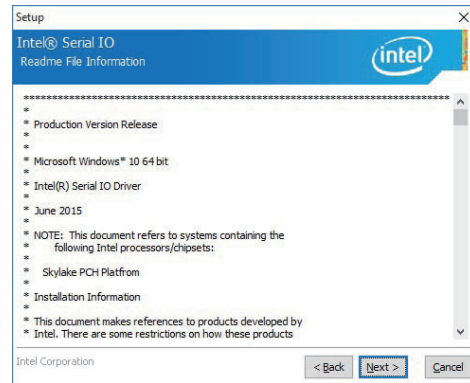1. Setup is ready to install the driver. Click "Next".
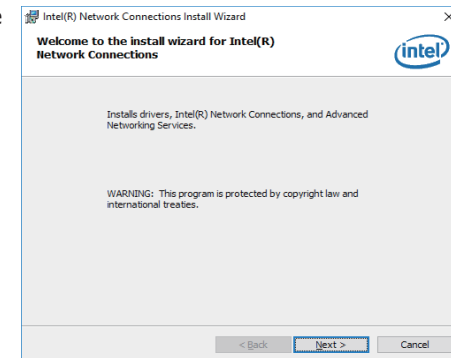
2. Click "I accept the terms in the license agreement" then click "Next".
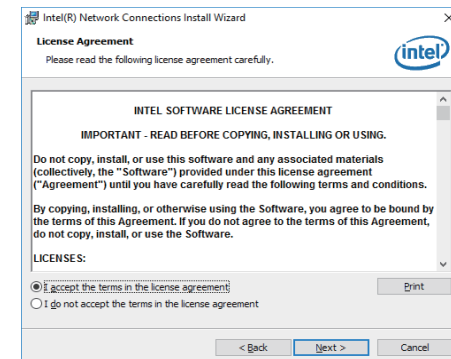
3. Select the program features you want installed then click "Next".

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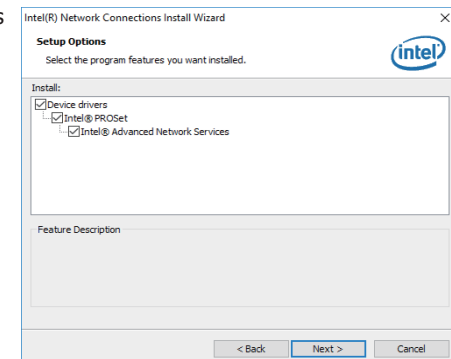
4. Click "Install" to begin the installation.
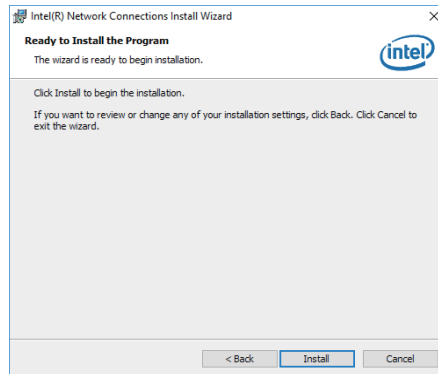
5. The step displays the installing status in the progress.
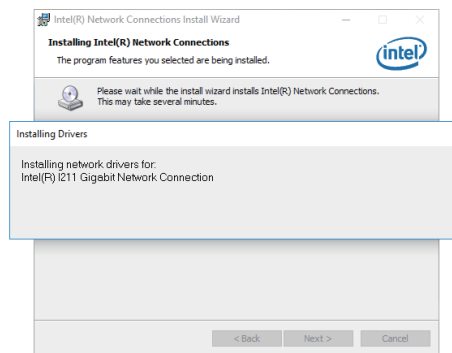
6. After completing installation, click "Finish".
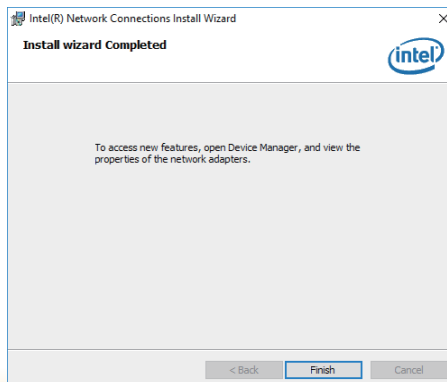
Intel Trusted Execution Engine Driver

To install the driver, download "AL170_TXE Driver" zip file at our website.

1. Tick "I accept the terms in the License Agreement" and then click "Next."
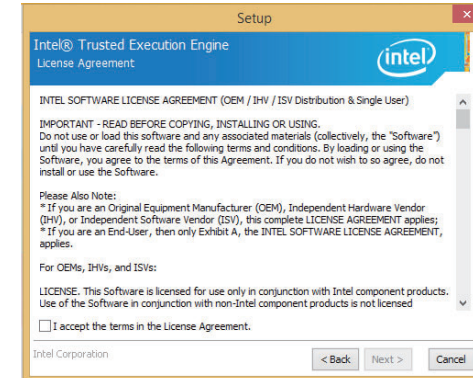
2. The step shows the components which will be installed. Then, Click Next.

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3. The step displays the installing status in the progress.
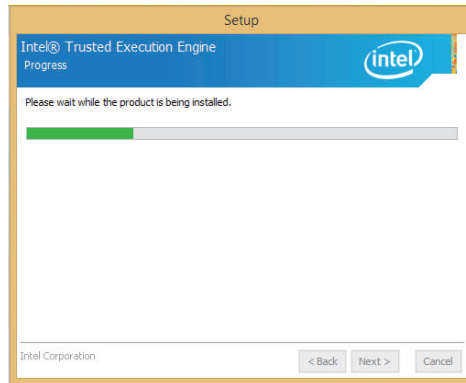
4. Click "Finish" when the installation is complete.
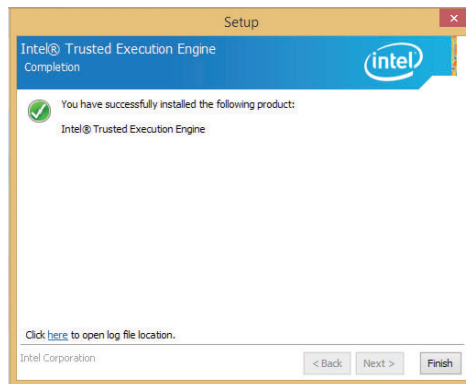
SIO Driver

To install the driver, download "AL170_SIO Driver" zip file at our website.

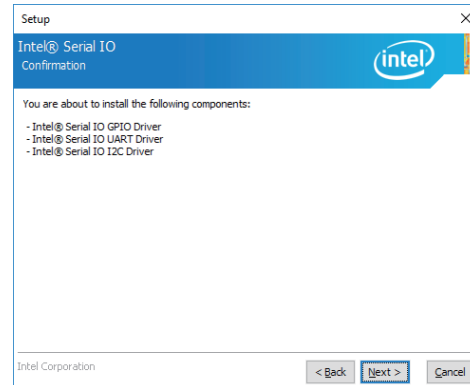1. Setup is ready to install the driver. Click "Next".
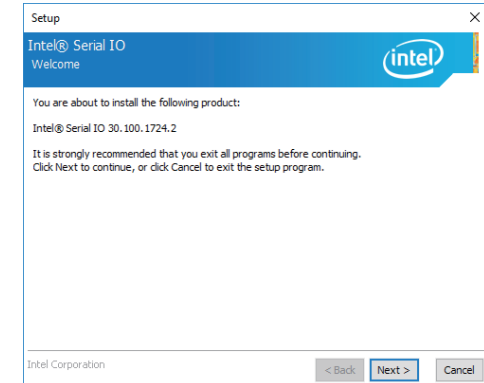
2. Read the license agreement carefully.

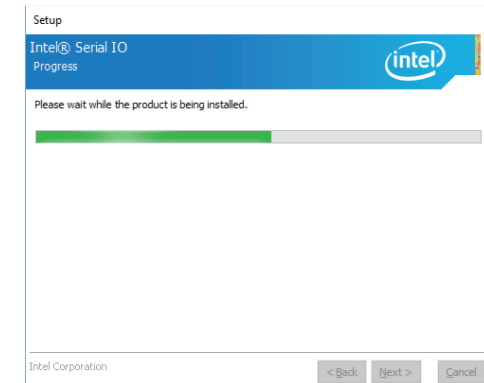   Tick "I accept the terms in the License Agreement" then click "Next".

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

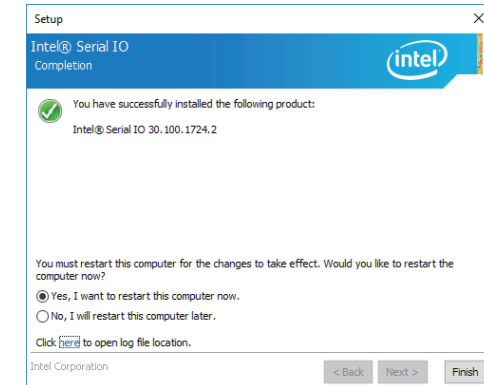4. Setup is ready to install the driver. Click "Next".

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.

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Appendix A - Troubleshooting Checklist

Troubleshooting Checklist

This chapter of the manual is designed to help you with problems that you may encounter with your personal computer. To efficiently troubleshoot your system, treat each problem individually. This is to ensure an accurate diagnosis of the problem in case a problem has multiple causes.

Some of the most common things to check when you encounter problems while using your system are listed below.

1. The power switch of each peripheral device is turned on.

2. All cables and power cords are tightly connected.

3. The electrical outlet to which your peripheral devices connected is working. Test the outlet by plugging in a lamp or other electrical device.

4. The monitor is turned on.

5. The display's brightness and contrast controls are adjusted properly.

6. All add-in boards in the expansion slots are seated securely.

7. Any add-in board you have installed is designed for your system and is set up correctly.

Monitor/Display

If the display screen remains dark after the system is turned on:

1. Make sure that the monitor's power switch is on.

2. Check that one end of the monitor's power cord is properly attached to the monitor and the other end is plugged into a working AC outlet. If necessary, try another outlet.

3. Check that the video input cable is properly attached to the monitor and the system's display adapter.

4. Adjust the brightness of the display by turning the monitor's brightness control knob.

The picture seems to be constantly moving.

1. The monitor has lost its vertical sync. Adjust the monitor's vertical sync.

2. Move away any objects, such as another monitor or fan, that may be creating a magnetic field around the display.

3. Make sure your video card's output frequencies are supported by this monitor.

The screen seems to be constantly wavering.

1. If the monitor is close to another monitor, the adjacent monitor may need to be turned off. Fluorescent lights adjacent to the monitor may also cause screen wavering.

Power Supply

When the computer is turned on, nothing happens.

1. Check that one end of the AC power cord is plugged into a live outlet and the other end properly plugged into the back of the system.

2. Make sure that the voltage selection switch on the back panel is set for the correct type of voltage you are using.

3. The power cord may have a "short" or "open". Inspect the cord and install a new one if necessary.

Hard Drive

Hard disk failure.

1. Make sure the correct drive type for the hard disk drive has been entered in the BIOS.

2. If the system is configured with two hard drives, make sure the bootable (first) hard drive is configured as Master and the second hard drive is configured as Slave. The master hard drive must have an active/bootable partition.

Excessively long formatting period.

If your hard drive takes an excessively long period of time to format, it is likely a cable connection problem. However, if your hard drive has a large capacity, it will take a longer time to format.

Serial Port

The serial device (modem, printer) doesn't output anything or is outputting garbled

characters.

1. Make sure that the serial device's power is turned on and that the device is on-line.

2. Verify that the device is plugged into the correct serial port on the rear of the computer.

3. Verify that the attached serial device works by attaching it to a serial port that is working and configured correctly. If the serial device does not work, either the cable or the serial device has a problem. If the serial device works, the problem may be due to the onboard I/O or the address setting.

4. Make sure the COM settings and I/O address are configured correctly.

Keyboard

Nothing happens when a key on the keyboard was pressed.

1. Make sure the keyboard is properly connected.

2. Make sure there are no objects resting on the keyboard and that no keys are pressed during the booting process.

System Board

1. Make sure the add-in card is seated securely in the expansion slot. If the add-in card is loose, power off the system, re-install the card and power up the system.

2. Check the jumper settings to ensure that the jumpers are properly set.

3. Verify that all memory modules are seated securely into the memory sockets.

4. Make sure the memory modules are in the correct locations.

5. If the board fails to function, place the board on a flat surface and seat all socketed components. Gently press each component into the socket.

6. If you made changes to the BIOS settings, re-enter setup and load the BIOS defaults.